Dixon Middle School Historic Preservation Feasibility Study

for Provo City School District
November 19, 2018

VCBO ARCHITECTURE

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> **DIXON MIDDLE SCHOOL IS A GEM NESTLED IN THE HEART OF PROVO. IT HAS SERVED GENERATION AFTER GENERATION OF PROVO STUDENTS, AND HOLDS A PLACE OF PRIDE FOR MANY COMMUNITY MEMBERS.**

Objectives

Provo City School District recognizes that Dixon Middle School, in the current facility, is not currently serving the students at the level expected of a modern school facility. In addition, the District recognizes the need to invest in Dixon to meet the modern learning needs of the students, while maintaining the historic character and value of the original building.

The original 1931 building is both a neighborhood gem, contributing to the appeal of the neighborhood, and a community landmark. There are strong attachments to the historic school as it has served thousands of community members over generations.

As such, Provo City School District has engaged three architecture firms to assess the needs and opportunities associated with the Dixon building(s) and site. Specifically, the three teams have been tasked with:

1. Option 1 would preserve the historic 1931 building, demolishing the additions to the historic building. A new middle school would be built on the north of the site.

2. Option 2 would renovate the existing school as required, to house various district services. The historic 1931 building would be preserved and rehabilitated to the greatest extent possible in this option.

3. Provide pros and cons for each option assessed and provide a recommendation as to whether or not Dixon Middle School should remain on the campus long-term.

In addition to the tasks outlined by the District, VCBO has taken a broader view of the project opportunities and site, and has approached this study through the lens of:

- Providing guidance to the District on extent of work and considerations associated with rehabilitating the historic 1931 building.

- Exploring opportunities to provide a modern middle school on the project site.

- Assessing other potential uses that could occur on the site with, or in lieu of, a middle school. Specifically, Provo City School District has considered locating some or all of the District Support Services on the site as well as an alternative school or community center.

The VCBO Architecture team has approached this project with an open mind, assessing a number of potential options to restore the existing historic portion of the building and provide additional District functions on the project site. Specifically, 6 options were developed to help the team understand and assess pros and cons of various massing and phasing outcomes.

Google Earth imagery of Dixon Middle School site.

Recommendations

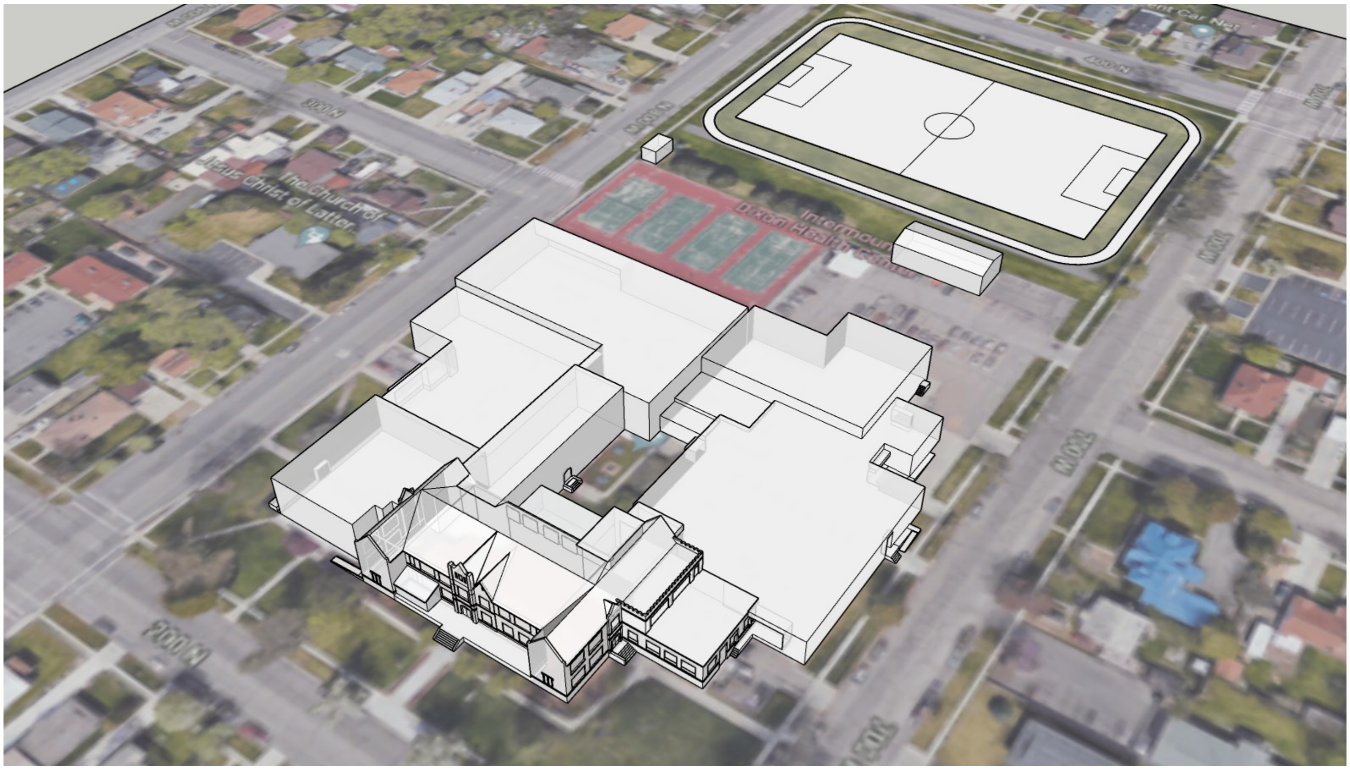
In all options assessed in this study, VCBO would propose the historic 1931 building be rehabilitated in the following ways. A full seismic analysis should be conducted and upgrade goals be determined with the Provo City School District. Preservation of the original 1931 building is critical and to the greatest extent possible, restoring the character of the building's historic fabric. Major focus for this will take place at the exterior of the building, common spaces and entrances. This is to be achieved using historically compatible modern materials with energy saving goals. This includes:

- *Replace roof*
- *Repoint brick*
- *Remove small additions on the north and south facades*
- *Stabilize structure for improved seismic performance*
- *Remove dropped ceilings*
- *Replace/update HVAC, electrical, & communications infrastructure*
- *Abate asbestos (assessment to be acquired from Provo District)*
- *Replace/restore windows*
- *Replace/refinish interior finishes*

The current site is just under 9 acres. The original 1931 building footprint and associated landscape use 1.5 acres of land, leaving 7.5 acres available for a middle school or other use. The Utah State Office of Education suggests a new middle school for 800-1000 students be housed on roughly 28 to 30 acres of land. However, this is more ground than is typically seen in a middle school. We would recommend a minimum of 7 acres for outdoor athletic program area, in a smaller middle school built today. With the limitations of the site area, there are two options to move forward.

Option 1 - Maintain a middle school on-site that is not athletically-focused, or share athletic areas with the Timpanogos Elementary School and Provo Recreation Center.

Option 2 - Build a new middle school on a 20 acre parcel (or slightly less) and use the existing Dixon property to house District Support Services or other ancillary uses.



Existing Dixon Middle School massing and site configuration.

Massing Considerations

All Options considered preserve the original 1931 building and make modifications necessary for it to remain as a functional building. Any additions to the original structure would be removed in order to rehabilitate the original building and renovate the building to retain its original character. Because current building systems are outdated and in need of replacement, a full mechanical and electrical system upgrade should be included for the original building area. A full seismic analysis needs to be completed and recommendations implemented as directed by Provo City School District.

Option 1 includes a new 150,000 square foot middle school, constructed on the north portion of the school's property. Site improvements to relocate athletic fields and parking will be incorporated as feasible based on the site limitations. Through the exploration process, four iterations for option 1 were developed. Each of these iterations looks at locating the new school in different areas of the site and in a variety of configurations to understand the most optimal configuration. These iterations have been developed, and are illustrated as Options 1A, 1B, 1C and 1D.

Option 2 would renovate the entire existing building to be utilized for various district programs. This adaptive reuse may include district offices, professional development, special education transition services, and community & district meeting spaces, etc. Because current building systems are outdated and in need of replacement at present or near future, a full mechanical and electrical system upgrade should be studied further and incorporated into Option 2 if chosen. Seismic requirements in today's codes are more robust and comprehensive than construction practices used in the current Dixon Middle School. A full seismic analysis of the areas outside the original building scope needs to be completed and recommendations implemented as directed by Provo City School District.

Option 3 was developed to assess the feasibility of providing space for both district support services as well as a middle school on-site.

Options Assessed

Option 1A Massing Diagram

Option 1A

Rehabilitate historic building for district educational programs & build **new 150,000 sf, two-story middle school**.

With the layout of this option, a standard sized soccer field can be accommodated. The track length will be reduced to approximately 336 meters and fits tightly between the two buildings. Two separate parking lots will be provided for the historic building and new school, allowing for 32 and 92 spaces respectively.

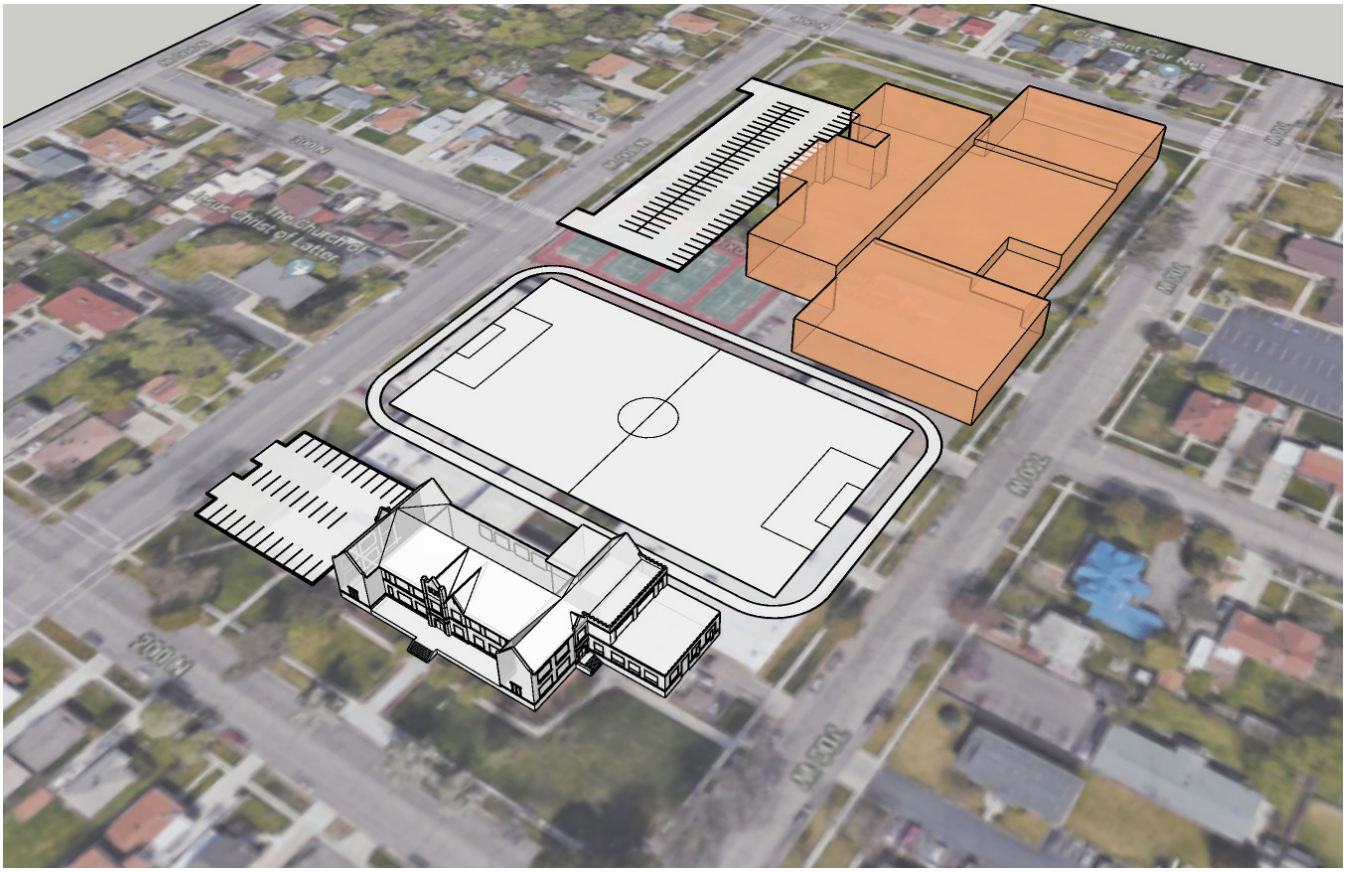
- *Build new two-story school on north of site: 150,000 sf*
- *Build new parking for middle school*
- *Demolish subsequent additions to 1931 building: 109,000 sf*
- *Relocate existing track and field, add new parking*
- *Rehabilitate historic building for use as educational facility or limited district services: 26,000 sf*
    - *Rehabilitate interior as noted previously for desired use*
    - *Rebuild exterior on north, northwest, & west facades*
    - *Add vertical circulation for accessibility in building*

Pros:

- *Rehabilitate original 1931 school and restore character of the historic building*
- *Retain middle school function for the community*
- *Minimal displacement of students during construction*
- *New middle school solar orientation ideal*
- *Site amenities could be shared between the two facilities*
- *Increase in parking*

Cons:

- *Displacement of outdoor Athletic programs for up to two and half years*
- *Outdoor athletic programs are reduced compared to standard middle school designs, due to property size restrictions*
- *Existing outdoor athletic fields would be replaced at a smaller size due to site constraints*
- *Tennis Courts would be eliminated*
- *Views for adjacent home owners will be impacted, but are restricted to the north side of the site*
- *Construction would occur in multiple phases over 3 year time period +/*



Option 1B Massing Diagram

Option 1B

Rehabilitate historic building for Support Services & build **new 150,000 sf, three-story middle school.**

This option provides the same amenities as option 1A, but allows for some more flexibility of the track & field layout between the buildings.

Phase I:

- *Build new three-story school on north of site: 150,000 sf*
- *Build new parking for middle school adjacent*

Phase II:

- *Demolish subsequent additions to 1931 building: 109,000 sf*
- *Relocate existing track and field, add new parking*
- *Rehabilitate historic building for limited district services or as educational facility: 26,000 sf*
    - *Rehabilitate interior as noted previously for desired use*
    - *Rebuild exterior on north, northwest, & west facades*
    - *Add vertical circulation for accessibility in building*

Pros:

- *Rehabilitate original 1931 school and restore character of the historic building*
- *Retain middle school function for the community*
- *Minimal displacement of students during construction*
- *New middle school solar orientation is ideal*
- *Three story middle school design frees up more area for site improvements*
- *Athletic fields would be replaced to match existing*
- *Site amenities could be shared between the two facilities*
- *Increase in parking*

Cons:

- *Displacement of outdoor Athletic programs for up to two and half years*
- *Outdoor athletic programs are reduced compared to standard middle school designs, due to property size restrictions*
- *Construction would occur in multiple phases over 3+ year time period*

Option 1B Alternative Massing Diagram

Option 1B Alternate Orientation

Rehabilitate historic building for District Services & build **new 150,000 sf, three-story middle school.**

Shifting the new school to the north of the site opens up the space in the middle of the block. The standard size soccer field will fit and the track length will be increased to a length of 360 meters. This also allows for access to the new building both from the east and west, allowing for a separation for bus and parent drop offs. Parking for this layout provides 29 spaces at the historic building and 79 spaces for the new school with protected access to the fields.

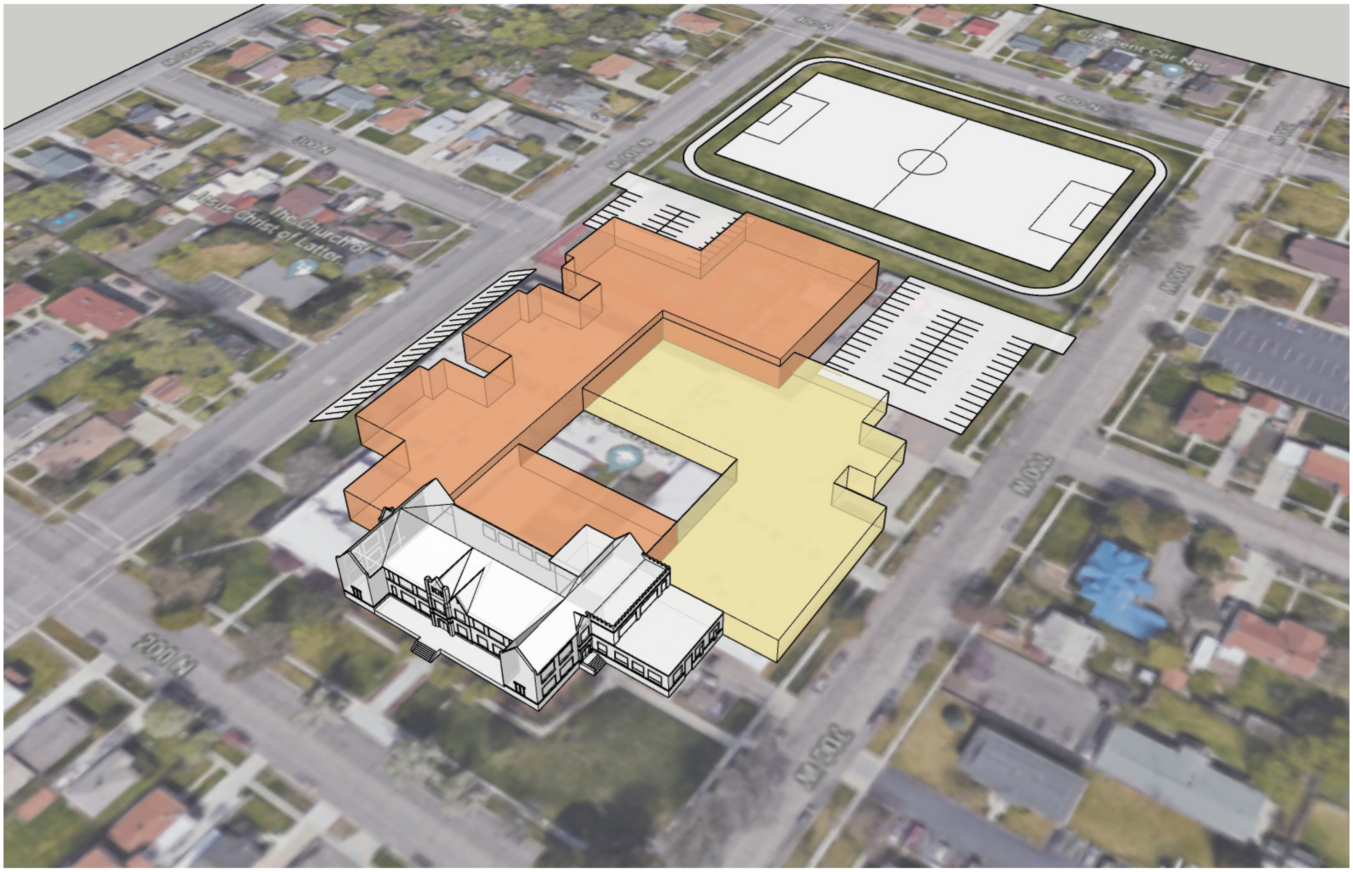
- *Build new three-story school on north of site: 150,000 sf*
- *Build new parking for middle school adjacent*
- *Demolish subsequent additions to 1931 building: 109,000 sf*
- *Relocate existing track and field, add new parking*
- *Rehabilitate historic building for limited district services or as educational facility: 26,000 sf*
    - *Rehabilitate interior as noted previously for desired use*
    - *Rebuild exterior on north, northwest, & west facades*
    - *Add vertical circulation for accessibility in building*

Pros:

- *Rehabilitate original 1931 school and restore character of the historic building*
- *Retain middle school function for the community*
- *Minimal displacement of students during construction*
- *Three story middle school design frees up more area for site improvements*
- *Athletic fields would be replaced and slightly increased in size*
- *Site amenities could be shared between the two facilities*
- *Increase in parking*

Cons:

- *Displacement of outdoor Athletic programs for up to two and half years*
- *Outdoor athletic programs are reduced compared to standard middle school designs, due to property size restrictions*
- *New middle school solar orientation is not ideal*
- *Construction would occur in multiple phases over 3+ year time period*



Option 1C Massing Diagram

Option 1C

Rehabilitate historic building, **remodel a portion of existing building,** demolish the remaining portion of existing building & add **new wing to house a 87,000 sf middle school.** This will allow for some phasing of the project.

Renovating the existing building will allow for the track (approximately 360 meters) and field to remain in their current location. This layout will restrict the parking options, but with using parking on either side of the site and re-configuring the west side for 45 degree parking off the street, this option provides 105 spaces for the site.

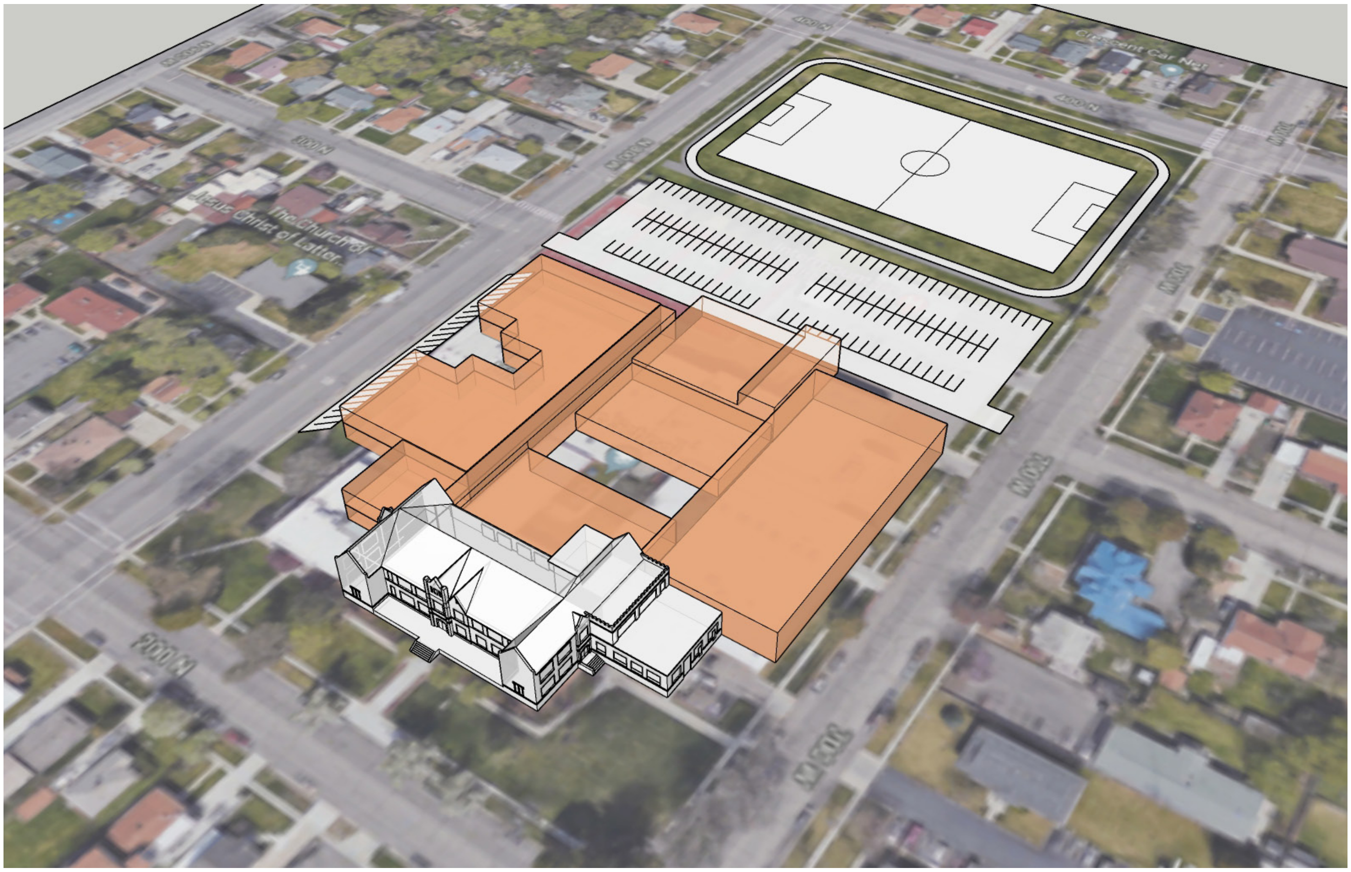
- *Identify the portions of the existing building that can be remodeled for future use: 37,000 sf*
- *Phase demolition portion of structure that is not feasible: 98,000 sf*
- *Rehabilitate historic building for middle school programs: 26,000 sf*
    - *Rebuild exterior walls of historic building as feasible*
    - *Add/maintain vertical circulation for accessibility*
- *Resurface track, repair & extend existing parking*
- *Provide pricing option for including a parking garage*

Pros:

- *Rehabilitate original 1931 school and restore character of the historic building*
- *Retain middle school function for the community*
- *Solar orientation ideal for new classroom wings*
- *Athletic fields would be retained during construction and repaired*
- *Increase in parking*

Cons:

- *Construction would occur in multiple phases over 3+ year time period*
- *Remodel & demolition phases will displace students over several years*
- *Portable classrooms will be required for the duration of construction, displacing parking*
- *Outdoor athletic programs are reduced compared to standard middle school designs, due to property size restrictions*
- *Tennis courts would be eliminated*



Option 1D Massing Diagram

Option 1D

Rehabilitate historic building, demolish the remaining portion of existing building in phases & add new wing to house a 124,000 sf middle school. The phasing of the project allows occupants to remain utilizing the existing building while new portions are constructed.

Renovating the existing building will allow for the track (approximately 360 meters) and field to remain in their current location. This layout will restrict the parking options, but with using parking on either side of the site and re-configuring the west side for 45 degree parking off the street, this option provides 105 spaces for the site.

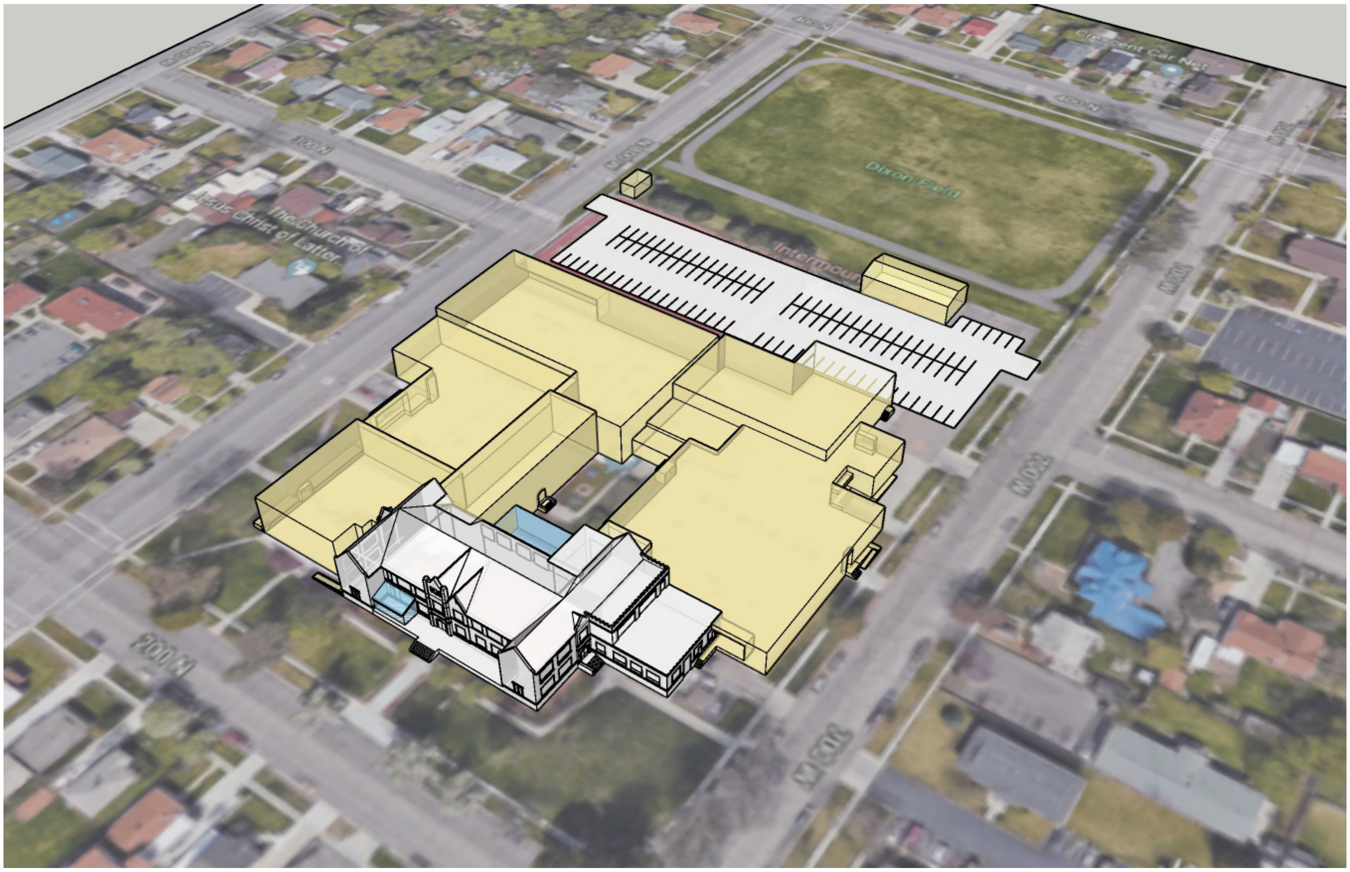
- *Phase demolition portion of structure (3 phases of demo), includes 6 portable classrooms*
- *Add/maintain vertical circulation for accessibility*
- *Build new portion of middle school with a connection to the existing building in 3 phases*
- *Rehabilitate historic building for middle school programs: 26,000 sf*
    - *Rebuild exterior walls of historic building as feasible*
- *Resurface track, repair & extend existing parking*

Pros:

- *Rehabilitate original 1931 school and restore character of the historic building*
- *Retain middle school function for the community*
- *Solar orientation ideal for new classroom wings*
- *Athletic fields would be retained during construction and repaired*
- *Athletic fields would remain the current size at the end of construction*
- *Increase in parking due to smaller footprint*

Cons:

- *Construction would occur in multiple phases over 3+ year time period*
- *Remodel & demolition phases will displace students over several years*
- *Auditorium would be eliminated until the final phase of construction*
- *Portable classrooms will be required for the duration of construction, eliminating tennis courts*
- *Outdoor athletic programs are reduced compared to standard middle school designs, due to property size restrictions*



Option 2 Massing Diagram

Option 2

Rehabilitate historic building & maintain/remodel existing building for new use of: support services, community ed., special ed., & alternative middle school programs. The new middle school will be built on separate site. Existing building area: 135,167 sf.

Renovating the existing building to house all of the needs of the district, opens up the north end of the site to new opportunities. This could not only be used by the district, but could be come a needed amenity for the neighborhood. The re-imagining of this portion of the site will be a benefit as it has the possibility to house a large multi-purpose field park, or a combination of both. This parking layout also provides access through the middle of the site with 110 parking spaces while maintaining the existing clinic.

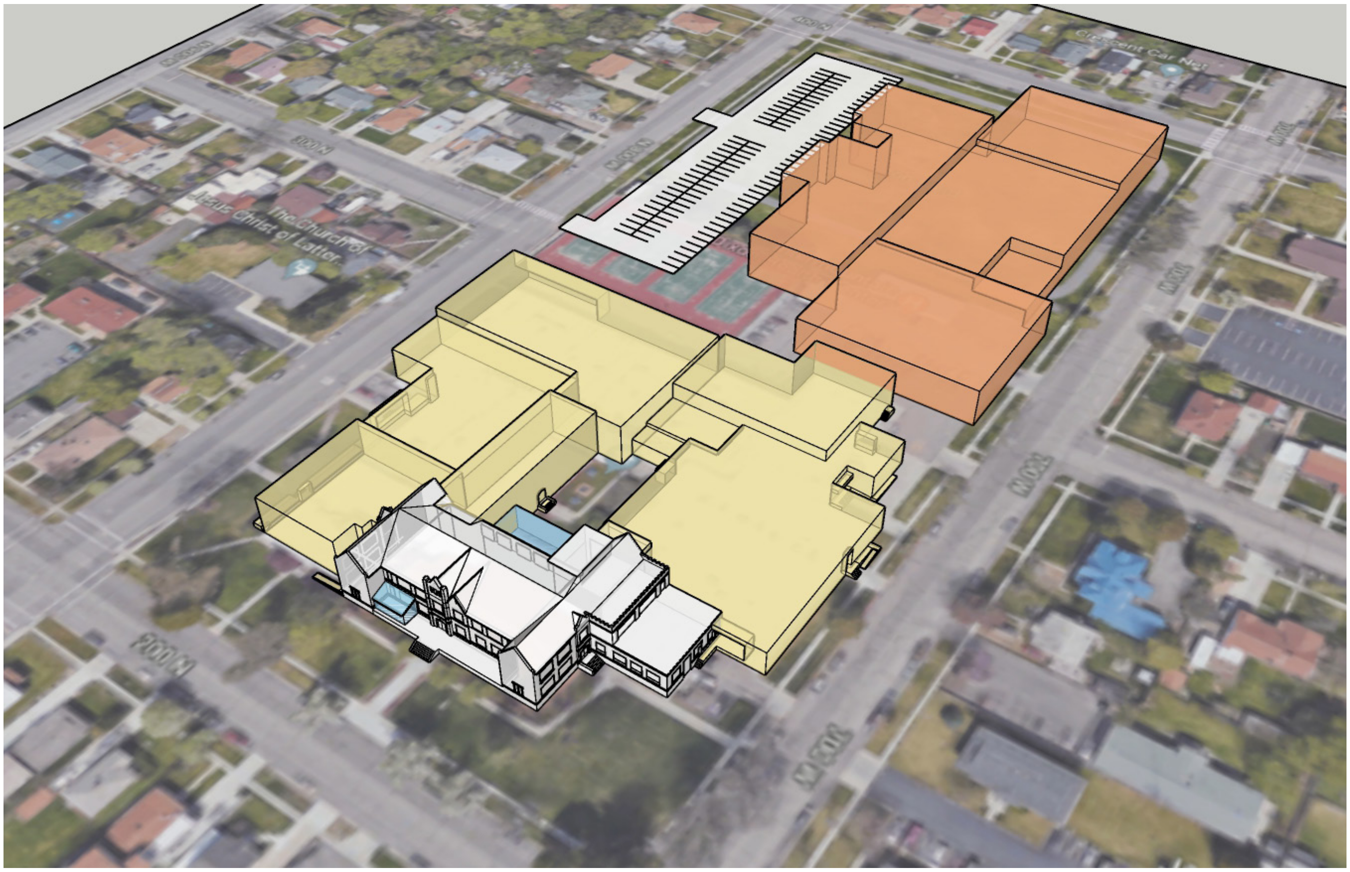
- *Upgrade HVAC, electrical, & communications infrastructure throughout*
- *Seismic upgrade throughout*
- *Look at various levels of renovation from basic finish upgrades and addition of historic windows to full restoration – or a combination of the two.*
- *Resurface track, repair & extend existing parking*

Pros:

- *Rehabilitate original 1931 school for adaptive reuse, restoring the historic character to the greatest extent possible*
- *Move school to a new site more suited for middle school curriculum*
- *Students would remain at the existing school during middle school construction*
- *Construction phasing would be minimized*
- *Building would be remodeled for district services*
- *Athletic fields could remain for community use*
- *Increase in parking*

Cons:

- *Students would be relocated from current middle school site*
- *Property acquisition costs for new middle school site*



Option 3 Massing Diagram

Option 3

Rehabilitate/remodel existing building for Support Services & build new 150,000 sf middle school on north of site.

While providing the needed building footprints for both the district and the new school, this option will eliminate the ability to house a track and field on this site. The 115 parking spaces on site will shift to the north west corner and serve both buildings to maintain the historic nature of the south access to the existing building.

- *Upgrade HVAC, electrical, & communications infrastructure throughout*
- *Seismic upgrade throughout*
- *Look at various levels of renovation from basic finish upgrades and addition of some glazing to full gut and reconfigure – or a combination of the two.*
- *Build new school on north of site*
- *Relocate parking for both facilities*
- *Eliminate track and fields*

.Pros:

- *Rehabilitate original 1931 school and restore character of the historic building*
- *Retain middle school function for the community*

Cons:

- *Construction would occur in multiple phases over 3+ year time period*
- *Outdoor athletic programs are lost*
- *Insufficient parking for both programs to function adequately*
- *The building mass to site ratio is inappropriate for the neighborhood context*

Preferred Options

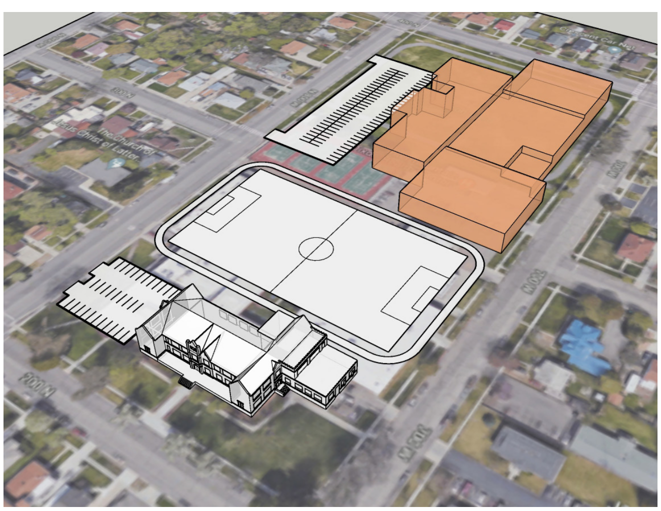
Of the options explored, option 1B and option 2 are recommended to further evaluate with Provo City School District to determine the best outcome long term for the community. In all options, budget, site constraints and construction phasing will play a critical role in moving forward.

Option 1B constructs a new three story middle school, on the north end of the existing site, maintaining the original 1931 Dixon Middle school to be reused as either an educational facility or used for limited district services. The new 150,000 square foot middle school would be designed to facilitate the educational pedagogy of Provo City School District and ensure success of its students, incorporating the community's specific needs and retaining the roots of education facilitated on this site for generations. This option would also allow the new middle school to be constructed without displacing the current students of Dixon. Once the new school was complete, demolition of the additions to Dixon Middle could begin and rehabilitation of the historic building could take place without disrupting students and staff. Any additions to the original structure would be removed in order to rehabilitate the original building to preserve its original character.

Retaining the middle school on the Dixon site would allow for shared use of site amenities, such as playfields and parking. However, it is important to note that the outdoor athletic programs will be displaced for up to two and half years during the construction period. It is anticipated that these programs could be moved to the adjacent Timpanogos Elementary and/or Provo Recreation Center during construction. Because the current Dixon Middle School Site is smaller than a typical middle school, there are limitations to the site improvements. The athletic programs currently in place could be relocated on the site; however the tennis courts would be eliminated. Additional parking could be increased 50% due to the smaller footprint of the new middle school.

Option 2 renovates the current Dixon Middle School as needed to facilitate various district services and allows the district to build the middle school on a new site. Building on a new site would give the school the increased space typically allotted for a middle school and allow more standard athletic programs to be incorporated into the curriculum. This option would impact the neighboring community the least during construction, but students would be moved to the new school or another nearby middle school.

Option 2 would include preservation and rehabilitation of the original 1931 building to the greatest extent possible. This adaptive reuse may include district offices, professional development, special education transition services, and community & district meeting spaces, etc. Because current building systems are outdated and in need of replacement at present or near future, a full mechanical and electrical system upgrade should be studied further and incorporated into Option 2, if chosen. Seismic requirements in today's codes are more robust and comprehensive than construction practices used in the current Dixon Middle School. As such, a full seismic analysis should be conducted and upgrade goals be determined with the Provo City School District. Additionally, selected demolition of the more problematic adddditions could be explored with the District.



Option 1B with the playfield in the center of the two buildings and parking to the west is the recommended alternative - if the District chooses to maintain a middle school on-site.

Option 2 illustrates keeping the existing facility for support services or alternative prorams on-site and building a middle school elsewhere.

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Cost Considerations

Construction Control Inc. is a critical member of the VCBO team, studying potential project costs for each of the assessed options. The following budgets have been developed for the various options explored. The budgets for the recommended options 1B and 2 are presented on this page. Additional cost estimates for other options considered can be found in Appendix A.

Option 1B: Rehabilitate Historic Buildings for Support Services and New 150,000 sf Middle School On-Site

Rehabilitation

Selective Demolition	26,000 sf	$	3.75	$	97,500
Hazardous Material Abatement	TBD				
Seismic Upgrade	26,000 sf	$	40.00	$	1,040,000
Architectural Rehabilitation	26,000 sf	$	145.00	$	3,770,000
Re-Roof Existing Building	15,428 sf	$	45.00	$	694,238
Repoint Exterior Masonry	26,000 sf	$	12.00	$	270,432
Replace Steel windows	3,606 sf	$	148.00	$	533,652
Structural Modifications	26,000 sf	$	5.00	$	130,000
Fire Sprinkler System	26,000 sf	$	4.00	$	104,000
Plumbing Replacement	26,000 sf	$	5.00	$	130,000
HVAC Replacement	26,000 sf	$	38.00	$	988,000
Electrical Power & Lighitng Replacement	26,000 sf	$	24.00	$	624,000
Electrical Communication Replacement	26,000 sf	$	3.00	$	78,000
Electronic Safety & Security Replacement	26,000 sf	$	6.00	$	156,000
Subtotal Rehabilitation		**$**	**331.38**	**$**	**8,615,822**

Demolition & New Addition

Demolish Remaining Building	1,744,000 cf	$	0.40	$	697,600
New Three Story Middle School	150,000	$	265.00	$	39,750,000
Subtotal New Addition		**$**	**269.65**	**$**	**40,447,600**

Total Construction Cost	**176,000 sf**	**$**	**278.77**	**$**	**49,063,422**

Option 2: Rehabilitate and Remodel Current Building, with New Middle School Off-Site

Rehabilitation

Selective Demolition	26,000 sf	$	3.75	$	97,500
Hazardous Material Abatement			TBD		
Seismic Upgrade	26,000 sf	$	40.00	$	1,040,000
Architectural Rehabilitation	26,000 sf	$	145.00	$	3,770,000
Re-Roof Existing Building	15,428 sf	$	45.00	$	694,238
Repoint Exterior Masonry	26,000 sf	$	12.00	$	270,432
Replace Steel windows	3,606 sf	$	148.00	$	533,652
Structural Modifications	26,000 sf	$	5.00	$	130,000
Fire Sprinkler System	26,000 sf	$	4.00	$	104,000
Plumbing Replacement	26,000 sf	$	5.00	$	130,000
HVAC Replacement	26,000 sf	$	38.00	$	988,000
Electrical Power & Lighitng Replacement	26,000 sf	$	24.00	$	624,000
Electrical Communication Replacement	26,000 sf	$	3.00	$	78,000
Electronic Safety & Security Replacement	26,000 sf	$	6.00	$	156,000
Subtotal Rehabilitation		**$**	**331.38**	**$**	**8,615,822**

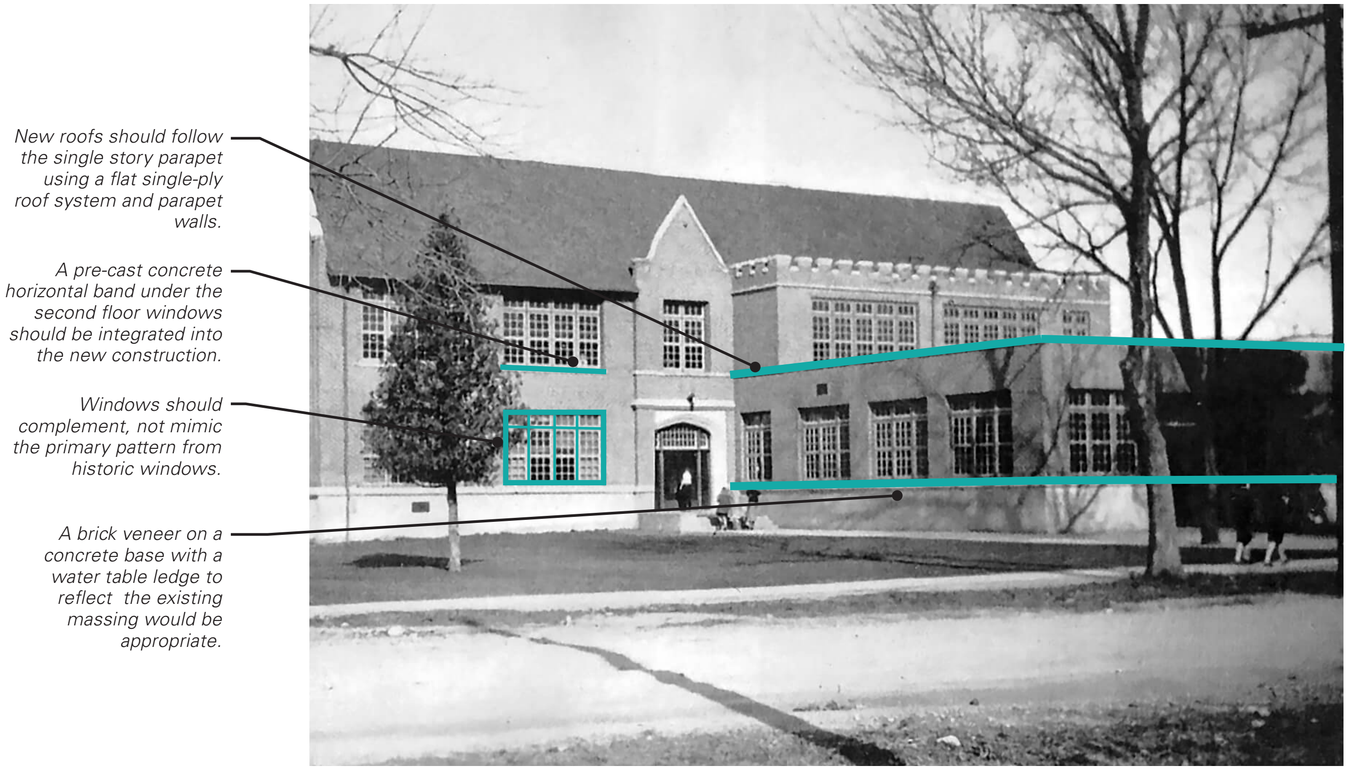
Demolition & New Addition

Selective Demolition	109,167 sf	$	3.75	$	409,376
Hazardous Material Abatement			TBD		
Medium Seismic Upgrade (Areas)	109,167 sf	$	25.00	$	2,729,175
Architectural Renovations	109,167 sf	$	80.00	$	8,733,360
Structural Modifications	109,167 sf	$	5.00	$	545,835
Fire Sprinkler System	109,167 sf	$	4.00	$	436,668
Plumbing Replacement	109,167 sf	$	5.00	$	545,835
HVAC Replacement	109,167 sf	$	38.00	$	4,148,346
Electrical Power & Lighting Replacement	109,167 sf	$	24.00	$	2,620,008
Electrical Communication Replacement	109,167 sf	$	3.00	$	327,501
Electronic Safety & Security Replacement	109,167 sf	$	6.00	$	655,002
Exterior Site Improvements	1 lump sum	$		$	250,000
Subtotal Remodel		**$**	**196.04**	**$**	**21,401,106**

Total Construction Cost - Dixon Site	**135,167 sf**	**$**	**222.07**	**$**	**30,016,928**

New School at New Site

Land Acquisition (acre cost is an allowance and will vary by location)	20 acres	$	150,000	$	3,000,000
New Two Story Middle School	150,000 sf	$	265.00	$	39,750,000
Subtotal New School		$	285.00	$	42,750,000



Original Dixon Middle School building with key architectural features identified, to be reflected in new construction work.

Design Considerations

The Dixon Middle School has been serving the Provo Community for nearly five generations. This school has been expanded, renovated and updated over these nearly 90 years, and is at a point in its life where critical intervention is needed.

Architectural Considerations

Architecturally, the design of the original Dixon Middle School reflects a collage of architectural styles with hints at Tudor Style, such as the crenelations at the parapet as well as the pointed arches at the entryways and in the hallways. Other elements such as the plinth at the base of the building and the steep roof pitches also are reminiscent of this style. Any work on the exterior of the original building should be respectful and compatible with the style and detailing of this structure. However, new construction and upgrades to the later additions should be complementary to, not mimic the architecture of the original building.

Connecting to / Complementing the Original Building

As improvements occur on the existing building or on the site, the architecture and prominence of this original structure should be respected.

An architecture that responds to the historic features in a manner that is reflective of the construction techniques and materials of today is appropriate for renovation of the newer elements and new construction on the site. Specific considerations for new construction or renovation of exterior elements includes:

The new walls for the school, and walls exposed on the historic building after demolition, need to complement the existing historic materials. A brick veneer on a concrete base with a water table ledge to reflect the existing massing would be appropriate. Any new exterior walls shall be designed to meet current energy codes with exterior insulation behind the brick veneer to reduce operating cost for the Provo City School District.

Window openings need to be large punched openings windows with high-performance insulated low-e glazing. These units should complement, not mimic the primary pattern from historic windows. It is important that the historic windows stand out as unique and more prominent than the new windows.

A precast concrete horizontal band under the second floor windows should be integrated into the new construction to tie into the historic structure.

New roofs should follow the single story parapet using a flat single-ply roof system and parapet walls. All rooftop mechanical equipment should be minimized, or at a minimum, be located toward the center and screened from view.

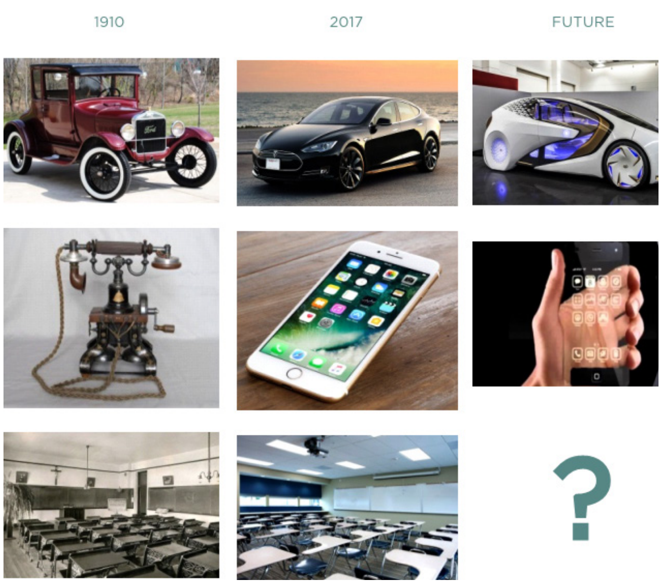
21st Centry Learning

The current model of education was envisioned in 1892 in order to align educational outcomes with industrial age economic interests. This teacher-centered model, where the student learns facts and then recites those facts with no associative context is no longer adequate for preparing students for the innovative global 21st Century knowledge economy. We are in the midst of a continued technological revolution where worldwide information is now ubiquitous and accessible from any electronic device. The teacher is no longer the primary source of information.

A 21st Century economy calls for an educational system that is student-centered and informal, within a new social framework of collaboration, communication, critical-thinking, and creativity; a structure based on the idea of "Learning by Doing". The skilled teacher becomes the mentor, while the student directs and manages the learning process. The new curriculum thus becomes rigorous, relevant, flexible, and self-guided from the perspective of the student.

As a result of this modern learning paradigm, school buildings need to provide open, flexible environments that can accommodate the diversity of teaching pedagogies as well as ever-changing technologies. Additionally, the following characteristics are integral to a 21st century learning environment:

- *Improved transparency into informal learning environments outside of the classrooms*
- *Varied furniture options to accommodate diverse learning needs*
- *Maker space to allow students to build and explore*
- *Access to a variety of technologies for research, presentations and work*



Additionally, modern learning environments integrate security seamlessly to provide environments safe from bullying and designed to support first responders in case of emergencies.

The existing Dixon Middle School is not equipped to meet the modern 21st century learning needs of students without broad renovations and improved learning environments and building systems.

Middle School Design

Successful middle school design shares a balance between school philosophy, educational foundation and the vision and adaptability for the future. The goals and values set by the school district and community become the school philosophy. These need to be identified early in the design process, and will be the backbone that the educational programs tie back to. As students attending middle school are in an very transitional stage of their lives, middle school philosophy should include the developmental needs of students throughout all areas of education.

Modern middle schools are designed to facilitate student learning and engagement through both traditional and modern means. Learning spaces are adjacent to and visible from collaborative learning environments. Transparency is integral to the sucess and safety of the students. Oftentimes the classrooms are configured in suites to promote learning communities. Middle schools also have access to a range of specialty learning envirnoments, from a gymnasium to auditorium, drama and music learning spaces.

The following is a list of spaces that are typically found in middle schools, and that have been accounted for in the middle school options explored for the Dixon site:

- *Classrooms*
- *Collaborative learning spaces*
- *Media Center*
- *Gymnasium and associated PE support and team space*
- *Auditorium, with associated drama and music learning areas*
- *Art classrooms, kiln room and art storage areas*
- *Consumer science and CTE learning spaces*
- *Student Commons, kitchen and servery*
- *Administrative suite*

Sufficient program spaces for 1,000 students have been provided in all presented and studied options.

Site Considerations

The current school site has just under 4 acres for outdoor athletic programs, with a track and a multi-use field within, as well as 4 tennis courts. Retaining the current site components, with exception of the tennis courts, is a requirements of the project. The current track does not meet the standard track length or dimensions for a middle school. Typically a 400 meter track would be provided at a middle school.

If **Option 1B** is selected, the track should be maintained to the current size, at a minimum. Additionally, for option 1B, 90 parking stalls for the middle school and approx. 30 parking stalls for the administrative building would be needed. Parking can be shared between these two faciities at peak demand times. Parking for the original building should be located to minimize the presence of parking, and maximize the traditional landscape around the original building.

If **Option 2** is selected, approx. 100 parking stalls would be needed at the Dixon site. This parking should be located to the north of the building, expanding current parking into the tennis court area for increased parking capacity. The site area north of the parking should then become a community-oriented space as a track and field or a park area.

A new middle school site would then be needed to accomodate the school. This site should be between 18 and 20 acres in size and include the following:

- *120 parking stalls*
- *400 meter track*
- *Baseball / softball diamond*
- *1-2 soccer fields*
- *baskteball court(s)*

Code Considerations

The current building codes adopted by the State of Utah will be followed, these include:

- *International Building Code (IBC) 2015, to include Appendix J;*
- *Accessible and Useable Buildings and Facilities, ANSI 117-1 2009;*
- *International Existing Building Code (IEBC) 2015*
- *International Mechanical Code (IMC) 2015;*
- *International Plumbing Code (IPC) 2015;*
- *International Energy Conservation Code (IECC) 2015, for commercial projects;*
- *International Fire Code (IFGC) 2015;*
- *National Electrical Code (NEC) 2014*
- *ASCE 41 Standard, Seismic Evaluation and Retrofit of Existing Buildings*

Depending on the option the School District decides to adopt, issues of access to all floors and spaces will be implemented. For example in the variations of option 1 an elevator may need to be added to the north side when the 1960's addition is demolished. In option 2 corridors with steep ramps need to be measured if the ramps are steeper than allowed they may need to be lengthened and doors relocated or a handrail should be added to the center of the hall so a wheel chaired person could reach it on both sides of the chair.

Accessibility code considerations in the existing building include:

- *Doors without the required clearance;*
- *Clearances in the restrooms including turning space for wheelchairs;*
- *Drinking fountain with high/ low fountains*
- *Doors with lever hardware (no round knobs)*

Life Safety and Egress

- *Changes in level: elevator access to all upper floor space to be provided and ramping to meet maximum slope of 1"/foot.*
- *Schools will be fully sprinkled. The historic building will not need to be sprinkled in option 1A and 1B due to smaller footprint and change in use to business.*
- *Travel distance to exits to be a maximum of 200 feet without a sprinkler system and 250 feet with a sprinkler system.*

Sustainable Design Considerations

Any improvements to the existing Dixon Middle School building shall be in compliance with the current energy conservation code. This includes building envelope performance, mechanical system performance and electrical system performance. These systems will all serve Provo City School District for decades to come. The design team selected to complete the Dixon project should engage and energy modeler to assess building system options, insulation levels as well as the potential for renewable energy systems. This process will enable the district to select the right systems and details, balancing the upfront project costs with the ongoing operational cost implications for the facility(s).

Security Design Considerations

Today, school security and student safety are a top priority in many school districts. The most frequent questions we are asked by many of our school clients are regarding school security and the safety of both students and teachers. VCBO believes that student/teacher safety is paramount in the design of learning facilities. We have developed several design concepts, which if implemented, will certainly create a more secure and safe school environment. Many of these concepts have been implemented in the recently completed Farmington High School. The following deterrence, passive/active security concepts should be implemented into Dixon Middle School.

- *Minimize the number of access points where possible*
- *Simplify the overall layout for visual supervision where possible.*
- *Locate the Administration Suite next to the main entry for visual observability.*
- *Slow down any would be intruder: We start by assuring that all exterior doors are locked and accessible only through card*
- *access throughout the day.*
- *Provide a secure vestibule so that all people entering the building are screened by the office personnel.*
- *Seal off night time events from remainder of school.*
- *Budget permitting, install a security ballistics film which limits the break-ability of the glass at all major entry points thus slowing down the intruder and allowing time for first responders to mobilize.*
- *Provide a mullion pattern at the entry that makes it difficult to "walk through" if the glass fails.*
- *Design Learning Suites in order to compartmentalize students and teachers into wings which are easily*
- *"locked down" with the push of a button in the main office.*
- *Within the Learning Suites transparency is recommended (see and be seen) which allows an easy way for teachers and students to survey the presence of someone who shouldn't be there, as well as allow students and teachers to quickly determine the safest path to evacuate the building. (the amount and extent of transparency is as determined by the District)*
- *Transparency has been found by behavioral psychologist to minimize the occurrence of bullying events in secondary schools. A plan to prevent school related violence and bullying needs to be determined.*

Dixon Middle School, October 2018

Historic Restoration Considerations

The VCBO Team approach to the issues of historic preservation at the Dixon Middle School utilizes the recognized and appropriate strategy of rehabilitation. Rehabilitation acknowledges the need to alter or add to a historic property to meet continuing or changing uses while retaining the property's historic character. The Secretary of the Interior's Standards for Rehabilitation (see Appendix B) are nationally-recognized, locally-applied guides for the successful reuse of historic buildings.

Rehabilitation is the process of returning a property to a state which makes a contemporary use possible, while still preserving those portions or features of the property which are significant to its historic, architectural and cultural values. While restoration of specific features or materials may be part of a rehabilitation project, a restoration approach returns a building to a particular period of time in its history, while removing evidence of all other periods, replicating missing historic features, etc. Restoration is often 'museum quality' and can prioritize historical accuracy at the expense of functionality.

VCBO recognizes the need to appropriately preserve the Dixon Middle School while making it a fully functional, safe and responsive building for the Provo City School District. Work descriptions below and throughout this response fully engage this rehabilitation approach.

Rehabilitation Scope of Work

Listed work items that follow are roughly sequential and prioritized within each group. Relative importance of work items in different groups to be developed, in consultation with the District.

Exterior

Demolition

- *Completely remove one-story addition on south elevation.*
- *Remove modern windows and other infill (painted panels, modern masonry at east one-story extension, etc.)*
- *Remove modern exterior light fixtures.*

Masonry

- *Repair arch and brickwork above east entry.*
- *Secure/repair parapet caps, crenelations and finials.*
- *Repair/repoint crenelations. Cleanly/simply cap all parapets, gable cornices and crenellations with minimally visible sheet metal.*
- *Miscellaneous repointing, hole patching, etc.*
- *Repair/restore masonry following removal of south one-story addition and window in-fills.*
- *Repair masonry following removal of west and north additions. Repairs at these less visible/less significant locations could be modern/interpretive rather than historic/restorative.*
- *Chemically strip paint from foundation; patch and repair skim coat as needed.*

Seismic Upgrades (in conjunction with structural recommendations)

- *Brace gable end walls from attic.*
- *Brace crenelations and other parapets if too tall.*
- *Anchor brick and precast masonry above primary egress locations.*

Roof

- *Following anticipated roof sheathing/diaphragm upgrade, re-roof with more compatible 'architectural' grade asphalt shingles.*
- *Verify function of gutters, downspouts and drainage elements to move storm water away from foundation. Minimize gutters if not needed.*

Windows

- *Retain historic multi-light window sash stored in attic. Use as model for new windows.*
- *Install aluminum true divided-light windows with high-performance insulated low-e glazing. Match multi-light pattern and profiles as feasible from historic windows.*
- *Interior: Provide responsive interior shades to match needs.*

Entries, Railings & Balustrades

- *Retain historic railing section stored in boiler room. Reuse as needed for new conditions.*
- *Replace modern entry doors with new doors, sidelights and transoms following historic layout, profiles, etc as feasible. Use system matching new windows.*
- *Retain/preserve remaining multi-light vestibule sidelights and transoms (south entry to courtyard). Use as model for new work.*
- *Recreate historic precast balustrade for south elevation podium.*
- *Upgrade stair handrails for code-compliance and historic compatibility using simple metal profiles and systems.*

Light Fixtures, Equipment, etc.

- *Replace modern light fixtures at entries. Select historically compatible sconces to replace historic removed form south entry. Compatible pole lights flanking entry stairs could be another compatible solution.*
- *Relocate MEP equipment, conduit, etc. from south and east elevations and other prominent locations. Patch foundation holes.*

Landscape

- *Re-establish simple mulched foundation beds at south and east elevations referencing historic minimalism. (No irrigation or plantings near foundation, etc.)*

Interior

Ceilings

- *Remove lay-in ceilings, mechanical ductwork, abandoned light fixtures and glued-on acoustical tile (possible abatement component) to re-establish historic hallway conditions and expose historic Tudor arches.*
- *Final ceiling options include sound-absorbing materials, dropped crossing soffits (for MEP and fire protection connections), etc.*
- *Select modern light fixtures with simple, compatible character, appearance and good functionality. Consider use of more historic (but simply detailed) pendant fixtures at main entries.*

Interior Walls & Doors

- *Upgrade classroom and other entries to meet building codes and safety requirements. Model doors on historic examples (if any remain) or period-appropriate raised panel panel doors.*
- *Re-establish hallway character through removal of modern boards, panels, displays, etc. and creating more responsive, better positioned and scaled installations.*

Floors

- *Halls, classrooms, etc. can be simply detailed, functional modern installations. Refine and include typical character-defining border/panel 'frames' to reinforce hallway crossings, stairs, grouped entries, etc.*
- *Within entry vestibules use running bond installation of square tile following historic 6 in. ceramic tile now concealed by overlay.*

Stairs & Railings

- *Retain historic railings; upgrade as needed.*
- *Strip treads and risers to determine best new material. Use 6 in. running bond as installation model if possible.*
- *Repaint metal; refinish wood handrails.*

Restrooms

- *Functionality and code compliance most important factors here. Historic details can be referenced and compatible modern materials and elements selected (e.g., small scale ceramic tile, 'schoolhouse' pendant light fixtures.)*

Notable Spaces

- *If historic research or other investigations identify any prominent or detailed historic spaces (e.g., main administrative offices, teachers' lounge, etc.) evaluate possible reuse or application in new program.*

Structural Considerations

Introduction

Provo City School District is considering two options for re-purposing the Historic Dixon Middle School. Both options include seismically upgrading the historic building. The building has expected structural deficiencies owing to its age, building techniques of its era and materials used for its construction. This notwithstanding, it is a good candidate for seismic retrofit and upgrade. The expected deficiencies can be mitigated with a thoughtful and strategic rehabilitation approach.

Building Background

The Historic Dixon Middle School was originally constructed in 1931 with additions coming in 1941, 1964, 1989, 1998 and 2005. It is comprised of both 1-story and 2-story spaces and handles a current enrollment of 964 students. Owing to the numerous additions, construction materials are varied in nature and include wood, masonry, steel, cast-in-place concrete and precast concrete. Conditions of existing materials are reported as good with the potential for structural systems to provide many more years or even decades of use under standard service conditions.

Buildings constructed prior to the advent of earthquake resistant design are deemed particularly vulnerable in consideration of potential seismic events. The Dixon Middle School is no exception. In particular, the unreinforced masonry walls are deemed especially vulnerable. Recent earthquakes in other regions, along with other learning experiences have shown that these assemblies do not have characteristics enabling them to remain intact when lateral shaking occurs. As a result, lives of occupants are jeopardized and structures may become compromised. For the Dixon Middle School, earlier phases of construction (1931, 1941 and 1964) are deemed seismically deficient simply as on the basis of age. The later additions are at risk, with the seismic threat likely decreasing in relation to the age of each addition.

Option 1 for renovation includes continued use of the site as a middle school, razing all but the original 1931 component of the facility. For Option 2, the entire building remains and becomes re-purposed for district services. For either of these options, a full seismic upgrade is antcipated for structures that remain.

Seismic Upgrade Approach

Introducing seismic upgrades to aging and historic structures such as this can be costly and difficult. Oftentimes, bringing an aging structure to current code standards is not feasible as its cost can be significant. As an alternative, recent years have seen the development of new standards and approaches for the seismic rehabilitation of existing structures. Among these are the methods of Performance Based Seismic Design (PBSD). These methods enable engineers and stakeholders to understand the potential strength of existing building systems even when they do not meet the intent of current building codes. PBSD enables engineers to predict how a building will perform in consideration of a potential earthquake shaking. These methods can sometimes show that a structure can perform satisfactorily even when it does not meet requirements of current codes.

A variety of modifications have been made by District staff over time to address concerns in the existing building structure. These would need to be assessed and a holistic seismic upgrade completed.

At other times, these methods reduce the total scope and cost of a seismic retrofit since it can give credit to existing building systems that might not be counted using current codes. This process helps engineers to maximize their understanding of the building so that informed conclusions can be reached rather than developing conclusions from simple rules of thumb. The processes of Performance Based Seismic Design are outlined in the ASCE 41 Standard, Seismic Evaluation and Retrofit of Existing Buildings.

For any portion of the Dixon Middle School which is to remain, the ASCE 41 Standard and its methods of Performance Based Seismic Design constitute the recommended approach to address the seismic upgrade. The standard follows a systematic approach for the seismic evaluation, repair and rehabilitation of existing buildings. It follows a three-tiered process that begins with establishing the required seismic performance that is needed for the project. For this case, Provo City School District officials must establish the performance requirements. This can be done in consultation with the project design team and should hold the aim of enabling or verifying performance that is consistent with the intent of codes for new buildings. For instance, new building codes most often assign Risk Category III to middle schools, which implies performance better than most structures (e.g. Risk Category II), in accordance with increased risk due to higher occupancy. However, expected performance for Risk Category III structures is lower than structures such as hospitals and emergency response facilities which are generally expected to be open after an earthquake. The guidelines of ASCE 41 enable the definition of required seismic performance kind of structure at hand and the expectations of the project stakeholders.

Tier 1 of the ASCE 41 procedure is the screening phase, which seeks to identify the primary building deficiencies. It uses simplified procedures and quick checks coupled with observations of the structure and record drawings (if available). Once deficiencies are identified, Tier 2 seeks to evaluate the specific deficiencies using more complex and more accurate methods than used for the quick check procedures. Sometimes, a Tier 2 analysis cannot fully address behaviors and systems to characterize expected performance. In these cases, a Tier 3 analysis (detailed evaluation) can enable the appropriate characterization of behavior and performance. Tier 3 utilizes the most complex analysis tools and methods available. While its engineering efforts are intense, it holds the potential for reducing the conservative aspects of Tier 1 and Tier 2 analyses. Hence, it often yields the most economical overall result (lowest construction costs).

Noted/Anticipated Deficiencies

Specific upgrade measures cannot be characterized until at least a Tier 1 evaluation is complete. However, past experience indicates the following to be among the most probable vulnerabilities for Dixon Middle School:

1. Unreinforced or lightly reinforced masonry walls with insufficient in-plane and out-of-plane strength.

2. Insufficient connections of roof decks and floor decks to supporting walls. Since walls support decks and decks brace walls, the connection between the two is a particular risk.

3. Insufficient diaphragm action of straight sheathed wood decks. Such assemblies quickly pull apart under seismic actions.

4. Insufficient diaphragm action of precast concrete double T members. Lack of topping slab means lack of continuity of the system which can come apart in an earthquake.

5. Insufficient connections between portions of the facility built at different times. Oftentimes additions are simply abutted to, but not rigidly connected to earlier construction. These interfaces become the focal points of seismic damage.

6. Vertical and plan irregularities that concentrate seismic forces at specific locations. Re-entrant corners and vertical offsets create relatively high concentration of seismic forces and damage.

Other deficiencies likely exist which can be revealed upon following the Tier 1 and potentially Tier 2 and Tier 3 protocols of ASCE 41.

Responsive Upgrade Measures

To address these deficiencies, the following measures are anticipated as part of the seismic upgrade:

1. Applying a layer of reinforced concrete (shot-crete) to existing masonry walls. This will provide the required in-plane and out-of-plane strength needed for the walls. It is likely that as much as 30% of the existing walls from the 1960 and earlier additions would need this treatment. The balance of walls from this era would likely need to be braced, perhaps by furring with metal studs to one side of the wall.

2. Providing positive anchorages and connections between floor decks, roof decks and their supporting walls. This will prevent decks from pulling away from their supporting walls.

3. Overlaying plywood panel sheathing products to all straight-sheathed wood floors and wood roofs. This will overcome the inherent seismic weakness of sawn lumber deck products (straight sheathing)

4. Overlaying existing double T precast concrete members with a structural diaphragm. Normally a topping slab would be used for this purpose but if the structure cannot support the weight of a new topping slab, metal deck or carbon fiber materials may serve this purpose. This will provide seismic continuity of the precast system.

5. Incorporating rigid anchorages between abutting phases of previous construction. This will prevent adjacent structures from pulling apart and/or pounding together in an earthquake.

6. Introducing structural reinforcements at re-entrant corners and vertical offsets to address load and stress concentrations that can occur at these areas.

Expected Results

Following the rehabilitation protocol of ASCE 41 will not likely result in a project that meets the requirements of codes for new construction. However, this approach will provide a project that will seismically perform as needed and in all likelihood, will enable performance similar to modern construction. The ASCE 41 Performance Based Seismic Design approach can enable realization of the overall project objectives while minimizing the structural expenses associated with seismic rehabilitation. Recent projects using this methodology have shown savings in construction costs of approximately 30% with similar reductions in construction schedule.

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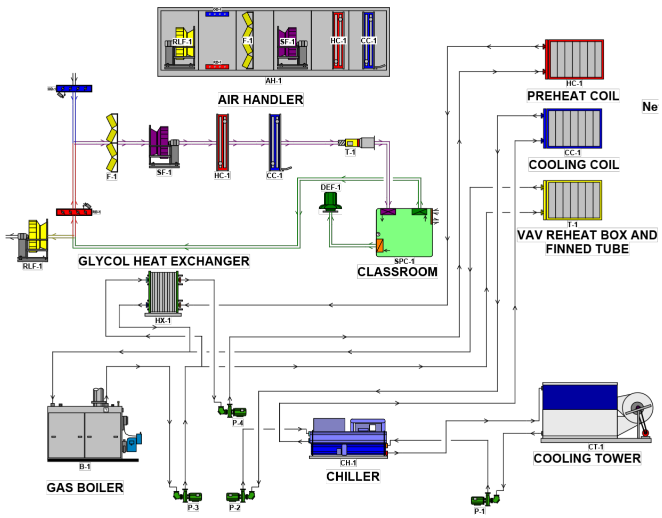
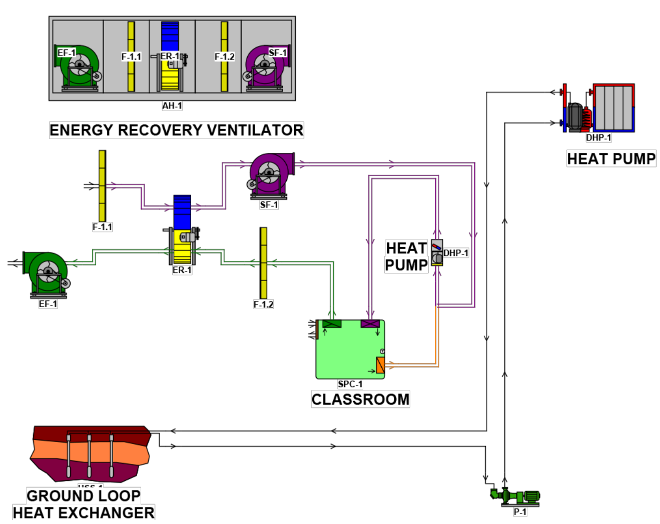


Central System - Variable Air Volume
EUI = 38 kbtu/sf/yr
ECI = 93 cents/sf/yr
Net CO2 Emmissions = 10.5 lbs/sf/yr
2018 First Cost = $35/sf



Unitary Ground Source Heat Pumps
EUI = 25 kbtu/sf/yr
ECI = 89 cents/sf/yr
Net CO2 Emmissions = 11.7 lbs/sf/yr
2018 First cost = $36/sf

Mechanical Considerations

Heating System

Provide multiple boilers for redundancy. Design such that loss of one boiler will still provide 90% capacity. Provide high efficiency condensing type boilers. Use boilers with at least a 5 to 1 turndown ratio. Use firetube type boilers. Approved manufacturers will be Aerco, Lochinvar, and Camus. Design a low temperature hot water system in order to condense flue gases and obtain high efficiency. Design for 140 deg F supply water and 110 deg. F return water at design winter temperature. Reset water temperature based on outside air temperature down to 100 deg F supply.

The boilers and hot water system will be sized for 150,000 sq. ft. Middle School. The heating system is designed for a diversified people load. The Main Gym will have 700 people, Auxiliary Gym will have 70 people, the Auditorium will have 350 people, the Cafeteria will have no people, the Commons area will have no people. All of the Classrooms will be full. The Administration area will be full.

Provide a primary- hot water system. Primary system will be variable flow for energy savings. Use 30 deg F delta T (140-110) for pump energy savings. Provide two primary loop pumps for redundancy, each sized for 100 % flow (primary-standby operation). Provide automatic shutoff valves for each boiler for isolation and to run fewer boilers on very low loads.

Coil freeze protection pumps will be provided on both the hot and chilled water coils.

Cooling System

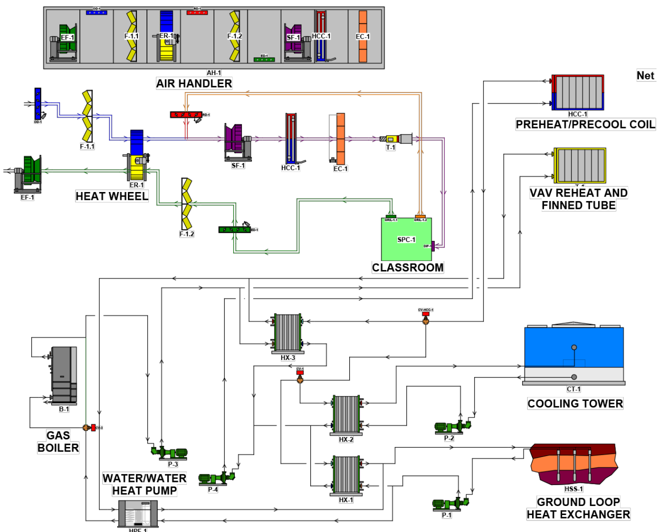
Provide water cooled variable speed chillers. This is for high efficiency and will provide the capability of operating at small part loads. This will accommodate cooling only the Administration Area in the summer. This will also allow chillers to operate efficiently at lower condensing water temperatures. Each chiller will be sized for 50% of the load.

The people load will be diversified the same as the heating system.

A cooling tower will be provided for each chiller. The towers will be connected for a common sump. Each tower will have a variable speed fan for energy savings. The tower will be a cross flow type for reduced fan energy.

There will be primary-standby condenser water pumps. The pumps will be constant flow. VFD’s will be provided for balancing.

Provide a filtering system for the cooling tower. Provide a sweeping system for each cell of the two towers. Use a “Valve and Filter” screen type filter. Size flow for 1 GPM per square foot of tower basin, per the BAC Application Guide.



Hybrid System - Maximize Efficiency
EUI = 17
ECI=37 cents/sf
Net CO2 Emmissions = 6.8 lbs/sf/yr
2018 First cost = $40/sf

After PV
EUI <0
ECI = 17 cents/sf
Net Carbon Emmissions <0

Chilled water system will be primary secondary. Primary loop will be constant flow. Secondary loop will be variable flow. Pumps will be sized for primary-standby operation. The chilled water system will be designed with 15 deg F delta T to reduce pump energy and reduce pipe sizes. The temperatures will be 44 supply and 59 return. Cooling tower will be designed for a 10 degree approach temperature, condenser water supply temperature will be 76 deg F, the return will be 86 deg F.

Supply Air Handlers

There will be approximately 6 central air handlers. The air handlers will be located indoors for improved access and freeze protection. The air handlers will be factory custom built. They will have variable air volume (VAV) supply and relief air fans. Plenum fans, mixed flow fans and fan walls were considered. The efficiency is comparable. Fan walls will be provided for ease of replacement. The air handlers will be sized for 400 feet per minute through the air tunnel where space is available, for fan energy savings. The maximum velocity will be 500 fpm. On systems with plenum return air, relief fans will be used for control simplicity. On ducted return air systems, return air fans will be used. Air handlers will have angled filters for increased face area and lower fan energy. Filters will be 4" thick pleated low pressure type for fan energy savings. Filters will be changed out when the dirty pressure drop is double the clean pressure drop. Each air handler will have an outside air flow measuring sensor to enable proper control of outside ventilation air. The lower minimum outside air flow will be determined from exhaust air makeup and building pressurization. The upper minimum outside air flow will be based on the Code ventilation air flow. A carbon dioxide sensor in the return air duct will vary the outside air flow between the upper and lower flows, in order to save the energy involved with tempering outside air. Medium pressure ducts shall be limited to 2500 ft per minute for energy savings.

Single zone air handlers, such as the Auditorium and Gyms will have variable speed fans. This will allow these spaces to operate on reduced air flows when they are only partially occupied, and save energy.

Air Distribution

In classrooms, gyms, auditorium, cafeteria etc. the return air will be from low sidewall grilles to comply with the Code in order to comply with the ventilation air effectiveness , improve comfort and minimize the outside air required. In the offices, the air will be returned at the ceiling and the outside air flow will be increased.

Fire Sprinkling

Automatic wet-pipe sprinkler system. Piping will be standard weight black steel with mechanical couplings, threaded joints or welded joints.

Gas fired high efficiency condensing water heater.

Water-saving plumbing fixtures would include low flow urinals, dual flush water closets and low flow lavatory faucets. Incorporation of these features will reduce water consumption by about 30%.

Option 1B

Rehabilitate historic building for Support Services & build new 150,000 sf, three-story middle school recommendation;

- *Existing Historic Building Mechanical Recommendation;*
- *Variable Refrigerant Flow "VRF" system with individual cassettes installed in ceiling of each room providing individual space temperature control.*
- *Dedicated Outside Air Unit in attic to provide ventilation air. Outside air ventilation air ductwork will run in existing attic as necessary. Rooms that are not located below the existing attic will require duct to run thru structure where possible or just below structure as necessary.*
- *Install new wet-pipe sprinkler system.*

New 150,000 sf, three story middle school recommendation;

- *New central system including new gas fired condensing hot water boilers, water or air cooled chiller, VAV Air Handling Unit with VAV Reheat Boxes with hot water coils for individual zone control.*
- *New Domestic gas fired hot water heater and water conserving plumbing fixtures to meet 2015 International Energy Conservation Code.*
- *Install new wet-pipe sprinkler system with multiple risers as required.*

Option 2

Rehabilitate historic building & maintain/remodel existing building for new use of: support services, community ed., special ed., & alternative middle school programs. New middle school to be built on separate site.

Rehabilitate historic building;

- *Variable Refrigerant Flow "VRF" system with individual cassettes installed in ceiling of each room providing individual space temperature control.*
- *Install Dedicated Outside Air Unit in attic to provide ventilation air. Outside air ventilation air ductwork will run in existing attic as necessary. Rooms that are not located below the existing attic will require duct to run thru structure where possible or just below structure as necessary. Perimeter spaces on upper level can also get required ventilation air from operable windows.*
- *Toilet Rooms, all plumbing fixtures should be replaced with new. Where required add ADA fixtures.*
- *Install new wet-pipe sprinkler system.*

Maintain/remodel of existing building;

As part of the rehabilitating the historic building the 70 Ton VAV Rooftop Handling Unit will be removed and the historic building as well as the other parts of the building served by this unit will need to be provided with other HVAC equipment. The VRF system will serve historic portion of the building and existing rooftop equipment on all other areas of the building will need to be modified as necessary to make best use of existing rooftop equipment and new packaged rooftop air conditioners will need to be added to provide acceptable zoning. The two story portions of the existing building on the southwest corner and down the center will require supply and return air chases constructed for duct system to drop down thru the roof to supply both upper and lower floors.

- *Toilet Rooms, all plumbing fixtures should be replaced with new. Where required add ADA fixtures.*
- *Install new wet-pipe sprinkler system with multiple risers as required.*

Electrical Considerations

Codes And Standards

Codes, Standards, and Guidelines, which are applicable to the design of the electrical systems, are listed below. Comply with each of the latest adopted publications:

- *ADA, Americans with Disabilites Act*
- *International Energy Conservation Code*
- *EIA/TIA, Electronics Industries Association/Telecommunications Industry Association*
- *IBC, International Building Code*
- *IECC, International Energy Code*
- *ANSI/ASHRAE/IES Standard 90.1-2010*
- *IEEE 1100-1999, Recommended Practice for Power and Grounding Electronic Equipment*
- *IESNA, Illuminating Engineering Society of North America, 9th Edition*
- *NFPA, National Fire Protection Association (applicable sections including but not limited to):*
- *NFPA 70, National Electrical Code*
- *NFPA 72, National Fire Code*
- *UL, Underwriter's Laboratories*
- *Utah State Fire Marshal Laws, Rules and Regulations*

Site Utilities

Medium Voltage Power Distribution:

The electrical utility serving Dixon Middle School will be Provo Power.

Electrical Systems

Electrical Service

In all instances and options, the electrical service will need to be upgraded to current NEC codes and requirements.

Feeder Distribution

To the greatest extent possible, different types of loads shall be separated onto different feeders and busses, such as HVAC equipment, lighting, and convenience power. In general, large motors and equipment shall be served at 480V, 3 phase; lighting at 277V; outlets and small equipment at 120V.

277/480-volt lighting and appliance branch circuit panel boards shall be utilized to provide power for lighting, HVAC, and other electrical motor loads.

208/120-volt lighting and appliance branch circuit panelboards shall be utilized to provide power for specialty lighting, computer equipment, owner furnished equipment, outlets, small mechanical equipment, etc. Computers and any sensitive equipment shall be tied to separate panelboards to isolate them from other equipment such as small mechanical equipment and general-purpose outlets. All 208/120-volt lighting and appliance branch circuit panelboards that serve teaching spaces and computer labs shall have 200% neutral busses and feeders.

Feeder conductors shall be aluminum where #1/0 AWG or greater and copper where less the #1/0 AWG. Aluminum conductors shall be Alcan Stabiloy or equivalent. Mechanical-type lugs are acceptable for both aluminum and copper conductors. All grounding electrode conductors and equipment grounding conductors shall be copper only. Bussing for power panel boards, lighting and appliance branch circuit panel boards and motor control centers shall be aluminum.

Power panels and lighting and appliance panel boards shall have 25% excess capacity for future growth and flexibility and shall also be provided complete with branch breakers with sufficient capacity to serve any shelled spaces.

Emergency and Optional Standby Power Distribution System

The emergency system shall consist of a diesel generator with a skid-mounted tank in a weather-protective and Level II sound attenuated enclosure. The fuel tank shall be sized for 24 hours of engine operation at full load. Two automation transfer switches shall be provided, one for emergency power (egress lighting) and the other for standby power (lighting for equipment rooms, telephone/data equipment, HVAC for communications rooms, BAS system, refrigerators and freezers, intrusion detection systems, CCTV systems, and access control system). The system will be required to be completely commissioned and tested to ensure that it has been installed in accordance with all manufacturers' installation instruction and that it is functioning properly.

Surge Suppression

To provide protection against damage to sensitive electronic equipment, due to surges, surge suppression devices (SPD) shall be provided at new service entrance, distribution panels and branch circuit panelboards serving sensitive electronic equipment.

Branch Circuits

Branch circuits shall be loaded to no more than 80% of what is allowed by NFPA 70. Where outlets are intended for a specific piece of equipment, the load of the outlet shall be based on the equipment nameplate. Otherwise, allow no more than 4 convenience outlets per circuit in instructional lab spaces and for computer workstations, and 6 convenience outlets per circuit for general purpose use. Outlets with dedicated branch circuits (one outlet per circuit) are required for vending machines, copy machines, break room counters, IT Racks and where the equipment nameplate requires it. Each branch circuit homerun shall have no more than 3 circuits per raceway. All branch circuits shall be provided with an oversized neutral (one AWG size larger than the largest phase conductor); multi-pole breakers shall be utilized to meet all NEC requirements regarding shared neutrals. Conductors for branch circuits shall be sized to prevent voltage drop exceeding 3% at the farthest load. The total voltage drop on both feeders and branch circuits shall not exceed 5%. When calculating, the voltage drop, the load shall be assumed to be 80% of the ampacity of the branch circuit.

Branch circuit conductor shall be copper installed in conduit, ¾" minimum. Type MC Cable is allowed only when concealed in ceiling or gypsum board walls. MC Cable shall not be utilized in CMU. MC cables must be protected from physical damage and supported directly from the building or structure by use of a listed support. MC Cable home runs are not allowed. Home runs must be in conduit from the electrical panel or cabinet to the first junction or pull box. MC Cable used for Fire Alarm System Signaling or Initiation Circuits must have an overall outer coating with red finish.

Outlets

Generally, convenience outlet shall be provided with stainless steel cover plates. Convenience outlets in corridors and in other areas where vacuums and floor cleaners are anticipated shall be hospital grade. Where outlets for equipment such as vending machines and electric water coolers are required to be GCFI-protected, GFCI breakers shall be utilized in lighting and appliance panel boards in lieu of GFCI outlets.

Grounding

Grounding conductors shall be installed with all feeder and branch circuits.

A grounding riser system shall be provided for all new telecommunication rooms consisting of a grounding bus mounted on the wall in each room near the telecommunications boards and two grounding conductors (one extending to the main ground bus of the main distribution panel and the other extended to building steel).

Interior Lighting

General Design Criteria

LED light fixtures shall be used exclusively throughout the new Classroom and Administration additions to meet the illumination requirements to maintain high efficiency and require minimal maintenance. All fixtures shall have a minimum of 50,000 hour life at 70% lumen maintenance and be tested in accordance with IESNA LM79. Daylight harvesting with variable dimming shall be employed in all spaces that receive natural light. LED's are specified to have a Kelvin Temperature of 3,500 degrees.

Task Illuminance

Lighting levels shall be in accordance with the Recommended Illuminance Categories and Illuminance Values for Lighting Design, IES Lighting Handbook. The lighting levels listed below in footcandles should be used for design purposes. The values listed are average maintained illuminance levels using a maintenance factor of 75%. The numbers listed are target values and should be adjusted to meet the special requirements of individual areas.

Function / Space	Illuminance (Avg. Footcandles)
Classrooms	35 FC
Vestibules	10 FC
Reception	35 FC
Offices	35 FC
Teacher's Lounges	20 FC
Conference Rooms	30 FC
Teacher's Prep	30 FC
Work Rooms	30 FC
Storage Rooms	10 FC
Corridors	10 FC
Large Restrooms:	
General	5 FC
Fixtures	15 FC
Toilet Rooms	15 FC

Interior Lighting Control

General: The lighting control system will be designed to provide a high level of control by individual occupants or groups in multi-occupant spaces and promote their productivity, comfort and well-being. A new lighting control system will be installed to match Provo City School District current standard. The baseline system shall be Acuity N-Light. High profile spaces shall be networked and made accessible via the BAS.

Classrooms: Lighting controls in each classroom will consist of ceiling-mounted occupancy sensors, light level sensors for daylight harvesting, and low voltage switches. A single-button momentary contact switch will be provided at the main entry door and programmed as a vacancy switch (lights will not be switched on automatically via the occupancy sensor). A four-button switch will be provided at the teaching station adjacent to the white board. It will be programmed to have various scenes including a standard daylight harvesting mode, all full on, all off, all lights at 50%, or A/V mode where the front row of lights adjacent to the white board is completely off and the back rows are dimmed to 50%. It will also have the ability to act as a dimmer to raise and lower each scene. In the daylight harvesting mode, the row of lights closest to the window will be dimmed depending upon the amount of light entering the room; the remaining rows will be programmed to be at full on. Occupancy sensors will be set to switch all lights completely off if movement is not detected within 5 minutes. All dimming will be continuous via LED driver in each light fixture.

Vestibules: Lighting controls in the Vestibules will consist of ceiling-mounted occupancy sensors and light level sensors for daylight harvesting. In the daylight harvesting mode, all lights within a zone of 15 feet from a window will be dimmed down depending upon the amount of light entering the room; the remaining fixtures will be programmed to be at full on. Occupancy sensors will be set to switch all lights on when motion is detected and to switch all lights completely off if movement is not detected within 5 minutes. All dimming will be continuous via LED driver in each light fixture. Emergency lighting will be required in these spaces. A generator transfer device will be specified so that the emergency lighting will be controlled similarly to the other lights on normal power; however, during a power outage, the lights will switch on to full-on.

Reception: Lighting controls in the reception area will consist of ceiling-mounted occupancy sensors and low voltage switches. A single-button momentary contact switch will be provided at the main entry doors and programmed as a vacancy switch (lights will not be switched on automatically via the occupancy sensor). A dimmer switch with master on/off will be provided at a readily accessible location to the occupant users. Occupancy sensors will be set to switch all lights completely off if movement is not detected within 5 minutes. All dimming will be continuous via LED driver in each light fixture. Emergency lighting will be required in this space. A generator transfer device will be specified so that the emergency lighting will be controlled similarly to the other lights on normal power; however, during a power outage, the lights will switch on to full-on.

Offices: Lighting controls in these spaces will consist of wall box type occupancy sensors with manual on/off control. Where such spaces have windows, light level sensors will also be included for daylight harvesting; the wall box occupancy sensor will be provided at the main entry doors and programmed as a vacancy switch (lights will not be switched on automatically via the occupancy sensor). Occupancy sensors will be set to switch all lights completely off if movement is not detected within 5 minutes. All dimming will be continuous via LED driver in each light fixture. In the daylight harvesting mode, all lights within a zone of 15 feet from a window will be dimmed depending upon the amount of light entering the room; the remaining fixtures (if any) will be programmed to be at full on.

Teachers Lounges/Conference Rooms/Teachers Prep: Lighting controls in these spaces will consist of ceiling-mounted occupancy sensors, light level sensors for daylight harvesting, and low voltage switches. A single-button momentary contact switch will be provided at the secondary entry doors and programmed as a vacancy switch (lights will not be switched on automatically via the occupancy sensor). A four-button switch will be provided at the main entry door. The four-button switch will be programmed to have various scenes including daylight harvesting mode, all full on, all off, all at 50%. In the daylight harvesting mode, all lights within a zone of 15 feet from a window will be dimmed depending upon the amount of light entering the room; the remaining rows will be programmed to be at full on (if any). Occupancy sensors will be set to switch all lights completely off if movement is not detected within 5 minutes. All dimming will be continuous via LED driver in each light fixture.

Work Rooms/Storage Rooms: Lighting controls in these spaces will consist of wall box type occupancy sensors with manual on/off control. Occupancy sensors will be set to switch all lights on when motion is detected and to switch all lights completely off if movement is not detected within 5 minutes.

Corridors: Lighting controls in Corridors will consist of ceiling-mounted occupancy sensors. Occupancy sensors will be set to switch all lights on when motion is detected and to switch all lights completely off if movement is not detected within 5 minutes. Emergency lighting will be required in this space. A generator transfer device will be specified so that the emergency lighting will be controlled similarly to the other lights on normal power; however, during a power outage, the lights will switch on to full-on.

Mechanical/Electrical Rooms: Lighting controls in mechanical and electrical rooms will consist of single-pole, three-way, or four-way switches dependent upon the application. These spaces will not have automatic shut-off as this would endanger the occupants. Digital timer switches could be utilized and will be evaluated as design progresses.

Janitors Rooms: Lighting controls in these spaces will consist of wall box type occupancy sensors with manual on/off control. Occupancy sensors will be set to switch all lights on when motion is detected and to switch all lights completely off if movement is not detected within 5 minutes.

Exterior-Mounted Building Lights: Lighting for exterior-mounted building lights shall be controlled via the building automation system so the lights are switched on at dusk and switched completely off at a pre-programmed time. Selected building-mounted light fixtures shall have occupancy sensors to switch lights completely off if movement is not detected within 5 minutes.

Exterior Lighting

Design Criteria

The exterior lighting fixtures should be selected to harmonize with the architectural style of the building. In general, all outdoor lighting shall have full cut-off optics as defined by the IESNA. Wall mounted decorative fixtures may be used to draw attention to main entry or circulation areas. Fixtures for parking surface areas are to be pole mounted. All fixtures shall be LED and have a minimum of 50,000 hour life at 70% lumen maintenance and be tested in accordance with IESNA LM79. All exterior light fixtures should be robust and suitable for the harsh exterior environment. Preference should be given to fixtures that have design features such as hinging reflectors and removable ballast trays that reduce the cost of lamp replacement and fixture repairs.

Illuminance

Lighting levels should be in accordance with the Recommended Illuminance Categories and Illuminance Values for Lighting Design, IES Lighting Handbook. The lighting levels listed below in footcandles should be used for design purposes. The values listed are average maintained illuminance levels using a maintenance factor of 75%.

Function	Iluminance (Avg. Footcandles)
Parking	1
Walkways	1
Building Perimeter - Entrances	5

Emergency Illuminance

Standard building lighting shall be selected as may be required to achieve the illuminance criteria set forth in the NFPA Life Safety Code, IBC, and local codes. These fixtures shall be designed as egress lighting fixtures. Dedicated branch circuiting from the emergency power branch shall be provided. Emergency lighting shall be provided on all paths of egress including but not necessarily limited to corridors, large open office or instructional spaces, restrooms, mechanical rooms, electrical rooms, and communication rooms.

Illuminated exit signs shall be provided in locations as required by the NFPA Life Safety Code, IBC, and local codes. Exit sign shall be cast aluminum LED type. Dedicated branch circuiting from the emergency power branch shall be provided.

Fire Alarm System

The fire alarm system will be per Provo City School District standards.

The fire alarm system shall be designed to comply with Utah State Fire Marshall's "Rules and Regulations" and other applicable codes.

Strobes shall be located to be visible from all locations. Horn installation shall comply with NFPA including for higher ambient noise requirements. Duct smoke detectors shall be provided and fans shall be shut down where required by NFPA and the IMC, including detection of smoke at all return air shafts servicing multiple floors. Smoke detectors shall be provided in corridors and in machine rooms. Heat detectors shall be provided in machine rooms. Carbon Monoxide detection shall be located per the current State Fire Marshal requirements.

Telecommunication System

General

The voice and data system shall consist of two main categories: 1) Pathways and Spaces to support the voice and data system, and 2) The structured cabling system.

Pathways And Spaces

New MDF or IDF will need to be added to accommodate each option. Communication rooms shall be provided in quantities and in locations, so the cabling does not exceed 300’ in length from patch panel to jack.

Each telephone/data outlet shall utilize a 4” square by minimum 2-1/8” deep junction box with a single-gang plaster–ring. One ¾” conduit with nylon pull rope shall be run from each junction box to the accessible ceiling space and a protective bushing should be provided at the end of the conduit. J-hooks shall be utilized for routing of cables between stub-ups and the cable tray. Wall Sleeves shall be provided for routing of cables through wall that extend above ceilings.

Data locations will be per current Provo City School District standards and requirements.

Structured Cabling System

General

The structured cabling system shall be designed to support high-speed voice/data/video and future high bandwidth applications. The system should be a Category 6 solution and shall be in accordance with Provo City School District specifications.

The backbone cable shall be one 6 strand single-mode and one 6 strand multimode fiber-optic in accordance with Provo City School District specification. Horizontal cabling to each telephone/data outlet shall be unshielded twisted pair. All backbone cables shall be terminated in a rack-mounted fiber break out enclosure. All horizontal cabling shall be terminated in patch panels located in 7’-0” high, 19” floor-standing four-post and double-post racks. Each communication room shall be provided with floor-standing racks.

Each telephone/data outlet shall have Category 6 RJ-45 4-pair ports with dedicated horizontal Category 6 cable ran from the respective communication room, area or wing to each port. Cable shall be equivalent to Mohawk Giga Lan.

Wireless:

Wireless access point (WAP) data outlet shall be specified with one category 6, RJ-45 data jack mounted in a 4” square by minimum 2-1/8” deep junction box with a cover plate. Routers shall be furnished and connected by Provo City School District. We recommend that cables be shielded to support high speed video streaming. Cabling will be (2) CAT 6A cables to each WAP location.

Security System

Security System devices, cabling, control panels, monitors, terminations, etc. shall be furnished, installed, and connected by the contractor, unless otherwise noted below. The contractor shall also provide raceways, outlet boxes, 120 volt power connections, etc. The cable tray shall be utilized where possible for the routing of low voltage cables. All low voltage cable shall be plenum-rated. Raceways shall be provided for wall-mounted devices and stubbed into accessible ceiling areas. J-hooks shall be utilized for routing of cables between stub-ups and the cable tray. Wall Sleeves shall be provided for routing of cables through wall that extend above ceilings.

The following is a description of the security systems planned for this building:

Card Access:

The facility shall utilize Provo City School District current standard POE Isonas Access Control System. The contractor will be responsible for the complete installation of the system.

Video Surveillance:

The facility shall utilize Provo City School District current standard IP Video Surveillance System with Milestone Headend. The contractor will install the cabling. Provo City School District will install the Cameras and Headend Equipment.

Intrusion Detection:

Provo City School District will provide and install the Intrusion Detection System.

Clocks shall consist of 120 volt clocks capable of receiving and transmitting signal and a master clock controller. The system will be required to be completely commissioned and tested to ensure that it has been installed in accordance with all manufacturers’ installation instruction and that it is functioning properly.
The clock system per Provo City School District Specifications.

Clocks shall have a black housing, 12” round.

Clocks shall have a black housing, 15” round (Gym, Auditoriums).

School Intercom System

The School Intercom System will be IP based and consist of interior speakers, intercom call switches, main equipment cabinet, and volume control switches with a tie into the telephone system. The system will be required to be completely commissioned and tested to ensure that it has been installed in accordance with all manufacturers' installation instruction and that it is functioning properly.

The head end equipment cabinet shall be in a telecommunication room with consoles in the Main Reception area or area determined by Provo City School District. The preferred system is Audio Enhancement; however, an equivalent system from another manufacture through a reputable local vendor may also be considered.

A small UPS system shall be provided for the School Intercom system.

Classroom A/V System

The School Classroom Audio System will be Audio Enhancement voice lift system consisting of interior speakers, wireless microphones, amplifier, and volume control.

The School Classroom Video System will consist of Large Touch Screen, HDMI, USB, audio inputs and display controls.

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Appendix A

Project Budget Estimates

PROJECT ESTIMATE	CONSTRUCTION CONTROL CORPORATION	11/19/2018

PROJECT NAME……...…..DIXON MIDDLE SCHOOL FEASIBILITY STUDY
LOCATION……………..……..PROVO, UT
ARCHITECT…..…………..…VCBO
STAGE OF DESIGN…..…..FEASIBILITY STUDY

CSI #	DESCRIPTION	QTY	UNIT	UNIT COST		TOTAL	
	OPTION 1A REHABILITATE HISTORIC BUILDING FOR EDUCATION PROGRAM AND NEW 150,000 SF MIDDLE SCHOOL ON-SITE						
	Rehabilitation						
	Selective Demolition	26,000	SF	$	3.75	$	97,500
	Hazardous Material Abatement						TBD
	Seismic Upgrade	26,000	SF	$	40.00	$	1,040,000
	Architectural Rehabilitation	26,000	SF	$	150.00	$	3,900,000
	Re-Roof Existing Building	15,428	SF	$	45.00	$	694,238
	Repoint Exterior Masonry	22,536	SF	$	12.00	$	270,432
	Replace Steel windows	3,606	SF	$	148.00	$	533,652
	Structural Modifications	26,000	SF	$	10.00	$	260,000
	Fire Sprinkler System	26,000	SF	$	4.00	$	104,000
	Plumbing Replacement	26,000	SF	$	5.00	$	130,000
	HVAC Replacement	26,000	SF	$	38.00	$	988,000
	Electrical Power & Lighitng Replacement	26,000	SF	$	24.00	$	624,000
	Electrical Communication Replacement	26,000	SF	$	3.00	$	78,000
	Electronic Safety & Security Replacement	26,000	SF	$	6.00	$	156,000
	Subtotal Rehabilitation			**$**	**341.38**	**$**	**8,875,822**
	Demolition & New Addition						
	Demolish Remaining Builidng	1,744,000	CF	$	0.40	$	697,600
	New Two Story Middle School	150,000	SF	$	265.00	$	39,750,000
	Subtotal New Addition			**$**	**269.65**	**$**	**40,447,600**
	TOTAL CONSTRUCTION COST	**176,000**	**SF**	**$**	**280.25**	**$**	**49,323,422**

OPTION 1B REHABILITATE HISTORIC BUILDING FOR SUPPORT SERVICES AND NEW 150,000 SF MIDDLE SCHOOL ON-SITE

Rehabilitation						
Selective Demolition	26,000	SF	$	3.75	$	97,500
Hazardous Material Abatement						TBD
Seismic Upgrade	26,000	SF	$	40.00	$	1,040,000
Architectural Rehabilitation	26,000	SF	$	145.00	$	3,770,000
Re-Roof Existing Building	15,428	SF	$	45.00	$	694,238
Repoint Exterior Masonry	22,536	SF	$	12.00	$	270,432
Replace Steel windows	3,606	SF	$	148.00	$	533,652
Structural Modifications	26,000	SF	$	5.00	$	130,000
Fire Sprinkler System	26,000	SF	$	4.00	$	104,000
Plumbing Replacement	26,000	SF	$	5.00	$	130,000
HVAC Replacement	26,000	SF	$	38.00	$	988,000
Electrical Power & Lighitng Replacement	26,000	SF	$	24.00	$	624,000
Electrical Communication Replacement	26,000	SF	$	3.00	$	78,000
Electronic Safety & Security Replacement	26,000	SF	$	6.00	$	156,000
Subtotal Rehabilitation			**$**	**331.38**	**$**	**8,615,822**
Demolition & New Addition						
Demolish Remaining Builidng	1,744,000	CF	$	0.40	$	697,600
New Three Story Middle School	150,000	SF	$	265.00	$	39,750,000
Subtotal New Addition			**$**	**269.65**	**$**	**40,447,600**
TOTAL CONSTRUCTION COST	**176,000**	**SF**	**$**	**278.77**	**$**	**49,063,422**

OPTION 1C REHABILITATE HISTORIC BUILDING, REMODEL REMAINING BUILDING AND NEW 87,000 SF ADDITION

Remodel						
Selective Demolition	37,000	SF	$	3.75	$	138,750
Hazardous Material Abatement						TBD
Seismic Upgrade	37,000	SF	$	25.00	$	925,000
Architectural Renovation	37,000	SF	$	80.00	$	2,960,000
Structural Modifications	37,000	SF	$	5.00	$	185,000
Fire Sprinkler System	37,000	SF	$	4.00	$	148,000
Plumbing Replacement	37,000	SF	$	5.00	$	185,000
HVAC Replacement	37,000	SF	$	38.00	$	1,406,000
Electrical Power & Lighitng Replacement	37,000	SF	$	24.00	$	888,000
Electrical Communication Replacement	37,000	SF	$	3.00	$	111,000
Electronic Safety & Security Replacement	37,000	SF	$	6.00	$	222,000
Subtotal Remodel			**$**	**193.75**	**$**	**7,168,750**
Rehabilitation						
Selective Demolition	26,000	SF	$	3.75	$	97,500
Hazardous Material Abatement						TBD
Seismic Upgrade	26,000	SF	$	40.00	$	1,040,000
Architectural Rehabilitation	26,000	SF	$	150.00	$	3,900,000
Re-Roof Existing Building	15,428	SF	$	45.00	$	694,238
Repoint Exterior Masonry	22,536	SF	$	12.00	$	270,432
Replace Steel windows	3,606	SF	$	148.00	$	533,652
Structural Modifications	26,000	SF	$	5.00	$	130,000
Fire Sprinkler System	26,000	SF	$	4.00	$	104,000
Plumbing Replacement	26,000	SF	$	5.00	$	130,000
HVAC Replacement	26,000	SF	$	38.00	$	988,000
Electrical Power & Lighitng Replacement	26,000	SF	$	24.00	$	624,000
Electrical Communication Replacement	26,000	SF	$	3.00	$	78,000
Electronic Safety & Security Replacement	26,000	SF	$	6.00	$	156,000
Subtotal Rehabilitation			**$**	**336.38**	**$**	**8,745,822**
Demolition & New Addition						
Demolish Remaining Builidng	1,568,000	CF	$	0.40	$	627,200
New Two Story Middle School	87,000	SF	$	265.00	$	23,055,000
Subtotal New Addition			**$**	**272.21**	**$**	**23,682,200**
Parking Garage (not included in total)	**120**	**Stalls**	**$**	**24,000.00**	**$**	**2,880,000**
TOTAL CONSTRUCTION COST	**150,000**	**SF**	**$**	**263.98**	**$**	**39,596,772**

OPTION 1D REHABILITATE HISTORIC BUILDING, PHASE DEMOLITION AND NEW 124,000 SF ADDITION

Rehabilitation						
Selective Demolition	26,000	SF	$	3.75	$	97,500
Hazardous Material Abatement						TBD
Seismic Upgrade	26,000	SF	$	40.00	$	1,040,000
Architectural Rehabilitation	26,000	SF	$	145.00	$	3,770,000
Re-Roof Existing Building	15,428	SF	$	45.00	$	694,238
Repoint Exterior Masonry	22,536	SF	$	12.00	$	270,432
Replace Steel windows	3,606	SF	$	148.00	$	533,652
Structural Modifications	26,000	SF	$	5.00	$	130,000
Fire Sprinkler System	26,000	SF	$	4.00	$	104,000
Plumbing Replacement	26,000	SF	$	5.00	$	130,000
HVAC Replacement	26,000	SF	$	38.00	$	988,000
Electrical Power & Lighitng Replacement	26,000	SF	$	24.00	$	624,000
Electrical Communication Replacement	26,000	SF	$	3.00	$	78,000
Electronic Safety & Security Replacement	26,000	SF	$	6.00	$	156,000
Subtotal Rehabilitation			**$**	**331.38**	**$**	**8,615,822**
Demolition & New Addition						
Demolish Remaining Building (phased)	1,744,000	CF	$	0.50	$	872,000
New Two Story Middle School	124,000	SF	$	265.00	$	32,860,000
Subtotal New Addition			**$**	**272.03**	**$**	**33,732,000**
Parking Garage (not included in total)	**120**	**Stalls**	**$**	**24,000.00**	**$**	**2,880,000**
TOTAL CONSTRUCTION COST	150,000	**SF**	**$**	**282.32**	**$**	**42,347,822**

OPTION 2 REHABILITATE AND REMODEL CURRENT BUILDING, WITH NEW 150,000 SF MIDDLE SCHOOL OFF SITE

Rehabilitation						
Selective Demolition	26,000	SF	$	3.75	$	97,500
Hazardous Material Abatement						TBD
Seismic Upgrade	26,000	SF	$	40.00	$	1,040,000
Architectural Rehabilitation	26,000	SF	$	145.00	$	3,770,000
Re-Roof Existing Building	15,428	SF	$	45.00	$	694,238
Repoint Exterior Masonry	22,536	SF	$	12.00	$	270,432
Replace Steel windows	3,606	SF	$	148.00	$	533,652
Structural Modifications	26,000	SF	$	5.00	$	130,000
Fire Sprinkler System	26,000	SF	$	4.00	$	104,000
Plumbing Replacement	26,000	SF	$	5.00	$	130,000
HVAC Replacement	26,000	SF	$	38.00	$	988,000
Electrical Power & Lighitng Replacement	26,000	SF	$	24.00	$	624,000
Electrical Communication Replacement	26,000	SF	$	3.00	$	78,000
Electronic Safety & Security Replacement	26,000	SF	$	6.00	$	156,000
Subtotal Rehabilitation			**$**	**331.38**	**$**	**8,615,822**
Remodel						
Selective Demolition	109,167	SF	$	3.75	$	409,376
Hazardous Material Abatement						TBD
Medium Seismic Upgrade areas	109,167	SF	$	25.00	$	2,729,175
Architectural Renovation	109,167	SF	$	80.00	$	8,733,360
Structural Modifications	109,167	SF	$	5.00	$	545,835
Fire Sprinkler System	109,167	SF	$	4.00	$	436,668
Plumbing Replacement	109,167	SF	$	5.00	$	545,835
HVAC Replacement	109,167	SF	$	38.00	$	4,148,346
Electrical Power & Lighitng Replacement	109,167	SF	$	24.00	$	2,620,008
Electrical Communication Replacement	109,167	SF	$	3.00	$	327,501
Electronic Safety & Security Replacement	109,167	SF	$	6.00	$	655,002
Exterior Site Improvements	1	Allow	$	250,000.00	$	250,000
Subtotal Remodel			**$**	**196.04**	**$**	**21,401,106**
New School at New Site						
Land Acquisition (acre cost is an allowance/ varies on location)	20	ACRE	$	150,000.00	$	3,000,000
New Two Story Middle School	150,000	SF	$	265.00	$	39,750,000
Subtotal New School at New Site			**$**	**285.00**	**$**	**42,750,000**
TOTAL CONSTRUCTION COST	**135,167**	**Cost/SF**	**$**	**538.35**	**$**	**72,766,928**

OPTION 3 REHABILITATE HISTORIC BUILDING, REMODEL REMAINING BUILDING AND NEW 150,000 SF MIDDLE SCHOOL ON-SITE

Rehabilitation						
Selective Demolition	26,000	SF	$	3.75	$	97,500
Hazardous Material Abatement						TBD
Seismic Upgrade	26,000	SF	$	40.00	$	1,040,000
Architectural Rehabilitation	26,000	SF	$	145.00	$	3,770,000
Re-Roof Existing Building	15,428	SF	$	45.00	$	694,238
Repoint Exterior Masonry	22,536	SF	$	12.00	$	270,432
Replace Steel windows	3,606	SF	$	148.00	$	533,652
Structural Modifications	26,000	SF	$	5.00	$	130,000
Fire Sprinkler System	26,000	SF	$	4.00	$	104,000
Plumbing Replacement	26,000	SF	$	5.00	$	130,000
HVAC Replacement	26,000	SF	$	38.00	$	988,000
Electrical Power & Lighitng Replacement	26,000	SF	$	24.00	$	624,000
Electrical Communication Replacement	26,000	SF	$	3.00	$	78,000
Electronic Safety & Security Replacement	26,000	SF	$	6.00	$	156,000
Subtotal Rehabilitation			**$**	**331.38**	**$**	**8,615,822**
Remodel						
Selective Demolition	109,167	SF	$	3.75	$	409,376
Hazardous Material Abatement						TBD
Medium Seismic Upgrade areas	109,167	SF	$	25.00	$	2,729,175
Architectural Renovation	109,167	SF	$	80.00	$	8,733,360
Structural Modifications	109,167	SF	$	5.00	$	545,835
Fire Sprinkler System	109,167	SF	$	4.00	$	436,668
Plumbing Replacement	109,167	SF	$	5.00	$	545,835
HVAC Replacement	109,167	SF	$	38.00	$	4,148,346
Electrical Power & Lighitng Replacement	109,167	SF	$	24.00	$	2,620,008
Electrical Communication Replacement	109,167	SF	$	3.00	$	327,501
Electronic Safety & Security Replacement	109,167	SF	$	6.00	$	655,002
Exterior Site Improvements	1	Allow	$	250,000.00	$	250,000
Subtotal Remodel			**$**	**196.04**	**$**	**21,401,106**
Demolition & New Addition						
Demolish Remaining Builidng	1,744,000	CF	$	0.40	$	697,600
New Two Story Middle School	150,000	SF	$	265.00	$	39,750,000
Subtotal New Addition			**$**	**269.65**	**$**	**40,447,600**
TOTAL CONSTRUCTION COST	**285,167**	**SF**	**$**	**247.10**	**$**	**70,464,528**

Appendix B

Secretary of the Interior's Standards for Rehabilitation

The following Standards for Rehabilitation are the criteria used to determine if a rehabilitation project qualifies as a certified rehabilitation. The intent of the Standards is to assist the long-term preservation of a property's significance through the preservation of historic materials and features. The Standards pertain to historic buildings of all materials, construction types, sizes, and occupancy and encompass the exterior and the interior of historic buildings. The Standards also encompass related landscape features and the building's site and environment, as well as attached, adjacent, or related new construction. The following Standards are to be applied to specific rehabilitation projects in a reasonable manner, taking into consideration economic and technical feasibility.

1. A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.

2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.

3. Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.

4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a historic property shall be preserved.

6. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

7. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.

8. Significant archeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.

9. New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.

10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

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Appendix C

Mechanical System Considerations for Alternative Options

Option 1A

Rehabilitate historic building for district educational programs & build new 150,000 sf, two story middle school

Existing Historic Building Mechanical Recommendation;

- *Variable Refrigerant Flow "VRF" system with individual cassettes installed in ceiling of each room providing individual space temperature control.*
- *Dedicated Outside Air Unit in attic to provide ventilation air. Outside air ventilation air ductwork will run in existing attic as necessary. Rooms that are not located below the existing attic will require duct to run thru structure where possible or just below structure as necessary.*
- *Toilet Rooms, all plumbing fixtures should be replaced with new. Where required add ADA fixtures.*
- *Install new wet-pipe sprinkler system.*

New 150,000 sf, two story middle school recommendation;

- *New central system including new gas fired condensing hot water boilers, water or air cooled chiller, VAV Air Handling Unit with VAV Reheat Boxes with hot water coils for individual zone control.*
- *New Domestic gas fired hot water heater and water conserving plumbing fixtures to meet 2015 International Energy Conservation Code.*
- *Install new wet-pipe sprinkler system with multiple risers as required.*

Option 1B

Rehabilitate historic building for Support Services & build new 150,000 sf, three-story middle school recommendation;

Existing Historic Building Mechanical Recommendation;

Variable Refrigerant Flow "VRF" system with individual cassettes installed in ceiling of each room providing individual space temperature control.

Dedicated Outside Air Unit in attic to provide ventilation air. Outside air ventilation air ductwork will run in existing attic as necessary. Rooms that are not located below the existing attic will require duct to run thru structure where possible or just below structure as necessary.

Install new wet-pipe sprinkler system.

New 150,000 sf, three story middle school recommendation;

New central system including new gas fired condensing hot water boilers, water or air cooled chiller, VAV Air Handling Unit with VAV Reheat Boxes with hot water coils for individual zone control.

New Domestic gas fired hot water heater and water conserving plumbing fixtures to meet 2015 International Energy Conservation Code.

Install new wet-pipe sprinkler system with multiple risers as required.

Option 1C

Rehabilitate historic building, remodel a portion of existing building, demolish the remaining portion of existing building & add new wing to house an 87,000 sf middle school. This will allow for some phasing of the project.

Existing Historic Building Mechanical Recommendation;

- *Variable Refrigerant Flow "VRF" system with individual cassettes installed in ceiling of each room providing individual space temperature control.*
- *Install Dedicated Outside Air Unit in attic to provide ventilation air. Outside air ventilation air ductwork will run in existing attic as necessary. Rooms that are not located below the existing attic will require duct to run thru structure where possible or just below structure as necessary. Perimeter spaces on upper level can also get required ventilation air from operable windows.*
- *Toilet Rooms, all plumbing fixtures should be replaced with new. Where required add ADA fixtures.*
- *Install new wet-pipe sprinkler system.*

Remodel 37,000 Sq. Ft. Portion of Existing Building Recommendation;

- *New central system including new gas fired condensing hot water boilers, water or air cooled chiller, VAV Air Handling Unit with VAV Reheat Boxes with hot water coils for individual zone control.*
- *New Domestic gas fired hot water heater.*
- *Central plant located in or adjacent to remodeled area to serve both the remodeled area as well as the new 87,000 sq. ft. middle school addition. Central plant would include boilers, chillers, pumps and domestic water heating and storage. Pipes would extend to 74,000 sq. ft. addition.*
- *Add VAV Air Handling Unit and VAV Reheat Boxes with hot water coils for individual zone control sized for remodeled area.*
- *87,000 sq. ft. middle school addition will have a VAV Air Handling Unit and VAV Reheat Boxes with hot water coils with heating water and chilled water extended from central plant.*
- *Toilet Rooms, all plumbing fixtures should be replaced with new. Where required add ADA fixtures.*
- *Install new wet-pipe sprinkler system.*

Option 1D

Rehabilitate historic building, demolish the remaining portion of existing building in phases & add new wing to house a 124,000 sq. ft. middle school. The phasing of the project allows occupants to remain utilizing the existing building while new portions are constructed.

Existing Historic Building Mechanical Recommendation;

- *Variable Refrigerant Flow "VRF" system with individual cassettes installed in ceiling of each room providing individual space temperature control.*
- *Install Dedicated Outside Air Unit in attic to provide ventilation air. Outside air ventilation air ductwork will run in existing attic as necessary. Rooms that are not located below the existing attic will require duct to run thru structure where possible or just below structure as necessary. Perimeter spaces on upper level can also get required ventilation air from operable windows.*
- *Toilet Rooms, all plumbing fixtures should be replaced with new. Where required add ADA fixtures.*
- *Install new wet-pipe sprinkler system.*

Phasing Demolition Recommendation;

The large VAV Rooftop Air Conditioning Unit and the existing steam boiler is currently serving the Historic Building as well as the two story classroom wing connected to, and extending directly south of the historic building. The historic building rehabilitation will affect the HVAC system serving this two story classroom wing. Heat will still be available from the steam boiler. However Ventilation and Cooling will no longer be available when the large VAV Rooftop Air Conditioning unit is removed. All other portions of the existing building are independent and are served by Packaged Gas Fired Rooftop Air Conditioning Units which will maintain operation until each area is demolished which will allow for phased demolition.

New 124,000 sf, middle school recommendation;

- *New central system including new gas fired condensing hot water boilers, water or air cooled chiller, VAV Air Handling Unit with VAV Reheat Boxes with hot water coils for individual zone control.*
- *New Domestic gas fired hot water heater and water conserving plumbing fixtures to meet 2015 International Energy Conservation Code.*
- *Install new wet-pipe sprinkler system with multiple risers as required.*

Option 2

Rehabilitate historic building & maintain/remodel existing building for new use of: support services, community ed., special ed., & alternative middle school programs. New middle school to be built on separate site.

Rehabilitate historic building;

- *Variable Refrigerant Flow "VRF" system with individual cassettes installed in ceiling of each room providing individual space temperature control.*
- *Install Dedicated Outside Air Unit in attic to provide ventilation air. Outside air ventilation air ductwork will run in existing attic as necessary. Rooms that are not located below the existing attic will require duct to run thru structure where possible or just below structure as necessary. Perimeter spaces on upper level can also get required ventilation air from operable windows.*
- *Toilet Rooms, all plumbing fixtures should be replaced with new. Where required add ADA fixtures.*
- *Install new wet-pipe sprinkler system.*

Maintain/remodel of existing building;

As part of the rehabilitating the historic building the 70 Ton VAV Rooftop Handling Unit will be removed and the historic building as well as the other parts of the building served by this unit will need to be provided with other HVAC equipment. The VRF system will serve historic portion of the building and existing rooftop equipment on all other areas of the building will need to be modified as necessary to make best use of existing rooftop equipment and new packaged rooftop air conditioners will need to be added to provide acceptable zoning. The two story portions of the existing building on the southwest corner and down the center will require supply and return air chases constructed for duct system to drop down thru the roof to supply both upper and lower floors.

- *Toilet Rooms, all plumbing fixtures should be replaced with new. Where required add ADA fixtures.*
- *Install new wet-pipe sprinkler system with multiple risers as required.*

Option 3

Rehabilitate/remodel existing building for Support Services & build new 150,000 sf middle school on north of site.

Maintain/remodel of existing building;

As part of the rehabilitating the historic building the 70 Ton VAV Rooftop Handling Unit will be removed and the historic building as well as the other parts of the building served by this unit will need to be provided with other HVAC equipment. The VRF system will serve historic portion of the building and existing rooftop equipment on all other areas of the building will need to be modified as necessary to make best use of existing rooftop equipment and new packaged rooftop air conditioners will need to be added to provide acceptable zoning. The two story portions of the existing building on the southwest corner and down the center will require supply and return air chases constructed for duct system to drop down thru the roof to supply both upper and lower floors.

- *Toilet Rooms, all plumbing fixtures should be replaced with new. Where required add ADA fixtures.*
- *Install new wet-pipe sprinkler system with multiple risers as required.*

New 150,000 sf, middle school recommendation;

- *New central system including new gas fired condensing hot water boilers, water or air cooled chiller, VAV Air Handling Unit with VAV Reheat Boxes with hot water coils for individual zone control.*
- *New Domestic gas fired hot water heater and water conserving plumbing fixtures to meet 2015 International Energy Conservation Code.*
- *Install new wet-pipe sprinkler system with multiple risers as required.*

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