MATANUSKA-SUSITNA BOROUGH
Transportation Advisory Board Agenda

Vern Halter, Mayor

LaQuita Chmielowski
Cindy Bettine
Donna McBride
Scott Adams
Jennifer Busch
Antonio Weese
Joshua Cross - Chair

Kim Sollien - Staff

Michael Brown, Borough Manager

PLANNING & LAND USE DEPARTMENT
Alex Strawn, Planning & Land Use Director
Kim Sollien, Planning Services Manager
Jason Ortiz, Development Services Manager
Fred Wagner, Platting Officer

Virtual Meeting

August 20, 2021
REGULAR MEETING
9:30 am

Ways to participate in the Transportation Advisory Board meetings:

MICROSOFT TEAMS MEETING

- **Join on your computer or mobile app :**
  Click here to join the meeting

TELEPHONIC TESTIMONY:
Or call in (audio only)

- Dial +1 907-290-7880, Conference ID: 631 022 291#
- State your name for the record, spell your last name, and provide your testimony

I. CALL TO ORDER

II. ROLL CALL – DETERMINATION OF QUORUM

III. APPROVAL OF AGENDA

IV. APPROVAL OF MIUTES

A. April 30 2021, Regular Meeting Minutes
B. June 11 2021, Special Meeting Minutes

V. AUDIENCE PARTICIPATION (*three minutes per person, for items not scheduled for public hearing*)

VI. STAFF/AGENCY REPORTS & PRESENTATIONS

A. OSHP Update
B. MPO Update

C. RSA Board Update – DJ McBride
   - Road condition matrix

D. Transportation 21 Update
   - Current list of projects

VII. UNFINISHED BUSINESS

VIII. NEW BUSINESS

A. Design Criteria Manual Draft Resolution
B. Bike and Pedistrian Scope of Work Review

IX. MEMBER COMMENTS

X. NEXT MEETING DATE
October TBD

XI. ADJOURNMENT

MATANUSKA-SUSITNA BOROUGH
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Virtual Meeting

April 30, 2021
REGULAR MEETING MINUTES
9:30 a.m.

I. CALL TO ORDER

Mr. Cross called the meeting to order at 9:40 a.m.

II. ROLL CALL – DETERMINATION OF QUORUM

Members Present: LaQuita Chemielowski
DJ McBride
Scott Adams
Antonio Weese
Joshua Cross

Staff: Kim Sollien
Kelsey Anderson, MSB Planner II

Guests: Assembly Member Tew

A. Introductions: Kelsey Anderson, Planner II

1. APPROVAL OF AGENDA

Motion: Scott Adams moved to approve the Agenda. The motion was seconded.
Vote: The motion was approved as amended with no objection.

III. APPROVAL OF MINUTES

The following amendments were made to the Minutes.

DJ Mc Bride correction: retired surveying and engineering assistant
Scott Adams correction: called the meeting to order to correction 11:00 a.m.

Motion: DJ McBride moved to approve the minutes from the January 29, 2021, Regular Meeting Minutes as amended. The motion was seconded.

Vote: The motion was approved as amended with no objection.

IV. AUDIENCE PARTICIPATION (*three minutes per person, for items not scheduled for public hearing*)

Assembly member Tew let the board know he was attending the meeting and was looking forward to listening in.

V. STAFF/AGENCY REPORTS & PRESENTATIONS

A. Official Streets and Highways Plan Update –

Kim Sollien gave a brief overview of the OSHP update process highlighting that the draft maps and implementation plan are almost complete. Public hearings with the Platting Board, Planning Commission, and Assembly will occur this fall.

Metropolitan Planning Organization –

Kim Sollien gave an update on the Pre-MPO process to date and provided the link to the website Mat-Su Metropolitan Planning Organization (MPO) Coordination (matsumpo.com)

MPO Funding Discussion- Kim Sollien shared that she is working with ADOT&PF to determine what they might provide the Mat-Su Pre-MPO for FY22 so they can design the work plan and roll out a new contract for support to continue to prepare for forming an MPO.

Pre-MPO Policy Board Discussion- the Pre-MPO steering committee is making final recommendations for the pre-policy board and we hope to begin meeting in August.

B. **Bike and Pedestrian Plan Update** –

Kelsey Anderson MSB Planner II, gave an overview of the scope of work for the plan and talked about the project timeline.

C. **LLRSA Board Update –** DJ McBride

- RSA 16 in the Colony area was offered lighting but they said no because they could not afford to maintain it.
- SB 15 tracking violation fines in the OPEN meetings act
- Discussion- RSA board is developing a matrix to determine what condition a road is in and to develop a system for prioritizing repairs. DJ will send forms to TAB so they can see what is being discussed and proposed. (in packet)

- RSA board has requested a 4th road Superintendent from the Assembly because the RSA's believe the superintendents are overwhelmed, and they need more support.

VI. UNFINISHED BUSINESS

None.

VII. NEW BUSINESS

A. Earmark Funding for Transportation Projects-

Kim Sollien shared that the Mat-Su Project for Seldon Road extension was still on the list of projects from Don Young's office.

B. Statewide LRTP Update

Kim Sollien shared the update from the first settring committee meeting and provided the list to the website for TAB members to get more information.
Project Home - Alaska Moves 2050 or www.alaskamoves2050.com

C. Go Bond Update-

Motion: DJ Mc Bride moved that TAB to draft a letter supporting GO bond projects in the Mat-Su. The motion was seconded.

Vote: The motion was approved with no objection.

LaQuita Chmielowski offered to write the first draft.

Motion: Mr. Cross moved that TAB draft a resolution to the Assembly requesting staff develop a Design Criteria Manual. The motion was seconded.

Vote: The motion was approved with no objection.

Actions: Mr. Weese will send one for the DCM for the school district, and he will send it.
For more information here is link the the Anchorage DCM
Project Management and Engineering Design Criteria Manual (muni.org)

Mr. Cross volunteered to draft the first draft of the resolution

VIII. MEMBER COMMENTS

Mr. Weese:	no comment
Ms. Chiemlowski:	no comment
Mr. Adams:	Thank you, Mr. Tew, for joining
Ms. McBride:	no comment

Mr. Cross: Thank you Mr. Tew for joining. Welcome to Kelsey and we are looking forward to working with you. Looking forward to working through OSHP and MPO processes.

IX. NEXT MEETING DATE

A special meeting will be held to discuss Road Infrastructure Package. Kim will send out a Doodle Poll to pick the date.

Regular Meeting
July TBD

X. ADJOURNMENT

Motion: Scott Adams, moved to adjourn the meeting. Motion was seconded. Meeting adjourned at 11:16 a.m.

_____
Joshua Cross, Chair

_____
Kim Sollien, Clerk

*Approved Date:*_____

MATANUSKA-SUSITNA BOROUGH
Transportation Advisory Board Agenda

Assembly Chambers of the
Dorothy Swanda Jones Building
350 E. Dahlia Avenue, Palmer

June 11, 2021
SPECIAL MEETING MINUTES
9:00 am.

I. CALL TO ORDER 9:12 am

ROLL CALL – DETERMINATION OF QUORUM
Members Present: Mr. Cross, Ms. Busch, Mr. Weese, Ms. Bettine

Staff Present: Kim Sollien, Planning Services Division Manager
Terry Dolan, Public Works Director
Brad Sworts, Pre-Design and Engineering Manager
Kelsey Anderson, Planner II

Assembly Member Tew joined at 9:31am

II. APPROVAL OF AGENDA
Motion: Ms. Bettine moved to approve the Agenda, Mr. Weese 2nd.
Vote: All in favor.

III. AUDIENCE PARTICIPATION

IV. NEW BUSINESS

A. Resolution 21-01 – Transportation Infrastructure Package

Discussion-
Mr. Cross provided an overview of what the transportation package is and clarified what is being asked of TAB- "TAB's purpose is to provide the MSB Assembly with recommendations about the MSB roads, trails and transit. TBS's job is to make sure we are recommending what is best for the MSB and the community."

1) Brad Sworts gave an overview of each of the projects on the list.
Motion: Ms. Bettine moved to support the MSB staff recommended projects, Mr. Weese 2nd.
Vote: All in Favor

Motion: Ms. Bettine moved to add a Be it Resolved – TAB encourages the Assembly to prioritize projects previously identified and supported bond efforts. Mr. Weese 2nd
Vote: All in Favor

Motion: Ms. Bettine moved to add a Be it Further Resolved - to direct staff to explore and document cost estimates for projects recommended by staff. Mr. Weese 2nd
Vote: All in Favor

Motion: Ms. Bettine moved to add a Resolved TAB asking the Assembly to develop of new funding mechanisms to improve the safety and function of the transportation system. Ms. Busch 2nd
Vote: All in Favor

Motion: Ms. Bettine moved and Ms. Busch 2nd to approve the Resolution as as amended vote: All in Favor

Motion: Ms. Bettine moved to extend the meeting until 11:10am. Mr. Weese 2nd.
Vote: All in Favor.

V. MEMBER COMMENTS

Ms. Busch – No comment
Mr. Weese – No comment
Mr. Busch- No comment
Ms. Bettine – Suggested that TAB have a presence at the Assembly meeting on June 22.
Mr. Cross – thanked to the board members who showed up to the meeting stating that "your time is important" and he thanked to Mr. Tew for joining.

VI. NEXT MEETING DATE: TBD

VII. ADJOURNMENT

Motion: Mr. Weese moved to adjourn and second Ms. Bettine
Vote: All in Favor - meeting adjourned

_____ **Date:**_____

Joshua Cross, Chair

_____ **Date:**_____

Kim Sollien, Clerk

"Matrix" Training for LRSAAB on 4/15/21

What Is the "Matrix": A form for documenting a road's date-specific physical and geometric condition as compared to the MSB standards found in the Subdivision Construction Manual (SCM), and allowing for consideration of *measurable* factors (like residences served, ADT counts, traffic impedance, accident rates, available non-RSA funding, etc.) which could influence that road's position in a priority ranking like a CIP List. Originally developed by the Butte RSA Board in 2004 to better document the objectivity of our CIP List ranking decisions, in 2008 it was given its current format and pushed by Public Works Director Keith Rountree and met immediate widespread resistance, largely regarding its length (5 pages) and that "it doesn't fit my RSA" or "it's too technical". In 2012 the Butte RSA Board reworked the form to simplify the ranking numbers, and that is the "Matrix" you see today. I will note that photos of particular problem spots or areas are also very valuable "documentation", both in themselves and in support of the form (Marty Quaas was great at this aspect).

What is it Not: It cannot document road *maintenance* effectiveness, and it was never designed for that. The effectiveness of road maintenance, which is the annual effort to retain an existing condition, is judged by compliance with the Maintenance Contract's terms and specifications.

Do I need to be an Engineer to use it: Absolutely Not, but you do need to ask for help from your Road Superintendent whenever you feel flummoxed. That will most often arise around determining road or ditch-line grades, or what's going on below the road surface in terms of soil mechanics and/or hydrology. The tools I carry (after 60 years' experience in this game) are a 25-ft steel tape, a 50-ft reel tape, a clinometer, and a trenching spade; you can limit that to the steel tape and rely on your Superintendent for the rest.

Is this "Matrix" the Only Way To Go: Again, Absolutely Not – you can do this on a piece of notepaper if you wish. But however you choose to document a road's condition, it must address the same physical elements in a consistent manner if it's to avoid being seen by the public as "subjective" (ie., it's my *opinion* versus yours). So let's consider a checklist variant of the Matrix, included in your packets, as one alternative:

It's a 2-page (single sheet printed on both sides) version, used in conjunction with the SCM Criteria. It accomplishes the same thing the 5-page Matrix does, but with more limited room for Notes, and no fancy headings.

It is "weighted" like the Matrix to reflect the relative importance of the various elements. Without that you'll be surprised to find most roads scoring so nearly the same that making priority decisions is almost an exercise in coin-flipping.

It allows for the addition of RSA-specific elements that might otherwise be overlooked, but be leery of adding something not "measurable" in a way everybody, including the public, can agree on.

Where and How Do We Use It: Its primary role is in providing objective evidence to support CIP List ranking decisions made by the RSA Board and Road Superintendent in public meeting. In the Butte we often use it in meetings with residents and Community Councils to explain why a given road is at its spot on the CIP List. It can also be your best defense against the charge that you fixed XYZ road just because Assemblyman Glockenspritz lives on it.

Should Use of the Matrix, or this variant, be mandatory: I think not. It is a "tool" among a variety of such tools in the RSA Board's toolbox, and the Board should be allowed to choose the most appropriate tool for the specific task at hand. I can support seeing the checklist variant included in the Operating Manual as an optional method, perhaps even a recommended method, but the Matrix is neither a Holy Bible nor the greatest thing since sliced bread.

Mike Shields RSA 26 Primary

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	A	B	C	D	E	G	H	I	J	K	L	M	N	O	P
1		This **DRAFT** list is a compilation of transportation infrastructure projects for consideration for potential bonding													
2	**Number**	**Projects**	**Description**	**Assembly District**	**Cost Estimate**	**RSA**	**Design**	**Length (miles)**	**Funcitional Classification**	**School Access**	**Improves Access-Safety**	**Previous Bond Project**	**Mullti-Modal /Pathway**	**2035 LRTP**	**2007 OSHP**
3	1	Trunk Road Connector/Katherine Drive	Project would complete design and construct a collector road from Stringfield Road to Trunk Road and Trunk Road to Manhattan Way providing access to a new school site and the large Midtown Estates Subdivision.	1	$ 2,530,000	25 Bogard	75%	0.4	Minor Collector	Y	Y	2013 & 2018	Y	Y	
4	2	Smith Road Extension Upgrade and Pathway	Upgrade the MSB owned segment of Smith Road providing improved and safer residential and recreational trailhead access.	1	$ 2,070,000	26 Greater Butte		0.9	Minor Collector		Y	2018	Y	Y	Y
5	3	Old Glenn Pathway Phase 2	Extend the pathway from Sodak Circle to Knik River providing a safe pedestrian and bike facility connecting to the existing pathway all the way into Palmer.	1	$ 1,800,000	26 Greater Butte	65% (ROW acquisition also underway)	1.2	Minor Arterial		Y	2011	Y		
6	4	49th State Street Pathway	Construct pathway adjacent to 49th State Street from Bogard Road to Palmer-Wasilla Highway providing a pathway connection between two major highway corridors.	1	$ 1,000,000	16 South Colony		0.8	Minor Collector						
7	5	Hemmer Road Extension South	This project will improve safety and traffic signal access to the Valley Pathways School and a large residential subdivision by extending Hemmer Road south of the Palmer Wasilla Highway.	2	$ 4,500,000	16 South Colony		1.0	Major Collector	Y	Y		Y	Y	Y
8	6	Inner-Outer Springer Loop Pathway	Construct a pathway from Cope Industrial Way to the west providing a pathway connection from Downtown Palmer to the Glenn Highway pathway.	2	$ 1,000,000	No RSA-City of Palmer		1.2	Major & Minor Collector		Y		Y	y	
9	7	Lakes Boulevard Upgrade	Reconstruct and repave Lakes Boulevard from Beaver Lake Road to Devils Club Place.	5	$ 4,500,000	21 Big Lake		5.2	Minor Collector						
10	8	Point MacKenzie Road Reconstruction MP 0-7	Reconstruct the embankment, add shoulders, and pave Pt. MacKenzie Road from KGB Road to Ayrshire Road providing improved/safer access to Port MacKenzie, Goose Creek Correctional Center and Pt. MacKenzie Agricultural District.	5	$ 10,000,000	17 Knik	Geotech Complete	7.0	Major Arterial		Y		N	Y	Y
11	9	Lucille Street and Pathway Upgrade	Project would upgrade Lucille Street and pathway from Spruce Street to Seldon Road and provide a turn lane for Tanaina Elementary School.	6	$ 4,900,000	28 Gold Trail	65%	1.0	Major Collector	Y	Y	2013	Y		

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12	10	Tex-Al Drive Extension, Upgrade and Pathway	Connect east and west segments of Tex-Al, upgrade remaining portion of the corridor to include a pedestrian pathway.	6	$ 6,325,000	16 South Colony & 28 Gold Trail	25%	3.0	Minor Collectior		Y	2018	Y	Y	Y
13	11	MSB School District (MSBSD) Shaw Elementary Turn-Lane	Add left-turn lane on the southbound lane of Wasilla Fishhook for safer access to Shaw Elementary.	6	$ 500,000	28 Gold Trail		0.1	Minor Arterial	y	y				
14	12	Engstrom Road to Trunk Road Corridor	Project would provide connection from Engstrom Road to Trunk Road connecting to a segment of Homestead Road north of the Trunk-Bogard roundabout reducing heavy traffic on Engstrom Road.	6	$ 2,500,000	25 Bogard		0.9	Minor Collector		Y		N	Y	
15	13	Edgerton Parks Road-Mtn. Trails Drive Upgrade & Pathway	Project would upgrade Edgerton Parks Road from Palmer-Fishhook Road to Mountain Trails Drive with pathway extending from Palmer-Fishhook Road to GPRA Parking Lot.	6	$ 2,800,000	16 South Colony	35%	Rd. 1.0 Path 2.0	Minor Collector		Y		Y		
16	14	Caswell Lakes Rd./Bendapole Rd./Passthebait Ave. Paving	Pave from Caswell Lakes Road down Bendapole Road and Passthebait Avenue to Hidden Hills Road.	7	$ 810,000	15 Caswell Lakes		3.5	Major Collector						Y
17	15	Cheri Lake Drive/Karen Avenue/King Arthur Drive	Corridor upgrade/improvements to a large residential area - City of Houston nomination.	7	$ 8,050,000	City of Houston & 27 Meadow Lakes	35%	3.1	Minor Collector		Y	2018	N		
18	16	Hidden Hills and Passthebait Ave. Reconstruction	Reconstruct Hidden Hills Road to collector level road from the Parks Highway to Caswell Loop and Passthebait Avenue to Bendapole Road.	7	$ 3,600,000	15 Caswell Lakes		3.6	Major Collector						Y
19	17	Boyd Road to Norman Avenue	Project would provide a collector level road connection from Palmer-Fishhook Road to Norman Avenue by way of a Hermann Avenue extension and upgrade, providing secondary access for many subdivisions.	1,6	$ 3,000,000	16 South Colony		2.2	Minor Collector		Y		N		Y
20	18	Palmer-Fishhook Separated Pathway	Provide a safe pedestrian/bicycle facility in this fast growing area of the borough from the Glenn Highway to Little Susitna River Bridge linking to the heavily used Trunk Road pathway.	1,6	$ 4,500,000	16 South Colony		8.5	Minor Arterial		Y		Y	y	

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21	19	Fern Street Upgrade and Pathway	This project would upgrade Fern Street to borough collector level road standards and include a paved pathway between KGB Road and Fairview Loop. City of Wasilla nomination.	3,4	$ 4,000,000	City of Wasilla, 14 Fairview & SOA		1.6	Minor Collector		Y		Y	Y	
22	20	Seward Meridian Parkway-Tambert Traffic Signal	Project would provide safe crossing of Seward Meridian Parkway for students attending three schools as well as for pedestrians living to the east.	3,6	$ 1,500,000	25 Bogard		N/A	Minor Arterial	Y	Y				
23	21	MSB School District 2018 Pedestrian Projects	Safe Routes to Schools Implementation: Big Lake Elementary, Machetanz Elementary, Larson Elementary, Dena'ina Elementary, Redington High School, Colony Middle School, and Talkeetna Elementary.	1,3,5,6,7	$ 2,300,000	21 Big Lk.; 16 S. Colony; 17 Knik; 25 Bogard; 14 Fairview; 29 Talkeetna		Varies		Y	Y	2018	Y		
24	22	Multi-modal Wasilla Depot	This project would provide for land acquisition and site preparation for a new transit facility which would act as a commuter, bus and passenger rail hub for the core area of the borough reducing traffic congestion. (*The acquired property and site improvements will be transferred to the City of Wasilla.*)	1-7	$ 1,500,000	City of Wasilla	10%		Interstate Hwy.		Y			Y	
25			**Total**	All	**$ 73,685,000**										
26															

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MATANUSKA-SUSITNA BOROUGH
TRANSPORTATION ADVISORY
RESOLUTION SERIAL NO. 21-02

A RESOLUTION OF THE MATANUSKA-SUSITNA BOROUGH TRANSPORTATION ADVISORY BOARD REQUESTING THE ASSEMBLY DIRECT BOROUGH STAFF TO DEVELOP, PUBLISH, AND MAINTAIN A DESIGN CRITERIA MANUAL. THE MANUAL WILL DEFINE STANDARDS, GUIDELINES, AND RECOMMENDED PRACTICES FOR THE DESIGN AND DEVELOPMENT OF TRANSPORTATION RELATED INFRASTRUCTURE.

WHEREAS, the Matanuska-Susitna Borough is the fastest growing borough in the state; and

WHEREAS, with the ever increasing population, there is a need for additional roads, trails, transit and pedestrian facilities within the Borough; and

WHEREAS, the Matanuska-Susitna Borough adopted the January 1, 2021, Subdivision Construction Manual (SCM) to guide road, drainage, and utility construction within the borough's residential and commercial subdivisions.

WHEREAS, the transportation improvements identified in the Long Range Transportation Plan (LRTP), as well as the Official Streets and Highways Plan (OS&HP), Capitol Improvement Plan (CIP), and Safe Routes to School Plan are not directly related to construction of subdivision and commercial developments; and

WHEREAS, the SCM provides limited guidance and criteria for transportation infrastructure identified in the LRTP, OS&HP, and the CIP; and

WHEREAS, the transportation improvements identified in the LRTP, OS&HP, and CIP must be designed and constructed to uniform,

consistent criteria; and

WHEREAS, Title 11, Chapter 04, Section 020 of Borough Code authorizes the Public Works Department to establish standards for the design and construction of roads in the borough; and

WHEREAS, the Borough has no published standards, guidance, and recommended practices for the design, development, and construction of transportation improvements not described in the SCM; and

WHEREAS, it is in the best interest of Borough to provide standardized design criteria and guidance to ensure transportation improvements are uniform and consistent.

NOW, THEREFORE, BE IT RESOLVED the Matanuska-Susitna Borough Transportation Advisory Board (TAB) recommends the Borough Assembly direct Borough staff to develop, publish, and maintain a manual that identifies, describes, and establishes the technical requirements, standards, and guidance for borough transportation and infrastructure improvement projects.

BE IT FURTHER RESOLVED the TAB recommends the manual specifically include criteria for following topics:

1. Roads and streets
2. Drainage and hydrology
3. Traffic control
4. Non-motorized transportation facilities
5. Transit
6. Public parking areas
7. Bridges

8. Illumination

9. Intelligent Transportation Systems (ITS) and autonomous vehicle infrastructure.

BE IT FURTHER RESOLVED the TAB recommends the manual be updated regularly to stay abreast of current design practices, standards, and procedures.

ADOPTED by the Matanuska-Susitna Borough Transportation Advisory Board this _____ day of MONTH, 2021.

_____
, Chair

ATTEST:

_____
Kim Sollien
Transportation Advisory Board Clerk

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2021 School Facility Design Criteria Manual

(This edition supersedes all previous or undated copies)

Plan Contacts

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501 North Gulkana
Palmer, AK 99645
907-761-4000
www.matsuk12.us

Jim Estes
Executive Director of Operations
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"School designs in K-12 education in the Mat-Su Borough must meet the needs of a continuing growing population while accommodating changing educational needs. Making the most of every dollar spent on school design and construction, schools, and the District alike, look to fuse modern learning with modern tools. We want to ensure that our schools provide efficient and effective spaces for students and teacher collaboration and interaction. School design is about meeting the needs of our students—today and into their future."

Dr. Randy Trani, Superintendent

FACILITY DESIGN AND CONSTRUCTION CRITERIA MANUAL

MSB – Matanuska-Susitna Borough
MSBSD – Matanuska-Susitna Borough School District

Message to the Designers**:**

This document is intended to assist professional designers and tradesmen qualified in their specific field. It is not intended to replace good judgment, best construction practices or sound engineering principles. Rather, it is to list preferred types of materials and equipment and to identify those types that should be avoided based upon problems experienced on previous School District/Borough projects. There are standards outlined in this manual. Deviating from preferred products within each type listed should only be done after Designers have discussed proposed deviations with MSBSD Operations and Maintenance. When the manual clearly states “do not use” a specific product, it is unlikely that product would be accepted under any condition. However, the most important guideline in the selection of construction materials is the strict compliance with mandatory building codes and industry reference standards.

Users of this manual are invited to offer suggestions for improving the document. However, material suppliers should not take this as an invitation to seek District or Borough endorsement of their product or to have it included herein as a standard. Use of this standard does not relieve the design professional from adhering to engineering practices, applicable codes, etc. Where there is a conflict between the contents of this standard and applicable code that which is more stringent will take precedence. Direct all questions and comments to the MSBSD.

This edition supersedes all previous editions, specifically including undated copies. Please discard any outdated copies. To obtain a copy of the current edition please contact the MSBSD Operations and Maintenance Department at 864-2000.

Any designed deviation from this FDCM requires submission in writing by the designer with justification and approved by the MSBSD Director of Operations & Maintenance.

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LEED STATEMENT

Leadership in Environmental Energy Design (LEED) – The Matanuska-Susitna Borough School District, in an effort to promote "Green Building and Green Infrastructure" within its realm of responsibility is requiring these two concepts be addressed as they would apply within all architectural design and design/build projects (MSB Resolution Serial No. 07-137 and MSB Information Memorandum No. 07-310). It is understood that one or both concepts may or may not apply to every project. Designs will address each of these concepts separately, as supported by project budget.

The concept of Green Building is to maximize energy efficiency and conservation methods and techniques. The areas for consideration are, but not limited to, indoor air quality standards, maximize waste reduction and promote recycling. Discussion of the Leadership in Energy and Environmental Design (LEED) program and the rating to which is applicable/obtainable and/or the minimum principles recommended will be addressed. The Architect will address in percentages, the cost increases, and savings the MSBSD could expect in both the construction phase and in maintaining and operating the facility.

An effort to promote the retention of native vegetation, protect water quality methods and techniques, conserve local soils and maintain natural green spaces will be addressed. The MSBSD's design and design/build projects will maximize the retention of natural vegetation on building sites and minimize disturbances to water bodies and riparian habitat, if at all possible. The areas for consideration, as they apply, are buffers along water bodies, wetlands functions, flood and erosion prevention, wildlife habitat, fish passage, forest health, connectivity with other green spaces, trail corridors and parks and recreation. Designs will implement green infrastructure strategies and Best Management Practices for Development Around Water Bodies (MSB Ordinance 05-023) in their design and project construction. Discussion of conservation easements with a certified land trust, conservation platting restrictions and/or land use covenants as they apply to the site will be addressed.

MSBSD desires to have high performance school buildings that are consciously designed to have a long life with low environment impact. High performance schools join together the very best of today's design strategies and building technologies, as well as:

- Provide a healthy and comfortable indoor environment
- Conserve energy, resources, and water
- Functions as a teaching tool
- Serve as a community resource for neighborhood meetings and functions
- Ensure easy maintenance operation
- Create a safe and secure educational atmosphere
- Built to last with minimal repair

Also, high performance schools are cost-effective and help to protect the environment.

GENERAL PHILOSOPHY OF DESIGN

All school district facilities are public property and are normally obtained entirely at public expense. For this reason, the district is obliged to endeavor to obtain facilities that provide maximum benefit to the public for the money expended. Schools, as public facilities, should be available to the public for any reasonable public purpose that does not impair the facility's use as a school. However, since construction funds for schools usually are appropriated specifically for educational purposes and state funding usually will be dedicated exclusively to meeting defined educational needs, these facilities must be designed as schools first and accommodation of other public purposes must be given secondary consideration only. Some public amenities, such as hockey rinks and other recreational facilities, are specifically disallowed from construction using state funds for schools.

One very important goal of the FDCM is to improve public health, safety, and general welfare by enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact or positive impact and encouraging sustainable construction plans. To obtain maximum benefit in a school facility the design must address the following:

Design Program: Does it meet the space and other functional requirements of the Educational Specification developed specifically for this project? Can the built environment be used as a context for learning?

Security: Does it provide a protected and defensible place for students, staff, and public property?

Health: Does it provide a safe and healthy environment for students and staff?

Sustainability: Is sustainability integral to the entire project through skillful, sensitive, and intuitive design applications adaptable a variety of demands with particular attention to USGCB's LEED certification requirements?

Energy Management- Are separate air and light systems being used to reduce utility consumption in unoccupied spaces outside of school hours?

Durability: Does it have appropriate materials, finishes and equipment to provide a long useful life?

Maintainability: Can the building be kept clean and in good repair without excessive maintenance costs or issues?

Cost Control: Are the design and materials free of extravagance? Likewise, materials having a high initial cost are acceptable provided there is appropriate compensation in the form of a long useful life, low maintenance or vandal resistance to justify the difference.

Design Quality Control: Is the design thoroughly reviewed by District and Borough staff and the design committee at appropriate stages of development? For major projects, a value engineering process is encouraged and may be required by the district.

Adherence to this manual: A key purpose of this manual is to assist designers in covering the above areas of concern by prescribing specific standards for components of the facility. Minimum standards are identified for quality of materials, standardization of components and performance standards for equipment.

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Abbreviation List

AAC- State of Alaska Administrative Code

ADEC- Alaska Department of Energy Conservation

AHERA- Asbestos Hazard Emergency Response Act

AHJ- Authority Having Jurisdiction

ANSI- American National Standards Institute

ASHRAE- American Society of Heating, Refrigerating, and Air-Conditioning Engineers

BAS- Building Automation System

CMU- Concrete Masonry Unit

CQC- Contractor Quality Control

CPSC- Consumer Public Safety Council

CTE- Career Technical Education

DEC- Department of Environmental Conservation

DEED- Department of Education and Early Development

EIFS- Exterior Insulation and Finish Systems

FRP- Fiberglass Reinforced Plastic

GWB- Gypsum Wallboard

IPEMA- International Playground Equipment Manufacturers Association

MPR- Multipurpose Room

MSBSD- Matanuska-Susitna Borough School District

MSB- Matanuska-Susitna Borough

NBS- National Borough of Standards

NEC- National Electric Code

NFS- Non-Frost Susceptible

NRCA- National Roofing Contractors Association

NSF- National Sanitation Foundation

O&M- Operation and Maintenance

RAR- Response Action Report

VAV- Variable Air Volume

VCT- Vinyl Composition Tile

Division 00- Procurement and Contracting Requirements

00 21 13 Instructions to Bidders

Part 1- General

1.01 General Bidding Requirements

A. Bidders are cautioned that mailed bids, which arrive after the time of the scheduled bid opening, will not be opened, or considered. It is the Bidders sole responsibility to ensure that their bid is in the physical possession of the Purchasing Department prior to the scheduled time for the opening of the bid.

B. The submission of a bid shall be an admission that the Bidder has made such, examined the proposed works site and is satisfied as to the conditions to be encountered in performing the work and as to the requirements and accuracy of the Bid Documents.

C. Bidders shall notify the Purchasing Department promptly of any error, omission, or inconsistency that may be discovered during examination of the bid documents.

D. Use “lump sum” as basis of bidding to the maximum extent possible unless special provisions are made on an individual project basis. Coordinate this with the MSBSD during the design development. Consider the use of “Best Value” as basis of bidding.

E. If additional work is anticipated but the scope cannot be clearly defined or if unit prices are required for some other specific reason, review project with MSBSD to determine best method of establishing unit pricing in specification.

F. If unit pricing is to be part of bid proposal, specify the length of time the unit pricing is to remain in effect.

G. Bids shall specify a price, typed or written in ink for each bid item called for. Bids may be rejected if they show any omissions, alteration of the forms, additions not called for, conditional or alternate bids not called for, qualified bids, or irregularities of any kind.

H. If additive alternates are to be a part of the bid proposal, specify length of time additive alternate pricing is to remain in effect.

I. Project documents (drawings and specifications) are to be provided to the MSBSD in both paper and electronic format. Coordinate exact numbers of each with the MSBSD during the design process.

J. Prior to the final selection, Bidders may be required to submit additional information, which the MSBSD may deem necessary to further evaluate the bids.

K. The MSBSD reserves the right to make investigations of the qualifications of the Bidder as it deems appropriate, including but not limited to, a background investigation conducted by proper authorities.

L. The MSBSD may, from time to time, require modifications in the Scope of Services to be performed under this Agreement. However, it is expressly understood that this Agreement shall not under any circumstances be modified without written authorization from the

MSBSD. All modifications in the terms of this Agreement shall be incorporated by written amendments to this Agreement executed by both parties.

M. The selected Bidder shall not delegate duties or otherwise subcontract work or services under any agreement without prior written approval of the MSBSD.

N. The MSBSD may terminate any awarded contract of Agreement at any time by serving written notice to the selected Bidder of such termination and specifying the effective date of termination at least ten (10) days prior to the effective date of termination.

O. This Invitation to Bid and the resulting bids received, together with copies of all documents pertaining to the award of a contract, will be kept by the Purchasing Department and made a part of the record which will be open to public inspection, unless restricted by the Bidder and/or School Board Policy. If a bid contains any information which is proprietary or confidential, each page of the bid must be clearly marked. Cost or price information will be open to public inspection after award of bid.

P. The MSBSD is exempt from Federal Excise Taxes. Exemption Certificate will be furnished when required.

Q. The successful Bidder shall procure and maintain minimum insurance requirements and shall provide proof of coverage to the MSBSD upon award of any agreement. Failure to furnish proper evidence of insurance, or the lapse of insurance required under the provisions of the agreement, may be ground for termination.

R. It is highly recommended that Bidders confer with their respective insurance companies or brokers to determine if their insurance program complies with the MSBSD's insurance requirements.

S. All individuals or businesses conducting business within the State of Alaska and within the Mat-Su Borough are hereby advised that they must obtain both a State of Alaska and a Mat-Su Borough business license.

T. Bids may be withdrawn upon written request delivered to the MSBSD Purchasing Department prior to the time specified for submittal of bids. However, no Bidder shall withdraw or cancel his/her bid for a period of ninety (90) days after said advertised closing time for the receipt of bids, nor shall the selected Bidder withdraw, cancel, or modify their bid after having been notified by the Purchasing Department that said bid has been accepted by the MSBSD.

Division 01- General Requirements

01 10 00 Summary

Part 1- General

1.01 General Summary

A. Must have a clearly defined scope of project and work limits must be provided.

B. Comply with all current laws, rules, and regulations of State of Alaska Administrative Code for all MSBSD designs. Only those codes formally adopted or codified are mandatory. The following contains requirements applicable to MSBSD construction work:

1. Building Code (IBC/UBC)
2. Fire Code (NFPA)
3. Electrical Code (NEC)
4. Mechanical Code (IMC)
5. Plumbing Code (UPC)
6. International Energy Conservation Code (IECC)
7. Energy Standard for Buildings current (ASHRAE 90.1)
8. Underwriters Laboratory, Inc. (UL) or approved equal (as referenced)
9. American National Standards Institute (ANSI) (as referenced)
10. American Society for Testing and Materials (ASTM) (as referenced)
11. Consumer Product Safety Commission (CPSC)
12. American with Disabilities Act of 1990 (ADA)
13. Department of Environmental Conservation (DEC)

C. In addition, if applicable, review the individual DEED project agreement for compliance with supplied list of potentially applicable statutes, codes, regulations, standards, and guidelines.

D. Designers will provide and review with MSBSD a list of appropriate governing agencies during schematic design phase. As directed by the Project Manager, designers shall review and obtain all permits and approvals for the project from appropriate state and local agencies, such as State of Alaska Department of Education and Early Development (DEED), State of Alaska Fire Marshal, State of Alaska Department of Environmental Conservation, Environmental Protection Agency, and others as necessary in the course of the project development.

E. Identify construction schedule for completion of spaces, fire alarm systems, sprinkler systems, etc. and responsibilities for beneficial occupancy. Schedule is to indicate number of calendar days from “Notice to Proceed” to “Substantial Completion”.

F. Provide for coordination of MSBSD-furnished Contractor-installed items, such as blocking, inserts, templates, etc. Storage and staging of furnished equipment will be furnished by the MSBSD.

G. **Provide schedule of all proposed deviations unless otherwise noted in the FDCM with justifications for same. MSBSD has first right of refusal.**

H. Provide schedule of salvaged items and equipment.

I. The Contractor will be charged the difference in the monthly utility cost for the previous year whenever the amount exceeds $200.00 in a single month. (This condition applies only when an existing building is being remodeled and has the capacity to provide the service.)

01 25 00 Substitution Procedures

Part 1- General

1.01 Substitution Guidelines

A. There are to be no substitutions allowed to specified products prior to bid.

B. The Contractor is to submit any requests for substitutions on a “Request for Substitution” form which is included in the project specification. At a minimum, Contractor shall certify in the Request for Substitution that the proposed substitute product(s) will:

1. Perform adequately the functions required by design and specifications
2. Be similar and equal or better in performance to that specified
3. Be suited to the same use and function as that specified
4. Be equal or exceed all other specifications.

C. It is the Contractor’s responsibility to indicate any deviation in the substitute products performance, appearance, or quality from the originally specified material, equipment, or detail**. No substitute shall be ordered or installed without written approval of MSBSD, who shall be the judge of quality and who may require Contractor to furnish additional data regarding a proposed substitute product.**

D. It is the responsibility of the Architect/Engineer to review all substitution requests and discuss the advantages and disadvantages of each with MSBSD. Where appropriate due to lower cost material or labor savings the substitution request shall include monetary credit to the project.

E. MSBSD in coordination with the proper department shall give the final approval of any substitute product.

F. The Architect/Engineer must review any/all changes in furnishings with MSBSD.

01 29 00 Payment Procedures

Part 1- General

1.01 Summary

A. Use of AIA documents G702 and G703 for pay requests and G703 for schedule of values is encouraged but not required. “Pay Requests” in a “Schedule of Values” format is preferred and must be approved by both Architect and MSBSD.

B. Pay Requests will not be approved if Certified Payroll as required by MSB’s General Conditions is not current or if the project progress photos are not current.

01 31 19 Project Meetings

Part 1- General

1.01 Summary

A. Contractor shall submit as part of the mandatory preconstruction meeting requirements digital photos of the conditions before any work is performed. Photos shall document the condition of the project prior to any work being done and verify Contractor’s acceptance of project’s “as is condition”.

B. A schedule for “on-site” construction progress meetings to review progress and discuss problems or items needing special coordination should be established. Frequency shall be a minimum of once per week.

C. Contractor shall submit as part of the mandatory preconstruction meeting requirements one (1) digital copy of the project prior to any work performed. These photos shall document the condition of the project prior to any work being done and verify Contractor’s acceptance of project’s “as is condition”. Submit photos in digital format with appropriate documentation by the date determined at the preconstruction meeting but generally within one week of the preconstruction meeting.

D. Ongoing daily project photos are to be taken and submitted on a regular basis (weekly) at the on-site construction progress meetings. One (1) digital copy is to be submitted in digital format with appropriate documentation.

01 33 00 Submittal Procedures

Part 1- General

1.01 Required Submittals

A. Submittals shall include the following:

1. Provide complete product data that includes the following:

a. Manufacturer's technical data for all material and equipment at the system and sub system level

b. A system description including analysis and calculations used in sizing equipment. The description shall show how the equipment will operate as a system to meet the performance requirements. The following information shall be supplied as a minimum:

1. Description of site equipment and its configuration

2. Startup operations

2. Shop Drawings

3. O&M Manuals shall consist of the following:

a. Operators Manual

b. Maintenance Manual

4. As-Built Drawings after products are installed

5. Manufacturer's warranty on all products and equipment

01 41 13 Codes

Part 1- General

1.01 General Mechanical Codes

A. Comply with all current laws, rules, and regulations of the State of Alaska Administrative Code (hereinafter referred to as AAC) for all MSBSD designs.

B. All mechanical and electrical work shall comply with the codes or guidelines, latest edition, as applicable to the project.

C. The following contain requirements applicable to MSBSD construction work:

1. Industrial Ventilation, American Conference of Governmental Industrial Hygienist (latest edition)

2. National Fire Protection Association (NFPA)

3. International Fire Code (IFC)

4. International Mechanical Code (IMC)

5. International Building Code (IBC)

6. International Energy Conservation Code (IECC)

7. Energy Standard for Buildings current (ASHRAE 90.1)

8. General Safety Code (OSHA)

9. Uniform Plumbing Code (UPC)

10. Underwriters Laboratory, (UL) or approved equal
11. American National Standards Institute (ANSI)
12. American Society for Testing and Materials (ASTM)
13. Institute of Electrical and Electronics Engineers (IEEE)
14. Insulated Cable Engineers Association (ICEA)
15. National Electrical Manufacturers Association (NEMA)
16. EIA/TIA.606. Administration for the Telecommunications Infrastructure of Commercial Buildings
17. BICSI. Telecommunications Distribution Methods Manual
18. IEEE Standard 142
19. SMACNA. HVAC Duct Construction Standards, Metal and Flexible
20. SMACNA. Industrial Duct Construction Standards
21. SMACNA. Fire Damper Guide
22. NFPA Air Conditioning, Warm Air Heating, Air Cooling and Ventilating Systems, Pamphlet Nos. 90, 90A, 91, 96
23. State of Alaska Department of Labor, Mechanical Inspection Division
24. ASHRAE guide and SMACNA design guides are applicable for design and construction methods

1.02 Security Codes

A. The codes and regulations below form a part of the specifications for Security Management Systems. Work shall be performed in accordance with the applicable international, federal, state, and local codes or standards current at the commencement of installation. The following list summarizes applicable standards:

1. UL 294, “Access Control Systems Units”
2. UL 1076, “Proprietary Burglar Alarm Units and Systems”
3. FCC- Part 15 “Radio Frequency Devices”
4. FCC- Part 68 “Connection of Terminal Equipment to the Telephone Network”
5. NFPA 70, NEC

01 42 00 References

Part 1- General

1.01 School identification numbers are:

1-9, 101-109 High School

10-19, 110-119 Middle School

20-29, 120-129 Test/Network Management

30-59, 130-159 Elementary

60-69, 160-169 Charter

70-79, 170-179 Alternative

80-89, 180-189 Transition Sites (i.e., Redington Jr/Sr)

90-99, 190-199 Administrative

01 43 13 Manufacturer Qualifications

Part 1- General

1.01 Requirements

A. The manufacturer shall be an established organization with referenced and documented experience in delivering and if applicable maintaining the product or service at equal or high sophistication than the project being bid on.

01 45 00 Quality Control

Part 1- General

1.01 Contractor Responsibilities

A. Contractor is responsible for Preparatory Phase meeting to review test requirements applicable to the work and project. Attendees are to include Contractor's CQC Manager and superintendent, Project Manager, architect/engineer, testing firm representative and subcontractors.

B. Contractor is responsible for obtaining all permits necessary for project completion.

C. Contractor is responsible for calling Special Inspector or testing firm for inspections. Notice shall be a minimum of 24 hours in advance. All reports shall be available at the next project meeting.

D. Contractor shall have approved plans and current construction documents, including redlines, on-site at all times, available for reference and clarification.

E. Contractor is responsible for retaining on-site copies of all tests and inspection records submitted by Special Inspector.

F. Contractor is responsible for coordination of inspections to avoid disruption of construction.

G. Contractor shall furnish all required lifts, labor, samples, and electrical power, fuel, etc., for testing and inspections.

H. Contractor is to report all test results including deficiencies, promptly to the architect and to the MSBSD Capital Planning / Construction Manager.

I. Coordinate with laboratory personnel to provide access to work.

J. Provide all preliminary mix designs proposed for all concrete work and other material mixes to the laboratory.

K. Repair test holes to match existing material and protect test samples.

L. Contractor is responsible for all retesting where results of required inspections, tests, or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements. The costs of retesting, construction, or replacement are the Contractor's responsibility.

M. Contractor shall obtain and pay for all incidental testing necessary to qualify materials for use in the work. This will include but is not limited to: material quality tests, mix design, equipment calibrations, plant calibrations, optimum moisture and maximum density curves and other similar tests as required to qualify materials for compliance with specified standards for field control tests. Contractor's inspection service providers must be qualified / certified.

N. Contractor shall coordinate with Project Manager and/or Engineer/Architect for testing schedules and submit all test results weekly.

O. O & M training for all equipment shall be provided by the Contractor.

P. Contractor's Quality Control submittals shall include:

1. Name and qualifications of CQC Manager
2. Quality Control Plan
3. Submittal log with division, paragraph, line item specified
4. Testing Agencies Qualifications
5. Planned schedule of tests and inspections
6. Test reports
7. Permits, licenses and certificates as required by MSBSD to establish compliance with standards and regulations of the project specifications

1.02 Quality Control Plan

A. Within 14 days of Contractor's receipt of Notice to Proceed Contractor shall submit the proposed Contractor Quality Control (CQC) Plan to designated Mat Su Borough representative. This plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used.

B. At a minimum, the CQC Plan shall include the following:

1. Description of quality control organization, including name, qualifications, duties, responsibilities, and authorities of each person assigned a CQC function, including the CQC manager.
2. Control, verification, and acceptance testing procedures for each specific test.
3. Procedures for tracking preparatory and follow-up control phases.
4. Procedures for verification and acceptance tests, including documentation.
5. Procedures for tracking construction deficiencies from identification through acceptable corrective action including the verification process of corrected deficiencies.
6. Contractor shall maintain records on-site showing quality control activities are being performed.
7. Sample of daily CQC report chronicling project progress including as a minimum the following:
    a. Contractor/ subcontractor areas of responsibility
    b. Operating equipment hours
    c. Location and description of work and number of tradesmen
    d. Test and control activities
    e. Materials received on the site
    f. Instructions given, received, and conflicts in plans or specifications
    g. Other remarks impacting quality control or progress
    h. Verification or certification statement
    i. Outside weather conditions and building interior conditions
8. A report covering the above items shall be either sent to the Project Manager or available on-site before noon of the next workday.
9. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there is frequently more than one definable feature under a particular section.

1.03 Quality Control Organization – CQC Manager

A. Contractor shall identify a CQC Manager who shall be overall manager of CQC and have Contractor authority in all CQC matters.

B. The CQC Manager should have a minimum of ten (10) years in construction and three (3) years in quality control management or construction inspection, preferably some quality control training as offered by Association of Contractors.

C. The CQC manager will be on-site at all times when construction is being done by the Contractor and/or sub-contractors.

1.04 Control

A. Contractor Quality Control is the means by which the Contractor ensures all construction work and materials supplied complies with contract requirements.

B. At least two phases of control shall be conducted by the CQC Manager for each definable feature of work as follows:

1. Preparatory Phase

This phase shall be performed prior to beginning work on each Definable Feature of Work; after all required plans/documents/materials are approved, and after copies are at the work site. It will be attended by the MSBSD, Architect, the Contractor and principal sub-contractor. The MSBSD shall be notified at least 48 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC Manager and attended by the Superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be prepared by the CQC Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications. This phase shall include:

a. A review of applicable specifications, reference codes and standards, copies of which will be maintained on the job site until final acceptance of the work

b. A review of the contract drawings and all changes that have occurred throughout the construction process

c. A review to assure all materials and/or equipment have been tested, submitted, and approved

d. Review of provisions required for control inspection and testing

e. Examination of work area to assure all preliminary work is complete and in compliance with the contract

f. A physical examination of required materials, equipment, and a “mock-up” sample to assure quality acceptance

g. Review of applicable procedures for controlling quality of the work

h. Review of applicable construction tolerances and workmanship standards

i. A review to ensure work to be performed has MSBSD approval

j. Discussion of the initial control phase.

2. Follow-up Phase

Daily checks to assure control activities including control testing are providing continued contract compliance. These checks shall be documented in the daily CQC reports.

Final follow-up checks shall be conducted, and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon nor conceal non-conforming work.

1.05 Testing and Inspection Services

A. The Contractor shall provide professional inspections, tests and similar services by certified agencies as required by the contract, specification requirements and governing authorities. Testing also includes operational, acceptance and commissioning tests, although these may be conducted by the factory or commissioning firm and in some cases by the contractor.

B. During the testing, the Contractor will:

1. Verify the testing procedure complies with contract requirements.

2. Verify the facilities and testing equipment are available and comply with testing standards.

a. Check for current calibration on instruments.

b. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

c. All network connections (both copper and optical) need to be tested after installation, and a copy of the certification results needs to be furnished to the MSBSD.

C. MSBSD reserves right to direct specific location or area of work to be tested in accordance with contract requirements.

D. Testing Laboratory Services

1. Qualifications of Laboratory

a. Independent laboratory approved by Architect or building official.

b. Meet “Recommended Requirements for Independent Laboratory Qualifications” latest edition published by American Council of Independent Laboratories.

c. Meet ASTM E-329 latest edition, “Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel Used in Construction”.

d. Must have current engineer licensed in the State of Alaska to review tests and services.

2. Laboratories Duties

a. Ascertain and certify compliance with Contract Documents.

b. Promptly submit written inspection and test reports to Project Manager, Architect and Contractor within 48 hours of inspection.

c. Prepare and submit written reports include at a minimum the following:

1. Date of Issue

2. Project and title
3. Name and address of testing agency
4. Dates and locations of samples and tests
5. Names of individuals making tests and inspections
6. Description of work and test method
7. Identification of product and specification section
8. Complete inspection or test data
9. Test results and interpretation
10. Record of weather both inside and outside the test site
11. Comments or professional opinion on whether tested or inspected work complies with the contract specifications
12. Name and signature of the laboratory inspector
13. Recommendations on re-testing and re-inspection

d. Laboratory is not authorized to:
1. Release, revoke, alter, or enlarge on Contract Documents requirements
2. Approve or accept any portion of the work
3. Assume any duties of Contractor
4. Issue a stop work order

1.06 Observation

A. The following stages of construction specifically require observation by the Architect, Project Manager and utility or authority with jurisdiction. Contractor shall also provide digital images before and after each stage of construction listed below.

B. Stages requiring a minimum two (2) day advance notice for incremental parts:
1. Completion of trench excavation prior to placement of bedding
2. Completion of a utility prior to backfill
3. Completion of sub-drainage and underground piping
4. Completion of driveway, parking lot, sidewalk, etc., prior to installation of geo-textile fabric and prior to placement of pavement
5. Completion of excavations for footings and foundations
6. Completion of forming prior to concrete placement- verify rebar correctly installed and subgrade utilities and conduit etc. are correctly installed
7. Completion of masonry as damp proofing work is beginning
8. Wall framing and sheeting on one side of a wall

9. Mechanical and electrical rough-in
10. Insulation and vapor barrier installation prior to cover
11. Completion of mock-ups and finishes
12. Beginning of roofing

C. Stages requiring a minimum five (5) day advance notification:
1. Substantial completion
2. Operational Training
3. Final Completion

1.07 Completion Inspection

A. Contractor will prepare a “Punch List” inspection report near the scheduled end of the project. Deficiencies will have been corrected or a date for correction will be listed. After Contractor has completed this “Punch List” inspection the Contractor will notify MSBSD the project is ready for the substantial completion inspection.

B. MSBSD/ Project Manager will determine which deficiencies will need correction prior to award of Substantial Completion.

C. Prior to one year of operation there will be a warranty inspection to evaluate all building systems and components.

D. When applicable a DEC approved water test shall be pre-formed prior to the one-year warranty expiration date.

1.08 Notification of Non-Compliance

A. MSBSD Project Manager will notify Contractor of any detected non-compliance with contract requirements. Contractor will take immediate corrective action upon receipt of such notice. Such notice when received at the job site is sufficient for Notification of Non-Compliance. If Contractor fails or refuses to address Non-Compliance, the Project Manager may issue a stop work order for all or part of the work until satisfactory corrective action has been taken. No time, costs or damages associated with such stop orders can be part of a claim for extension of time or for excess costs or damages by Contractor.

B. Non-Compliance notices must have follow-up release notifications from the MSBSD or Architect as part of the CQC record documents.

01 50 00 Temporary Facilities and Controls

Part 1- General

1.01 Temporary Facilities and Controls Requirements

A. Contractor shall make provisions for temporary power, lighting, heating, ventilation, plumbing, toilet facilities and communications during the course of construction.

B. Unless project constraints dictate a different approach, the MSBSD will assume all utility costs after the date of substantial completion for the phase of the project which has been completed.

C. Architect to review design in regard to extent and location of construction barriers, areas for materials storage and areas to be utilized for construction staging. The Architect will review the proposal with the MSBSD. Specify types of barriers and provide details for construction as required.

D. Contractor shall be responsible for their own on-site security both during and after hours of all construction projects. Upon request the MSBSD will provide the Contractor with keys as required.

E. The Architect is to review the design with the MSBSD and make provisions in the drawings and specifications which outline the extent of noise and dust control barriers which are to be provided, if any.

F. During times when school is in session, the facility will function during the normal established hours for school. School functions shall have priority use of existing facilities unless provisions are made and agreed to by MSBSD. Architect shall coordinate with MSBSD and will provide an outline of acceptable work hours in the specification for Contractor construction in progress during the school year. Contractor shall make necessary accommodations in work schedule so as not to interfere in normal school routine.

G. Specifications shall note Contractor is responsible for ensuring all temporary power is to be installed in a code approved manner and shall be disconnected and removed from the site at completion of project.

H. Specifications should note Contractor is responsible for returning all areas utilized for construction purposes back to original condition at completion of project if these areas are not being covered elsewhere in construction documents.

01 77 00 Closeout Procedures

Part 1- General

1.01 Closeout Requirements

A. Specifications shall dictate the Contractor provide MSBSD with a set of construction drawings with all construction As-Built changes marked legibly. Drawings to include actual locations of major conduit runs, piping and underground utilities. Architect/Engineer shall deliver these record drawings with electronic copies and prints to MSBSD.

B. Based upon Contractor furnished markups the Architect/Engineer shall prepare and submit two (2) full sets of As-Built prints, one (1) ½ size set of prints, and three (3) digital copies of record drawings to MSBSD.

C. The Architect/Engineer is to provide a complete list of Operations and Maintenance requirements in one section of the specifications and is responsible for reviewing this list with the MSBSD prior to project bid.

D. Specifications shall require Contractor to submit two (2) copies of each Operations and Maintenance manual which at a minimum will include the following information:

   1. Product data
   2. Parts numbers and illustrations
   3. Maintenance information to include the Operators and Service Manuals for all serviceable products and equipment installed
   4. Preventative Maintenance schedule to include specific make, model, and room location of equipment
   5. Names and addresses of suppliers of replacement products
   6. Special cleaning and care instructions for all finish materials
   7. List of all spare parts which should be maintained on hand

E. Specifications shall require Contractor to coordinate with Architect, Owner, and appropriate subcontractor(s) to provide MSBSD personnel training for all systems.

F. Specifications shall dictate all training seminars to be scheduled a minimum of two (2) weeks in advance. Operations and maintenance seminars shall include a thorough hands-on systems demonstration by the appropriate subcontractor. It is required that a video record and appropriate training material be provided to MSBSD Maintenance in electronic format for future reference.

G. Individual specifications may require the Contractor to fully test all systems to confirm the system is fully operational in accordance with the intent of the design.

H. The Contractor will neatly store, separate, and identify all spare parts and maintenance materials required in other portions of the specifications. The Contractor will be responsible to turn these items over to the MSBSD at the end of the project.

I. All Punch List items shall be completed by project completion date. The Contractor shall ensure each item on the Punch List has been completed by providing Architect and MSBSD with a copy of the original Punch List on which each completed item on the punch list has noted as completed with a signature/initial and a date for re-inspection.

J. Provide final certification stating no asbestos materials were used in construction.

K. Provide all warranty information in the appropriate section of the Operations and Maintenance Manual. Warranties will include all individual product warranties and guarantees along with complete contact information for each individual vendor providing those products.

L. Contractor shall submit a complete set of photos that verify the completion of project scope. Submit photos in digital format with appropriate documentation.

Division 02- Existing Conditions

02 30 00 Subsurface Investigation

Part 1- General

1.01 Subsurface Investigation Requirements

A. The MSBSD will require the Architect/Engineer to furnish soils and survey data under third party services.

B. Site survey information will be included in contract documents. Note all pertinent existing utilities, buried tanks, wells, etc.

C. Soils Report or Geo-Tech Report shall be made available to bidders and contractors but not bound in bid documents.

02 41 13 Selective Site Demolition

Part 1- General

1.01 Non-Hazardous Materials

A. Contractor to coordinate all items to be demolished and salvaged with MSBSD, otherwise the Contractor is to remove and legally dispose of all demolished items off site.

B. Contractor will photograph entire project prior to demolition and submit a digital copy of photographs to MSBSD with appropriate documentation

1.02 Hazardous Materials

A. Consult with MSBSD regarding potential hazardous materials requiring special treatment or abatement. Communicate specific regulatory requirements in writing, including responsibility for hazmat survey, State Notification, testing and abatement.

B. Contractor will supply MSBSD with letter of AHERA (Asbestos Hazard Emergency Response Act) compliance on all new construction. AHERA Exclusion Document requires the signature of either the architect or engineer of record.

C. Contractor will supply MSBSD with letter of verification on legal disposal and chain of custody documentation on all remodels (AHERA).

D. Contractor will supply MSBSD with letter of AHERA compliance on all renovations.

E. Response Action Report (RAR) is required for any construction project that disturbs asbestos. Supply MSBSD with RAR at completion of project.

Division 03- Concrete

03 30 00 Cast-In-Place Concrete

Part 1- General

1.01 Cast-In-Place Concrete Requirements

A. For concrete slabs on grade receiving membranes of any kind (wood flooring, liquid applied flooring, adhesive applied finish, etc.) specifications should call for independent testing immediately prior to and during the flooring installation. Tests shall include moisture content, slump, air entrainment, compressive strength, and alkalinity.

B. Provide compacted Non-Frost Susceptible (NFS) fill to a minimum depth of 6' 0" below all loading docks and entry slabs to prevent heaving at doors.

C. Color, if used, in exposed concrete shall be integral. Paints or stains must be MSBSD approved.

D. Apply sealer to all exposed concrete as appropriate.

E. Use of foundation / footing drain(s) required.

F. Layout of sidewalks 8' width minimum should relate to actual paths people will walk as opposed to geometric figures or abstractions. All sidewalks will be edged with a minimum ¾" radius. Any sidewalks under 8' width must be approved by MSBSD rep.

03 35 00 Concrete Finishing

Part 1- General

1.01 Concrete Finishing Requirements

A. High traffic and loading dock areas shall have a broom concrete finish

B. Protection

1. Protect floor from any stains during the course of construction.

a. All hydraulic powered equipment must be protected in such a manner to avoid staining the concrete.

b. If it becomes necessary to complete the scope of work and a vehicle is required on the interior slab, drop cloths will be placed under vehicles at all time.

c. No pipe cutting machine will be used on the inside floor slab without proper protection.

d. Protect slab prior to placing steel to avoid rust staining.

e. Avoid acids or acidic detergent contact with slab.

f. General Contractor is required to inform all trades that the slab must be protected at all times.

C. Products

1. Basis of Design Concrete Hardening/Finishing System
    a. Retro-Plate 99 manufactured by Advanced Floor Products, Inc. or MSBSD approved equal.
        1. Performance Criteria must meet ASTM standards
    b. Certified applicators to perform work is required
    c. Manufacturer's regional representative must be consulted on all applications.

D. Surface Conditions: Examine substrate with installer present, for conditions affecting performance or finish. Correct conditions detrimental to timely and proper work. Do not proceed until unsatisfactory conditions are corrected.

E. Application
    1. Sealing, Hardening and Polishing of Concrete Surface
        a. Allow a minimum of 45-day curing time or a time as specified by the manufacturer prior to application of polishing/hardening system.
        b. At a minimum, 10 days curing time post finish application before equipment is placed on finished floor.
        c. Only a certified applicator shall apply the polishing/hardening system. Installer is required to follow installation guidelines and procedures as recommended by the product manufacturer and as required to match approved test sample.

F. Protect finished work until fully cured in accordance with manufacturer's recommendations.

03 35 19 Colored Concrete Finishing

Part 1- General

1.01 General Requirements

A. Concrete coloring must be approved by MSBSD rep after request by designer, engineer, or contractor.

Part 2- Products

2.01 Colored Concrete Products

A. Scofield product or MSBSD approved equal

Part 3- Execution

3.01 Application

A. Apply stain to concrete per manufacturer recommendation only after concrete has cured for the timeframe recommended by the manufacturer of the product and as required for the specific color.

B. Score decorative jointing in concrete surfaces before staining.

C. Application of Sealer:

1. Utilize sealer recommended by the stain manufacturer.

2. Apply sealer according to manufacturer's instructions.

D. Protect finished work until accepted by MSBSD in accordance with manufacturer's recommendations.

Division 04- Masonry

04 20 00 Unit Masonry

Part 1- General

1.01 Masonry Requirements

A. Raked joints in CMU walls are not permitted.

B. Joints exposed to view should have a concave profile except where fabric, cork or other flexible materials are to be applied over masonry. In that specific case, joints are to be flush with face of CMU.

C. CMU coursing is to be flush with the finish floor of each level. Do not design block coursing to vary from standard nominal 8", 6" or 4" coursing. Do not start CMU course 1/2 module from finish floor.

D. Current ASCE 5, ASTM and IBC seismic standards must be followed.

E. ASTM C270 Mortar standards shall be used.

F. ASTM C476 grout standards must be used.

G. Ensure appropriate sealer is applied to both sides of all exposed masonry as appropriate.

Division 05- Metals

05 10 00 Structural Steel

Part 1- General

1.01 Framing Requirements

A. Review Quality Assurance and Control requirements per ASTM standards for inspections and/or certifications required by the International Building Code (IBC).

B. Specify individual certifications to be submitted for all on-site welders.

C. MSBSD requires a summary of all special inspections to be completed describing how each structural weld and bolted connection is to be inspected, tested, and documented.

D. Each structural connection, (i.e., bolt / weld) will receive an inspection.

05 14 00 Structural Metal Stud Framing

Part 1- General

1.01 Framing Requirements

A. Minimum 18-gauge studs to be used

B. Maximum spacing 16” on center and maximum height of fire blocking to be 10’ from finish floor

C. Bridging of studs at maximum of 10’ height

D. Provide blocking for all specialty items noted on plans. Architect to provide blocking schedule when needed.

E. Provide fire blocking in rated walls.

05 50 00 Metal Fabrications

Part 1- General

1.01 Handrails

A. Clear anodized aluminum or stainless steel is preferred system.

B. Unpainted hot-dipped galvanized coated exterior railings will be considered with MSBSD approval.

C. If steel rails are used, they must be powder coated and approved by MSBSD

05 53 00 Metal Gratings

Part 1- General (Possible Removal of spec completely)

1.01 Gratings

A. Require that anti-slip stainless steel or galvanized metal grates be placed outside main entrances.

B. Install grating on exterior side of entry doors, 6” from door and centered on the door.

C. Maximum space sizes no greater than ½-inch but avoid very tightly spaced grates which get very slippery.

D. Entry grates must be removable and designed in panels less than 50 pounds each.

E. Specify tolerances to help avoid accidental injuries.

F. Grates to comply with the Americans with Disabilities Act (ADA) Standards for Accessible Design 2011 of latest edition.

05 55 00 Metal Stair Treads and Nosing’s

Part 1- General

1.01 Stair Treads and Nosing’s

A. Provide abrasive coated anchored or cast-in place nosing’s at interior concrete stairs where specified finish is exposed concrete. Treads and Nosing’s must meet current ADA requirements.

B. Anti-slip patterned rubber treads are required stair finish at interior occupied spaces unless alternate is approved by MSBSD.

Division 06- Wood, Plastics, Composites

06 10 00 Rough Carpentry

Part 1- General

1.01 Rough Carpentry Requirements

A. Specifications shall make provisions for backing for all wall mounted items.

B. There should be a hardened minimum wall height of 8'.

C. Blocking shall be clearly noted on drawings and/or noted in specifications. This includes but is not limited to the following: handrails, grab bars, hooks, door stops, wall hung lavatories, toilets, peg boards, white boards, tack boards, and interactive boards, cabinets, gym equipment, toilet partitions, toilet accessories, drapes, wall-to-wall and wall-to-ceiling intersections to support sheetrock and projection screens.

06 20 00 Finish Carpentry

Part 1- General

1.01 Trim

A. Provide resilient base in gym, physical education room and dressing rooms except where tile occurs. Resilient base needs to be appropriate for the type of floor system.

B. Secure applied trim with screws or other positive vandal resistant attachments.

06 60 00 Plastic Fabrications

Part 1- General

1.01 Plastic Laminate

A. Plastic laminates, Fiberglass Reinforced Plastic (FRP) may be used in areas such as custodial closets with mop sinks, kitchens, restrooms, and showers.

B. Draw and specify moisture resistant MDF, or concrete board for backing of plastic laminates in wet locations. Particle board is not allowed.

C. Plastic laminate over wood or other porous substances is not acceptable for science classrooms or prep rooms. Use solid, homogeneous, synthetic material appropriate to this application.

D. Assembly techniques are to effectively seal joints most likely to be exposed to water, such as around sinks.

E. ADD SCIENCE LAB COUNTERTOP SPEC

F. ADD Solid Surface Countertop Spec

Division 07- Thermal and Moisture Protection

07 10 00 Damp Proofing and Waterproofing

Part 1- General

1.01 Waterproofing Requirements

A. Under-slab vapor barrier is required such as poured athletic flooring, sheet goods, impervious carpet backing, etc. Install 10 mil vapor barrier directly under concrete slab. Review this requirement with each job based on current energy recommendations and research.

B. Damp proofing is required at all exterior foundation walls.

C. Waterproofing is required if one or more of the following conditions are present:

1. Building has a basement and native soils that do not drain well.

2. Site has a high-water table.

3. Site is poorly drained.

4. all foundation walls where adjacent interior floor is below ground

D. A weather barrier (i.e., Tyvek or other building paper) is required to be placed directly under all siding materials. Use of Tyvek does not change exposure classification required for sheathing.

E. Provide specifications and drawing details for sealing of all seams and penetrations. Provide protection of vapor barrier from penetrations.

07 21 00 Insulation

Part 1- General

1.01 Insulation Requirements

A. In vented attic roofs installer to maintain minimum 3-inch airspace between top of insulation and bottom of roof sheathing or decking. Verify adequate passive ventilation. No power assisted fans.

B. Fiberglass batt insulation in metal stud walls must be full width between studs. Specifications should address proper insulation around conduit, wires, blocking, etc., in walls with attention paid to proper fit in corner of stud bays and at seams.

C. Specifications are to require the Contractor to notify Project Manager for an insulation and vapor barrier inspection in each area at least 24 hours in advance of wall covering installation.

D. Specifications are to require a minimum 8 mil positive air / vapor barrier caulked with acoustical sealant and stapled or sealed with vapor barrier tape. Provide clear details for construction.

E. Minimum R-21 at walls and minimum R-42 average at roof/ceiling assembly is required.

07 40 00 Roofing and Siding Panels

Part 1- General

1.01 Roofing- General Comments

A. All assemblies listed below shall have minimum 20-year warranty, 30 year preferred where applicable, with preference in order listed below.

1. Exposed PVC Membrane Roof Assembly – 60 mil minimum fully adhered, no exposed mechanical fasteners allowed

2. Exposed Membrane Roof Assembly – 75 mil reinforced EPDM, fully adhered, no exposed mechanical fasteners allowed

3. Preformed Metal Roofing Assembly

B. Shingles not allowed without MSBSD approval.

C. If alternative roofing assemblies are considered, the Architect is required to consult the MSBSD before committing to any particular roofing assembly. It is the responsibility of the designer to submit the roof design and detailing to the MSBSD for review.

D. Minimum slope shall be 1/4” per foot except where roofing manufacturer requires greater slope for warranty.

E. Consider the effect of centrifugal forces on exhaust fumes or prevailing winds as related to roof curbs, proximity of exhaust sources and building intake vents.

F. Parapet Cap flashing to have drip edge on roof edge of flashing as well as exterior edge and be fastened with a cleat.

G. Provide roof ladders at locations greater than 5' roof height difference.

1.02 Pre-formed Roofing and Siding

A. The design of sloped metal roofing systems shall be such that snow and water runoff does not fall on or near sidewalks, entries, loading/unloading zones, playgrounds, parking areas or other places frequented by pedestrian and vehicular traffic.

B. The design and specifications for pre-formed, pre-manufactured roofing systems should be based on the manufacturer's published details and specification guide. Deviations from the manufacturer's standard details or specifications should be carefully considered and engineered and thoroughly discussed with and approved by the MSBSD.

C. Specifications shall dictate the manufacturer of the roofing system provide uplift calculations for the proposed roofing system which have been stamped by a structural engineer, licensed by the State of Alaska.

D. Shop drawings must be checked thoroughly, and the actual application must be monitored in the field continuously by qualified personnel throughout the roofing process.

E. Pitched metal roofs shall be designed to either shed snow or to retain snow.

1. If the design intent is to shed snow from the roof, then accommodation must be made to minimize or eliminate the potential of injury from sliding snow.

2. If the design intent is to retain snow on the roof, the design should employ a mechanism, such as a warm gutter system with an interior drain to catch shifting snow and ice rather than sole reliance on snow clips.

1.03 Membrane Roofing

A. Continue expansion joints at roofing membrane wherever they occur in the structural system of the building. Curbs for expansion joints are to be detailed to a height of at least 8-inches above the membrane surface. Make sure all louvers, windows and other wall penetrations are at least 24-inches above top surface of roofing assembly including.

B. Locate roof drains at point of maximum deflection, mid-span if possible.

C. All roof drains and down spouts are required to be heated bowls.

D. Roof drains to terminate in one of the following methods:

1. Municipal storm drain system.

2. Dry wells with cleanouts per ADEC permit.

3. Daylight at remote location. Potential for drain line freeze up at daylight locations is probable; make provisions to heat trace the pipes.

E. The use of overflow scuppers is acceptable provided:

1. The scuppers are not placed to discharge onto or near walkways, entrances, etc.
2. The scuppers are thoroughly detailed.
3. If downspouts and/or collector boxes are to be considered in a design, they are required to be thoroughly detailed and fully heat traced.
4. Details for scuppers and downspouts are to be reviewed by the MSBSD.

F. The use of scuppers as the primary means of draining a roof is prohibited. However, if scuppers are considered a reasonable solution for a small portion of a particular project, the Architect is to do the following:

1. Review the roof and scupper design with the MSBSD
2. Thoroughly detail the scuppers and down spouts
3. Specify the installation of heat trace at all scuppers
4. Place scuppers at locations that will not be a maintenance dilemma for the MSBSD

G. Roof systems will have a 30-year guarantee/warranty with wind upload for zone/area of construction.

H. On projects with large areas requiring either a new roof or re-roof, specifications are to require a pre-roofing conference. Minimally, attendees are to include, the MSBSD, the Contractor, the Roofing Subcontractor, the Manufacturer's Representative, if at all possible, and any other person(s) the MSBSD, Architect, or Contractor deem necessary.

I. Exposed membrane roofs must have reinforced walkway matting placed at access points, equipment, and commonly used maintenance paths.

1.04 Roof Accessories

A. The use of skylights is prohibited.

B. Provide lockable roof access hatches with ladders inside the building.

C. Sills of clerestory windows are to be a minimum of 24 inches above the top of the roofing material.

D. Design clerestory windows so ventilation air or convection currents from adjacent radiation will pass across the glazing to prevent condensation and ice buildup.

07 46 00 Exterior Siding

Part 1- General

1.01 Exterior Siding Requirements

A. Use of wood siding is prohibited.

B. Synthetic materials must be checked for adequate installation. Do not use materials that are brittle or so soft they can be scratched with a ballpoint pen. Materials should have an impact resistance at least equivalent to the heaviest grade of anti-vandalism reinforcement available.

C. EIFS (Exterior Insulation and Finish Systems) are generally not an acceptable wall finish system. EIFS may be considered provided the designer can demonstrate a sufficiently impact resistant finish is specified for the full height of walls.

D. Architect will verify building integrity envelope to acceptable standards by best method determined at the time of construction as soon as practical.

E. For all exterior siding materials specify materials previously used successfully in the MSBSD or conduct field tests to verify and demonstrate durability with specific attention to vandalism resistance before specifying.

F. All Material must be readily available in Alaska or the continental United States.

07 60 00 Flashing and Sheet Metal

Part 1- General

1.01 Sheet Metal Requirements

A. Parapet cap flashing with drip edges shall be designed to drain back onto the roof deck on low sloped roofs.

B. Be aware of parapet conditions where there is a sloped roof on one side and a pitched roof on the other side. Membrane must extend over parapet.

C. For sloped metal roofs, gutters are required over all pedestrian ways where water can be expected to drip from the building. Continuous gutter will be used. Examples are: entryways, garage doors, loading docks and sidewalks.

Division 08- Openings

08 10 00 Doors and Frames

Part 1- General

1.01 General Comments

A. Typically draw and specify standard size doors throughout a design. Provide door/ opening schedule with sizes noted for review and approval by MSBSD. If exterior doors require canopies, there should be designed entryways to protect from corrosive conditions. Canopies less than 40” should be attached to building.

B. Keep door recesses to a minimum, especially at corridors into classrooms doors.

C. Door glazing is to be typically half height maximum, including entry doors. If the design warrants a large amount of glazing in a door it requires approval by MSBSD.

D. Provide glazing in all doors for the following uses:

1. Offices
2. Conference rooms
3. Classrooms
4. For collision prevention/blind traffic

E. Steel doors are required, do not specify or schedule aluminum, fiberglass, or wood doors.

F. Require double doors for gym entries and equipment storage room(s). Verify height and width of opening will handle the largest piece of equipment to be used or stored in the room.

G. Verify floor structure at door sills extends far enough to support mullions and bottom frame anchors.

H. Proprietary door systems not allowed.

I. Raceways for electrified door hardware shall be factory prepped whenever possible. Field prepped doors shall be recertified to maintain required ratings.

J. All doors should have locking mechanisms to provide security unless fire code prohibits.

08 12 00 Door Frames

Part 1- General

1.01 Interior Door Frames

A. Shall be steel, welded construction. Knock down or drywall type will not be accepted. Face joints shall be smooth finished.

B. Shall be minimum 16 gauge up to 36” opening. More than 36” shall be 14 gauge or heavier according to SDI-100 recommendations. See exception “Seclusion Room”.

C. Wet locations shall be galvanized A60 or stainless steel, kitchens, restrooms, lockers, and custodial closets for example.

1.02 Exterior Door Frames

A. Shall be galvanized A60 or stainless steel, fully welded construction, knock down or drywall type will not be accepted. Face joints shall be smooth finished and include thermal breaks.

B. Shall be minimum 14 gauge or heavier according to SDI-100 recommendations.

C. Aluminum frames prohibited.

08 13 00 Metal Doors

Part 1- General

1.01 Summary

A. Schedule metal fully welded galvanized doors/stainless exclusively at all public corridors and exits.

B. All exterior metal doors and frames are to be polyurethane insulated and include thermal breaks.

Part 2- Products

2.01 Door gauge and material:

A. Door to be handed, beveled edge construction

B. Interior door shall be minimum 16-gauge steel. Wet locations shall be galvanized A60 or stainless: kitchens, restrooms, lockers, and custodial closets for example. Exceptions see “Seclusion Room”.

C. Exterior door shall be minimum 14-gauge steel, A60 galvanized or stainless steel, polyurethane insulated.

2.02 Required Parts

A. Provide key operated removable center mullion on exterior and corridor doors. Provide one removable mullion per bank of doors. Sheet metal mullions not allowed.

B. Grade III, model 2 seamless design is preferred at all locations subject to high frequency use, extreme environmental conditions, and high abuse areas. Provide galvanized, beveled lock/latch edge, handed type doors and frames at all exterior and wet locations. No narrow stiles.

C. Provide full mortise continuous hinges on all oversize (over 36-inches) doors and at high frequency use entrances. Do not use aluminum geared type. Use barrel type stainless steel. See Section 08 71 00 Door Hardware.

D. Provide required fire rated doors in accordance with current NFPA codes.

08 14 00 Wood Doors

Part 1- General

1.01 Requirements

A. On new school projects wood doors are not acceptable due to a lack of resistance to abuse. Wood doors acceptable in some renovations by MSBSD approval only.

B. Specify additional wood back-up at specified points of attachment for butts, door closers and knobs.

08 30 00 Specialty Doors and Frames

Part 1- General

1.01 Handicap and ADA Doors and Power Operated Doors

A. Handicap operated doors that are primarily manually operated. Low energy operates as a manual surface closer during close cycles or when non-powered. Opening force, non-powered, is similar to manual closer. Sequential operation when used in pairs. Use Glynn Johnson 100 series overhead stop.

B. Provide adequate bracing of overhead door roller channels and verify engineering with manufacturer of door assembly and/or with a registered engineer.

C. Discuss options available for keying and locking overhead doors with the MSBSD. If it is determined the overhead door is to be lockable, key the lock into the MSBSD master key system. Verify the locking mechanism will be accessible. Use standard components. Do not allow field expedient or locally fabricated components.

D. Coordinate or require coordination of power operated doors with electrical design and work. Keyed switches for power operation are to be coordinated with MSBSD standard keying.

E. Power operated doors are to be designed with safety devices standard to the industry for the particular type of door. Supply manual operations in the event of power failure.

F. Specify polyurethane insulated overhead doors for exterior use and carefully detail heads and jambs to minimize heat loss. R ratings: 14.86 = 1 5/8” door and 17.5 = 2” door. Specify 100,000 cycle springs, pneumatic safety bottom, 1” brush weather-strip, and Lexan thermal vision kits.

G. Use of swinging doors is preferred over side coiling doors or grills.

H. The use of pocket door/sliding doors prohibited by the MSBSD

I. The use of Dutch doors is prohibited. Designers are encouraged to solve the problem of partial access in other ways. Consider the use of overhead coiling counter doors if possible.

08 31 00 Access Doors and Panels

Part 1- General

1.01 Access Doors and Panels

A. To provide the degree of access required, the installed location of both the access door or panel and the concealed item it serves is important.

B. Coordinate with other trades on the location of concealed items and the Architect on location and size of access opening required.

C. Show approved locations and sizes on the drawings for all anticipated doors or panels.

D. Include a sufficient number of additional appropriately sized access doors and panels besides those shown on the drawings to cover situations not anticipated during design but requiring access due to the installed location.

E. Review the indicated location of all concealed items and their accessibility during construction. If at any time it becomes obvious that access will be impaired, revise the location of the item and/or its access.

F. Show all access doors. Do not include statements such as, “Install access doors ‘as required,’ ‘where required,’ ‘of sufficient size,’ ‘as directed,’ etc.”, in the specifications.

08 31 15.53 Security Access Doors and Frames

Part 1- General

1.01 Keyless Door Entry Access Control System

A. A keyless door entry system shall be installed to provide automated access control of selected exterior doors.

B. Access Control Function Description

1. Provides automated door unlocking function utilizing MSBSD approved software and hardware.

2. Funnels first entry and last exit through card access-controlled doors

3. Provides record of access activity to audit compliance with policies and procedures

4. Provides capability to add, edit, and disable access rights via software commands in lieu of costly re-keying

5. Provides flexibility of door locking via software scheduling and ad-hoc software commands

6. Supports MSBSD approved photo ID badge by Faculty and Staff
7. Automatic operator function does not allow access during lockdown, panic, and closed position on the open/close card reader in the front office. Automatic operator function for egress must be enabled at all times.
8. All exterior doors will fail secure on fire alarm
9. Elevator operation function during fire alarm will operates to lower level only

C. Door Hardware Functional Description

1. Provide shop drawings with sequence of operations of access control system for approval by MSBSD,
2. Electrified locking door hardware is required to provide automated (not pre-scheduled) door unlocking function; main entry doors may be left unlocked during normal hours via manual card-unlock. Provide fail-secure on all devices.
3. To achieve unlock door handles use Von Duprin E996L Electrified Trim or MSBSD approved equal.
4. Electrified door hardware shall be installed at these doors in order to provide the automated door unlocking functionality. When the door is locked, and an authorized access control card is presented in proximity to the card reader the door shall momentarily unlock and allow access.
5. Door alarm contacts provide status monitoring of open or closed position of door and are used to detect “Door Forced” alarms when the door is opened without the use of an authorized access control card.
6. Latch bolt monitoring devices (ex. VonDuprin LX) relays the dogging of the latch bolt position, and also senses travel in the egress direction to shunt “Door Forced” alarms

Part 2- Execution

2.01 Access Control

A. Card readers shall be installed at specific doors in order to provide the audit and entry funneling functions described above.

1. A card reader shall be installed at the main front entry doors of the School. These doors are the primary entry/exit for all persons entering the School.
2. A card reader may be installed at the Faculty, Staff employee entry door. These doors are the primary or secondary entry/exit for Faculty, Staff, and custodial personnel.
3. A card reader shall be installed at the loading dock entrance. These doors are the primary entry/exit for warehouse/nutrition, maintenance, and custodial personnel.
4. If a separate entry door exists for bus unloading/loading, a card reader shall be installed at this entrance.
5. A card reader shall be installed at the main playground re-entry for elementary schools.

6. Additional card readers per function/flow as designated by MSBSD.

B. The installation of electrified door hardware means that in addition to the normal automated door unlocking function these doors will be interfaced to the panic button or lock-down buttons to switch from an unlocked state to a locked state when the button is pressed. They may also be locked or unlocked through programming (ADA access), scheduling or ad-hoc software commands via the access control system.

C. Access controlled door locations will be where the Intrusion Alarm arming stations are installed. When the Intrusion Alarm is armed, entry through these designated doors will provide the timed period for the Intrusion Alarm to be disarmed. However, entry through any of the other building perimeter doors will instantly cause an alarm. In this way, even though Faculty and Staff retain mechanical keys for many doors such as playground re-entry doors and classroom doors, they are funneled through the card reader access-controlled doors for first entry and last exit.

D. Typically, the loading dock entry doors are the primary entry/exit for custodial personnel. Therefore, it is the location where a custodial lighting circuit timer would be installed and activated.

E. Middle Schools and High Schools have a significantly higher number of doors as well as more diverse requirements for access control. However, the basic functionality described above would only have to be expanded by the number of card readers in order to designate controlled Faculty and Staff employee entry doors. This would funnel all other traffic to the entries designated to be unlocked during normal hours. These entries shall be interfaced to the panic button or lock-down buttons to switch from an unlocked state to a locked state when the access lock-down button is pressed.

F. The entries designated for ADA access must interface with the automatic operator actuators with security system and card reader access.

G. Where doors are equipped with a card reader the access control system can display a “Door Held Open” alarm in order to provide notice that the door has been propped open past a certain set time.

H. Where doors should not be used except as emergency exits, local door alarms should be considered. These devices sound an audible alarm when the door is opened and may provide an alarm to the access control system if requested.

08 34 00 Special Function Doors

Part 1- General

1.01 Recovery Room (Seclusion Room) Door, Frames and Hardware

A. Door

1. Shall be 14-gauge steel, SDI type N, narrow vision lite. 4” x 25” Lexan.

2. Mortise type door, no face prep, with mortise pocket blanked off.
3. Must be out swing from recovery room, push open to exit.
4. Reinforcing present for surface applied hardware.

B. Frame

1. Shall be 14-gauge steel welded construction with no side or transom lite.
2. Shall have American National Standards Institute (ANSI) strike prep but have blank installed.
3. Reinforcing present for surface applied hardware.

C. Hardware

1. Ball bearing hinges.
2. Recovery room side of door shall be smooth finish. No kick plates, push plates, door pulls, or sound seals on recovery room side.
3. If auto door bottom is desired, it must be mortised into bottom channel of door.
4. Provide LCN 4041 XP HEDA MC door closer.
5. No mortise set or overhead stop allowed.
6. Use Trimco 1209HA or equivalent door floor stop. No wall stops.
7. Use Locknetics 490M x TJ90 1500-pound magnet mount on pull side, top of door.
8. Use Locknetics 623 style momentary button
9. Use single door pull Ives 8103-0 or equivalent, 1” round straight pull 10” on center.
10. Incorporate door magnet controls to fire alarm panel and security system.
11. No windows exterior or otherwise in Recovery Room.
12. 1200 lb. Shear Magnet self-aligning magnet (SAM). 24” centered above finished floor

08 34 56 Security Gates

Part 1- General

1.01 Interior Roll-Down Gates

A. Interior roll-down gates will be installed to partition selected MSBSD facilities into zones to allow after-hours use of certain zones without allowing access to the entire facility.

B. Interior Roll-Down Gates Functional Description

1. Provide the means to partition and segment the building into multiple zones.
2. Allows after-hours use of a portion of a building without creating access to the entire interior of that building.

08 40 00 Entrances, Storefronts, and Curtain Walls

Part 1- General

1.01 Requirements

A. Do not design entry doors with glass in bottom half as per MSBSD requirements.

B. All frames are to be fully welded.

C. Provide reinforcement at door and frame for all surface applied hardware such as pulls, push bars, continuous hinges, etc. All door and frame reinforcement shall be large enough to accommodate all screw attachment points on all surface applied hardware. Minimum reinforcement standards to comply with ANSI/SDI A250.6.

D. Frame and door reinforcement for continuous hinges 12-gauge full length at attachment locations. Reinforcement to fill full depth of stop and/or face as required for application.

E. Utilize the heavy, top-mounted parallel arm style closer at entries. See Section 08 71 00 Door Hardware. Reinforce all doors with closers to permit machine screw attachment of closers. (No sex bolts or sheet metal screws.) All door and frame reinforcement shall be large enough to accommodate all closer arm screws. Closer arm with incorporated stop/holder prohibited. Use Glynn Johnson 90 Series in addition to closer.

F. Middle and High School entrances to athletic areas are to be designed as high abuse areas and all components should be as maintenance free as possible. See Section 08 71 00 Door Hardware for acceptable heavy-duty hardware components.

G. Exterior doors shall have a minimum 3/8-inch with a maximum 1/2-inch clearance between the bottom of the door and the top of the finished threshold.

H. Building overhangs cannot exceed current Fire Codes at entrances unless designed with dry pipe sprinklers.

I. Utilize continuous stainless-steel barrel type hinges at all entrance doors. Use continuous hinges at all high traffic and high frequency use locations such as gyms, libraries, locker rooms, hall doors and vestibule doors. See Section 08 71 00 Door Hardware.

J. Provide for extended time in years from acceptance warranties from both manufacturer and installer for glazed curtain and window wall systems.

K. Consider prevailing wind pattern during school design. Provide barrier to protect main entries from prevailing wind to prevent damage to doors and accumulation of drifting snow. All exterior doors to be equipped doors with closers to help control doors during extreme wind.

08 50 00 Windows

Part 1- General

1.01 Summary

A. Sliding windows are not acceptable. Preferred operator opening type is awning. Casements are acceptable. Operable windows should be kept to a minimum of one per classroom.

B. In science rooms, provide a relite between chemical storage and lab to allow for line of sight observation.

C. Provide glazing between shop office and student work areas.

D. Specify glazing systems where window glazing is easily removed and replaced. All glazing to be at least 36-inches above finish floor, maximum window size shall not exceed 4' width and 6' length.

E. Design with window walls must be preapproved by MSBSD.

F. All thermo-pane windows must have a non-conducting thermal spacer between the panes of glass, low e rating and energy efficient.

G. Minimize structural steel bracing overlap in classroom windows.

08 51 00 Metal Windows

Part 1- General

1.01 Summary

A. Specify a baked on or electrostatically applied factory finish on metal windows.

B. Metal windows are required to be thermally broken.

08 52 00 Wood Windows

Part 1- General

1.01 Summary

A. Use of wood windows is not allowed in new construction. Wood windows may be allowed in renovations.

B. Wood windows are to be either vinyl or metal coated.

C. Specifications must require wood used in fabrication of wood windows be treated with a preservative.

08 70 00 Hardware

Part 1- General

1.01 General Comments

A. Floor mounted doorstops are generally not acceptable. Plunger foot operated with rubber shoe door stops not acceptable.

B. Closer mounted doorstops are not acceptable. All doors must have some type of stop to protect walls and counter tops, other doors, etc.

C. Provide magnetic hold-open devices tied into the fire alarm and lock down system on all classroom doors, student educational spaces doors, multiple occupant bathrooms' doors, hallway doors, gym doors, corridor, library doors, music doors, etc.

D. Provide keyed release heavy duty magnetic hold-opens on toilet room doors and mid-corridor doors. See Door Hardware Specification Guide below.

E. Standard hardware finish shall be satin stainless steel at all exterior and wet locations. Dull chrome shall be used elsewhere.

F. Bottom shoe of mullions shall attach to interior floor slab vs. exterior and shall not be placed on top of threshold.

G. No drop plates allowed on door closer installations.

H. Panic device standard placement must be coordinated with window size.

I. Panic device not to be mounted over door window or visible from outside of door window.

J. Use of sound seals is generally not preferred and should be limited to very noisy locations only and separation of classroom to classroom.

K. Provide adequate blocking for all door hardware, including wall stops.

L. Installation of door closers must follow manufacturer's template instructions as it applies to each door opening requirement. Door closer shall be mounted to meet ADA requirements where applicable.

08 71 00 Door Hardware

Part 1- Products

1.01 Door Hardware Specification Guide

Section	Products	As Specified	Acceptable Substitutions
A	Butts	Hager	Stanley, McKinney, Lawrence
B	Continuous Hinges	Markar	Ives, Stanley
C	Key Removable Mullion	Von Duprin	None
D	Key Switch	Locknetics	Von Duprin
E	Locksets and Cylinders	Schlage Grade 1	None
F	Exit Devices	Von Duprin	None
G	Door Closers	LCN	None
H	Kick & Mop Plates	Builders Brass Works	Quality, Tice, Signature Brass, Rockwood
I	Overhead Stop and Holders	Glynn-Johnson	ABH
J	Coordinators	Glynn-Johnson	Door Controls
J	Flush Bolts	Ives	Builders Brass Works
K	Wall and Floor Stops	Builders Brass Works	Quality, Rockwood
M	Key Cabinet	Telkee	Lund
O, P	Weatherstrip & Thresholds	Pemko	National Guard, Reese
12 30 00	Cabinet Locks	Schlage	Olympus

A. Butts

Acceptable Manufacturers: Hager, Stanley, Lawrence, McKinney or MSBSD approved.

Types:

1. Extra heavy four ball bearing butts – Classroom, office, closet doors to 36”.
2. Anchor Hinge – Doors with closers and surface mounted overhead stops
3. All butt hinges to be NRP (Non-Removable Pin).
4. All exterior butt hinges to be stainless steel.

Sizes:

1 3/4” Exterior and vestibule doors. 5” x 4.1/2”

1 3/4” Interior doors up to and including 36-inches. 4.1/2” x 4.1/2”

For Interior doors over 36” and 1 HR+ rated doors use continuous hinges or pivots only.

B. Continuous Hinges

Acceptable Manufacturers: Markar, Stanley, Ives.

1. Provide continuous hinges on all oversize doors and all high frequency use doors.
2. Use barrel type, only stainless-steel continuous hinges.
3. Do not use aluminum geared type.
4. Hinges must be Grade 1 and rated for 600 lbs. minimum.
5. Continuous hinge may not be electric transfer hinges.

C. Mullions

1. Manufacturer: Von Duprin
2. No wires in mullion.
3. Non key removable

a. 4954 not fire rated

b. 9954 fire rated

4. Key removable

a. KR 4954 not fire rated

b. KR 9954 fire rated

D. Electric Strikes

1. Surface mounted strike: HES 9600 24VDC, 630 finish
2. Mortise and Cylindrical Locksets: Von Duprin 6200 Series, 630 finish

E. Magnetic Hold Opens

1. All classrooms, offices, and assembly area doors requiring closers will have a magnetic hold open device which will deactivate upon a fire alarm. Provide adequate support blocking in walls. Basis of design is Caddy TSGB16 X 2 or equal.
2. Standard Duty 35 lb. minimum Magnetic Holders – Standard Locations

   Acceptable Manufacturers: LCN, 7840/7850 Series.

   No extensions on magnetic hold open.
3. Heavy Duty 400 lb. Magnetic Holders – high frequency use doors, such as public toilets, mid-corridor doors, and other selected locations

   Design needs to incorporate release of magnets by security and fire suppression systems.

   Acceptable Manufacturer: Architectural Builders Hardware 2500 series

   Acceptable Substitutions: As approved by MSBSD
4. Features Required:

   Minimum of 400# holding power -- required in Bathrooms

   Separate keyed release switch

   Acceptable Manufacturer: Locknetics 643.05, Von Duprin KS920

   Use District keying

   Acceptable Substitutions: As approved by MSBSD
5. Seclusion Room requires Locknetics 490M x TJ90 1500 lbs. operated by Locknetics 623 button. 1200 lb. Shear Magnet as specified in Seclusion Room specifications.
6. Top of security door Shear Magnet 1000 lb. – Current basis of design is the Schlage GF3000

F. Mortise Locksets

Specify deadbolt function at exterior locations.

Acceptable Manufacturer: Schlage “L9000” series mortise

Escutcheons designation: 06L

(Escutcheons are to be cast. Wrought escutcheons are not acceptable.)

Acceptable Substitutions: None

Specified Finish 630

1. Typical classroom mortise function, L9050 with thumb turn, no indicator
2. Common doors between classrooms, L9082, double storage room
3. Public restrooms and locker rooms, L9070
4. Staff/single/family use restrooms, L9456 with occupied/vacant indicator
5. Staff restroom in public space/hallway L9440 with occupied/vacant indicator. Schlage 30-008 FSIC Cylinder.
6. Mortise set for operation with card reader storeroom function electrically unlocking, REX option, fail secure.

G. Exit Devices and Push Bars

Acceptable Manufacturer: Von Duprin

Acceptable Substitutions: None

Mount exit devices at standard height: 39 13/16“AFF

No glass bead kits. Windows are not to interfere with or modify device mounting.

Use 98 series on classroom and instructional area doors with thumb turn and security indicator

Types:

1. Exterior doors 98 series rim with dead latchingss0200 function, night latch, with Allen wrench dogging
2. Single Doors – 98L.x996L
3. Pairs of Doors with Mullion – 2 each 98L. x 996L x KR9954 mullion
4. Pairs of Doors without Mullion (cross corridor) – 2 each 9848L. x 996L (metal doors). Less bottom rod prohibited. (9848L) Require 2-point latching.
5. Proper handle designation is 06, 996L trim, US 26D finish.
6. All lever exit device trim rim to incorporate Breakaway lever trim or Vandal resistant lever trim
7. Vertical rod devices not allowed on exterior doors
8. Electrified exit devices and electrified trim must be solely from approved manufacturers no conversions or retrofits. E996L fail secure

9. Use the above specified devices for fire rating according to NFPA.
10. Exit device US32D finish

H. Door Closers

Acceptable Manufacturer: LCN

Acceptable Substitutions: None

Types:

1. Cold weather fluid at all exterior doors and vestibule doors
2. LCN 4040XP closer, parallel arm, EDA (extra duty arm), metal cover
3. Arms: parallel arm 3077A, hold open arm 3049EDA
4. No drop plates. Coordinate window size and placement
5. In-swing doors –4040XP x 3077EDA, limited use of 4041T acceptable
6. Out--swing doors –4040XP x 3077EDA
7. Wall mounted magnets shall be used for hold open points. Electrified door closers with hold open points not acceptable
8. Auto Operators shall be LCN 4642 interior mounted electro-hydraulic device. Use long arm for frame reveals greater than 4 1/2'"
    a. 4-1/2" hardwired actuator LCN 8310-856
    b. Escutcheon for actuator: LCN 8310-874
    c. Wireless actuators not allowed
    d. Concealed switches not allowed
    e. Electrical latch retraction device with hex dogging to be used on openings with mullions

I. Door Pulls, Mop Plates, Kick Plates, Push Plates

Acceptable Manufacturers: Quality, Builders Brass/Trimco, Signature Brass, Rockwood

Features Required:

1. Plates shall be beveled on all four edges.
2. No offset pulls, straight only, 1" diameter
3. US32D or 630, no plated devices allowed, 0.05" thick

J. Overhead Stops/Holders

Acceptable Manufacturers: Glynn-Johnson-90 Series, Architectural Builders Hardware

9000 Series

Features Required:

1. Stops must be constructed of stainless steel
2. Through bolting required

K. Flush Bolts and Coordinators

Acceptable Manufacturers: Trimco or Ives

Flush Bolt types: Constant Latching, IVES FB51P

L. Door Stops

Acceptable Manufacturers: Glynn-Johnson, Builders Brass/Trimco, Ives, Rockwood

M. Keying

1. All locksets shall be keyed into existing MSBSD grand master keying system.
2. The Permanent Cores, Changing Keys, and Control Keys, prepared according to the approved keying schedule, shall be shipped directly to the MSBSD, prior to substantial completion. The Contractor shall remove the construction cylinders and install the permanent cylinders. All construction cylinders shall be returned to the MSBSD.
3. All Permanent Cylinders, Keys, and Key Transcript shall be sent via Registered Mail, Return Receipt Requested, to the MSBSD.
4. Furnish:
    a. Two control keys per keyway
    b. Six (6) Building Master Keys
    c. Six (6) Sub Master Keys per Set
    d. Four (4) change keys per Lockset and Cylinder
    e. Key Transcript with 25% extra change combinations

N. Key Cabinet

1. Gray colored 18-gauge metal cabinet with nickel-plated brass pin tumbler lock, with two keys
2. Two tag complete system with logbook
3. Pre-numbered tags: one red octagon shaped, reusable; one white shamrock or oval shaped, reusable
4. Numbered label above hooks
5. Acceptable Manufacturers: Telkee Aristocrat model T2110 250 capacity; Lund Model #1204 250 capacity, #507 red tags, #504 white tags

O. Lock Cylinder Cores

1. Coordinate all work with MSBSD Locksmith to verify type, function, and keying for all devices.
2. Provide Schlage FSIC interchangeable cores and Schlage original cylinder housings on all doors to match the MSBSD's keying system.
3. The Contractor to furnish construction cores and keys.
4. All keyed switches for electrical devices must have interchangeable (I/C) cores of the type to match the MSBSD's keying system.
5. Lock Cylinders shall have removable core housings. Manufacturer: Schlage

P. Thresholds

1. Exterior: Extruded aluminum full width single piece at exterior doors. 6 inch by ½" tall with beveled edges and anti-slip fluted top. J32130, PEMKO or equivalent.

Q. Weather-stripping (Typical and Exterior Doors)

1. Dense layered plastic bristle brush weather-strips. Install all exterior doors and interior vestibule doors. Brush fibers fused into place, flexible and minus -30°F held in extruded aluminum holder-mount with pre-punched pre-slotted holes for mounting with screws. ANSI and PEMKO Corporation numbers listed, equivalent Sealeze or Zero.
2. Header- full length single piece, under closer, and overhead stop areas ¼" thick heavy duty rigid silicone rubber gasket: PEMKO 2891AS.
3. Side Jambs & mullion- 40 to 45-degree angle mount, use PEMKO 28945CNB.
4. Door Bottom sweep 1-inch brush; ANSI R3A415 and PEMKO 18100.
5. Paired Doors Meeting Rails: 3/8"; ANSI R3A635 and PEMKO 18041

R. Door Silencers (Typical Interior Door)

1. Provide 3 evenly spaced rubber silencers at each swing doorjamb steel frame.

Division 09- Finishes

09 20 00 Plaster and Gypsum Board

Part 1- General

1.01 Gypsum Wallboard (GWB)

A. Exposed GWB is to be screw attached only. Nailing is not permitted.

B. Do not use unprotected GWB in wet or damp areas such as restrooms and shower rooms.

C. Do not use GWB soffits at exterior. Densglass is acceptable or equivalent.

D. Provide splash protection and water resistant GWB when used near fountain or sinks.

E. In Junior/Middle and Senior High Schools, GWB shall be backed with 1/2-inch CDX plywood for impact resistance in corridors and entryways and in the gymnasium up to 8 feet high where cost prohibits masonry or concrete.

F. Elementary school gymnasiums where GWB is used as either a wall or ceiling surface shall have a backing of 1/2-inch CDX plywood up to 8 feet high.

G. Impact resistant GWB above 8 feet in gymnasiums is acceptable when budget prohibits masonry or concrete.

H. GWB ceilings are acceptable in certain areas if access panels are provided. Verify adequacy of access with MSBSD.

09 30 00 Tiling

Part 1- General

1.01 Summary

A. Provide 1/2-inch cementitious backer board, 1/4-inch Hardy board over plywood, or 1/2-inch GP Dens-Shield on ceilings and vertical tiled areas.

B. Maximum stud spacing is 16 inches o/c with 12 inches preferred.

C. Mud all joints.

D. Provide tiled walls and floors in all shower rooms.

E. Tiled walls in kitchen are preferred. Fiber Reinforced Plastic panels (FRP) wall finish is an acceptable lower cost alternative when budget is restrictive.

F. Quarry tile floors and coves in food service areas.

G. Use thick set mortar floors in all wet areas.

H. All ceramic floor tiles must have an anti-slip surface.

I. All specified tile shall be current run stock. Special order tile is not acceptable.

J. Extra (maintenance stock) tile to be delivered to MSBSD upon completion of project.

1. 1% field tile of each color to a maximum of 100 square feet

K. Thin set mortar is acceptable for wall installations.

L. Specify a minimum five-year warranty on all ceramic tile installation.

M. Shower rooms or other such wet areas shall have a chlorinated polyethylene (CPE) pan with fully welded seams installed on a sloped mortar bed within a thickset assembly.

N. All color schemes must be approved by MSBSD.

09 64 00 Wood Flooring

Part 1- General

1.01 Gymnasium Wood Flooring

A. Floor manufacturers shall be MSBSD approved. Seam pattern shall be submitted for approval. Installer must be manufacturer certified.

B. Materials shall not be delivered or installed until all masonry, painting, plastering, and tile work is completed.

C. All overhead mechanical work, lighting, backstops, and scoreboards are to be approved, installed, inspected and MSBSD accepted before installation of a wood gymnasium floor.

D. The room temperature is to be at least 65 degrees and relative humidity 50% or lower and otherwise in compliance with manufacturer's recommendations.

E. Contractor is to maintain area according to manufacturer's recommendations where materials are to be stored prior to installation.

F. Do not install floor system until concrete has been cured and moisture tested. Strictly adhere to manufacturer's moisture content limits and guidelines.

G. Do not begin installation of wood flooring until all other work in gymnasium has been completed except installation of bleachers and any other such work that follows floor installation.

H. The entire wood gymnasium floor system shall be supplied by one manufacturer and installed by one approved subcontractor.

I. Finishing materials, sealer and game line paint shall be on the manufacturer's accepted products list. Play lines may be inlaid in wood gymnasium flooring. Tape is not allowed.

J. Specifications are to require wood flooring be delivered to the construction site at least 30 days prior to installation in order to acclimate wood to environmental conditions. Flooring strips should be unbundled and "stacked out" to breathe in a temperature and humidity controlled environment approximating installation conditions. Specify as per manufacturers' recommendations.

K. Specifications must require wood flooring subcontractor keep a log of humidity and temperature at start and end of each and every workday the flooring is being installed.

L. Specify vapor barrier between concrete slab and gym floor as per manufacturer's recommendation.

M. Specify vented floor systems with vented cove base. Unvented systems are not acceptable.

N. Game line layout and school logo is to be MSBSD approved.

O. Specifications should indicate at least two (2) coats of sealer be applied to floor to protect wood and painted game lines. Coatings are to be applied as per manufacturer's specifications.

P. All color schemes must be approved by MSBSD.

09 65 00 Resilient Flooring

Part 1- General

1.01 Luxury Vinyl Tile (LVT)

A. Use most durable material with lowest life cycle cost whenever possible.

B. Use of cutback adhesives is not acceptable.

C. Installation cleanup is to include damp mopping or wet mopping only. No application of any sealer or wax by contractor.

D. All color schemes must be approved by MSBSD.

1.02 Resilient Flooring- Sheet Vinyl

A. Provide sheet vinyl with continuously welded seams in wet areas where tiled surfaces are not used.

B. Provide commercial grade heavy duty material.

C. Use of cutback adhesives is not acceptable.

D. All color schemes must be approved by the MSBSD.

09 65 13 Resilient Base and Accessories

Part 1- General

1.01 Summary

A. Preformed corners, inside and outside, for all rubber base is the preferred specification.

B. Specifications for field formed corners are to be strict with detailed requirements for scribing and scoring.

09 65 66 Athletic Surfacing

Part 1- Products

1.01 Gymnasium Floors

A. Gymnasium floors in Elementary Schools shall be a synthetic material, preferably a poured floor or welded seam sheet goods. ADD in Pulastic Spec and approved Elementary line standard.

B. Manufacturer for athletic surfacing: Should be reviewed with MSBSD.

1.02 Weight Rooms

A. Manufacturer: Material should allow for heavy equipment and free weights.

Width		Roll Width 4ft – Tile 2ft x 2ft
Length		Specify length (min. 15 ft.)
Total Thickness		8 mm
Weight		1.92 lbs./sq.ft.
Tensile Strength	ASTM D412	200 minimum
Static Load	ASTM F970	1000 p.s.i. (modified test)
Coefficient of Friction	ASTM 2047	>.9
Chemical Resistance	ASTM F925	Excellent
Ambient Noise Reduction	ASTM C423	.10
Impact Sound Insulation	ASTM E492	.45 minimum
Thermal Conductivity	ASTM C518	
Sound Transmission	ASTM 413	.45 minimum

09 68 00 Carpeting

Part 1- General

1.01 Modular Carpet

A. Modular carpet tile shall meet the following performance standards.

1. Carpet Flammability
   .1 Pill test (ASTM D2859 or CPSC FF-1-70) — Passes
   .2 Radiant Panel Test (ASTM E648) — $\geq$ 0.45 watts/cm^2, Class 1
2. Smoke Density — $\leq$ 450 Flaming Mode
3. Dimensional Stability (Aachen Method Din 54318) — $\leq$ 0.1% change
4. Static Generation at 70°F (AATCC 134 with neolite) — $\leq$ 2.5 kV at 20% R.H.
5. Lightfastness (AATCC 16E) — ≥ 4.0 after 60 hours
6. Gas Fade (AATCC 23) — 4

7.	Ozone Fade (AATCC 109)	4
8.	Antimicrobial (ASTM 2471-05)	Complete to Partial Inhibition (high) on primary and fiber layers
9.	Antimicrobial (AATCC 174, Part II)	≥ 90.0% reduction
10.	Fungicidal (AATCC 174, Part III)	No growth
11.	Soil/Stain Protection (AATCC 175-1991)	≥ 8.0 on the Red 40 Stain Scale
12.	Sustainable Carpet Assessment Standard- NSF 140	EPD certified-preferred Minimal level Platinum

1.02 Definitions

A. The term “Carpet System” refers to the tufted yarn and yarn/pile treatments, primary backing, pre-coat, secondary backing, and adhesive.

1.03 Shop Drawings

A. Use the same project, Owner, building, floor, room, material, and product designations that appear on construction drawings and schedules. Indicate the installation company, General Contractor, drawing dates and scales. Show the following:

1. Columns, doorways, enclosing walls, partitions, built-in cabinets and equipment, and locations where cutouts are required in carpet.
2. Carpet manufacturer, type, style, color, and dye lot for each carpet specified.
3. Locations of expansion joints and treatments.
4. Type of substrate.
5. Type of installation.
6. Type of adhesive.
7. Type of wall base in each room/area.
8. Direction of carpet pattern/s.
9. Type, color, and location of edge and transition strips, and other accessories.
10. Transition details to other flooring materials.
11. Large-scale drawings showing treatment of steps and other areas where detailed work is required.
12. Mill Manufacturer Origin.

1.04 Product Data

A. Product Data and Samples

1. For each proposed carpet, submit two (2) samples of each standard color available. Once color or colors are selected, submit four (4) each 18” x 18” minimum samples of each selected color/s. A larger sample may be requested by the Project Manager.
2. For all Installation Accessories, submit manufacturer’s specifications and data.

3. For adhesive(s), provide Material Safety Data Sheet.

B. Manufacturer's printed maintenance manuals for proposed carpet shall include the following:

1. Methods for maintaining carpet, including cleaning and stain removal products and procedures and manufacturer's recommended maintenance schedule.

2. Precautions for cleaning materials and methods that could be detrimental to carpet.

3. Material Safety Data Sheet for recommended cleaning and stain removal products.

1.05 Quality Assurance

A. Installer shall provide documentation showing experience performing similar installations; certification for commercial installations by the Floor Covering Installation Board or demonstrated compliance with its certification program requirements; and certification and warranty by the proposed carpet manufacturer to install carpet in this Project.

B. Provide products with critical radiant flux classification indicated as determined by testing identical products per ASTM E-648 by an independent testing and inspecting agency acceptable to MSBSD.

C. Product Quality

1. All carpet must be first quality with no seconds or imperfections and to be of one dye lot.

2. Carpet shall have a documented five (5) year history complying with Performance Characteristics listed in Products/Carpet/Performance Data certified by an independent testing laboratory.

3. At MSBSD's option, on-site carpet may be tested for specification compliance at MSBSD's expense.

D. Carpet submitted shall be available in sufficient range of colors to enable MSBSD to select color(s) coordinated with Project's predetermined color scheme.

E. All color schemes must be approved by MSBSD.

1.06 Storage and Handling

A. Carpet and related materials shall be stored in a climate-controlled, dry space per specific manufacturer's instructions. Carpet shall be adequately protected from soil, dust, moisture, and other contaminants, and stored on a flat surface. Follow manufacturer's instructions for storing and stacking boxes of carpet tiles.

B. Carpet shall be transported in a manner that prevents damage and distortion.

1.07 Project Conditions

A. Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained for a minimum of 72 hours prior to and after installation at levels normal to Project space when occupied for intended use.

B. Do not install carpet over concrete slabs until slabs have sustainable pH range and moisture level acceptable to specific carpet manufacturer.

1.08 Warranty

A. Special warranty specified in this Article shall not deprive MSBSD of other rights MSBSD may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Written warranty, signed by authorized agent of carpet manufacturer and by the manufacturer's warranted installer, agreeing to replace carpet that does not comply with requirements listed herein or that fails within specified warranty period. Warranty includes labor and materials for removal and disposal of failed product, substrate repair as required due to carpet removal, cost of replacement carpet, freight, and delivery to site and cost of installation, including furniture, fixture and equipment moving expenses. Warranty does not include deterioration of failure of carpet system due to failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, zippering, dimensional stability, edge raveling, snags, runs, delamination, backing resiliency loss, color fastness, stain resistance and static resistance properties of carpet system for the warranted period.

1. Warranty Period shall be 20 years wear from date of Substantial Completion.

1.09 Extra Materials

A. Before installation begins, furnish extra materials described below that match installed products. Package with protective covering for storage and identify with labels describing contents including manufacturer, carpet name/quality, carpet color name, and amount of carpet (sq. yds.).

1. Full boxes of carpet equal to 3 percent of amount installed for each type indicated, unless otherwise instructed by the Project Manager.

Part 2- Products

2.01 Carpet Physical Characteristics

A. Carpet Tile only.

B. Tufted carpet construction.

C. Multi-level textured loop with maximum pile height variation of no more than 1/32".

D. Pattern to be non-directional and random in appearance. Minimum of five (5) distinctly different colors.

E. 100 percent bulk continuous filament cationic nylon fiber Type 6.6 with a modification ratio of no greater than 2.0, using Fiber Identification Cross Pattern and Analysis results according to AATCC TM 20.

F. 100% Solution dye

G. 2 to 4 yarn ply

H. 20-oz/sq. yd. minimum per ASTM D-5848 finished pile yarn weight. This weight does not include weight of backings.

I. Pile Thickness to be measured according to ASTM D-6859, adjust to meet density

J. Pile Density: Allowable minimum 6500. Density is calculated as follows: Density = (36 x Finished Pile Weight in oz. per sq. yd.) ÷ Pile thickness in inches as determined by ASTM D 5823.

K. Gauge: Minimum 1/10 per inch in accordance with ASTM D 418.

L. Minimum 10 stitches per inch.

M. Primary Backing must be non-woven. Woven primary backings not allowed.

N. Secondary Backing to be high performance, moisture impermeable 70 oz. minimum PVC or non-PVC backing system. Min 5 year proved record of successful performance in K-12 education use.

O. 9” minimum x 48” maximum size for plank tiles and 18” x 18” minimum to 36” x 36” maximum for square carpet tiled.

2.02 All test and performance data shall be performed and documented by an independent testing lab:

A. Carpet shall pass surface flammability of Methenamine Pill Tests ASTM D-2859 and CPSC ff1-70 (as found in 16 CFR 1630). 7 passes out of 8 specimens tested minimum.

B. Carpet to achieve a Class 1 rating: >0.45 watts/sq. cm critical radiant flux and/or federal, state, or local requirements per ASTM E 648 or a lower rating as allowed by all applicable codes

C. NBS Smoke Chamber Test: ASTM E-662 Test Method: carpet rating to be < 450 Dm in Flaming Mode or as allowed by all applicable codes.

D. By permanent means and without chemical treatment, static control shall be achieved below 3.5 kV when tested at 20% relative humidity and 70°F in accordance with Electrostatic Propensity Test, AATCC-134.

E. Carpet shall have an appearance rating based upon the 12,000 cycle Hexapod Drum Test performed in accordance with ASTM D 5252 carpet to achieve a minimum rating of 3.5 in severe use areas such as corridors, assembly areas, commons, and minimum rating of 3.0 in heavy use areas.

F. Dimensional Stability: Tolerance of 0.2% maximum dimensional change in varying moisture condition per Aachen Test (I.S.O. 2551).

G. A minimum of 10lbs of force allowed to pull a single carpet strand from its primary backing in accordance with ASTM D 1335 Test method for Tuft Bind

H. A minimum rating of 4 after 160 AFU for 3 cycles using the AATCC Grey Scale for Color Change in accordance with AATCC 16, Option E.

I. Rating of not less than 4, wet and dry uses the ATCC Color Transference Scale in accordance with AATCC-165.

J. Minimum rating of 4 using the ATCC Grey Scale for Color change in accordance with AATCC-164 (oxides of nitrogen) and AATCC-129 (ozone) for 2 cycles.

K. Achieve a minimum rating of 4 on the AATCC Transference Scale in accordance with AATCC 107 Test Method. (for yard dyed carpet fibers only)

L. Achieve a minimum rating of 8 using AATCC Red 40 Stain Scale in accordance with AATCC Test Method 171 (HWE) for two (2) cleaning to simulate removal of topical treatments by hot water extraction followed by AATCC 175 Stain Resistance Test Method.

M. An average of 3 fluorine analyses per AATCC-189, using a single composite sample, to be a minimum of 500 ppm fluorine by weight when new and 400 ppm fluorine by weight after 2 AATCC-171 (HWE) cleanings. Single composite sample to be made by taking nine (9) fiber cuts across the entire width of the carpet.

N. A minimum of 3.5 lbs. per inch shall be allowed in accordance with ASTM D-3936.

O. Comply with NSF ANSI 140 and CRI IAQ Green Label Program Emission Requirement in accordance with ASTM D 5116.

P. All carpet shall comply with Section 4.5 of the ADA Guidelines.

Q. Non-toxic antimicrobial treatment of inherent properties for the life of the carpet as guaranteed by the manufacturer in accordance with AATCC 174 Part 1 (qualitative).

2.03 Installation Accessories

A. Trowel compatible Leveling and Patching Compounds: water-resistant, mildew-resistant, non-staining, latex-modified, hydraulic cement- based formulation provided by or recommended by the carpet manufacturer. Leveling and patching compounds shall be CRI Indoor Air Quality, or SCS certified.

B. Floor Sealers: Water-resistant, mildew-resistant, non-staining type as recommended by proposed carpet manufacturer, that complies with flammability requirements for installed carpet and that suits the sub-floor and leveling and patching compounds. Sealers shall be CRI Indoor Air Quality or SCS certified.

C. Adhesives: Water-resistant, mildew-resistant, non-staining type and releasable for life of the warranty to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and that is recommended by the carpet manufacturer. Adhesive shall be CRI Indoor Air Quality or SCS certified.

D. Resilient Edge Strips

Part 3- Execution

3.01 Examination

A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting

carpet performance. Verify that substrates and conditions are satisfactory for carpet installation and comply with requirements specified.

B. Verify that concrete sub flooring complies with the specific carpet manufacturer's recommendations and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by the carpet manufacturer. Provide a copy of test reports to MSBSD.

2. Installer is responsible to assure surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.

3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 Preparation

A. Comply with carpet manufacturers written installation instructions for preparing substrates indicated to receive carpet installation.

B. Use trowel compatible leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depression in substrate.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the carpet manufacturer.

D. Broom and vacuum clean substrates to be carpeted immediately before installing carpet. After cleaning, examine substrates for moisture, alkaline slats, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 Installation

A. Direct-Glue-Down installation shall comply with manufacturer's instructions.

B. Carpet shall be installed using manufacturer's recommended installation method and products in a manner that will allow its removal from substrate without damage or destruction of substrate or carpet and carpet backing for the life of the carpet.

C. Comply with Architect's direction for carpet pattern/pile of carpet; maintain specified carpet pattern, as required by Design Documents. At doorways, center carpet change of style, pattern, or color under the door in closed position.

D. Do not bridge building seismic expansion joints with carpet.

E. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosing's. Bind or seal cut edges as recommended by carpet manufacturer.

F. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use non-permanent, non-staining marking device.

H. Install pattern parallel to walls and borders, or as indicated by design.

I. Completed carpet installation is to be smooth and free of bubbles, puckers, bumps, and other defects.

J. Carpet installations will be rolled with a 100 lb. carpet roller unless otherwise specified by manufacturer.

3.04 Cleaning

A. Perform the following operations immediately after installing carpet:

1. Remove excess adhesive, and other surface blemishes using cleaner recommended by carpet manufacturer

2. Remove yarns that protrude from carpet surface

3. Vacuum carpet using commercial machine with face-beater element

4. All rubbish, wrappings, trimmings, and debris, etc. are to be removed from site and disposed of properly.

09 72 16 Vinyl-Coated Fabric Wall Coverings

Part 1- General

1.01 Requirements

A. Vinyl coated fabric wall coverings rolled vinyl wall coverings, wallpaper or other fabrics are not acceptable. These are not recommended for use in any area.

09 80 00 Acoustic Treatment

Part 1- General

1.01 Summary

A. When Suspended Acoustic Tile (SAT) ceiling systems are utilized in acoustically sensitive situations, extend interior partition walls to structure above with acoustic insulation at entire wall.

B. Provide Suspended Acoustic Tile (SAT) ceiling systems wherever practical.

C. Provide wall and ceiling mounted acoustical panels within gymnasium space. Wall and/or ceiling surfaces in gymnasiums and multi-purpose rooms should be designed to help reduce reverberation and absorb sound.

D. Unbacked, perforated hardboard is not an acceptable acoustic baffle in gymnasiums.

1.02 Suspended Acoustical Tile (SAT) Ceilings

A. Installation to conform to International Building Code (IBC) 2012 or most recently adopted code.

B. 30 inches of clearance minimum is required above suspended ceilings. This includes space requirements above light fixtures.

C. SAT ceilings are preferred for all spaces, except those subject to damage, such as gymnasiums. GWB ceilings are acceptable for special areas, verify with MSBSD. Use washable type tiles in kitchens.

D. Ceiling heights should be kept sufficiently high in corridors to prevent students from jumping up and hitting the ceiling. A desired ceiling height in junior and senior high schools is at least 10 feet. When ceiling heights must be lower impact resistant ceiling materials must be used.

E. Do not use any concealed spline ceiling support assemblies.

F. SAT ceilings of any type are not acceptable in gymnasiums, multi-purpose rooms and dressing rooms.

09 91 00 Painting

Part 1- General

1.01 Painting Requirements

A. Corridors, kitchen, locker rooms and restrooms require special attention. Durable finishes such as semi-gloss Alkyd enamel or epoxy have performed well. Avoid high gloss wall finishes due to defect magnification. Use of slight texturing or other effects is preferred; for example, consider stipple texture in paint system.

B. All metal door jambs to be semi-gloss Alkyd enamel or epoxy.

C. Semi-gloss latex in classrooms.

D. Require all exterior wood be back primed before installation on building.

E. Select light colors for the base field color in all areas. Do not use dark colors that absorb light.

F. Prefer maintenance-free corridor finish. If necessary, painted corridor surfaces are to be a washable semi-gloss paint.

G. Specifications are to require Contractor to retain labeled samples of each paint color and type used throughout the project.

H. All paint colors and types must be MSBSD approved before field application. Sherwin Williams Promar 400 semi-gloss finish or MSBSD approved equal.

I. There should be one coat of primer and two finished coats of paint on all GWB.

J. Door frames shall have 2 coats of finish.

K. Drywall finish:

1. Level 4- Interior walls, corridors, kitchens
2. Level 3- Fan Rooms, mechanical rooms

Division 10- Specialties

10 00 00 Specialties

Part 1- General

1.01 Summary

A. Provide metal nosing's on risers in all Music Rooms. Carpet must extend underneath nosing.

B. Boot racks are to be a minimum height of 4 inches from finished floor. Provide a plastic or seamless aluminum/galvanized pan under boot rack to catch water. Consider elevating boot rack above resilient flooring to allow mopping and sweeping underneath.

C. Provide marker trays on all marker boards except in gym or MPR due to possibility of injury.

10 11 00 Visual Display Surfaces

Part 1- General

1.01 General Guidelines

A. Provide adequate blocking for all marker and tack boards and interactive boards.

B. Provide two flag holders per classroom.

C. Map rails with map hooks are required on all white boards.

D. Indicate blocking behind all marker, tack and interactive boards when installed on either wood frame or metal frame partitions.

E. Board height is maximum 7 feet from top of board to finish floor. Exceptions are considered with MSBSD approval.

F. Provide standard size marker boards with map rails and map hooks.

G. Provide porcelain on steel, white marker boards with Manufacturer's standard warranty.

H. The use of field applied tackable wall surfacing with aluminum edge and joint trim as an alternative to tack boards is acceptable with MSBSD approval.

10 14 00 Signage

Part 1- General

1.01 Sign Criteria

A. All interior signage to comply with Americans with Disabilities Act (ADA) requirements.

B. Interior signage package to be coordinated with architectural final room numbering system.

C. All rooms are to be numbered, including all support spaces. Support spaces such as mechanical, IT rooms and storage rooms shall have room use as part of signage. (Ex. Fan Room, MDF and Fire Sprinkler room)

D. Numbering system shall be as follows: basement (if applicable) numbered one (1) thru ninety-nine (99), first floor numbered one hundred (100) thru one hundred ninety-nine (199) unless a basement exists, first floor will begin with one hundred (100), second floor numbered two hundred (200) thru two hundred ninety-nine (299) and so on. Rooms shall be numbered in a sequential clockwise logical order. Schools with more than 100 rooms per floor will have to use a 4-digit numbering system.

E. Exterior signage generally shall not be fabricated using wood for the sign material. All school identification signs are subject to approval by the MSBSD for style and content. Security camera signage quantity and location shall be adequate to notify public and is subject to approval by the MSBSD.

F. Specifications are to require Contract to install MSBSD supplied Knox Box Model 3207 dark bronze.

G. Specifications are to require Contractor to provide and install 30” x 30” bronze facility dedication plaque. Specific message text will be approved by MSBSD during project prior to Contractor ordering and installing.

H. Specifications are to require Contractor coordinate AK DOT approved directional signage. Specific message text will be approved by MSBSD during project prior to Contractor ordering and installing.

10 21 13 Toilet Compartments

Part 1- General

1.01 Summary

A. Provide vandal resistant toilet partitions. Vandal resistant means graffiti, scratch, marking, flame, and impact resistant.

B. Specify toilet partitions which are smooth solid high-density polyethylene (HDPE) rigid plastic panels with cast through integral plastic color not less than one-inch-thick with hardness that meets 68 Shore “D” per ASTM D2240.

C. Provide toilet partitions which are braced at the floor and ceiling and continuous wall brackets.

D. Top rails should be designed to discourage students from either swinging or hanging on them.

E. All hardware on toilet partitions is to be stainless steel.

F. Provide ADA accessible hardware.

G. Mount coat hooks in accessible stalls at 48 inches above finished floor.

10 22 26 Operable Partitions

Part 1- General

1.01 Folding Partitions

A. Due to high cost verify requirements for individual projects with the MSBSD

B. Operable partitions can be single, paired or continuously hinged series of individual flat panels

C. Top track support with manual operation

D. Interlocking seals as required

E. Must meet acoustic requirements

F. Must meet Fire Codes requirements where applicable

G. Installer must be manufacturer certified

1.02 Accordion Partitions

A. Accordion-type folding partitions are not acceptable.

10 26 13 Corner Guards

Part 1- General

1.01 Summary

A. Provide corner guards on all GWB partitions in corridors and other high use areas.

B. Stainless Steel or brushed aluminum with a minimum of 16 gage thickness.

C. Corner guards shall have minimum 2” legs and be mechanically fastened to wall. Glued on is acceptable if approved by MSBSD.

D. Corner guards are not necessary on CMU. CMU should use bull-nose corners where exposed to traffic.

10 28 00 Toilet, Bath, and Laundry Accessories

Part 1- General

1.01 General Requirements

A. The Architect shall verify if the following toilet room accessories shall be MSBSD selected and/or MSBSD supplied to match MSBSD standard to assure proper fit of paper products and replacement of damaged units:

1. Soap dispensers
2. Toilet paper holders
3. Waste receptacles
4. No built-in waste receptacles
5. Feminine napkin disposals

B. Architect shall select other toilet room accessories which include, but is not limited to:

1. Metal framed mirrors
2. Shower curtains and curtain rods
3. ADA Accessible seating in showers and tubs as required by code
4. Dyson Air Blade hand dryer (Middle and High Schools Only)

C. The Architect is to provide drawings, which clearly lay out the position of all toilet room fixtures, specialty items and devices. Drawings and specifications shall indicate blocking requirements for MSBSD, and Contractor furnished specialties. Ensure items are placed in locations to comply with the Americans with Disabilities Act (ADA).

D. Each toilet accessory item shall be identified in the specifications and on the plans as to make and model to facilitate the coordination of blocking requirements. These specifications will be provided by MSBSD.

10 44 16 Fire Extinguishers

Part 1- General

1.01 General Requirements

A. Provide Code appropriate fire extinguishers for facility.

B. Provide proper class and type fire extinguishers in Food Service areas.

C. Prefer brushed aluminum or stainless-steel finish cabinets for fire extinguishers provided in public areas.

D. Label “Fire Extinguisher” in red color, as required by OSHA.

E. Quantity and locations to be determined by latest NFPA standard.

10 51 00 Lockers

Part 1- General

1.01 Typical “Student” Locker

A. Verify locker types with MSBSD.

B. Prefer fully recessed lockers. Provide sloping top lockers in corridors where exposed.

C. Provide fully enclosed bases with lockers and 3-point latching of locker doors.

D. Welded lockers preferred. If knock down lockers are provided, lockers are to be riveted not bolted.

E. Handles and locks shall not protrude. Recessed built-in locks must be Master Lock.

F. Doors are to have continuous 16 gage piano hinge.

G. Doors will be minimum 14-gauge steel with full height 3-inch minimum width edge and door stiffener.

H. Minimum 4” curb height.

I. Provide number plates with MSBSD provided designation.

J. Each locker to have one shelf, one double-prong ceiling hook and three single-prong wall hooks.

K. Provide ADA accessible lockers as determined by IBC.

L. Locker height must be approved by MSBSD.

1.02 Athletic Lockers

A. Verify locker types with MSBSD.

B. Lockers are to be well ventilated with vent perforated doors and sides having penetrations no larger than 1/4 inch.

C. Door faces are to be 14 gauge with edge and door stiffeners.

D. Provide hasps in recessed area for padlock.

E. Provide number plates with lockers.

1.03 Elementary School Cubbies

A. Provide open cubbies, coat hooks and boot racks with grates in each Elementary School classroom.

10 75 00 Flagpoles

Part 1- General

1.01 General Requirements

A. Flag poles are to be 30 feet in height.

B. Revolving external, gold, heavy cast, double truck.

C. Specify cone tapered seamless aluminum flagpole with double 5/16” braided polypropylene halyards.

D. All exposed aluminum surfaces shall have clear anodized finish.

E. Cleats for halyards shall have lockable covers. Padlock type lock preferred.

F. Locate near main entrance, accessible by sidewalk, preferably on a raised portion. Taper away from pole base to provide adequate drainage.

G. Locate flagpole off all main sidewalk surface.

H. Lighting must be provided on all Flagpoles.

Division 11- Equipment

11 00 00 Equipment

Part 1- General

1.01 General Comments

A. Carefully review each piece of equipment which is to be placed in the building. Verify size, storage, access, and specialty requirements such as power, water hookup, exhaust, code compliance, etc.

B. Provide schedule of all Contractor installed equipment to MSBSD as part of the design development submittal.

C. Provide schedule of Owner Furnished Contractor Installed (OFCI). Provide time frame for schedule.

11 12 33 Property Access Gates

Part 1- General

1.01 Design Criteria

A. No installation of motor operators at vehicle gates except requested by MSBSD.

B. Custodial lighting circuits will be coordinated with main vehicle gate locations.

11 13 00 Loading Dock Equipment

Part 1- General

A. If the building requires a loading dock, provide a covered loading dock and entry (dock height 44") hand operated dock leveler. Verify dock and bumpers extend outward farther than the canopy to protect canopy from impact of tall trucks.

B. As per OSHA requirements, include a railing or safety chain around loading dock if dock is higher than three feet.

C. Provide permanent OSHA approved platforms on one side of the dumpster at least ¾ of the length to minimize lifting requirements to a maximum of 3 feet in height.

11 14 13 Pedestrian Gates

Part 1- General

1.01 Design Criteria

A. Ped. gates shall be a minimum of 4 feet in width.

B. Walkthrough gates shall be a minimum of 3 feet in width and provide vehicle barrier deterrence.

11 20 00 Commercial Equipment

Part 1- General

1.01 Industrial Equipment

A. Coordinate with electrical to ensure provisions for a master shunt trip for all shop equipment.

B. Provide acoustical separation from other areas of facility.

C. Provide a separate room for shop dust collection equipment and coordinate dust collection system and shop equipment.

D. Shop equipment is to be MSBSD specified with Contractor furnish and installation. Coordinate individual equipment with MSBSD as part of design development.

E. All work benches shall be equipped with compressed air with quick disconnect fittings, hoses, and piping.

11 40 00 Food Service Equipment

Part 1- General

1.01 General Requirements

A. MSBSD shall provide the architect with the current approved food service equipment list for the contractor to install.

B. Adequate kitchen space in initial design proposal to reflect numbers to be served and style of service. This space will include storage area, mop sink or custodial closet, restroom and or office area. The serving, prep, loading and or staging area all need to be in this original space design.

C. Carefully coordinate Food Service Equipment requirements with other Divisions.

D. Review kitchen requirements with MSBSD. Carefully coordinate size of kitchen sinks, spray nozzles, dishwasher installation and size and type of trays to be used. All traps must be self-priming above floor.

E. Comply with applicable National Sanitation Foundation (NSF) standards and recommended criteria.

F. Ensure Alaska Department of Environmental Conservation (ADEC) sanitarian review and approval/permit for entire kitchen installation prior to final drawings.

G. Be sure proper water temperature of 140° is available. Booster water heaters for dishwashers are necessary and required.

H. Design adequate exhaust for kitchen equipment. Provide exhaust hoods for all heat producing equipment and exhaust fan for kitchen in general.

I. Provide floor sinks for drainage of hot food wells, etc.

J. Kitchen equipment and sinks must have grease traps with easy access and clean out.

K. Ensure adequate access with power and light necessary to provide for maintenance capability for all freezer and refrigerator condenser units.

L. Locate all condensers within building for ease of maintenance.

M. Locate all condensers in areas that the compressor motor and pump noise does not disturb students.

N. Ensure adequate data access with proper data outlets for food service computers, and designated setup areas.

O. Monitor refrigeration unit temperatures. (Ex. MasterBilt Dial Access Milk Cooler, Shelleymatic NDF cooler, Continental Refrigerator, Beverage-Air)

N. All eyewash stations shall be installed in compliance with Federal, State, and local codes, including location, temperature control, etc.

11 53 00 Laboratory Equipment

Part 1- General

1.01 General Requirements

A. Ensure provision for master shutoff for gas and downstream insolation valves for individual lab classrooms.

B. Ensure provision of automatic emergency shower/eyewash station with floor drain in every room that chemicals are mixed or used.

C. Provide acid proof drains, tops, sinks and flooring.

D. Each lab sink must have readily accessible plaster/clay trap for easy clean out.

E. Fume hood shall have explosion proof motors, lights and switches and shall be vented directly to the exterior of building.

F. Include flow and riser diagrams, including gas, air, and all associated support systems.

11 66 23 Gymnasium Equipment

Part 1- General

1.01 General Requirements

A. All athletic and recreational areas and equipment must meet ADA guidelines.

B. Considerations shall be made in the design of high/middle schools for a mezzanine track built into the gym.

1.02 Acoustic Considerations

A. Gymnasium walls shall be designed to reduce reverberation and absorb sound to accommodate use as multipurpose room.

B. All noises, either of inside or outside origin, should be reduced to levels that will not interfere with the hearing of speech or music. This includes both direct (unamplified) and reinforced speech or music.

C. Gymnasiums and associated restrooms must be configured in a way that they can be easily isolated from the remainder of the facility for after school activities.

D. Provide adequate storage and handling facilities for the mats used as part of the physical education curriculum.

E. Provide mat hoist(s) for high and middle schools.

F. Make storage space provisions in the Gymnasium/Multipurpose Room.

G. Provide for a commercial washer and dryer for high/middle school gymnasium areas.

Part 2- Products and Execution

2.01 Gymnasium Curtain Dividers

A. Divider curtains are to be Fire Marshal approved type with lifetime flame-retardant and flame-resistant qualities.

B. Material shall be vinyl fabric equal to Herculite #80. Net shall be 7/8" square #252 knotless nylon netting. Vinyl fabric shall be at least the first 10 feet high with the balance to be net top. All seams minimum double lock stitched with #69 nylon thread using full-length, unspliced widths of fabric.

C. Curtains are to be motorized, indirect mount, fold up curtains. Factory inserted personnel doors ("man-doors") are to be included as part of the curtain supplied. Accordion or other types of moveable walls are not acceptable.

D. Curtain to extend full height of gymnasium, except when sloping ceilings occur.

E. Hoist mechanism to be remote key operated only with motorized indirect mount; fold up curtain Protective limits to be used on system, including emergency stop switches and thermal protection.

2.02 Wall Protection Mats

A. Wall mats must not contain any exposed foam plastics.

B. All cutouts in mats (light switches, outlets, etc.) must be thoroughly covered and repaired with the same mat surfacing material.

C. Material must be puncture resistant and self-healing to small punctures, such as pencil holes.

D. Place mats near athletic equipment and specifically under pull-up bars. (Ex. End of court under baskets)

2.03 Volleyball Standards

A. Volleyball standards are to be a stand-alone cantilevered system which does not require guy-wiring or guy-anchors.

B. Floor plates and sleeves shall be chrome or brass plated.

C. Standard system shall be adaptable to badminton and tennis.

D. Volleyball nets and standards are not to interfere with basketball backboards and hoops.

E. Elementary- Provide (2) volleyball standard inserts and (3) badminton standard inserts.

2.04 Mat Hoist

A. Provide mat hoist(s) at secondary schools.

B. Provide vertical lift type only unless horizontal applications are necessary.

C. Coordinate individual project mat hoist requirements with MSBSD during design development.

2.05 Wall-Hung Athletic Equipment

A. Avoid athletic equipment with protruding fasteners or other dangerous protrusions.

B. Provide wall mats under athletic equipment such as pull-up or chin-up bars.

C. Climbing wall should be 4” off floor.

2.06 Mirrors

A. All mirrors in athletic areas must be laminated safety glass.

B. Full length mirrors must not be mounted less than 24 inches from floor.

11 68 13 Playground Equipment

Part 1- General

1.01 General Requirements

A. Playground areas for elementary schools shall conform to following standards:

1. National Playground Safety Institute Standards
2. American Society for Testing and Materials (ASTM), F1292, F1487, F1951 (1995) (2001e1) Playground Equipment for Public Use
3. Consumer Public Safety Council (CPSC), Pub No. 325 (2008) Handbook for Public Playground Safety (www.cpsc.gov)
4. Approval by the MSBSD
5. Current ADA requirement as applicable to playground equipment.

B. Require all playground equipment and safety surfacing has current International Playground Equipment Manufacturers Association (IPEMA) and CPSC Certification for Safety. (www.ipema.org). The IPEMA Certification process ensures compliance with the current ASTM F-1487 Public Playground Safety Standard.

C. Require job specific affidavit from the manufacturer that the equipment design and play area meets ADA requirements.

D. A 6-foot high chain link fence with 2” ground clearance, knuckles up and down, shall be installed around perimeter of playground to help staff monitor children during the school day and to control motor vehicle traffic after hours. Fence shall have gates to permit appropriate access for snow removal, maintenance equipment and fire equipment as required.

E. All slides of equipment shall be free standing and mounted in an approved safety fall zone area including Kindergarten area where straight slides may be component mounted on multiple play units.

F. No play equipment shall have a platform height over six-foot high for lower grades and eight-foot high for upper elementary grades.

G. Playground is to be designed to allow for separate running areas for open play. Provide open line-of-sight for activities monitoring of all play areas. All areas must have appropriate drainage.

H. Playground surfacing methods are to be approved by MSBSD and will be dependent upon soil conditions and drainage.

I. Consideration must be given for a designated snow storage area that will not interfere with play areas.

J. All playground equipment shall be provided with an ASTM approved fall zone surfacing contained by appropriate border construction and otherwise complying with safety standards cited above.

K. Be aware of special performance requirements for playground equipment such as no trapeze rings because of mittens and no small toeholds or smooth surfaces because of large boots.

11 68 33 Athletic Field Equipment

Part 1- General

1.01 ADA Requirement

A. All parts of athletic field must follow ADA minimum standards or higher.

11 68 33.33 Baseball Field Equipment

Part 1- Products

1.01 Pitcher's Rubber

A. Four-sided molded rubber on a cylindrical aluminum core.

1. 24-inch long by 6-inch wide to meet requirements of MLB (Major League Baseball).

1.02 Baseball Bases

A. Set of three bases (per field)

1. 15-inch by 15-inch by 3-inch to meet requirements of MLB.
2. White, weather resistant rubber with ultraviolet inhibitors
3. Include anchor mounts, ground anchors, and plugs.

1.03 Softball Bases

A. Set of three bases (per field)

1. First base: double base, 30-inch by 15-inch by 2.5-inch half in orange, half in white, manufactured to be of equal height.

2. Second and third bases: 15-inch by 15-inch by 3-inch, white, to meet requirements of MLB.
3. Weather resistant rubber with ultraviolet inhibitors
4. Include anchor mounts, ground anchors, and plugs.

1.04 Home Plate

A. Five-sided plate based on a 17-inch square to meet requirements of MLB.
1. White, weather resistant rubber with ultraviolet inhibitors.
2. 1.5-inch thick
3. Include anchor mounts, ground anchors, and plugs.

1.05 Foul Pole

A. Pole:
1. 6-inch schedule 40 (6-5/8-inch OD) aluminum foul pole with wing.
2. 30 foot above grade height
3. Power-coated yellow

B. Angled wing fabricated of 0.125-inch Aluminum:
1. Stamped mesh with 1.50 inch by 1.50-inch punch outs
2. 1.5 feet wide by 22.0 feet long starting 8 feet above finish grade.
3. Double reinforced bends, welded at corners
4. Powder coated yellow

C. Accessories
1. Stainless steel assembly bolts and nuts
2. Base plate of ground sleeve system

Division 12- Furnishings

12 21 00 Window Treatments

Part 1- General

1.01 Window Treatment Requirements

A. Provide energy efficient blinds in all exterior offices and classrooms. Interior blinds for privacy reasons reviewed by MSBSD.

B. Head rail housing prefinished, formed metal box internally fitted with blind mechanics, with cords and control rods provided as part of assembly.

C. Provide for sufficient backing into surrounding construction for durability.

D. One color used throughout facility.

E. Provide blackout shading on all blinds.

12 22 00 Drapes and Curtains

Part 1- Stage Curtains

1.01 Stage Curtains Descriptions

A. Provide cloth drapes in staged music rooms as required for acoustics.

B. Complete stage-curtain systems, including stage curtains, tracks, draw-curtain machines and rigging with necessary accessories for support and operation.

C. Obtain stage-curtain systems from single manufacturer.

D. Stage-curtain systems and attachments to structure shall withstand the effects of gravity and operational loads and the weight of curtains.

1.02 Fabrics

A. Curtain fabrics should be permanently fire resistant or chemically flame resistant and of heavyweight woven cotton velour.

B. 100 percent polyester fabric lining, black.

C. 54-inch minimum width.

D. All curtains must meet current NFPA codes with lifetime flame-retardant and flame-resistant qualities.

1.03 Curtain Bottom Weights

A. Manufacturer’s standard segmented weights to suit each curtain type and location shall be provided.

B. Manufacturer’s standard, continuous weight tape to suit each curtain type and location shall be provided.

C. Manufacturer’s standard or recommended stiffening pipe or conduit that slides into bottom hem and is suitable for curtain type and location indicated shall be provided.

1.04 Curtain Accessories

A. S-Hooks should be Manufacturer’s standard heavy-duty plated-wire hooks, not less than 2 inches long.

B. Tie lines should be No.4 or No. 4-1/2 cord or braided soft cotton tape, black or white to best match curtains, not less than 5/8-inch-wide by 36 inches long, threaded through grommets.

C. Snap hooks should be manufacturer’s standard heavy-duty hooks, blind sewn to top hem of curtain.

1.05 Aluminum Curtain Track

A. Aluminum track should consist of extruded aluminum, ASTM B 221; alloy and temper as recommended by manufacturer for strength and corrosion resistance; mill finish; complete with necessary accessories for support and operation.

B. Curtain rails shall be single or double curtain capacity as indicated. Provide end stops for track rails.

C. Curtain carriers should be standard carriers with a pair of nylon-tired ball-bearing wheels riveted parallel to plated-steel body. Equip carriers with rubber or neoprene bumpers and nylon glide strips to reduce noise, and heavy-duty, plated-steel swivel eye for attaching curtain snap or S-hook. Provide quantity of curtain carriers sufficient for track length, to suit curtain fabrication.

1. One master curtain carrier, for each leading curtain edge, with two pairs of nylon-tired ball-bearing wheels riveted parallel to plated-steel body should be provided.

D. Steel pipe for supporting both sections of suspended curved tracks.

E. Steel clamps and brackets of sufficient strength required to support loads for attaching track to overhead support.

F. Where indicated, equip carriers with rear-fold or backpack guide and rubber spacers to fold curtain from the offstage end of the track; sized for use with operating line if any.

G. For manual walk-along operation, fabricate curtain track without cord, cable, pulleys, or floor pulley.

H. For motorized function fabricate curtain track with cord and pulleys.

1. Operating line should be 1/4-inch diameter, stretch-resistant operating cable consisting of braided synthetic-fiber jacket over galvanized wire cable.

2. End pulley should have one single dead-end and one double live-end pulley. Provide sheave(s) with shielded ball bearing(s), housed in plated-steel body finished to match track. Provide with bracket for securing off-stage curtain end.

1.06 Draw-Curtain Machines

A. Operating machine of size and capacity recommended and provided by track manufacturer for each motorized curtain specified; complete with electric motor and factory-prewired motor controls, starter, gear-reduction unit, brake, and control station.

B. Operator type should be cable drum with grooved drum and cable tension device to automatically take up cable slack and retain cable in grooves.

C. Should be traction driven.

D. Motor should be size sufficient to start, accelerate, and operate curtain in either direction from any position at indicated speeds without exceeding nameplate rating or service factor.

E. Controllers, disconnect switches, wiring devices, and wiring shall be manufacturer's standard unless otherwise indicated.

F. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

G. The Control Station should consist of a three-button control station with push-button controls labeled "Open", "Close", and "Stop".

H. Should have fully closed and fully open preset stops.

12 30 00 Casework

Part 1- General

1.01 Cabinets and Storage

A. Provide common key for common group cabinets in individual labs. Review keying of cabinets with MSBSD locksmith and MSBSD for approval.

B. Provide locking door on all lab storage cabinets, nurses office, and one each per classroom that are keyed to a master key system

C. Doors on all cabinets shall have flush mounted handles with swing of 180°.

D. Review cabinet specification in detail with MSBSD. MSBSD is looking for first quality, perdurable cabinets with substantial plywood bases and heavy-duty edge banding and sturdy hardware.

E. Cabinet locks with access to utilities shut offs to be keyed to building master key system.

F. Cabinet Locks

1. Door Locks: Schlage CL100PB 626 or Olympus 700SC 26D
2. Drawer Locks: Schlage CL200PB 626 or Olympus 800SC 26D
3. Strikes
    a. Plastic bar strikes ½" Schlage CL10-355 or Olympus 10-055
    b. Plastic bar strikes ¼" Schlage CL10-354 or Olympus 10-054
    c. Olympus 12-2 26 D Metal angle bracket, .074 thickness
4. Do not kerf cabinet surfaces for projection of cabinet lock bolt. Use angle strikes or bar strikes to achieve latch.
5. Key Blanks
    a. To be Schlage original key blanks stamped "**Do Not Duplicate**" and change key designation per stamping instructions included with pinning instructions.
6. Locks to be 6 pinned cylinders with Schlage OEM pins
7. Supply 6 master keys

8. Supply 4 cabinet keys per change key set
9. MSBSD will provide pinning list per request
10. Pinning Requests
    a. Supply room numbers and lock quantities with request for pinning list
    b. Use the chosen Schlage Classic keyway on pinning list report

12 60 00 Multiple Seating

Part 1- General

1.01 Bleachers

A. Interior bleachers selection requires specific approval from MSBSD.

B. Preferred bleacher type is wall attached, molded plastic seat assembly with motor operation (traction) with automatic stop for systems more than five rows deep.

C. Provide appropriate ADA seating.

D. Provide railings for all bleacher sections over 4 rows high.

12 93 00 Site Furnishings

Part 1- General

1.01 Exterior Areas

A. Exterior benches, handrails, fences, barricades, walkways, etc. shall be constructed of durable and sustainable materials.

B. Baseball Bleachers shall be aluminum low-rise bleachers with no more than three (3) rows for bleachers without rails. Provide railing for any bleachers that are higher.

Division 13- Special Construction

13 20 00 Special Purpose Rooms

Part 1- General

1.01 Seclusion Room

A. Fire Marshal approval must be obtained. This is done on an “Application for Code Modification”. The following wording is suggested:

"The Seclusion Room is intended to restrict students to a room for a minimal time limit as a behavioral deterrent; when the button is engaged the student is restricted, but only constant pressure engages door; release of button frees access."

B. Door, frame, and hardware specifications see 08 34 00.

C. Address Sprinkler Head – no protrusions; must be flush.

D. Address Light Switches – outside of room.

E. Address Lights – no protrusions; must be flush.

F. Provide spray on liner (Rhino lining) for the floors and all walls.

G. Provide floor drain.

1.02 Nurse's Office

A. Locate near or adjacent to administration area to allow shared responsibilities.

B. Provide strong safe secure location in the Nurse's Office for drug storage.

C. Provide extra storage as necessary for spare clothing, wheelchair, CPR aids, screening aids, crutches, etc.

D. Provide refrigerator with built-in icemaker, ADA shower, washer, and dryer.

E. Nurse's office electric and lighting shall be included on emergency circuits for generated power.

13 34 16 Grandstands and Bleachers

Part 1- General

1.01 General Requirements

A. Design grandstand system, including comprehensive engineering analysis by a qualified professional engineer registered in Alaska, using performance requirements and design criteria indicated.

B. Grandstand systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

C. Elevated Angle Frame Grandstands

1. Quantity and Size should be as indicated on Drawings.

2. Prefabricated galvanized steel or aluminum angle spaced at 6'-0'' intervals joined by means of galvanized steel or aluminum angle cross bracing

3. Shop connections shall be welded to meet AWS standards and local code requirements.

4. Internal splices, where required shall be two per joint, and shall penetrate the joint a minimum of 8 inches in each direction and be riveted at one end only to allow for contraction and expansion.
5. Closed riser construction with 8-inch vertical rise and 24-inch tread depth. Seat height is 17 inches above its respective tread.
6. Seats shall be nominal 2-inch by 10-inch anodized aluminum with anodized end caps.
7. Treads shall be nominal two (2) 2-inches by 10-inch mill finish aluminum with mill finish end caps on all rows. Planks must be placed in such a way that there are no openings in the deck greater than 4 inches and no gaps between planks greater than 1/4-inch.
8. Closed riser construction with nominal two (2) 1-inch by 6-inch anodized finish aluminum with anodized finish end caps on top row. Nominal one (1) 1-inch by 6-inch anodized finish aluminum with anodized end caps on all other rows.
9. Aisle footboards shall be of aluminum alloy and be of mill finish with contrasting aisle markings. Three aisle stiffener angles shall be used to strengthen the aisle step. Aisles shall be 54 inches wide.
10. Aisle handrail shall be anodized aluminum pipe with intermediate rail.
11. Stair frames shall be of galvanized steel of mill finish aluminum angle with 2-inch by 12-inch mill finish aluminum plank with step riser and contrasting aluminum nose. Guardrail and handrails shall be provided for stairs as required. Stairs shall have two-line rails 36 inches above nose of step. Handrails shall extend in the direction of the exit steps 12 inches beyond the end of the steps. Ends shall terminate in newel post. Stairs shall be compatible with walkway and for seating.
12. Walkways, ramps, and decks shall be decked with mill finish aluminum on galvanized steel or aluminum frames. Ramps shall have a 12 to 1 slope and shall not run more than 30 feet without a 5-foot landing. Length of ramp will be determined by walkway elevation as shown on plans. Walkway minimum width shall be as per local amendments to the ICC 300-2007 and IBC. Dimensions as required and as shown on plans.
13. Guardrail shall be two lines of anodized aluminum tube with galvanized chain link fence 42 inches above the seats on both ends of the grandstand and across the back of the grandstand. Install end plugs and elbows where required. Front guardrails shall be three lines of aluminum tube with galvanized chain link fence. Top rails at sides, rear and front shall be 42 inches above the leading edge of seat or walking surfaces. Rail supports shall be manufacturer standard galvanized steel or aluminum angle and/or tube.
14. Handicapped accessibility shall be provided as required by code.

Part 2- Products

2.01 Materials and Finishes

A. The supporting framework shall be fabricated from aluminum or galvanized steel.

1. Structural Fabrication with aluminum alloy 6061-T6 mill finish. Each frame shall be unit-welded, using metal inert gas method, under guidelines by the American Welding Society. All cross bracing and horizontal bracing shall be aluminum angle 6061-T6 mill finish.

2. Structural fabrication with galvanized steel. Each frame shall be unit-welded, using metal inert gas method, under guidelines by the American Welding Society. All cross bracing and horizontal bracing shall be galvanized steel. After fabrication, all steel shall be hot dipped galvanized to ASTM A-123 specifications.

B. Extruded Aluminum

1. Seat planks shall be aluminum alloy 6063-T6, clear anodized 204R1, AA-MC10C22A31, Class II. With a minimum wall thickness nominally 0.078-inch for impact and deformation resistance.

2. Tread and riser planks shall be aluminum alloy 6063-T6, mill finish. With a minimum wall thickness nominally 0.078-inch for impact and deformation resistance.

3. Entry stair and ramp frames shall be aluminum ally 6063-T6 mill finish.

4. Guardrail Pipe shall be 1-5/8-inch OD schedule 40 aluminum alloy 6105-T5, clear anodized 204R1, AA-M10C22A31, Class II.

C. Accessories

1. Channel end caps shall be Aluminum alloy 6063-T6, clear anodized 205R1, AA-M10C22A31, Class II.

2. Bolts and nuts shall be hot dipped galvanized or stainless steel as appropriate.

3. Hold Down Clip Assembly shall be made of Aluminum alloy 6063-T6 mill finish.

Part 3- Execution

3.01 Erection of Structural Framing

A. Erect angle frame grandstand system according to manufacturer's written erection instructions and erection drawings.

1. Do not field cut, drill, or alter structural members without written approval from angle frame grandstand system manufacturer's professional engineer.

B. Erect all other components of the grandstand system according to manufacturer's written erection instructions and erection drawings.

Division 14- Conveying Equipment

14 24 00 Hydraulic Elevators

Part 1- General

1.01 Elevator Requirements

A. Provide hydraulic elevator system complete and ready to operate including hole less cylinder and pump, controls car and hoist way doors.

B. Machine-room less elevator design preferred.

C. Carefully coordinate elevator specification with Mechanical, Electrical and Fire Protection sections. (No sprinklers in elevator shaft,)

D. Where hole less elevators are specified, do not permit single cylinder type operation.

E. Specify both keyed and electronic keypad operation. Keypad operation is for faculty and staff.

F. Specify non-proprietary controller so it can be maintained and reprogrammed by the MSBSD Maintenance Department.

G. Specify inspections as required by the State of Alaska Department of Labor and Workforce Development Mechanical Inspection, Elevator Division and as part of closeout documentation.

H. Obtain elevators from single manufacturer including major elevator components, including driving machines, controllers, signal fixtures, door operators, car frames, cars, and entrances, shall be manufactured by single manufacturer.

1.02 Performance Requirements

A. Comply with ASME regulatory requirements.

B. Comply with ADA-ABA Accessibility Guidelines.

C. Elevator system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and shall comply with elevator safety requirements for seismic risk Zone 3 or greater in ASME A17.1/CSA B44.

Part 2- Products

2.01 Elevator Description

A. Basis of Design is Machine-room less Gen2 traction passenger elevator as manufactured by Otis Elevator Company. The system shall consist of the following components:

1. Hoist way: No machine room is provided
2. Gearless traction
3. 2500lb rated load
4. 200 fpm rated speed

5. Selective-collection automatic operation system
6. Auxiliary Operations
    a. Standby power operation
    b. Service at all floors

2.02 Car Enclosures

A. If standard cars are unacceptable, detail cars on Drawings or use an allowance and retain only those subparagraphs specifying car dimensions and describing items not included in allowance.

B. Before retaining options in “Inside Width” and “Inside Depth”, verify that selected configuration complies with requirements for providing accessibility to people with disabilities and to emergency stretchers, if required. Revise descriptions of width and depth if car has more than one entrance.

2.03 Operation Systems

A. In addition to primary operation system features, provide the following operational features for elevators where indicated:

1. On activation of standby power, car is returned to a designated floor and parked. Car can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at main lobby. Manual operation causes automatic operation to cease.

B. Provide the following security features, where indicated. Security features shall not affect emergency firefighters’ services:

1. The Card-Reader Operation System uses card readers at car- control stations to authorize calls. Security system determines which landings and at what times calls require authorization by card reader. Provide required conductors in traveling cable and panel in machine room for interconnecting card readers, other security access system equipment, and elevator controllers. Allow space as indicated for card reader in car. Provide card reader integral with each car- control station.

2.04 Signal Equipment

A. Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with LEDs.

B. Provide signal equipment designed for destination-based system. Fabricated lighted elements with LEDs.

C. Provide manufacturer’s standard recessed car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.

1. Mark buttons and switches for required use or function. Use both tactile symbols and Braille.

2. Provide “No Smoking” sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics.

D. Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

E. Provide illuminated, digital-type car position indicator, located above car door or above car-control station. Also, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served. Include travel direction arrows if not provided in car-control station.

F. Provide one hall push-button station and card reader at each landing.

1. Provide manufacturer’s standard wall-mounted units.

2. Equip units with buttons for calling elevator and for indicating desired direction of travel.

3. Equip units with buttons for calling elevator and for indicating direction of travel or destination as required by system. Provide a signaling system to verify floor selection, where destination registration is required, and to direct passengers to appropriate car.

4. Provide a dedicated phone line for the two-way communication system.

Division 21- Fire Suppression

21 00 00 Fire Suppression

Part 1- General

1.01 Fire Suppression Requirements

A. Sprinkler piping may be Schedule 10 rolled iron with protective sealant on inside diameter of pipe to save funds and provide a longer warranty on wet systems, otherwise schedule 40 shall be used.

B. Design per current NFPA code for zones and sectionalization valves located in the mechanical room.

C. Wet sprinkler systems are preferred. If dry system specified, avoid building design that requires dry pipe sprinkler branches.

D. Three hard copies and one electronic copy of all control, fire protection, and other specialty shop drawings must be included as separate drawings with the “As-Built” Record Drawings in each of the previously mentioned formats.

E. Provide accurate device location map (2 copies), one for front entrance fire department use, and one for fire panel location.

21 07 19 Fire-Suppression Piping Insulation

Part 1- General

1.01 Fire Suppression and Insulation

A. All interior insulation shall have a UL listed composite fire and smoke hazard rating not exceeding the following:

1. Flame Spread 25/50
2. Fuel Contributed 50
3. Smoke Developed 25/50

21 13 00 Fire-Suppression Sprinkler Systems

Part 1- General

1.01 Scope Description

A. Provide a complete wet pipe automatic fire sprinkler system, hydraulically calculated to protect the entire facility, complete and in operating order.

B. System shall follow all applicable codes and standards, as well as the Authority having jurisdiction as defined by the NFPA.

C. Sprinklers shall provide for fire suppression for entire building, including outside roof canopies, attic areas, crawlspaces, and underfloor areas, utilizing systems compatible with the specific application.

Part 2- Products

2.01 General

A. Provide only new materials and equipment, which are standard products of a manufacturer regularly engaged in the manufacture of fire protection equipment.

B. All products shall bear the “UL” label or “FM” listing and be specifically approved for fire protection application where they are used.

C. Thin wall piping is not allowed. At a minimum use Schedule 10 rolled iron with protective sealant on inside diameter of pipe.

2.02 Sprinklers

A. Provide sprinklers as required by NFPA 13 standards and in compliance with the UBC chapter 9 for the entire project. Sprinkler finish and style as follows:

1. In all areas with surface mounted light fixtures attached to finished suspended ceilings, provide standard spray pendant sprinklers and escutcheons to position the sprinkler deflector below the light fixture. Sprinklers and escutcheons to be chrome finish.

2. In all areas with recessed lighting flush to the suspended ceiling finish, provide recessed standard spray pendant sprinklers. Sprinklers and escutcheons to be chrome finish.
3. Sprinklers above ceilings and throughout shop and mechanical service areas shall be bronze finish, standard spray, upright or pendant type as required by the drawings.
4. Sidewall sprinklers shall be bronze finish in all service areas, and chrome throughout all public areas.
5. Dry pendant, sidewall sprinklers protecting inside freezers/coolers or outside overhangs shall be bronze finish. Application of dry type sprinklers shall comply with NFPA 13 standards and are required on all dry pipe systems where the system piping and/or sprinkler head is located in an unheated area.
6. Dry pendant sprinklers protecting entry vestibules shall be chrome finish. Dry pendant sprinklers protecting unheated areas and piped from wet pipe systems shall have an "A Length" dimension of not less than 18".
7. Sprinkler Guards shall be of the same manufacturer and finish as the sprinkler which they are to be installed on. Red guards are acceptable for bronze sprinklers only. Chrome finish guards are required for chrome sprinkler heads.
8. Sprinklers of correct temperature rating shall be installed in accordance with NFPA 13.
9. Sprinklers for new additions of existing facilities shall match Make, Model, and finish for existing sprinklers, while complying with NFPA 13 standards, provided those sprinklers are still being manufactured.
10. Provide sprinkler wrenches for each type of sprinkler.
11. Spare sprinkler cabinet to be red sheet steel manufactured by the same company that made the sprinklers. Size the cabinet in accordance with NFPA 13 standards. Provide sprinklers for the cabinet representative of the assortment provided for the system to include at least one dry pendant. Mount cabinet on the wall within 60" of the sprinkler control riser.

21 30 00 Fire Pumps

Part 1- General

1.01 Quality Assurance

A. The fire pump shall be assembled by the pump manufacturer. An assembler of fire pumps not engaged in the design and construction of fire pumps shall not be considered as a fire pump manufacturer. The manufacturer shall assume "Unit Responsibility" for the complete fire pump. Unit responsibility shall be defined as responsibility for interface and successful operation of all system components supplied by the pumping system manufacturer.

B. Equipment provider shall be responsible for providing certified equipment start-up and, when noted, in the field certified training session. This pump start-up shall be by the pump

manufacturer or a certified factory-trained representative per NFPA 20, Section 11-2. This start-up shall include verification of proper installation, system initiation, adjustment, and fine tuning. Start-up shall not be considered complete until the sequence of operation, including all alarms, has been sufficiently demonstrated to the MSBSD or MSBSD's designated representative. This job site visit shall occur only after all hook-ups, tie-ins, and terminations have been completed and signed off on the manufacturer's start-up request form.

C. Conform to NFPA 13 and NFPA 20.

Part 2- Products

2.01 Vertical Turbine Pumps

A. Casing should be cast-iron, rated for 250 psi or 1.20 times actual discharge working pressure discharge gage, air vent, wear rings, seal flush connection, drain plug and flanged discharge.

B. The impellers shall be bronze, fully enclosed, keyed to shaft or secured with lock nut.

C. Shaft shall be stainless steel or carbon steel with bronze or stainless-steel sleeve through seal chamber.

D. Seals shall consist of packing gland with minimum four rings graphite impregnated packing and bronze lantern rings.

2.02 Fire Pump Accessories

A. Eccentric suction reducer and OS&Y gate or butterfly valve on suction side of pump.

B. Concentric increaser and check valve in pump discharge and OS&Y gate or butterfly valve on system side of check valve.

C. Fire pump bypass fitted with OS&Y gate or butterfly valves and check valve.

D. Circulation relief valve.

E. Suction pressure gage, 4-1/2-inch diameter dial with snubber, valve cock and lever handle.

F. Discharge pressure gage, with snubber, valve cock and lever handle.

G. Casing 3/4-inch relief valve.

H. Float operated automatic air release valve.

I. Flow metering system for closed loop testing.

Division 22- Plumbing

22 00 00 Plumbing

Part 1- General

1.01 General Comments

A. Drawings and specifications to be complete, detailed, and accurate so that all bidders may prepare estimates on exactly the same work and the construction may proceed with no misunderstandings on the work to be done.

B. Cross coordinate with all other Architectural Divisions. Make sure there is available power for these special items.

1.02 Codes

A. Comply with all current laws, rules, and regulations of the State of Alaska Administrative Code (hereinafter referred to as AAC) for all MSBSD designs.

1.03 Designs and Project Procedure

A. The Architect and Engineer shall meet with the MSBSD throughout the completion of the design to review issues which include locations for mechanical equipment, equipment chases, and accessibility. Available access to be provided to all control valves and VAV boxes in the ceiling space.

B. The Architect/Engineer shall submit the following with design drawings:

1. Water Systems shall include piping plans and isometric or schematic diagrams.

2. Drain Systems will have piping plans, isometrics, or schematic diagrams. Indicate slope of all piping that is greater or lesser than 2%.

3. Submit all applicable plumbing system plans to DEC for approval to operate.

1.04 Specifications and Drawings

A. Avoid the use and specification of unusual materials, or those not available on the local market. Where materials may not be well known, include the name and address of either the manufacturer or local agent in the specifications.

B. Make schematics and diagrammatic details for each project large enough to be easily read. Scale boiler room, kitchen and mechanical / electrical /MDF-IDF room plans and elevations at 1/4” minimum. Use 1/2” or larger if required to clearly show details of design.

C. On each set of plans provide an adequate identifying legend of all symbols used. Identify and define all abbreviations used on the drawings.

D. Make sectional drawings of congested areas to show all electrical and mechanical work involved. Repeat, or refer to, such sections on the drawings for each affected trade.

E. Unless the system is very simple, provide separate drawings for plumbing and heating work. Separate specialty piping from plumbing and hot water piping drawings.

F. Provide adequate space for soil, waste and vent stacks, water lines, ducts, etc.

G. Provide isometric or equivalent detail drawings for complicated pipe connections.

H. Show complete duct and pipe sizing, including sizes and locations of all transitions. Pinpoint change in sizes, either by symbols or by indication of sizes, immediately adjacent to the point of change.

I. Do not imply responsibility of the contractor for elements of engineering design in specification paragraphs that require compliance with rules, regulations, and codes.

J. Specify installations to be made “in accordance with the manufacturer’s recommendations”.

K. Include, as a minimum, the controls schematic diagrams, sequences of operation, specifications, and BAS points list. Provide printed and electronic copies of all PPCL Control Language (Appendix OM-005).

L. When specific brands and catalog numbers are used to specify a material, product, item, or service, if possible, it shall be followed by two or more acceptable brand names, and concluding with “MSBSD approved equal.”

M. Specify that pipe welders be qualified for the specific process to be performed and hold current certificate, issued by a recognized testing authority, for that process. Require welder certification to be submitted for approval only if on-site welding will be required for the project.

N. For conformity on all Mechanical Drawings, indicate piping, and ductwork as follows:

1. Rising within a floor as “RISE”
2. Rising to another floor as “UP”
3. Dropping within a floor as “DROP”
4. Dropping to another floor as “DOWN”
5. Exposed at ceiling as “AT CEILING”
6. Concealed in ceiling as “IN CEILING”
7. Below floor as “IN CEILING BELOW” or “BELOW FLOOR”

O. Show locations of duct static sensors and differential pressure sensors on drawings and labeled directly on the ceiling grid.

1.05 As-Builts (Record Drawings)

A. Accurate "As-Builts" are essential. This must be spelled out clearly in the contract documents and diligently pursued during construction by MSBSD, Architect, and Contractor.

B. MSBSD requires three (3) hard copy sets of Record Drawings turned in for record purposes. Two of these shall be submitted on Architectural D size (24x36 inches) paper and one-half size copy and one (1) copy electronically.

1.06 Operation and Maintenance Manuals

A. Electronic (PDF) copies of all O&Ms are to be provided along with two (2) hard copies O&M manuals.

B. Include procedures for startup, shutdown, and emergency operation. Where a particular sequence is required this must include a statement to that effect and instructions in numbered steps. Require a description of all adjustments necessary or optional.

C. Include a schedule of manufacturer's recommended Preventative Maintenance (PM) procedures. The PM schedule must be a standalone document that can be used independent of the rest of the O&M submittal.

D. Preventative Maintenance schedule must be provided in Excel spreadsheet format (and electronically) to include specific make, model, and room location of equipment. Maintenance Instructions must include instructions for minor repairs that can reasonably be performed by persons qualified to operate the equipment and perform day-to-day maintenance. Require inclusion of all information necessary to maintain equipment, especially noting items required to keep warranties in effect.

E. Require inclusion of manufacturer's descriptive literature for all equipment in final O&Ms and all shop drawings of specially fabricated items in final corrected shop drawings.

F. Require inclusion of manufacturer recommended spare parts list for all equipment with replaceable parts.

G. Require a valve directory listing valve number, type, size, function, and normal position for each numbered valve.

H. Require coordination of required training for MSBSD personnel with specific instruction in the provided and approved Preventative Maintenance procedures, Maintenance Instructions for minor repairs and the final Operations and Maintenance Manuals.

1.07 Access

A. Access for operation, maintenance, repair or replacement of any equipment or item is very important. With this in mind, the words access, accessible, etc., as used in this standard, are defined as to be able to operate, maintain, repair, or replace such equipment or item without disassembly or damage to the surrounding installation.

B. Consider the use of lifting hooks for heavy equipment and the need for larger access doors to upper areas with larger equipment.

C. Pay particular attention to access and clearance for all main, sectionalizing, or isolating valves, as they are usually operated under emergency conditions.

D. All equipment must have OSHA compliant access, including ladders, catwalks, safety rails, doors, etc. and power and light capability when directed by MSBSD.

1.08 Shop Drawings

A. Include in each division of the specifications a list of specific equipment for which shop drawings and/or catalog data will be required.

B. At a minimum, specify the contractor to submit shop drawings or catalog data for the following items:

1. Fans, including drives
2. Heat exchangers
3. Tanks or receivers
4. Boilers and breeching
5. Control equipment
6. Heating and ventilating specialties
7. Unit ventilators
8. Flexible connectors
9. Vibration isolators
10. Heating and ventilating units
11. Pumps including drives
12. Fire protection systems
13. Valves

1.09 Machinery and Equipment Arrangements

A. Arrange machinery and equipment for safe convenient access and for efficient operation. Refer to current OSHA, General Industry Safety Orders, for accessibility requirements.

B. Provide access to equipment, valves, and controls in spaces for maintenance personnel making routine visits to the building. Locate access so these visits will not disturb the occupants or normal functions of the building.

C. Locate machinery and equipment rooms with due regard for locations of outside utilities serving the building.

D. Undesirable conditions in machinery spaces, with respect to machinery and equipment which require periodic inspections, maintenance, or adjustment are:

1. Less than 6’ 6” headroom around machinery and equipment.
2. Less than 5’ ’0” space around or between machinery and equipment.
3. Vertical access ladders.
4. Access via crawl space.
5. Ceiling mounting of equipment requiring servicing. Note MDF/IDF rooms cooling requirements in architecture section.

6. Difficult or dangerous access to lubrication points.
7. Gauges and thermometers in locations that is hard to see or read.
8. Inaccessible main utility valves.
9. Insufficient lighting.
10. Heat buildup due to poor ventilation.

E. The locations of access doors, electric panels, fire hose cabinets, dry standpipe valves, convector or supply and exhaust grilles, etc., in areas of public access are to be reviewed with the Architect and MSBSD for approval of appearance as related to other parts of the structure.

F. Provide escape exits where required by code.

G. Provide doors, removable panels, and pathways of sufficient size to allow removal and replacement of all mechanical equipment in fan rooms, boilers and within the structure.

1.10 Pipe and Duct Penetrations

A. Design and detail all utility pipes penetrating exterior walls with sufficient flexibility for all normal settling of backfill. Take particular care with cast iron, ductile iron, and pressure pipe. Coordinate with Architect on compaction specifications of building backfill supporting utility piping entering or leaving the building.

B. Design and detail pipe and duct penetrations so that a minimum opening remains after installation. Specify and detail effective fire seals for openings. Design to prevent frost blockage of air screens.

C. Where pipe or ducts are insulated, provide for continuous insulation through openings at all means of support.

1.11 Access Doors and Panels

A. To provide the degree of access requested above, the installed location of both the access door or panel and the concealed item it serves is important.

B. Coordinate with other trades on the location of concealed items and the Architect on location and size of access opening required.

C. Include a sufficient number of additional appropriately sized access doors and panels besides those shown on the drawings to cover situations not anticipated during design but requiring access due to the installed location.

D. Review the indicated location of all concealed items and their accessibility during construction. If at any time it becomes obvious that access will be impaired, revise the location of the item and/or its access.

E. Show all access doors. Do not include such statements as, “Install access doors ‘as required,’ ‘where required,’ ‘of sufficient size,’ ‘as directed,’ etc.”, in the specifications.

Part 2- Products

2.01 General

A. Provide incoming water meter as required by all applicable codes including local / municipal code.

B. Provide 1/4 turn full port ball type isolation valves for each plumbing group. Provide minimum 12" x 12" access doors to all valves that are otherwise inaccessible.

C. Cleanouts must be properly placed, capped, and noted on As-builts. Provide minimum of one cleanout outside building and note on As-builts. Provide access to all cleanouts, including carpeted areas. Do not put cleanout in crawlspaces unless it is within 10' of an opening large enough to bring in an electric snake machine. It is preferred to extend cleanout lines to the outside if the line is close to an outside wall and would be accessible from the outside. Prefer cleanouts to be in wall approximately 2 feet above ground floor, (no greater than 3 feet) rather than in floor under floor finish.

D. Provide showers with flow as designed by manufacturer, not to exceed 2.5 GPM.

E. Provide floor drain at the low point of all mechanical rooms. Prime all traps with water so no sewer smells come from the drains.

F. Hose Bibs

1. Provide interior valves for all exterior frost proof hose bibs.
2. Provide vacuum breakers on all hose bibs.
3. Provide hose bibs every 100 linear feet around building perimeter. Provide for drain down of water supply lines not used during winter months. Provide isolation valves for each hose bib. Deviations from preferred hose bib placement around building are to be approved by MSBSD.

G. Provide vacuum/pressure or pressure gauges as required to indicate operating pressures on both upstream and downstream sides of each pump installed.

H. Provide isolation valves within 5' of unit heaters.

I. Provide clean, safe, DEC certified drinking water. This requires the full spectrum test that will include lead/copper, total coli form, asbestos, inorganics, nitrates, nitrites, VOC, pesticides, and arsenic. Prefer the use of copper however, HDPE (High Density Polyethylene) pipe may be approved depending upon application by MSBSD from well or water source to building.

J. All drains are to be primed with water as part of closeout procedures prior to building occupation.

K. All plumbing/heating fixtures, pumps and appliances must provide adequate isolation valves for maintenance repair or replacement.

L. Do not locate any valves in public spaces, but rather behind lockable access doors or in mechanical spaces accessible only to maintenance personnel.

2.02 Undesirable Pipe Locations and Connections

A. The following conditions are considered undesirable:

1. Cold water lines near heat sources such as heating or hot water lines.
2. Water, waste, sprinkler, hydronic, or roof drain lines over live electrical parts.
3. Soil or waste lines over food processing and preparation areas or in storage areas.
4. Pipes under a concrete ground floor slab or in concrete walls. Drainage pipes are an exception where their location elsewhere is impracticable. Coordinate penetrations with structural design. Sleeve all pipe penetrations.
5. Valves installed in such a manner as to be inaccessible for maintenance or replacement.
6. Utility piping entering or leaving a building below exterior stairs or concrete. Excavation for repair or replacement in these types of areas is expensive and inconvenient to the building occupants.

2.03 Permit no cross connection between the domestic water system and water which may be contaminated. Provide backflow prevention devices per code.

2.04 Strainers

A. Provide strainers ahead of all meters, regulators, pumps, controls, or equipment that could be damaged or rendered inoperative due to foreign matter in the piping. Size screen opening for degree of protection required. Provide isolation valves and drain valves with hose fittings on strainers.

B. Purge lines and clean strainers, at completion and before acceptance, in each division.

2.04 Unions, Couplings and Nipples

A. Aquatherm is the preferred manufacturer or approved equal.

B. Provide unions and isolation valves at all threaded connections to equipment, regulators, controls that may have to be removed or replaced and at all points where necessary for the disassembly of piping for maintenance.

C. Specify dielectric unions or couplings installed at any point where electrolysis might occur between piping of dissimilar materials. Specify temperature and pressure of pipe and contents that will be used so that manufacturer can provide a proper gasket and washer material to withstand the specified conditions.

D. Specify isolation flanges and ball valves for equipment that may have to be removed or replaced.

2.05 Changes in Sizes of Pipelines

A. Specify bell reducing fittings wherever changes in sizes of piping occur. No bushings will be permitted.

2.06 Condensation

A. Review the location of all piping and ducts in any atmosphere that would cause condensation due to the temperature of the contents in the pipe or duct in relation to surrounding temperature.

B. Specify proper insulation and vapor barrier for each condition.

C. Specify waterproof duct joints (soldered, welded, flanged, etc.) that may have an internal problem due to warm saturated air being exhausted. An example is a dishwasher hood exhaust duct. Pitch all waterproof ducts to a drain outlet.

D. Specify and detail drip pans, with drain piping, below all cooling coils.

E. Do not allow access doors to be installed in the bottom of any duct subject to internal condensation.

F. Coordinate with plumbing for location of adequate and accessible drains.

G. Specify and show all drip pan drains having concealed drain outlets with clear plastic section to permit observation.

22 05 16 Expansion Fittings and Loops for Plumbing Piping

Part 1- General

1.01 Expansion Compensation

A. Arrange pipes and equipment with due regard for the effects of thermal expansion. Provide expansion joints or expansion loops as required to avoid noise or permanent physical deformation from this cause. Natural expansion loops are preferred over mechanical expansion joints.

22 05 29 Hangers and Supports for Plumbing and Piping Equipment

Part 1- General

1.01 Pipe Supports

A. Support all pipes with common trapeze type hangers where possible. Comply with current seismic regulations.

B. Do not allow valves or equipment to support the weight of any pipe.

C. Refer to manufacturer’s specs for supports for plastic piping.

D. Isolate all non-insulated copper pipes from supports by means of a felt wrapping or manufactured recommendation for isolating pipe.

E. Protect all insulated pipe from crushing at supports by means of a sheet metal shield outside the insulation, or pipe saddle secured to pipe.

F. Specify all concrete inserts with hot dipped galvanized finish.

22 05 48 Vibration and Seismic Controls for Plumbing and Piping Equipment

Part 1- General

1.01 General Requirements

A. Locate machinery and equipment which is noisy or may vibrate, so as to have the least possible detrimental effect on the occupants of the building; install with or on vibration isolating devices.

B. Where the noise level of an area is critical, such as a classroom, study area, music room, private office, etc., design for the maximum decibel rating based on the standards mentioned above.

C. Where a maximum noise level is specified for an area or equipment, specify test method, test conditions and person(s) responsible for the tests and documentation of results.

D. Select and specify equipment having quiet operating characteristics at its design capacity and speed. Be particularly careful if it is installed in, near, or on the roof above an occupied area. Size ducts and piping to have velocities below noise producing levels.

E. Specify and show acoustical treatment of ducts, pipes, and equipment, if required, to meet the conditions.

F. Pay particular attention to the location and support of any possible vibration producing equipment to determine the degree of isolation necessary for the particular location.

G. Provide sound absorbing pads between equipment and structure where equipment is to be installed without vibration isolators, such as pumps, compressors, vacuum pumps, etc.

H. Place flexible sections in all connections between vibration producing equipment and the building system it serves.

22 05 53 Identification for Plumbing and Piping and Equipment

Part 1- General

1.01 General Requirements

A. Identify all piping as to the contents and direction of flow. Use plastic wraparound labeling.

B. Identify all equipment with painted stenciled letters or engraved plaques to correspond to the construction plans.

C. Label, stencil or otherwise identify heating coils, heating and ventilating units, boilers, fans, pumps, and other equipment in the mechanical room.

D. Label equipment left to right. Boilers should be labeled left to right when facing the burner access panels.

E. Label all unit heaters and corresponding electrical panels.

F. Designate on the plans all main, sectionalizing, and isolating valves. Do this in a manner that easily identifies the valve and location for maintenance personnel.

G. Provide labeling directly on ceiling grid for all above ceiling equipment including valves, VAVs, etc. with color coordinated sticker dots.

H. Labeling of mechanical directly on ceiling grids.

22 10 00 Plumbing Piping and Pumps

Part 1- General Comments

1.01 Requirements

A. Use only Aquatherm pipes or approved equal for domestic water supply within the building. Any soldered joints shall be lead free and in conformance with the current plumbing code. Flux shall be code compliant B813 water soluble.

B. No Victaulic or mechanical fittings permitted except in the sprinkler systems or elevator.

Part 2- Products

2.01 Pipe and Piping Products

A. Manufacturer shall be Aquatherm or approved equal.

2.02 Valves

A. Use metallic ball valve up to 4”. Do not use Aquatherm or like plastic valves.

B. Isolation Valves

1. All isolation valves to be full port ball valves, up to 4”, larger valves to be gate valves, no butterfly valves. Isolation valves will be provided in a manner to provide isolation of branch lines supplying areas of building for future service.

2. Specify rising stem gate type for boilers where ASME requires gate valves, and outside rising stem gate valves for fire sprinkler systems where required by NFPA 13.

3. Provide valves for isolating all service parts of mechanical piping systems, equipment, and controls. Isolate separate floors, separate wings, all branches off of mains, toilet rooms, machinery rooms, all heating zones, and other natural subdivisions of the building. Provide isolation valves.

4. Show all valves on the drawings. Do not rely on a general note in the specifications or on the plans to “install valves ‘where’ or ‘as’ required.”

5. Make toilet room isolation valves accessible through locked ceiling hatch in restroom or inside janitor’s closet.

C. Provide separate isolation valves where balancing valves are required.

D. Relief Valves

1. Provide relief valves wherever required by code. The set pressure should be indicated on the valve and have externally operated level lift handles. Provide floor drain nearby for potential spills.

2. Specify ASME certified relief valves to comply with boiler code or Unfired Pressure Vessel Code.

3. Provide discharge piping of relief valves to glycol make up tank if glycol is used. If system is water provide a floor drain with discharge piping maximum 6 inches above floor.

E. Boiler Drain, water heater drains, and System Piping Drains

1. Use ball valves with hose end and cap.

Part 3- Execution

3.01 Fusion Welding of Joints

A. Install fittings and joints using socket-fusion, electrofusion, or butt-fusion as applicable for the fitting type. All fusion-weld joints shall be made in accordance with the pipe fitting manufacturer's specifications and product standards.

B. Fusion-weld tooling, welding machines and electrofusion devices shall be as specified by the pipe and fittings manufacturer.

C. Provide the fewest number of flanges as possible to prevent leaks.

D. Joint preparation, setting and alignment, fusion process, cooling times and working pressure shall be in accordance with the pipe and fitting manufacturer's specifications.

3.02 Valve Applications

A. Install isolation valves close to the main on each branch and riser.

B. Install ball valves on the inlet to each plumbing fixture, except those having stops on the supplies.

C. Install drain valves at the base of each rise, at low points of horizontal runs, and where required to drain the water distribution piping system.

D. Install ball valves in each hot water circulating loop and, on the inlet, and discharge side of each pump.

3.03 Pipe Installations

A. Install hangers and supports at intervals specified in the applicable Plumbing Code or as recommended by pipe manufacturer.

B. Fire stopping shall be compatible with the Aquatherm Piping and meet the requirements of ASTM E 814. Pipe insulations or fire resistive coating shall be removed where the pipe

passes through a fire stop and, if required by the fire stop manufacturer, for 3 inches beyond the fire stop outside of the fire barrier.

C. Install copper at all plumbing fixtures from the fixture to the first connection for bracing purposes. Adequately anchor and switch to copper at all in wall to fixture connections. Provide Copper or Steel piping in all boiler and fan rooms from the ball valve entering the room. For bathroom plumbing provide copper from ball valve outside of bathroom to provide plumbing support.

22 30 00 Plumbing Equipment

Part 1- General

1.01 General Requirements

A. Each lab, shop and art room sink must have a plaster/clay trap with easy access and clean out.

B. Refill of any and all water tanks must be normally closed slow acting control fall.

1.02 Water Heaters

A. Domestic hot water temperature system to provide 140°F for sanitary purposes, i.e., dishwashers, kitchen equipment, etc. Provide a tempering valve to reduce temperature down to 120°F throughout the rest of the building. The recirculation line pipe shall be to manufacturer's specifications. Both temperatures shall be monitored by the BAS control system.

B. Where the heating system is gas, 2 standalone natural gas fired water heaters are preferred. Each should provide 100% of the domestic hot water load for that building so each could be used as backup.

C. If an indirect fired water heater is being considered as an alternate to the standalone heaters, provide a 50-gallon gas water heater in a custodial area. This will provide domestic hot water for custodial use during summer shutdown of the boilers.

D. Where the main system is to be boilers and an indirect fired water heater is being considered, provide double wall vented coils with tanks for domestic hot water. It is preferred to use several of the smaller quick recovery tank-coil units rather than one large water generator.

E. If an indirect water heater is being used, the supply and return lines for heating that unit will tie into the boiler primary loop with a circulating pump to provide heat to water heater. Provide adequate access to all piping and maintenance devices.

F. When an oil fired water heater is being used provide 4 foot of clearance around and 5 foot on top of unit for maintenance. This will enable pulling the top off and doing tube cleaning.

G. Provide water heaters with BAS start/stop, status, and alarm capabilities along with points to schedule start/stop times.

H. Provide domestic hot water recirculation pump with BAS start/stop and status capabilities along with points to schedule start/stop times.

I. Provide BAS points for each water heater supply temp.

22 35 00 Special Exhaust Systems

Part 1- General

1.01 Laboratory Fume Exhaust and Fume Hoods

A. Provide spaces designated for use as laboratories with provisions for exhausting fumes to the outside, consisting of fume hoods or special exhausts in the room, connected by ducts to an exhaust fan on the roof of the building.

B. Combine several hoods in a building into fume hood exhaust systems, with one exhaust fan serving the system. All fume hoods on any one exhaust system shall have the same supply fan. Consider these fume hood exhaust systems a part, or all of, the building heating and ventilating exhaust system, as they operate continuously. Provide manual control at each fume hood. Size fume exhaust ducts for a transport velocity consistent with design noise levels, duct static pressure and size limitations.

C. All standard chemical fume hoods are designed for a minimum face velocity of 125 feet per minute through the clear opening.

D. Locate fans so that a negative pressure exists in all fume hood ducts within the building. Where fans cannot be located to satisfy the above, check the locations with MSBSD for approval and precautions to take.

E. Show flexible connections made of neoprene, coated glass fiber cloth at all fan connections to ducts.

1.02 Industrial Exhaust Systems

A. Design industrial exhaust systems for woodworking machinery, grinders, dust collecting, paint spraying or welding fumes, etc., with adequate provisions for entrapment and safe removal of any dangerous substances.

B. Use methods and duct velocities as recommended in the Industrial Ventilation Manual as published by American Conference of Governmental Industrial Hygienists, latest edition.

C. Welding lab station exhaust must conform to all applicable codes including OSHA for welding fume exhaust velocity. Weld lab ventilation system must be separate from general building return air system. During operation of lab, the lab must have a slight negative pressure so fumes will not escape out into the common areas.

22 40 00 Plumbing Fixtures

Part 1- Products

1.01 Plumbing Fixture Products

A. Reference in the specifications and shop drawings any existing mechanical or electrical equipment shown on the plans or specified as being furnished by the MSBSD.

B. Reference in the specifications and the shop drawings: existing location, and when necessary, who disconnects, moves, and reconnects in the new location, and if any new equipment is needed for re-installation in the new location.

C. Lavatories shall have countertops that are self-rimming, shall be constructed of type 302 (18.8) nickel bearing stainless steel with interior and top surfaces polished. All sinks to be thoroughly sound deadened. Bowls to be punched to receive type J15SSF nickel bearing stainless steel drain with flat strainer and 1.5-inch O.D. tailpiece.

D. Lavatories shall be wall hung, shall be constructed of vitreous china with 4 inch back splash and drilled for 4-inch faucet centers. Specify with concealed arm carrier.

E. All toilet and urinals shall have approved flushometers. Use flush valves with exposed body on toilets and urinals. The use of infrared auto switched flush valves is not allowed.

F. All plumbing fixtures and piping must be certified lead-free.

G. Science Lab Faucets shall be high gooseneck with convertible swing spout and vacuum breaker and serrated nozzle multipurpose turret, gas/water.

H. Check with MSBSD for garage faucet requirements.

I. Triple Bowl Sink Faucet shall be lead-free double-jointed swing spout

J. Classroom Countertop Bubblers shall be lead-free with volume control.

K. Provide fully recessed drinking fountains. “No drinking coolers”

L. Drinking Fountains shall be (Non-Refrigerated) push button where no HCP required.

M. Shower stalls shall be Fiat 39” x 39” OD ADA accessible for handicap stalls. Alternate accessible shower stall designs will be considered and discussed with MSBSD.

22 45 16 Eyewash Equipment

Part 1- General

1.01 Requirements

A. Dual Head in Science Rooms. All eyewash stations shall be installed in compliance with Federal, State, and local codes, including location, temperature control, etc. Because of the type of chemicals used, eye wash stations are needed in one (1) centralized custodial

closet on each floor, science prep and MSBSD kitchen; in addition to those normally put in science and vocational labs.

Division 23- Heating, Ventilating, and Air Conditioning (HVAC)

23 00 00 HVAC

Part 1- General

1.01 General Comments

A. Coordinate with all other Architectural Divisions for ventilation purposes. For example, consider the exhaust requirements of Food Service Equipment, Nurse's Room and Restroom exchange fans.

B. Provide the Architect with supply and exhaust air duct sizes and duct shaft space requirements as soon as possible to allow Architect to provide for adequate interstitial space.

C. Design ventilation system for acceptable indoor air quality. Comply with ANSI/ASHRAE standards for approved IAQ.

D. Provide CO2 monitoring and control for occupied spaces.

E. Provide CO monitoring with variable control at the fresh air intake.

F. Heat pickup by ventilation air passing through plenums or ductwork should be kept to a minimum. Under summer conditions, endeavor to supply ventilation air to rooms in the building with a minimum temperature rise above outside air temperature bearing in mind the MDF and IDF closets must have air conditioning. Avoid the following factors where practical:

1. Large electric motors located in air plenums or air streams.
2. Place Air intake of building where prevailing winds do not effectively provide air movement.
3. Plenums located next to hot spaces.
4. Ducts or plenums under non-insulated roofs.
5. Non-insulated plenums where substantial temperature differences exist.
6. Ducts passing through hot spaces.

1.02 Summary

A. Primary heating system will be designed with water as the heating medium. Areas that need freeze protection such as preheat coils will be on separate glycol loops served by a plate-type heat exchanger.

B. Arrange and locate machinery rooms so that heat and sound will not be transmitted to other parts of the building. Provide adequate ventilation to prevent excessive

temperatures in the mechanical room and insulate, if required, to prevent heat transmission to adjacent spaces.

C. Arrange and locate fan rooms and ductwork so that heat and sound will not be transmitted to other parts of the building. Provide adequate ventilation to prevent excessive temperatures in the mechanical room, if required, to prevent heat transmission to adjacent spaces. Provide access from interior of building.

D. In determining heating and ventilating air quantities to be circulated in a space, consider all the following factors:

1. Fresh air intake controlled by measured CO2 levels
2. Air required per occupant basis for the entire building
3. Air required to heat or cool the space
4. Make-up air required for non-recirculated spaces, fume hoods, kitchen hoods, rest rooms, shower rooms, locker rooms, or other special exhausts
5. Air required for combustion in fuel burning equipment

E. Provide mechanical ventilation (exhaust) for trash rooms, janitor rooms, restrooms, mechanical equipment rooms and electric rooms as follows:

1. Exhaust only for trash rooms, janitor closets and restrooms, providing a slight adjustable negative pressure in the room to confine odors.
2. Provide sufficient supply and exhaust ventilation to mechanical equipment rooms to prevent temperatures above 80°F. Use a minimum of 1.0 CFM/SF for cool rooms and 2 CFM/SF for hot rooms. Never exhaust a boiler or furnace room in excess of supply air because these spaces must be positively pressurized.

1.03 Codes

A. Comply with all current laws, rules, and regulations of the State of Alaska Administrative Code (hereinafter referred to as AAC) for all MSBSD designs.

1.04 Designs and Project Procedure

A. The Architect and Engineer shall meet with the MSBSD at the completion of the schematic design phase to review issues which include locations for mechanical equipment, equipment chases, and accessibility. Available access to be provided to all control valves and VAV boxes in the ceiling space. Maximize heat recovery during air exchange to maintain indoor CO2 standard.

B. The Architect/Engineer shall submit the following to the MSBSD with design development drawings:

1. Peak heating design conditions, the data shall use the latest version of ASHRAE guidelines.

2. The total annual energy budget for a nine-month Elementary School shall not exceed 70,000 BTU per square foot per year. The total annual energy budget for a nine-month operation of a junior high school shall not exceed 75,000 BTU per square foot per year. The total annual energy budget for a nine-month operation of a high school shall not exceed 85,000 BTU per square foot per year. The total annual energy budget for a 12-month operation of all other facilities shall not exceed 110,000 BTU per square foot per year.

3. The locations of the supply and return air diffusers, heating elements, routing of the hydronic piping systems, ductwork and thermostats and heating plant shall be shown on the contract drawings. Arrangements of equipment will be indicated. Provide preheat coils at make-up air if necessary, for adequate indoor air quality. Locate air intake vents away from vehicle parking/traffic.

4. Keep condensing units for walk-in freezers, coolers and air conditioners inside the building while providing adequate ventilation and access for maintenance.

1.05 Specifications and Drawings

A. Avoid the use and specification of unusual materials, or those not available on the local market. Where materials may not be well known, include the name and address of either the manufacturer or local agent in the specifications.

B. Make schematics and diagrammatic details for each project large enough to be easily read. Scale boiler room, kitchen and mechanical / electrical /MDF-IDF room plans and elevations at 1/4” minimum. Use 1/2” or larger if required to clearly show details of design.

C. On each set of plans provide an adequate identifying legend of all symbols used. Identify and define all abbreviations used on the drawings.

D. Make sectional drawings of congested areas to show all electrical and mechanical work involved. Repeat, or refer to, such sections on the drawings for each affected trade.

E. Provide schedules on drawings for pumps, fans, boilers, heaters, diffusers, coils, grilles, convectors, and other items that are used in many sizes or types. List enough operating characteristics to define the items without questions and include sufficient description for ordering of equipment replacement or parts.

F. Show all mechanical service and meter equipment and locations. Include complete details on the drawings with cross sections and elevations for all fan rooms, mechanical rooms, boiler rooms, and similar spaces with a high concentration of electrical and mechanical equipment.

G. Provide isometric or equivalent detail drawings for complicated pipe connections.

H. Show complete duct and pipe sizing, including sizes and locations of all transitions. Pinpoint change in sizes, either by symbols or by indication of sizes, immediately adjacent to the point of change.

I. Show ventilation ductwork to scale dimensions for ductwork larger than 12”. Do not use single line drawing in areas were interferences are possible with other trades.

J. Specify installations to be made “in accordance with the manufacturer’s recommendations”.

K. Provide DDC submittal with the control’s schematic diagrams, sequences of operation, specifications, and BAS points list and PPCL Control Language. Provide printed and electronic (PDF) copies of all. Refer to Integrated Automation Division 25.

L. Specify that pipe welders be qualified for the specific process to be performed and hold current certificate, issued by a recognized testing authority, for that process. Require welder certification to be submitted for approval only if on-site welding will be required for the project.

M. Specify that approval of submitted equipment will be given only to that of current manufacturer at time of delivery and that all parts for normal maintenance or repair be available for a minimum period of five years.

N. For conformity on all Mechanical Drawings, indicate piping, and ductwork as follows:

1. Rising within a floor as “RISE”
2. Rising to another floor as “UP”
3. Dropping within a floor as “DROP”
4. Dropping to another floor as “DOWN”
5. Exposed at ceiling as “AT CEILING”
6. Concealed in ceiling as “IN CEILING”
7. Below floor as “IN CEILING BELOW” or “BELOW FLOOR”

O. Show locations of duct static sensors and differential pressure sensors on drawings and labeled directly on the ceiling grid.

1.06 As-Builts (Record Drawings)

A. Accurate "As-Builts" are essential. This must be spelled out clearly in the contract documents and diligently pursued during construction by MSB Project Manager, Architect, and Contractor. Copy of redlines maintained on site during construction and updated daily for all trades/disciplines.

B. MSBSD requires two (2) hard copy sets of “As-Builts” turned in for record purposes. Two shall be submitted on Architectural D size (24x36 inches) paper and one-half size copy. A digital copy of all “As-Built” Record Drawings shall be provided to MSB and MSBSD.

1.07 Operation and Maintenance Manuals

A. Verify specific Operation and Maintenance (O&M) Manual requirements particular to each section are included in those sections that have such particular requirements.

B. Electronic (PDF) copies of all O&Ms are to be provided along with two O&M hard copies.

C. Include a schedule of manufacturer's recommended Preventative Maintenance (PM) procedures. The PM schedule must be a standalone document that can be used independent of the rest of the O&M submittal.

D. Preventative Maintenance schedule must be provided in Excel spreadsheet format (and electronically) to include specific make, model, and room location of equipment. Maintenance Instructions must include instructions for minor repairs that can reasonably be performed by persons qualified to operate the equipment and perform day-to-day maintenance. Require inclusion of all information necessary to maintain equipment, especially noting items required to keep warranties in effect.

E. Require inclusion of manufacturer's descriptive literature for all equipment in final O&Ms and all shop drawings of specially fabricated items in final corrected shop drawings.

F. Require inclusion of manufacturer recommended spare parts list for all equipment with replaceable parts.

G. Require a valve directory listing valve number, type, size, function, normal position for each numbered valve and location.

H. Require coordination of required training for MSBSD personnel with specific instruction in the provided and approved Preventative Maintenance procedures, Maintenance Instructions for minor repairs and the final Operations and Maintenance Manuals.

1.08 Access

A. Access for operation, maintenance, repair or replacement of any equipment or device is integral. Mechanical access will be located in common areas. Access to operate, maintain, repair, or replace such equipment or device without disassembly or damage to the surrounding installation is required.

B. The degree of access, or accessibility, will depend upon the importance, complexity, size and weight of the equipment or item. As an example, a branch circuit junction box, being a single item accessed infrequently or never after the initial installation, would require a lower degree of access than a system control panel requiring maintenance or possible removal for repair or replacement. Consider the use of lifting cranes for heavy equipment and the need for larger access doors to upper areas with larger equipment.

C. Pay particular attention to access and clearance for all main, distribution, or control, panel boards, equipment racks and enclosures. Refer to all applicable codes for working clearances for all main, distribution, or control, panel boards, equipment racks and enclosures.

D. Provide power and lighting to required maintenance access areas

1.09 Shop Drawings

A. Include in each division of the specifications a list of specific equipment for which shop drawings and/or catalog data will be required.

B. At a minimum, specify the contractor to submit shop drawings or catalog data for the following items:

1. Fans, including drives
2. Heat exchangers
3. Tanks or receivers
4. Boilers and breeching
5. Control equipment
6. Heating and ventilating specialties
7. Unit ventilators
8. Flexible connectors
9. Vibration isolators
10. Heating and ventilating units
11. Pumps including drives
12. Fire protection systems
13. Valves

1.10 Existing Equipment

A. Reference in the specifications and shop drawings any existing mechanical or electrical equipment shown on the plans or specified as being furnished by the MSBSD.

B. Reference in the specifications and the shop drawings: existing location, and when necessary, who disconnects, moves, and reconnects in the new location, and if any new equipment is needed for re-installation in the new location.

1.11 Machinery and Equipment Arrangements

A. Arrange machinery and equipment for safe convenient access and for efficient operation. Refer to current OSHA, General Industry Safety Orders, and previous for accessibility requirements.

B. Provide access to equipment, valves, and controls in spaces for maintenance personnel making routine visits to the building. Locate access so these visits will not disturb the occupants or normal functions of the building.

C. Locate machinery and equipment rooms with due regard for locations of outside utilities serving the building.

D. Undesirable conditions in machinery spaces, with respect to machinery and equipment which require periodic inspections, maintenance, or adjustment are:

1. Less than 6’ 6” headroom around machinery and equipment.
2. Less than 4’ ’0” space around or between machinery and equipment.
3. Vertical access ladders unless properly caged.
4. Access via crawl space.

5. Ceiling mounting of equipment requiring servicing. Note MDF/IDF rooms cooling requirements in architecture section.
6. Difficult or dangerous access to lubrication points.
7. Gauges and thermometers in locations that is hard to see or read.
8. Inaccessible main utility valves.
9. Insufficient lighting.
10. Heat buildup due to poor ventilation.
11. Less than 4’ 0” space around network equipment.

E. Locate machinery and equipment which is noisy or may vibrate, so as to have the least possible detrimental effect on the occupants of the building; install with or on vibration isolating devices.

F. The locations of access doors, electric panels, fire exhaust cabinets, dry standpipe valves, convector or supply and exhaust grilles, etc., in areas of public access are to be reviewed with MSBSD for approval of appearance as related to other parts of the structure.

G. Provide escape exits where required by code. See OSHA, Vol. 1 and 2, General Industry Safety Orders, NEC, etc.

H. Provide doors, removable panels, and pathways of sufficient size to allow removal and replacement of all mechanical equipment in fan rooms, boilers and within the structure. Do not locate any valves in public spaces, but rather behind lockable access doors or in mechanical spaces accessible only to maintenance personnel.

I. Cabinet heaters must have valves and switches located in the cabinet for easy access.

1.12 Pipe and Duct Penetrations

A. Design and detail all utility pipes penetrating exterior walls with sufficient flexibility for all normal settlement of building or backfill. Take particular care with cast iron, ductile iron, and pressure pipe.

B. Design and detail the manner in which pipes and ducts pass through roofs, interior walls, floors, and ceilings.

C. Design and detail pipe and duct penetrations so that a minimum opening remains after installation. Specify and detail effective fire seals for openings. Design to prevent frost blockage of air screens.

D. Where pipe or ducts are insulated, provide for continuous insulation through openings at all means of support.

1.13 Machinery Guards

A. Provide all moving equipment, such as fan belt drives and motor drive couplings, with guards.

B. Specify all accessible fan inlets or exhaust openings be covered with wire mesh guards. Size mesh to give 90% free area minimum, with 2-inch maximum openings. Provide easily removable access panels, of same material, for bearing check, lubrication, or tachometer readings.

1.14 Condensation

A. Review the location of all piping and ducts in any atmosphere that would cause condensation due to the temperature of the contents in the pipe or duct in relation to surrounding temperature.

B. Specify proper insulation and vapor barrier for each condition.

C. Specify waterproof duct joints (soldered, welded, flanged, etc.) that may have an internal problem due to warm saturated air being exhausted. An example is a dishwasher hood exhaust duct. Pitch all waterproof ducts to a drain outlet.

D. Specify and detail drip pans, with drain piping, below all cooling coils.

E. Do not show or allow access doors to be installed in the bottom of any duct subject to internal condensation.

F. Coordinate with plumbing for location of adequate and accessible drains.

G. Specify and show all drip pan drains having concealed drain outlets with clear plastic section to permit observation.

Part 2- Products and Execution

2.01 Air Conditioning and Cooling

A. Air conditioning for occupant comfort only, will not ordinarily be authorized for MSBSD facilities.

B. MDF and IDF rooms must have air conditioning with requirement that no liquids or condensation can interact with vital electronic equipment. Dedicated drainage systems also required.

2.02 Recirculation

A. Recirculation of general heating and ventilating air will be permitted for reduction of heating energy required, with the following exceptions:

1. Science laboratories or rooms
2. Art rooms
3. Rest rooms and Locker Rooms
4. Trash and garbage rooms
5. Custodial closets
6. Copy/work rooms using volatile solvents
7. Mechanical rooms

8. Electrical rooms
9. Kiln Rooms

B. Discuss with MSBSD other areas where recirculation of exhaust air may be a health hazard.

C. Where recirculation is used, install smoke detection required by code.

23 05 53 Identification for HVAC Pumping and Equipment

Part 1- General

1.01 MSBSD Circulation Pump Numbering System

10-19	Boiler pumps (blend, boiler, etc.)
20-29	System Pumps
30-39	Secondary pumps (glycol)
40-49	Domestic hot water pumps
50-59	Well Pumps
60-69	Septic Pumps

23 05 93 Testing, Adjusting, and Balancing

Part 1- General

1.01 Testing Requirements

A. Include tests of all mechanical and electrical installation by the Contractor to demonstrate compliance with the specifications. Include performance tests under simulated operating conditions, with the Contractor responsible for the cost of fuel, electricity or other utilities required to run such tests.

B. Require all mechanical and electrical systems to be commissioned prior to substantial completion. Provide data sheets to be completed at commissioning by contractor.

1.02 Utility Shutdowns

A. Include the following in any specification serving new utility connections to existing buildings or new structures.

1. Request any shutdown of a building or utility through the MSBSD at least two (2) working days in advance.
2. Contractor will arrange for the shutdown on requested time and date with MSB, if possible, or on alternate agreed time. Contractor shall be responsible for all work, such as splicing, tie-ins and connections shown on the drawings.
3. Schedule and execute work that will cause major shutdowns to be done after normal

school hours or on weekends unless approved otherwise.

4. Have adequate workers, materials, and equipment available at approved scheduled time to complete work and reestablish service with the least interference to operations.

23 07 13 Duct Insulation

Part 1- General

1.01 Summary

A. Outside air, relief air, combustion air, and exhaust air ducts shall have an average thermal conductivity of k=0.23 at 75°F mean temperature. All duct insulation shall meet the flame spread and smoke development rating requirement of NFPA 90A Foil-Scrim-Kraft (FSK) outer jacket not acceptable. A complete vapor barrier must be maintained throughout the whole system. All insulated exposed ducts shall have a 6 oz. canvas jacket.

B. Rigid fiber board insulation is not to be specified.

23 07 19 HVAC Piping and Insulation

Part 1- General

1.01 Cold Pipe Insulation

A. Domestic cold water, vents through roof, rain leaders and other cold piping, not including refrigeration piping, shall have a vapor barrier permeability rating of 0.02 perm or less. Maximum thermal conductivity of k=0.25 BTU inch/HR/FT2/degree @ 100 f. mean temperature. The insulation shall have a factory applied vapor barrier, flame-retardant, all service jackets.

B. All pipe sizes = Insulation shall be 1/2” thick minimum.

1.02 Hot Pipe Insulation

A. All pipe sizes = Insulation shall be minimum 1” thick.

23 09 00 Instrumentation and Control for HVAC

Part 1- Products

1.01 Gauges and Thermometer

A. Show and specify gauges or thermometers in the following locations:

1. Differential gauges across main building air filter.

2. Pressure gauges at all pressure reducing valves to indicate both high and reduced pressures.

3. Pressure gauges at all pump suction and discharges, and at glycol fill stations.

4. Thermometers on hot water systems, domestic or heating, to adequately indicate supply and return temperatures.
5. Temperature sensors connected to BAS on heating and ventilating systems to indicate temperatures at fresh air inlet, tempered supply and cooled air if used. The heating equipment locations shall include the boiler inlet and outlet and the heating coil inlet and outlet. Provide common header supply and return temps in addition to individual boiler sensors.
6. Provide other gauges and thermometers wherever needed to give pressures and temperatures necessary or desirable for maintenance and trouble shooting.

B. Specify pressure gauges with range that will read midscale at normal operating pressures.

C. Show all thermometers and gauges installed so that they are both visible and readable from an accessible and safe location. All T-stats are to be occupant adjustable from 68 to 72 F.

1. Filter Differential Pressure Gauges
    a. Specify direct reading differential pressure gauges of the range appropriate for the pressure drop being measured.
    b. Specify one gauge for each filter bank.
2. Thermometers
    a. Specify direct reading thermometers on both the supply and return hot water heating headers.

1.02 Meters

A. Meter the mechanical and electrical utility and water services to each building.

B. Additional sub-metering to include a boiler water consumption meter and any additional meters may be requested by the MSBSD for special subdivisions within the building.

23 09 13.33 Control Valves

Part 1- General

1.01 Control Valves

A. Control valves will be placed in the chase or above the ceiling and must have access for fin tube and baseboard radiation.

23 09 23 Direct-Digital Control System for HVAC

Part 1- Design Criteria

1.01 Direct Digital Control

A. We prefer PID tuning loops in our control program language where applicable.

B. Specify the DDC system to perform the following functions:

1. Furnish power for sensors and controls up to and including interposing relays.
2. Convert and store in a common format measurement received from the instruments. Common American measurements.
3. Monitor status of equipment items.
4. Provide for remote readjustment of control equipment.
5. Perform preliminary processing and analysis of selected measurements.
6. Encode and decode messages to ensure secure, reliable transmission between the DDC and remote equipment.
7. Self-testing via diagnostics with complete exerciser capability.
8. Provide monitoring with the building fire alarm system.
9. Design system for freeze protection. For example, outside air dampers would fail closed and heating valves would fail open.

C. Each room will have local control using individual room sensors that will operate fully modulating heating zone valves, and VAV damper operators. The VAV boxes will be mounted in hallways or mechanical chases above classrooms where possible. VAV boxes should have a minimum 6" access door before and after heating coil. Provide VAV discharge air temp monitoring and CFM.

D. Application Specific Controls

1. Control of central HVAC systems and equipment
2. Air handling systems
3. Terminal control units (VAV Boxes). Provide discharge sensors.
4. Damper actuators
5. Valve actuators
6. Site lighting control with basic zones to include high, medium, low, and building exterior lights.
7. Exterior Hockey rink lighting control
8. Electrical phase loss/phase reversal
9. KWH/KWD monitoring
10. Generator- Run status and Common alarm

1.02 Equipment Control

A. Boilers

1. Provide HOA switch on each boiler for local control.

2. Monitor boiler flame failure, run status, start/stop, temp, and pressure.

B. Hydronic System Hot Water Circulating Pumps

1. Provide circulation to all heat exchangers to keep all heat exchangers at a minimum of 120°F. Do not allow heat exchangers to warm and cool. Monitor points.

2. Provide lag pumps for back-up and alternate operation. Do not specify pump shut down for warm weather shut down.

3. Provide equal run times for each pump. Provide both lead/lag alarm and pump alarm for the failed pump. Provide a critical failure alarm should both pumps fail.

C. Supply Air Fan

1. Provide glycol on any fan that has outside air intakes.

Part 2- Heating and Ventilating Controls

2.01 General Controls

A. General preliminary design for heating and ventilating control systems shall include provisions for fully automatic electronic control.

B. If VAV boxes are specified, the MSBSD standard is to use electronic/electric actuators supplied by the automated controls contractor.

C. The electronic system, DDC shall be completely compatible with MSBSD's existing hardware and software. Coordinate with the Electrical Engineer the size and installation of the control and monitoring cable conduits from each mechanical room, remote, or roof equipment, to the building control station location. Locate the control panels on the plans to avoid interference with other mechanical. Modular design control panels are not acceptable (modular building controller, network control unit).

D. Show control diagrams on the drawings. Show specific size and routing of all cable conduits from each device to the building control station location.

E. Describe in specifications all component parts of the system with a detailed narrative of the control sequence. Include in the specifications a point list showing each device describing the type of input and output and its relationship to the component that is being controlled. Specify all temperature setting, control device limitations and operating limits.

F. Provide night heat setback parameters which can be fully programmed and controlled through the DDC.

G. Use individual room heating and ventilating controls with room thermostats in all new construction. Do not partition zones. For areas having a low level of control, such as entries, use line voltage or 24-volt electric controls that do not have to be connected to the DDC system. Monitoring of temps is still needed.

H. Divide large open areas, or rooms, into zones with separate thermostats for each zone exposure.

I. Use wall mounted thermostats.

J. Completely waterproof thermostats for any rooms, such as kitchen dishwasher machine areas that have a surface finish and provisions for washing with steam or high temperature water.

K. Show thermometers near each controlled point for setting of the control and checking its operations.

L. Show pressure gauges in the main and branch air lines to each major air operated control element. Pneumatics not acceptable.

M. Specify system to operate as a low-voltage multiplexed data system, with operator console communications with BAS over the serial data trunk, and a combination of electric control equipment. Design system so a failure of the BAS shall cause all heating applications to go to full heat.

N. Specify coordination of controls between pipefitter, sheet metal worker and controls contractor, stating each specific work assignments.

O. Specify all programming to be included to implement the controls sequences and to implement the systems and features in the host BAS system.

P. Specify the MSBSD Host CPU, located at the MSBSD Maintenance Facility, to be updated to include all controls installed under this design.

Q. Require that all control points be demonstrated to the MSBSD and engineer at substantial completion. The Engineer is required to witness operation of all control points.

R. Specify electronic devices for the following applications:

    1. Static Pressure Switches for the following:

        a. Air duct static pressure high/low alarm.

        b. Use current sensor on pump vs. differential pressure switches.

        c. Fan status monitoring.

        d. Filter pressure monitoring.

    2. Electric Thermostats

        a. Room thermostats: Line or low voltage, two-position devices.

        b. Unit heater thermostat: Amperage capacity sufficient to cycle fan without need for contactor.

        c. Remote bulb thermostats: Precision snap acting, dust tight contacts; external adjustment by screwdriver slot or range adjusting knobs; operating temperature point in mid-range of the instrument.

        d. Freeze protection thermostats: 20-foot element.

        e. Do not place before fan. Mixing is needed to prevent nuisance lockouts.

        f. High limit Thermostats (fire stats, etc.): Rod and tube type elements

g. Duct type smoke detectors: Dual chamber ionization type smoke detectors listed by UL for specific use in air handling systems.

23 11 00 Facility Fuel Piping

Part 1- General

1.01 Piping

A. Fuel oil piping shall be welded black iron for all pipe 2 inches and larger; threaded black iron 3/4 inch up to 2 inches and brazed or flared type L or K copper for tubing smaller than 3/4 inch and exposed in mechanical rooms where it cannot be damaged. Concealed fuel oil piping or piping subject to damage shall be black iron.

B. Buried fuel oil piping shall be in double wall containment piping with flexible inner carrier and outer containment piping, using specially manufactured and listed systems, such as Envirocon or MSBSD approved equal.

23 13 00 Facility Fuel-Storage Tanks

Part 1- General

1.01 Design Criteria

A. Fuel oil day tanks shall be UL listed and shall be equipped with automatically alternating duplex fuel oil pumps. Tanks shall be equipped with suitable level monitoring to start and alternate pumps as well as provide “high level” and “low level” alarm contacts for the building wide BAS monitoring system. Tank will have a rupture/leak containment outer tank and necessary access for emergency manual fill. See Section 23 11 00 for fuel oil piping requirements.

B. Fuel oil day tanks shall have the following minimum capacity for listed services:

1. Boilers: 50 gallons for every 2 million BTU gross Firing rate.

2. Generators: 25 gallons for every 75 KVA.

C. Method of fuel storage is project and site specific. This should be reviewed and approved with the MSBSD as part of the design development. Above ground storage is preferred.

23 20 00 HVAC Piping and Pumps

Part 1- Products

1.01 HVAC Pumps

A. Circulating pumps shall be Grundfos or MSBSD approved equal.

B. Variable frequency drives required for all heating pumps 3 HP or greater.

C. Provide two separate pumps, Lead/Lag alternating are required for each pump application. Do not specify double headed pumps. Include separate check and isolation valves on each pump assembly for service. Show pressure gauges of suitable range at the suction and discharge of each pump.

D. Specify bypass valves between the discharge and the suction of all pumps that do not have sufficient flow when all control valves are closed to meet the pump manufacturer's minimum flow requirements.

23 21 00 Hydronic Piping

Part 1- General

1.01 Design Criteria

A. Piping manufacturer shall be Aquatherm or MSBSD approved equal.

B. Hydronic piping shall be routed in the ceiling spaces, utilidors or mechanical chase above the room served.

C. Design all hot closed piping systems with a maximum pressure drop of 3 feet per 100 and a maximum velocity of 7 feet per second.

D. Provide for maintenance and repair work in the planning of hot water piping systems, with particular respect to draining the system when pipe joints are broken. Provide hose valves at all of the low points of the system to permit draining.

E. Provide automatic air vents at high points in hot water piping systems. Show or specify an isolation valve ahead of all automatic air vents to facilitate replacement. Specify Spiro Top.

F. Control valves, flow valves, and isolation control valves for fin tube heating units shall be located above ceilings to the greatest extent practicable.

G. Any serviceable devices must have ball valves to isolate device for maintenance.

H. Provide ball valves on all hydronic piping exiting or entering boiler room or to separate floors, fan rooms or branch zones.

1.02 Hydronic Specialties

A. Expansion Tanks

1. The expansion tank shall be a pre-pressurized diaphragm expansion tank, welded steel, ASME construction (where required by size of boiler of tank) with a working pressure of 125 psig.

2. The diaphragm shall be butyl rubber or other material suitable for use with corrosion inhibitors. The factory pre-charge shall be 12 psig.

3. Each tank shall have separate isolation ball valves (full port) and valve drain taps.

4. Acceptable manufacturers are B & G, Amtrol, Taco, Armstrong or MSBSD approved equivalent.

B. Make-up Water Assembly

1. The make-up water assembly shall be a bronze pressure regulating valve set at the pressure required to maintain system filled above highest point.
2. Specify Watts 900 series backflow preventer where code permits, with Watts pressure reducing valves.
3. Make-up water assembly shall have an isolation valve, backflow preventer, water meter in line serving a pressure regulator with a valved line by passing the pressure regulator. Provide water filter on boiler feed water system. 10 microns.

C. Boiler Water Treatment

1. Boiler water shall be chemically cleaned and flushed under the supervision of a water treatment specialist.
2. After cleaning and flushing, system shall be chemically treated for corrosion with a nitrate-based material compatible with what the MSBSD is now using at a level recommended by the water treatment specialist.
3. The MSBSD is currently using corrosion prohibiting 6439 CH2Mhill product as our standard.

D. Low water cutoff will be McDonnell-Miller Series with manual reset or as specified by boiler manufacturer design or MSBSD approved equal. Install auto air vent with shut off valve on low water cut off column. Ex. Spiro Top.

E. Glycol makeup tank shall be Axiom tank system or MSBSD approved equal.

F. Heat Transfer Medium will specify Dow Frost Safe-T-Therm propylene glycol-based system or MSBSD approved equal. Require permanently dyed glycol for quick identification with freeze factor of -25 degrees as seen on refractometer.

G. Plate Type Heat Exchangers shall be Graham or MSBSD approved equal.

H. Install air eliminators in mechanical room and fan rooms. Use Spiro Top or MSBSD approved equal.

I. Balancing Valve shall be B & G Circuit Setter II, Taco or MSBSD approved equal.

J. Air Separator shall be Spirovent or MSBSD approved equal. Air Separator should eliminate 99.6% of system air and 80% of a 30-micron particle size and larger within a 100 passes.

K. Flow Control valve shall be Griswold.

L. Use only approved ball valves with MIP by Hose adapter on boiler with cap. No light duty boiler drains. No cast pressure reducing valves.

23 27 13 Diffusers, Registers, and Grilles

Part 1- General

1.01 Diffusers and Grilles

A. Coordinate supply air register, diffusers and return air grills with Architect to ensure compatibility with design.

B. Select type and design characteristics from the latest manufacturer's data.

C. Design standards shall be based on the latest edition of ASHRAE Fundamental Handbook Chapter of Space Air Diffusion using the Air Diffusion Performance Index, ADPI.

23 31 00 HVAC Ducts and Castings

Part 1- General

1.01 Duct System Design

A. In addition to the codes and standards addressed elsewhere, the following Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) in the latest edition or revision of the codes and standards apply:

1. HVAC Duct Construction Standards, Metal and Flexible
2. Industrial Duct Construction Standards
3. Fire Damper Guide

B. To reduce static and velocity head loss, turbulence, and noise in the ventilation system, observe the following:

1. Do not use plenums for connecting fans, or main ducts, to several branch ducts.
2. Specify properly designed transitions, radius turns, or turning vanes in square elbows, extractors at outlets for volume control, etc.
3. Engineer is responsible for providing a system that can be properly balanced.

C. Ductwork for systems operating within the range of two (2) inches water column positive to two (2) inches water column negative shall be hot-dip galvanized steel sheet per ASTM Standard A525. Ductwork shall comply with UL Standard 181, Class Zero.

D. Rectangular ducts shall have a metal thickness and reinforcing in accordance with Table 1.5 of SMACNA HVAC Duct Construction Standards.

E. Round ducts shall have a metal thickness in accordance with SMACNA with all seams and joints constructed to specifications. Specify round ducts in lieu of rectangular ducts wherever possible.

F. Turning vanes are to be constructed in accordance with SMACNA HVAC Duct Construction Standards.

G. Provide plenums constructed of double wall insulated steel with a thickness of 2 inches. Construct in accordance with SMACNA HVAC Duct Construction Standards Section VI (6). Single wall construction must be approved by the Project Manager. Design pressure for plenums and casings shall not be less than any of the following:

1. The highest point of the fan static pressure curve at design rpm multiplied by 1.23 and considered to be negative or positive depending upon location relative to the fan.
2. For single walled plenums, lined or unlined, for low pressure/velocity systems: 2 inches W.C. (water column) positive and negative.
3. For double wall plenums for any type system: 6 inches W.C. positive and negative.

H. Flexible duct shall be used for connections to air diffusers and returns in lay-in ceilings. The flexible duct shall not exceed 10 feet length with one 90-degree bend or a large radius 180-degree curve in addition to the connection at the diffuser. All connections between the flexible ducts and metal ducts or collars shall be in accordance with SMACNA HVAC Duct Construction Standards Section III. Support the flexible duct at connections to air outlets or returns to maintain minimum recommended bend radius.

I. Acoustic characteristics shall not be less than the following:

BAND, Hz	125	250	500	1000	2000
Loss dB	8	12	29	35	36

J. Provide volume dampers at each low-pressure duct main and branch as necessary for air balancing. Do not use splitter dampers and extractors to control the volume of air.

1.02 Duct Air Velocities

A. Do not exceed supply and exhaust ventilation air velocities recommended by ASHRAE for the type of building and designated use.

B. Size ducts for maximum selected velocity only at fan. Reduce this velocity to minimum acceptable as air quantity and pressure decreases in relations to distance from fan.

C. The following shall be used as the MSBSD design standard for air velocity.

Component	Air Velocity fpm
OSA Intake	350
Filter	400
Coil	500
Main Trunk	1000
Distribution	800

1.03 Sheet Metal Ductwork

A. Specify galvanized steel for ductwork and plenum chambers

B. Conform to fabrication and supporting practices established in the SMACNA manuals for sheet metal work

C. Support all exposed ducts from concrete inserts with rods bolted to duct angle stiffeners or to set angle or channel cradles. Support vertical risers at each floor level with intermediate guide support midway between floors.

D. Specify all high humidity room, dishwasher, or range hood exhaust ducts to have watertight seams and joints, either by soldering or welding. Pitch duct to hood and provide for condensate drainage.

E. Specify installation of capped instrument test holes on each side of heating coils, fans, and units with duct connections. Extend to outside insulated ducts. Location to be visible and accessible for taking accurate measurements of static pressures and air velocities.

1.04 Access Panels and Doors (Ventilation) and Fire Dampers

A. Provide access to fire dampers to accommodate technician to maintain.

23 33 00 Air Duct Accessories

Part 1- Products

1.01 Air Filters

A. Design and detail filter bank leak tight and structurally stiff to prevent deformation or breathing action, with maximum static pressure.

1. Building Ventilation

a. Determine efficiency, type and number of filters required by building air requirements, occupancy, location of filters and available filter space.

b. The standard filter is based on MERV 8 or better, 30-35%.

c. Where a filter bank is used, limit its height to 8 feet where possible. Where necessary to have a greater height, provide for servicing the upper filters by specifying a roll-around aluminum scaffold of sufficient height, or catwalk with guardrail, specified and detailed.

d. Provide adequate illumination on each side of bank for servicing.

e. Specify that the system shall not be operated during construction without the filters in place. Where the static pressure at the time of balancing would affect the results, clean, or replace the media before balancing or acceptance.

f. Specify dial type draft gauges for all filter banks, with scale range to suit static conditions anticipated.

g. Specify a sign is to be posted below each gauge giving clean and dirty readings anticipated with the installed filters.

h. Provide filter size and amount needed on AHU by filter bay.

23 33 13 Dampers

Part 1- General

1.01 Dampers Requirements

A. Control dampers are used to maximize the efficient use of the outside air. Due to high quantities of outside air typically used for free cooling, adequately sized relief air openings are essential.

B. Show accessible dampers at major divisions in all duct systems to permit balancing of air quantities. Each supply outlet and each exhaust branch must have a damper control. In addition, damper the main duct runs to permit proper divisions of air quantities in the duct systems.

C. Specify locking quadrant type damper operators for exterior insulated ducts.

D. Use dampers which are integral parts of supply or exhaust grilles only for minor air balancing, provided the adjustment required will not cause noise in occupied areas.

E. If fire dampers are used in design, all fire dampers must be MSBSD approved. To prevent any misunderstanding during installation of the ventilation system, conform to the following:

1. Receive from the Architect, floor plans indicating all fire partitions in the building.
2. Show fire dampers or fire/smoke dampers in all ducts penetrating the fire partitions, as required by the Uniform Building Code and State of Alaska's Fire Marshal's office. Do not make a general statement such as, "Install fire dampers 'where' or 'as' required by applicable codes."
3. Specify fire or fire/smoke dampers meeting one of the following requirements:
    a. UL fire-rated and listed
    b. Having been manufactured conforming to specifications established as a result of testing in accordance with nationally recognized test methods and standards.
    c. Resettable fusible link fire dampers are preferred.
4. Show dampers installed in an accessible location or provide access to each fire damper for maintenance and fusible link replacement.
5. Detail fire damper installation in accordance with Sheet Metal Institute "Fire Damper Guide"

23 34 00 HVAC Fans

Part 1- General

1.01 Fans

A. Specify only fans meeting AMCA standards for construction and SCFM ratings.

B. Show all connections between fans and ductwork with a flexible section.

C. Specify safety guards where moving parts are exposed.

D. Separate Fans should be used in the following areas to help reduce utility consumption in unoccupied spaces:

1. Office area, gym, locker rooms, theater, bathrooms, commons, small gym/weight room, kitchen, custodian's shop, boiler room, welding shop, music and band room, drama room and art rooms.

1.02 Fan Drives

A. Rate V-belt drives at not less than 150% of motor nameplate rating.

B. Specify motors of five (5) horsepower and less be provided with an adjustable pitch motor sheave having the midpoint of the adjustment range equal to the specified RPM requirements of fan.

C. Specify motors larger than five (5) horsepower and drives with more than two (2) belts, be provided with a nonadjustable sheave providing the specified RPM required for the fan, and with a variable frequency drive where appropriate. (Where speeds can be reduced to accommodate reduced loads).

D. After tests have been performed on the ventilation system, or as soon as ascertainable, specify that the Contractor will be required to make, without cost, one change in the size of the nonadjustable sheave and belts to obtain the desired air quantities.

1.03 Motors

A. General

1. Note the environment and type of duty a motor is to be installed in, such as dusty, wet, damp, high temperature, continuous or intermittent operation, starting torque, etc., and specify a motor with frame and characteristics to meet those conditions.

2. Specify high efficiency motors.

B. Voltage

1. Specify motors of less than 1/2 HP as single phase, 60 cycle, with 115/230 voltage rating for 120-volt service and 200-volt single voltage rating for 208-volt service.

2. Specify motors of 1/2 HP and larger as three phase, where three phase is available, 60 cycle, with the following requirements:

a. 200 single voltage rating for 208-volt services

b. 230/460 or 460 single voltage rating for 480-volt service for motors less than 125 HP

c. 460 single voltage rating for motors 125 HP and larger

1.04 Bearings

A. General

1. Specify that the installer of any equipment having bearings of any type is responsible for the protection and proper lubrication of the bearings before operation of their equipment.

2. Give special attention to bearings in any equipment that has been delivered to the job site, or installed, in advance of completion.

3. Specify bearings with a useful life of 200,000 hours.

B. Motors

1. Fit 1.5 HP and above, driving air handling equipment, with lubrication applicable ball bearings having both a grease fitting and relief plug for purging during lubrication.

2. Less than 1.5 HP driving air handling equipment and other mechanical equipment such as pumps, compressors, vacuum pumps, etc. may have bearings as normally furnished by the equipment manufacturer.

C. Fans

1. Fans smaller than 24” will be self-aligning, provide lubrication applicable enclosed ball bearing, with pillow block mounting.

2. Fans larger 24” will be self-aligning and provide lubrication applicable enclosed ball bearing, with pillow block mounting.

3. Industrial fans (SP-27”) will be heavy duty, self-aligning lubrication applicable enclosed ball bearing, with pillow block mounting.

D. H&V Units should be enclosed, lubrication applicable self-aligning ball bearings, accessible for inspection, maintenance and lubrication if required.

E. Special fans (forced draft, induced draft) will be discussed with MSBSD.

F. Other fans shall be typical for unit specified.

G. Bearing Lubrication

1. Show or specify all bearing lubrication points as being both visible and safely accessible after installation of equipment.

2. Where extension pipes are needed to meet this requirement:

a. Vent oil lubricated bearings and extend oil fill pipe for easy access.

b. Install at proper elevation to indicate oil level in bearing.

c. Extend both supply and purge pipes for lubrication applicable ball bearings. Fit with proper lubricating fitting and fill each pipe with proper lubricant before installing.

d. Use clear extension tubing to be able to inspect proper bearing lubrication.

e. Grease fittings or zerts should be accessible from outside of air handler.

H. Maintenance Information

1. Include the following requirements in the Operations, Inspection or Maintenance section of each Division having equipment with grease lubricated or oil lubricated bearings.

a. Equipment and its type of bearing

b. Replacement number, name, or size of bearing

c. Recommended type of lubricant and lubrication period

d. Proper belt tension on belt driven equipment and instrument for obtaining it.

23 35 00 Special Exhaust Systems

Part 1- Systems

1.01 Laboratory Fume Exhaust and Fume Hoods

A. Provide spaces designated for use as laboratories with provisions for exhausting fumes to the outside, consisting of fume hoods or special exhausts in the room, connected by ducts to an exhaust fan on the roof of the building.

B. Combine several hoods in a building into fume hood exhaust systems, with one exhaust fan serving the system. All fume hoods on any one exhaust system shall have the same supply fan. Consider these fume hood exhaust systems a part, or all of, the building heating and ventilating exhaust system, as they operate continuously. Provide manual control at each fume hood. Size fume exhaust ducts for a transport velocity consistent with design noise levels, duct static pressure and size limitations.

C. All standard chemical fume hoods are designed for a minimum face velocity of 125 feet per minute through the clear opening.

D. Locate fans so that a negative pressure exists in all fume hood ducts within the building. Where fans cannot be located to satisfy the above, check the locations with MSBSD for approval and precautions to take.

E. Show flexible connections made of neoprene, coated glass fiber cloth at all fan connections to ducts.

1.02 Industrial Exhaust Systems

A. Design industrial exhaust systems for woodworking machinery, grinders, dust collecting, paint spraying or welding fumes, etc., with adequate provisions for entrapment and safe removal of any dangerous substances.

B. Use methods and duct velocities as recommended in the Industrial Ventilation Manual as published by American Conference of Governmental Industrial Hygienists, latest edition.

C. Welding lab station exhaust must conform to all applicable codes including OSHA for welding fume exhaust velocity. Weld lab ventilation system must be separate from general building return air system. During operation of lab, the lab must have a slight negative pressure so fumes will not escape out into the common areas.

23 37 00 Air Outlets and Inlets

Part 1- General

1.01 Air Outlets and Inlets

A. The building ventilation supply air inlet location is critical to minimize the intake of ground level dirt, leaves, noxious exhaust gases, etc. Preferred location is at an elevation to limit such intake. Do not locate in vicinity of loading docks or near areas with idling buses or other vehicles or on the ground.

B. Locate make-up air intakes away from areas where vehicles are likely to sit with engines running. Consider how prevailing winds will direct such contaminants.

C. Exhaust possibly contaminated air and other non-recirculated air vertically, at roof level, with high velocity for dispersion and dilution. Exhaust recirculated quality air at any point where the discharge will not be objectionable.

D. Arrange louvered supply and exhaust openings to exclude rain and snow, or safely dispose of it. Design for maximum air velocity of 500 feet per minute through the net free open area.

E. Screen or louver all ventilation air inlets. Screen exhausts outlets only where required for safety. Do not specify or show any screen with smaller than 1” minimum mesh.

F. Provide duct access from within the building for maintenance and cleaning of all louvered or screened openings from the inside.

G. In areas with high humidity such as swimming pools etc., locate supply and return air dampers in areas free of glaciation that would freeze dampers.

H. BAS panels must communicate on RS.485 Protocol.

23 38 00 Ventilation Hoods

Part 1- General

1.01 Hood Air Supply

A. Provide adequate exhaust and supply air for any new fume hoods installed in an existing building.

B. Where the existing building system was not designed for and cannot be modified to handle the added requirements or the existing exhaust duct system is not fume resistant, provide a new exhaust, and supply system.

1.02 Canopy Hoods

A. In general, canopy type hoods are not acceptable for laboratory or kitchen use.

B. When this type is proposed, the reason should be discussed with and approval received from the MSBSD.

23 51 00 Breechings, Chimneys, and Stacks

Part 1- General

1.01 Design Criteria-Cast Iron Boilers

A. Require separate stacks for each boiler. Cast iron boilers, require rear exiting stack.

B. Chimney (stack) shall be prefabricated UL listed for application with following features:

1. Listed for pressurized systems.
2. Stainless steel liner and outer jacket where exposed to outdoor weather.
3. Cleanout tee, insulating rood support, stainless steel flashing and counter flashing.

1.02 Design Criteria- Low Mass Boilers

A. Provide venting and intake per manufacturer's instructions.

23 52 00 Heating Boilers

Part 1- General

1.01 Boiler Rooms

A. Water to be the number one transfer fluid. No modular bank packaged skid frame type boilers may be used. Variations to these design criteria are subject to MSBSD approval.

B. The heating plant shall be located to allow maintenance to the heating units without interruption of building activities. Consideration shall be given during the concept stages of the design to ensure the height and access requirements of the boiler room are met as well as the replacement of heating units, sections of the heating units and other major components of the heating plant. Provide at least a 4' minimum unobstructed clearance for boiler service access around all components.

C. Boiler room ventilation air is to be provided using a fan that blows filtered air into the boiler room, along with mechanically coupled OSA/RA dampers that modulate to maintain temperature. The fan should start on call for cooling. Combustion air opening should be

provided, sized for the manufacturer's combustion air requirements. Must be at least 6 feet away from any pipes.

D. Provide a unit heater in the boiler room sized for the room heat loss, which should include the combustion air heat load.

E. Locate Boiler Room at ground level. No pit type mechanical room.

F. Corrosion inhibitor concentration of sodium nitrate should be 1,200 ppm upon filling boiler system.

G. In addition to the codes and standards addressed above, the following codes apply:

1. ASME Boilers and Pressure Vessel Code, Sections IV & VI.

2. Provide all automatic boiler controls listed in Table 10.C of the Uniform Mechanical Code 1994 Edition, and in ASME CSD.1, latest edition.

23 52 16 Condensing Boilers (HE Gas Boilers)

Part 1- Products

1.01 HE Boilers

A. Acceptable Condensing Boiler (High Efficiency Gas Boiler) Manufacturer: Aerco, Thermal Solution or MSBSD approved equal.

B. Boiler should be natural gas fired, condensing fire tube design with a modulating forced draft power burner and positive pressure vent discharge.

1.02 Oil Fired Boiler

A. Manufacturer: Fulton, Burnham, Weil McLain or MSBSD approved equal

23 52 23 Cast-Iron Boilers

Part 1- General

1.01 Boiler Requirements

A. Acceptable Cast Iron Boiler Manufacturers are Burnham, Weil McLain or MSBSD approved equal.

1. The MSBSD standard burner is based on a forced draft gas burner, sized to match the boiler rating, and furnished by the boiler manufacturer as part of the complete boiler package. The burner shall be UL/FM or ETL listed as a unit. Combustion and firing controls with self-diagnostic capabilities are requested for large boilers.

2. Set of dry contacts for flame failure monitoring.

3. Provide terminations for full Building Automation System, for example, relays for on/off control or 0.10V/4.20Ma inputs.

4. Firing control should be fully modulating.
5. Provide separate step-down gas regulators on the gas train for each unit; for example, regulate 2lb. gas to inches. Test ports required before and after regulators.
6. Indicators and Alarms should indicate power on, run, lock out, low gas pressure and high gas pressure. The lock out indicator shall have a provision for connection to a remote alarm or monitoring device for BAS.
7. Provide supply and return temperature wells for Building Automation System.
8. Provide boiler pressure sensor located near expansion tank.

B. Power flame for cast iron boilers preferred or MSBSD approved equal
   1. Provide a high turndown modulating burner
   2. Primary heating units are to be plumbed to allow one boiler to be offline for service or repair without losing operation of the rest of the system.
   3. Manual shutoff valve to shut off all gas service to the heating unit. The valve should be installed per burner manufacturer's gas train design specifications.
   4. Specify low water cutoff wired in series with burner controls. Follow working pressure of boiler manufacturer. Provide McDonnell Miller test and checks on Low Water Cutoff (LWCO) columns. Acceptable Manufacturer: McDonnell Miller, #63M or MSBSD approved equal.
   5. Separately vent each piece of gas fired equipment to main vent, size according to American Gas Association (AGA) code. Shield main vent on roof from weather or wind.
   6. Label boilers from left to right, i.e., Boiler #1 on left, Boiler #2 on right when facing the boiler/burner.
   7. Burner controls shall include a disconnect switch near burner.
   8. Do not mount J-Boxes or panels or disconnects on Boiler skin or within a 4' circumference around boiler.

C. Oil burners should be high turndown modulation burners. Modulation required for 1 million BTU or larger burners.
   1. DDC controls should include outdoor reset temperature control, high limit manual reset control and low water safety shutoff control with manual reset. Provide low fuel oil level alarms on oil fired boiler systems which shut down boilers when fuel is low on the day tank.
   2. The oil burner shall be tuned to maximum efficiency with no more than 30% excess air, no CO and a maximum of No. 1 smoke as measured on the Bacharach scale.
   3. The burners shall incorporate a stainless-steel flame retention type combustion head for long life and efficient operation.
   4. The burners are to be equipped with an external primary-secondary air ration adjustment in addition to the total air volume adjustment, such that it will be possible

to adjust both the total air and the primary air-secondary air ration without dismantling the burner.

5. The oil burners shall be mechanical pressure atomizing type equipped with the following:
    a. Two stage oil pumps shall be provided for each burner.
    b. Oil service shutoff valve.
    c. Oil pressure gauges with isolation valve are required to indicate the discharge oil pump pressure and supply pressure to burner nozzle.
    d. Fuel oil filter, General GF2A700A or MSBSD approved equal, and fuel strainer.
    e. Fusible link actuated oil safety shutoff valve for mounting in oil supply line between oil tank and approved isolation ball valve at oil pump.
6. Burner shall be factory assembled with a factory prewired control panel and fire tested at high and low fire at the factory. For burners larger than 3 million BTUs, provide factory prewired control cabinet with large swinging door, door gasket, and locking key latch shall be supplied with and mounted on each burner. Cabinet shall house the flame safeguard control, Honeywell RM7800, burner motor starter, fuses, control switches, alarm bell, auxiliary alarm contact, control transformer, indication lamps and relays as required. Panel shall have the following indicating lamps:
    a. Power On
    b. Flame Failure
    c. Low Water Connection

D. Show and specify gas fired heating units under Mechanical in the contract drawings. Primary heating units shall be low pressure hot water boilers. The design criteria shall be as follows:
1. The design shall be based on multiple boiler heating units that will efficiently run the peak design heating load thru the shoulder months. The capacity calculations shall be based on the following:

a. Entering water temperature (EWT)	160°F
b. Leaving water temperature (LWT)	180°F
c. Delta T	20°

2. The design shall consider that the heating plant may be shut down during the summer months.
3. Hand Off Auto switch on all boilers will provide complete operational control for technician to go from BAS control to local control.

23 82 00 Convection Heating and Cooling Units

Part 1- General

1.01 General Requirements

A. Air Handling Units shall be totally and should be considered for all applications which deliver 6000 CFM or more.

1. Enclosed units shall have provision for noise reduction material to reduce noise transmission.
2. Insulation shall be protected with minimum 20-gauge 1/4-inch perforated metal lining.
3. Units shall have adequately sized, well placed access doors for servicing of fan bearings, fan motor, damper actuators (if used), and shaft.
4. Provisions shall be made for the removal of fan shaft, bearings, and motor, without removal of attached ductwork.
5. Fan unit shall have spring isolation to alleviate sound attenuation.
6. Motor mounting bracket shall be of a screw driven sliding plate design which has appropriate adjustable travel for motor size and can be secured in position.
7. Provide a mixed air chamber design in fan units to avoid stratification that can result in freezing of coils.

B. Provide adequate room to service and maintain air handling units (pull coil, filters, service controls, and fan shaft). Provide windows and light switches on all the man doors into the air handlers.

C. All systems that contain an air handler with a coil that supplies with outside air shall use glycol. Provide plate and frame heat exchanger for transfer to glycol.

1.02 Heating Coils

A. Size, specify and accept only coils having 8 fins per inch spacing. Use of this spacing reduces early coating and eventual plugging with airborne dust and facilitates cleaning when necessary. Provide access for cleaning.

B. To prevent electrolytic or galvanic action, specify the coil header material shall be compatible with coil material and brass pipe from control valve to header.

1.03 Terminal Heat Transfer Units

A. Unit Heaters shall be Trane, Dunham-Bush or MSBSD approved equal

B. Convectors shall be Trane or MSBSD approved equal.

Division 25- Integrated Automation

25 90 00 Integrated Automation Control Sequences

Part 1- General

1.01 Direct Digital Control System Usage

A. The Matanuska-Susitna Borough School District utilizes Direct Digital Control systems for:

1. Monitoring and Control of all major mechanical systems
2. Monitoring and Control of all occupied space mechanical systems
3. Control of site and hockey lighting
4. Monitoring of electrical phase loss and generator systems

B. Each school's Direct Digital Control system connects to the MSBSD's wide area network through the school's local area network.

1.02 Direct Digital Control System Access

A. The MSBSD requires that the Direct Digital Control system be capable of being accessed by a password protection through a graphical computer interface Server. Provide an operator's terminal located at the school and remote connection by modern connection to a DDC Panel at the school.

1.03 Direct Digital Control System Alarm Monitoring

A. All alarms sent to a control monitoring station.

B. Critical alarms shall be sent to a remote notification system (i.e., text message).

C. The following conditions are defined as critical alarms:

1. Critical pump alarm (i.e., all main circulation pumps)
2. Boiler common supply temp
3. Boiler common header pressure
4. Electrical phase loss
5. Generator run status and generator general alarm
6. Other critical alarm items at the direction of the MSBSD

1.04 Electrical Power Phase Loss and Under/Over Voltage Monitoring

A. The Direct Digital Control monitors the quality of the commercial power through the use of a phase/voltage monitor relay.

B. If the relay indicates that the building has lost a phase or that the commercial power is in an under or over voltage situation the Direct Digital Control system will annunciate a critical alarm at all event-monitoring consoles and shut down all three phase motors that are controlled by the Direct Digital Control system.

C. When the electrical condition no longer exists, all electrical motors that had been shut down by the Direct Digital Control system shall be staged on one by one in increments of 10 minute after a time delay of at least 10 minutes.

25 93 00 Integrated Automation Control Sequences for Fire-Suppression Systems

Part 1- General

1.01 Fire Alarm System

25 95 00 Integrated Automation Control Sequences for HVAC

Part 1- General

1.01 Outside Air Monitoring

A. The Direct Digital Control system shall monitor the outside air temperature.

1.02 Building Critical Alarming

A. If any room temperature drops below 50°F, the Direct Digital Control system generates a building low temperature alarm.

1.03 Primary Air Handling Units

A. Start Stop Control

1. The air-handling unit start/stop function shall be controlled by a start/stop program.
2. In addition, fans that are the primary source of heat for a facility will be required to operate during unoccupied hours to maintain the unoccupied space temperature set point of 55°F. Occupied space temperature is a setting of 68-72°F.
3. Air handling units that are the primary sources of heating for their respective area shall be turned on during unoccupied hours whenever the Direct Digital Control system senses as space temperature below the unoccupied low limit. When the air-handling unit is operating in this mode it will keep the mixed air dampers in full recirculation and utilize the heating coil to bring the space back to the unoccupied temperature set point.

B. Fan Status

1. Fan status is sensed through the use of a current transformer with a digital output. The current transformer measures the electrical current flow to the fan motor and provides an on/off signal based on the measured current flow (field adjustable).
2. Failure of the fan to prove status within 30 seconds of being commanded to an on state will cause the Direct Digital Control system to generate an alarm on DDC.

C. Preheat Air Control

1. The Direct Digital Control system provides preheat air control by sensing the preheat air temperature and modulating the preheat coil valve to maintain the design discharge set point.
2. If the system utilizes a 2-way control valve, then the heating coil valve should be a normally open valve. If it is a 3-way control valve, then the heating coil valve will be piped to fail to full flow through the heating coil.
3. A preheat air set point is set in programming to meet the system design requirements.
4. Whenever the fan is shut down (whether by the occupancy program or from a safety device) the preheat coil valve is modulated to maintain 50°F as sensed by the preheat air sensor.

D. Mixed Air Control

1. The Direct Digital Control system will modulate the mixed air dampers to maintain the mixed air temperature set point.
2. On system start-up, restrict the speed at which the mixed air dampers can open by ramping the maximum damper position allowed by the control loop from 0% open to 100% open over a fifteen-minute window.
3. The mixed air set point shall be set by the return air and IAQ requirements. This set point must work in conjunction with the discharge air set point. The Indoor Air Quality (IAQ) requirements of the building shall not override the primary discharge air temperature control in order to meet the minimum IAQ ventilation standard.
4. If the Direct Digital Control system senses no airflow or if the system is in Unoccupied Mode, then the mixed air dampers shall remain in full recirculation.

E. Discharge Air Control

1. The Direct Digital Control system provides discharge air control by modulating the heating coil valve. If the system utilizes a 2-way control valve, then the heating coil valve should be a normally open valve. If it is a 3-way control valve, then the heating coil valve will be piped to fail to full flow through the heating coil.
2. A discharge air set point is periodically calculated by the Direct Digital Control system by comparing the average room temperature in its zone with the zone set point as entered by the operator. The discharge air set point is allowed to automatically adjust from a low of 45°F to the maximum design temperature.
3. Whenever the fan is shut down (whether by the occupancy program or from a safety device) the heating coil valve is modulated to maintain 50°F in the mixed air plenum

F. Duct Static Pressure Control

1. For VAV systems, the supply air fan variable frequency drive (VFD) is modulated by the DDC System to maintain a duct static pressure set point as determined by the mechanical engineer.

2. On system start-up, restrict the speed to which the VFD can be commanded by ramping the maximum speed allowed by the control loop from 0% open to 100% open over a 60 second window.

3. If the fan is commanded on and either a VFD failed condition or a fan failure is sensed by the Direct Digital Control system, then the variable frequency drive is commanded to the minimum setting.

G. Low Limit Control

(Parameter #1 Shall apply only in circumstances where the air handling unit does not contain glycol in the heating coils. Parameters 2-4 shall apply where the heating coils contain glycol.)

1. An auto reset, double pole, low limit thermostat located on the discharge of the primary heating coil shall shut down the fan system via a hard-wired connection to the motor starter or VFD.

2. After 15 minutes the fan system will restart and resume normal operation and bypass warm up mode. This shutdown/startup procedure will occur a maximum of five times before going into alarm.

3. Upon the sixth low temperature shutdown the system will stop restart attempts and will generate a manually reset maintenance alarm.

4. The count of low temperature conditions will be reset every time the system changes occupied modes.

H. Filter Monitoring

1. The Direct Digital Control system monitors the differential pressure across the filter bank through the use of an air differential pressure analog sensor and generates a maintenance alarm when the pressure drop exceeds its set point.

1.05 Exhaust Fans

A. Building/Classroom Exhaust Fans

1. Building/Classroom Exhaust Fans will be started and stopped in conjunction with their respective air handling units. Provide a start/stop point and scheduling for each restroom exhaust fan.

2. Fan status is sensed through the use of a current transformer with a digital output. The current transformer measures the electrical current flow to the fan motor and provides an on/off signal based on the measured current flow (field adjustable).

3. Failure of the fan to prove status within 30 seconds of being commanded to an on state will cause the Direct Digital Control system to generate a Maintenance Alarm.

B. Toilet Exhaust Fans

1. Toilet exhaust fans will normally be controlled by the Direct Digital Control system. They may be controlled in conjunction with the local light switch (occupancy sensor).

However, in cases where the exhaust fan serves multiple areas it should be controlled in a manner similar to a Building/Classroom exhaust fan.

C. Kitchen Exhaust Fans

1. Kitchen exhaust fans shall be controlled by a switch with disabled time frame located in the kitchen area.

D. Electrical Room Exhaust Fans

1. Electrical Room exhaust fans shall be controlled by a local thermostat that will cycle the exhaust fan and two-position damper.
2. Note that the thermostat and associated control components must be low voltage and conform to NEC Class 2 requirements.

Part 2- Boiler Systems

2.01 General

A. The MSBSD boiler system basis of uses a primary loop and a decoupled secondary loop.

B. The boilers will be controlled through a combination of factory controls and the Direct Digital Control system.

C. Each boiler shall provide disconnects with hand-off-auto switches for manual override.

D. The factory controls will provide dry contact outputs to the Direct Digital Control system for the monitoring of boiler status, boiler alarms, boiler enable. Provide a boiler set point to the boilers form DDC.

E. All direct burner control and safety interlocks will be controlled by the boiler's factory controls.

2.02 Boiler System

A. Primary Loop

1. The primary loop consists of boilers that operate in lead/lag staging. The lead boiler will automatically be switched to maintain equal hours on each boiler or whenever there is a failure of the current lead boiler.

B. Secondary Loop

1. The secondary loop consists of pairs of pumps that will provide circulation of hot water to the various building mechanical equipment and zones will operate in a lead/lag fashion. The lead pump will automatically switch on a monthly basis or equal time for each pump.

C. Boiler Reset Schedule

1. The standard reset schedules in use by the District is a follows:
   a. Primary Loop Hot Water Temperature Reset:
      1. 190°F HWS at 0°F Outside Air Temperature

2. 140°F HWS at 60°F Outside Air Temperature

2.03 Boiler Monitoring

A. The boilers will be monitored for boiler failure, run status and start/stop. The failure alarm and run status should be a dry contact closure generated by the boiler's factory control panel.

B. Boiler run status is defined as when the boiler factory control circuit or DDC is calling for the burner to operate. Verified run status is when the gas valve opens.

C. The Direct Digital Control system shall generate a maintenance alarm whenever it detects a failure indication from the boiler's factory control panel or an alarm whenever a boiler is commanded to operate, and its associated run status does not prove within a predetermined time delay.

D. Provide thermostats in close proximity to DDC sensor (corresponding) on boiler piping.

2.04 Control Sequence for Boilers with Modulating Burners

A. Cycle Up

1. The lead boiler header pump will run continuously; lag boiler header pumps will cycle with their respective boiler. For high mass boilers please set lag pumps to maintain minimum 140 F temperature.

2. The Direct Digital Control system will compare the primary loop supply temperature with the primary loop water set point as determined by the reset schedule. Enable the lead boiler with a 10-degree dead band with a 150 F to 190 F reset schedule.

3. Boiler modulation shall be controlled by either the manufactures boiler controller or through DDC and programed to maintain boiler supply temp set point.

4. The Direct Digital Control system will modulate the lead boiler to 75% capacity. If the lead boiler is commanded to 75% capacity and the rate-of-rise is still insufficient to achieve set point, then the Direct Digital Control system commands the lag boiler header pump on and commands the lag boiler into low fire along with the lead boiler in low fire. Firing rate will be modulated at same rate between running boilers. This sequence continues until the primary loop supply temperature set point is reached or until all boilers are operating at 100% capacity.

B. Cycle Down

1. If the primary loop water temperature exceeds the 10-degree dead band or 190 degrees F, then the sequence is reversed; boiler burners are modulated down to 0% capacity and then the boiler pump and burner are disabled.

2. Note that the lead boiler header pump remains enabled at all times. (Please refer to the Pumps section of this document for specific information on the sequence of operation for the various boiler pumps).

C. Notes

1. In order to ensure the integrity of the boilers this time delay must be coordinated with the boiler manufacturer's recommended procedures.
2. The Direct Digital Control system must modulate boilers to 0% capacity (low fire) prior to a full shutdown.

2.05 Pumps

A. Boiler Header Pump

1. The lead boiler header pump will run continuously; lag boiler header pumps will cycle with their respective boiler.
2. The boiler header pump will continue to operate for 10 minutes after its respective boiler has been disabled.
3. If the boiler header pump fails to prove flow through its current transformer then its associated boiler will be disabled, and a maintenance boiler header pump alarm will be generated.
4. On a return to normal status, all associated alarms and lockouts shall be released.
5. The pump runs whenever the boiler internal temperature drops below 140°F for high mass boilers.

B. Boiler Blend Pump

1. Each boiler blend pump is enabled and disabled whenever the respective boiler burner is enabled or disabled or to maintain minimum 140 F.
2. If the blend pump fails to prove flow a maintenance boiler blend pump alarm will be generated.

C. Secondary Loop Heating Pumps

1. The primary heating pumps will be a pair or multiple pairs of pumps that will operate in a lead/lag sequence. When operating in automation, the pumps shall alternate on a monthly basis or an equal time basis.
2. The Direct Digital Control system will provide a start/stop control through the motor starter. The pump electrical disconnects should also be provided with hand-off-auto switches for manual override.
3. Pump status is sensed through the use of a current transformer with a digital output.
4. Upon failure of the lead pump, the Direct Digital Control system will shut down the pump, start the lag pump and signal a maintenance alarm to DDC.

D. Domestic Recirculation Hot Water Pump and Water Heater control

1. Provide on/off, status, and alarm for the water heater.
2. Provide on/off, status, and alarm for the recirculating pump.
3. Provide a start/stop schedule for hot water system.

Part 3- Space Temperature Control

3.01 Variable Air Volume Terminal Units

A. General

1. Variable Air Volume Terminal Units will be controlled by the Direct Digital Control system. A Direct Digital Control room thermostat with a digital display that indicates temperature, set point, and occupied/unoccupied status.

2. All VAV's shall have a discharge sensor mounted downstream of the reheat coil and connected to the aux terminals of the TEC room controller.

B. Occupied Mode

1. During Occupied Mode (whether by schedule, or by operation of the unoccupied override input) the terminal unit control damper will modulate between Minimum Heating and cooling CFM and Maximum Heating and cooling CFM to maintain the zone day temperature set point plus or minus 2°F. If the terminal unit has a reheat coil, then the control valve will modulate in parallel with the terminal unit control damper as the damper modulates between a Minimum Heating and Maximum Heating CFM.

2. The supply air temperature of the terminal unit should be limited to a maximum of 20°F above room set point temperature. In rooms with auxiliary baseboard heating modulate the baseboard control valve in parallel with the reheat coil control valve.

C. Unoccupied Mode

1. During Unoccupied Mode, the night temperature set point is set back to 55°F and the system need only control to within plus or minus 3°F. In order to avoid unnecessary operation of the air handling unit modulate the baseboard control valve to fully open position before opening the reheat coil control valve.

2. If the space temperature falls 3°F below the night temperature set point open the VAV terminal unit damper to 100% open, start the air-handling unit in non-IAQ mode (or start the local fan in spaces with fan powered boxes) and modulate the baseboard valve in parallel with the reheat coil control valve.

3. Once the space temperature climbs to 3°F above the night temperature set point close the VAV terminal unit damper and reheat coil valve, stop the air-handling unit, and return the system to normal Unoccupied Mode operation. Note that spaces that utilize fan powered boxes will not bring on the air handling unit.

4. Activation of the override pushbutton located on the thermostat will return the space to occupied mode set points and control for a period of two hours. At the end of the override time the space will return to unoccupied mode control sequence.

3.02 Constant Volume Terminal Units with Reheat

A. General

1. Constant Volume Terminal Units will be controlled by the Direct Digital Control system. A Direct Digital Control room thermostat with LCD temperature indication provides temperature, set point, and unoccupied override inputs to the terminal unit controller.
2. The Units shall have a discharge temp sensor mounted downstream of the reheat coil and connected to the room controller.

B. Occupied Mode

1. During Occupied Mode (whether by schedule of by operation of the unoccupied override input) the terminal unit reheat coil control valve will modulate to maintain the zone day temperature set point plus or minus 1°F.
2. In rooms with auxiliary baseboard heating modulate the baseboard control valve in parallel with the reheat coil control valve.

C. Unoccupied Mode

1. During Unoccupied Mode, the night temperature set point is set back to 55°F and the system need only control to within plus or minus 3°F. In order to avoid unnecessary operation of the air handling unit modulate the baseboard control valve to fully open position before opening the reheat coil control valve.
2. If the space temperature falls 3°F below the night temperature set point start the air-handling unit and provide heating to the space by modulating the baseboard valve in parallel with the reheat coil control valve.
3. Once the space temperature climbs to 3°F above the night temperature set point close the reheat coil valve, stop the air-handling unit, and return the system to normal Unoccupied Mode operation.

Part 4- Classroom Unit Ventilators

4.01 Classroom Unit Ventilator Units

A. General

1. Classroom Unit Ventilators will be controlled by the Direct Digital Control system. A Direct Digital Control room thermostat with LCD temperature indication provides temperature, set point, and unoccupied override inputs to the unit vent controller.
2. The unit ventilator will follow an ASHRAE Cycle 2 sequence of operation. A discharge temp sensor mounted downstream of the reheat cool and connected to the room controller.

B. Occupied Mode

1. During Occupied Mode, the unit ventilator fan will start. The Direct Digital Controller will maintain the room temperature by modulating the discharge air temperature set point.
2. The heating coil valve and mixed air dampers will modulate to maintain the zone day temperature set point plus or minus 2°F.

3. A minimum percentage of outdoor air is provided to meet ASHRAE minimum ventilation requirements. Bypass dampers are not acceptable as part of the sequence.

C. Unoccupied Mode

1. During Unoccupied Mode, the night temperature set point is set back to 55°F and the system need only control to within plus or minus 3°F.

2. If the space temperature falls 3°F below the night temperature set point start the unit ventilator and provide heating to the space by modulating the heating coil control valve-mixed air dampers are to remain in full recirculation mode.

3. Once the space temperature climbs to 3°F above the night temperature set point the heating coil valve closes, the unit ventilator fan stops, and the system returns to normal Unoccupied Mode operation.

D. Safeties

1. In the case of an air handler unit with a coil that has water, install a low temp sensor in the mixed air chamber that will de-energize the fan unit and generate a maintenance alarm. Restart fan only after temp raises above 45 degrees.

2. Heating coil valves shall modulate coil to maintain 80 degrees during unoccupied mode also during safety shutdown. Mixed air dampers shall be in full re-circulation mode during safety shut down.

3. If the system utilizes a 2-way control valve, then the heating coil valve should be a normally open valve. If it is a 3-way control valve, then the heating coil valve will be piped to fail to full flow through the heating coil.

4.02 High & Low Space Temperature Alarm Monitoring

A. If the lowest temperature is below 50°F whenever the outside air temperature is below 20°F the Direct Digital Control system will generate a maintenance alarm.

B. The Direct Digital Control system will generate a maintenance alarm if any room temperature rises above 90°F.

25 96 00 Integrated Automation Control Sequences for Electrical Systems

Part 1- Emergency Generator Systems

1.01 Emergency Generator Monitoring

A. The Direct Digital Control system monitors the emergency generator for run status, pre-alarm, generator failure, and phase monitoring. On detection of a run condition failure the Direct Digital Control system will generate a critical alarm. Generate a critical alarm for phase loss without generator run or phase normal with generator run. Provide for generator cool down before critical alarm is generated.

1.02 Emergency Generator Ventilation

A. On detection of a generator run condition the control system modulates the intake, exhaust, and recirculation dampers to maintain the generator room temperature set point. When the generator is off, the generator system closes the intake and exhaust dampers and opens the recirculation damper. Provide emergency power for day tank supplying generator.

B. This control sequence will be powered by the generator system.

Part 2- Lighting

2.01 General Description

A. The Direct Digital Control system will control parking, exterior building lighting, and hockey rink lighting.

B. The Direct Digital Control system will have a photocell input point that controls all exterior lighting.

C. The Direct Digital Control system will allow for call in remote activation of exterior lighting. Allow for integration with the present system. The lighting shall also be brought on for a period of 2 hours.

2.02 Exterior Site Lighting

A. The lighting is staged on with individual zone schedules as per MSBSD standard. Typically, this is low, medium, and high including building exterior lighting.

B. The lighting is turned on whenever the security or fire alarm panels are in alarm condition and the photocell is in the night mode. The lighting will remain on until the alarm condition is cleared.

2.03 Hockey Rink Lighting

A. The Hockey lighting is to be enabled only during scheduled programmed with a manual switch onsite.

2.04 Interior Lighting

A. General

1. The interior lighting for hallways and common areas shall be controlled by the building controls system and shall use relays and a mechanically held (as opposed to electrically held) contactor. This will allow operators to schedule the lighting through the building controls system to create occupied/unoccupied times. For unoccupied times, the lighting shall be controlled by combination ultrasonic/PIR sensors to sweep on or off interior lighting, as necessary. Classrooms, offices and other non-maintenance storage or custodial areas shall be controlled by combination ultrasonic/PIR sensors for occupied times and have enough coverage to keep the lights on during occupied times. Switches are to be installed to temporarily override

the motion sensors. The switches shall keep the lights off until the switch is pressed a second time to return the lights to motion occupied mode.

B. Corridor and Night Lighting for Elementary and Secondary Schools

1. The lights throughout the entire building shall be “connected” to the security system. A solution for how the lighting system receives the signal when the building is armed/ disarmed or has been put into alarm. The lighting system shall receive two separate signals for this. First signal will be for arm/disarm and hallway and common lights shall flash on for a determined amount of time and shut off. The second signal shall alert when the building goes into alarm, this signal shall turn on all the lights in the building. The lights shall remain on until the alarm is reset and will then shut off after a predetermined time. The hallway lights, and common areas shall not be able to be overridden within those spaces.

C. Gym Lighting for Elementary and Secondary Schools

1. Provide local motion sensors in the gymnasium which will automatically turn on the lighting when they detect activity in the area and dim to a percentage when unoccupied. Lights shall then turn off completed with no motion detected after a predetermined time. Provide an override switch or switches to turn lighting off only or lighting off in stages if so provided.

2.04 Lighting Controls

A. General Considerations

1. Occupancy sensors will control all interior areas, DDC allowed only in exterior settings
2. Mount occupancy sensors at least 6 to 8 ft. away from HVAC ducts.
3. Ultrasonic / PIR sensors should be mounted on vibration free, stable surfaces and should not be used in areas of heavy air flow, moving objects, or where the ceiling height is greater than 14 ft.
4. If there is a concern that lighting could be turned off automatically or manually when people are still in a space, put in emergency lighting for safe egress.

B. Use products that are durable and can resist abuse.

C. Classrooms

1. Dual technology occupancy sensors should be used for classrooms with a 30 min delay.
2. Mount occupancy sensors so there is no detection outside the door. They should not be placed where they could be covered by artwork, shelves, or other furniture.
3. Consider daylight responsive, continuous dimming control.
4. Each classroom will have three levels of control.
    a. Manual off for teaching purposes
    b. Down lighting or dimmable for low levels

c. Up lighting for normal teaching conditions

D. Public Spaces/Common Areas

1. Public spaces, such as hallways and restrooms, are best suited for automatic on/off control of lighting. If manual control is needed, use key operated switches, or install switches in secured areas.

2. Consider daylight responsive, stepped dimming control.

E. Gymnasiums/Multipurpose Rooms

1. Provide occupancy sensors and manual override.

2. Use bi-level control with occupancy sensors and time-based control for shut off after hours.

F. Restrooms

1. Use ultrasonic sensors for spaces such as restrooms with stalls even when there is no direct line of site of the occupant from the sensor.

G. Exterior

1. Use DDC lighting control and photocell, control exterior lighting to turn on before school and off at scheduled time. Include day light harvesting and dimming capabilities.

Division 26- Electrical

26 00 00 Electrical

Part 1- General

1.01 General Comments

A. All work performed under this section shall be in accordance with the most current National Electric Code (NEC), Authority Having Jurisdiction (AHJ), with the drawings and MSBSD Standard Specifications and subject to the terms and conditions of the Contract.

B. Actively coordinate with the local utility. Speak with the utility engineers regarding load, specific load and phase requirements, and construction schedule for each individual project. Send the utility engineer plans and follow up. Inform the telephone company, local utilities.

C. Cross coordinate with all other Architectural Divisions.

D. Consider alternative energy means to minimize operating costs on major projects (greater than 70,000 SF). This specifically includes fuel cells or other new and emerging technology where they can be shown to offer lifecycle cost benefits.

E. All work shall be inspected before covering (i.e., underground, walls) by state electrical inspector and MSBSD.

1.02 Codes

A. Comply with all current laws, rules, and regulations of the State of Alaska Administrative Code (hereinafter referred to as AAC) for all MSBSD designs.

1.03 Designs and Project Procedures

A. The Architect and Engineer shall meet with the MSBSD at the completion of the schematic design phase to review issues which include lighting fixture types, equipment selecting panel locations proposed, alarm systems and lighting controls.

B. The Architect and Engineer shall meet with the MSBSD upon completion of the design development drawings. Items and discussions to include:

1. Load calculations to substantiate service and generator sizing, including spare panel capacity as directed by MSBSD in excess of 25%.
2. Lighting layout, including fixture types and designed illumination levels.
3. Planned electrical distribution system design.
4. Special system schematics.

1.04 Specifications and Drawings

A. Redline changes on construction drawings need to be kept up to date and available for review, at any time. Make each division of the specifications complete in itself. Avoid duplication and conflict between the specifications and the plans.

B. Make schematics and diagrammatic details for each project large enough to be easily read. Scale boiler room, kitchen and mechanical / electrical room plans and elevations at 1/4” minimum. Use 1/2” or larger if required to clearly show details of design.

C. On each set of plans provide an adequate identifying legend of all symbols used. Identify and define all abbreviations used on the drawings.

D. Make sectional drawings of congested areas to show all electrical and mechanical work involved. Repeat, or refer to, such sections on the drawings for each affected trade.

E. Provide separate drawings for lighting, power, network infrastructure and specialty systems.

F. Provide separate shop drawings for the following systems: Fire Alarm, Security, Intercom, and Network/Data.

G. Furnish riser diagrams for special systems. Where practicable show dimensions on the diagrams. Show clearances above ceilings, in walls and below floors where work is to be routed.

H. Provide schedules on drawings for lighting fixtures and other items. List enough operating characteristics to define the items without questions and include sufficient description for ordering of equipment replacement or parts. (i.e., Manufacture, voltage, amperage, model number etc…)

I. Show all electrical service and meter equipment and locations. Do not imply responsibility of the contractor for elements of engineering design in specification paragraphs that require compliance with rules, regulations, and codes.

J. Specify installations to be made “in accordance with the manufacturer’s recommendations”. Where a single type of material is acceptable and the method of application is uniform for all manufacturers’ products, the specifications should state the installation requirements explicitly and in detail.

K. Be specific as to the division furnishing automatic controls, control wiring, motors, disconnect switches, motor starters or other electrical equipment. Clarification is necessary both as to furnishing and installing. This may be done by a schedule on the Electrical and Mechanical drawings showing in which division(s) each item is specified and which trade installs the item. Include, as a minimum, the controls schematic diagrams, sequences of operation, specifications, and BAS points list. Provide printed and electronic (PDF) copies of all PPCL Control Language.

L. If performance is used as the basis for specifying any equipment, product, or material, use the following guideline:

1. Specify desired characteristics, salient features, or user requirements.
2. Specify complete performance criteria, with minimum, maximum or variable conditions expected.
3. Specify tests and methods to be used in determining compliance, together with where and who will perform tests. Include hard copy of all testing results. When the testing is performed, a representative of the MSBSD Facilities department must be notified prior to testing.

M. Specify that approval of submitted equipment will be given only to that of current manufacturer at time of delivery and that all parts for normal maintenance or repair be available for a minimum period of five years.

N. For all new construction provide at least two each, two (2) inch empty conduits to future locations for portables, ball fields, etc. All network conduits must meet current standards for data and voice, including, but not limited to distance requirements to nearest MDF or IDF. Empty conduit should be drilled and prepared for use, with pull strings, labeled at panel and terminated with a J-box.

1.05 As-Builts (Record Drawings)

A. Accurate “As-Builts” are essential. This must be spelled out clearly in the contract documents and diligently pursued during construction by MSBSD, Architect, Engineer, and Contractor. Maintain redlines on site.

B. MSBSD requires two (2) hard copy sets of “As-Builts” turned in for record purposes. Two of these shall be submitted on Architectural D size (24x36 inches) paper and one-half size copy. A copy of all “As-Built” Record Drawings shall be provided in digital format.

C. “As-Built” Record Drawings shall include controls, fire alarms, clock intercoms, sprinkler, BAS system and all other shop drawings.

D. Electrical “As-Builts” must show actual circuit routing by complete point to point lines.

1.06 Access

A. Access for operation, maintenance, repair or replacement of any equipment or item is very important. Mechanical access will be off common areas. Access to operate, maintain, repair, or replace such equipment or item without disassembly or damage to the surrounding structure is required.

B. The degree of access, or accessibility, will depend upon the importance, complexity, size and weight of the equipment or item. As an example, a branch circuit junction box, being a single item accessed infrequently or never after the initial installation, would require a lower degree of access than a system control panel requiring maintenance or possible removal for repair or replacement. Consider the use of lifting cranes for heavy equipment and the need for larger access doors to upper areas with larger equipment.

C. Ensure access and clearance for all main, distribution, or control, panel boards, equipment racks and enclosures. Refer to all applicable codes for working clearances.

D. Provide power and lighting to required maintenance access areas. Lighting needs to be accessible and free of obstruction.

1.07 Building Utility Service Locations

A. Information regarding the location, size and elevations of existing utilities and service points shall be confirmed in the field by the Electrical Engineer if necessary.

B. Do not start layout of any building utility system until this information has been received and discussed.

C. Coordinate with local utilities to fully satisfy their specific requirements.

1.09 Existing Equipment

A. Reference in the specifications and shop drawings any existing mechanical or electrical equipment shown on the plans or specified as being furnished by the MSBSD.

Part 2- Basic Methods and Materials

2.01 General

A. Provide minimum 25% spare conduits, identified as spare and terminated for electric power, clock and speaker system, and fire alarm system, etc. Terminate where future additions or improvements might take place. Permanently label both ends of empty conduits as to origin and termination.

B. Conduit runs exceeding 75 feet in length between panels/j-boxes/outlet boxes shall be a minimum 1" diameter.

C. Provide pull lines in empty conduits. Wire in conduit not to exceed NEC tables of conduit capacity.

D. No ground mounted flood lighting or pedestal flood lights.

E. Provide minimum 25% additional panel space.

F. All panels feeding general purpose outlet circuits within the building will have a transient surge suppression system across the input to the panel, from phase to phase and from phase to ground. Surge suppressor modules will indicate visually at local or remote point when service is required and will be easily replaceable when required without disruption of power flow through the panel.

G. Group classroom outlet circuits room-by-room. In classrooms provide duplex outlets on walls on 6-foot centers, minimum three walls.

H. Administrative offices, teachers work rooms, etc. shall have double duplex outlets on 4-foot centers, 3 walls minimum.

I. Computer classrooms shall be equipped with perimeter Wire-mold series 4000 two channel surface raceway, minimum 4 walls, with two adjacent duplex receptacles on 48-inch centers in the wire mold. Place no more than three (3) duplex receptacles on a twenty (20) amp circuit.

J. Twenty Amp GFCI outlets required within 6 feet of any sink or plumbing fixture.

K. All exterior buried conduits shall be sloped for drainage away from building and bedded in sand. Conduits extending beyond the building from within shall be GRC for the first 20ft.

L. All horns, bells, lights etc. mounted exterior to the building shall be at ten feet height minimum and inaccessible to tampering or vandalism.

M. All heat tapes shall be on Equipment Protection GFCI breakers connected to BAS and monitored by self-analyzing sensors. Disconnect switches for heat trace (if needed) shall be located in an electrical/mechanical room clearly marked on the “as-built” prints. All heat trace switches must be labeled.

N. All electrical devices and their associate’s poles, posts, brackets, and boxes shall be connected to a properly sized grounding conductor per NEC which shall be continuous to the feeding panel, then to the building ground rod system.

O. Flexible metal or LiquidTite conduit may be used only in lengths not exceeding 6’ in length. Flexible conduit shall not penetrate walls.

P. Use of armored or metal clad (type MC) cable is only permitted in concealed spaces and is only to be used in branch circuits that originate at main junction boxes and terminate at receptacles, switches, or other similar devices. Runs between junction boxes and main panels shall be metal conduit.

Q. Provide conduit or surface raceway for all exposed wiring.

R. A Third party, and a MSBSD Facilities Department inspection of all systems at completion of projects will be required.

S. No floor mounted receptacles permitted unless approved by MSBSD.

T. Duplex receptacles shall be 20 amp rated 3 wire, self-grounding, tamper resistant. Installed with the ground port on top. Exceptions allowed only by MSBSD.

U. Control Voltage: Verify with BAS system requirements

V. Disconnects shall be located at control device in compliance with all applicable codes.

W. Transformers must be pad mounted.

X. Surface raceway will be discouraged wherever possible.

Y. All j-boxes shall be labeled with panel and circuit number. Exposed locations shall be adhesive labeled.

Z. All branch circuit home runs to be a minimum of #10 awg conductor.

Part 3- Products

3.01 General Products

A. Provide totally enclosed, fan cooled commercial grade, 3 phase motors for all motors 1 HP or larger.

B. Square D motor starters with thermal overload protection, no substitutions. Use separate relays for over/under and phase loss/reversal protection. Over/under voltage and surge suppression are required on all boiler circuits. Motor starters to be magnetically held. Mechanically held contactors unacceptable. (Overload protection to be similar to Square D IE. A1.03)

C. Use solid state contactors to reduce equipment with moving parts.

D. Provide submittals for all equipment and products to be reviewed and signed off by MSBSD Facilities Department before ordering.

26 01 00 Operation and Maintenance of Electrical Systems

Part 1- General

1.01 Special Systems

A. Description

1. Provide self-limiting heat tapes listed for use in direct contact with water, on all roof drains that are exposed to freezing. For any heat tape installed in exterior drains, provide a return loop in excess of 5 feet.

2. Head bolt Outlets where specifically approved by the MSBSD. Head bolts controlled off temperature below 20 degrees F through the BAS system.

26 05 00 Common Work Results for Electrical

Part 1- General

1.01 Common Work Results

A. All wire and cable sizes noted on the drawings are for copper conductors and copper conductors shall be used throughout the entire installation. Exceptions per MSBSD.

B. Any conductors that extend below grade, interior and exterior shall be suitable for wet locations (Type XHHW).

C. The use of THHN below grade is not acceptable.

1.03 General Electrical Distribution Systems

A. Provide a minimum of not less than 4 feet minimum working clearance of poured concrete in front of the switchgear.

B. Switchboards and electrical equipment shall be located in dedicated electrical rooms only with panic hardware towards the egress. Switchgear shall not be located in boiler rooms. No overhead sprinkler or other piping inside the electrical room.

C. All panelboards and distribution panels shall have a neutral and ground bus.

D. All fire alarm and security branch circuit breakers to have a breaker lock to keep the circuit in the closed position. (i.e., SQD # QO1LO)

E. All fire alarm branch circuits to be in red on the panel schedules as well as the breaker handle to be red in color.

26 06 53 Identification for Electrical Systems

Part 1- General

1.01 Summary

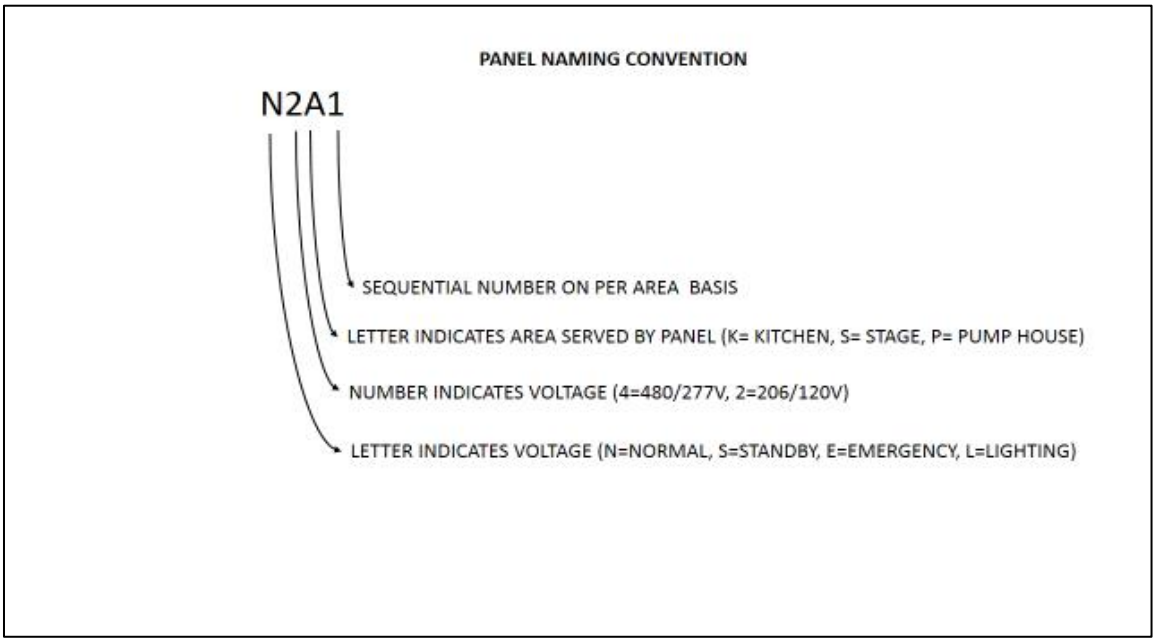
A. All sub distribution panel boards or sub panel boards, motor control centers and disconnects shall be labeled as to source of supply and location by room number. All labels to be mechanically fastened (rivets or screws NO TAPE), permanent laminated plastic placards with engraved lettering 1/4” in height of contrasting color. Background of labels shall be colored as to system Black- Normal, Yellow- Standby and Red for Emergency/Egress.

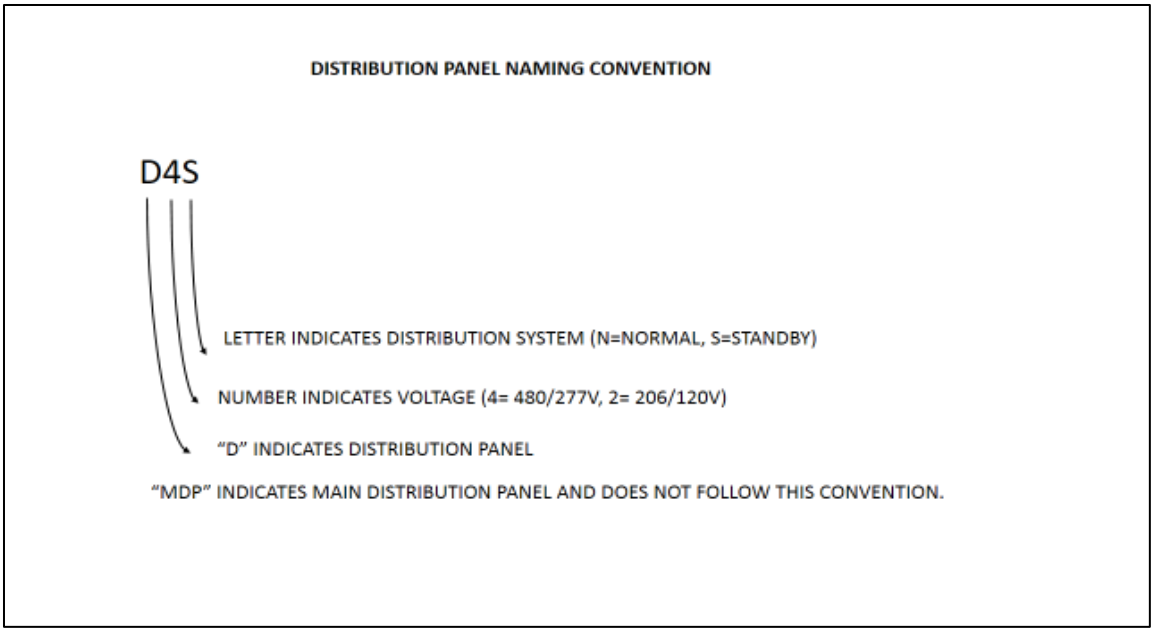
B. Main feeder conduits to each panelboard and distribution panel shall be labeled. Labeling shall be legible and permanent.

C. All panel boards shall contain directory cards in a holder with a transparent plastic cover. Directory cards shall be filled out with typed information showing the identity and location

served by the appropriate branch circuit breaker. Directory cards must be typed out, handwritten is not accepted. Where room numbers are used on directory cards, they shall be the room numbers used in the finished construction documents. Coordinate with the MSBSD prior to construction of signs. Branch panel boards shall have a label denoting source of power supply by room number and disconnect number.

D. All disconnect switches, push button stations, selector switches, branch panel boards and distribution panel or distribution switchboard circuit breakers shall be labeled with engraved plastic nameplates consisting of 1/4-inch white letters on appropriately colored background. Mechanically fasten labels (rivets or screws NO TAPE), to panels. Panels shall not be located in areas readily accessible by students. See following Numbering Sequence.





E. All conductors passing through gutters shall be labeled with tags having clearly legible data identifying the panel and circuit number. Conduits and J-boxes shall be identifiable on the exterior surface as follows:

1. Red= Fire alarm
2. Yellow= standby power, emergency power
3. Blue= PA and clocks
4. Orange= Security

Acceptable coloring methods are paint bands on 4-foot centers or solid coloring.

F. All service equipment, switch gear, panel boards, switch boards, and MDP's shall be marked with the available fault current per the National Electrical Code (NEC).

26 26 00 Power Distribution Units

Part 1- General

1.01 Description

A. For facilities larger than 50,000 square feet, provide 277/480V, 3 pole, 4 Wire underground service. Underground service shall be buried in rigid conduit from property line to distribution point.

B. For facilities less than 50,000 square feet, provide 120/280V, 3 pole, 4 Wire underground service. Underground service shall be buried in rigid conduit from property line to distribution point.

C. Power monitoring equipment to be installed on each distribution system and interface with BAS.

D. Provide electrical receptacles in corridors at least every 30'. Each receptacle shall be on a dedicated 20-amp circuit.

E. Provide four (4) 30-amp L5-30 outlets on back wall behind each rack in each MDF / IDF room. Each should be clearly labeled as "Standby power" or otherwise.

F. All mechanical systems shall be supplied from mechanical panel boards.

G. Mechanical room panels to supply boiler and mechanical equipment only.

H. Kitchen panel boards shall supply kitchen equipment only.

I. Provide readily accessible shunt-trip button to shut off all equipment in Home Ec, Wood Shops, Auto Shops, and Welding rooms.

26 32 00 Packaged Generator Assemblies

Part 1- General

1.01 General Criteria

A. Standby generator to be designed installed and tested in compliance with NFPA 110. Standby generators to provide power to entire building.

B. The standby applications of the generator shall be based on the Emergency Shelter Part 4, 26 32 13 Part 4.

C. Provide self-contained emergency light in mechanical generator and electrical rooms. Make all self-contained Emergency Lights surface mount.

26 32 13 Engine Generators

Part 1- General

1.01 Standby Generators

A. Engine: Onan/Cummins Power Generation, MTU, or Caterpillar.

B. Provide appropriately sized gel cell batteries. Do not use wet cell batteries.

C. Standard cooling system (radiator type) freeze protected -60°F.

D. Residential type silencer with a minimum overall attenuation level of 60 dB (A).

E. All flexible fuel lines to be made of stainless steel jacketed.

F. Provide a full set of O&M and repair manuals to MSBSD.

Part 2- Products

2.01 Description of Systems

A. Provide a surface mounted 20-light LED type remote alarm annunciator panel with brushed stainless-steel finish and alarm horn. The remote annunciator shall provide all the

audible and visual alarms called for by NFPA Standard 110 for level 2 systems for the local generator control panel. Annunciator shall be labeled with the specified functions. Alarm silence and lamp test switches shall be provided. Alarm horn (when switched on) shall sound for the first fault, and all subsequent faults, regardless of whether first fault has been cleared, in compliance with NFPA 110 3-5.6.2. The interconnecting wiring between the annunciator and other system components shall be displayed on the annunciator panel. Provide alarm horn, and indicators and alarms as follows: LED lamps shall be replaceable and indicating lamp color shall be provided to allow future addition of other alarm and status functions to the annunciator. Alarm horn shall be switchable for all annunciation points.

Condition	**Lamp Color**	**Audible Alarm**
Genset Running	Green	No
Not in Auto	Red (Flashing)	Yes
High Battery Voltage	Red	Yes
Low Battery Voltage	Red	Yes
Charger AC Failure	Red	Yes
Fail to Start	Red	Yes
Low Engine Temperature	Amber	Yes
Pre-High Engine Temperature	Amber	Yes
High Engine Temperature	Red	Yes
Pre-Low Oil Pressure	Amber	Yes
Low Oil Pressure	Red	Yes
Overspeed	Red	Yes
Overcrank	Red	Yes
Emergency Stop	Red	Yes
Low Coolant Level	Amber	Yes
Low Fuel Level	Amber	Yes
Network OK	Green	Yes
4 (Spares)	Configurable	Configurable

Low battery voltage lamp shall also be lighted for low cranking voltage or weak battery alarm.

B. Provide alarm capabilities to show the phase loss from the utility as well as generator startup at the same time.
C. Provide raised access with rails to generators that have access above fuel belly tanks.

2.02 Typical Construction

A. Unit shall be complete packaged engine generator system in an arctic walk-in enclosure with belly tank large enough to run generator continuously for 96 hours.

B. Each unit will have a steel rail base mounted on Mason springs with snubbers. Each engine generator along with its base, springs, and snubbers shall be mounted on a housekeeping pad. Mounting arrangement shall permit removing oil pan without moving generation unit.

2.03 Generator

A. Generator Set Characteristics

1. Rating shall be as specified by MSBSD

2. The specified KW shall be for continuous electrical service for entire school during any length of interruption of the normal utility source.

B. Generator

1. The generator shall be a three-phase, 60 Hertz, single bearing, synchronous type with brushless exciter and be built to NEMA Standards.

2. A generator mounted volts-per-Hertz type regulator shall be provided to match the characteristics of the generator engine.

C. Generator Main Circuit Breaker

1. A generator mounted molded case main three pole circuit breaker with characteristics as recommended by generator manufacturer for proper generator protection shall be installed as a load interrupting and overcurrent protection device. It shall operate both manually for normal switching function and automatically during overload and short circuit conditions.

2.04 Engine

A. Liquid cooled, in line or V-type four-cycle compression ignition diesel and meet specifications when operating on low sulfur diesel fuel. Equip the engine with fuel filters, lube oil filters, intake air filters; lube oil coolers, jacket water heater, fuel transfer pump, fuel priming pump, coolant pump and glycol/water coolant in a ration designed for the lowest anticipated ambient temperature.

B. Provide Safety shut offs for high coolant temperature, low oil pressure, over-speed, engine over-crank and high lube oil temperature.

C. The engine may be turbo-charged to meet horsepower requirements at the specified power rating.

2.05 Cooling Equipment

A. Provide an engine-mounted radiator with blower type fan sized to maintain safe operation at 100°F maximum ambient temperature.

B. Each engine cooling system shall be filled with a solution of ethylene glycol and water. Anti-freeze shall be rated to -60°F.

2.06 Fuel System

A. Provide an engine-mounted fuel filter, fuel pressure gauge, and engine fuel priming pump.

B. Provide flexible stainless-steel fuel connections at engine and at tank.

C. Provide high level warning and alarm plus low-level warning and alarm reporting to BAS from each tank.

2.07 Exhaust Systems

A. Provide properly sized, critical area exhaust silencer including flexible exhaust fitting for remote mounting.

B. Mount silencer(s) so its weight is not supported by the engine. Exhaust pipe sizes shall be sufficient to maintain exhaust back pressure well within maximum limitations specified by the engine manufacturer.

2.08 Automatic Starting Systems

A. Unit shall incorporate a starting system with these characteristics.

1. Provide a 24-volt DC electric starting system with positive engagement drive.

B. Controls

1. Provide a fully automatic generator set start-stop controls in the generator control. Controls shall provide shutdown for low oil pressure, high coolant temperature, overspeed, overcrank, high lube oil temperature and contain auxiliary contacts for activating accessory items. Controls shall include a 45 second single cranking cycle limit with alarm and lockout and manual rest.

2. Provide a thermostatically controlled unit mounted thermal circulation type coolant heater to maintain engine jacket coolant to 90°F in an ambient temperature of 50°F, single phase, 60 Hertz, 120 volts. Provide a low temperature alarm from each unit reporting to the BAS anytime coolant temperature falls below 80°F.

3. Provide a 24-volt valve regulated lead acid gel cell type storage battery of the heavy-duty diesel starting type, of sufficient capacity to provide one and one half minutes total cranking time without recharging and rated no less than 380 cold cranking amperes. Provide battery racks, necessary cables, and clamps.

a. Wet cell batteries are unacceptable.

4. Provide a current limiting battery charger for unit to automatically recharge batteries. Include overload protection, silicon diode full-wave rectifiers, voltage surge suppressors, DC ammeter, a fused AC input. AC input voltage shall be the same as generator output voltage, Exception per MSBSD.

2.09 Walk-In Enclosure

A. Generator shall be in an insulated walk-in enclosure with day tank, insulated paneling, electric unit heater, structural supports, lighting, generator distribution panel, and associated accessories.

B. Provide code required working clearances as a minimum around generator and in front on generator distribution panel.

Part 3- Execution

3.01 Wiring and Connections

A. Provide all wiring in conduit.

B. Provide dry contacts to open outside air louver and turn on exhaust/air circulation fans, etc. when engine starts. The control shall be a function of this equipment or the equipment specified.

C. Connect neutral point of generator and generator frame to service ground (Per the NEC). Provide connection at units as recommended by generator manufacturer.

3.02 On Site Testing

A. Test and adjust units with automatic switchgear on site.

B. Provide load banks if required but perform a full rated load test for 8 continuous hours minimum. Should shutdown occur for any reason, correct reason for shutdown and re-start test. Continue testing until the 8 continuous running hours are achieved within normal operating parameters without shutdown. MSBSD Facilities department to be notified when the testing has started and ended.

C. Submit certified data of tests.

D. Test alarm and shut down circuits by simulating each condition for each unit which would result in shutdown and alarm. Include description of simulation technique in certification.

E. Submit recorded performance data for evaluation to MSBSD for approval before request review for substantial completion.

Part 4- Emergency Shelters

A. Schools shall be equipped with sufficient backup power to act as a shelter where necessary

B. The fire alarm and security panel shall be circuited to the emergency power panel.

C. Telephone equipment shall be circuited to the emergency power panel.

D. Provide fuel storage for at least 4 days (96 hours) of power plant operation.

E. The following areas shall be equipped to run on back-up power:

1. Power complete building for all power systems.

26 36 00 Transfer Switches

Part 1- General

1.01 General Requirements

A. Transfer Switch shall be Onan/Cummins Power Generation, MTU, or Caterpillar. Provide 1 transfer switch. Program transition to allow for motor load decay. Transfer switch shall have the following features:

1. Electronic digital exercise clock shall be programmable
2. Voltage sensor for all 3 phases, amperage, Hertz, etc.

26 50 00 Lighting

Part 1- General

1.01 Description

A. Coordinate lighting system design with MSBSD.

B. Provide simple but adequate light in crawl spaces, pipe chases, and utilidors. In these areas, an illuminated switch is required when lights are on. Provide guards on all lighting of this category. Lighting will be LED.

C. Require vandal protection for all exterior lighting less than 10 feet. Use LED fixtures for exterior lighting controlled by photocell with BAS programing. Flush mounted light fixtures are preferred. The photo eye for exterior lighting control shall be a digital input to BAS. Coordinate with the MSBSD Facilities Department on photocell mounting location.

D. The lighting systems shall be controlled by motion detectors in corridors and similar public spaces classrooms, offices, etc.

E. All fixtures to be day light harvesting.

F. Activation of security and fire alarm systems shall turn on all exterior lighting as well as all common area lighting.

G. Provide safety cable for all pendant mounted fixtures.

H. Provide wire guards for all fixtures and devices in gymnasiums and multipurpose activity rooms or use fixtures that are impact resistant.

Part 2- Products

2.01 Lighting Products

A. Keyed light switches shall be 20-amp, 120/277-volt specification grade by Leviton or MSBSD approved equal. All other switches shall be specification grade.

B. Stage lighting and dimming sets should be coordinated with MSBSD.

C. Panel boards, contactors, disconnects and other electrical equipment shall not be used as a junction box. (Per the NEC)

26 51 00 Indoor Lighting

Part 1- General

1.01 Lighting Requirements

A. LED lighting is preferred for all applications.

B. Spaces with interactive boards shall have an additional light switch capable of turning lights off that are adjacent to interactive boards for events such as audio/visual presentations. The switch shall also be located adjacent to the interactive board.

C. All wiring for lights shall be J-box to light wiring. No daisy chaining of lighting wiring.

D. The MSBSD will not accept light to light wiring or tandem wired fixtures. Prefabricated modular connectors for light wiring systems are not acceptable.

E. No lighting fixtures shall be installed over stairs, only over landings.

26 52 00 Emergency Lighting

Part 1- General

1.01 Requirements

A. For mechanical and electrical rooms do not use occupancy sensors or any other automatic control. For mechanical and electrical rooms put every fixture in the room on standby power and control with a local switch.

26 56 00 Exterior Lighting

Part 1- General

1.01 Design Criteria

A. Exterior lighting will be provided to illuminate School grounds in support of the safety and security.

B. Exterior lighting shall be installed at all exterior doors and vehicle gate to provide adequate safety and security lighting when locking up and leaving the facility after the exterior lighting is off due to the “black-out” policy. Custodial lighting will be on a dedicated lighting circuit.

C. Exterior display and area lights shall not be ground mounted.

D. Driven pile foundations with 3’ concrete collars for parking lot light poles.

E. Verify with MSBSD which site lights are to be turned on through a remote connection via mobile device.

F. Provide electrical circuit for each of the following areas: general parking, staff parking, bus loop, gate / loading dock and flagpole.

G. Provide separate automation points to incorporate separate zones for the following areas:
    1. Custodial and building lights
    2. General parking
    3. Staff parking
    4. Bus loop/drop off area
    5. Athletic Fields
H. All lighting to be LED
I. Dock lights should illuminate dock and egress route to parking. Do not tie loading dock lights to the parking lot lights. Dock lights shall be motion activated.
J. No underground splices shall be allowed for site distribution, lighting, etc.
K. Use of subsurface lights is not allowed
L. Limit use of architectural lighting to utilitarian requirements.
M. Fixtures to meet or exceed IES BUG ratings
N. Fixtures to carry at least 10-year warranty on components and finish.
O. Poles to meet or exceed 120mph wind rating
P. Light flagpole to prevailing wind
Q. Face lighting controls photocell to the East. Coordinate with MSBSD for final location.
R. Install exterior lighting override switch in the main office in a locked cabinet. MSBSD will determine which circuits will be on override switches.

26 56 16 Parking Lighting

Part 1- General

1.01 Summary

A. Illuminate roads, driveways, and entries/exits for safe movement of vehicular traffic
B. Facilitates the use of lighting for IP Security Camera
C. All light poles to have a type 1A pull box at each pole.
D. Do not pull conductors into conduit until the junction boxes are set to grade, crushed rock sumps are installed, and metallic conduit is bonded.
E. No splices to occur in the underground pull boxes. All connections to be terminated in the light poles.
F. Excavating and back fill. Do not excavate wider than necessary for proper installation of conduits, junction boxes, and foundations. Do not perform excavation until immediately before installing conduit and other appurtenances.

a. Excavate trenches to a depth six (6) inches below the bottom of the conduit. Embed conduit between six (6) inches of sand.

G. Salvaging and Reusing Electrical Equipment. If requested by MSBSD, salvage and deliver existing electrical equipment, including luminaires, lighting standards, and mast arms to the MSBSD Facilities yard on E. Bogard road.

a. Remove and salvage electrical equipment without damage. Replace at contractors' expense any of the above-mentioned electrical equipment that has been damaged or destroyed by contractor operation.

b. Underground conduit, conductors, foundations, and junction boxes not reused become contractor property and must be removed off site.

H. Field Test. Before acceptance of the work, perform the following test on all electrical systems under this section, in the presence of the Engineer and/or a MSBSD Facilities Department Representative. The MSBSD reserves the right to retest, and the test results will govern the acceptance, or rejection, of the installation. Replace or repair, at contractor expense, and in an approved manner, any faults in material or any part of the installation revealed by these tests. Repeat the same test until no faults appear.

a. Grounds. Test the grounds of each circuit by physically examining the installation to ensure that all required grounding bushings, bonding jumpers, and ground rods have been installed and are mechanically secure.

b. Insulation Resistance Test. Perform a megohm test on each circuit, between circuits and a ground. Ensure the insulation resistance is not less than 100 megohm or the minimum specified by the manufacture, measured at 500 volts DC. Disconnect all lamps prior to the test. Document these tests in writing, for each circuit, and submit to the engineer prior to acceptance of the system.

c. Perform a functional test for each lighting system until the systems burn continuously five (5) days without the photocell, followed by a five (5) day operational test using the photocell.

(i) A shut down of the electrical system due to power interruption does not constitute discontinuity of the functional test if the system is functional when the power is returned.

Part 2- Pile Foundations.

1.01 Summary

A. Install pipe piles open-ended and to a minimum depth of fifteen (15) feet or refusal (less top projection).
B. Use CJP groove welds for all circumferential welds.
C. Inspect 100 percent of CJP welds using UT or RT.

D. Backfill and compact the work hole around the upper portion of each pile in eight (8) inch lifts with a soil-cement mixture. (minimum of 3 sacks of cement per cubic yard of soil).

Part 3- Conduits.

1.01 Summary

A. Run electrical conductors in conduit, except for wiring in the poles, and when otherwise specified.
    1. Galvanized rigid conduit must be installed between the pull box and into the pole base.
    2. Where nonmetallic conduit is to be installed, use a galvanized rigid conduit to run from the interior of the facility at least twenty (20) feet past the foundation of the building.
    3. If conduit and fittings to be installed, are exposed to sunlight on the surface of poles, or in structures and foundations, use galvanized rigid conduit.
    4. Thread and ream the ends of all conduits, whether shop or field cut, to remove burrs and rough edges. Make cuts square and true so that the ends butt together for the full circumference. Do not use slip joint or running threads for coupling conduit. When a standard coupling cannot be used for coupling metal type conduit, use an approved threaded union coupling. Where the coating on ferrous metal conduit has been damaged, paint such damaged places with rust preventative paint.
    5. Until wiring is started, cap all conduit ends with standard pipe caps or approved plug and coupling combinations. When caps are removed, provide the threaded ends with approved conduit grounding bushings.
    6. Bury conduit at least 24 inches below the finished grade. However, under paved areas behind a curb, bury the conduit at least 18 inches below the top back of curb or abutting pavement, whichever is lower.
    7. Keep the bottom of trenches for non-metallic conduit relatively free of sharp irregularities that would cause pinching and excessive bending of the conduit.
    8. Terminate the conduit entering the bottom of concrete pull boxes with a 90-degree sweep inside the box wall. Terminate conduit openings not less than 5 inches above the bottom of all boxes a minimum of 6 inches below the top of the Type IA boxes. Extend

conduits entering through the pull box wall a minimum of 2 inches beyond the inside box wall, and ensure it is a minimum of 6 inches above the bottom of the box.

9. At low points in all conduit runs, install a drain and sump containing approximately 2 ft3 of coarse concrete aggregate material. Compact aggregate used for sump as directed to prevent settlement of foundations, junction boxes, or adjacent improvements. The drains must be a 3/8-inch hole drilled in the bottom of the lower straight section of the sweep elbow. Prevent scraping of conductors by deburring drilled drain holes in conduit. Wrap the exterior of the hole with approved filter cloth material and secure it as directed or approved by the Engineer.
10. Provide conduits for future use with grounding bushings, bonded to ground, and capped with an approved plastic insert type plug. Install a polypropylene pull rope with 200-pound minimum tensile strength in all conduits that are to receive future conductors. Double back at least 2 feet of pull rope into the conduits at each end.
11. Mark all underground conduit with a continuous strip of polyethylene marker tape that is 4 mils thick and 6 inches wide. Minimum of 1’ above conduit.
12. Where new pull boxes are placed in existing rigid metal conduit runs, fit the conduit with bushings and bond them.
13. Clean existing underground conduit to be reused in the new system before pulling in the new cables, as follows:
    a) Conduits larger than 2” may be re-used.
    b) Conduits with reused conductors. Wherever the Plans show reusing existing conduits that contain in service cables, clean them using compressed air. Existing cables that will be reused may be left in the conduits while you clean them.
    c) Conduits with no reused conductors. Ream with a mandrel or cylindrical wire brush and blow out with compressed air.
    d) Use a heavy-duty air compressor that delivers at least 125 cubic feet per minute of air at 110 psi.
14. Use conduit of larger size than shown on the plans, when desired. If used, it must be for the entire length of the run from pull box to pull box. Reducing couplings and / or bushings are not allowed.
15. When extending existing conduits or installing pull boxes in existing conduit runs, extend the conduit into the proposed pull box

or foundation using drains, elbows, and bonding as required for new installations. When adjusting pull boxes, shorten or lengthen existing conduits to meet clearance requirements. Complete extensions and modifications to existing conduits using the same size and types of materials

16. Cut off abandoned conduits flush with the inside wall or bottom of pull boxes.

Part 4- Junction Boxes.

1.01 Summary

A. Furnish pre-cast reinforced concrete junction boxes of the sizes and details shown on the plans. Use cast iron lids. Emboss the word LIGHTING on the lids of all junction boxes.

B. Install junction boxes at the approximate locations shown on the Plans or when a location is not specific, locate the junction boxes as directed. You may, at your expense, install additional junction boxes to facilitate the work. Locate junction boxes so they are not in the roadway, sidewalk, or pathway surfaces. Where practical, place junction boxes shown in the vicinity of curbs adjacent to the back of curb with their long dimension parallel to the curb. Do not locate junction boxes in drainage collection areas.

C. Effectively ground the covers of all junction boxes with metal covers. Use a 3-foot tinned copper braid for Type IA Junction Boxes.

D. Bed the entire bottom of all junction boxes on coarse concrete aggregate material of a minimum depth of 18 inches.

E. Place the top of junction boxes flush with the sidewalk grade or top of adjacent curb. When located in an unpaved section adjacent to a paved shoulder, locate the junction box 1 inch below the finished grade. Install flush with the surface in paved areas. Adjust as directed the junction boxes located in areas requiring grading. Adjust junction boxes located in seeded areas to 1 inch below the surface.

F. Locate junction boxes immediately adjacent to the pole or fixture they serve.

Part 5- Wiring.

1.01 Summary

A. Pull conductors into conduit only after junction boxes are set to grade, crushed rock sumps are installed, grout is placed around the conduit, and grounding bushings have been installed on all conduits.
    1. Pull conductors by hand or by approved commercially built cable-pulling equipment that is specially designed for that purpose. Do not pull cable by any other means. Equip the cable pulling device with a force limiting circuit and force gauge.
    2. Use wire-pulling lubricant when placing the cables and conductors in conduit. Do not allow the tension of the wire or cable to exceed the manufacturers recommend allowable tension for the conductor or cable.
    3. When adding new conductors to a conduit with existing conductors, remove all conductors and clean the conduit with a mandrel or brush. Pull both old and new conductors through as a unit. In a new installation, pull all conductors through the conduit as a unit.
    4. Neatly leave at least 3 feet of slack illumination conductor or cable curled up in the bottom of each junction box.
    5. Route highway illumination cable through each lighting pole designated for connection to that cable's circuit. Do not splice illumination cable between a load center and a pole or between poles. Join the individual conductors by using non-insulated, overlap type pressure connectors. Insulate with mastic-lined heat shrink tubing or 2 layers of one-half lapped UL listed electrical tape. Do not use wire binding screws, studs, or nuts. Stagger splices to minimize the overall diameter.
    6. Permanently identify all cables and wire conductors by labeling all pole bases and in junction boxes adjacent to lighting poles. When modifying an existing system, label all new and existing lighting cables/conductors with circuit numbers at locations noted above.
        a. Use cable tags made of nylon reinforced vinyl impervious to the elements and which will not tear. Provide tags with a 4 inch by 1-3/4-inch minimum size that attach flag style at one corner to a single strap. Red tags for labeling lighting cables.
    7. Wire luminaires using No. 10 AWG illumination tap conductors that run from the fused disconnect kit in the pole base.
        a. Install a fused splice connector between the line and luminaire ballast tap conductors in the base of every pole equipped with a luminaire.
        b. Attach the conductors to the connector halves with setscrew type pressure connectors. Provide the plug and socket

assembly so that the fuse remains in the load side plug without exposing live metal parts when the connector separates, and the coil springs are not included in the current carrying circuit.

c. Make the fused connectors readily accessible from the hand hole. Install tap conductors to prevent slack when their ends touch the top of the foundation.

Part 6- Bonding and Grounding.

1.01 Summary

A. Make the following mechanically and electrically secure: metallic cable sheaths, metal conduit, non-metallic conduit grounding wire, ballast and transformer cases, service equipment, metal poles, and pedestals. These items must form a continuous system and be grounded.
B. Ground metal conduit, service equipment, and neutral conductor at service point as required by the Code and the serving utility, except that grounding electrode conductor must be No. 6 AWG, or equal. When installing conduit as a spare for future use, you may omit the grounding conductor.
C. Furnish threaded-type grounding bushings made of malleable iron or steel with a zinc or galvanized finish. Use bushings with an insulated throat, a tin-plated copper saddle for attaching the grounding conductors, and stainless-steel set screws.
D. Retrofit all existing spare conduits that will contain new cables exclusively with new grounding bushings. Whenever you reuse an existing conduit that contains no ground conductor, install a bare size 8 AWG copper wire as the ground conductor. Where conduits are installed for future conductors, the above-mentioned copper wire may be omitted.
E. Install a bare copper conductor in all conduit as the grounding conductor. Attach grounding conductors to each end of the metal conduit using insulated throat grounding bushings. Leave 12 inches of slack between each grounding bushing. Allow clearance for bushings when installing conduits in foundations.

Part 7- Luminaires

1.01 Summary

A. Furnish luminaires that:

B. Are LED with a rated life of 100,000 hours based on 10 hours per start. And have a ten-year life.

C. Include a terminal block for terminating the illumination tap conductors c. Feature an easily removed hinged door or tray used exclusively for mounting the ballast

D. Provide the illumination levels and uniformity specified (or better) in the arrangements listed on the Plans when calculated according to the American National Standard Practice for Roadway Lighting, A.N.S.I./I.E.S RP-8, dated 1983

E. Feature a wire way meeting NEC requirement for installing three size 10 AWG conductors with type XHHW-2 insulation between the pole and a terminal block located in the luminaire

F. Furnish the Engineer with manufacturer's current electronic photometric data in Illuminating Engineering Society (I.E.S.) format to verify illumination levels and uniformity ratios.

G. Manufacture all parts of the luminaire from corrosion-resistant materials

H. Submit the manufacturer's luminaire specifications and photometric data for approval

26 56 33 Walkway Lighting

Part 1- General

1.01 Summary

A. Illuminate sidewalks, pathways and entries/exits for safe movement of pedestrian traffic

B. Avoid the use of ground mounted fixtures

I. All light poles to have a type 1A pull box at each pole.

J. Do not pull conductors into conduit until the junction boxes are set to grade, crushed rock sumps are installed, and metallic conduit is bonded.

K. No splices to occur in the underground junction boxes. All connections to be terminated in the light poles.

L. Excavating and back fill. Do not excavate wider than necessary for proper installation of conduits, junction boxes, and foundations. Do not perform excavation until immediately before installing conduit and other appurtenances.

a. Excavate trenches to a depth six (6) inches below the bottom of the conduit. Embed conduit between two six (6) inch lifts of material that are free of rocks exceeding one (1) inch maximum dimensions.

M. Salvaging and Reusing Electrical Equipment. Salvage and deliver existing electrical equipment, including luminaires, lighting standards, and mast arms to the MSBSD Facilities yard on E. Bogard road.

a. Remove and salvage electrical equipment without damage. Replace at your own expense any of the above-mentioned electrical equipment that has been damaged or destroyed by your operation.

b. Underground conduit, conductors, foundations, and junction boxes not reused become your property and must be removed.

N. Field Test. Before acceptance of the work, perform the following test on all electrical systems under this section, in the presence of the Engineer and/or a MSBSD Facilities Department Representative. The Department reserves the right to retest, and the test results will govern the acceptance, or rejection, of the installation. Replace or repair, at your expense, and in an approved manner, any faults in material or any part of the installation revealed by these tests. Repeat the same test until no faults appear.

a. Continuity test each circuit for continuity.

b. Grounds. Test the grounds of each circuit by physically examining the installation to ensure that all required grounding bushings, bonding jumpers, and ground rods have been installed and are mechanically firm.

c. Insulation Resistance Test. Perform a megohm test on each circuit, between circuits and a ground. Ensure the insulation resistance is not less than 100 megohm or the minimum specified by the manufacture, measured at 500 volts DC. Disconnect all lamps prior to the test. Document these tests in writing, for each circuit, and submit to the engineer prior to acceptance of the system.

d. Perform a functional test for each lighting system until the systems burn continuously five (5) days without the photocell, followed by a five (5) day operational test using the photocell.

(i) A shut down of the electrical system due to power interruption does not constitute discontinuity of the functional test if the system is functional when the power is returned.

Part 2- Pile Foundations.

1.01 Summary

E. Install pipe piles open-ended and to a minimum depth of fifteen (15) feet (less top projection).
F. Use CJP groove welds for all circumferential welds.
G. Inspect 100 percent of CJP welds using UT or RT.

H. Backfill and compact the work hole around the upper portion of each pile in eight (8) inch lifts with a soil-cement mixture. (minimum of 3 sacks of cement per cubic yard of soil).

Part 3- Conduits.

1.01 Summary

G. Run electrical conductors in conduit, except for wiring in the poles, and when otherwise specified.
    1. Galvanized rigid conduit must be installed between the junction box and into the pole base.
    2. Where nonmetallic conduit is to be installed, use a galvanized rigid conduit to run from the interior of the facility at least twenty (20) feet past the foundation of the building.
    3. If conduit and fittings to be installed, are exposed to sunlight on the surface of poles, or in structures and foundations, use galvanized rigid conduit.
    4. Thread and ream the ends of all conduits, whether shop or field cut, to remove burrs and rough edges. Make cuts square and true so that the ends butt together for the full circumference. Do not use slip joint or running threads for coupling conduit. When a standard coupling cannot be used for coupling metal type conduit, use an approved threaded union coupling. Where the coating on ferrous metal conduit has been damaged, paint such damaged places with rust preventative paint.
    5. Until wiring is started, cap all conduit ends with standard pipe caps or approved plug and coupling combinations. When caps are removed, provide the threaded ends with approved conduit grounding bushings.
    6. Bury conduit at least 30 inches below the finished grade. However, under paved areas behind a curb, bury the conduit at least 18 inches below the top back of curb or abutting pavement, whichever is lower.
    7. Keep the bottom of trenches for non-metallic conduit relatively free of sharp irregularities that would cause pinching and excessive bending of the conduit.
    8. Ensure that the first 6 inches of backfill is free of rocks exceeding one (1) inch maximum dimension.
    9. Terminate the conduit entering the bottom of concrete junction boxes with a 90-degree sweep inside the box wall. Terminate

conduit openings not less than 5 inches above the bottom of all boxes a minimum of 6 inches below the top of the Type IA boxes. Extend conduits entering through the junction box wall a minimum of 2 inches beyond the inside box wall, and ensure it is a minimum of 6 inches above the bottom of the box.

10. At low points in all conduit runs, install a drain and sump containing approximately 2 ft3 of coarse concrete aggregate material. Compact aggregate used for sump as directed to prevent settlement of foundations, junction boxes, or adjacent improvements. The drains must be a 3/8-inch hole drilled in the bottom of the lower straight section of the sweep elbow. Prevent scraping of conductors by deburring drilled drain holes in conduit. Wrap the exterior of the hole with approved filter cloth material and secure it as directed or approved by the Engineer.
11. Provide conduits for future use with grounding bushings, bonded to ground, and capped with an approved plastic insert type plug. Install a polypropylene pull rope with 200-pound minimum tensile strength in all conduits that are to receive future conductors. Double back at least 2 feet of pull rope into the conduits at each end.
12. Mark all underground conduit with a continuous strip of polyethylene marker tape that is 4 mils thick and 6 inches wide.
13. Where new junction boxes are placed in existing rigid metal conduit runs, fit the conduit with threaded bushings and bond them.
14. Clean existing underground conduit to be reused in the new system before pulling in the new cables, as follows:
    a) Conduits with reused conductors. Wherever the Plans show reusing existing conduits that contain in service cables, clean them using compressed air. Existing cables that will be reused may be left in the conduits while you clean them.
    b) Conduits with no reused conductors. Ream with a mandrel or cylindrical wire brush and blow out with compressed air.
    c) Use a heavy-duty air compressor that delivers at least 125 cubic feet per minute of air at 110 psi.
15. Use conduit of larger size than shown on the Plans, when desired. If used, it must be for the entire length of the run from junction box to junction box. Reducing couplings are not allowed.

16. When extending existing conduits or installing junction boxes in existing conduit runs, extend the conduit into the proposed junction box or foundation using drains, elbows, and bonding as required for new installations. When adjusting junction boxes, shorten or lengthen existing conduits to meet clearance requirements. Complete extensions and modifications to existing conduits using the same size and types of materials
17. Cut off abandoned conduits flush with the inside wall or bottom of junction boxes.

Part 4- Junction Boxes.

1.01 Summary

A. Furnish pre-cast reinforced concrete junction boxes of the sizes and details shown on the plans. Use cast iron lids. Emboss the word LIGHTING on the lids of all junction boxes.

H. Install junction boxes at the approximate locations shown on the Plans or when a location is not specific, locate the junction boxes as directed. You may, at your expense, install additional junction boxes to facilitate the work. Locate junction boxes so they are not in the roadway, sidewalk, or pathway surfaces. Where practical, place junction boxes shown in the vicinity of curbs adjacent to the back of curb with their long dimension parallel to the curb. Do not locate junction boxes in drainage collection areas.

I. Effectively ground the covers of all junction boxes with metal covers. Use a 3-foot tinned copper braid for Type IA Junction Boxes.

J. Bed the entire bottom of all junction boxes on coarse concrete aggregate material of a minimum depth of 18 inches.

K. Place the top of junction boxes flush with the sidewalk grade or top of adjacent curb. When located in an unpaved section adjacent to a paved shoulder, locate the junction box 1 inch below the finished grade. Install flush with the surface in paved areas. Adjust as directed the junction boxes located in areas requiring grading. Adjust junction boxes located in seeded areas to 2 inches below the surface.

L. Locate junction boxes immediately adjacent to the pole or fixture they serve.

Part 5- Wiring.

1.01 Summary

B. Pull conductors into conduit only after junction boxes are set to grade, crushed rock sumps are installed, grout is placed around the conduit, and grounding bushings have been installed on all conduits.

8. Pull conductors by hand or by approved commercially built cable-pulling equipment that is specially designed for that purpose. Do not pull cable by any other means. Equip the cable pulling device with a force limiting circuit and force gauge.
9. Use wire-pulling lubricant when placing the cables and conductors in conduit. Do not allow the tension of the wire or cable to exceed the manufacturers recommend allowable tension for the conductor or cable.
10. When adding new conductors to a conduit with existing conductors, remove all conductors and clean the conduit with a mandrel or brush. Pull both old and new conductors through as a unit. In a new installation, pull all conductors through the conduit as a unit.
11. Neatly leave at least 3 feet of slack illumination conductor or cable curled up in the bottom of each junction box.
12. Route highway illumination cable through each lighting pole designated for connection to that cable's circuit. Do not splice illumination cable between a load center and a pole or between poles. Join the individual conductors by using non-insulated, overlap type pressure connectors. Insulate with mastic-lined heat shrink tubing or 2 layers of one-half lapped UL listed electrical tape. Do not use wire binding screws, studs, or nuts. Stagger splices to minimize the overall diameter.
13. Permanently identify all cables and wire conductors by labeling all pole bases and in junction boxes adjacent to lighting poles. When modifying an existing system, label all new and existing lighting cables/conductors with circuit numbers at locations noted above.
    a. Use cable tags made of nylon reinforced vinyl impervious to the elements and which will not tear. Provide tags with a 4 inch by 1-3/4-inch minimum size that attach flag style at one corner to a single strap. Red tags for labeling lighting cables.
14. Wire luminaires using No. 10 AWG illumination tap conductors that run from the fused disconnect kit in the pole base.
    a. Install a fused splice connector between the line and luminaire ballast tap conductors in the base of every pole equipped with a luminaire.

b. Attach the conductors to the connector halves with setscrew type pressure connectors. Provide the plug and socket assembly so that the fuse remains in the load side plug without exposing live metal parts when the connector separates, and the coil springs are not included in the current carrying circuit.
c. Make the fused connectors readily accessible from the hand hole. Install tap conductors to prevent slack when their ends touch the top of the foundation.

Part 6- Bonding and Grounding.

1.01 Summary

F. Make the following mechanically and electrically secure: metallic cable sheaths, metal conduit, non-metallic conduit grounding wire, ballast and transformer cases, service equipment, metal poles, and pedestals. These items must form a continuous system and be grounded.
G. Ground metal conduit, service equipment, and neutral conductor at service point as required by the Code and the serving utility, except that grounding electrode conductor must be No. 6 AWG, or equal. Use copper wire or copper braid bonding and grounding jumpers of the same cross-sectional area as No. 8 AWG for all other systems. When installing conduit as a spare for future use, you may omit the grounding conductor.
H. Furnish threaded-type grounding bushings made of malleable iron or steel with a zinc or galvanized finish. Use bushings with an insulated throat, a tin-plated copper saddle for attaching the grounding conductors, and stainless-steel set screws.
I. Retrofit all existing spare conduits that will contain new cables exclusively with new grounding bushings. Whenever you reuse an existing conduit that contains no ground conductor, install a bare size 8 AWG copper wire as the ground conductor. Where conduits are installed for future conductors, the above-mentioned copper wire may be omitted.
J. Install a bare copper conductor in all conduit as the grounding conductor. Attach grounding conductors to each end of the metal conduit using insulated throat grounding bushings. Leave 12 inches of slack between each grounding bushing. Allow clearance for bushings when installing conduits in foundations.

Part 7- Luminaires

1.01 Summary

I. Furnish luminaires that:

J. Are LED with a rated life of 100,000 hours based on 10 hours per start, and a ten-year life.

K. Include a terminal block for terminating the illumination tap conductors c. Feature an easily removed hinged door or tray used exclusively for mounting the ballast

L. Provide the illumination levels and uniformity specified (or better) in the arrangements listed on the Plans when calculated according to the American National Standard Practice for Roadway Lighting, A.N.S.I./I.E.S RP-8, dated 1983

M. Feature a wire way meeting NEC requirement for installing three size 10 AWG conductors with type XHHW-2 insulation between the pole and a terminal block located in the luminaire

N. Furnish the Engineer with manufacturer's current electronic photometric data in Illuminating Engineering Society (I.E.S.) format to verify illumination levels and uniformity ratios.

O. Manufacture all parts of the luminaire from corrosion-resistant materials

P. Submit the manufacturer's luminaire specifications and photometric data for approval

Division 27- Communications

27 00 00 Communications

Part 1- General

1.01 Description

A. All work shall be to current code and inspected by State of Alaska Electrical Inspector.

B. Provide appropriate audio/video connections from interactive white board to staff workstation location in accordance with appendix IT-008.

C. Provide conduit with labeled pull wires installed for future installation of cables for video security systems and computer networking. Provide cable trap when directed by MSBSD. Provide spare conduits for future relocatable classrooms.

D. Major assembly areas (gymnasium and commons in elementary schools) shall have built in sound reinforcement system to include microphone mixer with knobs for channel volumes plus master volume, and adequate speakers with a 200 watt, 2-channel power amp. Microphone jacks will be provided at convenient locations. Include CD player and

Behringer DSP 1124P Feedback Destroyer or equivalent. Provide wheeled portable rack with microphone mixer, CD, and power amplifier with portable speakers. Audio system must be tied to intercom system. All audio equipment must be serviceable by the AV department without factory training. Provide USB port to import media from other sources.

E. Provide Network Infrastructure installed as follows:

1. Provide MDF and IDF(s) when appropriate. The MDF must be sized to accommodate all systems phones, alarms, security, and access control. Provisions for a workbench area must also be provided adjacent to the MDF/IDF room with corridor access. Consult with MSBSD for most efficient placement and configurations.
2. Define and label these rooms as IT closets MDF, IDF and IT Support vs. storage or records.
3. Provide minimum 4 network surface-mounted data cables per classroom or 4-8 drops per office in conduit with homerun to IDF or MDF (based upon function of room). Wall jacks shall be in the academic spaces by the Architect and clearly labeled. All hardware shall meet the current MSBSD specifications in appendix IT-003. All drop locations are subject to review and approval by MSBSD.
4. No powered Network equipment will be installed above ceiling. Power over Ethernet allowed where appropriate.
5. All network switches shall be installed in the MDF / IDF all horizontal cable runs will be home runs from end station to patch panel.
6. Fiber interconnects between MDF and IDFs must be a minimum of 12-pair Changes to be approved by MSBSD IT. Refer to Appendix IT-004 for current fiber optic cabling specifications.
7. Switch-to-field wiring will be via modular jack field High density patch panel. Jack field will be clearly and permanently marked in accordance with MSBSD horizontal cabling labeling standards appendix (IT-001). Patch cables will be of the same specification as horizontal cabling described in Appendix IT-003.
8. All proposed connections including portables and other out-buildings must meet current standards including distances to MDF or IDF.
9. Air conditioning required in all MDF/IDF rooms, preferably mounted overhead, but not directly over equipment rack(s). Provide separate power circuit for air conditioning equipment.
10. Ceiling terminated Ethernet jacks to be determined by MSBSD for wireless access point locations.
11. All deviations and substitutions will need prior approval from the MSBSD.
12. In all MDF’s and IDF’s provide patch panels in accordance with MSBSD network infrastructure standards Appendix IT-002.

13. Horizontal cable coloring for systems will follow the standards set forth in the horizontal cable standards, Appendix IT-001.

14. Functionality throughout the building including mechanical, office, common areas, and instructional spaces of wireless connectivity must be considered in the design of the facility.

F. Provide surge protected power receptacles at intercom/phone/computer backboard. Power to be supplied from emergency power system and regular power. Provide UPS for intercom, phone system and Lenel security panels. UPS must meet IT specifications. Specifications will be updated as necessary by MSBSD. Refer to appendix IT-005.

G. Provide for Video Security System. Verify with Owner current MSBSD standards for security camera equipment. Refer to appendices IT-009. IT-010, IT-011, IT-012, IT-013, IT-014, IT-015.

H. Provide for Video Security System or Surveillance. Verify with MSBSD current standards for proprietary surveillance camera equipment.

I. The MDF shall have 2 minimum L5-30 electrical outlets for UPS's for Security camera system, routers and identified switches on generator power.

J. The rapid evolution of technology and equipment requires all equipment and designs for security, communication, surveillance, and computer systems be reviewed and approved by MSBSD.

K. Network redline drawings shall be posted on Architectural E size (36" x 48") paper for each MDF, and IDF in their respective locations placed behind Plexiglas for reference purposes.

1.02 Access

A. Access for operation, maintenance, repair or replacement of any equipment or item is very important. Mechanical access will be off common areas. The words access as used in this standard should allow someone to be able to operate, maintain, repair, or replace such equipment or item without disassembly or damage to the surrounding installation.

B. The degree of access, or accessibility, will depend upon the importance, complexity, size and weight of the equipment or item. As an example, a branch circuit junction box, being a single item accessed infrequently or never after the initial installation, would require a lower degree of access than a system control panel requiring maintenance or possible removal for repair or replacement.

C. MDF/IDF - Racks within MDFs and IDFs will require 4'0" on all navigable sides. Consult with MSBSD for placement and configuration of racks and types. Both four (4) post and two (2) post racks are used. Also note vertical cable management and make necessary space accommodations for Category 6A cable.

D. MDF location will be ground level. IDFs will be located as necessary to accommodate proper horizontal cabling length standards.

Part 2- Products

2.01 Communication Products

A. Master-clock with slave-clocks and solid-state bell program system by Rauland Telecenter ICS-2 or MSBSD approved equal. A Rauland ICS-2 intercom system will be used as a master clock controller for all digital and analog secondary clocks. All clock power supplies will be Rauland 2416 and will be mounted next to the intercom system, within five (5) feet of the floor.

B. Voice enhancement system standards are set forth in appendix IT-016.

C. Coordinate with MSBSD to verify whether switched hubs are in construction package or provided separately as technology or equipment purchases.

D. To ensure educational price savings are applied, contractor(s) must coordinate with MSBSD to compare costs prior to purchase of voice enhancement system through MSBSD vendor(s) pricing arrangements to ensure best possible savings.

E. Coordinate with MSBSD to verify whether voice enhancement systems (four speakers, receiver, pendant microphone, wiring, mounting shelf for receiver) are in construction package or provided separately as technology or equipment purchases. Must meet MSBSD specifications. Specifications will be updated, as necessary. The current MSBSD specification is the Promethean ActivSound.

F. MSBSD standard fiber specs refer to appendix IT-004.

G. MSBSD standard and quantity for racks

1. Must work with MSBSD to determine type, quantity, and layout of equipment racks in MDF/IDF.
2. Four (4) Rack Units of space should be reserved at the top in each rack for MSBSD owned equipment.
3. All racks in the room should be labeled with a laminated sign stating, “Reserved for School Equipment”.
4. Rack A is reserved for phone, intercom, television, and horizontal cabling. Adequate cable management should be available for all equipment.
5. Rack B is reserved for horizontal cabling, fiber backbone, wireless, switches and if designed in construction documents space is provided for CAT6a backbone. POE Switch and separate patch panel with cable management unit is allowed in this rack with the server positioned on a table near to the rack.
6. Rack C is reserved for horizontal cabling and MSBSD servers. Servers should have a shelf to support a monitor and keyboard.
7. Rack D should have one spare rack dedicated to MSBSD supplied equipment.
8. For every 48 port (keystone style) patch panel and coordinating 2RU cable management panel there should be 2RU space available for MSBSD installed switches.

9. MSBSD standard for interconnects between MDF and IDF

    a. Fiber interconnects terminated and marked to all IDFs.

    b. 12-strand 50 micron multimode aqua. Distances not to exceed distance requirements for 10-gig fiber, 50 microns.

H. MSBSD standard for interconnects between MDF and IDF:

1. Fiber interconnects terminated and marked to all IDFs.

2. Utilizing 24-strand in accordance with current specifications.

3. Distances not to exceed distance requirements for current specified standards in appendix IT-004.

I. Four each 30-amp L5-30 power on back wall behind racks. Connect all to emergency power generator. Each should be clearly labeled as “E power” or otherwise.

J. Two UPS (one with battery pack and temperature and environmental probes) L5-30 connectors.

K. For MSBSD standard for UPS refer to appendix IT-005.

L. MSBSD provided equipment switching equipment, router, and any proprietary network equipment associated.

M. Contractor provided equipment shall be all Fiber and Copper patch cables in accordance with current MSBSD Standards. Consult with MSBSD for quantities, lengths, and color standards. Refer to appendix IT-001, IT-003, IT-004.

N. Verify with MSBSD for any updates or changes to equipment. Specifications will be approved by MSBSD. See appendices IT-009. IT-010, IT-011, IT-012, IT-013, IT-014, IT-015 Refer to appendix spec sheet.

2.02 Projection Screens

A. Contractor will provide large ceiling mounted projection screen (grey or matte white) on stage in MPR or equivalent room. Verify specific criteria with MSBSD for individual projects.

B. Coordinate requirements for smaller specialty screens with MSBSD.

C. Projection screens will not be provided in individual classrooms.

D. Rear-Projection Screens

1. Manually operated projection screens should be Manufacturer’s standard spring-roller-operated units, consisting of case, screen, mounting accessories, and other components necessary for a complete installation.

    a. Fully recessed unit.

    b. Units should have stainless-steel tensioning cables on both sides of screen connected to edges of screen by tabs to pull screen flat horizontally.

2. Flexible rear screen stage should be equal to Da Lite “Tension Advantage Electrol” electric motorized projection screen and Draper “Access/ Series V” electric motorized projection screen.
3. Fully recessed metal encased, manually operated screens should be designed and fabricated for surface mounting in ceiling. Provide bottom closure panel suitable for mounting in Gypsum Board ceiling or suspended acoustical ceiling panel system
4. Screen material and viewing surface should be neutral density grey viewing surface.
5. Screen should be electrically operated, UL and ULC listed, retractable, with one (1) rigid metal roller and tab guide cable screen tensioning system.
6. The motor shall be housed inside metal roller and include automatic thermal overload protection, integral gears, capacitor, and electric brake to prevent coasting.
    a. 3-wire ground with quick connect male plug-in connector, permanently lubricated, quick reversal type designed for mounting inside roller.
    b. 115 V, 60 Hz
    c. 2.4 amps maximum
    d. Must include preset, adjustable limit switches to automatically stop viewing surface in Up and Down position.
    e. Wall mounted switch.
    f. Three (3) position switches with cover plate for Up, Down and Stop functions
    g. No handheld wireless remotes.
    h. Junction box should be internally attached to screen case
    i. The core of the Key switch shall be keyed to match building system
7. Screen mounting shall be ceiling recessed and plenum rated type
8. Include mounting hardware
9. Metal screen case should be designed to receive mounting hardware and sized to suit projection screen
    a. Type 1, extruded aluminum with heavy gage steel end caps and adjustable steel brackets
    b. Case bottom should be self-trimming with built-in flange and equipped with concealed hinge aluminum door for manual access.
10. Screen size should be H 100 inches x W 160 inches.

Part 3- Installation

3.01 Communication Installation

A. Provide two (2) ea. 4” conduits from telecom hand hole to MDF demarcation point, provide 4” conduit between MDF and IDF locations with an additional 4” conduit for later expansion.

B. Buildings are wired in star topology to MDF/IDF(s) and must meet current cable standards. All Network wires are home-run to MDF or IDF. Classrooms are given a minimum of two each 2-pack drops on each wall and no less than 4 drops total per classroom terminated in MDF or IDF.

C. All IDFs connect to MDF via fiber connect according to current MSBSD standards. Refer to appendix IT-004.

D. Four (4) speakers will be mounted in an equidistant square pattern throughout the learning space.

E. Intercom override for emergency notification.

27 51 16 Public Address and Mass Notification Systems

Part 1- General

1.01 Description

A. The Contractor shall furnish, install, and place in operation a complete electrically powered audio amplification system for sound reinforcement for each of the following areas:

1. Gymnasium/Music and Multipurpose. Each system shall include, but not be limited to, amplifiers, speakers, mixers, microphones, rack, enclosures, equalizers, cables, and accessories required to provide a complete and operable system.

B. The Contractor shall furnish and install rough-in provisions (conduit and back boxes) for a sound reinforcement system in the following areas:

1. Gymnasium/Music Room and Multipurpose.

1.02 Codes

A. All wiring shall be in accordance with the requirements of the National Electric Code (NEC).

1.03 Type of System

A. Specifications are based on companies having at least five years successful experience in the manufacturing of similar equipment and provided that sufficient documentation is provided to the MSBSD which certifies that the equipment meets the requirements of this Section.

1.04 Guarantee and Service

A. All components, parts, and assemblies supplied by the manufacturer shall be guaranteed against defects in materials and workmanship for a period of 12 months.

B. The equipment distributer shall offer the MSBSD an annual service contract at the end of the one-year warranty period. Acceptance or rejection of the service contract will be the MSBSD's option.

Part 2- Products

2.01 PA System Requirements

A. CD Player

B. MP3 Input

C. Handheld Microphone

D. Wireless Microphone System

E. Integrated Mixer/Amplifier/CD Player

F. Six Channel Mixer

G. Digital Signal Processor

H. Power Amplifier

I. Equipment rack (Wall Mounted Enclosure)

J. Equipment rack (Floor Mounted Enclosure)

K. Loudspeakers (Ceiling Mounted)

L. Loudspeakers (Wall Mounted)

M. Accessories

1. 70V to Line Level Transformer
2. Direct Box
3. Audio Control Relay
4. Cables
    a. Microphone, 25 feet
    b. Rack mounted equipment
    c. Furnish interconnecting cables as required.
    d. Loudspeaker cables shall be West Penn 227 or as approved
5. Microphone Floor Stand
6. Microphone Receptacles
7. Surge Suppression

Part 3- Execution

3.01 Operation (General)

A. During an intercom page to the area served by the sound system, the sound system shall mute temporarily the other audio sources and broadcast the page.

B. The compact disk shall be remotely controlled via handheld remote control.

3.02 Multipurpose Room Sound System

A. The system shall amplify and distribute program sources and shall include the following equipment as noted below or on the Drawings

1. Rack mounted wall in cabinet
    a. Digital signal processor (1)
    b. Power amplifier
    c. CD Player
    d. MP3 Input
    e. Wireless Microphone System (Provide separate frequencies for adjacent areas)
    f. Microphone Outlets (3)
2. Loudspeakers
    a. Wall mount, TOA Model F-2000, or as approved
3. Powered Antenna
4. Source select, volume control
    a. BIAMP Volume/Select 8, or as approved
5. Accessories as noted below or on the Drawings
    a. Microphones
        1. Wireless Lavalier (1)
        2. Wireless Headset (1)
        3. Handheld (2)
        4. Pendant Ceiling (6)
    b. Microphone Floor Stand (1)
    c. Microphone Cable, 25-feet (1)
    d. Microphone Cable, 10-feet (1)
    e. Audio from intercom paging system
        1. 70V to Line Level Transformer
        2. Audio Control Transformer

3.03 Music/Gym Sound System

A. The system shall amplify and distribute program sources and shall include the following equipment as noted below or on the Drawings:

1. Rack mounted in floor cabinet in Music Room
    a. Digital signal processor (1)
    b. Power amplifier
    c. CD Player
    d. MP3 Input
    e. Wireless Microphone System (Provide separate frequencies for adjacent areas)
    f. Microphone Outlet (2)
2. Desk mounted in wall cabinet in Gym Office
    a. CD Player
    b. AM/FM Tuner
    c. MP3 Input
3. Speakers
    a. Wall mount, TOA Model F-2000, or as approved
    b. Ceiling mount, TOA Model F-2852C, or as approved
4. Powered Antenna (2)
5. Source select, volume control
    a. BIAMP Volume/Select 8, or as approved
6. Accessories as noted below or on the Drawings
    a. Microphones
        1. Wireless Lavalier (1)
        2. Wireless Handheld (1)
        3. Handheld (1)
    b. Microphone Floor Stand (2)
    c. Microphone Cable, 25-feet (2)
    d. Microphone Cable, 10-feet (1)
    e. Audio from intercom paging system
        1. 70V to Line Level Transformer
        2. Audio Control Transformer

B. Coordinate Gym Office source rack height and exact location with Contracting Agency prior to rough-in.

3.04 Installation

A. Refer to the applicable one-line diagrams on the Drawings for system interconnections.

B. The Contractor shall supply all racks, wire, hardware, conduit, etc., required for the installation, and needed to provide completed usable sound systems.

C. All equipment except portable equipment shall be firmly held in place. This shall include loudspeakers, enclosures, amplifiers, cables, etc. Fastenings and supports shall be adequate to support their loads with a safety factor of at least three. All switches, connectors, hacks, and receptacles shall be clearly, logically, and permanently marked. All wires and cables shall be identified at every termination and connection point with permanent type markers. All equipment shall be shock isolated for seismic conditions according to codes and regulations.

D. The Contractor shall take such precautions as are necessary to prevent and guard against electromagnetic and electrostatic hum, to supply adequate ventilation, and to install the equipment so that it shall be safely operated.

E. Care shall be exercised in wiring, to avoid damage to the cables and to the equipment. All joints and connections shall be made with rosin-core solder, or with approved mechanical connectors. All wiring shall be executed in strict adherence to standard broadcast policies.

F. Lines shall be run in separate ferrous conduits for microphone level circuits (levels below minus 20 dBm), line level circuits (up to plus 30 dBm), loudspeaker circuits (above plus 30 dBm), and power circuits. All other conduits shall be spaced not less than two inches from power conduits.

G. Power conduits shall be bonded to the power system ground system. Power system conduits shall not be connected to the racks or to the audio system ground.

H. Microphone and 600-ohm lines shall be insulated from the conduit and from each other for the entire conduit length. Microphone and 600-ohm line conduits shall be electrically grounded to the audio system ground point. Cables in conduit shall not be spliced.

I. Low voltage D.C. for relay control or power supply shall be run in any conduit, except microphone line conduit.

J. The installation of all work shall be neat. All boxes, equipment, etc. shall be plumb and square.

K. The Contractor shall always keep the job adequately staffed, including a designated field supervisor present on the job site, and in responsible charge during all phases of installation and checkout. This supervisor shall be the same individual throughout the execution of the work unless circumstances beyond the control of the Contractor intervene.

L. It shall be the responsibility Contractor to cooperate with the MSBSD in order to achieve well-coordinated progress and satisfactory results. The Contractor shall schedule his work to prevent conflicts with other activities in the building.

M. For all drivers, red terminal (+) on driver, shall be connected to red terminal (+) on the power amplifier, black terminal (-) on driver, shall be connected to black (-) terminal on power amplifier.

27 51 16 School Audio Systems Defined

Part 1 - General

1.01 Description

A. If this design criteria is not applicable to the layout of the school contact the AV department for changes.

B. All wiring shall be in accordance with the requirements of the National Electric Code (NEC).

C. All wires exposed to students or staff will be run in conduit or metal wire molding. All wire not in conduit must be plenum rated.

D. New installs will not use existing conduit or infrastructure unless authorized by AV department.

E. New or existing conduit will not be filled more than 60% of capacity.

F. All wire runs and electronic enclosures will have to and from locations labeled on them.

G. Contractor shall provide a full set of prints in hard copy form and pdf format showing all wire runs, equipment layout and locations.

H. All installation software and manuals will be turned over to the A/V Department.

I. Contractor will provide factory and system operation training and manuals.

J. Equipment in high damage areas will be protected by cages, covers, etc...

K. All ceiling mounted equipment will have safety restraints.

L. All A/V gear will be mounted independently in its own rack or cabinet.

M. All audio equipment will be installed to MSBSD A/V specifications regarding location and equipment type. If unable to acquire specified equipment, MSBSD A/V department must authorize any equipment changes or substitutions.

N. All audio equipment must be serviceable by the AV department without factory training.

O. Equipment will be installed in easily accessible locations in the MDF/IDF and will not be installed in ceilings unless necessary. In which case it will be accessible, clearly marked and shown on prints.

P. All backup batteries installed in equipment for AC loss must sustain the equipment for a minimum of 8 hours.

Q. All equipment installed must be current and not out of date or legacy products unless otherwise specified. Contractor will supply sufficient documentation to the MSBSD AV department certifying the equipment meets school district design criteria.

R. All audio systems in the school will be independent of each other unless otherwise specified.

S. All audio systems in the MDF/IDF will be installed in a rack or cabinet according to the audio hardware specifications section. Gym, Music room, Theater and Football Field audio systems will be installed in a fold out wall-mounted cabinet specified in the audio hardware specifications section.

T. All components, parts, and assemblies supplied by the contractor will be guaranteed against defects in materials and workmanship for a period of 12 months.

U. The installation of all work shall be neat and clean. All boxes, equipment, etc. shall be plumb, square, and well-marked.

V. All single and double gang faceplates will be stainless steel.

W. An APC UPS will be supplied for the intercom rack and will be connected to E-Power.

X. All audio racks and cabinets will be independent of IT's infrastructure.

Part 2 - Audio Installation Specifications

2.01 Gym Area

2.02 Music Room Area

2.03 Theater Area

2.04 Classroom Area

2.05 Football Field Area

2.06 Schoolwide Intercom Area

2.01 Gym Area

A. High School

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

Install stereo system in wall mount cabinet located in a secure area adjacent to the gym. A double gang 120V 20 Amp circuit will be installed in the cabinet. Blank rack spacer plates will be installed in all un-used spaces in the audio cabinet.

Each amp will be set up in stereo mode, one amp for left and right speakers and one amp for the other left and right speakers.

Mixer will have two dedicated outputs to each amplifier.

Mixer will have a static IP programmed into the wireless router, contact the AV department for the IP address.

Contractor will contact the AV Dept. for programming mixer to MSBSD specifications.

Speakers will be ceiling mounted via Unistrut with safety cable. They will be installed horizontally using the specified brackets. Speakers will be mounted in the center of the gym, one pair facing the bleachers and the other pair facing the opposite side. Each speaker will have an independent two conductor 12 AWG stranded speaker wire run inside conduit for the entire length of the wire. Contact AV Dept. for exact speaker location and placement. Speak-on twist lock 4 pole connectors will be used for all speaker and amp connections.

iPad will have a static IP programmed into the wireless router. This iPad will not be managed by the IT department or entered into MDM. It is dedicated to the audio rack and not to be used for anything else. AV Dept. will be contacted for connection details.

iPad will be loaded with the x32 application software.

Dedicated Wi-Fi router will be independent of the MSBSD network. Contact AV Dept. for setup parameters. It will be mounted on top of the audio cabinet.

Wireless microphone receivers will be mounted in the rack.

A labeled, dedicated intercom line with a 10-foot service loop will be pulled into the audio cabinet.

A labeled, dedicated network connection with a 10-foot service loop will be pulled from the MDF or IDF into the audio cabinet.

Install a double gang recessed box in an accessible area in the gym with an audio plate that includes a 3.5mm stereo jack, left and right stereo RCA jacks, and 2 female XLR input jacks. A protective clear box that allows access to the jacks will be installed. Phone holder will be installed next to the inputs.

Install a recessed single gang female XLR jack near the center on each of the 4 main walls of the gym. All audio wire exterior to the audio cabinet will be 4-conductor 18 AWG stranded drain and shield.

All single and double gang faceplates will be stainless steel.

B. Middle School

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

Install stereo system in wall mount cabinet located in a secure area adjacent to the gym. A double gang 120V 20 Amp circuit will be installed in the cabinet. Blank rack spacer plates will be installed in all un-used spaces in the audio cabinet.

Each amp will be set up in stereo mode, one amp for left and right speakers and one amp for the other left and right speakers.

Mixer will have two dedicated outputs to each amplifier.

Mixer will have a static IP programmed into the wireless router, contact the AV department for the IP address.

Contractor will contact the AV Dept. for programming mixer to MSBSD specifications.

Speakers will be ceiling mounted via Unistrut with safety cable. They will be installed horizontally using the specified brackets. Speakers will be mounted in the center of the gym, one pair facing the bleachers and the other pair facing the opposite side. Each speaker will have an independent 2 conductor 12 AWG stranded speaker wire run inside conduit for the entire length of the wire. Contact AV Dept. for exact speaker location and placement. Speak-on twist lock 4 pole connectors will be used for all speaker and amp connections.

iPad will have a static IP programmed into the wireless router. This iPad will not be managed by the IT department or entered into MDM. It is dedicated to the audio rack and not to be used for anything else. AV Dept. will be contacted for connection details.

iPad will be loaded with the x32 application software.

Dedicated Wi-Fi router will be independent of the MSBSD network. Contact AV Dept. for setup parameters. It will be mounted on top of the audio cabinet.

Wireless microphone receivers will be mounted in the rack.

A labeled, dedicated intercom line with a 10-foot service loop will be pulled into the audio cabinet.

A labeled, dedicated network connection with a 10-foot service loop will be pulled from the MDF or IDF into the audio cabinet.

Install a double gang recessed box in an accessible area in the gym with an audio plate that includes a 3.5mm stereo jack, left and right stereo RCA jacks, and 2 female XLR input jacks. A protective clear box that allows access to the jacks will be installed. Phone holder will be installed next to the inputs.

Install a recessed single gang female XLR jack near the center on each of the 4 main walls of the gym. All audio wire exterior to the audio cabinet will be 4-conductor 18 AWG stranded drain and shield.

All single and double gang faceplates will be stainless steel.

C. Elementary school

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

2. Gym teacher's portable audio system per Audio Hardware Specifications.

3. The gym and music room create the theater area. (NOTE: See music room area for audio equipment specifications.)

2.02 Music Room Area

A. High School

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

Install stereo system in wall mounted cabinet located in music. A double gang 120V 20 Amp circuit will be provided in the cabinet. Blank rack spacer plates will be installed in all un-used spaces in the audio cabinet.

Amplifier will be set to stereo mode.

Mixer will have a static IP programmed into the wireless router, contact the AV department for the IP address.

Contractor will contact the AV Dept. for programming mixer to MSBSD specifications.

Speakers will be mounted vertically, using the specified brackets, to the far left and right of the front of the room. They will be mounted 8 feet from the floor unless otherwise specified. Each speaker will have an independent 2 conductor 12 AWG stranded speaker wire run inside conduit for the entire length of the wire. Contact AV Dept. for exact speaker location and placement. Speak-on twist lock 4 pole connectors will be used for all speaker and amp connections.

iPad will have a static IP programmed into the wireless router. This iPad will not be managed by the IT department or entered into MDM. It is dedicated to the audio rack and not to be used for anything else. AV Dept. will be contacted for connection details.

iPad will be loaded with the x32 application software.

Dedicated Wi-Fi router will be independent of the MSBSD network. Contact AV Dept. for setup parameters. It will be mounted on top of the audio cabinet.

Wireless microphone receivers will be mounted in the rack.

A labeled, dedicated intercom line with a 10-foot service loop will be pulled into the audio cabinet.

A labeled, dedicated network connection with a 10-foot service loop will be pulled from the MDF or IDF into the audio cabinet.

Install a double gang recessed box within 1 foot of the Promethean board with an audio plate that includes a 3.5mm stereo jack, left and right stereo RCA jacks, and 2 female XLR input jacks. Phone holder will be installed next to the inputs.

All single and double gang faceplates will be stainless steel.

B. Middle School

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

Install stereo system in wall mounted cabinet located in music. A double gang 120V 20 Amp circuit will be provided in the cabinet. Blank rack spacer plates will be installed in all un-used spaces in the audio cabinet.

Amplifier will be set to stereo mode.

Mixer will have a static IP programmed into the wireless router, contact the AV department for the IP address.

Contractor will contact the AV Dept. for programming mixer to MSBSD specifications.

Speakers will be mounted vertically, using the specified brackets, to the far left and right of the front of the room. They will be mounted 8 feet from the floor unless otherwise specified. Each speaker will have an independent 2 conductor 12 AWG stranded speaker wire run inside conduit for the entire length of the wire. Contact AV Dept. for exact speaker location and placement. Speak-on twist lock 4 pole connectors will be used for all speaker and amp connections.

iPad will have a static IP programmed into the wireless router. This iPad will not be managed by the IT department or entered into MDM. It is dedicated to the audio rack and not to be used for anything else. AV Dept. will be contacted for connection details.

iPad will be loaded with the x32 application software.

Dedicated Wi-Fi router will be independent of the MSBSD network. Contact AV Dept. for setup parameters. It will be mounted on top of the audio cabinet.

Wireless microphone receivers will be mounted in the rack.

A labeled, dedicated intercom line with a 10-foot service loop will be pulled into the audio cabinet.

A labeled, dedicated network connection with a 10-foot service loop will be pulled from the MDF or IDF into the audio cabinet.

Install a double gang recessed box within 1 foot of the Promethean board with an audio plate that includes a 3.5mm stereo jack, left and right stereo RCA jacks, and 2 female XLR input jacks. Phone holder will be installed next to the inputs.

All single and double gang faceplates will be stainless steel.

C. Elementary

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

Install stereo system in wall mounted cabinet located in music. A double gang 120V 20 Amp circuit will be provided in the cabinet. Blank rack spacer plates will be installed in all un-used spaces in the audio cabinet.

Two Amplifiers will be set to stereo mode. Monitor amp will be set for parallel.

All left and right outputs from the mixer to the amps will be independent.

Mixer will have a static IP programmed into the wireless router, contact the AV department for the IP address.

Contractor will contact the AV Dept. for programming mixer to MSBSD specifications.

Music room speakers will be mounted vertically, using the specified brackets, to the far left and right of the front of the room. They will be mounted 8 feet from the floor unless otherwise specified. Speakers mounted in the gym will be ceiling mounted horizontally on Unistrut with a safety cable. Speakers will be mounted to the left and right side of the stage approximately 12 feet in front of the stage area. Each speaker will have an independent 2 conductor 12 AWG stranded speaker wire run inside conduit for the entire length of the wire. Contact AV Dept. for exact speaker location and placement. Speak-on twist lock 4 pole connectors will be used for all speaker and amp connections.

iPad will have a static IP programmed into the wireless router. This iPad will not be managed by the IT department or entered into MDM. It is dedicated to the audio rack and not to be used for anything else. AV Dept. will be contacted for connection details.

iPad will be loaded with the x32 application software.

Dedicated Wi-Fi router will be independent of the MSBSD network. Contact AV Dept. for setup parameters. It will be mounted on top of the audio cabinet.

Wireless microphone receivers will be mounted in the rack.

A labeled, dedicated intercom line with a 10-foot service loop will be pulled into the audio cabinet.

A labeled, dedicated network connection with a 10-foot service loop will be pulled from the MDF or IDF into the audio cabinet.

Install a double gang recessed box on the left or right side of the stage with an audio plate that includes a 3.5mm stereo jack, left and right stereo RCA jacks, and 2 Speak-on output jacks for Monitor speakers. A protective clear box that allows access to the jacks will be installed. Phone holder will be installed next to the inputs.

Install 2 recessed female single gang XLR jacks in the ceiling. Jacks will be approximately 10 feet back from the front of the stage spaced evenly for hanging microphones.

All single and double gang faceplates will be stainless steel.

Install 5 recessed single gang female XLR wall jacks. One jack on each side of the stage, and one on each remaining wall near center of the wall.

2.03 Theater Area

A. High School

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

Install stereo system in wall mount cabinet located in or adjacent to the stage or sound booth. A double gang 120V 20 Amp circuit will be provided in the cabinet. Blank rack spacer plates will be installed in all un-used spaces in the audio cabinet.

One Amplifier will be set to stereo mode. Monitor amp will be set for parallel.

All left and right outputs from the mixer to the amps will be independent.

If there is a sound booth, X32 Desktop mixer will be installed in the booth. If there is no sound booth, X32 rack mount mixer will be mounted in the cabinet.

Mixer will have a static IP programmed into the wireless router, contact the AV department for the IP address.

Contractor will contact the AV Dept. for programming mixer to MSBSD specifications.

Speakers will be ceiling mounted horizontally on Unistrut with a safety cable. Speakers will be mounted to the left and right side of the stage approximately 12 feet in front of the stage area. Each speaker will have an independent 2 conductor 12 AWG stranded speaker wire run inside conduit for the entire length of the wire. Contact AV Dept. for exact speaker location and placement. Speak-on twist lock 4 pole connectors will be used for all speaker and amp connections.

iPad will have a static IP programmed into the wireless router. This iPad will not be managed by the IT department or entered into MDM. It is dedicated to the audio rack and not to be used for anything else. AV Dept. will be contacted for connection details.

iPad will be loaded with the x32 application software.

Dedicated Wi-Fi router will be independent of the MSBSD network. Contact AV Dept. for setup parameters. It will be mounted on top of the audio cabinet.

Wireless microphone receivers will be mounted in the rack.

A labeled, dedicated intercom line with a 10-foot service loop will be pulled into the audio cabinet.

A labeled, dedicated network connection with a 10-foot service loop will be pulled from the MDF or IDF into the audio cabinet.

Install a double gang recessed box on the left or right side of the stage with an audio plate that includes a 3.5mm stereo jack, left and right stereo RCA jacks, and 2 Speak-on output jacks for Monitor speakers. A protective clear box that allows access to the jacks will be installed. Phone holder will be installed next to the inputs.

Install 2 recessed female single gang XLR jacks in the ceiling. Jacks will be approximately 10 feet back from the front of the stage spaced evenly for hanging microphones.

All single and double gang faceplates will be stainless steel.

Install 5 recessed single gang female XLR wall jacks. One jack on each side of the stage, and one on each remaining wall near center of the wall.

B. Middle School

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

Install stereo system in wall mount cabinet located in or adjacent to the stage or sound booth. A double gang 120V 20 Amp circuit will be provided in the cabinet. Blank rack spacer plates will be installed in all un-used spaces in the audio cabinet.

One Amplifier will be set to stereo mode. Monitor amp will be set for parallel.

All left and right outputs from the mixer to the amps will be independent.

If there is a sound booth, X32 Desktop mixer will be installed in the booth. If there is no sound booth, X32 rack mount mixer will be mounted in the cabinet.

Mixer will have a static IP programmed into the wireless router, contact the AV department for the IP address.

Contractor will contact the AV Dept. for programming mixer to MSBSD specifications.

Speakers will be ceiling mounted horizontally on Unistrut with a safety cable. Speakers will be mounted to the left and right side of the stage approximately 12 feet in front of the stage area. Each speaker will have an independent 2 conductor 12 AWG stranded speaker wire run inside conduit for the entire length of the wire.

Contact AV Dept. for exact speaker location and placement. Speak-on twist lock 4 pole connectors will be used for all speaker and amp connections.

iPad will have a static IP programmed into the wireless router. This iPad will not be managed by the IT department or entered into MDM. It is dedicated to the audio rack and not to be used for anything else. AV Dept. will be contacted for connection details.

iPad will be loaded with the x32 application software.

Dedicated Wi-Fi router will be independent of the MSBSD network. Contact AV Dept. for setup parameters. It will be mounted on top of the audio cabinet.

Wireless microphone receivers will be mounted in the rack.

A labeled, dedicated intercom line with a 10-foot service loop will be pulled into the audio cabinet.

A labeled, dedicated network connection with a 10-foot service loop will be pulled from the MDF or IDF into the audio cabinet.

Install a double gang recessed box on the left or right side of the stage with an audio plate that includes a 3.5mm stereo jack, left and right stereo RCA jacks, and 2 Speak-on output jacks for Monitor speakers. A protective clear box that allows access to the jacks will be installed. Phone holder will be installed next to the inputs.

Install 2 recessed female single gang XLR jacks in the ceiling. Jacks will be approximately 10 feet back from the front of the stage spaced evenly for hanging microphones.

All single and double gang faceplates will be stainless steel.

Install 5 recessed single gang female XLR wall jacks. One jack on each side of the stage, and one on each remaining wall near center of the wall.

C. Elementary

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

2. The gym and music room create the theater area. (NOTE: See music room area for audio equipment specifications.)

2.04 Classroom Area

A. High School

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

1. Use Promethean board as All-Hear System.

B. Middle school

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

1. Use Promethean board as All-Hear System.

C. Elementary

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

1. Use Promethean board as All-Hear System.

2.05 Football Field Area

A. High School

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

100-volt paging system will be installed in a wall mount cabinet located in the crow's nest. A double gang 120V 20 Amp circuit will be provided in the cabinet. Blank rack spacer plates will be installed in all un-used spaces in the audio cabinet. All exterior connections to cabinet will be enclosed in liquid tight conduit and weather tight junction boxes out on the poles. Cable gland joints will be used to weatherproof any exterior wire penetrations into the weather tight junction boxes.

A single gang box with 2 female XLR jacks labeled left and right will be mounted on the wall 4-6" above the desktop. The XLR jacks will be connected to the left and right inputs of the rack mixer using18 AWG stranded shielded with drain and run in conduit to the audio cabinet.

A single gang 120-volt 20 Amp box will be mounted next to the single gang XLR box.

The Desktop mixer left, and right outputs will be connected to the left and right inputs on the rack mount mixer. Rack mixer will be mounted in the rack.

Mount both exterior antennas. One antenna will be mounted on the left of the crow's nest and one on the right. All wiring to the exterior antennas will be installed in conduit. All exterior penetrations will be weatherproof. Install wireless antenna combiner in the rack and all wireless microphones to the antenna combiner. Wireless microphone outputs will be connected to the rack mount mixer inputs with 3-foot XLR patch cables.

Amplifier input will be set to parallel mode. Amp input 1 will connect to left output from the rack mixer. Amp input 3 will connect to the right output from the rack mixer. Amplifier output will be set for channel 1 and 2 left, channel 3 and 4 right. Two speakers will be connected to each of the four outputs. Each output will have a dedicated 12 AWG stranded 2 conductor wire running to each pair of speakers. Amplifier and speakers will be set for 100-volt operation.

Mount speakers on poles with appropriate mounting hardware. Contact the AV Dept. for specific speaker locations. Speaker wire from the speaker to the weatherproof box will be outdoor SJO, UV rated 12 AWG 2 conductor stranded wire.

All single and double gang faceplates will be stainless steel.

B. Middle School

1. Reserved for future use

C. Elementary School

1. Reserved for future use

2.06 Schoolwide Intercom Area

A. High schools

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

Mount the Master Atomic clock in the rack with the intercom system, connect it to the network with a static IP supplied by the AV department, and connect it to the Rauland ICS-2.

Mount intercom controller in MDF room in a dedicated rack marked Intercom System. The intercom system will control school bell schedules, emergency announcements, act as a secondary fire notification to all portable buildings, connect to the school phone system for paging and will control all primary and secondary analog clock corrections. All fire and security relay connections to the intercom will be located in the MDF room with the intercom system. The intercom system will be connected to an APC UPS unit wired to E-Power.

If required, mount the Rauland Expansion Chassis directly below the intercom controller.

Surface mount PMI in office area and run dedicated Cat5e back to intercom rack. Mount phone holder next to PMI unit. Connect emergency microphone to PMI and supply shelf for emergency microphone if necessary.

All DTD's will have dedicated Cat5e runs back to the intercom rack. A recessed single gang network faceplate marked DTD, with RJ45 jacks, will be mounted in a location close to the DTD. A DTD will be installed in the front receptionist area and admin secretary area unless otherwise specified.

The Rauland ACM will have ports 1-4 reserved for clock corrections, port 5 will be Lenel Panic, port 6 will be Secondary Fire Annunciation to portables, port 7 will be

used for Front Door Access, port 8 will be reserved for future use, ports 9-10 will be used for audio 2 and ports 11-12 will be used for audio 1.

Leave an additional SLM card for later expansion.

Install one TIM module and connect to phone system trunk using the rail mounted 24VAC power supply.

Install one IAM for both audio ports on ACM module.

All call buttons will be installed near the intercom speakers.

Set Hallway and Exterior speaker voltage to 25V, 5 watts and set Classroom speakers to 25V, 2.5 watts. Hallway and Exterior speakers will be connected to an independent amplifier separate from the Classroom amplifier. Any room or office larger than 6x8 feet will get a speaker and call switch installed. Hallways get speakers every 20 feet with no call switches and no more than 10 hallway speakers per run to intercom rack. Gyms will get at least 8 ceiling mounted intercom speakers and 2 call switches. Girls and boy's locker rooms will get 2 speakers but no call switches. Libraries will get at least 2 speakers and 2 call switches. Theaters will get at least 4 speakers with 2 call switches. Cafeterias will get at least 6 speakers and 2 call switches. Classrooms will get 1 speaker and 1 call switch located by the entry door. Music room will get 2 speakers and a call switch. The gym, music room, and theater require independent intercom lines to the stereo systems for muting. Nutrition services area will get at least 2 speakers and a call switch. Custodial break area and office area will each get a speaker and a call switch. The Boiler, HVAC, MDF, IDF, Generator, Mechanical, and Electrical rooms will get speakers and call switches. Portables will get a speaker and a call switch by the front door entrance. Exterior intercom speakers will be installed every 50 feet and have a dedicated run back to the intercom rack.

Rack mount switch box 601101 will be labeled showing ever speaker location in the system.

The breakout box 603101 will be located in the speaker boxes.

Mount Bogen amplifiers in rack with intercom system. Connect Classroom speakers to one amplifier and connect Hallway and Exterior speakers to another amplifier.

Mount Ortronics patch panel in rack with intercom system. Run Cat5e to keystone patch panel. Leave expansion room for additional 24-port Ortronics keystone patch panel. Label all connections to patch panel showing all speaker locations.

All Rauland clock power supplies will be 2515's or newer, mounted in the rack with the intercom system and connected to the Rauland ACM card ports 1-4. No more than twenty clocks per power supply. Clock power supplies will be connected to APC UPS unit.

All hardwired clocks will be American Time and Signal Analog All Sync Plus.

All Wi-Fi N clocks will be American Time and Signal Analog clocks mounted in portables only unless otherwise specified by the AV department.

All clocks will have 12” or 15” guards installed in high impact areas like the gym.

B. Middle

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

Mount the Master Atomic clock in the rack with the intercom system, connect it to the network with a static IP supplied by the AV department, and connect it to the Rauland ICS-2.

Mount intercom controller in MDF room in a dedicated rack marked Intercom System. The intercom system will control school bell schedules, emergency announcements, act as a secondary fire notification to all portable buildings, connect to the school phone system for paging and will control all primary and secondary analog clock corrections. All fire and security relay connections to the intercom will be located in the MDF room with the intercom system. The intercom system will be connected to an APC UPS unit wired to E-Power.

If required, mount the Rauland Expansion Chassis directly below the intercom controller.

Surface mount PMI in office area and run dedicated Cat5e back to intercom rack. Mount phone holder next to PMI unit. Connect emergency microphone to PMI and supply shelf for emergency microphone if necessary.

All DTD’s will have dedicated Cat5e runs back to the intercom rack. A recessed single gang network faceplate marked DTD, with RJ45 jacks, will be mounted in a location close to the DTD. A DTD will be installed in the front receptionist area and admin secretary area unless otherwise specified.

The Rauland ACM will have ports 1-4 reserved for clock corrections, port 5 will be Lenel Panic, port 6 will be Secondary Fire Annunciation to portables, port 7 will be used for Front Door Access, port 8 will be reserved for future use, ports 9-10 will be used for audio 2 and ports 11-12 will be used for audio 1.

Leave an additional SLM card for later expansion.

Install one TIM module and connect to phone system trunk using the rail mounted 24VAC power supply.

Install one IAM for both audio ports on ACM module.

All call buttons will be installed near the intercom speakers.

Set Hallway and Exterior speaker voltage to 25V, 5 watts and set Classroom speakers to 25V, 2.5 watts. Hallway and Exterior speakers will be connected to an independent amplifier separate from the Classroom amplifier. Any room or office larger than 6x8 feet will get a speaker and call switch installed. Hallways get

speakers every 20 feet with no call switches and no more than 10 hallway speakers per run to intercom rack. Gyms will get at least 8 ceiling mounted intercom speakers and 2 call switches. Girls and boy's locker rooms will get 2 speakers but no call switches. Libraries will get at least 2 speakers and 2 call switches. Theaters will get at least 4 speakers with 2 call switches. Cafeterias will get at least 6 speakers and 2 call switches. Classrooms will get 1 speaker and 1 call switch located by the entry door. Music room will get 2 speakers and a call switch. The gym, music room, and theater require independent intercom lines to the stereo systems for muting. Nutrition services area will get at least 2 speakers and a call switch. Custodial break area and office area will each get a speaker and a call switch. The Boiler, HVAC, MDF, IDF, Generator, Mechanical, and Electrical rooms will get speakers and call switches. Portables will get a speaker and a call switch by the front door entrance. Exterior intercom speakers will be installed every 50 feet and have a dedicated run back to the intercom rack.

Rack mount switch box 601101 will be labeled showing ever speaker location in the system.

The breakout box 603101 will be located in the speaker boxes.

Mount Bogen amplifiers in rack with intercom system. Connect Classroom speakers to one amplifier and connect Hallway and Exterior speakers to another amplifier.

Mount Ortronics patch panel in rack with intercom system. Run Cat5e to keystone patch panel. Leave expansion room for additional 24-port Ortronics keystone patch panel. Label all connections to patch panel showing all speaker locations.

All Rauland clock power supplies will be 2515's or newer, mounted in the rack with the intercom system and connected to the Rauland ACM card ports 1-4. No more than twenty clocks per power supply. Clock power supplies will be connected to APC UPS unit.

All hardwired clocks will be American Time and Signal Analog All Sync Plus.

All Wi-Fi N clocks will be American Time and Signal Analog clocks mounted in portables only unless otherwise specified by the AV department.

All clocks will have 12" or 15" guards installed in high impact areas like the gym.

C. Elementary

1. All hardware specified in **Part 3 – Audio Hardware Specifications.**

Mount the Master Atomic clock in the rack with the intercom system, connect it to the network with a static IP supplied by the AV department, and connect it to the Rauland ICS-2.

Mount intercom controller in MDF room in a dedicated rack marked Intercom System. The intercom system will control school bell schedules, emergency

announcements, act as a secondary fire notification to all portable buildings, connect to the school phone system for paging and will control all primary and secondary analog clock corrections. All fire and security relay connections to the intercom will be located in the MDF room with the intercom system. The intercom system will be connected to an APC UPS unit wired to E-Power.

If required, mount the Rauland Expansion Chassis directly below the intercom controller.

Surface mount PMI in office area and run dedicated Cat5e back to intercom rack. Mount phone holder next to PMI unit. Connect emergency microphone to PMI and supply shelf for emergency microphone if necessary.

All DTD's will have dedicated Cat5e runs back to the intercom rack. A recessed single gang network faceplate marked DTD, with RJ45 jacks, will be mounted in a location close to the DTD. A DTD will be installed in the front receptionist area and admin secretary area unless otherwise specified.

The Rauland ACM will have ports 1-4 reserved for clock corrections, port 5 will be Lenel Panic, port 6 will be Secondary Fire Annunciation to portables, port 7 will be used for Front Door Access, port 8 will be reserved for future use, ports 9-10 will be used for audio 2 and ports 11-12 will be used for audio 1.

Leave an additional SLM card for later expansion.

Install one TIM module and connect to phone system trunk using the rail mounted 24VAC power supply.

Install one IAM for both audio ports on ACM module.

All call buttons will be installed near the intercom speakers.

Set Hallway and Exterior speaker voltage to 25V, 5 watts and set Classroom speakers to 25V, 2.5 watts. Hallway and Exterior speakers will be connected to an independent amplifier separate from the Classroom amplifier. Any room or office larger than 6x8 feet will get a speaker and call switch installed. Hallways get speakers every 20 feet with no call switches and no more than 10 hallway speakers per run to intercom rack. Gyms will get at least 8 ceiling mounted intercom speakers and 2 call switches. Girls and boy's locker rooms will get 2 speakers but no call switches. Libraries will get at least 2 speakers and 2 call switches. Theaters will get at least 4 speakers with 2 call switches. Cafeterias will get at least 6 speakers and 2 call switches. Classrooms will get 1 speaker and 1 call switch located by the entry door. Music room will get 2 speakers and a call switch. The gym, music room, and theater require independent intercom lines to the stereo systems for muting. Nutrition services area will get at least 2 speakers and a call switch. Custodial break area and office area will each get a speaker and a call switch. The Boiler, HVAC, MDF, IDF, Generator, Mechanical, and Electrical rooms will get speakers and call switches. Portables will get a speaker and a call switch

by the front door entrance. Exterior intercom speakers will be installed every 50 feet and have a dedicated run back to the intercom rack.

Rack mount switch box 601101 will be labeled showing ever speaker location in the system.

The breakout box 603101 will be located in the speaker boxes.

Mount Bogen amplifiers in rack with intercom system. Connect Classroom speakers to one amplifier and connect Hallway and Exterior speakers to another amplifier.

Mount Ortronics patch panel in rack with intercom system. Run Cat5e to keystone patch panel. Leave expansion room for additional 24-port Ortronics keystone patch panel. Label all connections to patch panel showing all speaker locations.

All Rauland clock power supplies will be 2515's or newer, mounted in the rack with the intercom system and connected to the Rauland ACM card ports 1-4. No more than twenty clocks per power supply. Clock power supplies will be connected to APC UPS unit.

All hardwired clocks will be American Time and Signal Analog All Sync Plus.

All Wi-Fi N clocks will be American Time and Signal Analog clocks mounted in portables only unless otherwise specified by the AV department.

All clocks will have 12" or 15" guards installed in high impact areas like the gym.

Part 3 – Audio Hardware Specifications

3.01 Gym Area

3.02 Music Room Area

3.03 Theater Area

3.04 Classroom Area

3.05 Football Field Area

3.06 Schoolwide Intercom Area

3.01 Gym Area

A. High School

1. QTY 2 Behringer EP2000
2. QTY 1: Behringer X32 Rack Mount Mixer or Desktop if sound booth
3. QTY 4: Behringer B215XL Speakers
4. QTY 4: Behringer WB215 Speaker mounts

5. QTY 1: 26U Middle Atlantic or Tripp Lite Swing out cabinet

6. QTY 1: iPad – 9.7-inch screen or greater, 32GB memory or greater

7. QTY 1: Dedicated Wireless access point. Netgear Nighthawk AC1900 or better

8. QTY 1: Otterbox Defender iPad case.

9. QTY 2: EV R300-HD Band C handheld wireless microphone kit

10. QTY 1: iPhone or Samsung phone holder

11. QTY 2: Middle Atlantic 3U rack mount drawer

12. QTY 2: Tripp Lite 15 Amp power strip RS-0615-R

12. QTY 1: double gang 120V 20-amp power receptacle

13. Intercom line

14. Network connection

15. double gang audio plate with 2 XLR jacks, 1 3.5mm jack, and 1 RCA left and right jacks

16. XLR wall jack centered on each wall in the gym.

17 QTY 2: 12-inch adjustable foldable microphone stand

18. QTY 4: recessed female single gang XLR jacks

B. Middle School

1. QTY 2 Behringer EP2000

2. QTY 1: Behringer X32 Rack Mount Mixer

3. QTY 4: Behringer B215XL Speakers

4. QTY 4: Behringer WB215 Speaker mounts

5. QTY 1: 26U Middle Atlantic or Tripp Lite Swing out cabinet

6. QTY 1: iPad – 9.7-inch screen or greater, 32GB memory or greater

7. QTY 1: Dedicated Wireless access point. Netgear Nighthawk AC1900 or better

8. QTY 1: Otterbox Defender iPad case.

9. QTY 2: EV R300-HD Band C handheld wireless microphone kit

10. QTY 1: iPhone or Samsung phone holder

11. QTY 2: Middle Atlantic 3U rack mount drawer

12. QTY 2: Tripp Lite 15 Amp power strip RS-0615-R

12. QTY 1: double gang 120V 20-amp power receptacle

13. Intercom line

14. Network connection

15. double gang audio plate with 2 XLR jacks, 1 3.5mm jack, and 1 RCA left and right jacks

16. XLR wall jack centered on each wall in the gym.

17. QTY 2: 12-inch adjustable foldable microphone stand

18. QTY 4: recessed female single gang XLR jacks

C. Elementary School

1. QTY 1: Behringer Europort PPA2000BT Portable Audio system

2. QTY 2: 6 Foot tripod speaker stand

3. The gym and music room create the theater area. (NOTE: See music room area for audio equipment specifications.)

3.02 Music Room Area

A. High School

1. QTY 1 Behringer EP2000

2. QTY 1: Behringer X32 Rack Mount Mixer

3. QTY 2: Behringer B212XL Speakers

4. QTY 2: Behringer WB212 Speaker mounts

5. QTY 1: 26U Middle Atlantic or Tripp Lite Swing out cabinet

6. QTY 1: iPad – 9.7-inch screen or greater, 32GB memory or greater

7. QTY 1: Dedicated Wireless access point. Netgear Nighthawk AC1900 or better

8. QTY 1: Otterbox Defender iPad case.

9. QTY 4: EV R300-HD Band C handheld wireless microphone kit

10. QTY 1: iPhone or Samsung phone holder

11. QTY 2: Middle Atlantic 3U rack mount drawer

12. QTY 2: Tripp Lite 15 Amp power strip RS-0615-R

12. QTY 1: double gang 120V 20-amp power receptacle

13. Intercom line

14. Network connection

15. Recessed double gang audio plate with (2) XLR jacks, (1) 3.5mm female jack, and (1) RCA left and right female stereo jacks

16. QTY 4: Hola HPS-101TB Professional tripod microphone stand with telescopic boom or equivalent – black

B. Middle School

1. QTY 1 Behringer EP2000

2. QTY 1: Behringer X32 Rack Mount Mixer

3. QTY 2: Behringer B212XL Speakers

4. QTY 2: Behringer WB212 Speaker mounts

5. QTY 1: 26U Middle Atlantic or Tripp Lite Swing out cabinet

6. QTY 1: iPad – 9.7-inch screen or greater, 32GB memory or greater

7. QTY 1: Dedicated Wireless access point. Netgear Nighthawk AC1900 or better

8. QTY 1: Otterbox Defender iPad case.

9. QTY 4: EV R300-HD Band C handheld wireless microphone kit

10. QTY 1: iPhone or Samsung phone holder

11. QTY 2: Middle Atlantic 3U rack mount drawer

12. QTY 2: Tripp Lite 15 Amp power strip RS-0615-R

12. QTY 1: double gang 120V 20-amp power receptacle

13. Intercom line

14. Network connection

15. Recessed double gang audio plate with 2 XLR jacks, 1 3.5mm jack, and 1 RCA left and right jacks

16. QTY 4: Hola HPS-101TB Professional tripod microphone stand with telescopic boom or equivalent – black

C. Elementary School

1. QTY 3: Behringer EP2000

2. QTY 1: Behringer X32 Rack Mount Mixer

3. QTY 2: Behringer B212XL Speakers (NOTE: Mounted in music room.)

4. QTY 2: Behringer WB212 Speaker mounts

5. QTY 2: Behringer B215XL Speakers (NOTE: Mounted in gym)

6. QTY 2: Behringer WB215 speaker mounts (NOTE: Mounted in gym)

5. QTY 1: 26U Middle Atlantic or Tripp Lite Swing out cabinet

6. QTY 1: iPad – 9.7-inch screen or greater, 32GB memory or greater

7. QTY 1: Dedicated Wireless access point. Netgear Nighthawk AC1900 or better

8. QTY 1: Otterbox Defender iPad case.

9. QTY 4: EV R300-HD Band C handheld wireless microphone kit

10. QTY 1: iPhone or Samsung phone holder

11. QTY 2: Middle Atlantic 3U rack mount drawer

12. QTY 2: Tripp Lite 15 Amp power strip RS-0615-R

12. QTY 1: double gang 120V 20-amp power receptacle

13. Intercom line

14. Network connection

15. Recessed double gang audio plate with 2 4-pole Speak-on jacks, 1 3.5mm jack, and 1 RCA left and right stereo jacks. (NOTE: Mounted in gym)

16**.** QTY 2: Audio-Technica PRO 45 ProPoint Cardioid Condenser Hanging Microphone, Black, ceiling mounted

17. QTY 1: Behringer VP1220F Monitor speakers.

18. Monitor speaker cables. QTY 1: 25-foot 2 conductor stranded 12AWG audio cable, Speak-on to Speak-on

19. QTY 4: Hola! HPS-101TB Professional tripod microphone stands with telescopic boom or equivalent - black

20. QTY 7: recessed female single gang XLR jacks. (NOTE: 5 mounted in gym area and the 2 mounted in music room ceiling.)

3.03 Theater Area

A. High School

1. QTY 2: Behringer EP2000

2. QTY 1: Behringer X32 Rack Mount Mixer

5. QTY 2: Behringer B215XL Speakers

6. QTY 2: Behringer WB215 speaker mounts

5. QTY 1: 26U Middle Atlantic or Tripp Lite Swing out cabinet

6. QTY 1: iPad – 9.7-inch screen or greater, 32GB memory or greater

7. QTY 1: Dedicated Wireless access point. Netgear Nighthawk AC1900 or better

8. QTY 1: Otterbox Defender iPad case.

9. QTY 6: EV R300-HD Band C handheld wireless microphone kit

10. QTY 2: EV R300-L Band C lapel wireless microphone kit

10. QTY 1: iPhone or Samsung phone holder

11. QTY 2: Middle Atlantic 3U rack mount drawer

12. QTY 2: Tripp Lite 15 Amp power strip RS-0615-R

12. QTY 1: double gang 120V 20-amp power receptacle

13. Intercom line

14. Network connection

15. Recessed double gang audio plate with 2 4-pole Speak-on jacks, 1 3.5mm jack, and 1 RCA left and right stereo jacks.

16**.** QTY 2: Audio-Technica PRO 45 ProPoint Cardioid Condenser Hanging Microphone, Black, ceiling mounted

17. QTY 2: Behringer VP1220F Monitor speakers.

18. Monitor speaker cables. QTY 2: 25-foot 2 conductor stranded 12AWG audio cable, Speak-on to Speak-on

19. QTY 6: Hola! HPS-101TB Professional tripod microphone stands with telescopic boom or equivalent - black

20. QTY 7: recessed female single gang XLR jacks.

B. Middle School

1. QTY 2: Behringer EP2000

2. QTY 1: Behringer X32 Rack Mount Mixer

5. QTY 2: Behringer B215XL Speakers

6. QTY 2: Behringer WB215 speaker mounts

5. QTY 1: 26U Middle Atlantic or Tripp Lite Swing out cabinet

6. QTY 1: iPad – 9.7-inch screen or greater, 32GB memory or greater

7. QTY 1: Dedicated Wireless access point. Netgear Nighthawk AC1900 or better

8. QTY 1: Otterbox Defender iPad case.

9. QTY 6: EV R300-HD Band C handheld wireless microphone kit

10. QTY 2: EV R300-L Band C lapel wireless microphone kit

10. QTY 1: iPhone or Samsung phone holder

11. QTY 2: Middle Atlantic 3U rack mount drawer

12. QTY 2: Tripp Lite 15 Amp power strip RS-0615-R

12. QTY 1: double gang 120V 20-amp power receptacle

13. Intercom line

14. Network connection

15. Recessed double gang audio plate with 2 4-pole Speak-on jacks, 1 3.5mm jack, and 1 RCA left and right stereo jacks.

16**.** QTY 2: Audio-Technica PRO 45 ProPoint Cardioid Condenser Hanging Microphone, Black, ceiling mounted

17. QTY 2: Behringer VP1220F Monitor speakers.

18. Monitor speaker cables. QTY 2: 25-foot 2 conductor stranded 12AWG audio cable, Speak-on to Speak-on

19. QTY 6: Hola! HPS-101TB Professional tripod microphone stands with telescopic boom or equivalent - black

20. QTY 7: recessed female single gang XLR jacks.

C. Elementary School

1. The gym and music room create the theater area. (NOTE: See music room area for audio equipment specifications.)

3.04 Classroom Area

A. High School

1. Use Promethean board speaker system.

B. Middle School

1. Use Promethean board speaker system.

C. Elementary School

1. Use Promethean board speaker system.

3.05 Football Field

A. High School

1. QTY 1: Electro-Voice CPS 4.50 4 channel amplifier
2. QTY 1: Behringer MX-882 Ultra-link Pro Mixer
3. QTY 1: Mackie 8 channel professional FX mixer w/ USB MAPROFX8V2
3. QTY 8: Electro-Voice SX-600PIX speakers with 70/100-volt transformer
4. QTY 8: Electro-Voice Super-Sam down angle adjustment mount
5. QTY 1: 18U Middle Atlantic or Tripp Lite Swing out cabinet
6. QTY 1: Electro-Voice PC Desktop 5” gooseneck microphone ELPCDT5
7. QTY 2: Electro-Voice WTU-2-G RE-2Pro bodypack transmitter Band G
8. QTY 2: Electro-Voice RE-97TX Mini-Mic head worn microphone
9. QTY 2: Telex RSB-2 Referee WT-55 mute switch
10. QTY 2: Electro-Voice RE-2Pro Wireless Microphone receiver Band-G
11. QTY 1: Electro-Voice RMD-300 dual rack mount kit
12. QTY 1: Electro-Voice APD4 Antenna/Power dist. System
13. QTY 2: Electro-Voice LPA500 Log Periodic antenna 450-900MHz
14. QTY 2: Middle Atlantic 3U rack mount drawer
15. QTY 2: Tripp Lite 15 Amp power strip RS-0615-R
16. QTY 1: double gang 120V 20-Amp power receptacle
17 QTY 1: Single gang box with (2) XLR jacks

B. Middle School

1. Reserved for future use

C. Elementary School

1. Reserved for future use

3.06 Schoolwide Intercom Area

A. High School

Rauland TCAMCS (Atomic Clock)

Rauland ICS2BaseRm (Rack Mount Controller)

Rauland ICS2XPRRM (Rack Mount Expansion Chassis)

Rauland ICSPMI (Program/Microphone Interface)

Rauland ICSDTD (Desktop Display)

Rauland TCACM (Audio Control Module)

Rauland TCSLM (Station Line Module 4 Wire)

Rauland ICS2TIM (Telephone Interface Module)

Rauland ICSIAM (Intercom Amplifier Module)

Rauland TCSPB1 (Single Button)

Rauland ACC1400 8” 25V/70V Round Ceiling Speaker or Equivalent

Rauland USO188 8” 25V/70V Speaker or Equivalent

Rauland ACC 1012 Speaker Baffle or Equivalent

Rauland ACC1105 Recessed Back box or Equivalent

Rauland 601101 (Rack Mount Switch Box)

Rauland 603101 (Breakout Box)

Bogen Amplifier HTA-250A

Ortronics Rack Mount 24 Port Keystone Patch Panel

DIN Rail Mounted 24DC Power Supply (Intercom Trunk Power)

Rauland 1295 or Astatic 878HL (Emergency Microphone)

Rauland 2515 Power Supply

American Time & Signal Molded Case Analog All Sync Plus 12” Hard Wired Clock

American Time & Signal Molded Case Analog All Sync Plus 15” Hard Wired Clock

American Time & Signal Molded Case Analog Wi-Fi 12” Battery Clock

American Time & Signal Molded Case Analog Wi-Fi 15” Battery Clock

Hinged 12” and 15” Guard for high impact areas

Use blue Belden Cat5e for all intercom wire connections to internal and external intercom speakers, switches, hardwired clocks, PMI’s, DTD’s, 603101 breakout box and keystone patch panels.

B. Middle School

Rauland TCAMCS (Atomic Clock)

Rauland ICS2BaseRm (Rack Mount Controller)

Rauland ICS2XPRRM (Rack Mount Expansion Chassis)

Rauland ICSPMI (Program/Microphone Interface)

Rauland ICSDTD (Desktop Display)

Rauland TCACM (Audio Control Module)

Rauland TCSLM (Station Line Module 4 Wire)

Rauland ICS2TIM (Telephone Interface Module)

Rauland ICSIAM (Intercom Amplifier Module)

Rauland TCSPB1 (Single Button)

Rauland ACC1400 8” 25V/70V Round Ceiling Speaker or Equivalent

Rauland USO188 8” 25V/70V Speaker or Equivalent

Rauland ACC 1012 Speaker Baffle or Equivalent

Rauland ACC1105 Recessed Back box or Equivalent

Rauland 601101 (Rack Mount Switch Box)

Rauland 603101 (Breakout Box)

Bogen Amplifier HTA-250A

Ortronics Rack Mount 24 Port Keystone Patch Panel

DIN Rail Mounted 24DC Power Supply (Intercom Trunk Power)

Rauland 1295 or Astatic 878HL (Emergency Microphone)

Rauland 2515 Power Supply

American Time & Signal Molded Case Analog All Sync Plus 12” Hard Wired Clock

American Time & Signal Molded Case Analog All Sync Plus 15” Hard Wired Clock

American Time & Signal Molded Case Analog Wi-Fi 12” Battery Clock

American Time & Signal Molded Case Analog Wi-Fi 15” Battery Clock

Hinged 12” and 15” Guard for high impact areas

Use blue Belden Cat5e for all intercom wire connections to internal and external intercom speakers, switches, hardwired clocks, PMI’s, DTD’s, 603101 breakout box and keystone patch panels.

C. Elementary School

Rauland TCAMCS (Atomic Clock)

Rauland ICS2BaseRm (Rack Mount Controller)

Rauland ICS2XPRRM (Rack Mount Expansion Chassis)

Rauland ICSPMI (Program/Microphone Interface)

Rauland ICSDTD (Desktop Display)

Rauland TCACM (Audio Control Module)

Rauland TCSLM (Station Line Module 4 Wire)

Rauland ICS2TIM (Telephone Interface Module)

Rauland ICSIAM (Intercom Amplifier Module)

Rauland TCSPB1 (Single Button)

Rauland ACC1400 8” 25V/70V Round Ceiling Speaker or Equivalent

Rauland USO188 8” 25V/70V Speaker or Equivalent

Rauland ACC 1012 Speaker Baffle or Equivalent

Rauland ACC1105 Recessed Back box or Equivalent

Rauland 601101 (Rack Mount Switch Box)

Rauland 603101 (Breakout Box)

Bogen Amplifier HTA-250A

Ortronics Rack Mount 24 Port Keystone Patch Panel

DIN Rail Mounted 24DC Power Supply (Intercom Trunk Power)

Rauland 1295 or Astatic 878HL (Emergency Microphone)

Rauland 2515 Power Supply

American Time & Signal Molded Case Analog All Sync Plus 12” Hard Wired Clock

American Time & Signal Molded Case Analog All Sync Plus 15” Hard Wired Clock

American Time & Signal Molded Case Analog Wi-Fi 12” Battery Clock

American Time & Signal Molded Case Analog Wi-Fi 15” Battery Clock

Hinged 12” and 15” Guard for high impact areas

Use blue Belden Cat5e for all intercom wire connections to internal and external intercom speakers, switches, hardwired clocks, PMI’s, DTD’s, 603101 breakout box and keystone patch panels.

27 51 23.50 Educational Intercommunications and Program Systems

Part 1- General

1.01 Description

A. The Contractor shall furnish, install, and place in operation an electrically powered, Intercommunication/Clock/Program system for paging, program signaling, internal and external intercom, telephone inter-communication, and monitoring of various classrooms throughout the building. The systems shall include, but not be limited to master controller, CD player, USB port, amplifiers, power supplies, peripheral instruments, clocks, speakers, administrative telephones, baffles, wire, and accessories required to provide a complete and operational system.

B. The telephone system will be provided by the MSBSD under separate contract. Coordinate with the MSBSD for information on phone system manufacturer and model. Provide all coordination with the telephone system to implement the system integration and telephone system performance requirements noted herein.

C. The Intercom system shall be integrated with the telephone system as described herein.

1.02 Codes

A. All wiring shall be in accordance with the requirements of Article 725 of the National Electrical Code for Class 2 Signaling Systems, applicable local codes, and manufacturer's wiring diagram.

1.03 Type of System

A. Intercom systems for secondary schools shall be Rauland Telecenter ICS or functional equivalent. Intercom for elementary schools shall be Rauland ICS or functional equivalent. Intercom systems for all schools shall be Rauland ICS-2. All clocks installed in elementary schools shall have a standard analog face but can have a digital control mechanism.

1.04 Integration with Telephone System

A. Access to the Intercom system control function from the telephone system shall be restricted to "Administrator" PBX telephones. One trunk on the intercom shall access the control privileges. The telephone system shall restrict which telephone can call into that intercom trunk. MSBSD will provide telephone instruments. Telephone instruments shall be connected to the building telephone switch. System integration shall be provided under this Section.

B. Sequence of Operations

1. Calls from any telephone to any classroom speaker shall be made by dialing the proper classroom speaker extension number from the telephone.

2. Calls from any telephone to any other telephone shall be made by dialing the proper extension number.

3. Outside calls shall be able to be placed from any telephone.

4. Intercom control functions shall be accessed via administrator's PBX telephones with control privileges in conjunction with an intercom system digital display (either telephone or wall mounted to provide visual feedback as the intercom control menus are accessed.

5. Any call shall be able to be conferenced between the caller, the teacher, student, or staff person, and the Principal or other administrator.

6. Dialing the classroom telephone shall be done by dialing the extension only. The classroom speaker shall be accessed by first pressing a "feature" button on features phones, or entering an access code on analog telephones, and then dialing the classroom extension.

7. Routine calls from classrooms shall be able to be placed from either telephones or “normal” intercom call-in pushbuttons, with the latter allowing hands-free two-way conversations.

1.05 Owner’s Manuals

A. Furnish two (2) complete sets of Owner’s Operation and Maintenance manuals and other information necessary for use and upkeep of the system along with one (1) digital copy. Manuals shall be completed and approved prior to Operator’s training.

1.06 Guarantee and Service

A. All components, parts, and assemblies supplied by the manufacturer shall be guaranteed against defects in materials and workmanship for a period of 12 months from the date of final acceptance.

1. Warranty service shall be provided by a trained specialist of the equipment manufacturer.

2. The specialist shall be based in a fully staffed branch office located within a reasonable distance from the job site.

B. The equipment manufacturer shall have a local branch office staffed with trained, full-time factory certified employees who are capable of performing testing, inspection, repair, and maintenance services for the life of the system. Factory certification must be submitted to the MSBSD prior to acceptance of the system.

C. Provide factory training to MSBSD staff for any new system installation.

D. The equipment distributer shall offer the MSBSD and annual service contract at the end of the one-year warranty period. Acceptance or rejection of the service contract will be the MSBSD’s option.

1. Time Clocks

2. Electromechanical time clocks are not acceptable.

3. Clock power supplies are to be mounted near intercom head end rack.

4. All conduits 1 ¼ and larger shall be insulated throat type.

Part 2- Products

2.01 Manufacturers

A. Telecenter ICS manufactured by Rauland-Borg Corp

2.02 System Requirements

A. The system shall provide the state of the art in technology for all internal intercom communications, emergency call-in notification, secondary clock corrections, and bell schedule. The system shall be easy to learn and operate. All standard system programming shall be user friendly to allow the system administrator the ability to easily program system features.

B. Features offered by this system shall be implemented and controlled by software programs that can be changed and expanded as customer needs evolve.

C. The system shall be equipped with voice prompting, allowing the administrative user to distinguish between an internal intercom call from a room station and a telephone call from another telephone call from another telephone or outside trunk.

D. Two-way communication between any telephone and any room speaker.

E. Room speakers, call switches, and telephone extension numbers shall be programmable and may be assigned any three or four-digit number.

F. The system shall be UL listed to the UL 1950 Third Edition standard.

2.03 Equipment and Materials

A. Central Controller Unit

B. Emergency/Normal Call Switch

1. Provide one (1) “Normal” call switch that shall activate a distinctive “NORM” level call from single button activation. Button shall be clearly marked “NORM” and shall route call to Displays (DTD’s). In accordance with the Americans with Disabilities Act (ADA), the “Normal” call will provide a steady call assurance LED confirming that the call has been placed in the system.

C. Program Distribution System

1. The system shall provide facilities to distribute program in the following manner.

a. The media operator shall cue remotely located music source.

b. The media operator shall dial from an Administrative Telephone to select the room(s) or areas to distribute program.

2. Power amplifiers shall meet all specifications exactly as specified herein, including power capacity and count, provide a minimum of ½ watt power to all intercom speaker locations plus 15 watts power to all horn type speaker locations.

D. Hallway Baffle and Enclosure

1. The hallway baffle shall be a Rauland ACC1000 or MSBSD approved. The baffle shall be constructed of 22-gauge cold rolled steel; zinc treated and have a semi-gloss white baked epoxy finish. The baffle shall have a diameter of 12-7/8 inches.

2. The metal protective enclosure shall be a Rauland ACC1101 or MSBSD approved. The enclosure shall have a rust preventive coating. Interior of enclosure shall be undercoated to prevent mechanical and acoustical resonance.

3. Provide ceilings tile bridges Rauland ACC1104 or MSBSD approved.

E. Gymnasium paging speakers shall be Rauland Model USO188 with ACC1003 baffle and ACC1112 enclosure.

2.04 Complete System

A. As it is not practical to enumerate in these specifications all details of fittings and accessory equipment required for proper operation of the system herein described, it is understood that they will be supplied by the Contractor without extra compensation.

B. All fittings, terminations, amplifiers, relays, switches, wiring, conduit, functional modules, custom programming, and fabrication, testing and balancing, etc., needed to provide the best performance possible at the present state of the art shall be supplied at no additional cost.

2.05 Overvoltage Protection

A. Head-end equipment shall incorporate a device to protect all solid-state equipment against power line surges and power line over-voltages.

Part 3- Execution

3.01 Installation

A. Mount Intercom/Clock Control Panel enclosure in the MDF, where it is accessible only by authorized personnel, as shown on plans.

B. Mount a floor standing rack containing the program sources and monitor panel in the office area designated on the plans.

C. Refer to Architectural elevations and reflected ceiling plans and electrical drawings for locations and mounting heights of devices and equipment. Coordinate special framing or mounting requirements with other trades for proper installation.

D. All connections to the Intercom/Clock Control Panel shall be via 25 pair cables to the punch down blocks located on the rack.

3.02 Wiring Requirements

A. All wiring shall be in conduit or cable tray.

B. All wiring shall be sized per the manufacturer’s recommendations. Each type shall be approved for the specific application.

C. Use color coding of conductors and apply wire and cable marking tape to designate wires and cable so all media are identified in coordination with system wiring diagrams.

3.03 System Testing and Balancing

A. The system shall be fully tested and balanced by a qualified technician prior to final acceptance. Make all final adjustments to the system to the satisfaction of the MSBSD.

B. Provide a list of all phone numbers, speaker numbers, and zone numbers and punch down configuration.

C. When requested by the Architect within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels, resetting matching transformer taps, and adjusting controls to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

Division 28- Electronic Safety and Security

28 00 00 Electronic Safety and Security

Part 1- General

1.01 Security System Information

A. Security camera specifications are outlined in appendix IT-009.

B. Verify with MSBSD for any updates of changes to equipment and standards prior to design completion.

C. Contractor must provide camera licenses in coordination with MSBSD.

D. Verify with MSBSD for any updates of changes to equipment and standards prior to design completion.

E. To ensure educational price savings are applied, contractor(s) must coordinate with MSBSD to compare costs prior to purchase of hardware and licensing through MSBSD vendor(s) pricing arrangements to ensure best possible savings.

F. Security equipment and systems must be IP based. CCTV is no longer acceptable.

28 10 00 Electronic Access Control and Intrusion Detection

Part 1- General

1.01 Security Management System Description

A. The Security Management System outlined is the key central component for managing physical security and the bridge between physical and logical security for this project. The system shall provide a variety of integral functions including the ability to regulate access and egress; provide identification credentials; monitor, track, and interface alarms.

1.02 Quality Control

A. The manufacturer shall be an established organization with referenced and documented experience delivering and maintaining Security Management Systems of equal or higher sophistication.

B. O&M Manuals must be provided

1. Hardware manual
2. Software manual
3. Operators Manual
4. Maintenance Manual

C. Must provide As-Built Drawings

Part 2- Products

2.01 Manufacturers

A. SMS Software

1. Lenel Systems International or MSBSD approved equal.

B. SMS Field Hardware

1. Lenel Systems International or MSBSD approved equal.

C. SMS Authentication Hardware

1. HID, iClass 13.56 MHz contactless Smart Card

D. SMS Third Party Integrated Devices

1. The SMS shall seamlessly interface with devices from the following manufacturers

a. Radionics/Bosch

b. Zenitel

c. Visonics

d. Honeywell

e. Osborne Hoffman

f. EST

g. Notifier

h. Pyrotronics

28 13 26 Access Control Remote Devices

Part 1- General

1.01 Lock-Down button functional description

A. When the lock-down button is pressed a number of events are initiated:

1. Locks the card reader access-controlled doors which were in an unlocked state during normal hours

2. Drops power to electromagnetic door hold-opens, causing those interior doors to swing shut and lock.

3. Lock-down buttons shall be installed in designated Administrative Offices to lock associated access controlled exterior doors and close associated hold-open doors.

1.02 Duress button functional description

A. Duress button shall be installed in designated Administrative Offices to initiate alarm signaling to the commercial central station monitoring service, play a pre-recorded PA

system announcement, lock associated access controlled exterior doors, and close associated hold-open doors.

1. When the Duress button is pressed a number of events are initiated:
    a. The Fire/Security Panel sends an alarm signal received by the monitoring service which responds to alarm signal following pre-determined protocol which relays call to authorities.
    b. Initiates pre-recorded intercom or PA system announcement
    c. Locks the card reader access-controlled doors
    d. Drops power to door hold-opens
    e. Initiates signal to BAS to shut down fans
    f. Bus strobe activated

FUNCTIO-NALITY MATRIX	BUTTON DESCRIPTION	Signals central station to initiate response call to 911	Plays pre-recorded PA announcement	Closes electro-magnetic hold-open doors	Locks associated Access controlled doors	Bus Strobe activated	Fans Shut down
LOCK DOWN BUTTON	"Mushroom" button latching pushbutton starts sequence			**X**	**X**	**X**	
DURESS BUTTON	“Hold-up” button mounted under desk at right-hand side knee-well, latches on activation and is reset by key	**X**	**X**	**X**	**X**	**X**	**X**

28 16 00 Intrusion Detection

Part 1- General

1.01 Intrusion Alarm Functional Description

A. Provides ability to arm the Intrusion Alarm during times when the building will be unoccupied and disarm the Intrusion Alarm during times when the building will be occupied using a PIN-code keypad Intrusion Alarm arming station and/or card reader.

B. Communicates alarm signals to the commercial central station monitoring service upon activation of any Intrusion Alarm sensors. They in turn respond to alarm signals following pre-determined protocols which may include calling 911.

1. Door alarm contacts provide status monitoring of open or closed position of door and are used to detect “Door Forced” alarms when the door is opened without disarming the Intrusion Alarm.

2. Motion detection sensors detect the passive infrared signature of a person moving within the building while the Intrusion Alarm is armed and initiates an alarm signal.

3. Glass break detectors detect the sound signature of breaking glass and initiates an alarm signal; these may be active at all times – not just when the Intrusion Alarm is armed.

4. Door sensors.

5. Window sensors on ground level window openers.

1.02 Design Criteria

A. In existing schools new alarm contact, motion detectors, door sensors, and glass break sensor devices will utilize existing Intrusion Alarm Panels and auto-dialers.

28 23 00 Video Surveillance

Part 1- General

1.01 Summary

A. A video surveillance system shall be installed to provide live and recorded video images of MSBSD facilities in support of the safety and security of users of the facility in accordance with MSBSD defined standards.

1.02 IP Security Camera and Recording System

A. IP Security Camera and Functional Description

1. Provides live and recorded video images of activity at the facility

2. Provides forensic evidence from recorded video images

3. Provides capability to audit compliance with policies and procedures

4. Provides capability to remotely view activity and history at a facility

5. Provides recorded video images that can be used for Faculty and Staff training

B. Design Criteria

1. The IP Security Camera system shall be installed with the goal of providing

a. Protection of Student, Faculty, and Staff

b. Protection of MSBSD facilities against threats that could potentially shut down the School (preserve continuity of operations)

c. Protection of high-value property and assets

d. Observation and recording of behaviors and actions exhibited in and around the School

2. The IP Security Camera design location should first be installed in areas where Student, Faculty and Staff safety are most likely in jeopardy. These areas may include but are not limited to:

   a. Where pedestrians and traffic cross paths

   b. Where incidents have historically occurred

   c. Where visitors first enter the School through publicly accessible entry points

   d. Where visitors first interact with Students, Faculty and Staff

   e. Where video images may place individuals at a certain place at a certain time

   f. Where video images may capture identifiable characteristics, clothes, and other features

   g. Where Faculty and Staff enter and exit the School

   h. Where Faculty and Staff arm and disarm the Intrusion Alarm

3. Camera locations should then be specified in areas where the MSBSD facilities are most likely to be in jeopardy. These areas may include but are not limited to:

   a. Where incidents of arson have historically occurred

   b. Where an act of arson might occur, is a likely or easily accessible point, or would produce a great amount of damage

   c. Where window breakage has historically occurred

   d. Where an act of window breakage might occur, is a likely or easily accessible point, or might go unnoticed for a significant amount of time

   e. Where utility equipment, rooms, vaults, network, and communications connections are accessible

   f. Shall be installed at card reader access-controlled doors covering entry with the intention of being able to identify person(s) entering these locations.

4. The IP Security Camera system should be supported by MSBSD-approved signage indicating the use of video surveillance in the area.

5. The tables on the following pages represent the Design Criteria for camera surveillance criteria, typical camera placement, camera function, and camera priority. Camera priority is classified as follows:

Priority 1—required based upon school type

Priority 2—recommended based upon school type

Priority 3—optional based upon school type

Separate Tables have been created to further clarify the Design Criteria by School Type (Elementary, Middle & High School).

HIGH SCHOOL Camera Criteria		**Camera Placement**	**Camera Function**	**Camera Priority**
1	Where visitors first interact with Students, Faculty and Staff	Interior	Reception Area and immediate corridor(s)	1
2	Where visitors first enter the School through publicly accessible entry points	Exterior	Viewing Main Entrance(s)	1
3	Where Faculty, Staff and Students enter and exit the School	Exterior	At controlled entry points	1
4	Where incidents have historically occurred	Exterior	Viewing areas of concern	2
5	Where an act of arson might occur, is a likely or easily accessible point, or would produce a great amount of damage	Exterior	Viewing areas of concern such as Loading Dock, Dumpster Area, and major perimeter points.	1
6	Where incidents have historically occurred	Interior	Viewing areas of concern such as stairwells	2
7	Where video images may place individuals at a certain place at a certain time	Interior	Primary Corridor(s), Bathroom Entrances and Locker areas	1
8	Where video images may place individuals at a certain place at a certain time	Interior	Secondary Corridor(s)	2
9	Where pedestrians and traffic cross paths	Exterior	Parent pick-up & drop-off and viewing approaches to facility	2
10	Where video images may capture identifiable characteristics, clothes, and other features	Exterior	Viewing areas of concern such as Parking Lots, portables, and assembly areas	2
11	Where video images may capture identifiable characteristics, clothes, and other features	Exterior	Athletic Complexes with artificial turf and adjacent areas	1
12	Where pedestrians and traffic cross paths	Exterior	School bus pick-up & drop-off and viewing approaches to facility	1
13	Where utility equipment rooms, vaults, and other high value assets are accessible	Interior	General viewing of adjacent areas of concern in conjunction with cameras viewing interior corridors	3
14	Where Faculty and Staff arm and disarm the Intrusion Alarm	Interior and/or Exterior	Viewing person entering facility and/or interior view of arming station approach	1
15	Areas that are used by community access groups	Interior and/or Exterior	Areas of concern such as gymnasiums, and sporting fields	3

MIDDLE SCHOOL Camera Criteria		**Camera Placement**	**Camera Function**	**Camera Priority**
1	Where visitors first interact with Students, Faculty and Staff	Interior	Reception Area and immediate corridor(s)	1
2	Where visitors first enter the School through publicly accessible entry points	Exterior	Viewing Main Entrance(s)	1
3	Where Faculty, Staff and Students enter and exit the School	Exterior	At controlled entry points	1
4	Where incidents have historically occurred	Interior	Viewing areas of concern	2

5	Where an act of arson might occur, is a likely or easily accessible point, or would produce a great amount of damage	Exterior	Viewing areas of concern such as Loading Dock, Dumpster Area, and major perimeter points.	1
6	Where video images may place individuals at a certain place at a certain time	Interior	Viewing areas of concern such as stairwells and restroom entrances	2
7	Where video images may place individuals at a certain place at a certain time	Interior	Primary Corridor(s) and Locker areas	1
8	Where video images may place individuals at a certain place at a certain time	Interior	Secondary Corridor(s)	2
9	Where pedestrians and traffic cross paths	Exterior	Parent pick-up & drop-off and viewing approaches to facility	2
10	Where video images may capture identifiable characteristics, clothes, and other features	Exterior	Viewing areas of concern such as Parking Lots, portables, and assembly areas	2
11	Where video images may capture identifiable characteristics, clothes, and other features	Exterior	Athletic Complexes with artificial turf and adjacent areas	1
12	Where pedestrians and traffic cross paths	Exterior	School bus pick-up & drop-off and viewing approaches to facility	1
13	Where utility equipment rooms, vaults, and other high value assets are accessible	Interior	General viewing of adjacent areas of concern in conjunction with cameras viewing interior corridors	3
14	Where Faculty and Staff arm and disarm the Intrusion Alarm	Interior and/or Exterior	Viewing person entering facility and/or interior view of arming station approach	1
15	Areas that are used by community access groups	Interior and/or Exterior	Areas of concern such as gymnasiums, and sporting fields	3

ELEMENTARY SCHOOL Camera Criteria		**Camera Placement**	**Camera Function**	**Camera Priority**
1	Where visitors first interact with Students, Faculty and Staff	Interior	Reception Area and immediate corridor(s)	1
2	Where visitors first enter the School through publicly accessible entry points	Exterior	Viewing Main Entrance(s)	1
3	Where pedestrians and traffic cross paths	Exterior	Parent pick-up & drop-off and viewing approaches to facility	1
4	Where pedestrians and traffic cross paths	Exterior	School bus pick-up & drop-off and approaches to facility	1
5	Where incidents have historically occurred	Interior/Exterior	Viewing areas of concern	2
6	Where an act of arson might occur, is a likely or easily accessible point, or would produce a great amount of damage	Exterior	Viewing areas of concern such as Loading Dock, Dumpster Area, and major perimeter points.	1
7	Where video images may capture identifiable characteristics, clothes, and other features	Exterior	Play Areas(s), portables and adjacent outside areas	1
8	Where Faculty, Staff and Students enter and exit the School	Exterior	At controlled entry points	2
9	Where pedestrians and traffic cross paths	Secondary Exterior	Parent pick-up & drop-off and viewing approaches to facility	2
10	Where pedestrians and traffic cross paths	Secondary Exterior	School bus pick-up & drop-off and approaches to facility	1
11	Where video images may place individuals at a certain place at a certain time	Interior	Primary Corridor(s)	1

12	Where video images may place individuals at a certain place at a certain time	Interior	Secondary Corridor(s)	2
13	Where utility equipment rooms, vaults, and other high value assets are accessible	Interior	General viewing of adjacent areas of concern in conjunction with cameras viewing interior corridors	3
14	Where Faculty and Staff arm and disarm the Intrusion Alarm	Interior and/or Exterior	Viewing person entering facility and/or interior view of arming station approach	1
15	Areas that are used by community access groups	Interior and/or Exterior	Areas of concern such as gymnasiums, and sporting fields	3

C. General System Information

1. Responsibility for operation and maintenance of the IP Security Camera system shall be shared by MSBSD IT and MSBSD O&M.
2. The goals for the IP Security Camera system to be provided and installed as part of this project include:
    a. Standardize security measures across the MSBSD
    b. Ensure system compatibility and integration
    c. Review use of IR panels in exterior areas where there may not be sufficient lighting to support camera operation in low/no light (such areas may include athletic complexes and areas with high-value property or assets).
3. IP Security Camera surveillance cameras will not be installed in classrooms. In rare cases, dual use areas may be covered by scheduling camera operation times. This will require Superintendent approval on a case-by-case basis in accordance with MSBSD policy.
4. The MSBSD is standardized on CAT-6a and 50-micron multimode (OM3) fiber for network and video cabling.
5. Each School will have its own dedicated Network Video Recorder (NVR) installed locally within the School MDF or IDF Room with approval from MSBSD IT Director or designee.
6. There is no intent for the design to include pan-tilt-zoom (PTZ) cameras.
7. While the installation of cameras does not present a physical barrier to undesirable or unsafe behaviors their very presence may act as a deterrent to the behaviors.
8. IP Security Camera video recordings shall be kept for a period of 30 days in accordance with the existing Mat-Su BP 5143 and AR 5143 “Closed Circuit Television Systems (Surveillance Camera Systems)” policy documents. These documents are written to require on-going configuration of settings such as frame rate, resolution, and motion detection in order to achieve the 30 days’ worth of recordings.
9. Interior camera installations are preferred over exterior camera installations. Where cameras are installed at exterior locations, they should be installed on buildings in lieu

of pole-mount. Pole-mount cameras are to be avoided due to the fact that they are difficult to access and expensive to service.

10. Authorized personnel should have the capability to remotely access, view, archive, search, and otherwise perform administrative and management functions on any networked Network Video Recorder (NVR) from a centralized location.

28 30 00 Electronic Detection and Alarm

Part 1- General

1.01 General Comments

A. Fire alarm conduit shall be red except where exposed in classrooms and common areas. Vocation room exposed conduit can remain red. Fire alarm and detection system must have appropriate Fire Marshal approval. Architect may verify specific jurisdiction with Project Manager if necessary.

1.02 Description

A. Initiating Device

1. Smoke detection throughout all paths of egress. This includes smoke detectors in larger rooms or intersecting spaces in the exit path of offices or rooms such as offices within libraries, or exercise rooms off of gyms. The gym and library in that case shall be protected. Generally, keep smoke detectors to a minimum using RA duct detector to cover large spaces where code permits.

2. Smoke detection of any sleeping areas. Intensive resource day care and areas for disabled persons may incorporate naps or rest times. These areas shall have smoke detection.

3. All doors opening into the corridor system will have door release electromagnets controlled by general alarm. The corridor side of the room doors, being part of the exit system, will have general area smoke detection to meet the requirement for door control on that side. When a waiver cannot be obtained for single side control of these doors throughout the building, then all rooms will be protected with full coverage, area smoke detection. Where the room environment is subject to smoke or dust, the door may be protected on the room side with a non-system detector, 3' from the door, powered from the door holder circuit and having dry contacts to release the door magnet.

4. Air handling units shall have photoelectric type duct smoke detectors downstream of filters and motors and away from any humidifiers. Return air shall be sampled for smoke ahead of the filters. When return air is common to the mechanical room, protection may be provided by area smoke detectors in sufficient quantities to sample the volume of air at no flow to maximum flow. Very large mechanical rooms may contain return air sampling only where return air enters the mechanical room, and a few area smoke detectors for building protection during night fan shutdown.

5. Manual pull stations shall be provided at every exit and where required under UBC and NFPA 101, 72. Stopper II vandal resistant covers shall be installed on all pull stations.
6. High temperature heat detectors shall be fixed temperature replacement element type. One hundred thirty-five (135) degree heat detectors shall be the intelligent type. Star Sprinkler Corporation or MSBSD approved equal. Do not use rate of rise type.
7. Solid state interface modules to fan shut down circuits, sprinkler switches, heat detectors, etc. shall not be mounted higher than 6' in boiler rooms, utilidors, mechanical and electrical rooms and other potentially high temperature areas. These circuits are not rated for more than 135 degrees and can fail before high temperature devices can operate; lower mounting height will keep them cooler.
8. Fire alarm shut down shall function as follows:
    a. Individual control circuit for air handling units shall be zoned through the supplemental relay contacts of the fire alarm control panel.
    b. No high voltage (non-class 2).
9. Provide separate 110-volt outlet at the fire alarm panel.

B. Horn circuits

1. Horn/strobe devices will be provided throughout the building in all occupiable spaces, restrooms, working spaces, mechanical spaces, corridors, and exterior of the building. Consideration will be given to visibility per the ADA; however, ADA maximum mounting heights may be exceeded to compensate for vandalism protection requirements.
2. Horn circuits shall be designed so that if one horn circuit fails, other circuits will still provide a minimum of 6db over ambient in occupiable areas. Corridor horn circuits shall be 96db full power horn strobe units in sufficient quantity to provide the 6db level in the connecting rooms through closed doors. They shall be on a separate circuit from the rooms. Rooms will have mini horn strobe units
3. Assembly areas and areas larger than a classroom such as gyms, auditoriums, cafeterias, locker rooms, commons, double classrooms, libraries, etc. shall have 2 or more horn strobe units. Half of the horn strobes in these areas shall be on a separate horn circuit from the others and arranged so that occupants can see and hear the alarm even in the event that one entire horn circuit fails.
4. Rooms which may have high ambient noise levels will have full size horn strobes. These include Band and Music rooms as well as shop areas.
5. The office will have a strobe unit only, so that the staff can communicate with the fire department on the telephone.
6. At the FA/Security panel specify a lockdown tone different from fire alarm.

7. Exterior horns shall be watertight and sealed against moisture entering the back box through the building vapor barrier and the conduit system with silicone sealer around and inside the conduit. Exterior horns shall be on a separate circuit.
8. Exterior horns shall be located so as not to drown out the sound of the sprinkler water gong. Use single horn per building.
9. Sprinkler flow bell shall be independent of the fire alarm system. The sprinkler bell shall be 24 volts D.C. It shall be powered from a Class 2 power supply fed from the emergency panel and operated by the main flow switch contacts. It shall be located above the fire department connection.
10. All J-box covers painted red for identification.
11. Provide program feature to self-reset after power outage.

C. Reserve Capacity

1. Horn circuits shall be limited to maximum 3 ohms loop resistance.
2. Horn circuits shall not draw more the 1 1/8 amp.
3. Initiating circuits shall be limited to half of manufacturer's recommended maximum capacitance and shall not exceed manufacturer's maximum resistance to the furthest point on the cable.
4. Initiating circuits shall be limited to 2/3 of maximum number of devices permitted per circuit.
5. Three spare dry contacts, Form C, shall be located in the panel, one (1) alarm contact, one (1) trouble contact and one (1) supervisory contact. These shall be over and above those used for municipal tie and other functions.
6. Six (6) pair 24-gauge, telephone cable shall be pulled to the fire alarm dialer from the main telephone demark point.
7. The wiring of the system shall be in metal conduit.
8. The bonding and grounding of the conduit shall meet the requirements of the NEC for a power circuit.
9. No remote powered horn modules are permitted. All horn modules will be powered from a regulated power supply within the factory produced enclosure that houses the associated horn modules.
10. All fire alarm circuits shall be Class 2 and shall not be run in the same conduit with any other circuits. AC circuits shall not be run in fire alarm conduits.
11. Sprinkler supervision shall cause a supervisory condition on the panel and a trouble condition at dispatch. Valve tamper, cistern level, fire pump power available, circulating pump flow, and dry system low pressure shall be supervised.

D. Panel Programming

1. The master disks of the panel program shall be under the control of the MSBSD at all times. No modification may be loaded into the panel without notification to and approval from the MSBSD and providing the MSBSD with the latest version on disk and in print along with an explanation for the changes.
2. The access codes to the software shall belong to the MSBSD.
3. All functions controlled by the panel shall be able to be isolated by the function keys. The following is a list of typical function key assignments:

    a. Horn bypass (disables all audible circuits for testing).

    b. AHU disconnect (disables fan and louver operation).

    c. Door disconnect (prevents door closure during tests).

    d. Elevator bypass (disables elevator recalls if any).

    e. Gas shut off disconnects.

    f. Municipal tie disconnects.

    All of the above functions when active shall cause a system trouble and the system trouble to be transmitted to dispatch. Upon reset all functions will return to normal.

    NOTE! When gas shutdown is active during an actual alarm resetting the panel shall not restore gas to the building. This shall require a separate manual reset at the gas control panel.

4. In addition to the control functions, two keys shall be programmed to override groups of input devices:

    a. Sprinkler flow switch override.

    b. Kitchen extinguisher (Ansul) alarm override.

    These functions allow the alarm system to be fully operational during sprinkler maintenance. Trouble signals are generated and reset of the panel restores these functions to normal.

E. Quality Control

1. The system shall be installed according to the UBC, NFPA, NEC, other applicable codes as well as the manufacturer's directions and the specifications and drawings.
2. No work may proceed until submittals have been approved.
3. Wire and cable shall pass megger tests while still on the spool. Results shall be approved before beginning wiring.
4. When wiring is complete, capacitance and megger readings shall be observed by MSBSD approved personnel and submitted before installing devices.
5. A full test of the system (per NFPA 72) will include functional tests of all devices under realistic conditions and verification of addresses and messages.

Part 2- Products

2.01 Electronic Detection Products

A. Fire alarm and detection system requires dedicated phone line with installation access readily available at the Fire Alarm System main panel.

B. Fire alarm and detection system shall be **Notifier OR General Electric EST3 system,** providing integrated security, life safety and access control.

C. Manual Pull Stations shall be strictly compatible with manufacturer of fire alarm panel.

D. Audible and visual alarm signal devices will be installed in every occupied space or room and directly visible to all occupants. These devices shall be compatible with manufacturer of fire alarm panel.

E. Fire extinguishers need to be labeled for location. Either an arrow saying Fire Extinguisher or if in cabinet then cabinet must be labeled or stenciled with “Fire Extinguisher”. Per OSHA regulation fire extinguisher itself is not adequate even though color and mounting criteria satisfies the fire department.

F. MDFs/IDFs will have appropriate fire extinguishers.

Division 31- Earthwork

31 00 00 Earthwork

Part 1- General

1.01 Earthwork Requirements

A. Drawings and specifications shall indicate which, if any, on-site materials may be used for construction and shall also indicate any limitations regarding the usage of any on-site materials.

B. Specify that no stumps, trees, brush, other vegetation, and any organic detritus shall be buried on-site. Under special circumstances and approval this requirement may be waived by the MSBSD.

C. Drawings specifications shall require Contractor to mark all major underground utilities with permanent markers. Marker is to name the utility and identify depth of burial at property lines, entry into buildings and at changes in direction. Please mark or survey all standpipes (clean outs on septic system for easy location).

D. Coordinate all demolition with the Project Manager and review all materials to be salvaged and discuss available options for on-site storage. Note special requirements for disposal of regulated wastes or abandonment of well or tanks. MSBSD requires first right of refusal.

E. Clearly define utility locates as a Contractor responsibility. Akonecall.com, dial 811.

31 10 00 Site Clearing

Part 1- General

1.01 Preparation

A. Protect existing trees and other vegetation to remain against damage.

1. Do not stockpile construction materials or excavated materials within drip line of trees.
2. Avoid foot or vehicular traffic or parking of vehicles within drip line.
3. Provide temporary protection as required.

B. Repair or replace trees and vegetation damaged by construction operations.

1. Repair to be performed by a qualified tree surgeon.
2. Remove trees which cannot be restored to full-growth status.
3. Replace with new trees of minimum 4 IN caliper measured 6” above ground.

C. Owner will obtain authority for removal and alteration work on adjoining property.

1.02 Site Clearing

A. Topsoil Removal

1. Strip topsoil to depths encountered.

a. Remove heavy growths of grass before stripping.

b. Stop topsoil stripping sufficient distance from such trees to prevent damage to main root system (minimum by dripline).

c. Separate from underlying subsoil or objectionable material.

2. Stockpile topsoil where directed by Engineer.

a. Construct storage piles to freely drain surface water.

b. Seed or cover storage piles to prevent erosion.

3. Do not strip topsoil in wooded areas where no change in grade occurs.
4. Borrow topsoil: Free of subsoil, objects over 2 IN DIA, weeds and roots.

B. Clearing and Grubbing:

1. Clear from within limits of construction all trees not marked to remain.

a. Include shrubs, brush, downed timber, rotten wood, heavy growth of grass and weeds, vines, rubbish, and debris.

2. Grub (remove) from within limits of construction all stumps, roots, root mats, logs and debris encountered.

a. Totally grub and strip topsoil and subsoil and prepare for compaction under areas to be paved.

b. Grubbing in lawn areas

1. In cut areas, totally grub.
2. In fill areas, where fill is less than 3 FT totally grub ground.
3. Where fill is 3 FT or more in depth, stumps may be left no higher than 6 IN above existing ground surface.

Division 32- Exterior Improvements

32 00 00 Exterior Improvements

Part 1- General

1.01 Landscaping

A. Any landscaping gravel placed around the perimeter of the building must not be larger than D-1 gravel or less than 6" rock.

B. Trees no closer than 20' from any building.

32 10 00 Bases, Ballasts, and Paving

Part 1- General

1.01 Paving Requirements

A. All exterior play slabs, walks, ramps and etc. that receive asphalt paving or concrete shall be placed on Non-Frost Susceptible (NFS) material. Extend NFS material a minimum 12 inches beyond edge of slab at bottom of excavation.

B. Minimize all concrete curbs. Raised curbs are not conducive to snow removal. If curbs are required, utilize low profile rolled curbs except at the edge of a sidewalk. Utilize raised curbs on proposed walkways. Do not allow medians or islands in parking areas unless absolutely essential for traffic control/guidance.

C. Asphalt curbs are not permitted.

D. Review use of speed bumps or other traffic speed control devices with MSBSD before specifying in documents. No speed dips allowed.

E. Provide a concrete pad of an appropriate size for dumpsters. Match MSBSD Standard 33 CY model. Dumpster space should include enough room for a loading dock catwalk extending at least ¾ the length of the dumpster.

F. Approach shall have no more than 2% slope.

G. All walks, steps and entrances shall slope to drain.

H. All concrete walks, steps and entrances shall have a deep slip resistant broom finish.

I. All walkways at entrances and drop-offs shall be a minimum eight (8) feet wide. Other walkway widths shall be reviewed and approved by MSBSD.

J. Provide curb cuts to achieve an accessible route in conformance with "preferred" options in ADA guidelines. Locate ADA parking on school entrance side of parking lot. Number of spaces as per applicable codes.

K. Expansion joints are required at locations where concrete sidewalks interface a building.

1.02 Parking Lot Areas

A. MSBSD requires three distinct drop off areas designed and constructed at all schools. These three areas provide for separation of buses, student drop off and general parking for the safety of the students.

1. Bus drop off and pick up area
2. Students drop off area
3. General parking

B. Bus parking will be separate giving enough area to allow for the arrival, parking, and departure with separate entrance from other areas. Student should exit the bus towards the entrance of the school and not have to cross in front of moving traffic. This separated bus area is to eliminate mixing of buses and other vehicles from competing for right of way.

C. Students drop off will provide a one-way entrance/exit by the front door for parents to drop students and have a visual of student access to the school. This driveway should not allow for vehicles to pass or drop students off other than a sidewalk or designated area. Students should not be crossing traffic flow while walking to the school. No drop off lanes wider than a lane and a half total.

D. Teachers and public should have a parking area that allows for parents/students to safely walk from the parking to the school with marked paths with minimal walking in traffic flow. Parking should have its own entrance/exit with clearly signed areas. ADA parking should be available without having to traverse through the parking lot.

E. All areas should have proper ADA access, signage and be sloped appropriately. Lighting should be separated for all three parking areas and be controlled through a DDC system.

32 18 00 Athletic and Recreational Surfacing

Part 1- General

1.01 Artificial Turfs

A. When providing artificial turf, it shall meet conditions and character comparable to FieldTurf Tarkett or MSBSD approved equal within budget constraints.

B. FieldTurf Fill

1. On prepared subgrade place and compact Base Stone, Finishing Stone and other appurtenances to final elevation as specified on the Plans.

2. Base Stone

a. Base stone must be laid without damaging or disturbing the soil bed, geotextile liner or membrane, or the underlying flat composite drains. It is very important not to create any depressions in the sub-grade with heavy equipment. The specified stone or aggregate supplied must conform to the specifications, as noted above. The stone shall be damp when transported to site and shall be kept damp during installation, to minimize segregation of the materials.

b. If the required compacted depth of the Base Stone exceeds six inches (6”), the Base Stone shall be constructed in two (2) or more layers or lifts of approximate equal thickness that shall not exceed twelve inches (12”) in loose thickness. Each layer must be compacted in both directions to attain the specified compaction.

c. The Base Stone shall be sloped a minimum of one-half percent (0.5%) from the center longitudinal axis towards the sidelines or as specified on the Plans.

d. The grade of the Base Stone shall not vary from the specified grade by more than one-half inch (1/2”) from design grade.

e. The Base Stone shall be compacted in both directions to ninety-five percent (95%) of the maximum density.

3. Finishing Stone

a. Finishing Stone final lift layer shall not be more than two inches (2”) deep.

b. The Finishing Stone final lift material shall be sloped a minimum of one-half percent (0.5%) from the center longitudinal axis towards the sidelines or as specified on the Plans.

c. The final grade must be compacted in both directions to ninety-five percent (95%) of the maximum density.

d. The final grade of the Finishing Stone shall not vary from the specified grade by more than one-quarter inch (1/4”) from design grade, nor by more than one-quarter inch (1/4”) when measured under a ten-foot (10’) straightedge, in all directions. Laser guided fine grading is mandatory. This tolerance is required over the entire field to receive turf. Check the tolerance-to-grade by means of an orbital laser once the stone is fine grades and compacted to proper density. The turf installation company shall not commence work until the base has been tested for compaction, tolerance to grade, and porosity.

C. Equipment

1. Provide one set of equipment for each new field
2. A drag style sweeper to remove debris from the field surface. The field sweeper shall be the FieldTurf SweepRight as manufactured by FieldTurf Tarkett or approved equal.
3. A drag style groomer for raking, brushing, and aerating the field. The groomer shall be the FieldTurf GroomRight with extension wings as manufactured by FieldTurf Tarkett or approved equal.
4. A field maintenance vehicle for towing the above equipment. This vehicle will be a John Deer Gator TH 6x4. The vehicle shall come with the following factory-provided equipment.
    a. Hi-flotation, turf tires.
    b. 19 hp. gas, air-cooled, 2-cylinder, 4-cycle engine
    c. 16.4 cubic foot cargo box with bed liner, tailgate, and drop-down sides for flatbed conversion. Include cargo box power lift kit.
    d. 1,400-pound minimum towing capacity with a 1.25-inch rear receiving hitch.
    e. Front protection package with front bumper/brush guard, rubber floor mats, and front fender guard.
    f. Rear protection packaged with rear bumper and cargo box bed mat.
    g. Worksite package with brake and taillight kit, horn kit, cargo box bed mat, and backup alarm.
    h. Deluxe signal light kit.
    i. 1-year power train warranty.
5. Equipment shall be approved by the Artificial Turf Surface Manufacturer for maintenance of the installed field.

D. Manufacturer shall be FieldTurf by Tarkett Sports Company or MSBSD approved equal.

1.02 Synthetic Track

A. When providing a running track for High School facilities specify a rubber surfaced eight lane tracks. The synthetic track basis of design is Beynon. The surface shall meet conditions and characteristics specified by Beynon or be MSBSD approved equal.

B. 1.03 Outdoor Fields

A. All schools must have a level playing field, minimum 60 yd. x 100 yd. and not over 2% slope but no less than 1.5% with a crown to drain outward to sidelines.

32 30 00 Site Improvements

Part 1- General

1.01 Summary

A. Drawings to indicate locations and types of required traffic signs as needed in the design of the project.

B. Fire Lane Requirements are to be met through Fire Marshal review and approval.

C. Confirm specification of bike racks, single lighted flagpole, and all site related accessories in written specifications as well as notes on drawings off sidewalks and parks areas. Provide clear indication of location, orientation, height, depth, color to match school colors and number as appropriate.

32 31 00 Fences and Gates

Part 1- General

1.01 Requirements

A. A chain link fence shall be installed around the improved portion of the school site or school site boundaries.

1. Two-inch / 9-gauge for all perimeter fencing, playground fencing, track, and football field fencing.

2. Fence fabric shall be “knuckle-knuckle”, barbs up or down is not allowed.

3. Gate tiebacks, hold-opens, with chain lanyard at least 1.5 feet long with 5/16-gauge links. Pipe sleeves and padlock caps are not allowed.

4. Post-galvanized, schedule 40 pipe for corners and gate. Top Rail-galvanized, 1 5/8” pipe.

B. Coordinate height and configuration of fences with the MSBSD to achieve desired control. Typical fence height to be 6-feet above grade with 2” ground clearance.

C. Specify lightweight, swing type gates adequate in size and located in appropriate areas to allow for snow and equipment removal. Vehicle gates shall be of heavy pipe frame construction. If using pipe sockets in ground for pivots, use freeze proof detailing.

D. All components of chain link fence system are to be heavy gauge galvanized steel.

E. Asphalt at all fence pedestrian breaks.

F. Provide at least (2) Moose gates per site perimeter fencing.

1.02 Definitions

A. Plan Requirements

1. Defines perimeter of School property
2. Delineates the transition from public to private property
3. Provides physical barrier around play areas and sports fields to keep students within appropriate areas
4. Provide ADA access according to ADA standards.
5. Provides physical barrier around play areas and sports fields to restrict access to unauthorized visitors, motorized vehicles, and animals
6. Funnels vehicular and pedestrian traffic to designated entries/exits

B. Design Criteria
1. Fence fabric shall be standard 6-foot-high chain link “cyclone fence”.
2. Where Schools share the same site or share a common property line there will be instances where fencing need only be provided under one scope of work to satisfy the fencing needs of both Schools.

32 31 13 Recreational Court Fences and Gates

Part 1- General

1.01 Summary

A. Do not interrupt utilities serving facilities unless given written permission by the MSBSD.

B. The product of only one manufacturer will be accepted, except for items which do not influence the appearance of completed fence.

C. Accurately form all parts to dimensions.

Part 2- Products

2.01 Gate Parts

A. All steel and iron parts shall be zinc coated after fabrication, using zinc grade “E” in accordance with Federal Specifications.

B. Caps will be cast steel or malleable iron, galvanized; sized to post dimension.

C. Fittings shall be steel.

D. Tension wire will be 7-gauge thick steel, single strand.

E. Framework, posts, rails, and braces shall comply with ASTM A120 and be Schedule 40 steel pipe, standard weight, and one piece without joints. Lightweight tubing is not acceptable.
1. Post braces shall be provided for each corner, gate, pull, and end post with fabric five feet (5’) or more in height.

a. The post brace shall consist of a round tubular brace extending to each adjacent post at mid-height of the fabric, and a truss consisting of a rod not less than three-eighths inch (3/8") in nominal diameter from the adjacent post back to the gate, corner pull, or end post, with a turnbuckle or other equivalent provision for adjustment.

2. Top Rails shall be round (tubular) and in length of not less than eighteen feet (18').

   a. Top rails shall be fitted with couplings for connecting the lengths into a continuous run. The coupling shall not be less than six inches (6") long and should provide a substantial connection and shall allow for expansion and contraction of the rail.

   b. Suitable ties or clips shall be provided in sufficient number for attaching the fabric securely to the top rail.

   c. Means shall be provided for attaching the top rail to each gate, corner, pull, and end post.

F. Fittings and Materials

1. Mill-finished aluminum or galvanized iron or steel to suit manufacturer's standards.

2. Unless specified otherwise, hot dip galvanized pressed steel or cast-iron fence fittings and accessories with at least 1.2 oz. zinc per sq. ft. as determined by ASTM A90.

3. Aluminum shall be die cast conforming to ASTM B26, aluminum-alloy 360 or sand cast conforming to ASTM B85, aluminum-alloy 365, ZGC1A, or Tenzaloy.

Part 3- Execution

3.01 Fence Construction

A. Posts shall be driven with pneumatic post driver or set in augured holes and filled with concrete, or as shown on plans.

1. Concrete footing shall be a minimum of eight inches (8") in diameter and three feet (3') deep.

2. The footings shall be allowed to cure for a period of at least seven (7) days before attaching fabric.

3. Alternately, line posts (only) may be driven to minimum embedment of 36 inches. All gate, corner and pull posts shall be in concrete.

B. Placement

1. Posts shall be set vertical and of uniform height above ground with a maximum horizontal spacing of ten (10) feet on center.

2. On straight runs, pull posts shall be provided at intervals not to exceed five hundred (200) lineal feet.

3. Changes in line of thirty degrees (30) or more shall be considered corner posts.

4. The posts shall be set at grade breaks as required to allow fabric to be attached without creating a gap greater than 4 inches (4”) or less than 2 inches (2”) between fabric and grade.

C. Fabric

1. Fabric shall be stretched taut and securely fastened to each end and corner post.
2. Top edge of fabric shall be fastened to the top rail and the lower edge of fabric shall be fastened to bottom tension wire.
3. Fabric shall be attached to posts in an even and uniform manner to follow the grade of the land.
4. Fabric shall be fastened to fence frame at the following intervals:
    a. Posts- 15 inches maximum on center.
    b. Top Rail- 24 inches maximum on center.
    c. Tension Wire- 24 inches maximum on center.
5. All fabric tie wire ends will be parallel with fabric surface to minimize potential injury.

D. Top Rail

1. Top rails shall pass through the ornamental tops of the line posts, forming a continuous brace from end to end of each stretch of fence.
2. Join lengths of tubular top rail by sleeve couplings.
3. Secure top rails fastened to terminal posts by pressed steel fittings or other appropriate means.

E. Tension Wire

1. Provide one continuous length of tension wire between pull posts.
2. Apply sufficient tension to avoid excess sag between the posts.
3. Tie or otherwise fasten tension wires to end, gate, corner, or pull posts tension by industry standards.

F. General Appearance

1. All runs of fence shall present the same appearance.
2. No used, re-rolled, or open seam steel will be permitted in posts, rails, or braces.

32 90 00 Planting

Part 1- General

1.01 General Requirements

A. Contract Documents shall identify the planting seasons for each type of plant used. Avoid plantings requiring more attention other than watering, fertilizing, and mowing. Design and provide landscaping with due consideration of maintenance issues.

B. Landscape maintenance is the Contractor's responsibility until the facility is returned to the MSBSD upon Substantial Completion. MSBSD requires a two-year warranty period until ground stable on all plantings.

C. The Architect shall check with MSBSD prior to specifying method of seed placement to determine the areas to be maintained to ensure proper placement of application.

D. Use only Alaska native trees, shrubs, or perennials. See section 2 products for examples.

Part 2- Products

2.01 Allowed Plants

A. Trees

1. Evergreen Trees
    a. Native Alaskan White Spruce/Picea Glauca
    b. Colorado Green Spruce/Picea Pungens
2. Deciduous Trees
    a. Native Paper Birch/Betula Papyrifera
    b. Mountain Ash (No berry species)
    c. Swedish Columnar Aspen/Poplus Tremuliodes Erecta

B. Shrubs

1. Alaska Blue berry
2. Alaska Raspberries
3. Low Bush Cranberry
4. Hedge Cotoneaster/Cotoneaster Lucidus
5. Goldfinger Potentilla/Potentilla Fruticosa Goldfinger
6. Miss Kim Lilac/Syringa Patula
7. Alpine Currant/Ribes Alpinum
8. Amur Maple/Acer Ginnala
9. Native Goatsbeard/Alaska Aruncus
10. Yellow Flower/Forsythia Meadowlark
11. Goldflame Spiraea/Spiraea x Bulmada

C. Perennials

1. Alaska Wild Iris/Setosa

2. Yellow Day Lily/ Stella D'Oro Yellow
3. Alaska Rhubarb
4. Forget me not
5. Alaska Lupine

D. Ferns
1. Ostrich Fern/Matteuccia sturthiopteris
2. Lady Fern/Athyrium filix femina

E. Grass
1. Mowed- Alaska Lawn Mix
2. No Mow- Bromegrass or Perennial Ryes

Division 33- Utilities

33 05 00 Common Work Results for Utilities

Part 1- General

1.01 Building Utility Service Locations

A. Information regarding the location, size and elevations of existing utilities and service points will be furnished by MSB Project Manager or MSBSD Rep if a school district project and confirmed in the field by the Mechanical Engineer if necessary.

Part 2- Execution

2.01 Backfill

A. Complete the following before backfilling and compacting. Backfill as soon as possible after completion of these items:
1. Surveying locations of underground utilities for Record Documents.
2. Testing and inspecting underground utilities.
3. Remove all concrete formwork and construction trash/debris.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

2.02 Utility Trench Backfill

A. Place backfill on subgrades free of mud, frost, snow, or ice. Under no circumstances will any utility be constructed over frozen material, organic matter or other unstable or unsuitable materials.

B. Bedding is to be uniformly placed the full extent of the ditch and completely cover the piping or conduit a minimum of size inches (6") above and below the piping or conduit and one foot (1') to each side of the piping or conduit.

C. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

D. Backfill trenches excavated under footings and within eighteen inches (18") of bottom of footings with Class A subbase fill.

E. Backfill voids with existing NFS fill compactable to 95% while removing shoring and bracing.

F. Place and compact initial backfill of bedding course, non-angular particles larger than 1/2 inch in any dimension, to a height of 12 inches over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

G. Place and compact final backfill of satisfactory fill to final subgrade elevation.

H. Placement and compaction of backfill shall not disturb, move, or affect the piping or conduit.

I. Install detectable warning tape directly above utilities, placed 8" above the pipe. Warning tape shall be installed above and parallel to axis of the utility with no breaks in continuity.

2.03 Soil Fill

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use selected material.

2. Under walks and pavements, use subbase and leveling course.

3. Under steps and ramps, use subbase and leveling course.

4. Under building slabs, footings, and foundations, use subbase and leveling course.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

2.04 Compaction of Soil Backfills and Fills

A. Place backfill and fill soil materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the fill length of each structure.

C. Compact soil materials to not less than the following percentage of maximum dry unit weight according to ASTM D 1557:

1. Under structures, building slabs, steps, and pavements, scarify and re-compact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways and Artificial Turf, scarify and re-compact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95%.
3. Under unpaved areas, scarify and re-compact top six inches (6”) below subgrade and compact each layer of backfill or fill soil material at ninety percent (90%).
4. For utility trenches, compact each layer of initial and final backfill soil material at 95%.

33 10 00 Water Utilities

Part 1- Products

1.01 Materials

A. Pipe, fittings, and appurtenances shall be **lead-free** and certified for use in potable water systems per the current version of ANSI/NSF Standard 61.

B. All water distribution piping in this project must be installed with restrained joints. Joints, fittings, valves, and piping deflection points must utilize a thrust restraint system.

1.02 Ductile-Iron Pipe and Fittings

A. Ductile-Iron Pipe (DIP)

1. Pipe and fittings for potable water service shall be evaluated, tested, and certified for conformance with NSF Standard 61 (NSF 61).
2. Ductile Iron Pipe must conform to the requirements of AWWA C151, with cement mortar lining conforming to the requirements of AWWA C104/ANSI A24.1.
3. Class 52 pipe shall be used for all Ductile-Iron Pipe unless otherwise specified.
4. All Ductile-Iron Pipe shall be restrained. Tie back rods and/or tie back rod and shackle assemblies, along with thrust blocks will not be acceptable thrust restraining system for valves, fittings, piping deflection points, and inside casing.
5. All Ductile-Iron Pipe cement-mortar lining shall be given a seal coat in conformance with AWWA C104.
6. Ductile-Iron Pipe fittings shall be a minimum of 250 pounds pressure rating, mechanical joint, or all bell, lined or unlined, either cast iron or ductile iron, unless otherwise required by the Contract Documents.
7. All Ductile-Iron Pipe fittings shall conform to the requirements of AWWA C110/ANSI A21.10 or C153 A21.53-06.
8. Fittings, except for the bell protection devices, are to have exterior and interior surfaces coated with fusion bonded epoxy in accordance with AWWA C116/A21.13-09.
9. Glands, Gaskets, and Bolts: Rubber gasket joints for Ductile-Iron Pipe and fittings shall conform to the requirements of AWWA C111/ANSI A21.11. Nuts and bolts shall be

Type 316 stainless steel with a minimum tensile strength of 75,000 PSI and shall conform to ASTM F593 and F594. All bolts shall be stamped with the grade marking on the head of the bolt, and shall be T-316, 316, or F593.

10. Acceptable Manufacturers: Subject to compliance with requirements of this Section and Contract Documents acceptable manufacturers include the following:

    a. U.S. Pipe.

    b. Pacific States Cast Iron Pipe Company.

    c. Or approved equal.

33 20 00 Wells

Part 1- General

1.01 Well Requirements

A. Contractor must obtain all permits to construct, including the following:
    1. Approval to Construct by ADEC
    2. Interim approval to operate by ADEC
    3. Final approval to operate by the ADEC
B. Wells must be operated by a certified water operator for each system.
C. Wells must be grouted per DEC regulations.
D. Final grade must be sloped away from the well according to DEC.
E. Wells to have VFD (variable frequency drives) for the well pumps.

33 36 00 Utility Septic Tanks

Part 1- General

1.01 Requirements

A. Provide DEC approval to operate prior to installation of system.
B. Allow no equipment walkways, pavement, or play areas within 15’ of septic tank or septic field.

Part 2- Products

2.01 Steel Septic Tank

A. Concrete septic tanks are preferred by MSBSD

B. As an alternate, baffled, cylindrical 10-gauge steel tank may be accepted with MSBSD approval.

C. Interior/exterior coating: 10 mils corrosion inhibiting polyurethane lining

2.02 Insulated Risers and Lids:

A. Risers shall be required for access to internal vaults and access into the septic tanks for pumping. All standpipes and risers on tank (and all compartments) must be above ground for access and pumping.

B. All risers and their connection to the septic tank shall be constructed watertight.

C. Risers shall extend 3” above original grade to allow for settlement and to ensure positive drainage away from the access.

D. Risers providing access to pump vaults shall be a minimum of 48 inches in diameter and shall have a minimum of 4 inches of polyurethane spray-applied insulation with shop applied, water resistant coating on the top exterior 4 feet of the riser.

E. One lid shall be furnished steel with each access riser.

F. Lids shall be fiberglass with non-skid finish, and provided with stainless steel bolts, and wrench.

G. Lid shall be shop insulated to ensure a proper fit.

H. Pump out riser to primary tank chamber shall be ABS with rubber cap and pipe clamp, Jim Cap or approved equal. Pump out riser is not insulated.

I. If tank riser is below grade provide a 6’ diameter insulated access to the tank vault with insulated cover.

2.03 Tank Backfill and Bedding Material

A. Compacted to a minimum 95% density.

B. Backfill of tank must be brought up in 1’ lifts and compacted or sand inlayed with vibration damping technique backfill.

C. Tank, piping, and risers/vaults must be insulated to a minimum 4’ ground cover equivalent.

2.04 Underground Warning Tape

A. Vinyl foil back tape.

B. Size

1. 6 IN wide (minimum).

2. Thickness: 5 mils.

C. Fabrication

1. Legend: Preprinted and permanently imbedded.

2. Message continuous printed.

3. Tensile strength: 1750 psi.

D. Green with black letters.

E. Letter height shall be 1-1/4 IN minimum.

F. Install tape 2’ above piping.

G. Legend

1. First line: “CAUTION CAUTION CAUTION”

2. Second line: “BURIED SEWER LINE BELOW”

Part 3- Execution

3.01 General

A. All pipe shall be installed in strict accordance with manufacturer's recommendations, drawings and/or specifications and in the best commercial trade practice. Remove scale and dirt on inside and outside of pipe ends before assembly.

B. Pipe and Fittings: Size as indicated on the plans. Install as shown in accordance with manufacturer’s recommendations.

C. Replace any piping that was damaged prior to installation.

3.02 Examination

A. Examine areas and conditions for compliance with requirements and other conditions affecting performance of septic tank systems.

B. Verify compatibility with and suitability of soil structure and materials.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 Earthwork

A. Stockpile topsoil for reuse in finish grading without intermixing with other excavated material.

B. Excavate sufficient width and length for tank to depth determined by tank inlet elevation. Provide level bottom for placement of tank or basin.

C. Bed in minimum of 1’ of sand.

D. Excavate and install drain field to dimensions and elevations indicated on the Drawings.

E. Install perforated discharge piping level within a drain rock channel.

F. Provide monitor wells and cleanouts as shown on the drawings.

3.04 Protection of Existing Utilities

A. Contractor to verify the location of all underground utilities.

33 40 00 Storm Drainage Utilities

Part 1- General

1.01 Storm Drain Requirements

A. Furnish an overall site drainage plan for review and approval of the MSBSD.

B. Contract documents shall identify areas to be utilized for stockpile of snow. Provisions must be made to allow for drainage of these areas.

C. Maintain positive drainage away from all buildings. Finished floor elevation is to be a minimum of one foot above surrounding grade.

D. Provide (2%) to (2 ½%) slopes in all parking lots, drive and loading docks.

E. Do not interfere with natural drainage of adjacent properties.

F. Asphalt play areas shall be well drained, generally with a 2% minimum slope.

G. If dry wells are used, verify, and obtain Alaska Department of Environmental Conservation (ADEC) approval. Dry wells are to be provided with fully insulated and heat taped waste lines.

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Matanuska-Susitna Borough
Active Transportation Plan
SCOPE OF WORK

Objective

The Matanuska-Susitna Borough (MSB) is seeking a consultant team to supply major components of the borough-wide Active Transportation Plan (ATP). The successful bid will provide demonstrated skills in producing deliverables like those outlined by this scope of work. MSB is also looking for a partner who has experience working in creative ways to capture public feedback and producing an intuitive final document that is used by government and the public. The final ATP will include the following content (to be further outlined below):

1. A detailed report on existing non-motorized borough infrastructure;
2. Goals and objectives for a more connected non-motorized transportation network;
3. A prioritized list of short-, mid-, and long-term infrastructure investments with cost estimates to build out the network;
4. Components of the Final Draft of the Active Transportation Plan; and
5. Implementation plan to include, but not limited to, changes to Borough code and funding mechanisms to bring the goals and objectives to reality.

The ATP will help the MSB, and its local nonprofit and business partners, promote a healthier, safer, and more vibrant transportation network that provides connectivity and increased transportation choices for the growing population of the Mat-Su Borough.

Timeline

Three phases within 18 months – October 1st, 2021, through April 1st, 2023.

Phase 1: Existing Conditions Report with Recommendations for an Improved Non-Motorized System

Phase 2: Community Involvement for Feedback on Existing Conditions and Recommendations

Phase 3: Active Transportation Plan Production

* Once the contract is awarded, the Project Management Team and Consultant will work together to finalize a detailed work plan and schedule.

Budget

$90,000.00 over 18 months.

Modes Addressed

This plan will address three primary modes of non-motorized transportation: bicycling, walking, and travel by wheelchair or other assistive devices. Other forms of non-motorized transportation will benefit from planning for these three modes and will only be referenced in this plan, if included at all.

Other considerations for active transportation could include support from traditional modes of transportation such as adding bike racks to public transit vehicles and scheduling bus routes that stop at strategic locations like trailheads and popular urban pathways.

MSB Project Management Team

The MSB Project Management Team (PMT) will be staff from the Borough Planning Department.

ATP Steering Committee

The MSB PMT will shape the steering committee that will guide the process and provide feedback on deliverables. The steering committee will also provide volunteer support for public events. Other MSB staff from Land Management and Public Works will be members of the steering committee.

Other entities that could be on the steering committee are Alaska Department of Transportation; Alaska Department of Natural Resources; Cities of Houston, Palmer, and Wasilla; Chickaloon Village Traditional Council and Knik Tribal Council; Non-governmental organizations; and other non-motorized advocates and user groups.

Background: Active Transportation Planning in the Matanuska-Susitna Borough

The Matanuska-Susitna Borough (MSB) is Alaska's fastest-growing borough. As the population of the MSB increases, there is a growing need for transportation infrastructure that provides safe, reliable routes to schools, residential neighborhoods, trailheads, and businesses for all residents. In 2017 the MSB adopted the 2035 Long Range Transportation Plan (LRTP). According to the LRTP, many people throughout the public process expressed interest in higher-density, mixed use development rather than lower-density single-use development. The LRTP also found that senior citizens and Millennials make up the majority of residents in the MSB and both groups tend to drive less, buy fewer cars, and are looking for alternative ways to get around a better-connected borough. There is also a growing demand for connectivity between backcountry and rural trails with the recreation-specific and urban trails we use closer to home. Public outreach for the upcoming MSB transportation infrastructure package showed high community support for separated pathways and non-motorized connections to more rural areas such as Willow, Caswell Lakes, Talkeetna, and Sutton. Once adopted, the Active Transportation Plan will be a major step towards implementing the LRTP goals of planning for a more connected and safer borough.

The MSB is also forecasted to meet the requirements to become a designated Metropolitan Planning Organization (MPO) in the spring of 2022. With this designation comes the requirement of producing a fiscally constrained Metropolitan Transportation Plan (MTP). The MTP is like an LRTP but only for the area within the MPO boundary. The ATP will be a useful plan for the MPO as it develops the MTP and prioritizes non-motorized facilities.

The overarching goal of the Planning Division is to have all MSB plans working together to provide an integrated design for infrastructure and facilities that supports the social, environmental, economic, and physical health of all Borough residents. During the ATP planning process, there are several Borough plans that must be incorporated into the ATP. These plans include but are not limited to the Official Streets and Highways Plan; the Metropolitan Planning Organization goals; the Safe Routes to School program; the LRTP; the 2021 Transportation Infrastructure Package; the MSB Parks, Recreation & Open Space Plan; the 2016 MSB Recreational Trails Plan; and the Borough-Wide and Community Comprehensive Plans. The Borough sees the ATP as an opportunity for the MSB to commit to working towards transportation equity for residents of all physical abilities and socio-economic statuses.

Scope of Work

The Matanuska-Susitna Borough Planning Team is seeking a professional consultant team that can provide the primary components of the Active Transportation Plan through a three-phase process. The expected consultant deliverables are:

The expected MSB Project Manager Deliverables throughout each phase are:

1. Reliable communication and prompt invoice payment
2. Reviewing all documents, goals, objectives, and measures of effectiveness
    a. The Steering Committee and MSB staff will provide prompt and thoughtful review of all ATP documents.

MSB PMT deliverables for more specific roles can be found throughout the scope of work.

Phase I

Existing Conditions Report with Recommendations for an Improved Non-Motorized System

Budget: $30,000

Timeline: October 2021 through April 2022

Overview: Phase I will focus on project team and steering committee development, data collection, research, and analysis of existing conditions. The goal for Phase I is working together to produce research and recommendations that are ready to share with the public for feedback.

Matanuska-Susitna Borough
Active Transportation Plan
SCOPE OF WORK

1. **Task:** Organize PMT Meetings and Steering Committee Meetings (exact number will be determined in final contract based on proposed schedule).
   Deliverable 1: Kick-off meeting with Borough Project Management Team (PMT) and Steering Committee to organize project schedule and scope. Schedule and facilitate monthly Steering Committee meetings.
   Deliverable 2: Send out monthly Project Status e-updates (including budget, tasks, and scheduled upcoming meetings) to PMT.
   MSB PMT Deliverable: The Project Manager will work as a liaison between the MSB entities (boards, departments, and Assembly) and the consulting team.

2. **Task:** Understand current MSB transportation, recreation, trails, and community plans.
   Deliverable 1: The Consultant will research current MSB plans and provide an analysis of how the ATP can integrate existing non-motorized goals for Borough pathways and trails.
   MSB Deliverable: The Project Manager will provide access to all MSB plans and studies, and GIS data.

3. **Task:** Identify policy, facility, and infrastructure needs.
   Deliverable 1: The Consultant will use the most up-to-date inventory of bicycle and pedestrian networks in the MSB area, along with traffic counts and crash data, to identify community needs. Addressing gaps and deficiencies in the overall network are the priorities. If there is insufficient data available, the Consultant will work with Steering Committee to organize the collection of that data. The network the MSB would like to develop is connectivity from the urban network to recreation areas all the way through to backcountry trails. Rural pathways, such as Palmer to Chickaloon, or Wasilla to Talkeetna are also a priority. Existing needs will be summarized in a report for MSB and Steering Committee review.
   Deliverable 2: The MSB Planning Department is looking for data about adventure travel economies and how the Borough, with updated active transportation infrastructure, could capitalize on an updated trails network to increase tourism through sport competitions such as marathons, triathlons, bike tours, etc. The Consultant would be expected to work with the Mat-Su Convention and Visitor Bureau, as well as

other organizations that are currently working on these efforts. Economic benefits of adventure travel will be summarized in a report for MSB and Steering Committee review.

Deliverable 3: The Consultant will review and assess the current MSB subdivision code and Subdivision Construction Manual. The Consultant would provide a report on how current code would limit the development of the ATP.

MSB PMT Deliverable: The PMT will provide the Consultant with the most up-to-date transportation data; economic studies; GIS data on trails, separated pathways, and subdivision development; other pertinent data that would be useful in infrastructure and economic development research.

4. **Task:** Develop materials to be used for community feedback events in Phase II.

   Deliverable 1: Based on the research outlined in Tasks 1-3, the Consultant will provide the MSB PMT with a map and a narrative document identifying all the proposed facilities and policy updates needed to improve the borough non-motorized transportation network. The map and narrative document must be easily read and understood by the public.

   MSB PMT Deliverable: The PMT will provide robust feedback and collaborative effort to help the Consultant deliver a needs assessment, map, and narrative document that is easily consumed by the public, and within the powers of the MSB.

Phase II

Community Involvement for Feedback

Budget: $30,000

Timeline: May 2022 through October 2022

Overview: Phase II uses the data from Phase I to draft documents that will be used to educate the public on the ATP vision. Phase II will focus on community engagement for the purpose of gaining feedback and public knowledge.

1. **Task:** Facilitate public and stakeholder engagement events.

   Deliverable 1: Consultant shall plan, schedule, and execute events with the public. (Specific number of events will be determined in Phase I.) Public engagement pertains to standard forms of involvement like open houses and surveys, and extends into virtual meetings, geo-referenced surveys, marketing schedules, advertisements, and other strategies, as necessary.

MSB PMT Deliverable: The PMT will provide staff at every public and stakeholder event. If/when needed, the PMT will help recruit and train volunteers to help with events.

2. **Task:** Strive for inclusive community events via contribution and participation from all borough residents, including differently abled, LGBTQ+, Native communities, BIPOC, immigrant communities, English-as-second-language residents, low-income residents, homeless residents, senior citizens, and other often under-represented communities.
   Deliverable 1: Produce a Public Participation Plan for the ATP that outlines how these communities will be included and served throughout Phase II.
   MSB PMT Deliverable: The PMT will work closely with community councils to help engage the public on a smaller scale.

3. **Task:** Produce an updated prioritized list of short-, mid-, and long-term projects based on community feedback.
   Deliverable 1: The Consultant will incorporate the public process from Phase II into the prioritized list of projects that will be included in the final ATP.

Phase III

Active Transportation Plan Completion

Budget: $30,000

Timeline: November 2022 through April 2023

Overview: Phase III will synthesize all research and findings from Phase I and II into the Active Transportation Plan. Primary focus in this phase is completing documents, including maps, and sharing the final products in the agreed upon formats.

1. **Task:** Update needs and implementation strategy based on public feedback.
   Deliverable 1: The Consultant will incorporate the public process from Phase II into the final ATP. This will include a summary of the outreach, as well as updating the needs and recommendations based on new findings from public involvement.

2. **Task:** Produce a concise, user-friendly document, including maps, and supportive materials that will be adopted by the MSB Assembly as the Active Transportation Plan.
   Deliverable 1: The final ATP should be visually stimulating and easily understood by the public. MSB is looking for a plan that relies more on maps and photos

rather than text. The final products may also include materials such as professionally edited educational videos and marketing tools that could be used by a variety of stakeholders.

MSB PMT Deliverable: MSB staff and the Steering Committee will provide timely, thoughtful feedback on final drafts of the ATP.

3. **Task:** Produce an implementation plan.

   Deliverable 1: The final ATP must contain an implementation plan that names code and policy changes that are necessary to develop the facilities that can support the goals and objectives of the plan. The ATP must also include potential funding mechanisms that the MSB could use to fund the prioritized projects.

   MSB PMT Deliverable: MSB staff and the Steering Committee will provide timely, thoughtful feedback on the implementation plan and will provide guidance on how funding mechanisms and policy work within the MSB.

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Matanuska-Susitna Borough
ROAD SERVICE AREAS

Road Service Areas

- ALPINE
- BIG LAKE
- BOGARD
- CASWELL LAKES
- FAIRVIEW
- GOLD TRAIL
- GREATER BUTTE
- GREATER TALKEETNA
- GREATER WILLOW
- KNIK
- LAZY MOUNTAIN
- MEADOW LAKES
- MIDWAY
- NORTH COLONY
- SOUTH COLONY
- TRAPPER CREEK

Petersville
S Parks Hwy
Trapper Creek
Talkeetna
7
Caswell Lakes
Willow
W Parks Hwy
Houston
Big Lake
6
4
E Parks Hwy
Wasilla
2
Palmer
1
Chickaloon
N Glenn Hwy
Sutton
Butte
3
S Glenn Hwy
S Glenn Hwy
Knik
5
Point MacKenzie
Chugiak
Eagle River
S Glenn Hwy
Anchorage

N

0 5 10 Miles

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MSB IT/GIS Division 12/2/2020

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