Alaska School Design & Construction Standards

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Acronyms

The following acronyms are used within this publication:

AAC	Alaska Administrative Code (regulations)
ABS	acrylonitrile-butadiene-styrene (pipe)
ADM	average daily membership (as defined in AS 14.17.990)
AFF	above finished floor
AHJ	authority having jurisdiction
AS	Alaska Statute
A/V	audio/video
AWW	all weather wood
BAS	building automation system
BRGR	Bond Reimbursement and Grant Review Committee
CCTV	closed circuit television
CF	cost factor
CIP	capital improvement program or project
CMU	concrete masonry unit
CY	cubic yard
DDC	direct digital control
DEED	Department of Education & Early Development
ECM	electrically commutated motors
FF&E	furniture, fixtures & equipment
FPA	footprint area
FPSF	frost protected shallow foundation
FRP	fiberglass reinforced plastic
FT or ft	foot
GA or ga	gauge
GFCI	ground fault circuit interrupter
GLB	glue laminated beam/timber; glulam
GPF	gallons per flush
GPM or gpm	gallons per minute
GSF or gsf	gross square footage
GWB	gypsum wall board
HDPE	high-density polyethylene (pipe)
HDMI	high-definition multimedia interface
HEPA	high efficiency particulate air (filter)
HP or hp	horsepower
HSS	hollow structural shapes or sections
HVAC	heating, ventilation, and air conditioning
IMC	intermediate metal conduit
IT	information technology, computer hardware
LBS or lbs	pounds
LAN	local area network
LCCA	life-cycle cost analysis
LCD	liquid crystal display
LED	light emitting diode
LF or lf	linear foot
MAU	make-up air units
MBR	membrane bioreactor (wastewater treatment processes)

MERV	minimum efficiency reporting values (air filter standard)
MIL or mil	thousandths of an inch (thickness)
mm	millimeter
MPR	multi-purpose room
O&M	operations & maintenance
OSB	oriented strand board (engineered wood)
OT/PT	occupational therapy/physical therapy
PRP	potentially responsible party
PSI or psi	pounds per square inch
PVC	polyvinyl chloride (pipe)
SF or sf	square foot/feet
SIP	structural insulated panels
STC	sound transmission class
TARR	texture appearance retention rating
UPS	uninterruptible power supply
V or v	volt
VFD	variable frequency drives
VOC	volatile organic compounds
VRF	variable refrigerator flow
WAN	wide area network

The following organization abbreviations and standards are used within this publication:

AASL	American Association of School Librarians
ADA	Americans with Disabilities Act
ANSI	American National Standards Institute
ANSI-S12.60-2010	Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools Part I
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASHRAE 55	Thermal Comfort in Buildings (latest edition)
ASHRAE 90.1	Energy Standard for Buildings Except Low-Rise Residential Buildings
ASSE	American Society of Sanitary Engineering
ASTM	American Society of Testing Materials
AWI	Architectural Woodwork Institute
BEES	Building Energy Efficiency Standards; adopted by Alaska Housing Finance Authority as Alaska-specific IECC
CPTED	Crime Prevention Through Environmental Design
CHPS	Collaborative for High Performance Schools
IBC	International Building Code
IECC	International Energy Conservation Code
IES	Illuminating Energy Society of North America
LEED	Leadership in Energy and Environmental Design certification, through United States Green Building Council
NEC	National Electrical Code
NFPA	National Fire Protection Association

NFRC	National Fenestration Rating Council
OSHA	Occupational Safety and Health Administration
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
UL	Underwriter's Laboratories
UL-142	fuel tanks standard
UL 752 Ballistic Rating	bullet-resisting equipment standard
USGBC	United States Green Building Council
US EPA	United States Environmental Protection Agency
WELL	International WELL Being Institute certification
WBDG	Whole Building Design Guide

Part. 1. PURPOSE & APPLICATION

Overview

Alaska statutes provide for state aid through debt reimbursement and grants under AS 14.11. This aid is for construction, rehabilitation, and improvement of schools and education-related facilities. The Alaska Department of Education and Early Development (DEED) has the responsibility to execute and oversee such projects when awarded or approved. Design documents for those projects are required to be submitted for approval by the department. This document was developed to assist the parties who are, or will be, responsible for the design of capital improvement projects that include state aid.

These Standards achieve two primary objectives. They fulfill a statutory mandate to provide cost-effective construction standards and they establish consistency for state aid. The focus will always be cost effectiveness from a state perspective. The Standards apply to all new school construction and new additions to existing buildings. Renovation to existing facilities will adhere to the Standards, whenever possible, as approved by DEED.

Background

In 1993, the Alaska legislature created the Bond Reimbursement and Grant Review Committee under AS 14.11.014 and identified the committee's purpose. Among its many tasks, the committee was charged, through DEED, with the development of criteria intended to achieve cost-effective school construction in the State of Alaska. These Standards are those criteria and are the result of decades of work by the committee. They also set the stage for continued work toward ensuring cost-effective school construction into the future.

Regarding consistency, powers granted to DEED provide broad authority for the state to revise a project's scope and budget if the costs are excessive, and to reject projects not in the state's best interests. These Standards have been developed to make these determinations more transparent; to provide consistent, clear information for school districts and design professionals, and to establish a uniform level of quality and performance for all of Alaska's public-school facilities.

The Standards also provide a framework for research, "best practices," accepted procedures, "lessons learned," statutory and regulatory requirements, and for inclusion of the experience of students and educators across the State of Alaska. The best of what is currently known and available in these areas is included; future knowledge and understanding will be incorporated through a vetted public process.

It should be acknowledged that the Standards are also very DEED-centric in fulfilling the two objectives stated above. These Standards are not a building code. Alaska's adopted statewide building code requirements for schools are already well developed and are enforced by the appropriate authority having jurisdiction (AHJ).[1] Neither are these Standards district-level facilities

[1] For a list of building codes applicable to school facilities, reference 4 AAC 31.014(a).

manuals. They do not, for example, establish a preference for a side-coiling grille versus an upward acting grille for security or access separation. These Standards fit between adopted building codes and local preferences.

School construction in Alaska encompasses a wide range of climates, differences in school sizes, and the logistics of building in remote areas with limited access to labor and materials. Building system and component types, quantities, and quality vary widely across school projects with state aid. Where applicable, the Standards are tailored to address this wide range of conditions.

The Standards recognize the need to consider the long-term operations and maintenance of a school facility rather than focus solely on initial construction cost. Therefore, these Standards will not only consider the initial cost of construction but also operations and maintenance expenses, by looking at design and construction decisions on a life cycle basis.

It is evident that there is an extensive need for new and renovated school facilities. Many of the older schools in Alaska do not meet the program needs of today's complex learning environments. Older schools tend to be costly to maintain, energy inefficient, and in some cases, non-code compliant. There are also many safety issues within and outside of older school buildings. With a deep financial involvement by the State of Alaska, the Department of Education and Early Development has a responsibility to assure that projects meet established criteria for cost effectiveness including durability, economy, and quality.

One of the major objectives of the State is to address as many projects as possible within the limited financial resources at both the State and local levels. To this end the State wants to avoid unnecessarily expensive designs, inappropriate assemblies, and products that carry premium costs. The Standards are intended as a reference point for architects, engineers, and other design professionals, along with school districts, to develop cost-effective solutions that meet the needs of individual school communities. The information is provided to allow the planning, design, and construction process to proceed most efficiently—without undo restriction on the design of facilities—focusing efforts on the creation of the best possible educational environments for each project.

Authority

AS 14.11.013. Department review of grant applications.

(a) With regard to projects for which grants are requested under AS 14.11.011, the department shall …

(5) consider the regionally based model school construction standards developed under AS 14.11.017(d).

AS 14.11.014. Bond reimbursement and grant review committee.

(b) The committee shall …

(3) develop criteria for construction of schools in the state; criteria developed under this paragraph must include requirements intended to achieve cost-effective school construction;

AS 14.11.017. Grant conditions.

(a) The department shall require in the grant agreement that a municipality that is a school district or a regional educational attendance area

(1) agree to construction of a facility of appropriate size and use that meets criteria adopted by the department if the grant is for school construction; …

(d) The department shall develop and periodically update regionally based model school construction standards that describe acceptable building systems and anticipated costs and establish school design ratios to achieve efficient and cost-effective school construction. In developing the standards, the department shall consider the standards and criteria developed under AS 14.11.014(b).

Document Organization

These Standards are intended to be used in conjunction with other school planning guidelines developed by DEED, including those for alternative project delivery, educational specifications, school condition surveys, and site selection. When available, the Standards may also incorporate design ratios, the purpose of which will be to measure the efficiency of a school design as it relates to cost effectiveness. The Standards do not include all possible building components and materials used in school construction. They reflect the department's belief that good design is occurring every day based on the compendium of knowledge present in Alaska's design firms and school districts. Instead, they are to provide both general guidance to the design professional in key areas of concern, and specific guidance on selected design elements and materials that DEED has identified, based on experience from prior projects.

This document is organized into three main parts:

Part 1 – **Purpose & Application** is an introduction to the Standards, their background, the intended purpose, and implementation.

Part 2 – **Design Principles** deals with overall planning and design principles for site and building design, especially as they relate to safety, security, and sustainability. The subsection, *School Buildings*, provides guidance organized by types of functional spaces.

Part 3 – **System Standards** is organized by a DEED-specific elemental cost structure[2] with specific material or system selections, design criteria, and guidance.

Within these main parts, the Standards information is further grouped or identified by the by the following:

Levels of Implementation
In Part 2 and Part 3, the Standards are grouped into categories with the following definitions:

Baseline: These are design and construction elements that are accepted practice by DEED. Not all of these elements are intended to be incorporated into any one project. Applicability will vary based on design intent, budget, region, climate, and school size/program.

Provisional: These elements are improvements, upgrades, and educational program-related enhancements to Baseline elements. These are also accepted practice by DEED, subject to applicability where noted.

Premium: These elements are considered substantial upgrades to the Baseline and Provisional designations. They can be included in a project but in most cases

[2] See DEED Standard Construction Cost Estimate Format. https://education.alaska.gov/facilities/facilitiescostformat

will not qualify for DEED funding. Inclusion of Premium elements in a project requires DEED review.

Best Practice/Lessons Learned
In addition to the Levels of Implementation, a section is provided for considerations learned based on department and stakeholder involvement in projects in Alaska. Some items may be general in nature, while others may be more region-specific.

Cost Factor and Life Cycle Cost Analysis Index
Selected design features and materials described in Part 2 Design Principles and Part 3 System Standards, have been designated with indicators of CF (Cost Factor) and LCCA (Life Cycle Cost Analysis). The indicators are followed by a numerical scale of 1 through 5 that conform to the following levels:

Designation	Additional Cost	Notes
CF-1	Less than 2%	
CF-2	2% to <5%	
CF-3	5% to <8%	
CF-4	8% to < 12%	
CF-5	12% to 15%	

Designation	Cost Savings	Notes
LCCA-1	0% to 2%	
LCCA-2	2% to <5%	
LCCA-3	5% to <8%	
LCCA-4	8% to <12%	
LCCA-5	12% to 15%	

For CF, a factor of 1 is the least costly option, 5 is the most expensive. For LCCA, 1 has the least life cycle to cost benefit, 5 has the most benefit.

Prerequisites

[This placeholder section title is for possible DEED-specific content developed around "prerequisites" on how the state might implement this document.]

Flexibility and Innovation

DEED recognizes that there will be necessary modifications to this document as new technologies and products enter the construction market. Design professionals and school district personnel are encouraged to discuss new approaches, technologies, and materials with DEED officials. Many design decisions should be based on a "life-cycle analysis" that considers energy use, first cost, operational cost, equipment life, and replacement cost. In addition, consideration should be given to materials that can be recycled and are not hazardous to the environment.

DEED understands that school facilities will differ with each school district's educational program and internal organization. The design of the building will also be influenced by the school site, region, climate, and other external factors. A one-design-fits-all approach is not advocated; however, these Standards do attempt to address cost-effectiveness, quality considerations, and design efficiency. To allow for appropriate flexibility and innovation, as discussed above, the Standards set out elements as Baseline, Provisional, or Premium. Recipients of state-aid that wish to incorporate elements that exceed these Standards (indicated as Premium) shall do so with non-state funds unless a variance is obtained from DEED.

DEED has a commitment to the development of quality educational spaces that will meet the educational needs of students in Alaska schools. Spaces and buildings should be flexible so that present and future programs can be housed appropriately to meet the needs of an ever-changing public-school curriculum. These Standards will be used by DEED when reviewing school capital projects approved for state-aid.

DEED encourages an integrated planning and design process that combines the Recipient's project requirements with these Standards to provide the design team with greater clarity as to the needs of both. The process of qualifying for state-aid for school capital projects as established in AS 14.11 provides all the necessary steps for close collaboration between the recipient district or city/borough regarding the scope of a project. From the initial application and evaluation process through the design iterations, the importance of maintaining collaboration and DEED oversight throughout is critical. A cooperative approach will ensure a smooth process.

Part 2. DESIGN PRINCIPLES

1. REGIONALLY BASED DESIGN

School construction in Alaska encompasses a wide range of climates and must respond to the challenging logistics of building in remote areas with limited construction seasons. Design principles must be adapted based on climate and geographic region. The climates zones illustrated below will be used as a baseline to identify and evaluate appropriate design strategies when the application of these Standards intersects with building operations. It remains the responsibility of design and facility professionals to understand any micro-climate or site-specific conditions that may impact the application of the Standards on a project-by-project basis.

Table A301 Alaska Census Areas

Zone 6	Zone 7	Zone 8	Zone 9
Haines	Aleutians East	Bethel	North Slope
Hoonah-Angoon	Aleutians West	Denali	
Juneau	Anchorage	Kusilvak	
Ketchikan Gateway	Bristol Bay	Fairbanks North Star	
Petersburg	Chugach	Nome	
Prince of Wales-Hyder	Coopper River	Northwest Arctic	
Sitka	Dillingham	Southeast Fairbanks	
Skagway	Kenai Peninsula	Yukon-Koyukuk	
Wrangell	Kodiak Island		
Yakutat	Lake & Peninsula		
	Matanuska-Susitna		

The four identified zones have been chosen to align with existing zones established by the Alaska Housing Finance Corporation's Commercial and Residential Building Energy Efficiency Standards (BEES) in their Alaska-specific amendments to the International Energy Conservation Code (IECC).

Consideration of geographic regions in the application of the Standards relate primarily to initial construction costs. The department has established an analytical model for the evaluation of geographic cost variations across Alaska, as it relates to school facilities, and publishes the results of that analysis as part of the *Program Demand Cost Model for Alaskan Schools*.[3] The geographic cost factors identified in that DEED publication may be used as a baseline to identify and evaluate appropriate design strategies in the application of these Standards for construction costs-on both a first-cost and life-cycle basis. As with climate zones, it remains the responsibility of design and facility professionals to understand any local variations and site-specific conditions related to construction that may impact the application of the Standards on each project.

2. SITE & INFRASTRUCTURE

A. Building Location & Orientation

The State must be involved in reviewing site selection, education specifications (i.e., programming), and design. Selected sites should be affordable, easily developed, and close to commercial-grade utilities wherever possible. In addition to the following, the current edition of the department's *Site Selection Criteria and Evaluation Handbook*[4] provides guidance and tools to assist school planners in the site selection process.

Baseline:

1. Select the building site to minimize environmental impact and encourage a simple, straightforward construction process.
2. Orient the main entrance to face primarily south. Avoid entrances facing north.
3. Evaluate prevailing wind direction and wind speeds. Provide measures such as wing walls or rails to prevent wind from catching doors and causing damage.
4. Orient the building design to maximize natural daylighting in classrooms and other occupied spaces.
5. Keep building ventilation intakes away from vehicle exhaust and other sources of air pollution. Consider the site's prevailing winds when locating intake and exhaust equipment.

Provisional:

6. Consider building and entry orientations other than provided for in Baseline when competing factors such as prevailing wind or length of entry drives govern as supported in an LCCA.
7. Consider orienting the longer axis of the building East-West when in a location or site where solar impact from a southern exposure can be maximized.

[3] See DEED *Program Demand Cost Model*. education.alaska.gov/facilities/facilitiescip#CostModel

[4] *Site Selection Criteria and Evaluation Handbook*. 2019. education.alaska.gov/facilities/publications/SiteSelection.pdf

Premium:

8. Building pads/sites with slopes in excess of 10 percent.

Best Practice/Lessons Learned

A. Sites requiring extensive earthwork, long driveways, or environmental challenges should be avoided.
B. It can be difficult to secure permits for school access drives located on major roadways with high speeds or heavy traffic. Mitigations such as turn lanes or signaling may be required that are not covered by department funding.

B. Safety & Security Site Design

Tragedies at schools around the country have reinforced the need for designs to keep students and staff safe in our public schools. School safety experts and educational facility planners have been working together to develop recommendations that cover the outside and inside of school buildings. DEED encourages school districts to consider student safety as one of the most important criteria when designing or renovating schools.

Baseline:

1. Make the main entrance easily identifiable from the street, primary parking area, or main access route.
2. In settings where the school building is at or near grade, provide main entrances with discrete physical barriers such as steel bollards/staples, boulders, planters, or other physical barriers, as applicable, to prevent vehicles from being driven into the school. Select final solution based on cost-effectiveness.
3. Maintain clear and unobstructed sight lines for security and safety.
4. Obtain preliminary approvals from the Department of Transportation & Public Facilities (driveways), the Army Corp of Engineers (wetlands), and other appropriate agencies before site approval.
5. In school settings where emergency services are available, provide emergency vehicle access to all areas of the site, including playgrounds and fields.
6. In school settings where bus service is available, separate bus loop and parent drop-off areas and install fencing or guardrails to limit pedestrian circulation to designated crosswalks and sidewalks.
7. Provide safe access for pedestrian and bicycle circulation from site entrances to the main building entrance; separate or segregate pedestrian pathways, sidewalks and/or boardwalks from vehicular traffic with markings or barriers as needed.
8. Locate play areas away from vehicle circulation and parking areas. Provide accessible pedestrian pathways to playgrounds and athletic fields that avoid vehicular traffic.
9. Provide chain link fencing at the perimeter of playgrounds as required for site control.
10. Avoid sidewalks that link to high-speed roads and highways.
11. Provide clear vehicular circulation patterns and signage. Provide stop signs and speed tables for appropriate traffic control.
12. Provide lighting at all travel ways, parking areas, and building perimeter.
13. Keep flammable and combustible fuels away from buildings except as permitted by code. Store heating fuel in above-ground, double wall tanks protected with fencing, berms, or

bollards. Small heating fuel day tanks or propane tanks serving kitchen or science room equipment may be located above ground as permitted by code.
14. Separate service vehicles from bus and parent drop-off areas.
15. Keep perennial bushes and trees a minimum of 20 feet away from each side of major entrance/exit doors. Use CPTED principles.
16. Elevate or bury electric and telephone services to reduce susceptibility to vandalism.
17. Provide adequate lighting for the main entrance sidewalk and parking lot to discourage loitering and vandalism.
18. Provide appropriate site security gates at fire lanes to prevent non-authorized vehicles from driving around the sides or back of the school.
19. Provide exterior public address systems that can be heard in the parking lot, bus loop, and playgrounds.

Provisional:

20. Consider providing clear visual access to the main entry exterior from school administration spaces for passive observation.
21. Consider developing/designating emergency staging areas on-site.
22. Consider providing a secondary access to the site for emergency vehicles.
23. Consider how an emergency evacuation will be conducted. Consider bus loading areas and/or staging areas.
24. Consider using electric kitchen equipment and small burners with fuel canisters in science programs in lieu of piped propane or natural gas systems.

Premium:

25. Locally required (i.e., municipality, borough) off-site improvements including off site-staging and assembly areas.
26. Concrete sidewalks further than 100 ft from the main entrance.
27. Perimeter fencing at site boundaries/property lines except as incorporated at playgrounds and sports fields.

Best Practice/Lessons Learned

A. For increased security, consider using individual fuel canisters at science workstations in lieu of external tanks and/or piped gas(es).

C. High-Performance Site Principles

Baseline:

1. Site buildings to maximize daylighting (locating the school on an East-West axis).
2. Choose native and adaptive plants that do not need permanent irrigation systems.
3. Conduct a Phase I Environmental Assessment (and Phase II, if necessary, based on Phase I) to identify hazardous materials. Conduct required mediation on-site.
4. Control erosion and sedimentation during construction.

Provisional:

5. Consider opportunities to reduce light trespass onto adjacent sites and improve nighttime visibility by reducing up-lighting, reducing maximum lumens of fixtures above horizontal, and locating luminaires well inside the project site boundary.
6. Consider opportunities to reduce impervious surfaces on-site, reduce quantity and improve quality of stormwater runoff. Practice low-impact rainwater management strategies.
7. Consider alternatives to piped stormwater systems to include bioswales, pervious pavements, and retention basins.
8. Consider maximizing snow storage on-site where possible; be aware of the impacts of on-site drainage, security site lines, and visual observation.
9. Consider installation of school vegetable gardens when in support of established educational curriculum.

Premium:

10. Green roofs.

Best Practice/Lessons Learned

A. (Reserved)

3. SCHOOL BUILDINGS

Every school plan should be a reflection of the Space Allocation Guidelines found in Alaska Administrative Code (4 AAC 31.020), as well as the school district's educational specifications and pedagogy. The opportunity to design new or redesign existing school buildings is often a once-in-a-lifetime experience for teachers, school boards, and the local community. Serious consideration should be given to a comprehensive educational visioning process that reviews current state-of-the-art thinking and considers which educational strategies are most appropriate for the school's age group and local community values. Learning spaces should support traditional as well as expeditionary and "virtual" learning experiences. The following general planning principles apply to all school facility design:

A. General Planning Principles

Baseline:

1. Design interior wall layouts to be simple and straightforward.
2. Zone the building to accommodate public and after-hours use.
3. Zone the building for lockdowns that allow different sections of the building to be securely isolated.
4. Design the floor plan to carefully separate quiet, academic areas from noisy, high activity functions.
5. Design classrooms to conform to best practices for acoustic isolation and separation as defined by ANSI-S12.60.
6. Organize functional layouts to support small-group and large-group activities.
7. Designs should emphasize multi-functioning rooms to maximize daily use and minimize underutilized spaces.

8. Design the floor plan to optimize multi-functioning spaces such as cafeterias, commons, gymnasiums, and exploratory labs.
9. Arrange school such that public restrooms are accessible to after-hour spaces without gaining access to the rest of the school (Reference *0831 Control Systems* for additional standards).
10. At the Concept Design or Schematic Design phase, school designs for projects with greater than 30 percent new space must demonstrate the ability to be expanded to accommodate a 30 percent increase in student population.
11. Provide acoustical and smoke separation by designing classroom walls to extend to the underside of the structural deck whenever possible and when required by codes.

Provisional:

12. Consider single or double intercommunicating doors between classrooms.
13. Consider designing schools to be as flexible as possible to accommodate future learning styles and technology.
14. Consider flexible breakout and small-group rooms with whiteboards, tackable surfaces, and configurable FF&E.

Premium:

15. Complex floor patterns involving curves, cuts, and intricate details. CF-2.
16. Wood floors (except where allowed for gymnasiums), natural stone floors, or terrazzo.
17. Elaborate, expensive, curved, or complex walls, ceilings, windows, and arches.
18. Designs with more than one elevator.
19. Stairways not required by code for egress.
20. Elaborate, monumental stairs, regardless of location or code compliance.
21. Interior channel glass wall systems or glass block walls.
22. Complex ceilings with multiple levels and decorative soffits. CF-2.
23. Operable partitions or full-height sliding doors.

Best Practice/Lessons Learned

A. (Reserved)

B. Safety & Security Building Design

Baseline:

1. Design the building so it can be locked down into separate security zones, preferably at internal firewalls requiring rated steel fire doors.
2. Design the building to reduce nooks and areas where visibility is reduced or compromised.
3. Provide a single point of entry for all visitors that is easily identifiable from the main approach to the school. When called for by school district policy, visitors shall enter through a secure vestibule at the main building entrance. This arrangement may not be practical to accommodate in a renovation or necessary in a very small school.
4. Safety and Security at Main Office:
    a. Locate the main office door adjacent to the security vestibule lobby so office personnel can maintain visual supervision while visitors come in to sign the visitor log.

b. Provide an accessible electronic security panic button in the office that can send a signal to police or emergency responders when a crisis is developing at the school.
c. Provide a minimum of two locations for interior intercom and exterior public address system. The second location should be designated as a "safe room."
d. Design main offices with a second means of exit, either directly outdoors or into a more remote hallway.
e. Provide security cameras at the main entrance and other remote locations around the school. Video systems should be capable of being reviewed for live on-demand broadcasting as well as a minimum thirty-day archival library system.
f. Design the main office so it has easy supervision of the security vestibule, the main entrance lobby, and one or more main corridors leading into the "heart" of the school.

5. Provide a minimum of two means of exit out of any gymnasium, cafeteria, or library if the number of occupants is above 50.
6. Provide locked, secure chemical storage areas that are not accessible to students or visitors.
7. Install exterior rain canopies at the main entrance and exterior doors that are expected to have high usage.
8. Minimize the number of exterior doors that need to be supervised or checked for security and safety purposes.
9. Provide exterior doors convenient to playgrounds and playfields that can be quickly unlocked by access control in cases requiring "reverse evacuation."

Provisional:

10. Consider putting fire doors on electric hold opens and having them tied into the emergency security notification system that allows the main office to release fire doors for lockdown.

Premium:

11. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

C. Safety & Security at Building Entries

Baseline:

1. Design all exits and entrances so the building can be securely locked down after the start of school if necessary.
2. Design all major entrances and exits with vestibules if they are likely to be used during school hours.
3. In a secure vestibule arrangement, the interior bank of doors of the vestibule should be equipped with an electronic strike (or equivalent electrical release) that allows the door to be unlocked electronically by main office personnel after visitors have been approved for entrance.
4. Provide video cameras in the ceiling of the secure vestibule and directly inside of the vestibule doors so that visitors can be reviewed later on video loops.
5. Provide a secure door at the service entrance with access control and a means of identifying visitors without opening the door.

6. Provide electronic access control systems for staff at the main entrance and at least one other staff entrance.
7. Design entrance doors to be controllable from a remote location, preferably at the administrative office, with a direct view and oversight of the main entrance security vestibule.
8. Provide security glass at remote exterior doors or sidelites.
9. Provide steel frame doors with no glass vision panels at remote, unsupervised doors.
10. In buildings that are at or near grade, protect all front entrances and other entrances with more than a single leaf door and used on a regular basis throughout the school day with concrete-filled steel bollards or other appropriate, rugged obstructions.

Provisional:

11. (Reserved)

Premium:

12. Pivot hinges, sliders, or revolving doors.
13. Electric door openers other than those at the minimum number of entries required to be accessible.

Best Practice/Lessons Learned

A. (Reserved)

D. Safety & Security at Classrooms

Baseline:

1. Provide commercial-grade hardware and locksets on all doors.
2. Provide hardware at classroom doors that allows the door to be quickly locked by the teacher from the inside.
3. Provide a phone and/or two-way intercom system in every classroom.

Provisional:

4. Consider vision panels with security glass in classroom doors.

Premium:

5. Security cameras within classrooms.

Best Practice/Lessons Learned

A. Provide a minimum of one National Fire Protection Assoc. (NFPA) approved escape window in every classroom, where necessary.

Category A – Instructional or Resource

General Use Classrooms

Baseline:

1. Provide space and amenities for instruction and learning associated with grade levels in support of adopted curriculum and a variety of teaching/learning styles in all or some of the following areas: instructor-led learning, individual, team and project-based learning, small

group activities, computer-based learning/research, instructional storage, and personal storage.

2. Provide from among the following features for this educational space:

System	Features
Planning Factors	**Elementary General Classroom**: 800 – 1,250; minimum 550sf **Secondary General Classroom**: 650 – 1,000; minimum 550sf
Spatial Elements	Ceilings: 9ft +/-, traditional rectangular or 'fat L' configuration
Finishes	Floor: resilient sheet/tile at project and entry/exit areas (where used), carpet at teacher and student stations. Ceiling: acoustic tile Walls: GWB with paint
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	Sills at approx. 42in or lower for visual connection to exterior; one operable unit minimum
Specialties	36in base cabinets w/laminate counter (adjust where needed for accessibility), 42in wall cabinets, teacher wardrobe, whiteboard, tackboard, window coverings (glare control)
Plumbing	None required; see Provisional below
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Pendant or drop-in indirect, banked controls plus dimming
Power	110v duplex for code compliance, 110v quadplex at each data port
Special Systems	Phone/intercom, synchronized clock, interactive display, wireless internet, duplex data ports (approx. 1 per 4 students + teaching station)
Equipment/Furnishings	None required (FF&E not covered in these Standards)

Provisional:

3. Consider ceiling heights not to exceed 10ft in classrooms serving any grades 9-12.
4. Consider double leaf door openings between classrooms.
5. Consider classroom cubbies for coats, hats, and boots in grades Pre-K–2; extend through grade 6 where space for corridor lockers is limited.
6. Consider toilets in the classrooms for grades Pre-K, Kindergarten, and K-1 combined classrooms. Add seamless resilient flooring with integral coved base or ceramic tile flooring/base and FRP wainscoting to a height of 48in in wet areas to *Finishes*.
7. Consider using soffit framing and GWB where needed at ceilings to conceal building services systems (ref. *0612 Soffits & Ceilings*).
8. Consider infrared touchless fixtures in classroom toilet rooms.
9. Consider sinks in the classroom serving grades Pre-K–5; extend to grade 6 in schools serving grades K-6. Add paper towel and soap dispenser to *Specialties*.

10. Consider solid-surface polymer counter tops where sinks are installed.
11. Consider providing one whiteboard with multiple sliding panels per classroom (8ft typical); especially at upper-level math/science.
12. Consider paperless gypsum board or water-resistant materials for wet walls.
13. Consider instructional voice amplification system.
14. Consider specifying 'blackout' shades versus glare control where needed to support the instructional program.

Premium:

15. Sinks in general use classrooms beyond grade 6.
16. Operable wall systems or full-height sliding doors.
17. Curved walls.
18. Architectural woodwork such as picture rails, wainscoting, crown moldings, or paneling.
19. Decorative ceiling systems such as metal or wood slat ceilings.
20. Decorative lighting.
21. Ceramic tile walls in a toilet room located inside a classroom.

Best Practice/Lessons Learned

A. Design all classroom doors to be easily lockable from the inside by the teacher but to allow egress from the classroom at any time.
B. Specify laminate counter tops with postformed front edge for durability. Use field-installed backsplash for efficient transportation.
C. Confirm carpet for classroom floors with building owner/maintenance staff, specifically in remote areas where paved pedestrian surfaces are not common thus increasing the amount of dirt on footwear.
D. Consider that 3mm PVC edge fares better long-term than post-formed edge and is less expensive and easier to install if you have L- or U-shaped counter arrangements.
E. Specify extended rims for classroom sinks with bubblers.
F. Provide waterproof finishes at 'in-classroom' coat and boot storage.
G. Consider appropriate fixture location and light levels on vertical surfaces used for instruction (whiteboards, screens, televisions, etc.).

Specialized Instruction

Special Education

Baseline:

1. Provide space and amenities for instruction and learning for students with special needs as identified in an individual education plan (IEP) for all grade levels in support of adopted curriculum and a variety of education delivery in all or some of the following areas: group activity, motor skills, center-based activities, project-based, etc. Include core curriculum life skills, occupational/physical therapy. Provide instructional storage, personal storage, and health/hygiene support.

2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Provided dedicated space where student population exceeds 50; typical 700 – 1,000sf; minimum 600sf + 200 – 400sf support space
Spatial Elements	Ceilings: 9ft +/-, traditional rectangular or 'fat L' configuration
Finishes	Floor: resilient sheet/tile at project and entry/exit areas (where used), carpet at teacher and student stations, seamless resilient or ceramic tile at toilet room Ceiling: acoustic tile. Walls: GWB paint, FRP at OT/PT to 48in
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	Sills at approx. 42in or lower for visual connection to exterior; one tilt/turn operable unit minimum
Specialties	36in base cabinets w/laminate counter, 42in wall cabinets, teacher wardrobe, whiteboard, tackboard, window coverings (full, room darkening)
Plumbing	Stainless steel double sink w/lever mixing valve; toilet room with water closet and lavatory
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance; see also Provisional
Lighting	Pendant or drop-in indirect, banked controls plus dimming
Power	110v duplex for code compliance, 110v quadplex at each data port
Special Systems	Phone/intercom, synchronized clock, interactive display, projector, duplex data ports (approx. 1 per 4 students + teaching station)
Equipment/Furnishings	Structure-mounted OT/PT items such as swings and tables; undercounter refrigerator; wall-mounted equipment rack(s)

Provisional:

3. Consider instructional kitchen with range, refrigerator, microwave/hood, dishwasher (all residential) for life skills programs serving grades 6-12; add approx. 150sf to listed planning factors.
4. Consider solid-surface polymer counter tops where sinks are installed.
5. Consider color temperature adjustable and dimmable lighting in special needs classrooms and behavioral settings.
6. Consider accessible restroom where program requires. Add to Finishes: seamless resilient or ceramic tile flooring and ceramic tile to a wainscoting height of 48in in wet areas.
7. Consider accessible shower where program requires.
8. Consider en-suite washer and dryer for larger programs; shared washer/dryer with other programs (e.g., Gymnasium, Food Service, etc.) in smaller schools.
9. Consider quiet or timeout spaces that are hygienic, vandal proof, and code compliant.

Premium:

10. Instructional kitchens in schools serving only grades K-5.

Best Practice/Lessons Learned

A. Integrate special needs spaces within the larger school population.
B. For life skills programs in small student populations, consider multi-function use of kitchen/kitchenette provided in support of other programs.
C. Consider OT/PT space adjacent to or inside of other multi-functioning spaces to maximize efficiency.
D. Provide appropriate structural support for special swings or hanging equipment in OT/PT spaces; may require increased ceiling height above Baseline.
E. Locate on entry level; consider easy access from accessible parking spaces.

Art

Baseline:

1. Provide space and amenities for dedicated visual arts instruction, cultural education, and learning in all or some of the following areas: multi-media drawing/painting, multi-media sculpture/fabrication including wood, plastics, fabrics, digital 2D and 3D art including printing. Support includes instructional storage, devices, and equipment.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Dedicated space where K-6 student population exceeds 300, or 7-12 student population exceeds 200; typical 900 – 1,500sf including support spaces; separate kiln room typical 80sf (see Premium for ceramics)
Spatial Elements	Ceilings – 10ft +/-, traditional rectangular configuration
Finishes	Floor: polished concrete or 'seamless' resilient Ceiling: acoustic tile Walls: GWB with paint
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	Optional
Specialties	36in base cabinets w/stainless steel counter, storage base cabinets to 52in, wall cabinets, teacher wardrobe, whiteboard, tackboard, window coverings (glare control)
Plumbing	Utility sinks (3) w/hot and cold valves, cleanable drain traps and solids interceptor
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance; provide negative pressure where required by products used; exhaust at kiln room (see Premium for ceramics)

System	Features
Lighting	Pendant or drop-in indirect, three-bank controls plus dimming; utility track lighting at display walls
Power	110v duplex for code compliance, 110v quadplex at each data port; GFCI outlets; floor or retractable ceiling at large project area
Special Systems	Phone/intercom, synchronized clock, projector, retractable screen, duplex data ports (1 per 6 students + teaching station)
Equipment/Furnishings	Display case(s)

Provisional:

3. Consider separate instructional storage area for large programs.
4. Consider exposed structure at ceilings; provide suspension grid for display.
5. Consider floor drains with cleanable solids traps and trap primers.
6. Consider multiple station student cleanup sinks.
7. Consider instructional voice amplification system.
8. Consider specifying 'blackout' shades versus glare control where needed to support the instructional program.

Premium:

9. Ceramics/pottery equipment in schools serving students below grade 9, or grades 6-8 with school capacity below 500 students.
10. Stone or epoxy counter tops.
11. Wood cabinetry or architectural millwork.
12. Decorative or special track lighting.
13. Decorative flooring, ceramic tile, or epoxy coatings.

Best Practice/Lessons Learned

A. Provide acoustical absorption panels in exposed ceilings as needed.
B. Orienting display cases to corridors adjacent to Art rooms is beneficial to increase exposure.
C. Consider appropriate fixture location and light levels on vertical surfaces used for instruction (whiteboards, screens, televisions, etc.).
D. Consider the use of marine edge and drain board, especially for ceramic programs.

Science

Baseline:

1. Provide space and amenities for dedicated science instruction and learning in all or some of the following areas: physical and life sciences. Support includes instructional storage, devices, and equipment.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Provide dedicated space where grade 7-12 student population exceeds 50; typical 900 – 1,200sf including support spaces such as prep rooms
Spatial Elements	Ceilings: 9ft +/-, rectangular configuration

System	Features
Finishes	Floor: polished concrete or seamless resilient. Ceiling: acoustic tile. Walls: GWB w/paint
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	Optional
Specialties	Base cabinet lab stations w/resin work surface, wall cabinets (lockable), teacher demonstration center, teacher wardrobe, whiteboard, tackboard, window coverings (as needed)
Plumbing	Sinks integrated in lab stations w/cold water, deep clean-up sink w/hot and cold, portable eye wash, see Provisional below
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance; exhaust air not recirculated; direct exhaust at demonstration, negative pressure
Lighting	Pendant or drop-in indirect, three-bank controls plus dimming
Power	110v duplex for code compliance, 110v quadplex at each data port
Special Systems	Phone/intercom, synchronized clock, interactive display, projector, duplex data ports at lab stations.
Equipment/Furnishings	Chemical storage cabinets

Provisional:

3. Consider ceiling heights not to exceed 10ft in classrooms serving any grades 9-12.
4. Consider deluge showers with floor drains for programs serving grades 10-12.
5. Consider plumbed eye wash stations with floor drain.
6. Consider fume hoods, acid neutralization tanks, and acid-resistant plumbing, where needed, in chemistry labs.
7. Consider including gas piped to chemistry fume hoods.
8. Consider instructional voice amplification system.
9. Consider using bottled propane rather than plumbing gas to stations.
10. Consider providing movable lab tables in place of built-in stations.
11. Consider chemical resistant counter tops in chemistry labs.
12. Consider the use of movable counter height lab tables.
13. Consider the use of hot plates for chemistry labs in place of gas.

Premium:

14. Compressed air systems.
15. Gas at rooms other than chemistry.
16. Fume hoods at rooms other than chemistry.

Best Practice/Lessons Learned

A. Design to maximize shared amenities such as fume hoods, prep rooms, and storage.

B. Consider separate acid, flammables, and general chemical storage cabinets, lockable, to provide better inventory control and safety.

Bi-Cultural/Bilingual & Consumer Education

Baseline:

1. Provide space and amenities for project-based learning associated with cultural and traditional language heritage when supported with intentional curriculum in all or some of the following areas: food processing and preparation, construction and use of traditional art/artifacts and apparel, oral and visual presentation both live and electronic.
2. Provide from among the following features for this educational space:

System	Features
Planning Factor	Provide dedicated space where 7-12 student population exceeds 30; typical 900 – 1,200sf including support spaces
Spatial Elements	Ceilings: 10ft +/-, rectangular, typical 900 – 1,200sf including support spaces
Finishes	Floor: resilient sheet/tile Ceiling: acoustic tile Walls: GWB with paint
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*; see Provisional for exterior door
Windows	Sills at approx. 42in or lower for visual connection to exterior; one operable unit minimum
Specialties	36in base cabinets w/laminate counter, solid surface counter at sink, 42in wall cabinets, teacher wardrobe, whiteboard, tackboard, window coverings (glare control); paper towel dispenser, soap dispenser
Plumbing	Stainless steel double sink w/lever mixing valve
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	Range hood at cooking surfaces
Lighting	Drop-in indirect, two-bank controls
Power	110v duplex for code compliance, 110v quadplex at each data port, as required for appliances
Special Systems	Phone/intercom, synchronized clock, interactive display, projector, duplex data ports (approx. 1 per 4 students + teaching station)
Equipment/Furnishings	Range, Refrigerator, Microwave/hood, Dishwasher (all residential)

Provisional:

3. Consider an exterior door for biologic products and/or for the purpose of afterhours/ community use (control other interior access as needed).
4. Consider solid-surface polymer counter tops where sinks are installed.
5. Consider dedicated room exhaust for odor control.
6. Consider solids interceptor on waste pipe and accessible cleanout on waste riser.

7. Consider locking hardware on one or more cabinets if valuables will be stored.
8. Consider elements for display of 2D and 3D projects.
9. Consider task lighting, recessed or surface mount, in support of specific curricular and room use needs.
10. Consider instructional voice amplification system.
11. Consider walk-off flooring for classrooms with exterior doors.
12. Consider specifying 'blackout' shades versus glare control where needed to support the instructional program.

Premium:

13. Commercial appliances.
14. Laundry appliances.
15. Oversize or non-standard doors.

Best Practice/Lessons Learned

A. Design door configurations to allow for the easy movement of large instructional items.
B. Design room enclosure (walls, floors, ceilings) and ductwork to reduce sound transfer to adjacent spaces.

Computer/Technology Lab (Reserved)

Music/Drama

Baseline:

1. Provide space and amenities for dedicated music instruction and learning in all or some of the following areas: choral/singing, instruments, music appreciation, drama, and dance instruction. Support includes instructional storage, devices, and equipment.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Dedicated space where K-6 student population exceeds 300, or 7-12 student population exceeds 200; typical 800 – 1,200sf including en-suite office/storage room; provide acoustical isolation
Spatial Elements	Ceilings: 12ft +/-, rectangular configuration
Finishes	Floor: rubber sheet/tile for ambient noise control Ceiling: acoustic tile Walls: GWB w/paint; may incorporate sound absorptive materials
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	Optional at K-6 space; none typical at 7-12 space
Specialties	Lockers/cabinets (lockable) for instrument storage, wall cabinets, sheet music, teacher wardrobe, whiteboard (2), window coverings (glare control)
Plumbing	None required; see Provisional below

System	Features
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Pendant or drop-in indirect, three-bank controls plus dimming
Power	110v duplex for code compliance, 110v quadplex at each data port
Special Systems	Phone/intercom, synchronized clock.
Equipment/Furnishings	None required

Provisional:

3. Consider separate office/instructional storage area for large programs. Fit this space with additional *Specialties* to include: open wall shelving, work counter for instrument repair, upper and lower cabinetry for storage of materials and resources, lockable wardrobe storage, and tackboard.
4. Consider acoustical tuning in programs serving grades 9-12.
5. Consider dedicated practice rooms in programs serving grades 9-12. Provide security glass in doors.
6. Consider acoustic vestibules at doorways where sound isolation cannot be resolved by adjacency or construction features.
7. Consider instructional voice amplification system.
8. Consider providing portable bandshells as FF&E.
9. Consider specifying 'blackout' shades versus glare control where needed to support the instructional program.
10. Consider prefabricated practice rooms. CF-2; LCCA-2.

Premium:

11. Sloped or tiered floors in programs below grade 6; where provided must meet ADA provisions.
12. Natural hardwood paneling or woodwork used as acoustical baffles and reverberation panels.
13. Specialty flooring.
14. Television or acoustical recording studios or services.

Best Practice/Lessons Learned

A. Consider adjacency to Gymnasium, Auditorium (& Stage), and Multipurpose Room; access to stage and performance areas.
B. Design door configurations to allow for the easy movement of pianos, drums, and other large instruments.
C. Design walls, floors, and ventilation systems to prevent noise through these or related structural elements.

Career & Technical Education

Baseline:

1. Provide space and amenities for dedicated career and technical education in all or some of the following area: wood, metal and plastics fabrication, general construction, small engine repair. Space should also provide for lectures, demonstration, discussion with presentation capability. Support includes instructional storage, devices, and equipment.

2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Provide dedicated space where 6-12 student population exceeds 30; typical 900 – 1,200sf including support spaces
Spatial Elements	Ceilings: 10ft +/-, traditional rectangular configuration
Finishes	Floor: sealed concrete, protected wood Ceiling: acoustic tile Walls: GWB with protective material (plywood, steel sheet, FRP, etc. to 8ft), paint above
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	Optional; sill height approx. 60in minimum to maximize wall storage
Specialties	72in locker cabinets, lockable tool cabinet(s), teacher wardrobe, whiteboard, tackboard
Plumbing	Utility sink (1) w/hot and cold valves, cleanable solids drain traps; see Premium below
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance; provide negative pressure; (welding exhaust see Provisional)
Lighting	Pendant or drop-in indirect, three-bank controls plus dimming; utility track lighting at display walls
Power	110v duplex for code compliance, 220v power for equipment; GFCI outlets; emergency shunts on tool circuits
Special Systems	Phone/intercom, synchronized clock, projector, retractable screen, duplex data ports (1 per 6 students + teaching station)
Equipment/Furnishings	Floor mounted wood/plastic working, metal working tools by instructional program; dust and exhaust system (see Provisional)

Provisional:

3. Consider separate instructional storage area for large programs.
4. Consider separate, secure area for tool storage.
5. Consider floor or retractable ceiling power at large project areas.
6. Consider exposed structure at ceilings.
7. Consider plate steel protection with traction enhancement over plywood at floors. CF-4
8. Consider insulated overhead door to exterior for large item entry/exit.
9. Consider covered, secure exterior storage for large materials not sensitive to exposure.
10. Consider multiple station student cleanup sink.
11. Consider centralized dust collection system to exterior tank for large programs.
12. Consider centralized welding exhaust system to exterior for large programs.

Premium:

13. Distributed compressed air systems.

14. Centralized welding exhaust systems for curriculum requiring less than three welding booths.

Best Practice/Lessons Learned

A. Often designed as 'maker space' for grades 6-8 with powered hand tools only.
B. In some cases, a double leaf door with removable center mullion has been used in lieu of an overhead door.
C. Portable HEPA filter units purchased as FF&E have been effective for welding shops to support activities outside of hooded areas.
D. To enhance energy efficiency, specify a recirculating dust collection system to reduce make-up air requirements.

Assembly Spaces

Library /Media Center

Baseline:

1. Provide space and amenities which support the following uses: collections (i.e., stacks), computer workstations, individual and group seating, staff workspace, meeting/collaboration space, and presentation space.
2. Provide from among the following features for this educational space:

System	Features
Planning Factor	Provide dedicated space where student population exceeds 50; typical 750 – 3,000sf (approx. 5sf/student at large populations) + 100 – 500sf of support space
Spatial Elements	Ceilings: 10ft +/-, vaulted accepted, non-rectilinear room configuration accepted
Finishes	Floor: carpet, resilient sheet/tile at workroom Ceiling: acoustic tile Walls: paint
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	Sills at approx. 42in or lower for visual connection to exterior; maximize under allowable energy standards
Specialties	Whiteboard, tackboard, window coverings (full, room darkening) (see Provisional for support spaces)
Plumbing	None required
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance; minimize system noise in this space
Lighting	Pendant or drop-in indirect, banked controls plus dimming
Power	110v duplex for code compliance, 110v quadplex at each data port, integral USB ports

System	Features
Special Systems	Phone/intercom, synchronized clock, interactive display, projector, duplex data ports (approx. 1 per 4 students + teaching station), robust wireless
Equipment/Furnishings	Circulation desk

Provisional:

3. Consider planning and design guidance from the American Association of School Librarians (AASL).
4. Consider distributed versus centralized media for small student populations and adjust classroom sizes accordingly.
5. Consider library office/workroom within or adjacent to the library space. Provide 36in base cabinets w/laminate counter, lockable drawer cabinets and intermittent openings for knee space.
6. Consider a single bowl stainless steel sink in workroom. Add paper towel and soap dispensers to *Specialties*.
7. Consider library storage room to have upper and lower cabinetry, heavy duty shelving, lockable file cabinets, video monitors and other A/V equipment on rolling carts and laptop carts.
8. Consider providing an exterior swing door for connection to supporting exterior spaces or after-hours entrance to support extended use (control other interior access as needed).

Premium:

9. Space required for non-district, municipal/borough-owned library functions.
10. Architectural woodwork such as picture rails, wainscoting, crown moldings, or paneling.
11. Decorative lighting.
12. Custom ceilings, soffits, skylights, or other monumental architectural features.
13. More than one exterior door.

Best Practice/Lessons Learned

A. Design room enclosure (walls, floors, ceilings) and ductwork to reduce sound transfer to adjacent spaces.
B. Design room and furniture layout for easy supervision, avoiding unviewable zones.
C. Place book shelving, full height, at perimeter only; as electronic media increases, this will facilitate multi-function use of space.
D. Review structural design for heavy book loading when present.
E. Provide moveable furniture and equipment for maximum flexibility; use fixed, built-in features sparingly.
F. The preceding standards are based on centralized library and media display/use. This Equipment may not be needed if books and media are distributed throughout a school.

Gymnasium

Baseline:

1. Provide space and amenities for physical education supported with intentional curriculum in all or some of the following areas: gross motor activity, group play and competition, skill, and knowledge in individual, recreational, and team sports, fitness, dance, etc.
2. Provide from among the following features for this educational space:

<table>
<tr><th>System</th><th>Features</th></tr>
<tr><td>Planning Factor
Notes:
1. Does not include spectator space; at lowest populations spectator space may be unavailable unless combined with Commons or Multipurpose.</td><td>3,500sf (common basketball court size 60ft x 40ft)
<table>
<tr><th>Grade Level(s)</th><th>Student Population</th><th>Notes</th></tr>
<tr><td>K-12</td><td>30 – 55</td><td></td></tr>
<tr><td>K-6</td><td>30 – 400</td><td></td></tr>
<tr><td>7-12</td><td>25-50</td><td></td></tr>
<tr><td>Mixed Grade</td><td>30-55</td><td></td></tr>
</table>
Note: For student populations below 30 (45 if K-6 only) see Multipurpose Room
5,000sf (common basketball court size 74ft x 42ft)
<table>
<tr><th>Grade Level(s)</th><th>Student Population</th><th>Notes</th></tr>
<tr><td>K-12</td><td>55 – 170</td><td></td></tr>
<tr><td>K-6</td><td>400 – 900</td><td></td></tr>
<tr><td>7-12</td><td>50-160</td><td></td></tr>
<tr><td>Mixed Grade</td><td>55-170</td><td></td></tr>
</table>
Note: For K-6 student populations beyond this maximum, possible multiple gymnasium space is acknowledged.
7,500sf (common basketball court size 84ft x 50ft)
<table>
<tr><th>Grade Level(s)</th><th>Student Population</th><th>Notes</th></tr>
<tr><td>K-12</td><td>170 – 330</td><td></td></tr>
<tr><td>K-6</td><td>N/A</td><td></td></tr>
<tr><td>7-12</td><td>160-400</td><td></td></tr>
<tr><td>Mixed Grade</td><td>170-330</td><td></td></tr>
</table>
Note: For student populations beyond these maximums, multiple gymnasium space is acknowledged.</td></tr>
<tr><td>Spatial Elements</td><td>Ceilings: minimum 24ft to structure, vaulted/exposed typical, rectangular configuration</td></tr>
<tr><td>Finishes</td><td>Floor: synthetic sports floor
Ceiling: open to structural deck or GWB with adhered acoustic
Walls: protective material (plywood/OSB, FRP, etc. to 10ft), paint above</td></tr>
<tr><td>Doors</td><td>Interior and exterior for code compliance; hardware, see Safety & Security at Classrooms and Safety & Security Building Design</td></tr>
<tr><td>Windows</td><td>Optional</td></tr>
<tr><td>Specialties</td><td>(see Provisional for support spaces)</td></tr>
<tr><td>Plumbing</td><td>Drinking fountain with water bottle fill station, 1 + ADA</td></tr>
<tr><td>Heating/Cooling</td><td>As calculated for code compliance</td></tr>
</table>

System	Features
Ventilation/Exhaust	As calculated for code compliance
Lighting	High bay fixed or surface mount; provide impact protection
Power	110v duplex for code compliance
Special Systems	Phone/intercom, synchronized clock, LCD projector, retractable screen, robust wireless
Equipment/Furnishings	Basketball backboards/rims, climbing apparatus, bleachers

Provisional:

3. Consider available space within allowable maximum (4 AAC 31.020) for Gymnasium support spaces to include: instructor office(s), spectator/classroom seating, and equipment storage (See Locker Room for other dedicated support space.).
4. Consider multi-layer, cushioned hardwood floor systems for programs serving any grades 6-12.
5. Consider floor markings in support of any sport or activity in the curricular program.
6. Consider school names, mascots, or logos on floor, integrated with court markings.
7. Consider installing damage-resistant light fixtures where susceptible to damage.
8. Consider translucent panels or opaque window glass for glare control where optional windows are not north facing.
9. Consider safety and security cages around fixtures, controls, thermostats, sensors, sprinkler heads, etc. where susceptible to damage.
10. Consider strategies for maintaining appropriate humidity levels for wood flooring.
11. Consider sports net dividers to maximize class use of gymnasiums.
12. Consider wall padding when walls are in close proximity to out-of-bounds court lines.
13. Consider adjustable, retractable basketball backboards/hoops.
14. Consider recessed floor sleeves for volleyball posts.
15. Consider motorized bleachers at height-stacks greater than 8ft.
16. Consider destratification fans for efficiency and comfort.

Premium:

17. Indoor running tracks/mezzanine.
18. Separate, specialized dehumidification systems for wood floors.
19. Glass backboards or automatic electric winch backboards other than two for the main court.
20. More than one electrically operated net/divider system.
21. College or professional grade floor systems.

Best Practice/Lessons Learned

A. Consider gymnasiums as possible multi-functioning and multipurpose spaces. Provide enough sound absorbing material to allow for good voice recognition, and appropriate sound amplification for group presentations.
B. Locate gyms adjacent to or with easy access to exterior playfields and parking lots for public events.
C. Provide public toilet areas near the gymnasiums.

D. Provide for wireless network computer access in the gymnasium and offices.
E. Locate bleachers and gymnasium doors to protect floors from street shoe traffic.
F. Locate door swings, equipment, and other enclosures so they do not become dangerous obstructions to running students playing within the space.
G. Place climbing ropes appropriate distance from walls to account for swinging.
H. Provide afterhours access to gymnasium space (and public restrooms) while restricting access to remainder of the school.
I. Avoid radiant floor systems. They may damage the floor system and cannot react quickly enough to dramatic occupancy changes.
J. Zone heating and ventilation system so that gymnasium and after hour space activities can operate separately from the rest of the school.

Category B – Support Teaching

Shared Spaces

Teacher Workroom/Offices

Baseline:

1. Provide space and amenities for teacher and staff access to centralized instructional resources and equipment. If preparation and/or teacher office/administration is distributed, provide consolidated restroom amenities.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Typical 300 – 1,000sf; plus restroom space
Spatial Elements	Ceilings: 8ft +/-, rectangular configuration
Finishes	Floor: resilient sheet/tile at Workroom, carpet, or resilient sheet/tile at Offices Ceiling: acoustic tile Walls: paint
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	One tilt/turn operable unit minimum
Specialties	Laminate counter work surface over back-to-back base cabinets, 42in wall cabinets over base cabinets/counter, open shelving and/or cubbies, whiteboard, tackboard, window coverings
Plumbing	None
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Pendant or drop-in indirect, banked controls plus dimming
Power	110v duplex for code compliance, integrated USB ports, dedicated power for appliances
Special Systems	Phone/intercom, synchronized clock
Equipment/Furnishings	Refrigerator, coffee maker (if plumbed), networked printer/copier

Provisional:

1. Consider consolidated unisex toilet in support of distributed office/workrooms. Provide seamless resilient or ceramic tile flooring, and FRP on walls to a wainscoting height of 48in in toilet room, add to *Finishes*.
2. Consider infrared touchless fixtures in toilet room.
3. Consider solid-surface polymer counter tops where sinks are installed.

Premium:

4. Solid-surface counters at other than wet locations.
5. Commercial appliances.

Best Practice/Lessons Learned

A. Specify laminate counter tops with postformed front edge for durability. Use field-installed backsplash for efficient transportation.
B. Zero threshold transition at room entry is ideal for rolling carts in/out at teacher workroom.

Teacher Breakroom

Baseline:

1. Provide space and amenities for teacher and staff breakroom, food storage and preparation. Provide restroom(s).
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Typical 200 – 800sf; plus restroom space
Spatial Elements	Ceilings: 8ft +/-, rectangular configuration
Finishes	Floor: carpet, or resilient sheet/tile, sheet/tile at Toilet, Ceiling: acoustic tile Walls: paint
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	One tilt/turn operable unit minimum
Specialties	Kitchenette base cabinets and wall cabinets, 'mail slot' casework, whiteboard, tackboard, window coverings; paper towel and soap dispenser
Plumbing	Stainless steel single bowl sink w/lever mixing valve; toilet room with water closet and lavatory
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Pendant or drop-in indirect, banked controls plus dimming
Power	110v duplex for code compliance, integrated USB ports, dedicated power for appliances
Special Systems	Phone/intercom, synchronized clock
Equipment/Furnishings	Refrigerator, coffee maker (if plumbed), networked printer/copier

Provisional:

3. Consider range+hood and dishwasher if used in support of special needs life skills.
4. Consider seamless or ceramic tile flooring and ceramic tile to a wainscoting height of 48in in toilet room, add to *Finishes*.
5. Consider infrared touchless fixtures in toilet room.
6. Consider solid-surface polymer counter tops where sinks are installed.

Premium:

7. Solid-surface counters at other than wet locations.
8. Commercial appliances.

Best Practice/Lessons Learned

A. Specify laminate counter tops with postformed front edge for durability. Use field-installed backsplash for efficient transportation.

Dedicated Spaces

Counseling/Testing

Baseline:

1. Provide space and amenities for student services to include counseling and testing. Services may be itinerant.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Typical 100 – 500sf (upper range can provide for small group space); minimum office size 80sf
Spatial Elements	Ceilings: 8ft +/-, rectangular configuration
Finishes	Floor: carpet Ceiling: acoustic tile Walls: paint
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms;* see *063 Interior Openings* for relites
Windows	Optional
Specialties	Open wall shelving, whiteboard, tackboard, window coverings
Plumbing	None required
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Pendant or drop-in indirect, provide dimming
Power	110v duplex for code compliance; 110v quadplex at each data port
Special Systems	Phone/intercom, synchronized clock; duplex data port (2)
Equipment/Furnishings	Workstation, conference table

Provisional:

3. Consider acoustic separation; walls to achieve STC 50.

Premium:

4. (Reserved)

Best Practice/Lessons Learned

A. Ideal if area is accessible to parents very near main entry.

B. Common to locate adjacent to, but not with, the Administration suite of spaces.

Educational Resource Storage

Baseline:

1. Provide space and amenities for resources to support seasonal curriculum and other multi-use supplies.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Typical 100 – 500sf (upper range provide for distributed spaces)
Spatial Elements	Ceilings: 8ft +/-, rectangular configuration
Finishes	Floor: resilient sheet/tile Ceiling: acoustic tile Walls: paint
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	None
Specialties	Open wall shelving; reinforced for heavy loads
Plumbing	None required
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Surface mounted or drop-in direct with diffuser
Power	110v duplex for code compliance
Special Systems	None
Equipment/Furnishings	None

Provisional:

3. (Reserved)

Premium:

4. (Reserved)

Best Practice/Lessons Learned

A. Floor loads in this space may be greater than typical administrative space. Review with Structural.
B. High density storage systems can reduce the amount of dedicated square footage.

Quiet Room

Baseline:

1. Provide space and amenities for students to have some quiet time when distressed and/or acting inappropriately.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Typical 40 – 80sf (minimum 40sf room size)
Spatial Elements	Ceilings: 8ft +/-, rectangular configuration

System	Features
Finishes	Floor: resilient sheet/tile Ceiling: vandal and impact resistant hard ceiling Walls: FRP or similar vandal and impact resistant material
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	None
Specialties	None
Plumbing	None required
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Surface mounted or drop-in direct with diffuser, vandal resistant
Power	None (for safety)
Special Systems	None
Equipment/Furnishings	None

Provisional:

3. Consider sound absorptive materials as needed.
4. Consider video camera with concealed/hardened mounting for monitoring.

Premium:

5. (Reserved)

Best Practice/Lessons Learned

A. Locate away from public interaction but to have direct supervision.
B. Ensure opposite walls are at least 5ft apart to restrict 'climbing'.
C. Door should typically open out versus into the room.
D. Many schools have moved away from isolated space and have students sit in a quiet area of the admin. office or, in a large school, a counseling area with assigned staff.

Category C – General Support

Administration

Baseline:

1. Provide space and amenities for parent and visitor reception, workspace for administrative staff and volunteers including principals, vice principals, etc., and secure record storage. The administrative area should be located at the main entrance to the school and provide for necessary elements of security and building control. The administrative suite should have the ability to be secured at night from all other users of the building.
2. Provide from among the following features for this general support space:

System	Features
Planning Factors	Reception: 60-80sf typical General Administration: 200 – 800sf typical, includes storage Principal(s): 100-120sf typical Secure Storage: 50sf typical
Spatial Elements	Ceilings: 8ft +/-, rectangular configuration
Finishes	Floor: carpet Ceiling: acoustic tile Walls: paint
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	One operable unit in each enclosed, occupied space
Specialties	Open wall shelving, whiteboard, tackboard, window coverings
Plumbing	None required
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Pendant or drop-in indirect, provide dimming
Power	110v duplex for code compliance plus equipment support; 110v quadplex at each data port
Special Systems	Phone/intercom head end systems, synchronized clock; electronic main entry access; duplex data port (2)
Equipment/Furnishings	Large capacity copy/print/scan machine

Provisional:

3. Consider built-in reception counter with ADA height section and lockable storage pedestals and waiting area with chair rail.
4. Consider including dedicated conference room.

Premium:

5. (Reserved)

Best Practice/Lessons Learned

A. Personnel should be able to provide electronic access for approved visitors, who should be welcomed through a glass partition between the administrative office security vestibule. Provide an easily accessible area where visitors may wait, sign in, and obtain badges.
B. Consider separation from counseling and testing rooms.

Conference Room (Reserved)

Parent/Community Schools (Reserved)

Dedicated Spaces

Nurse/Clinic

Baseline:

1. Provide space and amenities for student health care to include examination, treatment, and medication. Program area will include administrative space and a dedicated restroom.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Provide dedicated space generally as follows: K-6 student population greater than 250 students 7-12 student population greater than 150 students K-12 student population greater than 250 students Administration: 60-80sf typical Infirmary/Treatment: 120 – 400sf typical, includes storage Exam/Rest: 60-80sf typical Isolation room: 50sf typical Restroom: 50 – 100sf typical
Spatial Elements	Ceilings: 8ft +/-, rectangular configuration
Finishes	Floor: resilient with integral cove base Ceiling: acoustic tile Walls: paint
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	None
Specialties	Whiteboard, tackboard; exam curtain(s)
Plumbing	Handwash sink; restroom fixtures
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Pendant or drop-in indirect, provide dimming
Power	110v duplex for code compliance; 110v quadplex at each data port
Special Systems	Phone/intercom, synchronized clock; duplex data port (2)
Equipment/Furnishings	Under-counter refrigerator

Provisional:

3. Consider isolation room(s) in support of sick/contagious students. Ventilate per ASHRAE requirements.
4. Consider providing space to administer the program and create/maintain records.
5. Consider providing an en-suite restroom.
6. Consider a small stand-alone ice maker where needed to support provided services.

Premium:

7. (Reserved)

Best Practice/Lessons Learned

A. Locate Nurse station adjacent to other administration areas.
B. Provide an entry door direct off a corridor to allow access without transiting office areas.

Cafeteria

Baseline:

1. Provide dedicated space and amenities for student dining.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Typical 4,000sf minimum; approx. 15sf per student for table seating for one-third of the student population.
Spatial Elements	Ceilings: 12ft +/-; often double-height in two-story schools; rectangular configuration
Finishes	Floor: resilient sheet or other hard surface Ceiling: suspended or adhered acoustic tile, vaulted/exposed typical Walls: protective material (FRP, etc.) 4ft to 8ft, paint above
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	Fixed windows in frames, storefronts typical (see *0422 Storefronts*)
Specialties	Acoustic panels, window coverings
Plumbing	None required; drinking fountain common
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Pendant direct/indirect, accent and cove lighting common, provide dimming based on programmed use
Power	110v duplex for code compliance; 110v quadplex at each data port
Special Systems	Phone/intercom, synchronized clock; wireless data
Equipment/Furnishings	Tables with integral seating typical;

Provisional:

3. (Reserved)

Premium:

4. Dedicated space in school facilities serving grades other than 9-12 or in school facilities where one-third of the projected ADM is less than 200 students (see Multipurpose and/or Commons).

Best Practice/Lessons Learned

A. Wall-mounted pocket tables should be reserved for instances where maximum space efficiency is needed. Otherwise, provide wheeled tables and a table storage room.

Kitchen/Food Service

Baseline:

1. Provide space and amenities for on-site food preparation, planning, and serving. Standard is hot lunch meal preparation and breakfast service eligible under federal and state programs.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Food Prep/Planning: 10sf per seated meal Food Service: 1sf per seated meal Food Storage – Seasonal Delivery: 7sf/student population Food Storage – Regular Delivery: 3sf/student population
Spatial Elements	Ceilings: 10ft +/-, rectangular configuration
Finishes	Floor: ceramic/quarry tile Ceiling: gypsum board/paint Walls: protective surfaces such as stainless steel, FRP full height in prep/cooking areas, washable paint
Doors	Exterior: insulated swing door up to 42in or double door with removable astragal. Interior for code compliance; hardware to meet ADA and functional needs
Windows	None
Specialties	Staff lockers, tackboard, whiteboard, corner guards
Plumbing	Hot/cold water, waste, and vent to support specific equipment; grease interceptor; prep sink, handwash sink, three-compartment wash sink; commercial dish machine
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance; commercial Type 1 or 2 hood(s)
Lighting	Surface mount or recessed
Power	110v duplex for code compliance; 110v quadplex at each data port
Special Systems	Phone/intercom, synchronized clock; duplex data port (2)
Equipment/Furnishings	All prep, cooking, and cleaning equipment with direct connection to building services

Provisional:

3. Consider enclosed office for kitchen supervisor when serving 200 or more meals per day.

4. Consider central kitchens in large districts with warming kitchens distributed at the individual school level.
5. Consider kitchens capable of pre-packaged food preparation in locations where kitchen staff is not available.
6. Consider welded seam resilient flooring with slip resistance in lieu of tile floors when installing over frame construction.

Premium:

7. (Reserved)

Best Practice/Lessons Learned

A. Locating a custodial service closet near the kitchen space can be very beneficial.
B. In larger schools, consider using transfer air from the school for exhaust hood make-up air in place of dedicated make-up air unit.

Student Store

Baseline:

1. Provide space and amenities for student-run food service operations in support of business and hospitality curriculum elements and extra-curricular and community use activities. Anticipated items include school supplies, promotional/branding hard and soft goods, and food items.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Provide dedicated space where 6-12 student population exceeds 60; typical 120sf minimum; up to 300sf
Spatial Elements	Ceilings: 9ft +/-, rectangular configuration
Finishes	Floor: resilient Ceiling: acoustic tile Walls: painted GWB, FRP at wet areas
Doors	Security door at counter, Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	None
Specialties	Tackboard, corner guards, 36in base cabinets w/laminate counter, 42in wall cabinets (some open shelving for display), soap and paper towel dispenser
Plumbing	Prep/clean-up sink; hot/cold water, waste, and vent to support specific equipment
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Pendant or drop-in indirect
Power	110v duplex for code compliance; 110v quadplex at each data port
Special Systems	Phone/intercom, synchronized clock; duplex data port (2)

System	Features
Equipment/Furnishings	Any prep, cooking, and cleaning equipment with direct connection to building services, point of sale (POS) equipment, all other as FF&E

Provisional:

3. (Reserved)

Premium:

4. (Reserved)

Best Practice/Lessons Learned

A. Commonly arranged with display/sales space connected to support/storage space.

Fitness Room

Baseline:

1. Provide space and amenities for physical education supported with intentional curriculum in the following fitness areas: strength, conditioning, cardio (may also incorporate aerobics/dance).
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Provide dedicated space where 6-12 student population exceeds 60; typical 500sf minimum; up to 3,000sf
Spatial Elements	Ceilings: 9ft +/-, rectangular configuration
Finishes	Floor: cushioned resilient Ceiling: acoustic tile Walls: paint
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	Optional
Specialties	Whiteboard, tackboard, window coverings
Plumbing	None
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance; ducting treatment to reduce sound transfer out
Lighting	Pendant or drop-in indirect, provide dimming
Power	110v duplex for code compliance;
Special Systems	Phone/intercom, synchronized clock; duplex data port (2)
Equipment/Furnishings	Wall-mounted racks for elevated equipment storage; weightlifting pads.

Provisional:

3. Consider a 10ft ceiling height if needed to support specific curriculum and space uses.

4. Consider providing acoustical wall assemblies at this space if programmed for music and dance.
5. Consider dedicated room exhaust or negative pressure at ventilation systems.

Premium:

6. Dedicated space in school facilities where the projected student population in grades 6-12 is less than 60 students.

Best Practice/Lessons Learned

A. Consider locating adjacent to Gymnasium.
B. Consider impact loads when floors are not slab on grade.

Locker Room/Showers

Baseline:

1. Provide space and amenities for clothes changing in preparation for physical fitness activities and for showering and changing following activities. Often combined with space from *Category D – Supplementary Restroom/Toilet* allocations.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Provide dedicated space where 6-12 student population exceeds 20; typical 400sf minimum (2ea); up to 3,000sf (2ea)
Spatial Elements	Ceilings: 9ft +/-, rectangular configuration
Finishes	Floor: resilient with welded seams; ceramic tile at wet areas Ceiling: gypsum board, paint Walls: ceramic tile, full-height at showers; gypsum wall board at lockers/non-wet areas, paint
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	None
Specialties	Partitions/curtains at showers, lockers for 25 percent of 6-12 student population
Plumbing	Recessed, lockable hose bib (stainless)
Heating/Cooling	As calculated for code compliance; dedicated zone control
Ventilation/Exhaust	As calculated for code compliance
Lighting	Surface mount LED, occupancy sensors controls, key override
Power	110v duplex for code compliance in changing area
Special Systems	Intercom, synchronized clock, hair/hand dryers
Equipment/Furnishings	Fixed benches in changing/locker area

Provisional:

3. Consider providing stall showers where program uses warrant. Reduced gap, privacy panels permitted.

Premium:

4. Dedicated space in school facilities where the projected student population in grades 6-12 is less than 20 students.

Best Practice/Lessons Learned

A. Non-metallic (i.e., plastic/resin) Specialties are preferred over metallic.

Shared Spaces

Student Commons

Baseline:

1. Provide space and amenities for student and visitor entry and welcome, 'hub' circulation, student informal and intentional congregation and interaction. Can receive community use. May accommodate student dining and large group instruction.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Typical 600 to 1,400sf; up to 3,000sf
Spatial Elements	Ceilings: 12ft +/-; often double-height in two-story schools; irregular configuration
Finishes	Floor: resilient sheet or other hard surface Ceiling: suspended or adhered acoustic tile, vaulted/exposed typical Walls: protective material (FRP, etc.) 4ft to 8ft, paint above
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	Fixed windows in frames, storefronts typical (see *0422 Storefronts*)
Specialties	Acoustic panels, window coverings
Plumbing	None required; drinking fountain common
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Pendant direct/indirect, accent and cove lighting common, provide dimming based on programmed use
Power	110v duplex for code compliance; 110v quadplex at each data port
Special Systems	Intercom, synchronized clock; wireless data, projection screen
Equipment/Furnishings	Stackable chairs w/carts, tables on wheels; informal seating and instructional furnishings

Provisional:

3. Consider incorporating compatible ancillary features and spaces to include art/cultural installations, project learning, and presentations.

Premium:

4. (Reserved)

Best Practice/Lessons Learned

A. Consider adjacencies with performance spaces such as platforms/stages, and Student Store.
B. Space may occur at any grade level and student population. Often must be multi-use at lower grades and populations versus functioning as dedicated space.
C. Larger K-12 schools may consider an additional smaller Commons for secondary grade student use. Space can be for informal student gathering and breakout space for guided learning.

Multipurpose

Baseline:

1. Provide space and amenities for curricular and extra-curricular activities in all or some of the following areas: performing arts, cafeteria/lunchroom, student, and visitor entry and welcome, 'hub' circulation, student informal and intentional congregation and interaction, etc.
2. Provide from among the following features for this educational space:

<table>
<tr><th>System</th><th>Features</th></tr>
<tr><td>Planning Factors</td><td>Typical 600sf minimum typical; approx. 15sf per student for table seating in support of dining at the following percentage factors:
<table>
<tr><th>Student Population</th><th>Percent of Population</th><th>Approx. Chair Seating</th></tr>
<tr><td>10-50</td><td>100%</td><td>60</td></tr>
<tr><td>51-150</td><td>75% to 65%</td><td>165</td></tr>
<tr><td>151 – 350</td><td>65% to 45%</td><td>340</td></tr>
<tr><td>351 – 500</td><td>45% to 35%</td><td>440</td></tr>
<tr><td>Over 500</td><td>30%</td><td></td></tr>
</table>
Platform Stage:
<table>
<tr><th>Student Population</th><th>Platform Area</th><th>Notes</th></tr>
<tr><td>150 – 350</td><td>300 – 500sf</td><td></td></tr>
<tr><td>351 – 500</td><td>500 – 900sf</td><td></td></tr>
<tr><td>Over 500</td><td>900 – 1,400sf</td><td></td></tr>
</table>
Note: For student populations below 150 portable stage/platforms are typical.</td></tr>
<tr><td>Spatial Elements</td><td>Ceilings: 12ft +/-; often double-height in two-story schools; rectangular configuration</td></tr>
<tr><td>Finishes</td><td>Floor: resilient sheet or other hard surface
Ceiling: suspended or adhered acoustic tile, vaulted/exposed typical
Walls: protective material (e.g., FRP) 4ft to 8ft, paint above</td></tr>
<tr><td>Doors</td><td>Interior for code compliance; hardware, see Safety & Security at Classrooms</td></tr>
<tr><td>Windows</td><td>Fixed windows in frames, storefronts typical (see 0422 Storefronts)</td></tr>
<tr><td>Specialties</td><td>Acoustic panels, window coverings</td></tr>
<tr><td>Plumbing</td><td>None required; drinking fountain common</td></tr>
<tr><td>Heating/Cooling</td><td>As calculated for code compliance</td></tr>
<tr><td>Ventilation/Exhaust</td><td>As calculated for code compliance</td></tr>
</table>

System	Features
Lighting	Pendant direct/indirect, accent and cove lighting common, provide dimming based on programmed use
Power	110v duplex for code compliance; 110v quadplex at each data port
Special Systems	Phone/intercom, synchronized clock; wireless data
Equipment/Furnishings	Stackable chairs w/carts, 5ft tables on wheels

Provisional:

3. Consider table and chair storage support space.
4. Consider kitchenette support space in educational programs supported by a central kitchen for food preparation.

Premium:

5. (Reserved)

Best Practice/Lessons Learned

A. Provide afterhours access to Multipurpose Room (and public restrooms) while restricting access to remainder of the school.
B. Zone heating and ventilation system so multipurpose afterhours space activities can operate separately from the rest of the school.

Auditorium (+ Stage)

Baseline:

1. Provide space and amenities for performing arts curricular and extra-curricular activities in all or some of the following areas of group and individual performance, and performance production: drama, dance, choir, band, orchestra, etc.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Seating area: typical 7-10sf per seat total area Proscenium width: 1. 200 – 400 seats – +/-35ft 2. 400 – 600 seats – +/-40ft 3. 600 – 900 seats – +/-50ft Stage area: 1. Depth: 75% proscenium width 2. Width: 150% proscenium width
Spatial Elements	Ceilings: 12ft +/-; often double-height in two-story schools; irregular configuration
Finishes	Floor: resilient sheet or other hard surface Ceiling: suspended or adhered acoustic tile, vaulted/exposed typical Walls: gypsum wall board, painted with applied acoustical treatment/elements

System	Features
Doors	Exterior as required for code compliance; interior for code compliance and function; exit hardware for code compliance, passage hardware for function and safety
Windows	None, typical
Specialties	Acoustic panels, window coverings
Plumbing	None required; consider counter mounted sink in dressing rooms
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance; sound attenuators and low dba diffusers
Lighting	Recessed indirect, accent and cove lighting common, provide dimming based on programmed use
Power	110v duplex for code compliance
Special Systems	Stage lighting, sound system, synchronized clock; wireless data
Equipment/Furnishings	Fixed seating

Provisional:

3. Consider carpet as floor finish in aisles for sound control.
4. Consider dedicated, enclosed Control Room of approximately 150sf.
5. Consider Dressing Room/Green Room space of approximately 600sf.
6. Consider Fabrication/Storage Room space of approximately 800sf.

Premium:

7. Dedicated space in school facilities serving grades other than 9-12 or in school facilities where one-third of the projected ADM is less than 200 students (see Multipurpose and/or Commons).
8. Square footage that exceeds that required for seating one-third of the projected ADM or for stage areas greater than 35ft deep and 1.75 of the proscenium width.
9. Proscenium arches wider than 60ft.
10. Fly galleries.
11. Stage gridirons, pin rails, or catwalks over stages.
12. Proscenium openings higher than 25ft or stage ceilings higher than 30ft.
13. Trap rooms (under-stage storage).
14. Orchestra pits.
15. Professional theater lighting systems.
16. Balconies or spectator boxes.
17. Elevators dedicated to serving just the auditorium.
18. Special curved plaster wall or ceiling assemblies designed for acoustic balancing.
19. Decorative wood paneling, wallpaper, and murals.
20. Spaces and systems for “black-box” theaters.
21. Digital variable acoustics systems for grades 9-12.

Best Practice/Lessons Learned

A. Provide afterhours access to Auditorium (and public restrooms) while restricting access to remainder of the school.

Pool

Swimming pool sizes and amenities are described in the department publication *Swimming Pool Guidelines for Educational Facilities*.[5]

[5] See DEED publication *Swimming Pool Guidelines for Educational Facilities*. https://education.alaska.gov/facilities/publications/SwimmingPool.pdf

Category D – Supplementary

Circulation

Corridors/Vestibules/Entries

Baseline:

1. Provide space and amenities for building entry and circulation between program areas. Maximize visual continuity for observation and supervision.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Corridors: Grades K-6: 15-20sf/student design capacity Grades 7-12: 18-24sf/student design capacity Standard corridor width: Grades K-6: 7ft-6in clear (add 6in for corridors with lockers) Grades 7-12: 8ft-6in clear (add 12in for corridors with lockers) Entries/Vestibules: 2-5sf/student design capacity
Spatial Elements	Ceilings: 10ft +/-, linear configuration, alcoves common, clerestory and light monitors common
Finishes	Floor: resilient at corridors, walk-off carpet tile at vestibules Ceiling: acoustic tile, can be open to structure Walls: painted GWB above 6ft, durable overlay below 6ft
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	Fixed where used in clerestory or roof monitors
Specialties	Lockers, full height, one per student
Plumbing	Drinking fountain w/bottle fill
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Wall sconce, uplight, or drop-in indirect
Power	110v duplex for code compliance
Special Systems	Phone/intercom speakers, synchronized clock
Equipment/Furnishings	None

Provisional:

1. See Section *0711 Passenger Elevators* for use of ramps in lieu of elevators.
2. See Part 2, Section 3, *C. Safety & Security at Building Entries*.

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. Manufactured sloped tops on lockers are preferred to full recess and soffiting; much easier to change out when needed.

Stairs/Elevators

Baseline:

1. Provide space and amenities for building entry and circulation between program areas. Maximize visual continuity for observation and supervision.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Stairs: see factors under *0331 Stair Structure* Elevators: see factors under *0711 Passenger Elevators*
Spatial Elements	Ceilings: Vary, often double height, linear configuration, alcoves common
Finishes	Floor: resilient at stairs, match adjacent at elevator Ceiling: acoustic tile, can be open to structure Walls: painted GWB w/durable overlay typical
Doors	Interior for code compliance; hardware, see *Safety & Security at Classrooms*
Windows	Fixed where used
Specialties	None
Plumbing	None
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Wall sconce, uplight, or drop-in indirect
Power	Elevator support
Special Systems	Speakers
Equipment/Furnishings	None

Provisional:

3. See Section *0711 Passenger Elevators* for use of ramps in lieu of elevators.
4. See Part 2, Section 3, *C. Safety & Security at Building Entries*.

Premium:

5. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

Utilities/Maintenance

Restrooms/Toilets

Baseline:

1. Provide space and amenities for student and staff restrooms. Student restrooms for boys and girls, and one unisex staff restroom should be distributed in each classroom cluster.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	K-6 Facilities: 2sf per student design capacity 7-12 Facilities: 3sf per student design capacity K-12 Facilities: 5sf per student design capacity See also *General Use Classroom* for Pre-K and K, *Special Education*, *Nurse*, and *Teacher Workroom/Breakroom* for other restrooms in addition to this category.
Spatial Elements	Ceilings: 9ft +/-, rectangular configuration
Finishes	Floor: ceramic tile or resilient with integral cove base Ceiling: suspended GWB, paint (washable) Walls: ceramic tile or FRP to 6ft paint (washable) above
Doors	Interior for code compliance; hardware
Windows	None required
Specialties	None required. Mirror, soap dispenser, paper towel dispenser, grab bars (smaller profile for Pre-K to 1st grade), toilet paper dispenser, sanitary napkin receptacle, sanitary napkin dispenser at grades 6-12.
Plumbing	Toilets, urinals, sinks; as calculated for code compliance
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Wall-mount at sinks/counters; recessed or surface-mount for ambient lighting
Power	110v duplex for code compliance
Special Systems	None required
Equipment/Furnishings	TBD

Provisional:

3. (Reserved)

Premium:

4. (Reserved)

Best Practice/Lessons Learned

A. Do not use baseboard or wall mounted cabinet unit heaters to heat these spaces.

Custodial

Baseline:

1. Provide space and amenities for custodial activities. Space should accommodate short-term supply storage, and daily-use equipment (e.g., custodial cart, vacuums, etc.).
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Typically, one 80sf room per 15,000sf to 25,000sf of space to be cleaned. Minimum 70sf
Spatial Elements	Ceilings: 9ft +/-, rectangular configuration
Finishes	Floor: resilient with integral cove base, sealed concrete Ceiling: acoustic tile, open to structure Walls: paint
Doors	Interior for code compliance; hardware, keyed lever latch
Windows	None
Specialties	None
Plumbing	Floor-mounted mop sink with hot and cold supply
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	Exhaust fan with controls, continuous negative pressure
Lighting	Surface-mounted or drop-in indirect
Power	110v duplex for code compliance
Special Systems	None
Equipment/Furnishings	Wall-mounted adjustable shelving, wall-mounted mop racks, chemical dispensing unit, chemical storage cabinet

Provisional:

3. Consider soap and paper towel dispenser for personal cleanup.
4. Consider locating a stacking washer/dryer unit in custodial space (if not at Gymnasium storage).

Premium:

5. (Reserved)

Best Practice/Lessons Learned

A. Recommend a minimum of one Custodial room on each level of a multi-level building. Placement close to restrooms is ideal.

B. A covered entry at this space is a good idea.

Supply/Food Storage

Baseline:

1. Provide space and amenities for bulk deliveries of all types for school operations (food service, custodial, instructional, FF&E, etc.). The space(s) also serve as the exit point for various types of solid waste. Provide space and amenities for the storage of supplies related to building operations, primarily custodial and dry-goods. For perishable food additional space and

feature are need. (Note: See *Category B – Support Teaching* for storage of instructional materials.) and for storage of food and food preparation items.).

2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Supply Storage: Seasonal Delivery: 5sf per student population Supply Storage: Regular Delivery: 1sf per student population
Spatial Elements	Ceilings: 10ft +/-, rectangular configuration
Finishes	Floor: resilient, sealed concrete Ceiling: acoustic tile, open to structure Walls: GWB, wainscot to 4ft, paint above
Doors	Interior for code compliance; keyed lever hardware
Windows	None
Specialties	None
Plumbing	None required
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Surface or drop-in indirect, provide dimming
Power	110v duplex for code compliance
Special Systems	Synchronized clock
Equipment/Furnishings	Adjustable shelving

Provisional:

3. (Reserved)

Premium:

4. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

Refer/Freezer (Reserved)

Maintenance & Receiving

Baseline:

1. Provide space and amenities for a maintenance office, tool storage, work table/bench. Provide space to receive bulk deliveries of all types for school operations (food service, custodial, instructional, FF&E, etc.). The space(s) also serve as the exit point for various types of solid waste.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Maintenance & Receiving: Typical 200 – 600sf (upper levels provide for on-site maintenance/custodial office, maintenance shop, and large custodial and maintenance equipment storage

System	Features
Spatial Elements	Ceilings: 10ft +/-, rectangular configuration
Finishes	Floor: resilient, sealed concrete Ceiling: acoustic tile, open to structure Walls: GWB, wainscot to 4ft, paint above
Doors	Interior for code compliance, 8ft x 8ft coiling or sectional door (motorized), exterior personnel door; keyed or card-controlled lever; hardware
Windows	None; exterior personnel door should have narrow-lite
Specialties	Tackboard, whiteboard at Receiving
Plumbing	None required
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Surface or drop-in indirect, provide dimming
Power	110v duplex for code compliance; 110v quadplex at each data port
Special Systems	Phone/intercom, synchronized clock; duplex data port (2)
Equipment/Furnishings	Adjustable shelving

Provisional:

5. Consider installation of a floor drain in Receiving/Maintenance if supplies and equipment will chronically be snow covered.

Premium:

6. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

Mechanical/Electrical

Baseline:

1. Provide space and amenities for heating, ventilation, electrical service/distribution equipment and all appurtenances supporting this equipment. These categories of equipment may be in combined space or separate spaces depending on building codes, building layout, and design parameters.
2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Net Floor Area = Footprint Area x Equipment Factor x Circulation Factor

Equipment Type	Base Area	Equip. Factor	Circ. Factor
Heating Equip.	equip. footprint	2.5	1.5
Ventilation Equip.	equip. footprint	3.5	1.3
Electrical Equip.	equip. footprint	2.5	1.5
Electrical Panels	panel width	3.0	1.3

System	Features
Spatial Elements	Ceilings: height varies, often exposed to structure; clearance to structure greater than 7ft AFF is GSF, irregular configuration
Finishes	Floor: resilient, sealed concrete, epoxy on wood underlayment Ceiling: GWB with paint or exposed to structure Walls: paint
Doors	Interior for code compliance, exterior door for mechanical rooms sized per mechanical equipment; keyed or card lever hardware
Windows	None
Specialties	None
Plumbing	Floor drain with trap primer (not needed in Electrical if separate)
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Surface mounted
Power	110v duplex for code compliance; 110v quadplex at each data port
Special Systems	Duplex data ports (as needed for network connected equipment)
Equipment/Furnishings	None

Provisional:

3. Consider installing acoustical separation (STC 34 minimum) around spaces with mechanical ventilation equipment.
4. Consider installing a whiteboard for diagramming, discussion, notes, etc.

Premium:

5. (Reserved)

Best Practice/Lessons Learned

A. Locate boiler rooms at grade with exterior door access to an adjacent service vehicle parking space whenever possible.
B. Floors in Mechanical should generally be designed as 'water tight'.
C. Consider access for equipment replacement in Mechanical with boilers and/or air handling units; oversize doors many be needed. Provide exterior doors whenever possible.

Telecom/Server Room

Baseline:

1. Provide space, equipment, and appurtenances for data and communication service, processing, and distribution. This includes the entry and termination of public communications utilities and WAN and LAN equipment. Space may also house headend equipment for other special electrical systems including intercom/paging, clock, security/CCTV, etc.

2. Provide from among the following features for this educational space:

System	Features
Planning Factors	Typical 30sf/100 students; minimum 15sf; maximum 360sf including two intermediate closets at 30sf/each Notes: 1. Space typically transitions from telecom closet to a telecom room above 30sf. 2. Often located in Administration, can be co-located with Utilities/Maintenance function.
Spatial Elements	Ceilings: 9ft +/-, rectangular configuration
Finishes	Floor: resilient, sealed concrete, electrostatic resistant Ceiling: acoustic tile, open to structure Walls: paint
Doors	Interior for code compliance; keyed or card lever hardware
Windows	None
Specialties	Whiteboard
Plumbing	None required
Heating/Cooling	As calculated for code compliance
Ventilation/Exhaust	As calculated for code compliance
Lighting	Surface mounted or drop-in indirect
Power	110v typical, meet power requirements of equipment, provide UPS back up
Special Systems	Phone/intercom
Equipment/Furnishings	Equipment racks (two-post), cable tray or j-hooks

Provisional:

3. Consider providing dedicated space for telecom rooms to isolate cooling system needs. Avoid co-locating racks in mechanical rooms.
4. Consider providing 4-post racks only where required by specific equipment.
5. Consider providing cable tray versus j-hooks within telecom space to aid in organization.
6. Consider, at space needs below a dedicated room (less than 30sf), co-locating with compatible special electrical systems (e.g., intercom/paging, security, etc.) or administrative areas (e.g., Administration Office, Teacher Workroom, etc.).
7. Consider ventilation systems for temperature control in climates where this can provide sufficient cooling.

Premium:

8. Central UPS systems.
9. Air conditioning if temperatures are not excessive in rack cooling systems.

Best Practice/Lessons Learned

A. Locate telecom room in central area of building where possible to average cable lengths.

B. Separate mechanical cooling system from other HVAC system(s) to independent operation during unoccupied times.

4. HIGH PERFORMANCE FACILITIES

DEED encourages high-performance schools for Alaska communities. A high-performance school is designed to conserve natural resources, save money over time, and improve the overall health and well-being of students, staff, and community. Emphasis is placed on low-impact site design, reduced impact on local infrastructure, energy efficiency, water use reduction, non-toxic materials, waste management, indoor air quality, efficient operations, and community engagement.

High performance school design principles can be broken into three general areas of emphasis:

A. Human health and comfort
B. Demand reduction
C. Resiliency

These principles are woven throughout this document as both Baseline strategies and accepted alternatives when considering Provisional strategies. Key standards are summarized in **F. DEED Standards for High Performance Facilities** below. Other resources on high-performance school design are available from many public and private organizations. Review of these may provide further assistance to project teams.

Because elements of these three principles for high performance school design are often completing against each other, a synthesizing approach is needed to achieve the optimal balance. That approach is known as the Integrated Design Process (IDP). A good introductory primer on IDP has been developed as part of the Whole Building Design Guide (WBDG), an information gateway that is part of the National Institute of Building Sciences.

A. Integrated Design Process

One of the key ingredients to creating a high-performance school is to conduct an integrated design process. The integrated design process is a collaborative approach that includes the full project team in decision making from project inception through design, construction, and commissioning. The process focuses on a whole-systems design approach: recognition that all the components of the building work interdependently and affect the performance of one another.

A few key steps to implementing an integrative design process include:

1. Set sustainability goals with the owner at project inception.
2. Conduct a full team meeting at the beginning of each project phase.
3. Include high-performance design principles as an agenda item at all project meetings.
4. Incorporate life cycle cost and value analysis into the project decision-making process.

Buildings are often budgeted on first costs alone. Life cycle costing takes a more integrated approach, factoring in energy savings over time, durability and reduced maintenance of systems and materials, and enhanced occupant health and productivity. High performance design principles place

emphasis on looking at the building as a whole over time to minimize energy use, maximize cost savings, and increase resiliency—all while creating comfortable and healthy spaces for the occupants.

As part of an integrated design process, energy modeling and commissioning will confirm that all systems and components are integrated to achieve optimum results and are installed and operated as designed. One strategy may offset another. For instance, daylight sensors may cost more up front as an individual strategy, but once energy savings and associated reduced mechanical loads are considered, the team may realize that they can save money by selecting a smaller mechanical system.

Practices to optimize systems integration and increase efficiency include energy modeling and building commissioning. Design-phase energy modeling is a tool to use early and throughout the design process to test a variety of energy efficiency measures to determine the best way to align systems and components. Commissioning also offers an opportunity to make adjustments in the field and to train occupants on how to use the systems, improving efficiency even further.

B. Human Health & Comfort

Learning environments have a huge impact on student performance, health, and overall well-being. High performance schools can provide high quality indoor air along with thermal, visual, and acoustical comfort. Emphasis is placed on daylight in classrooms and views to the outdoors, HVAC and lighting controls, non-toxic materials, enhanced filtration, carbon dioxide sensors, cross-contamination prevention, natural ventilation, and increased outdoor airflow rates in mechanically ventilated spaces.

Benefits of high-performance schools can include improved student performance, increased occupant health, reduced student absentee rates, and greater staff satisfaction. When implemented well, ancillary benefits such as visual and physical connection to exterior spaces and shared community spaces within the building often occur. In addition, community benefits that reach beyond the school facility are common including highlighting the benefits of reusing and recycling materials, and creating an environment that serves as a community teaching tool for sustainable living

C. Demand Reduction

High-performance schools are designed to reduce demand on energy and natural resources, to optimize the performance of building systems, and to reduce the overall operating costs of the school. Emphasis is placed on energy efficient mechanical systems, high-performance envelope design, low-flow water fixtures, lighting and daylight controls, and energy efficient equipment and appliances. The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 90.1 sets out performance criteria in these areas and is enforced by DEED through customized checklists.

Employing high-performance principles such as demand reduction, energy efficiency, and system optimization results in climate appropriate solutions, buildings that have low-to-no impact on local infrastructure, and an overall reduction in the school facility's carbon footprint.

<u>Baseline</u>

1. Utilize night-setback control systems for unoccupied times.

2. Zone the HVAC system to the operational use of the facility during after-hour, or public uses (common after-hour space uses include the Gym, Library/Media Center, Auditorium, and Student Commons).

Provisional

3. Consider separate ventilation systems for the gymnasium and an associated set of restrooms accessible after-hours.
4. Consider displacement ventilation for classrooms and larger spaces. Displacement ventilation systems have lower energy requirements (reduction in cooling loads and higher Zone Air Distribution Effectiveness ratio) compared to traditional overhead ventilation systems. Systems are also typically quieter and have been shown to reduce transfer of germs between occupants.
5. Consider heat pump supplemented heat plants where geographically appropriate and where District has maintenance capabilities to support.
6. Consider extending waste/recovered heat systems from nearby power plants.

Premium

7. (Reserved)

Best Practice/Lessons Learned

A. If displacement ventilation is being considered, be aware of the challenges presented in classroom spaces where large wall diffusers that are required can often get covered.

D. Resiliency

Schools often serve as an emergency shelter within community disaster preparedness plans. As such, they must be designed to ensure they will be safe and operational for the students and community during minor events such as a power outage as well major natural disasters. This goes beyond the traditional redundancy in mechanical and electrical systems to include structural and building envelope design that will sustain a comfortable indoor environment for occupants during prolonged periods without power.

Baseline:

1. Provide standby generator or power source. This may be excluded in urban locations.
2. Provide redundancy in heat plant equipment including boilers and main circulation pumps. Appropriate redundancy factors for boilers (i.e., two at 67% or three at 50% of total heat load).

Provisional:

3. Consider high mass structures that will retain heat for extended periods of time. CF-1.
4. Consider redundancy in domestic hot water heaters for remote locations where a loss of domestic hot water will impact kitchen/nutritional capabilities of the school.
5. Consider having all air handling units inside of the building envelope instead of roof mounted air handling equipment.

Premium:

6. Boiler redundancy beyond two, 100% boilers.

E. High-Performance Certifications

High-performance building certification systems such as the United States Green Building Council (USGBC) LEED for Schools Rating System, Collaborative for High Performance Schools (CHPS), or International WELL Being Institute (WELL) can provide detailed guidance on implementing high-performance school design strategies.

Although DEED recognizes the value of building certifications by a third-party organization, the State will not participate in costs associated with these certifications.

Baseline:

1. None.

Provisional:

2. Consider high-performance building materials in any systems identified in this handbook that may be certified by recognized standards bodies to the extent these products are cost-effective for the region. CF-1; LCCA-5.

Premium:

3. Green Building Certification: Registering the project with the USGBC LEED Rating System and obtaining LEED for Schools certification.
4. Educational Displays: Providing a permanent display, building signage, digital dashboard, or building tour that describe the high-performance features of the school.
5. Carbon Footprint Reporting: Costs to calculate the school's carbon footprint. Include a greenhouse gas inventory and opportunities to reduce greenhouse gas emissions.
6. Climate Action Plan: Costs to develop and implement a climate action plan to raise awareness of the school community's carbon footprint and engage students, staff, and the community in reducing that carbon footprint.

F. DEED Standards for High Performance Buildings

Baseline:

1. Commission facility using a certified commissioning agent in accordance with Alaska regulations 4 AAC 31.080(j), 31.900(31), 31.900(32), and 31.065.
2. Design heating and cooling systems to meet the requirements of ASHRAE 55 Thermal Comfort in Buildings (latest edition) except where humidification/dehumidification is not practical.
3. "Right size" HVAC equipment based on development of building massing and envelope. May require multiple iterations as building layout changes during design.
4. Avoid designs where operating independent heating and cooling systems simultaneously is required.
5. Utilize HVAC systems that will redistribute heat while also providing cooling, such as variable refrigerant flow (VRF) systems (where appropriate for local conditions and maintenance capabilities).
6. Design variable output HVAC systems to adapt to varying building heating and cooling demands.

7. Provide minimum MERV-13 filtration on all ventilation systems.

Provisional:

8. Consider incorporating the commissioning agent early in the design, such as 35%.
9. Consider re-commissioning systems two months prior to one-year warranty date to help identify failed equipment or components and to correct control system programming errors.
10. Consider providing green spaces, open spaces, and shared community spaces in the building.
11. Consider reusing and recycling materials during construction and occupancy.
12. Consider creating an environment that is a community teaching tool for high-performance buildings and sustainable living.
13. Consider providing access to daylight and views to outdoors from classrooms and other regularly occupied spaces.
14. Consider using energy modeling and iterative design to reduce building energy consumption by 5 percent over ASHRAE-90.1 (current version).
15. Consider using the building control system to monitor indoor air quality and adjust ventilation rates to mitigate contaminants such as VOCs and CO2.
16. Consider providing a building flush-out post construction per LEED, WELL or similar accepted procedures.

Premium:

17. Re-commissioning systems two years after the school opens to ensure the energy conservation features are operating as intended and to adjust to increase efficiency.
18. On-going commissioning of the facility every 5 years.
19. Grey water reclamation systems for use with flushing plumbing fixtures.
20. On-site harvesting of renewable energy such as wind and solar.
21. Ventilation systems providing more than ASHRAE 62.1 minimum outdoor air rates beyond acceptable cost increases. CF-2.

Best Practices/Lessons Learned

A. (Reserved)

Part 3. SYSTEM STANDARDS

01. SITE AND INFRASTRUCTURE

A. Building System Summary

The **Site and Infrastructure** of school buildings consist of construction elements, systems and features external to the school facility. A common rule-of-thumb for the demarcation of building infrastructure from site infrastructure is "five feet outside the building line". This is, of course, an imperfect approximation but it can serve as a useful reference when differentiating between similar systems. The department recognizes five sub-categories in this building system: **Site Improvements**, **Site Structures**, **Civil/Mechanical Utilities**, **Site Electrical**, and **Offsite Work**. While all these systems support the use and purpose of the school facility, many have no physical connection to the facility. The utility sub-systems are the exception; they both serve and are connected. Utility systems will need to be integrated with standards in *081 Plumbing* and *091 Services & Distribution*. Site issues not related to improvements and infrastructure are identified and categorized under **11 Special Conditions**. Examples would be site and utility demolition, site drainage, and remediation of hazards.

B. Design Philosophy

Historically, development of Site and Infrastructure systems for educational facilities has been widely variable in projects with state-aid across Alaska. School planning and design goals should achieve statewide equity for capital investments in the various subsystems of this category while responding to the variety of geographic and climatic needs. Overbuilding must be avoided and sustainable solutions which respond to local conditions must govern.

Many determinants influence the ultimate cost of site and infrastructure development for a project. Some determinants are programmatic; for instance, site development costs for a high school will be higher than those of an elementary school due to factors such as the increased accommodation of vehicles, and the inclusion of competition sports fields typically provided with the construction of a high school. The location of the site and proximity to utilities also can greatly affect the site development costs. Rural sites can have much greater utility costs than urban sites due to the need to provide utility infrastructure, such as water storage and treatment, sewage treatment and disposal, and heating oil storage, that urban sites are not required to provide. Though sometimes necessary, constructing, and operating dedicated utility systems to serve the needs of school facilities places a heavy burden on a school district. This should be avoided wherever possible, instead making that the responsibility of the local community.

The physical characteristics of the site, such as soil conditions and topography, also have a great impact on the site development costs. Sites that require a good deal of excavation, grading, or imported fill to provide an adequate building pad will understandably have higher earthwork costs when compared to building sites not requiring such extensive alterations. The cost of earthwork is not limited to the building footprint; the construction cost of playfields, parking areas, roads, and even utility infrastructure will be impacted by the physical characteristics of the site.

The selection of a quality building site is the first step in ensuring cost-effective Site and Infrastructure costs. The department's publication *Site Selection and Evaluation Criteria Handbook* is

intended to be a resource and tool for districts to use when evaluating potential school sites. For additional design parameters see the **Design Ratio & Ratios** section of this system.

C. Design Criteria & Ratios

Criteria

A. Site earthwork should attempt to achieve no import or export of soil; this will clearly be difficult on sites with poor soils.
B. Site utilities should be provided offsite by the public utility whenever possible. This includes water, sewer, stormwater, electrical, and fuel storage utilities at rural sites and efforts should be made to work with the community to a developed, shared utility infrastructure.
C. Development of vehicular circulation and storage areas shall be minimized.
D. Parking areas will be sized to provide the required parking spaces per the governing code and the parking spaces will be sized to accommodate the standard vehicle in the region.
E. Construction of fire service roads around school buildings is not required in communities that do not have an organized fire fighting capacity and equipment. It is recommended to consider designing fire service roads for all communities to provide access for maintenance and future construction access.
F. Roads and parking areas shall be consolidated to minimize their footprint on the site.

Ratios

1. XX/AC (Reserved)
2. XX/GSF(Reserved)

011 Reserved

011X TBD

012 Reserved

012X TBD

013 Site Improvements

0131 Vehicular Surfaces

Baseline:

1. Parking areas, access drives, and vehicular circulation will have appropriate structural subbase, 4-inch basecourse, and 2-inch asphalt paving; increase cross-section at truck delivery and bus loops.
2. Provide parking spaces at a ratio of 1 per 20 K-8 students and 1 per 15 grade 9-12 students for the projected student population.
3. Provide dedicated bus lanes/bus loops and dedicated parent pick-up/drop-off areas. Design vehicle circulation and parking areas to maximize site safety.

4. Minimize islands and other obstructions in parking areas, except where needed for circulation control, to accommodate snow removal and storage.
5. Provide parking lot lighting to IES standards (ref. *0163 Lighting & Equipment* for additional provisions).
6. Provide accessible parking spaces in accordance with applicable codes.

Provisional:

7. Consider a top course of uniform gravel, crushed rock, or recycled asphalt in any community without access to a batch or drum-mix plant within an approximate 45-minute delivery radius.
8. Consider vehicular surfaces of the best available local fill in roadless communities.
9. Consider designing mitigations in vehicular pavement to prevent stormwater and snowmelt from flowing across pedestrian surfaces.
10. Consider speed control measures a long straightaways and high-pedestrian areas.
11. Consider designating parking spaces near the main entrance for carpool and low-emitting vehicles.
12. Consider providing headbolt heaters at staff parking areas in climate zones 7, 8 and 9 (ref. *0161 Electrical Services & Distribution* for additional provisions).

Premium:

13. Paving plants as a project cost.
14. Additional parking and locally mandated parking over the above the standards.
15. Concrete pavement other than at loading dock aprons and dumpster approaches.
16. Asphalt concrete pavement more than 2in thick except at loading docks, bus loops, and dumpster approaches which may be 4in.
17. “Porous” drainage pavement.
18. Access controlled (e.g., magnetic cards, etc.) parking lots.
19. Colored pavement.
20. Radiant parking snow melt systems.
21. Headbolt heaters in climate zone 6, or in zone 7 for more than 50 percent of the anticipated number of school staff.

Best Practice/Lessons Learned

A. (Reserved)

0132 Pedestrian Surfaces

Baseline:

1. Provide pedestrian surfaces from building entries to all vehicular parking areas and bus and parent drop-offs.
2. Provide pedestrian surfaces from primary public access points to the school facility.
3. Pedestrian surfaces will have appropriate structural subbase, basecourse, and allowable surfacing.
4. Provide accessible pedestrian routes in accordance with applicable codes (e.g., ADA, etc.).

Provisional:

5. Consider a top course of uniform gravel, crushed rock, or recycled asphalt in any community without access to a concrete or asphalt batch plant within an approximate 45-minute delivery radius.
6. Consider pedestrian surfaces of the best available local fill in roadless communities.
7. Consider pressure treated wood (CF-2; LCCA-2), or grates (CF-5; LCCA-4).
8. Consider radiant snow melt systems at main entries. LCCA-5.

Premium:

9. Pedestrian surfaces over 6ft width except at main entrances.
10. Concrete or asphalt pavers.
11. Concrete walks beyond 50ft from building entries unless demonstrated to be more cost-effective than asphalt paving. LCCA-3.
12. Asphalt concrete pavement more than 1-1/2in thick.
13. Radiant snow melt systems beyond 30ft from main entries.

Best Practice/Lessons Learned

A. (Reserved)

0133 Elevated Decks & Ramps

Baseline:

1. Provide handrails and guardrails for elevated decks when required by code.

Provisional:

2. Consider elevated decks at buildings constructed above grade on piling or caissons; use substructure similar to the adjacent facility, adjusted for load conditions.
3. Consider decking/surfacing of pressure treated wood, galvanized metal (grip-strut) or fiberglass. CF-5; LCCA-4.

Premium:

4. Elevated decks beyond 50ft from building entries unless demonstrated to be more cost-effective than at-grade decks.
5. Elevated decks or ramps sized to support vehicles greater than 1,000lb.
6. Decorative or custom handrails and/or guardrails.

Best Practice/Lessons Learned

A. (Reserved)

0134 Site Walls

Baseline:

1. None.

Provisional:

2. Consider retaining walls where required by transitions in grade.

3. Consider alternatives to concrete in any community without access to a batch plant within an approximate 45min delivery radius. Alternatives might include gabion baskets, driven posts/piles, or unit masonry. CF-2; LCCA-1.

Premium:

4. Site walls over 10ft in height.
5. Decorative or custom detailed site walls.

Best Practice/Lessons Learned

A. (Reserved)

0135 Landscaping & Irrigation

Baseline:

1. Prioritize the location of plantings at the main entrance and as buffering for paved areas and walks, and along public building facades.
2. Avoid plantings that create a security or visibility issue near entrances.
3. Provide native, water conserving plants.
4. Plant trees of a reasonable size and diameter.
5. Locate trees away from the building to provide a minimum of 12ft clearance from the drip line of a fully grown tree.

Provisional:

6. (Reserved)

Premium:

7. Annuals plantings.
8. Buffering plantings required by local authorities.
9. Non-native plantings or trees.
10. Site irrigation systems for athletic fields.

Best Practice/Lessons Learned

A. (Reserved)

0136 Fencing and Gates

Baseline:

1. Provide 6ft chain-link fencing around all playgrounds and athletic fields.
2. Provide 8ft chain-link fencing at elevated play decks.
3. Provide personnel swing gates where needed for reasonable access and control.
4. Provide one 10ft wide vehicle access gate, swing hinged or slide roller.
5. Provide fencing associated with site utility requirements (e.g., bulk fuel storage, generators, off-site utilities, etc.).

Provisional:

6. Consider safety bollards or ‘staples’ to segregate vehicular and pedestrian traffic at drop-off zones where curbs are not provided.
7. Consider staggered-fence access points in lieu of swing gates wherever possible.

8. Consider ground contact treated wood for fence posts where determined to be cost-effective.

Premium:

9. Custom fabricated or decorative fencing.
10. Wood fencing.
11. Chain link fence coatings and screen slats.
12. Site fencing at property boundaries.

Best Practice/Lessons Learned

A. Swinging vehicle access gates often get out of plumb and will not stay in an open position without an attachment point (post, etc.) at the appropriate location.

0137 Site Furnishings & Equipment

Baseline:

1. Provide low maintenance, animal proof exterior trash receptacles near playgrounds and building entrances.
2. Provide one 30ft aluminum flagpole with hinged base (may also be building mounted).

Provisional:

3. Consider a free-standing school sign when building-mounted signage is not visible from the main access drive. Meet local signage ordinances, if any. (Ref. *0443 Other Exterior Accessories* for building mounted signage.)
4. Consider bike racks at the main entrance to the school.
5. Consider aluminum benches with backs at locations where outdoor seating is needed.

Premium:

6. Building signs with a surface area greater than 45sf per side.
7. Decorative concrete or stone benches.

Best Practice/Lessons Learned

A. (Reserved)

0138 Playgrounds & Playfields

Baseline:

1. Provide at-grade playgrounds with age-appropriate play equipment and play surfaces for schools serving any grades K-6. Quantity and size of play equipment should conform to established standards and be calculated to meet the student population. Structured play surfaces should be approximately 60 percent hard surface (i.e., asphalt, concrete) and 40 percent soft surface (i.e., fall-protected).
2. Provide at-grade playfields for schools serving any grades 7-12 necessary for established physical education curriculum.
3. Where playfields will function as sports fields, provide field size and orientation to conform with NFHS (National Federation of State High School Associations) Court and Field Diagrams.
4. Design play areas to conform to ASTM standards and the publication by the National Principals Association.

5. Specify play area equipment and surfaces to meet Consumer Product Safety Commission standards.
6. Provide drainage for playgrounds and playfields to prevent ponding.
7. Specify surfaces and play equipment for soft play areas that meet ADA and OSHA standards.
8. Provide subsurface drainage systems under soft play areas.
9. Provide playgrounds and playfields designed to accommodate snow removal and maintenance.
10. Specify playground equipment constructed of durable, weather-resistant, low maintenance materials.

Provisional:

11. Consider installing empty conduit for future power to the athletic fields.
12. Consider additional unstructured play areas with sand or gravel surfaces.
13. Consider on-grade play decks constructed of pressure treated wood where access to asphalt and concrete are limited (see also Provisional elements at *0131 Vehicular Surfaces* and *0132 Pedestrian Surfaces*). Size play decks at approximately 15sf per K-6 student population.
14. Consider elevated playgrounds on helical pile where fill for construction of at-grade playgrounds is not available. Provide perimeter fencing as needed. Size elevated playground/play decks at 10sf per K-6 student population.

Premium:

15. Sports fields in support of extracurricular sports with less than three consecutive years of school-sponsored activity.
16. Artificial turf surfaces for any sports field.
17. Surfaced running tracks (e.g., urethane, etc.).
18. Athletic and play areas that exceed Provisional limitations by more than 15 percent.
19. Bike trails or walking/running trails.
20. Bleachers, lighting, concession stands, irrigation systems, press boxes, scoreboards, and exterior drinking fountains.

Best Practice/Lessons Learned

A. (Reserved)

0139 Other Site Improvements

Baseline:

1. None.

Provisional:

2. Consider sledding hills where project excavation would otherwise be required to be removed from site.
3. Consider school gardens (see Part 2, *2. C. High Performance Site Principles*).

Premium:

4. Sledding hills with imported fill.
5. Ice rinks.

6. Water features.

Best Practice/Lessons Learned

A. (Reserved)

014 Site Structures

0141 Freestanding Shelters

Baseline:

1. None.

Provisional:

2. Consider covered play areas with sidewall eave heights up to 16ft in climates with high precipitation.
3. Consider outdoor classroom structures/pavilions to support a specific educational program.
4. Consider energy efficient lighting inside shelters.
5. See *0138 Playgrounds & Playfields* for Baseline and Provisional equipment and surfaces.

Premium:

6. Perimeter wall enclosures greater than 75 percent of enclosed perimeter.
7. Heating of any type.
8. Footprint areas in excess of allowable covered area (4 AAC 31.020).

Best Practice/Lessons Learned

A. (Reserved)

0142 Attached Shelters

Baseline:

1. None.

Provisional:

2. See *0141 Freestanding Shelters* for applicable recommendations.

Premium:

3. See *0141 Freestanding Shelters* for applicable premiums.

Best Practice/Lessons Learned

A. (Reserved)

0143 Support Buildings

Baseline:

1. None.

Provisional:

2. See *111 Special Construction* for specific support building types.
3. Consider walk-in freezers for food storage in remote locations.

4. Consider storage for approved school equipment needed to protect such from premature deterioration.
5. Consider storage for instructional and/or education support items.
6. Consider "bus barn" where student transportation is provided by school district, will count as school GSF.

Premium:

7. Support Buildings classified as temporary (4 AAC 31.900).

Best Practice/Lessons Learned

A. (Reserved)

015 Civil/Mechanical Utilities

0151 Water Systems

Reference *0812 Plumbing Piping* for in-building systems.

Baseline:

1. Provide adequate water supply to the facility based on established industry consumption and use metrics for potable and non-potable uses.
2. Where possible, select sites with service from public water systems.
3. Provide piping from a connection point identified by the public water system provider.
4. Direct-bury water service lines at depths providing adequate protection from freezing.
5. Piping material for water supply services up to 1in may be copper or polyethylene; greater than 1in to 6in will be polyethylene; service lines 6in or greater may be ductile iron or polyethylene.
6. Locate water utility service entrance away from main building entry.
7. Coordinate water connections with wastewater, stormwater, fuel, and other utility connections to enter building at Mechanical/Electrical space.
8. Locate water piping to allow access for pipe maintenance and building maintenance; locate piping away from pedestrian walkways and vehicle traffic to the greatest extent practicable.

Provisional:

9. Consider sizing water systems on specific occupancy and usage information when local water supplies are limited. Provide a record of design calculations and any operational limitations due to system design.
10. Consider locating piping above ground using insulated (arctic) pipe with HDPE or CMP outer jackets when climate and/or soil conditions will not permit direct bury.
11. Consider on-site water service systems (wells, surface ponds, rainwater retention, etc.) only when reliable water service is not available from a public utility.
12. Consider water storage in above-ground insulated steel tanks on appropriate foundations when local water production is not sufficient to supply system needs with quantities and/or pressures required.
13. Consider recirculating lines and/or heat trace on water supply mains as required by site climate conditions. LCCA-4.

14. Consider on-site water treatment for approved on-site water systems when required by water quality tests or other known-contamination factors for approved water source(s).

Premium:

15. On-site water systems when service is available from a public entity except for considerations of reliability and resiliency. LCCA-3.
16. Water service connections (curb-stops) greater than 20 feet from the school parcel property line.
17. Piling-supported above ground water storage tanks. CF-1.
18. PCI membrane 'Fyne' water treatment systems. LCCA-4.
19. Reverse osmosis (RO) water treatment systems. LCCA-5.

Best Practice/Lessons Learned

A. Perform a system flow test and provide static pressure, residual pressure, and residual flow data to mechanical engineer at beginning of project for fire suppression design, including a fire pump assessment.
B. If source water quality is not known at the point of bidding (e.g., a well is installed under the project), include appropriate allowances for treatment systems and designate a location/space for equipment.

0152 Sanitary Sewer

Reference *0814 Waste & Vent Piping* for in-building systems

Baseline:

1. Provide adequate sanitary sewer to the facility based on established industry production metrics for wastewater generation.
2. Where possible, select sites that are serviced by a public wastewater system.
3. Provide sanitary sewer discharge piping/system with an invert that allows gravity flow throughout the school without the need for a lift station.
4. Provide piping from a connection point identified by the public wastewater system provider.
5. Direct-bury sanitary sewer lines at depths providing adequate protection from freezing.
6. Piping material for sanitary sewer will be ABS, PVC, or HDPE.
7. Locate sanitary sewer service entrance away from main building entry.
8. Coordinate sanitary sewer connections with water, fuel and other utility connections entering the facility at Mechanical/Electrical space.
9. Locate wastewater piping to allow access for pipe maintenance and building maintenance; locate piping away from pedestrian walkways and vehicle traffic to the greatest extent practicable. Reference *0814 Waste & Vent Piping.*

Provisional:

10. Consider multi-stage septic systems for sites where a municipal or community connection is not available.
11. Consider wastewater pretreatment systems at sites with septic systems.

12. Consider multi-stage wastewater treatment lagoons where a municipal or community system is not available and where these systems can be permitted under Alaska Department of Environmental Conservation regulations.
13. Consider locating piping above ground using insulated (arctic) pipe with HDPE or CMP outer jackets when climate and/or soil conditions will not permit direct bury.
14. Consider packaged wastewater treatment systems when conventional subsurface (septic) or surface (lagoon) treatments are not possible.
15. Consider forced main sanitary sewer where gravity discharge cannot be achieved. Coordinate with the vacuum waste utility to have vacuum collection sumps installed within the school building, for sites served by utility level vacuum waste systems.
16. Consider kitchen waste design with Alaska Department of Environmental Conservation and local AHJ to ensure exterior grease interceptors or sampling manholes, if required, are incorporated into the documents and specifications.

Premium:

17. On-site wastewater systems when service is available from a public entity except for considerations of reliability and resiliency. LCCA-3.
18. Wastewater service connections greater than 20 feet from the school parcel property line.
19. MBR package plants with capacity beyond 100,000L/day. LCCA-4.

Best Practice/Lessons Learned

A. Avoid locating septic tanks and leach fields in playground areas. Consider implications of a failure of the tank or field.

0153 Storm Water

Reference *0814 Waste & Vent Piping* for in-building systems

Baseline:

1. Select sites with public stormwater available to the site, where available.
2. Design an on-site drainage system to keep stormwater run-off away from the building and to keep grounds, paved areas, and playfields free of standing water.
3. Design “open pond” stormwater storage systems, where possible. Avoid buried storage systems.
4. Enclose stormwater ponds and holding areas with 4ft high galvanized chain link fencing. Provide gates for maintenance.
5. Provide drip edges at sloped roof areas with positive means of collecting roof runoff and a pipe to convey the flow to the drainage system. Do not use perimeter foundation drains to intercept roof runoff.
6. Coordinate stormwater system overflow spout locations away from public walkways but locate such that they will be noticed if the standard stormwater system backs up.

Provisional:

7. Consider providing heat trace on stormwater discharge piping if system daylights.
8. Consider providing electric heat trace on stormwater overflow spouts.

Premium:

9. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0154 Fuel Systems

Coordinate with *0851 Fuel Supply (Gas & Oil)*

Baseline:

1. Select sites with natural gas utility connection to the site, where available.
2. Locate fuel oil and propane storage away from the building front entrance and readily accessible for year-round filling by fuel trucks.
3. Enclose bulk fuel oil and propane storage areas with 8ft-high galvanized chain link fencing. Provide gates for maintenance.
4. Install UL-142 above grade double wall intermediate fuel oil storage tank as close as practicable to fuel-fired mechanical equipment. Enclose with 8ft-high galvanized chain link fencing. Provide gates for maintenance.

Provisional:

5. Consider above ground bulk fuel storage tanks in locations where fuel delivery is less than three times a year.
6. Consider co-locating district-owned bulk fuel storage tanks with other local entities such as power providers to reduce infrastructure costs.

Premium:

7. Bulk fuel storage capacity greater than 200% of the calculated need to supply heat to education related facilities (i.e., a two-year supply).

Best Practice/Lessons Learned

A. (Reserved)

0155 Heating/Cooling Piping & Utilidors

Baseline:

1. None.

Provisional:

2. Consider site distribution of heating supply/return when an existing 'central plant' has excess capacity, and when piping and system equipment (e.g., heat exchanger, etc.) is cost effective on a life-cycle cost basis.

Premium:

3. Cooling piping of any type, size, or length; any cooling piping should be provided within each building.
4. Site heating piping runs from any central plant to a supported building in excess of 500 feet.

Best Practice/Lessons Learned

A. (Reserved)

016 Site Electrical

0161 Electrical Service & Distribution

Baseline:

1. Utilize 3-phase power if available.
2. Coordinate with the local utility for connection point, distribution voltage, and power plant capacity early in the design.
3. Locate service entry near electrical room and generator.
4. Locate generator near service entry and fuel source. Provide year-round access to module.

Provisional:

5. Consider locating the transformers as close as practical to service entrance when designing the line extension.
6. Consider time or occupancy-based control of these circuits feeding headbolt heaters.
7. Consider use of transformers to combat line loss in feeding headbolt heaters.

Premium:

8. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0162 Data/Comm Service & Distribution

Coordinate with *0942 Data and Communications*

Baseline:

1. Utilize public fiber optic services if available.

Provisional:

2. Consider using the same routing as power to reach site/building where practicable.

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0163 Lighting & Equipment

Coordinate with *0162 Data/Comm Service & Distribution* and *092 Lighting*

Baseline:

1. This lighting is for general use. Specific applications such as athletic fields, hockey rinks, and similar would be included in design of those site elements.

2. Building-mounted lighting may be used for site lighting if practical, or as a supplement to pole-mounted lighting.
3. Pole-mounted lighting should be designed for roadway, driveway, and parking areas per IES standards. Additional lighting should be considered for hardscape, playground equipment, sledding hills, and similar areas where use may require artificial lighting.
4. Poles should be located on the perimeter of parking areas to stay out of the way of snow removal paths as much as possible.
5. Lighting parameters including minimum lighting levels, glare, uniformity, and similar should meet IES standards where no local code is in effect.

Provisional:

6. Consider providing conduit to new poles for signal wiring to cameras, wireless access points, etc., as design budget and need allows.

Premium:

7. Lighting for trails.

Best Practice/Lessons Learned

A. (Reserved)

0164 Security Systems

Coordinate with *0162 Data/Comm Service & Distribution* and *092 Lighting*

Baseline:

1. Provide video surveillance of the building perimeter and access points using wide dynamic range cameras.
2. Provide hard-wired devices with power over ethernet capability.
3. Interconnect site security components to security headend and monitoring equipment providing a similar function within the school facility.

Provisional:

4. Consider video surveillance of parking areas not easily observed by routine law enforcement patrol protocols.
5. Consider video surveillance of sensitive site improvements such as bulk fuel storage and playgrounds.
6. Consider public address systems.

Premium:

7. Intrusion detection or video surveillance expressly positioned and providing coverage of the perimeter boundary of the school parcel.
8. Dedicated mounting poles or other apparatus serving only the security system.
9. Security system coverage of trails and off-site improvements.
10. Electrically operated access control gates at vehicular or pedestrian entry points.

Best Practice/Lessons Learned

A. (Reserved)

017 Offsite Work

0171 Offsite Improvements

Baseline:

1. None.

Provisional:

2. Consider offsite (beyond the school parcel boundary) improvements when required to provide a functioning, accessible school site and school facility.

Premium:

3. Elements of offsite improvements that are not a direct and sole benefit to the school for the lifespan of the improvement.
4. Costs of offsite improvements not appropriately shared with the landowner when such improvements benefit entities in addition to the school.

Best Practice/Lessons Learned

A. (Reserved)

0172 Offsite Utilities

Baseline:

1. None.

Provisional:

2. Consider offsite utilities when required to provide a functioning school infrastructure and school facility.

Premium:

3. Elements of offsite utilities that are not a direct and sole benefit to the school for the lifespan of the utility.
4. Costs of offsite utilities not appropriately shared with the landowner when such utilities benefit entities in addition to the school.

Best Practice/Lessons Learned

A. (Reserved)

0173 Other Offsite Work

Baseline:

1. None.

Provisional:

2. Consider other offsite work when required to provide a functioning school site and school facility.

Premium:

3. Elements of other offsite work that are not a direct and sole benefit to the school for the lifespan of the work.

4. Cost of other offsite work not appropriately shared with the landowner when such other work benefits entities in addition to the school.

Best Practice/Lessons Learned

A. (Reserved)

02. SUBSTRUCTURE

A. Building System Summary

The **Substructure** of school buildings consist of all types of building foundations and supporting elements such as insulation, waterproofing and drainage systems. At-grade concrete floor slabs, both structural and non-structural, are also included in this system including special features in those slabs such as trenches and pits. The department recognizes three sub-categories in this building system: **Standard Foundations & Basements**, **Slab on Grade**, and **Special Foundations**. Basements, which are not common in Alaskan schools, are included within the standard foundation element. They often only differ from standard foundations in the height of the foundation stem wall. Five types of special foundations are identified. A common special foundation would be a pile foundation. As a sub-system, Slab on Grade overlaps with the function of the Floor Structure sub-system within **Superstructure**. Similarly, **Substructure** performance is often very dependent on proper control of site drainage and grading, areas which overlap with the Special Site Conditions sub-system within **Special Conditions**.

B. Design Philosophy

Substructure systems, foundations, are typically far more expensive in Alaska than in other parts of the country. Usually, foundation system options are heavily influenced by the soil conditions of a particular site. Similar to its effect on the cost of site development, the soil conditions of the selected site also play a large part in the cost of the foundation system and determining the number of foundation system options that are acceptable on a given site. Thus, the quality of soils should be given significant weighting when evaluating site options.

Due to the relative high cost of foundation systems, consideration should be given to the construction of two-story structures for school facilities exceeding 40,000 GSF. The cost savings of a two-story structure is not only limited to the foundation system. When evaluating the potential cost savings of a two-story design versus a single story, other building systems, such as roofing, vertical circulation, and exterior walls, should be considered. The shipping weight of the potential foundation system as well as the installation cost should be taken into consideration when evaluating foundation system options. Access to readily available raw materials or the cost of importing raw materials (i.e., gravel for concrete) should be considered in the selection of foundation systems. Building sites whose soil conditions allow the use of standard concrete foundations are preferable to sites that require piling foundations.

The selection of a quality building site Is the first step in ensuring cost-effective Site and Infrastructure costs. The department's publication ***Site Selection and Evaluation Criteria Handbook*** is intended to be a resource and tool for districts to use when evaluating potential school sites. For additional design parameters see the **Design Ratio** section of this system.

C. Design Criteria & Ratios

Criteria

1. Where appropriate for soil conditions, standard concrete foundations are almost always the preferred substructure system.
2. If any other substructure system is to be considered, a cost analysis may be required at the department's discretion. Cost analysis shall include cost of energy and maintenance.
3. Where soils are of low moisture content, all weather wood foundations should be considered for facilities smaller than 20,000 GSF.
4. Where appropriate for soil conditions, substructure systems utilizing a heated crawlspace with perimeter enclosure are preferable to substructure systems that utilize an elevated building with an air space between the underside of the building and grade.

Ratios

A. Total building deadload/GSF
B. Cubic feet of concrete/GSF
C. Pounds of rebar/CY concrete
D. Total building deadload/GSF
E. Pile weight (LB)/Footprint area (FPA)

021 Standard Foundations & Basements

0211 Continuous & Column Footings

Baseline:

1. 4,000psi concrete is the basis of design. Mixes for other strengths are subject to evaluation by life-cycle cost analysis.
2. Carbon steel reinforcing bar is the basis of design with ratios in the 30-80lbs range per cubic yard of concrete.
3. Design footings sized in accordance with building codes, soils, and superimposed loads.

Provisional:

4. Consider all weather wood (AWW) footings consisting of timbers and strongbacks are acceptable where soils are appropriate (i.e., low moisture, non-permafrost). AWW foundations must be supported by appropriate life-cycle cost analysis.

Premium:

1. Development on sites with soil bearing pressures below 2,000psi.
2. Coated reinforcing bar, including galvanized and epoxy, and stainless steel.
3. Reinforcing bar above 80lbs per cubic yard of concrete.

Best Practice/Lessons Learned

A. (Reserved)

0212 Foundation Walls & Treatment

Baseline:

1. Extend foundation walls to frost depths per local conditions/codes.
2. 4,000psi concrete is the basis of design. Mixes for other strengths are subject to evaluation by life-cycle cost analysis.
3. Carbon steel reinforcing bar is the basis of design with ratios in the 50-100lbs per cubic yard of concrete.
4. Design foundation walls sized in accordance with building codes, soils, and superimposed loads.
5. Insulate foundations as required by DEED-adopted energy codes to eliminate or minimize heat loss.
6. Provide damp-proofing treatment as required by local conditions/codes.
7. Provide durable (e.g., 10mil poly) vapor barrier on all exposed earth contained within foundation walls.

Provisional:

8. Consider concrete masonry unit (CMU) foundation walls, with reinforcing, are acceptable.
9. Consider all weather wood (AWW) foundation walls consisting of framing and sheathing are acceptable where soils are appropriate (i.e., low moisture, non-permafrost). AWW foundations must be supported by appropriate life-cycle cost analysis.
10. Consider frost protected shallow foundations (FPSF) including perimeter insulation are acceptable when supported by appropriate life-cycle cost analysis.
11. Consider avoiding below grade functional space enclosed by foundation walls whenever possible.
12. Consider exterior sheet waterproofing on foundation walls that enclose space below the finish grade level; includes below-grade mechanical and service spaces.

Premium:

13. Coated reinforcing bar, including galvanized and epoxy, and stainless steel.
14. Reinforcing bar above 100lbs per cubic yard of concrete.
15. Foundation walls enclosing below grade space classified under adopted codes as occupied space.

Best Practice/Lessons Learned

A. (Reserved)

0213 Foundation Drainage

Baseline:

1. Install perimeter foundation drainage only where required by codes adopted by the state or a local jurisdiction with delegated authority.

Provisional:

2. Consider, when required by local conditions/code, perforated pipe footing drains bedded in drain rock with filter fabric are acceptable.

3. Consider run foundation drain systems to daylight where possible and appropriate (see *0153 Storm Water* for standards on-site drainage collection).
4. Consider drainage mats and other water/moisture control measures are acceptable when required by site conditions and supported by appropriate life-cycle cost analysis.

Premium:

5. Sites requiring underslab drainage.

022 Slab on Grade

0221 Structural & Non-structural Slab

Baseline:

1. 4,000psi concrete is the basis of design for interior slabs. 5,000psi concrete is the basis of design for exterior, exposed slabs. Mixes for other strengths are subject to evaluation by life-cycle cost analysis.
2. Carbon steel reinforcing bar is the basis of design with ratios in the 20-50lbs range per cubic yard of concrete.
3. Structural slabs are not anticipated except at isolated point loads for installed equipment.
4. Non-structural slabs shall be 4-inch nominal thickness.
5. Provide standard compacted sub-base, welded wire fabric reinforcement, moisture control, and trowel finish.
6. Insulate slabs as required by DEED-adopted energy codes to eliminate or minimize heat loss.
7. See *0311 Lower and Main Floors* for wood and steel superstructures.

Provisional:

8. Consider reinforcing bar in non-structural slabs where required for slab openings, incidental loads, and perimeter durability.
9. Consider shrinkage and crack control using glass fiber reinforcing in-lieu of or in addition to welded wire fabric.
10. Consider integrating footings and slabs where part of an approved design assembly such as at FPSF.
11. Consider polished concrete finish where appropriate to be used in lieu of applied floor coverings.
12. Consider providing full frost-depth wall foundations under entry slabs where necessary to prevent frost heaving.
13. Consider perimeter insulation when required by site conditions and supported by appropriate life-cycle cost analysis.

Premium:

14. Coated reinforcing bar, including galvanized and epoxy, and stainless steel.
15. Reinforcing bar above 50lbs per cubic yard of concrete.
16. Colored or decorative concrete slabs exceeding 40 percent of exposed concrete.

Best Practice/Lessons Learned

A. (Reserved)

0222 Trench, Pit and Pad

Baseline:

1. 4,000psi concrete is the basis of design for pits and pads. Mixes for other strengths are subject to evaluation by life-cycle cost analysis.
2. Carbon steel reinforcing bar is the basis of design with ratios in the 50-100lbs range per cubic yard of concrete.
3. Provide elevator pits in the dimensions and depths required by the selected equipment
4. Pads to provide adequate securing of equipment will be provided where required for anchoring or other safety measures were required by codes adopted by the state or a local jurisdiction with delegated authority.

Provisional:

5. Consider non-seismic housekeeping pads for major HVAC and electrical equipment at nominal heights not to exceed 4in above the surrounding floor level.

Premium:

6. Trenches formed of concrete; slab block-outs and reinforcing for nominal trench drains in support of Career and Technical Education are acceptable.

Best Practice/Lessons Learned

A. (Reserved)

0223 Underslab Elements

Baseline:

1. Provide underslab insulation, minimum R-10, where slab-on-grade radiant floor heating is provided.

Provisional:

2. Consider underslab rigid insulation in support of FPSF and where otherwise supported by an energy life-cycle cost analysis of the proposed heating system.

Premium:

3. Sites requiring underslab drainage.
4. Sites requiring underslab radon mitigation.

Best Practice/Lessons Learned

A. (Reserved)

024 Special Foundations

0241 Piling & Pile Cap

Baseline:

1. Provide a steel H-pile foundation including steel or lumber pile caps and required lateral bracing where soil bearing pressures cannot support a standard foundation or where it is not cost effective to remove poor soils and replace with suitable fill.
2. Install thermistor tubes integral with pile.

Provisional:

3. Consider a treated wood piling foundation including timber or engineered lumber pile caps and required lateral bracing for smaller education related facilities up to 5,000gsf.
4. Consider steel pipe piles where supported over H-piles based on a life-cycle cost analysis.

Premium:

5. Sites where pile stick-up exceeds a total average of 6ft for all piles, or any pile stick-up exceeds 12ft.
6. Pile foundations exceeding 40pounds per footprint area (does not include lateral bracing or pile caps).

Best Practice/Lessons Learned

A. (Reserved)

0242 Caissons

Baseline:

1. None; caisson foundations not anticipated.

Provisional:

2. Consider caisson foundations where bedrock (+/- 15,000psi) occurs at shallow depths of up to 8ft below grade. If this foundation is proposed, it must be supported with an appropriate cost analysis of the full substructure.

Premium:

3. Caisson foundations where total estimated **02 Substructure** cost exceeds other alternatives.

Best Practice/Lessons Learned

A. (Reserved)

0243 Grade Beams

Baseline:

1. None; grade beam foundations not anticipated.

Provisional:

2. Consider grade beam foundations where adequate support for continuous footings is not available, subgrade point loads are available or can be created (i.e., piling etc.), and concrete is readily available and cost effective. If this foundation is proposed, it must be supported with an appropriate cost analysis of the full substructure.

Premium:

3. Grade beam foundations where total estimated **02 Substructure** cost exceeds other alternatives.

Best Practice/Lessons Learned

A. (Reserved)

0244 Arctic Foundation Systems

Baseline:

1. Provide an arctic foundation system consisting of thermopile (with or without helical ribs, pile extensions, steel or lumber pile caps and required lateral bracing where soils consist of continuous or discontinuous permafrost.
2. Install thermistor tubes adjacent to each pile.
3. Thermopile and thermosyphons will be included in a project's commissioning plan unless approved otherwise by DEED.

Provisional:

4. Consider passive thermosyphons in lieu of thermopile where suitable fill is available to support installation of standard foundations.
5. Consider underslab rigid insulation in support of FPSF and where otherwise supported by an energy life-cycle cost analysis of the proposed heating system.

Premium:

6. Arctic foundations with active refrigeration unless. LCCA-4.
7. Gravel pads in conjunction with thermopile arctic foundations.

Best Practice/Lessons Learned

A. (Reserved)

0245 Other Special Foundations

Baseline:

1. None; other special foundations such as sheet pile, raft, multi-point frame, etc. are not anticipated.

Provisional:

2. Consider other special foundations when building loads and soil conditions may exclude other substructure solutions. If a special foundation is proposed, it must be supported with an appropriate cost analysis of the full substructure.

Premium:

3. Other special foundations where total estimated **02 Substructure** cost exceeds other alternatives.

Best Practice/Lessons Learned

A. (Reserved)

03. SUPERSTRUCTURE

A. Building System Summary

The **Superstructure** of a building consists of all gravity and lateral force resisting members above the substructure to and including the roof deck. The department recognizes three sub-categories in this building system: **Floor Structure**, **Roof Structure**, and **Stairs**. Floor, roof, and stair structures normally include vertical members (columns, walls), horizontal members (beams, joists/rafters, trusses, stringers), decking (wood sheathing, concrete, etc.), and a variety of bracing elements. In some superstructure systems with bearing walls (e.g., masonry units, light-gauge steel, nominal wood framing, etc.) the superstructure blends with the Exterior Closure and Interiors systems. In **Floor Structure** using slab-on-grade, the system overlaps with **Substructure**.

B. Design Philosophy

Alaskan schools must be provided with an adequate superstructure which responds efficiently, and effectively to building loads as prescribed in adopted building codes and to the conditions of the local environment and building use. Structural efficiency measures include minimizing the deadload of the building, selecting high strength-to-weight and strength-to-cost materials, building simplicity, and structural member uniformity. A uniformly loaded floor system is typically the most cost-effective elevated floor system; concentrated point loads must be accommodated but should be minimized. It should be noted that concrete slab on grade floor systems are the least expensive floor systems in areas where concrete is readily available. For additional design parameters see the **Design Ratio** section of this system.

The same can be said for roof assemblies that are typically comprised of roof sheathing, roof rafters or trusses, beams, and columns carrying concentrated vertical loads to the foundation or a lower floor assembly. Structural roof assemblies that utilize load-bearing partitions are typically more cost-effective than assemblies that use post and beam systems to bear vertical loads. With the inclusion of the structural insulated panels in the roof assembly and its use to replace both the roof sheathing and roof rafters or trusses due to its large span and loading limits, roof assemblies have become more reliant on a post and beam assembly. While the use of structural insulated roof panels may reduce the time required to fully construct the structural roof assembly, its inherent inclusion of heavily loaded beams and columns adds to the overall cost of the superstructure.

The previous paragraphs deal with how the structural systems are designed to accommodate gravity loads. Consideration must also be given to how the structural system performs under lateral, seismic, and wind loading conditions. The best way to design a cost-effective structural system to handle wind loads is to limit them. The building's form and massing play a significant role in limiting the structure's exposure to wind loads and should be considered by the architect at the outset of design. Buildings that expose large areas of high bay space to lateral wind loads will not be conducive to cost-effective structural design.

C. Design Criteria & Ratios

Criteria

- All single-story structures and smaller (60,000 GSF or less) two story structures should utilize uniform loading structural systems (i.e., load bearing walls) wherever feasible.
- Building massing should limit exterior wall area and exterior exposure of large high bay spaces to wind loads.

Ratios

1. (Reserved)

031 Floor Structure

0311 Lower & Main Floors

Baseline:

1. Provide structural floor framing assemblies of wood or metal consisting of posts, beams/frame bearing walls, joists, and decking where required when slab on grade is not cost effective (ref. *0221 Structural & Non-structural Slab* (CF-2; LCCA-2)). Provide floor framing assemblies (materials, size, spacing, etc.) designed for maximum efficiency in accordance with building codes and superimposed loads.
2. Provide HSS shapes for columns/posts, W-shapes for beams/girders, open web trusses for joists and fluted sheet metal for decking as the basis of design.
3. Wood members functioning in the capacity of metal deck and concrete must be minimum 1-1/8-inch wood structural panel or wood decking.
4. Insulate frame floors as required by DEED-adopted energy codes to eliminate or minimize heat loss.
5. Provide protective coating on structural members as required by local conditions/codes.

Provisional:

6. Consider light-gauge steel, engineered wood, or lumber for any component listed in the basis of design. Support light-gauge steel and wood members and assemblies with appropriate cost analysis and justification (e.g., building dimensions and configurations with small spans).
7. Consider, where pile foundations (*0241 Piling & Pile Cap*, *0244 Arctic Foundation Systems*) are accepted, a structural insulated panel (SIP), with or without embedded floor joists, as required to meet code-specified loading. If panels will not span between pile caps, consider intermediary engineered wood beams or steel wide flange beams. Support SIP assemblies with an appropriate cost analysis of the full substructure and *0311 Floor Structure*.

Premium:

8. Framed floor assemblies where total estimated **02 Substructure** + *0311 Lower and Main Floors* cost exceeds other alternatives.

Best Practice/Lessons Learned

A. (Reserved)

0312 Upper Floors

Baseline:

1. Provide structural frame floor assemblies of wood or metal consisting of columns, beams/frame bearing walls, joists, and decking.
2. Provide upper floor assemblies (materials, size, spacing, etc.) designed for maximum efficiency in accordance with building codes and superimposed loads.
3. Provide HSS shapes for columns/posts, W-shapes for beams/girders, open web trusses for joists and fluted sheet metal for decking as the basis of design.
4. Wood members functioning in the capacity of metal deck and concrete must be minimum 1-1/8-inch wood structural panel or wood decking.
5. Insulate upper floor perimeters as required by DEED-adopted energy codes to eliminate or minimize heat loss.
6. Provide protective coating on structural members as required by local conditions/codes.

Provisional:

7. Consider light-gauge steel, engineered wood, or lumber for any component listed in the basis of design. Support light-gauge steel and wood members and assemblies with appropriate cost analysis and justification (e.g., building dimensions and configurations with small spans).
1. Consider framed bearing walls in lieu of columns and beams/girders where cost effectiveness can be increased when considering the combination of systems in *0312* and *0411 Exterior Walls* or *0312* and *0611 Fixed Partitions*.
8. Consider, where pile foundations (*0241 Piling & Pile Cap*, *0244 Arctic Foundation Systems*) are accepted, a structural insulated panel (SIP), with or without embedded lumber, as required to meet code-specified loading. If panels will not span between pile caps, consider intermediary engineered wood beams or steel wide flange beams. Support SIP assemblies with an appropriate cost analysis of the full substructure and *0311 Floor Structure* analysis.

Premium:

9. Framed floor assemblies where total estimated **02 Substructure** + *0311 Lower and Main Floors* cost exceeds other alternatives (i.e., slab-on-grade as the cost baseline).
10. Exterior balconies and construction.

Best Practice/Lessons Learned

A. (Reserved)

0313 Ramps

Baseline:

1. Ramps accepted with framing equal to *0311 Lower and Main Floors* and alternative systems as required by building function and with approved cost analysis.

Provisional:

2. Consider light-gauge steel, engineered wood, or lumber for any component listed in the basis of design. Support light-gauge steel and wood members and assemblies with appropriate cost analysis and justification (e.g., ramp dimensions and configurations).
3. See *0711 Passenger Elevators* for use of ramps in lieu of elevators.

Premium:

4. Framed ramp assemblies where total estimated **02 Substructure** + *0311 Lower and Main Floors* cost exceeds other alternatives (i.e., slab-on-grade as the cost baseline.)
5. Ramps wider than 110 percent of the minimum permitted under applicable codes.

Best Practice/Lessons Learned

A. (Reserved)

032 Roof Structure

0321 Pitched Roofs

Baseline:

1. Provide structural frame roof assemblies of wood or metal consisting of columns, beams/frame walls, rafters, and decking.
2. Provide trusses where clear spans are required or possible (gymnasiums, multipurpose, library, etc.).
3. Design roof assemblies (materials, size, spacing, etc.) for maximum efficiency in accordance with building codes and superimposed loads.
4. HSS shapes for columns/posts, W or HSS steel for beams/girders, open web trusses or engineered wood for rafters, and fluted sheet metal for decking form the basis of design.
5. Wood members functioning in the capacity of metal deck may be wood structural panel or wood decking with appropriate span ratings as required by applicable building codes.
6. Provide protective coating on structural members as required by local conditions/codes.

Provisional:

7. Consider light-gauge steel, engineered wood (including GLB) or lumber for any component listed in the basis of design. Support light-gauge steel and wood members and assemblies with appropriate cost analysis and justification (e.g., building dimensions and configurations with small spans).
8. Consider framed bearing walls in lieu of columns and beams/girders where cost effectiveness can be increased when considering the combination of systems in *0321* and *0411 Exterior Walls* or *0321* and *0611 Fixed Partitions*.
9. Consider a structural insulated panel (SIP), with or without embedded lumber, as required to meet code-specified loading. Support SIP assemblies with an appropriate cost analysis of the full substructure and *0321* analysis.

Premium:

10. (Reserved)

Best Practice/Lessons Learned

A. Combustible framing materials and cold/vented attic construction may require dry-system sprinkler heads in fully sprinklered schools. This will impact initial and life-cycle costs.

0322 Flat Roofs

Baseline:

1. Provide structural frame roof assemblies of wood or metal consisting of columns, beams/frame walls, rafters, and decking.
2. Provide trusses where clear spans are required or possible (gymnasiums, multipurpose, library, etc.).
3. Design roof assemblies (materials, size, spacing, etc.) for maximum efficiency in accordance with building codes and superimposed loads.
4. HSS shapes for columns/posts, W or HSS steel for beams/girders, open web trusses or engineered wood for rafters, and fluted sheet metal for decking form the basis of design.
5. Wood members functioning in the capacity of metal deck may wood structural panel or wood decking with appropriate span ratings as required by applicable building codes.
6. Provide protective coating on structural members as required by local conditions/codes.

Provisional:

7. Consider light-gauge steel, engineered wood (including GLB) or lumber for any component listed in the basis of design. Support light-gauge steel and wood members and assemblies with appropriate cost analysis and justification (e.g., building dimensions and configurations with small spans).
8. Consider framed bearing walls in lieu of columns and beams/girders where cost effectiveness can be increased when considering the combination of systems in *0322* and *0411 Exterior Walls* or *0322* and *0611 Fixed Partitions*.

Premium:

9. Exposed structural members where cost analysis demonstrates a cost increase above CF-1 for the *0321 Pitched Roofs* and *0322* systems.
10. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0323 Special Roofs

Baseline:

1. None; other special roof such as (occupied) roof decks, canopies, etc. are not anticipated.

Provisional:

2. Consider other special roofs when building loads, logistics, materials, and construction may exclude other roof solutions. If a special roof is proposed, it must be supported with an appropriate cost analysis of the full superstructure.

Premium:

3. Other special roofs where total estimated **03 Superstructure** cost exceeds other alternatives.

Best Practice/Lessons Learned

A. (Reserved)

033 Stairs

0331 Stair Structure

Baseline:

1. Provide stair structure assemblies for stairs and landings, of wood or metal consisting of stringers, treads, risers, connectors, beams/joists. Treads and landings may include concrete decking.
2. Design stair assemblies (materials, size, spacing, etc.) for maximum efficiency in accordance with building codes and superimposed loads (e.g., plate steel stringers with stiffening provided by treads and risers).
3. Provide stairs in the quantity prescribed by code and with dimensions not greater than 110 percent of code minimums.
4. Provide protective coating on structural members as required by local conditions/codes.

Provisional:

5. Consider up to one stair associated with a primary common area or public space that has 'architectural features' such as: no stair enclosure, concealed structure, concealed connections, open risers, cantilevered treads, integrated enhanced finishes, etc.
6. Consider alternative stair types where permitted by code for limited access such as alternating tread stairs.

Premium:

7. Stairs with any dimension greater than 110 percent of the minimum permitted under applicable codes.
8. More than one stair with 'architectural' features.

Best Practice/Lessons Learned

A. (Reserved)

0332 Stair Railings

Baseline:

1. Provide stair railing assemblies for stairs and landings, of wood or metal consisting of posts, rails, spindles/panels, shoes, and connectors.
2. Design railing assemblies (materials, size, spacing, etc.) for maximum efficiency in accordance with building codes and superimposed loads.
3. Provide railings in the quantity prescribed by code and with dimensions not greater than 110 percent of code minimums.
4. Provide protective coating on railing members as required by local conditions/codes.

Provisional:

5. Consider up to one stair railing associated with a primary common area or public space that has 'architectural features' such as: decorative posts, tempered glass panels, concealed structure, concealed connections, open risers, cantilevered treads, integrated enhanced finishes, etc.

6. For stairs railings in high-visibility areas, consider stainless steel for all high-wear elements such as handrails and shoes to reduce long-term maintenance costs.
7. Where functionally and visually appropriate, consider stair railings with top rails at guardrail heights and separate handrails.

Premium:

8. Railings with any dimension greater than 110 percent of the minimum permitted under applicable codes except as noted.
9. More than one stair railing with 'architectural' features.

Best Practice/Lessons Learned

A. (Reserved)

0333 Ladders & Steps

Baseline:

1. Provide ladder assemblies of wood or metal consisting of rails, rungs, cages, and connectors.
2. Provide structural step assemblies in conformance with applicable provisions of *0331 Stair Structure*.
3. Design ladder assemblies (materials, size, spacing, etc.) for maximum efficiency in accordance with building codes and superimposed loads.
4. Provide ladders in the quantity prescribed by code and with dimensions not greater than 110 percent of code minimums.
5. Provide protective coating on ladder members as required by local conditions/codes.

Provisional:

6. Consider alternating tread stairs and other alternatives to ladders to improve access.

Premium:

7. Ladder and step materials not commonly accepted as 'utilitarian'.

Best Practice/Lessons Learned

A. (Reserved)

04. EXTERIOR CLOSURE

A. Building System Summary

The **Exterior Closure** of a building consists of an assembly of components which isolate the interior spaces of a building from the exterior environment or modulate the interaction between those elements. In addition to its technical function, the sub-systems in this category are often the most visible elements of a building and work together to provide an aesthetic function. The department recognizes four sub-categories in this building system: **Exterior Walls & Soffits**, **Exterior Glazing**, **Exterior Doors**, and **Exterior Accessories**. Wall and soffit systems normally include framing, exterior and interior substrates and finishes, insulation, and various types of membrane barriers. Windows and doors integrate with the wall/soffit assembly. Where wall framing provides structural capacity, some exterior closure elements overlap with **Superstructure**. In addition, while roof systems provide a technical function that is nearly identical to **Exterior Closure**, the department recognizes **Roof Systems** as a separate major building system due to its unique complexities.

B. Design Philosophy

Exterior closure systems bear the brunt of Alaska's harsh climate. They must be able to endure large variations in seasonal temperatures. While fraught with differing elements and junctions of such elements, the assembly must remain weather tight, even in Alaska's extreme wind and rain. To achieve optimal performance, the exterior assembly should be constructed of quality materials and craftsmanship. Exterior closures should be designed holistically to control transfer of heat, air, moisture, vapor drive, daylight, and noise. The construction of a high-performance exterior assembly is expensive, so the design of a school facility should strive to reduce the amount of exterior wall area that is to be constructed. This is not only cost-effective in terms of initial cost, but is also cost-effective in terms of operations, maintenance, and replacement costs. By reducing the area of the exterior closure system, the area for heat loss is reduced, the area to be painted or regularly maintained is reduced, and when the exterior finish has reached the end of its useful life, the area to be replaced is reduced. All of these factors contribute to reduce the life cycle cost of the school facility.

Oftentimes, a facility's exterior closure system will also serve as part of the facility's structural system by transferring roof and floor loads to the foundation system. The use of an assembly that serves dual purposes is a helpful step toward the cost-effective design of a facility. Wall assemblies constructed from dimensional lumber, structural insulated panels, metal studs, and concrete masonry units are all capable of serving this dual-purpose role as exterior closure and structural system. Each material assembly has its own strengths and weaknesses that require the designer to determine the systems appropriateness for a given project. However, as noted earlier, load bearing exterior wall systems deserve serious consideration on most projects.

C. Design Criteria & Ratios

Criteria

- All single-story structures and smaller (60,000 GSF or less) two story structures should utilize a load bearing exterior wall assembly wherever feasible.
- Building massing should limit exterior exposure of large high bay spaces to wind loads.
- The footprint, configuration, and structural grid should be simple and straightforward, without complex geometries.
- Exterior walls should be straight, with few, if any, curves. Avoid complex configurations with unnecessary corners and changes of materials.
- DEED-adopted energy codes will have a significant influence on envelope design and must be complied with in the most cost-effective way possible.

Ratios

1. School facilities less than 20,000 GSF shall have a maximum exterior closure area (excluding roof soffits) to GSF ratio of 0.8 and a maximum number of one exterior door leaf per 2,000 GSF.
2. School facilities between 20,000 and 40,000 GSF shall have a maximum exterior closure area (excluding roof soffits) to GSF ratio of 0.7 and a maximum number of one exterior door leaf per 2,500 GSF.
3. School facilities greater than 40,000 GSF shall have a maximum exterior closure area (excluding roof soffits) to GSF ratio of 0.6 and a maximum number of one exterior door leaf per 3,000 GSF.

041 Exterior Walls and Soffits

0411 Exterior Walls

Baseline:

1. Wall and soffit assemblies should be designed to consider life-cycle analysis, energy efficiency, durability, low or no required maintenance and overall costs of assemblies.
2. Materials used for exterior enclosures shall be of commercial grade, durable with an intended 20-year or longer usable life.
3. Consider use of a load-bearing exterior wall assembly where feasible. Wall assemblies constructed from dimensional lumber, structural insulated panels, metal studs, and concrete masonry units are all capable of serving this dual-purpose role as exterior closure and structural system.
    a. Wood studs. CF-3; LCCA-3, labor intensive.
    b. Structural insulated panels. CF-3 to 4 (better in remote locations); LCCA-3.
    c. Metal Studs: CF-4, Thermal Bridging leads to more complex total wall assembly. LCCA-3.
    d. Concrete masonry units. CF-3 (rural location 1); LCCA-1. CMU become very expensive in rural location due to freight. CMU has addition LCCA cost for future renovation as it is difficult to remove/modify.

4. Exterior Cladding and Siding: Exterior material choices are numerous and diverse. When choosing cladding, careful consideration should be given to design guidelines listed above and coordinated with District design preferences. Products that require sealants and repeated paint and stain maintenance are discouraged. Products include:
    a. Structural Insulated Panels (SIP): Overall thickness, surface thickness, and R-value appropriate to region and structural design intent. CF-3; LCCA-3.
    b. Metal Wall Panels: 24-gauge minimum thickness zinc-coated (galvanized) or aluminum-zinc alloy coated-sheet steel. Fluoropolymer exterior finish with minimum 20-year finish warranty. CF-2; LCCA-2 (in rural locations overall wall system may be more expensive as more layers of material are used in total system).
    c. Insulated Metal Wall Panels (IMP): 24-gauge minimum thickness zinc-coated (galvanized) or aluminum-zinc alloy-coated sheet steel. Fluoropolymer exterior finish with minimum 20-year finish warranty. R-value as appropriate to the climate and region. CF-2; LCCA-2.
    d. Phenolic Resin Panels: Install per manufacturer's instructions on recommended mounting and fastening systems. Specify colors and patterns proven to not fade over time due to ultraviolet radiation exposure. CF-4; LCCA-2.
    e. Fiber Cement Panels: Install per manufacturer's instructions on recommended mounting and fastening systems. CF-4; LCCA-2.
    f. Exterior Insulation Finish System (EIFS): Specify impact resistant mesh that will resist damage from projectiles. Provide flashing to prevent water intrusion into the system. Provide drainage layer behind insulation layer to allow moisture to escape if needed. CF-4; LCCA-2 to 4, (expensive to repair in rural locations).
    g. Exterior Masonry: Can also serve as the structural system. Consider also as an exterior 4ft to 8ft high protective "wainscot" with different materials above. Avoid use in remote areas due to transportation costs. Schedule installation to avoid the need for temporary heat. Masonry or concrete walls should contain weep holes at the base of walls 8-12 inches above finish grade, unobstructed, with insect screen. CF-3; LCCA-1 to -2.
5. Wall Insulation: Types and R-values; the following values or those values tested from manufacturers may be used in determining R-values of wall assemblies.
    a. Expanded Polystyrene (EPS) Board R-Value = 4.17 per inch. CF-2; LCCA-2.
    b. Extruded Polystyrene (XPS) Board R-Value = 4.17 per inch. CF-3; LCCA-3.
    c. Polyisocyanurate (Polyiso) Board R-Value = 5.6 per inch. CF-2; LCCA-2.
    d. Glass-Fiber Batt Insulation R-Value = 3.16 per inch. CF-1; LCCA-2.
    e. Glass-Fiber Batt Insulation (High Density) R-Value = 4.28 per inch. CF-1; LCCA-2.
    f. Glass-Fiber Blown-In Insulation R Value = 3.7 - 4.28 per inch. CF-1; LCCA-2.
    g. Mineral Wool Batt Insulation R-Value = 4.0 per inch. CF-4; LCCA-2.
    h. Open Cell Spray Foam Insulation R-Value = 3.6 per inch. CF-3; LCCA-3.
    i. Closed Cell Spray Foam Insulation R-Value = 6.0 - 6.5 per inch. CF-3; LCCA-3.
6. Continuous Exterior Insulation (CI): Provide a continuous layer of insulation at the exterior side of the wall assembly. Protect CI with air/weather barrier and siding material in a rain screen assembly. Minimum R-Value of continuous insulation layer of R-7. Use CI to mitigate

thermal conductance through wall structure. CF-1; LCCA-1, low first cost and significant LCCA advantage due to energy savings.

7. Vapor Retarders at Exterior Walls: Provide vapor retarder at the warm side of wall insulation with permeance rating not to exceed 0.13 perms, polyethylene, 6-10 mils thick. Where vapor retarder is not in direct contact with a cover material such as gypsum wallboard, vapor retarder shall have a flame-spread rating not to exceed 25 and a smoke density not to exceed 450. Ensure vapor retarder is continuous at wall to roof transitions. Minimize penetrations of vapor retarder.
8. Vapor Retarders at Concrete Floor Slabs: Floor slabs on grade with non-permeable floor finishes should have a vapor retarder of 0.05 perms or less, polyethylene, 10-15 mils thick. Non-permeable floor finishes include (but are not limited to) epoxy, polyurethane, vinyl, linoleum, and rubber. Under slab vapor retarders must be durable enough to withstand construction activity. Penetrations should be detailed according to the manufacturer's instructions. Specifications should require measurement of slab relative humidity in accordance with the requirements of the floor finish manufacturer.
9. Thermal Resistance: Insulation and minimum R-values of wall assemblies shall accommodate regional climate. Minimum wall assembly value in all Climate Regions is R-19.
10. Exterior Air/Weather Barrier Systems: Self-adhering sheets, fluid applied membrane, or mechanically attached building wrap. Detail wall/roof intersection to provide continuous air/weather barrier system. CF-2 to 4; LCCA-2 to 3 (product vary in cost and performance).
11. Impact Resistance at Exteriors: Provide impact resistant material up to a minimum of four feet above ground height. CF-3; LCCA-3.
12. Corrosion Resistance: Analyze local risks of corrosion from environmental or industrial sources.
13. Graffiti Resistance: Enable the removal of graffiti without damage to the appearance, finish, and durability of the substrate.
14. Acoustics: Consider local conditions for requirements.
15. Building massing should limit exterior exposure of large high bay spaces to wind loads.
16. Design flashing details as per SMACNA flashing recommendations to prevent water infiltration into the wall.
17. Design simple, cost-effective steel, concrete, or masonry lintels. Specify galvanized at exterior steel lintels.
18. Do not use paper or organic products that support mold growth when wet in any exterior wall assembly.

Provisional:

19. Consider specifying materials that do not require regular application of paint or sealers to prevent water intrusion.
20. Consider providing impact resistant material up to a minimum of eight feet above ground height. CF-1; LCCA-1.
21. Consider avoiding masonry veneer. CF-3; LCCA-2.
22. Consider power and data raceways at exterior walls to reduce the number of penetrations in the vapor retarder.

23. Consider Insulated Metal Wall Panels (IMP) with addition of air/weather barrier directly behind the IMP for additional protection. Air/Weather Barrier CF-1; LCCA-1.

Premium:

24. Glazed bricks, cast stone, 'architectural' finish cast-in-place concrete. Cost prohibitive in most rural applications. CF-4; LCCA-3.
25. Precast concrete cost prohibitive in rural applications due to freight and need for large equipment to handle. CF-3 to 4; LCCA-2.
26. Granite, slate, or other stone that is more expensive than common masonry. CF-5; LCCA-2.
27. Lead-coated copper, stainless steel, zinc, or other metal shingles and siding products. CF-4; LCCA-1, may have application in saltwater environments.
28. Ceramic, porcelain, or other tile products that are more expensive than common brick. CF-3 to 4; LCCA-2.
29. Enamel panels or other manufactured curtain wall products. CF-4; LCCA-3.
30. Exterior porcelain tile, glass tile, or glass cladding systems. CF-4; LCCA-3.
31. Composite stone veneer cladding. CF-4, LCCA-3, weight of material is problematic in rural locations.
32. Channel glass facades. CF-5; LCCA-4.

Best Practice/Lessons Learned

A. (Reserved)

0412 Facias & Soffits

Baseline:

1. Soffits at upper floor and roof overhangs will include the following:
    a. Exterior materials as described in *0411 Exterior Walls*.
    b. Vapor retarders, insulation, and exterior air/weather barrier as required for conformance with energy standards.
2. Soffited areas that include both heated space and unheated space should be avoided or minimized. Where this condition occurs in fire sprinklered buildings, and the size of the soffit requires sprinkler coverage, sprinkler piping must be in a heated space, or a dry sprinkler system provided.
3. Full or partial underfloor soffits are allowed when building floors are elevated based on local geotechnical and climatic condition (ref. *024 Special Foundations*) and will include the following:
    a. An economical exterior finish.
    b. Vapor retarders, insulation, and exterior air/weather barrier as required for conformance with energy standards.
4. Provide skirting system (chain link fencing) to prevent public access to underside of building for fire-safety prevention. CF-1; LCCA-1.

Provisional:

5. Consider enclosure skirting with sheathing or another weather-resistant covering in climates where under-building air flow is not required.

6. Consider structural insulated panels (SIPs) for underfloor soffits, which are all capable of serving a dual-purpose role as exterior closure and structural system. CF-3; LCCA-3.

Premium:

7. Building skirting:
    a. Perforated metal panel. CF-4; LCCA-2.
    b. Welded wire fabric. CF-4; LCCA-2.
8. Metal panel siding on underside of SIPs. CF-2; LCCA-1.

Best Practice/Lessons Learned

A. Keep roof and upper floor soffits to less than 4ft to minimize the need for providing sprinkler coverage.

0413 Curtainwalls & Non-bearing Walls

Baseline:

1. Provide exterior curtainwall assemblies where cost effective in schools exceeding two stories.

Provisional:

2. Consider glazing options other than structural silicone such as mechanically keyed gaskets.

Premium:

3. Curtainwall systems in one-story and two-story schools (see *0422 Storefronts* as an acceptable alternative).

Best Practice/Lessons Learned

A. (Reserved)

042 Exterior Glazing

0421 Windows

Baseline:

1. Provide glass thickness and safety glass materials appropriate to safety risk, energy performance requirements and local conditions, including wind loads and internal air pressures, deflections, safety, and code compliance.
2. Provide vinyl, or vinyl-clad wood frames.
3. Exterior windows must have insulated glazing system (outer glazing low E coating with an air space and interior glazing that meets latest adopted edition of IBC for wind pressures). Ensure building energy efficiency, interior glare, daylighting, acoustic performance, and security when selecting exterior window and glazing systems. Provide high performance glazing units with high visible light transmittance for better daylighting and a low solar heat gain coefficient in accordance the National Fenestration Rating Council.
4. Square feet of exterior openings to square feet of total exterior wall will meet Design Ratio provisions. Size and placement should provide a balance of natural lighting, view, solar gain, and heat loss.
5. Glazing in windows in high-traffic and vandal-prone areas should provide an appropriate level of impact resistance.

6. To simplify replacement of broken units, avoid individual glass pieces larger than 4 feet in width or 6 feet in height.
7. Exterior windows constructed with thermally broken frames to reduce heat loss and prevent thermal conduction.
8. Provide commercial-grade windows. Provide prefinished exterior surfaces as opposed to field finished or painted options.
9. Provide casement and awning windows with screens at operable vents. Casement and awning windows must not be oversized and must be easily opened by crank mechanisms. Do not locate operable windows at locations where persons can accidently strike the frame of an open window. Provide an adequate number of locking points to provide positive closure.
10. Specify windows with sub-frame construction for efficiency and to resist water penetration.

Provisional:

11. Consider fiberglass frames. CF-3; LCCA-3.
12. Consider aluminum clad wood frames. CF-3; LCCA-3.
13. Consider single or double hung windows with window screens in appropriate climates (primarily zones 6 and 7) as a character defining feature of an existing building or as an historic treatment. CF-3; LCCA-3.
14. Consider specifying high-performance glazing as determined by orientation and energy modeling. CF-4; LCCA-TBD, depending on glazing, price of windows can double. LCCA analysis of the systems vary.
15. Consider polycarbonate covers at windows susceptible to vandalism and in remote areas where window replacement is not readily available.

Premium:

16. Stainless steel, mahogany, teak, or exotic hardwood window frames or sashes.
17. Skylights.
18. Triple-glazed windows in climate zones 6 and 7. LCCA-3.
19. Bullet-resistant glass.
20. Any windows of special sizes requiring manufacturer's premium costs.
21. Silicone glazing systems, butt glazing systems, or double wall glazing systems.
22. Non-standard colors or finishes on windows that require manufacturer's premium costs.
23. Glazed channel glass wall systems.
24. Arched or complex windows and frames.

Best Practice/Lessons Learned

A. When considering window sizing and placement to achieve openings to exterior walls (O:EW) ratios, it is often more energy efficient to use less but larger windows versus multiple smaller windows or windows with mullions.

0422 Storefronts

Baseline:

1. Provide thermally broken aluminum frames or aluminum clad wood frames in storefront systems for larger window installations. CF-4; LCCA-3.
2. Provide engineered systems from the manufacturer.

Provisional:

3. (Reserved)

Premium:

4. Storefront systems with glazing extending less than 15in above floor level.

Best Practice/Lessons Learned

A. (Reserved)

0423 Structural Window Walls

Baseline:

1. None.

Provisional:

2. None.

Premium:

3. Structural glazing systems of any size.

Best Practice/Lessons Learned

A. (Reserved)

0424 Translucent Panels

Baseline:

1. (Reserved)

Provisional:

2. Consider insulated translucent sandwich panels where light transmittance is desired but visual transmittance is not required.

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. Translucent sandwich panels are particularly suited to high bay and clerestory windows where clear glass would produce uncontrolled glare.

043 Exterior Doors

0431 Personnel Doors

Baseline:

1. Exterior doors shall be water-tight, weather-tight, and protected from climatic influences, including rain and strong winds.
2. Exterior doors subject to continual heavy use must be constructed both for strength and resilience against wear, and against accidental or deliberate damage. Sufficiently robust to provide appropriate building security and to withstand high traffic conditions without stress or damage to the door, glazing or hinges. Specify exterior doors with fully welded metal frames. Avoid "knock-down" frames at exterior doors.
3. Door materials include:
   a. Insulated, fully galvanized steel, primed and painted. CF-2; LCCA-1.
   b. Fiberglass, especially suitable for coastal, salt environments, climate zones 6 and 7.
   c. Aluminum, factory finish. CF-2; LCCA-1.
4. Avoid the use of fully glazed door systems.
5. Specify ANSI Grade 1 exterior door hardware with stainless steel components and no plastic components in hinges, locks, panic hardware, or lever handles. CF-4; LCCA-1.
6. Specify exterior doors with fully welded metal frames. Avoid "knock-down" frames at exterior doors. CF-3; LCCA-1.
7. Provide electronic locks and controls at exterior doors where required for security.

Provisional:

8. Consider specifying 42-inch-wide doors only at limited locations when functionally necessary such as at service doors. CF-2; LCCA-1.
9. Consider the site-specific local complexities of construction logistics when selecting exterior materials for remote communities.

Premium:

10. Non-standard colors or finishes on doors that require manufacturer's premium costs. CF-4; LCCA-2.
11. Stainless steel doors or frames. CF-4; LCCA-1.

Best Practice/Lessons Learned

A. (Reserved)

0432 Special Doors

Baseline:

1. (Reserved)

Provisional:

2. (Reserved)

Premium:

3. Non-standard doors that are higher than 84in or wider than 36in – other than service doors. CF-4; LCCA-1.

4. Any doors of special sizes requiring manufacturer's premium costs. CF-4; LCCA-1.
5. Overhead doors except at service/delivery. CF-3; LCCA-3.
6. Bullet-resistant doors.

Best Practice/Lessons Learned

A. (Reserved)

044 Exterior Accessories

0441 Louvers, Screens & Shading Devices

Baseline:

1. Louvers: Specify internally draining style. In high wind environments of all climate zones, provide protective exterior wall mounted hoods to prevent accumulation of rain, snow and ice within louvers or screened openings.
2. Hoods shall be galvanized and painted metal or stainless steel with sloped tops.
3. Coordinate location of ventilation intakes with prevailing wind direction(s) and location of combustion flues, plumbing vents, and other sources of objectionable odors.

Provisional:

4. Consider screening enclosures at services areas and dumpsters; cedar fencing, front of the enclosure may have a gate, however, may also be left open for ease of access.
5. Consider exterior light shelves at large window areas to reduce interior glare and solar heat gain, primarily at south and west facing facades. Light shelves may be pre-manufactured as part of the window system or "stick built".

Premium:

6. Light shelves on the interior side of windows. LCCA-4.

Best Practice/Lessons Learned

A. In schools with elevated main floors, consider utilizing the space below the school for exhaust and relief air discharge, but only where skirting is such that heat can be easily dissipated. Take care with air intakes; organics below the structure may create objectionable odors for outside air intakes. Provide security screening across face of termination points.

0442 Balcony Elements

Baseline:

1. Guardrails and handrails: Provide at locations and construction as required by IBC. Materials include galvanized; galvanized and painted or high-performance coated steel; aluminum (bare or coated); treated wood or combinations of the above.

Provisional:

2. (Reserved)

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0443 Other Exterior Accessories

Baseline:

1. Provide building-mounted school sign of individual letters or ganged on sign-board.

Provisional:

2. Consider providing lighting for school sign; control on photocell.

Premium:

3. More than one building-mounted school name sign.

Best Practice/Lessons Learned

A. (Reserved)

05. ROOF SYSTEMS

A. Building System Summary

The **Roof Systems** of a building consist of an assembly of components which protect the building's structure and interior spaces from precipitation of all types and work together to control and remove that precipitation. It also isolates the interior spaces of a building from other exterior environmental factors such as temperature. The department recognizes three sub-categories in this building system: **Pitched Roof**, **Flat Roof**, and **Roof Accessories**. The sub-systems under these categories consist of the components associated with each roofing system including the roofing material, and collection and drainage features. Roof accessory components such as hatches and skylights, and curbs for mechanical equipment are also in this section. Roofs which also serve as walkable/usable decks and components associated with vegetative roofs are assessed in this section. **Roof Systems** interface with **Exterior Closure** and **Roof Structure** but have little to no component overlap. Unlike **Exterior Walls & Soffits** where an interior wall substrate is part of the wall assembly, all interior ceilings are assigned to **Ceiling Finishes**.

B. Design Philosophy

One of the most challenging building systems on Alaskan school facilities is the roof system. Achieving high-performing roofs with long lifespans can be difficult. Failed roofs, especially those which allow water to penetrate interior spaces are a distraction to students and educators. In addition, they degrade building structural systems and finishes, oftentimes creating damages whose repair costs dwarf the repair cost of the leak itself. Many school districts' maintenance staffs spend an inordinate amount of time chasing roof leaks and repairing the damage they have created. But roof issues aren't just limited to leaks. The insulating property of a facility's roofing system is also an important design consideration. As the primary point of heat loss, the design and construction of the roof system must be designed in response to Alaska's climate zones.

The easiest way to reduce the potential roofing problems and initial construction cost of a high-performance roofing system is to reduce the area of roof to be constructed. By decreasing the roof area of a facility, the annual roof maintenance effort is reduced, thus reducing the system's maintenance cost. Often these types of reductions can only occur when considering multi-story versus single-story buildings. Following size, reducing roof complexity is the next most important factor when designing for cost effectiveness. The footprint, configuration, and structural grid should be simple and straightforward, without complex geometries. Water-shedding pitched roofs offer the best performance in areas of high rainfall but can reach performance limitations on schools with large roof areas. Successful, cost-effective use of low-slope roof systems has been proven in most Alaska climate zones; however, these roofs are the most dependent on high quality materials and excellent installation.

C. Design Criteria & Ratios

Criteria

- Hot roof design is preferable to a vented cold roof especially in facilities possessing a wood structural system.

- Roof penetrations will be minimized by consolidation of plumbing vents and other systems where possible.
- Roof penetrations will be located near the ridge or top of the roof slope to reduce potential snow damage and roof leaks.
- Roof design shall be simple and not broken into planes or cut-up by unnecessary dormers.
- Water shedding roof systems shall be constructed at a minimum of a 3:12 slope.
- Metal roofs with exposed fasteners are not to be utilized on new construction or replacement roof projects.

Ratios

1. (Reserved)

051 Pitched Roofs

Baseline:

1. Recommended pitch for major portion of roofs is 3:12 to 6:12. Where the size of the structure in a pitched roof design causes an excessive volume of unused attic space consider changing to a low slope roof design.
2. Snow shedding: For roof materials prone to snow shedding carefully consider the discharge areas to provide occupant safety and to avoid damaging nearby surfaces. Snow shedding shall not occur at any door, including service and maintenance doors.
3. Gutters and downspouts: Where needed to control run off, provide commercial grade gutters and downspouts. Ensure downspout discharge is in a controlled drainage system. Do not discharge run-off over sidewalks or other pedestrian circulation.
4. Roof penetrations: Minimize the number of roof penetrations. Where possible, sidewall penetrations such as mechanical intake and exhaust are preferred. On metal roof surfaces, locate necessary penetrations near to the ridge to minimize risk of sliding snow damage. Provide heavy gage snow diverters above penetrations where shedding may damage penetrations.
5. Installation detailing shall consider and accommodate thermal expansion and contraction.
6. Roof Materials: When choosing roofing systems, careful consideration should be given to design guidelines listed above and coordinated with District design preferences.
    a. Metal Roofs: Sheet material, 26-gauge in portable roll formed or factory formed profiles. Base metal aluminum-zinc alloy coated hot-dipped process and pre-painted. Two-coat fluoropolymer finish system, 20-year warranty on the finish. Avoid large roofs where metal lengths exceed practical lengths due to shipping, handling and machine roll forming considerations. Avoid field splices. CF-3; LCCA-3.
    b. Insulated Metal Roof Panels (IMP): Overall thickness, surface thickness, and R-value appropriate to region and structural design intent. CF-3; LCCA-3.
    c. Asphalt Shingles: Asphalt coated glass felt, maximum 225lbs per square (100sf), mineral granule surface with algae resistance, Class A fire resistance. Installation must be rated for site wind conditions. 30-year warranty. CF-1; LCCA-3.

   d. Underlayment: Self-adhering polymer-modified asphalt sheet, 40 mil total thickness, polyethylene sheet top surface, specify slip resistant top surface when needed for safe installation. CF-2; LCCA-1.

7. Roof Insulation: Types and R-values; the following values, or tested values from manufacturers may be used in determining R-values of roof assemblies.
   a. Expanded Polystyrene (EPS) Board R-Value = 4.17 per inch. CF-2; LCCA-1.
   b. Extruded Polystyrene (XPS) Board R-Value = 4.17 per inch. CF-3; LCCA-1.
   c. Polyisocyanurate (Polyiso) Board R-Value = 5.6 per inch. CF-2 to 3; LCCA-1.
   d. Glass-Fiber Batt Insulation R-Value = 3.16 per inch. CF-1; LCCA-1.
   e. Glass-Fiber Batt Insulation (High Density) R-Value = 4.28 per inch. CF-1; LCCA-1.
   f. Glass-Fiber Blown-In Insulation R Value = 3.7 - 4.28 per inch. CF-1; LCCA-1.
   g. Mineral Wool Batt Insulation R-Value = 4.0 per inch. CF-3; LCCA-1.
   h. Open Cell Spray Foam Insulation R-Value = 3.6 per inch. CF-3; LCCA-1.
   i. Closed Cell Spray Foam Insulation R-Value = 6.0 - 6.5 per inch. CF-4; LCCA-1.
8. Ventilation: Provide ventilation openings equal to or exceeding building code requirements for the roof area to be ventilated. Ensure the structure and associated blocking does not impede air movement. In high wind areas provide design to mitigate infiltration of wind driven rain, snow, or ice crystals through use of filters and/or baffle design at ventilation openings. Provide weep holes, or similar, to allow escapement of moisture accumulation such as at ridge vents.

Provisional:

9. Consider 24-gauge metal roof panels for flat-pan standing seam, or where design wind speeds exceed 100 miles per hour.
10. Consider 22-gauge metal roof panels where on purlins or other interval-spaced structural support. CF-2; LCCA-2.
11. Consider Attachment: Fasten sheet metal roofing to supports with concealed clips at each standing-seam joint, avoid exposed fastener systems.
12. Consider providing (2) layers of underlayment at slopes of 2 in 12 or less. CF-1; LCCA-1.
13. Consider at asphalt shingle installations, providing hand-tabbing at each shingle to manufacturer's recommendation to prevent wind uplift.
14. Consider Asphalt Shingles: Asphalt coated glass felt, mineral granule surfaced, Class A fire resistance. Installation must be rated for site wind conditions. 50-year warranty.

Premium:

15. Polyurethane Foam (PUF) roof assemblies.
16. Metal roof panels 22-gauge or greater except where providing structural support over purlins or battens and part of an assembly approved under an LCCA.
17. Metal shingles and tiles.
18. Clay or ceramic roof tiles.
19. On large roof areas served by gutters: Gutter system large enough to walk in and with safety rail along the side of gutter and tie offs for cleaning.

Best Practice/Lessons Learned

A. (Reserved)

052 Flat Roof (Low Slope)

Baseline:

1. Low slope roofs to be exposed membrane over coverboard, insulation, vapor retarder and thermal barrier board over structural deck. Specify roofs with extended warranties with 20-year minimum life. CF-3; LCCA-3.
2. Assemblies should be fully adhered systems. Mechanically attached systems may be used when conditions do not allow for fully adhered. In a mechanically attached system provide self-healing vapor retarder to reduce impact of attachment penetrations through the system.
3. Slope of the surface membrane to drain is 3/8 inch per foot preferred, 1/4 inch per foot minimum. Calculate slope of valleys at tapered crickets to maintain positive drainage.
4. Membranes:

   Note that membranes requiring heated asphaltic products may not be practical in remote locations due to transportation costs and logistics.

   a. Ethylene propylene diene monomer (EPDM) single ply membrane, 60 mil, internally reinforced. CF-2; LCCA-2.
   b. Ethylene propylene diene monomer (EPDM) single ply membrane, 90 mil, non-reinforced. CF-2; LCCA-2.
   c. Asphaltic built-up, 5-ply (BUR) consisting of base sheet, 3-ply sheets plus cap sheet. CF-4; LCCA-3.
   d. Asphaltic mineral cap built-up, 5-ply (MCBUR) consisting of base sheet, 3-ply sheets plus mineral cap top sheet. CF-4; LCCA-3.
   e. Weldable Thermoplastic Polyolefin (TPO) single-ply membrane. CF-3; LCCA-2.
   f. Weldable Thermoplastic Polyvinyl Chloride (PVC) single-ply membrane. CF-3; LCCA-2.
   g. Modified Bitumen, multi-ply membranes. CF-4; LCCA-2.
5. Insulation: See *051 Pitched Roofs* Item 7 above for insulation types and R-values.
6. Roof drains: Provide code required secondary overflow drains.
   a. Connect to internal rain leaders leading to storm drain system where available and code allows.
   b. Provide insulated roof drains sumps to reduce condensation. Rain leaders may lead to dry wells or to daylight where storm drains are not available.
   c. Avoid the use of scuppers except for secondary overflow drains. Provide rock/debris screening at any discharge pipes where accessible from ground level.
   d. Provide measures to prevent freezing around roof drains such as reduced R-value around drains, minimum R-value around drains is R-12. Use heat trace as a last option.
   e. Use cast iron dome strainers on roof drains. Do not use plastic.
   f. Do not discharge water, snow, and ice along the face of the walls. Design systems to prevent water from sheeting down across the face of exterior walls or splashing against exterior walls at grade.
   g. Locate overflow spouts where visible to staff but not draining onto pedestrian areas.

h. Where heat trace is provided, locate clearly labeled switches/controls in readily accessible locations.

7. Parapets: Top of parapet to be minimum 12 inches above the roof surface. Roof membrane to lap up and over the parapet and be protected by a cap flashing. Cap flashing to be held by a continuous wind cleat, fastened at an on-center distance capable of resisting site-specific wind conditions.
8. Minimize roof penetrations through the roof membrane. All roof penetrations to be made by certified installers with approved roofing manufacturer's details. Avoid 'shelves' on the exterior faces of parapet that might hold ice to prevent the potential of falling and personal injury and to avoid melting and staining down the face of the wall.
9. Mechanical equipment curbs should have diversion crickets to maintain rainwater flow and avoid damming. Elevate mechanical equipment a minimum of 18 inches above the roof surface. Locate mechanical air intakes a minimum of 24 inches above the roof surface.
10. Minimize complex and multiple roof levels in the building design.
11. Provide access to the roof from an interior location.

Provisional:

12. Consider for BURs – Built-up bituminous roofing: Asphalt saturated glass fiber felts, four ply plus base sheet. CF-4; LCCA-4.
13. Consider installing electric heat trace and insulation on roof plumbing vents.
14. Consider, where possible, achieving roof slope by sloping the building structure to reduce the quantity of tapered insulation.
15. Consider heat trace in roof and overflow drains based on regional applicability.
16. Consider providing overflow spout on primary stormwater piping at exit point from building, so that blockages in site storm drain do not cause backup into interior rain leader piping.

Premium:

17. Roof warranties exceeding 30 years.
18. Liquid Applied Membranes (LAM). CF-3.
19. Any colored roofing system other than manufacturer's standard colors. CF-4; LCCA-1.
20. Green/vegetative roofs. CF-5; LCCA-5.

Best Practice/Lessons Learned

A. (Reserved)

053 Roof Accessories

Baseline:

1. Provide OSHA compliant rooftop safety railings where rooftop equipment requires access within 10 feet of a roof edge.
2. Design roof hatches for maintenance sized large enough to accommodate individuals equipped with full emergency gear or service personnel with supplies and toolboxes.
3. Combine roof access with regular stairway access to upper-level building elements. If not possible, provide alternating tread stairs in lieu of ship's ladders or exterior roof ladders whenever possible.

4. Provide snow guards to prevent large accumulations of snow and ice from shedding. CF-1; LCCA-1.

Provisional:

5. Consider vertical glazed clerestories or light monitors over skylights. Locate base of glazing minimum 24 inches above roof surface.
6. Permanently mounted safety harness tie offs. CF-1; LCCA-4.

Premium:

7. Roof deck plazas with pavers and protective railings, walls and supports.

Best Practice/Lessons Learned

A. (Reserved)

06. INTERIORS

A. Building System Summary

The **Interiors** of a building consist of elements that divide buildings into different rooms and spaces and the fittings and finishes in those rooms and spaces which contribute to their special function. It does not include mechanical and electrical systems. The department recognizes six sub-categories in this building system: **Partitions/Soffits**, **Special Partitions**, **Interior Openings**, **Special Floors**, **Interior Finishes**, and **Specialties**. The sub-systems under these categories include the components needed to construct walls, provide openings in those walls such as doors and windows, and provide appropriated finishes to all the surfaces including ceilings, walls, and floors. **Interiors** systems interface primarily with **Mechanical** and **Electrical** systems which are often embedded in or attached to **Interiors** elements.

B. Design Philosophy

Interior partitions, soffits, openings, finishes, and specialties typically account for approximately 10 to 12 percent of a project's total construction cost. In a traditional school design, the cost of partitions and doors are fairly consistent. However, the use and quantity of special partitions such as glazing and movable partitions varies between school designs and can significantly impact the cost of the interiors. The use and quantity of casework also varies between school designs, thus affecting the project cost. The material choice and specification of interior floors, walls, and ceilings also plays a large part in determining the cost of a project's interiors. Interiors are the work and learning environment and they directly impact the health and wellness of occupants, affect absenteeism and teacher retention, and influence learning.

C. Design Criteria & Ratios

Criteria

- Interior glazing should be used prudently.
- Alternative storage solutions, such as closets with shelving in lieu of casework, should be considered.
- Entries and circulation corridors should utilize a durable, non-staining, non-slip floor material.
- In areas without paved walk and road surfaces, gymnasium floors should utilize a sheet athletic flooring or a poured urethane floor in lieu of a wood floor to minimize damage to floor from tracked in soils.
- Interior spaces and floor finishes should be laid out in a manner that reduces seams and material waste.

Ratios

A. Interior doors should be limited to one per every 400 GSF.

061 Partitions/Soffits

0611 Fixed Partitions

Baseline:

1. Specify interior construction materials of high durability, low maintenance, and an expected life span of 30 years.
2. Provide acoustical and smoke separation by designing interior walls to extend to the underside of the structural deck whenever practicable and when required by codes.
3. Provide the appropriate STC ratings for school spaces (per ANSI/ASA S12.60 on Classroom Acoustics).
4. Standard partition construction will be 20-gauge metal framing sized for needed wall cavity widths, 5/8-inch gypsum wall board each side, taped, mudded, and finished to Level 4. CF-3; LCCA-3. Add the following:
    a. Plywood sheathing where required for shear. CF-2; LCCA-1.
    b. Wood blocking as permitted by code where required for wall-mounted accessories. CF-2; LCCA-1.
    c. 18-20 ga metal backing if wood is not permitted. CF-3; LCCA-1.
    d. Cementitious backer board where installing wall tile. CF-3; LCCA-1.
    e. Acoustical insulation, resilient channel, and sealant where required for STC ratings. CF-3; LCCA-1.
    f. Impact resistant GWB or surface applied impact resistance at high-traffic areas.
5. Partitions to be easy to maintain and easily cleanable.
6. High traffic areas to be impact resistant GWB. CF-4; LCCA-1.
7. Provide expansion/control joints as recommended in the latest edition of the United States Gypsum (USG) Construction Handbook.
8. Gymnasium wall finishes to have additional wall protection below 10 feet to allow for general durability, and impact resistance. (ref. *Category A, Assembly Spaces, Gymnasium*).
9. Non-porous, easily cleanable surfaces for food services areas. FRP, ceramic or porcelain tile wainscot to 4ft AFF at a minimum for wet areas. Provide full height FRP, ceramic or porcelain tile, or stainless steel at grease-prone areas. CF-3; LCCA-3.

Provisional:

10. Consider concrete masonry walls where cost effective and deemed essential by design team (may need LCCA). CF-3 to 5 in rural locations; LCCA-1.
11. Consider wood framed walls where more cost effective. CF-3; LCCA-3.
12. Consider at glazed porcelain and/or ceramic tile, consider use of manufactured metal trim pieces at base, corners, and terminations. CF-1; LCCA-1.
13. Consider acoustical panels: fabric wrapped panels or paint-grade wood fiber strand board. CF-1; LCCA-2.

Premium:

14. Full-height ceramic or porcelain tile, or stainless-steel sheet at Food Service areas.
15. Radiused and curved walls beyond CF-1.

16. Walls that exceed the minimum STC rating for school spaces.
17. Walls that use both impact resistant GWB and an impact resistant applied wall finish.

Best Practice/Lessons Learned

A. (Reserved)

0612 Soffits & Ceilings

Baseline:

1. Standard soffit construction will be 20-gauge metal framing, cold rolled channel, or fabricated metal suspended-ceiling systems sized for anticipated loads and spans, 5/8-inch gypsum wall board, taped, mudded, and finished to Level 4. Add the following:
    a. Additional gypsum wall board where required for fire resistance. CF-3; LCCA-3.
    b. Wood blocking as permitted by code where required for wall-mounted accessories. CF-2; LCCA-1.
    c. 18-20 ga metal backing if wood is not permitted. CF-3; LCCA-1.
    d. Acoustical insulation, resilient channel, and sealant where required for STC ratings.
2. Soffits to be easy to maintain and easily cleanable.
3. Soffits below 10ft in high traffic areas to be impact resistant GWB. CF-4; LCCA-1.
4. Provide expansion/control joints as recommended in the latest edition of the United States Gypsum (USG) Construction Handbook.

Provisional:

5. Consider using acoustic lay-in tile for horizontal elements of soffits where appropriate.

Premium:

6. Soffits of wood or metal panel systems. CF-1.
7. Soffits of suspended 'cloud' and other decorative treatments. CF-1.

Best Practice/Lessons Learned

A. (Reserved)

062 Special Partitions

0621 Operable Partitions

Baseline:

1. None.

Provisional:

2. Consider side or upward acting operable partitions when needed to create isolated, functional smaller spaces from larger open spaces (e.g., to separate Stage from Multi-purpose to create a Music/Drama classroom). (ref. *Category A – Instructional/General Use Classroom* for Provisional elements related to hinged double doors up to 4ft per leaf for connection between classrooms.)

Premium:

3. Operable partitions or large sliding doors between classrooms in Category A.

Best Practice/Lessons Learned

A. (Reserved)

0622 Demountable Partitions

Baseline:

1. (Reserved)

Provisional:

2. (Reserved)

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0623 Glazed Partitions

Baseline:

1. (Reserved)

Provisional:

2. Consider use of glazed partition walls in aluminum or steel frames with appropriate safety glazing in areas where transparency is important in delivery of the educational program.

Premium:

3. Glazing modules exceeding 60in in more than one dimension.

Best Practice/Lessons Learned

A. (Reserved)

0624 Railing & Screens

Baseline:

1. (Reserved)

Provisional:

2. (Reserved)

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

063 Interior Openings

0631 Personnel Doors

Baseline:

1. Interior doors systems shall be readily available and have a wide variety of offerings including acoustical, fire rated, hollow metal and flush wood veneer. CF-varies, LCCA-varies.
2. All doors within public use areas to be ADA compliant.
3. All swing doors throughout to have ADA compliant, lever-style, commercial grade hardware.
4. Overhead doors at food service pass-throughs, shop areas, or for separating zones; lockable.
5. Specify interior doors with welded metal frames in all new construction. "Knock-down" frames are discouraged. CF-3; LCCA-3.
6. Standard door assemblies to be solid core, factory-finished wood doors and painted hollow metal frames, with fire resistive ratings as required by code. 1 ¾-inch, 16-gauge insulated hollow metal doors may be used in lieu of wood; metal doors should be used in PE, shops, gymnasium, labs, and locker rooms.
    a. Provide glass vision lite kits and/or louvre openings as indicated by educational specification and/or program.
    b. In un-rated assemblies, provide ¼-inch, clear tempered glass door inserts and relites.
    c. Vision Lite kits within doors to have 18-gauge cold rolled steel frames with mitered and welded corners and should utilize standard sizes: 6"x27", 12"x12", 24"x24", 24"x36", 24"x60".
7. Door hardware in a variety of configurations including, but not limited to:
    a. Office sets: full-perimeter gaskets and door bottom with neoprene element, office lockset, wall, or floor stop.
    b. Storage sets: full-perimeter gaskets and door bottom with neoprene element, storage lockset, wall, or floor stop, closer, kickplate.
    c. Classrooms: full-perimeter gaskets and door bottom with neoprene element, closer, wall or floor stop, lockdown locking mechanism.
    d. Gymnasium doors or sets of double doors used to close down portions of the school: panic hardware, closers, kickplates, locking doors (manual or card reader), floor or wall stops where possible, overhead stops where floor/wall stops are not possible and full-perimeter gaskets and door bottom with neoprene element. Double doors should not have astragals. CF-3; LCCA-3.
    e. ADA/Unisex single-toilet room doors: full-perimeter gaskets and door bottom with neoprene element, lockset with occupied indicator, and a wall or floor stop.
    f. Teacher work and support spaces: silencers, proximity card readers, closer, and a wall or floor stop.

Provisional:

8. Consider all classroom doors to have closers, with closing mechanism to be mounted on the classroom side to allow for locking devices to be applied in the event of lockdown situations.
9. Consider door glazing insert kits in a variety of sizes, safety glazing. CF-3; LCCA-3.
10. Consider single or double intercommunicating doors between classrooms. CF-3; LCCA-2.

Premium:

11. Non-standard doors that are higher than 84in or wider than 36in. CF-4; LCCA-2.
12. Any doors or windows of special sizes requiring manufacturer's premium costs. CF-4; LCCA-2.
13. Non-standard colors or finishes on doors that require manufacturer's premium costs. CF-4; LCCA-1.

Best Practice/Lessons Learned

A. (Reserved)

0632 Special Doors

Baseline:

1. (Reserved)

Provisional:

2. (Reserved)

Premium:

3. Motorized overhead doors with glazing used as space dividers walls between classrooms. CF-4; LCCA-4.
4. Bullet resistant doors & glazing; UL Listed Level 1- Level 3 is acceptable. CF-5; LCCA varies.
    a. UL 752 - Level 1 - protects against 9mm full metal copper jacked with lead core. No spall, no penetration.
    b. UL 752 – Level 2 – protects against .357 Magnum jacketed lead soft point. No spall, no penetration.
    c. UL 752 – Level 3 – protects against .44 Magnum lead semi-wadcutter gas checked. No spall, no penetration.

Best Practice/Lessons Learned

A. (Reserved)

0633 Windows & Sidelites

Baseline:

1. Limit the size of windowpanes and relites to standard sizes: 18, 24, 36, 48, 60 inches wide by 18, 24, 36, 48 or 60 inches high. Limit overall size of windowpanes; use multiple smaller windows in lieu of one large window. Glazing/relites adjacent to doors can go up to 84 inches high.
2. Relite and frames to be painted hollow metal, with fire resistive ratings as required by code.
3. Window and relite frames and sills to be paint grade. CF-3; LCCA-3.

Provisional:

4. Consider 2-way mirrors in observation areas, safety glazing.

Premium:

5. Silicone glazing systems, butt glazing systems or double wall glazing systems.
6. Arched or complex windows and frames.
7. Non-standard relites and vision lite kits.

8. Ballistic and blast mitigation coatings or films.

Best Practice/Lessons Learned

A. (Reserved)

064 Special Floors

0641 Access Floors

Baseline:

1. (Reserved)

Provisional:

2. (Reserved)

Premium:

3. Raised floor raceway systems. CF-3; LCCA-3.

Best Practice/Lessons Learned

A. (Reserved)

0642 Platforms & Stages

Baseline:

1. (Reserved)

Provisional:

2. Consider floors in stage/platform areas appropriate for a variety of performances: dance performances, vocal/music performances, etc. Floors, where required by the program, shall be a cost-effective, self-install sprung floor, resilient finish panel system designed for permanent installation. CF-4 to 5; LCCA-3.

Premium:

3. Auditorium spring floor panel system with hardwood surfaces.

Best Practice/Lessons Learned

A. (Reserved)

065 Interior Finishes

0651 Floor Finishes

Baseline:

1. Selected finishes to be sustainable and contribute to a healthy, productive learning environment. Evaluate products for recycled content, recyclability, waste reduction, energy efficient maintenance, low VOC content and post-installation product emissions.
2. Specified applied finishes shall be easy to clean and resistant to moisture and mold/bacterial growth.

3. Resilient flooring such as linoleum, sheet vinyl, rubber flooring or VCT is preferred for hallways/corridors, art classrooms, storage rooms, and other locations where carpet is not ideal.
    a. Resilient floor materials to be low-VOC, use low-VOC adhesives, and be compatible with low-VOC, water-based solvents/cleaning agents.
    b. All resilient materials shall be commercially rated for heavy-duty wear.
    c. Resilient sports flooring to have striping for common indoor sports played within the district.
    d. Science labs to have chemical resistant flooring.
    e. Provide static dissipative flooring where required by the program.
4. Carpet tiles are preferred for office and classroom spaces throughout (exception: labs and art rooms).
    a. Carpet tile should have a high wear / TARR rating, stain resistance and cleanability; carpet to have moisture impervious backing.
    b. Carpet tiles should have a minimum of 25 percent recycled content and a minimum of 17-ounce face weight.
    c. Carpets to be low-VOC, use low-VOC adhesives, and be compatible with low-VOC, water-based solvents/cleaning agents.
5. Adhesives and sealants used in the building interior (inside the exterior moisture barrier) must be low VOC.
6. Provide a walk-off mat system at every main entrance.
7. Standard resilient wall base should be use throughout office, classroom, and hallway areas with slight modifications based on the rooms.
    a. Tile base where walls are receiving tile applications.
    b. Resilient sheet with integral cove base with top trim in toilet rooms or food service areas.
8. Wood sports flooring, where required by the program, to be second and better grade maple strip flooring with striping for common indoor sports played within the district. CF-4 to 5; LCCA-3.

<u>Provisional:</u>

9. Consider porcelain tile and mosaic tile floor and wall finishes in toilet/shower rooms where required by the program. All tile and grouts should be installed based on the installation conditions and as recommended by the Tile Council of America. CF-3; LCCA-1.
    a. Use epoxy-modified grout mixture for high moisture areas.

<u>Premium:</u>

10. Wood sports flooring for elementary schools.
11. Cork or bamboo flooring material.
12. Wood, plywood wrapped, or stainless-steel wall base.
13. Recessed walk-off grate entry system. CF-4; LCCA-1.
14. Integral cove base in areas other than toilet rooms, lockers, kitchens, and custodial closets.

Best Practice/Lessons Learned

A. Consider the use of ice melt when selecting flooring materials in high traffic areas. Extending the walk off mat length helps reduce the amount of ice melt in other areas of the building.

0652 Wall Finishes

Baseline:

1. Paint/sealers used throughout should be durable and scrubbable, with low- to no-VOC content.
    a. Use acrylic latex for non-metal surface.
    b. Use water-based acrylic alkyd enamel paints on metal surfaces.
    c. Use water-based epoxy paints in interior spaces with high humidity or areas subject to surface moisture.
    d. Use concrete sealer and/or concrete paint where required by the program.
    e. Wall paint to have one primer and two (2) finish coats.
    f. Door/relite frames to have a minimum of two (2) applied coats over a factory prime coat.
2. Gymnasium wall finishes to have hard surfaces below 8 ft to allow for rebound of balls. Surfaces above 8 ft to have acoustical wall panels.
3. Non-porous, easily cleanable surfaces for food services areas. Ceramic or porcelain tile wainscot to 4 ft above floor level at a minimum for wet areas. Provide full height ceramic tile at grease-prone areas.

Provisional:

4. Consider FRP panels as needed for service and as required. CF-2; LCCA-1.

Premium:

5. Wall paneling or wallpaper. CF-4; LCCA-2.
6. Full height wall tile except at grease-prone areas in kitchens. CF-4; LCCA-1.
7. Architectural resin panels.

Best Practice/Lessons Learned

A. (Reserved)

0653 Ceiling Finishes

Baseline:

1. Acoustical ceilings and panels to contain recycled content where possible.
    a. Sound absorptive with a minimum noise reduction coefficient (NRC) of .55 and a ceiling attenuation class (CAC) rating of 35.
    b. Ceilings to be installed with a standard 15/16 inch grid system and seismically braced. Ceiling suspension system to be hot dipped galvanized steel to inhibit rust.
    c. Ceilings within food service and lab areas to be washable and scrubbable.
    d. Acoustic ceilings shall meet ASTM C 1264 for Class A materials.

Provisional:

2. Consider ceiling grids to support hanging displays in all classrooms and hallways.

Premium:

3. Decorative or expensive non-standard ceiling tiles or ceiling systems such as metal or wood slat ceilings. CF-5; LCCA-2.
4. Suspended acoustic ceiling trims other than 15/16 inch grid profiles.

Best Practice/Lessons Learned

A. (Reserved)

0654 Other Finishes

Baseline:

1. Provide resilient preformed stair tread and riser units; landings to match typical floor finishes.

Provisional:

2. Consider exposed concrete treads in metal pan where compatible with aesthetic and regional cost factors; provide non-slip metal nosings.

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

066 Specialties

0661 Interior Specialties

Baseline:

1. Interior signage to be provided at all areas required by code to receive signage. All signs to have grade 2 Braille, tactile characters and pictograms as required by code.
2. Student lockers shall be provided as required by the programming documents and should be steel construction with sloped top and closed base; lock requirements to be selected by the school district. Lockers within locker rooms and changing areas to be ventilated steel construction.
3. Toilet room accessories to include, but not limited to commercial-grade, readily available:
    a. Soap dispensers.
    b. Mirrors.
    c. Toilet paper dispensers.
    d. Seat cover dispensers.
    e. Sanitary napkin receptacles.
    f. Grab bars.
    g. Paper towel dispensers.
    h. Baby changing stations and/or adult-sized changing stations for special needs classrooms as indicated by the program documents.

i. Waste receptacles.
j. Toilet partitions; to be durable and graffiti resistant. Partition hardware or door type to be selected to provide maximum privacy and minimum gaps between stall components.
k. ADA shower with shower seat.

4. Corner guards to be minimum of 2mm thick, have a 1-1/2 inch wing on either side and be a minimum of 4ft AFF. Material to be textured rigid material and available in 90 degree and 135-degree corner styles. CF-2 to 4; LCCA-1.
5. Fire extinguishers to be provided per code. All fire extinguisher cabinets to be recessed or semi-recessed. Provide signage and stickers on cabinet for fire extinguisher visibility.
6. Provide standard porcelain enamel steel whiteboards with integral trays and tack/map/poster rail as required by educational program; music rooms to have whiteboards with and without staff lines.
7. Provide tackboards with aluminum frame in manufacturer standard sizes.
8. Provide retractable projection screens.

Provisional:

9. Consider polyethylene terephthalate (PET) felt, and fabric covered rigid fiberglass board or fine-grain cork core acoustic wall and ceiling panels where needed for acoustical control.
10. Consider ventilated plastic lockers for high-humidity locker room conditions.
11. Consider stainless steel corner guards in non-high traffic areas; ease all sharp edges for safety.
12. Consider sliding double whiteboards with an integrated map/poster rail at top and tackboards, typical one per classrooms where whiteboards are called out.
13. Consider wayfinding signage with changeable inserts, ADA signage on acrylic with standoffs or vinyl graphic signage.
14. Consider dry-erase wallcovering surfaces that double as projection screens.
15. Consider electric automatic hand dryers at locker rooms.

Premium:

16. Toilet room premiums: motion-sensor soap dispensers, automatic hand dryers. LCCA-3.
17. Antimicrobial lockers to help protect against bacteria, mold, yeast and mildew or hardwood or hardwood veneer lockers. CF-4; LCCA-3.
18. Wood or metal framed mirrors of custom size, backlit.
19. Stainless steel corner guards outside of high-traffic areas.
20. Magnetic glass whiteboards.
21. Motor operated projection screen in any location other than auditoriums, gymnasiums, or other large presentation/lecture areas.
22. Linear, panel grille and perforated wood wall panels for acoustical control.
23. Suspended acoustical felt baffles & wall panels.

Best Practice/Lessons Learned

A. Match toilet room (and classroom) accessories to the district's supply contracts for consumable hygiene products.

B. Semi-recessed fire extinguisher cabinets often allow for continuity of acoustic or smoke/fire barriers.
C. The need for a retractable projection screen in every teaching space may have been overcome with the advent of a readily available projection surface provided by a whiteboard.
D. Be aware that use of 'maximum' privacy partitions (i.e., bottoms less than 9in AFF may require larger stalls for accessibility compliance.

0662 Casework & Millwork

Baseline:

1. Specify durable and easily cleaned casework. Base requirement is high pressure laminates over stable substrate with 3mm PVC edge banding. Counters are high pressure laminate with postformed backsplash and front edge profile. Casework to meet AWI Custom/Duty Level 3 throughout with the following special conditions: CF-3; LCCA-1.
    a. Resin counters in science labs space. CF-4; LCCA-1.
    b. Polycarbonate glazing to be used for casework within science lab space. CF-3; LCCA-1.
    c. Coat cubby areas with coat hooks, storage above and benches for changing shoes/outdoor gear. Provide dividers and spacing between hooks to prevent the spread of head lice and other parasites.
    d. Boot racks with space below to allow for cleaning.
    e. Perimeter counter with lab sinks/stations, and art drying racks in art classrooms.
    f. Administration reception counter including ADA-height counter, (ref. *Administration*).
    g. Library circulation desk with counter space including ADA height counter, book drop (ref. *1015 Equipment*).
2. Hallway areas to have lockable display cases for 2-D and 3-D displays, benches near toilet rooms and tackboards. CF-3; LCCA-1.

Provisional:

3. Consider stainless steel counters with integral backsplash, sinks, and drainboards at *Art*.

Premium:

4. Specialty solid surface counters to include, composite quartz, recycled glass, cast terrazzo, or polycarbonate counters.
5. Stainless steel lab storage and cabinetry.
6. Solid wood cabinets or wood veneer cabinets.
7. Casework or architectural woodwork such as picture rails, wainscoting, crown moldings, or paneling.

Best Practice/Lessons Learned

A. (Reserved)

0663 Seating

Baseline:

1. Building entry vestibules to have perimeter benches in the parent pick-up / drop-off zones and lost & found bin. CF-3; LCCA-1.

Provisional:

2. (Reserved)

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0664 Window Coverings

Baseline:

1. Window treatments to be roller shades. Provide fascia on coverings to hide mounting brackets and mechanisms.

Provisional:

2. Consider blackout shades where required by the instructional program.

Premium:

3. Motorized roller shades.

Best Practice/Lessons Learned

A. (Reserved)

07. CONVEYING SYSTEMS

A. Building System Summary

The **Conveying Systems** of a building are dedicated systems designed to move persons or materials up, down, around, and through a facility. The department recognizes two sub-categories in this building system: **Passenger Conveyors**, and **Material Handling Systems**. The sub-systems under these categories include elevators and personnel lifts as well as material lifts, hoists/cranes, and other kinetic systems such as dense files storage. The functions and loads induced by Conveying Systems often require broad integration with other building systems such as **Substructure**, **Superstructure**, **Mechanical** and **Electrical** systems. **Interiors** elements including Partitions, Soffits, and Interior Finishes are often represented in Conveying System components.

B. Design Philosophy

Conveying systems were developed to increase efficiency and capacity. Where they are able to achieve this in Alaskan schools, they should be implemented—with discretion. The efficiencies gained with two story school construction are often offset by the need for passenger conveyors. In addition, most of these systems rely on tight tolerances that are impacted by building movement. Such movement can occur in all Substructure and Superstructure types and is primarily influenced by the stability of subsurface conditions. Some sites and building configurations can appropriately trade the space efficiency of elevators and vertical lifts with the equally accessible solution of ramps. Cost-effective use of Conveying Systems in schools should be supported by solid life-cycle cost analysis.

C. Design Criteria & Ratios

Criteria

- Select the type of elevator mechanism based on subsurface soil conditions and building stability.
- Two-story school solutions should incorporate a design layout that requires only one elevator.
- Vehicle lifts and hoist systems will be limited to a defined educational program need.

Ratios

1. (Reserved)

071 Passenger Conveyors

0711 Passenger Elevators

Baseline:

1. Install elevators only where required by codes adopted by the state or a local jurisdiction with delegated authority. (For multi-story schools meeting accessibility requirements with ramps in lieu of elevators, see 4 AAC 31.020 for a space variance.)
2. Install electric traction elevators when permitted for maximum energy efficiency.
3. Installations not within 100 road miles of an established elevator service center at the time of construction are limited to hydraulic elevators excluding roped-hydraulic mechanisms.

4. In-ground hydraulic elevators must be supported by a geotechnical report showing suitable subsurface conditions.
5. Single piston hydraulic systems may not be eccentrically loaded.
6. Elevators will be supplied with backup power for lowering only.
7. Elevators will be included in a project's commissioning plan unless approved otherwise by DEED.

Provisional:

8. Consider elevators with machine rooms are preferred for maintenance simplicity. (For space variances associated with machine rooms, see 4 AAC 31.020.)
9. Consider if a sump is required for an elevator pit, locate the sump pump outside the elevator shaft.
10. Education related facilities with three or more stories should consider in-ground hydraulic pistons where subsurface geotechnical considerations allow.
11. Consider that cab flooring should match adjacent lobby/corridor flooring; doors and frames should be stainless steel.
12. Consider robust, durable controls, one per car (including both card access if a building standard and keyed controls), sensors, and connection to building automation.

Premium:

13. Education-related facilities with more than one passenger elevator. CF-2; LCCA-2.
14. Elevators with rated speeds above 200fpm and load capacities above 2,500lbs.
15. Cab construction, features (lighting, etc.), and finishes above the manufacturer's standard base or that require manufacturer's premium costs except as noted above.

Best Practice/Lessons Learned

A. (Reserved)

0712 Lifts & Other Conveyors

Baseline:

1. Passenger lifts or wheelchair lifts may be used where permitted by codes adopted by the state or a local jurisdiction with delegated authority. Primarily this will be at floor level changes that are less than a story height.
2. Inclined stair lifts are not permitted.

Provisional:

3. Consider providing an audio-visual alarm that is operational at all times and activates when the lift is in operation except that a lift installed at a stage shall be free of a warning light or alarm.
4. Consider providing shielding devices to protect users from the machinery or other hazards and obstructions.
5. Consider cab flooring to match adjacent lobby/corridor flooring.

Premium:

6. Escalators or any type of moving walkway.

Best Practice/Lessons Learned

A. (Reserved)

072 Material Handling Systems

0721 Elevators & Lifts

Baseline:

1. Dedicated freight elevators (or lifts where permitted by code) in education related facilities may be installed where the upper level(s) served by the conveyance total in excess of 100,000gsf.
2. If layouts permit, and as allowed by code, a required passenger elevator may be increased in size and capacity to function as a freight conveyance.
3. Vehicle lifts in the following quantities may be installed at any education related facility serving grades 9-12 whose approved educational specification includes an automotive Career Technology Education pathway:

Number of Students in grades 9-12	Allowable Vehicle Lifts
< 500 students grades 9-12	1
501 – 2,000 students grades 9-12	2
> 2,000 students grades 9-12	3

Provisional:

4. Consider lifts shall have shielding devices to protect users from the machinery or other hazards and obstructions.
5. Consider the maximum lifting height for vehicle lifts shall be 68 inches.
6. Consider two post lifts are limited to slab-on-grade construction; use four post lifts for elevated floors.
7. Consider where portable automotive lifts can meet curriculum requirements, such lifts shall be purchased and provided under School Equipment.

Premium:

8. Eligible education related facilities with more than one freight elevator or lift.
9. Freight elevator dimensions exceeding 5ft x 8ft and load capacities above 5,500lbs.
10. Vehicle lifts in excess of allowable quantities.
11. Vehicle lifts with load capacities above 9,000lbs or with ancillary accessories or features such as alignment calibration.

Best Practice/Lessons Learned

A. (Reserved)

0722 Hoists & Cranes

Baseline:

1. None.

Provisional:

2. Consider modular hoist and rail systems where needed to support the specific educational program.

Premium:

3. Overhead hoists with a capacity greater than 2,000lb.
4. Site fabricated, permanent, overhead hoist or crane assemblies.

0723 Other Systems

Baseline:

1. None.

Provisional:

2. Consider dumbwaiters of any size permitted by code may be used when transfer of materials between floors is needed and freight elevators are not permitted. (Note: dimensions and capacity of dumbwaiters are restricted by code and are very modest.)

Premium:

3. Belt conveyors, pneumatic tube systems, linen/trash/mail chutes, or operable scaffolding.

Best Practice/Lessons Learned

A. (Reserved)

08. MECHANICAL

A. Building System Summary

The **Mechanical** systems of a building create the internal environment necessary for comfort, hygiene, and safety within the school facility. The systems are highly integrated and are often highly automated. The department recognizes five sub-categories in this building system: **Plumbing**, **HVAC**, **Integrated Automation**, **Fire Protection**, and **Special Mechanical Systems**. The sub-systems under these categories include a large variety of fixtures, equipment combined with several types of distribution components including piping, valves, ducting, and controls. The **Mechanical** functions within a facility require broad integration with other building systems such as **Civil/Mechanical Utilities**, **Superstructure**, **Exterior Closure**, **Interiors**, and **Electrical** systems.

B. Design Philosophy

Mechanical systems shall be designed to conserve energy and water to reduce operating costs and demand on community resources. The systems shall be integrated with the design of the building plan and envelope to optimize performance and provide occupant comfort. The systems shall be durable, expandable, and easily maintained. Mechanical systems shall comply with DEED-adopted energy codes.

Mechanical joins Interiors as one of the higher cost building systems and typically accounts for approximately 10-12 percent of a project's total construction cost. Like Interiors, Mechanical systems are subject to initial cost savings by specification of materials or equipment, but oftentimes the reduction in initial cost is offset by increased maintenance and operation costs over the life of the system. It is important that the cost effectiveness of all material and equipment specifications is evaluated on a life cycle basis.

Plumbing systems can be greatly influenced by standards for cost-effective design because their use is not required in every functional area, whereas HVAC and sprinkler systems are. Consolidation of plumbing systems to core areas to limit piping runs and reduction of the overall plumbing fixture count are design decisions that limit a project's plumbing cost. Fine-tuning the design of the HVAC systems can also generate cost savings. Ventilation requirements for indoor air quality are a primary driver of energy use. By right-sizing the ventilation system to a proper occupancy count, establishing a higher acceptable maximum temperature, and incorporating operable windows into the design calculations, ventilation rates can be reduced, thus reducing air handler capacity and the space required for equipment and distribution. Wet sprinkler systems are less expensive than dry systems, so reducing or eliminating the need for dry sprinkler systems will reduce the cost of the facility.

C. Design Criteria & Ratios

Criteria

- Boilers should be designed to burn natural gas where available or #2 diesel fuel where not.
- Sinks or other plumbing fixtures shall not be provided in standard classrooms that serve other than elementary grades.

- Ventilation systems shall be sized per the intended room occupancy provided by the district (rather than the fire egress code occupancy).
- Maximum interior design temperature for ventilation system design shall be 75°F.
- Where operable windows are furnished, design of the ventilation system shall consider the cooling and ventilation capacity of the windows.
- Install mechanical and building automation systems capable of being operated by school district personnel.
- Integrate monthly utility consumption records into integrated automation systems where possible.

Ratios

1. (Reserved)

D. General

Baseline:

1. Design in accordance with the version of ASHRAE 90.1 currently required by DEED, including amendments by DEED.
2. Incorporate redundancy and resiliency into critical mechanical systems.
3. Consolidate equipment into mechanical spaces where possible. Provide sufficient floor space to provide minimum equipment clearances, and to allow maintenance activities and maintenance equipment. Locate equipment where it can be readily accessed for maintenance. Where feasible, keep equipment within 6 feet of finished floor.
4. Design potable water systems to conserve water to the greatest extent practicable, without compromising system performance.
5. Group spaces with high fixture counts together – e.g., public restrooms, commercial kitchens, custodial.
6. Design piping systems to provide ease of maintenance – valves and equipment that are readily accessible, clearly indicated access locations, and clearly labeled piping, valves, and equipment.
7. For remodel/addition projects, do not abandon equipment or systems in place. Demolish piping, ducts and wiring back to active portions of the systems.
8. Install low-VOC containing materials in accordance with 40 CFR 59, the National Volatile Organic Compound Emission Standards For Consumer and Commercial Products.
9. Design building systems to allow for future expansion. Provide clearly designated space for future equipment when appropriate.
10. Specify plenum-rated piping and materials in open return-air plenums and fan rooms.

Provisional:

11. Consider accommodating future removal and replacement of all mechanical equipment, with appropriate coordination between disciplines to provide for this occurrence.
12. Consider a flow meter on the domestic water service for monitoring by the building control system.

13. Consider rainwater and/or snowmelt capture systems for facilities with limited access to potable water. Design gray water and rainwater capture, treatment, and distribution systems for urinal and water closet flushing.
14. Consider using energy modeling during the design phase for system selection and building configuration.
15. Consider compiling comprehensive life cycle analyses throughout the design phase that addresses the initial cost of the systems, annual operating cost, maintenance costs, and replacement costs.
16. Consider designing building systems to allow for 15 percent additional capacity for future expansion when population rates indicate future growth.

Premium:

17. Renewable energy sources such as geothermal, biomass, and thermal electric storage from turbines.

Best Practice/Lessons Learned

A. (Reserved)

081 Plumbing

0811 Plumbing Fixtures

Baseline:

1. Provide water conserving fixtures that meet the Energy Policy Act (EPAct) 1992, with Amendments.
2. Provide commercial fixtures that are durable and easily maintained.
3. Specify floor mounted wall carriers for wall-mounted water closets, urinals, lavatories, and drinking fountains.
4. Provide plumbing walls large enough for wall-mounted water closet carriers – typically 11-inches minimum for single-wall carriers, and 16-inches for back-to-back carriers. Confirm dimensions with selected manufacturer.
5. Provide toilet rooms accessible from Pre-K–1st grade classrooms.
6. Provide sinks with ASSE 1017 tempering valves in classrooms for elementary grades.
7. Specify floor drains with trap primers.
8. Pitch all slabs to floor drains.
9. Avoid locating floor and roof drains over electrical and data system equipment.
10. Install floor drains next to air handlers.
11. Install floor drains next to all equipment that produces condensate.
12. Install floor drains next to fire sprinkler pumps if applicable and feasible.
13. Provide emergency eyewash, shower units, floor drains, and sloped slabs as required by Occupational Safety and Health Administration (OSHA) in science rooms, art rooms, shop and maintenance spaces, kitchens (when using chemical sanitizing), and any classroom where chemicals are used.
14. Provide tamper-proof hose bibs adequately spaced around the perimeter of the building, except in locations where water supply is limited.

15. Install hose bibbs with backflow protection in mechanical equipment rooms for equipment cleaning.

Provisional:

16. Consider installing plumbing fixtures on interior walls only.
17. Consider reducing potable water use by choosing low-flow water fixtures that meet these maximum flow rates:
    - Lavatories 0.5 gpm metered
    - Sinks 0.5 gpm
    - Water closet 1.28 gpf
    - Urinal 0.125 gpf
    - Showerhead 1.5 gpm
    - Kitchen sink (commercial kitchen sink excluded) 1.5 gpm
18. Consider restricting use of ultra-low flow or waterless water closets and urinals to only those locations where water supply is severely limited.
19. Consider providing floor drains in all restrooms regardless of number of fixtures.
20. Consider providing floor drains near janitor sinks and clothes washers.
21. Consider providing automatic controls at lavatories, water closets and urinals.
22. Consider specifying institutional/penal grade shower heads.
23. Consider providing bottle fill stations.
24. Consider providing multi-station wash fountains with automatic operation for elementary ganged restrooms.
25. Consider installing bubblers on elementary classroom sinks.
26. Consider providing large sinks – minimum 30in wide by 18in front-to-back – with solids interceptors in Alaska Native cultural studies classrooms.

Premium:

27. Garbage disposals are not an accepted fixture outside of commercial kitchens.
28. Refrigeration on drinking fountains. LCCA-1.

Best Practice/Lessons Learned

A. (Reserved)

0812 Plumbing Piping

(Reference *0151 Water Systems* for site work)

Baseline:

1. Meet the requirements of the National Sanitary Foundation International (NSF-61) for materials in contact with drinking water.
2. Provide furred out walls for plumbing fixtures installed on exterior walls. Do not install plumbing piping in the building thermal envelope.
3. Install isolation valves on piping serving rooms with ganged fixtures – such as restrooms, science rooms, and kitchens.

4. Provide recirculation loop for domestic hot water systems out to the furthest hot water fixture. Only operate during occupied hours.

Provisional:

5. (Reserved)

Premium:

6. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0813 Plumbing Equipment

Baseline:

1. Provide grease interceptors in commercial kitchens. Coordinate additional grease traps or sampling ports outside of the facility with the Civil Designer and AHJ.
2. Store domestic hot water at minimum 140°F to prevent Legionella growth. Provide ASSE 1017 tempering valves to protect points of use for handwashing or.
3. Provide hot water in accordance with Alaska Food Code 18 AAC 31 for facilities with commercial kitchens. Provide separate hot water recirculation systems for each different temperature distribution system.

Provisional:

4. Consider providing above-floor grease traps with automatic grease skimming technology in commercial kitchens.
5. Consider install ceiling anchor points above lift stations, for mounting equipment to aid in removing pumps.
6. Consider choosing equipment and appliances with an Energy Star label.
7. Consider providing redundant sources of hot water where community sources are not available.
8. Consider providing supply temperature monitoring and alarm on hot water main.
9. Consider specifying variable speed, redundant pumps where domestic water pressure boosting systems are needed.
10. Consider water softener/treatment to reduce iron content where needed.

Premium:

11. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0814 Waste & Vent Piping

(Reference *0152 Sanitary Sewer* and *0153 Storm Water* for site work)

Baseline:

1. For sites that use sewage lift stations, design waste and vent piping systems to use as few lift stations as practicable.

2. Locate plumbing vents away from air intakes, operable windows, roof edges, and snow drift locations. Place near the ridge of sloping roofs.
3. Locate cleanouts in locations readily accessible to maintenance personnel. Where practical, extend cleanouts into walls of areas with washable surfaces.
4. Provide solids interceptors (plaster traps) at art rooms.

Provisional:

5. Consider locating roof plumbing vents in visually discreet locations to the greatest extent practicable.
6. Consider specifying cast-iron waste piping for noise reduction and resistance to snaking damage.
7. Consider yard cleanout on waste piping at building exit.

Premium:

8. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0815 Special Systems

Baseline:

1. None.

Provisional:

2. (Reserved)

Premium:

3. Grey water reclamation systems.

Best Practice/Lessons Learned

A. (Reserved)

082 HVAC

0821 Heating Equipment

Baseline:

1. Locate heating equipment away from educational spaces to avoid the transfer of noise and vibrations. Provide noise mitigation in walls of mechanical spaces.
2. Avoid placement of combustion air intakes, ventilation air intakes, mechanical room doors, and similar openings on leeward side of building where subject to snow drifting.
3. Use high efficiency 3-pass cast iron boilers for locations heating with fuel oil.

Provisional:

5. Consider providing a separate glycol system for just the ventilation heating and preheat coils and using water for the remainder of the heating system.
6. Consider providing glycol fill and storage tanks with integral pump, check valve, isolation valves, pressure switch, and alarm panel.

7. Consider using utility waste heat where available. Size plate-and-frame heat exchangers for future expansion.
8. Consider requiring extended warranties on major heating equipment items (e.g., boilers, hot water generators, etc.).
9. Consider locating heating equipment in mechanical rooms or penthouses, not on roofs, in most regions of Alaska.
10. Consider installing floor mounted equipment on 4-inch concrete housekeeping pads.
11. Consider using condensing boilers and low temperature (140°F and lower heating supply) hydronic heating systems when using natural gas or propane as heating fuel.
12. Consider installing BTU (British Thermal Unit) metering of hydronic heating.
13. Consider using utility load-shed electric heat where available. Provide sufficient storage/buffer capacity for electrothermal systems.
14. Consider installing bypass filtration on new hydronic heating systems connected to existing piping and equipment.

Premium:

15. Electrostatic precipitators for wood chip systems.
16. Provisions for future addition of alternative energy systems.

Best Practice/Lessons Learned

A. (Reserved)

0822 Terminal Heating and Distribution Systems

Baseline:

1. Locate isolation valves, control valves, and balancing valves to allow easy access for testing and balancing.
2. Provide isolation valves at key locations throughout building to be able to isolate portions of the building for maintenance (leaks) without having to drain entire system.

Provisional:

3. Consider installing radiant ceiling panels or radiant floors in restrooms and locker rooms, rather than fin tube.
4. Consider low temperature heating systems such as radiant floor.
5. Consider providing ceiling identification tags on ceiling grids where equipment, isolation valves and control valves are located.
6. Consider installing strainers upstream of all modulating control valves to reduce clogging from system debris.

Premium:

7. Snowmelt systems.

Best Practice/Lessons Learned

A. (Reserved)

0823 Ventilation Equipment

Baseline:

1. Coordinate with local electric utility for equipment motor sizes requiring variable frequency drives (VFD).
2. Control indoor air quality during construction, meeting SMACNA IAQ Guideline for Occupied Buildings under Construction 2007, Chapter 3.
3. Provide radon testing for buildings with slab-on-grade construction, below grade crawlspaces, and basements, particularly in locations known to have radon. Design radon mitigation systems as needed.
4. Locate equipment like make-up air units (MAU) for kitchens on the roof, where practicable due to climate.
5. Locate equipment in mechanical rooms or penthouses, not exposed on roofs, in most regions of Alaska.
6. Implement demand control ventilation where appropriate.
7. Utilize economizer cooling and natural ventilation to the greatest extent practicable.
8. Locate building air intakes away from sources of air pollution such as buses, exhaust vents, kitchens, and shop spaces.
9. Exceed minimum distances as needed between outside air intakes and pollution sources (such as plumbing vents and boiler flues) if subject to entrainment and carryover from wind. Consider weather effects such as cold air inversions when evaluating pollution sources.
10. Locate louvers at least 8ft above grade and keep plantings away from louvers.
11. Avoid using louvers on outside air intakes in locations with frequent wind driven snow and rain, and subject to heavy frosting. Use arctic-tee hoods or other proven means to address excess moisture intake instead.
12. Maintain outside air intake duct velocities below 500 feet per minute to reduce entraining rain and snow.
13. Provide deck-to-deck partitions, dedicated exhaust to the outdoors, and negative air pressure for spaces with hazardous materials (janitors' closets, chemical mixing areas, darkrooms, and high-volume copy rooms, etc.).
14. Operate exhaust fans with lighting controls in small restrooms.
15. Operate exhaust fans with dedicated wall switches in janitor closets to allow continuous operation.
16. Provide exhaust fans sized for 6 air changes per hour in spaces that allow access to below-floor sewage lift stations. Exhaust fans to have dedicated switches to allow continuous operation.
17. Avoid belt-driven equipment to reduce parts and maintenance.
18. Provide filter pressure gauges across each individual filter bank.

Provisional:

19. Consider preheat coils on outside air ducts in locations with winter design temperatures lower than 40°F to avoid condensation when mixing with return air. Provide preheat coils with summer filters.

20. Consider providing variable frequency drives (VFD) or electrically commutated motors (ECM) on all equipment for energy reduction, load matching, and system balancing.
21. Consider providing VFDs with integral disconnects.
22. Consider providing passive radon venting that can be converted to active ventilation when site soil test confirm radon mitigation is needed.
23. Consider using return air for kitchen hood makeup air in lieu of a dedicated makeup air unit (MAU).

Premium:

24. Humidification or dehumidification systems.

Best Practice/Lessons Learned

A. For sites prone to wind driven snow, identify predominant wind directions for the entire year and locate outside air intakes away from that side of the building. Identify this at the time of massing and concept design so that the mechanical rooms can be appropriately located. Avoid putting air intakes in corners that may be prone to wind eddies.

0824 Ventilation Distribution Systems

Baseline:

1. Locate balancing dampers to allow easy access for testing and balancing.
2. Cover and seal ventilation equipment and ductwork during construction to prevent dust and debris in ductwork and equipment.
3. Use sound attenuation for air handlers and ductwork serving classrooms, media centers, theaters, and administrative spaces.
4. Use minimum 3/4-inch birdscreen on outside air intakes to avoid frost build up.
5. Install duct access doors at inlet and outlet side of all indoor duct-mounted equipment.
6. Provide Minimum Efficiency Reporting Value (MERV) 13 filters at central equipment.
7. Provide ceiling identification tags on ceiling grids where equipment, isolation valves and control valves are located.

Provisional:

8. Consider including MERV 8 summer or pre-filters to prolong life of MERV 13 bank.
9. Consider using factory-fabricated, UL listed grease duct for Type 1 kitchen hoods.
10. Consider displacement ventilation for classrooms and larger spaces.
11. Consider destratification fans for gymnasiums (use units rated for high-impact conditions).

Premium:

12. Building flush-out following LEED requirements. CF-varies, LCCA-low.

Best Practice/Lessons Learned

A. (Reserved)

0825 Cooling Equipment

Baseline:

1. Provide appropriate air conditioning or heat removal system in computer rooms, computer labs, and data hub rooms. Utilize economizer cooling for server and data rooms and reject heat to return path of building ventilation system, to the greatest extent practicable.
2. Limit air conditioning to spaces used year-round: administrative offices, auditoriums, data, and equipment rooms with equipment that generates heat, and spaces needed for summer school programs.
3. Design dedicated space cooling systems to operate during unoccupied hours without the need for operation of the central ventilation system.

Provisional:

4. Consider providing direct expansion (DX) cooling coils in air handling units to reduce total airflow in the school during swing seasons under economizer mode.
5. Consider locating refrigerator and freezer condensing units in mechanical rooms as long as ventilation fans are sized appropriately to remove the heat from the space.

Premium:

6. Install variable refrigerant flow (VRF) or variable refrigerant volume (VRV) for interior spaces that need cooling and reject heat in other portions of the building.

Best Practice/Lessons Learned

A. (Reserved)

0826 Cooling Distribution Systems

Baseline:

1. None.

Provisional:

2. None.

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0827 Heat Recovery Systems

Baseline:

1. Provide energy recovery on ventilation systems according to size, based on DEED requirements for compliance with ASHRAE 90.1. For 2016 version of 90.1, refer to section 6.5.6.1 Exhaust Air Energy Recovery, and associated tables for Zone 7/8.

Provisional:

2. Consider providing energy recovery on all ventilation systems.

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

083 Integrated Automation

0831 Control Systems

Baseline:

1. Provide all electronic control devices by the same manufacturer to the greatest extent practicable.
2. Provide individual room temperature controls.
3. Provide programmable temperature controls in occupied spaces.
4. Provide On-Off heating temperature controls for unoccupied and utility spaces (e.g., storage rooms, mechanical rooms, electrical rooms, generator rooms, vestibules, cargo receiving areas, refuse storage, heated attics, crawlspaces, utilidors, etc.).
5. Provide On-Off cooling temperature controls for unoccupied spaces with cooling applications (e.g., mechanical rooms, electrical rooms, generator rooms, refrigerator/freezer condensing unit spaces, telecommunications rooms, server rooms, etc.).
6. Provide locking enclosures on temperature controls in common areas and public spaces (e.g., gymnasiums, restrooms, locker rooms, corridors, vestibules, auditoriums, multipurpose rooms, etc.), or use plate-type temperature sensors.
7. Temperature controls shall not contain mercury.
8. Programmable logic controller (PLC) based digital controllers operating equipment should be capable of providing 7-day, 24-hour scheduling, digital and analog inputs, and outputs (including alarms), user interface on the controller for manual control and programming.
9. Boiler control panels are preferred over aquastats for operating boiler plants and heating circulation pumps.
10. Provide standard controls components not custom designed specifically for the project.
11. Provide local-readout gages at each control system sensor location (at minimum).
12. Wired networks are preferred over wireless.
13. Locate controls components in dry, stable environments to reduce need for specialty enclosures.
14. Provide engraved identification tags on controls components.
15. When direct digital control (DDC) systems are provided:
    a. Include remote (web) access, alarms, graphics of all monitored and controlled equipment and systems, and programming tools for maintenance personnel.
    b. Provide for future expandability.
    c. Connect directly to equipment having integral (on-board) controls to provide a communication interface for remote monitoring and control.

d. Specify trending of critical points to facilitate troubleshooting and system performance evaluation.

Provisional:

16. Consider methods of putting after-hour spaces (gymnasiums, libraries, etc.) into temporary occupied mode. Also activate support spaces such as public restrooms if not on local control. Consider putting spring-wound timers with indicator lights in Administration area with labels noting what area will be in occupied mode to provide easy access to staff.
17. Consider requiring control contractor to inspect control system performance, confirm occupant comfort, and provide training 1 month prior to 1-year warranty date.
18. Consider a permanent metering system in the building management system to track water and energy consumption, manage use, and identify opportunities for additional savings.

Premium:

19. Integrating maintenance management software with building automation software.
20. Establishing service contracts with control contractor with clearly stipulated and measurable performance requirements.

Best Practice/Lessons Learned

A. Consider recommissioning system 2 months prior to 1-year warranty date. This will identify any failed actuators and sensors within warranty period and correct any mis-programming that the user may have accidentally done while learning the system.

0832 Other Automation

Baseline:

1. On Support buildings less than 5,000sf, provide temperature controls (thermostats, etc.) using stand-alone, low voltage systems.

Provisional:

2. Consider wireless versions where non-local control is needed.

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

084 Fire Protection

0841 Riser & Equipment

Baseline:

1. Provide complete National Fire Protection Association (NFPA) 13 systems.
2. Do not recirculate fire sprinkler pump discharge to a potable water supply.
3. Provide a dedicated fire pump room with fire-rated construction, and door directly accessible to the outdoors or through a fire-resistant-rated corridor, per NFPA 20, for facilities with fire pumps.

4. Provide direct access from the fire sprinkler pump room.
5. Check with the AHJ for special requirements related to fire panel types/locations and fire department connections (FDC).
6. Design sprinkler systems in conformance with local sprinkler ordinances.
7. Use cross contamination protection (i.e., backflow prevention) when connecting fire sprinkler system to potable water supply, including fire pumps.
8. Avoid combining potable water and fire sprinkler water storage.

Provisional:

9. Consider using electric fire pumps if electric utility has sufficient capacity.
10. Consider installing diesel fire sprinkler pumps near other fuel-fired equipment for efficient fuel storage and distribution.
11. Consider fabricating all exterior building overhangs, walkways, balconies, porches, etc., of dimensions and/or materials to avoid fire sprinkler protection.
12. Consider nitrogen-generator for dry sprinkler systems, rather than air compressor only.

Premium:

13. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0842 Sprinklers & Piping

Baseline:

1. Use Schedule 40 steel pipe for threaded fittings.
2. Use galvanized Schedule 40 steel pipe for dry pipe systems.
3. Avoid dry sprinkler systems as much as practicable. Use other NFPA 13 methods such as dry heads or detached entry canopies to eliminate the need for the systems.
4. Use dry heads at entry/exit vestibules, loading docks, and similar applications on wet fire sprinkler systems.
5. Conceal fire sprinkler piping to the greatest extent practicable in occupied spaces.
6. Do not install exposed sprinkler piping below 10 feet above finished floor to the greatest extent practicable. Provide sidewall heads in stairwell where possible.
7. Standardize on sprinkler heads throughout building.
8. Provide sprinkler head guards in areas subject to damage such as gymnasiums, mechanical spaces, utilitarian areas, or when located less than eight feet above floor.

Provisional:

9. Consider institutional/tamper-resistant heads in time-out rooms and similar locations.

Premium:

10. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0843 Special Suppression Systems

Baseline:

1. (Reserved)

Provisional:

2. Consider water mist fire sprinkler protection system designed to NFPA 750, in lieu of an NFPA 13 sprinkler system.

Premium:

3. Clean agent suppression systems.

Best Practice/Lessons Learned

A. (Reserved)

085 Special Mechanical Systems

0851 Fuel Supply (Gas & Oil)

Also refer to *0154 (Site) Fuel Systems* for additional requirements.

Baseline:

1. Provide containment for fuel oil piping installed below ground including double-wall fuel-rated piping, corrugated carrier pipe, pipe transition and containment sumps.
2. Protect fuel oil storage tanks from vandalism and theft.
3. Provide minimum of Schedule 40 steel with welded, threaded, or mechanically pressed fittings for natural gas, propane, and fuel oil piping.
4. Avoid copper materials in fuel oil systems serving electric power generators.
5. Avoid routing gas piping up exterior of building where it could enable unwanted roof access.

Provisional:

6. Consider providing day tanks on fuel oil systems.
7. Consider installing a fuel leak detection system with alarms to monitor integrity of fuel storage tank and distribution piping.
8. Consider fuel level monitoring system with digital outputs for remote viewing and connection to building energy management system/control system.

Premium:

9. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0852 Specialty Exhaust Systems

Baseline:

1. For facilities with equipment producing hazardous or combustible fumes or dust (vocational education, maintenance shop, etc.), provide dust collection / fume exhaust systems designed

to applicable Codes and NFPA Standards. Provide separate general room exhaust in addition to specialty exhaust system.

Provisional:

2. Consider using point-of-use HEPA filters for welding exhaust.
3. Consider using recycled air system to reduce need for makeup air.

Premium:

4. Vehicle exhaust systems.

Best Practice/Lessons Learned

A. (Reserved)

0853 Compressed Air & Vacuum Systems

Baseline:

1. Compressed air and vacuum systems to have dedicated equipment rooms with limited access, constructed per the building code.

Provisional:

2. (Reserved)

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0854 Other Special Mechanical Systems

Baseline:

1. Provide lab exhaust hoods for labs and science rooms, with lighting, fan switch, and retractable sash. Install other accessories as required by school district.
2. Install HVAC systems for swimming pools to maintain space temperature and humidity levels between 82°F to 86°F, and 50 percent to 60 percent relative humidity.

Provisional:

3. Use outside air only for pool room dehumidification, if possible, based on site climate conditions.

Premium:

4. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

09. ELECTRICAL

A. Building System Summary

Electrical systems are required to support nearly every function and purpose of the school facility and support and provide key safety functions with the school. The systems are highly integrated and are often highly automated. The department recognizes five sub-categories in this building system: **Service & Distribution**, **Lighting**, **Power**, **Special Systems**, and **Other Electrical Systems**. The sub-systems under these categories include a large variety of fixtures, devices, and equipment combined with several types of distribution components including low-voltage and normal-voltage wiring, conduit, raceway, and control components. The Electrical functions within a facility require broad integration with other building systems such as **Site Electrical**, **Exterior Closure, Interiors**, and **Mechanical** systems.

B. Design Philosophy

Electrical systems shall be cost effective and will reduce initial construction costs as well as long-term energy consumption and operating costs. The systems shall be integrated with the design of the building plan and envelope to optimize performance and provide occupant comfort. The systems shall be durable, expandable, and easily maintained. Electrical systems shall comply with DEED-adopted energy codes.

Of all the building systems, a school facility's Electrical Systems have probably experienced the greatest increase in scope and cost over the last 20 years. With the integration of computers in education, first into the school and now into the classroom, the scope of network data systems has increased dramatically. A biproduct of the increased number of computers is a corresponding increase in the power systems required to operate the computers. An increase in the scope and complexity of other special electrical systems, in particular fire alarm and detection, and security systems, has also increased the overall cost of electrical systems.

Since many of the electrical systems are required by code (e.g., power, lighting, and fire alarms), a baseline cost for Electrical is part of all school facility projects. However, cost savings opportunities still exist in the scope of these systems beyond the minimums established by codes and in the materials specified. It is important for the cost effectiveness of electrical systems to be evaluated on a life cycle basis where the operating and maintenance cost of the system is considered. Often, a more expensive lighting fixture will more than pay for itself over time by a reduction in power consumption.

Other optional electrical systems (security systems, phone/data systems, intercom systems) should be evaluated in the same manner as code-required systems. In addition to a life cycle analysis of the systems and their components, the optional systems should also pass a commonsense test. For instance, is it necessary for a four-classroom school to have an intercom system? Does it make sense for a school designed to house 50 students to have 75 data outlets?

C. Design Criteria & Ratios

Criteria

- LED light fixtures should be utilized whenever possible in lieu of incandescent, fluorescent, or other lamp types.
- Lighting control options should be evaluated on a life cycle basis.
- Computer data ports and related outlets shall be laid out as they are to be used, not as they might be used in the future.
- Power wiring and service shall be sized per the present electrical demand of the facility rather than to meet perceived future demands.

Ratios

1. (Reserved)

D. General

Baseline:

Electrical systems shall comply with the version of ASHRAE Standard 90.1 currently required by DEED, including amendments by DEED.

1. The building electrical systems encompass lighting, power, telecommunications, and electronic safety and security systems. These systems are for the purposes of life safety, user convenience, building and user security, occupant comfort, and educational delivery.
2. Electrical systems shall be designed in accordance with applicable codes and standards and shall conserve energy while also meeting the needs of the building and users.
3. The systems shall be integrated with the building programming, floor plan, and local District requirements to enhance and support the building's usefulness and longevity.
4. The systems shall be robust, expandable where feasible, and easily maintained.
5. Design shall meet present needs, with consideration given to future. Spare capacity or the ability to expand in the future should be evaluated within budgetary constraints.
6. Electrical systems should be considered for replacement based on age, condition, availability of parts, availability of support, and obsolescence.
7. For Special Systems, in the absence of code requirements, design should follow Building Industry Consulting Service International (BICSI) or similar standards to the extent possible.

Provisional

8. (Reserved)

Premium

9. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

091 Service and Distribution

0911 Main Distribution Panels & Switchgear

Baseline:

1. Size equipment for all building and site systems.
2. Locate equipment as close to the service entrance as practical to minimize the length of large feeders.
3. Use secondary distribution panels to consolidate panels and reduce the number of feeders running throughout the building.

Provisional:

4. Consider limiting spare capacity to around 25 percent of physical breaker capacity or overall electrical capacity.
5. Consider providing surge protection and phase loss protection at the main distribution panel, particularly on grids with lower reliability.
6. Consider providing metering with a network connection at the main distribution panel and any large distribution panels for accurate energy monitoring.
7. Consider listed series-rated systems to lower rating and cost of downstream panels and breakers.
8. Consider aluminum conductors on large feeders to lower project costs, if local District maintenance personnel are in agreement.

Premium:

9. Provisions for future addition of alternative energy systems.

Best Practice/Lessons Learned

A. (Reserved)

0912 Panels & Motor Control Centers

Baseline:

1. Locate panels away from student-occupied areas unless unavoidable. Try to consolidate in electrical rooms, storage rooms, or similar spaces. Coordinate locations during design and monitor during construction to maintain working clearance. Provide an equipment grounding conductor in all conduits containing line voltage conductors.
2. Provide a dedicated neutral conductor for all circuits requiring a neutral.

Provisional:

3. Consider feeding lighting circuits from a single panel that can be monitored.
4. Consider providing surge protection for panels primarily serving classroom and office receptacles, or telecom equipment.
5. Consider locating a panel in areas with high numbers of circuits required, such as the kitchen and mechanical rooms, to minimize the length of branch circuits and number of disconnects.

Premium:

6. Building-wide monitoring of all panels.

7. Spare capacity beyond 25 percent of physical breaker capacity or overall electrical capacity.

Best Practice/Lessons Learned

A. (Reserved)

0913 Transformers

Baseline:

1. Size transformers for required load.
2. Avoid excessive transformer capacity and losses.
3. Coordinate with the electrical utility early in the project to identify delineation of work, particularly with respect to utility/medium-voltage transformers and circuits.
4. Vibration isolators are required where transformers may affect nearby spaces.

Provisional:

5. Consider using 120/208V where practical to avoid step-down transformers.
6. Consider utilizing wall-mount or suspended configurations to maximize floor space.
7. Consider time or occupancy-based control of these circuits feeding headbolt heaters.

Premium:

8. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0914 Conduit & Feeders

Baseline:

1. Size conduit and feeders for the actual load designed.
2. Limit spare capacity to 25 percent on conduit and feeders.
3. Provide conduit at inaccessible portions of low-voltage systems.
4. Provide conduit sleeves for risers between telecom rooms if stacked. If not stacked, provide open cabling systems as much as possible between rooms.

Provisional:

5. Consider transitioning to cable tray or j-hooks wherever possible for low-voltage cabling.
6. Consider providing spare conduit stubs from recessed panels for future use; limit of two per 100A of panel capacity.
7. Consider electrical metallic tubing (EMT), metal clad (MC) Cable, and Flexible Metal Conduit where practical and code-compliant for savings over rigid metal conduit (RMC) or IMC systems.

Premium:

8. Duct bank systems.

Best Practice/Lessons Learned

A. (Reserved)

092 Lighting

Baseline:

1. Fixture types should be commodity level, commonly available, and cost effective to the extent possible. The use of custom/architectural fixtures, whether for general or decorative/accent lighting, should be limited to small areas of architectural interest and fit within budgetary constraints of the project.
2. Fixture source should be LED for efficiency and life expectancy unless design criteria justifies use of alternate sources.
3. Maintenance should be considered in fixture placement and selection. Fixtures should have field replaceable components, readily available replacement parts, and be installed in a manner that allows for access by local maintenance staff to clean, test, or repair.
4. Minimize the types of lamps to reduce inventory and replacement costs.
5. Provide fixtures that are easily cleaned and maintained.
6. Lighting levels shall be in accordance with Illuminating Engineering Society standards and Alaska Administrative Code (AAC). Lighting levels shall meet or exceed minimum recommended levels of the latest published version of the IES Handbook (25-65 age group) unless AAC requires higher light levels.
7. Emergency lighting/exit signs shall be provided in all code-required areas. Additional emergency lighting should be provided in areas with either increased risk of injury during an outage, or likelihood of persons unfamiliar with the space. These would include support spaces (electrical/mechanical/telecom rooms), large restrooms, conference/meeting rooms, kitchen, and similar.
8. Coordinate ceiling plan and lights with projectors and IT equipment.
9. Provide light emitting diode (LED) site lighting with full cut-off fixtures where light trespass is unwelcome.
10. Provide lighting controls for dimming or multi-level light switching in educational spaces.
11. Install task lighting at instructional area wall surfaces where necessary.
12. Install LED fixtures or extended life lamps in areas with high ceilings where relamping is difficult.
13. Lighting control shall meet current codes at a minimum. Additional energy savings may be achievable with a more complex system but should be balanced with local maintenance capabilities and project budget constraints.
14. Minimum lighting control elements should include exterior photocell control, interior occupancy sensor control of applicable spaces, dimming of fixtures either through manual interface, daylight sensor input, or occupancy sensors, and multi-zone layouts for more functional use of spaces. Examples would be a separate teaching wall zone in classrooms, or multiple zones in a gymnasium or multi-purpose room to allow for most lighting to be off while maintaining some visibility.
15. See *0163 (Site) Lighting & Equipment* for applicable requirements.
16. Coordinate fixtures and lamps with district and look to standardize within multiple facilities when possible and practical.

Provisional:

17. Consider control for site and corridor lighting systems with the direct digital control system or a lighting control system.
18. Consider direct/indirect fixtures in classrooms with 10ft ceilings or greater.
19. Consider track energy use through a building automation system or local metering of the lighting panel.
20. Consider use of dimmable site lighting with integral photocell/occupancy sensors to reduce energy use.
21. Consider use of fixtures with integral controls where practical to reduce device count and cabling.

Premium:

22. Building-wide lighting controls with extensive individual control of fixtures or connection with other systems. CF-3; LCCA-2.
23. Architectural fixtures outside of limited use noted above. CF-4 to 5; LCCA-3.

Best Practice/Lessons Learned

A. (Reserved)

093 Power

Baseline:

1. Provide adequate electrical capacity for future building expansion.
2. Specify variable speed/frequency drives or ECM motors on electrical motor applications. Coordinate requirements with Mechanical.
3. Specify a minimum of two (2) double duplex outlets (2 outlets per circuit) per classroom wall unless covered with cubbies/casework that makes them inaccessible.
4. Provide receptacle load control per energy code requirements. Switch receptacles with lighting occupancy sensor, by DDC, or by other code-compliant means.
5. Provide tamper resistant and GFCI receptacles where required by code.
6. Provide dedicated circuits for 120V equipment and appliances equal to or greater than 10 amps of draw.
7. Provide power and data for electronic whiteboards or digital TVs in classrooms.
8. Provide GFCI receptacles for rooftop equipment where required by code.
9. Coordinate power requirements and locations for control panels and control transformers with mechanical.

Provisional:

10. Consider using GFCI circuit breakers where maintaining ready access to GFCI receptacles may be difficult.
11. Consider limit general purpose circuits to 6 duplex outlets.
12. Consider limiting high-draw areas (kitchen, break room/lounge, workroom, etc.) to 2 duplex outlets per circuit in areas with high concentrations of equipment.
13. Consider use of floor boxes and power poles in areas where they serve a specific purpose, instead of general power distribution.

14. Consider providing locations with dedicated circuits for laptop charging stations if programmed.

Premium:

15. Excessive receptacle counts, including surface raceway with high quantities outside of labs or workbenches where required.

Best Practice/Lessons Learned

A. (Reserved)

094 Special Systems

0941 Fire Alarms

Baseline:

1. Code-minimum coverage for initiating and notification devices.
2. Code-required monitoring of mechanical equipment, generator, suppression systems, fire pump, duct smoke detectors if not part of fire alarm system.
3. 24-hour monitoring service in areas served with a fire department.
4. Automatic dialer with local contacts in areas without a fire department.

Provisional:

5. Consider additional detection in areas with elevated risk of fire, such as storage rooms, kitchen, mechanical/electrical spaces, public restrooms.
6. Consider exterior notification on at least two sides of the building.
7. Consider low-frequency sounder/horn and high-candela strobe in areas that may be used for sleeping, even if occupancy is not called out for itinerant housing.

Premium:

8. Pre-action systems.
9. Full coverage detection.

Best Practice/Lessons Learned

A. (Reserved)

0942 Data and Communications

Baseline:

1. Provide classroom ceilings with an outlet with voice/data capability and power for technology (if required, not needed if devises will be Power over Ethernet (PoE)).
2. Provide for wireless connectivity. Coordinate with IT for number and location of needed devices.
3. Provide minimum CAT 6 cabling–all horizontal cabling to be less than 295ft in length.
4. Provide one (1) voice/data jack at each classroom wall unless inaccessible due to cubbies/casework.
5. During design development, provide layouts and cut sheets for all equipment requiring active electrical equipment to be built-in or purchased as part of movable equipment budget.

6. Provide cable pathways between all points.
7. Use plenum-rated cabling where distributed in open-air environments.
8. Coordinate data and communication requirements and locations with building controls system.
9. Coordinate with Section 0162.

Provisional:

10. Consider fiber optic backbone between telecom rooms even if close enough for copper.
11. Consider Category 6A cabling to wireless access points.
12. Use of J-hooks for smaller cable counts, consolidate into cable tray for larger counts.
13. Coordinate with Architect to minimize number of inaccessible conduit sleeves in cable pathway to telecom rooms.

Premium:

14. Raised floor raceway systems.
15. Oversize cable tray systems.
16. Passive Optical Network or similar fiber distribution systems.

Best Practice/Lessons Learned

A. (Reserved)

0943 Security Systems

Baseline:

1. Access Control: If a system is used, limit number of doors to main entry points, including front, playground, staff entry, and loading dock/kitchen. Office area may be controlled.
2. Intrusion Detection: Verify need/want with School District.
3. Video Surveillance System: Verify need/want with School District.
4. Secure Entry/Lockdown: Verify need/want with School District.

Provisional:

5. Use card Access readers or combination card reader/keypad.
6. Minimize use of keypad only, and if so, assign unique codes to individuals. Do not assign a common code to a given door.
7. Consider a lockdown device in the main office and security office. Lockdown should re-lock all doors, and release any magnetic door holders to seal off corridors, Multipurpose Room, Gymnasium, etc.
8. System should function independently if network connection is lost.
9. System should use standard readers, locks, and hardware to the extent possible to allow for migration to a different software.
10. Consider utilization of a combination of door contacts, glass break sensors, motion sensors for intrusion detection.
11. Consider locating an intrusion detection keypad at main entry and staff or kitchen entry.
12. Consider providing either a 24-hour monitoring service or automatic dialer with local contacts (particularly if no local law enforcement agency exists).

13. Connect to lighting controls if used to switch on corridor/site lighting upon alarm.
14. System can monitor industrial alarms but avoid redundancy with building control system.
15. Consider providing surveillance cameras at all major entry points and corridor intersections, with traffic in and out of the office covered.
16. Consider providing a workstation in the Principal's office for review/download of video, and a monitor in the main office.
17. In schools with a security officer, Assistant Principal, or other similar party, consider providing additional workstations for effective monitoring.
18. IK10 impact resistance is recommended, but IK08 impact resistance should be the minimum allowed for cameras that can be touched, or objects thrown at them from less than 10ft away.
19. Consider monitoring playgrounds via video surveillance to ensure adequate coverage of all play structures and areas.
20. Consider use of multi-sensor or wide-angle cameras wherever possible to replace multiple cameras with a single camera.
21. Video system can integrate with access control/intrusion detection to assist those systems.
22. If lockdown is only used for duress (as opposed to abundance of caution such as non-custodial parent), button should call local law enforcement and/or alert District.
23. If lockdown and duress functions differ, provide two buttons.
24. Consider broadcasting a coded message to classroom paging zone upon activation of button to alert teachers to lock doors.
25. Consider a controlled point at main entry to screen visitors, including intercom/camera.

Premium:

26. Card readers on interior doors except for the office area, particularly when used widely to eliminate keys.
27. Cabinet locks and similar where keys would normally be used.
28. Proprietary hardware (such as wireless locksets, hubs, etc.) that cannot migrate in case of software replacement.
29. Badging printers at every school in a District instead of centralized credentials.
30. Surveillance cameras at locations other than exterior doors, office, playgrounds, or corridors.
31. Interior cameras that exceed the ratio of 1 camera per 5,000 sf
32. Security camera systems that exceed 20 cameras for schools under 50,000 sf. For schools over 50,000 sf, add 2 cameras (one inside, one outside) per 5,000 sf.
33. Pan-tilt-zoom cameras, particularly without an active security officer.
34. Video walls, analytics packages if not justified, thermal or other specialty cameras.

Best Practice/Lessons Learned

A. (Reserved)

0944 Clock Systems

Baseline:

1. Provide clocks in all educational and administrative spaces. Coordinate with District standards for battery vs. central clock system. If battery, no work required.

2. Provide intertie between clock system and intercom system for communication where needed for bell schedules.

Provisional:

3. Consider synchronized central clock system.
4. Consider wireless clock systems to minimize cabling needs.

Premium:

5. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0945 Intercom Systems

Baseline:

1. Provide general paging throughout the building, with ability to page via phone system or master station.

Provisional:

2. Consider providing multiple paging zones, including classrooms, corridors, exterior, support spaces. Consider a network-based solution with individual zones for each classroom.

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

0946 Other Special Systems

Baseline:

1. Provide power and data for electronic whiteboards or digital TVs in classrooms.
2. Provide HDMI connection at teacher's desk for electronic media.
3. Provide sound system in Gymnasium/Multipurpose Room/Student Commons with speakers, microphones, media input (CD optional/Aux input), amplifier and digital signal processor/mixer.
4. Provide small sound system in Band/Orchestra/Choir for support of program.
5. Coordinate location of motorized screen controls with sound input, basketball hoops, stage controls, lighting, etc.

Provisional:

6. (Reserved)

Premium:

7. Augmented/Virtual Reality systems.
8. Multiple fixed projectors in large spaces.
9. TV Walls instead of projector screens.
10. Digital signage, graphic walls for decorative/accent purposes.

Best Practice/Lessons Learned

A. (Reserved)

095 Other Electrical Systems

0951 Power Generation & Distribution

Baseline:

1. None.

Provisional:

2. Consider use of battery backup instead of an emergency generator. If a generator is included, design it for standby functions.
3. Consider a standby generator to support safety, security, and core building systems including heating systems and building controls.
4. Consider locating the generator inside of the building; alternatively, to preserve square footage, consider installing an equipment enclosure instead of a walk-in module.

Premium:

5. Photovoltaic arrays or systems.
6. Electrical wind generators.
7. Standby generator beyond critical systems.
8. Walk-in generator modules or buildings unless square footage allows.
9. Excessive capacity, either electrically or physical.
10. Redundant generators or bypass isolation automatic transfer switches.
11. Combined heat and power systems.

Best Practice/Lessons Learned

A. (Reserved)

0952 Electrical Heating Systems

Baseline:

1. Provide electrical heating systems only where necessary; coordinate with Mechanical for system needs and justification.
2. Size conduits, feeders, and branch circuits to load served, not future spare capacity.

Provisional:

3. Consider other heating methods and use if more cost-effective or efficient.

Premium:

4. Electrical heated floor systems.

Best Practice/Lessons Learned

A. (Reserved)

0953 Grounding Systems

Baseline:

1. Provide grounding system for each electrical service per NEC requirements.
2. Provide bonding of all systems and metallic parts per NEC requirements.
3. Provide grounding and bonding of telecom/data systems to meet industry standards and connect to building ground system.
4. Use code required or standards-based conductor sizes.
5. Use ground rods, with minimum quantity needed to meet NEC requirements.

Provisional:

6. Consider routing telecom/data bonding backbone in cable pathways instead of conduit where possible.
7. Consider ground rings instead of ground rods if site soils allow.

Premium:

8. Redundant grounding systems.
9. Oversized grounding and bonding with no specific need.

Best Practice/Lessons Learned

A. (Reserved)

10. EQUIPMENT & FURNISHINGS

A. Building System Summary

The **Equipment & Furnishings** of school buildings consist of the educational program and support equipment physically connected to the facility or its support systems. It also includes furnishings that are fixed or integral to the building. The department recognizes two sub-categories in this building system: **Equipment** and **Furnishings**. Equipment in this category is normally incorporated into load calculations by engineering disciplines and installed by a contractor using one or more trades. Furnishings in this category are of traditional types (chairs, bookcases, tables, etc.) but that are built-in or affixed to the facility. The **Furnishings** category fits in a niche between **Specialties** in **06. Interiors** and moveable fixtures, furnishings, and equipment (FF&E). Lockers, casework, display cases, bleachers and window coverings are all examples or items covered in **Specialties**. For additional information and standards on FF&E, see the department's publication ***Guidelines for School Equipment Purchases***.[6]

B. Design Philosophy

Cost-effective school construction requires detailed design coordination between the school's building systems and the **Equipment** and **Furnishings** needed to deliver and support education. Items in this section include those that have proven to need a moderate to high level of integration to meet their intended function, and to avoid changes during construction. The building technology and educational technology elements deserve a special note as components related to these areas are changing rapidly from year to year with new technology resulting in faster, lightweight, affordable, and portable "plug-in" equipment. The State expects schools to take advantage of the latest technology that can simplify building systems and lower installed technology costs. For additional design parameters see the **Design Ratio** section of this system.

101 Equipment

1011 Food Service & Kitchen Equipment

Baseline:

1. Provide equipment for basic food preparation and cleanup for student lunch preparation of up to 40 meals/day in all school facilities to include appropriately sized items from the following categories:
    - Reach-in refrigerator
    - Reach-in freezer
    - Combi steam/convection oven
    - Commercial range
    - Wall-mounted shelving
    - Dishwashing machine
    - Mop sink cabinet
    - Type 1 exhaust hood

    (Ref. *0811 Plumbing Fixtures* for code required handwash, prep and cleanup sinks.)

[6] See DEED publication *Guidelines for School Equipment Purchases*. https://education.alaska.gov/facilities/publications/EquipmentPurchases.pdf

2. Provide equipment for full-service food preparation and cleanup for student lunch preparation of over 40 meals/day. Size and select equipment based on DEED-reviewed kitchen design from the basic equipment list and the following categories:
    - Walk-in refrigerator
    - Walk-in freezer
    - Steam kettle
    - Braising pan
    - Production steamer
    - Fryer
    - Ice maker
    - Type 1 exhaust hood(s)

    (Ref. *0811 Plumbing Fixtures* for code required handwash, prep and cleanup sinks.)
3. Provide other support equipment that is mobile/moveable and plugs into standard receptacles as FF&E. Items below are considered FF&E; see Building System Summary preceding:
    - Prep appliances (mixer, slicer, etc.)
    - Cooking appliances (microwave, toaster)
    - Mobile hot/cold serving tables
    - Mobile heating cabinets
    - Multi-tier shelving units
    - Mobile prep/worktables
    - Mobile transport carts
    - Pots/pans/utensils

Provisional:

4. Consider only providing equipment for a warming/cooking kitchen (when the district provides a central kitchen) to include:
    - Reach-in refrigerator
    - Reach-in freezer
    - Convection oven
    - Wall-mounted shelving
    - Mop sink cabinet
    - Type 2 exhaust hood

    (Ref. *0811 Plumbing Fixtures* for code required handwash, prep and cleanup sinks.)

Premium:

5. Equipment for full-service food preparation in districts that operate a central kitchen.

Best Practice/Lessons Learned

A. (Reserved)

1012 Athletic Equipment

Baseline:

1. Provide ceiling or wall-mounted basketball backboard/hoops at competition court; motor-operated raise/lower.
2. Provide floor inserts for volleyball standards/nets.
3. Provide a multi-sport wall-mounted score board opposite each set of bleachers.

Provisional:

4. Consider secondary, wall-mounted basketball backboards/hoops at recreational courts; motor operated raise/lower.
5. Consider mat hoists where wrestling programs are established.
6. Consider ceiling mounted gymnasium curtains to support multiple concurrent programs; motor-operated raise/lower.

7. Consider ceiling-mounted climbing ropes.
8. Consider chinning bar(s), peg climbing board, and other wall-mounted fitness equipment requiring structural support.
9. Consider a motor-operated projection screen.
10. Consider a high-capacity washer and dryer.

Premium:

11. Whirlpools or ice-bath equipment.
12. Saunas

Best Practice/Lessons Learned

A. (Reserved)

1013 Career & Technology Equipment

Baseline:

1. Provide the following woodworking equipment in floor-standing models: 10in table saw with 'saw stop' technology, 12in band saw, 1hp drill press. (Other benchtop and plug-in equipment will be provided as FF&E.)
2. Provide the following metal working equipment: welding station/booth, 1hp milling machine/lathe.

Provisional:

3. Consider additional woodworking equipment to include: lathes, router/joiner, and belt/disc sanders.
4. Consider additional metal working equipment to include: sheet metal brake, and grinders.
5. Consider moving all equipment to portable, tabletop, 110v for small programs and additional flexibility. All such equipment would be provided as FF&E.
6. Consider "fabrication lab"/ "maker space" equipment including 3D printer(s), small to medium format 4ftx8ft Computer Numerical Control routing and laser/plasma cutting machines.
7. See Section *0721 Elevators and Lifts* for provisions associated with vehicle lifts.

Premium:

8. See Section *0733 Hoists and Cranes* for premium limitations.
9. Paint booths.

Best Practice/Lessons Learned

A. (Reserved)

1014 Science Equipment

Baseline:

1. See Section *0652 Casework/Millwork* for fixed lab tables.
2. Provide one 36in fume hood, if required for educational program.

Provisional:

3. Consider a 48in fume hood for larger programs; demonstration type or double sided.
4. Consider a commercial undercounter dishwasher at Science Storage/Prep.

Premium:

5. Fume hoods larger than 48in.

Best Practice/Lessons Learned

A. Many standard size hazardous/flammable storage cabinets are not designed to fit under standard-height counter tops or with standard base cabinet depths. Select this FF&E item early and in coordination with Designers.

1015 Library Equipment

Baseline:

1. Provide a book drop with catch bin; free standing or built-in to casework.
2. Provide book stacks in a combination of wall perimeter (5-6 shelf) and freestanding (2-3 shelf) for approximately 50 volumes/student capacity. Laminate finish. [Note: Other book display shelving to be FF&E; all seating, tables, and other loose furnishings to be FF&E.]
3. Provide a motor-operated projection screen.

Provisional:

4. Consider wood veneer on book stacks in libraries serving any secondary grades.

Premium:

5. (Reserved)

Best Practice/Lessons Learned

A. The preceding standards are based on centralized library and media display/use. This Equipment may not be needed if books and media are distributed throughout a school.

1016 Theater Equipment

Baseline:

1. Provide motor-operated projection screen.
2. Provide motor-operated stage curtain.

Provisional:

3. Consider fixed overhead rigging for stage curtains, sets, and lighting.
4. Consider stage lighting system including fixtures and control board.
5. Consider auditorium audio/visual system including building-mounted elements such as speakers, projectors, etc. (Note: all rack-mounted components and hand-helds will be FF&E.)

Premium:

6. Orchestra pit equipment

Best Practice/Lessons Learned

A. (Reserved)

1017 Art Equipment

Baseline:

1. None.

Provisional:

2. Consider up to two gas-fired kilns.
3. Consider heavy-duty clay mixer.
4. Consider electric pottery wheels; quantity for anticipated class size.

Premium:

5. Darkrooms for chemical film/print processing.
6. Paint booths.

Best Practice/Lessons Learned

A. (Reserved)

1018 Loading Dock Equipment

Baseline:

1. None.

Provisional:

2. Consider bin-size recyclable baler and multi-waste compactor.
3. Consider providing fixed commercial compactor chute (to align with vendor provided compactor and waste service).
4. Consider dock bumpers where elevated truck loading/unloading occurs.

Premium:

5. Dock leveler systems.

Best Practice/Lessons Learned

A. (Reserved)

1019 Other Equipment

Baseline:

1. None.

Provisional:

2. Consider kitchenette at special needs life skills areas with residential type refrigerator, range, over range microwave, and dishwasher.
3. Consider high-capacity washer and dryer at Intensive Needs program area.
4. Consider ceiling mounted plates/eye bolts at OT/PT program area.

Premium:

5. Plumbed and hardwired commercial equipment at *Student Store* unless specifically supported by curriculum in an approved educational specification.

Best Practice/Lessons Learned

A. (Reserved)

102 Furnishings

1021 Fixed Furnishings

Baseline:

1. Provide benches at building entry vestibules/lobby in the parent pick-up/drop-off zones; secure to floor.

Provisional:

2. Consider built-in benches/seating at Library and Elementary Classroom.

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

1022 Mats

Baseline:

1. Provide walk-off grates/mats at entry vestibules.

Provisional:

2. (Reserved)

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

1023 Other Furnishings

Baseline:

1. (Reserved)

Provisional:

2. (Reserved)

Premium:

3. (Reserved)

Best Practice/Lessons Learned

A. (Reserved)

11. SPECIAL CONDITIONS

A. Building System Summary

The **Special Conditions** related to school buildings consist of both special purpose facilities and project conditions that bridge across, rather than fitting within, several of the core building systems. The 'system' deals with the installation, removal, or relocation of integrated or self-contained support buildings, and with site conditions that, while altering the site, do not install utility or improvement features. Generally, all elements related to hazardous materials and conditions are included within this system. The department recognizes three sub-categories in this building system: **Special Construction**, **Special Demolition**, and **Special Site Conditions**. Special Construction includes three specific use-types. Special Demolition includes all demolition work from entire buildings to selective building elements and utilities. It also captures hazmat associated with that demolition. **Special Site Conditions** deals with management of site conditions for both effective construction execution and long-term building operations. Remediation work for sites is also captured. **Special Construction** will overlap nearly all building system sections **02** through **09** depending on complexity, as will **Special Demolition**. The **Special Site Conditions** category abuts **01. Site & Infrastructure** categories but should not have much, if any, overlap.

B. Design Philosophy

Cost-effective school construction can sometimes be enhanced by isolating special facility uses such as greenhouses or various types and combinations of utility modules and providing them as separate facilities. These solutions, while more common in remote school locations, are not automatic for any project and should be based on solid value analysis. Similarly, selective, and whole building demolition work occurs across a range of scope and possibility. Final project solutions should be driven by options analysis supported by accurate life-cycle costing. Site conditions can have a significant impact on cost-effective school construction. Factors such as topography, erosion, proximity to natural hazards, wetlands, site drainage, and flooding must be properly evaluated in the project planning phase. The department's publication ***Site Selection Criteria and Evaluation Handbook***, provides guidance and tools in these areas. DEED expects school districts to thoroughly evaluate **Special Conditions** that can simplify building systems and lower construction costs. For additional design parameters see the **Design Ratio** section of this system.

111 Special Construction

1111 Packaged Utility Modules

Baseline:

1. Provide packaged utility module supporting any of the following functions in locations where site-constructed solutions are less cost effective: fire suppression, heating plants (e.g., oil and wood-fired boilers, etc.), power generation, walk-in refrigerator/freezers. CF-3; LCCA-1.
2. Packaged modules that provide water and/or wastewater treatment systems in locations where no community utility support is available to the school site and where utility extension solutions are less cost effective. CF-4; LCCA 3.

Provisional:

3. Consider including electrical services in conjunction with utility modules providing heating plants. CF-3; LCCA-1.

Premium:

4. Packaged utility modules with utility runs to the supported facility that exceed 40ft.

Best Practice/Lessons Learned

A. (Reserved)

1112 Swimming Pool

Baseline:

1. Swimming pools are supported as school space under AS 14.11 under certain conditions. Refer to the most current department publication *Swimming Pool Guidelines for Educational Programs*.

Provisional:

2. Consider construction of swimming pools in support of the educational program where the capacity exists to meet the above average operations and maintenance costs of such facilities over time.
3. Consider partnering with related municipal and borough entities in sharing the cost of initial capital, O&M, and capital renewal costs through a joint use agreement (ref. 4 AAC 31.020(g)).

Premium:

4. Swimming pool tank sizes, amenities, and resulting facilities not supported under statute and regulation.

Best Practice/Lessons Learned

A. (Reserved)

1113 Greenhouse

Baseline:

1. None required. [Note: Greenhouses are considered school space under 4 AAC 31.020.]

Provisional:

2. Consider building-attached greenhouse spaces when such spaces can meet the educational program being provided (ref. *0142 Attached Shelters*).
3. Consider freestanding greenhouses in support of the educational program where the capacity exists to meet the above average operations and maintenance costs of such facilities.
4. Consider providing hydroponic systems in place of greenhouses to provide year-round production and educational benefits.

Premium:

5. Greenhouse space which is beyond the allowable gross square footage in the attendance area (ref. 4 AAC 31.016 and 4 AAC 31.020).

Best Practice/Lessons Learned

A. (Reserved)

112 Special Demolition

1121 Structure Demolition

Baseline:

1. Provide demolition of existing schools which are no longer cost effective to repair or transfer to another entity when approved for replacement as part of an application for state-aid under AS 14.11. CF-3; LCCA-1.
2. Provide structure demolition at state-owned abandoned school sites as part of the development of new schools, replacement schools, or additions/renovations to existing schools.
3. Secure permits for local disposal (i.e., one-time monofill on state-owned or district-owned property), on property owned by others by agreement, or in approved local landfills.

Provisional:

4. Consider the demolition of education support facilities that have exceeded their useful life and cannot be renovated for additional use(s).
5. Consider removal of demolition waste to a landfill in Alaska or outside of Alaska when local disposal options have been exhausted. CF-3; LCCA-1.

Premium:

6. Demolition of any structure not accepted as an education related facility and approved by the department.

Best Practice/Lessons Learned

A. (Reserved)

1122 Building Selective Demolition

Baseline:

1. Provide selective demolition in support of approved new work or rehabilitation.
2. Secure permits for local disposal in approved local landfills.

Provisional:

3. Consider removal of demolition waste to a landfill in Alaska or outside of Alaska when local disposal options have been exhausted. CF-3; LCCA-1.

Premium:

4. Any selective demolition not accepted as part of an education related facility and approved by the department.

Best Practice/Lessons Learned

A. (Reserved)

1123 Site and Utility Demolition

Baseline:

1. Provide demolition of site improvements associated with education related facilities approved for replacement or those in conflict with approved new work or rehabilitation (ref. *013 Site Improvements* for acceptable site features).
2. Provide for demolition of utilities supporting education related facilities approved for replacement or those in conflict with approved new work or rehabilitation (ref. *015 Civil/Mechanical Utilities* and *016 Electrical Utilities* for acceptable utility elements).

Provisional:

3. Consider opportunities to transfer site improvements or utilities to another entity when approved for replacement under AS 14.11.
4. Consider vacating and capping underground utilities in-place when the cost to excavate and remove due to obstructions or geotechnical considerations substantially exceed normal removal. CF-3; LCCA-1.

Premium:

5. Any site and utility demolition not accepted as supporting an education related facility and approved by the department.
6. Underground utility demolition where the cost exceeds normal removal by more than 100 percent.

Best Practice/Lessons Learned

A. (Reserved)

1124 Hazardous Material Removal

Baseline:

1. Provide for removal of hazardous materials in work under *1121 Structure Demolition* associated with education related facilities approved for replacement.
2. Provide for removal of hazardous materials in work under *1122 Building Selective Demolition* when hazardous materials will be disturbed during approved rehabilitations.
3. Secure permits for local disposal, if possible, on state-owned or district-owned property, on property owned by others by agreement, or in approved local landfills.

Provisional:

4. Consider fully documenting hazardous materials present in existing facilities in preparation for opportunities to transfer education related facilities to another entity when approved for replacement under AS 14.11. [Note: standards for some hazardous materials, such as asbestos, diminishes with changes in building occupancy and use.]

Premium:

5. Any hazardous material removal not accepted as supporting an education related facility and approved by the department.
6. Removal of hazardous materials for which a potentially responsible party (PRP) or responsible party has been identified other than the Department of Education & Early development.

Best Practice/Lessons Learned

A. (Reserved)

1125 Building Relocation

Baseline:

1. Relocate education related facilities to other locations on the school parcel when required by expansion projects approved by the department.
2. Relocate education related facilities to parcels off the school site under control of the state or a political subdivision of the state when required as part of excess building disposition approved by the department.
3. Relocate non-education related facilities owned by the school district to other locations on the school parcel when required by expansion projects approved by the department (this will primarily consist of teacher housing units).

Provisional:

4. Consider relocating an education related facility when an alternate location will improve the efficiency of school operations. CF-3; LCCA-1.

Premium:

5. Building relocation to parcels not under the site control of a state or a political subdivision of the state.

Best Practice/Lessons Learned

A. (Reserved)

113 Special Site Conditions

1131 Site Shoring & Dewatering

Baseline:

1. Provide site shoring required to support construction operations on school sites.
2. Provide dewatering required to support construction operations on school sites.
3. Provide site shoring and dewatering that might be generally required to support all site improvement and utility work and not associated with any particular one of these subsystems.

Provisional:

4. Consider selecting school sites where site shoring and dewatering are not required.

Premium:

5. Site shoring and dewatering that exceeds 0.3 percent of the total estimated construction cost.

Best Practice/Lessons Learned

A. (Reserved)

1132 Site Earthwork

Baseline:

1. Provide excavation, fill, geotextiles, and other similar elements required to support construction operations on school sites.
2. Provide site earthwork that might be generally required to support all site improvement and utility work and not associated with any particular one of these subsystems.

Provisional:

3. None. All other earthwork should be in support of approved work in *013 Site Improvements*, *015 Civil/Mechanical Utilities*, or *016 Site Electrical*.

Premium:

4. Site earthwork that exceeds 0.5 percent of the total estimated construction cost.

Best Practice/Lessons Learned

A. (Reserved)

1133 Site Remediation

Baseline:

1. Provide for remediation of contaminated site materials for work not covered in *1121 Structure Demolition* that is associated with education related facilities approved for replacement.
2. Secure permits for local remediation (soil farming, etc.), if possible, on state-owned or district-owned property, on property owned by others by agreement, or in approved local landfills.
3. Provide and place clean backfill from local sources as necessary to return site to a safe and functional condition.

Provisional:

4. Consider working with the Alaska Department of Environmental Conservation on options for contaminated site materials to remain under Institutional Controls (ICs).
5. Consider imported backfill when local sources are not available or can be demonstrated to be not cost-effective. CF-3; LCCA-1.
6. Consider removing and disposing of contaminated site materials to approved landfills in Alaska or outside of Alaska on a cost-benefit basis. CF-3; LCCA-1.

Premium:

7. Any contaminated site material removal not accepted as supporting an education related facility and approved by the department.
8. Removal of contaminated site materials for which a potentially responsible party (PRP) or responsible party has been identified other than the Department of Education & Early development.

Best Practice/Lessons Learned

A. (Reserved)

Appendix A: Cost Model's Escalation Model Alaska School

The following describes the "State of Alaska Escalation Cost Study - Model School Building". This cost study model is used by the contracted cost estimator that updates the DEED *Program Demand Cost Model for Alaskan Schools* to develop concept-level gross square footage construction costs based on educational program and to index historical construction cost escalation.

The model school conforms to the Standards in this publication. It is not a prototype design or basis of design for schools in Alaska.

01 Site and Infrastructure

The Model Alaskan School includes site improvements typical for the less remote locations including paved parking and drives, appropriate catch basins and culverts for drainage, concrete walks, vegetative landscaping, playgrounds with equipment, and fencing. A variety of minor elements such as bike racks and flag poles round out the developed school site. Utility distribution piping from municipal connection points is provided for heating fuel, water, wastewater, electrical power, and data/communications. Exterior pole-mounted lighting is also included. No **Site Structures** or **Off-site Work** is anticipated with the model school.

02 Substructure

The Model Alaskan School includes Substructure elements typical of sites with high-quality soils which are suitable for building construction. These elements include a standard concrete foundation, and a concrete slab on grade—both with typical steel reinforcing. Insulation, vapor retarder, and dampproofing are the only minor elements needed to support these sub-systems. No **Special Foundations** elements are anticipated with the model school.

03 Superstructure

The Model Alaskan School includes a main floor structure of reinforced concrete slab on grade and includes a small portion of elevated floor with steel columns, beams, joists, metal decking and concrete. The roof structure uses a combination of wood frame bearing wall, steel columns, beams, joists, and metal decking. Steel angle bracing and light-gauge steel shear walls provide lateral support.

04 Exterior Closure

The Model Alaskan School includes exterior load-bearing walls with light-gauge steel members and structural wood panel sheathing. Insulation is a combination of fiberglass in the wall cavity and 2in of continuous board at the exterior. Air and vapor barriers complete the assembly. Siding is a primarily metal panel with some phenolic panel in a rain-screen assembly as an accent. Vents, flashings, and sealants complete the exterior. Gypsum wall board is used on the interior side of the assembly. Soffits are framed with nominal lumber, treated plywood and siding finishes were visible. Windows are metal-clad dual-pane insulating units with operable sections. Doors are hollow metal with insulated frames and high-quality hardware including motor operated doors where required.

05 Roof Systems

The Model Alaskan School includes a pitched roof system consisting of concealed fastener metal roofing over fire-treated plywood sheathing and 8 in of rigid insulation. Vapor barriers, ice and water shield, and flashing complete the assembly.

06 Interiors

The Model Alaskan School includes light-gauge steel framing members enclosed with gypsum wall board, or other substrates suitable to the finish applied. Solid core wood doors in hollow metal frames are standard, complete with hardware. Vertical coiling grilles are used in select locations. Glazing consists of relites in hollow metal frames, and specialties include partitions in toilet rooms, lockers, whiteboards, tackboards and signage. Fire extinguishers and cabinets are provided when required. Finishes include carpet, tile and rubber flooring, paint, tile, and FRP walls, and suspended and glue-on acoustic ceilings.

07 Conveying Systems

The Model Alaskan School, a single-story structure, does not include any Conveying Systems elements.

08 Mechanical

The Model Alaskan School includes cast-iron waste piping, hot and cold domestic water distributed in insulated copper piping, bathroom fixtures, stall showers, classroom sinks, exterior hose bibs, commercial food prep and clean up sinks and hot water generating equipment. Heating systems are oil/gas fired boilers and hydronic heat distribution to terminal devices. Cooling is a 10T DX (direct expansion) air conditioner supplying fan coils. Ventilation is a single AHU with distributed ducting and VAV boxes for classroom and administration areas, and a variable speed AHU for gymnasiums and/or multipurpose rooms; both central and localized exhausting is provided via fans and ducting. Heat and /or energy recovery for ventilation systems. Controls include a DDC system and thermostats. Fire protection is wet pipe system with appropriate risers and valves. Heating fuel is stored in an exterior tank and interior day tank and is distributed via steel piping.

09 Electrical

The Model Alaskan School includes a service disconnect, a main distribution panel, and subpanels all fed via various size conductor and both rigid, IMC, and flexible conduit. Lighting systems include pendent and surface mounted area lighting, task lighting, and emergency lighting. Lighting is controlled via occupancy sensors, manual, and automated controls. Power is distributed through sub-panels to feed receptacles of varying amperages, motors, and equipment. Special Systems include addressable fire alarm, data/telecom, public address intercom and at gymnasium/stage, security to include intrusion detection and video surveillance, and hearing-impaired classroom audio assist. Emergency backup power is provided via diesel generator complete with fuel storage and system interties.

10 Equipment & Furnishings

The Model Alaskan School includes a selection of athletic equipment (main and secondary basketball goals, volleyball floor inserts, chinning bar, pegboard), food preparation (refrigerator, freezer, convection oven, range and hood, under-counter fridge), laundry equipment (stacked washer and dryer), classroom equipment (projection screens, window blinds), and entry mats. Associated with special electrical systems, the model also provides for classroom and gymnasium/stage audio visual systems. Associated with plumbing systems, the model provides for three-compartment sink, handwash sink, and grease interceptor. Acceptable additional items and alternatives are detailed in the construction standards that follow.

11 Special Conditions

The Model Alaskan School includes site preparation work that aligns with Special Site Conditions of this section to include clearing and grubbing, survey, and layout, SWPPP, excavation, geotextiles, fill, and compaction work. While the full *Program Demand Cost Model for Alaskan Schools* does include estimating elements for demolition and hazardous materials conditions, its Model School Escalation file does not. Primarily this is due to these elements being dependent on specific project environments and conditions.