
# TECHNICAL GUIDE

## For Facility Design and Construction

**Updated:**
April 22, 2024

**Boulder Valley School District**
Department of Operational Services
6500 East Arapahoe Avenue
Boulder, Colorado 80303
https://www.bvsd.org/
https://bond.bvsd.org

## PREFACE - PLEASE READ

The Boulder Valley School District (BVSD) Technical Guide is intended to provide uniform and consistent minimum quality standards for equipment and materials used in capital construction projects--including new construction, renovation, remodeling and maintenance. This guide is based on considerable design, maintenance, and contracting experience. It is intended to extend the life cycle of materials, systems, and facilities while reducing future maintenance problems. The Technical Guide must be referenced in conjunction with the Consultant Agreement, Construction Agreement, General Conditions of the Contract, and Educational Specifications.

The organization of this Technical Guide is based upon the UniFormat™ classification system. UniFormat™, a publication of CSI and CSC, is a method of arranging construction information based on functional elements, or parts of a facility characterized by their functions, without regard to the materials and methods used to accomplish them. These elements are often referred to as systems or assemblies. UniFormat™ breaks a facility into systems and assemblies that perform a predominating function, such as substructure, shell, interiors, and services, without defining the technical solutions to provide these functions. This allows the facility to be priced at the elemental level, allowing design alternatives to be better evaluated, and allows facility performance to be established at the system level as the project design is being refined. UniFormat's approach to organizing data is also important to the continued development of building information modeling (BIM) software, as its system organization allows objects to be placed before their properties have been further defined. [1]

During the early stages of projects, design teams intuitively think in terms of building systems—similar to that found in UniFormat. Therefore, it is hoped this Guide facilitates the communication of BVSD standards in a straightforward, brief manner. Prevailing industry standards are acceptable for a topic noted with “No Owner Requirements”.  All sections reference a corresponding MasterFormat number when applicable.

---

## LATEST EDITS AND UPDATES

Consultants frequently print hard copies of BVSD's Tech Guide as they begin a project. Many times the hard copy is used on subsequent projects even though an updated version is available. Consequently, important updates and current BVSD standards get overlooked or omitted from design projects. To avoid this circumstance, please visit the BVSD website annually to download a PDF version of The Technical Guide For Facility Design and Construction.  A last date of revision is listed on the first page of this document — future publishing dates are planned to be within the month of March.

**APRIL 2024 REVISIONS ARE INDICATED IN ORANGE TEXT.**

**Design Teams must incorporate the standards and updates herein that occur prior to the execution of a project's Owner-Architect Agreement.  Designers will not be liable for updates occurring after the execution date of the Owner-Architect Agreement.**

Questions?  Contact BVSD Operations Department.

[1] http://www.csinet.org/uniformat

**TABLE OF CONTENTS**

# ELEMENT AA: INTRODUCTION

## AA10 PROJECT DESCRIPTION

AA1010 Project Summary

1. Summary of Work 01 11 00: Architect shall prepare project-specific summary of work for project manual
2. Work Restrictions 01 14 00 – per current municipality requirements

AA1020 Project Program

1. Site Program: Development Criteria shall be site specific
2. Facility Program: Consultant to obtain current Educational Specification from PM

AA1030 Project Criteria

1. Zoning Requirements 01 41 00: Per Municipality Requirements
2. Code Analysis 01 41 13
   - A. Code Analysis and Code Plan shall be submitted per Colorado Department of Public Safety, Division of Fire Prevention and Control Building Permit Submittal Document Checklist
   - B. Documentation of Compliance with the most current adopted International Energy Conservation Code shall be submitted per Colorado Department of Public Safety, Division of Fire Prevention and Control Building Permit Submittal Document Checklist
   - C. Soils Report shall be included in the Building Permit Submittal per Colorado Department of Public Safety, Division of Fire Prevention and Control Building Permit Submittal Document Checklist
3. Building Codes and Standards:
   - A. As defined on the Colorado Department of Public Safety, Division of Fire Prevention and Control website.
     - (i) State Agencies that also require approvals
       - a. State Electrical Board
       - b. State Plumbing Board
       - c. State Health Department
       - d. State Boiler Inspection Section
       - e. Local Fire Department
       - f. State Conveyance Regulations
4. Design Loads
   - A. Boulder County Wind and Snow Loads Design Criteria as defined on the Boulder County website.
   - B. Structural Calculations shall be submitted per Colorado Department of Public Safety, Division of Fire Prevention and Control Building Permit Submittal Document Checklist
5. Design Requirements 01 81 13
   - A. Energy and Sustainability standards in this section are derived from the most current Sustainability Management System (SMS). Because the SMS is supported by Board of Education policy ECF, these standards are a requirement for building design and construction. BVSD's long-term energy goal for its building portfolio is to achieve an average Energy Use Intensity of 30 kBTU/sf/year by 2050; the following building energy requirements are a strategic approach to attain this goal.
   - B. Where these alternatives exist, all projects should use materials that are durable, repairable, and reusable or recyclable; limit toxins and indoor air pollutants; are made with high post-consumer recycled content; and are resource and energy efficient in their manufacturing, use and disposal.
   - C. Energy Efficiency
     - (i) New Construction
       - a. New construction shall be designed as Zero Energy (ZE) / Zero Energy Ready (ZER) using the Integrated Design Process.
       - b. Energy Use Intensity (EUI) Requirements (kBTU/sf/year)
         - i. Primary Schools: **18.7 Site EUI**
         - ii. Secondary Schools: **19.0 Site EUI**
     - (ii) Existing Building Renovation >50,000 sf affected area

a. Deep Energy Retrofits
    i. Projects identified for Deep Energy Retrofits shall use the integrated design process to reduce existing Site EUI's BY 50% or to the following levels, whichever is lower.
    ii. Primary Schools: 35 Site EUI
    iii. Secondary Schools: 40 Site EUI
b. Deep Retrofit Triggers (from the Rocky Mountain Institute)
    i. End- (or near end) of-life roof, window or siding replacement: Planned roof, window and siding replacements provide opportunities for significant improvements in daylighting and efficiency at small incremental cost, providing the leverage for a deep retrofit that reduces loads and therefore costs of replacing major equipment such as HVAC and lighting.
    ii. End- (or near end) of-life HVAC, lighting or other major equipment replacement: Major equipment replacements provide opportunities to also address the envelope and other building systems as part of a deep retrofit. After reducing thermal and electrical loads, the marginal cost of replacing the major equipment with much smaller equipment (or no equipment at all) can be negative.
    iii. Upgrades to meet code: Life safety upgrades may require substantial disruption and cost, enough that the incremental investment and effort to radically improve the building efficiency becomes not only feasible but also profitable.
    iv. Fixing an "energy hog": As part of an ongoing management plan for a group of buildings, the Owner may desire a set of replicable efficiency measures. These measures can be developed from the deep energy retrofit of an archetypical building.
c. Other Efficiency Targets.
    i. Buildings not identified for Deep Energy Retrofits shall target a 20% reduction of existing Site EUI's.

(iii) Existing Building Renovation <50,000 sf affected area
a. Comply with the prescriptive path of ASHRAE Standard 90.1-2010 or most recent update.
b. Target a minimum 20% reduction of existing Site kBTU/sf/year in the affected area.

D. Energy Audit
(i) Existing Building Renovations classified as Deep Energy Retrofits
a. Owner shall conduct an ASHRAE Level 3 Energy Audit to provide the design team energy improvement recommendations and Basis of Design (BOD) document.

E. Existing Building Renovation <50,000 sf affected area
a. Owner shall conduct an ASHRAE Level 2 energy audit to provide the design team energy improvement prescriptions.

F. Building Energy Modeling
(i) Required for New Construction and Deep Energy Retrofit projects
(ii) Modeling Tool: The modeling tool must be ASHRAE 140 certified
(iii) Inputs: Weather input file – Broomfield/Jeffco [Boulder – Surfrad] TMY3
(iv) Utility rates:
a. Electric – Xcel Energy
b. Gas – Current Xcel Energy gas rates.
c. Assume 3% utility annual price increase.
(v) Setpoints
a. For building setpoints, use 70°F for the occupied heating and 74°F for the occupied cooling. Unoccupied setback in heating mode is 65°. Unoccupied setback for cooling is "off" or 90° for unoccupied cooling.
b. Verify current occupied/unoccupied schedules with BVSD Maintenance for energy modeling calibration.
(vi) Coincident Peak
a. Use the load on the peak day for each month at the following hours to determine the Coincident Peak value. Month Hour Ending
- Jan 7:00 PM
- Feb 7:00 PM

- Mar 7:00 PM
- Apr 9:00 PM
- May 5:00 PM
- Jun 5:00 PM
- Jul 5:00 PM
- Aug 5:00 PM
- Sep 5:00 PM
- Oct 7:00 PM
- Nov 7:00 PM
- Dec 7:00 PM

(vii) Summer Peak Demand Savings
   a. When calculating Summer Peak Demand Savings, first find the peak hour in the reference model and then use the load for the same day and hour in the proposed models to calculate savings. Summer Peak kW is defined as the maximum one hour building peak demand within the window of 3-6 p.m., weekdays, June/July/August.

(viii) Winter Peak Demand Savings
   a. When calculating Winter Peak Demand Savings, first find the peak hour in the reference model and then use the load for the same day and hour in the proposed models to calculate savings. Winter Peak kW is defined as the maximum one hour building peak demand within the window of 5-7 p.m., weekdays, December/January/February
   b. Modeling reports are an important tool for the entire project team and should also be specified as to what type of report and when it is expected. They include information such as:
      i. Summary of annual projected utility costs and savings
      ii. Performance graphs (e.g., monthly energy use for gas and electric, monthly facility peak kW, etc.) in comparison to the baseline
      iii. Input parameter information (e.g., internal load specifications, building envelope characteristics, HVAC system definitions, etc.)
      iv. Assumptions of building characteristics (e.g., schedules, HVAC setpoints, etc.)
      v. Notations of changes from previous modeling versions (e.g., changes made between schematic design and design development, etc.)
      vi. Interpretation of results
      vii. Software input and output files (electronic)

(ix) Life Cycle Cost Analysis (LCCA)
   a. Analyze the proposed measures against the calibrated existing building baseline. Analyze the life cycle cost using estimated installation costs, maintenance costs, and time of equipment replacement (base condition).
   b. The LCCA Report should include:
      i. Summary of recommended measures including baseline conditions and proposed changes
      ii. Any measures considered but not recommended or included in the analysis
      iii. Table of measures included in the bond package and the original budget
      iv. Table of monthly average energy usage based on historical utility bills and calculated energy use index (in kBTU/ft2) for the building
      v. Comparison of monthly historical energy usage versus the baseline (existing building) model energy use
   c. Table summarizing project costs
      i. Total Bond allocation
      ii. Estimated design consulting fees
      iii. Estimated utility rebates
      iv. Estimated budget remaining for implementation of proposed measures
   d. Table summarizing results of LCCA for each proposed measure
      i. Energy savings
      ii. Energy cost savings
      iii. Estimate installation cost
      iv. Calculated simple payback

v. Calculated life cycle cost
vi. Life cycle cost difference in comparison to baseline
vii. Ranking of measures based on life cycle cost
viii. The overall building EUI reduction for each measure
ix. Recommendation if the measure should be included in the design package
x. Running installation total of measures recommended to be included
xi. Include envelope study recommendations by grouped packages

e. Projects shall consider Xcel Energy rebates in the design process.

G. Building Envelope Commissioning
(i) Required for New Construction
(ii) The air leakage rate of the building envelope shall not exceed 0.25 cfm/SF at a pressure differential of 75pa.

H. Energy System Commissioning
(i) **Energy Design Flowchart - Interface Between 3rd-Party Energy Consultant & Project Design Teams**
(ii) Required for new buildings and additions
(iii) Existing Building Renovation >50,000 sf affected area
a. Full building systems commissioning process required.
b. Retro-commissioning of existing building systems required.
(iv) Existing Building Renovation <50,000 sf affected area
a. Commissioning of newly-installed building systems required.
b. Retro-commissioning of existing building systems required.

I. Retro-commissioning: Required as indicated per project scope

J. Photovoltaic Systems
(i) New roof structures shall be designed and constructed to allow for the installation of photovoltaic panel installation across the entire surface. Space shall be allocated for the installation of the required electrical equipment. Group all roof penetrations and mechanical equipment to the greatest extent possible to allow for uninterrupted PV array layouts.
(ii) Consult with BVSD regarding procurement of PV systems. Regular preventative maintenance on PV systems can be very time-consuming and costly. Consultant and BVSD must evaluate the long term costs of procuring PV systems:
a. Purchasing System outright - District staff to provide preventive maintenance.
b. Purchasing System outright - District contracts with outside vendor for preventive maintenance.
c. District enters into a Power Purchase Agreement - vendor provides preventive maintenance.
(iii) Photovoltaic system shall be designed to local wind loads.
(iv) Solar panels on the following facilities are not owned by BVSD and are under contract with Tesla (formerly Solar City). BVSD purchases power from these systems and leases the roof space to Tesla. In the event that the panels need to be turned off or removed, contractors must work with Owner and Tesla prior to doing so and make a plan for storing the panels and reinstalling them as soon as possible.
a. Angevine Middle School (Lafayette)
b. Aspen Creek K-8 (Broomfield)
c. Boulder High School (Boulder)
d. Broomfield High School (Broomfield)
e. Centaurus High School (Lafayette)
f. Coal Creek Elementary School (Louisville)
g. Columbine Elementary School (Boulder)
h. Creekside Elementary School (Boulder)
i. Eldorado K-8 (Superior)
j. Foothill Elementary School (Boulder)
k. Heatherwood Elementary School (Boulder)
l. Manhattan Middle School (Boulder)
m. Monarch High School (Louisville)
n. Sanchez Elementary School (Lafayette)

(v) Solar panels at the following schools are owned by BVSD. In the event that the panels need to be turned off or removed, Contractors should work with Owner to uninstall, store and reinstall.
   a. Arapahoe Campus High
   b. Boulder Community School of Integrated Studies/High Peaks Elementary
   c. Casey Middle School
   d. Crest View Elementary
   e. Fireside Elementary
   f. Flatirons Elementary
   g. Jamestown Elementary
   h. Horizons K8
   i. Manhattan Arts and Academics Middle
   j. Mesa Elementary
   k. Monarch K-8
   l. Nederland Elementary
   m. New Vista High School
   n. Pioneer Elementary
   o. Sanchez Elementary
   p. Summit Middle
   q. Thorne Ecological Institute

K. Electric Vehicle Charging Stations
   (i) Provide dual plug Level 2 charging station for passenger electric vehicles with AC , 208 Vac or 240 Vac and at least 7 kWh output. Reference the State of Colorado Purchasing and Contracts Office for acceptable manufacturers. Submit for Owner Approval.
   (ii) Contact Owner to assess needs for bus chargers.
   (iii) Contact Owner to assess future rough-in needs.
   (iv) Bollards required to protect chargers from vehicle damage. Cast-in-place installation preferred, where applicable.

L. Water Conservation
   (i) New and Remodeled Building spaces will push water efficiency beyond code requirements and will decrease water consumption by 5%.

M. LEED Building Standards
   (i) All New Building and Major Reconstruction projects greater than 50,000 sq. ft. shall be designed to achieve a minimum of LEED Gold status (60 points minimum) as established by the LEED v4.1 for Schools checklist. BVSD will NOT pursue official certification unless noted otherwise in the Owner's Project Requirements. See **BVSD Preferred LEED Credits**

N. Sustainable Building Materials
   (i) 100% of procurement solicitations of goods and services should meet sustainability criteria. All Building projects should use materials that are durable, repairable, and reusable or recyclable; limit toxins and indoor air pollutants; are made with high post-consumer recycled content; and are resource and energy efficient in their manufacturing, use, and disposal.
      a. Use recycled and/or rapidly renewable materials whenever possible.
      b. All purchased appliances/equipment must be Energy Star certified.
      c. All wood-based materials and products shall be certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria.
   (ii) Building materials should be selected through use of a Life Cycle Analysis of environmental impacts that considers:
      a. Extraction of materials and fuel used for energy
      b. Manufacture of building components
      c. Transportation of materials and components. Source materials and products regionally whenever possible (manufactured and/or sourced from within 500 miles of the building site).
      d. Assembly and construction
      e. Operation, including energy consumption, maintenance, repair, and renovations
      f. Demolition, disposal, recycling, and reuse of the building at the end of its functional or useful life.

g. End of life take back programs by manufacturer.

O. Construction Waste Management
   (i) Construction projects will target a 75% diversion rate for construction waste. BVSD will provide contacts and priorities for waste reduction, collection, and removal.

P. Building Occupant Education
   (i) Project design and construction shall allow for teachable moments. Examples include displays about the construction work in the school and energy efficient or sustainable features; designing features that teach, such as a "truth wall" (i.e., a cutaway portion of wall that shows the components of the construction); and including interested student groups and classes in the design and construction process.

Q. Additional Facility Environmental Quality Requirements 01 81 16
   (i) Classroom Light, maximize daylighting opportunities.
   (ii) Classroom Acoustics: Appropriate acoustical design is extremely important in all types of educational facilities. The design consultant shall provide acoustical separation or isolate noise-generating activities, areas, and equipment. The spaces shall be designed with appropriate acoustical separations, acoustical absorption and reverberation time for all intended activities and the various acoustical volumes. Special attention shall be paid to providing vibration control and sound isolation for mechanical and electrical equipment, particularly mechanical rooftop units placed above occupied spaces.
   (iii) Classroom Thermal, designed to meet district set-points and maximize thermal comfort

R. Indoor Air Quality Requirements 01 81 19
   (i) All projects will be designed to maximize LEED points for Indoor Environmental Quality. All projects will target a CO2 (ppm) of <1200 for occupied spaces. (ASHRAE Standard 62 recommends carbon dioxide (CO2) concentration 700 ppm above the outdoor concentration as the upper limit for occupied classrooms (usually around 1,000 ppm)).

S. Use Low Volatile Organic Chemical (VOC) flooring material and flooring adhesive, paints, primers, adhesives and coatings
   (i) All products installed in an interior location or location that can off-gas to the interior of buildings shall comply with the following VOC limits:
      a. Plywood Adhesive: Water based contact cement with VOC content not to exceed 10 grams per liter.
      b. Total VOC for Upholstered Assembly: Not greater than 0.5 mg/m2/hr.
      c. Formaldehyde Emission for Fabric: Not greater than 0.05 mg/m2/hr.
      d. Formaldehyde Emission for Adhesive: Not greater than 0.05 mg/m2/hr.
      e. Phenylcydohexene Emission: Not greater than 0.05 mg/m2/hr.
      f. Styrene Emission: Not greater than 0.05 mg/m2/hr.
      g. 2 Ethyl - 1 Hexanol Emission: Not greater than 3.00 mg/m2/hr.
      h. General Adhesives: Water based adhesives with VOC content not to exceed 250 grams per liter.
      i. Do not provide adhesives or accessories for wood flooring installation with a VOC content greater than 150 grams per liter (excluding finishing materials).
      j. Finishing Material Adhesive: Water based adhesives with VOC content not to exceed 350 grams per liter.

T. Segregate Occupied Area from Construction Areas with barriers to prevent dust and fume infiltration.

U. Ventilate Construction Areas directly to the outside not adjacent enclosed areas.

6. Historic Restoration Requirements 01 35 91
   A. Design and construction shall follow City of Boulder Historic District Design Guidelines for review and approval of work on designated buildings.
   B. City of Boulder Landmark Board Review applies to Mapleton
   C. City of Boulder Landmark Board Approval applies to Whittier & University Hill
   D. Landmark review and approval is limited to the exterior of the original structure

AA1040 Existing Conditions

1. Assessment 02 20 00
   A. Surveys 02 21 00: Site Survey updates are BVSD responsibility

B. Existing Conditions Assessment 02 22 00: Facility Condition Assessments are BVSD responsibility
C. Exiting Material Assessment 02 25 00: Material Condition Assessments are BVSD responsibility
D. Hazardous Material Assessment 02 26 00: Asbestos, Lead, Mercury & PCB Assessments are BVSD responsibility

2. Subsurface Investigation 02 30 00
   A. Geophysical Investigations 02 31 00: Per CRS 22-32-124, all projects must undergo a State of Colorado Geological Review – BVSD responsibility
   B. Geotechnical Investigations 02 32 00: Soil Investigation and Foundation Recommendation to be completed by BVSD Geotechnical Consultant

AA1050 Owner's Work 01 11 16

1. Hazardous Material Abatement to be completed by BVSD Contractor
2. Facility Furniture Fixtures & Equipment Moves by BVSD Contractor
3. Facility Furniture Fixtures & Equipment Procurement & Installation by BVSD Contractor
4. Improvement of BVSD Fiber Optic Wide Area Network by BVSD Contractor

**AA20 OWNER DEVELOPMENT**

AA2010 Site Acquisition

1. Site Purchase or Lease shall be executed by BVSD
2. Rights-of-Way and Easements
   A. Rights-of-Way and Easements Modifications prepared by Architect and submitted on behalf of BVSD
3. Utilities
   A. Improvement of Electrical and Gas Utilities (Xcel) – Application prepared by Architect / Engineer and submitted on behalf of BVSD
   B. Improvement of Communication Utilities (CenturyLink, Comcast) – Application prepared by Architect and submitted on behalf of BVSD
   C. Improvement of Fiber Optic Utilities (BVSD) – Design and Build of Fiber Optic Infrastructure is to be contracted by BVSD
   D. Improvement of Water, Sanitary Sewer, Storm Sewer per municipality requirements

AA2020 Permits 00 31 46

A. State of Colorado Permit Plan Review Application – submitted by Architect / BVSD expense
B. Public School Construction and Inspection Fees – BVSD expense
C. Building Permit Submittal Worksheet – submitted by Architect
D. Small Project Building Permit – submitted by Architect or BVSD / BVSD expense
E. Fire Code Plan Review, used for Modifications to Fire Sprinkler / Standpipe, Fire Detection and Alarm and Kitchen Hood Suppression – submitted by contractor / contractor expense, Not Applicable for City of Boulder
F. Notification to DFPC of Hired 3rd Party Inspector – submitted by BVSD
G. Pre-Construction Meeting Agenda – submitted by State Inspector

2. Right of Way Permits
   A. As required by the specific Municipality
   B. Prepared and submitted by the General Contractor at the contractor's expense
3. Stormwater Management Permits
   A. As required by State of Colorado in accordance with Colorado Department of Public Health and Environment; Water Quality Control Division; Storm water Program
   B. Prepared and submitted by the General Contractor at the contractors expense
4. Ditch Right of Way / Easement
   A. Prepared by Architect / Engineer, submitted by the contractor at BVSD Expense
5. Regulatory Required Permits 01 41 00
   A. Kitchen Modifications Permit Requirements
      (i) Boulder County Health Plan Review Packet, prepared and submitted by Architect – BVSD expense
   B. Early Childhood Education Licensing Requirements
      (i) Colorado Department of Human Services, Division of Child Care

(ii) Boulder County Public Health Plan Review Application prepared and submitted by Architect – BVSD expense
(iii) Broomfield County Health

C. Fire Department Plan Review
(i) City of Boulder – Authorized Reviewer: City of Boulder Fire
(ii) City Of Broomfield – Authorized Reviewer: North Metro Fire
(iii) City of Lafayette – Authorized Reviewer: Colorado Division of Fire Safety
(iv) City Of Louisville – Authorized Reviewer: Louisville Fire Protection District
(v) City of Nederland – Authorized Reviewer: Colorado Division of Fire Safety
(vi) City of Erie – Authorized Reviewer: Colorado Division of Fire Safety
(vii) Boulder County – Authorized Reviewer: Colorado Division of Fire Safety

D. Elevator Installation or Alteration Permit
(i) Application submitted and paid for by elevator contractor
(ii) Third Party Elevator inspection required – elevator contractor expense

AA2030 Professional Services

1. Design Professionals
A. Architects: Contracted by BVSD, must have LEED AP on staff
B. Civil, Structural, Mechanical, Electrical Engineers: Contracted by Architect
C. Landscape Architects
(i) As requested by BVSD Project Manager
(ii) Contracted by Architect
D. Interior Designers
(i) As requested by BVSD Project Manager
(ii) Contracted by Architect
2. Other Consultants
A. Surveyors: Contracted by BVSD
B. Geotechnical Engineers: Contracted by BVSD
C. Commissioning Agents: Contracted by BVSD
D. Energy Consultants/Cx Agent: Contracted by BVSD
E. Testing Laboratories 01 45 29 – No Owner requirements
3. Special Inspectors 01 45 23 as required by Colorado Department of Public Safety, Division of Fire Prevention and Control permit requirements
A. Special Inspections requirements are project specific and identified on the State Building Permit
(i) Contracted by BVSD
B. Third Party Inspections requirements are project specific and identified on the State Building Permit
(i) Inspector must be state certified
(ii) Contracted by BVSD

**AA30 PROCUREMENT REQUIREMENTS**

AA3010 Project Delivery

1. Project Delivery Methods shall be specified by BVSD
A. Design-Bid-Build: Recommended for projects less than $5M
B. Construction Manager / General Contractor: Recommended for projects greater than $5M
C. Design/Build: BVSD will consider for special projects
D. Design/Negotiate/Build, Construction Manager as Advisor, Owner/Build, Integrated Project Delivery: Not Recommended
2. Number of Construction Contracts
A. Single Contract – Required
B. Multiple Contracts – Not Allowed
3. Methods of Payment
A. Stipulated Sum 00 52 13: Use for Design-Bid-Build Projects
B. Unit Price 00 52 43: only with BVSD Project Manager approval
C. Cost Plus a Fee 00 52 33: Not Allowed
D. Cost Plus a Fee with a Guaranteed Maximum Price (GMP): Use for CM/GC Projects

AA3020 Solicitation 00 10 00: No Owner requirements

AA3030 Instructions for Procurement 00 20 00: Follow BVSD Purchasing Requirements. Contact PM
AA3040 Available Project Information 00 31 00

1. The following will be provided by Owner
    A. Preliminary Schedules 00 31 13
    B. Project Budget Information 00 31 16
    C. Existing Condition Information 00 31 19
    D. Survey Information 00 31 21
    E. Environmental Assessment Information 00 31 24
    F. Existing Material Information 00 31 25
    G. Existing Hazardous Material Information 00 31 26
    H. Geophysical Data 00 31 31
    I. Geotechnical Data 00 31 32
    J. Permit Application 00 31 43: By Architect, fee by BVSD

AA3050 Procurement Forms: Per BVSD Requirements; contact Project Manager

**AA40 CONTRACTING REQUIREMENTS**

AA4010 Contracting Forms and Supplements 00 50 00: No Owner requirements
AA4020 Bond Forms 00 61 00: Use BVSD forms. See Project Manager.
AA4030 Conditions of the Contract 00 70 00: Use BVSD-approved forms. See Project Manager
AA4040 Revisions, Clarifications, and Modifications 00 90 00: Use BVSD-approved forms.

## ELEMENT A: SUBSTRUCTURE

### A10 FOUNDATIONS

A1010 Standard Foundationsexpoxy

1. Standard Foundation Supplementary Components
    - A. Void Forms 03 11 00
        - (i) Void form shall be stored and kept dry prior to concrete placement. Any form crushed or damaged shall be replaced prior to concrete placement.
    - B. Inspection of formwork and reinforcing by the Architect is required before concrete placement.
    - C. The use of earth as a form will not be allowed.
    - D. Lap forming will not be allowed.
    - E. Use of calcium chloride additives are prohibited.
    - F. Concrete shall not be placed on frozen or saturated ground.
    - G. Testing agency shall be designated, secured, and services paid for by the Owner. Testing will be done per specified procedures. Architect will consult with Owner if additional testing is needed. Architect will consult with Owner's geotechnical consultant regarding the number of tests, number of cylinders, etc. Contractor will schedule testing with Owner's testing agency.
        - (i) Averaging of separate tests to determine strength is not permitted. Contractor will contact the testing agency to schedule specified testing.
        - (ii) Contractor shall work with the Owner to schedule the Owner's inspections and testing.
        - (iii) Coordinate form release oils or other products with materials to be applied over concrete

A1020 Special Foundations 31 60 00

- A. Helical piers prohibited unless approved by BVSD
- B. Micropiling is prohibited unless approved by BVSD.

### A20 SUBGRADE ENCLOSURES

A2010 Walls for Subgrade Enclosures

1. Subgrade Enclosure Wall Construction
    - A. Exposed rough texture finish concrete prohibited for interior and exposed exterior finish.

### A30 SLABS-ON-GRADE

A3010 Standard Slabs-on-Grade

1. Cast-In-Place Concrete 03 30 00
    - A. Specify restrictions for hot and cold weather placement
    - B. Contractor is responsible for protection of concrete in work areas where concrete will be exposed.
    - C. No concrete shall be placed on frozen ground.
    - D. Control joints in concrete slabs on grade shall be shown on the drawings or maximum spacing. Reinforcing shall extend through joints unless noted otherwise. Sawed joints shall be ¼ of the slab thickness. Saw cutting shall be started as soon as the concrete has hardened sufficiently to prevent aggregates being dislodged by the saw, and shall be completed before shrinkage stresses have developed sufficiently to induce cracking.
2. Use of pigmented and stained concrete shall be approved by BVSD prior to placement of finished product.
    - (i) Representative sample of stained concrete shall be approved by BVSD prior to commencement and will be retained for comparison.
    - (ii) Specify concrete finishes for all interior concrete whether covered with finish flooring or left exposed. Specify a finished clear sealer for all interior slabs that are to remain exposed in the finished work
    - (iii) F. Consideration should be given to addition of fiber reinforcement. Interior floor slabs should receive a trowel finish.
    - (iv) G. Acid washing is prohibited unless fully extracted. All surrounding surfaces are to receive adequate protection from acid wash procedures.

A3020 Structural Slabs-on-Grade: No Owner Requirements

A3030 Slab Trenches: No Owner Requirements

A3040 Pits and Bases: No Owner Requirements

A3050 Slab-On-Grade: Supplementary Components
1. Vapor Retarder 07 26 00
    A. Where floor coverings are to be applied to a finished slab on grade provide a moisture barrier below the slab to prevent the migration of moisture up through the slab

**A40 WATER AND GAS MITIGATION**

A4010 Building Subdrainage
1. Foundation Drainage 33 46 13
    A. Perimeter drain shall be provided where indicated by Geotechnical report.

A4020 Off-Gassing Mitigation 31 21 00
1. Verify requirements for radon mitigation with the Owner's Hazardous Materials department.

**A50 SUBSTRUCTURE RELATED ACTIVITIES**

A5010 Substructure Excavation 31 23 16
1. 1. Backfill and Compaction 31 23 23
    A. Strictly comply with recommendations and reports of Geotechnical Engineer.
    B. The Owner will employ a soils engineer to assist in obtaining required compaction standards. Consult the soils investigation report for suggested compaction standards for this project.
    C. Soil Stabilization: Lime stabilization not allowed unless approved in writing by BVSD. Procedures are to be reviewed and accepted by Owner and Geotechnical Engineer prior to implementation.

A5020 Construction Dewatering 31 23 19: No Owner Requirements

A5030 Excavation Support 31 50 00: No Owner Requirements

A5040 Soil Treatment 31 31 00
1. Rodent Control 31 31 13
    A. The District is responsible for removal of prairie dogs before commencement of work.

## ELEMENT B: SHELL

### B10 SUPERSTRUCTURE

B1010 Floor Construction

1. Levelness 01 83 13
   - A. Where concrete is exposed, slab shall be flat and smooth in accordance with ACI-117 specifications. Precautions should be taken at joints to avoid curling.
2. Floor Decks, Slabs, and Toppings
   - A. Metal Decking 05 30 00
     - (i) Decking exposed to high humidity areas shall have galvanized coating, hot dipped application in accordance with ASTM A653.
     - (ii) Steel deck shall be stored off the ground with one end elevated to provide drainage, and shall be protected from the elements with a waterproof covering, ventilated to avoid condensation.
     - (iii) If a metal deck will be used as a finished ceiling it shall be protected from moisture and must never be subjected to corrosive substances . All decks must be protected from erection operations that could distort panel configuration.
   - B. Acoustical Metal Decking 05 34 00
     - (i) Decks utilizing fiberglass insulation batts must be protected from moisture, rain, snow, dirt, or mud. Field installed batts are to be installed in the flutes just before roof system installation. Shop installed batts are to be protected until roof installation.

B1020 Roof Construction

1. Roof Structural Frame
   - A. Sloping of the structural support system in lieu of adding tapered insulation is preferred. Minimum ¼" per foot slope.
2. Canopy Construction
   - A. Decorative open canopies with no protective cover are Prohibited. Design shall prevent roosting birds and ice formation.
   - B. Exposed undersurface of any exterior overhanging section of a roof eave shall be of water resistant materials. Gypsum products Prohibited.

B1030 Stairs

1. Stair Construction
   - A. Precast Concrete Stair Treads 03 48 19
     - (i) Precast stair tread design shall allow for future replacement
   - B. Metal Stairs 05 51 00
     - (i) Exterior stairs and ladders shall have weather resistant coatings approved by BVSD
   - C. Metal Stair Treads and Nosing 05 55 00
     - (i) Interior exposed concrete stairs shall have integral metal nosing with tread.
2. Stair Soffits
   - A. Plaster and Gypsum Board 09 20 00
     - (i) Suspended acoustical soffits Prohibited.
3. Stair Railings
   - A. Wire Rope Railings 05 15 00 Prohibited
   - B. Metal Railings 05 52 00 Preferred
   - C. Decorative Metal Railings 05 73 00 Preferred
   - D. Wood Railings 06 43 16 Prohibited
   - E. Plastic Railings 06 63 00 Prohibited
   - F. Composite Railings 06 81 00 Prohibited
4. Fire Escapes 05 51 23 Prohibited
   - A. Metal Catwalks 05 51 36.13
     - (i) Catwalks and grating exposed to high humidity areas shall have galvanized coating, hot dipped application in accordance with ASTM A653.

## B20 EXTERIOR VERTICAL ENCLOSURE

B2010 Exterior Walls

1. Exterior Wall Veneer
   - A. Unit Masonry:
     - (i) Brick is the preferred exterior material. Retrofit: New masonry coursing preferred to match adjacent existing.
     - (ii) Single wythe unit masonry walls prohibited. CMU masonry walls preferred as back-up for brick veneer walls.
     - (iii) CMU: Plain Faced, Ground Face, and acoustic with integral color are acceptable. Split face allowed only by written permission by Owner.
     - (iv) If unit masonry is used on interior of building, all exposed corners shall be bullnosed. Avoid bullnose at door jambs where resilient base is to be applied. Frames or other trim shall extend ½" beyond face of masonry so base can abut.
     - (v) Sound absorbing acoustic units: NRC 0.65 minimum.
     - (vi) Define procedures and standards of workmanship and cold weather guidelines in pre-construction meetings.
     - (vii) Define procedures for removing effloresce without the use of muriatic acid or high pressure spray.
     - (viii) Grout all hollow metal frames at masonry and concrete walls.
     - (ix) Coordinate tolerances with other trades before construction.
     - (x) Masonry detailing shall be in accordance with Rocky Mountain Masonry Institute standards.
     - (xi) Glass Unit Masonry: Discouraged.
     - (xii) Adobe Unit Masonry: Prohibited.
     - (xiii) Vitreous type glazed tile: Prohibited
   - B. Stone Masonry 04 43 13
     - (i) Native, local stone.
     - (ii) Retrofit: Match existing. Samples are to be provided for approval by Owner.
     - (iii) Source documentation required.
     - (iv) Provide stone quarried and fabricated within a 500 mile radius of the project site.
     - (v) Where possible, use salvaged stone to the greatest extent possible
   - C. Water Repellents 07 19 00
     - (i) Concrete Masonry Units: ASTM C 140.
     - (ii) Water Vapor Transmission: ASTM E 96.
     - (iii) Water Penetration and Leakage through Masonry: ASTM E 514.
     - (iv) Apply anti-graffiti material to exterior walls to a minimum height of 10'-0" above bottom course. Coordinate requirements with Owner.
     - (v) Stain only on exterior wood is Prohibited. Provide a minimum of (2) coats of finish over stain base coats.
   - D. Exterior insulation and finishing system (EIFS) : Prohibited
   - E. Siding 07 46 00
     - (i) If metal siding is used, metal gauge shall be of sufficient thickness to prevent denting from normal school activities. Minimum 4'-0" above finished grade.
     - (ii) Panels to have integral backing to prevent oil-canning. Minimal maintenance required.
     - (iii) Care should be taken during installation to prevent damage to the face. Damaged panels will be replaced at the discretion of the district.
   - F. Cement Plastering: Discouraged
   - G. Cement Stucco: Preferred
   - H. Painting and Coating: minimize use of materials that require coatings
2. Parapets
   - A. Height of parapet walls shall be sufficient to allow for proper insulation and flashing to be installed.
3. Equipment Screens
   - A. Louvered Equipment Enclosures 08 92 00
     - (i) Screens shall allow adequate space for routine maintenance and filter replacement.
4. Exterior Wall Supplementary Components

A. Vapor Retarder 07 26 00: Vapor barriers shall consist of fully adhered building wrap or spray applied foam applied to seal all wall openings
B. Insulation 07 20 00: Continuous insulation is required. No gaps or voids permitted.
C. Expansion Joints 07 95 00
(i) Maximum space for caulk joints shall be ¾". Wider spaces shall be permanently sealed.
(ii) Architect shall detail location of control and expansion joints on drawings
D. See **Building Envelope Commissioning** requirements

5. Exterior Wall Opening Supplementary Components
A. Lintels: Exposed lintels shall be coated to prevent corrosion
B. Flashing 07 60 00
(i) Sharp edges and corners on flashing are Prohibited.
(ii) Consideration should be given to the height of flashing in relation to adjacent walkways to avoid injury to pedestrian traffic.
C. Sills: Precast sills preferred

B2020 Exterior Windows

1. Performance Class and Grade 01 83 16
A. Maximum area of individual panes of glazing shall not be greater than 20 square feet. This will facilitate maintenance and replacement.
B. Consider laminated glass in lieu of tempered glass at entries
C. Glazing shall not be lower than 24" above finished floor or ground to avoid breakage.
D. Windows shall have integral thermal break.
E. Wire glass prohibited.
F. Wood Windows: Use only where required to meet historic preservation requirements.
G. Aluminum Windows: Preferred.
H. Plastic Windows: Not Allowed
I. Roof Windows: Prohibited
J. Steel Windows : Not Allowed
K. Stainless Steel Windows: Not Allowed
L. Maximum window "U" factor shall be between .25 and .55
2. Wind Load Capacity 01 83 16: Refer to Boulder County Colorado Front Range Gust Map
3. Thermal Resistance 01 83 16: Heat mitigation should be considered in window design and selection.
4. Exterior Operating Windows 08 50 00:
A. Operable sash with insect screen required for most exterior applications.
B. Operating mechanism and screens shall not interfere with window blind operation.
(i) Window Screens 08 51 66: Aluminum preferred
(ii) Storm Windows 08 51 69: Not Allowed
a. Stops to be installed to limit operation, final adjustment to be determined by Owner.
b. Consideration to be given to interference with pedestrian traffic on adjoining walkways.

B2030 Exterior Doors and Grilles

1. Exterior Doors Performance Requirements 01 83 16
A. Thermal Resistance 01 83 16
(i) All opaque doors, including swinging doors and overhead doors shall have the following thermal performance criteria.
a. U-factor for metal overhead doors shall be between .25 and .55 (Btu/hr sq ft °F)
b. U-factor for metal swinging doors, including fire-rated doors, insulated access hatches, and insulated smoke vents shall not be greater than 0.50 (Btu/hr sq ft °F).
c. Swinging doors shall have an insulated core.
d. Where thermally broken welded frame product is specified, welds shall not cause thermal transfers between exterior and interior surfaces.
2. Exterior Entrance Doors 08 42 00
A. Sliding Glass Doors 08 32 00: Not Allowed
B. All-Glass Entrances 08 42 26: Not Allowed
C. Automatic Entrances 08 42 29: Push Button operation preferred.
D. Revolving Door Entrances 08 42 33: Not Allowed
E. Balanced Door Entrances 08 42 36: Not Allowed

F. Sliding Storefronts 08 43 29: Prohibited
G. Aluminum Entrances and Storefronts: 5" tiles width minimum. 10" bottom rail width minimum. 6" center rail width minimum. 5" top rail width minimum. Thick-walled (3/16" minimum), **welded extrusions required.**
   (i) Non-conducting thermal breaks should separate aluminum members exposed to the exterior from members exposed to the interior.
   (ii) Warranty to be manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
   (iii) Provide low-voltage raceway within framing for access control. Surface-mounting prohibited.
   (iv) Manufacturers: Consult with District Maintenance.
H. Stainless Steel Entrances and Storefronts: Not Allowed
I. Steel Entrances and Storefronts: No Owner requirements
J. Exterior Oversize Doors : Prohibited
K. Exterior Coiling Doors 08 33 00 Prohibited
L. Exterior Panel Doors 08 36 00 Prohibited
M. Exterior Sectional Doors 08 36 13: with District written approval
N. Exterior Single-Panel Doors 08 36 16 Prohibited
O. Exterior Multi-Leaf Vertical Lift Doors 08 36 19 Prohibited
P. Exterior Telescoping Vertical Lift Doors 08 36 23 Prohibited

3. Exterior Door Supplementary Components
   A. Specialty Door Frames 08 30 00: Door frame shall have continuous thermal break between the interior and exterior surfaces.
   B. Exterior and wet area frames and frame components shall be 14-gauge, hot dipped galvanized steel having an A 60 zinc coating conforming to ASTM specification A 525.
   C. Exterior and wet area doors shall be 14-gauge, A 60 Galvanized. Tops of doors shall be made flush and sealed with the use of 16-gauge channel in addition to the 14-gauge inverted steel reinforcement channels. Plastic filler channels or flush reinforcement channels are prohibited.

B2040 B2080 Exterior Wall Appurtenances

1. Exterior Fixed Grilles and Screens 10 82 13
   A. Decorative Metal 05 70 00 Preferred: Factory anodized finish with a minimum 0.8 mil thickness.
2. Bird Control Devices 10 81 13: Design shall not provide roosting areas for birds.

## B30 EXTERIOR HORIZONTAL ENCLOSURES

B3010 Roofing

1. Roofing Performance Requirements 01 83 19
   A. Fully adhered EPDM rubber systems. Re-cover options available with BVSD approval.
   B. Must comply with BVSD Roofing consultant; coordinate with BVSD Project Manager
2. Roofing Shingles and Shakes 07 31 00: Prohibited except to match existing conditions
3. Roof Tiles 07 32 00: Prohibited except to match existing conditions
4. Roofing Pavers 07 76 00: Provide non-deteriorating walkways walk pads from roof access point to roof mounted mechanical units. Precast concrete pavers discouraged.
5. Vegetated Low-Slope Roofing 07 55 63
   A. Prohibited without acceptance by BVSD.
   B. Must include adequate fall protection railing integral with building design

B3020 Roof Appurtenances

1. Roof Accessories 07 72 00
   A. Roof Ladders 05 51 33: Provide as needed to provide access to all roof levels.
   B. Snow Guards 07 72 53
      (i) Plastic adhesive applied snow guards are prohibited.
      (ii) Ridge applied Standing seam mechanically fastened snow guards fences are preferred.
2. Rainwater Management
   A. Gutters 07 71 23
      (i) Plastic or composite gutters are Prohibited

(ii) Metal gutters shall be corrosion resistant and of sufficient gauge and have proper support for ice and snow loads. Gutters shall be in as long a continuous length as possible.

B. Downspouts 07 71 23
   (i) Plastic or composite downspouts are Prohibited
   (ii) Metal downspouts shall be corrosion resistant and of sufficient gauge and have proper support for ice and snow loads.
   (iii) Downspouts shall have open design so obstructions can be easily removed.
   (iv) Care should be taken in design to avoid placement of scuppers at or above walkway areas or drain into areas where water can freeze.
   (v) Reference electrical section for heat trace.

C. Scuppers and Overflow Roof Drains 07 71 33
   (i) Care should be taken in design to avoid placement of scuppers at or above walkway areas or drain into areas where water can freeze.

D. Precast Concrete Splash Blocks 03 48 16
   (i) Provide non-deteriorating splash blocks under all downspouts and size to prevent erosion.

B3030 Horizontal Openings

1. Framed Skylights--Clerestories are preferred over skylight roof penetrations.
   A. Metal-Framed Skylights 08 63 00
      (i) Preferred where approved by the Owner.
      (ii) Tubular skylights shall be minimum 18" diameter and shall include electrically actuated dimmers in classrooms.
      (iii) Electrically actuated dimmers not required in corridors.
   B. Plastic-Framed Skylights 08 64 00 Prohibited
2. Skylight Protection and Screens 08 67 00: Skylights over a 24" square opening shall have integral fall protection railing surrounding them.
3. Roof Hatches 07 72 33: Roof hatches shall include safety posts or safety railings

B3040 Overhead Exterior Enclosures

1. Exterior Ceilings
   A. Gypsum Board 09 20 00 Prohibited
2. Exterior Soffits
   A. Gypsum Board 09 20 00 Prohibited
   B. Painting and Coating 09 90 00
      (i) Soffits shall have factory finish applied if they are metal or integral color cementitious board.
3. Exterior Bulkheads
   A. Gypsum Board 09 20 00 Prohibited
   B. Painting and Coating 09 90 00
      (i) Bulkheads shall have factory finish applied if they are metal or integral color cementitious board

# ELEMENT C: INTERIORS

## C10 INTERIOR CONSTRUCTION

C1010 Interior Partitions

1. Interior Partitions Performance Requirements
   - A. Sound Transmission 01 84 13 -Provide design of interior walls to provide the following STC rating minimums:
     - (i) Where code does not dictate, follow these standards:
       - a. 50 at classrooms, special education spaces, and health rooms.
       - b. 45 at corridors, offices and conference rooms.
       - c. 60 at music rooms, mechanical equipment rooms, cafeteria, kitchens, and auditoriums.
       - d. Other locations should be designed for appropriate STCs and NRCs by use.
2. Interior Fixed Partitions – Gymnasiums, locker rooms, corridors, etc., walls to door height minimum should be materials resistant to impact and hard use. Finish should be non-abrasive, resistant to marking, scarring and of a material that can be easily cleaned or re-finished. Masonry preferred, other materials allowed with Owner approval.
   - A. Cast-In-Place Concrete 03 30 00: Provide for bullnose or chamfered outside corners.
   - B. Precast Concrete 03 40 00
     - (i) Provide for bullnose or chamfered outside corners.
     - (ii) Broom finish Prohibited on exposed surfaces.
   - C. Unit Masonry 04 20 00
     - (i) Provide bullnose outside corners at all concrete block walls.
     - (ii) Split face block Prohibited without Owner approval inside buildings.
   - D. Structural Metal Stud Framing 05 41 00
     - (i) Provide wall studs at 16" o.c. maximum spacing in areas of impact where possible. Consider 24" oc where spacing conflicts with STC rating.
     - (ii) Soffits 16" o.c. exterior or 24" o.c. interior.
     - (iii) 25 gauge minimum for interior applications.
     - (iv) 20 gauge double steel studs at door jambs
     - (v) 16 gauge minimum for exterior studs and 2-leaf door jambs
     - (vi) Detail “slip joints” at top of partition, not base.
   - E. Wood Framing 06 11 00
     - (i) Wood stud walls – Prohibited without Owner permission.
     - (ii) Provide fire treated wood blocking as required for backing for attachment through gypsum board where applicable.
3. Plaster and Gypsum Board 09 20 00
   - A. APPLICATIONS
     - (i) Provide gypsum board with paper faces containing 100% post-consumer recycled paper and gypsum cores containing 10% recycled gypsum content.
     - (ii) Use 5/8" fire rated gypsum board in all “dry” (no plumbing) locations.
     - (iii) Use cement board in lieu of gypsum board at all wet areas or plumbing walls and behind all ceramic tile installations on framed walls.
     - (iv) Regular-use Gypsum board discouraged below 6'-0" in common/public areas of middle and high schools. Protect below 6'-0" against heavy traffic and abuse.
     - (v) Provide impact resistant gypsum board to 6'-0" in corridors and other appropriate locations.
     - (vi) Limit gypsum plaster to patching of existing conditions. Prohibited without Owner approval.
   - B. “L” Metal beads at all termination edges exposed to view.
   - C. Finish: Smooth “level 4” finish preferred. Match existing at retrofit work.
4. Wire Mesh Partitions 10 22 13: No Owner requirements
5. Interior Glazed Partitions
   - A. Interior Storefronts 08 43 00 – Comply with all fire and safety requirements.
     - (i) Hollow metal or Aluminum systems preferred. Coordinate requirements for privacy blinds, roller shades, or obscure glass with the Owner.

6. Interior Demountable Partitions 10 22 19: Prohibited without Owner approval
7. Interior Operable Partitions
   A. Sound Transmission 01 84 13 STC ratings should approximate adjacent fixed partition ratings.
   B. Provide independent structural support.
8. Accordion Folding Partitions 10 22 33: Prohibited.
9. Coiling Partitions 10 22 36: Prohibited.
10. Folding Panel Partitions 10 22 39: Prohibited.
11. Sliding Partitions 10 22 43: Prohibited.

C1020 Interior Windows 08 50 00

1. Interior Windows Performance Requirements 01 84 13
   A. Interior Fixed Windows 08 50 00 – Hollow metal or aluminum preferred.
   B. Interior Observation Windows- with Owner approval
   C. Interior Pass Windows 08 56 19 – Provide for sturdy, lockable design. Locks built into frame or track preferred to ratcheting, glass "slide-on" type.
   D. **Review the Safety and Security Guidelines for Facility Design;** when needed, consult with BVSD Project Manager.
   E. **Reception Security Window Detail**

C1030 Interior Doors 08 10 00

1. Interior Swinging Doors 08 10 00
   A. **Finish Hardware** 08 71 00
   B. Wood Doors:
      (i) All interior wood doors shall be 1-3/4" pre-finished solid core, AWI Custom grade or WDMA Premium grade, 5 ply, with FSC Certified fully bonded MDF, SCL, agri-fiber, or staved wood cores.
      (ii) Performance standard: Meet WDMA I.S.1-A, Extra Heavy Duty.
      (iii) Standard door height 7'-0" unless approved by the Owner. Verify existing door heights.
      (iv) Use FSC-certified sustainably harvested woods and veneers. Provide Grade 'A' hardwood face veneers. Wood species as approved by the Owner, match existing in remodels where applicable. Match the face veneer species at exposed vertical door stiles.
      (v) Only low odor/low-VOC emitting core boards, adhesives, composite wood products, and MDF shall be used.
      (vi) Mineral core wood doors Prohibited without Owner approval. Use hollow metal doors where above described solid core wood doors do not meet fire code rating.
      (vii) Factory finish of wood doors preferred. Field finish allowed with Owner approval. Use low VOC stains and sealers.
2. Steel Doors and Frames:
   A. Interior doors, frames, and frame components shall be manufactured from cold-rolled steel conforming to ASTM specification A 366. Standard door height 7'-0" unless approved by Owner. Verify existing door heights.
   B. Interior frames shall be 16-gauge cold rolled. All frames to be back welded at the faces and ground smooth.
   C. All frames to receive a high frequency hinge reinforcement at top hinge only, or full width hinge reinforcements.
   D. Interior doors shall be 16-gauge cold-rolled, with visible edge seams.
   E. Doors with glass cutouts shall be flush glazed. Glazing kits to be flush with door panels.
   F. If knock-down frames are required, they must be field-welded and ground smooth.
3. Interior Coiling Doors 08 33 00: Stainless steel preferred at kitchen and serving locations. Review application and any required fire alarm interface with the Owner. Discuss design options with the Owner to verify operation and maintainability.
4. Interior Sectional Doors 08 36 13- Overhead doors allowed with Owner approval. Special consideration of hardware and operation with safety in mind.
5. Interior Special Function Doors 08 30 00: Interior Sound Control Doors 08 34 73
   A. Consider installation at Music, Band and Practice Rooms to approximate STC of adjacent walls.
6. Interior Access Doors and Panels 08 31 00 : Provide at valves, controls, and all locations where adequately sized access for maintenance of equipment is required. Consider keying locks to building system in unsupervised locations.

C1040 Interior Grilles and Gates
1. Interior Coiling Grilles 08 33 00 – Stainless steel preferred at kitchen locations. Review application and use with the Owner.
2. Interior Security Gates 08 34 56 – Prohibited. Provide swinging doors in lieu of gates. Gate placement shall avoid creating dead end corridors when closed. Key all gates and recessed gate cabinets alike, with mortise cylinders master-keyed to the building system.

C1010 Raised Floor Construction
1. Platform/Stage Floors
   A. Thrust stage and orchestra pit covers should be single manufacturer's engineered and warranted system design.
   B. Provide a safety net at the orchestra pit. Coordinate with Maintenance.

C1060 Suspended Ceiling Construction
1. Suspended Ceiling Construction Performance Requirements
   A. Fire Rating 01 84 13
      (i) Class A; 1-hour rated materials. Limit rated ceiling construction assemblies to those required by code.
   B. Sound Transmission 01 84 13
      (i) STC Rating: 35 to 39 required in assignable classroom and office spaces.
      (ii) Consider higher NRC and STC rated ceilings in critical sound controlled areas.
   C. Recycled Content:
      (i) Provide acoustical ceiling tile with a range of 79%-85% post-consumer recycled content.
      (ii) Provide suspension system with minimum of 25% recycled content.
      (iii) Suspended ceiling products shall be 100% recyclable.
   D. Sound Attenuation 01 84 13 CAC 35 (minimum)
   E. Sound Absorption 01 84 13 70 NRC (minimum in teaching spaces)
   F. Light Reflectance 01 84 13 – 0.75 (minimum)
2. Acoustical Suspended Ceilings 09 51 00 – All classrooms should have acoustic ceilings or equivalent acoustic control.
   A. Preferred: Armstrong World Industries, or USG compressed mineral fiber non-directional deep fissure in manufacturers' standard, factory applied white color.
   B. 5/8" minimum, square edge, 24"x48" or 24"x24" tiles.
   C. Minimum height AFF: 8'-0"
   D. Impact resistant coating in corridors, high use, non-assignable areas.
   E. Mylar, vinyl, or impervious finish required at kitchens and food service areas.
   F. Provide extra panels: 1% of installed panel types. Quantity shall be rounded up to the nearest full carton.
   G. Acoustic Insulation 09 81 00: Avoid placing loose laid batts on accessible ceiling panels for restroom sound control.
3. Suspended Plaster and Gypsum Board Ceilings 09 20 00 – Consider in wet locations and for restricting access above ceilings in locker and restrooms.
4. Ceiling Suspension
   A. Suspension Systems
      (i) 6" minimum vertical clearance between structure, mechanical, plumbing, and ceiling grid for new and remodel construction.
      (ii) Recessed lighting fixtures shall have adequate space for installation.
      (iii) Ceiling tie wires: minimum of 6'-0" o.c. each way. One wire supporting the grid at each corner of the lay-in lighting fixture. All wires supported from building structure.

C1070 Interior Specialties
1. Interior Railings and Handrails
   A. Metal Railings 05 52 00 – Preferred
   B. Decorative Metal Railings 05 73 00
      (i) Vertical rod or bar, in lieu of horizontal (ladder) installations preferred. Expanded metal and perforated metal acceptable.
      (ii) Tensioned cable – Prohibited
   C. Wood Railings 06 43 16: Allowed if matching existing or historic installations.
2. Interior Louvers 08 91

A. Provide heavy duty, metal gauge in gymnasiums, corridors and other locations subject to impact.

3. Information Specialties 10 10 00
   A. Visual Display Units 10 11 00
      (i) Chalkboards 10 11 13 Prohibited without Owner approval
      (ii) Marker boards 10 11 16
         a. Polyvision Magnetic Markerboard or as approved by Owner.
         b. Typical new classroom: minimum (1) 12'-0" x 4'-0" Marker board. Confirm with Owner.
         c. 24 gauge minimum porcelain enamel steel facing sheet laminated to a ½" fiberboard core with aluminum backing sheet.
         d. Provide an integral clear anodized aluminum frame with concealed fasteners, full length tray and map rail with end stops and (1) standard map hook/clip for every 24" of length.
         e. All boards shall be backed and shimmed to prevent "bounce" and shall be completely rigid during use.
         f. Marker boards in gymnasiums and high activity areas should have the marker tray mounted at the top of the board or recessed. Marker trays should have exposed ends 1" radius minimum.
         g. Provide (1) flag holder per classroom
      (iii) Tack boards 10 11 23
         a. Typical new classroom: minimum (2) 4'-0" x 4'-0" tack boards. Confirm with Owner.
         b. ¼" un-faced or vinyl faced sheet cork, bonded to ½" fiberboard with integral clear, satin anodized aluminum frame and concealed fasteners.
   B. Display Cases 10 12 00
      (i) Provide lighted, lockable cases, with tempered glass doors and shelving. Glass "slide-on" type of locks prohibited. Key cylinders to building key system. Recess case in walls or alcoves.
   C. Directories 10 13 00 – Meet ADA Requirements
   D. Interior Signage 10 14 00 – Meet ADA Requirements – Match existing compliant signage where possible.
      (i) Coordinate size, titles, and wording with Owner. Discuss wayfinding and possible bilingual requirements.
      (ii) Provide mechanical and silicone fastening.
      (iii) Provide matching backer plates where signs are located on glass.
      (iv) All room numbering schemes shall be Owner approved, coordinate with existing.
   E. Lobby Plaques – New construction
      (i) Provide a bronze plaque in the school lobby or primary entrance area.
      (ii) The plaque shall be size 18" x 24" containing the following.
         a. District brand, 10" wide (**PNG file format link**)
         b. [Roboto 72pt, centered, capitalization to match following text]

**With deep appreciation to the**
**Boulder Valley School District community,**
**this building is dedicated to the students and staff of**

         c. [Roboto 94pt, bold, centered, first letters capitalized]

**[Full Name of School]**

         d. [Roboto 84pt, centered]

**[year construction completed]**

      (iii) .25" border, background leatherette finish, letters and border in satin Finish.
      (iv) Layout must be approved by Operational Services Communications Manager before production.
      (v) **Lobby Plaque Example**
4. Compartments and Cubicles 10 21 00
   A. Toilet Compartments 10 21 13
      (i) Provide phenolic or HDPE solid plastic partitions.
      (ii) Provide heavy-duty stainless steel operating hardware and accessories.

(iii) Consider the manufacturer's standard continuous aluminum heat-sink strips at all exposed bottom edges of HDPE units to prevent burning.
(iv) National Fire Protection Association (NFPA) class B
(v) International Code Council (ICC) class B
(vi) Comply with NFPA 286 and ASTM-E84
(vii) Smoke Developed – not to exceed 450
(viii) Flame Spread Index – not to exceed 75
(ix) Toilet partition hinges shall be "no sight line" hardware.

B. Shower & Dressing Compartments 10 21 16: See toilet compartment requirements.

5. Wall and Door Protection 10 26
   A. Corner Guards 10 26 13
      (i) Provide Acrovyn 4000 series, surface applied type or approved equal 4'-0" minimum AFF at all gypsum board and stud wall outside corners in hallways, corridors, and locations that may be prone to damage.
      (ii) Provide stainless steel corner guards in kitchen, prep, and serving areas.
6. Toilet Accessories 10 28 00- Provide blocking, installation reinforcement as needed. Install accessory units according to manufacturer's instructions. All installations to meet ADA requirements.
   A. Toilet Accessories 10 28 13- Owner provided items, Contractor installed. Coordinate requirements with Owner:
      (i) Soap dispensers
      (ii) Paper towel dispensers – Install one at every sink or lavatory.
      (iii) Toilet tissue dispensers
   B. Toilet Accessories 10 28 14 – Contractor furnished and installed.
      (i) Grab bars- stainless steel, provide as indicated. Must withstand at least 250 lbs. of downward load. Comply with ASTM F 446.
      (ii) Mirror units – Stainless steel framed units: Fabricate frame with angle shapes not less than 0.05 inch, with square corners mitered, welded, and ground smooth. ¼" silver plate glass and tamper resistant fasteners. Provide in No. 4 satin polished finish. Use mirrors mounted at ADA height in lieu of sloped ADA mirrors.
      (iii) At mop sinks: install either ceramic tile wainscot to approximately 4'-0" AFF, or install stainless steel panels to 4'-0" AFF on concrete masonry or cement backer board above basin. Also provide a mop rack with clips.
      (iv) Sanitary napkin disposal units.
7. Storage Specialties 10 50
   A. Lockers 10 51 00 ASI Lockers, DeBourgh, List Industries, Lyon, Penco or approved equal
      (i) Standard Corridor Lockers: 12" deep x 15" wide x 36" high, 14 gauge reinforced construction doors, 11 gauge, single- point latch, double tier, ½ lockers without louvers. Provide with built-in recessed Master lock combination locks with control key. Consider matching predominant existing building lock system (Master lock padlocks or built-in Master locks). Provide continuous 18 gauge sloped tops or recess lockers in walls. Provide 24 gauge sides and backs, 20 gauge bottoms, and 16 gauge boxed end panels at all locations where sides of lockers are exposed. Recessed or masonry fin walls at ends are preferred. Locker base shall be concrete or solid 2x and plywood in finished, retrofit locations. All other configurations, including full height (60" or 72") lockers shall be approved by Owner.
      (ii) Locker Room Lockers: Welded frame, expanded or punched metal 14 gauge lockers with 18 gauge sloped tops. 3 point minimum, cremone, rod type latching mechanism for full height or ½ height lockers. All sizes and configurations to be approved by Owner.
      (iii) Music Room Lockers: As manufactured by Wenger Corporation or approved equal. All sizes and configurations to be approved by Owner.
   B. Locker Room Benches 10 51 53 – No special Owner requirements, consider concrete bench integral to locker base.
   C. Mail Boxes 10 55 23 – Coordinate number, size, placement, and configuration with Owner. Individual user slots, 9"x 14" minimum.

## C20 INTERIOR FINISHES

### C1010 Wall Finishes 09 70 00

1. Wall Finishes Performance Requirements 01 84 19
   A. Kitchen, restroom, and locker room walls and ceilings must be constructed of materials that will not suffer damage as a result of repeated cleaning.
2. Tile Wall Finish 09 30 00 – Consider use in areas of abuse or wet conditions.
   A. Substrate: Concrete, masonry, or cement backer board.
   B. Thin set mortar only; mastic prohibited. Consider tile use in:
      (i) Restrooms.
      (ii) Shower rooms.
      (iii) Kitchen
      (iv) Mop sinks in custodial closets (may be partial height).
3. Use of thin, glazed, ceramic base is discouraged at high traffic areas.
4. Extra Materials (Owner 'attic' stock):
   A. Provide: wall, flooring, base and preformed profiles of each material and each color and pattern. Quantities specified to be determined by consultation with Owner.
5. Preformed single piece required at all external corners.
6. Apply sealant to junction of tile and dissimilar materials and at junction of dissimilar planes, including:
   A. Joints between plumbing fixtures and tile work.
   B. Inside corners: Rake out and seal.
   C. Door frames.
   D. Wall and floor planes: Rake out and seal.
   E. Install bullnose profile where tile abuts dissimilar materials.
   F. Cleavage membrane: Required at slabs over soils with swelling potential.
7. Wall Paneling
   A. Wood Paneling 06 42 00 – Consider as wainscot and in historic building applications.
   B. Plastic Paneling 06 64 00 – Consider FRP panels in kitchen, custodial, and serving areas.
8. Wall Coverings 09 72 00 – Allowed with Owner approval.
9. Wall Carpeting 09 73 00 – Discouraged, only allowed with Owner approval
10. Special Wall Surfacing 09 77 00- Consider stainless steel in kitchen and serving areas.
11. Wall Painting and Coating 09 90 00
    A. Kitchen, restroom and locker room areas should be painted with epoxy paint or other approved, maintainable, non-porous finish.
    B. Furnish the Owner with minimum of 1 gallon of each color and type of paint used.
    C. Provide Owner with list, by room number, of paint color and manufacturer.
    D. Provide Owner with 8 ½ x 11 "draw downs" with color submittals.
    E. A final, revised, room paint schedule shall be included with the closeout documents for the Owner's records.
    F. All paint materials selected for coating systems for each type of surface shall be the product of a single manufacturer. Sherwin-Williams preferred or approved equal.
    G. Paint interior surfaces of ducts with a flat, non-specular black paint where visible through registers or grilles.
    H. Concrete block should have one coat of filler-sealer and a minimum of two coats of paint. At areas where epoxy paint is to be applied (toilets, kitchen areas), block filler is to be applied with squeegee to insure that all pores are filled before application of epoxy.
    I. Drywall, concrete, or plaster should have one coat of suitable primer and a minimum of two coats of semi-gloss or eggshell enamel.
    J. Metal work which is factory primed, should have minimum two coats of finish.
    K. Exterior steel hand and guard rails shall be finished with a high performance coating (TNEMEC-primer: "Teneme-Fascure" series 161, polyamide epoxy 4.0mil DFT and TENEMEC-finish coat "Endura Shield" series 73, Aliaphaic Acrylic polyurethane 4.0 mil DFT or approved substitute). Consider at all exposed exterior steel conditions.
    L. Whiteboard paint is prohibited.
12. Acoustic Wall Coating 09 83 13 – Discouraged
    A. Acoustic Room Components 09 84 00

(i) Sound-Absorbing Wall Units 09 84 33 Consider use in music rooms, cafeterias, gymnasiums and other acoustically loud areas.
(ii) Consider "Sound Block" to improve acoustics in CMU-constructed rooms.

C2020 Interior Fabrications – No Owner requirements.

C2030 Flooring 09 60 00

1. Flooring Performance Requirements 01 84 19
   A. Slip Resistance 01 84 19 – Ramps, kitchen, and locker room floors shall have non-slip surfaces. Floors around shop machinery shall also slip resistant.
2. Tile Flooring 09 30 00 – Use in wet areas in conjunction with wall tile. Consider in areas where sub-slab moisture readings are high.
   A. Floors: Thin set attachment only: mastic prohibited. Consider at following locations:
      (i) Restrooms
      (ii) Locker and Shower Rooms
      (iii) Kitchen
      (iv) Entryways
3. Masonry Flooring 09 63 00 – Prohibited without Owner approval.
4. Wood Flooring 09 64 00 – Consider at stage floors in High Schools with Owner approval.
5. Resilient Flooring 09 65 00 – Consider at corridors, art rooms, science rooms, cafeterias, technology labs, and near sinks in classrooms.
   A. Resilient VCT – Permitted in select areas with Owner approval.
   B. Resilient BBT – Permitted in select areas with Owner approval.
   C. Resilient Sheet Flooring – Prohibited.
   D. Rubber Floor Tile – Consider at ramps and stair applications.
   E. LVT – Consider at resilient flooring locations with Owner approval.
6. Portland Cement Terrazzo Flooring 09 66 00
   A. Consider at high traffic, corridor or commons areas with Owner approval.
7. Fluid-Applied Flooring 09 67 00
   A. Resinous Flooring 09 67 23 - Epoxy flooring preferred in restrooms, locker rooms, kitchens, and other wet areas. Cove base shall be integral and seamless. Color and flake density to be evaluated on a project basis. Slip resistance as required by code.
8. Carpeting 09 68 00
   A. Carpet Tile 09 68 13 – Consider at high traffic, corridor or commons areas.
      (i) Allowable manufacturers: InterfaceFlor, Tarkett, Mannington, Shaw Contract Group, or BVSD approved equal. Coordinate with Owner for product line and other specific information.
   B. Sheet (roll) Carpeting 09 68 16 – Prohibited.
      (i) Allowable manufacturers: Tandus (Collins and Aikmen), Mannington, Shaw Contract Group, or BVSD approved equal. Coordinate with Owner for product line and other specific information.
9. Athletic Flooring Includes: Flooring for athletic purposes. DIN certification preferred. Wood floor systems restricted to products/systems with at least five years of history in Colorado institutional applications. Moisture testing and recording required prior to installation. Consider FSC wood products. The layout for game lines and gym floor markings will be laid out by the Architect with Owner consultation and approval.
   A. Wood Athletic Flooring 09 64 66 – Preferred gymnasium system – Robbins, Bio-Cushion Classic, Accer, AccerFlex EN, or approved equal: floating system, maple strip over plywood subfloor and resilient pads. No continuous padding allowed. Strips shall be laid parallel to the long dimension of the gym. Allowance is to be made for expansion of the floors. There shall be adequate protection from moisture gain from sub-base. Lines and school logos are to be painted with system compatible with floor finish prior to final coat. Initial finish coats (on raw wood) shall be oil based of low VOC type. Finish must be compatible with water based finish used by district for maintaining floor after installation.
      (i) Elementary School gym floors: consider third grade and better maple and resilient athletic sheet flooring or fluid applied flooring.
      (ii) High School and Middle School gym floors: Consider second and better grade maple. Multi-purpose areas: Consider other listed Athletic flooring below.

B. Resilient Athletic Flooring 09 65 66 – Consider Gerflor, Taraflex Sports Flooring or Owner approved equal, at multi-purpose areas and retrofit projects.
C. Fluid-Applied Athletic Flooring 09 67 66 – Consider Robbins, Pulastic, (modified polyurethane over recycled rubber pad) or Owner approved equal in multi-purpose areas and retrofit projects.

10. Entrance Flooring
    A. Entrance Floor Mats and Frames 12 48 13 –Prohibited without BVSD approval.
    B. Consider Tarkett "Abrasive Action" carpet, Mannington "Liason Collection" carpet entryway system or approved equal.

C2040 Stair and Ramp Finishes

1. Resilient Stair Finish 09 65 00 – Consider rubber treads, stringers and risers or other Owner approved non-slip materials for ramps and stairs.
2. Terrazzo Stair Finish 09 66 00 – allowed only with abrasive tread inserts.

C2050 Ceiling Finishes 09 50 0000

1. Plaster and Gypsum Board Finish 09 20 00 – Consider in wet locations and for restricting access above ceilings in locker and restrooms.
2. Ceiling Painting and Coating 09 90 – Kitchens, restrooms, locker rooms and other wet areas shall be finished with epoxy paint, or other approved, maintainable, non-porous finishes.
3. Acoustical Ceiling Treatment
    A. Acoustical Metal Decking 05 34 00 – Consider at all Gymnasiums, and other exposed open structure spaces to assist in sound control.
    B. Acoustic Ceiling Coating 09 83 16 – Discouraged, use only with Owner approval.
    C. Acoustic Room Components 09 84 00- Consider at Auditoriums, vocal and instrumental music areas to acoustically tune space.
        (i) Sound-Absorbing Ceiling Units 09 84 36: No Owner requirements
        (ii) Sound-Reflective Ceiling Units 09 84 39: No Owner requirements

## ELEMENT D: SERVICES

### D10 CONVEYING

D1010 Vertical Conveying Systems

1. Elevators
   - A. Elevator Performance Requirements 01 85 00
     - (i) Two-year warranty required by manufacturer.
     - (ii) Consider a bid alternate for a two-year extended warranty.
     - (iii) Stipulate no use during construction in specifications
     - (iv) Provide all special programming required including any required for proprietary controls.
     - (v) Use only biodegradable hydraulic fluid.
     - (vi) Acceptable manufacturers are ThyssenKrupp, Kone, Otis and Schindler
   - B. Cab Capacity 01 85 00
     - (i) 5'-8" by 4'-3" and ADA compliant as a minimum.
     - (ii) Consider the next size larger for the fire department gurney if any floor access is limited for emergencies.
   - C. Car Load Capacity 01 85 00
     - (i) 2000 lb. minimum
   - D. Car Speed 01 85 00
     - (i) 150 fpm minimum
   - E. Electric Traction Freight Elevators 14 21 13 – Prohibited
   - F. Hydraulic Freight Elevators 14 24 13 – Preferred
   - G. Electric Traction Passenger Elevators 14 21 23 – Prohibited
   - H. Hydraulic Passenger Elevators 14 24 23 – Preferred
   - I. Machine Roomless (MRL) Elevators Shall be avoided (unless approved by Owner)
   - J. Elevator Equipment and Controls 14 28 00
     - (i) Include car lighting
     - (ii) Consider including car position indicator on control station
     - (iii) Consider including the direction of travel indicator on the control station.
     - (iv) Car interior panels to be plastic laminate. Provide protection during any transport or moving activity.
     - (v) Consider a handrail at the back of the car.
     - (vi) Include emergency power backup for return to Level 1 and open door if power outage.
     - (vii) Include emergency lights and alarm system.
     - (viii) Include light, receptacle and ladder in elevator pit.
     - (ix) Include an emergency phone with 2 data cables.
     - (x) Provide key switch operation
     - (xi) Provide hydraulic silencers if adjacent to classroom(s).
     - (xii) Provide an overheating alarm in the elevator room with automatic shut down.
   - K. Additional Requirements: Provide blanket hooks and 1 complete set of full height protective blankets.
2. Lifts: No Owner requirements.
3. Escalators: Prohibited
4. Dumbwaiters: Prohibited
5. Moving Ramps: Prohibited

D1020 Horizontal Conveying: Prohibited

### D20 PLUMBING

D2010 Domestic Water Distribution 22 11 00

1. Plumbing Fixture Water Consumption 01 86 16
   - A. Water Closet – 1.28 GPF maximum.
   - B. Urinal – 0.125 GPF maximum.
   - C. Lavatory – 0.5 GPM maximum.
   - D. Shower – 2.0 GPM maximum.
2. Domestic Water Equipment

A. Domestic Water Pumps 22 11 23 – bronze or stainless steel construction. Cartridge style pumps preferred. Taco, Grundfos, or Armstrong, no substitutions

3. Domestic Water Heaters Includes electric and fuel-fired equipment.
   A. Electric Domestic Water Heaters 22 33 00 – generally avoid, except for point of use and with district written approval.
   B. Fuel-Fired Domestic Water Heaters 22 34 00 – gas fired, Lochinvar, PVI, Bradford White, or approved equal.
4. Domestic Water Heat Exchangers 22 35 00 – double wall heat exchanger required for isolation of potable water from heating water.
5. Domestic Water Piping 22 11 – lead free solder required.
   A. Domestic Water Piping Specialties 22 11 19 – lead free valves and fittings required.
   B. Propress style fittings and valves acceptable.
6. Plumbing Fixtures 22 40 00
   A. Commercial Plumbing Fixtures 22 42 00
      (i) Commercial Water Closets 22 42 13;
         a. Elongated vitreous china bowl with top spud connection for exposed flush valve required.
         b. Tank-type water closets prohibited unless approved by BVSD Maintenance. If tank-type water closet is approved, tank lid shall be secured by tamper-proof system.
      (ii) Commercial Urinals 22 42 13; , Removable stainless steel drain screens required.
      (iii) Commercial Lavatories 22 42 16; Stainless steel in high abuse areas with BVSD permission; vitreous china preferred.
      (iv) Commercial Sinks 22 42 16; Stainless steel 18ga preferred with sound deadening or as approved by District
      (v) Commercial Showers 22 42 23; prefer masonry shower enclosures with ceramic tile
      (vi) Commercial Disposers 22 42 26; Insinkerator preferred or as approved by District
      (vii) Shampoo Bowls 22 42 29; no requirements
      (viii) Wash Fountains 22 42 33; Bradley stainless steel with sensors or as approved by District
      (ix) Service Sink; fiberglass prohibited. Terrazzo floor receptor, 24x24" minimum preferred.
   B. Commercial Plumbing Fixture Trim 22 42 39
      (i) Manual Lavatory Faucet – Chicago Faucet 802-VCP or Zurn equivalent--confirm with BVSD Maintenance
      (ii) Automatic Lavatory Faucet – Sloan BASYS Mid Faucets EXF-275.500
      (iii) Service Sink – wall mount – Chicago Faucet 305-VBRRCF
      (iv) Kitchen Sink – wall mount – Chicago Faucet 445-L12CP
      (v) Kitchen Sink – deck mount – Chicago Faucet 1100-CP
      (vi) Kitchen – Pre-rinse fittings – Chicago Faucet 919-LCP
      (vii) Science Sink – deck mount – Chicago Faucet 930-369CP
      (viii) Freezeless Wall Hydrant – Woodford B67
      (ix) Toilet seats – Beneke, Bemis Olsonite or approved. Solid plastic, white only. Stainless bolts required.
      (x) Flush valves 22 42 43; Confirm with BVSD Maintenance for preference below
         a. Manual – Sloan or Zurn exposed diaphragm style, no substitutions
         b. Retrofit or Automatic Side-mounted sensor automatic flush handle with diaphragm style flush valve – Battery operated Sloan OPTIMA EBV-89-A or Zurn EZ flush, no substitutions
         c. No AC connection
7. Emergency Plumbing Fixtures 22 45 00; tempered water required.
   A. Emergency Showers 22 45 13 – provide a floor drain.
   B. Eyewash Equipment 22 45 16 – provide with a dedicated drain.
   C. Eye/Face Wash Equipment 22 45 26 – locate over sink in science room.
   D. Hand-Held Emergency Drench Hoses 22 45 29 – locate over sink in science room.
   E. Combination Emergency Fixture Units 22 45 33 – provide with floor drain. Prefer Bradley S19-315BF Barrier free recessed drench shower and eye wash.
8. Drinking Fountains and Water Coolers 22 47 00

A. Drinking Fountains 22 47 13 – prefer water coolers over fountains.
B. Water Coolers 22 47 23 – prefer coolers with bottle fillers. Elkay basis of design, Murdock is an acceptable substitutions.
C. Water coolers/bottle fillers – Elkay EZH2O or Murdock equivalent.
D. Vandal-resistant bubbler required; plastic prohibited.

9. Domestic Water Distribution Supplementary Components
   A. Mechanical Metal Supports 05 45 13 – generally provide unistrut supports.
   B. Common Work Results for Plumbing 22 05 00 – only lead free fittings are acceptable.
   C. Meters and Gages 22 05 19 – only lead free meters and gauges are acceptable.
   D. Valves 22 05 23 – only lead free valves are acceptable. Ball valves required. Gate valves prohibited up to 2".
   E. Hangers and Supports 22 05 29 – hangers and supports to be sized to accommodate pipe insulation.
   F. Heat Tracing 22 05 33 – Avoid if possible.
   G. Vibration Controls 22 05 48 – piping shall be supported to prevent water hammer. Shock arrestors shall be installed at all locations which have a quick closing valve.
   H. Identification 22 05 53 – comply with ANSI A13.1
   I. Insulation 22 07 00 – comply with energy code requirements.
   J. Instrumentation and Controls 22 09 00 – provide gauges with isolation valves for monitoring system operation.
   K. Backflow preventer – for hydronic systems – Watts 009. Must be readily accessible, Ceiling installations prohibited.

D2020 Sanitary Drainage

1. Sanitary Sewage Equipment
   A. Sanitary Waste Interceptors 22 13 23 – provide solids interceptors where required by code. Must be maintainable without removal from the cabinet.
   B. Sanitary Waste Separators 22 13 26 – provide grease interceptors for kitchen waste.
   C. Sanitary Sewage Pumps 22 13 29 – Avoid if possible. Sewage pumps shall be alarmed and be on emergency power. Prefer duplex pumps for reliability. Provide grinder pumps to prevent clogging. Sanitary sewage pump systems shall be installed with a rail system for easy removal and maintenance.
2. Sanitary Sewage Piping
   A. Sanitary Sewers 22 13 13 – when work is in public highway or street, paving repairs shall comply with municipal agency requirements.
   B. Grease Removal Devices 22 13 19.26 – Must be accessible for cleaning. 36" lid minimum. Locate grease traps outdoors.
   C. Backwater Valves 22 13 19.33 – no Owner requirements.
   D. Air-Admittance Valves 22 13 19.36 – Avoid if at all possible. Must have written permission of BVSD. Must be accessible for servicing.
   E. Sanitary Drainage Manholes 22 05 73 – Must be accessible for sewer cleaning.
   F. Sanitary Drainage Piping Cleanouts 22 05 76 – Must be accessible for sewer cleaning. 75' spacing maximum within the building.
   G. Main exterior cleanouts must be two-way.
   H. Acid Resistant Piping – Prefer PVDF piping from sinks to dilution/neutralization basin.
   I. Where trap primers are required, trap primer valves are preferred. The use of Shurseal or Trap Guard inserts are acceptable with approval from BVSD Maintenance.
3. Sanitary Drainage Supplementary Components
   A. Mechanical Metal Supports 05 45 13 – use unistrut supports generally.
   B. Common Work Results for Plumbing 22 05 00 – no Owner requirements.
   C. Expansion Fittings and Loops 22 05 16 – no Owner requirements.
   D. Hangers and Supports 22 05 29 – no Owner requirements.
   E. Vibration Controls 22 05 48 – no Owner requirements.
   F. Identification 22 05 53 – comply with ANSI A13.1
   G. Insulation 22 07 00 – no Owner requirements.
   H. Instrumentation and Controls 22 09 00 – no Owner requirements.
   I. Acid Neutralization Basins – provide for high school and middle school labs

J. Solids Interceptors (clay traps)– provide for art classrooms, must be accessible without removing from the cabinet.

D2030 Building Support Plumbing Systems

1. Stormwater Drainage Equipment
   A. Stormwater Drainage Pumps 22 14 33 – stormwater pumps shall be alarmed and be on emergency power. Prefer duplex pumps for reliability
   B. Stormwater Drainage Sump Pumps 22 14 29 – stormwater pumps shall be alarmed and be on emergency power. Prefer duplex pumps for reliability.
2. Stormwater Drainage Piping 22 14
   A. Rainwater Leaders 22 14 16 – no Owner requirements.
   B. Stormwater Drainage Piping Specialties 22 14 23 – no Owner requirements.
   C. Stormwater Drainage Manholes 22 05 73 – Must be accessible for storm drain cleaning.
   D. Stormwater Drainage Piping Cleanouts 22 05 76 – Must be accessible for drain cleaning.
3. Facility Stormwater Drains 22 14 26
   A. Area Drains 22 14 26.13 – no Owner requirements.
   B. Roof Drains 22 14 26.16 – require cast iron domes for durability.
   C. Trench Drains 22 14 26.19 – no Owner requirements.
4. Building Support Plumbing System Supplementary Components
   A. Mechanical Metal Supports 05 45 13 –unistrut supports preferred.
   B. Common Work Results for Plumbing 22 05 00 – no Owner requirements.
   C. Expansion Fittings and Loops 22 05 16 – no Owner requirements.
   D. Meters and Gages 22 05 19 – no Owner requirements.
   E. Valves 22 05 23 – no Owner requirements.
   F. Hangers and Supports 22 05 29 – size hanger and supports to accommodate pipe insulation.
   G. Heat Tracing 22 05 33 – Discouraged. Limit heat tracing to exterior exposed downspouts likely to freeze.
   H. Vibration Controls 22 05 48 – no Owner requirements.
   I. Identification 22 05 53 – comply with ANSI A13.1
   J. Insulation 22 07 00 – provide insulation to prevent condensation.
   K. Instrumentation and Controls 22 09 00 – no Owner requirements.
   L. Natural Gas Piping – Verify with Xcel Energy the gas pressure available on-site. All exterior gas piping shall be painted with exterior-grade rust inhibiting paint.
   M. Emergency Natural Gas Shut-off – provide in kitchens, science labs and all areas where students may be present or required by code.

D2040 General Service Compressed-Air 22 15 00

1. General Service Compressed-Air Piping 22 15 13 – no Owner requirements.
2. General Service Compressed-Air Valves 22 15 16 – no Owner requirements.

D2050 Process Support Plumbing System Supplementary components

1. Mechanical Metal Supports 05 45 13 – use unistrut supports generally.
2. Common Work Results for Plumbing 22 05 00 – no Owner requirements.
   A. Valves 22 05 23 – ball valves required. Gate valves prohibited.
   B. Hangers and Supports 22 05 29 – no Owner requirements.
   C. Vibration Controls 22 05 48 – no Owner requirements.
   D. Identification 22 05 53 – comply with ANSI A13.1
3. Insulation 22 07 00 – no Owner requirements.
4. Instrumentation and Controls 22 09 00 – provide gauges with isolation valves for monitoring system operation.

## D30 HEATING, VENTILATION, AND AIR CONDITIONING

HVAC Performance Requirements 01 86 19

## D40 FIRE PROTECTION

D4010 Water-Based Fire Suppression

1. Fire Pumps 21 30 00 – no Owner requirements.
2. Fire-Suppression Piping 21 11 00 – no Owner requirements.

3. Fire-Suppression Standpipes 21 12 00 – no Owner requirements.
4. Fire-Suppression Sprinkler Systems 21 13 00 – no Owner requirements.
5. Fire Extinguishing
    A. Wet-Chemical Fire-Extinguishing Systems 21 23 00 – no Owner requirements.
    B. Dry-Chemical Fire-Extinguishing Systems 21 24 00 – no Owner requirements.
6. Fire Suppression Supplementary Components
    A. Mechanical Metal Supports 05 45 13 – use unistrut supports generally.
    B. Common Work Results for Fire Suppression 21 05 00 – no Owner requirements.
    C. Expansion Fittings and Loops 21 05 16 – no Owner requirements.
    D. Meters and Gages 21 05 19 – provide meters and gauges for system monitoring.
    E. General-Duty Valves 21 05 23 – provide valves requires for system service isolation.
    F. Hangers and Supports 21 05 29 – no Owner requirements.
    G. Heat Tracing 21 05 33 – no Owner requirements.
    H. Vibration Controls 21 05 48 – no Owner requirements.
    I. Identification 21 05 53 – comply with ANSI A13.1
    J. Insulation 21 07 00 – no Owner requirements.
    K. Instrumentation and Control 21 09 00 – no Owner requirements.
    L. Backflow devices: locate 48" above finished floor maximum.

D4020 Fire Protection Specialties

1. Fire Protection Cabinets 10 44 13 – provide cabinet in fire riser room for spare sprinkler heads.
2. Fire Extinguishers 10 44 16 – provide dry chemical ABC extinguishers.
3. Fire Extinguisher Accessories 10 44 43
    A. Lockable fire extinguisher cabinets
    B. Recessed or semi-recessed cabinets preferred
    C. Review cabinet type and location with Project Manager

## D50 ELECTRICAL

D5010 Facility Power Generation Performance Requirements

1. Voltage 01 86 26 – generally 208 or 480v 3-phase.
2. Power Output Ratings 01 86 26 – no Owner requirements.
3. Packaged Generator Assemblies 26 32 00
    A. Engine Generators 26 32 13 – must be natural gas-fueled: Cummings, Generac or as approved by District. Include 5-year warranty on packaged generators.
    B. Generators shall power
        (i) IT functions
            a. Rack power to MDF & IDF's - see D6030.2.A for details
            b. Intercom Systems - Consult with BVSD Project Manager.
            c. For new buildings that require a radio repeater, locate repeater equipment in either the MDF or the IDF and connect to the generator. Contact BVSD for space requirements.
        (ii) Life Safety
            a. EM lighting
            b. Fire alarm
            c. Door / Badge Access
            d. Paging System
            e. Lockdown Interface; see **Fire Detection and Alarm**
            f. Sewage pumps
        (iii) Optional Standby Loads - Consult with BVSD Project Manager.
4. Photovoltaic Collectors 26 31 00 – see also **design requirements**.
5. Power Filtering and Conditioning 26 35 00 – no Owner requirements.
6. Transfer Switches 26 36 00
    A. Generally same manufacturer as generator.
    B. IT and Life Safety shall have separate transfer switches.
7. Facility Power Generation Supplementary Components: Per NFPA 70
    A. Electrical Metal Supports 05 45 16 – use unistrut supports generally.
    B. Common Work Results for Electrical 26 05 00 – no Owner requirements.
    C. Grounding and Bonding 26 05 26 – no Owner requirements.

D. Hangers and Supports 26 05 29 – no Owner requirements.
E. Raceways and Boxes 26 05 33 – no Owner requirements.
F. Vibration Controls 26 05 48 – no Owner requirements.
G. Identification 26 05 53 – comply with ANSI A13.1
H. Wiring Connectors 26 05 83 – no Owner requirements.
I. Instrumentation and Control 26 09 00 – no Owner requirements.

D5020 Electrical Service and Distribution

1. Electrical Service 26 21 00
   A. **Xcel Energy Capacity Check**
      (i) When electric loads are determined--usually no later than Design Development--the design team shall verify with PM that a capacity check to Xcel Energy has been submitted to confirm transformer capacity requirements.
   B. Electric meter should not be remote from the building; rather, it should be mounted to the building to facilitate connection to Owner's real-time metering dashboard.
   C. Transformers 26 12 00 – no Owner requirements.
   D. Switchgear and Switchboards 26 13 00 – Siemens, Square D, Eaton preferred or as approved by District. Provide capability to monitor status of main gear. Provide space for future Solar PV gear/inverters within the layout of the electric room.
   E. Protection Devices 26 18 00 – Siemens, Square D, Eaton preferred or as approved by District. Bolt-on devices required.
2. Electricity Metering
   A. Confirm with BVSD Office of Sustainability and Energy. Verify with Owner if new builds require whole building data monitor.
   B. Electric Submetering
      (i) eGauge (preferred)
      Provide eGauge Core digital electronic electrical meters with properly sized CT's to measure all current carrying phases. Meters shall report voltage, kva, kw, kvar, and amps to the internet via Ethernet connection. Energy meter CT's shall be installed in the main switchgear [and each panel to measure lighting, hvac, plug loads, etc.**].
      (ii) Provide (1) ethernet data drop at the location of the eGauge data logger in the main electrical room. Contractor shall install a 3-phase circuit breaker to which the eGauge meter voltage wires shall be connected. Label the eGauge enclosure with a permanent engraved nameplate "ENERGY METERING".
      (iii) The parts that are needed for each school, assuming 3 phase 3-wire systems:
      (1) eGauge core
      (2) Rogowski Coil CTs: RCT - 106mm 2775A (confirm size for system)
      (3) Hinged Enclosure: INT10x8x4
3. Power Distribution 26 20 00 – Siemens, Square D, Eaton preferred or as approved by District.
4. Switchboards and Panelboards 26 24 00 – Siemens, Square D, Eaton or as approved by District.
5. Distribution Equipment 26 27 00 – no Owner requirements.
   A. Electrical Cabinets and Enclosures 26 27 16 – NFPA 70
6. Electrical Wiring System: Per NFPA 70
   A. Raceways and Enclosures 26 05 33 – no Owner requirements.
   B. Ducts 26 05 43 – no Owner requirements.
   C. Wiring 26 05 13 – no Owner requirements.
   D. Magnetic Door Holders - In the event the FACP does not have fire magnetic door holders then the electrical contractor shall install 120VAC magnetic door holders LCN Sentronics Electro Magnet 7830SEM 120V AC / 24 AC/DC 12V DC ALUM Finish or BVSD approved equivalent. Relay controlling 120VAC mag hold shall be installed by D50 contractor (coordinate relay type and location with security contractor). Security contractor shall control relay by a 24 volt DC N/C relay interface for lockdown purposes as directed by BVSD security. This will also apply to additional doors not mandated by the state as fire rated doors but necessary for BVSD standard lockdown features. Electrical Contactor shall consult and coordinate with Division 28 Security and Fire contractors for any and all needs concerning lockdown features on all fire and non-fire doors. See also **Fire Detection and Alarm**.
7. Facility Grounding 26 05 26: Per NFPA 70.

A. Raceways 26 05 33 – no Owner requirements.
B. Wiring 26 05 13 – no Owner requirements.

8. Electrical Service and Distribution Supplementary Components: Per NFPA 70
   A. Electrical Metal Supports 05 45 16 – no Owner requirements.
   B. Common Work Results for Electrical 26 05 00 – no Owner requirements.
   C. Grounding and Bonding 26 05 26 – no Owner requirements.
   D. Hangers and Supports 26 05 29 – no Owner requirements.
   E. Raceways and Boxes 26 05 33 – No adhesive wiremold.
   F. Vibration Controls 26 05 48 – transformers shall be provided with vibration isolation.
   G. Identification 26 05 53 – comply with ANSI A13.1
   H. Wiring Connectors 26 05 83 – no Owner requirements.
   I. Instrumentation and Control 26 09 00 – no Owner requirements.

D5030 General Purpose Electrical Power

1. Branch Wiring System
   A. Raceways and Enclosures 26 05 33 – no Owner requirements.
   B. Engineer to confirm if 10ga wire required for voltage drop
   C. Ducts 26 05 43 – no Owner requirements.
   D. "Box walks" with GC and BVSD Maintenance are required before walls covered by drywall.
2. Wiring Devices 26 27 26 – GFI's shall not be installed behind kitchen equipment, use remotes.
3. General Purpose Electrical Power Supplementary Components
   A. Electrical Metal Supports 05 45 16 – no Owner requirements.
   B. Common Work Results for Electrical 26 05 00 – no Owner requirements.
   C. Grounding and Bonding 26 05 26 – no Owner requirements.
   D. Hangers and Supports 26 05 29 – no Owner requirements.
   E. Raceways and Boxes 26 05 33 – no Owner requirements.
   F. Vibration Controls 26 05 48 – no Owner requirements.
   G. Identification 26 05 53 – comply with ANSI A13.1. and NFPA 70
   H. Wiring Connectors 26 05 83 – Wire nuts preferred over stab-on connectors
   I. Instrumentation and Control 26 09 00 – no Owner requirements.
   J. Variable Frequency Drives –Manufacturers – Siemens, ABB, or as approved by District
   K. Motor Starters –Manufacturers – Allen Bradley, Cutler Hammer, Square D or as approved by District

D5040 Lighting

1. Lighting Performance Requirements 01 86 26
   A. Lighting Levels for Various Areas of Facility - where not dictated by building codes, refer to the following:
      (i) Administrative Offices – 50 fc
      (ii) Auditorium – 10 fc
      (iii) Restrooms – 15 fc
      (iv) Cafeteria – 30 fc
      (v) Kitchen – 50 fc
      (vi) Classrooms – 35 fc
      (vii) Computer labs – 30 fc
      (viii) Gymnasium – 30 fc , High School competitive – 75 fc
      (ix) Corridors – 30 fc
      (x) Media center – stacks – 30 fc, reading area – 40 fc
      (xi) Locker rooms – 10 fc
      (xii) Exterior Areas
         a. Pedestrian areas – 5 fc
         b. Surrounding building areas – 1 fc
         c. Parking areas – 1 to 3 fc generally
         d. Roadways – 2 fc
         e. High School football – competitive – 50 fc
         f. High School tennis – competitive – 60 fc
2. Lighting Control 26 09 23
   A. Lighting Control Devices 26 09 23

(i) Classrooms, Conference Rooms, Multi-use rooms: Provide Room Controllers with 24 volt output to power ceiling-mounted dual technology vacancy sensors; 0-10V dimming; emergency lighting relay; aux relay output for mechanical system control use, and wall mounted keypads - Provide zoned lighting and daylight sensors (where required).
a. Room controllers / dimming & switching modules / power pack lighting relays – Shall be installed in a readily accessible location close to the main entrance into the room. When installed above a grid ceiling, the mounting location shall be identified with a label on the T-grid that is visible from below the ceiling.
(ii) Gang toilets, Locker Rooms, and similar areas shall be controlled from ceiling-mounted, dual technology occupancy sensors; Kitchens shall be controlled from ceiling-mounted dual technology vacancy sensors. Provide emergency lighting relay and auxiliary relay output for mechanical system control use.
(iii) Single use toilets, storage rooms, electrical rooms, small mechanical rooms, and custodial rooms: Lighting shall be controlled by wall mounted dual technology vacancy sensors with integral manual control switches.
(iv) Corridor and common area lighting shall be controlled by occupancy sensors

B. Lighting Control Panels 26 09 26 – Lutron Vive (preferred), Watt Stopper, or as approved by District. Systems that require PC software to connect to the control panel for troubleshooting and/or programming are prohibited. Web-based systems are acceptable.
C. Central Dimming Control 26 09 33 – Discouraged.
D. Network Lighting Control 26 09 43 – Discouraged.
E. Theatrical Lighting Control 26 09 61 – ETC control boards or as approved by District.
F. Exterior Lighting Control 26 56 00
(i) Exterior building-mounted lights, parking lot lights, and other site lighting shall turn off at night via time clock 30 minutes after the last custodian exits the building. Lighting shall turn on via time clock 30 minutes before the first staff member arrives in the morning. A photocell shall prevent lighting from turning on in the morning in the event daylight is present. Consultant shall establish building staff arrival/departure times with the help of BVSD Project Manager. 5am off to 15mins after sunrise.
(ii) Photocell shall be roof-mounted

3. Branch Wiring for Lighting
A. Raceways and Enclosures 26 05 33 – no Owner requirements.
B. Ducts 26 05 43 – no Owner requirements.
C. Wiring 26 05 19 – no Owner requirements.
D. Wiring Devices 26 27 26 – no Owner requirements.

4. Lighting Fixtures 26 50
A. Interior Lighting 26 51 00 – prefer LED fixtures. Replaceable LED drivers. Specify fixtures whose replacement parts are readily available. Acuity & Illumination Systems. Project Managers to confirm Owner's stock items.
B. Emergency Lighting 26 52 00 – require LED fixtures. as approved by District
C. Exit Signs 26 53 00 – require LED fixtures, AC only. Battery powered exit signs prohibited. Without emergency lights Lithonia LQM SW 3G 120/277 ELN, with emergency lights Lithonia LHQM LED G HO.
D. Classified Location Lighting 26 54 00 – no Owner requirements.
E. Special Purpose Lighting 26 55 00 – Gym LED with remote drivers required. Coordinate driver location with Maintenance.
F. Security Lighting 26 55 53 – prefer LED fixtures.
G. Theatrical Lighting 26 55 61 – prefer dimmable LED fixtures. Remote drivers for theatrical lighting required. Confirm driver locations with Maintenance.
H. Exterior Lighting 26 56 00
(i) LED preferred
(ii) 80 CRI
(iii) 4100K
(iv) Dimmable from 100 to 10 percent
(v) Internal driver
(vi) 50,000 hours minimum rating
(vii) Dark sky compliant

5. Lighting Supplementary Components
    A. Electrical Metal Supports 05 45 16 – use unistrut supports generally.
    B. Identification 26 05 53 – comply with ANSI A13.1

D5050 Miscellaneous Electrical Systems

1. Lightning Protection
    A. Lightning Protection for Structures 26 41 13 – no Owner requirements.
    B. Lightning Protection and Dissipation 26 41 16 – no Owner requirements.
    C. Lightning Protection Surge Arresters and Suppressors – no Owner requirements.
    D. Lightning Protection Performance Requirements – no Owner requirements.
2. Transient Voltage Suppression 26 43 00 – Built-in at Main Distribution level.
3. Miscellaneous Electrical Systems Supplementary Components
    A. Common Work Results for Electrical 26 05 00 – no Owner requirements.
    B. Grounding and Bonding 26 05 26 – no Owner requirements.
    C. Hangers and Supports 26 05 29 – no Owner requirements.
    D. Raceways and Boxes 26 05 33 – no Owner requirements.
    E. Vibration Controls 26 05 48 – no Owner requirements.
    F. Identification 26 05 53 – comply with ANSI A13.1
    G. Wiring Connectors 26 05 83 – no Owner requirements.
    H. Instrumentation and Control 26 09 00 – no Owner requirements.
4. Existing equipment
    A. Contact BVSD for the disposition of removed existing items.
    B. Removed equipment that is to be reused shall be cleaned and serviced before being reinstalled.
5. Owner's Stock
    A. Fuses: 10% of each type of fuse installed or a minimum of 3 of each type, whichever is greater.
    B. LED drivers: 10% or a minimum of 3 of each type, whichever is greater.
    C. Power packs: 10% or a minimum of 1 of each type, whichever is greater.
    D. Light sensors: 10% or a minimum of 1 of each type, whichever is greater.
    E. Lamps: 10% or a minimum of 1 of each type, whichever is greater.
    F. Luminaires: 1 of each type.
    G. Wall station switches / dual tech switches: 10% or a minimum of 3 of each type, whichever is greater.
    H. Owner's Stock delivery must be counted, approved and coordinated with BVSD electricians.

## D60 COMMUNICATIONS

D6010 Common Work Results for Communications 27 05 00

1. Pathways for Communications Systems 27 05 28, 27 05 33, 27 05 36
    A. Data cables shall be suspended above the ceiling and comply with TIA/IEEE and TIA/EIA 569 standards.
    B. All cables shall be in cable trays or conduit, particularly in hallways and main spaces. Any deviation needs prior BVSD IT approval.
    C. Cable trays in hallways and main spaces shall have room for 25% future expansion.
    D. Conduit pathways from hallways to rooms shall allow for 25% future expansion.
    E. All cable trays and conduit pathways shall be grounded to comply with NFPA 70 standards.
    F. Cable trays or conduit should be used whenever possible, but J hooks/hangers/supports are acceptable with BVSD IT approval. They shall have room for 25% future expansion. See section below for details.
    G. All old Cat3 cable shall be removed from sites where cable is being replaced, coordinated with BVSD IT personnel on what can be removed.
2. Hangers and Supports for Communications Systems 27 05 29
    A. All cable installations which are not supported by a cable tray or conduit system shall comply with TIA/IEEE and TIA/EIA 569 standards.
    B. J hooks or CommScope approved hangers are acceptable with BVSD IT approval. Hooks/hangers should be used in classrooms and other spaces where cable trays or conduit are not feasible. This shall be coordinated with MEP during all phases of construction.

C. Accessible ceiling areas must have adequate and suitable space available for the distribution layout with a minimum of 3" clear vertical space between ceiling tiles and wiring and pathway. The cable shall not be laid directly on the ceiling tiles or rail.
D. Inaccessible ceiling areas, such as lock-in ceiling tiles, drywall or plaster, shall not be used as distribution pathways.
E. Cable support shall be provided through the use of open-top cable supports located on 48"-60" centers. Where large quantities of cables (50-75) are bunched together in the ceiling at a congested area, the contractor shall use multiple open-top cable supports or a special support designed to carry the additional weight and comply with ANSI/TIA standards for fill rates.
F. Wiring Harnesses
    (i) All wires and cables used in assembling custom panels and equipment racks shall be formed into harnesses, tied with Velcro tie wraps, and supported in accordance with accepted engineering practice.
    (ii) Harnessed cables shall be combed straight.
    (iii) Each cable that breaks out from a harness for termination shall be provided with ample service loop. Cable length shall not exceed maximum cable length of 328' so it shall pass certification tests.
    (iv) Harnessed cables shall be formed in either a vertical or horizontal relationship to equipment, controls, components, or terminations.

3. Identification for Communications Systems 27 05 53
    A. General Labelling Requirements
        (i) All rack-mounted and wall-mounted equipment shall be clearly and permanently labeled in a manner approved by Owner.
        (ii) All cables, patch panels, jacks, ports, and biscuits shall be clearly and permanently labeled in a manner approved by Owner. See section below for details.
        (iii) In addition to the wall port and patch panel labeling, all cable/fiber terminations shall be clearly and permanently labeled with appropriate cable number within 12"-18" from each end of the cable.
    B. Cable Labelling Standards
        (i) Labels for Cables in the Field - Network Ports, Data Cables, and/or Biscuits
            a. Place labels:
                i. Above or below port on faceplate in rooms
                ii. On cable by RJ45 jack for ceiling cables
                iii. On RJ45 biscuit for other connections
            b. Use XAB naming convention, where X = Closet, A = Panel, B = Port
                i. Example: AA20 = Closet A, Panel A, Port 20
                ii. For closets, use A for MDF, B for 1st IDF, C for 2nd IDF, etc. Coordinate with BVSD IT personnel to identify MDF/IDF room numbers and letter designations.
                iii. Port numbers shall match exactly at both ends of all copper cables.
        (ii) Labels for Patch Panels in Closets
            a. All labels shall be uniform in size using the same font size with block style letters and numbers and printed with a P-Touch labeller or similar device.
            b. Place labels above ports.
            c. Use room number only, except add a lowercase letter before room number for the following labels:
                i. For WIRELESS, add a “w"
                ii. For INTERCOM, add an “i"
                iii. For SECURITY CAMERA, add a “c"
            d. Examples:
                i. 303 = Room
                ii. w303 = WIRELESS
                iii. i303 = INTERCOM
                iv. c303 = SECURITY CAMERA
        (iii) Labels for Backbone Distribution Patch Panels and Cables
            a. Label all copper and fiber feeder cables between closets on both ends of cables and patch panels: “Feeder Cable to X", where X =

i. MDF-A
ii. IDF-B, IDF-C, etc.
iii. Demarc

D6020 Commissioning of Communications 27 08 00

1. Every system and component as specified herein shall be tested and verified for correct installation and operation.
2. Copper Cable Tests for Cat6A, Cat6, and Cat5e
   A. Upon substantial completion of work, the contractor shall:
      (i) Perform cable tests that comply with TIA/EIA standards.
      (ii) Provide test results to BVSD IT personnel and Project Manager.
3. Fiber Cable Tests for Multi-mode and Single-mode
   A. Upon substantial completion of work, the contractor shall:
      (i) Perform power meter tests from point to point that comply with TIA/EIA standards.
      (ii) Provide test results to BVSD IT personnel and Project Manager.

D6030 Communications Equipment Rooms 27 11 00

1. MDF (Main Distribution Frame) and IDF (Intermediate Distribution Frame) Architectural Requirements
   A. Network closets shall be a minimum size of 10'x12' for Elementary schools, 12'x12' for Middle schools, and 12'x15' for High schools with an open ceiling with minimum height of 10'.
   B. All walls shall be lined with rigidly-installed, wall-to-wall ¾" plywood – trade size, AC grade, 8' high, fire-rated, and NOT painted.
   C. The door shall be 7' high by 3' wide, lockable, and open outward. Doors and frames shall be designed and piped for door alarms, electric locksets, and access control system readers. NO windows, door sills, or center posts are allowed.
   D. Floors shall be exposed, sealed concrete (preferred) or tile. NO carpeting is allowed.
   E. NO wet utilities (ex. water, glycol, drains, etc.) shall pass through the MDF or IDF, except for building sprinkler system heads required to be in the space by law. Each room shall be designed and located to minimize the potential for water entry.
   F. Each room shall not be shared with or used for any function other than legitimate communication systems. Other systems such as Intercom, Security, Fire, and HVAC shall be coordinated with BVSD IT personnel prior to any installation to determine their location within the space.
   G. In MDF in a new building or completely relocated closet, two 4-inch pipes shall be run from MDF outside to closest Telco location near property with pull strings, based on CenturyLink's requirements, plus two 2-inch pipes, one for BVSD WAN and Comcast. Coordinate all pipe installs with BVSD IT personnel for exact location on site.
   H. IDF's shall be created if horizontal data cable lengths exceed 300' from MDF.
2. MDF and IDF Electrical and Environmental Requirements 27 11 26
   A. Rack-mounted power shall be placed above each rack on back of ladder rack with a dedicated 20A circuit, single gang with duplex outlet. Each 20A circuit shall be tied back to the Automatic Transfer Switch (ATS) to connect all network closets to the building generator.
   B. Room power shall be installed with 1 dedicated 20A single gang outlet minimum per wall at standard height.
   C. Grounding bus bars shall be installed, so all racks and cable trays are grounded to comply with BICSI standards.
   D. Lighting intensity shall be at least 50 foot candles at 3' above the floor. Light fixtures shall be chain hung at least 6 inches above the racks on front and back sides. LED lights that are on a motion-activated switch with manual override are preferred.
   E. AC unit shall be installed to keep temperature of the room between 70º F and 76º F. The fan coil unit shall be installed outside the closet. Relative humidity shall be kept between 30% and 55%.
   F. Card access shall be installed on doors and tied into District system. Coordinate with BVSD Security personnel.
3. MDF and IDF Rack Requirements 27 11 16, 27 11 19, 27 11 23
   A. All closets shall have minimum of two standard, floor-mounted, black 19" x 7' CPI network racks as specified below with vertical cable manager on both sides and in between racks. One rack shall remain empty on the top half for fiber and systems equipment. Allocate space

for Security and Intercom equipment in racks or wall-mounted enclosures. Coordinate with BVSD IT personnel to determine exact layout.

B. All racks shall be spaced from front and back walls with a standard minimum of 36" to 48" (preferred) clearance.
C. All racks shall be mounted on concrete floor with four 3/4" bolt down holes and hardware.
D. First rack shall be installed against the wall with vertical cable manager installed between it and the wall.
E. Ladder racks shall be used around the perimeter of the room and above the racks.
F. Vertical cable managers as specified below shall be used on both sides of the racks.
G. Horizontal cable managers as specified below shall be used between patch panels. For example of layout, see **BVSD IT Cable Management Guide**.
H. Data patch panels as specified below shall be used to terminate all Cat6A/6/5e cabling to comply with TIA/EIA-568B standards.
I. BVSD IT shall provide and install all patch cables except for Intercom and Security.
J. Fiber Termination Panels as specified below shall be used to terminate all WAN SC and LAN LC fiber.
K. IT specified equipment shall be used. For a complete list, see **BVSD IT Network Closet and Cabling Specifications**.
L. For example of rack layout, see **BVSD IT Typical Network Closet Layout**.
M. Coordinate with BVSD IT personnel to assist with and approve exact room layout for all network closets.

D6040 Communications Backbone Cabling 27 13 00

1. Communications Copper Backbone Cabling 27 13 13
   A. From Telco Demarc to MDF
      (i) 25 pair plenum rated TIA/EIA-568B Cat5e UTP cable. Demarc termination is 110 punch block, extended to rack and terminated on patch panel.
   B. From MDF to IDF(s)
      (i) 25 pair plenum rated TIA/EIA-568B Cat5e UTP cable, terminated on patch panels at each location.
      (ii) Six (6) 18/4 copper wiring for BVSD Security
2. Communications Optical Fiber Backbone Cabling 27 13 23
   A. All new fiber installs shall be in a Fiber Termination Panel (FTP). If rack mount box cannot be used, as is the case with portables, then a standard wall mount box can be used with BVSD IT approval.
   B. WAN Single-mode Fiber
      (i) WAN single-mode plenum rated armored fiber shall be used.
      (ii) WAN single-mode fiber shall be terminated with SC connectors in a 2U FTP (Fiber Termination Panel). Coordinate with BVSD IT personnel for location on or near property.
   C. LAN Multi-mode Fiber
      (i) LAN multi-mode plenum rated armored fiber shall be used between all MDF and IDF's. Singlemode shall only be used if distance between locations exceeds manufacturer's maximum distance for 10 GB.
      (ii) LAN multi-mode fiber shall be terminated with LC connectors in a 1U FTP (or 2U if needed.)
      (iii) Minimum requirements are for 12 fiber strands at Elementary and Middle schools, and for 24 fiber strands at K-8's and High Schools. Coordinate with BVSD IT personnel to determine quantity of strands required.
   D. IT specified equipment shall be used. For complete list, see **BVSD IT Network Closet and Cabling Specifications**.

D6050 Communications Horizontal Cabling 27 15 00

1. Communications Copper Horizontal Cabling 27 15 13
   A. Existing classrooms shall have minimum per location: 2 data cables for computer/voice, 1 data cable for Audio-Video box, and 2 data cable for TV (if applicable).
   B. New or completely renovated classrooms shall have per location: Data as specified on the **Classroom Wall Detail**.

C. Wireless Access Points (WAPs) shall have 2 Cat6A data cables for each location with length of 280' or less and terminated with an RJ45 biscuit. WAPs shall have a 15'-20' service loop in the ceiling, unless cable is exposed on hard ceiling or maximum cable distance is reached.
D. All cable categories and colors are identified on the **BVSD Cable Standards Guide**, which includes:
(i) Data cable categories and colorsf
(ii) Patch cable categories and colors
(iii) Labels for patch panels and data cables
E. IT specified plenum rated TIA/EIA-568B UTP data cables shall be used. For complete list, see **BVSD IT Network Closet and Cabling Specifications**.
F. Only BVSD approved Certified Uniprise Installers shall be used for the 20-year Extended Product Warranty. For complete list, see **BVSD Approved IT Wiring and Fiber Contractors**
G. Do not exceed 300' for any single cable run.

2. Communications Faceplates and Connectors 27 15 43
A. Standard faceplate/jack termination is 2 data ports with 2 blanks, not to exceed 4 data ports per single gang faceplate without approval from BVSD IT personnel.
B. Faceplates and jacks shall be located at standard electrical height, unless prohibited by location. e.g., offices with built-in desks. Desk height jacks shall be appropriate in these cases only.
C. All data cables shall be terminated with the TIA/EIA-T568B standard.
D. IT specified jacks and faceplates shall be used. For complete list, see **BVSD IT Network Closet and Cabling Specifications**.

D6060 Audio-Video Communications 27 40 00
1. Integrated Audio-Video Systems and Equipment 27 41 16
A. AV Equipment for Classrooms
(i) Standard Projectors and TVs
a. Standard projectors – Epson PowerLite 982W or Epson PowerLite L200SW Short Throw
b. Standard TVs – Samsung 65" or 75" Series 4K Display. Coordinate with Bond Project Manager and BVSD IT personnel for specific model numbers.
(ii) Standard Projector Screens/Brackets, Projector Mounts/Plates, and TV Mounts
a. Standard projector screens – Da-Lite 40197 84" x 84" Model B Screen
b. Standard projector wall brackets – Da-Lite 40932 #6 Brackets
c. Standard projector mounts for ceilings – Peerless Projector Mount PRG-UNV
d. Standard projector plates for ceilings – Peerless Ceiling Plate CMJ500R1
e. Standard projector mounts for walls – Epson Wall Mount V12HA39010
f. Standard TV mounts – Peerless Wall Mounts (model depends on TV size)
(iii) **Audio Enhancement (AE) Classroom Audio System** - Existing Buildings
a. MS-500A Networked Amplifier in 1'x2' AV ceiling box for tile ceilings or in AV Wall Box for open/hard deck ceilings
b. 4 x CS-12 Ceiling Speakers for tile ceilings or 4 x WS-09 Wall Speakers for open/hard deck ceilings
c. Wall Controller with RS232 control
d. HDMI/Audio Input Plate with HDMI, 3.5mm Audio in, and 3.5mm Audio out
e. XD Microphone Receiver
f. XD Lanyard Microphone for teachers
g. XD Handheld Microphone for students
(iv) **Lightspeed (LS) Classroom Audio System** - New Buildings - for system upgrades or full system replacements, consult with Owner.
a. Topcat Base Station for tile ceilings or with added Mounting Bracket for open/hard deck ceilings
b. Media Connector
c. Flexmic for teachers
d. Sharemic for students
(v) Infrastructure Requirements for new or completely renovated classrooms with TVs

a. **Classroom Wall Detail**

B. Gym Sound Systems - Consult with BVSD Project Manager
(i) Built-in preferred over portable systems
(ii) Fire alarm override required
(iii) PA override required
(iv) Design speaker layout based on gym design
(v) On-off amplifiers only
(vi) No programmable amplifiers
(vii) Bluetooth capability
(viii) Lockable cabinets

C. Auditorium Sound Systems - Consult with BVSD Project Manager
(i) Fire alarm override required
(ii) PA override required
(iii) On-off amplifiers only
(iv) No programmable amplifiers
(v) Lockable cabinets

2. Electronic Digital Systems 27 42 00
A. Point of Sale Systems 27 42 13: Coordinate with Project Manager and BVSD Food Service
B. Outdoor Digital Sign Requirements
(i) The approved methods below, in priority order, are for connecting outside digital signs at schools, which includes marquee signs in front of the building and signs mounted to the building exterior.
a. Ethernet fiber connection
b. Ethernet copper connection
c. Cell connection with plan for one-time cost covered by bond if first two options are not feasible – requires sign off by BVSD CIO and Bond Director.
d. Cell connection with a plan for monthly recurring cost covered by school – requires sign off by BVSD CIO, Bond Director, and Principal.
e. Wireless point-to-point bridge connection – requires sign off by BVSD CIO, Bond Director, and Principal.

D6070 Distributed Communications and Monitoring Systems 27 50 00
1. Distributed Audio-Video Communications Systems 27 51 00
A. Paging Systems 27 51 13: at high school level only.
B. Public Address and Mass Notification Systems 27 51 16: integral with fire system
C. Sound Masking Systems 27 51 19: prohibited
D. Intercommunications and Program Systems 27 51 23 - Consult with BVSD Project Manager.
(i) For system upgrades or full system replacements, confirm with Owner.
a. Call buttons required at elementary and middle level
b. Provide 20 minute UPS backup
c. If emergency generator available, connect to emergency circuit
d. Yealink / FluentStream phones; VOIP-compatible.
e. Provide satellite punch-down blocks at intermediate building zone locations. Locate in IT closets.
f. System shall provide a minimum of 60 dB at all areas within 50 feet of outside building, where speakers are tapped at no higher than 7 watts
g. System shall provide a minimum of 60 dB (with no ambient noise) at all areas inside the building, where speakers are tapped at no higher than .625 watts. Confirm with BVSD Maintenance for acceptable tapped wattage for Hallways, gyms, library, and cafeteria, which will be higher.
h. All classrooms, offices, gyms, auditorium, cafes, and libraries shall be home run to the main intercom rack.
i. Bathrooms, locker rooms, corridors and hallways shall be run in series with each other; no T-taps allowed.
j. Any rooms not specified in the above list, shall be verified with BVSD Maintenance for proper wiring prior to install.
k. All Amplifiers shall not exceed 70% capacity.
l. All Zones shall have individual Amplifiers.

m. Ability to selectively communicate to monitor individual classrooms in emergency situations; all communication within the classroom shall be hands free and will not require any interaction by the end-user to answer (Intercom system only Middle and Elementary schools).
n. Two-way communication between any telephone and any room speaker (Intercom system only).
o. Zone Programming design shall be approved by BVSD prior to final acceptance.
p. Pre Recorded messages shall be approved by BVSD prior to final acceptance. Confirm with BVSD Security.
q. Up to sixteen (16) separate paging zones shall be provided; each location shall be programmed in software to belong to any combination of software zones. Zones shall be provided for the following:
    i. All page
    ii. Inside page
    iii. Outside page
    iv. Hallway page
    v. Classroom page
    vi. Offices page
r. The administrative phones shall be located in the office and where indicated on the plans.
s. Confer with Project Manager if the building does not meet these specifications to determine if intercom shall be included in scope.
t. Must connect to building Security systems for emergency and lock-downs.

(ii) Assistive Listening Systems 27 51 26- no Owner requirements.

2. Distributed Systems 27 53 00

A. Clock systems 27 53 13

(i) Manufacturer: Sapling, no substitutions

a. Sapling, Inc., 1633 Republic Road, Huntingdon Valley, PA 19006
Phone: 215.322.6063
Fax: 215.322.8498
Web: www.Sapling-Inc.com

b. Approved Vendors: Equipment manufacturer-certified installers shall be used to complete this work to protect the district's interest and keep the equipment warranty valid. A list of vendors with whom we have had successful experience with in recent projects is available upon request. Installation vendor must be pre-approved by BVSD Maintenance Director.

(ii) The master clock shall have a GPS receiver board and antenna port built into the unit. This hardware and software will allow the master clock to receive UTC data from GPS satellites. Part number is SMA-2RO-1100-1 with 900 MHz Transmitter & GPS, Rack Mount & Wall Mount Antenna. GPS antenna and a 75 foot (22.8 meters) GPS Antenna Cable, standard.

(iii) Transmitter/Transceiver: The Master Clock / Transmitter shall be the Sapling SMA 2000 Transceiver.

(iv) Repeater: The repeater (if needed) shall be a Sapling Wireless Repeater.

(v) Analog Clock: The secondary clock shall be Sapling SAL Series wireless clock.

(vi) AC powered preferred. Consult with Project Manager and Maintenance.

(vii) Installation and startup of all systems shall be under the direct supervision of Sapling/Sapling Rep. PM regularly engaged in installation, repair, and maintenance of such systems. The contractor shall be accredited by the proposed equipment manufacturers.

(viii) Provide up to 2 in-service training visits for school personnel end users in the operation of this system. Operators Manuals and Users Guides shall be provided at the time of this training. BVSD clock technicians shall be factory trained on any new features or software new to the system. Installer shall provide up to 2 visits after final acceptance for onsite adjustments.

## D70 ELECTRONIC SAFETY AND SECURITY

D7010 Access Control and Intrusion Detection: Contact Project Manager to meet with BVSD Director of Security

D7020 Electronic Surveillance 28 20 00: Contact Project Manager to meet with BVSD Director of Security

D7030 Detection and Alarm

1. **Fire Detection and Alarm** 28 31 00
   - A. The FA designer chosen by the Electrical Contractor shall be submitted to the District for approval.
   - B. Digital, Addressable Fire-Alarm Systems 28 31 11
     - (i) Follow current adopted Fire code for the amount of devices required.
   - C. Zoned Fire-Alarm Systems prohibited
   - D. Spark detection: dry systems preferred
2. Fuel-Gas Detection and Alarm 28 33 00- no Owner requirements
3. Refrigeration Detection and Alarm 28 35 00 – coordinate with Project Manager
4. Water Intrusion Detection and Alarm 28 36 00 – no Owner requirements
5. Check with local fire authority for specific code requirements regarding carbon monoxide (CO) detectors or combination carbon monoxide / smoke detectors.

## D80 INTEGRATED AUTOMATION

D8010 Integrated Automation Facility Controls 25 50 00

1. Currently only Boulder/Denver Schneider Electric EcoXpert-certified partners are to be used as the BAS controls contractor and vendor
2. The manufacturer and installer must be highly qualified with extensive experience and must be committed and bound to thorough Commissioning (Cx) as agreed upon per project basis and performed per the Commissioning Facility Standards.
3. Existing Continuum facilities which have not been converted to EcoStruxure shall be converted to EcoStruxure in new project work
4. **See District sequences of operation**, coordination between Tech Spec and District Sequence of operation must be taken into consideration and cross referenced when designing systems
5. EcoStructure graphics shall be formatted as detailed in this document.
6. Design documents should include control drawings, sequences of operation, and point lists at the DD phase of the project. The distributed digital control (DDC) and BAS defined in this specification shall interface with the District private VLAN.
7. Minimum 2-year warranty is required on all BAS controls systems with a min of 1 hour response time to reception of service call and 24 hours for repair. Minimum 1 hour onsite training required for new work
8. BAS failure modes shall be considered and accounted for in design, including critical power for BAS control panels. Examples below but are not limited to
   - A. BAS outputs to hydronic pumps should be landed on the normally closed output of the BAS controllers with software input object "inverted" to indicate normal "On" functions.
     - (i) This is to help insure BVSD with a fail-safe that the plant will call to run when a building loses main power or any communication with controllers.
   - B. Both hot and chilled water valves are to fail open to ensure flow during both loss of actuator power and signal
   - C. Dampers are to fail closed to outdoor spaces
   - D. Fans are to fail to off
9. If scope of work replaces BAS controllers or peripherals, specify that old devices shall be returned to the Owner.
10. Equipment Controllers:
    - A. System shall be controlled with District-wide EcoStruxure multi-purpose, fully Owner programmable control system. Packaged BACnet, LonWorks, Modbus or other similar forms of 3rd party communication protocols controlled equipment are strictly prohibited, no substitutions
    - B. If equipment control systems provide alarming and troubleshooting communications for connection to the BAS it is to be a BACnet IP (not MSTP) interface. At no point shall BACnet, LonWorks, Modbus or other similar forms of 3rd party communication protocols be used for direct system control, only use is for additional non primary monitoring of onboard points.

C. All equipment must be capable of self modulation based on BAS hardwired (not BACnet, LonWorks, Modbus or other similar forms of 3rd party communication protocols) 0-10vdc or 0-5vdc setpoints, and is not to be directly modulated by BAS.
   (i) Examples are gas fire rates, chillers and DX staged/modulated cooling
D. Local manual override switches on controller outputs are not preferred when other options are of lesser cost
E. Built in damper actuators on controllers, including VAV controllers, are highly discouraged
   (i) Analog external actuators are required
   (ii) Institutional Knowledge: Far too often expensive controllers are replaced due to built in faulty/stripped out actuators
F. Built in CFM flow stations on controllers are not preferred if less expensive 0-10vdc options are available
   (i) Institutional Knowledge: Far too often expensive controllers are replaced due to faulty built in flow stations
G. Only accepted Manufacturers:
   (i) EcoStruxure:
      a. Product line: MP-C
      b. Communication protocols: BACnet IP (not MSTP)
      c. Only Multi-purpose, fully Owner programmable, IP based field controllers are acceptable
   (ii) Andover:
      a. Product line: i2, b3
      b. Communication protocols: Infinet, BACnet IP (not MSTP)

11. Sensors:
   A. Any sensor in high impact risk spaces similar to gyms, wrestling or weight rooms, are to be in an open air wire cage guard with a hinge allowing servicing without unscrewing the cage from surface.
   B. Do not locate sensors where:
      (i) It could/will be blocked by furniture, coats, other equipment and/or the like
      (ii) Locations that will see regular misreadings such as directly next to occupants or heat/cold producing devices
      (iii) Exterior walls
   C. Standalone single use, purpose built “room controllers”
      (i) Are prohibited and not acceptable under any circumstances.
   D. Thermostats:
      (i) Are prohibited and not acceptable under any circumstances.
   E. Occupant Space:
      (i) Sensors shall not have logos
      (ii) No sensor shall have occupant adjustability, including sliders, buttons or those with touch screen capabilities.
      (iii) All spaces that are not hallways or closets are to have an occupied override button. This occupancy button is the only accepted form of occupant interaction with sensors
      (iv) Sensor location shall be next to or near the return air grill of each space but not in a location where it will be blocked or in locations where it will see regular misreading from occupants such as next to student/staff desk or next where students or staff are regularly at for extended periods of time.
      (v) Duct mounted return air sensors are not allowed as a substitute replacement for space mounted sensors
      (vi) Large spaces such as gyms or auditoriums: use 2 or more sensors which are spread apart in opposite corners and not located directly next to occupants.
      (vii) Temperature:
         a. Preferred Manufacturer: Veris CW2, Veris CWL, ST-S3 Stainless Steel flush mount (for use in hallway spaces), TTS-SE-BNS-1
         b. Communication protocols: 10kΩ, 0-10vdc or 0-5vdc
      (viii) CO2:
         a. Demand Control Ventilation (DCV) is preferred control strategy
         b. Preferred Manufacturer: Veris CWL

c. Do not locate CO2 sensors:
    i. in a location where it will be blocked
    ii. in locations that will see regular misreading such as next to student/staff desk
    iii. In proximity to where occupants spend extended periods of time.
    iv. Return air ducts
    v. Return air sensors are prohibited and not acceptable under any circumstances
d. CO2 sensors shall be installed in all classrooms and common spaces for DCV. The CO2 sensor will control the minimum air flow at all times, if this is associated with a VAV this means the VAV minimum setpoint, if this is for a AHU (or similar) it will be the outside air minimum position. Outside air flow stations are not required for this operation and preferred to not be used for primary operation of systems. DCV CFM must not be less than 30% of code required minimum.The CO2 sensor will control the minimum air flow at all times:
e. if associated with a VAV this means the VAV minimum setpoint
f. if associated with an AHU (or similar) it will be the outside air minimum position.
g. Outside air flow stations are not required for this operation and preferred not to be used.
h. All sensors must be capable of self calibration as well as yearly calibration by BVSD HVAC staff

12. Communication protocols: 0-10vdc or 0-5vdc
13. BACNET is prohibited except in rare circumstances as listed below. For these circumstances, Bacnet is for monitoring purposes only, not controlling. CONFIRM WITH Owner!
    A. Chillers
    B. Boilers
    C. Heat pumps
14. Integrated Automation Supplementary Components
    A. Conductors and Cables 25 05 13

| **BAS service** | **Color** | **Plenum Cable types** |
|---|---|---|
| Communications | Orange | Cat6, |
| | | 1Pair2 4AWG Tinned Copper Shielded RS-485 Low-CapacitanceCommunication |
| Room tstat | Pink | Cat6 |
| | | 22AWG/2 |
| | | 22AWG/3 |
| | | 22AWG/4 |
| Peripherals w/o shld | Purple | 18AWG/2 |
| | | 18AWG/3 |
| | | 18AWG/4 |
| Peripherals w/shld | Purple | 18AWG/2 |
| | | 18AWG/3 |
| | | 18AWG/4 |
| 24V power (Remote controllers, etc) | White w/Green stripe | 16AWG/3 |

| | | |
|---|---|---|
| Conduit | Orange | |
| Conduit box and covers | Orange | |
| Enclosures | Orange | |

B. Grounding and Bonding 25 05 26 – no Owner requirements.
C. Pathways 25 05 28 – no Owner requirements.
D. Vibration and Seismic Controls 25 05 48 – no Owner requirements.
E. Identification 25 05 53 – comply with ANSI A13.

15. If scope of work replaces BAS Controllers, specify that old controllers shall be returned to the Owner.

## ELEMENT E: EQUIPMENT AND FURNISHINGS

**E10 EQUIPMENT**

E1010 Vehicle Servicing Equipment: No Owner requirements

E1020 Commercial Equipment

1. Food Service Equipment 11 41 00
   A. MATERIALS
      (i) Metals: Stainless Steel (S/S): Except as otherwise indicated, provide AISI Type 304 or 305, hardest workable temper, with No. 4 directional polish applied either prior to or after forming, except finish on non-exposed surfaces may be No. 2D or 2B.
         a. Provide Type 316 S/S for work exposed to high temperatures or high acid/chloride exposure.
         b. Provide Type 420/440 S/S for cutters, valves, shafts, and other machined parts in food service equipment.
         c. At Contractor's option, provide Type 409 in lieu of Type 304/305 for splash zone and on-food zone applications; except do not use Type 409 mixed with Type 304/305 on units of equipment exposed to customer view or combined in ways which might result in electrolytic or galvanic corrosion of either metal.
         d. At Contractor's option, in lieu of No. 4 directional polish, provide No. 3 directional polish for splash zone and non-food zone surfaces.
         e. Provide protective covering on polished surfaces of S/S sheet work and retain/maintain until time of final testing, cleaning, start-up, and substantial completion.
      (ii) Galvanized Steel Sheet: ASTM A526, except ASTM A 527 for extensive forming; ASTM A 525, G90 zinc coating, chemical treatment.
         a. Where unpainted exposure in food service equipment is indicated, provide special sheet with extra smooth surface, produced by temper rolling of minimum-spangle galvanized sheet.
         b. Where painted finish is indicated, provide mill phosphatized treatment in lieu of chemical treatment.
         c. Where factory-applied finish of porcelain or baked-on synthetic enamel is indicated for exposed face of galvanized steel sheet, differentially coated sheet complying with ASTM A525 may be provided at manufacturer's option.
         d. Steel Sheet: ASTM A569 hot-rolled carbon steel.
         e. Stainless Steel Tube: Provide seamless or welded tubing complying with ASTM A270, Finish 120, 180, or R for food conveying piping. Provide tubing complying with ASTM A651 for water and drain/waste/vent service, Grade H for water and Grade G for SWN; and complying with ASTM A554 for framing/structural support services; A IS I type and finish number matching food service equipment at location of use, Type 304 with No. 4 directional polish where matching of other S/S work is not required.
         f. Galvanized Steel Pipe: ASTM A53 or ASTM A 120, welded or seamless, Schedule 40, galvanized.

g. Steel Structural Members: Hot-rolled or cold-formed carbon steel unless stainless steel is indicated.
h. Galvanized Finish: ASTM A123 hot-dipped zinc coating, applied after fabrication.
i. Aluminum: ASTM B 209.B 221 sheet, plate, and extrusions (as indicated); alloy, temper, and finish as determined by manufacturer/fabricator, except 0.40 mill clear anodized finish on exposed work unless another finish is indicated.

(iii) Hardwood Work Surfaces: Not permitted.

(iv) Insulation:
a. Cooled-Component Insulation: Rigid, closed-cell polyurethane foam; either heat aged slab stock for adhesive lamination with face sheets, or foamed-in-place using Freon 11 as expanding agent; K-value of 0.15; not less than 1.7 lbs. per cu. ft. density.
b. Heated-Component Insulation: Rigid board, semi-rigid blanket or adhesively applied blanket of glass fiber or other non-asbestos mineral fiber simulation, certified by manufacturer to withstand long-term exposure to heat (temperature rating of each insulated equipment item) without deterioration; K-value of not more than 0.30; density of not less than 1.5 lbs. per cu. ft.

(v) Joint Materials:
a. Sealants: One part or two part, polyurethane or silicone based, liquid elastomeric sealant, FS TT-S-00227E, FS TT-S -00230C , or FS TT-S-001543A , non-solvent-release type, mildew resistant, Shore A hardness of 30 except 45 if subject to traffic or similar abuse.
i. Except for Non-Food Contact Surfaces: Provide silicone-based sealant only.
ii. Backer Rod: Closed-cell polyethylene road stock, larger than joint width.
iii. Gaskets: Solid or hollow (but not cellular) neoprene or polyvinyl chloride; light gray, minimum of 40 shore A hardness, self-adhesive or prepared for either adhesive application or mechanical anchorage.

(vi) Paint and Coatings:
a. General : Provide thermosetting types of painting and coating materials which, after drying, setting, or curing are suitable for use in conjunction with food service and which are durable, non-toxic, non-dusting, non-flaking, mildew resistant, and comply with governing regulations and NSF recommendations for food service.
b. Sound Deadening: Heavy-bodied resinous coating, filled with granulated cork or other resilient material, compounded for permanent, non-flaking adhesion to metal in a 1/8" thick coating.

(vii) PREFABRICATED PRODUCTS
a. Hardware: General : Manufacturer's standard, but not less than compliance with ANSI A156.9 (BHMA Std. 201) Type 2 (Institutional), and ANSI A 156.11 (BMHA Std. 511) Grade 1, satin finish stainless steel or dull chrome finish on brass, bronze, or steel .
i. Cabinet Catches: Heavy-duty magnetic type, except as otherwise indicated.
ii. Drawer Slides: 250 lbs. capacity ball-bearing type, sidemounting, self-closing, sizes in accordance with slide manufacturer's recommendations for drawer size.
iii. Sliding Door Hardware: Overhead track with tandem nylon wheel hangers for door leaves over 5 SF area; rollerless sanitary slides for smaller doors (comply with NSF standards).
b. Casters: Type and size indicated or, if not indicated, as recommended by caster manufacturer for type and weight of equipment supported; but not less than 4" diameter with 15/16" tread width, with sealed self-lubricating ball-bearings, cadmium-plated steel disk wheels and solid light gray synthetic rubber tires. Provide S/S horns and accessories. Unless otherwise indicated, equip each item with 2 swivel-type casters and 2 fixed casters, and provide foot brakes on 2 casters. All assemblies shall be NSP approved.
c. Plumbing Fittings, Trim, and Accessories:
i. General: Where exposed or semi-exposed, provide bright chrome-plated brass or polished stainless steel units. Provide copper or brass where not exposed.
ii. Water Outlets: At sinks and at other locations where water is supplied (by manual, automatic, or remote control), provide commercial quality faucets,

valves, dispensers, or fill devices of type and size indicated and as required to operate as indicated.

iii. Vacuum Breakers: Provide with food service equipment where indicated in itemized specifications.

iv. Waste Fittings: Except as otherwise indicated, provide 2" remote-lever waste valve and 3.5" strainer basket.

d. Electrical Materials:

i. General: Provide standard materials, devices, and components as recommended by manufacturer/fabricator, selected and installed in accordance with NEMA standards and recommendations; and as required for safe and efficient use and operation of food service equipment, without objectionable noise, vibrations, and unsanitary conditions.

ii. Controls and Signals: Provide recognized commercial-grade signals, "On-Off" push buttons or switches, and other speed and temperature controls as required for operation of each item, complete with pilot lights and permanent signs and graphics to assist user of each item. Provide S/S cover plates at controls and signals.

iii. Connections: Equip each item requiring electrical power with either terminal box or cord and plug for interruptible connection as indicated.

iv. Motors: Totally enclosed type, except drip-proof type where not exposed to dust or moisture condition; ball-bearings, except sleeve bearings on non-continuous duty motors of 1/25 hp and less and on small timing motors; windings impregnated to resist moisture; horse power and duty cycle ratings as required for the service indicated.

v. Power Characteristics: Refer to Division 16 sections for project power characteristics. Also, refer to individual equipment requirements for loads and ratings.

vi. Nameplates: Where possible, locate nameplates and levels on manufactured items in accessible position, but not within customer's normal view. Do not apply nameplates or labels on custom fabricated work, except as required for compliance with governing regulations, insurance requirements, or operator performance.

B. FABRICATION OF METALWORK

(i) General Fabrication Requirements: Remove burrs, sheared edges of metal work, ease corners, and smooth to eliminate cutting hazard. Bend sheets of metal at not less than minimum radius required to avoid grain-separation in the metal. Maintain flat, smooth surfaces without damage to finish. Where possible, fabricate work from single sheet to minimize seaming.

a. Reinforce metal at locations of hardware, anchorages, and accessory attachments where metal is less than 14 gauge or requires mortized application. Conceal reinforcements to the greatest extent possible. Weld in place on concealed faces.

b. Where fasteners are permitted, provide Phillips head, flat or oval head machine screws. Cap threads with acorn nuts unless fully concealed in inaccessible construction; and provide nuts and lock washers unless metal for tapping is at least 12 gauge. Match fastener head finish with finish of metal fastened.

c. Where components of fabricated metal work are indicated to be galvanized and involve welding or machining of metal heavier than 16 gauge, complete fabrication, to the greatest extent possible (depending upon available dip-tank size). Comply with ASTM A123.

i. Where hot-dipped galvanizing after fabrication of welded work is not possible, solder over weld-damaged area of zinc coating. Apply high temperature lead/tin solder on one side, followed by lower-temperature lead/tin solder on the reverse side of each welded seam.

ii. Where vents are required for enclosed spaces or for cabinet enclosures, provide removable stainless steel insect screens of 18 x 18 mesh. Locate vents to avoid moisture penetration during cleaning of equipment.

iii. Provide removable panels for access to mechanical and electrical service connections and operating components which are concealed behind or within food service equipment but only where access is not possible and not indicated through other work.

(ii) Metal and Gauges: Except as otherwise indicated, fabricate exposed metal work of stainless steel, fabricate the following components from gauge of metal indicated, and fabricate other components from not less than 20-gauge metal.
   a. Table Tops: 14 Gauge
   b. Counter Tops: 14 Gauge
   c. Shelves: 16 Gauge
   d. Front Drawer/Door Panels: 28 Gauge (Double-Pan Type)
   e. Single-Pan Doors & Drawer Fronts: 16 Gauge
   f. Enclosed Base Cabinets: 18 Gauge
   g. Enclosed Wall Cabinets: 18 Gauge
   h. Sinks and Drainboards: 14 Gauge
   i. Sink Compartment Covers: 14 Gauge
   j. Exhaust Hoods: 28 Gauge
   k. Pan-Type Inserts & Trays: 16 Gauge
   l. Removable Covers, Panels: 18 Gauge
   m. Skirts & Enclosure Panels: 18 Gauge
   n. Closure & Trim Strips Over 4" Wide: 18 Gauge
   o. Hardware Reinforcement: 18 Gauge
   p. Gusset Plates 10 Gauge

(iii) Work-Surface Fabrication: Fabricate metal work surfaces by forming and welding to provide seamless construction, using welding rods matching sheet metal, grinding and polishing where necessary for disassembly; provide waterproof gasketed draw-type joints with concealed bolting.
   a. Reinforce work surfaces 18" o.c. both ways with galvanized or stainless concealed structural members. Reinforce edges which are not self-reinforced [by forming.
   b. Sound deaden underside of metal work surfaces, including sinks and similar units, with a coating of sound deadening material. Apply as specified by the local health department.

(iv) Structural Framing: Except as otherwise indicated, provide framing of not less than 1" nominal pipe or tube members with mitered and welded joints and gusset plates, ground smooth. Provide S/S tube framing for exposed work exposed to customer view, with minimum 0.064" wall thickness. Provide either S/S tube (minimum 0.064" wall) or, where permitted by NSF standards, epoxy-polyester enameled steel pipe for exposed work not exposed to customer view. Provide galvanized steel pipe for concealed framing where acceptable under NSF standards; otherwise provide S/S tube (minimum 0.064" wall).

(v) Enclosures: Provide enclosures, including panels, housings, and skirts for service lines, operating components, and mechanical and electrical devices associated with food service equipment, except as specifically indicated or otherwise required to be "open."

(vi) Casework: At fabricator's option, and unless otherwise indicated, provide either box-type face framing or open channel-type (complying with NSF requirements in either case).
   a. Enclosure: Except as otherwise indicated, provide each unit of case work (base, wall, overhead, and freestanding) with a complete-enclosure metal cabinet, including fronts, backs, tops, bottoms, and sides.
   b. Door and Drawer Fronts: Except where single-pan construction is indicated, provide double-pan type, not less than 5/8" thick, with seams on the inside face. Weld hardware reinforcement to the inside of the inner pan. Sound deaden by either coating both pans on concealed face or by inserting mineral wood insulation between pans.
   c. Shelves: Except as otherwise indicated, provide adjustable standards for positioning and support of shelves in case work. Turn the back edge of shelf units up 2" and hem. Turn other edges down to form an open channel. Reinforce shelf units to support 40 lbs. per sq. ft. loading, plus 100% impact loading.

d. Drawer Bodies: Except as otherwise indicated, provide seamless construction; either draw formed single piece metal or draw-formed single piece metal insert and framed metal drawer.
    i. Plastic Units: At Contractor's option and unless otherwise indicated, drawer inserts may be of molded plastic (seamless), and drawer bodies of less than 0.75 cu. Ft. capacity may be of solid, molded, seamless plastic construction.
    ii. Closed Base: Where casework is indicated to be located on a raised floor base, prepare casework for support without legs and for anchorage and sealant application as required for a completely enclosed and concealed base.
e. Support Floor: Equip floor-supported mobile units with casters, and equip items indicated as "roll out" units with manufacturer's standard one-directional rollers. Otherwise, and except for "closed base" units, provide pipe or tube legs with adjustable bullet-design feet for floor supported items of fabricated metal work. Provide 1" adjustment of feet (concealed threading).

(vii) Exhaust Fabrication: Comply with NFPA No. 96, including Appendix A.
a. Grease Removal: Provide type indicated (removable S/S extractor filters if not otherwise indicated) with drip-channel gutters, drains, and collection basins.
b. Light Fixtures: Provide UL-listed fluorescent fixtures outside the hood with sealed safety lenses flush with inside of hood; S/S exposed conduit for wiring unless otherwise indicated.
c. Exhaust Duct: Galvanized steel, except S/S where exposed to view inside the building. Provide all exposed-to-view ductwork as indicated. All other ductwork by mechanical subcontractor.
d. Fire Extinguishing System: CO system complying with NFPA No. 12, dry chemical system 2 complying with NFPA No. 17 and 96, or liquid fire suppressant system complying with applicable NFPA regulations as specified.

(viii) Shop Painting: Clean and prepare metal surfaces to be painted; remove rust and dirt. Apply treatment to zinc-coated surfaces which have not been mill-phosphatized. Coat welded and abraded areas of zinc-coated surfaces with galvanized repair paint. Apply manufacturer's standard metal enamel finish.
a. Bake primer (if any) and finish coatings in accordance with paint manufacturer's instructions for baked enamel finish.

C. PLASTIC LAMINATE CASEWORK
(i) General: Fabricate plastic laminate casework in types and styles indicated, with hardware and accessories. Provide exposed and semi-exposed surfaces and edges (self-edged) with plastic laminate covering on particle board cores. At fabricator's option, semi-exposed surfaces with exposures equivalent to no more than underside of shelves may be surfaced with plastic laminate backer sheet. Provide pointed plywood or hardboard for concealed panels.
a. Provide adjustable standards for positioning and support of shelves.
b. Provide seamless rigid molded plastic drawer bodies or drawer liner inserts, white except as otherwise indicated.
c. Comply with applicable standards of AWI "Custom Grade" casework.

D. REFRIGERATION EQUIPMENT
(i) General: Provide either single or multiple compressor units, as specified. Provide units of capacities indicated, arranged to respond to evaporator thermostats and defrosting timers. Include coils, receivers, compressors, motors, motor starters, mounting bases, vibration isolation units, fans, dryers, valve piping, insulation, gauges, pump-down cycle units, and complete automatic control system.
a. Refrigerant: Pre-charge units with type or types recommended by manufacturer for services indicated.
b. Provide water-cooled condensers where indicated, ready for piping connections with condenser water piping and drain or return. Locate units with compressors, complete with refrigerant piping installed at the factory.
c. Provide air-cooled condensers where indicated, located with the compressors, complete with refrigerant piping installed at the factory. Locate units as shown. Exterior units with weather housings, protective enclosures, and low ambient kits.

d. Do not put units on top of walk-in boxes. Place units in room close to walk-in boxes, or, if that is not an option, locate units on the rooftop of the school.
e. Coordinate cooler/freezer floor heights to match kitchen floor height. Loading of units with hand trucks should be an element of design.
f. Ramps immediately inside the walk-in door should be avoided; floor level entry is preferred

E. CARBON DIOXIDE (CO ) EQUIPMENT
(i) General: Where equipment requires connection with compressed CO cylinder for operation, provide 2 cylinder manifold and control system (integral with equipment) with proper connectors for Department of Transportation (DOT) approved type cylinders and complete with cylinder safety devices and supports. Comply with ANSI B57.1 "Compressed Gas Cylinder Valve Outlet and Inlet Connection," and comply with applicable recommendations by Compressed Gas Association.

F. KITCHEN EQUIPMENT (Exact schedule is project-dependent and must be approved by BVSD Food Service and Maintenance Departments.)
(i) Service Counter/Steam Table
a. Manufacturer: Volrath, Duke, or equal
b. Model No.: Volrath C-6-HF, or Duke TEHF-60SS
c. Furnish and set in place as per manufacturer's standard specs and the following:
i. Provide with 12" solid ribbed tray slide and required connections to adjacent components.
ii. Stainless steel fronts and 6" adjustable legs in lieu of casters; verify height with BVSD
d. Provide either two wells that accept 4 pans, or 4 individual pans.
i. fully welded 18-gauge stainless steel with radius corners. Furnish with 3/4" stainless steel drain. Provide individual thermostatic controls for each well recessed in apron. (12-3 cord, 6-30P cap). (Wells for moist heat only.)
ii. Two wells to accept four 12" x 20" pans (opening size 19-7/8" x 39-3/4") with standard adapter bars, or 4 individual wells.
e. Provide a serving shelf on top of all service counters at the customer side.
f. Must include filler faucet & drain
g. When space allows, a SS table should be installed at the end of the steam table, at equal height, for a service counter.
(ii) Sneeze Guard
a. Manufacturer: Con-tur Health Guard or approved equal
b. Model No.: 14CS
c. Furnish and set in place as per manufacturer's standard specs and the following:
i. All panels have 12" free space between top of counter and bottom of sneeze guard.
ii. Install units on or above hot food wells and cold units.
(iii) Milk Dispenser
a. Silver King
b. Model: SKMAJ 1 – 2 – 3
(iv) Check Stand: Cambro (or approved equal)
(v) Soiled Dishtable
a. Manufacturer: Custom fabricated
b. Model No.: S/S
c. Fabricate and set in place as per plans, details, and the following:
d. One T&SB -133 pre-rinse with B-109 wall bracket.
e. Round inset rinse sink preferred.
(vi) Disposer in Dish Table
a. Manufacturer: Insinkerator
b. Model No.: SS -200-6
c. Pertinent Data: 6" collar
d. Utilities Required: 2 HP, 208V, 3PH, 1/2" CW, 2"W
e. Furnish and set in place as per manufacturer's standard specs and the following:
f. Install assembly in Soiled Dishtable.

i. Manual reverse switch.
ii. Install "On" and "Off" switch where it CAN NOT be turned on accidentally. Contact BVSD Plumbing Department for details.

g. In corner installations, dish rinse sink should be installed clear of the dishwasher's depth, such that a person can stand in front of the sink without interference.

(vii) Dish machine
a. Manufacturer: Hobart Model: AM 15 Tall
b. Model No.: Coordinate with BVSD
c. Pertinent Data: High Temp
d. Utilities Required: Coordinate with BVSD
e. Furnish and set in place as per manufacturer's standard specs and the following:
i. Straight operation.
ii. Dishwasher electric heater preferred. Natural gas heater with BVSD approval.

(viii) Booster Heater
a. Booster Heater Manufacturer: Hatco or Hobart.
b. Model No. C15 or larger where needed
c. Utilities Required: Electric preferred. Natural gas with BVSD approval.
d. Hose bib installed for draining booster heater.
e. Unions on inlet and outlet lines.

(ix) Condensate Hood
a. Manufacturer: Custom Fabricated
b. Model No.: Stainless Steel only
c. Pertinent Data: -

(x) Clean Dishtable
a. Manufacturer: Custom Fabricated
b. Stainless Steel only.

(xi) Wall Shelf
a. Manufacturer: Custom Fabricated
b. Stainless Steel only.
c. Wall shelves installed over the clean dishtable would be at least 32" above the table top.

(xii) Tray Cart
a. Quantity: 2
b. Manufacturer: Cres-Cor (or equal)
c. Model No.: 1408-6
d. Pertinent Data: Spring Handle
e. Food Services should be consulted for cart selection based on kitchen layout and needs.

(xiii) Hand Sink
a. Install S/S sink (14 gauge minimum) with DWV copper trap (no plastic or cast iron plumbing)
b. Chicago faucets, no substitution; See plumbing section.
c. Sinks installed next to prep surfaces must include a splatter shield.

(xiv) Soap and Towel Dispenser: Furnished by Owner

(xv) Pot and Pan Sink
a. Manufacturer: Custom Fabricated
b. Stainless Steel only.
c. Utilities Required: Two 1/2" H&CW, three 1-1/2" IW
d. Fabricate and set in place as per plans, details, and the following:
i. Two Chicago faucets and three 1-1/2" lever waste drains.
ii. Size: 18" X 26"

(xvi) S/S Wall Cap
a. Stainless Steel only

(xvii) Storage Shelving
a. Quantity: 6 – 8 dependent upon kitchen size; verify with BVSD
b. Manufacturer: Metro

c. Model No.: Super Electra Chrome-Plated Wire
d. Furnish and set in place as per manufacturer's standard specs and the following:
e. Length and configuration as per plan and verified room dimension.
f. Use "S" hooks for common post assemblies where possible.
g. Stainless steel preferred; plastic shelves prohibited.

(xviii) Fire Protection System

a. Manufacturer: Range Guard, Ansul or approved equal
    i. Type: Ansul/Kidde
    ii. Model No. R102
b. Model No.: Wet Chemical System
c. Pertinent Data: Automatic and Manual
d. Furnish and set in place as per manufacturer's standard specs and the following:
    i. Surface appliance nozzles, hood, and duct protection nozzles in exhaust hood, as required.
    ii. Manual pull station and microswitches with 2 sets of normally open and 2 sets of normally closed contact points.
    iii. All exposed pipe and fittings shall be stainless steel.
    iv. 6-month and 12-month inspections, serving, and replacement of components as per NFPA 96, latest edition.
e. Supply one wall-mounted 40 BC rated fire extinguisher as part of this item.
f. Local building and health codes should be consulted as determinants of fire protection installation.

(xix) Walk-In Cooler/Freezer

a. Quantity:
    i. All Schools 1 each
    ii. Size depends upon the school's Average Daily Participation. Verify with BVSD.
b. Manufacturer: Bally, American Panel, Heatcraft or approved equal
    i. NSF, UL, and UL Classified Panels
c. Furnish and set in place as per manufacturer's standard specs and the following:
    i. Unit to be installed in 4" deep building floor depression. See plan for size and configuration of compartments.
    ii. Interior and exterior finish to be stucco embossed galvalume with 14- gauge galvanized floor
    iii. Two 30" x 78" entrance doors; hinges as shown on plan.
    iv. Ramps immediately inside the walk-in door should be avoided, where possible; floor level entry is preferred.
d. Unheated pressure relief port in cooler compartment; heated in freezer compartment.
e. Specify plastic doors on the interiors of the units: Clear Vu made by CCI industries, Costa Mesa, CA
f. Audio-visual alarms required.
g. 2 extra vapor-proof lights for field installation. 4 matching floor-to- finished-ceiling trim strips; verify height and width.
h. Matching closure panels on exposed front and to finish ceiling with louvered access panels for adequate ventilation of top-mounted condensing units; verify height.
i. Freezer: air cooled, 208V, 3Ph, freezer compartment refrigeration system with low-profile blower coil, pump- down cycle kit, quick connect wiring harness and wholly precharged quick connect refrigerant lines, drain line heater kit and any accessories necessary for a completely installed and functional system for a freezer box temperature of -10°F to -5°F. Condensing unit to be mounted to ensure best performance of unit.
j. Cooler: air cooled, 208V, 2Ph, cooler compartment refrigeration system with low-profile blower coil, pump- down cycle kit, quick-connect refrigeration lines, and any accessories necessary for a completely installed and functional system for a cooler box temperature of +35°F to +40°F. Condensing unit to be mounted to ensure best performance of unit.
k. Manufacturer shall furnish 10-year panel warranty for cooler and freezer sections including parts FOB school and labor.

(xx) Pan Rack Cart
   a. Quantity: 2
   b. Manufacturer: Cres-Cor (or approved equal)
   c. Model No.: 207-UA-13
   d. Pertinent Data: Universal Angle
   e. Furnish and set in place as per manufacturer's standard specs and the following: Corner bumpers.
   f. When the cart must be assembled post-shipping, all bolts should be coated with Loctite Threadlocker Blue 242 (removable Loctite).

(xxi) Refrigerator Shelving
   a. Quantity: 8 Section
   b. Manufacturer: Metro (or approved equal)
   c. Model No.: Super Erecta Chrome-Plated Wire
   d. Furnish and set in place as per manufacturer's standard specs and the following:
      i. Length and configuration per plan and verified walk-in dimensions.
      ii. Use "S" hooks for common post assemblies where possible.

(xxii) 30-Quart Mixer (only if specifically requested by BVSD)
   a. Manufacturer: Hobart
   b. Model No.: F30
   c. Pertinent Data: Floor Model

(xxiii) 60-Quart Mixer (only if specifically requested by BVSD)
   a. Manufacturer: Hobart
   b. Model No.: F60
   c. Pertinent Data: Floor Model

(xxiv) Double Convection Oven
   a. Manufacturer: Blodgett
   b. Model No.: DFG- 100 excel
   c. Pertinent Data: Two Compartment
   d. Furnish and set in place as per manufacturer's standard specs and the following:
   e. S/S front, left, and right sides.
   f. 6" S/S legs with castors
   g. Flexible Gas Line

(xxv) Work Table: Stainless Steel only.

(xxvi) Exhaust Hood
   a. Manufacturer: CaptiveAire (or approved equal)
   b. Model No.: 6024 ND-2
   c. Furnish and set in place as per manufacturer's standard specs and the following:
      i. S/S construction.
      ii. Recessed LED lights with lamps.
      iii. Provide S/S closure panels to finished ceiling.
      iv. Make-up air to be introduced into the room through the front face of the hood.

(xxvii) 40-Gallon Kettle (only if specifically requested by BVSD)
   a. Manufacturer: Cleveland or Groen
   b. Model No.: KDL-40-T
   c. Pertinent Data: Tilting
   d. Furnish and set in place as per manufacturer's standard specs and the following:
      i. 2" tangent draw-off in lieu of 1-1/2".
      ii. Interconnect to Convection Steamer.

(xxviii) Retherm Oven, Warming and Holding
   a. Manufacturer: Crescor
   b. Model No. RO-151-FWUA-18DX
   c. Water line should be connected to a water source.

(xxix) Convection Steamer
   a. Manufacturer: Cleveland
   b. Model No.: 24 CGA 10.2 ES
   c. Include filter & descaler
   d. Pertinent Data: Two Compartment

e. Furnish and set in place as per manufacturer's standard specs and the following: Provide Cleveland IMK interconnection kit.
f. Backflow preventer (Dual Check with atmospheric vent conforming to ASSE 1012 Standard) must be installed on domestic water supply to steamer, per health code.

(xxx) Prep Table
a. Manufacturer: Custom Fabricated
b. Model No.: S/S
c. Furnish and set in place as per manufacturer's standard specs and the following:
d. Integral sink to have one T&S B-201 faucet and 1-1/2 rotary waste.
e. For Disposer information, see Disposer.

(xxxi) Heated Cart
a. Manufacturer: Cres-Cor
b. Model No.: H-137-CDD-UA-12-HH
c. Pertinent Data: Universal Angle
d. Utilities Required: 9 amp, 120V, 1Ph
e. Furnish and set in place as per manufacturer's standard specs and the following:
i. Hasp lock, L-H.
ii. Two wheel locks.

(xxxii) Ingredient Bin (only if specifically requested)
a. Quantity: 3
b. Manufacturer: Rubbermaid
c. Model No.: 3628
d. Pertinent Data: Sliding Lid

(xxxiii) Slicer (only if specifically requested by BVSD)
a. Manufacturer: Hobart
b. Model No.: 7512
c. Pertinent Data: 12" Blade
d. Utilities Required: 120V (xl)

(xxxiv) Salad Bar
a. Manufacturer: Cambro Model No. 6FBR

(xxxv) Refrigerator – Reach – In & Freezers – 1 or 2 door
a. Manufacturer: Turbo Air or Atosa
b. Model No. Pro 26 R or 50 R; or MBF8005GR
c. R134a or other refrigerants with Polyolester Oil that use a capillary tube as the metering device are prohibited. POE is known to break down at high temperatures and generate metallic soap, sticky substances, or solids which lead to capillary tube blockage causing catastrophic failures.

(xxxvi) Compressor Cooler
a. Manufacturer: Imperial Manufacture
b. Model No. MOH008X62CFT

(xxxvii) Flooring
a. The flooring must withstand heat.
b. Linoleum prohibited.
c. Provide molded corners with 6" base for easy cleaning in all areas of the kitchen
d. Flooring should have a non-slip texture or surface.

E1030 Institutional Equipment 11 50 00

1. Educational and Scientific Equipment 11 50 00
2. Library Equipment 11 51 00 Furnished and installed by Owner
   A. Audio-Visual Equipment 11 52 00
      (i) Projection Screens: Owner Furnished, Contractor Installed (OFCI)
      (ii) 8' wide manual screen typical at classrooms and instruction areas.
      (iii) Power operation at high ceilings and large rooms. Coordinate size and location with BVSD.
      (iv) Projectors: Owner Furnished, Contractor Installed (OFCI).
      (v) Similar to Calypso System ezroom 200.(iii)
      (vi) Learning Laboratories: No Owner requirements.
3. Laboratory Equipment 11 53 00

A. Laboratory Fume Hoods 11 53 13
B. Pre-wired and pre-piped.
C. Factory-finished sides, base and filler panels.

4. Kilns 11 95 1
   A. Use electric Skutt kiln with enviro-vent as distributed by Mile Hi Ceramics.
5. Theater and Stage Equipment 11 61 00
   A. APPLICATIONS/RESTRICTIONS
   B. A. E.S.: Cyclorama
   C. B. M.S.: Proscenium Curtain and Cyclorama.
   D. H.S.: Proscenium Curtain and Cyclorama.
   E. Acoustical Shells 11 61 13 – No Owner requirements.
   F. Folding and Portable Stages 11 61 23 – No Owner requirements.
   G. Rigging Systems and Controls 11 61 33 – No Owner requirements.
6. Stage Curtains 11 61 43
   A. Furnished and installed by Contractor.
   B. 1. Pre-bagged.
   C. 2. Pre-hung.
   D. Heavyweight fabric of woven cotton velour. Napped fabric of 100 percent cotton weighing not less than 25 oz. per lineal yard. Similar to Memorable by KM Fabrics.
   E. Architect to contact Fire Department for latest requirements. Fabricator to submit notarized affidavits concerning type of flame proofing.
   F. Stage sound system: No Owner requirements
7. Athletic Equipment 11 66 00
   A. Exercise Equipment 11 66 13
   B. Gymnasium Equipment 11 66 23
      (i) Volleyball standards and anchors.
      (ii) Climbing ropes.
      (iii) Exterior basketball standards.
      (iv) Gym divider curtains
      (v) Gym wall padding(safety pads)
      (vi) Gym Basketball hoops and backboards
      (vii) Gym Wall mounted chinning bar
      (viii) CLIMBING ROPES
         a. Secure to exposed metal joists above the suspended ceiling provided under Section 05211.
   C. EXTERIOR BASKETBALL STANDARDS
      (i) Acceptable Manufacturers:
      (ii) Coordinate with BVSD.
   D. Gym Divider curtains—No Owner requirements
   E. Gym wall padding- Complete perimeter wall padding for middle and high schools: No Owner requirements.
8. Interior Scoreboards 11 66 43
   A. Manufactured by NEVCO or approved equal.
   B. Cable: 75 ohm shielded coaxial.
   C. Plug/Socket: Physically different from that used with gymnasium public address system to prohibit cross-connection.
   D. Controls: Remote from scoreboard preferred for servicing.
   E. Control Panel: Single solid state microprocessor with capability for multiple-sports (basketball, wrestling, volleyball):
   F. Multiple interchangeable and mechanical type controls are prohibited.
   G. Battery backup preferred.
   H. Locate at folding bleacher faceplate.
   I. 8'-0" (L) x 4'-0" (H) minimum size.
   J. Rear and side service access panels prohibited.
   K. Scoreboard receiver modules: Pluggable "black box" type units.
9. Back Stops
   A. Main Court:

(i) Elementary: Glass backboard adjustable height, 8-10 feet.
a. Manually operated, forward folding.

B. Middle and High: Glass backboard, operable, 10 feet.
(i) Electrically operated with normally open manual key switch, forward folding.

C. Short Courts (2):
(i) Elementary: Glass backboard, adjustable height, 8-10 feet.
a. Manually operated, side folding.
(ii) Middle: Glass backboard, operable, 10 feet.
a. Manually operated, side folding.
(iii) High: Glass backboard, operable, 10 feet
a. Manually operated, side folding.

10. Gym Dividers 11 66 53: Power operated, drop type.
A. Gymnasium Equipment Inserts:
(i) Elementary: One volleyball court.
(ii) Middle: Inserts for one main volleyball court + (2) short court volleyball courts.
(iii) High: Inserts for one main volleyball court + (2) short court volleyball courts.

B. Exercise Equipment: No Owner requirements.

C. Therapy Equipment: No Owner requirements.

11. Climbing Walls 11 67 33: See Project Manager

E1040 Other Equipment

1. Solid Waste Handling Equipment 11 82 00: Coordinate the following with Director of Facilities and Sustainability Officer.
   A. Solid Waste Bins 11 82 13
   B. Recycling Equipment 11 82 23
   C. Composting Equipment 11 82 29

**E20 FURNISHINGS**

E2010 Fixed Furnishings

1. Window Blinds 12 21 00
   A. Horizontal louver blinds shall be aluminum slat similar to Hunter Douglas-Flexalum or Levelor-Rivera.
   B. Optical Light Shelf Daylighting System-No Owner requirements.
2. Window Shades 12 24 00
   A. Roller shades to be made of fabric similar to Draper Inc.-Access Flexshades or MechoShade Systems-Mecho/5.
3. Window Treatment Operating Hardware 12 25 00
   A. Optical Light Shelf Daylighting System
4. Casework 12 30 00
   A. Furnishings included in the General Contract for Construction are generally limited to built-in type components (i.e. fixed seating would be included in the contract whereas folding chairs would be considered a furnishing to be purchased separately by the Owner). Exception: Rolling shelf units are usually included with Manufactured casework subcontract.
   B. Custom made cabinets may be considered if quality and cost are approximately equal to pre-built cabinets. Verify with BVSD.
   C. (i) All cabinet drawers and doors (except sink base cabinets) in general office area, nurse's area, and audio-visual storage areas in elementary schools should have locks. One cabinet drawer and teachers closet door in each elementary classroom shall be locked. All cabinet drawers and doors (except sink base cabinets) in middle and senior high schools should have locks. Verify keying with Owner, but in general all cabinets in any one room shall be keyed alike. Assemble all keys with keying schedule and turn over to Owner's representative.
   D. Particular attention shall be given to detailing and hinges of large instrument and general storage cabinets. Use continuous hinges where necessary to support weight of door under heavy use.
   E. Specify five knuckle hinges or concealed hinges;
   F. wire pulls with no points or edges.
   G. Casework Acceptable Manufacturers:
      (i) TMI Systems Design Corp.
      (ii) LSI Corp.
      (iii) Westmark.
      (iv) Colorado Custom Cabinets.
      (v) Sidney Millwork.
      (vi) Stevens Cabinet Company.
      (vii) Kamtz Companies, Inc.
      (viii) John Murphy.
      (ix) BVSD Approved Substitute.
   H. Plastic Laminate Acceptable Manufacturers:
      (i) Wilsonart.
      (ii) Formica
      (iii) Nevamar
      (iv) Laminart
      (v) Approved substitute
5. Specialty Casework 12 35 00
   A. Educational/Library Casework 12 35 50- No Owner requirements
   B. Laboratory Casework 12 35 53
   C. Epoxy resin countertops and drop-in sinks in science rooms and prep rooms.
   D. 1" thick solid black epoxy resin with integral molded back and end splashes.

6. Display Casework 12 35 59 –No Owner requirements
    A. Reception Casework –No Owner requirements
7. Countertops 12 36 00
    A. Provide oak edging on laminate countertops.
8. Fixed Multiple Seating 12 60 00
    A. Auditorium seating in high schools
    B. Upholstery to meet strictest flame resistance and fire codes.
    C. provide 5 additional seat backs, 5 additional seat bottoms, additional extra set of hardware for retracting seats, and 3 additional yards of each fabric color selected.
    D. Provide ADA seating Access and drop arms on end aisle seats.
    E. Provide identification plates for each row and seat.
    F. Acceptable manufacturers:
        (i) Irwin Seating Company
        (ii) Hussey Seating Company
        (iii) Approved substitute.
9. Stadium and Arena Seating 12 63 00
    A. Bleachers 13 34 16.53
    B. Gymnasium bleachers: Hussey Model 2600 or equal system of other approved manufacturer.
    C. Self-contained electric motor operation.
    D. Acceptable manufacturers:
    E. Hussey Seating Company
    F. Approved substitute.
10. Telescoping Stands 12 66 00
    A. Maxam Telescopic Gym Seating or equal.
11. Fixed Seat and Table Assemblies 12 68 00 – No Owner requirements
12. Furniture 12 50 00
    A. Office Furniture 12 51 00 by Owner
    B. Institutional Furniture 12 56 00
        (i) Classroom Furniture 12 56 33 by Owner
        (ii) Library Furniture 12 56 51 by Owner
    C. Audio-Visual Furniture 12 56 52 by Owner
    D. Laboratory Furniture 12 56 53 by Owner
    E. Systems Furniture 12 59 00 by Owner

# ELEMENT F: SPECIAL CONSTRUCTION AND DEMOLITION

## F10 SPECIAL CONSTRUCTION

F1010 Integrated Construction

1. Fabric canopies prohibited.
2. Manufacturer-Engineered Structures 13 34 00
3. Exterior Grandstands and Bleachers 13 34 16 – All aluminum bleachers with clear anodized finish, manufacturer's non-slip seat and footboards and guardrail systems. Meet all current ADA requirements.
4. Metal Building Systems 13 34 19 – Allowed with Owner approval.

F1020 Athletic and Recreational Special Construction

1. Safety Netting 13 28 16 – No special Owner requirements.
2. Floor Sockets 13 28 26
   A. Provide 3 ½" round metal recessed floor inserts with covers for volleyball standards. Comply with manufacturers recommendations for floor type and substructure. Coordinate number, location and type with Owner and existing building equipment.

## F20 FACILITY REMEDIATION

F2010 Hazardous Materials Remediation

1. Asbestos Remediation 02 82 00 –Separate contract by Owner. Contractor shall review building AHERA Plan and control all access by workers to ACM materials during construction.
2. Lead Remediation 02 83 00
   A. Lead Hazard Control Activities 02 83 13 General Contractor responsible for any OSHA-required lead hazard control to protect workers.
   B. Lead-Based Paint Remediation 02 83 19 by General Contractor per EPA requirements. Pre-school areas identified by Owner.
3. Polychlorinate Biphenyl (PCB) Remediation 02 84 00
   A. By General Contractor per EPA requirements.
4. Mold Remediation 02 85 00
   A. By Owner. Project manager should be notified of any moisture introduced by construction that might produce mold conditions.

## F30 DEMOLITION

F3010 Structure Demolition

1. Building Demolition 02 41 16.13
   A. Building Demolition 02 41 16.13 – Contractor responsible for all special permits and notifications. See ELEMENT: INTRODUCTION, Sustainable Design Requirements, for all construction and demolition materials.

F3020 Selective Demolition 02 41 19

1. Selective Building Demolition 02 41 19.13
   A. For retrofit carpet projects, remove and mark doors which will not clear new flooring. (Trim and reinstallation by unit price.)
   B. Protect existing construction, finishes, mechanical and electrical systems, especially floor and wall finishes and roofing. See General Conditions Section 13.
   C. All demolished electrical and mechanical fixtures and equipment to be returned to the District. All demolished copper piping and electrical wire to be salvaged and returned to the District. All demolished door hardware to be salvaged and returned to the District.
2. Selective Interior Demolition 02 41 19.16
   A. See requirements for Selective Building Demolition.
3. Selective Historic Demolition 02 41 91
   A. See requirements for Selective Building Demolition.

F3030 Structure Moving 02 43 00

1. Structure Relocation 02 43 13: By Owner unless otherwise directed. Special permitting required.

## ELEMENT G: SITEWORK

### G10 SITE PREPARATION

G1010 Site Clearing

1. Tree and Shrub Removal and Trimming 31 13 00
    A. Install a protective construction fence at drip line around all trees within the construction area.

G1020 Site Elements

1. Utility Demolition
    A. Design Consultants are responsible for identification of existing District-owned underground utilities on the appropriate drawings.
    B. Coordinate with BVSD Maintenance Department for all in-district line locates.
    C. Utilities damaged by Contractor must be repaired by Contractor within 24 hours.
2. Infrastructure Demolition
    A. Where existing sites were used for residential purposes prior to acquisition by the School District, foundation structures may be encountered during excavation operations. All such obstructions should be removed as required for the proper construction of this facility. The Architect should include sufficient information on the drawings to indicate locations of previous construction.

G1030 Site Element Relocations

1. Utility Relocation
    A. Design Consultant to assist Owner with utility relocation applications.
    B. Relocations shall be at Owner's expense.

G1040 Site Remediation 02 50 00

A. In order to preserve District grounds, a mulch road of 4" depth shall be installed to protect turf and irrigation from construction traffic.

G1050 Site Earthwork 31 20 00

1. Grading 31 22 00
    A. To the greatest extent possible, balance the cut and fill.
    B. Stockpile topsoil.
    C. Export and dispose of debris, organic matter and contaminated soil.
    D. All finish grades should be designed to provide positive drainage away from the buildings and into approved drainage systems.
    E. Finish Grading 31 22 19
        (i) From outside face of building wall to a distance of 10 feet: 3% (minimum)
        (ii) Parking areas: 1% slope minimum; 3% maximum
        (iii) Playground areas: 1% to 2% slope
        (iv) Lawn areas: 25% maximum. Owner prefers the least amount of slope for ease of mowing.
        (v) Finish grade shall contain no debris or rocks larger than 1.5 inches.
2. Excavation and Fill 31 23 00
    A. Fill 31 23 23: As recommended by Geotechnical Engineer.
    B. Backfill 31 23 23.13: As recommended by Geotechnical Engineer.
    C. Compaction 31 23 23.23: As recommended by Geotechnical Engineer.
    D. Flowable Fill 31 23 23.3: Required by the City of Boulder at rights-of-way.
3. Erosion and Sedimentation Controls 31 25 00
    A. Any construction project that disturbs one acre or more will require a Stormwater construction permit from the State of Colorado. A construction site Stormwater Management plan shall be included in the construction documents and will follow the local jurisdiction regulations. The Architect and Contractor will prepare and document a Site Construction Stormwater Management Plan for submittal to the State for an approved Stormwater Discharge Permit. Fees shall be paid by the Contractor. The Owner will stop work and hold the Contractor liable for violation of the Stormwater Discharge Permit.
4. Soil Stabilization 31 32 00
    A. Soil Mixing Stabilization 31 32 13
        (i) Lime stabilization is not allowed unless approved in writing by BVSD.
5. Rock Stabilization 31 33 00 No requirements
6. Soil Reinforcement 31 34 00 No requirements

7. Slope Protection 31 35 00 No requirements
8. Riprap 31 37 00: Consult with BVSD.
9. Site Soil Treatment 31 31 00
    A. Vegetation Control 31 31 19
        (i) At Roadways and Parking specify organic Soil Sterilant with minimum lateral leaching properties.

**G20 SITE IMPROVEMENTS**

G2010 Roadways

1. Roadway Pavement
    A. Flexible Roadway Pavement 32 12 00
        (i) As recommended by Geotechnical Engineer.
        (ii) Preferred except as otherwise noted
        (iii) Recycled Asphalt Pavement (RAP) use is permitted with Owner approval and must follow the latest version of CDOT specifications.
    B. Rigid Roadway Pavement 32 13 00
        (i) Provide at school bus traffic & bus parking areas
            a. As recommended by Geotechnical Engineer.
            b. Width: 20'-0" minimum; 25' -0" preferred.
            c. Inside Turning Radius: 40' -0" minimum.
            d. Outside Turning Radius: 60'-0" minimum.
            e. Bus Length: 40'-0" average.
            f. Provide separate bus drive, entrance, and exit from street.
        (ii) Provide at trash pick-up areas/dumpster pads, including turn around zones.
        (iii) Provide at service vehicle/loading dock areas.
        (iv) Drain Pans: Concrete and 3' wide minimum. Concrete drain pans within asphalt pavement are preferred.
    C. Roadway Unit Pavement 32 14 00; Prohibited.
2. Roadway Curbs and Gutters 32 16 13
    A. Prefabricated curbs Prohibited.
    B. Hollywood curbs preferred.
3. Roadway Appurtenances 32 17 00
    A. Speed Bumps 32 17 16: Consult with BVSD. Prevent drainage issues through design.
    B. Pavement Snow Melting Systems: Consult BVSD.
4. Traffic Signage 10 14 53:
    A. Aluminum traffic and pedestrian control signs shall be shown on the construction documents. Mount signs on perforated 2-1/2" square galvanized steel posts. Install posts in sleeves set in concrete.
    B. Do not locate on sidewalks to facilitate snow plowing
5. Pavement Markings 32 17 23: per CDOT specifications

G2020 Parking Lots

1. Sustainable Transportation
    A. When designing new schools and sites, plan for access by all modes of transportation, with preference for sustainable modes of transportation including biking, walking, carpooling and busing.
    B. When redesigning existing sites, where reasonable, increase accessibility for sustainable modes of transportation including biking, walking, carpooling and busing.
    C. During any project, where reasonable, add infrastructure to support electric vehicle charging and bicycling.
2. Parking Lots Performance Requirements 01 89 16
    A. Automobile, truck, and bus traffic patterns shall be designed with student safety in mind.
    B. Separate bus drop-off areas from parent drop-off areas.
    C. All signs, signals and markings on school property shall conform to the "Manual on Uniform Traffic Control Devices," published by the Federal Highway Administration.
    D. Islands should be kept to a minimum to facilitate snow removal. If present, islands must be contained with a Hollywood concrete curb.
    E. At pedestrian walks, maintain 4'-0" minimum clearance beyond maximum vehicle overhang.

F. Inside Turning Radius: 15′ -0″ minimum.
G. Conform to local Fire Department rules for provision of any paved or unpaved lanes for fire truck access and for temporary fire lanes to be maintained during construction. Include confirmation of fire hydrant locations along with other fire safety requirements.
H. Design drainage to prevent water from collecting in traffic patterns. Drainage shall not cross major pedestrian paths.
I. Snow plow access required to all paved areas. 8′-0″ width required for snow removal.
J. Parking Lot Pavement 32 10 00
K. Flexible Parking Lot Pavement 32 12 00
(i) Preferred
(ii) Recycled Asphalt Pavement (RAP) use is permitted with Owner approval and must follow the latest version of CDOT specifications.
L. Rigid Parking Lot Pavement 32 13 00
(i) As recommended by Geotechnical Engineer.
(ii) Aggregate: Free of ferrous material which could leach onto the surface.
M. Parking Lot Unit Pavement 32 14 00; Prohibited.
N. Parking Lot Aggregate Surfacing 32 15 00: discouraged. With BVSD approval only.

3. Parking Lot Curbs and Gutters 32 16 13: asphalt curbs prohibited
A. Hollywood curbs are preferred to facilitate BVSD vehicle access
4. Parking Lot Appurtenances 32 17 00
A. Parking Bumpers 32 17 13: Discouraged
B. Pavement Snow Melting Systems 32 17 43: Generally avoid.
C. Parking Lot Traffic Signage 10 14 53: Coordinate with BVSD
D. Parking Lot Pavement Markings 32 17 23
(i) Include painted striping designation of parking stalls, directional markings, and fire lanes in the construction contract.
a. Handicapped: per ADAAG.
b. Standard: 9′-0″ x 18′ -0″.
c. Parallel to Curb: 9′-0″ x 25′-0″.
d. Drive aisle width (minimum for 90-degree configuration): 26′-0″.
5. Parking Lot Lighting 26 56 16
A. Illumination: Perimeter lighting configuration is preferred over island type. Provide 36″ high minimum concrete base to protect light poles from traffic.
B. Horizontal Illuminance
(i) .8 average
(ii) .2 minimum
(iii) 4/1 uniformity ratio
C. LED luminaires preferred
D. Dark Sky compliant

G2030 Pedestrian Plazas and Walkways
1. Outdoor Classrooms
A. All elementary schools will have green schoolyards and outdoor learning spaces that may include but are not limited to gardens, nature play areas and vegetation/landscaping and/or natural habitat. All secondary schools will have increased outdoor seating and shaded areas. Consult with a Project Manager, Maintenance, and Sustainability Officer.
2. Pedestrian Pavement 32 10 00
A. Flexible Pedestrian Pavement 32 12 00: with Owner approval.
B. Rigid Pedestrian Pavement 32 13 00: Preferred.
(i) Provide access to all paved areas for sweepers and snow removal equipment
(ii) 8′-0″ minimum width to allow snow removal via pickup truck.
(iii) Ramps: 6′-0″ clear width from guard rails to facilitate snow plowing
(iv) Specify epoxy-coated rebar for areas expected to receive salt for de-icing (stairs, ramps, landings, etc.).
(v) Flatwork Reinforcing:
a. Fibrous reinforcement admixture acceptable.
b. 6 x 6 – W 1.4 x 1.4 galvanized or stainless steel welded wire fabric acceptable.
c. Curing and Anti-Spalling Compound: Required for exterior flatwork.

(vi) Aggregate: Free of ferrous material which could leach onto the surface.
(vii) As recommended by Geotechnical Engineer.
(viii) Medium broom texture perpendicular to main traffic flow.

C. Pedestrian Unit Pavement 32 14 00
(i) Limit use; subject to Owner's written approval.

D. Pedestrian Aggregate Surfacing 32 15 00
(i) Soil sterilant required
(ii) Provide weed barrier fabric
(iii) Stabilized crusher fines preferred.
(iv) 3" minimum

3. Exterior Steps and Ramps: keep to minimum
4. Pedestrian Pavement Appurtenances 32 17 00
A. Tactile Warning Surfacing 32 17 26: Per ADA requirements
B. Pavement Snow Melting Systems 32 17 43; With written Owner approval only.
5. Plaza and Walkway Lighting 26 56 33
A. Horizontal Illuminance
(i) .8 average
(ii) .2 minimum
(iii) 4/1 uniformity ratio
(iv) LED luminaires preferred

G2040 Athletic, Recreational, and Playfield Areas

1. Athletic Areas
A. Athletic Areas Performance Requirements 01 89 16
(i) Lighting Levels 01 89 16: Confirm with Owner

B. Athletic Surfaces 32 18 00
(i) Baseball Field Surfacing 32 18 23.13
a. Natural grass
b. Synthetic turf acceptable - **Artificial Turf Field Specifications**
c. Stabilized infield mix
i. Dura-edge preferred

(ii) Running Track Surfacing
a. Polyurethane or as approved by BVSD.

(iii) Tennis Court Surfacing 32 18 23.53
a. Sub-surface development for new tennis courts is critical for maintenance of a quality playing surface. The design shall include careful analysis and preparation of the subgrade; post-tensioned concrete courts are preferred. Assure positive site drainage away from courts in all directions. Post-pour leveling is prohibited.
b. **Tennis Courts - Post Tensioned Concrete Overlay 32 1313.21**

(iv) Football Field Surfacing - **Artificial Turf Field Specifications**

C. Athletic Court Fencing
(i) Tennis Court Wind Breaker: Minimize. If windscreens are required, design fence structures for wind loads.
**(ii) Tennis Court Galvanized Chain Link Fencing Specifications 32 31 13.27**

D. Athletic Equipment
(i) Exterior Athletic Equipment 11 68 23
a. Basketball Backstops: Manufacturer as approved by BVSD.
i. Rim at 8'-0" for elementary schools.
ii. Rim at 10'-0" at middle and high schools.
iii. Nylon nets only.
b. Aluminum bleachers shall have a clear anodized finish with manufacturers' standard aluminum non-slip seat and footboards. Consult BVSD for bleacher seating capacity. Permanently anchor to ground. Design for wind load.
**c. Tennis Court Equipment Specifications 32 31 13.30**

(ii) Exterior Scoreboards 11 68 43
a. Provide at High Schools; coordinate with the Owner.
b. LED type.
c. Hardwired with wireless backup.

2. Playfield Areas
    A. Playfield Surfacing
        (i) Synthetic Resilient Surfacing
            a. Synthetic Poured or tile surfaces preferred.
            b. Synthetic turf acceptable
            c. Engineered Wood Fiber with BVSD approval. Drains are required.
            d. Pea gravel prohibited.
    B. Playfield Equipment and Structures 11 68 00
        (i) Playground Equipment 11 68 13
            a. Playground equipment shall be included in the construction contract. Consult BVSD for layout.
            b. Equipment must be installed by a certified installer.
            c. ADA access required.
            d. Avoid steep slopes, open drainage swales and retaining walls.
            e. Exclude motorized vehicles from all playground areas. Provide protected access ways at normal lines of pedestrian traffic.
            f. In paved playground areas requiring installation of tetherball posts or any other posts, require that paving be completed before poles are installed. Provide steel sleeves in concrete that are level with adjacent surfaces.
            g. The site should be developed so that student traffic does not cross or go through service traffic lanes.
            h. Sandboxes prohibited
            i. New playground equipment must be audited by a Certified Playground Safety Inspector hired by the equipment installer.
            j. Wood play structures are generally prohibited.
            k. Paint colors on asphalt and concrete playground surfaces will be limited to white, blue, and yellow only.

G2050 Site Development
1. Fences and Gates 32 31 00
    A. Chain Link Fences 32 31 13: Preferred
        (i) Specifications
            a. All fence materials shall be steel, galvanized by the hot dip process.
            b. Design for wind and snow loads.
        (ii) Standard Boundary Fence Height: 8'-0".
        (iii) Set property line fence post centerline 6 inches inside property line.
        (iv) Mow strip: 12" wide concrete, continuous along fence.
        (v) Gas Meter Enclosure: Provide a fenced enclosure with gate and top around the gas meter; coordinate with Xcel Energy.
        (vi) Provide a 48" high fence around the playground structure area. If on the property line, provide an 8'-0" fence. Provide a 10'-0" wide gate to allow for district maintenance vehicle access.
    B. Gates 32 31 13
        (i) Design for wind and snow loads.
        (ii) Hinges: 180° swing
        (iii) Panic bar exit devices required at playgrounds: preschool and afterschool programs. Coordinate with BVSD.
        (iv) Latches: Fork type for single gate, plunger-bar for double gates. Operation either side, integral padlock eye, plunger-bar strike set in concrete. To facilitate snow removal, where possible set fence line 8'-0" (minimum) away from vehicle pavement.
        (v) 6'-0" width for pedestrians
        (vi) 12'-0" width for vehicles
    C. Alternate types of fencing in lieu of chain link fencing may be considered, particularly at the elementary level, in order to satisfy local and unique conditions. Alternate types of fencing must be carefully evaluated to assure long-term durability, low maintenance, ease of maintenance, proper control and comparable cost to chain link fence. Alternate fences not meeting this criterion may be installed if adjacent property Owners agree to maintain the fence and participate in excess costs of installing the alternate fence type.

(i) Welded Wire Fences and Gates 32 31 16: With BVSD approval
(ii) Decorative Metal Fences and Gates 32 31 19: Prohibited.
(iii) Plastic Fences and Gates 32 31 23: Prohibited
(iv) Wire Fences and Gates 32 31 26: Prohibited
(v) Wood Fences and Gates 32 31 29: With BVSD approval
(vi) Snow fence: prohibited

2. Site Furnishings 12 93 00
   A. Bicycle Racks 12 93 13
      (i) Provide an area for bicycle parking that is accessible, conveniently located, and noticeable.
      (ii) Fence enclosure: verify with Owner.
      (iii) Inverted U bicycle racks with black powder coated finish preferred. Bolt to concrete slab.
      (iv) Minimum quantity: 15% of the school's student capacity.
      (v) Locate as close to the main entrance as feasible.
      (vi) Visitor/staff bicycle parking separate from student parking is desirable.
      (vii) Sheltered parking is desirable.
      (viii) Locate in view of windows within the building for increased security.
   B. Trash and Litter Receptors 12 93 23
      (i) Coordinate with the Owner.
      (ii) Snow dome tops required.
      (iii) Must be wildlife resistant.
   C. Planters 12 93 33: discouraged.
   D. Site Seating and Tables 12 93 43
      (i) Vinyl-coated expanded metal type preferred
      (ii) Mechanically fasten to concrete; Do not embed in concrete.
3. Exterior Signage 10 14 00;
   A. Provide exterior free-standing signage in the contract for new buildings. Electronic signs must have wireless controls. Coordinate with the Owner.
   B. Provide cast aluminum letter signage including address on new buildings; letters shall be large enough to be read from a vehicle on the street
4. Flagpoles 10 75 00
   A. Aluminum, tapered with internal halyard.
5. Retaining Walls 32 32 00 Use is discouraged. Where retaining walls are necessary, they should be held to a minimum height.
   A. Cast-In-Place Concrete Retaining Walls 32 32 13; Preferred type if required.
   B. Precast Concrete Retaining Walls 32 32 16; With Owner Approval.
   C. Unit Masonry Retaining Walls 32 32 19; With Owner Approval.
   D. Segmental Retaining Walls 32 32 23; With Owner Approval.
   E. Metal Crib Retaining Walls 32 32 26; Prohibited
   F. Timber Retaining Walls 32 32 29; Prohibited.
   G. Reinforced Soil Retaining Walls 32 32 34; Prohibited
   H. Gabion Retaining Walls 32 32 36; Prohibited.
   I. Soldier-Beam Retaining Walls 32 32 43; Prohibited.
   J. Stone Retaining Walls 32 32 53; With Owner Approval.
6. Site Bridges 32 34 00: Discouraged. With BVSD approval only.
7. Site Screening Devices 32 35 00
   A. Include visual screening of the delivery, transformer, meters, and trash dumpster areas. Consult BVSD for height.
8. Site Specialties 32 39 00
   A. Metal Bollards 32 39 13
      (i) Provide at building corners with proximity to vehicle access.
      (ii) Concrete-filled, 8" schedule 40 steel preferred.
      (iii) EV charging stations
      (iv) Utility transformers, gas meters,
      (v) 48" height
      (vi) Bolt-down type discouraged

G2060 Landscaping

1. General
   A. Absolute minimal maintenance must be the design objective for any landscaping!
   B. Lawn areas should have a minimum 4" topsoil installed and should be fine graded to finish elevations. The topsoil is to be disked or tilled in to blend with the existing soil.
   C. Specify that the site soil be tested and amended as required.
   D. Avoid berm slopes which make rider-driven machine mowing difficult.
   E. Provide a 3' wide concrete apron adjacent to the outside wall of the buildings wherever lawn or planting areas occur.
   F. Prior to any site work commencing, all existing irrigation must be marked by the contractor. Contractors shall minimize damage to grounds; any damage that occurs must be immediately reported to the District Maintenance Team at 720.561.5143 and must be repaired within 24 hours.
   G. All existing irrigation must be tested, verified, and marked with GC and BVSD.
   H. Contractor-repaired irrigation system wires must be placed in a new irrigation box and properly marked. Use DBR or DBY connectors only.
   I. If damage to existing irrigation systems causes irrigation to be inoperable for greater than 10 days, the Contractor shall protect or replace affected sod and shrubs, like-for-like. Additionally, the Contractor shall be liable for any tree loss in the affected area for a period of three years.
   J. New landscaping shall have a two year warranty, which includes winter watering of trees.
   K. Prior to acceptance all work shall be tested, inspected, and approved by Owner.
2. Pesticides
   A. The use of landscape plantings that require treatment with systemic pesticides, especially neonicotinoids, or have been pretreated with these pesticides is prohibited.
3. Planting Irrigation 32 84 00
   A. Irrigation Pumps 32 82 00
      (i) Precision Pumping Systems or as approved by BVSD
   B. Drip Irrigation 32 84 13
      (i) Extended length pop-up types preferred over drip irrigation.
   C. Sprinkler Systems 32 84 23
      (i) Non-potable irrigation systems must use purple PVC, valve box lids, and irrigation heads.
      (ii) Water Utility Service
         a. For new buildings/sites, a separate irrigation tap is preferred.
         b. For new service taps, use the smallest tap reasonable, as the tap size affects ongoing monthly fees. Consult with BVSD Energy Manager to determine best tap sizes for expected monthly water use; most water utilities have cost ratchets based on use.
         c. Irrigation Water Wells: consult with BVSD
      (iii) Water Distribution Piping
         a. Trenching
            i. To protect BVSD irrigation assets, install 2" of pea gravel over Mainlines and Laterals.
            ii. Uniform and straight.
            iii. 24" (min.) 36" (max.) ground cover to top of pipe for mainline; bed pipes in granular matter. 16" for rotary heads; 12" minimum over lateral lines for spray heads; 12" minimum over control wires and from controllers to valves.
            iv. Trenches shall be made wide enough to allow a minimum of 6 inches between parallel pipelines.
            v. Match original density and grade. Crown for future settlement if original density cannot be achieved.
               - After the system is operating and required tests and BVSD Maintenance inspections have occurred, backfill excavations and trenches with clean soil, free of rubbish and rock.
               - Compact trenches in areas to be planted by thoroughly flooding the backfill. Jetting process may be used in those areas.
         b. Setting: Uniform firm bearing for the entire length of line. Wedging or blocking is prohibited.

c. Thrust Blocking: Required. Approved configurations available from BVSD.
d. Sleeves
    i. Required at all pavement where irrigation lines cross under pavement.
    ii. Use at least 2 nominal pipe sizes larger than irrigation pipe and extend 12" minimum beyond pavement or concrete.
    iii. PVC Class 160 or galvanized heavy wall steel conduit.
    iv. Wiring must be sleeved separately under all pavement or concrete.
    v. Mark/chisel sleeve locations on adjacent pavement and as-built drawings with an “X".

(iv) Water Distribution Equipment
a. Main Line Fittings: PVC Schedule 40 molded; solvent weld type up to 4", gasketed fittings for larger than 2"
b. Master valve and flow sensor wired back to controller required. Consult with BVSD.
c. Copper Pipe: Required between meter and backflow preventer, and from backflow preventer to below ground at drain, Type K . Also required with any booster pump installation.
d. Branch Line Pipe (Intermittent Pressure):
    i. PVC: normal impact class schedule 40 min Schedule 80 may be required where determined by Owner
    ii. Polyethylene: prohibited.
e. Branch Line Joints: Suitable for solvent weld.
f. Branch Line Fittings: PVC: compatible with schedule 40
g. Solvent and Glue: Per pipe manufacturer. No substitutions.
h. Risers
    i. Rotary Head or Quick-Coupler Valve: PVC schedule 80 nipple adjustable double swing joint riser.
    ii. Lawn Spray Head: Same as above. No "cutoff" nipples or plastic fittings shall be used.
    iii. Pipe shall be cut in a standard pipe cutting tool with sharp cutters. Ream only to the full diameter of the pipe and clean all rough edges or burrs. Cut all threads accurately with sharp dies.
    iv. Set to precise elevations 1-1/2" above finish grade and 1" above sodded areas, 1/4" below and 6" away from adjacent pavement and 12" away from building. Set swing joint angles between 20° and 45°.
    v. Sprinkler Heads. Radius 45' to 67': The full and/or part circle sprinklers shall be gear driven rotary, in-ground type and designed with an integral check valve for control of line drainage. Water distribution shall be via two (2) nozzles mounted in a 1 1/2" diameter stainless steel nozzle turret.
    vi. Sprinkler Heads. Radius 4' to 15': The sprinkler shall be of the fixed spray type designed for in-ground installation.
        - The sprinkler as designated shall be manufactured by Rainbird, Hunter, or approved equal.
        - Do not mix head types within a zone.
    vii. Shrub Bubblers
        - Prohibited. Use extended pop-up sprayers.
i. Wiring: Type UF with 4/64" U L-listed insulation for underground burial for class II circuits.
    i. New Irrigation systems:
        - Two-wire decoder system required.
    ii. Existing Irrigation Systems
        - Solenoid: Single color coded 14 gauge wire to each solenoid.
        - Common: White coded wire; 14 gauge permitted for runs up to 1000 lineal feet.
        - Connections: Locate at valve boxes; use DBR or DBY connectors. Buried splices prohibited.
        - Control wire splices will be allowed only in runs more than 500 feet.

- All wire passing under existing or future paving, construction, etc., shall be encased in plastic conduit extending at least 12" beyond edges of paving or construction.
- Run adjacent to the pipe in the same trench. Run at least one additional wire along the main line for each 8 automatic valves in the system. Identify additional wires on "as-built" documents.
- Install control wires at least 18" below finish grade and lay to the side and below the main line.
- Provide looped slack at valves and snake wires in the trench to allow for contraction of wires.
- Tie wires in bundles at 10' intervals.

j. Gate Valves: Cast iron or bronze; rated 150 psi (minimum); waterway equal to full nominal diameter of valve; open counterclockwise; square nut activated at sleeves; wheel handle activated at manhole or open areas.

k. Drain and Semi-Automatic Valves: Bronze, angle type, 200 lb. Class with cross-type operating handles.

l. Quick-Coupler Valves:
   i. Consult with BVSD for locations.
   ii. At the end of the line if the system is not looped or at the lowest point of loop.
   iii. After backflow
   iv. Two at ballfields: near first and third bases.
   v. 2-piece 150 psi rated cast brass with locking rubber lid.

m. Automatic Control Valves: Cast brass body and bonnet globe-type; normally closed, integrally-molded, single-seat, diaphragm-operated, 2-way 24-volt solenoid activated with manual bleed plug and flow adjustment. Atmosphere-vented and 3-way solenoid valves are prohibited.

n. Remote Control Valves: The automatic remote control valve shall be a globe pattern electrically activated, 150 psi rated. Cycolac and glass filled nylon plastic construction. Diaphragm shall be of polyurethane material. Solenoid shall be 3.5 watt, 24 volt A.C. with waterproof-molded coil capable of being removed from the valve with turning coil and twisting wire. Valve shall be equipped with a hand operated flow control stem, a manual bleed plug, and all internal parts shall be serviceable from top of valve without removing the body from the line. Pressure loss at 30 GPM shall not exceed 7.0 psi.
   i. Install isolation ball valve before each control valve
      - Brass or schedule 80 acceptable.

o. Sprinkler Heads:
   i. Large Turf Areas:
      - Hunter I-20s, I-25s and I-40s
      - Rainbird 6504
   ii. Small Turf Areas:
      - Rainbird 1800 series, 4".
      - Hunter Pro series
   iii. Ornamental Areas:
      - Rainbird 1800 series
      - Hunter Pro series
   iv. Protective rubber covers required at all areas except ornamental landscape.

p. Automatic Controller: Baseline 3200X controller. If applicable, use a Baseline 1000X - Confirm with BVSD Grounds prior to installation. Provide **6** extra zones in existing controllers.
   i. Acceptable Controller locations (coordinate with BVSD Maintenance)
      - On exterior wall in stainless steel vandal-proof enclosure
      - Within the grounds storage room or
      - In building with a view toward irrigated areas to the greatest extent possible.
   ii. Locate the rain gauge to prevent vandalism.

iii. Connect remote control valves to the controller in a clockwise sequence to correspond with station setting, beginning with Stations 1, 2, 3, etc.
iv. Coordinate with low-voltage to supply a dedicated communication cable.

q. Backflow Preventer: Febco or Watts, no substitutions
   i. Above-Ground:
      - Atmospheric Vacuum Breaker: Not permitted.
      - Reduced Pressure Principle Vacuum Breaker: Locate in heated, secure structure, installed per manufacturer's specifications and applicable codes.
      - Provide secure lockable metal cage enclosure
      - Provide heat for enclosure at high school level.
   ii. Below Ground: Not permitted.

r. For work at existing sites, test and document irrigation system performance with BVSD personnel present before work begins . This is required.

s. Service Saddles: No saddles permitted.

t. Specify the following extra materials for Owner's stock
   i. One head of each type
   ii. Controller keys, valve keys, quick coupler keys.
   iii. Hose swivels for quick couplers

u. Water Service Connections
   i. Water Distribution Valve: Space valves in manifolds to allow access for repairs. 24" minimum separation.
   ii. Control valves shall be grouped in one location where possible and installed in valve boxes for protection and access; place no closer than 12 inches to walk edges, buildings, and walls.
   iii. In-line anti-siphon check valves shall be installed where needed to prevent drain down of a large portion of the system to a single point.
   iv. Isolation valves: Required to permit maintenance without complete shutdown of system.
   v. Remote Control Valves: Separate valve box required for each valve.

v. Valve Boxes:
   i. Inconspicuous locations only, away from playfields, drive areas, and activity areas. Provide vertical separation to prevent contact with mainline. 10" or 12" bright color polyiron with locking cover and extensions to adjust to grade level.
   ii. Provide purple valve boxes and caps if using raw water.

w. Water Pumping Stations
   i. Pumps (AS REQUIRED): Centrifugal type activated by flow switch or controller relay. Precision Pumping Systems or other approved by BVSD.

x. Water Metering testing required as part of acceptance

D. Contractor requirements
   (i) Contractor shall be responsible for winterizing the irrigation system at the close of the first sprinkling season and for start-up of the system the following spring without being requested by the Owner. Contractor shall use compressed air or an acceptable equivalent to drain the system. Use procedures that are industry standards. Contractor shall adjust the system (sprinkler heads, coverage, etc.) as part of the start-up procedures. Owner shall be notified before draining or the reactivation of the irrigation system by the Contractor.
   (ii) Blow out and initial startup, winterization and spring start up (when Contractor deems necessary to maintain plant material and prevent frost damage to system) are required for work in this section.
   (iii) Settling of backfilled trenches that may occur during warranty period shall be repaired at no expense to Owner including complete restoration of damaged property.
   (iv) Demonstration/walk-through with BVSD personnel required before acceptance.

G2070 Turf and Grasses 32 92 00

1. Contractor is responsible for the first, second and third mowings for newly sodded or seeded areas.
2. Hydro-Mulching 32 92 13; permitted in non-irrigated areas
   A. At high use areas: Prohibited at non-irrigated areas

B. At low use areas: Provide low maintenance, low growing native grass mixes. Consult with BVSD.

3. Plugging is not recommended.
4. Seeding permitted with Owner approval. All native seed mix needs to be compatible for growing in Colorado.
   A. Moutainview 365SS Kentucky Bluegrass, 4lb per 1,000sf OR Vitality HD Sport 2.0, 5lb per 1,000sf.
5. Sodding 32 92 23; Preferred over seeding.
   A. At high use areas: Consult with the Colorado State University Extension Service for bluegrass cultivar mixes that require less water than traditional bluegrass cultivars.
6. Plants 32 93 00;
   A. Plants shall be selected for minimal maintenance and shall not require the use of pesticides and herbicides.
   B. Do not specify plants that have thorns, bear fruit that attracts bees and insects or break easily.
   C. Contractor shall be responsible to replace plants for 2 years
7. Ground Covers 32 93 13
   A. Junipers and Fitzers are prohibited.
8. Shrubs: thorny shrubs prohibited.
9. Trees
   A. The following species are prohibited.
      (i) Silver Maple
      (ii) Siberian/Chinese Elm
      (iii) Cottonwood
      (iv) Willow
      (v) White or Green Ash
      (vi) Russian Olive
      (vii) Crabapple
      (viii) Honey Locust
      (ix) Spruce
   B. Do not specify plants that have thorns, bear fruit that attracts bees and insects, or break easily.
   C. Refer to City of Boulder approved list. Reference: https://bouldercolorado.gov/media/2106/download?inline
10. Planting Accessories 32 94 00
    A. Landscape Edging 32 94 13
       (i) Concrete preferred
       (ii) Soft edge discouraged.
       (iii) Metal prohibited.
    B. Landscape Timbers 32 94 16; Wood type prohibited.
    C. Planters 32 94 33; discouraged
    D. Tree Grates 32 94 43: Use only if trees are located in a pavement area.
    E. Decorative Landscape Boulders: no requirements
    F. Vertical Planting Nets and Grids are discouraged.
    G. Stone Cobble: Rocks must be grouted to prevent removal
11. Landscape Lighting 26 56 26: discouraged.

## G30 LIQUID AND GAS SITE UTILITIES

1. For new construction projects provide and cap water, gas, electric, data, communications, and sewer utilities to 5 feet outside the face of the building to allow for connection of future temporary classrooms. The facility's master plan shall consider location for such temporary classrooms (24' x 60' typical size). For schools that are not built to ultimate capacity in the initial phase, size the utilities to allow for ultimate capacity. Provide for enclosures at meters, transformers, and remote readers, as required by the utility company. Coordinate with BVSD for vaults, locations and contents.

### G3020 Water Utilities

1. For new service taps, use the smallest tap that is reasonable, as the tap size affects ongoing monthly fees.
   A. For new buildings/sites, a separate irrigation tap is preferred.

B. Consult with BVSD Energy Manager to determine best tap sizes for expected monthly water use; most water utilities have cost ratchets based on use.

2. Site Domestic Water Distribution
   A. Water Utility Service: Reduced pressure assembly backflow preventer required.
   B. Water Supply Wells 33 21 00 Prohibited
   C. Water Storage Tanks 33 16 00 no Owner requirements
   D. Water Ponds and Reservoirs 33 47 19
      (i) Enclose with 8' chain link fence
      (ii) Raw water or grey water preferred for irrigation; coordinate with BVSD
      (iii) Water Pond and Reservoir Liners 33 47 13
      (iv) Water Pond and Reservoir Covers 33 47 16

G3030 Sanitary Sewerage Utilities

1. Sanitary Sewerage Utility Connection
   A. Conform to requirements of the water/sewer agency having jurisdiction.
   B. Provide the following Traps/filters
      (i) Grease Traps: Kitchens.
      (ii) Sand Oil Traps: Vehicle Shops.
      (iii) Acid Neutralization: Science laboratories, photo labs, and art facilities.
      (iv) Solids Interceptor: Art facilities.
2. Utility Septic Tanks 33 36 00: Prohibited.
3. Sanitary Sewerage Structures 33 39 00
   A. Sewerage Manholes, Frames, and Covers 33 39 13
      (i) Precast concrete eccentric cone; 36" minimum height with cast-in aluminum ladder rungs (not rebar) at 16" o.c
      (ii) Provide precast concrete manholes at 300' maximum intervals and at all pipe junctions of 6" or larger.
   B. Sewerage Cleanouts 33 39 23

G3040 Storm Drainage Utilities

1. Storm Drainage Utility Connection
2. Storm Drainage Piping 33 41 00
   A. Review drainage study with local jurisdiction.
   B. Protect inlet and outflow with tamper resistant grate to prevent passage of objects larger than four inches.
   C. Whenever possible, roof drains should be conducted through concealed pipes to the city storm sewer system. If a storm sewer is not available, consult with the jurisdiction's wastewater management division for acceptable methods of surface drainage.
   D. Rodent Control: Required at site drainage outlets.
3. Culverts 33 42 00: no requirements
   A. Pipe Culverts 33 42 13
   B. Concrete Culverts 33 42 16
4. Site Storm Water Drains 33 44 00: no requirements
   A. Area Drains 33 44 13
   B. Trench Drains 33 44 16
   C. Storm Water Treatment 33 44 19
5. Storm Drainage Pumps 33 45 00: Prohibited
6. Site Subdrainage 33 46 00
   A. Subdrainage Piping 33 46 16
   B. Drainage Layers 33 46 23
   C. Geotextile Subsurface Drainage Filtration 33 46 26
7. Storm Drainage Ponds and Reservoirs 33 47 26: Perimeter fencing is required.

G3050 Site Energy Distribution

G3060 Site Fuel Distribution

1. Site Gas Distribution 33 41 00: Coordinate with BVSD and XCEL Energy
2. Xcel Energy Gas Capacity Check
   A. When natural gas loads are determined--usually by Design Development--the design team shall verify with PM that a gas capacity check to Xcel Energy has been submitted to confirm capacity and pressure requirements.

G3070 Liquid and Gas Site Utilities Supplementary Components

**G40 ELECTRICAL SITE IMPROVEMENTS**

G4010 Site Electric Distribution Systems

1. Electrical Utility Services 33 71 73
2. Electric Transmission and Distribution 33 71 00.
    A. Electrical Utility Towers 33 71 13
    B. Electrical Utility Poles 33 71 16
    C. Underground Ducts and Manholes 33 71 19
    D. Insulators and Fittings 33 71 23
    E. Transmission and Distribution Equipment 33 71 26
    F. Wiring 33 71 39
    G. Direct Current Transmission 33 71 53
    H. Transmission and Distribution Specialties 33 71 83
3. Electrical Substations 33 72 00
4. Electrical Transformers 33 73 00
5. Electrical Switchgear and Protection Devices 33 75 00
    A. Circuit Breakers
    B. Fusible Interrupter Switchgear 33 77 26
    C. Cutouts 33 77 33
    D. Fuses
    E. Surge Arresters
    F. Shunt Arresters
    G. Reclosers 33 77 53
6. Site Grounding 33 79 00

G4020 Site Lighting 26 56 29

1. Building Illumination is prohibited

**G50 SITE COMMUNICATIONS**

G5010 Site Communications Systems

1. Site Communications Structures 33 81 00: Coordinate the following with BVSD IT personnel
    A. Communications Transmission Towers 33 81 13
    B. Antenna Towers 33 81 16
    C. Communications Utility Poles 33 81 19
    D. Aerial Cable Installation Hardware 33 81 23
    E. Communications Underground Ducts, Manholes, and Hand holes
    F. Communications Vaults, Pedestal, and Enclosures: Precast concrete preferred.
    G. Communications Blowers, Fans, and Ventilation
2. Site Communications Distribution 33 82
    A. Optical Fiber Communications Distribution 33 82 23: Coordinate with BVSD IT personnel

End of Document