Sarasota County Schools

Design Standards 2023

SARASOTA COUNTY SCHOOLS
DESIGN STANDARDS

Table of Contents

SARASOTA COUNTY SCHOOLS
DESIGN STANDARDS

SARASOTA COUNTY SCHOOLS
DESIGN STANDARDS

DIVISION 1 - GENERAL REQUIREMENTS

THE DISTRICT

1. The mission of Sarasota County Schools (SCS), in partnership with families and the community, is to inspire and empower every student to be an innovative, lifelong learner prepared for success in an ever-changing world.

2. The vision is, “Working as one for the success of all.”

3. One of the goals of Sarasota County Schools is to meet the needs and demands of current and future residents and businesses through planning efforts that provide for current student populations, future student demands, and the education needs of Sarasota County.

4. SCS strives to construct “maintenance-friendly”, cost effective schools and facilities.

5. We recognize that operational costs incurred after the project is complete also play a significant role in selecting products and equipment.

6. SCS strives to provide buildings that meet green building objectives. We believe that utilizing renewable products, energy efficient equipment and other items are vital to the long-term performance of SCS buildings.

DESIGN STANDARDS

1. The purpose of this document is to introduce our Design Standards for constructing, remodeling and/or renovating schools and ancillary spaces.

2. It is our goal to establish these standards in an effort to streamline the process of designing and constructing our facilities, to accomplish our mission.

3. This is a “living document” which will be available on the SCS website. Continual review and periodic revisions will take place with resulting changes posted on the SCS website. It has been formatted for ease of use.

4. The intent is to provide a framework for decisions and allowing for creative solutions to be considered and implemented wherever possible.

5. The Design Professional shall write the technical specifications applicable to each assigned project as required to provide a complete set of construction documents while considering these guidelines.

6. Any list of proprietary names is to establish a level of quality, performance, and features, and is not to restrict competition; however, there may be instances where a single source product is required.

7. Deviation from these guidelines shall be allowed only with the express written consent of the Owner.

8. These guidelines are not intended to stifle other approaches and systems.

9. The Design Professional is encouraged to present alternatives to the Owner for consideration.

DIVISION 2 – EXISTING CONDITIONS

ADDING, REPLACING, OR REMOVING EQUIPMENT IDENTIFICATION TAGS

1. If equipment is removed:

    a. The Archibus identification tag, which assists in identifying any item requiring maintenance, is a barcode metal tag that begins with 9029, affixed to the equipment's exterior. When removing the equipment, the equipment's identification tag shall be removed and turned over to the Facilities Zone Manager.

    b. Any equipment to be deleted from a cost center inventory must be surveyed by district personnel to determine if the equipment should be disposed of, stored for reuse, or sent to the SCS fixed assets warehouse for auction. Coordination shall be through the SCS Project Manager assigned to the project.

2. If equipment is added or replaced:

    a. The CM must complete a Facilities Equipment Information Form and email the completed form to the Facilities Data & Business Process Manager with operation and maintenance instructions for the replacement equipment.

    b. The Facilities Data & Business Process Manager in the Facilities Department shall be responsible for adding/updating the equipment and identification tags to the Archibus database system.

3. These procedures are designed to complement the Archibus program.

CONSTUCTION RENOVATION MOLD-RELATED ISSUES

1. Proactive Measures to be included in the project specifications are:

    a. The CM shall have a basic knowledge, acquired through appropriate training and ideally previous experience, of available proactive measures used for preventing development of mold-related issues during completion of typical building construction/renovation projects.

    b. The CM shall be capable of implementing proactive measures typically used for preventing development of mold-related issues during construction/renovation projects. Such proactive measures shall minimally include:

i. Physical isolation of project work from non-work areas (e.g., by construction of effective floor-to-ceiling and wall-to-wall containment barrier systems).

ii. Physical isolation of ventilation system components servicing containment zones (e.g., by effective sealing of supply/return air registers using polyethylene sheeting.)

iii. Negative-pressurization of containment zones (e.g., by use of negative-air devices exhausting HEPA (high-efficiency particulate air filter) filtered directly outdoors.

iv. The CM shall have a basic understanding of implementing mold response strategies by methods in accordance with generally accepted industry guidelines.

v. The CM shall develop a plan of action for response to detection of suspect mold activity should it be discovered during completion of originally contracted project tasks.

CONSTUCTION RENOVATION ASBESTOS-RELATED ISSUES

1. Proactive measures to be included in the project specifications are:

    a. The CM shall have a basic knowledge, acquired through appropriate training and ideally previous experience, of available proactive measures used for identifying and testing asbestos containing materials during completion of typical building construction/renovation projects.

    b. The CM shall be capable of implementing proactive measures typically used for identifying and testing asbestos containing materials during construction/renovation projects. Such proactive measures shall minimally include:

        i. Physical identification of suspect materials

        ii. Notifying the owner of suspect materials

        iii. Coordinating/facilitating testing of suspect materials

        iv. Following SCS asbestos protocols if materials are identified as containing asbestos

DIVISION 3 – CONCRETE

1. The Design Professional and the Owner shall require 48 hours advance notice for all concrete pours.

2. No concrete shall be poured unless a representative of the Design Professional, the Owner, or the Owner's testing agency is present; or the CM has received prior consent to pour without the representative personnel present.

3. Approved admixtures are:

    a. Fly ash

    b. Super-Plasticizer

4. The Owner will pay for initial concrete testing.

5. The CM will pay for retesting of failed materials.

6. The CM will schedule the Owner's testing agency for sampling.

7. Exterior stairways shall be pre-cast concrete set in place with connections as determined by the Design Professional. Cast-in-place concrete stairs shall not be used without the express written consent of the Owner.

8. Interior or enclosed stairways shall consist of either pre-cast concrete or prefabricated steel "pan" stairs with concrete treads.

9. If Tilt Wall Construction is utilized:

    a. All reinforcing steel supports (chairs) shall be 100% plastic or stainless steel to prevent rust staining.

    b. All panel edges shall be chamfered to eliminate erection damage.

    c. For brick veneer tilt-wall, Versaliner is the preferred system. Alternate systems such as Brick Master will be considered; however, it is the responsibility of the installing contract to ensure that the specified brick fits properly into the form liners and the face elevation is consistent. As an option, SCS will consider the use of full-wythe masonry brick in tilt-wall panels. Brick veneers may be the entire panel, or they may only be part (ie: wainscoting, trim, etc.)

10. Where Radon is present, provide the appropriate barrier under slabs.

11. Sidewalks should be a minimum of 4” thick with a 6” thickened edge adjacent to high traffic areas, sodded areas and asphalt areas.

12. Wire mesh is preferred to Fiber Mesh.

13. Sidewalks should have an expansion or control joint at every 20’ minimum.

14. Broom finish is preferred at all exterior sidewalks, stairs, etc.

15. Vapor barriers for all new concrete shall be a minimum of 15 mil and tape shall be a minimum of 6 mil.

16. Radon testing should be done for all fill material and existing material under new slabs on grade.

DIVISION 4 – MASONRY

1. New schools constructed for Sarasota County Schools are preferred to have double-wythe brick exterior wall systems to provide a longer building life cycle, unless an alternative is approved in advance. Alternatives that will be considered are ICF masonry and tilt-wall with brick veneer.

2. Exterior building walls shall be treated to prevent water penetration.

3. Scored CMU and scored stucco shall not be used.

4. Exposed brick walls, if used, shall have an exterior facing of not less than 4" thick wythe of hard burned standard size clay brick, equal to ASTM C-216.

5. Walls shall have 2" cavity with face brick and CMU backers tied together with galvanized extra heavy Dur-O-Wal or equal for cavity walls with drips in center of cavity and be installed on 16" centers vertically. Out to out dimension of side rods shall be approximately 12" for the standard 14" thick cavity walls. Cavity shall have a minimum of 1" thick insulation board built in as the wall is constructed.

6. Provide weep holes in exterior wythe of cavity walls immediately above ledges or flashing, spaced 2'-0" o.c. Insulation shall be a minimum of 1” thick Styrofoam SM or equal adhered to CMU with Styrofoam insulation mastic No. 11.

7. SCS prefers Total Flash system, or equal in cavity walls.

8. Bricks shall be guaranteed against efflorescence.

9. All exposed masonry wall joints shall be struck and pressed. Raked joints are not permitted.

10. The CM shall construct a sample masonry panel as part of the new construction prior to start of masonry work to demonstrate laying-up of a typical 4” thick brick faced cavity type masonry wall with 8” CMU backing, Dur-O-Wal wall ties and 2” thick insulation. Wall shall be 4’ high and shall have a right-angle corner with 6’ and 4’ legs. Upon approval of this sample wall, it shall serve as an example for all masonry work. Any rejected wall samples shall be torn down, the debris removed, and a new wall constructed. Under the above conditions, a portion of the building wall may be used as the sample.

11. In the selection of masonry components, it shall be the Design Professional’s responsibility to make certain that the brickwork and CMU course out properly to provide through joints to receive the joint reinforcing and work out with standard size insulation boards.

12. The CM shall build in all required metal inserts and anchors in masonry for work of all trades.

13. Masonry control joints shall be galvanized or copper and shall be located by the Design Professional and clearly shown on the architectural plans.

14. Stainless or copper flashing is preferred; however, flexible flashing is acceptable if required by budget.

15. Masonry walls at mechanical room locations should be insulated.

DIVISION 5 – METALS

1. Exposed steel or ferrous metal shall not be used on the exterior of any building or structure unless hot dipped galvanized after fabrication.

2. Structural steel lifting beams shall be provided above heavy equipment for removal or servicing. A suitable sign shall be provided and fixed to each beam with safe capacity of beam and points of attachment (structural steel shall be used to accept steel beam clamps).

3. A/E shall use care in the use of metal, whether ferrous or non-ferrous, and corrosive action that may occur with adjacent material. Special care shall be used in the presence of corrosion due to chlorides and the salty and humid atmosphere of this county.

4. Concrete filled steel pan stairs shall be used only in the interior of a building in an exposed condition. All pans to be coated with bituminous coating where in contact with concrete

DIVISION 6 – WOOD, PLASTICS, COMPOSITES

1. Countertops and backsplashes with sinks shall be plywood, constructed to AWI Standards.

2. All wood that comes in contact with concrete must be pressure treated.

3. No fire-treated wood to be installed in student occupied areas.

4. Pulls on cabinets shall be metal, not plastic. All exposed hardware shall have a brushed chrome finish.

5. Cabinet locks shall be provided in all Clinic and Science Lab casework. Locksets preferred are CompX Timberline and CompX National brands. Keys for casework shall be transmitted to the Project Manager at Substantial Completion.

6. Caulk all cabinets and countertops.

7. Wood blocking must be installed for all wall-mounted door stops and/or bumpers.

8. Cabinet bases shall be 4" high, ¾" CDX pressure treated.

9. Metal (not plastic) shelf supports are preferred.

10. No cabinets shall have shelves over 36" long.

11. Overhead cabinets should be a minimum of 12" deep.

12. Casework glazing shall be at least ¼" tempered glass (doors and/or shelves).

13. All custom cabinet work shall be constructed of plywood with a high-pressure plastic laminate finish, shall be constructed to AWI premium grade standards, and shall have concealed fasteners and concealed adjustable European type hinges. (Five knuckle hinges may be used with prior approval from Facilities.) Tops shall be plywood with laminate at wet areas. All other cabinets shall be high density particle board with plastic laminate. Plastic laminate preferred is Wilsonart or Formica brands. Solid surface countertops are required in science and other specialty locations.

14. Particle board shall be Fir, industrial grade, Roseburg or equal. Ceiba, Suma, and Virola brands of Banack are not acceptable.

15. All cabinet work shall comply with California Standard 93120 for Formaldehyde levels.

16. Supports for shelving, attached to walls, shall be securely fastened to wood furring strips with wood screws through wall finish or with bolts and metal expansion shields

into masonry. Supports shall not be over 24" o.c. All metal work and fastenings shall be non-ferrous. Shelving shall be adjustable.

17. All drawer slides shall be rated for 75 lbs. or greater.

18. All file drawer slides shall be rated for 150 lbs. or greater when fully extended.

19. All open shelves and counter tops shall have a 1" minimum radius at all exposed corners.

20. Edge banding material preferred is glue applied, no thicker than 1 mm.

21. For Musical Lab instrument storage:

    a. The preferred musical storage shall be FFE

    b. If custom casework is required/desired, it should be reviewed with Facilities during the submittal process

22. For Media Center casework:

    a. Shelving shall be provided by the Owner. The shelving units shall be a minimum of 48" high. Freestanding units shall not be more than 48" high. Wall units may be up to 72" high, except in the Everybody Book Section. All shelves shall be 12" deep and shall provide a minimum 13" of vertical clearance.

    b. The Media Center design shall not have windows with a sill height that prevents the installation of 48" high wall mounted shelving units.

    c. In each elementary school, an "Everybody Book Section" shall be provided. This section shall have 48" high wall mounted units forming an "L" in one corner of the media center and 48" high double-sided mobile units forming an "L" on the other sides to complete the section that is generally square shaped. A minimum of 1600 linear feet of shelving is required, with three shelves required per shelf unit. This section shall be observable from the checkout desk for supervisory purposes.

    d. The layout of the freestanding shelves shall be such that aisles between them are observable from the checkout desk for supervisory purposes.

DIVISION 7 – THERMAL & MOISTURE PROTECTION

1. GENERAL

    a. Kitchen Dry Storage rooms and Cooler/Freezers require additional insulation and a vapor barrier.

    b. Dry Storage room set point shall be 74 degrees F.

    c. All attics shall be of the non-ventilated type.

2. MOISTURE PROTECTION

    a. This section left blank for consideration of vapor barriers, sealants, etc.

3. ROOFS

    a. It is a requirement of the School Board Roofing committee that the Project Design Professional follow these guidelines.

    b. Only Torch Applied Modified Bitumen Roofing membrane system is to be utilized on new construction and on re-roofing projects for low-sloped roofs. Single-ply roof systems, coal tar pitch and asphalt built-up roofing membrane systems with conventional felts shall not be installed on Sarasota County School District projects.

    c. The following are the modified bitumen roofing membrane systems that are currently approved by SCS:

        i. Siplast Paradien 20 TG or equal

        ii. No substitutions will be approved. Any manufacturer of a similar modified bitumen membrane roofing system may apply to the Roofing Committee for approval. However, any manufacturer waiting until a project is being bid should not expect to become approved for that project.

    d. The preferred deck system for new construction and for re-roofing projects, as applicable, is lightweight insulating (cellular) concrete over tapered expanded polystyrene insulation.

e. Sheet metal coping shall be stainless steel (minimum 26-gauge) with welded corners.

f. Joints shall have cover plates.

g. The terminal edges of the roofing membrane shall be carried well above (eight inches minimum above the finished roof surface) the level of possible standing water (or wind-driven water) to have access to such edges. This speaks to vertical interruptions to the roofing membrane such as at parapet walls, roof curbs for penetrations of the roof for mechanical equipment, ducts, chimneys, piping, etc. – or for supporting framework on top of roofs.

    i. One exception to item g. above is situations where the roofing membrane terminates at the bottom of a slope spilling water into gutters or onto the ground. There, of course, the edge of the roofing membrane cannot be extended to a point eight inches minimum above the level of the adjoining deck or where water can have access. An exception also is where gravel stop situations occur.

h. The termination of roofing membrane edges at parapets, roof curbs, equipment supports, etc., must be behind and “up and under” the metal counter flashing by a minimum of four inches. That is, four inches of the eight inches of flashing height is to be covered by counter flashing.

i. The counter flashing must be continuous. The final counter flashing ultimately must be made of metal to transition from the “horizontal” roofing membrane into other construction.

j. Metal flashing should always be utilized for the transition. Such metal flashing should meet these requirements:

    i. Must be in maximum single piece lengths as practical.

    ii. Must be joined by sizeable overlapping cover plates and designed in a manner to allow for adequate thermal movement.

    iii. Should never terminate at the ends in a manner difficult to make watertight.

    iv. The Design Professional must detail all of these conditions.

v. Must be of long-life metal, stainless steel (minimum 26 gauge.)

vi. Must be clearly and properly detailed in accordance with SMACNA guidelines.

vii. Must follow the details prepared by the manufacturer of the modified roof system.

k. There are two drainage situations for roof systems:

i. In situations where a gutter does not exist and it is not desired for water normally to run over the edge, a few feet inboard from the eave edge, a reverse slope upward should be built-in by sloping the deck or the use of tapered insulation, etc. This raises the edge of the eave and returns the water to the valley between the two slopes.

ii. When a gutter occurs and/or it is desired that water run over the edge of the eave in a somewhat uniform distribution, a raised edge is not appropriate. Gutters will be sloped to provide adequate drainage. Downspouts to be sized to provide adequate drainage. The condition of allowing water to run over the edge is generally an unsatisfactory solution. Providing roof drains in the formed valley are the first choice. Installing gutters and downspouts are the second choice. Valleys shall have positive drainage between drain locations.

l. Position roof drains in the valley where most practical to drop directly and vertically into a pipe or conductor to the ground.

m. Vertical conductors should not be built into masonry. Roof drains and connections shall be shown on the plumbing drawings. Internal drain locations should not be at or near columns.

n. Positive drainage is required.

o. Gutters and downspouts: When exterior gutters and downspouts are needed, the following requirements must be met:

i. Do not use standard Ogee gutters from “off the shelf” services.

ii. Size gutters and downspouts to handle the quantity of water in accord with code. Select gauge, types of metal, support details and finish. Determine support strapping and anchorage clearly detailing and specifying such.

iii. Space downspouts to accommodate quantity of water per code. Provide for positive slope during the installation of the gutters to prevent ponding

within the gutters.

iv. Downspouts and gutters shall be customized in design rather than the common molded lightweight type for residences. Gutters shall be designed to have a higher inner edge to be installed at least two inches up behind gravel stop and the outer edge must be sufficiently lower so water will spill out of the gutter before it reaches the height of the inner edge and thus avoid water entering the overhang or roof deck construction. Gutters shall not be designed as integral with the gravel stop.

v. Gutters and downspouts shall be seamless using 24 gauge galvalume or 26 gauge stainless steel, except downspouts shall be 3/16" manufactured aluminum where the location may allow damage to occur.

vi. In-board locations necessitate "horizontal" runs of roof drain piping. These are costly, and frequently need to be quite sizeable (6" to 8" and even larger). Further, code and practicality necessitate maintaining a constant slope, which creates a serious clearance problem. In-board locations requiring "horizontal" runs of roof drain systems necessitate insulation of such piping to eliminate condensate. In-board locations requiring "horizontal" runs of roof drain systems necessitate insulation of such piping to eliminate condensate.

p. Roofing slope/tapered insulation:

i. On new construction, "low slope" roofs shall have minimum slopes of ¼" per horizontal foot.

ii. It is generally agreed that it is more economical and practical in new construction to achieve the slope by building slopes into the structure instead of by tapering the thickness of roof deck construction or adding tapered insulation on top of flat decks.

iii. In re-roofing dead level roof decks, tapered insulation may be the practical solution. When tapered insulation is specified, the Project Design Professional is to provide sufficient detailing and layouts.

q. Windloads/Anchorage of Roofing: Design roof uplift anchorage shall be in accordance with ASCE 7-10 or as required current FBC. The Project Design Professional shall be responsible to properly determine required uplift resistance, specify uplift anchorage and to endeavor to insure such is provided during construction. Specifications shall address the application rate of insulation or base sheet fasteners at the corners, perimeters and field of the

roof. The size of the corners and perimeter widths shall also be specified.

r. Roofing system manufacturers shall provide minimum 20 year “no dollar limit” warranty using form included in specification 07 52 00, covering both material and labor for repairs or replacing the roof if it should fail.

s. Roofing contractors shall provide minimum 5-year warranty for workmanship and materials to run concurrently with manufacturer warranty.

t. The roofing manufacturer’s representative shall make at least one inspection per week during construction or more often if problems occur. Such representative shall promptly submit a written report for each inspection to the Project A/E.

u. Manufacturer shall designate a local roofing contractor to make leak repairs within 24 hours of notification or manufacturer shall approve the SCS Facilities Department in-house roof repair crews/designee make emergency repairs.

v. Manufacturer shall provide training for in-house crews/designee for qualified repairs.

DIVISION 8 – OPENINGS

STOREFRONTS

1. Aluminum framed storefronts and curtain walls shall not be used without the express written authorization of the Owner.

DOORS AND FRAMES

1. Heads of exterior steel doors shall have a closure channel to preclude water entering it and shall be watertight.

2. Steel door frames shall be fabricated of high-grade cold rolled galvanized steel, no less than 16 gauge, except in areas of high use such as cafeterias, gyms, locker rooms, auditoriums, gang toilets, and exterior hallway entrances, which shall be no less than 14 gauge.

3. Head joints shall be mitered and welded through and through across the entire frame section to the frame and shall be of sufficient size to stiffen frame and to support the loads imposed. Reinforcement shall be not less than 10 gauge.

4. Wood doors shall be five (5) ply or seven (7) ply frames laminated block or strip wood core, solid flush construction. The bond between the veneer plies and between veneer, frame and core unit shall be Type 2 (water-resistant bond) for interior doors. Interior doors shall be guaranteed for the life of the building, and a certificate shall be furnished for each type of door.

5. All doors shall be single doors with full frames for each door, except where required to pass large equipment or furniture. The use of double doors or pairs will not be permitted unless approved during design. Where double doors are approved, a key-controlled, removable steel mullion shall be installed to preclude forcible entry.

6. Each kitchen and food service room shall have at least one ceiling height door adequate to pass refrigerators and other high equipment. These doors shall be double (2-3/0) width doors, with a key-controlled, removable mullion or a single 4/0 door.

7. The design of the kitchen/serving area shall avoid the use of the fire-rated roll-up doors.

8. All exterior hollow metal doors shall have top and bottoms pre-primed with a rust-resistant paint prior to installation.

9. For new construction, provisions for access control shall be included for exterior doors and frames. For renovation, match the existing system at the project location. Check with Security for these provisions.

WINDOWS

1. Hopper vents or projecting vents of windows within 6'-0" of the floor shall not extend into passages or room beyond the wall line at jambs.

2. The Media Center design shall not have windows with a sill height that prevents the installation of 48” high wall mounted shelving units.

3. Where hurricane shutters are used internal to the window, they shall be white or a highly reflective color. Dark or medium bronze shall not be used.

4. Exterior windows should be located at a height of 4’ above finished floor or greater, for safety purposes.

HARDWARE

1. General

    a. The Contractor shall complete hardware schedule, including catalog sheets for each item of hardware. A complete set of instructions for installation and adjustment shall be furnished following final approval.

    b. On main exit doors, kitchen, storerooms, and other doors subject to heavy use, extra-large kick plates shall be used.

    c. Furnish labor and material to complete hardware work indicated, as specified herein, or as may be required by actual conditions at building.

    d. Include all necessary screws, bolts, expansion shields, other devices, if necessary, as required for proper hardware application. The hardware supplier shall assume all responsibility for correct quantities.

    e. Hardware shall meet the requirements of Federal, State and Local codes having jurisdiction over this project, notwithstanding any real or apparent conflict therewith in these Design Standards.

    f. The supplier shall be a directly franchised distributor of the products to be furnished and have in their employ an AHC (Architectural Hardware Consultant). This person is to be available for consultation to the Architect, Owner and Contractor at reasonable times during the course of work.

g. The finish hardware supplier shall prepare and submit to the Contractor for approval by the Owner and Architect, a complete Hardware Schedule identifying each door and each set number, following the numbering system provided by the Owner. No separate numbering systems will be accepted.

h. Approval of schedule will not relieve Contractor of the responsibility for furnishing all necessary hardware, including the responsibility for furnishing correct quantities.

i. No manufacturing orders shall be placed until the Hardware Schedule has approved.

j. Upon approval of the Hardware Schedule, furnish templates required by manufacturer to provide for accurate fitting, finishing hardware setting. Furnish templates in ample time to facilitate progress of work.

k. Hardware supplier shall have an office and warehouse facilities to accommodate the materials used on each project.

l. The hardware supplier must be an authorized distributor of the products specified.

m. Wiring diagrams and elevation for electronic hardware to be provided with submittals.

2. Acceptable Manufacturers

a. To the extent possible, obtain each kind of hardware from one manufacturer.

b. The following manufacturers, models, and products is the basis of design:

Product	Manufacturer	Acceptable Substitute
Hinges	Ives	McKinney, Hager, Bommer
Cylindrical Locks	Schlage	Owner Approval Required
Electronic Locks	Schlage/Von Duprin	Owner Approval Required
Cyliners, Keys	Schlage Primus XP	NONE
Exit Devices	Von Duprin	Owner Approval Required
Keyed Mullions	Von Duprin	Owner Approval Required
Door Closers	LCN	Norton
Overhead Stops/Holders	Glynn Johnson	Rixson
Magnetic Hold Opens	LCN	Dor-O-Matic
Wall Stops	Ives	DCI, Rockwood
Floor Stops	Ives	DCI, Rockwood
Flushbolts	Ives	DCI, Rockwood
Kick Plates	Ives	Quality, Rockwood
Thresholds	National Guard	Pemco, Zero
Weatherstrip	National Guard	Pemco, Zero
Silencers	Ives	Rockwood, Glynn Johnson
Key Cabinet	HPC KEKAB 160x	NONE
Key Cabinet, Electronic	Key Tracker KTA 32 Key Module	NONE

3. Finish of Hardware

    a. Exterior Hinges to be Stainless Steel (32D)

    b. Interior Hinges to be Satin Chrome (26D)

    c. Door Closers to be Aluminum

    d. Locks to be Satin Chrome (26D)

    e. Exit Devices to be Satin Chrome (26D)

    f. Overhead Holders to be Satin Chrome (26D)

    g. Flat Goods to be Satin Chrome (26D) or Stainless Steel (32D)

    h. Thresholds to be Mill Finish Aluminum

4. Locksets

a. Locksets shall be heavy-duty Cylindrical type, Grade 1, series 4000 unless specified otherwise, in “ND” series, Rhodes design as manufactured by Schlage Lock Company.

b. Deadbolts shall be heavy-duty Grade 1, B600 series IC core by Schlage Lock Company.

2. Rim and Mortise cylinders are to be IC core.

a. LOCK FUNCTIONS — SCHLAGE NUMBER

i.	Exterior Classrooms	ND80EUPD
ii.	Interior Classrooms Corridor	ND80PD
iii.	Corridor Staff Toilet	ND80PD
iv.	Classroom Adjoining Interior	ND82PD (Owner spec)
v.	Storeroom-Closet	ND80PD
vi.	Admin Office	ND75PD-ND80PD (Owner Spec)
vii.	Mechanical, Electrical	ND80PD
viii.	Bathroom – Elementary	ND44S K thru 3
ix.	Bathroom	ND40S
x.	Passage	ND10S
xi.	Gang toilets	B663J

b. All electronic locking hardware types and manufacturers to be determined by the SCS Safety and Security Department.

5. Exit Devices

a. Exit devices shall be Von Duprin 98 and CD98 Series in types and functions specified. All devices must be listed under “Panic Hardware” in accident equipment list of Underwriters Laboratories.

b. All labeled doors with “Fire Exit Hardware” must have labels attached and be in strict accordance with Underwriters Laboratories.

c. All exit devices shall be tested to ANSI/BHMA A156.3 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 1,000,000 cycles must be provided.

d. All surface strikes shall be roller type and come complete with a plate underneath to prevent movement and shall be provided with a dead-latching feature to prevent latchbolt tampering.

e. Exit devices shall have deadlatching and cylinder dogging where specified.

f. Provide VonDuprin XP series at exterior openings. No acceptable substitutions. Any deviation from this requirement requires Owner approval.

7. Door Closers

a. All closers shall be LCN 4011/4111 series having non-ferrous covers, forged steel arms separate valves for adjusting backcheck, closing and latching cycles and adjustable spring to provide up to 50% increase in spring power. Closers shall be furnished with parallel arm mounted on all doors opening into corridors or other public spaces and shall be mounted to permit 180 degrees door swing wherever wall conditions permit. Furnish with non-hold open arms unless otherwise indicated.

b. Door closer cylinders shall be of high strength construction to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.

c. Door closers shall utilize temperature stable fluid capable of withstanding temperature ranges of 120 degrees Fahrenheit to -30 degrees Fahrenheit, without requiring seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with the standards UBC 7-2 (1997) and UL 10C.

d. Door closers shall incorporate tamper resistant non-critical screw valves of V-slot design to reduce possible clogging from particles within the closer. Closers shall have separate and independent screw valve adjustments for latch speed, general speed, and hydraulic backcheck. Backcheck shall be properly located so as to effectively slow the swing of the door at a minimum of 10 degrees in advance of the dead stop location to protect the door frame and hardware from damage. Pressure relief valves (PRV) are not acceptable.

e. Acceptable substitution for LCN closers is Norton PR7500

8. Hinges and Pivots

a. Exterior butts shall be Stainless Steel.

b. Butts on out-swinging doors shall be furnished with non-removable pins (NRP).

c. Interior butts shall be as listed.

d. Doors 5’ or less in height shall have two (2) butts. Furnish one (1) additional butt for each 2’6” in height or fraction thereof. Dutch doors shall have two (2) butts per leaf.

9. Trim and Plates

a. Kick plates, mop plates, and armor plates, shall be .050 gauge with 32D finish.

b. Kick plates to be 10” high, mop plates to be 4” high.

c. All plates shall be two (2) inches less full width of door.

d. On main exit doors, kitchen, storerooms and other doors subject to heavy use, extra-large armored plates shall be used.

e. Push plates, pull plates, door pulls, and miscellaneous door trim shall be shown in the hardware schedule.

10. Doorstops

a. Doorstops shall be furnished for all doors to prevent damage to doors or hardware from striking adjacent walls or fixtures.

b. Wall bumpers equal to IVES WS407 Series are preferred, but where not practical furnish floor stops equal to IVES FS436 or FS438 series.

c. Where conditions prohibit the use of either wall or floor type stops, furnish surface mounted overhead stops equal to Glynn Johnson, 450 Series.

11. Door Silencers:

a. Furnish rubber door silencers equal to IVES SR64for all new interior hollow metal frames, (2) per pair and (3) per single door frame.

12. Fire-rated Openings

a. Provide hardware for fire-rated openings in compliance with A.I.A. (NBFU) Pamphlet No. 80, NFPA Standards NO. 101, UBC 702 (1997) and UL10C. This requirement takes precedence over other requirements for such hardware.

b. Provide only hardware that has been tested and listed by UL for the types and sizes of doors required and complies with the requirements of the door and door frame labels.

c. Panic exit devices are required on fire-rated doors, provide supplementary marking on door UL label indicating Fire Door to be equipped with fire exit hardware and provide UL label on exit device indicating “Fire Exit Hardware”.

13. Exterior Openings

a. Provide hardware for hurricane openings in compliance with local jurisdiction. This requirement takes precedence over other requirements for such hardware.

b. Provide only hardware that has been tested and listed by local authority for the types and sizes of doors required and complies with the requirements of the door and door frame.

14. Fasteners:

a. Hardware as furnished shall conform to published templates generally prepared for machine screw installation.

b. Furnish each item complete with all screws required for installation. Typically, all exposed screws installation.

c. Insofar as practical, furnished concealed type fasteners for hardware units that have exposed screws shall be furnished with Phillips flat head screws, finished to match adjacent hardware.

d. Door closers (4 each) and exit devices (2 each) to be installed with closed head through bolts (sex bolts).

15. Keying

a. Locks and cylinders shall be 11 Pin Schlage Primus XP key system level III, with ID card for duplication.

b. All key quantities to be provided by Owner for factory order.

c. All keys to be Patent Restricted.

d. Provide 100 % expansion bitting list as designed by Owner.

e. Hardware supplier to provide temporary cylinders or cores during the construction phase with 30 construction keys supplied. Contractor to change out the temporary cylinders for the permanent cylinders.

f. Locks on rollup doors, elevators, key removable mullions, and mechanical exit devices shall be keyed to the school system with interchangeable core.

g. Permanent keying shall be done by Schlage factory keying department.

h. Deliver all PrimusXP keys and permanent cores to:
   i. SCS - Locksmith
   ii. Marvin Miller – James Dawson
   iii. 351 Old Venice Rd
   iv. Osprey, FL 34299
   v. 1-941-966-7233

16. Key Cabinet

a. New schools and renovated office areas shall be furnished with 2 separate types of key cabinets: one (1) HPC KEKAB 160X and one (1) KeyTracer KT32, installed in locations designated by the Owner. All mounting, electrical, and data requirements to be provided by the Contractor.

b. Set up and index one (1) Key Cabinet that allows room for expansion for 150% of the number of keys for the project.

c. Key cabinet to be indexed and “set up” by the direction of SCS Construction Services Department Project Manager in coordination with SCS Safety & Security Department.

17. Delivery, Storage, and Handling:

a. Wrap and protect finishing hardware items for shipment.

b. Deliver to manufacturing contractors hardware items required by them for their application; deliver balance of hardware to job.

c. Store hardware in designated location(s).

d. Mark each item with its intended location.

e. Contractor shall protect the hardware, as it is stored on construction site in a covered and dry place.

f. Contractor shall protect exposed hardware installed on doors during the construction phase.

18. Installation

a. All hardware shall be applied and installed in accordance with the Finish Hardware schedule.

b. Care shall be exercised not to mar or damage adjacent work.

c. Contractor to provide a secure lock-up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items that are not immediately replaceable, so that the completion of the work will not be delayed by hardware losses both before and after installation.

d. The hardware manufacturers of locks, panic devices and closers are to supply both a pre-installation class as well as a post-installation walk-thru with installer and school board locksmith. This is to ensure proper installation and provide adjustments or replacements of hardware as required.

e. Contractor shall adjust all hardware in strict compliance with manufacturer's instructions.

f. Prior to turning project to owner, contractor shall clean and make any final adjustments to the finish hardware.

19. Warranty

a. The material furnished shall be warranted for one year after installation or longer as the individual manufacturer's warranty permits.

b. The manufacturer against failure due to defective materials and workmanship shall warrant overhead door closers in writing for a period of ten (10) years. Commencing on the Date of Final Completion and Acceptance, and in the event of failure, the manufacture is to promptly repair or replace the defective with no additional cost to the Owner.

This hardware schedule was prepared by:

Ingersoll Rand Security Technology
735 W. SR 434, Suite H
Longwood, FL 32750
Ph: 407-571-2000
Fax 407-571-2006

DIVISION 9 – FLOORING

1. SCS developed a comprehensive flooring plan for all District facilities to obtain the best products, prices, service, and warranties, and obtained State contract pricing.

2. The attached Flooring Matrix provides the Design Professional and CM with a comprehensive list of products, applications, sizes, and in some cases, even color selections for all flooring types.

    a. The Design Professional should specify flooring materials from Flooring Matrix.

    b. The CM shall price and provide flooring materials from the Flooring Matrix.

    c. Any deviation from the Flooring Matrix must be approved by SCS Facilities & Operations.

3. The process for procuring these materials via Direct Purchase Order (DPO) is:

    a. The CM shall include the flooring quantities and cost information when compiling the GMP, using the State contract rates for the items, and obtain a quote from the State approved vendor.

    b. Upon Board approval of the GMP, the CM will request the DPO from the Owner and provide order details.

    c. SCS will issue the DPO to the vendor and the amount will be deducted from the CM's contract via Change Order (CO.)

4. The CM is responsible for providing all materials, quantities, installation, and warranty.

5. Polished/stained concrete may be considered in specific areas such as labs, shops, art rooms, cafeterias, etc. Prior approval by Facilities is required.

DIVISION 9 – PAINTING

1. General

    a. The information contained in this document is intended to serve as the minimum Design Standard for new and renovation construction projects and maintenance related work.

    b. Florida Paints and the respective products listed herein shall be used as the Basis of Design (BOD). The alternative manufacturers listed below shall be considered equal providing all warranties (mandatory), manufacturer required project participation throughout each project (mandatory), and all other stipulated requirements are being provided by the alternative selected manufacturer. Should any manufacturer not be able to completely fulfil all manufacturer requirements, this shall be cause for rejection and selecting a manufacturer that can fulfil all stipulated requirements at zero added cost to Sarasota County Schools shall be required. Alternate manufacturers are Benjamin-Moore Company, Master Builders Solutions (formally BASF), PPG Industries, Inc. and Sherwin-Williams.

    c. Submittals shall include a sample of the contractor's warranty.

    d. Submittals shall include manufacturer’s letter of intent to provide the specified warranty.

    e. Contractor shall provide project-specific sample warranties from manufacturer in the submittal of products. All manufacturer warranties shall be non-prorated.

    f. Paint finish preference is semi-gloss for walls, doors and frames.

    g. Paints shall be formulated to resist the growth of mildew and algae on the paint film surface.

    h. Contractor shall provide 5 gallons of each color and material used for attic stock or as reasonably necessary based on the project size.

2. Warranty

    a. Manufacturer Warranty:
        i. All exterior systems shall be mildew, fade and stain resistant and shall carry a minimum 10-year labor and material warranty excluding vandalism, mechanical damage or acts of God.

ii. All interior systems shall carry a 5-year warranty excluding vandalism, mechanical damage or acts of God.

b. Contractor Warranty:

i. Provide a minimum 5-year duration applicator warranty which covers all aspects of the paint/coating system. This shall include all preparation of substrates, elastomeric patching compounds, sealant and other work necessary to complete the project including providing water penetration resistance of the applied paint/coating system for the exterior applications. The warranty shall exclude vandalism, mechanical damage or acts of God.

3. Manufacturer shall provide a list of painted surfaces and their corresponding color name and number in a maintenance packet. Manufacturer shall provide a maintenance packet and touch-up procedures for all finishes over various substrates [e.g., stucco, concrete masonry unit (CMU), metal doors and frames, etc.]. All such information shall be provided on a building-by-building basis and included in the Closeout Documents.

4. A manufacturer's representative shall be required to (1) attend a pre-application meeting, (2) visit the project a minimum twice per week throughout the duration of the project and provide a written report within 2 days of each site visit, (3) conduct a final inspection on each building and provide a written punch list report within 2 days of the inspection, and (4) repeat the final inspection until such time a report provided within 2 days of the inspection indicates zero deficiencies are noted. These requirements are mandatory.

5. All paint and coating shall be applied at the manufacturer's published spread rate as required to achieve the minimum dry film thickness (DFT) per the manufacturer's published recommendations. Project-specific substrates and textured surfaces/finishes must be reviewed and considered by the manufacturer as required to ensure pinhole-free paint finishes are achieved.

6. Exterior Paint Schedule

a. Concrete, Stucco: Provide the following finish systems over exterior concrete, stucco surfaces. Acrylic Finish: 2 coats over a primer.

i. 1st Coat: Florida Paints #3850 SunFlex Concrete and Masonry Primer.

ii. 2nd and 3rd Coats: Florida Paints #1120 Legacy Premium 100% Acrylic
Wall and Trim Finish-Satin.

b. Concrete Masonry Units: Provide the following finish systems over exterior concrete masonry units.
   i. 1st Coat: Florida Paints #3550 Fortifill Acrylic Masonry Filler.
   ii. 2nd and 3rd Coats: Florida Paints #1120 Legacy Premium 100% Acrylic Wall and Trim Finish-Satin.

c. Alternate High Build System, Stucco: Provide the following finish systems over exterior concrete; Stucco: 2 coats over a primer.
   i. 1st Coat: Florida Paints #3850 SunFlex Concrete and Masonry Primer.
   ii. 2nd and 3rd Coats: Florida Paints #1820 SunFlex 100% Acrylic Hi Build/Coating - Total system film thickness to be no less than 7.9 MILS DFT.

d. Elastomeric coating systems may be used for project-specific applications when approved in writing by Sarasota County Schools. Elastomeric coating shall not be applied to overhead surfaces (e.g., soffits, etc.) or flat surfaces which do not promote free, unobstructed water shedding.

e. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.
   i. Acrylic-Enamel Finish: 2 finish coats over a rust-inhibitive primer.
   ii. Touch-up existing primer with matching primer or prime unprimed metal with Florida Paints #5450 Ironman Alkyd Metal Primer.
   iii. 2nd and 3rd Coats: Florida Paints #5340 Aquatra Industrial DTM Acrylic Enamel.

f. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated (galvanized) metal surfaces.
   i. 1st Coat: Florida Paints #5350 Aquatra Industrial DTM Acrylic Primer.
   ii. 2nd and 3rd Coats: Florida Paints #5340 Aquatra Industrial DTM Acrylic Enamel.

g. Exposed Metal Decking: Florida Paints #8800 Waterbourne Latex Dryfall.

7. Interior Paint Schedule

a. Concrete: Provide the following paint systems over interior concrete floor surfaces scheduled to be sealed.
    i. 1st Coat: Florida Paints #6920 Series Color and Seal Solvent Based Solid Color Concrete Sealer.
    ii. 2nd and 3rd Coats: Florida Paints #6920 Series Color and Seal Solvent Based Solid Color Concrete Sealer, full strength.
    iii. Concrete sealing floor/horizontal surfaces requires a minimum CSP - 2 surface profile. Follow manufacturer's preparation recommendations.
        1. Broadcast fine carborundum between first and second coat apply at rate of 10 LBS per 100 SF.

b. Concrete Masonry Units: Provide the following finish systems over interior concrete masonry block units.
    i. 1st Coat: Florida Paints #3550 Fortifill Acrylic Masonry Filler.
    ii. 2nd and 3rd Coats: Florida Paints #8430 Allgrip Acrylic Semi-Gloss.

c. Concrete Masonry Units in Restrooms, Semi-Gloss Epoxy.
    i. 1st Coat: Florida Paints #3550 Fortifill Acrylic Masonry Filler.
    ii. 2nd and 3rd Coats: Florida Paints #5230 Aquations Pre-Catalyzed Waterbourne Epoxy.

d. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces.
    i. 1st Coat: Florida Paints #3692 Aquaseal Primer/Surface Conditioner.
    ii. 2nd and 3rd Coats: Florida Paints #8430 Allgrip Acrylic Semi-Gloss.

e. Stained Woodwork: Provide the following stained finishes over, new interior woodwork.
    i. Old Masters Wiping Stain in Desired Color.
    ii. 1st Coat: Old Masters #49601 Satin Polyurethane Coating.
    iii. 2nd and 3rd Coats: Old Masters #49601 Satin Polyurethane Coating sand lightly between 1st and 2nd coats.

f. Ferrous Metal: Provide the following finish systems over ferrous metal.
    i. 1st Coat: Florida Paints #5350 Aquatra Industrial DTM Acrylic Primer.
    ii. 2nd and 3rd Coats: Florida Paints #8430 Allgrip Acrylic Semi-Gloss.

g. Zinc-Coated Metal: Provide the following finish systems over zinc-coated metal.
    i. 1st Coat: Florida Paints #5350 Aquatra Industrial DTM Acrylic Primer.
    ii. 2nd and 3rd Coats: Florida Paints #8430 Allgrip Acrylic Semi-Gloss.

8. Recommended Sealants

a. Exterior: Pecora Dynatrol 1XL Hybrid Urethane Sealant (10-year manufacturer warranty) and specifically covered as part of the manufacturer warranty.

b. Opaque silicone sealants may be required where deemed appropriate on non-paintable surfaces such as sheet metal, factory-finished aluminum, etc. All silicone sealants shall include a 20-year manufacturer warranty covering product defects.

c. All accessory materials necessary to complete the work shall be provided by the paint/coating manufacturer or accepted in writing by the paint/coating manufacturer with the manufacturer's written acknowledgement all such materials will be covered by the specified manufacturer warranty.

d. Interior: Florida Paints Sun Gun Plus Siliconized Sealant.

e. Reference the Sealant Design Standard for required exterior sealant applications for various building envelope systems to ensure consistency and sealant compatibility.

DIVISION 10 – SPECIALTIES

1. Toilet Compartments/Partitions

    a. Toilet compartments shall be floor mounted with rigid overhead aluminum bracing.

    b. Doors and dividers shall be a solid plastic material.

    c. Shoes at floor and all hardware shall be non-ferrous.

2. Toilet Accessories

    a. Mirrors shall be stainless steel and shall not located directly over lavatories in student toilet rooms.

    b. Hand Dryers

        i. Shall be located in group toilet rooms and shall be the Excel Dryer Xlerotor Model X:C.

    c. Paper Towel Dispensers:

        i. Shall be located in areas where there is NOT an electric hand dryer, similar to In-Sight 9990, Sani-touch, Smoke Gray.

    d. Toilet Paper Dispensers:

        i. Shall be located at all toilets, similar to In-Sight 09551 Cored JRT Combo, Black.

    e. Soap Dispensers and Sanitizer Dispensers:

        i. Shall be located at lavatories and hands sinks, similar to Diversey Intellicare 1.3 liter, Black.

3. Markerboards

    a. Face Sheets shall be 0.024-inch enameling grade steel especially processed for temperatures used in coating porcelain on steel. Coat exposed face and edges with a 3-coat process consisting of primer, ground coat, and color cover coat. Coat concealed face with a 2-coat process consisting of primer and ground coat. Fuse cover and ground coats to steel at manufacturer's standard firing temperatures, but not less than 1200 deg F.

b. Core shall be 3/8-inch thick particleboard core material complying with requirements of ANSI A208.1, Grade 1-M-1.

c. Backing Sheets shall be 0.005-inch thick aluminum sheet backing.

d. Laminating Adhesive shall be Manufacturer's standard moisture resistant thermoplastic-type adhesive.

e. Markerboards require marker trays and map rails.

f. The "Teaching wall" in each classroom shall have a minimum of two (2) markerboards 4'x8'. Other markerboard locations and sizes will be determined by the Project Team.

4. Tackboards

a. Fabric shall be Mildew resistant washable vinyl fabric complying with FS CCC-W-408 Type II, weighing not less than 13 oz per sq. yd, laminated to ¼-inch thick cork sheet.

b. Provide fabric with a flame spread rating of 25 or less when tested according to ASTM E 84.

c. Provide color and texture as scheduled or as selected from manufacturer's standards.

d. The "Teaching wall" in each classroom shall have a minimum of two (2) tackboards 4'x4'. Other tackboard locations and sizes will be determined by the Project Team.

5. Lockers

a. All lockers, except wall hung type, shall be mounted on concrete base 4" to 8" high with two (2) treated wood sleepers.

b. Where practical, lockers shall be recessed, flush with wall.

c. No student lockers in hallways, unless approved by the Project Team.

d. PE and Athletic lockers shall be "heavy duty".

6. Plaque

a. Each new facility shall have a plaque placed on the facility bearing the name of the facility. The plaque shall also contain the names of the Superintendent and Board members holding office at the time the construction contract is approved by the Board, the name of the Architect, and the name of the Contractor, in accordance with School Board Policy 8.55, Designation of School Facilities, available at: https://www.sarasotacountyschools.net/policy8.55

b. The Design Professional shall prepare a full-size sketch of metal plaque for approval prior to preparation of drawing or rubbing by manufacturer.

7. Signage

a. This section does not provide guidance for all the possible signs required for all projects. The intent is to standardize certain type of signs.

b. Where evacuation maps are required at exit doors, they shall be 11" x 8 ½" sub-surface printed laminated to back of 1/8" Rowmark Ultra-Matte Clear, beveled edges, no screw holes. The graphics for the evacuation route shall be furnished by the Design Professional.

c. Classroom and office room signage shall be 7 ¾" x 5 ¾" with a 1 ½" high window pocket open on both sides to allow for teacher/staff name. 1st surface shall be 1/16" clear acrylic laminated with 3M 468 MP clear adhesive.

d. Elementary schools and administrative facilities shall have engraved and applied type tactile text. Middle and high schools shall have vandal resistant fused and embedded type tactile text.

e. Electronic, programmable school and site signs shall be installed on all new construction projects and major renovation projects. These signs shall have a foundation as required by the Design Professional or a registered, Florida Engineer, to comply with applicable Building Codes.

f. Shall comply with the Sarasota County Sign Ordinance, as required.

g. Street address numbers shall be posted at the front of the school. Minimum size is 6".

h. Building number signs shall be mounted on each building. Minimum size is 18".

i. 6' Building numbers should also be painted on the roof for visibility of fire and law enforcement entities in the event of an emergency.

j. Florida Inventory of School Houses (FISH) signage shall be the same for all areas in a facility, shall include braille, and shall be mounted consistently throughout. (SCS should develop standards for FISH signage including size, font, color, numbering, etc.)

8. Flagpoles

   a. Aluminum poles meeting structural wind load requirements shall be used.

   b. Halyard type.

9. Kiln Rooms

   a. If a kiln is required, a Kiln Room shall be designated and properly ventilated.

10. Appliances

   a. In clinics, provide a small refrigerator for medication storage.

   b. Washers shall be electric commercial grade, top loading.

   c. Dryers shall be electric commercial grade, front loading.

   d. Wherever ranges, ovens or cooktops are provided, an exhaust to the outside is required.

   e. Appliances shall be electric unless approved by the Owner.

11. Gymnasium Bleachers

   a. Gymnasium bleachers shall be retractable and motorized, with reinforced wood blocking under the path of travel.

   b. There shall be access to behind the bleachers when in the closed position.

   c. There shall be wall mounted lighting behind the bleachers.

   d. The motorized control point shall be in-front of the bleachers.

   e. The bleacher roller wheels shall be a minimum 5” diameter and “hard” for easy rolling.

12. Projection Screens (Need IT input)

    a. Sizes and types of all manual and motor operated projection screens and mounting requirements shall be as directed by the Owner.

    b. All screens and mountings shall be furnished and installed by the Contractor.

    c. Screens shall be mounted from ceilings, not walls.

    d. Adequate access shall be provided for motor and controls.

    e. Typically, screens shall be provided in the Cafeterias, Media Centers and other large gathering places. They shall be motorized.

13. Basketball Backstops

    a. Exterior Backstops

        i. Exterior backstops shall be fan shape aluminum with a powder coat finish and orange target markings.

        ii. Steel and fiberglass backstops are not acceptable.

        iii. All exterior backstops shall be mounted on a 4-1/2” OD Schedule 40 unbraced gooseneck post with a 4’ extension.

        iv. Exterior basketball rims shall be a fixed steel 18” diameter double rim. Gared 7550 Titan playground super goal is preferred.

        v. Rims shall be at the appropriate height for the expected students in the facility.

    b. Interior Backstops

        i. The control for raising and lowering backstops shall be operated by push button with a key or passcode to lock and unlock the controller.

        ii. The winch motor shall be located high and not on a wall accessible to students.

        iii. The backstop cushions shall be bolt-on or screw-on type. Glue-on or Velcro attached cushions are not acceptable.

iv. Backstops shall have breakaway rims.

v. Rims shall be at the appropriate height for the expected students in the facility.

DIVISION 11 – KITCHEN EQUIPMENT

1. Initial Kitchen Design Meeting

    a. The Project Manager (CSD) shall coordinate an initial meeting at the start of the Project to include the following: Food Service Director and Area Manager/Representative, Facilities Services representative, the Food Service Consultant, the Architect, and the Construction Manager.

    b. This meeting shall be to review the scope of service required from the Food Service Consultant and Architect.

2. Miscellaneous Design Requirements (These requirements shall be included in the Food Service Consultant's bid specifications for each respective project.)

3. Kitchen Consultant: The preferred Kitchen Consultant for SCS is a firm with elementary, middle, high and/or K-8 school kitchen experience and with familiarity of SCS Food & Nutrition Services' requirements and desires.

4. Power

    a. Power for the equipment under the kitchen hood shall be fed from one panel which shall be located in the kitchen and shall have a MCB shunt.

    b. Electrical Outlets designed for use at workstation areas shall be located above the worktable backsplash.

    c. The compressors for the various pieces of equipment on the serving line shall be equipped with on/off switches in easily accessible locations and have protective screen/mesh.

5. Gas

    a. Gas lines and gas line settlement pipes shall be located as not to create an obstruction to food service workers.

    b. The Food Service Equipment Contractor shall coordinate with the installation of the gas line to the equipment under the hood to ensure the equipment fits under the hood.

    c. All exposed gas lines shall be painted with high visibility yellow paint. See Division 9 – Finishes, Painting.

    d. All connections for gas-fired equipment shall be provided with line size flexible

hoses with industrial grade quick disconnect couplings.

e. Manual reset for gas solenoid valves shall be readily accessible (not above ceilings).

f. All gas-fired equipment (if gas service provided) shall have electronic ignitions.

6. Space/Size/Location Requirements

a. A sufficient area between the serving line and the cashier area shall be allowed to accommodate the passage of a 24” to 36” wide mobile food cart.

b. Manager’s office shall be designed with a window that overlooks the food preparation area and service/delivery door.

c. Furniture for the FNS Manager’s office shall be included in the project design.

d. The service/delivery door must have a minimum opening of 4’0” wide and 7’0” high, to allow any piece of equipment to pass through the door opening. This door shall have a piano hinge.

e. An external ringer from the kitchen manager’s telephone line shall be installed in the kitchen and shall be audible to the kitchen staff.

f. A security box and buzzer or bell with a separate phone shall be installed at the kitchen entrance door to allow communication between delivery personnel and the kitchen manager. Need model/operation from Security.

7. Milk Coolers

a. Milk coolers shall have front and rear stocking capability with stainless steel front, top and rear with anodized aluminum interior, door locks, casters for easy movement and heavy-duty floor rack.

b. Milk cooler cooling system shall be self-contained with forced air circulation with condensate drain heater.

c. Coolers shall be placed at the beginning of the serving line.

8. Plumbing

a. Equipment, including the ice machine and the steamer, shall not be placed directly on top of floor drains.

b. All floor sink and trench drain locations shall be coordinated with the kitchen

equipment to allow proper location of the equipment beneath kitchen hood.

c. Every effort shall be made to provide easy access to floor drains for cleaning.

d. All floor trench drains shall be located to allow for positive drainage away from the food service equipment and away from walls.

e. All trench floor drains shall be stainless steel pans and a minimum of 14-gauge stainless steel.

f. Stainless steel grates for trench floor drains shall have a maximum spacing of 3/8" and a maximum length of 24". A tool shall be provided to hook and lift the grates.

g. Floor sinks underneath sinks and equipment shall be a 12"x12" grate-style stainless steel, floor drain equal to a Zurn Z-1900. These shall be included in the Plumbing submittals.

h. A hose reel shall be installed in the dish room.

9. Metals

a. Stainless steel schedule shall meet the following:

Description	US Standard Gauge
Sinks	14
Tops, undershelf, overshelf, legs	16
Body	18

b. The following may be galvanized steel:

Description	US Standard Gauge
Support channel	12
Unexposed body	18

10. HVAC

a. A separate split DX unit shall be supplied for the kitchen manager's office and another split DX unit supplied for the Dry Storage.

b. The Dry Storage area must be kept at temperatures below 74 degrees Fahrenheit at all times.

11. Equipment Specific Items

a. The kitchen hood shall be designed with the make-up air discharging straight down and an envelope of conditioned air surrounding the make-up air. The hood shall be equal to a CaptiveAire Model ND with Perforated Supply Plenum AC- (PSP), and shall be designed by the Mechanical Engineering Consultant.

b. Dishwashing machines shall be the type with “pant legs” for exhaust. Do not use hoods over dishwashing machines.

c. Tray slides for the elementary schools should be lowered to 27-28” high.

12. Walk-in Cooler/Freezer

a. Basis of design, xxx or equal.

b. Installation requirements.

c. Floor material.

d. It shall be the responsibility of the Kitchen Equipment Contractor to install the entire unit of the walk-in cooler(s) and freezer(s), including refrigeration systems, and all control wiring. This responsibility shall not be sub-contracted. The installer shall be factory trained and authorized personnel.

13. Closeout/Completion Requirements

a. Prior to substantial completion, a separate walk-thru punch list will be made by the Food Service Consultant, the Food Service Director or Representative/Area Manager, Facilities Services Representative, the Construction Manager, and the Project Manager (CSD).

b. A start-up verification and training session will be provided by the Kitchen Equipment Contractor with the Kitchen Manager, kitchen staff, with a Representative of each of the kitchen equipment manufacturers.

DIVISION 12 – FURNISHINGS

1. Window Treatments

    a. Where windows or exterior light is admitted to building, vertical blinds shall be utilized.

        i. Vertical blinds should not be motorized.
        ii. Vertical blinds should be limited to the width of the window and should not extend on the wall beyond the window.
        iii. Vertical blinds should cover the entire window.

    b. All windows in doors shall have one way tint preventing visual access into the rooms.

DIVISION 13 – SPECIAL CONSTRUCTION

1. Pre-engineered Metal Buildings

    a. All pre-engineered metal (PEM) building designs shall include the appropriate wind load, dead load, live load, point load and collateral load on the structural drawings. The structural drawings shall also include all required connections between the PEM and various building components and the required footing reinforcements.

    b. The horizontal loading at column bases shall not be carried by the slab.

    c. All slabs shall be free floating.

2. Enhanced Hurricane Protection Areas (EHPA's)

    a. If a new or renovated school project is to be used as an Enhanced Hurricane Protection Area (EHPA) shelter, the following procedures are required:

        i. Adhere to Florida Statute 1014.372, Education Facilities as Emergency Shelters. The facility must meet or exceed Florida Building Code Chapter 453.25, Public Shelter Design Criteria.

        ii. Work collaboratively with Sarasota County Emergency Management to determine the shelter requirements and/or desires for the affected facility. Costs for items beyond what is required for the District to provide will be submitted to the County for consideration and reimbursement.

        iii. Determine the areas to be used as the shelter.

        iv. Determine where the EHPA Shelter Manager's office will be located.

        v. Provide the required construction elements including Fire Alarm Control Panel in the EHPA Shelter Manager's Office, bladders, generators or provisions for hook-up of portable generator units.

        vi. The use of a deep well system for EHPA water provisions will be considered by each project team.

        vii. Generator fuel source shall be diesel or "dual fuel." (See Division 26 – Generator.)

        viii. Determine the appropriate parking requirements for the EHPA Shelter.

ix. The AE should prepare an Operating and Maintenance Manual for the EHPA Shelter Manager and related school-based staff.

x. The CM should provide training for the EHPA Shelter Manager and related school-based staff.

xi. EHPA water system preferred options include:

1. Tank coupler – Gopher Industrial Item #APG315DAL (1-1/2" Part D Aluminum Ever-Tite)

2. Tank coupler dust cover – Gopher Industrial Item PTC1071115 (Part V Dust Cap Aluminum with Brass Handles 1-1/2")

xii. NOTE: These items are intended to provide for relatively inexpensive means to have consistent requirements for filling and servicing of the EHPA water system tanks.

3. Hurricane Shutters

a. Hurricane shutters are not permissible, unless approved by the Owner.

b. For renovations where hurricane shutters exist:

xiii. Check the shelter status of the facility being renovated.

xiv. Pay careful attention to where existing hurricane shutters are located. The Design Professional and the Owner should review the shutters and determine if they should be removed, repaired or replaced.

xv. Due to Maintenance issues, it is the SCS desire to reduce or eliminate hurricane shutters.

DIVISION 14 - ELEVATORS

1. Conveying systems, dumbwaiters, elevators, etc., as related to individual projects shall be reviewed with the Owner prior to design or specifying of same.

2. Electric, traction elevators are preferred.

3. The use of elevators will, in general, be for people with disabilities to gain access to floors above the ground floor.

4. The lock for conveying systems, dumb waiters and elevators shall be capable of accepting cylinders as specified in the Finish Hardware Specifications.

5. An elevator shall be covered by a maintenance agreement and third-party inspections for one (1) year after Substantial Completion of the project.

6. All elevator equipment and diagnostic systems shall be non-proprietary.

7. Elevator telephones shall be hand-free and communicate with the SBSC Security (not to an independent provider) on a 24 hour per day, 7 days per week basis, and shall be on a dedicated phone line.

8. When elevators are controlled by a card-swipe access control, a separate key in the Knox Box shall be provided which will allow Fire Department access without the use of a card.

9. Elevator and wheelchair lift certificate should be submitted to the Project Director who shall coordinate the acquisition of this certificate with Maintenance. This documentation will be transmitted to the appropriate representative in Tallahassee.

10. Install a card reader at the elevator to call the elevator.

DIVISION 21 – FIRE SUPPRESSION

1. NFPA 13 requires valves on connections to fire sprinkler system water supplies to be supervised.

2. Tamper switches that are part of the fire alarm system shall NOT be used.

3. Valves at the fire main backflow preventer shall be chained and locked in the open position.

4. The penetration of the fire riser(s) of the floor/ground shall be through concrete.

5. Do not use gravel or crushed rock where risers are located.

6. Sprinklers shall be installed in elevator equipment rooms and in the bottom of elevator shafts.

7. Electric fire pumps are preferred. Diesel pumps are not preferred. If an electric fire pump is used, a separate auto transfer switch and back-up generator are required. Consult with Fire Protection Engineer.

8. Fire Risers

    a. The Project team shall meet with SCS Fire Inspector and the local fire department to determine fire riser locations.

    b. AMES one-piece stainless steel In-building risers are preferred. The in-building riser shall be composed of a single extended 90 degree fitting fabricated of 304 stainless steel tubing. The fitting shall have a grooved-end connection on the outlet (building) side and a CIPS coupler on the underground (inlet) side.

9. Provide exterior access to all riser rooms.

10. Coordinate location of inspector stations with the Project team.

11. In ANSUL systems (kitchen hoods), R-102 tanks should be stainless steel.

12. Above Ground Piping:

    a. Pipe shall be black steel designed for 175 psi working pressure, conforming to ASTM Specifications, and have manufacturer's name or brand, along with the applicable ASTM standard, marked on each length of pipe.
    b. Pipe shall be Schedule 40 black steel per ASTM A120 or A53, or Schedule 10 black steel in accordance with ASTM 235.

c. Schedule 40 black steel pipe shall be joined by screwed joints, welded joints or by mechanical grooved couplings. Grooves may be rolled or cut and they shall be dimensionally compatible with the coupling.

d. Schedule 10 black steel pipe shall be joined by UL approved grooved mechanical couplings.

e. CPVC sprinkler piping is not allowed.

13. Sprinkler Heads

a. Flexible sprinkler hose fittings may be used. If used, they must have braided lines with the appropriate FM approval and UL Listed.

b. Do not install a sprinkler head in the cooler/freezer. If a sprinkler head is required in the cooler/freezer, a dry sprinkler should be used.

DIVISION 22 – PLUMBING

1. General

    a. On alteration/renovation work, all existing abandoned overhead and underground piping, septic tanks, grease traps, lift stations, etc., shall be completely removed. Items under concrete slabs to remain or built into masonry work to remain may be left in place with the written consent of the Owner.

    b. Metallic detection tape shall be installed over all underground lines and pipe outside of building.

    c. The Plumbing Engineer shall coordinate with the Civil Engineer for all utility connections, including inverts. The Construction Documents shall specify that final piping connections shall be made by the plumbing contractor.

    d. Gas lines shall not be installed under building slabs.

    e. Gas line solenoid valves shall be clearly located on the plans, shall be manual re-set, and shall be protected by a lockable enclosure to prevent unintended shut-offs or vandalism.

2. Water

    a. Domestic water piping shall be run overhead whenever feasible. Domestic water piping shall not be run over any electrical or data equipment rooms or spaces.

    b. No pipe fittings shall be installed under the building slab.

    c. Shut off valves shall be readily accessible and installed at:
        i. All hose bibs/wall hydrants (no frost proof hydrants allowed)
        ii. All branch lines serving fixture groups including individual toilet rooms
        iii. At each building
        iv. Prior to each trap primer
        v. Water shut off valves shall be installed at not more than 100-foot maximum intervals
    d. Water distribution shall enter the building through a riser in a mechanical or Custodial room. Water shut off valves shall be located on each riser.

e. Domestic water distribution pipe shall be CPVC Flow Guard Gold or equal (COPPER not permitted unless directly connected to a hot water source and only within 20' of hot water outlet. Type K copper only.)

f. Ball valves shall be brass.

g. Domestic water shall be stubbed out of walls in copper at fixture locations, utilizing Sioux Chief Model 630-C248 stub out elbows or equal.

h. No exposed CPVC allowed.

i. Domestic water service pipe must be minimum Schedule 80 CPVC to five feet (5') outside the building for all permanent structures. Portables may be schedule 40 PVC.

j. Gate valves shall not be used.

k. Blue dot labels shall be placed on ceilings to locate valves above the ceiling.

l. Hose bibs with loose tee key (Woodford or equal) shall be provided on the exterior of the building at intervals no greater than 75 feet. In addition, one hose bibb per portable in an accessible location is preferred.

m. Deep seal traps shall be used exclusively in lieu of trap primers.

n. Hot water re-circulating pumps shall be repairable and equal to B & G NBF series Model #W06189 Series 1001B or equal.

o. A time clock or the Trane Tracer system shall be tied to the re-circulation pump. Time clock shall be Intermatic or equal.

3. Drainage

a. Sanitary and storm drainage piping under the building slab shall be minimized to the extent practical. Piping shall be PVC schedule 40 solid core, no foam core.

b. Two-way cleanouts shall consist of two separate clean-outs connected to two wyes such that all sections of the drain are cleanable.

c. Double fixture fittings are not preferred and should only be used in specific locations. Review with SCS Facilities prior to specifying.

d. Clean-outs and pipe terminations at grade shall be set in a 24”x 24” x 4” concrete slab with the top sloped away from the pipe. Clean out caps shall be recessed brass.

e. The floor drain(s) required in group toilet rooms shall be 3” in diameter. All group toilet rooms shall have floor drains. All floors shall be pitched to prevent any standing water on the floor. Floor drains shall be required at all dousing shower/eye wash assemblies. Protect surrounding areas from splashing water.

f. Do not use floor drains in kitchen areas. Use only trench drains or floor sinks. Where no trench drains are shown, use floor sinks for equipment drains and general area drains. Floor sinks shall be stainless steel (no porcelain floor sinks shall be used.)

g. Exposed fixture traps shall be 17-gauge chrome-plated brass or schedule 40 PVC union hubs.

h. Clay traps (solids interceptors) in art labs shall be all plastic with an easily removable top equal to Zurn model Z-1180. Traps must be readily accessible.

i. Air admittance valves shall be used only where no alternative exists.

j. All vents protruding through the roof shall be of adequate distance from exhaust and fresh air intakes.

k. External Acid Neutralization tanks shall be located outside the building. Piping to the acid neutralization tanks shall be acid resistant. Tanks shall be readily accessible.

4. Equipment & Fixtures

a. Where possible, gas-fired domestic water heaters shall be used for any hot water tank over forty gallons. Gas fired domestic water heaters shall be high efficiency condensing tankless type equal to Takagi t-H2 series with flushing option. Water heaters for kitchen related dish machines shall be dedicated to the dish machine and located as close as possible to the unit.

b. Bathtubs shall be equal to American Standard “Americast” with multi-flex trip lever tub drain.
c. Water coolers shall have stainless steel cabinets and shall have no electric solenoid valves. Water coolers shall be as follows:

i. Hi Lo unit shall be equal to Elkay model no. LZSTL8WSLP.
ii. Single with bottle filler shall be equal Halsey Taylor model no. VRCHD85.
iii. Fill Station shall be equal to Elkay model no. LZWSM8K.

d. Urinals shall utilize the model WEUS-1000.1001-0.13 or WEUS-1002.1001-0.25 cartridge manufactured by Sloan or equal.

e. Individual water closets shall be floor mount type.

f. The height of accessible water closets for primary classrooms (K-3) shall be 15".

g. Flush valves shall be hi-low dual flush type.

h. Toilet seats shall be open front, black solid surface.

i. Wall mounted lavatories shall be china equal to Sloan SS-3103-A with cold water faucets (**no hot water**) and shall be supported by a carrier (no wall bracket). China lavatories are acceptable in countertops.

j. Installation detail for all fixtures shall show 100% silicone seals and identify all fixtures, wall penetrations, escutcheons, etc.

k. The use of "Hands Free" or solenoid controlled flush valves or faucets is discouraged. If hands free faucets or flush valves cannot be avoided, they shall be 120V powered, not battery powered.

l. When master mixing valves are utilized in group showers, shower valves shall be single handle on-off valves.

m. Full turn brass ball valves (preferably BrassCraft) are required under casework.

n. Where delayed closing faucets are required, acceptable manufacturers are:
i. T & S Model no. (1)185Z35 or B-0712 or equal

o. Where master safety switches are required by code, quarter turn ball valves shall be installed in an accessible cabinet.

p. All hot water heater installations other than Kitchens, Clinics and Shower Rooms shall be pre-approved by the Owner.

DIVISION 23 – HEATING, VENTILATION & AIR CONDITIONING (HVAC)

1. General

    a. Before any design is started, a meeting shall be convened with the Design Professional, the CM, the CSD PM, and a Facilities Services representative, to review the Design Professional's recommendations.

    b. Thermal energy storage preference is water tank or ice storage, for new construction. For existing campuses, an alternative may be required. These alternatives must be approved on a case-by-case basis during the Design process.

    c. Electrical rooms containing transformers shall be mechanically ventilated.

    d. Provide a minimum 4" high concrete base (above the finish floor level) under air handlers, boiler, water heaters, tanks, large pumps and other heavy mechanical equipment.

    e. Provide emergency condensate overflow pans under A/C equipment located over ceilings, providing conspicuous secondary drainage to signal a drainage problem. Conspicuous locations include over doorways, hallways, etc. The use of float switches is not preferred, except on DX units. Outside of buildings, condensate shall not drop onto roofs. The use of dry wells is not acceptable without prior approval by the Owner.

    f. No piping or conduits of any nature shall be installed below a building or a structural slab except the mechanical and electrical lines serving fixtures and equipment within the building.

    g. Refrigerant suction line insulation shall be a minimum of 3/4 "thick.

    h. Acceptable manufacturers of variable frequency drives are:

        i. Magnetek
        ii. Square D
        iii. Trane
        iv. ABB

    i. Schematic diagrams of control system, chilled and hot water piping system, along with chiller and boiler design and performance specification shall be mounted in a frame under unbreakable glass or plexiglass in mechanical rooms. Example: If A/H mechanical room, then all information pertaining to that equipment should be in that room with the equipment.

j. The drawings shall include a large-scale plan and elevation of each mechanical room depicting all equipment, piping, and required clearances. All piping up to 3" diameter may be shown single line and 4" and over shall be double line. All fittings, valves and accessories shall be shown.

k. Provide labels on the grids of ceilings to identify the location of equipment (VAV's, duct heaters, etc.) installed above lay-in ceilings.

2. Equipment

a. Manufacturers

i. Approved manufacturers of chillers are:
1. Daiken-McQuay
2. Trane
3. York

ii. Approved manufacturers of modular air handlers are:
1. Carrier
2. Daiken-McQuay
3. Trane
4. York

iii. Approved manufacturer of thermal storage tanks are:
1. CalMac (ice)
2. Custom made (cold water)

b. Chillers

i. Redundancy is preferred so that schools are not shut down due to equipment issues.

ii. Use air-cooled screw or scroll compressor chillers.

iii. Provide factory applied coating on condenser coils to reduce corrosion. Field applied coatings are not acceptable.

iv. In addition to the normal one-year parts and labor warranty, chiller compressors shall be warranted for five years (parts only).

v. Include a factory mounted starter and non-fused disconnect.

vi. Provide a single point power connection.

vii. Provide a control interface panel to communicate with the Owner's Trane Summit control system. The interface shall be via Trane Controls. All control objects and points available internally shall be accessible via this interface. The complete list of objects and control points shall be included in the pre-bid equipment checklist.

viii. Sound attenuation packages shall be considered during the design process, especially at schools and facilities adjacent/near residential areas. Consideration should also be given to provide physical enclosures to further attenuate sound.

c. Modular Indoor Air Handling Units

i. Provide clean filters required prior to substantial completion and a new, clean set of filters installed in the equipment upon turning over the system to the Owner. (Specify type of filter and request one spare set of filters for the warranty period.)

ii. Direct drive, axial fans/fan wall drives are required.

iii. All modules shall be full double wall construction with no insulation exposed to the air streams.

iv. Drain pans shall be stainless steel construction.

v. Variable air volume units shall include a factory mounted airflow measurement station for measuring/controlling the outside air. Acceptable stations are Trane TRAQ or Ruskin IAQ 50 or equivalent.

d. Variable Volume Air Terminal Units

i. All units shall be of double wall construction with no insulation exposed to the air stream.

ii. Wherever possible, VAV's should be mounted outside of classroom spaces, to provide serviceability without interrupting instruction.

e. DX Equipment

i. Independent DX equipment shall be provided in the following spaces:

1. IDF and MDF rooms
2. Custodial Office
3. Kitchen Dry Storage Room
4. Kitchen Manager's Office

ii. Basis of design, xx or equal.

iii. Thermostats for DX Systems shall be Venstar programmable Model II 2900SCH.

f. HVAC Equipment Pre-Bid Requirements

i. Major HVAC equipment specified for SCS projects shall require Owner approval. The Design Professional shall include this provision in the project specifications.

ii. Major HVAC equipment shall include, but not be limited to, chillers, heat exchangers, thermal storage tanks, and modular air handlers.

iii. Any items not listed in this Division that are desired to be used, must be approved by the Owner prior to final GMP or bid.

g. Other

i. Every effort shall be made to not locate equipment or systems that will require use of ladders to oil, change belts, filters or service any part of the equipment.

ii. Rooftop equipment is not preferred. Every effort shall be made to locate equipment inside and accessible.

iii. Power ventilators shall be direct drive. Belt drive power ventilators must be approved in writing.

iv. Provide a factory authorized representative for all chillers, variable frequency drives, and other equipment with control modules that interface with the Trane Summit building control system. The factory representative shall also provide on-site instruction and training of the owner's in-house staff and technicians.

v. At closeout, the Engineer of Record shall provide an Instruction to Owner describing the design intent of the systems.

vi. Kitchen hoods shall not discharge make-up air through the face of the hood. Hoods shall be equal to Captive-Aire Model ND with ACPSP accessory.

vii. Water heating boilers, if used for heating water for HVAC purposes, shall be the forced draft type.

h. Hydronic

i. Chilled and hot water lines shall be high density polyethelene pipe (HDPE.) Glycol loop shall also be HDPE. HDPE chilled water shall have a #12 AWG copper tracer wire attached to one of the runs and Locate Tape above the first lift of backfill.

ii. On projects with multiple buildings or zones, provide chilled and heating water shut-off valves at each building or zone (supply & return). Whenever possible, install them in an exterior room that is easily accessible and not above ceilings.

iii. Install full port ball valves that can flush strainers in the chilled water system without removing insulation. Also, insulation over the cup of strainer should be removable type so strainer can be cleaned without damage to insulation. Design with a floor drain nearby.

iv. All valves on lines 2” or smaller shall be the full port ball type with nylon or equal seats. Valves on lines larger than 2” shall be the butterfly type with rubber, nylon or compatible sealing surfaces.

v. All valves shall be identified with numbered round copper tags secured with chains and indexed to a master list, showing location and system function. All valves in each piping system, with exception of those normally found exposed in toilet rooms, shall be identified with color coded valve handles and valve tags. Tags shall be at least 1-1/2”in diameter and of the same material as specified above for nameplates or brass with stamped black enamel filled letters and numbers. Shut off valves shall be required on all branch lines. A valve tag list shall be posted in each mechanical room.

vi. Supply and return lines shall be equipped with pressure and temperature taps that are accessible. Provide two sets of taps at chillers and heat exchangers. Taps shall be brass. Steel taps are not acceptable.

vii. All hydronic sensors shall be installed facing down, between the four and eight o'clock position.

viii. All lines shall be properly and clearly labeled as to their function and flow.

ix. Closed cell insulation shall be used in chilled water lines. Use of fiberglass is not acceptable on chilled water lines.

x. Supply and return lines for hot and/or chilled water shall not be run over any electrical or data equipment rooms or spaces.

xi. All hydronic piping shall be flushed per the following flushing schedule:

10-DAY FLUSHING SCHEDULE
(Based on two 5-Day work weeks)

1. Day #1:
   Fill loop with fresh water.
   Start pump(s) – (Minimum 6 fps velocity is desired.)
   Begin F & B (Feed and Bleed)
   Minimum 10 gpm and 50 psi make-up water, with 1.5" firehose is preferred
2. Day #2: Pull and clean EVERY strainer, re-install screens.
3. Day #3: Rotate Bleed locations.
   Note: Minimum number of bleed points is 2, maximum number is dependent on incoming water pressure.
4. Day #4:
   Pull and clean EVERY strainer, re-install screens.
   Blow down and flush from every possible low point.
5. Day #5: Repeat Day 3
6. Day #6:
   Check samples with White Cup Test (WCT)
   Note: Take samples from ALL locations and put each sample in a white Styrofoam cup. If the water looks clean enough to drink, WCT passes.

   If WCT passed: Stop F & B and add cleaner to loop.
   If WCT failed: Repeat days 3 thru 6.
7. Day #7:
   After <u>full 48 hours</u> of cleaner circulation:
   a. Drop entire loop and refill.

b. Begin F & B.

8. Day #8: Repeat Day 4
9. Day #9: Repeat Day 3
10. Day #10: Repeat Day 4
    Perform WCT again:
    If WCT Passed: Remove ALL startup screens and call for inspection.
    If WCT Failed: Repeat Days 8 thru 10.

xii. For renovations where steel pipe may still be present, once WCT passes, call Water Treatment Contractor to have the loop tested for iron content and traces of cleaner still in the loop. When test is low on iron (1.5 ppm or less), and there is no indication of cleaner still present in loop, pull all strainers and clean one final time. System shall additionally be treated for biological rust. Once this is done, add the final inhibitor. Water treatment contractor then checks periodically (as required by specifications) and submits reports throughout warranty period.

i. Airside

i. For new construction, VAV units for classroom applications are our preferred system. VAV systems should not be located in classrooms.

ii. Direct Outside Air Systems (DOAS), if required, must be pre-cooled.

iii. Separate HVAC zones shall be provided for each classroom and for each conference/meeting room. A single zone for offices shall not exceed three spaces that have similar occupancies and exposures. Do not mix interior and exterior spaces in the same zone.

iv. Administration area airside systems shall be independent and not part of assembly or classroom airside systems.

v. Mechanical equipment rooms containing air handling units shall be pressurized with conditioned supply air where the room opens to the exterior of the building.

vi. Sheet metal ducts shall not be internally lined but EXTERNALLY wrapped. Use of fiber duct board is not acceptable except as an external insulation over sheet metal duct. Insulation shall be a minimum of x" thick and shall have mastic coated tape.

vii. Flex duct may be used in lengths not to exceed five (5) feet.

viii. Design air system equipment with metal on the airstream side.

ix. Supply and return registers and grills shall be metal and constructed with adjustable opposed blade dampers either at discharge or internal for adjusting of air flow.

x. The Design Professional shall include in the Contract Documents, complete documentation demonstrating compliance with ASHRAE Standard 62, “Ventilation for Acceptable Indoor Air Quality”.

xi. The bottom of outdoor air intakes shall be at least 4’ above grade to minimize the intake of dirt, debris, and cut grass, nor shall they be located near vehicular paths such as bus loops, to prohibit the intake of exhaust fumes.

j. Controls

i. The Owner has a long-term agreement with Trane to provide Tracer Systems. The Design Professional shall contact Trane and coordinate the design with the Trane representative.

ii. The basis of design for the controls system on new projects shall be Trane Tracer/Enterprise, LONTALK or BACNET. Coordinate fiber optic requirements with the Electrical Engineer. Renovation/retrofit projects on existing campuses shall be evaluated for the type controls based on the existing controls and the extent of the renovation/retrofit.

iii. CO2 controls shall be provided for outdoor air intake.

iv. Do not use combination temperature/humidity sensors in spaces. Separate sensors shall be provided. Space Sensors and Thermostats shall be installed 48” above finish floor (AFF) to comply with ADA.

v. Do not factory mount unit controllers on air handling units.

vi. Kitchen Dry Storage room design temperature setpoint shall be 74 degrees F.

vii. All outside air dampers shall be automatically controlled and interlocked with exhaust fan to insure closure upon shutdown of blower.

viii. Control systems shall be protected electrically with surge suppression with battery backup.

ix. Kiln room ventilation shall not be interlocked or connected to the Building Automation System.

x. The following sequences of operation shall be included in the design:

1. Dedicated outside air cooling coil control shall maintain a minimum of 52 to 55 degrees.

2. For renovation projects with Multi-zone main/return air cooling coils, close the chilled water control valve if the average zone damper position is less than 10%.

3. Provide a freeze protection sequence for the heat exchanger if one is in the project. If the glycol entering temperature is less than 32 degrees, shut down chiller compressors.

4. If the fire alarm panel goes into alarm, it should provide a shut-down notice to the Trane system.

5. All glycol system piping shall have a pressure sensor to be used by the controls to alarm for leak detection.

6. Walk-in Freezers shall have a Temperature Sensor which shall send an alarm on high temperature. This sensor shall be separate and independent from the Security System Temperature alarm.

DIVISION 26 – ELECTRICAL

1. General

    a. Include on the Construction Documents a large-scale plan and elevations for each electrical room showing all panels, equipment and wiring to scale with conduits to each item to assure adequate size and clearances. Provide dedicated electrical rooms throughout the facility, large enough to provide working clearances, dedicated space for equipment and unobstructed egress.

    b. Provide a dedicated room for MDP that opens to the exterior, preferably with double doors.

    c. Provide single point metering on all new projects and on major renovations to existing cost centers. Provide payback analysis of meter consolidations. Generally, paybacks of less than seven (7) years will be accepted. The Owner shall review paybacks greater than seven (7) years.

    d. On all new projects and major renovations, provide two (2) empty four (4”) inch PVC conduits from the main switchgear to an area near future portable/permanent building locations. This spare conduit shall terminate in a 3’x3’ concrete pull box. Also provide three (3) empty four-inch (4”) conduits from the telecom/data room to this area and terminate in a similar concrete pull box. Also include conduits for Data, Fire Alarm, Security, and Intercom. More detail in the related divisions.

2. Generator

    a. The preferred generator manufacturers are Kohler, Cummins and Caterpillar.

    b. Preferred fuel is diesel or “dual fuel”, with a tank size to accommodate 72 hours at 75% of load.

    c. All emergency generators shall have a communication tie-in into the building energy management system to indicate run/stop status.

    d. For new schools:

        i. In all new schools NOT designated as EHPA shelters:

1. SCS prefers to have a small generator at new schools that will service the emergency lighting, security/access controls, security cameras, fire alarms and fire panels, at least one elevator, and the cooler/freezer.

2. A circuit and connection for double-pole, double-throw switch is required.

ii. In all new schools designated as EHPA shelters:

1. Provide a manual transfer switch for the shelter operation system requirements, including Code required ventilation fans, receptacles, lighting, IDF closets (for VoIP), convenience outlets in the EHPA Manager's Office, and kitchen equipment.

2. At the transfer switch location, provide a concrete pad. This should be located near/adjacent to the Central Energy Plant (CEP.)

3. A portable generator (or permanent generator) shall be provided by others and hooked up to the transfer switch as required for EHPA operation. A generator may be required if funded by the County EOC, or a generator connection may be required with a transfer switch.

4. A circuit and connection for double-pole, double-throw switch is required.

3. Conduits and Conductors

a. All conductors shall be copper. Multi wire branch circuits are not permitted (no shared neutrals) for 120 volt and 277 volt circuits.

b. Provide conduits for power and data to location of future school sign per SCS detail.

c. Provide "Seal off" conduit body at all conduit penetrations to prevent moisture intrusion into any areas with large temperature differentials such as walk-in coolers and freezers. Seal off shall be installed per manufacturer's installation instructions.

d. Provide spare conduit between buildings in multiple building campuses between electrical and telecom rooms as determined by The Owner. There may also be spare conduits required for the BDA/P-25 Radio system.

e. Die-cast fittings for EMT shall not be acceptable. Specify only steel fittings when specifying EMT.

f. All electrical conductors shall be color coded as follows:

i. 277/480 Volt

1. Phase A – Brown
2. Phase B – Orange
3. Phase C – Yellow
4. Phase A Switch Leg – Black
5. Phase B Switch Leg – Red
6. Phase C Switch Leg – Blue
7. Neutral conductor - Gray
8. Travelers – 2 Pink or 2 Purple

ii. 120/208 Volt

1. Phase A – Black
2. Phase B – Red
3. Phase C – Blue
4. Neutral conductor - White

g. All Electrical conduits shall be color coded as follows:

i. Orange – conduits fed from 277/480-volt panels
ii. Blue – conduits fed from 120/208-volt panels
iii. Orange/Red – conduits fed from 277/480-volt Emergency Panels
iv. Blue/Red – conduits fed from 120/208-volt Emergency Panels
v. Red OR Yellow, Black or both – conduits for Fire Alarm Systems
vi. Red OR Red with Yellow Stripes – two-way Communication Enhancement Systems DAS/BDA
vii. Purple – conduits for Voice, Data, Intercom & Sound Systems
viii. Orange Dot – marked on ceiling grid denotes occupancy power pack or other electrical equipment above ceiling.

4. Switchgear/Panelboards/Surge Suppression

a. All main switch gear shall be equipped with voltage meter, amperage meter and ground fault, and shall not have copper clad steel or aluminum bus bars.

b. Bolt-in type breakers shall be used on all panelboards within permanent facilities. The preferred panelboard is Square D. Alternate manufacturers are Siemens and Cutler-Hammer.

c. MDP shall have lock-off provisions for all breakers. Certain branch breakers will also require breaker locks (fire alarm, security, hand dryers, etc.

d. Dual voltages shall not be present in the same raceway.

e. Provide dedicated sub-panels with no less than 25% spare capacity and 25% spare space for computer areas. Provide surge protection. Designer shall consider mitigating harmonics.

f. Provide surge protection of main electrical service and all sub-panels with surge suppression meeting or exceeding a minimum of UL1449 performance criteria. The surge protection shall have a 10-year warranty.

g. All transformers shall have a means of disconnect within sight of the transformer.

h. On new construction, all electrical panel boards shall have a coordination study conducted by the manufacturer or electrical engineer to insure breaker trip settings and properly balanced.

i. Include the kitchen panel location and GFCI Breakers for branch circuits with a receptacle for equipment.

5. Lighting

a. The number of different types of fixtures shall be minimized.

b. All interior and exterior lighting shall be LED with a 10-year product warranty.

c. For classrooms and offices, provide 2X2 (preferred) and/or 2X4 LED full distribution, recessed static troffer with a minimum of 4,200 delivered lumens, 4000K temperature, universal voltage (120-277V), with integral step dimming (0%, 50%, 100%) LED driver.

d. For back-of-house spaces (storage rooms, electrical closets, etc.) provide a 2x2 (preferred) and/or 2X4 LED fixture, recessed static troffer with a minimum of 4,000 delivered lumens, 4000K temperature, universal voltage (120-277V)

and fast blow fuse.

e. All performing art center lighting shall be accessible for servicing without the aid of a man lift. Coordinate with stage lighting design and structural supports and catwalks to make sure all fixtures are accessible.

f. All lighting fixtures installed in stairwells shall be readily accessible without the use of scaffolding or special equipment.

g. Each ceiling light fixture shall be self-contained.

h. Provide a separate whip from a junction box to each ceiling light fixture (do not loop). Daisy chaining of fixtures is not permitted in new construction. Junction boxes shall be limited to four (4) whips per junction box (see fixture detail at end of section.) Junction boxes shall be within 4' above the acoustical tile ceilings for access purposes.

i. Internal and external emergency lighting shall be LED wall packs and not part of the ceiling fixtures, unless the school has a Level 1 emergency generator for life safety.

j. Central mechanical yards shall be adequately lit and be locally switched.

k. Exterior walkway lighting shall be LED. Fluorescent or metal halide fixtures are not acceptable. Installing lighting in or on canopy is subject to Owner approval.

l. Parking lot lights shall be individually fused at the base of each pole.

6. Lighting Controls

a. SCS prefers simplistic lighting controls. No centralized lighting control systems are desired. Switches and occupancy sensors are preferred for individual room lighting control. Zones may be created using occupancy sensors to comply with applicable exit discharge codes. Hybrid lighting controls may be implemented. Check with Facilities before specifying lighting control systems.

b. Parking lot and Security lighting shall be controlled by an energy

management system (Trane is preferred, the version should match the front end of the existing system, if applicable.) Building lighting and each parking lot lighting group shall be separately zoned. Install Hand-Off-Auto (HOA) switch for testing and maintenance purposes that will interrupt the Trane controlled program. In the event the energy management system cannot be utilized, programmable time clocks may be used for exterior lighting control (TORK model no. DZS200BP or equal).

c. All motion activated lighting controlled by relays shall have the relay in a readily accessible location and preferably directly above the wall switch. Approved manufacturers are Lutron Vive, Hubbell, and Leviton/Wattstopper.

d. Where motion activated lighting is required, all controls shall be automatic.

e. A pole requiring security cameras will be required to be on a separate circuit from the energy management system, so it has constant feed power. This is to ensure that security cameras are active at all times.

7. Receptacles/Circuiting/Wiring Devices

a. Label all receptacles with the panel number/circuit number using a permanent stick-on attachable label or engraved label (engraving required for new construction).

b. All wall plates (receptacle, switch, etc.) shall be Nylon, un-breakable, engravable device plates. For renovations, match existing color, if possible. For new construction, use White.

c. Tamper resistant receptacles shall be required.

d. Wiring devices shall be acceptable for stranded wiring and colored coded as follows:
   i. White – Normal Power
   ii. Gray – Computer Power
   iii. Red – Emergency Power

e. Devices
   i. Specification grade devices are required.
   ii. Devices shall be screw actuated, back wired, clamping type only
   iii. Receptacles serving water coolers shall be readily accessible,

serviceable without removing the water cooler.

f. Home run circuitry (junction boxes) shall be accessible above ceilings, not in walls.

g. MC cable shall be acceptable only above accessible ceilings for connection to light fixtures, power poles, or cord reels.

h. All branch circuit wiring shall be “stranded” copper wire type THHN.

8. BDA/P-25 Radio Systems

a. A dedicated conduit between the MDF’s and IDF’s for BDA/P-25 radios is required for new construction and renovation projects.

b. For renovation projects, existing conduit, if available, may be used.

c. Breaker locks (screw on) are required on fire circuits and for BDA/P-25 Radios.

9. Miscellaneous Items

a. Provide a notification system at the kitchen service entrance that can be heard in the kitchen. Provide raceways for kitchen service entrance notification system. Coordinate with Division 27 requirements. Notification system shall be “Red Alert” model 393-00x by GAI-Tronics or equal. (Review with IT for IP system interface.)

b. Electrical rooms shall have no drop or hard ceilings and shall be exposed to the structure.

c. Electrical in-ground pull boxes / hand holes

i. Pull boxes shall be concrete. Precast polymer concrete pull boxes are allowed, but only with Owner approval.

ii. Pull box dimensions shall meet all NEC requirements in relation to wire sizes.

iii. Pull boxes/hand holes should not be located in sports fields.

iv. After in-ground pull boxes are installed and conduit has been installed, provide a one-piece, poured-in-place concrete apron around the pull box. This apron shall be at least 6” deep and extend out 12” on all sides.

v. Pull box shall meet tier 15 or higher weight requirements.

vi. Boxes shall be buried at least 18-24” with a cover flush with ground level.

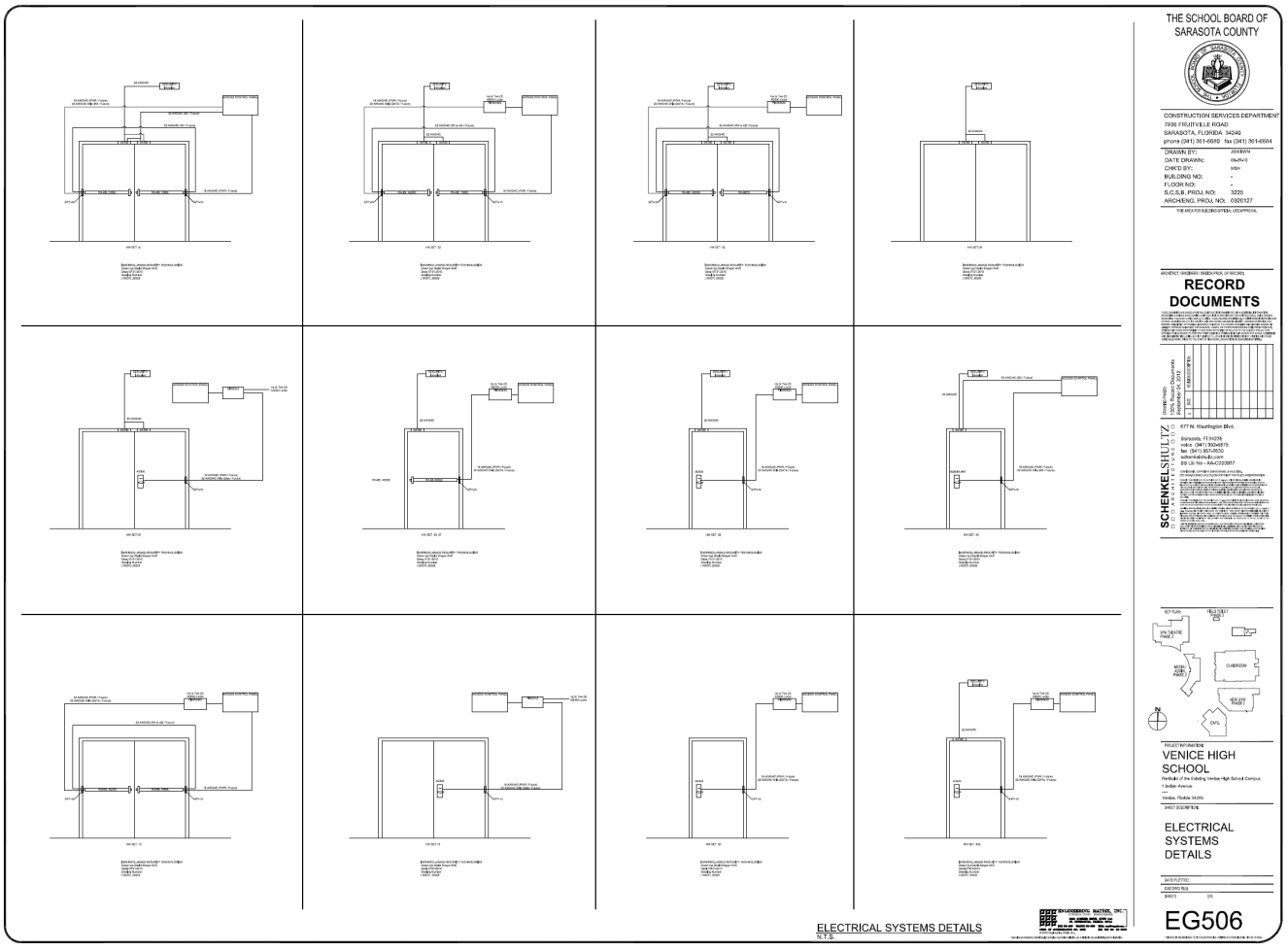
vii. Do not set covers below ground level.

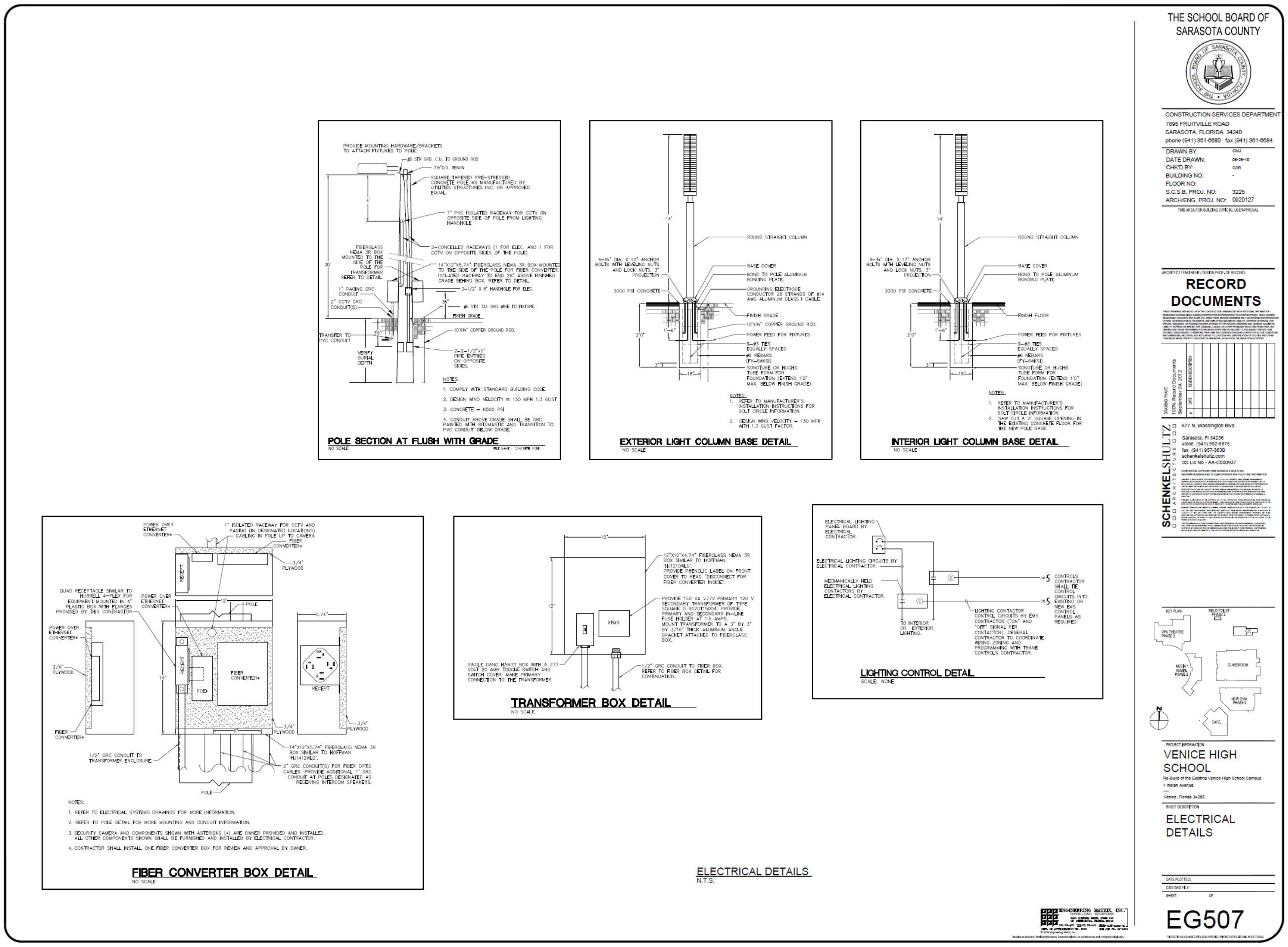
viii. The lid for concrete boxes shall be steel diamond plate, traffic rated.

d. Covered play areas shall have provisions for water coolers, bottle fillers, fans, lights, and convenience outlets.

SARASOTA COUNTY SCHOOLS
DESIGN STANDARDS

Electrical Door Types-Electrical Systems Details Drawings:




THE SCHOOL BOARD OF SARASOTA COUNTY
RECORD DOCUMENTS
POLE SECTION AT FLUSH WITH GRADE
EXTERIOR LIGHT COLUMN BASE DETAIL
INTERIOR LIGHT COLUMN BASE DETAIL
FIBER CONVERTER BOX DETAIL
TRANSFORMER BOX DETAIL
LIGHTING CONTROL DETAIL
ELECTRICAL DETAILS
N.T.S.
VENICE HIGH SCHOOL
ELECTRICAL DETAILS
EG507

DIVISION 27 – COMMUNICATIONS

TELEPHONES

1. General System

    a. The Contractor shall furnish a NEC NEAX 20001VS phone switch that will be installed by Owner's network service provider, who shall perform programming of the system.

    b. All cabling, conduit, boxes, punch down blocks, jacks, patch cords, testing of ports, accessories, connections, etc., shall be by the Electrical Contractor.

    c. The phone system shall interface with the intercom system. Electrical contractor shall provide 4 pair CAT5E cabling between the phone system and intercom system.

    d. Notification to telephone company.

        i. Provide sufficient notice of intention to use privately owned telephone system equipment.

2. Electrical Service

    a. The power supply requires a dedicated 117 VAC @ 60 Hz, 15 amps. The electric service must be a NEMA 5-20R outlet and located within six (6) feet of the power supply location. The electric service must provide a double duplex receptacle with third wire ground.

3. Grounding

    a. An earth ground must be provided within 25 feet (7.6m) of the installation. The third wire of the electric line is not an acceptable earth ground. A grounding rod shall be placed directly below or as close as possible to the phone switch.

    b. Contractor shall provide a ground connection point in the location of the phone system.

    c. A power line surge protection device shall be installed at the dedicated electrical receptacle to minimize the effects from high static voltage, low-level transients, and ripple effects. The protector shall be a self-contained, 3-prong grounded receptacle with 20A capacity or equivalent.

4. Lightning Protection

a. Installation will require maximum lightning protection as necessary, using the following:

    i. Contractor shall provide and install Porta or Circa building entrance terminal protectors (using modules Porta 75BCXN 230111 or Circa C3BIS BALI) between 230ul-250ul.

    ii. Install a lockable Junction Box at all Intermediate Distribution Frames (I.D.F.) with 3/4-inch plywood for mounting purposes.

    iii. At each Intermediate Distribution Frame (I.D.F.) install required amount of 66MI-50 Punch Down Blocks with 89 B brackets, extended to data distribution rack patch panel when structured cabling format is used (shared data/voice).

    iv. Install an audible bell to ring off of the Food Service Telephone. Location in the kitchen to be determined by the Owner and A/E.

    v. Install conduit and a 4 pair CAT5E cable outside food service delivery area for bell/intercom, a 4 pair CAT5E cable for kitchen food service entry intercom loud bell, and a 4 pair CAT5E cable for kitchen food service bell/intercom telephone. Locations to be determined by Owner and A/E.

b. Installation and Cabling

    i. Install RJ-45 jacks integrated with data outlets connected to the data rack patch panels with CAT5E cable. Provide a 6' patch cord for each port.

    ii. Install interface cabling to eight (8) CO ports for the interfacing of the telephone and intercom systems.

    iii. High Performance unshielded, twisted pair data cables are required.

    iv. Furnish and install level 5E 100 ohm twisted pair cables, unshielded, suitable for data speeds of 100 Mb/sed from the jack to the data rack patch panel.

c. Telephones

    i. Telephones will be provided by the Owner.

1. General

    a. Furnish and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a complete and operating Intercommunication and Media Retrieval System for the project.

    b. Provide 8 CO ports for interconnection with the telephone switch.

    c. The Contractor shall provide a Five-year Warranty of the installed system against defects in material and workmanship. All labor and materials shall be provided at no expense to the Owner during normal working hours. The warranty period shall begin on the date of the acceptance by the Owner/Engineer.

    d. The Contractor shall, at the Owner's request, make available a service contract offering continued factory authorized service of this system after the initial Five-year Warranty period.

    e. The Contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.

    f. The Contractor shall note in the system drawings, the type and location of these protection devices, as well as all wiring information.

2. Acceptable Manufacturers

    a. The design shall be based on Rauland-Borg equipment. Acceptable manufacturers are:

        i. Rauland-Borg Corporation of Florida

    b. The Rauland-Borg system should be capable of interfacing with an audio enhancement system in the classrooms to broadcast Lockdown and All Calls.

3. System Requirements

    a. The system must include the following features, with ***no exceptions***, that are considered Critical to the convenience and safety of the school:

        i. Program distribution of audio and tones

        ii. Pre-announce tone

iii. Periodic privacy tone

iv. Capabilities for 16 tones

v. 16-time tone "bells" zones

vi. 16 time signaling "bells" schedules

vii. Ability to support high draw paging areas

viii. Ability to stack classroom calls into call queue so that calls are not forwarded to voicemail

ix. Wire system clocks (I.E. digital or analog)

x. Automatic call routing for rerouting of emergency calls

4. Global Switching

   a. The system shall be a global switching system. That is, there shall be no linking within the system that would restrict or block telephone communications.

   b. Providing two (2) consoles or telephones at the attendant position is not acceptable (except at intercom master handset locations).

   c. The system shall have no limitations within the switch that restricts the linking capabilities, such as station/linking. Systems that utilize station/linking will not be accepted under this specification.

5. Central Switching Exchange

   a. The NEC telephone switch shall provide telephone functions with interface to the intercom system for intercom functions.

   b. The Central switching exchange shall be a microprocessor-controlled unit and shall provide the memory, logic, sensing and control circuitry for the system.

   c. The central switching exchange shall utilize standard dual-tone multi-frequency (DTMF) signaling for conformance with standard telephone practices.

   d. The system shall provide direct dialing, full duplex private telephone communications between all locations.

   e. The system shall be able to supervise call switch wiring for opens and shorts.

f. The central switching exchange shall utilize standard dual-tone multi-frequency (DTMF) signaling for conformance with standard telephone practices.

g. Minimum diagnostic functions shall include:

   i. Check active list of activity within the system.
   ii. DTMF test, to check the DTMF registers.
   iii. I/O diagnostics shall enable the checking of each line and each device connected in the circuit.

6. Intercom/Public Address System/Instructional Technology

a. Speakers/call-in switch shall be connected to the intercom system.

b. The central switching exchange shall be supplied with (2) two-way amplified communication path(s) to locations equipped with staff speakers. The intercom amplifiers shall be capable of delivering at least twelve (12) watts RMS and shall contain an automatic level control. Systems that are restricted to a single two-way amplified voice intercom path shall not be deemed acceptable.

c. The System shall be to current Classroom Specifications: 1 Top Cat Speaker in each classroom, lab, skills lab, art room, music room, science room, resource room, and ESE room (and any other room greater than 650 s.f.). This speaker shall be Lightspeed, with direct interoperability with Rauland Borg PA system. It shall come with one wearable, wireless microphone and remote controller. It shall integrate with the Active Panel displays. For new construction, separate 110 power drop shall be provided. For renovations, a transformer will be required.

d. The system shall include with a 4-Button wall plate consisting of Call, Check in Button, Emergency Call and Lockdown.

e. Each Campus shall have Multiple Location Lockdown Push buttons in Common areas of the campus Including Admin offices, Gymnasium, Media, Cafeterias, Auditoriums, and multilabel story buildings.

f. Visual strobe lights shall be installed in Band/Music/Dance Rooms, Cafeteria, Gym, Cover P.E. and Auditoriums.

g. The system shall provide direct dialing, full duplex private telephone communications between all classrooms.

h. The system shall provide facilities for calling a staff station (classroom) by dialing the station number.

i. The system shall provide the capability of assigning speaker locations to any one or more of the sixteen (16) software programmable zones for zone paging or time signal reception.

j. Systems using switches to assign zones shall not be acceptable.

k. Rauland System should be capable of interfacing with audio enhancement system used for classroom instruction purposes. In these classrooms, Lockdown and All Calls shall override instructional technology.

7. PA Systems for Media Centers

a. The Project Team shall coordinate Media Center instructional technology to ensure that the group instruction and meetings can be accommodated. In general, Media Centers in new construction projects will have at least one large Active Panel and one Top Cat Speaker with one wearable, wireless microphone and remote controller, integrated with the Active Panel displays.

8. PA Systems for Gyms and Cafetoriums

a. General

i. Provide a complete audio sound system using audio mixing/pre-amplification. The audio system shall contain equalizers equipped with its own protective cover to prevent maladjustment of control settings.

ii. In wall audio systems are acceptable with applicable 60 watt or 120-watt outputs with speaker level outputs of 4, 8, 16 ohms, 25 volt center-tapped and 70.7 volt shall be provided.

iii. Dual phono type jack, inputs and outputs will be provided for easily accessible interconnection of user's portable recording and play back equipment. Low-level RCA type external input jacks will be provided for use of auxiliary equipment.

iv. All systems controls shall be protected from tampering and/or mal adjustment behind a locking hinged cover panel.

b. Acceptable Manufacturers

i. Rauland-Borg Corporation
ii. Dukanne
iii. Bogen
iv. Shure
v. Bose Sound System

c. The following manufacturers, models, and products are the basis of design:

Manufacturer	Model	Description
Atlas Sound	MRB-1-13	Microphone Outlet (floor)
Atlas Sound	NRB-TR	Carpet trim
Atlas Sound	s501-13c	Microphone Outlet (wall)
Proco	C-AQ25	25' Microphone Cable
Anicom	4050	Two-conductor unshielded cable
Anicom	4350	Two-conductor shielded cable
Edco	HSP-121BL1	Power Line Protector
Altec	9442	100-watt Power Amplifier
Altec	9444	200-watt Power Amplifier
Altec	1753A	Equalizer
Altec	1712A	Compressor/Limiter
Yamaha	MX-200-16	Mixer
Altec	816A	Low-frequency Speaker
Altec	MRI 1654	High-frequency Horn
Altec	290-16	Driver
Altec	816-VI-SK	Low-frequency Speaker Access
Altec	1230B	Stage Monitor
Shure	SM-11	Lavalier Microphone
Shure	SM-58	Unidirectional Microphone
Crown	CM-30W	Ceiling Microphone
Atlas Sound		Desktop Cabinet
Atlas Sound	svP19-3	2-rack Vented Units

CCTV

1. Distribution System

   a. The system shall operate from 5 MHz to 450 MHz.

   b. All outlets shall be capable of back feeding sub band frequencies (T7-11) to head end equipment.

   c. The signal level at each outlet shall be +10, +5 dbmv from 54 MHz. Outlets shall be flush mounted, snap-fit "F" type with stainless steel plate.

d. Cable feed from property line to head end cabinet for local cable company input.

e. Channels 2-6 shall be blocked for local transmission.

f. Provide a single data system outlet (RJ-45 jack) adjacent to each TV outlet.

2. Headend Equipment

a. Cabinet
   i. The equipment shall be housed in a Soundolier Rack with series 110 (front door) or equivalent.
   ii. The rack shall be equipped with an AC power strip and casters.
   iii. Equipment of non-standard 19" mounting shall be mounted on blank panels (Soundolier A 19) as required.

b. Equipment
   i. The equipment shall be capable of providing five (5) low band channels of local origination.
   ii. The equipment shall include a multiplexer and converter for sub band use, a broadband amplifier for frequencies 54 to 450 MHz, a sub band processor with intermediate frequency (IF) switching.
   iii. The equipment shall include but not be limited to the following items:
      1. Modulators FAVM-450, Blonder-Tongue or equal
      2. Broad band amplifier, BIDA-75A-43, Blonder-Tongue or equal
      3. Demodulator, ISS or equal
      4. Processor, ESHP-T9—5, Option A, Blonder-Tongue or equal
      5. Head end combiner, amplified, OCA-8, Blonder-Tongue or equal
      6. Multiplexer, MSVM, Blonder-Tongue or equal
      7. Modulator, SAVM-60-T9, Blonder-Tongue or equal
      8. Microphone Mixer, Shure Brothers or equal
      9. Multiplexer MLHF, Blonder-Tongue or equal
      10. Splitter, MS2 UN, Blonder-Tongue or equal
      11. Directional Coupler (4028 or 4488), B-T or equal
      12. Directional Coupler TAPA (CRS 2, 4, 8) B-T or equal
      13. Modulator, MAVM

c. Additional Local Origination Channels
   i. For each additional channel of local origination, the equipment will consist of a channel elimination filter, a modulator and a directional coupler.
   ii. The equipment shall include but not be limited to:
      1. Modulator, MAVM, (5923) B-T
      2. Directional coupler (4488*) B-T
      3. Channel elimination filter (CEF*, 4416*) B-T
   iii. Block channels 2 through 6 for local origination distribution.

3. Systems Cabling (see also IT Tech Specs Division 27, dated 3/25/2022)

    a. Coaxial Cable for Internal Wiring

        i. Provide RG-6 type radio frequency, flexible coaxial cable; 75 ohm characteristic Impedance with solid 22-gauge copper-covered, steel wire inner-conductor; outerconductor, single braid 34-gauge bare copper wire; foam dielectric core with black PVC jacket; constructed in compliance with MIL-C-17/29.

    b. Coaxial Cable for External Wiring

        i. Provide RG-11 type radio frequency, flexible coaxial cable, 75 ohm characteristic impedance with solid 22-gauge copper-covered, steel wire inner conductor; outerconductor, single braid, 34-gauge bare copper wire; solid polyethylene dielectric core with black PVC jacket, constructed in compliance with MIL-C-17/29.

    c. Coaxial Coupler and TAPS

        i. Provide as many as required directional couplers TAP (Jerrold DFT Series).

    d. Coaxial Cable Connectors and VHF

        i. Provide radio frequency, type F one-piece cable connectors for RG-6 and RG-11 flexible coaxial.

    e. Video Cable (provide as necessary)

4. LOCAL AREA NETWORK (see also IT Tech Specs Division 27, dated 3/25/2022)

1. Communications Equipment Room (CER)

    a. A CER is required in every building.

    b. The CER is a receiving point for all signal cables entering the building and serves as the origination point of all communications systems in the building.

    c. The CER can function as a Main Hub and act as the demarcation point for external systems listed below:

i. Telephone Distribution
ii. Intercom Distribution
iii. Security Distribution
iv. LAN Distribution Systems
v. Fire Alarm Distributions
vi. CCTV Distribution
vii. Energy Management System

d. This CER shall be uncluttered, secure and climate-controlled 24 hours a day seven days a week.

e. The size of the CER is proportional to the quantity and types of the electronic equipment.

f. Communications equipment to be delivered to the user (classroom).

g. The primary or Main Distribution (MDF) room shall not be less than 100 square feet. This room will house the Main Distribution Frame (MDF), AS/400 Telephone PABC or KSU, and Security. The secondary CER's located in classroom buildings can be smaller in size proportional to the quantity and types of electronic communications equipment used. It shall be designed for a minimum of 6 floor mount racks and some wall mounted equipment as required for the facility.

h. The floor of the CER should be smooth and free of cracks, crevices and dust. If finished concrete is used, a dust protection sealer should be applied. Distribution load capability shall be at least 250 pounds per square foot. The walls may be concrete block, drywall or other suitable materials. All walls should have 3/4-inch plywood backboards installed from near floor to near ceiling with minimum plywood height of six (6) feet. The plywood shall be painted with a flame-retardant light-colored latex paint. The room does not require a finished ceiling. Equipment racks maybe installed in the CER to support communication systems equipment and the communications distribution system. All equipment racks used shall be installed to provide a three (3) foot clearance on all working sides to provide access for maintenance and operation.

i. A double duplex receptacle shall be installed on each of the four walls to power the CER communications and test equipment. All receptacles shall be double duplex, NEMA 5-20 RIG, 125 VAC, isolated ground receptacles and shall be wired (line, Neutral, isolated ground) to the power distribution panel. Each of the double duplex receptacles shall be on its own 20 ampere circuit breaker from the primary power source.

j. Non-EMI generating lighting shall be installed with a minimum reading of 50-foot candles measured 3 feet about the finished floor.

k. A minimum 1” minimum conduit shall be provided from the CER to the building grounding Electrode. A ground Bus size for #6 AQG ground conductor shall be installed to the Plywood backboard (Newton Instrument #3059 or equivalent). A #6 AWG solid copper insulated grounding wire shall be provided from the ground bus to the building main electrical service entrance disconnect enclosure. A separate solid #6 AWG insulated grounding wires shall also be connected between the ground bus and the building ground system.

l. The CER ambient temperature shall be maintained between 40 degrees F and 95 Degrees F 24 hours per day seven days a week. Relative humidity shall not exceed 60 percent. Any required cooling shall accommodate an internal 50-watt per square Foot heat load generated within the CER, if the CER contains active equipment.

m. A portable fire extinguisher shall be provided and maintained within the CER as close as practical to the entry or exit of the CER. A carbon dioxide fire extinguisher shall be used.

2. Data Wiring System

    a. See also IT Tech Specs Division 27, dated 3/25/2022

RADIO SYSTEMS

1. Furnish and install two (2) conduits (a minimum of 1”) and pull strings from the main office area to exterior locations terminated with weather heads.

2. Radio system locations in office and exterior areas to be determined by the Owner and the A/E.

3. Provide wall space for equipment mounting in the MDF room. Avoid using cable ladder racks above the designated wall equipment locations.

4. The Owner will provide radio and antenna equipment.

DIVISION 27 – COMMUNICATIONS

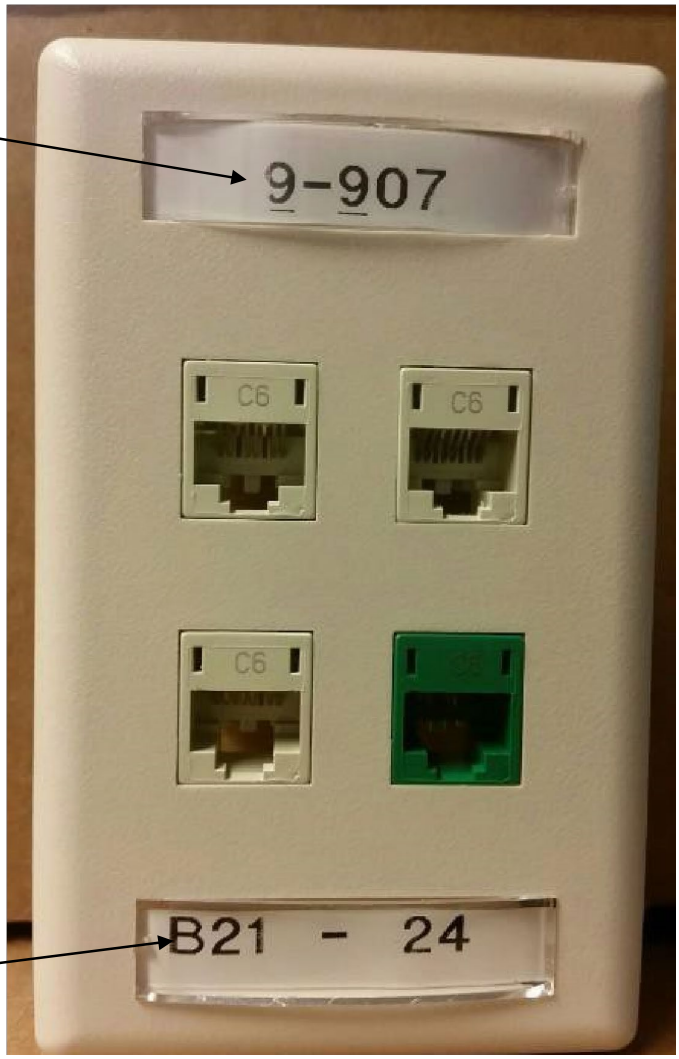
See separate specification sections from IT dated 3/25/2022

SARASOTA COUNTY SCHOOLS
DESIGN STANDARDS

Appendix A
Wall Plate Labeling and Patch Panel Labeling

WALL PLATE

Building Number – Room Number

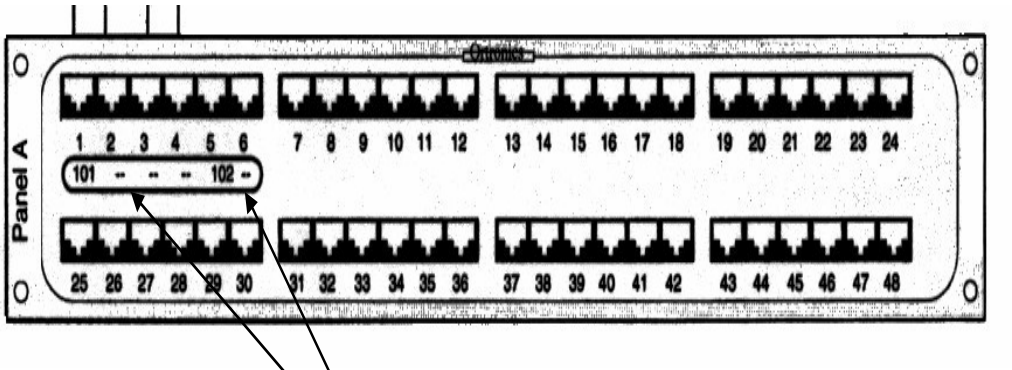


Patch Panel and Jack Number

Wall Plate will be labeled with IDF Building and Room number on top and PP and Jack number on bottom. Single drops are not allowed. Connections for Staff work areas are to have bottom right jack in green color. No Exceptions

SARASOTA COUNTY SCHOOLS
DESIGN STANDARDS

PATCH PANEL

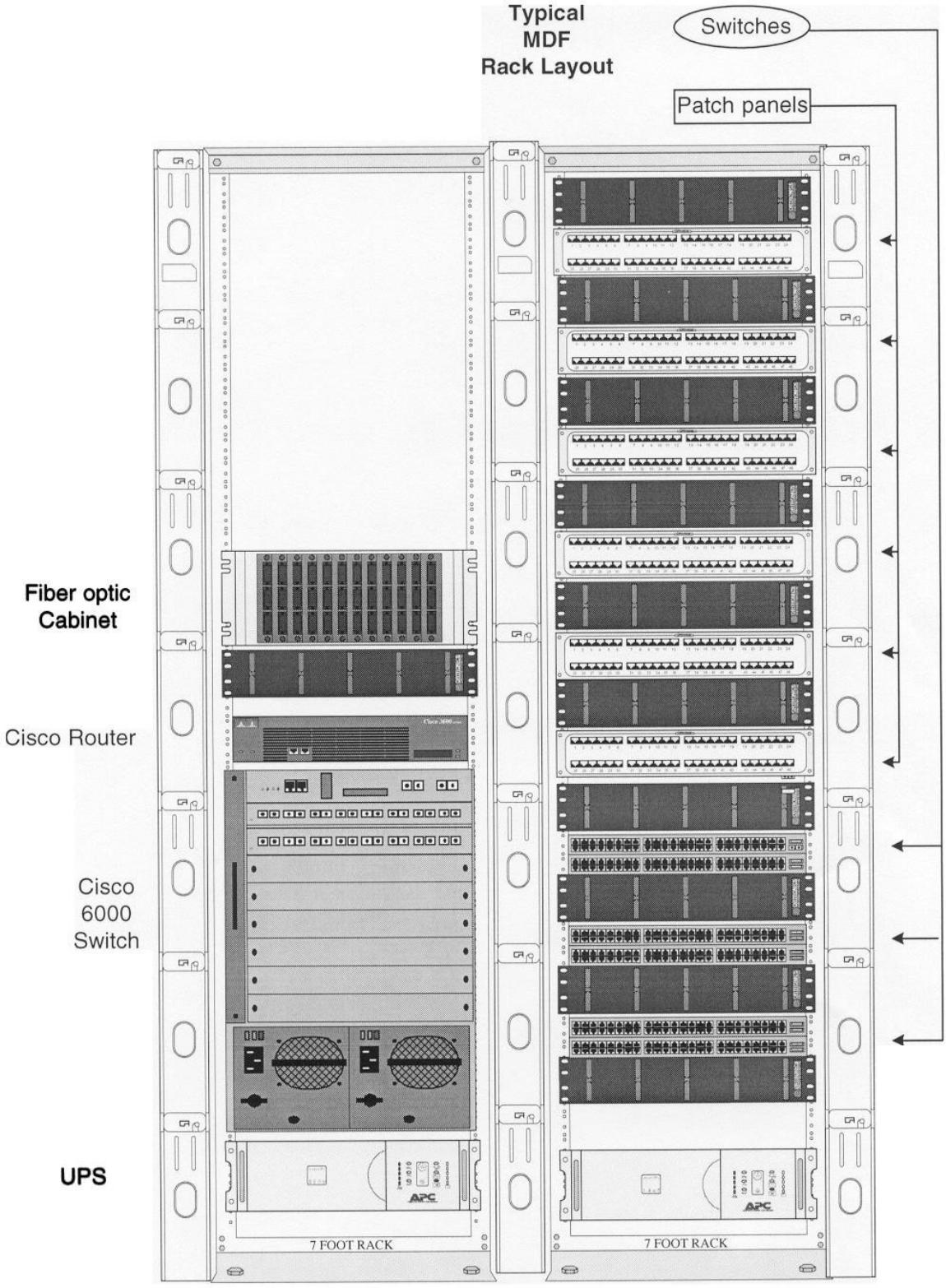


Patch Panel shall be labeled as above:

Room number followed by --- for each quad drop

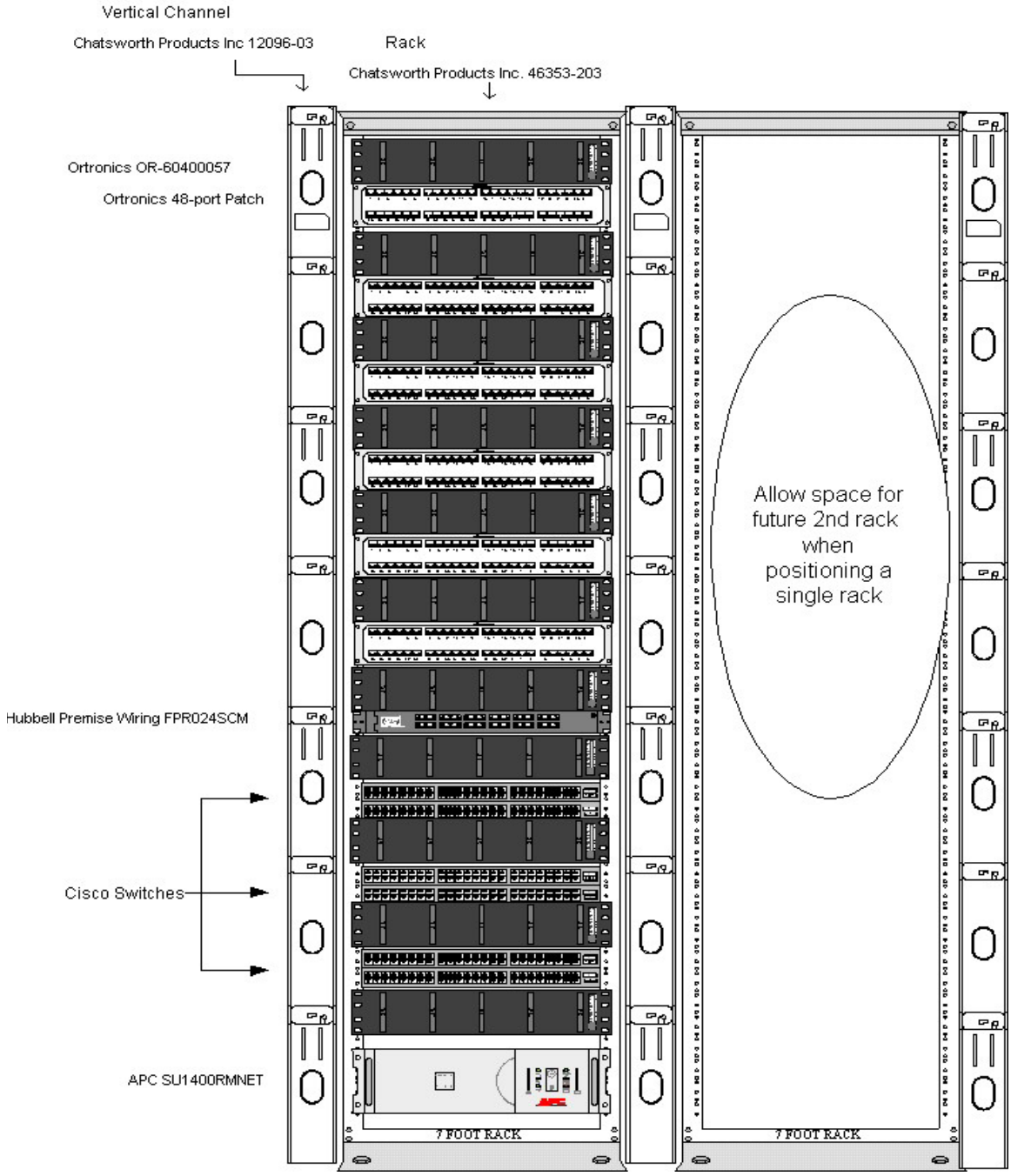
Room number followed by - for each duplex drop

Appendix "B"


Typical
MDF
Rack Layout
Switches
Patch panels
Fiber optic
Cabinet
Cisco Router
Cisco
6000
Switch
UPS
7 FOOT RACK
7 FOOT RACK

Appendix "C"

Typical IDF



Appendix D
Cabling Jacket Color Code

- Fiber Optic: Black Jacket (connector color to follow spec)
- Intercom CAT6: Unspecified; Gray Jacket
- Network/Data CAT6: Blue Jacket (Green insert used at phone/VOIP trim)
- Wireless Access Point CAT6a: Yellow Jacket
- Fire Alarm: Red Jacket
- Security/Surveillance: Purple Jacket
- Intrusion & Access Control Security: Unspecified
- Digital Lighting Controls CAT6: Green Jacket
- BAS/HVAC Control Cabling: Unspecified

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

FIRE ALARM SYSTEM

1. General

    a. Furnish and install in operating condition an electronically operated fire alarm system. All units on the fire alarm system shall be listed by Underwriters' Laboratories, Inc. (U.L.) for fire alarm use. The control panel shall bear the UL label.

    b. The Fire Alarm contractor shall include a 12-month full-service warranty contract from the date of Substantial Completion and shall re-certify the system at the end of this period. The re-certification shall be conducted in the presence of SCS Building Inspector and Fire Safety Inspector.

    c. All Fire Alarm wiring shall be installed in a dedicated raceway.

2. Control Panel

    a. Acceptable manufacturers, subject to compliance with requirements to provide a complete fire alarm and detection system, are:
        1. Siemen's Building Technologies, Inc.
        2. Silent Knight
        3. Simplex Grinnell (only for renovations on projects with this system)

    b. Proprietary network systems that cannot interface to existing addressable fire alarm systems or systems requiring the use of "dry contact" or "voltage monitoring" interface shall not be accepted.

    c. The system shall allow a mixture of different technologies and manufacturers' equipment to operate on the same network and provide the operator with a consistent look and operation for all monitored equipment and devices.

3. Elevator Shafts

    a. Elevator shafts shall contain a heat detector at the top of the shaft and a sprinkler at the bottom of the shaft. Additionally, a smoke detector is recommended at the top of the shaft for early notification and recall. The Design Professional shall design for the electric traction elevators preferred by the District.

4. Fire Main Backflow Preventers

a. Tamper and flow switches shall not be installed at fire main backflow preventers, nor at post indicator valves.

b. These backflow preventer valves shall be chained and locked.

5. Lightning Protection

a. Furnish and install an isolated loop circuit protector (ILCP) device on all fire alarm initiating device circuits, signaling line circuits, audio risers, telephone risers or circuits, and wiring (including shields) which extends beyond the main building by either aerial, underground or other methods, walkways, bridges or other above-ground connectors.

b. The ILCP shall be located as close as practical to the point at which the circuits leave or enter a building.

SECURITY SYSTEM

1. General

a. Owner shall be responsible for the layout of the system, the number of systems, location of motion detectors, location of zones in a partition, final termination at the control panel, and all programming.

b. All EXTERIOR doors (classroom, electrical/mechanical rooms, custodial, restrooms, office/administration, hallways/lobbies) shall have security contacts wired to the security system.

c. All door/hatches/roof access points shall have security contacts wired to the security system.

d. Install, label, and terminate security cabling in operating conditions.

2. Security System Control Pads

a. The keypad shall be mounted at a height of 58” from the finish floor to the bottom of the keypad. Back box (single gang mud ring) shall be installed in the vertical position.

b. A 22 awg 4 conductor solid NON-SHIELDED cable shall be provided from the MDF/IDF to all of the security system control pad locations.

3. Detectors

a. Motion detectors shall be of dual element type logic. They shall have microwave and passive infrared technology.

b. Depending on location of detectors, different types of detectors will be for different applications, and shall be determined by the Owner.

c. All detectors shall have a 22 awg 4 conductor solid NON-SHIELDED cable shall be provided from the MDF/IDF to all the detector locations.

d. All freezers/coolers shall be equipped with a temperature detector that will be wired into a zone of the security system and equipped with a temperature probe run into the freezer/coolers.

4. Door Contacts

a. Concealed type contacts shall be used in all doors, recessed in the top of the door and recessed in the jam on strike side of door.

b. Contact shall have a gap of a minimum of ¾" and of a quality that will be compatible with steel, wood and aluminum doors and frames.

c. For overhead door applications, a floor mounted overhead door contact shall be used.

5. Signal Device

a. A siren shall be installed on the outside of the building to sound in the event of an alarm. Some systems may require more than one siren.

b. An interior siren may be needed as well, depending on campus design, per Owner.

6. Wiring

a. Refer to the attached Security Door Information Drawing.

b. All door contacts, keypads (Combus), motion detectors and all other security system devices will be HOME RUN to a Hoffman 24" x 24" x 6" can and terminated on 66 blocks with a wire legend. All wires to be tested for labeling and to ensure contact function.

c. Wire shall be 22-4awg STJM four conductor and shall be used for door contacts, motion detectors, keypads, and all other security devices.

d. Wire shall be outdoor CAT X and 18 awg 4 conductor cable between buildings. Both cables shall be run between IDF's and MDF per system layout.

7. Key Vaults

   a. Two Knox rapid entry system key boxes shall be installed, one (model 4400 series) in the front of the building (office) and readily accessible, and one (model 1308) in an area to be defined by the Owner. Model 4400 shall be recessed into the wall with recessed kit 4470. Model 1308 vault will be surface mounted installed 60" from the bottom of the vault to finish grade. An additional front knox box Model 4418(Blue) for law enforcement shall be mounted at the front entry. Location to be determined by Owner.

   b. Acceptable manufacturer – Knox Co., Model 4444(Dark Bronze), Model 1308 and Model 4418(Blue). Model 4470 recess mounting kit is required for the model 4444 recess installation.

   c. Conduit shall be connected to the mounting rough-in box and stubbed above ceiling. The vaults tamper switch shall be wired into a zone at the security system.

   d. Contractor to furnish all required Knox Boxes.

8. Lightning Protection

   a. Provide lightning protection on both ends of all intrusion Combus communication wire runs between any and all buildings.

SECURITY CAMERAS

1. Furnish and install conduit, low voltage cabling, and 110-volt power for video security cameras and access control devices. The low voltage cabling specifications to be determined with the Owner and A/E.

2. Location of devices to be determined by Owner and A/E.

3. Cameras, recording devices, and access control equipment shall be provided by the Owner.

4. Each interior camera shall have one RG-6 and one CATx (x = current standard) run from each camera to closest IDF/MDF.

5. Each exterior camera shall have one RG-6, one 18/2 and one CATx (x = current standard) run from each camera to closest IDF/MDF.

6. Each exterior pole camera shall have a 6-count single mode fiber and 110AC power (continuous on) run from poles to the closest building IDF/MDF and electrical room.

7. Provide fiber for security cameras from all IDF's to MDF. Fiber count to be determined per system design.

8. Provide duplex data from IDF/MDF security rack to security/SRO office specified in design.

9. Run one (1) RG6 from office building IDF/MDF to front office with 50' loop.

10. Provide fiber for security cameras from all IDF's to MDF. Fiber count to be determined per system design.

11. Provide duplex data from IDF/MDF security rack to security/SRO office specified in design.

12. Run one (1) RG6 from office building IDF/MDF to front office with 50' loop.

ACCESS CONTROL

1. Access control system layout and design shall be determined by owner and meet the District's Design Standard.

2. All exterior doors (stairs, hallways, classrooms, administrative) shall be provided access control. Refer to the attached Security Door Information Drawing. All interior classroom doors to be prepped for access control to include EPT, card reader and door.

3. All MDF/IDF doors shall be provided access control.

4. Doors leading from lobby areas to secured areas shall have access control and be provided an electronic release switch from the reception/office area.

5. Wire types and quantities are illustrated in the attached Security Door Information drawing.

6. Door contractor shall be responsible for installing, mounting, and terminating all access control door hardware on door.

7. Door and door component shall be Schlage/Von Duprin. See Division 8 Hardware for models and part numbers.

8. All access control doors shall be equipped with a request to exit device and door position contact for door forced monitoring.

9. In addition to Door King 1802EPD and proximity reader devices, all electrically operated gates shall include a Knox key switch (model 3509) for Fire Department use in Sarasota County and a RF receiver (which replaces Knox key switch) in City of North Port.

10. All Elevators shall have a proximity reader and a Schlage key switch (keyed to schools "All Staff" key) that enables the elevator call button.

11. All Card Reader back boxes shall have single gang prep and be mounted vertically.

DIVISION 31 – EARTHWORK

1. Fill and Grading

    a. Plan wherever possible for balanced cut and fill to maximize the use of on-site materials and minimize the need for imported fill.

        i. All imported fill material used shall be clean, free of any deleterious substances (i.e.: rocks, debris, asphalt, etc.)

        ii. All import fill should not contain deleterious or hazardous substances in excess of the minimum threshold limits established by the appropriate Governmental Agency (i.e.: Organochlorines, Organophosphates, Arsenic, etc.)

    b. Site grading elevation shall not be less than 1 foot above any known flood level.

    c. Floor level on new buildings shall not be less than 12” above roads, walks, and site grading around same to preclude any possibility of flooding.

    d. Radon – All imported fill materials shall meet the following maximum requirements established by Dr. Bolch, the Environmental Radiation Group:

        i. Beneath occupied structures – 2 pci/g or less

        ii. Exterior General Use – 11 pci/g or less

        iii. Paved parking or roadway areas – no limitation

        iv. All imported fill must be certified in writing to be in conformance with the above requirements prior to being deposited on site.)

2. Cement Stabilized Sub-base and Base

    a. All sub-base material shall have a minimum LBR 40

    b. Soil cement shall not be used under asphalt play courts. Asphaltic base, crushed concrete, or limerock base are acceptable.

3. Boundary surveys are required for all new school construction projects.

4. Soil treatment shall provide a 5-year warranty for termite damage and shall include provisions for replacement of the structure.

5. Slopes should not exceed 4:1.

DIVISION 32 – EXTERIOR IMPROVEMENTS

1. Site Considerations

    a. Parking Lots

        i. Islands in parking lots shall be minimized.

        ii. Islands that are required shall be curbed and finished with a high-quality weed barrier mat and a minimum of 5 inches of cypress mulch.

    b. Concrete Sidewalks, Driveways, Curbs and Gutters

        i. All concrete for sidewalks and driveways shall have a minimum 28-day compressive strength of 3000 psi and have fiber-mesh reinforcing. Welded wire mesh shall not be used.

        ii. All concrete for curbs and gutters shall have a minimum 28-day compressive strength of 3000 psi.

        iii. Sidewalks adjacent to existing shall be pinned with a minimum of 8” inset with #5 rod 2’ on center.

    c. Asphalt Paving

        i. All on site asphalt wearing surfaces shall be type S-III (3/8” aggregate)

    d. Landscaping

        i. All sod shall be Argentine Bahia.

        ii. High School athletic fields shall be artificial turf.

    e. Trees and Shrubs

        i. All trees and shrubs shall be native Florida species and shall be limited to the current edition of the School Board Hardy Florida Native and Florida Friendly Plants booklet dated 2007-2008 included herein by reference.

        ii. Trees shall be a minimum of 30’ from any building roof and shall have a canopy not less than 8’.

iii. Shrubs shall be no taller than 3’.

f. Irrigation

i. Permanent irrigation shall be limited to athletic fields.

ii. Temporary drip irrigation may be allowed only to establish landscaping.

2. Master Plan & Functional Relationships

a. Master plan wherever possible the total anticipated complex so that drives, utilities and related items are appropriately sized and located for future expansion of the campus.

b. Provide designated areas of campus facilities that can be used for off-hour use by school advisory groups, community and civic organizations that can be properly controlled and have minimal energy consuming effect.

c. Comply with CPTED (Crime Prevention Through Environmental Design).

3. Site Safety & Security Features

a. Building details and features shall be designed to discourage climbing and vandalism.

b. Recesses, alcoves and offsets that would screen vandals shall be held to a minimum.

c. Pipe over 30” in diameter shall have features at all openings to restrict access.

d. With the exception of retention basins, all storm drainage shall be in underground pipe drains where possible. The use of drainage ditches and swales shall be held to a minimum. Where attenuation studies indicate it desirable, grade site to form storm water retention basins to retain excessive rainfall. Basins that retain more than 12” depth of water when at full design capacity shall be fenced with 6’ high chain link mesh.

e. Fencing

i. All fencing plans shall be reviewed and approved by the SCS Chief of Police.

ii. Consider privacy slats for perimeter fencing. Where required, make sure the posts and foundations are sized to adequately accommodate the additional load for the slats.

iii. A galvanized 6’ high mesh chain link (9gauge) fence shall be shown on the drawings to enclose all open or unprotected water and sewage treatment tanks, transformers, chillers, or other hazards to students. Each area shall be provided with a pair of 5’ wide gates to provide a 10’ clear opening.

iv. The use of die-cast fittings will not be acceptable.

v. Fencing which has high public visibility such as in the front of schools shall be vinyl coated with a 9-gauge core wire, and all other areas shall be galvanized.

vi. Fabric: No. 9 ga. (0.148” + 0.005”) steel wires, 2” mesh, with top and bottom selvage knuckled for all fabric.

vii. Fabric Finish: Galvanized, ASTM A 392, Class I, with not less than 1.2 ounces of zinc per sq. ft. of surface.

viii. End, Corner, and Pull Post shall have minimum sizes and weights as follows:

1. Up to 6’ fabric height: 2.375” OD steel pipe, 3.65 lbs. per lineal ft. and buried a minimum of 24”.

2. Over 6’ fabric height: 2.875” OD steel pipe, 5.79 lbs. per lineal ft. and buried a minimum of 36”.

ix. Line Posts: Space 10’ o.c. maximum, of following minimum sizes and weights:

1. Up to 6’ fabric height: 1.90 OD steel pipe, 2.72 lbs. per lineal ft. and buried a minimum of 24”.

2. 6’ to 8’ fabric height: 2.375” OD steel pipe, 3.65 lbs. per lineal ft. and buried a minimum of 24”.

3. Over 8’ fabric height: 2.875 OD steel pipe, 5.79 lbs. per lineal ft. and buried a minimum of 36”.

4. All line posts shall have steel ties (not vinyl).

f. Gate Posts:

Leaf Width	Gate Post	Lbs./Lin.Ft.
Up to 6'	2.875" OD pipe	5.79
Over 6' to 13'	4.000" OD pipe	9.11
Over 13' to 18'	6.625" OD pipe	18.97
Over 18'	8.625" OD pipe	28.55

g. All fences to have top rail equal to line post.

h. All fences shall have galvanized.177-inch diameter bottom tension wire.

4. Fencing around tennis courts shall have windscreens equal to Durascreen 80% as manufactured by Southern Shade Solutions, with a minimum fabric weight of 9.5 ounces per square yard.

5. Speed bumps may be installed on District roadways, if necessary to control vehicular traffic. This should be approved by SCS Facilities.

6. Dumpster Enclosures

   a. At high school sites, a 20 CY dumpster is located near the Custodial Office and two units (Recycle and Trash) are located near the Kitchen.

   b. Dumpster pads shall be concrete, not asphalt.

   c. Do we have any special requirements for dumpster yards?

7. Do we want to add anything for amphitheaters, or other exterior improvements? Here is sample language:

8. Play Fields-Baseball/Softball

   a. For elementary schools, use Bahia sod throughout, with clay at the diamond infield.

   b. For middle schools, use Bahia sod throughout, with clay at the diamond infield or otherwise as determined by the Project Team.

   c. For high schools, use Bermuda sod with full clay areas. Some bleacher seating and dugouts should be installed for high school baseball and softball facilities.

d. All playfields shall be equipped with charging station locations, electric and satellite hookups for robotic field mowers when grass outfields are present.

9. Playgrounds

a. Equipment shall comply with NPSI specifications.

b. Playgrounds should be located at the back portion of the campus, close to an exit door.

c. Playgrounds should be located away from egress windows.

d. SCS standard flooring is playground mulch. Schools may request and fund pour and play surfacing.

e. All playgrounds shall include shade structures to incorporate no less than 75% shade coverage of the play structure.

10. Athletic Facilities

a. High Schools shall have:

i. High School athletic fields shall meet National Association of State High School Associations (NFHS) minimum guidelines.

ii. One Women's softball field

iii. One Men's baseball field with bleacher seating and dugout facilities

iv. Five tennis courts with "Laycool" type topping or equal

v. Football stadiums shall have 3,000 home and 1,000 visitor seats

vi. Consider band practice field and band tower

vii. Consider backstop and netting to protect spectators at athletic areas where danger of being hit is an issue.

viii. Outdoor stage/amphitheater, if provided

1. Must meet ADA standards

2. Provide electrical power to the front and rear stage wall

3. Provide outdoor stage lighting

11. Athletic tracks (High School)

    a. Rubberized Beynon BSS-200 Resilient Rubber on new asphalt track surface, in a choice of colors shall be provided for running track surface, high jump and other field amenities (see item 11.c. in this section.) The track shall include striping and markings required for High School track comeptitions.

    b. Where rubberized tracks are installed, concrete curbs are preferred.

    c. Track amenities shall include a pole vault, long jump/triple jump, javelin and shot put/discus and track runway

12. High School Football Fields

    a. Football fields shall be artificial turf: 46 ounce turf, with Brock Pad and Brockfill organic fill. Fields shall include drainage, goal posts, striping for football and soccer, and track amenities.

    b. The turf shall be a tufted blend of polyethylene monofilament and fibrillated yarns on a reinforced multi-layer backing, installed over a suitable substrate with appropriate drainage. It shall have a complete edging system.

    c. A seaming plan is required before turf can be installed.

    d. G-MAX testing (ASTM 355, 1936 Method) must be performed by an independent testing lab to verify that the shock attenuation properties of the field meet the requirements.

    e. The installing Contractor shall provide a maintenance program for scheduled maintenance at 12 months, 24 months, and 36 months after Substantial Completion. This program must include grooming with a SMG SportChamp.

    f. The turf shall have a warranty of 8 years from the date of Substantial Completion.

    g. Football field lighting shall be MUSCO or equivalent and have bird deterrents.

13. Concession stands are required with provisions for commercial cooking for football and baseball/softball events.

14. Athletic fields should be laser graded and regraded after irrigation is installed.

15. School signs

a. One sign per school site shall be provided by the District. Additional signs may be installed by others (ie: Boosters, PTA, etc.) PROVIDED that they submit the engineered drawings and specifications to the Building Official.
b. When provided by the District as part of a construction and/or renovation project, they shall be similar to the following:

DIVISION 33 – UTILITIES

1. Storm Water – Flooding and Drainage

    a. Load bearing grates in traffic areas shall be cast iron (no stamped or riveted).

    b. Grates shall be secured with hold down straps.

    c. All storm water piping shall be Class III Reinforced Concrete pipe without lifting holes or HDPE corrugated plastic pipe. Metal storm water pipe shall not be used. The use of elliptical pipe is permitted but shall only be used when project conditions preclude the use of round pipe.

    d. The slope in retention/detention areas shall not exceed 1:4.

    e. Trees in slopes shall be minimized to allow for mowing and in no case shall result in mowing widths less than 6 feet.

    f. Roof drains should be tied into a storm drain system and should not discharge onto sod, landscaped areas, sidewalks or building walls. Any exceptions to this must be reviewed by the Project Team.

    g. Sheet flow drainage should not cross sidewalks.

    h. Where possible, oversize retention areas to allow for future additions and/or portables.

2. Potable Water and Sewer Facilities

    a. All plans for future projects will be submitted with a completed application to the appropriate governing agency for review and approval; this review and approval by the appropriate governing agency will cover all DOH and DEP review requirements. In addition, the Design Professional will provide all site inspections required by the appropriate governing agency.

    b. New schools and facilities should show future water/sewer connections for building additions and portable installations.

    c. The demarcation between the sanitary sewer system and the domestic wastewater collection system (DWCS), shall be clearly shown on the plans.

    d. Manholes – all interior surfaces shall have two (2) coats of bituminous mastic at a rate of not less than 120 square feet per gallon. Exteriors shall

have one (1) coat of bituminous mastic at a rate of not less than 120 square feet per gallon.

e. All gravity sewer lines shall be tested by pulling a mandrel and air pressure testing.

3. Fire Main

a. Fire hydrants and fire back flow assemblies shall be painted to comply with local Fire Department requirements.

b. Where required, use “reduced pressure detection assemblies” in lieu of backflows. Coordinate these with the local water authority.

c. For new projects, consider working with the surveyors on maintenance and/or repair of water/fire mains during Design/Planning.

DIVISION 34 – TRANSPORTATION

1. Concurrency

    a. Section 235.193 of the Florida Statutes requires coordination of planning with local governing bodies. The Director of Construction Services will determine if a specific project is covered by this Statute or under an Interlocal agreement. The Design Professional shall formally request from the Director of Planning an opinion as to whether Concurrency applies to the project.

2. Transportation

    a. Survey existing traffic patterns, condition of existing road capacities and accessibility to site.

    b. Review the preliminary site/transportation plan with the appropriate governing local and state agencies for the new school as well as for any future plans for the site (i.e.: future addition locations and future portable locations.) This should include site plan information, driveways, parent queuing, deliveries, bus queuing, etc.

    c. School buses currently in use by the Board have a minimum turning radius of 75 feet. All new road designs shall conform to this requirement. An allowance shall be made on turns and tangents for a bus to pull around a stalled or parked bus. The SCS Director of Transportation shall be consulted during the design process.

    d. Bus drives should be separated from all other traffic drives. Where appropriate, bus drives may share with deliveries. Where possible, a separate services drive should be provided for trash removal and placement of dumpster containers and to serve the Kitchen for deliveries.

    e. Speed bumps may be installed on District roadways, if necessary to control the speed of vehicular traffic. This should be verified with SCS Facilities.

3. Master Plans

    a. Master plan wherever possible the total anticipated complex so that drives, utilities and related items are appropriately sized and located for future expansion of the campus.

    b. Provide designated areas of campus facilities that can be used for off-hour use by school advisory groups, community and civic organizations that can be properly controlled and have minimal energy consuming effect.

c. Master plans should include an area for “future additions” and a separate area for “future portables.”

SARASOTA COUNTY SCHOOLS
DESIGN STANDARDS

APPENDICES
A - Flooring Matrix

Area / Room Type	Tandus Carpet Tile	Tandus Walk Off	Tandus Rolled	Shaw Eco Worx	Porcelain / Ceramic Tile	Quarry Tile	Resilient	Wood	Polished Concrete
Art Rooms		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door					***Tarkett ID Latitude LVP/T OR Johnsonite Color Splash Speckled Rubber Tile Hammered Finish 24" x 24" ALL colors or #723 Fireworks (or approved Roppe equal)***		Standard
Auditoriums		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door	***Tandus Nano OR Color Spectrum 6' Rolled Carpet, Powerbond, Cushion MK 1 RS Backing (all seams welded)***						Polished concrete is acceptable under the seating area
Cafeterias		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door			***12" x 12" (Daltile Harmonize) Porcelin Tile - With Epoxy Grout 3/16" or less grout lines***				Standard
Classrooms - Standard		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door	Tandus Color Spectrum 6' Rolled Carpet, Powerbond, Cushion MK 1 RS Backing (all seams welded)						
Classrooms - ESE							***Johnsonite Color Splash Speckled Rubber Tile Hammered Finish 24" x 24" ALL colors or #723 Fireworks (or approved Roppe equal)***		
Clinics		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door			***12" x 12" (Daltile Harmonize) Porcelin Tile - With Epoxy Grout 3/16" or less grout lines***				Standard
Consession / Kiosk (Floors)						Acceptable 6" x 6" Daltile Quarry Texture Floor Tile - With Dark Colored Epoxy Grout 3/8" or less Grout Lines			Standard
Consession / Kiosk (Walls)					***4" x 4" Daltile Color Wheel semigloss wall tile from floor to ceiling***				
Conference Rooms		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door	Tandus Color Spectrum 6' Rolled Carpet, Powerbond, Cushion MK 1 RS Backing (all seams welded)						
Gymnasiums (High School)								Resilient floating double layered plywood subfloor with #2 grade 25/32" x 2-1/4" thick Maple	
Gymnasiums (Middle School)							Teraflex Sport M Plus 6381 Maple or 6375 Oak	Resilient floating double layered plywood subfloor with #2 grade 25/32" x 2-1/4" thick Maple	
Hallways		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door	Tandus Color Spectrum 6' Rolled Carpet, Powerbond, Cushion MK 1 RS Backing (all seams welded)						Standard
Kitchens/Dishwash Area (Floors)						6" x 6" Daltile Quarry Textures Floor Tile - With Dark Colored Epoxy Grout 3/8" or less Grout Lines			
Kitchen/Dishwash Area (Walls)					***4" x 4" Daltile Color Wheel semigloss wall tile from floor to ceiling***				
Labs - Science		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door					***Tarkett ID Latitude LVP/T OR Johnsonite Color Splash Speckled Rubber Tile Hammered Finish 24" x 24" ALL colors or #723 Fireworks (or approved Roppe equal)***		Standard
Media Centers		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door	***Tandus Nano OR Color Spectrum 6' Rolled Carpet, Powerbond, Cushion MK 1 RS Backing (all seams welded)***						
Office Areas		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door	Tandus Color Spectrum 6' Rolled Carpet, Powerbond, Cushion MK 1 RS Backing (all seams welded)						
Planning Areas		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door	Tandus Color Spectrum 6' Rolled Carpet, Powerbond, Cushion MK 1 RS Backing (all seams welded)						
Portables		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door		Shaw Field Trip EPBL (Color Picnic) 12' Rolled Goods					
Portable (Arts or Science)		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door					***Tarkett ID Latitude LVP/T OR Johnsonite Color Splash Speckled Rubber Tile Hammered Finish 24" x 24" ALL colors or #723 Fireworks (or approved Roppe equal)***		
Raised Floors (Not a desirable type of flooring system)	***Tandus Color Spectrum (in the room) and Abrasive Action (installed at all entries---6' from exterior door) 24"x24" carpet tile, cushion/powerbond/dryback (Installed with carpet tile Tabs)***						***Johnsonite Color Splash Speckled Rubber Tile Hammered Finish 24" x 24" ALL Colors or #723 Fireworks (or approved Roppe equal) installed with releasable adhesive***		
Restrooms / Locker rooms (Floors)					***DalTile Vol 1 porcelain tile, 12" x 12" or 6" x 6" (depending on pitch) With Epoxy Grout 3/16" or less grout lines***				
Restrooms / Locker Room (Walls)					***4" x 4" Daltile Color Wheel semigloss wall tile from floor to ceiling***				
Shower Rooms (floors)					2" x 2" Mosaic Tile With Epoxy Grout				
Shower Rooms (walls)					***4" x 4" Daltile Color Wheel semigloss wall tile from floor to ceiling***				
Stages (Elementary)							***Johnsonite I.D. Inspiration Vinyl Plank (ALL colors)***		
Stages (Middle & High)								Resilient floating double layered plywood subfloor with 3/4" tongue & groove plywood (black) or 25/32" southern yellow pine	
Stairwells (interior - landings)		***Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback (seam welded)***					***Johnsonite Color Splash Speckled Rubber Tile Hammered Finish 24" x 24" ALL Colors or #723 Fireworks (or approved Roppe equal)***		
Stairwells (interior - treads & risers)							Johnsonite Rubber One Piece Tread/Riser Hammered Finish color to match Landings		
Storage (Kitchen)						6" x 6" Quarry Tile - With Dark Colored Epoxy Grout 3/16" or less Grout Lines			Acceptable
Storage (Media)		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door	Tandus Color Spectrum 6' Rolled Carpet, Powerbond, Cushion MK 1 RS Backing (all seams welded)						
Teachers Lounge		Tandus Abrasive Action 6' Rolled Carpet, Powerbond, Cushion, Dryback All Exterior Entries 6' in from door			***12" x 12" (Daltile Harmonize) Porcelin Tile - With Epoxy Grout 3/16" or less grout lines***				

updated: 10/18/2022

APPENDICES
B – Hearty Florida Native and Florida Friendly Landscaping

THE SCHOOL BOARD OF SARASOTA COUNTY

HEARTY FLORIDA NATIVE
AND FLORIDA FRIENDLY PLANTS

TABLE OF CONTENTS
CATEGORY LISTING

TABLE OF CONTENTS
CATEGORY LISTING
(Continued)

TABLE OF CONTENTS
ALPHA LISTING

Page

Arrowheads
Sagittaria spp.

Average size: 3 ft.
Moisture: Inundation or very wet conditions. Aquatic environment.
Exposure: Sun.
Leaves: Evergreen.
Features: Aquatic. Spreading habit. Attractive form and white flowers most of year.
Landscape use: Water gardens, retention ponds, canals, drainage swales.

Bulrushes
Scirpus spp.

Average size: 5 ft.
Moisture: Inundation or very wet conditions. Aquatic environment.
Exposure: Full sun.
Leaves: Dark green; those treated here mostly short, sometimes barely or not even exceeding the sheath around the stem. Evergreen.
Features: Aquatic. Spreading habit. Attractive form. Dark green to bluish foliage types. Valued for overall hardiness in all zones.
Landscape use: Water gardens, retention ponds, canals, drainage swales.
Form: Erect, herbaceous perennials with dark green leaves and soft, three-angled stems.

Pickerelweed
Pontederia cordata

Average size: 2 ft.
Moisture: Inundation or very wet conditions.
Exposure: Full sun to part shade.
Leaves: Heart shaped to lance shaped, dark green, with long-tapering, bluntly pointed tips. Evergreen.
Features: Rapid growth. Spreading habit. Showy flower spikes. Aquatic habit. Fruits are eaten by wildlife.
Landscape use: An excellent species for water gardens, shallow ponds, bogs, retention ponds, drainage swales and muddy canal banks. May be used in a container or rooted in mud.
Form: A perennial aquatic with dark green leaves and showy flower stalks, potentially spreading into large colonies by underground stems.

Water Lily
Nymphaea odorata

Average size: Spreading to 8 ft. in all directions.
Moisture: Floating aquatic.
Exposure: Full sun.
Leaves: Large, dark shiny green, nearly rounded in outline, to about 18 inches wide. Evergreen.
Features: Aquatic. Spreading habit. Attractive white flowers all summer. Tolerant of both cold and warm climates.
Landscape use: Water gardens, retention ponds, canals, drainage swales.
Form: A floating aquatic with showy white flowers and large, floating **leaves.**
Disadvantages: Able to completely fill small ponds.

Fishtail Fern
Nephrolepis iterate

Average size: 3-4 ft. x 3 ft.
Moisture: Average to moist.
Exposure: Shade.
Leaves: Evergreen.
Features: Native, clump fern. Grows quickly. Excellent for shady moist site. Fishtail shaped frond.

Leather Fern
Acrostichum danaeifolium

Average size: 6 ft.
Moisture: Wet soils.
Exposure: Dappled shade, but will tolerate moderate sun. Intolerant of freezing temperatures.
Leaves: Large, divided, erect to arching, to about 10 feet tall. Dark green above, paler below. Lower surfaces of fertile fronds conspicuously and densely coated with attractive reddish to golden brown spore cases. Evergreen.
Features: Attractive, dark green, upright fronds. Hardy, rugged, adaptable with few problems.
Landscape use: Large dense thicket shrub uses. Pond edges, swampy sites, for wet roadside edges.
Form: An erect to arching or leaning, very showy evergreen fern with large, dark green, stiff, divided fronds that are up to 10 ft. tall and 2 ft. wide.
Disadvantages: Leather fern grows to be quite large and can exceed its bounds in very small ponds or pools.

Macho Fern
Nephrolepisbiserrata: **Macho**

Average size: 4 ft. x 4 ft.
Moisture: Average to moist.
Exposure: Shade.
Leaves: Fronds. Evergreen.
Features: Large, dramatic evergreen clump fern for shade. Non-native, Florida friendly.

Dwarf Fakahatchee Grass
Tripsacum floridana

Average size: 3 ft. x 3 ft.
Moisture: Average to moist.
Exposure: Full to partial sun.
Leaves: Thin, blue-green leaf blades.
Features: Easy care. Hardy, native clump grass.

Eastern Gamagrass
Tripsacum dactyloides

Average size: 6 ft.
Moisture: Prefers moisture but will adapt to drier conditions.
Exposure: Full sun to partial shade. Intolerant of heavy shade.
Leaves: Flat, dark green, about 1 inch wide, 2-3 feet long and arching outwards from a 2- to 3-foot-diameter clump. Evergreen.
Features: Attractive dark green leaves. Tolerant and robust. Interesting flower spikes (spring to fall).
Landscape use: Mass plantings in moist to damp naturalistic settings, medians, roadside canal banks, retention ponds. Slope stabilization, buffering.
Form: A robust bunchgrass that spreads primarily by thick, knotty, underground stems.

Muhly Grass
Muhlenbergia capillaris

Average size: 4 ft.
Moisture: Prefers some moisture, sandy, slightly acid to alkaline soils. Will tolerate some drought and flooding. Salt tolerant.
Exposure: Full sun.
Leaves: Narrow, partly in-rolled, 1-3 feet long. Evergreen.
Features: General hardiness; requires little care. Showy flowering and fruiting periods, producing a stunning display of pinkish to purplish inflorescences.
Landscape use: Mass plantings in naturalistic settings, medians, roadside canal banks, retention ponds.
Form: A perennial bunchgrass with narrow, partly in-rolled leaves and delicate, pinkish to purplish masses of fall flowers and fruit.

Sand Cordgrass
Spartina bakeri

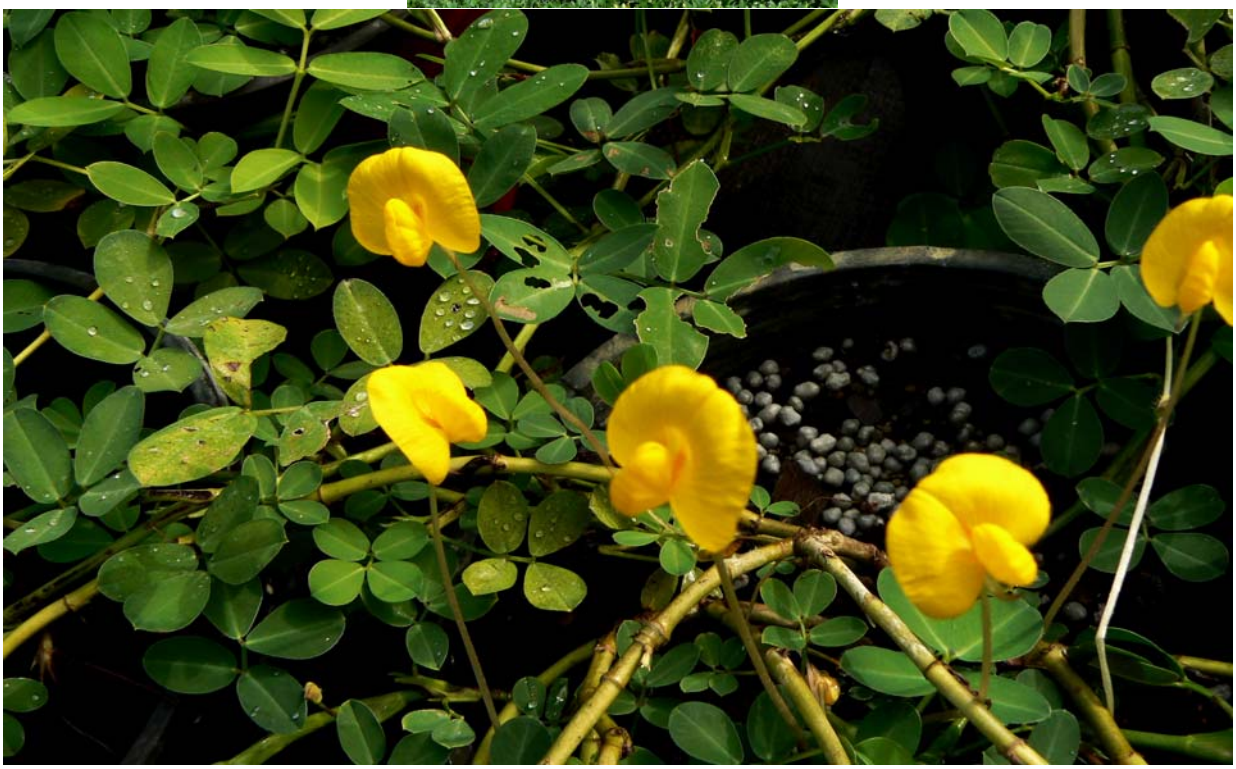
Average size: 5 ft.
Moisture: Moist, sandy, acidic sites but adapts to drier sites. Salt tolerant.
Exposure: Full sun.
Leaves: Flat to rolled inward, less than 1/4 inch wide, pale green and rough to the touch. Evergreen.
Features: Hardiness. Large, attractive v-shaped bunchgrass.
Landscape use: Mass plantings in naturalistic settings, medians, roadsides and retention ponds.
Form: A robust bunchgrass forming large, leafy clumps and spreading by basal offshoots or short subterranean stems.

Golden Creeper
Ernodea littoralis

Average size: 1 ft.
Moisture: Dry sites are preferred. Intolerant of over watering.
Exposure: Full sun to very light shade.
Leaves: Opposite, green to yellowish green, essentially stalkless, 1.5 inches long, fleshy, lance shaped. Evergreen.
Features: Tolerant of sun, drought and arid situations. Mat-forming habit. Good erosion control for shifting sands.
Landscape use: Excellent ground cover shrub for dry, sandy and similarly inhospitable situations. Good for parking lots, medians, power line easements and rights-of-way.
Form: A low, mat-forming shrub with arching stems, fleshy leaves, and pinkish, tubular flowers with recurved petals.

Perennial Peanut
Arachis glabrata

Average size: 6 inch ground cover.
Moisture: Average to dry.
Exposure: Sun and partial shade.
Leaves: Evergreen.
Features: Yellow flowers in spring and summer. Can be mowed.



Sunshine Mimosa
Mimosa strigillosa

Average size: 6 inches.
Moisture: Moist to dry sites.
Exposure: Full sun.
Leaves: Divided into 6-15 pairs of leaflets. Evergreen.
Features: Mat-forming. Showy pink flower heads from March to December. Attractive, finely textured foliage.
Landscape use: Mat-forming ground cover that can be mowed to control weeds.
Form: A prostrate, spreading perennial with finely divided leaves and ornate, globular heads of pink flowers.
Disadvantages: May be difficult to control in restricted spaces.

Blue-stem Palmetto
Sabal minor

Average size: 4 ft.
Moisture: Performs best in moist situations, but tolerant of drier sites after becoming established. Slightly salt tolerant.
Exposure: Partial sun to shade. Very cold tolerant.
Leaves: Fan shaped, deeply divided, bluish green to dark green, 2-4 feet broad and long, borne on long stalks that lack the sharp marginal teeth of the saw palmetto. Evergreen.
Features: Best as palm-like shrub in natural settings. Adaptable to a variety of soils, very hardy and useful for landscaping in difficult situations. Fall-ripening fruit is consumed by an array of wildlife. Tolerant. Slow growing.
Landscape use: Used as a shrubby specimen palm or as part of a planted shrub under story. Particularly suited for retention ponds, drainage swales, canal banks, parking lots and other difficult areas.
Form: A trunkless fan palm with several leaves and a long flowering stalk rising well above the leaf blades.

Cabbage Palm
Sabal palmetto

Average size: 35 ft.
Moisture: Moist conditions best. Adaptable to any soil but regular flooding.
Exposure: Full sun, intolerant of shade.
Leaves: Semi-fan shaped, 3-5 feet wide, slightly longer, reflexed upward from the central axis, giving the leaf a V-shaped appearance. Blade divisions have threadlike fibers along their edges. Evergreen.
Features: Versatile, hardy and easy to grow. Wide adaptability. At its best when planted in clusters.
Landscape use: Specimen but best in small natural groups to accent buildings. Excellent for difficult situations. Hurricane resistant.
Form: An erect fan palm with a grayish trunk that is sometimes smooth and other times covered with "boots" (the remaining bases of fallen leaves).

Scrub Palmetto
Sabal etonia

Average size: 4 ft. - 6 ft.
Moisture: Drier, well-drained sands. Drought tolerant.
Exposure: Full sun.
Leaves: Evergreen. Fan shaped, blades to about 3 feet wide, with stems to approximately 3 feet long.
Features: Tolerant of heat, drought and sun.
Landscape use: Low shrub in sunny, sandy, well-drained situations.
Form: A low, evergreen, shrublike palm with fan-shaped fronds and a subterranean trunk.

Blue Flag Iris
Iris virginica

Average size: 2 ft.
Moisture: Moist to wet conditions.
Exposure: Sun to part shade.
Leaves: Large, to about 2 feet long, erect, sword like, dark green and leathery. Evergreen.
Features: Showy blue flowers and dark green leaves. Aquatic habit. Elegant appearance. Shade tolerance.
Landscape use: Especially effective along the edges of shallow ponds and marshy sites. Excellent for the edges of retention ponds and drainage swales.
Form: Erect herbs with dark green, sword- or strap-shaped leaves and showy blue flowers.

Chapman's Senna
Senna mexicana

Average size: 3 ft. x 3 ft.
Moisture: Average to dry sites.
Exposure: Sun to partial shade.
Leaves: Evergreen.
Features: Yellow flowers during fall and winter. Excellent butterfly attractor. Native, small, tropical shrub.

Prostrate Porterweed
Stachytarpheta jamaicensis

Average size: 2 ft. x 4 ft.
Moisture: Dry to average.
Exposure: Sun to partial shade.
Leaves: Evergreen.
Features: Blue flowers on upright spikes most of the year. Low growing and spreading. Can be pruned several times a year. Gets woody over time but reseeds. Trim old growth to within six to eight inches of ground.

Purple Porterweed
Stachytarpheta urticifolia

Average size: 4 ft. to 6 ft. x 4 ft. x 6 ft.
Moisture: Average.
Exposure: Sun to partial sun.
Leaves: Evergreen.
Features: Spikes of purple flowers. Butterfly attractors. Will grow large but does not reseed easily. Easy to prune several times a season.

Red Pentas
Pentas lanceolata

Average size: 2 ft. x 1 ft.
Moisture: Average
Exposure: Sun to partial sun.
Leaves: Evergreen.
Features: Fast growing perennial. Excellent butterfly attractor. Last for years at 2 ft., if trimmed several times a year. Use original deep red only.

Beach Buttercup
Turnera ulmifolia

Average size: 2-3 ft.
Moisture: Average.
Exposure: Sun to partial sun.
Leaves: Evergreen.
Features: Showy white flowers in the summer, which close in the p.m. Prune several times a year for compact growth. Perennial, non-native, Florida friendly.

Compact Firebrush
Hamelia "compacta"

Average size: 4 ft. - 8 ft. x 4 ft. - 8 ft.
Moisture: Average to moist.
Exposure: Full sun to partial shade.
Leaves: Evergreen.
Features: Will freeze to ground but will recover. Wildlife attractor, coral flowers. Color for shade. Non-native, Florida friendly.

Ixora
Ixora coccinea

Average size: 5', several dwarf cultivars are avaliable
Moisture: Well drained, moist, acidic. Medium drought tolerance. Medium salt tolerance.
Exposure: Full sun.
Leaves: Glossy, dark green to 6" long
Flowers: Terminal 5 to 6" wide clusters avaliable in red, yellow, pink, scarlet, and various shades of orange. Blooms year-round.
Features: Tolerates rich, well drained, moist, acidic soil. Medium growth rate.
Landscape use: Bushy shrub.
Form: Evergreen hedge which requires constant pruning to keep its shape.

Dwarf Indian Hawthorn
Raphiolepis indica: **Alba**

Average size: 3 ft. x 3 ft.
Exposure: Sun to partial shade.
Leaves: Evergreen.
Features: Showy white flowers in spring. Slow growing. Excellent foundation plant. Non-native, Florida friendly.

Dwarf Schefflera
Heptapleurum arboricolum
Also known as *Schefflera arboricola*

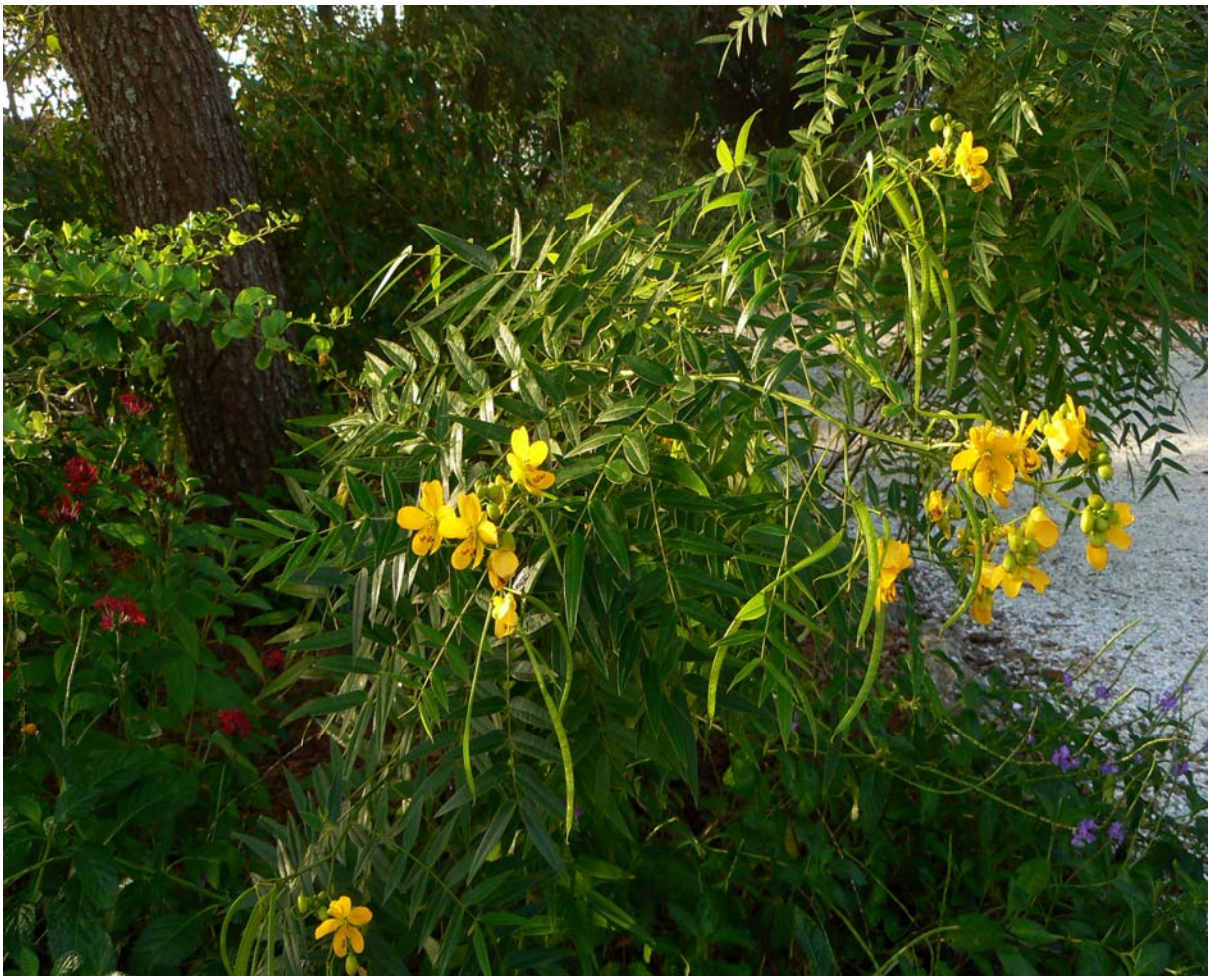
Average size: 10 ft. x 6 ft.
Moisture: Well to medium drained. Medium drought tolerance. Sandy loam. Unknown salt tolerance.
Exposure: Full sun to partial shade.
Leaves: Easy to keep shape with occasional pruning. Pruning the bushes make them full, round and thick with leaves measuring 4-6 inches across forming a "fingered umbrella".
Features: Fast growth rate. Produces thick, full plants. Also grown in tree form.

Dwarf Viburnum
Virburnum obovatum
("Mrs. Schiller's Delight" a dwarf selection to 3 ft. x 3. ft.)

Average size: 3 ft.
Moisture: Moist sites but adapts to drier situations.
Exposure: Full sun to shade.
Leaves: Evergreen.
Features: Showy flowers and fruit. Fast growing. May be hedged.
Landscape use: Hedges. Mass plantings. Shrub border. May be pruned as small single or multi-trunk tree. Dwarf form blooms seven months of year.

Privet Senna
Senna ligustrina

Average size: 5 ft. x 3 ft.
Moisture: Average to dry soils.
Exposure: Sun to partial shade.
Leaves: Evergreen.
Features: Yellow flowers in fall. Excellent butterfly attractor. Native.



Walter's Viburnum
Viburnum obovatum
(cultivars: "Withlacoochee" to 15 ft.)

Average size: 15 ft.
Moisture: Moist sites but adapts to drier situations.
Exposure: Full sun to shade.
Leaves: Evergreen.
Features: Showy flowers and fruit. Fast growing. May be hedged.
Landscape use: Hedges. Mass plantings. Shrub border. May be pruned as small, single or multi-trunk tree. Dwarf form blooms seven months of the year.

Wax Myrtle
Myrica cerifera

Average size: To 20 ft.
Moisture: Adaptive, dry to moist sites. Supplemental irrigation usually not required when situated in moist soil.
Exposure: Sun to partial shade.
Leaves: Alternate, narrow but slightly wider at the apex, 1-5 inches long, bluntly toothed near the apex, green above, slightly rusty below. Mildly aromatic. Evergreen.
Features: Hardy. Fragrant foliage. Fast growing on moist sites. Excellent cover and food for birds and other wildlife.
Landscape use: Screening. Mixed shrub borders and beds. May be pruned to form a small tree.
Form: An erect to somewhat leaning, often multistemmed, densely foliated shrub or small tree with a compact to spreading crown.
Disadvantages: Caterpillars and cankers are mild pests. Brittle and easily damaged by storms in exposed areas. May tend to form root sprouts.

American Elm
Ulmus americana: "Florida Population"

Average size: 40 ft.
Moisture: Moist sites. Adapts to dry to seasonally wet areas.
Exposure: Full sun to part shade.
Leaves: Deciduous. Alternate, simple, shiny green above, mostly ovate, 3-6 inches long, 1-3 inches wide, conspicuously asymmetrical on either side of the midrib, especially at the base, margins toothed.
Features: Large. Fast growth. Ornamental shape, shade tree.
Landscape use: An excellent shade tree for parks, colleges and school campuses. Underused as a landscape tree.
Form: A tall, stately, graceful, deciduous tree with thin, ascending to arching branches that form low on the tree and produce an attractive vase-shaped crown.

Bald Cypress
Taxodium distichum

Average size: 45 ft.
Moisture: Moist to wet conditions best. Adaptable to drier soils if irrigated until well established.
Exposure: Full sun.
Leaves: Deciduous. Short, green, linear, flattened, 1/2-1 inch long, sometimes pressed to the branchlet, more often spreading from the branchlet in the form of a feather.
Features: Fast growth. Feathery foliage. Fall color. Hardy and carefree. Long life.
Landscape use: Planted in groups along edges of ponds and small streams, drainage swales and canal banks. Sometimes used in parking lots. Essential for wetland restoration projects.
Form: A tall, stately, slender, deciduous conifer with a swollen base, conical crown, stout branches and reddish brown bark.
Disadvantages: Sheds its deciduous twigs with leaves still attached, which can be messy and require cleanup when planted in parking lots or formal landscapes. Not well suited to alkaline soils.

Laurel Oak
Quercus laurifolia

Average size: To 40 ft.
Moisture: Does best in moist soils.
Exposure: Sun to partial shade.
Leaves: Deciduous. Dark shiny green, 3-4 inches long, varying from lance shaped to diamond shaped.
Features: Large size, attractive leaves, fast growth, tolerant of wet soils, soil versatility.
Landscape use: Specimen tree in moist to wet areas. Street tree Restoration projects.
Form: A large, erect, single-trunked, fast-growing, robust oak with an oval crown of horizontal to ascending branches, often producing a buttressed base.
Disadvantages: Susceptible to the same insect pests as most oaks, but not seriously.

Live Oak
Quercus virginiana

Average size: 50 ft. x 75 ft.
Moisture: Well drained sites. Avoid very wet sites.
Exposure: Full sun.
Leaves: Alternate, dark green above, paler and grayish below, leathery, 1-5 inches long. Evergreen.
Features: Long life. Broad, spreading crown. Excellent for shade. Fast growth rate when young.
Landscape use: Southern landscape choice. Excellent shade or specimen tree for large spaces. Popular street and parking lot tree.
Form: A massive, hardy, long-lived, evergreen oak, typically with a short, thick trunk and large, spreading branches ascending into the crown. Branches sometimes sagging under their own weight and, in very old specimens, drooping to, or almost to, the ground.

Longleaf Pine
Pinus palustris

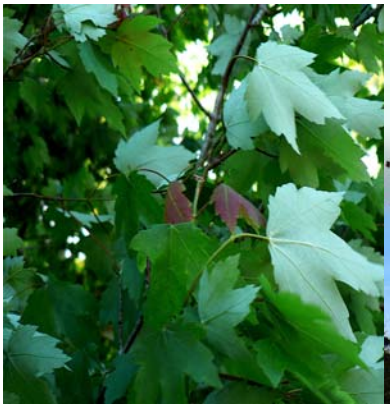
Average size: To 40 ft.
Moisture: Deep, well drained, acidic, drier sands.
Exposure: Full sun.
Leaves: Needlelike, 8-18 inches long, borne in large, globular clusters at the tips of stout branches that taper little toward their tips. Evergreen.
Features: Large size, large cones, long needles, fast growing when established. Importance to wildlife.
Landscape use: Specimen tree or in natural groupings. Restoration projects and roadside applications, especially in drier sites.
Form: A tall, single-trunked pine with a spreading crown of stout branches that taper little toward their tips, dense globular clusters of long to very long needles, large, conspicuous cones, and reddish orange bark that is divided into thin, irregular plates. Terminal buds are silvery white, showy, and a distinguishing character of this species. Seedlings may remain in a grasslike stage for many years before producing aboveground trunks.
Disadvantages: Does not perform well in heavy soils.

Red Cedar
Juniperus virginiana

Average size: 30 ft. x 30 ft.
Moisture: Dry to moist. Site should be well-drained. Drought tolerant.
Exposure: Full sun.
Leaves: Small, green, scalelike, crowded around the twigs and branches. Evergreen.
Features: Dense foliage and exceptional tolerance of alkaline soil. Usefulness to wildlife.
Landscape use: Specimen tree in groves, provides cover, food and nest sites for birds and other wildlife. Useful along streets, roadsides and as a tall, thick hedge along property borders.
Form: An erect, conical, densely foliated, very low-branching, evergreen tree.
Disadvantages: Host of cedar-apple rust; should not be grown near crabapple *(Malus angustifolia) or haws (Crataegus spp.).*

Red Maple
Acer rubrum

Average size: 45 ft.
Moisture: Prefers wet to moist sites. Trees planted on drier sites will require supplemental irrigation.
Exposure: Does best in dappled shade but will tolerate full sun. Young trees, especially, should be protected from strong sun.
Leaves: Deciduous. Opposite, simple, palmately 3- to 5-lobed, medium green above, coated below with a dense covering of whitish hairs, variable in size, 2-6 inches long, 2-4 inches wide (individual trees may have leaves tending toward either of these extremes), margins toothed, and the leaf stalk and central leaf veins red. Exceptionally beautiful in fall with color ranging from soft yellow to reddish.
Features: Fast growth. Excellent color from winter through spring. Can grow in either wet or moist upland soils.
Landscape use: Specimen for moist sites. Provides cover around retention ponds, drainage swales, canal banks and parking lots. Allow plenty of room for growth.
Form: An erect, typically single-trunked tree, with a relatively narrow crown and ascending branches.



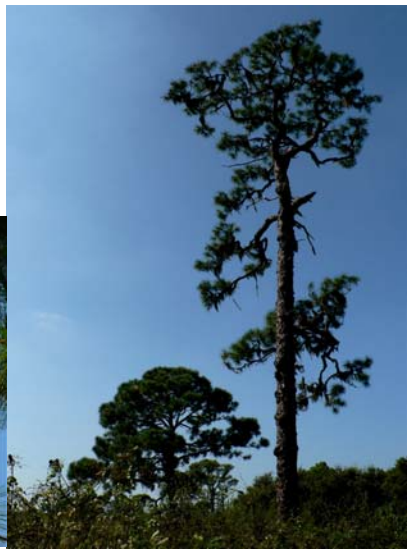
Sand Live Oak
Quercus geminata

Average size: 20 ft.
Moisture: Average to dry sites.
Leaves: Evergreen.
Features: Slow growing shade tree suitable for coastal or very dry, sandy sites. Acorns for wildlife. Salt tolerant.

South Florida Slash Pine
Pinus elliottii var "densa"

Average size: 40 ft.
Moisture: Moderate soil moisture is best. Well drained soils. Also used in moist to moderately wet sites.
Exposure: Full sun.
Leaves: Evergreen. Needlelike, 8-12 inches long, typically borne 2 or 3 per cluster.
Features: Fast growth. High canopy. Natural Florida appearance. Provides food and cover for birds and small animals.
Landscape use: Specimen or in natural groupings. When growth space is allowed, it forms a broad, spreading crown with relatively low branches; otherwise it produces high branches and a tighter crown. Especially good for roadside applications within its natural range.
Form: A tall, single-trunked pine with an ovoid crown, dense, elongated clusters of medium-long needles, tapering branches, medium-sized cones, and reddish brown bark that is divided into irregular, scaly, flaking plates.





Southern Magnolia
Magnolia grandiflora
(dwarf cultivars "Little Gem", "Alta")

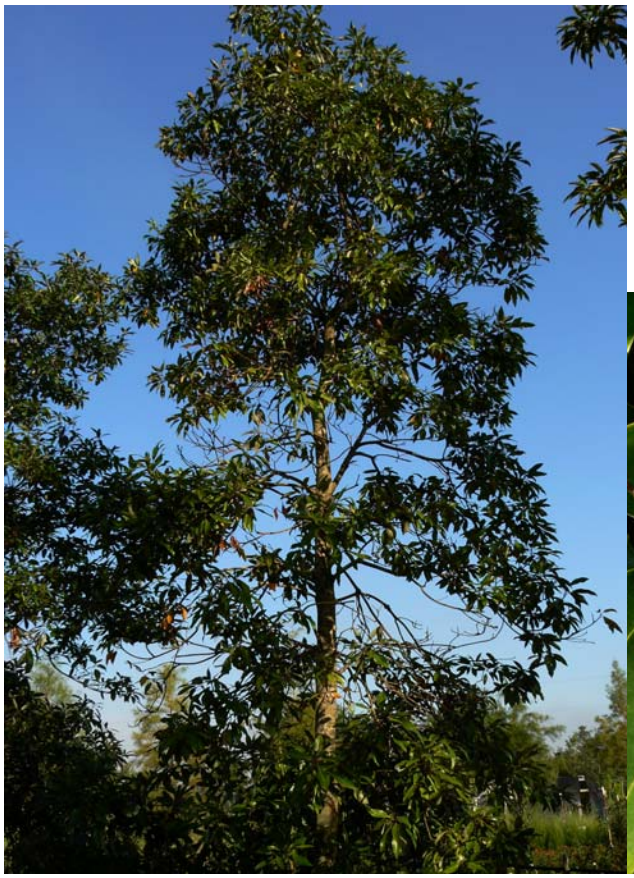
Average size: 25 ft.
Moisture: Moist, well drained sites. Supplemental irrigation typically not required after becoming established.
Exposure: Full sun to part shade. Blooms best in sun. Prefers some shade and richer soils.
Leaves: Evergreen. Showy, large, 6-10 inches long, leathery, dark shiny green above, and rusty orange to brownish below.
Features: Upright dwarf forms adapted to central Florida. Fragrant and large white flowers with extended blooming period.
Landscape use: Southern landscape choice. Specimen for smaller areas or good in groups. Excellent as a shade tree or to border the edges of large urban lots where space is adequate.
Form: A large, handsome, stately, evergreen tree with a broad, conical crown, stout branches, large, shiny green leaves and arresting blossoms.
Disadvantages: Few plants will grow beneath the Southern Magnolia. Requires supplemental watering and maintenance in open sun along road shoulders.

Sugarberry, Hackberry
Celtis laevigata

Average size: 40 ft.
Moisture: Irrigate to keep soil moist, but not wet, until established. Will adapt to drier sites.
Exposure: Part shade to full sun.
Leaves: Alternate, simple, 2-5 inches long, minutely toothed on the margins, light green during summer but turning yellow in the fall, somewhat wedge shaped in overall outline and tapering to a long, often curving point. Deciduous.
Features: Fast growth. Excellent for alkaline soils. Attractive, easy-to-grow shade tree. Appearance improves with age. Does very well on disturbed soils.
Landscape use: Good choice for parking lots and roadsides. Works well as a shade tree and is attractive to wildlife including butterflies, songbirds and especially, yellow-bellied sapsucker woodpeckers.
Form: A large, spreading tree with a rounded crown and stout, zigzag branches.
Disadvantages: Hackberry has a shallow root system that may prevent other plants from growing beneath it.

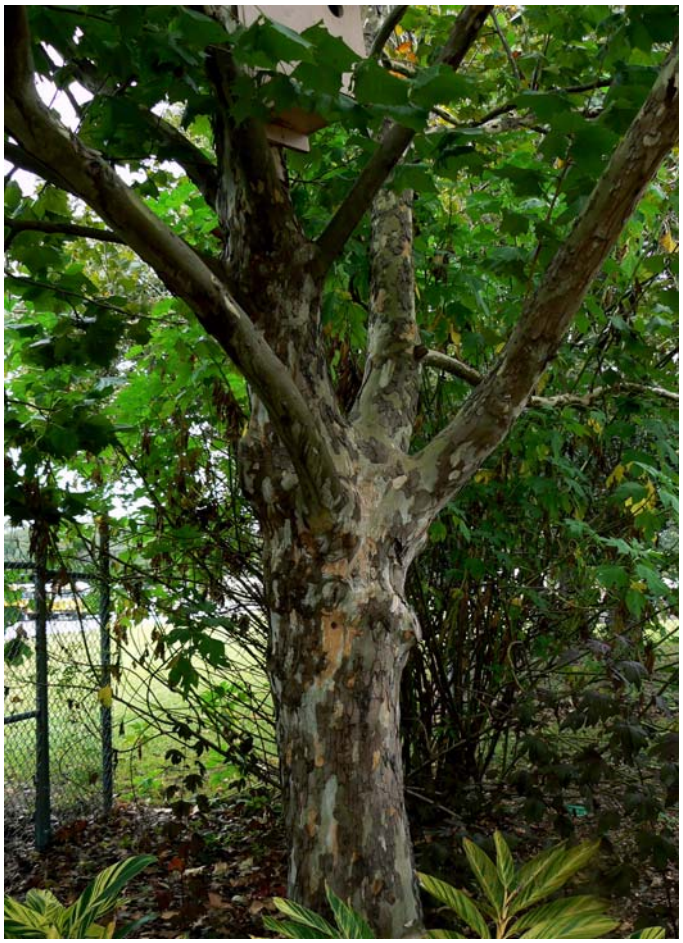
Sweetbay Magnolia
Magnolia virginiana

Average size: To 35 ft.
Moisture: Very moist to wet.
Exposure: Full sun (when growing in wet soils) to part shade.
Leaves: Alternate, long-elliptic in outline, 3-6 inches long, dull shiny green above, conspicuously silvery below. Evergreen.
Features: Wetland habit. Fragrant, white flowers. Seeds are eaten by wildlife.
Landscape use: Good for wet, soggy soils along retention ponds, drainage swales, canal banks and wet roadsides.
Form: An erect, evergreen tree with a narrow, conical crown and leaves that are silvery below and shiny green above. During breezy weather trees situated in the open are showy as they appear to change color from silvery to green due to the two-toned leaves.



Sycamore
Platanus occidentalis

Average size: 50 ft.
Moisture: Dry to moist. Adapts to almost all soil moistures. Prefers moderate moistures.
Exposure: Full sun.
Leaves: Deciduous. Large, coarse, shallowly 3- to 5-lobed, about 10 inches long and wide. Turns tan to pale yellow in the fall.
Features: Fast growth. Fall color. Interesting and attractive bark.
Landscape use: Large street tree. Erosion control along stream banks.
Form: A large, tall, deciduous tree with a flaking, mottled trunk, a spreading crown, stout to very large branches and an oval to pyramidal form.



Winged Elm
Ulmus alata

Average size: 35 ft.
Moisture: Moist to dry sites. Adapts to dry, poor, sandy soils.
Exposure: Full sun to part shade.
Leaves: Deciduous. Alternate, lance shaped, small, 1 - 2.5 inches long, doubly toothed along the margins, typically asymmetrical near the base.
Features: Fast growth. Tolerant of a variety of conditions. Excellent tree for small spaces. Relatively free of pests and insects. Clean appearance.
Landscape use: Specimen, shade tree for street tree plantings, parking lots and along sidewalks.
Form: A tough, drought-resistant, medium-sized tree with a rounded crown and spreading branches that are often lined with corky wings.

Orange Jasmine (Lakeview)
Murraya paniculata

Average size: 8 ft. x 8 ft.
Exposure: Sun to partial shade.
Leaves: Evergreen.
Features: Small, Florida friendly, non-native, evergreen flowering tree, white and fragrant flowers.

Simpson's Stopper
Myrcianthes fragrans

Average size: 12 ft.
Moisture: Dry to moist. Well-drained sites.
Exposure: Full sun to shade. Blooms best and maintains a more compact form in sun. Taller and more loosely branched in shade.
Leaves: Small, opposite, bright green, rounded to oval, to about 1 inch long. Evergreen.
Features: Graceful, delicate form. Attractive, fragrant flowers, red fruit highly attractive to birds, peeling ornamental bark.
Landscape use: Specimen plant for corners of buildings. Can be pruned for rounded shape. Understory plantings. Under power lines, mixed shrub borders. Good choice for parking lots and roadsides, medians, retention ponds.
Form: An erect, graceful shrub or very small tree with stiff branches, small leaves and tiny flowers.

Coral Honeysuckle
Lonicera sempervirens

Average size: Spreading to 8 ft. in all directions.
Moisture: Well-drained, moderately dry conditions.
Exposure: Sun to partial shade.
Leaves: Opposite, oval to oblong, 1-3 inches long, dark green with smooth margins, those below the flowers usually completely clasping the stem. Evergreen.
Features: Showy foliage. Bright reddish, coral, tubular flowers from February to December. Twining form. Attracts butterflies and hummingbirds.
Landscape use: Vine for trellises, fences, arbors and ground cover.
Form: A twining, climbing vine scrambling over fences, arbors, trees, shrubs and other structures. Will become a weak shrub if not trained to a structure.

Crossvine
Bignonia capreolata

Average size: Spreading vine.
Moisture: Well-drained, moderately dry to moist conditions.
Exposure: Sun to shade; flowers best in full sun.
Leaves: Opposite, compound, dark green, with 2 opposite leaflets on stalks about half the length of the petiole. Semi-evergreen.
Features: Fast growing and hardy. Showy, dark green foliage. Bright reddish, coral, tubular flowers mostly in spring. Twining and holdfasts. May be trained as a ground cover if mowed and pruned and sited away from trees or other support.
Landscape use: Vine for trellises, fences, arbors and ground cover on medians.
Form: A high-climbing, semievergreen, woody vine with opposite, compound leaves and showy, trumpet-shaped, reddish orange flowers.
Disadvantages: Its fast-growing habit may make this species difficult to control in small gardens.

APPENDICES

C - IT Technical Specifications dated 3/23/22

SECTION 27 00 00

COMMUNICATIONS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Applicable requirements of General Requirements/Provisions shall be considered a part of this section and shall have the same force as if printed herein full. In addition, all information related to communications infrastructure that is documented in the architectural, structural, mechanical, and electrical drawings/documents shall be included as part of the Communications documents.

1.02 QUALITY ASSURANCE

A. Specifications, Standards and Codes: All work shall be in accordance with the following:

1. The 2015 edition of the National Electrical Code (NFPA 70)
2. American National Standards Institute (ANSI)
3. National Electrical Manufacturers Association (NEMA)
4. Telecommunications Industries Association (TIA)
5. Electronic Industries Association (EIA)
6. Institute of Electrical & Electronics Engineers (IEEE)
7. Underwriters Laboratories (UL)
8. American Standards Association (ASA)
9. Federal Communications Commission (FCC)
10. Occupational Safety and Health Administration (OSHA)
11. American Society of Testing Material (ASTM)
12. Americans with Disabilities Act (ADA)
13. Local city and county ordinances governing electrical work
14. In the event of conflicts, the more stringent provisions shall apply.

1.03 SCOPE

A. The work to be done under this section of the Specifications shall include furnishing labor, material, equipment and tools required for the complete installation of the work indicated on the Drawings or as specified herein.

B. All materials, obviously a part of the Communications Infrastructure and necessary to its proper operation, but not specifically mentioned or shown on the Drawings, shall be furnished and installed without additional charge.

C. The Drawings and Specifications are complementary to each other and what is called for by one shall be as binding as if called for by both. If a discrepancy exists between the Drawing and Specifications, the higher cost shall be included, and the engineer shall be notified of the discrepancy.

1.04 WORK INCLUDED

The Communications Infrastructure installed, and work performed under this Division ofthe Specifications shall include but not necessarily be limited to the following:

A. Voice/Data/Video Cabling Infrastructure

B. Overhead Paging System and Intercom

C. Communications conduits, raceways, cable tray, racks, cabinets and equipment mounting boards

D. Grounding and Bonding

E. Underground raceway excavation, backfill, and compaction

F. Concrete work for duct banks, maintenance holes, handholes, vaults and restoration (where applicable)

1.05 DEFINITIONS

A. Terms: The following definitions of terms supplement those of the General Requirements and are applicable to Division 27 - Communications:

B. Provide: As used herein shall mean “furnish, install and test (if applicable) complete.”

C. Infrastructure: As used herein shall mean cable, conduit, raceway, cable tray or j-hooks with all required boxes, fittings, connectors, and accessories; completely installed.

D. Work: As used herein shall be understood to mean the materials completely installed, including the labor involved.

E. Owner: _____

F. Project Manager: _____

G. Architect: _____

H. Engineer: _____

1.06 DRAWINGS

A. Drawings are generally diagrammatic and show the arrangement and location of pathways, outlets, support structures and equipment. The Contractor shall carefully investigate the structural and finish conditions affecting his work and arrange his work accordingly. Should conditions on the job make it necessary to make adjustments to pathways or materials, the Contractor shall advise the Engineer and secure approval before proceeding with such work.

B. Where exact locations are required by equipment for stubbing-up and terminating conduit concealed in floor slabs, the Contractor shall request shop drawings, equipment location drawings, foundation drawings, and any other data required by him to locate the concealed conduit before the floor slab is poured.

C. Materials, equipment or labor not indicated but which can be reasonably inferred to be necessary for a complete installation shall be provided. Drawings and Specifications do not undertake to indicate every item of material, equipment, or labor required to produce a complete and properly operating installation.

D. The right is reserved to make reasonable changes in locations of equipment indicated on Drawings prior to rough-in without increase in contract cost.

E. The Contractor shall not reduce the size or number of conduit runs indicated on the Drawings without the written approval of the Engineer.

F. Any work installed contrary to Contract Drawings shall be subject to change as directed by the Engineer, and no extra compensation will be allowed for making these changes.

G. The location of equipment, support structures, outlets, and similar devices shown on the Drawings are approximate only. Do not scale Drawings. Obtain layout dimensions for equipment from Architectural plans unless indicated on Communications plans.

H. Schematic diagrams shown on the Drawings indicate the required functions only. The technology of a particular manufacturer may be used to accomplish the functions indicated without exact adherence to the schematic Drawings shown. Additional labor and materials required for such deviations shall be furnished at the Contractor's expense.

I. Verify the ceiling type, ceiling suspension systems, and clearance above hung ceilings prior to ordering cabling and associated hardware. Notify the Engineer of any discrepancies.

J. Review all architectural drawings for modular furniture.

K. Portions of these Drawings and Specifications are abbreviated and may include incomplete sentences. Omissions of words or phrases such as “the Contractor shall,” “shall be,” “as indicated on the Drawings,” “In accordance with,” “a,” “the” and “all are intended” shall be supplied by inference.

1.07 SUBMITTALS

A. Submit for approval, details of all materials, equipment and systems to be furnished. Work shall not proceed without the Owner and/or the Project Manager's approval of the submitted items. Three (3) copies of the following shall be submitted:

1. Submittals for individual systems and equipment assemblies that consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered, reviewed or stored, and such submittals will not be returned except at the request and expense of the Contractor.
2. Contractor shall generate shop drawings. Modify reviewed and accepted shop drawings to include revisions based upon completion of work. Submit shop drawings with record drawings on hard copy.
3. Shop drawings shall include equipment racks, patch panels, termination blocks, connection details, rack mounting details and any other details not included in the construction drawings.

B. Any materials and equipment listed that are not in accordance with Specification requirements may be rejected.

C. The approval of material, equipment, systems and shop drawings is a general approval subject to the Drawings, Specifications and verification of all measurements at the job. Approval does not relieve the Contractor from the responsibility of shop drawing errors. The Contractor shall carefully check and correct all shop drawings prior to submission for approval.

1.075 BIDDING PROTOCOL

A. In the case that the Electrical contractor for the project has a low voltage division, subsidy, or partnering company that uses their electrical licensure, and wishes to bid on the low voltage portion of a project, a sealed bid for low voltage work to be performed must be submitted directly to the General Contractor of the project. If an Electrical contractor directly receives bids, they forfeit the right to bid on the project with their low voltage division, subsidy, or partnering company that uses their electrical licensure.

B. Bid package for low voltage work shall be solicited to all qualified low voltage installation companies meeting requirements found in this document.

C. Bid submissions are to be accepted by all qualified low voltage installation companies meeting requirements found in this document.

D. Proposals to complete low voltage work must be reviewed by both the General Contractor as well as SCSB IT Department prior to final selection of low voltage subcontractor.

1.08 QUALITY ASSURANCE

A. Equipment and materials required for installation under these Specifications shall be the current model and new (less than one [1] year from the date of manufacture), unused and without blemish or defect.

B. Equipment shall bear labels attesting to Underwriters Laboratories, where subject to label service. Manufacturers of equipment and materials pertinent to these items shall have been engaged in the manufacture of said equipment a minimum of three (3) years and, if so directed by the Owner, be able to furnish proof of their ability by submitting affidavits and descriptive data about their product including size and magnitude comparable to requirements specified herein.

1.09 APPROVED CONTRACTORS

A. The Contractor shall be approved by the School Board of Sarasota County Information Technology Department.

1.10 CONTRACTOR QUALIFICATIONS

A. The Contractor shall have total responsibility for the coordination and installation of the work shown and described in the Drawings and Specifications. The Contractor shall be a company specializing in the design, fabrication and installation of integrated communications systems.

B. Communications Systems specified shall be installed under the direction of a qualified Contractor. Qualification requirements shall include submittal by the Contractor to the Owner of the following:

1. List of previous projects of this scope, size and nature; including names and sizes of projects, description of work, time of completion and names of contact persons for reference.

2. Shall certify that they are manufacturer-authorized for work to be performed.

C. Contractor must employ at least one (1) full-time Registered Communications Distribution Designer (RCDD). The RCDD shall be a W2 employee and not a subcontractor.

1.11 COORDINATION WITH OTHER TRADES

A. The Contractor shall coordinate communications work with that of other sections as required to ensure that the entire communications work will be carried out in an orderly, complete and coordinated fashion.

1.12 SITE INVESTIGATION

A. Prior to submitting bids for the project, visit the site of the work to become aware of existing conditions that may affect the cost of the project. Where work under this project requires extension, relocation, reconnections or modifications to existing equipment or systems, the existing equipment or systems, shall be restored to their original condition before the completion of this project.

1.13 PERMITS

A. Obtain all permits and inspections for the installation of this work and pay all charges incident thereto. Deliver to the Owner all certificates of said inspection issued by authorities having jurisdiction.

1.14 RENOVATIONS AND ADDITIONS

A. All work that would adversely affect the normal operation of the other portions of the Owner's property shall be done at a time other than normal working hours. Normal working hours shall be considered 7 a.m. to 4 p.m. Monday through Friday.

B. Prior to submitting bids on the project, visit the site of the work to become aware of existing conditions that may affect the cost of the project.

C. Where work under this project requires extension, relocation, reconnections or modifications to existing equipment or systems, the existing equipment or systems shall be restored to their original and operating condition. Remove all equipment indicated to be demolished, including outlets, devices, raceways and support structures.

D. Care shall be exercised in the removal and storage of equipment indicated to be relocated or removed and reused. Prior to placing back into service, equipment shall be cleaned, and marred or chipped paint surfaces touched-up.

E. Provide all coring, cutting and patching to existing walls, floors, etc., required for the removal of existing work or the installation of new work.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

A. Product substitutions are not allowed unless noted as, “Or Approved Equal (by the Information Technology Department).” The Engineer's decision as to whether the submitted equipment is acceptable shall be final and binding.

B. All changes necessary to accommodate the substituted equipment shall be made at the Contractor's expense and shall be approved by the Engineer. Detailed drawings indicating the required changes shall be submitted for approval at the time the substitution is requested.

C. If substitutions are made in lieu of device specified; form, dimension, design and profile shall be submitted to the Engineer for approval.

D. Submit request for approval of substitute materials in writing to the Owner at least ten days prior to bid opening.

2.02 MATERIALS

A. All materials used in this work shall be new and shall bear the inspection label of Underwriters' Laboratories Inc. or certification by other recognized laboratory.

B. The published standards and requirements of the Telecommunications Industries Association (TIA), National Electrical Manufacturers Association (NEMA), the American National Standard Institute (ANSI), the Institute of Electrical and Electronic Engineers (IEEE), and the American Society of Testing Materials (ASTM), are made a part of these Specifications and shall apply wherever applicable.

C. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts are available.

D. When more than one unit of the same class of equipment or material is required, such units shall be the products of a single manufacturer or partner manufacturers that offer a certified solution.

E. Components of an assembled unit need not be products of the same manufacturer but must offer a certified end-to-end solution.

F. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.

G. Components shall be compatible with each other and with the total assembly for the intended service.

PART 3 - EXECUTION

3.01 EXAMINATION OF CONDITIONS

A. Prior to the start of work, the Contractor shall carefully inspect the installed work of other trades and verify that such work is complete to the point where installation may properly commence. Start of work indicates acceptance of conditions.

B. Install equipment in accordance with applicable codes and regulations, the original design and the referenced standards.

C. In the event of a discrepancy, immediately notify the Project Manager.

D. Do not proceed with installation until unsatisfactory conditions and discrepancies have been fully resolved.

3.02 PROTECTION OF SYSTEMS AND EQUIPMENT

A. Protect materials and equipment from damage during storage at the site and throughout the construction period. Equipment and materials shall be protected during shipment and storage against physical damage, dirt, theft, moisture, extreme temperature and rain.

B. Damage from rain, dirt, sun and ground water shall be prevented by storing the equipment on elevated supports and covering the sides with securely fastened protective rigid or flexible waterproof coverings.

C. During installation, equipment shall be protected against entry of foreign matter on the inside and be vacuum cleaned both inside and outside before testing, operating or painting.

D. As determined by the Project Manager, damaged equipment shall be fully repaired or shall be removed and replaced with new equipment to fully comply with requirements of the Contract Documents. Decision of the Project Manager shall be final.

E. Damaged paint on equipment and materials shall be repainted with painting equipment and finished with the same quality of paint and workmanship as used by the manufacturer.

3.03 ACCESS TO EQUIPMENT

A. Equipment shall be installed in location and manner that will allow convenient access for maintenance and inspection.

B. Working spaces shall be not less than specified in the National Electrical Code (NEC) for voltages specified.

C. Where the Project Manager determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled, one time only, as directed by the Project Manager, at no additional cost to the Owner. “Conveniently accessible” is defined as being capable of being reached without the use of ladders or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping and duct work.

3.04 CLEANING

A. During construction, and prior to Owner acceptance of the building, remove from the premises and dispose of packing material and debris caused by communications work.

B. Remove dust and debris from interiors and exteriors of electrical equipment. Clean accessible current carrying elements prior to being energized.

3.05 COMPLETION

A. General: Upon completion of the work, remove excess debris, materials, equipment, apparatus, tools and similar items. Leave the premises clean, neat and orderly.

B. Results Expected: Systems shall be complete and operational, and controls shall be set and calibrated. Testing, start-up and cleaning work shall be complete.

C. Maintenance Materials: Special tools for proper operation and maintenance of the equipment provided under this Specification shall be delivered to the Owner.

3.06 TESTING AND VERIFICATION

A. See specific Division 27 sections for testing parameters of sub-systems.

B. The Contractor shall verify that requirements of this Specification are met. Verification shall be through a combination of analyses, inspections, demonstrations and tests, as described below.

C. Verification by inspection includes examination of items and comparison of pertinent characteristics against the qualitative or quantitative standard set forth in the Specifications. Inspection may require moving or partially disassembling the item to accomplish the verification, included as part of the work at no additional cost to the Owner.

D. The Contractor shall verify by formal demonstrations or tests that the requirements of this Specification have been met. The Contractor shall demonstrate that the communications systems, components and subsystems meet Specification requirements in the “as-installed” operating environment during the “System Operation Test.” Even though no formal environmental testing is required, the Contractor shall measure and record temperature, humidity and other environmental parameters and the environmental conditions, which were encountered during the “System Operation Test.”

E. The Contractor shall carefully plan and coordinate the final acceptance tests so that tests can be satisfactorily completed. The Contractor shall provide necessary instruments, labor and materials required for tests, including the equipment manufacturer's technical representative and qualified technicians in sufficient numbers to perform the tests within a reasonable time period.

F. The Contractor shall satisfy all items detailed in the final acceptance check-off list (punch list). The list shall be a complete representation of specified installation

requirements. At the time of final acceptance punch list items shall be corrected until the system is found to be acceptable to the Owner and the Project Manager.

G. After the Contractor systems have been installed and tested, the completed test plan shall be signed by the Communications Contractor Project Manager and submitted for approval.

END OF SECTION

SECTION 27 05 10

FIRESTOPPING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.15 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Firestopping for Communications Systems.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.16 SUBMITTALS

A. Provide product data from manufacturer’s specifications.

1.17 WORK INCLUDED

A. The work included under this Specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

PART 2 - PRODUCTS

2.03 APPROVED PRODUCTS

A. Approved Firestopping Manufacturer(s)

1. Flame stopper Thru-Wall Fitting - Wiremold Company (Firestop Devices)
2. Unique Firestop Products (Firestop Devices)
3. STI Firestop Products (Firestop Devices, Putties, Caulks, Sealants, etc.)
4. Hilti (Putties, Caulks, Sealants, etc.)
5. Approved Equal by SCSB Information Technology Department

2.04 TYPES OF PRODUCTS

A. Sealants

1. Intumescent Firestop Sealants and Caulks
2. Latex Firestop Sealant
3. Acrylic Water-Based Sealant
4. Silicone Firestop Sealants and Caulks
5. Firestop Putty
6. Firestop Collars
7. Wrap Strips
8. 2-Part Silicone Firestop Foam
9. Firestop Mortar
10. Firestop Pillows
11. Elastomeric Spray
12. Accessories:
13. Forming/Damming Materials: Mineral fiberboard or other type as per manufacturer recommendation

B. Firestop Devices

1. Thru-Wall Fitting (Flamestopper by Wiremold)
   a. The firestop device box shall be constructed of 16 gage G90 steel.
   b. The firestop device intumescent block shall be constructed of a graphite base material with expansion starting at 375°F and an unrestrained expansion between 6 to 12 times. The intumescent block shall be held securely by the box in order to prevent tampering and damage during installation.
   c. The firestop device shall have doors which can be adjusted to prevent materials from penetrating the device if the device is empty or completely full. The doors shall be constructed of 16 gage G90 steel with No. 10-32 screws use to adjust opening size.
   d. The firestop device shall be available for 2" and 4" trade size EMT conduit.
   e. The firestop device shall be available in safety yellow powder coat, custom colors and an unpainted galvanized finish.
2. Threaded Firestop Device (Unique Firestop Products)
   a. Threaded steel sleeve device incorporating flat washers secured by threaded device shall be installed around cables. The device shall be available in 1, 2 and 4-inch sizes. Maximum diameter of the wall penetration for 1, 2 and 4-inch sizes shall be 1-1/4, 2-7/16 and 4-1/2 inches respectively.
3. Smooth Firestop Device (Unique Firestop Products)
   a. Smooth steel sleeve device incorporating flat washers secured by sliding compression couplers. The device shall be available in 1, 2 and 4-inch sizes. Maximum diameter of the wall penetration for 1, 2 and 4-inch sizes shall be 1-1/4, 2-7/16 and 4-1/2 inches respectively.
4. Split-Sleeve Firestop Device (Unique Firestop Products)

a. Threaded steel sleeve halves incorporating split couplings and slotted washers to fit the specific diameter of the opening. The device shall be available in 1, 2 and 4-inch sizes. Maximum diameter of the wall penetration for 1, 2 and 4-inch sizes shall be 1-1/4, 2-7/16 and 4-1/2 inches respectively.

5. Fire Rated Cable Pathway (STI EZ-PATH)
   a. Fire rated cable pathway device modules shall be comprised of steel raceway with intumescent foam pads allowing 0-100 percent cable fill.

2.05 UL CLASSIFICATION

A. Thru-Wall Fitting - The firestop device for use in through-penetration firestop systems shall have been examined and tested by Underwriters Laboratories Inc. to UL1479 (ASTM E 814) and bear the U.S. and Canadian UL Classification Mark.

B. Threaded, Smooth and Split-Sleeve Firestop Devices - Firestopping sealants and devices shall be used together as a firestop system. All firestop systems shall bear a UL Classification system number. UL Classification system numbers are as follows:

1. Threaded Firestop System
   a. Block Wall - W-J-3049
   b. Dry Wall - W-L-3138
2. Threaded Firestop System (Vertical)
   a. Slab - F-A-3010
3. Smooth Firestop System
   a. Block Wall - W-J-3048
   b. Dry Wall - W-L-3137
4. Split-Sleeve Firestop System
   a. Block Wall - W-J-3047
   b. Dry Wall - W-L-3136

2.06 FIRESTOPPING SYSTEMS

A. Thru-Wall Fitting Firestop System:

1. The device shall be classified for use in one-, two-, three, and four-hour rated gypsum, concrete and block walls and provide a maximum L rating of six cfm. The devices shall also been tested by Underwriters Laboratories Inc. to UL2043 and determined to be suitable for use in air handling spaces.

B. Threaded, Smooth and Split-Sleeve Firestop Systems:

1. Shall conform to both Flame (F) and Temperature (T) ratings as required by local building codes and as tested by nationally accepted test agencies per ASTM E814 or UL 1479 fire tests in a configuration that is representative of field conditions.
2. The F rating must be a minimum of one (1) hour but not less than the fire resistance rating of the assembly being penetrated. T rating when required by code authority shall be based on measurement of the temperature rise on penetrating item(s). The fire test shall be conducted with a minimum positive pressure differential of 0.01 inches of water column.
3. For joints, must be tested to UL 2079 with movement capabilities equal to those of the anticipated conditions.

C. Firestopping materials and systems must be capable of closing or filling through-openings created by 1) the burning or melting of combustible pipes, cable jacketing, or pipe insulation materials, or 2) deflection of sheet metal due to thermal expansion (electrical & mechanical duct work).

D. Firestopping material shall be asbestos and lead free and shall not incorporate nor require the use of hazardous solvents.

E. Firestopping sealants must be flexible, allowing for normal pipe movement.

F. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.

G. Firestopping materials shall be moisture resistant and may not dissolve in water after curing.

PART 3 - EXECUTION

3.07 CONDITIONS REQUIRING FIRESTOPPING

A. General

1. Provide firestopping for conditions specified whether or not firestopping is indicated, and if indicated, whether such material is designed as insulation, safing, or otherwise.

B. Through-Penetrations

1. Firestopping shall be installed in all open penetrations and in the annular space in all penetrations in any bearing or non-bearing fire-rated barrier.

C. Membrane-Penetrations

1. Where required by code, all membrane-penetrations in rated walls shall be protected with firestopping products that meet the requirements of third-party time/temperature testing.

D. Construction Joints/Gaps

1. Firestopping shall be provided between the edges of floor slabs and exterior walls, between the tops of walls and the underside of floors, in the control joint in masonry walls and floors and in expansion joints.

E. Smoke-Stopping

1. As required by the other sections, smoke-stops shall be provided for through-penetrations, membrane-penetrations, and construction gaps with a material approved and tested for such application.

3.08 EXAMINATION

A. Examine the areas and conditions where firestops are to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Verify that environmental conditions are safe and suitable for installation of firestop products.

C. Verify that all pipes, conduit, cable, and other items that penetrate fire-rated construction have been permanently installed prior to installation of firestops.

3.09 INSTALLATION

A. General

1. Installation of firestops shall be performed by an applicator/installer qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
2. Apply firestops in accordance with fire test reports, fire resistance requirements, acceptable sample installations, and manufacturer's recommendations.
3. Unless specified and approved, all insulation used in conjunction with through-penetrants shall remain intact and undamaged and may not be removed.
4. Seal holes and penetrations to ensure an effective smoke seal.
5. In areas of high traffic, protect firestopping materials from damage. If the opening is large, install firestopping materials capable of supporting the weight of a human.

6. Insulation types specified in other sections shall not be installed in lieu of firestopping material specified herein.
7. All combustible penetrants (e.g. non-metallic pipes or insulated metallic pipes) shall be fire stopped using products and systems tested in a configuration representative of the field condition.

B. Dam Construction

1. When required to properly contain firestopping materials within openings, damming or packing materials may be utilized. Combustible damming material must be removed after appropriate curing. Noncombustible damming materials may be left as a permanent component of the firestop system.

3.10 FIELD QUALITY CONTROL

A. Prepare and install firestopping systems in accordance with manufacturer's printed instructions and recommendations.

B. Follow safety procedures recommended in the Material Safety Data Sheets.

C. Finish surfaces of firestopping that are to remain exposed in the completed work to a uniform and level condition.

D. All areas of work must be accessible until inspection by the applicable Code Authorities.

E. Correct unacceptable firestops and provide additional inspection to verify compliance with this Specification.

3.11 CLEANING

A. Remove spilled and excess materials adjacent to firestopping without damaging adjacent surfaces.

B. Leave finished work in a neat and clean condition with no evidence of spill-overs or damage to adjacent surfaces.

3.12 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION

SECTION 27 05 26

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.18 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Grounding and Bonding for Communications Systems.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.19 SUBMITTALS

A. Provide product data from manufacturer's specifications.

1.20 WORK INCLUDED

A. The work included under this Specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

PART 2 - PRODUCTS

2.07 APPROVED PRODUCTS

A. Approved Equipment Grounding Conductor Manufacturer(s)

1. Southwire
2. Or Approved Equal (by SCSB)

B. Approved Grounding Lug Manufacturer(s)

1. Burndy
2. Thomas & Betts
3. Or Approved Equal (by SCSB)

C. Approved Grounding Busbar Manufacturer(s)

1. Chatsworth Products, Inc.
2. B-Line
3. Harger
4. Or Approved Equal (by SCSB)

2.08 GROUNDING CONDUCTORS

A. Grounding Conductor

1. Construction shall be Type THHN copper conductors, insulated with heat and moisture resistant PVC over which a UL listed jacket is applied.
2. Jacket color shall be green or black. Black jacketed cable shall be identified at each termination point with a wrap of green tape.

2.09 GROUNDING LUGS

A. Grounding Lugs and Hardware

1. Grounding lugs shall be 2-hole and installed with a crimper that when properly executed the die of the crimper impresses the die # on the lug base. All lugs shall be sleeved with clear heat-shrink to allow for inspection of the crimp. Silicon bronze or stainless-steel bolts and washers shall be used to install lugs to equipment. Exothermic welding is also allowed.

2.10 GROUNDING BUSBARS

A. Grounding Busbar

1. The grounding busbar shall be made of 1/4" thick solid copper.
2. The grounding busbar shall be installed with minimum clearance, 1" offsets and 1-1/2" insulators.
3. The grounding busbar shall accommodate 2-hole compression lugs.
4. The grounding busbar shall meet or exceed ANSI/TIA-607-B requirements.

PART 3 - EXECUTION

3.13 GROUNDING

A. The facility shall be equipped with a Communications Bonding Backbone (TBB). This backbone shall be used to ground all communications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential to act as a current carrying conductor. The TBB shall be installed independent of the building's electrical and building ground and shall be designed

in accordance with the recommendations contained in the ANSI/TIA-607-B Telecommunications Bonding and Ground Standard.

B. The main entrance facility/equipment room in each building shall be equipped with a telecommunications main grounding busbar (TMGB). Each telecommunications room (TR) shall be provided with a telecommunications ground busbar (TGB). The TMGB shall be connected to the building electrical entrance grounding facility.

C. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the MC/IC/TC shall be grounded to the respective TGB or TMGB using a minimum #6 AWG stranded copper bonding conductor and compression lugs.

D. All wires used for communications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap or green tape. All cables and busbars shall be identified and labeled in accordance with the ANSI/TIA-606-A.

E. See Section 27 05 43 - Underground Ducts and Raceways for Communications Systems for underground duct and raceway systems ground requirements.

3.14 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION

SECTION 27 05 28

PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.21 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Pathways for Communications Systems.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.22 SUBMITTALS

A. Provide product data from manufacturer’s specifications.

1.23 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

PART 2 - PRODUCTS

2.11 APPROVED PRODUCTS

A. Rigid/Intermediate Conduit Manufacturer(s)

1. Approved by Owner

B. Non-Metallic (PVC) Manufacturer(s)

1. Approved by Owner

C. Electrical Metallic Tubing (EMT) Manufacturer(s)

1. Approved by Owner

D. EMT Fittings Manufacturer(s)

1. Approved by Owner

E. Innerduct/Inner-Conduit Channel Manufacturer(s)

1. Approved by Owner

F. Metallic Communications Outlet Box Manufacturer(s)

1. Approved by Owner

G. Pull Box Manufacturer(s)

1. Approved by Owner

H. Approved Cable Tray System Manufacturer(s)

1. Approved by Owner

I. Approved Cable Hanger Manufacturer(s)

1. Approved by Owner

J. Approved Velcro Strap Manufacturer(s)

1. Approved by Owner

K. Approved Surface Mounted Raceway Manufacturer(s)

1. Coordinate with Division 26 (Electrical Contractor). Refer to Drawings.

2.12 CONDUIT

A. Rigid and Intermediate Conduit

1. Rigid conduit, intermediate conduit, couplings, locknuts, bushings, elbows and connectors shall be standard thread. All materials shall be steel. Set screw or non-threaded fittings are not permitted.

B. Non-Metallic (PVC) Conduit

1. Non-metallic conduit shall be heavy wall, Schedule 40 PVC.

2. Couplings and connectors for non-metallic conduit shall be of the same material and be the product of the same manufacturer of the conduit furnished.

C. Electrical Metallic Tubing (EMT)

1. Electrical metallic tubing (EMT), couplings and connectors shall be steel. Malleable iron, pressure-cast or die-cast fittings are not permitted.
2. Fittings for 2" EMT and smaller shall be steel set screw type, except where otherwise noted. Fittings for 2.5" and larger shall be steel set screw type with two (2) screws for connectors and four (4) screws for couplings. All connectors shall be insulated throat type.

D. Conduit Support

1. Individual conduit hangers shall be galvanized spring steel specifically designed for the purpose and sized appropriately for the conduit type and diameter. Support individual conduits 1-1/2 inch and smaller with 1/4-inch threaded steel rods and use 3/8-inch rods for 2 inch and larger.
2. Conduit support channels shall be 14 gauge galvanized (or equivalent treatment) channel sized for the amount of conduit to be supported. Channel suspension shall be 3/8" threaded steel rods. Attach suspension rods to structure with swivel type connectors. Conduit straps shall be spring steel type compatible with channel.
3. Conduit straps shall be single hole cast metal type or two-hole galvanized metal type. Conduit clamps shall be spring steel type for use with exposed structural steel.

E. Innerduct/Inner-Conduit Channel

1. Innerduct shall be corrugated plastic equipped with pull-string or mule tape.
2. Inner-conduit channel shall be 3-channel with each channel equipped with mule tape.
3. See Drawings for innerduct / inner-conduit channel details.

2.13 METALLIC COMMUNICATIONS OUTLET BOXES

A. Metallic outlet boxes and device covers shall be galvanized steel not less than 1/16" thick.

B. The dimensions of the metallic outlet box shall be 4" x 4" square with a minimum depth of 2-1/8".

C. Metallic outlet boxes shall be equipped with single device covers (or two-device covers where needed). Where installed in plaster, gypsum board, etc., covers shall be raised to compensate for the thickness of the wall finish.

D. Where metallic outlet boxes are to be empty for future use, blank cover plates shall be used.

2.14 PULL BOXES

A. Pull boxes shall be constructed of galvanized steel with flat, removable covers fastened with plated steel screws.

B. Pull boxes shall be equipped with keyhole screw slots in the cover to permit removal of the cover without extracting the screws.

C. Pull boxes shall have provisions for grounding.

2.15 CABLE TRAY

A. Cable Tray System

1. Cable tray shall be steel or aluminum construction.
2. Cable tray cross members shall be factory welded at 12" intervals maximum.
3. Cable tray shall be equipped with one (1) or two (2) support rails that run the length of each segment.
4. End caps shall be installed on the exposed ends of the cable tray, channel supports and bolts. Protective covers shall be installed on threaded rods that come in contact with cabling plant.
5. Wall mount cable tray used in limited clearance areas shall be hook style and constructed of aluminum.
6. See Drawings for cable tray dimensions.
   a. Cable Tray color shall be black or clear.

2.16 CABLE HANGERS

A. J-Hooks

1. J-hooks shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables. J-hook shall be cULus Listed.
2. J-hooks shall have flared edges to prevent damage while installing cables.
3. J-hooks sized 1 5/16" and larger shall have a cable retainer strap to provide containment of cables within the hanger. The cable retainer strap shall be removable and reusable and be suitable for use in air handling spaces.

B. Adjustable Non-Continuous Cable Support Sling

1. Constructed from steel and woven laminate; sling length can be adjusted to hold up to 425 4-pair balanced twisted pair cables; rated for indoor use in non-corrosive environments. Rated to support Category 5 and higher cable, or optical fiber cable. Cable support sling shall be cULus Listed.
2. Adjustable non-continuous cable support sling shall have a static load limit of 100 lbs.
3. Adjustable non-continuous cable support sling shall be suitable for use in air handling spaces.

2.17 VELCRO STRAPS

A. Velcro Straps

1. Velcro straps installed in air handling spaces must be plenum rated.
   a. Non-plenum Velcro strap color shall be black.
   b. Plenum Velcro strap color shall be red.
   c. Tie Wraps are not approved

2.18 SURFACE MOUNTED RACEWAY

A. Surface Mounted Raceway

1. Coordinate with Division 26 (Electrical Contractor). Refer to Drawings.

PART 3 - EXECUTION

3.15 PENETRATIONS

A. Holes through concrete and masonry in new and existing structures shall be cut with a diamond core drill or concrete saw upon approval of the structural engineer of record for the base of building. Pneumatic hammer, impact electric, hand or manual hammer type drills shall not be allowed, except where permitted by the Project Manager as required by limited working space. X-ray all floor penetrations accordingly.

B. Holes shall be located so as not to affect structural sections such as ribs or beams.

C. Holes shall be laid out in advance. The Project Manager shall be advised prior to drilling through structural sections, for determination of proper layout.

D. Structural Penetrations: Where conduits, wireways and other raceways pass through fire partitions, fire walls or walls and floors provide a code compliant effective barrier against the spread of fire, smoke and gases.

E. All penetrations where conduit is not used shall be sleeved.

F. No gaps or rough edges shall be allowed between wall and conduit/sleeve.

3.16 CONDUIT SYSTEM

A. Conceal all conduits, except in unfinished spaces such as equipment rooms or as indicated by symbol on the Drawings.

B. Leave all empty conduits with a 200-pound test nylon cord pull line.

C. Flattened, dented, or deformed conduits are not permitted and shall be removed and replaced.

D. Fasten conduit support device to structure with wood screws on wood, toggle bolts on hollow masonry, anchors as specified on solid masonry or concrete, and machine bolts, clamps, or spring steel clips, on steel.

E. Install conduit with wiring, including homeruns as indicated on the Drawings. Any change resulting in a savings in labor or materials is to be made only in accordance with a contract change. Deviations shall be made only where necessary to avoid interferences and when approved by Engineer by written authorization.

F. Conduit shall be run parallel or at right angles to existing walls, ceilings, and structural members.

G. Attach backbone conduits larger than one-inch trade diameter to or from structure on intervals not exceeding twelve feet with conduit beam clamps, one-hole conduit straps or trapeze type support.

H. Where conduits must pass through structural members obtain approval of Architect or Engineer.

I. Install all conduits or sleeves penetrating or routed within rated firewalls or fire floors to maintain fire rating of wall or floor. Conduit shall not be installed in rated floors or walls if it compromises or violates the fire rating of floor or wall. Refer to architectural documents.

J. Provide expansion and deflection coupling where conduit passes over a building expansion joint.

K. Service entrance conduits and feeder conduits in direct contact with earth shall be schedule 40, heavy wall PVC. All service entrance conduit elbows shall be galvanized rigid steel. Service entrance conduits installed exposed or concealed in walls or above ceilings shall be galvanized rigid steel (G.R.S.) or intermediate metal conduit (IMC). Provide concrete encasement where required or as indicated on Drawings.

L. All other conduit, unless specified herein, shall be electrical metallic tubing (EMT). PVC conduit is not allowed in exposed or concealed areas, but only within concrete.

M. Conduit Installations Within Slab/Floor

1. Conduit shall be run following the most direct route between points.
2. Conduit shall not be installed in concrete where the outside diameter is larger than 1/3 of the slab thickness.
3. Conduits shall not be installed within shear walls unless specifically indicated on the Drawings. Conduit shall not be run directly below and parallel with load bearing walls.
4. Protect each metallic conduit installed in concrete slab or conduits 1-1/2 inch and smaller passing through a concrete slab against corrosion where conduit enters and leaves concrete by wrapping conduit with vinyl all-weather electrical tape.
5. Protect all conduits entering and leaving concrete floor slabs from physical damage during construction.
6. Provide expansion fittings in all conduits where length or run exceeds 200 feet or where conduits pass through building expansion joints.
7. Install all conduits penetrating or routed within rated fire floors to maintain the fire rating of the floor. Conduit shall not be installed in rated floors or walls if it compromises or violates the fire rating of floor or wall. Refer to architectural documents.
8. Conduits installed within concrete floor slabs which are in direct contact with grade or which penetrate the building roof shall be galvanized rigid steel (G.R.S.), intermediate metal conduit (I.M.C.) or Schedule 40, heavy wall PVC.

N. Communications cables shall not occupy conduits with power cables.

O. Metallic conduits shall be grounded in accordance with ANSI/TIA-607-B.

P. Conduit runs shall not have more than two (2) 90-degree bends between pull points.

Q. Communications conduit system shall contain no condulets (also known as an LB).

A. Rigid metal conduit (RMC) or intermediate metal conduit (IMC) shall be used for entrance conduits that exceed 50 feet into the building.

B. Horizontal Conduits

1. Support horizontal conduits at intervals not exceeding ten feet and within three feet of each outlet, junction box, backboard, enclosure or cabinet. Support conduits from structural steel members with spring steel type or beam conduit clamps and to non-metallic structural members with one-hole conduit straps. For exposed conduits and where conduits must be suspended below structure, single conduit runs shall be supported from structure by hanger rod and conduit clamp assembly, and multiple conduits shall be supported by trapeze type support suspended from structure. Do not attach conduits to ceiling suspension system channels or suspension wires.
2. For runs that total more than 100 feet in length, insert pull boxes so that no segment between boxes exceeds the 100 feet limit.
3. Each horizontal home-run conduit can serve from one (1) to three (3) outlet boxes. For one (1) outlet box, a 3/4" conduit shall be used, minimum. For two (2) outlet boxes, a 1" conduit shall be used, minimum. For three (3) outlet boxes, a 1-1/4" conduit shall be used, minimum.

3.17 COMMUNICATIONS OUTLET BOXES

A. Exact locations of the outlet boxes shall be coordinated with the electrical contractor and other trades.

B. Non-metallic communications outlet boxes may only be used for wood frame construction and/or where code allows.

C. The approximate locations of the outlets are indicated on the Drawings. The exact locations of outlets shall be determined at the building. The right is reserved to change, without additional cost, the exact location of any outlet, a maximum of 10' before it is permanently installed.

D. Orientation of outlet boxes (horizontal or vertical) shall be as indicated on the architectural elevations.

E. Install all outlet boxes in finished areas flush with the wall. Maintain 1/4" or less space between outlet box front and finished wall surface.

F. Outlet boxes shall be firmly anchored in place and shall not depend on the cover plate to hold it secure to the wall.

G. Outlet boxes installed back-to-back in fire-rated walls shall be separated horizontally by a minimum of 24".

3.18 PULL BOXES

A. Pull boxes shall be secured, independent of the conduit entries into the box. Pull boxes shall be secured to the building structure. In ceiling applications, pull boxes shall not be supported with ceiling wires.

B. Conduits entering pull boxes shall connect to pull boxes using die-cast zinc connectors.

C. Pull boxes shall be free from burrs, dirt and debris.

D. Pull boxes shall be installed in accordance with ANSI/TIA-569-B.

E. Pull boxes shall be grounded in accordance with ANSI/TIA-607-B.

3.19 CABLE TRAY SYSTEM

A. Install trays in accordance with recognized industry practices, to ensure that the cable tray equipment complies with requirements of the NEC.

B. All open trays shall be installed a minimum of six (6) inches away from any light fixture.

C. Provide external grounding strap at expansion joints, sleeves, crossover and other locations where tray continuity is interrupted.

D. Support all pathways from building construction. Do not support pathways from ductwork, piping or equipment hangers.

E. Install cable tray level and straight.

F. Provide all hardware, accessories, fasteners, anchors, threaded rods and support channels required to provide a complete cable tray system.

G. Cable trays shall not be used to house both low voltage and power cables unless cables are separated by a grounded physical barrier.

H. Cable tray system shall be grounded in accordance with ANSI/TIA-607-B.

3.20 CABLE HANGERS

A. Use J-hooks to support cable bundles according to BICSI Specifications

B. Installation and configuration shall conform to the requirements of ANSI/TIA-568-C.0, ANSI/TIA-568-C.1 & ANSI/TIA-569-B, NFPA 70 (National Electrical Code), applicable local codes, and to the manufacturer's installation instructions.

C. Install cables using techniques, practices, and methods that are consistent with Category 6 or higher requirements and that supports Category 6 or higher performance of completed and linked signal paths, end to end.

D. Install cables without damaging conductors, shield, or jacket.

E. Do not bend cables, in handling or in installing, to smaller radii than minimums recommended by manufacturer.

F. Pull cables without exceeding cable manufacturer's recommended pulling tensions. Use pulling means that will not damage media.

G. Do not exceed load ratings specified by manufacturer.

H. Adjustable non-continuous support sling shall have a static load limit of 100 lbs.

I. To avoid electromagnetic interference (EMI), pathways shall provide minimum clearances of four feet from motors or transformers, one foot from conduit and cables used for electrical power distribution, and five inches from fluorescent lighting. Pathways shall cross perpendicular to fluorescent lighting and electrical power cables or conduits.

3.21 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION

SECTION 27 05 43

UNDERGROUND DUCTS AND RACEWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.24 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Underground Ducts and Raceways for Communications Systems.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.25 SUBMITTALS

A. Provide product data from manufacturer’s specifications.

1.26 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

PART 2 - PRODUCTS

2.19 APPROVED PRODUCTS

A. Rigid/Intermediate Conduit Manufacturer(s)

1. Approved by Owner

B. PVC/HDPE Conduit Manufacturer(s)

1. Approved by Owner

C. Innerduct/Inner-Conduit Channel Manufacturer(s)

1. Approved by Owner

D. Marker Tape Manufacturer(s)

1. Approved by Owner

E. Approved Maintenance Hole/Handhole Manufacturer(s)

1. Approved by Owner

F. Approved Conduit Plug/Cap Manufacturer(s)

1. Approved by Owner

2.20 CONDUIT SYSTEM

A. PVC conduit for concrete encasement shall be Type DB, UL Labeled for 90 degrees C cables. Fittings shall be Type DB, solvent type, and from the same manufacturer as the conduit.

B. Concrete shall have a minimum strength of 2,500 psi at 28 days.

C. PVC conduit for direct burial shall be Schedule 40, UL Labeled for 90 degrees C cables. Fittings shall be Schedule 40, solvent type, and from the same manufacturer as the conduit.

D. Rigid and Intermediate Conduit

1. Rigid conduit, intermediate conduit, couplings, locknuts, bushings, elbows and connectors shall be standard thread. All materials shall be steel. Set screw or non-threaded fittings are not permitted.
2. Galvanized rigid steel conduit shall be hot dipped galvanized inside and outside, in 10-foot lengths and threaded on both ends. Fittings and bushings shall be threaded, cast or malleable iron, and hot dipped galvanized inside and outside.

E. Non-Metallic Conduit

1. Non-metallic conduit shall be heavy wall, Schedule 40 PVC / HDPE.
2. Couplings and connectors for non-metallic conduit shall be of the same material and be the product of the same manufacturer of the conduit furnished.

F. Conduit Support

1. Conduit straps shall be single-hole cast metal type or two-hole galvanized metal type. Conduit clamps shall be spring steel type for use with exposed structural steel.

G. Innerduct/Inner-Conduit Channel

1. Innerduct shall be non-corrugated PVC equipped with mule tape.
2. Inner-conduit channel shall be 3-channel with each channel equipped with mule tape.
3. See Drawings for innerduct/inner-conduit channel details.

H. Marker Tape

1. Marker tape shall be detectable, orange for communications, and labeled to indicate the type of circuit buried below.

2.21 MAINTENANCE HOLES/HANDHOLES

A. Maintenance Holes

1. Maintenance holes shall be pre-cast or cast in place concrete with a strength of 3,500 psi at 28 days, and steel reinforced.
2. Maintenance holes shall include a cast iron frame with cover, a hot dipped galvanized steel ladder, and hot dipped galvanized pulling eyes embedded in the concrete opposite each duct entrance and in the floor beneath the cover.
3. Maintenance holes shall be equipped with grounding busbar.
4. Maintenance holes shall be equipped with racking for cable storage.
5. Ground splices and connections at maintenance holes shall be exothermic welds, copper or bronze compression ground fittings, or bolted compression ring lugs.
6. The cover for maintenance holes shall have the lettering, “COMMUNICATIONS.”

B. Handholes

1. Handholes shall be non-conductive and shall not require grounding for safety. Handholes shall be unaffected by freeze/thaw and resistant to sunlight and chemicals. Handholes shall be pre-cast polymer concrete, heavy duty rated and bottomless.
2. Handholes shall be equipped with racking for cable storage.
3. Handholes shall have the word “COMMUNICATIONS” molded in the cover by the manufacturer. The cover shall be attached with penta-head stainless steel bolts.
4. Handholes shall be able to withstand 10,000 lbs. minimum.
5. See Drawings for handhole dimensions and locations.

2.22 CONDUIT PLUGS/CAPS

A. Conduit Plugs/Caps

1. Conduit plugs shall provide a watertight seal at expose ends of conduits.
2. Conduit plugs shall be conduit size specific.
3. Triplex and Quadplex duct plugs shall provide a watertight seal between the conduit and innerduct(s).
4. Simplex duct plugs shall provide a watertight seal between the innerduct and the cable that occupies it.
5. TDUX inflatable bladders shall be used to seal conduits equipped with MaxCell.

PART 3 - EXECUTION

3.22 CONDUIT SYSTEM

A. Excavation and Backfill

1. Contractor shall call underground utilities locator company before digging.
2. Barricades shall be provided around open holes and trenches. Temporary bridges shall be provided over trenches cut through major sidewalk routes. Major sidewalk routes shall not be closed to pedestrian traffic.
3. Barriers shall be provided to protect landscaping adjacent to the excavation area.
4. When rocks, concrete or other debris are encountered during excavation, remove completely.
5. Where sidewalk sections must be removed for installation of underground ducts, remove the sidewalk sections completely from joint to joint.
6. Where asphalt must be removed for installation of underground ducts, saw cut the asphalt in two, straight, parallel lines.
7. Backfill excavations in 6-inch layers and mechanically compact to 98 percent compaction.
8. Excavated materials may be used as backfill only if the backfill is sand or clean dirt that is free of rocks and debris over 3/4" in diameter.
9. In landscaped areas, backfill and mechanically compact to a depth of 6 inches below grade.
10. Backfill the last 6 inches with clean topsoil. Reseed lawn areas.
11. Restore concrete sidewalks and asphalt.
12. The Contractor shall perform all excavation to install the electrical work herein specified and as indicated on Drawings. During excavation, material for backfilling shall be piled back from the banks of the trench to avoid overloading and to prevent slides and cave-ins. All excavated materials not to be used for backfill shall be removed and disposed of by the Contractor. Grading shall be done to prevent surface water from flowing into trenches and others excavation and any water accumulating

therein shall be removed by pumping. All excavation shall be made by open cut.

13. The bottom of the trenches shall be graded to provide uniform bearing and support for conduits, cables, or duct bank on undisturbed soil at every point along its entire length. Overdepths shall be backfilled with loose, granular, moist earth, tamped. Remove unstable soil that is not capable of supporting equipment or installation and replace with specified material for a minimum of 12" below invert of equipment or installation.
14. The trenches shall be backfilled with the excavated materials approved for backfilling, consisting of earth, loam, sandy clay, sand and gravel or soft shale, free from large clods of earth and stones, deposited in 6" layers and rammed until the installation has a cover of not less than the adjacent ground but not greater than 2" above existing ground. The backfilling shall be carried on simultaneously on both sides of the trench so that injurious pressures do not occur. The compaction of the filled trench shall be at least equal to 95% of the maximum density as determined by the Standard Proctor Test. Settling the backfill with water will not be permitted. Reopen any trenches not meeting compaction requirements or where settlement occurs, refill, compact, and restore the surface to the grade and compaction indicated, mounded over and smoothed off

B. Duct Banks

1. Duct banks shall be sloped downward toward maintenance holes/handholes and away from buildings a minimum of 6 inches per 100 feet. Duct banks shall not route water from maintenance holes handholes into buildings. Duct banks shall not contain traps between maintenance holes/handholes where water may accumulate.
2. Directional changes in duct banks shall be made with 20' minimum radius bends. Duct banks and direct buried ducts shall be supported on undisturbed soil or on piers extending down to undisturbed soil.
3. Where power and communications duct banks run in parallel, they shall be separated by a minimum of 12 inches.
4. Prior to concrete encasement, ducts, reinforcing steel and ground wires shall be secured with nonmetallic straps or cable ties to nonmetallic duct spacers at intervals not exceeding 8 feet. Duct spacers shall be sized for the ducts being held and shall provide the minimum spacing between ducts required for concrete flow and by the NEC. Duct spacers shall be anchored to the ground using nonmetallic bands and stakes.
5. Duct banks shall have a minimum of 3 inches of concrete cover on all sides.
6. Where duct banks enter maintenance holes or buildings, they shall be constructed as integral to the wall.
7. Duct bank shall extend to the inside surfaces of the walls, and the duct bank reinforcing shall be integrated with the wall reinforcing.

8. Bell ends shall be provided on ducts where the ducts enter maintenance holes or buildings.
9. Direct buried ducts and fittings shall have bend radii greater than the minimum bend radii of the cables enclosed and shall not be smaller than the radii of standard manufactured elbows.
10. Direct buried ducts shall be installed parallel to or at right angles to building lines and site features, and as close to curbs and sidewalks as possible to avoid interferences with future landscaping.
11. Where direct buried PVC ducts cannot be buried deep enough to meet the NEC minimum cover requirements, rigid steel conduits shall be installed instead, or a concrete cover shall be poured over the ducts.
12. An orange detectable marker tape (for communications) shall be buried in the backfill approximately 12 inches above duct banks or direct buried cables for the entire length of the duct run.
13. A flexible mandrel and a stiff bristled brush shall be pulled through the ducts to clean them prior to cable pulling.
14. Ducts shall be identified in the maintenance holes and at both ends.

C. Additional OSP Conduit Requirements

1. Leave all empty conduits with a 200-pound test nylon cord pull line.
2. Install a #14 AWG tracer wire in one conduit for the entire length of each duct run.
3. Flattened, dented, or deformed conduits are not permitted and shall be removed and replaced.
4. Install conduit, including homeruns as indicated on the Drawings. Any change resulting in a savings in labor or materials is to be made only in accordance with a contract change. Deviations shall be made only where necessary to avoid interferences and when approved by Engineer by written authorization.
5. Where conduits must pass through structural members obtain approval of Architect or Engineer.
6. Install all conduits or sleeves penetrating or routed within rated firewalls or fire floors to maintain fire rating of wall or floor. Conduit shall not be installed in rated floors or walls if it compromises or violates the fire rating of floor or wall. Refer to architectural documents.
7. Provide expansion and deflection coupling where conduit passes over a building expansion joint.
8. Service entrance conduits and feeder conduits in direct contact with earth shall be schedule 40, heavy wall PVC/HDPE. All service entrance conduit elbows shall be galvanized rigid steel. Service entrance conduits installed exposed or concealed in walls or above ceilings shall be galvanized rigid steel (GRS) or intermediate metal conduit (IMC). Provide concrete encasement where required or as indicated on Drawings.
9. Seal all conduits entering building to prevent entrance of moisture.

10. Conduit fittings shall be gland and ring compression type for all conduit exposed to outdoor environments.
11. Below Grade Conduit Installations
    a. Install top of conduits 24 inches minimum below finished grade or as indicated on Drawings.
    b. Install top of conduits 6 inches minimum below bottom of building slabs.
    c. Where transition is made from below grade PVC installation to a metallic conduit system above grade or slab.
12. Communications cables shall not occupy conduits with power cables.
13. All metallic conduits shall be grounded in accordance with ANSI/TIA-607-B.
14. For runs that total more than 400 feet in length, insert handholes/maintenance holes so that no segment exceeds the 400 feet limit.
15. Conduit runs shall not have more than two (2) 90-degree bends between pull points.
16. Communication conduit system shall contain no condulets (also known as an LB).

3.23 MAINTENANCE HOLES/HANDHOLES

A. Maintenance holes/handholes shall be installed on a base of pea gravel at least 12 inches deep.

B. Tops of maintenance holes/handholes shall be level with the existing grade.

C. Ducts should enter as perpendicular to the wall surface as possible.

D. Maintenance holes shall be grounded with four 3/4-inch diameter by 8-foot-long ground rods, one driven inside of the maintenance hole at each corner. Connect the ground rods and any duct bank ground conductors together with a No. 4/0 AWG bare, stranded copper ground wire loop. A No. 2 AWG bare stranded copper pigtail from the ground wire loop shall be used to ground the maintenance hole cover frame, ladder support bracket, any metallic concrete inserts and metallic cable racks, and the shields of any cables that are spliced in the maintenance hole.

3.24 CONDUIT PLUGS/CAPS

A. Protect conduits against dirt, plaster, and foreign debris with conduit plugs. Plugs shall remain in place until ready for use.

B. Simplex, triplex or quadplex duct plugs shall be installed in conduits to house and seal cables.

C. TDUX inflatable bladders shall be used to seal conduits equipped with MaxCell.

3.25 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION

SECTION 27 05 53

IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.27 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the equipment and execution requirements relating to Identification for Communications Systems.

C. Equipment specifications, general considerations, and guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.28 WORK INCLUDED

A. The work included under this Specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete installation. The Contractor will provide and install all of the required materials whether specifically addressed in the Specification or not.

PART 2 - LABELING

2.23 LABELING REQUIREMENTS

A. Labeling shall be done in accordance with the recommendations made in the ANSI/TIA-606-A document, manufacturer's recommendations and best industry practices.

B. All spaces, pathways, outlets, cables, termination hardware, grounding system and equipment shall be labeled with machine-generated labels.

C. All labels shall be clear white with black text.

D. All cables shall be labeled with machine generated, wrap around labels.

E. A total of two (2) labels per horizontal cable are required at the following intervals: 6" from outlet and 12" from termination block/patch panel.

F. Labeling scheme shall be alphanumeric. See Appendix 1

END OF SECTION

SECTION 27 08 00b

COMMISSIONING OF COMMUNICATIONS

PART 1 - GENERAL

1.29 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the equipment and execution requirements relating to Commissioning of Communications.

C. Equipment specifications, general considerations, and guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.30 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

PART 2 - TESTING

2.24 TESTING REQUIREMENTS

A. General

1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA-568-C.0, ANSI/TIA-568-C.1, and/or ANSI/TIA-1152. All conductors/strands of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors/strands in all cables installed.

B. Copper Testing

1. All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional

testing is required to verify Category 5e and/or 6 performance. Horizontal balanced twisted pair cabling shall be tested using a level IIe and/or III test unit for category 5e and/or 6 performance compliance.

2. Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. The test shall be recorded as pass/fail as indicated by the test unit and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.
3. Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA-568-C.2 Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.
4. Approved tester is as follows:
   Fluke DTX

C. Fiber Testing

1. All fiber testing shall be performed on all fibers in the completed end-to-end system. There shall be no splices unless clearly defined in the RFP and/or Drawings. These tests also include continuity checking of each fiber.
2. Single mode
   a. Test the optical fiber cable bi-directionally with an OTDR and uni-directionally with a power meter/light source. Fiber must be tested at both 1310nm and 1550nm. Maximum attenuation dB/Km @ 1310nm/1550nm shall be 0.5/0.5 for outside plant and 1.0/1.0 for inside plant. Maximum attenuation per connector pair shall be .75 dB. Attenuation testing shall be performed with a stable launch condition using one-meter or two-meter jumpers to attach the test equipment to the cable plant. The light source shall be left in place after calibration and the power meter moved to the far end to take measurements. Test set-up and performance shall be conducted in accordance with ANSI/TIA-568-C.3, and to the manufacturer's application guides.
3. Approved optical fiber test equipment manufacturers are as follows:
   a. Power Meters & Light Sources
      Optical Wavelength Laboratories (OWL)
      Noyes
      Photonix
      Fluke
      Agilent

b. Optical Time Domain Reflectometers (OTDR)
GN Nettest
Agilent
Fluke
Anritsu
Tektronix

D. Test Results

1. Test documentation shall be provided on disk as part of the as-built package. The disk shall be clearly marked on the outside front cover with the words “Project Test Documentation,” the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair (or strand) and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.
2. The field test equipment shall meet the requirements of ANSI/TIA-568-C.2, ANSI/TIA-568-C.3, and/or ANSI/TIA-1152.
3. Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. Alternately, the Contractor shall furnish this information in electronic form. Electronic records shall contain the equivalent of the test results as defined by the Specification and be of a format readable from Microsoft Word.
4. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

PART 3 - DOCUMENTATION, AS-BUILTS, TRAINING AND RECORDS

3.26 DOCUMENTATION & AS-BUILTS

A. As-Built record documentation for communications work shall include:

1. Cable routing and identification
2. System function diagrams
3. Manufacturers' description literature for equipment
4. Connection and programming schedules as appropriate
5. Equipment material list including quantities
6. Spare parts list with quantities
7. Details not on original Contract Documents

8. Test results
9. Warranties
10. Release of liens

B. The Contractor shall provide and maintain at the site a set of prints on which shall be accurately shown the actual installation of all work under this section, indicating any variation from contract drawings, including changes in pathways, sizes, locations and dimensions. All changes shall be clearly and completely indicated as the work progresses.

C. Progress prints shall be available for inspection by the Owner or any of his representatives and may be used to determine the progress of communications infrastructure work.

D. At the completion of the work, prepare a new set of as-built drawings, of the work as actually noted on the marked-up prints, including the dimensioned location of all pathways.

E. Furnish as-built drawings and documentation to the Project Manager. As-built drawings shall be generated in AutoCad 2012 or later. Submit as-built drawings electronically and hard copy.

3.27 OPERATIONS AND MAINTENANCE MANUAL

A. After completion of the work, the Contractor shall furnish and deliver to the Engineer three (3) copies of a complete Operations & Maintenance Manual. A system wiring diagram shall be furnished for each separate system.

B. The manual shall be subdivided into separate sections with tab dividers to identify subsystems of the integrated system. Reference appropriate Specification sections.

C. Provide the following additional information for each electronic system. Information shall be edited for this project where applicable.

1. Operations manuals for components and for systems as a whole
2. Maintenance manuals for components and for system as a whole
3. Point-to-point diagrams, cabling diagrams, construction details and cabling labeling details
4. List of spare parts, materials and suppliers of components. Provide name, address and telephone number for each supplier.
5. Emergency instructions for operational and maintenance requirements
6. Delivery time frame for replacement of component parts from suppliers
7. Recommended inspection schedule and procedures for components and for system as a whole

8. List of spare parts, materials and suppliers of components. Provide name, address and telephone number for each supplier.
9. Complete “reviewed” shop drawings and product data for components and system as a whole
10. Troubleshooting procedures for each system and for each major system component

3.28 TRAINING

A. The Contractor shall be responsible for training of facility personnel. Training shall take place after occupancy and before acceptance and shall include programs for on-site operations and maintenance of technology and communications systems. Training shall be for not more than ten (10) people, shall be held at the Owner's site and shall be of sufficient duration and depth to ensure that the trained personnel can operate the installed systems and can perform usual and customary maintenance actions.

3.29 WARRANTY

A. General

1. All equipment is to be new and warranted free of faulty workmanship and damage.
2. Replacement of defective equipment and materials and repair of faulty workmanship within 24 hours of notification, except emergency conditions (system failures), which must be placed back in service within eight (8) hours of notification, all at no cost to the Owner.
3. The minimum warranty provisions specified shall not diminish the terms of individual equipment manufacturer's warranties.

B. Voice & Data Structured Cabling

1. Manufacturer(s) shall provide a minimum 25-year warranty for components used in the installed Voice & Data Structured Cabling System. Defective and/or improperly installed products shall be replaced and/or correctly installed at no cost to the Owner.

C. Overhead Paging System

1. Manufacturer(s) shall provide a minimum 1-year warranty for components used in the installed Overhead Paging System. Defective and/or improperly installed products shall be replaced and/or correctly installed at no cost to the Owner.

D. Pathway & Support Infrastructure

1. Manufacturer(s) shall provide a minimum 1-year warranty for components used in the installed Pathway & Support Infrastructure. Defective and/or improperly installed products shall be replaced and/or correctly installed at no cost to the Owner.

END OF SECTION

SECTION 27 11 13

COMMUNICATIONS ENTRANCE PROTECTION

PART 1 - GENERAL

1.31 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Entrance Protection.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.32 SUBMITTALS

A. Provide product data from manufacturer’s specifications.

1.33 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

PART 2 - PRODUCTS

2.25 APPROVED PRODUCTS

A. Approved Building Entrance Protector Terminal Manufacturer(s)

1. Circa
2. Marconi
3. Porta Systems
4. Or Approved Equal (by SCSB)

B. Approved Bonding Shield Connector Manufacturer(s)

1. 3M

2. Or Approved Equal (by SCSB)

2.26 BUILDING ENTRANCE PROTECTOR TERMINALS

A. Indoor Building Entrance Protector Terminal

1. The indoor building entrance protector terminal shall be equipped with 110-connector inputs and outputs and shall accommodate industry standard 5-pin protection modules.
2. The indoor building entrance protector terminal shall protect up to 100-pairs and shall be equipped with an internal fuse link.
3. The indoor building entrance protector terminal shall be wall or frame mountable, and able to be stacked for future expansion.
4. The indoor building entrance protector terminal shall be equipped with external ground connectors that accept 6-14 AWG ground wire.

B. Solid State Surge Protection Modules

1. The solid-state surge protector module shall be 5-pin and shall provide transient and power fault protection for standard telephone line applications.
2. The solid-state surge protector module shall be designed to provide a balanced configuration to protect against line-to-line metallic surges.
3. The solid-state surge protector module shall feature an external failsafe mechanism, which permanently grounds module under sustained high current conditions.
4. The solid-state surge protector module shall feature nanosecond response time and safe mode operation in adverse situations.
5. The solid-state surge protector module shall be UL & cUL Listed.

2.27 BONDING SHIELD CONNECTOR

A. Shield Connector

1. The purpose of the bonding shield connector is to make a stable, low resistant electrical connection between the shield of a communications cable and a ground conductor.
2. The bonding shield connector shall be tin-plated tempered brass.

PART 3 - EXECUTION

3.30 BUILDING ENTRANCE PROTECTOR TERMINALS

A. All copper circuits shall be provided with protection between each building with an entrance cable protector panel. All building-to-building circuits shall be routed through this protector. The protector shall be connected with a #6 AWG copper bonding conductor between the protector ground lug and the telecommunications room (TR) busbar.

B. Building entrance protector shall be installed in accordance with the recommendations contained in the ANSI/TIA-607-B Telecommunications Bonding and Ground Standard.

C. Building entrance protector panels shall be installed as per the requirements specified by the manufacturer's installation guidelines.

3.31 BONDING SHIELD CONNECTOR

A. Bonding shield connector shall be installed in accordance with the recommendations contained in the ANSI/TIA-607-B Standard.

B. Bonding shield connector shall be installed as per the requirements specified by the manufacturer's installation guidelines.

3.32 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION

SECTION 27 11 19

COMMUNICATIONS TERMINATION BLOCKS AND PATCH PANELS

PART 1 - GENERAL

1.34 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Termination Blocks and Patch Panels.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.35 SUBMITTALS

A. Provide product data from manufacturer’s specifications.

1.36 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

PART 2 - PRODUCTS

2.28 APPROVED PRODUCTS

A. Approved Patch Panel Manufacturer(s)

1. Leviton
   a. Patch Panel – 69586-L48, L-24
   b. Jacks - eXtreme 6+
2. Ortronics
   a. Patch Panel – OR-PHD66U48/24
   b. Jacks – SII, CAT6,Clarity OR-S22600
   c. Jacks – OR-KS6 (Fog White and Green)
3. No Exceptions

B. Approved Optical Fiber Enclosure Manufacturer(s)

1. Leviton
   a. Rack Mount -
   b. Wall Mount -
2. Ortronics
   a. Rack Mount – Q-Series - Designated per project
   b. Wall Mount – Q-Series - Designated per project
3. No Exceptions

C. Approved Termination Block Manufacturer(s)

1. Leviton
2. Or Approved Equal

2.29 PATCH PANELS

A. Category 6e Patch Panel

1. The Category 6/6e patch panel shall be modular in design and equipped with Cat 6/6e jacks.
2. The Category 6/6e patch panel shall be compatible with 19" equipment racks, cabinets or wall mount brackets.
3. The Category 6/6e patch panel shall be flat.
4. The Category 6/6e patch panel shall be equipped with front labeling space to facilitate port identification.
5. The connector module shall exceed the Category 6 performance criteria per ANSI/TIA-568-C.2.
   a. Icons shall be used if offered from the manufacturer.
   b. Jack/Icon colors shall be:
      Green for voice
      White for data

B. Category 6A Patch Panel

1. The Category 6A patch panel shall be modular in design and equipped with Cat 6A jacks.
2. The Category 6A patch panel shall be compatible with 19" equipment racks, cabinets or wall mount brackets.
3. The Category 6A patch panel shall be flat.
4. The Category 6A patch panel shall be equipped with front labeling space to facilitate port identification.
5. The connector module shall exceed the Category 6A performance criteria per ANSI/TIA-568-C.2.
   a. Icons shall be used if offered from the manufacturer.
   b. Jack/Icon colors shall be:

White for Data
Green for Voice

2.30 OPTICAL FIBER PANELS/ENCLOSURES

A. Rack Mount Optical Fiber Panel/Enclosure

1. The rack mount optical fiber panel/enclosure shall be equipped with either a swing out mechanism or a sliding drawer to access fibers.
2. The rack mount optical fiber panel/enclosure shall be capable of terminating tight-buffered or loose tube optical fiber cable.
3. The rack mount optical fiber panel/enclosure shall provide for bend radius control throughout the panel as well as storage space for slack cabling.
4. The panel/enclosure shall meet or exceed the performance criteria per ANSI/TIA-568-C.3.
5. The rack mount optical fiber panel/enclosure shall be equipped with optical fiber adapter panels from same manufacturer.
    a. The optical fiber adapter panels shall accommodate either multimode or single mode terminated optical fiber.
    b. The optical fiber adapter panels shall be compatible with SC connectors.
    c. OM3 laser optimized adaptors shall be aqua in color and equipped with zirconia ceramic sleeves.
    d. Single mode adaptors shall be blue or green in color and equippedwith zirconia ceramic sleeves.

B. Wall Mount Optical Fiber Panel/Enclosure

1. The wall mount optical fiber panel/enclosure shall have a hinged door for access, with locking available for security.
2. The wall mount optical fiber panel/enclosure shall be capable of terminating tight-buffered or loose tube optical fiber cables and all popular connector types.
3. The wall mount optical fiber panel/enclosure shall provide for bend radius control throughout the panel as well as storage space for slack cabling.
4. The panel/enclosure shall meet or exceed the performance criteria per ANSI/TIA-568-C.3.
5. The wall mount optical fiber panel/enclosure shall be equipped with optical fiber adapter panels from same manufacturer.
    a. The optical fiber adapter panels shall accommodate either multimode or single mode terminated optical fiber.
    b. The optical fiber adapter panels shall be compatible with SC connectors.
    c. OM3 laser optimized adaptors shall be aqua in color and equipped with zirconia ceramic sleeves.

d. Single-mode adaptors shall be blue or green in color and equippedwith zirconia ceramic sleeves.

2.31 TERMINATION BLOCKS

A. 110 Type Wiring Blocks/Cross-Connect Kits:

1. The 110-type wiring blocks shall be available in 100- and/or 300-pair configurations.
2. The 110-type wiring block shall be Category 5e for backbone terminations and Category 6 for horizontal terminations.
3. The cross-connect kits shall include all the components required to complete a wall-mounted 110 cross-connect installation and be available in both 100-pair and 300-pair configurations for Cat5e and 96-pair and 288-pair configurations for Cat 6. (Includes 110-blocks, connecting blocks and designation strips).
4. The termination block shall meet or exceed the performance criteria per ANSI/TIA-568-C.2.
5. Backbone blocks shall use 5-pair connecting blocks on each 25-pair row.
6. Horizontal blocks shall use 4-pair connecting blocks on each 25-pair row.

B. 66-Blocks

1. The 66-type wiring block shall be a 50-pair configuration.
2. The 66-type wiring block shall have a split clip system using bridge clips to connect incoming pairs to outgoing pairs.
3. The 66 block's labeling system shall use designation strips or covers to accommodate labels.

PART 3 - EXECUTION

3.33 PATCH PANELS

A. Cables shall be dressed and terminated in accordance with the recommendations made in ANSI/TIA-568-C.0 and/or ANSI/TIA-568-C.1, manufacturer's recommendations and best industry practice.

B. Pair untwist at the termination shall not exceed 13 mm (0.5 inch).

C. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

D. Cables shall be neatly bundled and dressed to their respective patch panel. Each patch panel shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

E. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.34 OPTICAL FIBER PANELS/ENCLOSURES

A. Cables shall be dressed and terminated in accordance with the recommendations made in ANSI/TIA-568-C.0 and/or ANSI/TIA-568-C.1, manufacturer's recommendations and best industry practices.

B. Each cable shall be individually attached to the respective splice enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.

C. Bend radius of the optic fiber cable in the panel/enclosure shall not exceed 10 times the outside diameter of the cable.

D. Each fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.

E. Each cable shall be clearly labeled at the entrance to the splice enclosure. Cables labeled within the bundle shall not be acceptable.

F. A maximum of 12 strands of fiber shall be spliced in each fiber splice tray.

G. All spare strands shall be installed into spare splice trays.

H. Fiber slack shall be neatly coiled within the fiber splice tray or enclosure. No slack loops shall be allowed external to the fiber panel.

3.35 TERMINATION BLOCKS

A. Cables shall be dressed and terminated in accordance with the recommendations made in ANSI/TIA-568-C.0 and/or ANSI/TIA-568-C.1, manufacturer's recommendations and best industry practice.

B. Pair untwist at the termination shall not exceed 13 mm (0.5 inch).

C. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

D. Cables shall be neatly bundled and dressed to their respective termination block. Each termination block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

E. Each cable shall be clearly labeled on the cable jacket within 12" of the termination block at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

F. Wall mounted termination block fields shall be mounted on communications backboard.

G. Wall mounted termination block fields shall be installed as per the requirements specified by the manufacturer's installation guidelines.

3.36 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION

SECTION 27 11 23

COMMUNICATIONS CABLE MANAGEMENT AND LADDER RACK

PART 1 - GENERAL

1.37 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Cable Management and Ladder Rack.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.38 SUBMITTALS

A. Provide product data from manufacturer's specifications.

1.39 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

PART 2 - PRODUCTS

2.32 APPROVED PRODUCTS

A. Approved Horizontal Cable Management Manufacturer(s)

1. Ortronics – OR-60400057
2. No Exceptions

B. Approved Vertical Cable Management Manufacturer(s)

1. Chatsworth Products, Inc. (CPI) – 11374-501 clear, 11374-703 black
2. No Exceptions

C. Approved Ladder Rack System Manufacturer(s)

1. Chatsworth Products, Inc. (CPI)
2. No Exceptions

D. Approved C-Ring/D-ring Manufacturer(s)

1. Chatsworth Products, Inc. (CPI)
2. Or Approved Equal (by SCSB)

2.33 CABLE MANAGEMENT - HORIZONTAL

A. Horizontal Cable Management

1. The horizontal wire manager shall be compatible with 19-inch equipment racks, cabinets or wall mount brackets.
2. The horizontal cable manager shall provide support for patch cords at the front of the panel.
3. The horizontal cable manager shall be 2 rack-units in height when matched with a 2 rack-unit patch panel or switch.
4. The horizontal cable manager shall be 1 rack-unit in height when matched with a 1 rack-unit patch panel or switch.

2.34 CABLE MANAGEMENT - VERTICAL

A. Vertical Cable Management

1. The vertical cable manger shall be double-sided.
2. The vertical cable manager shall provide support for patch cords at the front of the rack and wire management at the rear of the rack.
3. The vertical cable manager shall be a minimum width of 5".
4. Vertical cable manager color shall be clear or black.

2.35 LADDER RACKS

A. Ladder Rack System

1. See Drawings for ladder rack system details.
2. The ladder rack system shall be securely mounted with hardware designed for use in ladder rack systems.
3. End caps shall be installed on the exposed ends of the ladder racks, channel supports and bolts. Protective covers shall be installed on threaded rods that come in contact with cabling plant.
4. Ladder Rack System color shall be black.

2.36 VELCRO STRAPS

A. Velcro Straps

1. Backbone cables shall be fastened to support structures with Velcro straps.
2. Horizontal cables shall be fastened to support structures with Velcro straps.
   a. Velcro Strap color shall be black (or red in plenum spaces).
   b. Tie wraps are not approved.

2.37 C-RINGS/D-Rings

A. C-Rings/D-rings

1. C-rings/D-rings shall be used on backboards to support cables, patch cords and cross-connect wire.
2. C-rings/D-rings shall be made of high-strength, fire-retardant material with rounded edges to prevent damage to cable and wire insulation.

PART 3 - EXECUTION

3.37 CABLE MANAGEMENT - HORIZONTAL

A. Horizontal cable managers shall be installed below patch panels in a 1:1 ratio (one horizontal cable manager per patch panel) or as indicated on Drawings.

3.38 CABLE MANAGEMENT - VERTICAL

A. Vertical cable managers shall be installed on both sides of a single equipment rack. Where two (2) or more racks are positioned in a row, vertical cable managers shall be installed between each rack and each end of the row.

3.39 LADDER RACKS

A. Ladder rack system shall be installed straight, level and perpendicular to walls and ceiling slabs.

B. Ladder racks shall be supported at 5' intervals maximum.

C. Provide all hardware, accessories, fasteners, anchors, threaded rods and support channels required to provide a complete ladder rack system.

D. See Drawings for ladder rack system details.

3.40 C-RINGS/D-RINGS

A. C-ring/D-rings shall be installed on 3/4" backboard, straight and level.

3.41 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION

SECTION 27 13 13

COMMUNICATIONS COPPER BACKBONE

PART 1 - GENERAL

1.40 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Copper Backbone.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.41 SUBMITTALS

A. Provide product data from manufacturer’s specifications.

1.42 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

PART 2 - PRODUCTS

2.38 APPROVED PRODUCTS

A. Approved Copper Backbone Cable (Inside Plant) Manufacturer(s)

1. Berk-Tek
2. Superior Essex
3. General
4. CommScope
5. No Exceptions

B. Approved Copper Backbone Cable (Outside Plant) Manufacturer(s)

1. General
2. Superior Essex

3. No Exceptions

2.39 COPPER BACKBONE CABLE (INSIDE PLANT)

A. 100-Ohm Balanced Twisted Pair Building Backbone Cables (Inside Plant)

1. Generic Characteristics
   a. The inside plant, balanced twisted pair building backbone cable shall meet the 100-Ohm balanced twisted pair backbone requirements per the latest issue of ANSI/TIA-568-C.2.
   b. The inside plant, 100-Ohm balanced twisted pair cable shall be CMR or CMP rated (according to the space it occupies).
   c. The inside plant, balanced twisted pair building backbone cable core shall consist of 25-pair sub-units.

2.40 COPPER BACKBONE CABLE (OUTSIDE PLANT)

A. 100-Ohm PE-89 Backbone Cables (Outside Plant)

1. Generic Characteristics
   a. The outside plant backbone cable shall be assigned the RDUP designation of PE-89.
   b. The outside plant backbone cable core shall consist of 25-pair sub-units.
   c. The outside plant backbone cable shall contain water-blocking gel and have a jacket made of polyethylene.

PART 3 - EXECUTION

3.42 BACKBONE CABLES (INSIDE PLANT)

A. Cables shall be dressed and terminated in accordance with the recommendations made in ANSI/TIA-568-C.0 and/or ANSI/TIA-568-C.1, manufacturer's recommendations and best industry practices.

B. Backbone cables shall be installed separately from horizontal distribution cables

C. A plastic or nylon pull cord with a minimum test rating of 90 Kg (200 lb.) shall be co-installed with all cable installed in any conduit.

D. Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits

E. Exposed cables must be CMP or MMP rated if installed in an air return plenum. CMR rated cables shall be installed in metallic conduit if installed in an air return plenum.

F. Where backbone cables and distribution cables are installed in a cable tray or wireway, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.

G. Leave 10' of slack on each end of copper backbone cable.

H. Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.

I. Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.

J. Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.

K. The cable's minimum bend radius and maximum pulling tension shall not be exceeded. Refer to manufacturer's requirements.

L. Copper cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

M. Each copper cable shall be clearly labeled on the cable jacket behind the patch panel or block at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

N. Copper backbone cables shall be installed separately from horizontal distribution cables

3.43 BACKBONE CABLES (OUTSIDE PLANT)

A. All OSP cables brought to the Entrance Facilities shall have 15 ft of slack coiled and secured to the wall in the proximity of the termination field.

B. All cables shall be tagged and identified within each handhole/maintenance hole.

C. Place initial cables in bottom conduits to facilitate easy subsequent cable placement.

D. Place leader guard in the duct before placing cable to prevent damaging the cable sheath on the sharp edge of the duct.

E. Ventilate maintenance where gas has been detected before entering the maintenance hole.

F. A 600 lb. break-away swivel, along with a slip clutch capstan winch that shows the dynamometer (pulling tension) reading, shall be used at all times during pulling.

G. At each splice location the cable ends will be sealed watertight at all times. Reels will be continuously manned during cable installation.

H. Copper backbone cables shall be bonded and grounded in accordance with the recommendations made in the ANSI/TIA-607-B standard, manufacturer's recommendations and best industry practice.

3.44 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION

SECTION 27 13 23

COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING

PART 1 - GENERAL

1.43 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Optical Fiber Backbone Cabling.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.44 SUBMITTALS

A. Provide product data from manufacturer’s specifications.

1.45 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

PART 2 - PRODUCTS

2.41 APPROVED PRODUCTS

A. Approved Optical Fiber Backbone Cable (Inside Plant) Manufacturer(s)

1. Berk-Tek
2. Superior Essex
3. Corning
4. CommScope
5. No Exceptions

B. Approved Optical Fiber Backbone Cable (Outside Plant) Manufacturer(s)

1. Berk-Tek
2. Superior Essex

3. Corning
4. CommScope
5. No Exceptions

C. Approved Optical Fiber Connectivity Manufacturer(s)

1. 3M
2. No Exceptions

2.42 OPTICAL FIBER BACKBONE CABLE (INSIDE PLANT)

A. Indoor/Outdoor Distribution 850nm Laser-Optimized 50/125 Multimode Optical Fiber (OFNR) Tight Buffered Cable (OM3)

1. Generic Characteristics
   a. The indoor optical fiber cable shall be available with up to twelve 900-micron tight-buffered 250-micron fibers placed in a color-coded sub-unit bundle with aramid strength elements.
   b. The indoor optical fiber cable shall meet or exceed the performance criteria found in ANSI/TIA-568-C.3.
   c. Maximum attenuation dB/Km @ 850/1300 nm: 3.5/1.5
   d. Minimum overfilled modal bandwidth: 1500 MHz-km @ 850 nm.
   e. Minimum overfilled modal bandwidth: 500 MHz-km @ 1300 nm.
   f. Minimum effective modal bandwidth: 2000 MHz-km @ 850nm

B. Indoor/Outdoor Distribution 8.3/125-micron Single mode Optical Fiber (OFNR)Tight Buffered Cable (OS2)

1. Generic Characteristics
   a. The indoor optical fiber cable shall be available with up to twelve 900-micron tight-buffered, 250-micron fibers placed in a color-coded sub-unit bundle with aramid strength elements.
   b. The indoor optical fiber cable shall meet or exceed the performance criteria found in ANSI/TIA-568-C.3.
   c. The loss of fiber shall not exceed 1.0 dB per kilometer @ 1550 nm and 1.0 dB per kilometer @ 1310 nm.

2.43 OPTICAL FIBER BACKBONE CABLE (OUTSIDE PLANT)

A. Indoor/outdoor 850nm Laser Optimized 50/125 Multimode Optical Fiber Non-Conductive (OFNR) Tight Buffer Cable (OM3)

1. Generic Characteristics

a. The indoor/outdoor optical fiber cable with up to twelve 250-micron coated fibers placed in a color-coded sub-unit bundle with moisture-blocking gel.
b. The indoor/outdoor optical fiber cable shall meet or exceed the performance criteria found in ANSI/TIA-568-C.3.
c. The indoor/outdoor optical fiber cable shall have sequential length markings printed on the cable jacket.
d. Maximum attenuation dB/Km @ 850/1300 nm: 3.5/1.5
e. Minimum overfilled modal bandwidth: 1500 MHz-km @ 850 nm.
f. Minimum overfilled modal bandwidth: 500 MHz-km @ 1300 nm.
g. Minimum effective modal bandwidth: 2000 MHz-km @ 850nm

B. Indoor/outdoor 8.3/125-micron, Single mode Optical Fiber Non-Conductive (OFNR) Tight Buffer cable (OS2)

1. Generic Characteristics
a. The indoor/outdoor optical fiber cable with up to twelve 250-micron coated fibers placed in a color-coded sub-unit bundle with moisture-blocking gel.
b. The indoor/outdoor optical fiber cable shall meet or exceed the performance criteria found in ANSI/TIA-568-C.3.
c. The indoor/outdoor optical fiber cable shall have sequential length markings printed on the cable jacket.
d. The loss of fiber shall not exceed 0.50 dB per kilometer @ 1550 nm and 0.50 dB per kilometer @ 1310 nm.

2.44 OPTICAL FIBER CONNECTORS

A. Laser Optimized Multimode Fiber Connectivity OM3

1. The optical fiber field-installable connector shall be SC for installation onto multimode a laser optimized 50/125-micron fiber.
2. The optical fiber field-installable connector shall be compatible with 900-micron buffered fibers.
3. The optical fiber field-installable connector shall meet or exceed the performance criteria found in ANSI/TIA-568-C.3.
4. The optical fiber field-installable connector shall have a maximum Loss of 0 .5 dB.
5. The optical fiber adapter module that occupies the faceplate shall be equipped with zirconia ceramic sleeve.
6. Laser optimized multimode fiber connector color shall be aqua.

B. Single-mode Fiber Connectivity

1. The optical fiber field-installable connector shall be SC for installation onto single-mode 8.3/125-micron fiber.

2. The optical fiber field-installable connector shall meet or exceed the performance criteria found in ANSI/TIA-568-C.3.
3. The optical fiber field-installable connector shall be compatible with 900-micron buffered fibers or 250-micron loose-tube fibers.
4. The splice loss through each connector pair shall not exceed 0.50 dB.
5. The optical fiber adapter module that occupies the faceplate shall be equipped with zirconia ceramic sleeve.
6. Single-mode fiber connector color shall be blue.

PART 3 - EXECUTION

3.45 BACKBONE CABLES (INSIDE PLANT)

A. Cables shall be dressed and terminated in accordance with the recommendations made in ANSI/TIA-568-C.0 and/or ANSI/TIA-568-C.1, manufacturer's recommendations and best industry practices.

B. Backbone cables shall be installed separately from horizontal distribution cables

C. A plastic or nylon pull cord with a minimum test rating of 90 Kg (200 lb.) shall be co-installed with all cable installed in any conduit.

D. Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits with conduits labeled to and from.

E. Exposed cables must be OFCP or OFNP rated if installed in an air return plenum. Riser rated cables shall be installed in metallic conduit if installed in an air return plenum.

F. Where backbone cables and distribution cables are installed in a cable tray or wireway, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.

G. Leave 10' of slack on each end of fiber backbone cable.

H. Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.

I. Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.

J. Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.

K. The cable's minimum bend radius and maximum pulling tension shall not be exceeded. Refer to manufacturer's requirements.

L. Each optical fiber cable shall be individually attached to the respective enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.

M. Each optical fiber cable shall be clearly labeled at the entrance to the enclosure. Cables labeled within the bundle shall not be acceptable.

N. Each fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.

O. A maximum of 12 strands of fiber shall be spliced in each splice tray

P. All spare fiber strands shall be installed into spare splice trays.

Q. Fiber slack shall be neatly coiled within the fiber splice tray or enclosure. No slack loops shall be allowed external to the fiber panel.

3.46 BACKBONE CABLES (OUTSIDE PLANT)

A. All OSP cables brought to the Entrance Facilities shall have 15 ft of slack coiled and secured to the wall in the proximity of the fiber enclosure.

B. All cables shall be permanently tagged and identified within each handhole/maintenance hole.

C. Place initial cables in bottom conduits to facilitate easy subsequent cable placement.

D. Place leader guard in the duct before placing cable to prevent damaging the cable sheath on the sharp edge of the duct.

E. Ventilate maintenance where gas has been detected before entering the maintenance hole.

F. To ensure that the optical fiber cable's qualities and characteristics are not degraded during installation, excessive pulling tensions and short bending radii will not be allowed. The maximum pulling tension is 600 lbs. The minimum bending radius for cable under tension is 20 times the outside diameter of the cable and for cable at rest is 10 times the outside diameter of the cable.

G. A 600 lb. break-away swivel, along with a slip clutch capstan winch that shows the dynamometer (pulling tension) reading, shall be used at all times during pulling.

H. At each splice location the cable ends will be sealed watertight at all times. Reels will be continuously manned during cable installation.

I. Contractor shall coil 60 feet of spare optical fiber cable in each handhole/maintenance hole without a splice and 75 feet of each optical fiber cable in each handhole/maintenance hole with a splice. Cable coils shall have at least two points of support on the optical fiber racking system.

J. When mounting the optical fiber slack coils, the minimum bend radius shall not be exceeded; this radius is equal to 10 times the outside diameter of the cable in a static application and 20 times the outside diameter in a dynamic application. At anytime during the entire handling process of the optical fiber cable, as much care as possible should be maintained and all the manufacturer's recommendations should be followed.

3.47 OPTICAL FIBER CONNECTIVITY / SPLICING

A. Optical fiber connectors shall be installed as per the requirements specified by the manufacturer's installation guidelines.

B. All splicing shall be of the fusion type made under Light Injection and Detection Mode, whenever applicable. The Contractor shall provide certified and experienced personnel for splicing.

C. Contractor's tools and equipment shall be in excellent working order. Any worn or improperly working tools shall be discarded and not used on this project. All fusion splicers shall be calibrated and labeled according to the manufacturer's specifications. Contractor shall submit certification of calibration for the fusion splicers to the Engineer.

3.48 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION

SECTION 27 15 13

COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 - GENERAL

1.46 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Copper Horizontal Cabling.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.47 SUBMITTALS

A. Provide product data from manufacturer's specifications.

1.48 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

PART 2 - PRODUCTS

2.45 APPROVED PRODUCTS

A. Approved Horizontal Copper Cable Manufacturer(s)

1. Berk-Tek – LANmark 1000
2. Superior Essex – 66-240-2A
3. No Exceptions

2.46 HORIZONTAL COPPER CABLE

A. 100 OHM Category 6/6e Balanced Twisted Pair Cable

1. The horizontal balanced twisted pair cable shall exceed the Category 6 transmission characteristics per issue of ANSI/TIA-568-C.2.
2. Cable jacket shall be CMR rated.
3. Jacket color shall be Blue.

B. 100 OHM Category 6a Balanced Twisted Pair Cable
1. The horizontal balanced twisted pair cable shall exceed the Category 6
2. transmission characteristics per issue of ANSI/TIA-568-C.2.
3. Cable jacket shall be CMR rated.
4. Jacket color shall be Yellow.
5. Category 6a balanced twisted pair cabling shall be ran in pairs.

PART 3 - EXECUTION

3.49 HORIZONTAL CABLES

A. Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.

B. A plastic or nylon pull cord with a minimum test rating of 90 Kg (200 lb.) shall be co-installed with all cable installed in any conduit.

C. Cable raceways shall not be filled greater than the ANSI/TIA-569-B maximum fill for the particular raceway type.

D. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.

E. Where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.

F. The cable's minimum bend radius and maximum pulling tension shall not be exceeded. Refer to manufacturer's requirements.

G. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48 to 60-inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.

H. Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.

I. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

J. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the Contractor shall install appropriate carriers to support the cabling.

K. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the Contractor prior to final acceptance at no cost to the Owner.

L. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA-568-C.2 document, manufacturer's recommendations and best industry practices.

M. Leave a minimum of 12" of slack for twisted pair cables at the outlet. Cables shall be coiled in the in-wall box, surface-mount box or modular furniture raceway if adequate space is present to house the cable coil without exceeding the manufacturers bend radius. Excess slack shall be loosely coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.

N. Cables shall be neatly bundled and dressed to their respective termination device. Each terminating device shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

O. Each cable shall be clearly labeled on the cable jacket behind the termination device at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.50 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION

SECTION 27 15 23

COMMUNICATIONS OPTICAL FIBER HORIZONTAL CABLING

PART 1 - GENERAL

1.49 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Optical Fiber Horizontal Cabling.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.50 SUBMITTALS

A. Provide product data from manufacturer’s specifications.

1.51 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the specification or not.

PART 2 - PRODUCTS

2.47 APPROVED PRODUCTS

A. Approved Horizontal Optical Fiber Cable Manufacturer(s)

1. Berk-Tek
2. Superior Essex
3. Corning
4. No Exceptions

2.48 HORIZONTAL OPTICAL FIBER CABLE

A. Laser-Optimized 50/125 Multimode Optical Fiber Non-Conductive, Tight Buffered Cable (OM3)

1. Generic Characteristics
2. The indoor optical fiber cable shall be available with up to twelve 900-micron tight-buffered 250-micron fibers placed in a color-coded sub-unit bundle with aramid strength elements.
3. The indoor optical fiber cable shall meet or exceed the performance criteria found in ANSI/TIA-568-C.3.
4. The indoor optical fiber cable shall have sequential length marking printed on the cable jacket.
5. Maximum attenuation dB/Km @ 850/1300 nm: 3.5/1.5
6. Minimum overfilled modal bandwidth: 1500 MHz-km @ 850 nm.
7. Minimum overfilled modal bandwidth: 500 MHz-km @ 1300 nm.
8. Minimum effective modal bandwidth: 2000 MHz-km @ 850nm
9. Cable jacket shall be OFNR rated.
10. Jacket color shall be: Aqua

PART 3 - EXECUTION

3.51 HORIZONTAL CABLES

A. Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.

B. A plastic or nylon pull cord with a minimum test rating of 90 Kg (200 lb.) shall be co-installed with all cable installed in any conduit.

C. Cable raceways shall not be filled greater than the ANSI/TIA-569-B maximum fill for the particular raceway type.

D. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.

E. Riser rated cable shall be installed in metallic conduit when installed in a plenum space.

F. Where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.

G. The cable's minimum bend radius and maximum pulling tension shall not be exceeded. Refer to manufacturer's requirements.

H. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48 to 60-inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.

I. Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.

J. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

K. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the Contractor shall install appropriate carriers to support the cabling.

L. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the Contractor prior to final acceptance at no cost to the Owner.

M. Cables shall be dressed and terminated in accordance with the recommendations made in ANSI/TIA-568-C.0 and/or ANSI/TIA-568-C-1, manufacturer's recommendations and best industry practices.

N. Leave a minimum of 36" of slack for optical fiber at the outlet. Cables shall be coiled in the in-wall box, surface-mount box or modular furniture raceway if adequate space is present to house the cable coil without exceeding the manufacturers bend radius. Excess slack shall be loosely coiled and stored in the ceiling above each drop location where there is not enough space present in the outlet box to store slack cable.

O. Cables shall be neatly bundled and dressed to their respective termination device. Each terminating device shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

P. Each cable shall be clearly labeled on the cable jacket behind the termination device at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.52 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION

SECTION 27 15 43

COMMUNICATIONS FACEPLATES AND CONNECTORS

PART 1 - GENERAL

1.52 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Faceplates and Connectors.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.53 SUBMITTALS

A. Provide product data from manufacturer's specifications.

1.54 WORK INCLUDED

A. The work included under this Specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

PART 2 - PRODUCTS

2.49 APPROVED PRODUCTS

A. Approved Copper Connectivity Manufacturer(s)

1. Leviton – eXtreme Cat 6+
2. Ortronics – SII 6/6e, KS6
3. No Exceptions

B. Approved Optical Fiber Connectivity Manufacturer(s)

1. 3M
2. No Exceptions

C. Approved Faceplate Manufacturer(s)

1. Leviton
2. Ortronics
3. No Exceptions

D. Approved Surface Mount Box manufacturer(s)

1. Leviton
2. Wiremold
3. No Exceptions

E. Approved Surface Mount Housing manufacturer(s) for Wireless Access Points

1. Leviton (41089-2WP)
2. Ortronics (404TJ2)
3. No Exceptions

F. Approved In-Floor/Floor Box Data Receptacle manufacturer(s)

1. Leviton
2. Ortronics
3. No Exceptions

G. Approved Wall-Mount manufacture(s) for Wireless Access Points

1. Oberon – Model 1011-00-WH
2. Other manufactures upon approval and acceptance by SCSB IT Department

2.50 COPPER CONNECTIVITY

1. Category 6e, 8-Position, 8-Contact (8P8C) Modular Jack
   a. The connector module shall exceed the Category 6 performance criteria per ANSI/TIA-568-C.2.
   b. The eight-position connector module shall accommodate six-position modular plug modular cords without damage to either the cord or the module.
   c. The connector module shall be designed for use at the work area (WA), communications room (TR) and/or equipment room (ER) without modification.
   d. The connector module shall be available in both the T568A and T568B wiring configurations within the same module.
   e. The connector module shall have an insulation displacement connection featuring insulation slicing of 22 to 24 AWG plastic-

insulated solid copper conductors forming a gas-tight connection.

f. Icons shall be used if offered from the manufacturer.

g. Jack/Icon colors shall be:
Green for voice
White for data

2.51 FIBER CONNECTIVITY

A. Laser Optimized Multimode Fiber Connectivity OM3

1. The optical fiber field-installable connector shall be SC for installation onto multimode a laser optimized 50/125-micron fiber.
2. The optical fiber field-installable connector shall be compatible with 900-micron buffered fibers.
3. The optical fiber field-installable connector shall meet or exceed the performance criteria found in ANSI/TIA-568-C.3.
4. The optical fiber field-installable connector shall have a maximum Loss of 0 .5 dB.

5. The optical fiber adapter module that occupies the faceplate shall be equipped with zirconia sleeve.
6. Laser optimized connector color shall be aqua.

2.52 FACEPLATES

A. Faceplates

1. The faceplate housing the connector modules shall have no visible mounting screws.
2. It shall be possible to install the connector modules in wall-mounted single- and dual-gang electrical boxes, utility poles and modular furniture (cubicle) access points using manufacturer-supplied faceplates and/or adapters.
3. The faceplate housing the connector modules shall have the option of being mounted on adapter boxes for surface mount installation.
4. The faceplate housing the connector modules shall have a labeling capability using built-in labeling windows, to facilitate outlet identification and ease network management.
5. The faceplate housing the connector modules shall provide flexibility in configuring multimedia workstation outlets that respond to present or future network needs such as audio, video, coaxial and optical fiber applications.

2.53 SURFACE-MOUNT BOXES

A. The surface mount box shall accommodate connections of any type, UTP, optical fiber or coax.

B. The surface mount box shall have internal storage space for slack cabling and a built-in spool for controlling cable bend radius.

2.54 SURFACE-MOUNT HOUSINGS

A. The surface-mount housing shall be used in conjunction with Category 6a cabling for connecting wireless access points in instances of suspended (drop) ceiling.

B. The surface-mount housing shall be two-port and plenum rated and must be compatible with corresponding manufacturer of data jack.

C. The surface-mount housing shall be labeled per section 27 05 23

2.55 IN-FLOOR DATA RECEPTACLES

A. In-floor data receptacles are to be used in situations deemed necessary and approved by SCSB IT Department

B. In-floor data receptacles shall be of the poke-through variety and accommodate the corresponding manufacturer of data jack

C. In-floor data receptacles are to be fire-rated

D. In-floor data receptacles are to be labeled per section 27 05 23

2.56 WIRELESS ACCESS POINT WALL MOUTING

A. Wireless Access Points are to be mounted on the wall when deemed necessary by SCSB IT Department

B. Wall-mount for access points is to be used for instances of hard ceiling/atypical ceilings.

C. Wall-mounted access point brackets will not be mounted in excess of 12’ on wall in cases of hard/atypical ceilings.

D. Wall-mounted access point location shall be determined by SCSB IT Department

PART 3 - EXECUTION

3.53 COPPER CONNECTIVITY

A. 8-position, 8-contact (8P8C) modular jacks shall be installed in accordance with manufacturer's recommendations and installation guides, and best industry practices.

B. Pair untwist at the termination shall not exceed 13 mm (0.5 inch).

C. Data jacks, unless otherwise noted in Drawings or fiber adapter modules are present, shall be located in the bottom position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the right-most position(s).

D. Voice jacks, unless otherwise noted in Drawings, shall occupy the top position(s) on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the left-most position(s).

3.54 OPTICAL FIBER CONNECTIVITY

A. Optical fiber connectors shall be installed in accordance with manufacturer's recommendations and installation guides, and best industry practices.

B. Fiber adapter modules, unless otherwise noted in Drawings, shall be located in the bottom position(s) of each faceplate. Fiber adapter modules in horizontally oriented faceplates shall occupy the right-most position(s).

3.55 FACEPLATES

A. Blank inserts shall be installed where ports are not used.

B. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation.

C. Faceplates shall be installed straight and level.

D. Faceplates shall be installed at the same heights as electrical faceplates.

3.56 SURFACE MOUNT BOXES

A. Blank inserts shall be installed where ports are not used.

B. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation.

C. Surface mount boxes shall be installed straight and level.

D. Surface mount shall be installed at heights as electrical receptacles.

3.57 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION

WIRELESS ACCESS POINTS

A. Design Requirements

1. A Single, two-port, plenum-rated, surface-mount housing shall be specified at locations where wireless access points will connect. Locations will be typically concealed above drop-ceiling and shall be specified as a surface-mount housing. In some instances where appropriate, locations may be specified on wall below suspended ceiling as standard faceplate.
2. Other ceiling types such as hard ceiling or non-typical types; location must be coordinated with SCSB IT Department to meet appropriate mounting requirements referenced in subsection 2.56 of Section 27 15 43

B. Approved Products & Materials

1. Section 27 13 13 – Communications Copper Backbone
2. Section 27 15 13 – Communications Copper Horizontal Cabling
3. Section 27 15 43 – Communications Faceplates and Connectors
4. Section 27 05 28 – Pathways For Communications Systems
5. Section 27 05 53 – Identification For Communications Systems

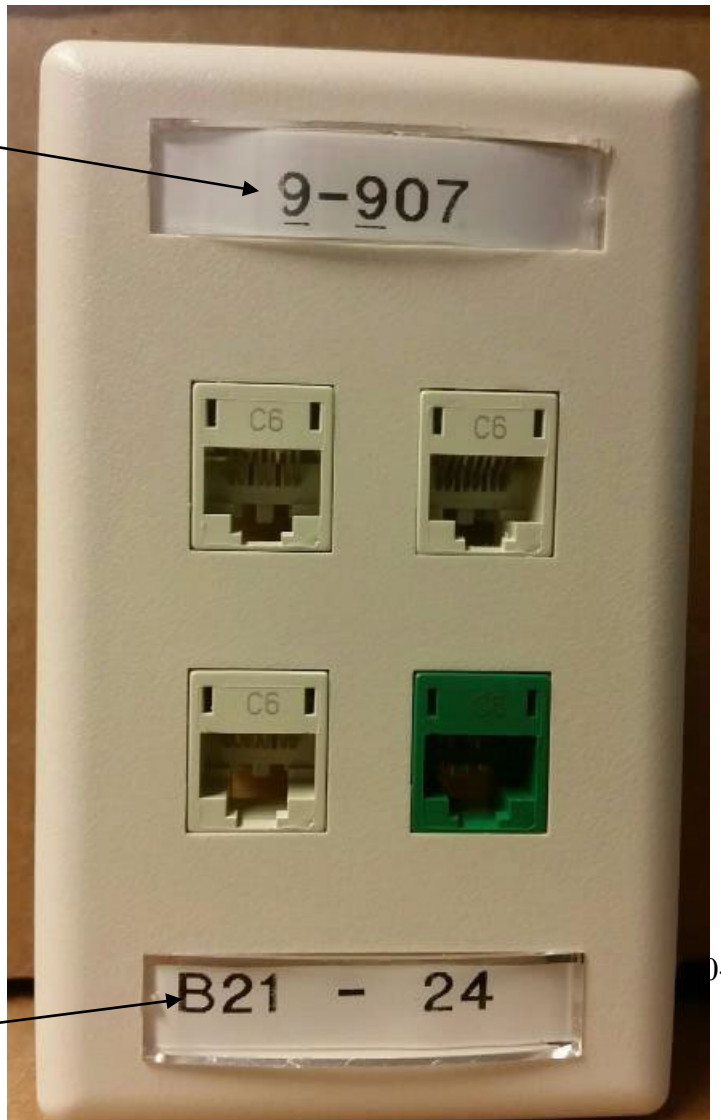
C. Installation

1. Install a single, two-port, plenum-rated, surface-mount housing for each wireless access point location (when ceiling is suspended, (drop) ceiling)
2. Access point is to be mounted to ceiling grid clear of other potential equipment (when ceiling is suspended (drop) ceiling)
3. Wall-mounted access points must be installed with wall-bracket approved by SCSB IT Dept.
4. Coordinate final placement locations with SCSB Network Engineer.
5. Wireless Access Points are to be provided by SCSB, installed/mounted by contractor.

6. Two Category 6a cables are to be run horizontally through proper channels/J hooks to each Wireless access point location.
7. Label surface-mount data housing/faceplates appropriately per section 27 05 53
8. Label suspended (drop) ceiling grid with additional label as surface-mount data housing
9. Provide separate CAT6a patch panel in communication closet for wireless.

Appendix A
Wall Plate Labeling and Patch Panel Labeling

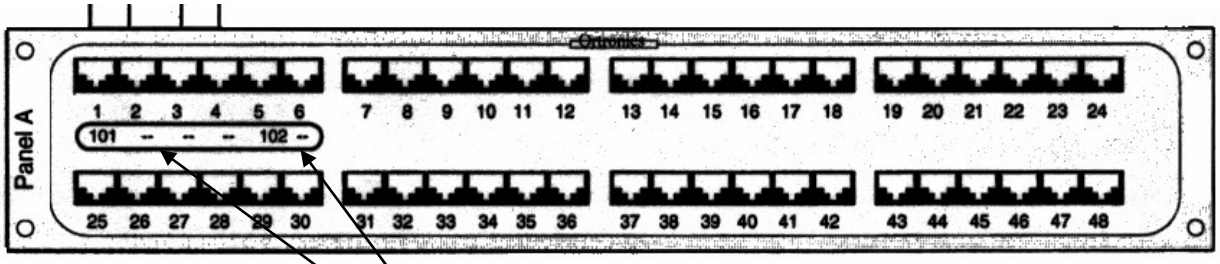
Wall Plate



Patch Panel and Jack Number

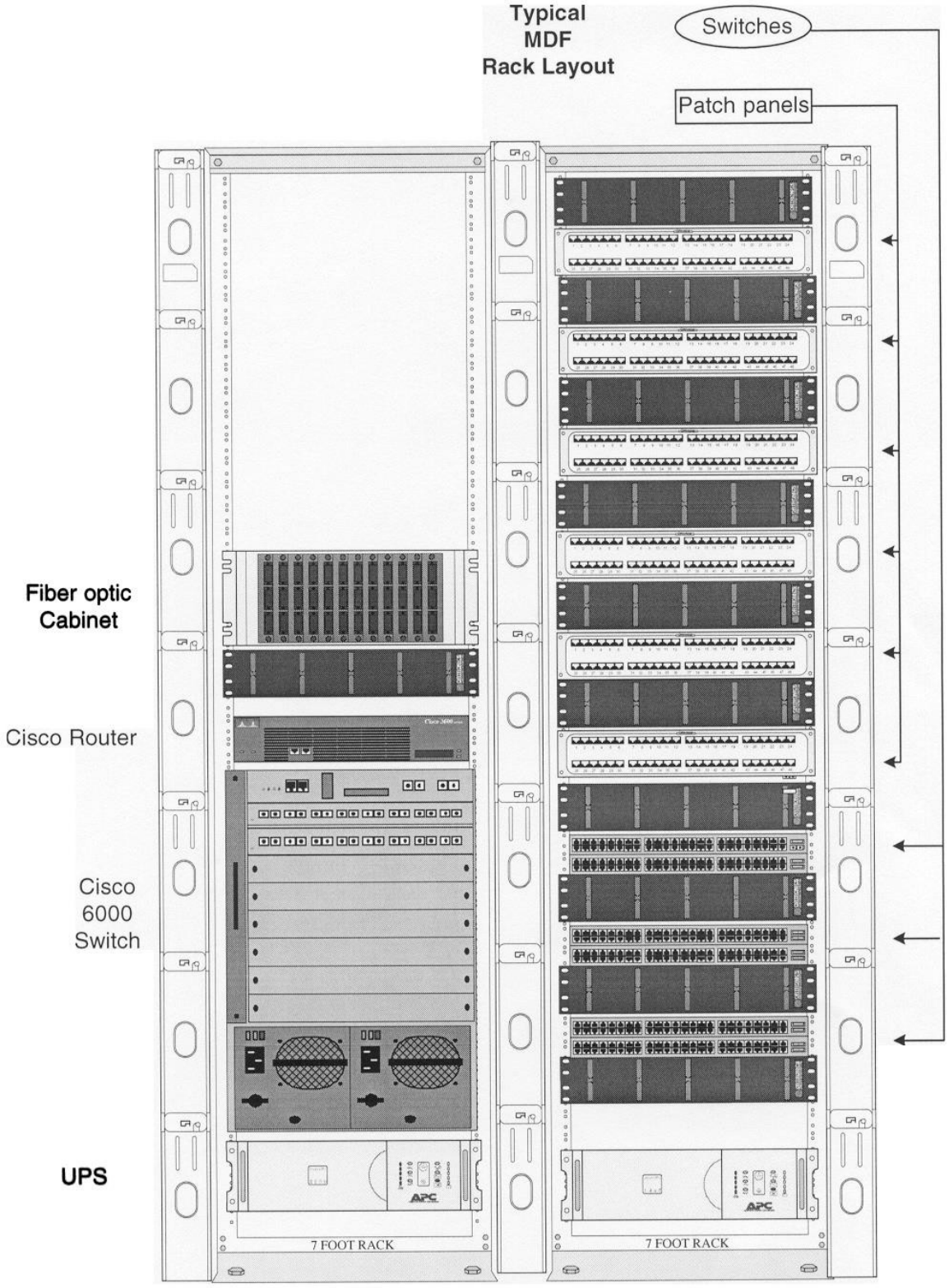
Wall Plate will be labeled with IDF Building and Room number on top and PP and Jack number on bottom. Single drops are not allowed. Connections for Staff work areas are to have bottom right jack in green color. No Exceptions

Patch Panel



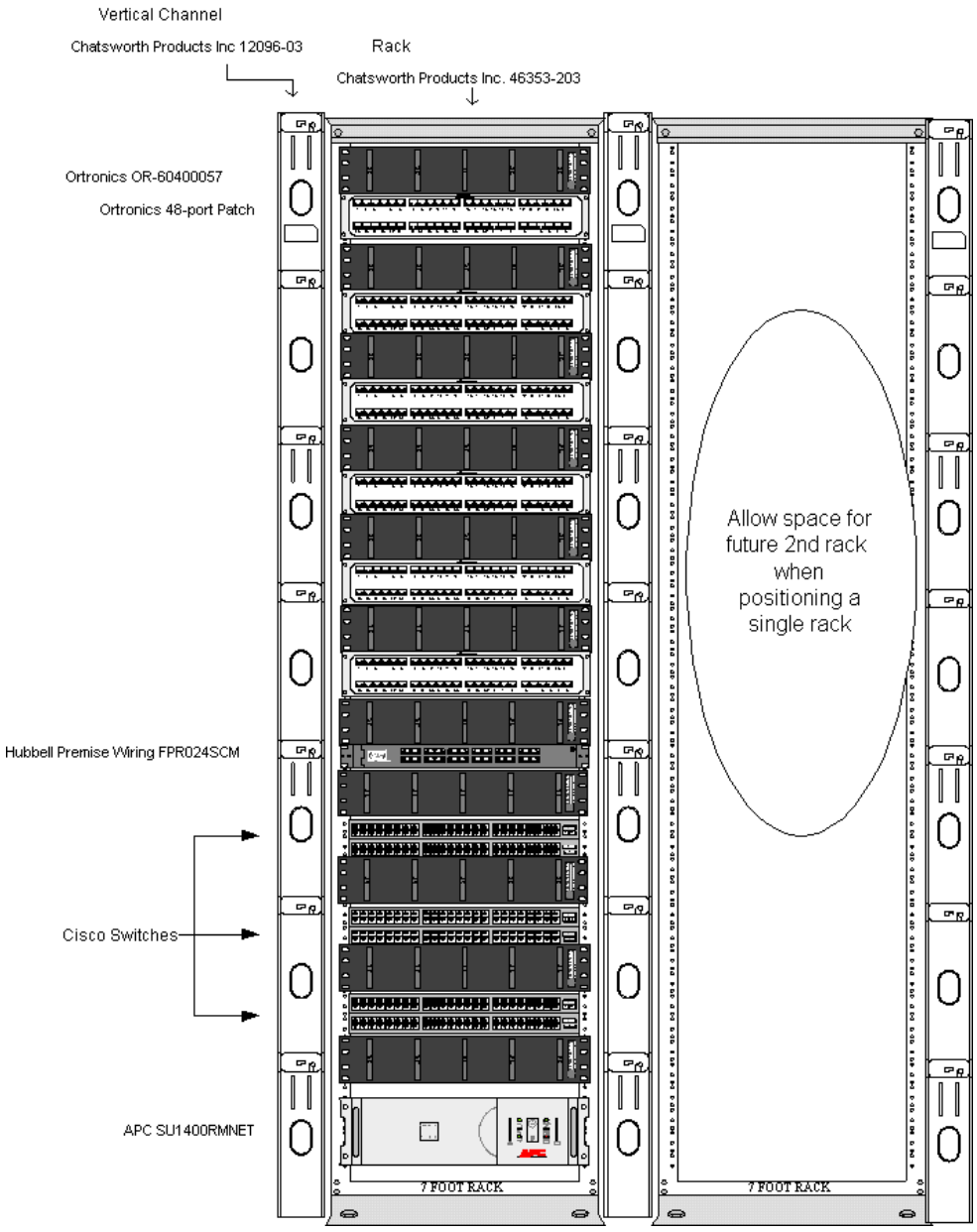
Patch Panel shall be labeled as above. Room number followed by --- for each quad drop and Room Number followed by – for each duplex drop.

Appendix "B"


Typical
MDF
Rack Layout
Switches
Patch panels
Fiber optic
Cabinet
Cisco Router
Cisco
6000
Switch
UPS
7 FOOT RACK
7 FOOT RACK

Appendix "C"

Typical IDF



Appendix D

Cabling Jacket Color Code

- Fiber Optic : Black Jacket (connector color to follow spec)
- Intercom CAT6 : Unspecified; Gray Jacket
- Network/Data CAT6 : Blue Jacket (Green insert used at phone/VOIP trim)
- Wireless Access Point CAT6a : Yellow Jacket
- Fire Alarm : Red Jacket
- Security/Surveillance : Purple Jacket
- Intrusion & Access Control Security : Unspecified
- Digital Lighting Controls CAT6 : Green Jacket
- BAS/HVAC Control Cabling : Unspecified

SECTION 1 GENERAL REQUIREMENTS

1.01 Objective

A. The purpose of this standards document is to enable consistency in planning and installation of structured cabling systems for our facilities. We recognize that the installation of cabling systems during building construction or renovation is significantly less expensive and less disruptive than after the building is occupied. Having consistent infrastructure at all of our facilities that meet our goals and objectives for bandwidth and capacity is critical to our global IT planning. This specification document will define the systems, products, installation practices and warranty support required of all Structured Cabling.

B. Product specifications, general design considerations, and installation guidelines are provided in this written document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types for a specified Sarasota County Schools facility will be provided as a separate submission for each specific project

1.02 KEY CONTACTS

A. Client Contacts

1. Daniel Talalaj, Daniel.Talalaj@sarasotacountyschools.net
2. Christian Bueche, Christian.Bueche@sarasotacountyschools.net

1.03 CODES AND STANDARDS COMPLIANCE

A. All materials shall comply with the applicable sections of all Local, State and Federal building codes, fire safety codes, amendments, and ordinances for installation of telecommunications cabling.

B. All materials shall comply with the applicable sections of the following Codes for installation of telecommunications cabling:

1. Uniform Building Code (UBC)
2. National Electrical Code – NFPA 70 (NEC)
3. National Fire Alarm and Signaling Code – NFPA 72
4. Federal Communications Commission (FCC) Part 15 and Part 68

C. All materials and installation practices shall comply with the most current version of the applicable sections of the following Telecommunications Industry Standards and Manuals as appropriate.

D. Telecommunication Industry Association (TIA)

1. ANSI/TIA-568.0-E Generic Telecommunications Cabling for Customer Premises
2. ANSI/TIA-568.1-E Commercial Building Telecommunications Cabling Standard
3. ANSI/TIA-568.2-D Balanced Twisted-Pair Telecommunications Cabling and Components Standards
4. ANSI/TIA-568.3-D Optical Fiber Cabling and Components Standard
5. ANSI/TIA-568.4-D Coaxial Components
6. ANSI/TIA-569-E, Telecommunications Pathways and Spaces.

7. ANSI/TIA-526-7-A, Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
8. ANSI/TIA-526-14-C, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
9. ANSI/TIA-606-C, Administration Standard for Commercial Telecommunications Infrastructure.
10. ANSI/TIA-607-D, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
11. ANSI/TIA-758-B, Customer-Owned Outside Plant Telecommunications Infrastructure Standard
12. ANSI/TIA TSB-162-B Telecommunications Cabling Guidelines for Wireless Access Points
13. ANSI/TIA-862-B, Structured Cabling Infrastructure Standard For Intelligent Building Systems
14. ANSI/TIA-942-B, Data Center Cabling
15. ANSI/TIA-1005-A, Telecommunications Infrastructure Standard for Industrial Premises
16. ANSI/TIA-1152-A, Requirements for Field Test Instruments and Measurements for Balanced Twisted Pair Cabling
17. ANSI/TIA-5017, Telecommunications Physical Network Security Standard
18. ANSI/TIA-5018, Distributed Antenna Systems (DAS)
19. TIA TSB-184-A Power Delivery (4-pair)

E. BICSI

1. Telecommunications Distribution Methods Manual (TDMM), 14th Edition
2. Information Technology Systems Installation Methods Manual (ITSIMM), 7th Edition
3. ANSI/BICSI 002-2019- Data Center Design and Implementation Best Practices
4. ANSI/BICSI 001-2017, Information and Communication Technology Systems Design and Implementation Best Practices for Educational Institutions and Facilities
5. ANSI/BICSI 006-2020, Distributed Antena System (DAS) Design and Implementation
6. ANSI/BICSI 007-2017- Information Communication Technology Design and Implementation Practices for Intelligent Buildings and Premises
7. ANSI/BICSI 008-2018 - Wireless Local Area Network (WLAN) Systems Design and Implementation Best Practices
8. ANSI/BICSI N1-2019: Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure
9. ANSI/BICSI N2-17: Installation of Telecommunications and ICT Cabling to Support Remote Power Applications

10. ANSI/BICSI N3-20: Planning and Installation Methods for the Bonding and Grounding of Telecommunications and ICT Systems and Infrastructure

11. BICSI G1-17, ICT Outside Plant Construction and Installation: General Practices

F. This document does not replace any Code, local or otherwise. The contractor must be aware of local Codes that may impact this project.

1.04 CONTRACTOR QUALIFICATIONS

A. The Contractor shall be a company specializing in the installation of Telecommunications Structured Cabling Systems.

B. The Contractor shall have total responsibility for the coordination and installation of the work shown and described in the Drawings and these Specifications.

C. The Contractor shall demostrate the following qualification requirements:

1. Demonstrate that they have a minimum of 5 years experience installing structured cabling for telecommunications.

2. Reference list of at least 5 previous successful projects of this scope, size and nature; including names and location of projects, description of work, time of completion and names of contact persons for reference.

3. Demonstrate that they are a current Leviton Certified Contractor.

4. Installers/technicians working on this project will be able to produce documentation from Leviton indicating that they have successfully completed the appropriate Copper and Optical Fiber Communications Cabling System training courses.

5. The Contractor must have a current BICSI certified Registered Communications Distribution Designer (RCDD) on staff as a full-time employee – copy of RCDD certificate required. It is the Owner's discretion, on a project by project basis, an RCDD consultant may be hired by the Owner to inspect work during and after completion. Based upon inspection by Owner's hired RCDD consultant or IT Staff the Contractor will be responsible for correcting any work that does not meet requirements detailed in this document.

6. The Contractor must have a supervisor on premises with the authority to act for the Contractor. The supervisor must be a current Leviton certified installer. Copy of certificate required.

D. Bidding Contractor shall be a licensed to install telecommunications systems in the locale where work will be performed.

E. Bidding Contractor shall be able to provide insurance in the types and values requested by the owner.

F. Bidding Contractor shall be able to procure bonding in the type and values as required by the owner.

1.05 ADMINISTRATIVE REQUIREMENTS

A. SCHEDULING AND COORDINATION WITH OTHER TRADES

1. The Contractor shall coordinate Structured Cabling Systems work with that of other trades as required ensuring that the entire communications work will be carried out in an orderly, complete and coordinated fashion.

2. Contractor shall attend project coordination meetings as necessary.

3. Upon contract award Contractor shall provide a detailed construction schedule with hard dates for completion of cable placement, terminations, and testing and submit to Owner's Project Manager for approval.
4. Cabling schedule submittals shall be in a format as designated by the Owner's Project Manager.
5. Inform General Contractor and Owner's Project Manager immediately of any delays or potential delays related to material procurement, delivery or labor related issues.
6. Include premium time required to comply with the project scheduling and phasing.

B. SITE INVESTIGATION

1. Prior to submitting bids for the project, and where practicable, contractor shall visit the work site to become aware of any conditions that may affect the cost of the project.
2. Contractor shall obtain a complete set of Project Drawings and Specifications for coordination and to determine the full scope of work.

C. PERMITS

1. Contractor shall obtain all permits and required inspections for the installation of this work and pay all charges associated.
2. Deliver to the Owner all certificates, permits and inspection reports issued by authorities having jurisdiction (AHJ).

D. DELIVERY, STORAGE, AND PROTECTION

1. Materials and equipment furnished shall be delivered in new condition and be of current production lots.
2. Contractor shall ensure that material deliveries to work site shall be coordinated with construction manager responsible for materials distribution to all trades. Handle in accordance with Manufacturer's recommendations and instructions to avoid damaging equipment, installed devices and finish.
3. Contractor is responsible for all materials, tools and vehicles left on the job site.
4. Contractor shall coordinate for the removal of all rubbish and packing materials produced by the Contractor's activities during the project.
5. Contractor shall ensure materials are stored according to Manufacturer's recommendations. In addition, materials must be stored in a location protected from vandalism and weather.
6. Inspect and report concealed damage to carrier within specified time.

E. PROJECT CONDITIONS

1. Environmental Requirements
    a. Contractor shall ensure that any rubbish produced by the structured cabling work are is of according to local, state or national regulations.
    b. It is preferred that the Communications Contractor recycle any used or un-used components during the course of the construction project.
2. Telecommunications Bonding and Grounding System

a. Contractor shall confirm with electrical engineer on project that a Telecommunications Grounding and Bonding System meeting industry standards has been provided.

b. All relevant telecommunications equipment installed must be bonded to the Telecommunications Grounding and Bonding System per industry standards and Manufacturers recommendations.

1.06 SUBMITTAL REQUIREMENTS

A. Contractor shall submit with bid for approval, Leviton specification sheets for all products to be furnished. Work shall not proceed without the Owner and/or the Project Manager's approval of the submitted items.

B. Any materials and equipment submitted that are not in accordance with this specification may be rejected.

C. Successful contractor shall generate shop drawings for approval prior to commencement of work. Shop drawings shall include cable routes, conduit penetration locations, elevation drawings of equipment racks, patch panels, termination blocks, connection details, rack mounting details and other relevant details not included in the project drawings.

D. Upon completion of project contractor shall modify initially reviewed and accepted shop drawings to include revisions based upon change orders and approved field conditions and submit a final drawing as an as-built submittal.

1.07 END-TO-END SYSTEMS REQUIREMENT

A. All cables, connectors, patch panels, and patch cords provided must manufactured by the same Leviton to provide for a complete end-to-end solution. Other manuafcturers solutions will not be accepted.

1.08 WARRANTY

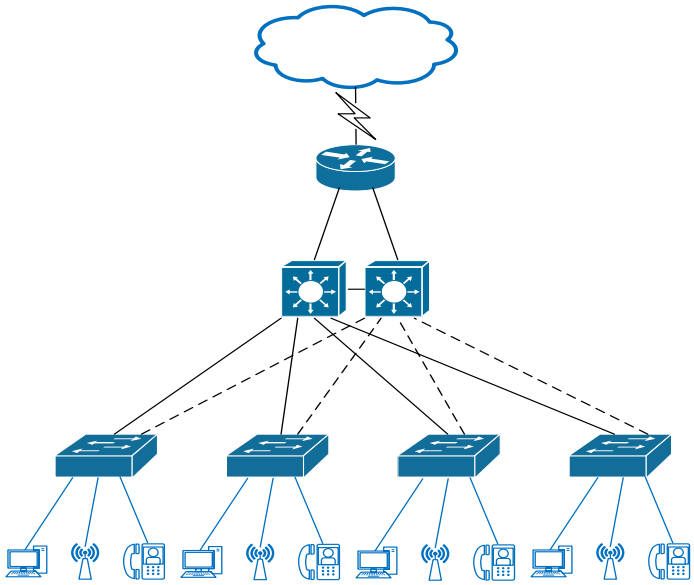
A. Contractor warrants to the end-user that their installation practices and workmanship will adhere to all standards and Leviton requirements. Contractor shall fix or repair any installation faults at their own cost..

B. A Leviton Limited Lifetime Product and Performance Warranty shall be obtained by the Contractor on behalf of the Owner covering all applicable structured cabling components of the installed system. It is the responsibility of the contractor to provide all forms/documents necessary to obtain the system warranty. Evidence of such warranty will be provided by Contractor as part of their contractual obligation and final retainage payments are contingent upon delivery to Owner of Leviton’s site warranty certificate.

1.09 Network TOPOLOGY

A. Sarasota County Schools deploys a LAN (Local Area Network) based on a switched ethernet collapsed backbone design consisting of core switches located at the Main Equipment Room (MER) feeding distribution switches located at floor Telecommunications Rooms (TR) . Interswitch links (ISL) between core switches and access switches are connected via fiber optic cabling.

B. Workstation, WAP and IoT devices connect to access switches via horizontal twisted pair connections.



1.10 BACKBONE CABLING

A. OM3 performance Multimode fiber optic cable shall be installed for LAN backbone applications up to 300m in distance

B. Each TR shall be cabled to the MER with a minimum of a 24 strands of fiber optic cabling.

C. The fiber optic cable shall be terminated in rackmount fiber optic patching enclosures located in cable racks at ER and MER. Fiber strands shall be terminated with SC duplex connectors mounted into SC duplex coupler plates mounted in the enclosures.

1.11 HORIZONTAL CABLING

A. All workstations and IoT devices shall be cabled with Category 6 UTP horizontal cabling as indicated on communications plans.

B. All Wireless Access Points (WAP's) shall be cabled with Category 6A UTP horizontal cabling as indicated on communications plans.

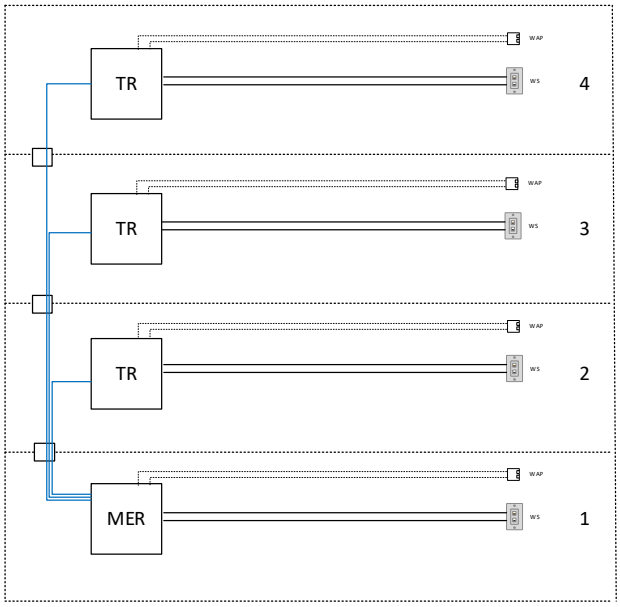
C. Two horizontal cables shall be run to each workstation or WAP unless indicated otherwise on project plans

D. Horizontal cables shall be terminated with 110-style, RJ45 connector modules installed in rackmount patch panels located in the Telecommunications Room (TR).

E. Horizontal cables shall be terminated with RJ45 connector modules installed in appropriate color and decor.

F. Locations of telecommunications outlets and outlet types are indicated on project plans.

1.12 NETWORK SCHEMATICS



1.13 Manufacturer Specific Declaration

A. Sarasota County Schools has specified Leviton Network Solutions as the product brand required to meet their design requirements. Product support questions can be directed to Leviton contacts below:

1. Leviton Network Solutions
2. 2222 - 222nd St SE, Bothell, WA 98021-4422
3. Customer Service 1-800-722-2082, 1-425-486-2222
4. Product Support 1-800-824-3005
5. www.leviton.com/ns

LEVITON PRODUCTS ORDERING GUIDE

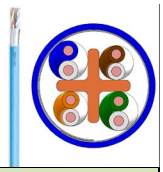
2.01 CATEGORY 6 CABLE

A. Category 6 cable shall be 23awg U/UTP construction

B. Cable shall meet fire rating appropriate to local building codes.

Category 6 U/UTP Cable		
Part Number	Description	Comment/Attribute
10032455	LANmark-1000 Riser- Blue	Data / VOIP
10032501	LANmark-1000 Riser- Violet	Security
10032477	LANmark-1000 Riser- Red	Fire
10032479	LANmark-1000 Riser- Green	Digital Lighting
11096490	LANmark-1000 Riser- Gray	Intercom
11072213	LANmark-1000 OSP - Black	Outside Plant

2.02 CATEGORY 6A CABLE



A. The cable shall be constructed of 23-gauge copper conductors, incorporate an insulated metallic isolation wrap, and shall exhibit alien crosstalk performance that exceeds TIA and ISO standards.

B. Cable shall meet fire rating appropriate to local building codes.

Category 6A Cable		
Part Number	Description	Comment/Attribute
11140411	LANmark-SST Category 6A UTP Riser Cable - Yellow	Wireless Access Points
11094458	LANmark-10G Cat 6A OSP - Black	WAPs - Outside Plant

2.03 CATEGORY 6 CONNECTOR MODULES

A. eXtreme connector modules shall be used
B. Connector shall be component-rated

Category 6 connector modules		
Part Number	Description	Comment/Attribute
61110-RW6	eXtreme Cat 6 QuickPort Jack, White	Data
61110-RV6	eXtreme Cat 6 QuickPort Jack, Green	VOIP
61110-RP6	eXtreme Cat 6 QuickPort Jack, Purple	Security
61110-RR6	eXtreme Cat 6 QuickPort Jack, Dark Red	Fire Alarm

2.04 CATEGORY 6A CONNECTOR MODULE

A. Atlas-X1 metal body connector modules shall be used
B. Connector shall be component-rated, non-shuttered

Category 6A connector modules		
Part Number	Description	Comment/Attribute
6AUJK-RY6	Atlas-X1 Category 6a UTP Connector Module, Yellow	Wireless Access Points

2.05 TRANSITION POINT COUPLER

A. To be used to transition outside plant category cable to inside plant cable
B. Coupler shall be 6A and backwards compatible
C. Coupler shall be plenum-rated

Transition point couplers		
Part Number	Description	Comment/Attribute
SBCPI-S	VXC Coupler	Use as transition point

2.06 COPPER PATCH PANELS

A. Patch panels shall be flat 110-style, 1RU 24 Port and 2RU 48 Port

B. Patch panels shall include rear cable management bar(s)

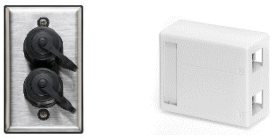
Patch panels and Horizontal cable managers		
Part Number	Description	Comment/Attribute
69586-L48	Cat 6 Flat 110-Style Patch Panel, 48-Port, 2RU, Magnifying Lens Label Holder	Cable management bars included
6A586-U24	Cat 6A Flat 110-Style Patch Panel, 24-Port, 1RU, Magnifying Lens Label Holder	Cable management bar included
6A586-U48	Cat 6A Flat 110-Style Patch Panel, 48-Port, 2RU, Magnifying Lens Label Holder	Cable management bar included

2.07 WALLPLATES & SURFACE MOUNT BOXES

A. Standard wall plates shall be single-gang 2, 4, and 6 port configurations. Standard color shall be white.

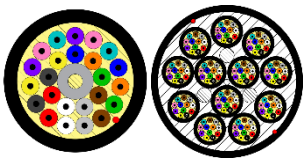
B. CoT wall plates shall be DuraPort

C. Surface mount boxes shall be 2, 4, and 6 port configurations



Wall plates & Surface Mount Boxes		
Part Number	Description	Comment/Attribute
42080-2WS	Single-Gang QuickPort Wall plate with ID Windows, 2-Port, White	Ivory color as defined by owner 42080-2IS
42080-4WS	Single-Gang QuickPort Wall plate with ID Windows, 4-Port, White	Ivory color as defined by owner 42080-4IS
42080-6WS	Single-Gang QuickPort Wall plate with ID Windows, 6-Port, White	Ivory color as defined by owner 42080-6IS
D670K-1S2	DuraPort Industrial Outlet Kit, Single Gang, 2-Port	Classroom of Tomorrow (CoT) applications
4S089-2WP	Surface-Mount Box with ID Window, 2-Port, White	Plenum-Rated
4S089-4WP	Surface-Mount Box with ID Window, 4-Port, White	Not plenum-rated
4S089-6WP	Surface-Mount Box with ID Window, 6-Port, White	Not plenum-rated

2.08 OPTICAL FIBER CABLE



A. Optical fiber cable shall be OM3 indoor/outdoor, tight buffered OFNP

B. Typically used strand counts shall be 6, 12, 24, and 48

Optical Fiber Cable		
Part Number	Description	Comment/Attribute
PDP006-I/O-EB3010/25	6-Strand, Berk-Tek Indoor/Outdoor Plenum Premises Distribution (PDP-I/O)	Jacket color choices – aqua or black
PDP012-I/O-EB3010/25	12-Strand, Berk-Tek Indoor/Outdoor Plenum Premises Distribution (PDP-I/O)	Jacket color choices – aqua or black
PDP024-I/O-EB3010/25	24-Strand, Berk-Tek Indoor/Outdoor Plenum Premises Distribution (PDP-I/O)	Jacket color choices – aqua or black
PDP048-I/O-EB3010/25	48-Strand, Berk-Tek Indoor/Outdoor Plenum Premises Distribution (PDP-I/O)	Jacket color choices – aqua or black

2.09 FIBER ENCLOSURES

A. Rack mounted fiber enclosures shall be 1RU and 2RU and be equipped with sliding tray

B. Wall mounted fiber enclosures shall be dual-door and support up to 48 SC fiber connections

C. Portable classroom fiber enclosures shall be plastic and support up to 6 SC connections

Fiber Enclosures		
Part Number	Description	Comment/Attribute
5R1UM-S03	Rack mounted Opt-X 1000i SDX 1RU Distribution and Splice Enclosure, empty, with sliding tray; Accepts up to (3) SDX adapter plates and accepts up to (3) splice trays	Couplers, splice trays, pigtails, and lock not included
5R2UM-S06	Rack mounted Opt-X 1000i SDX 2RU Distribution and Splice Enclosure, empty, with sliding tray; Accepts up to (6) SDX adapter plates and accepts up to (6) splice trays	Couplers, splice trays, pigtails, and lock not included

5WMED-4C	Medium SDX Wall-Mount Fiber Enclosure, empty with dual door	Couplers, splice trays, pigtails, and lock not included
5RCMP-KIT	Cable Clamp Kit	Use with rack mounted enclosures
41296-MMW	MOS Surface Mount Box, White	For use in portable classrooms. Requires MOS SC coupler modules

2.10 FIBER CONNECTIVITY & SPLICING

A. 12-port, duplex SC adapter plate shall be aqua color and equipped with zirconia ceramic ferrules

B. 24F splice tray shall be injection molded and include splice sleeves

C. 12F pigtail kit shall have discrete colors for each fiber

D. MOS SC adapters shall be used in MOS surface mount boxes located in portable classrooms

Fiber Connectivity & Splicing		
Part Number	Description	Comment/Attribute
5F100-2QC	SDX Precision Molded Plate (AQUA), 50/125um Multimode Laser Optimized OM3/4, Duplex SC, 12 fibers, Zirconia Ceramic Sleeve	Use in rack and wall mounted fiber enclosures
T5PLS-24F	Injection Molded High Density Splice Tray, Heat Shrink style (accepts standard sleeves), up to 24 fiber splicing	Use in rack and wall mounted fiber enclosures
5LPSC-KIT	12-Fiber Pigtail Kit, 50/125 µm, Multimode OM3, SC, 3 meters	Use for all splicing applications
41291-2CW	Duplex SC Fiber Adapter MOS Module, Zirconia Ceramic Sleeve, 1 Unit High, White	For use in MOS surface mount box

Part 3 – INSTALLATION PRACTICES

3.01 HORIZONTAL CABLES

A. Cable shall be installed in accordance with most current ANSI/TIA-568 Series, BICSI TDMM, manufacturer's recommendations, and best industry practices.

B. A plastic or nylon pull cord with a minimum test rating of 90 Kg (200 lb.) shall be co-installed with all cable installed in any conduit.

C. Cable raceways shall not be filled greater than the maximum fill for the particular raceway type.

D. Cables shall be installed in continuous lengths from origin to destination (no splices) except for approved connection points.

E. Where connection points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.

F. The cable's minimum bend radius and maximum pulling tension shall not be exceeded. Refer to manufacturer's requirements.

G. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 1.0 to 1.5-meter intervals and be randomly spaced. J hooks shall be properly sized to accommodate the immediate need and future growth of the cable pathway. J Hooks shall be designed to control bend radius requirements of the cable categories being installed.

H. Cable supports shall be self-supporting and utilize independent wires, support rods and associated hardware for suspension. At no point shall cable(s) rest on acoustic ceiling grids, T-bars, ceiling support wires, acoustical panels or other components of the suspended ceiling.

I. Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.

J. The bundle size recommendations of ANSI/TIA TSB-184-A shall be followed as it pertains to current or future support for POE applications.

K. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

L. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the Contractor prior to final acceptance at no cost to the Owner.

M. When cables are being installed, slack (service loops) shall be provided to accommodate future changes in the structured cabling system. Slack should be included in all length calculations to ensure that the permanent link does not exceed 90 m (295 ft). The amount of cable slack required will depend on the size and layout of the connecting hardware at the TR, TE or TO.

The recommended amount of cable slack shall be:

3m (10 ft) in telecom spaces (ER, TR, TE) and ceiling above TO

30cm at the work area outlet

N. Cables shall be neatly bundled and dressed to their respective termination device. Each terminating device shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

O. Cable bundles shall not be painted.

P. Each cable shall be clearly labeled on the cable jacket behind the termination device at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.02 EMI/RFI AVOIDANCE

A. Cables shall be routed such that the minimum separation distances from EMI/RFI and electrical power sources, as detailed in, are maintained and in accordance with most current ANSI/TIA-568 Series, BICSI TDMM, manufacturer's recommendations, and best industry practices.

B. To avoid electromagnetic interference (EMI) route cables to maintain the following minimum distances:

1. Three-inches from power lines of 2 KVA or less installed in conduits or grounded flexible armor below access floors.
2. Three-inches from fluorescent fixtures with remotely installed ballasts.
3. Five inches from standard fixtures.
4. Five-inches from power lines 2 KVA of less.
5. Twelve-inches from power lines of between 2 to 5 KVA.
6. Twelve-inches from 110 to 277-volt lighting.
7. Twenty-four inches from power lines of 5 KVA or greater.
8. Three-feet from transformers or motors.
9. Maintain minimum a twelve-inch separation between telecommunication cables running exposed in ceiling or floor voids and parallel electrical cables/conduits.

C. Telecommunication cables shall cross electrical cables/conduits at 90-degree angles.

3.03 VOICE AND DATA MODULAR JACKS

A. 8-position, 8-contact (8P8C) modular jacks shall be installed in accordance with manufacturer's recommendations and installation guides, and best industry practices.

B. Pair untwist at the termination shall not exceed 6.35 mm (0.25 inch).

C. Data jacks, unless otherwise noted in Drawings shall be located in the bottom position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the right-most position(s).

D. Voice jacks, unless otherwise noted in Drawings, shall occupy the top position(s) on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the left-most position(s).

3.04 PATCH PANELS

A. Cables shall be dressed and terminated in accordance with the recommendations made by manufacturer's recommendations and best industry practice.

B. Cables shall be separated into groups of twelve and routed symmetrically from both sides of the patch panel (e.g. split panel)

C. Cables shall be properly supported vertically in the rack or cabinet and supported at the rear of the patch panel using a cable management bar or a rear horizontal cable management to retain terminations

D. Pair untwist at the termination shall not exceed 6.35 mm (.25 inch)

E. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

3.05 FACEPLATES

A. Blank inserts shall be installed where ports are not used.

B. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation.

C. Faceplates shall be installed straight and level.

D. Faceplates shall be installed at the same heights as electrical faceplates or as designated on architectural and construction plans.

3.06 SURFACE MOUNT BOXES

A. Blank inserts shall be installed where ports are not used.

B. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation.

C. Surface mount boxes shall be installed straight and level.

D. Surface mount boxes shall be secured with screws to appropriate building structure or support bracket.

E. Plenum rated surface mount boxes shall be used for in ceiling and raised floor applications where required.

3.07 BACKBONE FIBER CABLES

A. Cables shall be dressed and terminated in accordance with the recommendations made in most current ANSI/TIA-568 Series, BICSI TDMM, manufacturer's recommendations, and best industry practices.

B. Minimum bend radius and maximum pulling tension for all cables shall be maintained during and after installation.

C. All cable and associated hardware shall be placed so as to make efficient use of available space in coordination with other uses. All cable and associated hardware shall be placed so as to not impair the use or capacity of other building systems, equipment, or hardware placed by others (or existing).

D. Backbone cables shall be installed separately from horizontal distribution cables

E. A plastic or nylon pull cord with a minimum test rating of 90 Kg (200 lb.) shall be co-installed with all cable installed in any conduit.

F. Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits

G. Where backbone cables and distribution cables are installed in a cable tray or wireway, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.

H. Leave 10' of slack on each end of Fiber backbone cable.

I. Vertical runs of cable shall be supported to messenger strand, cable ladder, mesh grips or other method to provide proper support for the weight of the cable.

J. Each optical Fiber cable shall be individually attached to the respective enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.

K. Each optical Fiber cable shall be clearly labeled at the entrance to the enclosure. Cables labeled within the bundle shall not be acceptable.

L. When splicing each Fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.

M. All spare Fiber strands shall be installed into spare splice trays.

N. Fiber slack shall be neatly coiled within the Fiber splice tray or enclosure. No slack loops shall be allowed external to the Fiber panel.

3.08 OPTICAL FIBER PANELS/ENCLOSURES

A. Cables shall be dressed and terminated in accordance with manufacturer's recommendations and best industry practices.

B. Each cable shall be individually attached to the respective splice enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.

C. Bend radius of the optic Fiber cable in the panel/enclosure shall not exceed 10 times the outside diameter of the cable.

D. Each Fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.

E. Each cable shall be clearly labeled at the entrance to the splice enclosure. Cables labeled within the bundle shall not be acceptable.

F. A maximum of 24 strands of Fiber shall be spliced in each tray

G. All spare strands shall be installed into spare splice trays.

H. Fiber slack shall be neatly coiled within the Fiber splice tray or enclosure. No slack loops shall be allowed external to the Fiber panel.

I. Installer will visually clean and inspect fiber connector end face prior to insertion into coupler plate.

J. Installer will attach dust caps immediately after end face inspection and after testing.

3.09 OPTICAL FIBER CONNECTORS AND PIGTAILS

A. All optical fiber shards shall be properly disposed in an approved container to prevent injury. The use of tape is not an approved method for disposal

B. Application of direct connect fiber connectors (crimp, adhesive or anaerobic) shall be done in accordance with manufacturer's instructions and industry best practice

C. Pigtails shall be installed with appropriate fusion splicing equipment that has been calibrated per manufacturer's recommendations.

D. After polishing/splicing is completed, optical fiber connectors shall be visually checked with an inspection scope (min x200) for damage and debris

E. If the optical fiber core is fractured, chipped or scratched it must be re-terminated

F. Dust caps to be installed immediately after inspection and insertion into coupler plates.

3.10 FIELD QUALITY CONTROL

A. OPTICAL FIBER TESTING AND QUALITY ASSURANCE

1. Testing procedures shall be in accordance with the following:

a. ANSI/TIA-568-C.3.

b. ANSI/TIA-526-7, Method B.

c. Proposed TSB-140 Tier One Fiber Certification, C.

d. Encircled Flux testing per the TSB-4979 and TIA-526-14-B standard.

2. Testing:

a. Test optical fibers at both 850 nm and 1300 nm wavelengths for multimode, end-to-end insertion loss,

b. Maximum channel insertion loss for fiber optic cables without consolidation point: 2.0 db.

3. All OLTS units shall be of current calibration, submit calibration certificate with test results to Manufacturer.

B. HORIZONTAL

1. Test 100 percent of all cable runs for defects in installation and verify cabling system performance under installed conditions in accordance with most current ANSI/TIA-568 Series, BICSI TDMM, manufacturer's recommendations, and best industry practices.

2. Defects in cabling system installation, including but not limited to cables, connectors, patch panels, and connector blocks shall be repaired or replaced to ensure 100 percent useable conductors in all cables installed.

3. Performance Certification Testing of Twisted-Pair Cables: (NOTE: Permanent Link Test results are recommended and are the expected norm).

a. Test twisted-pair copper cable links for continuity, pair reversals, shorts, opens, and performance as specified.

b. Test horizontal cabling using appropriate Level certification tester in accordance with TIA-1062-A.

c. Basic Tests Required:

i. Wire map.

ii. Length (feet).

iii. Insertion loss (dB), formerly attenuation.

iv. NEXT (Near end crosstalk) (dB).

v. Return loss (dB).

vi. ELFEXT (dB).

vii. Propagation delay (ns).

viii. Delay skew (ns).

ix. PSNEXT (Power sum near-end crosstalk loss) (dB).

x. PSELFEXT (Power sum equal level far-end crosstalk loss) (dB).

b. Provide test results in approved certification testers original software format on CD, with the following minimum information per cable:

i. Circuit ID.

ii. Information from specified basic tests required.

iii. Test Result: “Pass” or “Fail”.

iv. Date and time of test.

v. Project name.

vi. NVP.

vii. Software version.

c. Submit fully functional version of tester software for use by the Owner in reviewing test results.

d. Report in writing to the Owner immediately, along with copy of test results, failed test results that cannot be remedied through re-termination (as in the case of reversed or split pairs).

3.11 LABELING

1. All labeling is to be in accordance with ANSI/TIA-606-C, adopted labelling schema, and manufacturer’s instructions.

2. Label horizontal cables using machine-printed label at each end of cable at approximately 12 inches from termination point and again at approximately 48 inches from termination point.

3. Handwritten Labels: Not acceptable.

4. Label patch panel ports and TO ports with cable identifier.