

CIVIL DESIGN CRITERIA

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CIVIL DESIGN CRITERIA

I GENERAL

- A. The Design Professional shall use this document in conjunction with the District Master Specifications (DMS) to develop the design and contract documents.
- B. The Design Professional shall coordinate all aspects of the Civil plans with the plans prepared by other professionals to produce a consistent design document wherein all connecting, interrelated features match between disciplines.
- C. Design Professional shall follow the requirements of the School Districts Planning Department's manual "Technical Requirements for Site Plans".
- D. The Design Professional is encouraged to use recycled products when economically feasible and practical, such as recycled plastic wheel stops or crushed recycled concrete road base.
- E. Goals:
 - 1. Design the project to meet a nationally recognized high-performance green building rating system as approved by the Department of Management services. Such approved systems include the:
 - a. United States Green Building Council, Leadership in Energy and Environmental Design (LEED).
 - b. Green Building Initiative's Green Globes rating system.
 - c. Florida Green Building Coalition Standards.
 - d. International Green Construction Code.
 - 2. Ensure provision of safe, convenient, legal access to and circulation with the campus for vehicular, bicycle, disabled, and pedestrian traffic.
 - 3. Provide adequate infrastructure improvements in accordance with accepted standards for design and construction, and ensure associated rights and obligations exist for the use and maintenance of said improvements.
- F. This division contains requirements for the following elements:
 - 1. Site Surveys
 - 2. Geotechnical Reports
 - 3. Site Access
 - 4. Storm water Management - Elevation Criteria for Flood Protection
 - 5. Pavement Area and Road Improvements
 - 6. Concrete Curbs and Sidewalks
 - 7. Play and Sports Fields
 - 8. Potable Water Distribution System
 - 9. Fire Protection
 - 10. Sanitary Sewer System
 - 11. Lift Stations
 - 12. Fences and Barriers
 - 13. Signs and Pavement Markings
 - 14. Landscape requirements and Irrigation Systems
 - 15. Natural and Liquid-Petroleum (LP) Gas Systems
 - 16. Miscellaneous requirements related to the above systems or the general practice of Civil Engineering, which may be facility specific.
- G. Site design shall incorporate the latest design requirements or code requirements of the following:
 - 1. Florida Building Codes (FBC)
 - 2. Florida Fire Prevention Code as presented in the Florida Administrative Code (FAC).
 - a. FAC Chapter 69A-58, Fire Safety in Educational Facilities (existing facilities)

- b. FAC Chapter 69A-60, The Florida Fire Prevention Code
- c. The National Fire Codes (NFC), as specifically modified by FAC requirements
- 3. Florida Department of Transportation (FDOT)
 - a. Standards for Design, Construction, Maintenance, and Utility Operation on the State Highway System
 - b. Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways
 - c. Standard Specifications for Road and Bridge Construction
- 4. Florida Department of Environmental Protection Resources (DEP)
- 5. Palm Beach County Department of Environmental Resources Management (DERM)
- 6. Facilities Planning for Physical Activity and Sport
- 7. "National Federation Courts and Field Diagram Guide"
- 8. Palm Beach County Unified Land Development Code
 - a. Article 14 Environmental Standards, Chapter B, Well field Protection
 - b. Article 15 Health Department Regulations, Environmental Control Rule I and Rule II.
- 9. Palm Beach County or the local jurisdiction where the building is located
 - a. Traffic Engineering Standards
 - b. Minimum Engineering and Construction Standards for Potable Water, Reclaimed Water and Wastewater Systems
- 10. South Florida Water Management District (SFWMD):
 - a. Basis Of Review For Environmental Resource Permit Applications Within The South Florida Water Management District (Volume IV)
 - b. Basis Of Review For Water Use Permit Applications Within The South Florida Water Management District
- 11. United States Department of Transportation (USDOT), Federal Highway Administration, (FHWA), Manual on Uniform Traffic Control Devices (MUTCD)
- 12. If wetland mitigation and/or dredging and fill are required, provide a copy of the Joint Permit (WMD/DEP/ACOE) and a copy of the appropriate Nationwide Permit, including general and regional conditions (if required) as issued by the US Army Corps of Engineers.

II CRITERIA

A. SITE SURVEYS

- 1. Provide two copies of boundary and topographic surveys.
- 2. Provide all survey information on civil engineering plans -- boundaries (bearing and distance), existing grades, final grades, benchmark, horizontal control points, location of buildings, existing utilities, wells, and easements of record. Identify adjacent landowners and land use.
- 3. Show or note any municipal well fields, aviation air space, or other items that may affect construction.
- 4. Provide tree surveys to include:
 - a. Scientific and common tree names
 - b. Tree height
 - c. Canopy spread
 - d. Grade elevation at base
 - e. Trunk diameter at 4'6" above existing grade
 - f. Condition of tree
 - g. Recommendation for retainage, relocation, or removals

B. GEOTECHNICAL REPORT

1. The consulting Civil Engineer shall incorporate into the project specifications a copy of the Geotechnical Engineer's report, supplied by the SDPBC.
 - a. The report shall contain standard penetration tests, auger borings, a complete analysis of the borings, recommendations to presumptive soil bearing capacity, structural recommendations for pavement sections, and percolation tests -- either the "Open-Hole" test or the "Falling Head Open-Hole" test as described in the aforementioned SFWMD Manual, Volume IV.
2. Construct the building pads in accordance with the recommendations of the soils engineer. However, District policy requires that each 12" lift (loose measure) be compacted to at least 98% of maximum dry density as determined by modified proctor (AASHTO T-180) methods.
 - a. The Testing Laboratory shall take a minimum of one compaction test every 5,000 SF.

C. SITE ACCESS

1. Site Circulation

- a. Site access shall consist of a primary road and secondary access in the event the primary road is blocked.
- b. Provide separate bus driveways and parent drop-off area.
- c. Provide safe separation between vehicular and pedestrian access and bicycle routes.
- d. Build roads to drain properly by directing storm water to the stormwater management system.
 - 1) Do not design pavement low areas to provide storm water storage.
 - 2) The design storm water management system hydraulic grade line shall be lower than the adjacent pavement surface at all inlets.
- e. Minimum outside turning radii and unobstructed **one-way** travel width:
 - 1) School Buses 90 Feet / 24 Feet
 - a) 75 feet is the minimum centerline radius for two-way traffic.
 - 2) Passenger Vehicles 26 Feet / 12 Feet
 - 3) Fire trucks (pumper type) 50 Feet / 20 Feet
 - 4) Garbage Trucks 34 Feet / 15 Feet
 - a) The service organization providing trash removal must approve the dumpster and garbage truck arrangements for each school and may have criteria that are more restrictive.
- f. Parent drop-off area must accommodate small buses and must meet emergency access criteria as needed at the individual school site.
 - 1) The stacking distance in the parent loop shall be determined in accordance with the following equation:
$$L = 0.06 \times 25' \times \text{Design Student Population}$$
Where L = Design Stacking Distance (on school site)
 $\text{Design Student Population} = \text{Fully Occupied School Student Population}$
- g. Provide constant width of traffic lanes.
 - 1) Turning areas may require wider sections.
- h. Recommend off site turn lanes, sidewalks, traffic lights, crosswalks, and signs even if not in the school construction contract. Provide copies of proposed road improvements.
- i. Align driveways with existing roads where possible.
- j. Provide accessible passenger ramps/loading zones in the bus and parent drop-off areas.
 - 1) Locate passenger-loading zones beneath/adjacent to covered walkways.
 - 2) Refer to FBC Figure 11-10 for loading zone access aisle minimum dimensions.
 - 3) Provide curb behind loading zone to retain sod/topsoil and divert storm water.

- k. Provide loading area for delivery trucks near the Kitchen and custodial receiving.
 - 1) Do not use the bus loop or any other circulation driveway for loading area.
- l. Speed humps are not always effective speed control devices. Speed humps are discouraged on District Facilities.
 - 1) Speed humps furnished as part of a major project shall have a parabolic cross section, a maximum height of six inches, and a minimum width of 12 feet in the direction of travel.
 - 2) Speed humps furnished as part of a minor project on an existing campus may be pre-fabricated units mechanically fastened to the pavement, having a maximum height of 2.5 inches, and a minimum width of 34 inches in the direction of travel.
 - 3) Form or place all speed humps to allow storm water flow around the hump without excessive ponding.
 - 4) The normal minimum spacing between consecutive speed humps is 200 feet.
 - a) Spacing less than 200 feet must be authorized in advance.
 - 5) Place warning signs near the campus entrance.
 - a) Warning signs shall be 12" wide by 18" tall, minimum. The District can supply a standard warning sign drawing.
- 2. Emergency Access
 - a. Provide emergency vehicle access to all areas of the site, with double gates as required by FFPC.
 - 1) Provide a 20' wide emergency access road with markers on both sides of the road.
 - 2) Design access road to support a 32-ton fire truck.
 - 3) The local fire authority will approve location of the access road and may have additional requirements.
 - b. Provide ambulance access to the sport field areas at middle and high schools.
 - 1) Provide paved or stabilized access "path" having a 16' minimum clear width.
 - a) Stabilized access shall match emergency vehicle access design.
 - 2) Provide level paved access at all curbs. Ambulances cannot jar patients by jumping curbs.
 - 3) The access point will be the edge of the playing area. Leave 16' wide double gates in playing area fences to enhance ambulance access during dry weather when the ambulance can drive on non-stabilized playing field surfaces.
 - c. Maintain emergency access for fire department and emergency vehicles at all times during construction on new and existing campuses.
 - 1) Maintain all egress paths for all existing buildings on student occupied campuses.
 - 2) Provide a plan sheet that shows fire department access during construction.
- 3. Parking
 - a. Provide parking spaces as required by 453.10.2.8 FBC-B for each school.
 - 1) Follow fire department access criteria presented in the FFPC and NFPA 1141.
 - 2) Parking should be 90° when possible with two-way traffic.
 - 3) Stall dimensions shall be a minimum 9'0" wide x 19'0" long for 90° parking, recommend 10' wide.
 - a) The absolute minimum stall is 8'6" wide x 18'6" long, compact cars only, use must be pre-authorized.
 - 4) Accessible parking number and size shall conform to 453.10.2.8.7 FBC-B.
 - b. Provide accessible parking spaces with direct access to the main office.
 - c. Provide accessible parking spaces in each separate parking area.
 - d. Provide tabulation of proposed and required parking spaces.
- 4. Bicycle

- a. Provide bicycle access with a shared use path, with the following features:
 - 1) Minimum width of 8', 12' desirable.
 - 2) Minimum separation from public roadways shall be 5'.
 - a) Where less than 5' of separation is available, erect a 48" - tall barrier between the roadway and the path.
 - (1) Barrier shall be smooth and equipped to prevent puncture wounds.
 - (2) The barrier protection shall meet handrail-loading requirements.
 - 3) Minimum inside curve radius shall be 5'.
 - 4) Review these access criteria with the local municipality for appropriate construction of off-site improvements to maintain safe school access for cyclists.
- D. STORMWATER MANAGEMENT - FLOOD CRITERIA
- 1. Outside Agencies
 - a. SFWMD shall approve the storm water management system and finished floor elevation.
 - 1) Submit SFWMD permit and calculations.
 - b. If in Lake Worth Drainage District control, provide copy of their approval.
 - 2. Grade and Finish Floor Elevations
 - a. Minimum elevations of finished on-site grading and building lowest finished floor elevations shall comply with the highest elevation requirements of:
 - 1) SFWMD three-day, one hundred year storm event
 - 2) Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM).
 - 3) No less than the floor elevations of the building(s) remaining on an existing campus
 - b. Minimum grade elevation requirements:
 - 1) Set parking lot elevations at the ten-year, one-day storm event.
 - 2) Set roadway crown elevations at the ten -year, one-day storm event.
 - 3) Set playing fields elevations for elementary schools at the five-year, one-day storm event.
 - 4) Set playing fields for middle schools and high schools at the ten-year, one-day storm event.
 - 3. Paving Grading and Drainage
 - a. Paving, grading and drainage plans shall indicate the size, location, and material of the storm sewer system (all pipes and storm leaders), the size and location of all drainage structures, of all retention/detention areas, and of the outfall structure(s).
 - b. Provide an outfall for the drainage system to a retention pond, city catch basin, etc.
 - 1) Exfiltration trenches without an outfall to a retention pond, canal, city storm sewer, etc. are not recommended.
 - 2) Provide a control structure with a weir.
 - c. Interconnect all drainage retention ponds.
 - d. Provide catch basin and manhole details:
 - 1) May use yard drains in small grass areas.
 - 2) Provide traffic cover as required, and label all manhole covers "STORM".
 - 3) Keep catch basins 10' away from sidewalks and sport fields.
 - 4) Provide sump and drain hole in the bottom of catch basins.
 - 5) All inlet grates in paved pedestrian traffic areas will meet ADA requirements for opening dimensions.
 - 6) Provide concrete aprons around manhole lids, in grassed areas in accordance with sanitary manhole details in the Palm Beach County Water Utility Standards.
 - 7) Provide manhole lid casting anchors for all manholes placed in grassed areas.

- e. Drainage pipe will be reinforced concrete, high-density polyethylene (HDPE) or polyvinyl chloride (PVC).
 - 1) HDPE pipe shall not be adjacent to tilt wall construction (within 5 feet).
 - a) HDPE pipe shall have a minimum diameter of 8 inches, a smooth internal bore, and water tight push-on joints sealed with an elastomeric gasket.
 - 2) Specify concrete pipe at the following locations:
 - a) Below pavement.
 - b) At locations subject to large construction wheel loads.
 - c) At locations subject to large (over 1,500 psf) foundation loads.
 - (1) Small diameter alternatives to concrete pipe at these locations:
 - (a) PVC, SDR 25 min.
 - (b) DIP, Class 50 min., with appropriate lining.
 - (c) Alternate material, approved on a case by case basis.
 - 3) The normal minimum burial depth for storm water pipe is 18 inches for pipes 4 inches in diameter and less, 24 inches for pipes over 4 inches in diameter up to 8 inches in diameter, and 36 inches for pipes over 8 inches in diameter. Other burial depths may be permitted at the discretion of the Building Department.
 - 4) All PVC drainage pipe must be white.
 - 5) All plastic drainage piping shall be installed with warning tape placed six inches above the crown of the pipe. The warning tape shall be labeled "CAUTION – STORM PIPE BELOW" and shall be detectable with a magnetic locator.
- f. Provide perimeter berms to prevent storm water drainage onto adjacent property.
- g. Provide headwall details.
- h. Coordinate the size (8" minimum) and location of the roof drains with the architect and direct the roof drains to the storm drainage system.
 - 1) Use sweep fittings for roof drains and small diameter drainage piping that is routed between downspouts and yard drains.
 - 2) Use straight pipe runs between full size inlets.
- i. Connect the HVAC system condensate pipes with backflow valves to the drainage system, except as noted below.
 - 1) All classrooms with a single individual unit HVAC system, such as the Q-tech units in the portables and modular buildings, may drain condensate directly to grade with the following conditions:
 - a) Each individual unit shall no more than 10 tons of cooling capacity.
 - b) Each unit shall have its own condensate line with a separate discharge to grade at a location 12 inches or more from the building wall via splash block or equivalent. Piping from the second floor unit shall not connect into the first floor unit.
 - c) Do not install condensate lines in a wall; they must be readily accessible for easy maintenance, such as in covered chase alongside the HVAC unit.
 - d) Protect components installed on the outside of the exterior wall from vandalism and wind born debris. The exposed components shall be designed and installed to withstand anticipated wind loads and shall blend in with the architecture of the building.
 - e) All auxiliary and secondary drain systems shall also comply with the above requirements.

4. Well field protection requirements:

- a. Provide a letter or permit allowing construction in well-field zone 1-4 from the Palm Beach County Department of Environmental Resources Management.
 - b. Design Professional shall follow the requirements of the Palm Beach County Well-Field Protection Ordinance.
 - 1) Plans and specifications shall reflect these requirements.
 - c. Do not place exfiltration trenches and catch basin sump drains in well-field protection zones 1 and 2, or in any public well field.
5. Cistern Systems
- a. Plans
 - 1) Show all cistern plans on the Civil sheets or, if shown on Plumbing, Landscaping, and Civil sheets, be certain that all connection points are defined between disciplines and consistent.
 - b. Influent Filtering or Cleaning
 - 1) Specify use of influent cleaning devices that will automatically route storm flow to the storm water management system when plugged.
 - 2) Specify the influent cleaning devices available with easy access at grade level.
 - 3) Explain access procedure for cleaning of debris trapped within the cleaning devices.
 - a) A single person using common hand tools shall easily accomplish all cleaning.
 - 4) Specify use of 300 series (austenitic) stainless steel hardware (or other corrosion resistant materials) for all below grade or at grade locations.
 - 5) Show all anchoring and backfilling requirements
 - 6) Show all piping connections and design inverts for cleaning device, influent, effluent, and waste piping.
 - c. Cistern Tanks
 - 1) Show plan and elevation view of tanks used for cisterns.
 - 2) Specify invert elevation for all cistern piping connections and for the cistern tanks.
 - 3) Show tank access points.
 - a) Explain access procedure for cistern tank cleaning and maintenance.
 - 4) Show buoyancy calculations for underground cisterns.
 - a) Assume cistern tanks are empty and all buoyant forces must be offset by the weight of a concrete ballast slab attached to the cistern tank.
 - (1) Do not use soil overburden in the buoyancy calculations.
 - b) Provide complete details for connection of underground cistern tanks to ballast slabs.
 - (1) Specify use of 300 series (austenitic) stainless steel for all underground or at grade anchoring cables, chains, fasteners, and hardware.
 - 5) Show installation of above grade markers that will clearly identify the limits of all below grade cistern system components for future site development.
 - a) Nominal spacing between markers shall be six feet.
 - b) Use yellow schedule 40 polyethylene pipe that has been suitably capped at the above grade end, or equal.
 - (1) Permanently mark the side of each marker pipe with one inch tall lettering to read "Cistern System Limits"
 - (2) Markers shall extend four feet above grade and six feet below grade.
 - d. Wet Wells
 - 1) Show a wet well plan and section.
 - 2) Show wet well top, wall and floor material and thickness.
 - 3) Show wet well access details.

- 4) Show all anchorage details.
 - a) Specify use of 300 series (austenitic) stainless steel hardware (or other corrosion resistant materials) for all below grade or at grade locations.
 - 5) Show wet well buoyancy calculations.
 - a) Buoyancy control shall match that described for underground cistern tanks.
 - e. Pumping Equipment
 - 1) Show a pumping equipment plan and elevation.
 - 2) Provide complete pumping equipment specifications.
 - a) Identify all piping connections.
 - b) Specify type of pump to use and pump design characteristics (pump total dynamic head (TDH) at zero flow, nominal flow, and maximum allowable flow).
 - c) Specify maximum pump power usage (amperage draw).
 - d) Indicate not to overload the pump motor at any point on the pump curve.
 - e) Specify all electrical connection points for control and power wiring.
 - f) Specify power wiring connection to school electrical distribution panels.
 - g) Show all flow meters, valves, check valves, in-line pipe instrumentation, or other related equipment.
 - h) Show and specify level control devices used to control pump operation during low water level in the cistern tank.
 - i) Show pump control panels and indicate how cistern pumps will be coordinated with other irrigation water supplies.
 - 3) Use Barnes, Flygt, or other pumps approved by School District Maintenance and Plant Operations Department.
 - f. Piping
 - 1) Show all piping connections, including design inverts.
 - a) Design cistern tank inlet piping to limit disturbance of the bio-film growing on the tank walls.
 - b) Design cistern tank discharge piping to draw water from the cleanest area of the cistern tank and limit bio-film disturbance.
 - c) Cistern tank overflow piping shall provide protection from vermin entry, backflow protection, surface skimming of cistern contents, and protection from odor entry.
 - 2) Show use of polyvinyl chloride pipe for all below grade installations.
 - a) Minimum PVC pipe wall shall comply with SDR 26 or 100 psig design pressure.
 - b) PVC pipe joints shall have elastomeric gaskets unless device connections have other specifications.
 - (1) Show all special joint locations on drawings.
 - 3) Show use of galvanized steel, stainless steel, or ductile iron pipe for all above grade locations.
 - a) Line all ductile iron pipes.
6. Covered Walkways
- a. DEFINITIONS:
 - 1) Wet Column Pipe – A pipe connecting a single wet column to the drainage pipe
 - 2) Drainage Pipe – A larger pipe connected to one or more wet column pipes.
 - b. Covered walkway drainage shall discharge to a surface drainage feature whenever possible (i.e. swale, gutter section in a paved driveway, adjacent retention or detention system, etc.).

- c. The hydraulic design for canopy storm water conveyance shall meet one of the following options:
- 1) Option 1 – Design calculations for hydraulic capacity are not provided:
 - a) Designs submitted in accordance with this option will show the following features on the plans:
 - (1) A canopy deck having individual drain channels that are six inches wide by three inches deep with a center-to-center spacing of not more than 12 inches, refer to “Rigid*Roll*Lock Decking, 3” x 6” x .080”, or equal. However, structural calculations shall ultimately govern thickness.
 - (2) Holes that connect the invert of each individual canopy pan drain channel to a wet beam. Form each hole by drilling two 1-1/4 inch diameter holes in the canopy deck at the drain channel invert and removing the material between the holes. The hole will extend across the bottom of the drain channel.
 - (3) Side fascia extensions at each edge of the canopy decking that extend at least three inches above the top of the decking.
 - (4) Drain beams that will collect the storm water discharged by the canopy decking and convey that storm water to a wet column. The drain beams shall have a nominal width of four inches and a nominal depth of six inches.
 - (5) Provide a hole that connects the invert of the drain beam to the wet column. The hole shall be located at the centered on the wet column and have a minimum diameter of 1-1/2 inches. The minimum wet column size will be nominally four inches square.
 - (6) Provide a discharge point from the wet column to a drainage system.
 - (a) If the wet column discharges to a piped underground collection system, the pipe from the wet column shall be as large as possible within the limits of the column dimensions. The minimum acceptable size of the pipe connected to the wet column is **three** inches in diameter. Connect the wet column pipe to a main drainage leader of not less than **eight** inches in diameter using sanitary style sweep fittings.
 - (b) If the wet column discharges to a surface drainage feature, then a “mousetrap” hole will be left in the face of the column pointing away from the walking surfaces and toward the drainage feature (swale, bio-swale, etc.). Provide erosion protection at the discharge point. The minimum area of the column drain hole will be four square inches.
 - Plastic splash pads are not acceptable as erosion protection.
 - b) Show drain beams on the plans at locations so that each beam will accept drainage from not more than 400 square feet of canopy deck. That would mean wet beams/columns at 40-foot intervals on a 10-foot wide canopy.
 - c) The designer shall note on the plans that canopy deck shall be flat or slightly sloped toward the wet beams/columns.
 - 2) Option 2 – Provide design calculations for hydraulic capacity.
 - a) Provide all features identified in Option 1 for Option 2.
 - (1) Customize features in accordance with the hydraulic calculations but do not violate the minimum size requirements listed in Option 1.
 - b) The designer may extend the spacing between drain beams and drain columns so each beam will accept drainage from 2,500 square feet of canopy deck. That would mean wet beams/columns at 250-foot intervals on a 10-foot wide canopy.

- c) The designer will identify longitudinal deck slopes that will ensure delivery of all storm water collected on the canopy deck to a wet beam/wet column and will identify the location of each wet beam/wet column.
 - d) The design rainfall intensity shall be four and one-half inches per hour for this option.
 - e) Drainage calculations that show deck slopes, deck channel carrying capacity, wet beam collecting capacity, orifice discharge capacity for the hole between the wet beam and the wet column, and discharge capacity from the wet column pipe or orifice will be provided with the design drawings. Any special features added to the design, such as under slung pipes between wet beams, will be included in the calculations.
 - f) Furnish a plan view of the proposed deck with the calculations. The deck plan view will clearly show all separate drainage areas and will indicate the direction of drainage flow for each separate deck area.
- d. All aspects of drainage design will comply with requirements in the Florida Building Code- Plumbing and the requirements listed below. The following requirements list criteria for laying out the walkway drainage system.
- 1) Use PVC pipe to connect the wet column to the drainage collection pipe. The maximum length of wet column pipe from a single wet column shall not exceed the distance between two adjacent columns.
 - a) Do NOT install long parallel pipes from individual wet columns. Wet column pipes shall combine into a drainage collection pipe as soon as logistically possible.
 - 2) The drainage collection pipe shall have a minimum diameter of 8 inches. The drainage collection pipe will begin at the point where two or more pipes from individual wet columns join or at the point where a single wet column pipe has exceeded the maximum wet column pipe length, as above noted.
 - 3) Construct all wet column connector pipes using sanitary style sweep fittings that direct fluid and waste materials in the direction of flow. Assemble all drainage pipes in the same fashion or route them in straight runs between yard drains or other drainage structures.
 - 4) Assemble all wet column connector pipes and drainage collection pipes using flexible, watertight pipe gaskets that form an integral part of the manufactured pipe or fitting joints.
- E. PAVEMENT AREA AND ROAD IMPROVEMENTS
- 1. Paving material
 - a. Asphalt concrete paving, base and subgrade shall comply with the District Specifications. Refer to Section 32 12 16.
 - 1) The pavement section will provide the following minimum structural numbers (SN):
 - a) Pavement subject to large truck wheel loads and regular bus traffic, SN (min) = 2.82.
 - (1) This category includes all circulation driveways and service yards.
 - b) Pavement in parking areas that will normally serve only passenger vehicles, SN (min) = 2.04.
 - c) The minimum asphalt pavement thickness is one inch for all pavement design sections.
 - (1) Lesser asphalt thicknesses are acceptable for overlay projects.
 - d) Refer to the Appendix for additional SN information.
 - e) School design professionals may propose alternate paving materials, including synthetic materials and geotextiles, on a case-by-case basis.
 - b. Explore the option of using concrete paving material, including pervious concrete.
 - c. Explore option of using "green" paving options in overflow parking areas.
 - 2. Sleeves under paved areas

- a. Provide sleeves under roads and parking areas for irrigation pipes and other utilities and cables.
 - b. Sleeve materials shall be:
 - 1) American Water Works Association (AWWA) Standard C900/C905 PVC Pressure Pipe.
 - 2) Evaluate other sleeve material via the submittal review process.
 - c. Support carrier pipe or other cased materials within the casing by manufactured or locally fabricated supports.
 - 1) Design the supports to enable subsequent removal from the casing for repair or replacement.
3. Pavement markings
- a. Show all parking lot lines, stop bars, crosswalks (at bus loop, parent drop off, entrances, exits), direction arrows, traffic lane lines, accessibility striping and symbols, fire lane striping, and student warning line.
 - 1) Student warning line is a continuous 4" wide red line painted on the sidewalk 36" behind the face of the curb for the distance the bus loop and parent drop off area interface with the building and or cover walkway or minimum of 100'.
 - 2) Fire lane striping is a yellow painted curb with a 4" yellow line 42" from the face of the curb, and diagonal lines 36" o.c. with the alternating words "NO PARKING - FIRE LANE" 60' o.c. (12" high letters) for the distance the bus loop and parent drop off area interface with the building and or cover walkway or minimum of 100'.
 - 3) Fire lanes shall be marked with freestanding signs reading "NO PARKING FIRE LANE".
 - a) These signs shall be 12" x 18" with a white background and red letters.
 - b) Place the signs 7' above grade as measured to the bottom of the sign at 60' intervals.
4. Signs and traffic marking
- a. All signing and traffic marking shall conform to the MUTCD.
 - b. See Architectural for additional information and coordinate with Architect.
- F. CONCRETE CURBS AND SIDEWALKS
1. Sidewalks and Curbs
- a. Sidewalks and curbs shall be concrete.
 - 1) Reinforce concrete sidewalks with polypropylene fiber, if so desired. Refer to District Master Specification Section 03 24 00.
 - 2) Exception: Asphalt maybe used for walkways to temporary relocatable (portables) sites.
 - 3) Exception: Brick pavers may be used within designated area so long as those areas are away from normal walking paths.
 - a) All pavers shall be supported by a concrete base for settlement control.
 - b) All groups of pavers shall be restrained for control of lateral movement due to edge loading.
 - b. Provide curbs and raised sidewalk to separate pedestrians and vehicles.
 - c. Provide details for curb, accessibility curb cutouts, sidewalk ramps, aluminum walkway covers, striping (including stop bars) and sidewalk (dummy joint spacing, finish, expansion joints, etc).
 - 1) All sidewalk joints shall be designed to have ¼ inch of gap spacing, maximum. Maximum temperature differentials will be considered during joint design.
 - d. Covered walkway columns shall be separated from the face of adjacent roadway curbing by at least 24 inches, measured to the near face of the walkway column.
 - 1) Any walkway cover located within six inches of the edge of a vehicular way shall have a minimum clearance of 14 feet between the lowest portion of the walkway cover structure and the finished grade of the vehicular way.

- e. Extruded concrete curbs on top of asphalt are unacceptable.
- f. Provide 6' wide minimum sidewalks.
 - 1) Show expansion joints 48' o.c., at changes in direction, and against existing buildings.
- g. Provide accessible curb cutouts at all crosswalks (including perimeter sidewalk).
 - 1) Bus drop-off area (one per 100' of bus drop-off length, minimum of two)
 - a) The designer may use a disabled access aisle at the bus drop-off area meeting the requirements presented in h., below.
 - 2) Accessible parking, parent drop-off, and main entrance
- h. Provide disabled access aisle at the parent drop-off loop meeting the requirements of the Florida Building Code for aisle configuration.
 - 1) Place aisle beneath walkway canopy, maintaining a minimum 10' separation between canopy columns in this area.
- i. Treat all sidewalks as means of egress and accessible route; therefore, all sidewalk ramps and stairways will meet code requirements for egress and accessibility.
 - 1) Sidewalk longitudinal slopes greater than 1:20 are ramps.
 - 2) Sidewalk longitudinal slopes shall not exceed 1:12.
 - 3) Sidewalk cross slopes shall not exceed 1:50 (2%).
- 2. Wheel Stops
 - a. Wheel stops may be concrete or recycled plastic.
 - b. Show details of the anchoring of the wheel stops.
- 3. Dumpster Pad and Enclosure
 - a. Minimum size dumpster pad is 10' x 20' inside dimensions.
 - b. Provide concrete dumpster pad with a 10' approach apron.
 - c. Locate dumpster pad in an out-of-the-way area and with a direct approach for trucks.
 - d. Coordinate with the Solid Waste Service Provider.
 - e. Floor drains are required for compactors (Compactors not allowed).
 - 1) Floor drain design must comply with local public utility requirements for limiting and pre-treating storm water sent to the sanitary sewer system.
 - f. If no drains, direct drainage from the dumpster enclosure and pad into adjacent grassy areas.
 - 1) Use scupper openings in the enclosure or similar methods.
 - 2) Do not allow pad and enclosure to drain onto adjacent pavement.
 - g. Provide 6' high enclosure to visually screen the dumpster, with minimum 12' wide gates.
- 4. Recycling Area
 - a. The recycling area pad shall be 10'x12' inside dimensions, divide the interior into two 6' bays.
 - b. Provide a 10' approach apron.
 - c. Locate the recycling area near the dumpster pad and enclosure.
 - d. Provide a direct approach for trucks.
 - e. Properly drain recycling area as the dumpster enclosure.
- 5. Courtyards
 - a. Evaluate the courtyards for their role in fulfilling the requirements of SS Credit 5.2 Maximize Open Space.
 - b. Provide detailed control and expansion joint layout plans for all large concrete courtyards.
 - c. Show and dimension the location of all control and expansion joints.
- 6. Walkway Covers

- a. The storm water discharge from walkway covers flows via wet columns and discharges from a “mouse hole” located at the bottom of each wet column or directly into a storm water pipe.
 - b. All wet columns shall be located so rainwater will discharge into either a drainage pipe system or onto a grassed area or other ground surface drainage feature.
 - 1) Discharge from the wet column directly to a ground surface drainage feature is preferred at all times.
 - c. Wet columns shall not discharge to sidewalks, courtyards, or other walking/playing surfaces.
- G. PLAY FACILITIES AND OUTDOOR SPORTS FIELDS
- 1. Grading and Drainage
 - a. Provide proper drainage for all play and sports fields, and set at proper elevations coordinate with the Architect. The following elevation and slope guidelines will apply:
 - 1) Uniformly slope all play courts (tennis, basketball, etc.) in one direction at 1 inch per 10 feet.
 - a) The slope shall be even and free of depressions that hold rainwater.
 - b) All “birdbath” areas that collect rainwater or irrigation water shall be re-graded and repaired, without exception.
 - 2) The minimum allowable slope on a play court shall be 0.5% and the maximum allowable slope shall be 1.5%.
 - 3) Running tracks shall have a 1% cross slope, maximum turn bank of 18 degrees, and maximum longitudinal slope of 1:1000.
 - 4) High Jump in run area shall slope toward the crossbar with a maximum slope of 1:250.
 - 5) Baseball and softball infields shall be sloped away from the pitcher’s mound, which shall be the high point.
 - a) The slope away from the mound shall be 0.5%, and the baseline shall be set at a uniform elevation.
 - 6) Baseball and softball outfields shall slope away from the infield at 1.3%.
 - 7) Make provisions to control storm water runoff and collect it in drainage structures without field erosion or flooding.
 - 8) Other sport fields shall slope to the sides or ends of the fields from a center crown that is either transverse (side to side) or longitudinal (end to end).
 - a) The field slope shall be 1 inch per ten feet.
 - 9) All ball field and sport field slope guidelines apply to fields constructed using natural turf.
 - 2. General
 - a. Coordinate with Architect
 - b. Keep all active play areas and sports fields clear of obstructions.
 - 1) Obstructions shall include fire hydrants, drainage structures, valve boxes, and all similar items that may create tripping hazards or otherwise interfere with the footing, concentration, or performance of the student athlete.
 - 2) Obstructions shall be located at least 10' away from the nearest edge of the active play or sport participation area.
 - 3) This includes the entire area inside of the baseball/softball field perimeter fence and the extensions of said fence, when that fence is not continuous.
 - c. Provide access to athletic facilities and play fields via interconnected paved walkways, placed to coincide with the natural flow of pedestrian traffic and comply with FBC Accessibility.

- d. Coordinate locations of all in-ground metal inserts for Physical Education nets, poles, and equipment with surface markings of courts, fields, and facilities as applicable to each sport.
 - e. Architect shall coordinate locations of all junction boxes, grates, and other objects in athletic and play fields with other trades to prevent placement of these items in the fields causing potential hazards to the students.
 - f. Provide for drinking water at all play fields, playground equipment, or sports fields, within 250' of the facility.
 - g. Provide fences for athletic facilities in accordance with Facilities Planning for Physical Activity and the National Federation "Court and Field Diagram Guide".
 - h. The designer shall consider the following facilities for any sports fields: P.E. storage, restrooms, concession stands, bleachers, and ticket booths.
 - 1) These facilities shall be available to both home and visitor sides with no cross traffic between ticket purchases and other facility traffic.
 - i. Refer to "Landscaping", paragraph 1.f. of this document for leaving natural areas in place when possible.
3. Elementary Level
- a. Play fields shall follow "Facilities Planning for Physical Activity and Sport", ages 10 years and younger.
 - b. Refer to Elementary Play Court Marking Standards maintained on the District Web Site.
4. Middle School Level
- a. Play fields shall follow "Facilities Planning for Physical Activity and Sport", ages 14 and younger.
 - b. Provide non-rubberized 6-lane 400-meter track.
 - 1) Track surface shall cover the concrete curb.
 - c. Locate long jump, high jump, pole vault, and other specialty track events away from the end zone and sidelines of soccer and football fields, with a desired separation of 100', and minimum separation of 25'
 - d. Provide paved basketball, volleyball, and tennis courts in numbers as required by the Ed Specs.
5. High School Level
- a. Use the National Federation's "Court & Field Diagram Guide" for field dimensions and requirements.
 - b. Track and Field Facility
 - 1) Track shall be "broken oval", to allow for wider infield and flatter curves.
 - a) This allows adequate space for the soccer field and a faster track.
 - b) Infield shall accommodate football and soccer layouts.
 - c) Perimeter drains are preferred.
 - 2) When possible, align the long dimension of the track in north-south direction.
 - 3) Design track with an 8-lanes, with each lane a minimum 46" wide.
 - 4) Provide rubberized track surface, with the surface covering the concrete curbing.
 - 5) When possible keep the discus-throw and the shot-put events out of the infield, but keep two events in close proximity to each other.
 - a) Provide a cage around the discus throw circle.
 - b) Provide drain in the discus throw and shot put circle.
 - 6) Place the jumping events in one of the two curve areas.
 - a) Provide jump areas at each end of runway for the long/triple jump and pole-vault.
 - b) Extend the runway surface for the long/triple jump over the concrete curb for the pit.
 - c) Extend rubberized high jump surface over any concrete curbing.

- d) Locate the long jump, high jump, pole vault, and other specialty track events away from the end zone and sidelines of all soccer and football fields.
 - (1) The minimum separation is 25' the desired separation is 100'.
- 7) When possible, provide synthetic surface over one of the curves forming a "D", for the jumping events (Provides more flexibility and lower turf maintenance)
- 8) Provide dry-storage area near the track for track and field equipment.
- 9) Locate the scoreboard outside of the track infield on one of the curves.
- 10) Provide lighting for infield events.
- c. Baseball/Softball
 - 1) Align playing diamond in north-south direction.
 - 2) Provide protected covered dugouts along 1st and 3rd base lines.
 - 3) Provide ample space for relieve pitcher warm-up area.
 - 4) Place scoreboard in left-center or right-center field.
 - 5) Provide safety backdrop for batters centered on the pitcher's rubber and home plate in center field.
- d. Equipment
 - 1) Provide a list of the following equipment and identify the source of the equipment as being within the Contractor's scope, from FF&E funding, or not in the scope of work.
 - a) Bases, pitcher's plate, and home plate
 - b) Practice batting cage, including pitching machine and wiring for power.
 - c) Portable backstop (aka "turtle")
 - d) Flag pole
 - e) Foul ball poles
 - f) Scoreboard and supports
 - g) Safety padding on top of outfield fences
 - 2) The design professional shall develop specifications for all equipment included within the scope of the Construction project.
 - 3) The following items are always included within the scope of baseball and softball field construction and shall be shown on the design professional's plans and included within the technical specifications.
 - a) Backstop fencing
 - b) Wing fencing on each side of the backstop
 - c) Outfield fencing
 - d) All clay surfaces needed to create infield areas, baseline running tracks, warning tracks, batter's boxes, on deck circles, and any other clay surfaces identified on the drawings. This also includes creation of a raised pitcher's mound.
 - e) Covered, protected dugout areas along the 1st and 3rd base lines.
 - f) All turf surfaces and irrigation systems.
- e. Consider storage area for equipment near the baseball, track/football/soccer fields
- f. Provide paved basketball, volleyball, and tennis courts in numbers as required by the Ed Specs.
- 6. Dimensional Standards
 - a. The dimensional standards listed in the [Athletic Field Dimensions chart](#) in the appendix covers softball, baseball, soccer, and football fields for all grade levels.
 - b. Refer to guidance standards for unlisted dimensions and for sport court dimensions.
 - c. The Architect's plans may provide dimensions that differ from these if the site geometry will not support construction in accordance with the table.

d. Deviations must be justified during the SDPBC Building Department review.

H. WATER UTILITY SYSTEMS

1. General Requirements

- a. This section provides criteria for design of systems that distribute potable water, collect and transmit wastewater, and provide fire service.
- b. All potable water and wastewater systems shall satisfy criteria used by the Florida Health Department, and the Florida Department of Environmental Protection in their construction permitting process.
 - 1) All potable water and wastewater systems shall satisfy criteria presented in the Florida Building Code, Plumbing.
- c. Design the off-site potable water and wastewater system components per the criteria used by the owner of the off-site system.
 - 1) For example, a school located in the City of West Palm Beach would have off-site utility systems design to satisfy West Palm Beach criteria.
- d. Design the on-site potable water and wastewater system components, owned and maintained by the PBCSD per the “Palm Beach County Water Utilities Department Minimum Engineering and Construction Standards – Potable Water, Reclaimed Water, and Wastewater Systems” (MECS), edition in use at time of design.
- e. Design piping systems using polyvinyl chloride (PVC) and ductile iron (DI) pipes, fittings and appurtenances.
 - 1) See the District Master Specifications, referenced design standards and in the specific utility sub-sections for additional details.
- f. Provide easements for public systems constructed on District property.
- g. Fence or otherwise protect above ground features and keep at least 10' away from all playing areas and any sports field.
 - 1) This isolation requirement shall include valve boxes and cleanouts.
- h. The civil drawings and plumbing drawings shall agree regarding points of entry for all pipes extended to any given building and points of connection to public facilities.
- i. Note the size, material, and location for all piped utilities and their appurtenances on the design drawings.
- j. Provide valve boxes for all underground valve installations.
- k. Indicate limits of removal or abandonment for existing utility systems.
- l. Pipe Cover
 - 1) The normal earth or earth and pavement cover over the crown of any pipeline is 36 inches.
 - 2) The Engineer may request permission to have minimum cover over any pipeline at 30 inches.
 - a) If granted, plans shall identify all areas with less than 36 inch cover.
 - b) Use of less than 36 inches of cover requires written justification.
 - c) Poor grading design will not justify less cover.
 - 3) Gravity sewers; under special conditions, it is possible to provide the farthest upstream end of the pipe with less than 30 inches of cover.
 - a) This situation is always a special exception and normally allowed only to avoid installation of a lift station.
 - b) Heavy wall pipe and locator tape on top of the pipe is required.
 - c) The design engineer will review such installations with the Building Department.

2. Potable Water System

- a. The design operating pressure shall be 150 psig.
 - b. The potable water service shall be separate from the fire service.
 - 1) Provide separate connections to the public water system or similar protective measures.
 - 2) The water main connection to the source of supply shall always be upstream from the backflow prevention device used to isolate the fire service main.
 - c. Loop the potable water service main within the campus when there are more than three buildings having separate service lines.
 - 1) Each building shall have a separate service off the campus main domestic service.
 - 2) Provide an isolation valve at each building service line approximately 5 feet from the building wall.
 - d. The maximum water meter size shall be 3 inches.
 - 1) The Civil designer shall use the smallest diameter water meter allowed by the Florida Plumbing Code based upon the fixture unit count supplied by the building Plumbing designer.
 - 2) Provide this data (total fixture unit count) on the water and wastewater system plan sheets and be labeled as "Meter Design Criteria".
 - e. The minimum water main size at the meter and backflow preventor shall be 4 inches unless use of a smaller line size is justified with appropriate calculations.
 - f. Provide dual, 4-inch diameter, parallel, reduced pressure backflow preventor assemblies to isolate the District potable water main from the public water system.
 - 1) Each backflow preventor assembly shall be equipped with isolation valves on the inlet and outlet side.
 - g. Provide a hose bib with a tamperproof anti-siphon device and a drinking water fountain at all sports fields.
 - h. Provide a hose bib with a tamperproof anti-siphon device near the dumpster location.
 - 1) Provide bollards or other protective measures as necessary to protect the hose bib.
3. Fire Service System
- a. The design operating pressure shall be 200 psig.
 - b. The fire service shall be separate from the potable water service, see 2.b, above.
 - c. Fire hydrants shall be the dry barrel style and equipped with a barrel drain.
 - d. Fire hydrant branches shall be entirely ductile iron from the tee serving the branch to the hydrant, with an isolation valve installed on each hydrant branch.
 - e. Paint fire hydrants owned by the PBCSD bright yellow.
 - 1) Paint fire hydrants owned by the local utility to comply with the requirements of the authority having jurisdiction.
 - f. Fire mains feeding individual building fire suppression systems shall be entirely ductile iron from the tee serving the individual feed to the building connection point.
 - g. For a single building on campus, provide a double detector check valve, backflow prevention assembly and a fire department connection in the fire main.
 - h. For a multi-building campus, provide a double detector check valve, backflow prevention assembly at the main connection to the public water system. Also, provide to each building or group of buildings, a fire service line that contains a post indicator valve, check valve, and a fire department connection.
 - 1) In buildings with fire pumps, the fire department connection will connect to the discharge side of the pump.

- i. Post indicator valves, fire department connections, and fire hydrants shall be a minimum of 40' from the nearest building.
 - j. The maximum distance to a fire hydrant from the nearest point on the building shall not exceed 400 feet.
 - k. The maximum distance between fire hydrants shall not exceed 500 feet.
 - l. Provide a fire hydrant within 100' of fire department connection.
 - m. School design professionals shall calculate the required fire flow using the Florida Fire Prevention Code (FFPC), current edition, Section 1-18.4, entitled "Fire Flow Requirements for Buildings".
 - 1) The fire flow area shall be:
 - a) The area of the main building on small campuses.
 - b) The area of the largest continuous building on multi-building campuses.
 - c) The largest segregated building area in buildings designed with firewalls to reduce the fire flow area.
 - 2) Use table 1-18.4.5.2.1 in the FFPC to determine fire flow and duration.
 - n. All existing system flow and pressure tests, and new system design calculations, shall comply with the National Fire Protection Association Chapter 24, edition in use at time of design.
 - 1) Fire flow tests will occur at a fire hydrant, which is close to the school site and connected to the public water system serving the school.
 - 2) District personnel will review and approve the fire flow tests. Fire flow tests must demonstrate flow rates that meet or exceed fire flows determined in l, above.
 - 3) The civil design consultant will hydraulically analyze the on-site system to show that the hydrants can supply the design fire flow determined in l, above.
 - o. The local fire authority having jurisdiction shall approve all fire service features.
 - p. Dry Standpipes
 - 1) Provide dry standpipes for fire protection at newly installed portable classrooms when required by the local fire department.
 - 2) All hose connection nozzles will be 2-1/2 inch diameter.
 - 3) Dry standpipes will include:
 - a) Siamese connection with backflow preventer.
 - (1) Locate Siamese connection within 100 feet of a fire hydrant.
 - (2) The backflow preventer will stop flow from exiting the Siamese connection.
 - b) Fire department outlet with two outlet nozzles.
 - (1) Provide a non-rising stem gate valve to control each outlet nozzle.
 - (2) Provide more than one fire department outlet, if required by the local fire department.
 - c) Show construction details on the plans.
4. Wastewater System
- a. The design operating pressure for force mains shall be 150 psig.
 - b. The minimum standard dimension ratio for PVC gravity sewer shall be 35.
 - c. Locate pre-cast concrete manholes at the beginning and end of each sanitary sewer run, all gravity sewer deflection points, and at maximum intervals of 400' on straight sewer sections.
 - 1) Provide manhole lid casting anchors for all manholes placed in grassed areas.
 - d. Connect individual building wastewater lines to gravity sewer laterals with service tees.
 - 1) Connect individual building wastewater service lines to manholes with proper flow channels at the manhole invert.

- e. Connect wastewater service lines from cafeterias to concrete grease interceptors that meet the specific requirements in FBC Plumbing Sec P1003.1-Sec P1003.5.
- 1) The maximum number of interceptors shall be three at elementary, three at middle, and four at high schools. (see next page)
 - a) $[\text{Number of students eating meals} \times \text{gallons of waste per day (5)} \times \text{load factor (0.75)}] / 1250$ (gallons per trap)

(1)	Number students X % Eating Meals	
Elementary schools	1000	100
Middle schools	1500	67
High schools	2500	50
 - 2) Design Grease interceptor to resist floatation when empty.
 - 3) Design to meet H-20 truck loading if located below a driveway or parking lot.
 - a) The preferred location will be outside of paved areas or below a car parking area if a grassed area is not available.
 - b) Provide one of the following features when the grease traps are located in a paved area outside of a car parking area:
 - (1) Concrete pad extending a minimum of 5' beyond the limits of all grease traps
 - (a) The pad shall be at least 6" thick and reinforced with at least #3 bars at 12" on center each way.
 - (b) Place the rebar mat at the center of the pad.
 - (2) Use low strength mortar (LSM) backfill (200-psi compressive strength) for all backfill around the grease traps.
 - (a) The top elevation of the LSM will match the top elevation of the base course for adjacent pavement.
 - (b) Provide a sealer for the LSM if placed in advance of final paving operations.
 - 4) Grease and oil-water separators shall be made of concrete at all District facilities.
 - a) Exception: Provide polypropylene grease interceptors in strict accordance with District Master Specification 33 34 20.
 - 5) Grease interceptors shall comply with ASTM C1613.
- f. Provide an oil/water separator for vehicle maintenance areas or wash down areas, connect to wastewater system.
- g. Keep all cleanouts at least 10' from any building entrance.
- h. Lift Stations
- 1) Locate lift stations adjacent to public streets.
 - 2) Design lift station wet wells and valve vaults to resist floatation when empty.
 - a) The top elevation of the valve vault and wet well will be set above the 100 year, 3 day water surface elevation.
 - 3) Municipal Lift Stations, if conditions require, provide a lift station and force main.
 - a) Submit details of the lift station and force main in accordance with the details and specifications of the municipality having jurisdiction, along with evidence of their acceptance of the system design.
 - 4) Palm Beach County School District Lift Stations
 - a) Do not specify telemetry systems for District owned lift stations.
 - b) Comply with the Palm Beach County Water Utilities Department Minimum Engineering and Construction Standards.
 - (1) Evaluate use of fiberglass wetwells on a case-by-case basis.

- (2) Fiberglass wetwells must be part of a pre-manufactured lift station package.
 - c) Show electrical power to the lift station from a panel in the main building, with a tie into the school emergency power system.
 - (1) There is no separate FP&L meter for the lift station and emergency power receptacles are not required.
 - d) Water pipe to the lift station will include a backflow preventor.
 - i. Contact the Palm Beach County Department of Environmental Resources Management and the Palm Beach County School District Environmental and Conservation Services Office regarding any utilities construction in wellfield protection areas one and two as specific requirements apply.
- I. FENCES
 1. Clearly identify all fence locations and fence components on a site plan.
 2. Provide minimum 6' high fences around the site, dumpsters, athletic facilities, lift stations, pre-K and kindergarten play area, wet retention/detention ponds (on site or off site), irrigation pump systems and well, FP&L transformer(s), condensers, and other ground level equipment installations.
 - a. Use the 25-year, 3-day storm to determine water depth for fence requirements around retention or detention.
 - 1) Provide fencing if the water depth during the 25 year, 3-day event exceeds 12 inches for 24 hours.
 - b. Ensure that the pedestrian gates meet egress capacity requirements per the SDPBC Crisis Management Plan.
 - c. All pedestrian gates that are located along a means of egress shall be equipped with panic hardware allowing immediate egress from the school site.
 - 1) The panic hardware operating mechanism shall be equipped with guards that prevent unauthorized operation by individuals outside the school site.
 - d. At elementary schools, provide fences around wet and dry retention/detention ponds and all swales or depressed areas with **open access** to drainage pipes over 8 inches in diameter.
 3. Provide 8' high fence around bike racks, and propane tanks (including those serving emergency generators).
 4. Fences used as traffic control or guard rails maybe a minimum of 42 inches high, unless the location is described or listed above, then minimum 6 foot high fence is required.
 - a. May use a four foot high fence where pre-K and kindergarten play areas are isolated from direct parent/public access by other six foot high fencing, with approval of the District.
 5. All fencing shall prevent the passage of a 4 inch: sphere, and fencing around play areas for children under the age of 5 years, shall be less than 3.5 inches.
 6. Provide double gates in fences around retention ponds.
 7. Provide fences or chains for the water meter and backflow preventors in addition to any flow switch.
 8. Provide fences to protect all above grade gas system components and piping.
 - a. Provide a protected area above all underground LP storage tanks.
 - 1) Provide fencing in the area within 10 feet of all underground LP storage tanks.
 - 2) Apply number 4 stone in a five foot diameter area centered on all tank access manholes.
 - a) Place geo-textile fabric below the stone.
 - b) The stone layer shall be at least six inches thick.
 - c) Supply a construct detail for this rock area on the engineering drawings for the facility improvements.

- b. Construction site plans shall show where to provide six foot tall chain link fencing around all above grade gas system components.
 - 1) Provide bollards around the gas system components inside the fenced area if the fenced area is large enough to admit riding lawn mowers.
- 9. Fence fabric shall be selvage knuckled top and bottom.
- 10. Use black vinyl coated chain link fence in the following locations, unless directed by the District's Project Manager.
 - a. Property perimeters fronting street right-of-ways
 - b. Bicycle rack enclosures
 - c. Interior courts (adjacent to buildings)
 - d. Pre-K and Kindergarten play areas
- 11. Use aluminum coated chain link fence around athletic facilities including baseball fields, tennis and basketball courts, and volleyball courts.
 - a. Elementary school basketball courts and playfields need not be separately fenced.
 - b. Aluminum coated chain link fence may be allowed as an exception in item 8 above if authorized pursuant to Item 11 below.
 - c. Use fencing to separate public and vehicle access to the outdoor play areas.
- 12. Use galvanized chain link fencing (9ga.) in all other areas.
- 13. If contract documents, District Planning, or Program Management Department request another type of fencing then that specified above, attach copy of that request to construction documents supplied for permit plan review to the Building Department.
- 14. If part of the old fence is to remain, then the new fence should match the existing.
- 15. Provide swing gates.
 - a. Minimum vehicle gate clearance is 2 feet wider than the traveled way.
 - b. Use header curbing when gateposts are set behind the curb face.
 - 1) Required to minimize the separation between the pavement surface and the bottom of the gate.
 - c. Extend header curb to allow for gate swing.
- 16. DO NOT use barbed or razor wire fencing.
- 17. DO NOT place ITV poles, manholes, catch basins, etc. in the kindergarten play areas.

J. SIGNS

- 1. Provide signs that convey facility specific information.
 - a. These signs shall include as a minimum; a school marquee, building names (e.g. – Gymnasium, Cafeteria, etc), dedication plaque, principal parking only, assistant principal parking only, visitor parking, all necessary warning/no trespassing sign, and other directional signs needed to direct the general public to administrative locations (e.g. – main office, student services office, visitor parking, delivery/service area, etc.).
 - b. See DDC-Architectural for addition requirement on signage.
- 2. Provide signs of a regulatory nature in accordance with applicable codes and standards (e.g. – MUTCD, which would include yield, stop, etc; NFPA, ADA, etc.).
- 3. The Design Professional shall develop plans and specifications for sign types and locations as part of the final construction plans for permit.

K. LANDSCAPING

- 1. General Requirements
 - a. The Architectural team for new schools or other projects with large or specialized site components shall include a Florida registered Landscape Architect.

- b. Develop a comprehensive landscape design providing students protection from the sun and promoting low maintenance, energy, and water conservation.
 - 1) Emphasize the main administration entrance and front facades and coordinate with architectural, civil, mechanical, and electrical work.
 - c. The landscape design shall provide design grades, coordinated lighting layouts, plazas, walks, drives, service areas, fencing, playfields, site furnishings, planting plans, irrigation plans, relocatable classrooms, and expansion provisions.
 - d. Landscaping shall not impede any means of egress.
 - e. Locate all planters and plantings away from buildings.
 - 1) Planters and plantings immediately adjacent to buildings are prohibited.
 - 2) Show adequate maintenance space between planter and building, minimum 3 feet.
 - f. Maintain natural conditions in areas not needed for playfields or other purposes, these areas shall be self-maintaining and un-irrigated.
 - g. Trees, palms and shrubs shall be grade Florida No. 1 as outlined under the current edition of the Grades and Standards for Nursery Plants, Florida Department of Agriculture, unless otherwise noted.
2. Xeriscaping
- a. Identification of xeriscape zones on the landscape plan shall include:
 - 1) Natural Zones – Areas where landscape plantings can live on naturally occurring rainfall.
 - 2) Low Water Zones – Areas where landscape plantings are “drought tolerant” and can survive, for the most part, with very limited irrigation.
 - 3) Moderate Water Zones – Areas that require regular irrigation; these landscape areas should be limited to entryways or other special use areas.
 - b. Select plant material suited for the existing soil conditions; if not possible analyze soils to determine what additional materials are required for pH adjustment, nutrient enrichment, and moisture retention.
 - c. Select landscape materials that will conserve water. Refer to South Florida Water Management bulletin “quick facts on Xeriscape” for additional guidance on selection of drought tolerant landscape materials.
3. Protection and Transplantation of Existing Trees
- a. When feasible, preserve existing trees on site.
 - 1) Evaluate existing trees to decide feasibility and desirability of retainage or relocation during Phase 1.
 - b. Provide appropriate plans and specifications for tree protection or transplantation.
 - c. Tree Protection
 - 1) Construction documents shall indicate methods and scheduling for effective tree and plant protection during construction, or indicate how to coordinate protection with contractor.
 - d. Tree Transplantation
 - 1) Include tree relocation instructions on plans and in specifications.
 - 2) Specify all maintenance procedures and who is responsible for maintenance until substantial completion.
4. Earthwork for Landscape Areas
- a. The Architect shall recommend the number and locations of percolation and soil tests and the SDPBC geotechnical engineer will review the recommendations, finalized the scope of investigations, confirm the scope with the Architect, and then proceed.

- b. Architect shall check surface and subsurface soils before and after fill operations to confirm percolation and compaction levels meet playfield and planting requirements, and make recommendations as necessary.
 - c. The Architect shall prepare plans and specifications for slopes, grades, and materials in all landscaped areas including sport fields.
 - d. Slopes:
 - 1) Establish finish grade at building perimeter at least 6" below adjacent lowest interior finish floor.
 - a) From building perimeter, maintain a 1:50 slope for a minimum of 6 feet and then a slope not to exceed 1:12 to finish grade unless otherwise directed.
 - 2) Sidewalks shall not exceed a slope of 1:20 or cross slopes of 1:50.
 - a) From sidewalk edges, maintain a 1:50 slope for at least 5' and then a slope not to exceed 1:12 to finish grade unless otherwise directed.
 - b) Adjacent grade to receive sod shall be 2 to 4 inches below finish elevation of sidewalk.
 - 3) Finish grade slopes at berms shall not exceed 1:4.
5. Irrigation Systems
- a. The Architect will provide specifications for an automatically controlled irrigation system for head to head coverage of planted areas to comply with high quality local examples of engineering, landscaping practices, and equipment manufacturers' recommendations.
 - 1) Design all components to withstand 125 psig internal pressure, minimum.
 - 2) Design system and controls so internal pressure is maintained only while actively watering.
 - 3) Design system without curved pipe runs, use straight pipe runs with fittings for direction changes.
 - b. Design the irrigation system to water wisely, with a goal of meeting the Water Efficient Landscaping Credits 1.2 and 1.2; Strategies may include but are not limited to:
 - 1) Use of rain sensors that stop irrigation during periods of adequate rainfall
 - 2) Proper placement and selection of heads to prevent watering of paved areas and buildings.
 - 3) Setting timers for early morning watering
 - 4) Watering only the plant or grass areas and not the pavement or building
 - c. Design system so no irrigation head or pipe is within 2 feet of the building.
 - 1) Under no circumstances should water discharged for irrigation wet building surfaces.
 - d. Design Professional shall inspect and evaluate the existing well and pump system on modernizations and make recommendations for the renovation of the well and the pump system.
 - e. Irrigation water sources shall be:
 - 1) A well system, surface water system, or cistern system (rainwater harvesting/condensation capture); or combination
 - f. Locate pumps and controllers in a pump room, mechanical room, or other custodial controlled space within the facility for security.
 - g. Design irrigation pump stations to use pre-manufactured stations supplied by a vendor regularly engaged in the manufacture and supply of such systems.
 - 1) Pump stations assembled locally from component parts by the irrigation or piping contractor will not be acceptable.
 - 2) All pump station piping located above grade shall be metallic. All metallic piping shall extend to at least 36 inches below grade and be properly supported and jointed for the anticipated pressure, flow, soil, wind, and gravity loads.

- 3) All electric motors within the scope of the Energy Independence and Security Act of 2007 shall be designed to comply with NEMA MG1 efficiency requirements. Such motors shall be identified on the plans.
 - h. Size the irrigation zones so that the irrigation pumps will be able to supply a full irrigation cycle (flow and volume) for the entire campus within 8 hours.
 - i. Provide quick connect couplings near first and third base at high school softball and baseball fields.
 - 1) Place the couplings in a below grade enclosure that will allow hazard-free play.
 - 2) Locate the couplings outside of the clay area.
 - 3) Equip the couplings with a ball valve for isolation purposes.
6. Planting & Related Work
- a. Work closely with the District Planning, MP&O, and Police Department and local Jurisdictions to provide:
 - 1) Planting buffers and screening such as hedges, fences, walls, earth berms, or other landscaping between school site and adjacent land uses.
 - 2) A plan that preserves as many of the existing mature trees as possible.
 - a) Mature trees are trees having a minimum trunk diameter of 6" measured 4'6" from the ground, and a minimum canopy (drip-line) diameter of 15'.
 - 3) A plan using trees, shrubs, grass, ground cover, and hedges, and minimal sand, gravel, or wood chips.
 - b. Clear the site of poisonous and toxic plants and do not plant any.
 - c. Provide a systematic plan for the removal of invasive non-native plants, including Punk tree (*Melaleuca Quinquenervia*), Brazilian Pepper (*Schinus Terebinthifolius*), Australian Pine (*Casuarina-equisetifolia*), and Cat claw Mimosa (*Mimosa Pigra*) and do not plant any, as required by law.
 - d. Design and install trees and landscaping so as not to create blind spots around the perimeter of buildings or on roadways and not provide access to the roof.
 - 1) Provide road intersection visibility, on or off site by providing a clear sight line at intersections.
 - a) Place no large objects, earth berms over 2 feet high, or vegetation, other than grass or low ground cover in the right-of-way area within a safe distance of the edge of the intersecting roads.
 - b) Maintain clear line of sight from 3 feet above grade to 7 feet above grade within all tree and shrub planting areas.
 - c) Design planting areas so that the space between the tree or shrub and the nearest building or structure is at least 5 feet to the mature canopy of that tree or shrub.
 - (1) Shade tree assume 20' canopy.
 - (2) Palm trees assume 16' canopy
 - d) Place all ground plants at least 3 feet from the building to allow for maintenance.
 - e. Trees used in courtyards shall be of a species whose mature canopy is less than 50% of the width of the space between buildings.
 - f. Scientific names for all plants listed in the appendix come from United States Department of Agriculture, Natural Resources Conservation Service Plant Data Base web site: <http://plants.usda.gov>.
 - 1) See "[List of Acceptable Shrubs & Trees for acceptable plants](#)" in appendix.
 - 2) See "[List of Prohibited Plant for unacceptable plants](#)" in appendix.

- 3) Any plant not listed is subject to independent verification by the Building Department. In general, plants with negative database citations will be rejected.
 - g. Provide low maintenance varieties of plants.
 - h. Provide warranty periods after SDPBC acceptance of:
 - 1) 90-days for grassed areas
 - 2) One-year for trees, shrubs, and ground cover
 - i. Provide tree canopy shade to reduce sun exposure or heat gain at:
 - 1) Kindergarten and elementary play areas
 - 2) Waiting or congregating areas.
- L. MISCELLANEOUS
- 1. Liquid Petroleum Tanks
 - a. Generator engine located at a hurricane shelter, if fired by natural gas, requires a propane gas backup. (LP-tank shall be dedicated to the generator)
 - b. Provide generator engine located at a non-shelter school powered by natural gas or by a dedicated propane tank.
 - c. All propane tanks will be ASME code stamped, Section 8, Division 1.
 - d. Size the propane tank in accordance with the Electrical Design Criteria, Emergency Power section.
 - e. Install all LP-storage tanks underground.
 - a) Provide anchorage to resist floatation.
 - b) Provide fencing around area of tank and all above grade metering and supply equipment.
 - c) Provide bollards around all above grade metering and supply equipment when the equipment is located in a fenced grass area maintainable with a riding mower.
 - d) Provide a four foot radius gravel pad, 6" deep, around all buried tank access manholes with a weed resistant geotextile between the gravel and the sub-grade.
 - 2. As-built plans
 - a. The civil engineer of record is to provide as-built drawings on paving and on water, sewer, and drainage systems.
 - b. As-built information for pavement shall include installed finished surface elevations.
 - c. Complete "as-built" information relative to the horizontal and vertical location of all lines, service laterals, as well as invert and rim elevations of all manholes, shall be accurately recorded, and the information submitted to the engineer prior to final acceptance of the work. The horizontal and vertical location data for all buried pipe fittings shall be provided on the as-built drawings.
 - d. A line shall be drawn through the design elevation and the as-built elevation shall be noted near the struck-through design elevation.
 - e. An independent registered surveyor shall take all elevations and shown them on the as-built plans.
 - 3. Termiticide
 - a. Provide soil treatment as defined in the FBC for slabs or other hard surfaces under enclosed spaces.
 - b. Do not use Chlordane, Heptachlor, Aldrin, Dursban, Dieldrin, and any chemical detrimental to the water supply.
 - c. Use only products approved by the Florida Department of Aquiculture.

END OF SECTION

APPENDIX

List of Prohibited Plants						
Common Name	Scientific Name	Plants or Their Parts Know to Cause				County Prohibited
		Dermatology	Gastro	Respiratory	Death	
Agave	Agave	Yes				
Air Potato Vine	Dioscorea Publifera					Yes
Akee	Blighia sapida					
Allamanda	Allamanda	Yes	Yes			
Anemone	Anemone	Yes	Yes	Yes		
Australian Pine	Casuarina-equisetifolia					Yes
Azalea	Rhododendron				Yes	
Balsam Apple	Echinopepon					
Barbados Nut	Jatropha curcas				Yes	
Belladonna	Atropa				Yes	
Blackeyed Susan or Coneflower	Rudbeckia	Yes				
Boatlily	Rhoeo	Yes				
Brazilian Pepper	Schinus teribinthifolius	Yes		Yes		Yes
Buttercup	Ranunculus	Yes		Yes		
Caladium	Caladium		Yes			
Camphor	Dryobalanops gaertner		Yes			
Carolina Jasmine	<i>Gelsemium sempervirens</i>	Yes			Yes	Yes
Carrotwood	Cupaniopsis anacardiodes					Yes
CastorBean	Ricinus communis	Yes		Yes	Yes	
Cat claw Mimosa	Mimosa pigra					Yes
Chinaberry	Melia azedarach				Yes	
Chinese Tallow	Sapium sebiferum		Yes			Yes
Chrysanthemum	Chrysanthemum coronarium	Yes				
Citrus	Citrus	Yes				
Coontie	Zamia pumila					
Coral Bean	Erythrina flabelliformis					
Crape Myrtle	Lagerstroemia indica					SDPBC-ECS
Croton	Croton	Yes				
Crown of Thorns	Koeberlinia spinosa	Yes				
Datura	Datura			Yes	Yes	
Dieffenbachia	Dieffenbachia		Yes			
Dog Fennel	Chamaemelum P, Dysodiopsis or Eupatorium capillifolium	Yes				
Dwarf Schefflera	Schefflera arboricola					SDPBC-ECS
Dwarf Yaupon Holly	Shillings Holly					SDPBC-ECS
Earleaf	Acacia auriculiformis					Yes
Elderberry	Sambucus		Yes			
Elephant Ear, Dumbcane	Alocasia / Colocasia		Yes			
Eucalyptus	Eucalyptus	Yes	Yes	Yes		
Ficus, Green Island Ficus or Fig	Ficus	Yes				SDPBC-ECS
Firethorn	Pyracantha		Yes			
Fishtail Palm	Caryota					

APPENDIX

List of Prohibited Plants						
Common Name	Scientific Name	Plants or Their Parts Know to Cause				County Prohibited
		Dermatology	Gastro	Respiratory	Death	
Flame Lily	Gloriosa		Yes			
Florida Holly	Schinus Terebinthifolius			Yes		
Florida Privet	Forestiera segregata					SDPBC-ECS
Gaillardia	Gaillardia Aristata	Yes				
Ginkgo	Ginkgo	Yes				
Gladiolus	Gladiolus		Yes			
Green Island Ficus or Fig	Ficus microcarpa or macrocarpa					
Holly (except Dahoon Holly and Yaupon Holly)	Ilex		Yes			
Honeysuckle	Lonicera				Yes	
Hydrangea	Hydrangea		Yes			
Ivy	Hedera		Yes			
Jamaican Dogwood	Piscidia piscidia					SDPBC-ECS
Juniper	Juniperus	Yes				
Kudzu	Pueraria montana (P. Lobata)					Yes
Lantana	Lantana				Yes	
Leadwort or Doctorbush	Plumbago	Yes				
Mahogany	Swietenia mahogani					SDPBC-ECS SDPBC-Risk
Mango	Mangifera	Yes				
Melaleuca, Punk Tree	Melaleuca equinquenervia	Yes		Yes		Yes
Milkweed	Asclepias		Yes			
Mistletoe	Arceuthobium, Korthalsella, Phoradendron, or Viscum				Yes	
Morning Glory	Ipomoea eriocarpa		Yes			
Necklace Pod	Sophora tomentosa					SDPBC-ECS
Night Blooming Jasmine	Cestrum nocturnum					
Okra	Abelmoschus	Yes				
Old World Climbing Fern	Lygodium microphyllum					Yes
Oleander	Nerium			Yes	Yes	
Peaches, Cherries, Plums, Apricot	Prunus family				Yes	
Pencil Cactus	Euphorbia tirucalli					
Periwinkle	Vinca			Yes		
Philodendron	Philodendron					SDPBC-ECS
Pineapple	Ananas	Yes				
Plum pine	Podocarpus		Yes			
Plumeria	Plumeria	Yes				
Poinciana	Delonix regia or Peltophorum pterocarpa					
Poinsettia	Euphorbia	Yes				

APPENDIX

List of Prohibited Plants						
Common Name	Scientific Name	Plants or Their Parts Know to Cause				County Prohibited
		Dermatology	Gastro	Respiratory	Death	
Poison Ivy, Oak, Sumac	Toxicodendron radicans, Toxicodendron, or Toxicodendron vernix	Yes		Yes		
Pokeweed	Phytolacca				Yes	
Potato	Solanum tuberosum				Yes	
Pothos or centipede Tongavine	Epipremnum pinnatum	Yes				
Pride of Barbados	Caesalpinia pulcherrima		Yes			
Privet (except Florida Privet)	Ligustrum		Yes	Yes		
Rosary Pea	Abrus precatorius				Yes	
Schefflera (except Dwarf Schefflera)	Schefflera arboricola Fuscidea arboricola					Yes
Spanish Stopper	Foetida					SDPBC-ECS
Sweet Gum	Liquidambar sttyraciflua					SDPBC-ECS
Sycamore	Platanus					SDPBC-ECS
Trumpet Creeper	Campsis radicans	Yes				
Tung Oil Tree	Vernicia fordii	Yes	Yes			
Washington Fan Palm	Washingtonia robusta					SDPBC-ECS
Yew	Taxus				Yes	

APPENDIX

ATHLETIC FIELD DIMENSIONS

DIMENSIONS (FEET)	ELEMENTRY SCHOOL	MIDDLE SCHOOL	HIGH SCHOOL
SOFTBALL FIELD			
Home Plate (tip) to Pitcher’s Mound (plate center)	35	46	46
Between Bases	55	60	60
Infield Radius from Pitcher’s Mound (center)	55	60	60
Outfield Radius from Home Plate (tip)	150 – 175	175 – 200	200 – 250
Home Plate (tip) to Backstop	25	25	30
Offset from center Home Plate to On-deck Circle (On-deck circle is 5 feet in diameter, center is even with tip of home plate)	25	25	30
Radius of Pitcher’s Mound	6	8	8
Warning Track Width at Outfield Fence	10	10	10
Backstop Dimensions (wing – center – wing)	16 – 16- 16	16 – 16- 16	16 – 16- 16
BASEBALL FIELD			
Home Plate (tip) to Pitcher’s Mound (plate center)	46	54	60’ 9”
Between Bases	60	75	90
Infield Radius from Pitcher’s Mound (center)	50	80	95
Outfield Radius from Home Plate (tip)	180 – 200	250 - 300	315 - 385
Home Plate (tip) to Backstop	60	60	60
Radius of clay circle from center of Home Plate	9	13	18.5
Offset from center Home Plate to On-deck Circle (On-deck circle is 5 feet in diameter, center is even with rear of home plate circle)	37	37	37
Radius of Pitcher’s Mound	6	9	9
Radius of Arc at First, Second, Third Base	8	13	13
Baseline Track Width	6	6	6
Warning Track Width at Outfield Fence	10	10	10
Backstop Dimensions (wing – center – wing)	60 – 50 - 60	60 – 50 - 60	60 – 50 - 60

APPENDIX

ATHLETIC FIELD DIMENSIONS (continued)

SOCCER FIELD			
Length If site conditions do not allow for preferred, work with plan reviewer with in ranges.	210	300	360 preferred Acceptable range 300-360
Width If site conditions do not allow for preferred, work with plan reviewer with in ranges.	120	165	225 preferred Acceptable range 165-240
Center Circle Radius	24	30	30
Penalty Box (depth-parallel to the sideline x length-parallel to the goal line)	42 x 105	54 x 132	54 x 132
Goal Box (depth-parallel to the sideline x length-parallel to the goal line)	18 x 57	18 x 60	18 x 60
Penalty Kick Line (offset from goal line x length)	30 x 2	36 x 2	36 x 2
Corner Arc Radius	3	3	3
Penalty Kick Arc Radius (from center of penalty kick line)	24	30	30
FOOTBALL FIELD			
Length	NA	NA	300
Width	NA	NA	160
End Zone Width	NA	NA	30
Yard Line Hash Marks (offset from sideline x length)	NA	NA	53'-4" x 2'
Yard Line Numbers (height x width x offset from sideline to TOP of number)	NA	NA	6 x 4 x 27
Yard Line Arrows (triangle, height x base, inside vertex aligns with offset to top of yard line number)	NA	NA	3 x 1½

APPENDIX

**FLEXIBLE PAVEMENT STRUCTURAL NUMBER
LAYER COEFFICIENT VALUES**

LAYER TYPE	LAYER COEFFICIENT (per inch)
Stabilized Subgrade, FBV = 75 psi or LBR = 100 (minimums)	0.08
Limerock Base, LBR = 100 (minimum)	0.18
Asphalt, SP 9.5	0.44