BSD Technical Standard
Division 32: Exterior Improvements

1. PURPOSE

This is the Beaverton School District (BSD) Technical Standard for Exterior Improvements. This document, in coordination with BSD's Educational Specifications and Technical Standards, communicates fundamental policies, procedures, standards, and expectations for consultant services. This Division 32 outlines the minimum acceptable standards for products, materials, systems, and documentation used in all District facility exterior improvements. The Technical Standards loosely follow CSI MasterFormat. Under no circumstances are the BSD Technical Standards to be used as unedited project specifications.

2. GENERAL

2.1. PROJECT RECORD DOCUMENTATION

2.1.1. In addition to Contract, Division 0 and Division 1 Technical Standards requirements, provide additional documentation as listed in individual sections.

2.1.2. Design Drawings and Specifications

2.1.2.1. Design Drawings and Specifications for Paving

2.1.2.1.1. At the Design Documents (DD) phase, provide details and sections for pavement and fill designed to support: 1) bus, fire, and service truck traffic and 2) automobile traffic, parking, and paved playgrounds.

2.1.2.2. Design Drawings and Specs for Athletic and Recreational Surfacing

2.1.2.2.1. Design Coordination Services shall be included in the Contract Documents to require that construction fencing shall stay in place until the Certificate of Substantial Completion is fully executed.

2.1.3. Submittals

2.1.3.1. Irrigation Submittals

2.1.3.1.1. Product data showing manufacturer's name, catalog number, technical data

2.1.3.1.2. Photos or shop drawings of manufactured products that clearly identify and locate isolation valves, control valve, quick couplers, point of connection, control clock(s), control wire, junction boxes, main and lateral lines, and sprinkler heads.

2.1.4. Closeout Deliverables

2.1.4.1. Closeout Deliverables for Paving

2.1.4.1.1. Contractor warranty - Repair to original condition any paving disturbed by construction that occurred during warranty period.

2.1.4.2. Closeout Deliverables for Athletic and Recreational Surfacing

2.1.4.2.1. Installation, maintenance manual, and parts list for playground hardscapes

2.1.4.2.2. Manual of recommended maintenance procedures for artificial turf

2.1.4.2.3. Documentation of all deviations from the shop drawing submittals, including products that were changed and the reason for the change

2.1.4.2.4. Documentation of all deviations from that provided with original equipment submittals

2.1.4.2.5. Final test reports and any deficiency lists

2.1.4.2.6. Field and playground drainage lines

2.1.4.2.7. Contractor shall provide one-year warranty to begin at date of substantial completion to repair to original condition any improvements that were disturbed by construction that occurred during warranty period.

2.1.4.2.8. Third party testing to verify manufacturer's specified Head Injury Criterion (HIC) value.

2.1.4.2.9. Letter from installer confirming quality and safety inspection after 30-days of use.

2.1.4.3. Closeout Deliverables for Site Improvements

2.1.4.3.1. Contractor shall provide one-year warranty to begin at date of substantial completion to restore and repair to original condition any site improvements, furnishings and structures disturbed by construction that occurred during warranty period.

2.1.4.4. Closeout Deliverables for Irrigation

2.1.4.4.1. Record Drawings updated with significant changes including variations or changes to the system, main and lateral line locations, automatic control valves, quick coupling valves, drain valves, wire runs and locations of all splice boxes, cleanout locations, catch basin and drain line location.

2.1.4.4.2. Irrigation zone map provided by contractor - A map of the irrigation zone areas, fully laminated, clean print of final irrigation project as constructed, reduced by 50%, with zones clearly color-coded for posting near automatic controller.

2.1.4.4.3. One-year Warranty, to begin at date of substantial completion, for repair or replacement of faulty equipment and workmanship, and repair of all damage resulting from leaks or breaks.

2.1.4.4.4. Installation, maintenance manual, trouble-shooting guidelines, parts list, and local supplier for all irrigation equipment

2.1.4.4.5. Pressure testing documentation for irrigation piping

2.1.4.4.6. Documentation of all deviations from the shop drawing submittals, including products that were changed and the reason for the change

2.1.4.4.7. Documentation in Operations and Maintenance information of all deviations

from that provided with original equipment submittals

2.1.4.5. Closeout Deliverables for Planting

2.1.4.5.1. Contractor is to provide maintenance instructions for all plantings and include a one-year schedule of all recommended maintenance procedures for landscape work.

2.1.4.5.2. Recommended maintenance procedures for all field drainage systems areas

2.1.4.5.3. Contractor shall provide one-year warranty from the date of substantial completion of the site. Contractor shall provide regular maintenance and service throughout the warranty period to meet Clean Water Service's (CWS) Private Water Quality Facility Inspection requirements including vegetation survival, removal of trash and debris from the facility, digging out any blockage of inlet and outlet structures, and removing invasive species.

2.1.5.Quality Assurance and Inspections

2.1.5.1. Quality Assurance and Inspection for Athletic and Recreational Surfacing

2.1.5.1.1. After 30 days of school use the installer shall perform a follow-up inspection of soft play areas, verify wood fiber depth, etc.

2.1.5.2. Inspections for Irrigation

2.1.5.2.1. Perform final coverage test in the presence of the BSD Representative and Landscape Architect. Adjust and balance irrigation system to provide uniform coverage. Change, reset, or adjust heads and/or nozzles as required to provide uniform coverage and match final grades.

2.1.5.3. Quality Assurance and Inspections for Planting

2.1.5.3.1. Inspection of grounds and landscape shall be scheduled at the completion of installation of plantings to include the District's Grounds Foreman to assess condition of property and plantings.

2.1.5.3.2. An inspection shall be conducted at the end of the one-year warranty period. Additional work or replacement of plantings is needed. All plantings shall be watered, weed-free and alive at the end of the one-year warranty period. In addition, all filters shall be cleaned out of any and all construction debris at time of handover.

2.2. COMMON WORK RESULTS

2.2.1.Common Work Results for Paving

2.2.1.1. Separate bus loading and service traffic from parent drop off and other parking areas. Layout so that bus queuing does not interfere with deliveries and service vehicles. The layout must address pedestrian and bicycle safety by providing safe routes for access that minimizes interaction with vehicular traffic.

2.2.1.2. To ensure that there is safe access into and out of the school grounds, and to provide the maximum flexibility in scheduling of school hours and deliveries, the service entry should not be shared with bus traffic or parent/student drop off lanes. Traffic patterns and parking lots shall be evaluated to ensure that service traffic does not interfere or conflict with other vehicular or pedestrian traffic. Provide entry to the service yard for kitchen deliveries and

trash pick-up separate from bus traffic, staff parking, and parent/student drop off areas.

2.2.1.3. Service yard shall be designed to allow easy access by large delivery vehicles and waste disposal trucks. Provide adequate turning radius to accommodate tractor/trailer deliveries and access to dumpsters by disposal service. The Design Team shall consult with both the hauler and jurisdiction for the requirements of dumpster and service areas for the specific Project.

2.2.1.4. Sidewalk design should consider the natural flow of foot traffic along with ease of maintenance and mowing (e.g., minimize 90-degree angles, use radius intersections). Architectural design should incorporate a covered area or overhang to provide a dry area for students waiting by bus drop-off.

2.2.2. Common Work Results for Site Furnishings

2.2.2.1. Benches, retaining walls, and other surfaces shall be designed to discourage vandalism and skateboarding on school property.

2.2.2.2. Common Work Results for Irrigation

2.2.2.3. Complete operational underground landscape irrigation system with electronic controls for playing fields and landscape. Consult with BSD Representative and utility owner for direction before proceeding if any uncharted piping or other utilities are encountered during execution of work. Sprinklers, control boxes, manhole covers, and catch basins are to be at a height where they do not present a trip hazard or interfere with mowing. When possible, do not locate these items on playing fields or in play areas.

2.2.3. Common Work Results for Planting

2.2.3.1. Landscape design is to be developed as part of the overall project design. Site work, landscaping, and other exterior improvements are to be designed to be durable, low maintenance, and vandal resistant, while creating an aesthetically pleasing, safe, and secure environment.

2.2.3.2. Low maintenance cost is to be a primary consideration during selection of materials, plantings, and site equipment.

2.2.3.3. Courtyards shall have direct outside access without passing through halls or rooms. Architectural design is to include a service entry for all courtyards.

2.2.3.4. Courtyard landscape shall not contain grass or deciduous trees. Trees shall be planted far enough away from buildings so that they cannot be used to access roofs. This will also minimize the accumulation of needles, leaves, and debris on the roof and in gutters. Topsoil imported to the site shall come from naturally well-drained local sources having similar soil structure and characteristics.

3. BASES, BALLASTS, AND PAVING

3.1. FLEXIBLE PAVING

3.1.1. Asphalt Paving

3.1.1.1. Service areas - Minimum design requires bus rated pavement for all service areas.

3.2. RIGID PAVING

3.2.1.Concrete Paving

3.2.1.1. Dumpster and Service Areas - Provide stable pad and approach that will withstand traffic of service trucks and support dumpsters without cracking or rutting. Design dumpster pad so that trash receptacles do not roll while being filled or emptied. Pad shall have between 1% and 2% slope to provide drainage.

3.3. AGGREGATE SURFACING

3.3.1.Stone Surfacing

3.3.1.1. The use of round rock is not permitted on BSD property.

3.4. CURBS, GUTTERS, SIDEWALKS, AND DRIVEWAYS

3.4.1.Curbs & Gutters

3.4.1.1. Use standard, full depth, formed in place curb. For islands on traffic lane, bullnose curbs 2’ into island and flatten inside radius adjacent to traffic lane to provide a strip of concrete that has a maximum width of 3’ while parallel to the traffic lane.

3.4.2.Sidewalks

3.4.2.1. Concrete sidewalks and walkways shall be a minimum of 4’ wide. Finished grade of sidewalks and walkways shall be no more than 1” above surrounding grade and have a cross slope of less than 2%.

3.4.2.2. Sidewalks by bus drop-off shall be a minimum of 8’ wide.

3.4.2.3. Asphalt walking paths shall be a minimum of 6’ wide. Use a minimum of 4 inches of ¾ minus compacted gravel with a minimum of 2 inches AC Plant with grass flush to finished grade of the asphalt path.

3.4.2.4. Finished grade of the pathway may need to be raised so that there are no low points for water accumulation.

3.5. PAVING SPECIALTIES

3.5.1.Traffic-Calming Devices

3.5.1.1. Speed bumps shall be no more than 3” tall and a minimum of 3’ wide and contain gaps to allow for drainage.

3.5.2.Painted Pavement Markings

3.5.2.1. For off-street pavement markings of new or existing concrete/asphalt pavements, provide the following:

3.5.2.1.1. Contractor grade alkyd striping paint for existing asphalt and concrete pavements or restriping, Ennis paint or equal with approval by BSD Representative.

3.5.2.1.2. Apply two zone marking coats of alkyd paint at eight dry mils per coat.

3.5.2.1.3. Follow all paint manufacturer recommendation for adherence due to weather

conditions.

3.5.2.1.4. If placing over new asphalt/concrete a minimum of fourteen days cure time is required prior to any applications.

3.5.3.Minimum Dimensions:

3.5.3.1.1. Standard parking stalls shall have 4" stripe

3.5.3.1.2. Crosswalks shall be 8' wide (outside dimension) with a 1' thick line

3.5.3.1.3. Mile per hour stencils shall have a minimum of 2'6" height with a 3" thick line

3.5.3.1.4. All letter and number stencils shall be a minimum of 1' high, 2" thick

3.5.3.1.5. Directional arrows shall be a minimum of 5' in length, 3' wide and 1' thick

3.6. ATHLETIC AND RECREATIONAL SURFACING

3.6.1.Playground Protective Surfacing

3.6.1.1. Unitary surfacing systems are preferred. Shop drawings shall include adequate drainage system, and cross section with playground equipment foundations to ensure adequate fall protection.

3.6.1.2. SMARTE Turf is the basis of design for playground protective surfacing in new elementary school construction. Other products or systems may be reviewed by BSD to verify adequate warranty, maintainability, and shock attenuation.

3.6.1.3. Poured-in-Place (PIP) fall protection is permitted only with district approval.

3.6.1.4. Engineered Wood Fiber (EWF) is an acceptable surfacing material for existing playgrounds if unitary surfacing is not a viable option.

3.6.1.4.1. Ensure 12" minimum EWF coverage after settlement, including atop concrete foundations of playground equipment and concrete-mounted signs.

3.6.1.4.2. Provide adequate drainage below the EWF.

3.6.1.4.3. Concrete curbs are preferred but not required along the perimeter of the play area.

3.6.1.4.4. Non-compliant ramps into EWF shall be removed and replaced with ADA compliant curb ramps. Provide additional ramps as needed to reduce travel distance to areas of activity.

4. SITE IMPROVEMENTS

4.1. FENCES AND GATES

4.1.1.Gates

4.1.1.1. Gates will comply with ASTM F1043 Group 1-C, ASTM F900, and will have commercial grade hardware.

4.1.1.2. Access - Maintenance access shall have a minimum of a 10' opening. Any opening over 10' shall be a double gate. Pedestrian access shall be 24" with offset post to keep motorized vehicles off of school grounds.

4.1.1.3. Latches - Commercial grade fork latches are to be installed on gates and must be able to accommodate District and Fire Department padlocks.

4.1.1.4. Single gate latches shall be capable of retaining the gate in a closed position and shall have a provision for a padlock.

4.1.1.5. Double gate latches shall be a drop rod or plunger bar arranged to engage the gate stop. Center drop rod or plunger bar shall not be used in areas with gravel. The latching devices shall have a provision for a padlock.

4.1.1.6. Hinges - The hinges shall be designed to permit the gate to swing a full 180 degrees. For safety considerations, avoid the use of slide gates when possible. When a sliding style gate is necessary, a cantilever style slide gate with the appropriate safety covers will be required.

4.1.1.7. Keepers – Provide keepers for each gate over 5’ so that they do not swing unintentionally.

4.1.2.Fence Fabric

4.1.2.1. Fabric will have a knuckle/knuckle selvage. The standard diamond size will be 2”. In high-stress applications, a 1 ½” diamond size will be used. Fabric ends shall occur only at terminal, corner, or pull posts.

4.1.2.2. Attach fabric to terminal, corner, or pull posts with tension bars and tension bar clips with maximum 12” on center. Fasten fabric to line posts, top, brace, and bottom rails with tension wire with maximum 15” on center.

4.1.2.3. Runs of fence more than 500’ in length shall have at least one intermediate 3” outside diameter (O.D.) pull post with braces in two directions. Maximum distance between intermediate posts is 500’.

4.1.2.4. Fabric shall be installed taut, on outside of posts and rails, uniformly 1” above ground level.

4.1.2.5. Galvanized chain link fabric to be galvanized before weave and meet ASTM A 392 Class 1 (1.2 oz.) as manufactured by Pacific Fence & Wire Company or approved equal.

4.1.2.6. The wire will have a minimum 9-gauge finish. In high-stress applications such as backstops 10’ and below, track perimeters, trash enclosures, soccer practice areas, etc., the mesh will have a 6-gauge finish.

4.1.2.7. Vinyl coated chain link fabric shall meet ASTM F 668 Class 2B, Fused-Bonded, as manufactured by Pacific Fence & Wire Company or approved equal. Color will be black or as required by Authority Having Jurisdiction (AHJ).

4.1.2.8. Wire will have a minimum of a 9-gauge core/8-gauge finish. Where applicable the mesh will have a 6-gauge core/5-gauge finish.

4.1.3.Posts and Rail

4.1.3.1.1. Top rails shall be installed through line post caps and spliced with 6” sleeves. Bottom rail or tension wire shall be installed uniformly 1” above finish grade.

4.1.3.1.2. Posts and rail 4” and under will meet ASTM F 1043 Group 1-C

4.1.3.1.3. Posts 6 5/8” and 8 5/8” O.D. will meet ASTM F 1043 Group 1-A

4.1.3.1.4. Black or Green posts will have a powder-coated finish over the galvanized pipe

4.1.3.1.5. Bollard posts will be 4” x 7’ or 6 5/8” x 7’ as specified and comply with the ASTM specifications as listed above.

4.1.4. Post Footings

4.1.4.1. Posts shall be set in concrete with fence post extending through bottom of concrete. Fences 6’ and under will have:

4.1.4.2. 36” x 10” Terminal/Gate post footings

4.1.4.3. 24” x 8” Line post footings

4.1.5. Tension Wire

4.1.5.1. Galvanized tension wire will have a 7-gauge finish and meet ASTM A 824 Type II and will be marcelled

4.1.5.2. Vinyl coated tension wire will have a 6-gauge finish/9-gauge core and will be Marcelled

4.1.5.3. Vinyl coated tension wire will meet ASTM F 1664 Class 2a

4.1.5.4. Galvanized hog rings will be 9-gauge Class III

4.1.5.5. Vinyl Coated hog rings will have a 9-gauge finish

4.1.5.6. Hog rings will be spaced at a minimum of 24”

4.1.6. Fence Fittings

4.1.6.1. Standard Fence Fittings will meet ASTM F 626 (Domestic)

4.1.6.2. Heavy Brace and Tension Bands 1/8” x 1” are required

4.1.6.3. Fence ties are to be 11-gauge steel with frequency outlined in ASTM standard

4.1.6.4. Vinyl coated fence ties will have a 9-gauge finish with an 11-gauge core wire

4.1.6.5. Black and Green Fence fittings will be powder-coated

4.1.7. Chain Link Backstops

4.1.7.1. All baseball and softball back stops shall have the bottom 10’ from the ground in 6-gauge steel.

4.1.7.2. All end posts for back stops shall be set to a minimum 4’ depth or greater so that backstops can tolerate strong winds and weight of ice.

4.1.8. Decorative Metal Fences and Gates

4.1.8.1. If ornamental fencing is used, it shall be powder coated tubular steel. No powder coated aluminum or aluminum chain link shall be used.

4.2. RETAINING WALLS

4.2.1. All retaining walls shall be treated at the time of installation to waterproof and aid in graffiti cleanup. Use Degussa Protectosil or equal as stated in the Division 9: Paint and Finishes.

4.2.2. For top cap installation, use Super Wet Type 3 (foaming) adhesive or equal.

4.2.3. Retaining wall plantings may include low maintenance dwarf plants. No deciduous trees shall be used.

4.2.4. Provide a 12” wide concrete mow strip on low side of retaining walls, and at top of walls if turf is present.

4.3. SITE FURNISHINGS

4.3.1. Bicycle Racks

4.3.1.1. Bike racks shall be free-standing, heavy gauge steel with galvanized or rust proof powder coated finish. Bike racks shall be anchored for security and stability. Specify anchor kits when used.

4.3.1.2. Trash and Litter Receptacles

4.3.1.3. Trash receptacles shall be provided by the District, with the exception of large site (concrete) containers. Receptacles shall not be placed in mowing or landscaped areas.

4.3.2. Seating and Tables

4.3.2.1. Picnic tables and benches shall be placed on a concrete pad and secured with a locking mechanism. Concrete pads must be flush with turf. Extend concrete pads per ADA code past the outer portion of the table or bench.

4.3.2.2. The total weight of the picnic table is not to exceed 350 pounds. Distribute required Accessible seating.

4.3.2.3. Tables shall be one piece design made of perforated or expanded metal, preferably with a thick plastisol coating, or equivalent, on top. Frames for picnic tables shall be heavy duty steel with a rust resistant powder coated finish.

4.4. SITE SPECIALTIES

4.4.1. Metal Bollards

4.4.1.1. Provide bollards to protect utilities. Where bollards block access by service vehicles, the center bollard shall be sleeved to allow removal.

4.4.1.2. Bollards shall be 6” diameter concrete-filled galvanized steel pipe and set to a minimum depth of 3’- 0”. Removable bollards are to be 4” diameter maximum.

4.4.1.3. Bollards shall be powder coated safety yellow. For safety reasons, bollards shall have no protrusions or handles, unless required by Fire Marshal for fire lane access. If bollards with handles are to be installed, the handles should be oriented with the path of travel.

4.4.2. Handrails

4.4.2.1. All ferrous metal handrails are to be galvanized.

5. IRRIGATION

5.1. IRRIGATION COMPONENTS

5.1.1. Irrigation Controls

5.1.1.1. Irrigation Controller shall be Rainbird. For larger sites, the Rainbird system needs to have ESP-LXD controller with an IQ-NCC-GP cellular communication cartridge to go with the

existing BSD IQ system. For smaller sites, the ESP-LXME controller with an IQ-NCC-GP cellular communication cartridge may be acceptable. Confirm with the BSD representative. No decoder system needed unless the system is 48 zones or larger. Flow sensors, a master valve and a Flow Sensor Module in the controller are also required.

5.1.1.2. Keys: Provide two keys for each type of irrigation controller or cabinet.

5.1.2.Control Wiring

5.1.2.1. Wiring inside the control box is the only acceptable use of Multi-strand wire bundles. Make splices only in valve boxes. When that is not possible, create a splice box by installing a standard valve box and make splices at this location. Identify location of all splice boxes on as-built drawings. Provide minimum of 2' of coiled slack between wire splices.

5.1.3.Trenches and Pipe Replacement

5.1.3.1. Piping shall be placed in trenches so that there is a minimum of 2" of space between adjacent pipes. Lay control wires in trench under mainline and/or lateral lines whenever they occur in same trench. A trace or locator wire is required in all mainline trenches and in all trenches with control wiring.

5.1.4.PVC Pipe and Fittings

5.1.4.1. Polyvinyl Chloride Plastic (PVC) pipe shall be Type 1, normal impact, I.P.S., N.S.F. Schedule 40 PVC Pipe for all main lines and for lateral lines in turf. The only acceptable use for Class 200 PVC pipe is for lateral zones in landscape beds.

5.1.4.2. Use Schedule 80 PVC with molded threads for all threaded unions, including threaded PVC nipples. Schedule 40 PVC with molded threads may be used for all other instances. Use Schedule 40 PVC Fittings for all solvent welded slip joint connections.

5.1.4.3. Primer: Weld-On P-75 or equal. Cement: 2" and smaller: Weld-On 725 or equal; 2½" and larger: Weld-On 711 Gray Glue or equal. Compression fittings shall not be used on repairs or new installs.

5.1.5.PVC Sleeves

5.1.5.1. Class 200 PVC pipe sleeves are required when irrigation pipe or wiring passes under sidewalk, curbs, planter walls, retaining walls, roadway, parking lots, or other paved areas. Extend sleeves beyond pavement edge a minimum of 12".

5.1.6.Valves and Accessories

5.1.6.1. All valves shall be installed in valve boxes with locking covers. No more than one valve per valve box. Valve boxes shall be of adequate size to allow room to perform routine maintenance and full movement of valve handle.

5.1.6.2. Valve boxes shall be set level so that no part of the valve box, or its lid, is above finish grade or more than 1" below grade after settling.

5.1.6.3. Valve boxes shall be supported on pre-cast concrete pavers or blocks so that they will not shift or sink when run over by lawn maintenance equipment or service vehicles.

5.1.6.4. For new construction, Master Valves shall be installed immediately beyond the double check valve on the irrigation side, followed by a Flow Sensor. All Flow Sensors are to be 2" or

smaller. If mainline is larger than 2" diameter, consult with BSD representative during design to accommodate fitting.

5.1.6.5. Use Ball Valves for 2” and smaller lines and Gate Valves for lines 2” and larger.

5.1.6.6. Isolation Valves: Ball valve type, 150 psi min., rated, with standard seat and threaded ports.

5.1.6.7. Valve boxes for control, isolation valves: 12” minimum size box. For single valves, boxes should have locking top with 3” and/or 6” extensions, as needed, to facilitate required installation.

5.1.6.8. Double check valves: Use Febco Master Series 850 or approved equal.

5.1.6.9. Drain valves: complete with fittings in valve boxes and extensions. Install a minimum of 1 cubic foot drain rock at each drain valve location.

5.1.6.10. Manual drain valves: Buckner 2200 series bronze angle valve, or approved equal.

5.1.6.11. Manual drain valve covers: Weathermatic model number 960L, locking cover, or approved equal. Provide suitable length of 2” class 200 PVC pipe to fit over Drain Valve Stem and install locking valve cap flush with finish grade. Provide two valve-operating keys of type and length required to operate manual drain valves.

5.1.6.12. Quick coupling valves: Provide stub at end of main lines to allow for future addition of quick coupling valves. Quick couplers shall be installed on 1” prefabricated swing joint assemblies.

5.1.6.13. Control Valves - No part of the control box should be above finish grade and should be a maximum of 1” below grade. Provide threaded unions on both sides of the control valve. Isolation valve shall be installed on the mainline side of the control valve. All valves shall be installed in valve boxes.

5.1.7.Irrigation Heads

5.1.7.1. Hunter heads are preferred for rotors. Hunter or Rainbird are preferable for spray heads.

5.1.8.Swing Joint Assemblies

5.1.8.1. Lasco model number G132-212 with 18” lay length, MIPT by MIPT, schedule 80, or approved equal. Swing joint assemblies must be a minimum 1” diameter pipe size.

5.2. PLANTING IRRIGATION

5.2.1.Irrigation Zones

5.2.1.1. Provide separate zones for turf and shrub areas. All zones shall have head-to-head coverage. Design irrigation zones so that the plantings for each zone have similar water requirements.

5.2.2.Drip Irrigation

5.2.2.1. Use of drip irrigation must be approved for use on a case-by-case basis. Where approved, install drip irrigation tubing with inline, self-flushing emitters.

5.2.2.2. Drip irrigation shall be installed under a minimum of 3” of compacted topsoil followed

by 3” of bark dust/mulch.

6. PLANTING

6.1. PLANTING PREPARATION

6.1.1.Soil Preparation

6.1.1.1. Preparation for Planting Lawns

6.1.1.2. Finish grade shall be no more than 1/2” below walkway surfaces after final compaction. Compaction should be such that the surface will support a commercial grade riding lawn mower.

6.1.1.3. Preparation for Planting Grass on Athletic Playing Fields

6.1.1.4. In addition to the top soil preparation outlined above, addition of 2” organic matter to the top 4” of soil is recommended during preparation of seeded or sodded athletic playing fields due to the heavy clay content of the native soils found in the Beaverton School District area.

6.1.1.5. Preparation for Stormwater Conveyance and Detention Areas

6.1.1.6. Soil mix to comply with CWS standards and/or AHJ. Soil to be weed and seed free.

6.1.2.Landscape Grading

6.1.2.1. Grading for Lawns

6.1.2.2. Grade and level to provide 1% to 2% slope for positive drainage. Grade lawn areas to a smooth, even surface with loose, uniformly fine texture.

6.1.2.3. Grading for Athletic Playing Fields

6.1.2.4. Play fields shall be designed with positive drainage between 1% and 2% slope. Provide a drainage system on site to ensure the field will be usable in wet weather.

6.1.2.5. Grading for Stormwater Conveyance and Detention Areas

6.1.2.6. Slopes shall not exceed 3:1 except where approved by CWS and the AHJ.

6.1.3.Topsoil Placement and Grading

6.1.3.1. Top soil removed during grading or excavation of site shall be stockpiled on site for re-use during landscape work. Stockpiled material shall be fertile, friable, natural loam, and surface soil. Do not stockpile material that contains heavy clay lumps, brush, weeds, litter, roots, stumps, stones larger than 2” in any dimension, and other extraneous or toxic matter harmful to plant growth.

6.1.3.2. There shall be a minimum 12” depth of amended topsoil. The grade of the finished soil surface shall be no more than 1” below the top of pavement at pavement edges. After planting, turf and sod shall be at same finish grade as pavement.

6.1.3.3. If quantity of stockpiled topsoil is insufficient, provide additional topsoil, as required, to complete landscape work. Imported top soil shall be free of roots, weeds, debris, stones, and other extraneous matter over 3/4” in any dimension.

6.1.3.4. Perform laboratory soil test and add soil amendments to meet fertility and pH level

requirements of selected plantings. For natural grass play areas and athletic fields, pH levels shall be between 6.0 and 7.0. Amendments shall be free of toxins or viable seed.

6.2. TURF AND GRASSES

6.2.1.Hydro-Mulching

6.2.1.1. Sloped areas greater than 10% planted in grass shall be hydro-seeded to prevent erosion.

6.2.2.Seeding

6.2.2.1. Seed shall have a warranty for germination and growth of 60 days or until final acceptance of Project. After 60 days, bare areas are to be reseeded and top-dressed.

6.2.2.2. Athletic fields mix requirements:

6.2.2.2.1. Three-way rye grass seed in compliance with Oregon blue tag certification

6.2.2.2.2. Annual rye is not to be included in seed mix

6.2.2.2.3. Grass seed shall be applied at the rate of 10 pounds per 1,000 square feet

6.2.2.3. All other fields:

6.2.2.3.1. Rye grass fescue mix seed in compliance with Oregon blue tag certification

6.2.2.3.2. Annual rye Is not to be included in seed mix

6.2.2.3.3. Grass seed shall be applied at the rate of 8 pounds per 1,000 square feet

6.2.2.4. Renovation of Existing Lawns - Apply a ¼" depth peat seed bed mulch or other BSD approved mulch to maintain moist condition.

6.2.2.5. Reconditioning Existing Lawns - Remove diseased and unsatisfactory lawn area. Do not bury into soil. Remove topsoil containing foreign materials resulting from Contractor's operations including oil drippings, stone, gravel, and other loose building materials.

6.3. PLANTS

6.3.1.Materials

6.3.1.1. See Appendix for a list of approved and prohibited plants.

6.3.1.2. Plant materials shall meet current American Association of Nurserymen Standards or Oregon Association of Nursery Standards for nursery stock.

6.3.2.Ground Covers

6.3.2.1. Slopes greater than 25-degree shall be planted with a low maintenance perennial ground cover.

6.3.2.2. Ground covers shall be planted a minimum of 16" from structures, walkways, curbs, and fences.

6.3.2.3. Areas between sidewalks or curbs and fence lines less than 2' shall not be planted but only covered with 2" of bark mulch unless planting is required by the AHJ.

6.3.3.Shrubs

6.3.3.1. Shrubs shall only be planted in the mulched areas.

6.3.4.Trees

6.3.4.1. Do not plant trees closer to a building than 75% of its ultimate height or spread. At maturity, trees may not encroach into athletic playing zones (the drip line will be outside of the athletic playing zone).

6.3.4.2. Provide root barrier along sidewalk or curb for trees planted within 5' of sidewalk, curb, or pavement. Protect trees planted by concrete or pavement from sun scald. Trees shall only be planted in the mulched areas.

6.3.4.3. Site lighting and plantings shall be placed so that mature plants do not obstruct or obscure security lighting.

6.3.5.Special Consideration for Stormwater Management Areas

6.3.5.1. Plants are to be low-maintenance and hardy to the site's growing zone. Plant variety should be minimized for ease of upkeep. Sedges and grasses are preferred. Trees are not preferred unless required by the AHJ.

6.4. PLANTING ACCESSORIES

6.4.1.Landscape Edging

6.4.1.1. Mow strips are part of BSD's Integrated Pest Management (IPM) strategy. Mow strips must be flush with finish grade.

6.4.1.2. Install 12" wide concrete mow strip adjacent to vertical barriers such as buildings, fences, and retaining walls.

6.4.1.3. Install 24" wide by 4" thick concrete mow strip centered along fence lines.

6.4.1.4. Install 12" grass-free mow strip around sign bases mounted in grass areas.

APPENDIX – PLANTINGS

A. DESIRABLE PLANT MATERIAL

1. Approved Ground Covers

Latin Name	Common Name	Comments
Ajuga	Carpet Bugle	
Arctostaphylos uva-ursi	Kinnikinnick	
Cistus x purpureus	Rockrose	
Hypericum calycinum	St. John's Wort	
Vinca minor	Dwarf Periwinkle	
Waldsteinia fragarioides	Barren Strawberry	

2. Approved Shrubs

The following species are approved for their appearance and low maintenance.

Latin Name	Common Name	Comments
Aucuba japonica	Japanese Aucuba	
Azalea		Varieties 4' and under in size
Berberis thunbergi	Japanese Barberry	Compact varieties only
Chamaecyparis	False Cypress	
Choisya ternata	Mexican Orange	
Cornus stolonifera 'Kelseyi'	Kelsey Redtwig Dogwood	
Daphne	Species	
Escallonia		Compact varieties only
Euonymous – Species		
Halmiocistis Wintonensis	Shrubby Rockrose	
Hamamelis	Witch Hazel	
Hebe		Hardy varieties only
Hydrangea – Species		
Ilex crenata	Japanese Holly	
Kalmia latifolia	Mountain Laurel	
Mahonia aquifolium "Compacta"	Compact Oregon Grape	Only variety approved for use
Ornamental Grasses; Multiple species		No Risomatis
Osmanthus - Species		Use for unpruned screens
Pieris japonica	Lily-Of-The-Valley-Shrub	
Prunus laurocerasus 'Otto Luyken'	Otto Luyken Laurel	
Rhododendron Species		Compact or Dwarf Varieties Only
Viburnum burkwoodii	Burkwood Viburnum	
Viburnum davidii	David Viburnum	
Viburnum plicatum tomentosum	Double File Viburnum	
Viburnum Tinus 'Spring Bouquet'	Spring Bouquet Laurustinus	

3. Approved Trees – Large

Latin Name	Common Name	Comments
Calocedrus decurrens	Incense Cedar	
Cedrus atlantica 'Glauca'	Blue Atlas Cedar	
Cedrus libani	Lebanon Cedar	
Chamaecyparis nootkatensis	Alaska Cedar	
Cupressocyparis leylandii	Leyland Cypress	
Fagus sylvatica	European Beech	
Fraxinus pennsylvanica	Green Ash	
Ginkgo biloba	Maidenhair	Named Male variety only
Metasequoia glyptostroboides	Dawn Redwood	
Nyssa sylvatica Sour gum	Maidenhair	
Pinus strobus	Eastern White Pine	

Pseudotsuga menziesii	Douglas Fir	
Sequoia sempervirens	Coast Redwood	
Sequoiadendron giganteum	Giant Redwood	
Sequoiadendron giganteum pendula	Weeping Giant Redwood	
Thuja plicata	Western Red Cedar	
Tsuga canadensis	Canadian Hemlock	
Tsuga heterophylla	Western Hemlock	

4. Approved Trees – Medium

Latin Name	Common Name	Comments
Acer platanoides columnaris	Columnar Norway Maple	Columnar varieties such as Crimson Sentry
Acer rubrum Red Maple	Red Maples	Varieties similar to Scarlet Maple, Autumn spire, Armstrong, Red Sunset, Scarlet Sentinel
Betula nigra	River Birch	
Carpinus	Hornbeam	
Cercidiphyllum japonicum	Katsura Tree	
Cornus nuttalli	Pacific Dogwood	
Cotinus	Smoke Tree	
Laurus nobilis	Sweet Bay	
Zelkova serrata	Sawleaf Zelkova	

5. Approved Trees – Small

Latin Name	Common Name	Comments
Acer campestre	Hedge Maple	
Acer circinatum	Vine Maple	
Acer davidii	David's Maple	
Acer ginnala	Amur Maple	
Acer griseum	Paperbark Maple	
Acer palmatum	Japanese Maple	
Acer palmatum dissectum	Laceleaf Japanese Maple	
Acer shirasawanum	Fullmoon Maple	
Acer shirasawanum 'Aureum'	Golden Fullmoon Maple	
Cercis canadensis	Eastern Redbud	
Chamaecyparis	False Cypress	
Chamaecyparis obtusa	Hinoki False Cypress	
Cornus florida	Eastern Dogwood	
Cornus kousa	Kousa Dogwood	
Cornus Mas	Cornelian Cherry	
Cornus x rutgersensis	Stellar Dogwood	
Lagerstroemia	Crape Myrtle	

Magnolia stellata	Star Magnolia	
Thuja occidentalis	American Arborvitae	
Thujopsis	False Arborvitae	
Tsuga mertensiana	Mountain Hemlock	

B. PROHIBITED PLANT MATERIAL

1. Prohibited Trees

The following plant material is not to be used on BSD property. In general, no fruit or nut-bearing varieties are permitted.

Latin Name	Common Name	Comments
Acer platanoides	Norway maple	
Betula papyrifera	European Birch	
Crataegus Species	Hawthorn	
Ginkgo biloba		Male varieties allowed with BSD approval only. No female varieties allowed.
Gleditsia tricanthos	Honey Locust	
Koelreuteria paniculata	Goldenrain Tree	
Liquidambar styraciflua	American Sweet Gum	
Liriodendron tulipifera	Tulip Tree	
Magnolia grandiflora	Southern Magnolia	
Malus - Species	Ornamental Crabapple	
Pinus contorta	Shore Pine	
Pinus nigra	Austrian Black Pine	
Platanus acerifolia	London Plane, Sycamore	
Populus - Entire Species	Poplar, Cottonwood, Aspen	
Prunus- Entire Species	Flowering Cherry	
Prunus x cerasifera 'Blireanna'	Blireanna Flowering Plum	
Quercus palustris	Pin Oak	
Quercus rubrum	Red Oak	
Rhus Species	Sumac	
Robinia pseudoacacia	Black Locust	
Salix - Species	Willow	
Sorbus - Species	Mountain Ash	
Tilia – Entire Species	Linden	

2. Prohibited Shrubs and Ground Covers

Latin Name	Common Name	Comments
Abelia x grandiflora	Glossy Abelia	
Arbutus unedo	Strawberry Tree	
Bamboo – Species		
Berberis julianae	Wintergreen Barberry	
Berberis verruculosa	Warty Barberry	
Buddleia – Species	Butterfly Bush	

Calluna – Species	Heather	
Ceanothus – Large Varieties	Wild Lilac	
Cornus stolonifera	Redtwig Dogwood	
Cotoneaster Species	No varieties	
Escallonia – Species		
Hedera – Species	Ivy	
Juniperus Species –	Juniper	
Mahonia aquifolium	Tall Oregon Grape	Compact is OK
Nandina Domestica	Heavenly Bamboo	Poisonous to birds
Photinia	Red Top	All varieties are unacceptable
Pinus mugo	Mugho Pines	
Potentilla – Species	Cinquefoil	
Prunus laurocerasus	English Laurel	
Prunus lusitanica	Portugal Laurel	
Pyracantha – Species	Firethorn	
Rubus calycinoides	Ornamental raspberry or crinkled creeper	
Skimmia japonica		

REVISION HISTORY FOR DIVISION 32 EXTERIOR IMPROVEMENTS TECHNICAL STANDARD

Rev 1: 12/23/16

Section	Section Title	Revision
III.F.	GENERAL DESIGN CRITERIA; BOLLARDS	*Modify, edit text:* **Bollards shall be 6"Ø concrete-filled galvanized steel pipe and set to a minimum depth of 3'- 0". Bollards shall be** ~~painted~~ **powder coated safety yellow. Provide bollards to protect utilities. Where bollards block access by service vehicles, the center bollard shall be sleeved to allow removal. Removable bollards are to be 4"Ø maximum.**
III.M.	GENERAL DESIGN CRITERIA; HANDRAILS	*Insert new section* **All ferrous metal handrails are to be galvanized.**

Rev 2: 11/08/2017

Section	Section Title	Revision
I.	PURPOSE	*Clarification that standards are* **intended for use by the Project Design Teams in the design and construction of new or remodeled facilities.**
VIII.B.	PICNIC TABLES AND BENCHES	*Add locking requirement to picnic tables and benches. Replaced 18" requirement to state* **Extend concrete pads per ADA code past the outer portion of the table or bench.** *Add* **Distribute required Accessible seating.**
X.	ATHLETIC AND PLAYGROUND SURFACING AND	*Complete re-write. Added details for illustrative purposes only.*

	EQUIPMENT	

Rev 3: 12/31/2017

Section	Section Title	Revision
III.F.	GENERAL DESIGN CRITERIA; BOLLARDS	**For safety reasons, bollards are to be smooth with no handles or other protrusions.**

Rev 4: 12/31/2018

Section	Section Title	Revision
VII.F.1.	IRRIGATION; VALVES AND ACCESSORIES	~~Master Valve and Flow Sensor must be the same size as the main line.~~ **All Flow Sensors are to be 2" or smaller. If mainline is larger than 2" diameter, consult with BSD representative during design to accommodate fitting.**
VII.I.	IRRIGATION; IRRIGATION CONTROLS	~~ESP-LXME or Rainbird ESP-LXD Controller two wire decoder system~~ **For larger sites, the Rainbird system needs to have ESP-LXD controller with an IQ-NCC-GP cellular communication cartridge to go with the existing BSD IQ system. For smaller sites, the ESP-LXME controller with an IQ-NCC-GP cellular communication cartridge may be acceptable. Confirm with the BSD representative. No decoder system needed unless the system is 48 zones or larger. Flow sensors, a master valve and a Flow Sensor Module in the controller are also required.**

Rev 5: 05/31/2019

Note: **Bold** indicates new text; ~~strikethrough~~ indicates removed text; plain text indicates unchanged text; *italics* indicate summarized information.

Section	Section Title	Revision
All	All	*Reorg to better align with CSI MasterFormat; corrected headings and subheadings throughout; move doc req's to General; move Play Equipment and Structures to Div 11*
I.	GENERAL	*Clarified General statement* **The Technical Standards follow CSI MasterFormat. Under no circumstances are the BSD Technical Standards to be used as unedited project specifications.**
I.A.	GENERAL: PROJECT RECORD DOCUMENTATION	**In addition to Contract, Division 0 and Division 1 Technical Standards requirements, provide additional documentation as listed in individual sections.**
I.A.3. b)	Athletic and Recreational Surfacing Closeout Deliverables	*Spelled out* **Head Injury Criterion (**HIC**)**
I.A.3.e)	Planting Closeout Deliverables	*GDSR-130 Removed 90-day Contractor warranty; added 1-year Contractor warranty, maintenance and service requirements.*

II.F.1	Playground Protective Surfacing	*Removed inaccurate construction details for Smarte turf and EWF*
III.A.1.b)	Fence Fabric	Color will be black or ~~Green as specified~~ **as required by Authority Having Jurisdiction (AHJ).**
III.D.1.	Metal Bollards	For safety reasons, bollards ~~are to be smooth with no handles or other protrusions.~~ **with no protrusions are preferred, but handles are allowed if required by Fire Marshal for fire lane access. If bollards with handles are to be installed, the handles should be oriented with the path of travel.**
V.A.1.	Soil Preparation	*GDSR-130* **c) Preparation for Stormwater Conveyance and Detention Areas** **Soil mix to comply with CWS standards and/or AHJ. Soil to be weed and seed free.**
V.A.2.	Landscape Grading	*GDSR-130* **c) Grading for Stormwater Conveyance and Detention Areas** **Slopes shall not exceed 3:1 except where approved by CWS and the AHJ.**
V.C.	Plants	*GDSR-130* **4. Special Consideration for Stormwater Management Areas** **Plants are to be low-maintenance and hardy to the site's growing zone. Plant variety should be minimized for ease of upkeep. Sedges and grasses are preferred. Trees are not preferred unless required by the AHJ.**
VI.	Appendix - Plantings	*GDSR-66 Sorted tables alphabetically; moved Gleditsia tricanthos Honey Locust to Prohibited Trees; removed native variety allowance from Salix - Species Willow.*

Rev 6: 3/2025

Section	Section Title	Revision
All	All	Renumbered all sections of the Technical Standard; included other minor formatting and edits for clarity.