DIVISION 2 - SITEWORK GENERAL

A. GENERAL: All site work shall conform to standards set by the City of Colorado Springs Engineering Division and the District guideline specifications indicated in this document unless otherwise accepted by COTR.

1) Drainage. For new construction, additions, and other applicable projects, a drainage plan for the site shall be prepared by a Civil Engineer experienced in such work and conforming to local regulations. Particular attention should be given to surface and ground water including seasonal fluctuations, and to physical properties of construction materials with regard to expansion and contraction. In all cases, drainage design and construction shall conform with the MS4 guidelines and requirements as regulated by the Colorado Department of Public Health and Environment, Municipal Storm Water Sector.
2) Wind and Erosion Protection. Care should be taken to choose landscape materials that are stable and not subject to erosion by wind, water, or other natural elements.
3) Soil Conditions. Soil Import Guidelines: The following general requirements apply to fill materials brought from off -campus generated from ongoing or previous excavations. For new construction and additions, CSSD #11 shall require soils testing and recommendations by a registered soils engineer. In the event a soils report and recommendation has previously been prepared for a specific site, Architect and CSSD#11 shall review and determine adequacy and applicability for new project. All new construction shall be designed in accordance with recommendations provided by Soils Engineer unless otherwise directed by COTR.
    a) Notify CSSD#11 Environmental Programs prior to the import of any soil or fill material to a CSSD#11 site.
    b) A "Phase 1" investigation shall be conducted of the source of the fill prior to any material being imported or relocated on campus. The primary purpose shall be to identify the potential for soil contamination and the potential extent of that contamination of concern.
    c) The fill must not be from an industrial area, an area undergoing environment clean up or remediation, a demolition site, an area with expected contamination, unpaved parking areas, former service stations, solvent cleaning establishments, paint-related facilities, or similar locations with high potential for soil contamination.
    d) Acceptable soils shall be obtained from residential locations, undeveloped locations, previously evaluated and approved areas, or areas of "virgin" soils, such as deep excavations. Soils from agricultural areas should be used with caution due to potential pesticide contamination or presence of manure or decomposed organic material.
4) Vehicular Traffic. Safety at all schools and safety on playgrounds is of first consideration. Auto, truck, and bus traffic patterns should be designed so as not to become a hazard to staff, students, or general public. Where possible, bus drop-off areas should be separated from auto drop-off areas. All signs, signals and markings on school property shall conform to the "Uniform Traffic Control Device Manual," published by Colorado Department of Highways, Planning and Research Division. Service traffic of all types shall be held to an absolute minimum on school grounds. The site should be developed so that student traffic does not cross or go through service traffic lanes. For all projects, driving on school grounds when school is in session is not permitted unless driving within an area that is fenced and segregated from public or student access or unless aided by a ground guide.
5) Playgrounds. Care should be taken in site design near playground areas to avoid steep slopes, open drainage swales and retaining walls. Playgrounds should be located in areas which are easily visible by school staff. When possible, playgrounds should be located away from public right of ways and must be fenced or screened appropriately if not possible. Shading is required for preschool areas in accordance with the Colorado Department of Health and Human Services requirements. All playground designs and proposed playground

equipment must comply with the guidelines contained in the "Handbook for Public Playground Safety" published by the U.S. Consumer Product Safety Commission (CPSC) and must also comply with Americans with Disabilities Act (ADA) standards for playground access. All playground designs and proposed playground equipment must be approved by COTR and CSSD #11 Grounds shop.

6) Utilities. For all projects, water, sanitary sewer, storm sewer, gas, electric, data, and communications service lines and meter placements should be planned for ease of maintenance and prevention of vandalism. For any site where there are obvious future additions and/or potential portable classroom locations, Designer and/or Contractor should propose service size and stub locations that will support future site expansion. When work is being performed at existing District facilities, Contractors may utilize available water and electricity as needed for light construction. When large amounts of water are necessary, Contractor may be required to obtain water from other sources such as fire hydrants with meters and Contractors shall be responsible for cost of meter and water consumption as required.
7) Fire Lanes. Conform to local Fire Department rules for provision of any paved or unpaved fire access lanes and for temporary fire lanes to be maintained during construction. Include confirmation of fire hydrant locations along with other fire safety requirements.
8) Visual Screening. Include visual screening, where possible, of the delivery, transformer, meters, and trash dumpster areas, in harmony with the building design.

B. DEMOLITION

1. General Demolition. Items to be removed and retained by Owner will be removed by Owner prior to start of project unless stated otherwise in contract documents. Other items specified to be removed shall be removed by Contractor and transported away from site. Cutting shall be done with extreme care so as not to damage adjacent surfaces to remain. Any existing surfaces that are damaged during demolition activities shall be patched, repaired, replaced, or repainted to match existing finishes.
2. Cutting & Patching. All concrete required to be removed shall first be saw cut to present a clean and neat edge. Masonry units which are to be removed shall be chiseled at the mortar joints and the mortar shall be removed to facilitate re-installation and toothing of new masonry materials.
3. Asbestos, Lead Base Paint, and Other Hazardous Materials. CSSD #11 retains a site-specific Hazardous Materials Management Plan at each District facility and maintains a library of all Hazmat plans at our District Facilities Office located at 5240 Geiger Blvd. These documents indicate "known" conditions although it is always possible that unknown conditions may exist. Designers and Contractors shall be responsible for reviewing the documents and becoming familiar with the location of known hazardous materials at each District facility prior to beginning work. All asbestos abatement and/or operations affecting asbestos containing materials shall be performed in accordance with the Asbestos Hazard Emergency Response Act (29 CFR Part 763 – AHERA) and Emissions Standard for Asbestos excerpted from Colorado regulation number eight, "The Control of Hazardous Pollutants". Although asbestos may be present in many different building materials used for prior construction, Contractors & Designers should be aware that asbestos has typically been found in the following building materials:

    a. Mechanical Fittings and insulation
    b. Electrical wiring and insulation
    c. General building insulation
    d. Transite panels
    e. Floor tiles & floor tile adhesive

f. Ceiling tiles and ceiling tile adhesive
g. Gypsum board partitions

4. Contractors performing demolition or cutting and patching work in areas where lead based paint is present are required to be certified renovators in lead-safe work practices and must follow all governmental regulations regarding removal and disposal of materials containing lead based paint.

C. DESIGN, GRADING AND EXCAVATION

Contractor shall be responsible for locating all underground utility service lines prior to beginning any on site excavation or grading activities.

1. Design. Preliminary and final designs for all site improvements shall be submitted to all state and local governing agencies and copied to the CSSD #11 Facilities Department. Grading plans shall include:
   a. Surface and subsurface drainage, detention areas, and discharge points.
   b. Applicable site demolition and/or proposed removal of trees or other site vegetation
   c. Indication of all hardscape surfaces (sidewalks, parking areas, driveways, etc.)
   d. Indication of playground areas
   e. Proposed curb & gutter
   f. Proposed retaining walls
   g. Indication of existing and proposed finish grades
   h. North Arrow
   i. All other items required for plan reviews
2. Finish Grading. All finish grades should be designed to provide positive drainage away from the buildings and into approved drainage systems. Avoid berm slopes which make rider-driven machine mowing difficult. Grades shall be finished to remove all rocks, clods, debris, etc. and ready for soil preparation appropriate for planned surface material. Where surface material is gravel, finish grading shall be complete so that no additional surface preparation is necessary. When possible, grading should be designed to meet the following District guidelines:
   a. Playground Fall Surfaces: Dead Level Flat (maintain existing drainage)
   b. Concrete: 1.5% min (3/16" per foot) to 3% max (3/8" per foot)
   c. Soil, Gravel, Breeze: 1.5% min (3/16" per foot) to 3% max (3/8" per foot)
   d. Asphalt: 2% min (1/4" per foot) to 4% max (1/2" per foot)
   e. Sod or Seeded Areas: 3% min (3/8" per foot) to 6% max (3/4" per foot)

3. Retaining walls. Where retaining walls are necessary, they should be held to a minimum height. Retaining walls should be constructed primarily of concrete or masonry retaining wall systems. Use of landscaping timbers is generally discouraged but may be considered subject to review and approval by COTR.
   a. All retaining walls greater than 4'- 0" in height shall be designed and specified by a registered engineer, and meet appropriate building codes for guard rails.
   b. Design and installation of Keystone, Amastone, or similar masonry wall systems shall be in compliance with manufacturer's recommendations.
   c. Landscape timbers (if approved) shall be 6" x 6" treated fir, hemlock, or pine and shall not be used for any application greater than 4'-0" high. If used, timbers shall be installed with a 1" step back per course and shall be tied vertically w #4 rebar at minimum 2'0" on center or 3 spikes per timber whichever is greater. Any timber retaining walls greater than 2 courses high shall have deadmen installed a minimum of 16' spacing for each two additional courses in height.

d. Timbers or other materials used for perimeter containment of fall surfaces shall be installed dead flat and designed such that approved fall surface material is fully contained and will not migrate outside of perimeter containment.
e. When retaining walls are adjacent to a pedestrian path and handrails are required, handrails shall be provided and should be installed using the weld plate method of anchoring rather than sleeves or cast-in-place anchors.

4. Backfill & Compaction. All exterior holes, voids, footing trenches, etc. in soil created as part of construction shall be back-filled in 6" lifts with structurally sound material free of frost, organic material, debris, or other material which may reduce the structural integrity of subsoil and compacted to 90% maximum modified proctor density in accordance with ASTM D1557 or as otherwise stated in site specific soils report and recommendation. Owner may contract with a third party testing agency to provide quality control assurance in regards to required compaction.

D. SITE IMPROVEMENTS

1. Concrete Walks, Curbs, and Concrete Paving:

a. Outside of property lines, walks, curbs, gutters, aprons, etc., should be constructed in accordance with each local jurisdiction's requirements. Existing concrete walks, curbs, and gutters outside property lines shall be protected and, if damaged, shall be replaced by the Contractor in accordance with requirements of the local jurisdiction in which damage occurs.
b. Within property lines, pedestrian walks should be constructed of 4" thick, 3000 psi concrete with 0.5 bags of fiber-mesh reinforcement per cubic foot.
c. Concrete for driveways and parking areas shall utilize appropriate welded wire mesh reinforcement and the thickness shall be 6". Concrete design mixes shall be submitted for review and approval when requested by COTR.
d. Control joints should be provided in exterior concrete flatwork to minimize differences in dimensional shrinkage as follows:

i. Control joints in sidewalks should form square panels – ie. 4' o.c. spacing in 4' wide sidewalks, 5' o.c. spacing in 5' wide sidewalks, etc.
ii. Not greater than 15'-0" o.c. grid for driveways or parking areas

e. Expansion Joints should be provided for exterior concrete flatwork as follows:

i. Between any building foundation and any adjacent walkways or paved areas
ii. Between curbs and walkways or other paved areas
iii. Between any pier, pad, or caisson and adjacent hardscape surface

2. Playground Design and New Playground Fall Surfaces:

a. Proposed design, equipment, and fall surfaces shall comply with the guidelines contained in the "Handbook for Public Playground Safety" published by the U.S. Consumer Product Safety Commission (CPSC) and must also comply with Americans with Disabilities Act (ADA) standards for playground access.
b. Existing playground equipment shall be relocated only as required to meet the CPSC Handbook clearance requirements. New timber perimeters shall be installed as required to meet the CPSC Handbook clearance requirements. New fall surfaces shall comply with the CPSC Handbook requirements. New playgrounds and fall surface areas shall be designed such that existing drainage

patterns and drainage elements are maintained and free flowing without causing migration of the surfaces.

c. Acceptable fall surfaces. Pea Gravel, Engineered Wood Fiber and Poured in Place Rubber are acceptable surfacing materials under playground equipment.
    i. Rubberized fall surfaces. When budget permits, CSSD #11 prefers to utilize rubberized fall surfaces. Safety surface material shall be a minimum of 2" thick (2-1/2" where specified) and shall be installed on 3" of properly compacted Class 6 road base. **In all cases**, design and installation shall meet the requirements of ASTM F1292 "Standard Specification for Impact Attenuation of Surfacing Materials within the Use Zone of Playground Equipment."

        1. SBR rubber products shall not contain any metals or fiber from tire processing and shall meet the following gradations: .5mm – 2mm thickness x 3mm – 20mm in length, granulated rubber: 1 – 3.5mm.
        2. Polyurethane binders shall be specially formulated for playground surfacing, shall contain no TDI, filler minerals such as plasticizers, catalysts, extenders or heavy metals. Weight of polyurethane shall be no less than 8.5 lbs/gallon. Pigments shall contain no heavy metals and shall be 100% moisture free.
        3. Clear polyurethane binders and strand SBR rubber for base mat shall be thoroughly mixed on site to ensure 100% coverage of all particles, poured in place and installed to a consistent density 29 pounds 5 ounces per cubic foot to the specified thickness to meet critical height criteria of play equipment.

    ii. Engineered Wood Fiber. Engineered Wood Fiber fall surfaces shall be a minimum of 12" depth.

d. Playground equipment shall comply with CPSC Guidelines.

e. Playground equipment such as basketball backstops, softball backstops, and tetherball posts may be included in the construction contract. Play structures, swings, and slides are customarily planned and purchased by CSSD #11. Exact requirements will be defined on an individual project basis.

3. Fencing:

a. Temporary Construction Fence. For existing facilities where staff and students are present, construction fencing shall be chain link or other durable fencing material approved by COTR. Temporary fencing shall be furnished, installed, maintained, and removed by the Contractor. Verify location before installation.
b. Permanent Fence - Requirements for permanent fencing for playground, etc., vary from project to project. Location and extent of fencing will be determined as a part of the site development.
c. Chain Link Fencing. Chain link fencing is the preferred fencing for use at District facilities. All fencing material should be commercial grade galvanized steel. All fence posts shall be one piece and shall be set in concrete with minimum 6" soil coverage and minimum 24" depth. Fencing materials should be as follows:

    i. Fabric: 9 gauge wire, 2" mesh, knuckle to knuckle or knuckle to twist construction. Furnish one piece fabric width for height of fence section. Place fabric on outside of line posts.
    ii. All pipe products shall be DQ 40 construction

iii. Terminal Posts and Line Posts:
   a. 4’ high fencing: 2-1/2” O.D. terminal posts, 1-7/8" O.D. line posts spaced at maximum of 10' O.C.
   b. 6’ high fencing: 3” O.D. terminal posts, 2-1/2” O.D. line posts spaced at maximum of 10’ O.C.

iv. Gate Posts: 2-1/2” O.D. for single gate up to 4’-0” height, 3” O.D. for single gate 4’0” – 6’-0” high, and 3.5" O.D. for double gates or gates over 6’0” high.

v. Top Rail: 1-5/8" O.D., manufacturer's longest lengths, with 6" long expansion type couplings at each joint. Provide means to securely attach top rail to each post.

vi. Tension Bars: Minimum cross section 1/4" x ¾," one piece lengths equal to fabric height.

vii. Tension Clamps: 14 gauge x 1" spaced at 15" O.C. maximum.

viii. Tension Wire: 9 gauge wire. Install entire length at bottom edge of fabric. Wire to be continuous between terminal posts.

ix. Fence Fasteners: 12 gauge wire. Space 12" O.C. on line posts and 24" O.C. on rails and braces.

x. Post Tops: Weather tight closure cap with opening for top rail, one cap for each post.

d. Chain link Gates. Chain link gates shall be constructed and installed as follows:

   i. Frames: 1- 5/8" O.D. for all perimeter members and intermediate members if perimeters are over 5'-0” apart. Frames shall be welded and joints painted with zinc based paint.

   ii. Fabric: 9 gauge wire, 2" mesh, knuckled top and bottom, attached to frame with tension bars and clamps same as for fence.

   iii. Hinges: Pressed steel, 180 degree swing, one pair for each gate to 4' height. Provide 1-1/2 pair pressed steel bulldog type hinges for gates 6' height or greater.

   iv. Latches: Malleable steel fork type for single gates, plunger-bar for double gates. Operation either side, integral padlock eye, plunger-bar strike set in concrete.

e. Post & Rail Fencing. Wood post & rail fencing shall be treated pine doweled rail/post and doweled fencing. 3’ fence, 2-rail, nominal post size 4-1/2” to 5-1/2” diameter x 5’6” high, 8’ long rails. Fence posts to be installed 24” deep.

4. Site Signage.

   a. Traffic & Directional Signage. Aluminum traffic and pedestrian control signs shall be as shown on the drawings. Mount signs on perforated 2 1/2" square galvanized steel posts. Install posts in sleeves set in concrete minimum 24” deep.
   b. Site Identification/Monument Sign. A freestanding site identification sign, appropriate to the building design and budget, shall be included in the contract for new buildings. Photovoltaic power for front or remote signage is encouraged and preferred

5. Flagpoles

   A flagpole shall be provided at all CSSD #11 sites. Location of flagpole shall typically be near front entrance to building but must be approved by District PM. Flagpole shall be installed in concrete base in accordance with applicable codes and manufactures recommendations. Flagpole shall be 30’ (exposed length) seamless tapered alloy 6063-T6 aluminum tubing with clear satin anodized finish.

a. Overall pole length shall be 34'-0" with setting depth of 4'-0". Flagpole wall thickness shall be minimum .188 with a minimum 6" butt diameter.
b. Pole shall have revolving truck with 6" diameter 14 guage clear anodized aluminum ball, one aluminum sheave, one polypropylene halyard, and two sets chrome plated snap hooks for two flags. Provide matching clear anodized flashing collar.
c. Flagpole shall have internal halyard system with manually operated cam action cleat and key operated flush access door.
d. Provide galvanized corrugated steel foundation tube with self-centering bottom plate and lightning protector ground spike.

Acceptable manufacturers include:
a. Eder Flag
b. American Flagpole
c. Pole-Tech Co.
d. Morgan-Francis Flagpoles
e. EMC Flagpoles
f. Approved substitute

6. Exterior Bleachers. Aluminum bleachers shall have a clear anodized finish with manufacturers standard aluminum non-slip seat and footboards. Guardrail system shall be included at rear and each side to meet IBC and ADA standards.

7. Bicycle Racks. AAA Ribbon Rack Model No. RB11 or approved substitute. Hot dipped galvanized finish with ground anchor mount.

8. Exterior Basketball Backstops. When specified, basketball backstops shall be Summit Supply #543-629 pole, #542-600 aluminum backboard, and #240 double rim or approved substitute.

E. VEHICLE DRIVES AND PARKING AREAS

1. General Design. Public and private drive and parking areas shall generally be designed and specified in conformance with the State of Colorado Department of Highways, Standard Specifications for Road and Bridge Construction subject to review by CSSD #11 facilities office. The subgrade, whether undisturbed earth, fill or base course, should be compacted as required by the soils report and as defined under the grading section of the specifications and sterilized prior to installing base or asphalt. In no case, shall it be less than 95% of maximum density.

a. Asphalt Parking Lots and Driveways: Edges shall abut concrete curbs. If paved area is elevated from surrounding grounds, provide a positive means of carrying the run-off from the area so banks are not eroded.
b. Provide and install asphalt and base as indicated below:
    i. Heavy Vehicles (Bus & Trash Trucks): 3" Asphalt on 5" Base
    ii. Passenger Vehicles: 2" Asphalt on 6" Base
    iii. Playgrounds: 3" Asphalt on existing grade or 2" Asphalt on 4" Base
    iv. Full depth asphalt may be considered in lieu of mat on base subject to recommendations in soils report

c. Gravel Vehicle Operating Surfaces: Gravel drive and parking surfaces shall be a minimum of 2" depth, match existing grades, and meet the following sieve analysis:

Sieve #	% Ret	% Pass	Specs
½"	0	100	
3/8"	0.6	99.4	
4	5.5	93.9	
8	18.2	75.7	
16	20.2	55.5	
30	17.8	37.7	
50	15.5	22.2	
100	9.1	13.1	
200	4.2	8.9	
Moisture Wet	953.2		5.0%
Washed Wet	90.		

d. Asphalt Maintenance: Where asphalt maintenance is specified, all asphalt shall be sound before seal coating. All structural defects shall be repaired with hot mixed asphalt and all cracks filled with rubberized crack filler conforming to ASTM D-3405-78. The pavement shall be cleaned with compressed air and a broom type sweeper and all caked on dirt shall be water flushed. Two coats of asphalt emulsion sealer shall be applied in accordance with manufacturer's recommendations including non-skid aggregate skid prevention. All cracks larger than 1/8" shall receive crack filling prior to application of sealcoat. The entire asphalt surface shall receive seal coating and this will cover cracks smaller than 1/8". Cracks wider than 1" shall be repaired by removing asphalt to a width of 6" and replacing the asphalt with new asphalt on existing base. Potholes and other areas of soft or unsound asphalt shall be removed and replaced with new asphalt on existing base prior to application of sealcoat. Sealcoat material shall be an emulsified binder with a minimum of two (2) percent polymer, specified mineral fillers, and non-asbestos fibers to produce a smooth homogeneous material and shall meet the following requirements:

i. Uniformity: No separation of water coagulation of the bituminous base or settlement of suspended matter that cannot be overcome by moderate agitation.
ii. Weight: 10.00 - 11.50 pounds per gallon at 77 degrees F (ASDTM D-2939)
iii. Residue by evaporation: 47% minimum
iv. Non-volatile matter soluble in trichloroethylene: 15%-30%
v. Flammability: No tendency to flash or ignite
vi. Cone Penetration: Pass ASTM D-217 at 77 degrees F
vii. Weathering: Pass Fed Spec TTC-555B, Sect 4.4.6 2 year exposure
viii. Wind/Rain Resistance: Pass Fed Spec TTC-555B, Sect 4.4.7 98 miles per hour
ix. AASHTO T-44: Pass
x. Conform to: FAA spec P-626A

Medium to medium-fine slag sand shall be 100% fractured or have rough angular particles. The aggregate shall be black or dark grey in color and free from vegetable matter, organics, clay, and other deleterious substances and shall meet the following requirements:

i. Hardness: 6 to 7 on Mohs scale of mineral hardness
ii. Specific Gravity: 2.70
iii. Moisture Content: Less than 0.5%
iv. Free Silica: Less than 1%

Gradation:	Sieve #	% Retained
	16	0

20	0 - 2
30	10 - 30
40	25 - 45
50	10 - 30
60	0 - 15
80	0 - 15
100	0 - 5
Pan	0 - 5

e. All cracks with widths larger than 1/8 inch, including joints at concrete gutter lip and other concrete improvements shall be filled with hot poured crack sealant flush with the pavement surface. Immediately following the filling, any excess sealant shall be leveled off at the wearing surface by squeegee, a rubber shoe attached to the applicator wand or other suitable means approved by the School District. The squeegeed material to be left in place shall be centered on the cracks and shall not exceed three (3) inches in width or 1/16 inch in depth. Cracks in which the sealant has settled shall be topped off with additional sealant flush with the asphalt surface.

i. ASTM D 3405 78: Sealing Compound, hot applied for concrete and asphalt pavement
ii. Mil Spec FAA P625: Aggregate, Medium black slag sand

f. Pavement Markings. Painted striping designation of traffic lanes and parking stalls including handicapped parking areas will be a part of the construction contract and should be shown on the site plan drawing. Layout of parking spaces should be based on 9' x 20' stalls and 22' aisles unless otherwise indicated on site plan. Provide adequate spaces and curb cuts and ramps designed for the handicapped.

g. Precast or recycled concrete or recycled plastic wheel stops, where necessary, should be furnished and installed as part of the contract, but avoid where possible due to difficulty of snow removal.

2. Guarantee. In addition to guarantees as specified elsewhere, the Contractor shall repair or restore to first class condition any portion of the paving in which creeping, shoring, cracking, softening, settling or other defects that are due to improper placing or defective materials appear or become apparent within one year from date of acceptance. All workmanship and materials necessary for any repairs shall be in complete accordance with the requirements of these specifications for the original work.

F. LANDSCAPING & IRRIGATION

1. Landscaping. Landscaping and soil preparation shall be site-specific and shall be designed, specified, and installed with durability, ease of maintenance, and vandalism avoidance in mind. When on-site soils do not have acceptable organic material content, soil remediation and or application of suitable topsoil shall be required. In all cases, proposed landscape materials and design should generally consist of low water consuming drought-resistant plant materials. Turf areas should be kept to a minimum – typically just play areas and athletic fields. Native seeding should be utilized for other areas requiring vegetation or erosion control. Unless otherwise directed, avoid narrow grass areas less than eight (8’) feet wide and use of plantings in narrow islands, etc. Consult with Owner regarding the use of mulches, breeze, landscape finish materials and drought-tolerant plantings. If mulches are used, do not specify matting materials. Mulches shall be at least 4” deep (below grade level).

a. Aggregates. Breeze material is acceptable for landscaping. Decorative landscape rock, rip-rap, river rock, or any other rock with individual stones less than 100lbs in weight shall not be used unless grouted in place.
b. Topsoil. Lawn areas should have a minimum 4" topsoil installed and should be fine graded to finish elevations.
c. Sod: Sod shall be blue grass compatible with the environment in the Pikes Peak region and shall include topsoil. Sod shall be installed tight without seams and without stretching so that when sod shrinks no voids will appear. All new sod shall be fertilized with a starter or approved mixture.
d. Grass Seed Mixture: When specified, native grass seeding shall be planted on prepared subgrade with 4" topsoil or other soil preparation as specified and protected against erosion until seedlings can develop. Seed should be applied at a coverage rate of 23lbs/acre. Seed mixture (commonly called "Garden of the Gods Mixture") shall be composed of constituent parts as indicated in the following table.

Variety	Species	PLS/Acre @ 100%	% of Mixture	PLS Rate/Acre	Alternate Variety
Arriba	Western Wheatgrass	16	20	3.2	Barton Western Wheatgrass
Green	Green Needlegrass	10	10	1	Stipgrass Green Needlegrass
Hachita	Blue Grama	3	15	0.45	Lovington Blue Grama
Vanghn	Sideoats Grama	9	25	2.25	El Reno Sideoats Grama
Pastura	Little Bluestem	7	15	1.05	Cimmarron Little Bluestem
Blackwell	Switchgrass	4.5	5	0,225	Greenville Switchgrass
VNS	Sheep Fescue	4	10	0.4	

e. Plant Materials. Care should be taken to select and specify site-specific plant materials with consideration to wind, drainage, and sun light conditions for each site as well as durability and ease of maintenance. Vegetation shall be drought resistant, very cold hardy, capable of resisting abuse. The following plant materials are generally acceptable for use for CSSD #11 facilities:

<u>GROUND COVERS (no flowers)</u>
Oregon Grape – Mahonia Aquifolia
Blue Carper Juniper – Juniperus Horizontalis Wiltonii
Kinnickinnick – Arctystaphylos Uva Ursi
Winter Creeper – Euonymus Fortunei Azusa or Radicans
Goutweed – Aegopodium Podagraria
<u>GROUND COVERS (flowering)</u>
Thyme, Creeping or Common – Thymus Serpyllum or Vulgaris
Thrift, Sea Pink – Armeria Maritima
Moss Pink – Phlox Subulata
Rock Cress – Arabis Procurrens or Alpina
Perennial Penstemon - Penstemon Davidsonii or P. Mensiesii Davidsonii
Evergreen Penstemon - Penstemon Rubicola
Alpine Poppy - Papaver Alpinum
<u>FLOWERS (tall)</u>
Golden Summer Daylily – Hemerocallis Aurantiaca
Iris, Tall Bearded – Iris Germanica
Sun Drop – Oenothera Tetragona
Mexican Evening Primrose – Oenothera Speciosa Childsii (O. rosea mexicana)
Stonecrop – Sedum Spectabile
<u>SHRUBS</u>
Bush Cinquefoil – Potentilla Fruticosa

Flowering Quince – Chaenomeles Speciosa
Russian Olive – Elaegnus Augustifolia
Siberian Pea Shrub – Caragana Arborescens
Tam Juniper, Juniperus Sibira Tamariscofloia
TREES
Aspen, Quaking Aspen – Populus Tremuloides
Honey Locust, Gleditsia Tricanthos Inermis Shademaster
Seedless Ash, Fraxinus Pensylvanica Marshalls Seedless
Scotch Pine, Pinus Sylvestris
Knobcone Pine – Pinus Attenuatta
Pinon Pine – Pinus Edulis
Limber Pine - Pinus Flexilis
Rocky Mountain Juniper – Juniperus Scopulorum
Red Cedar Juniper – Juniperus Virginiana

f. Planting Instructions: Pit shall be at least twice as large as the diameter of the plant ball. Remove all plastic, vinyl, pressed paper and nylon or twine trunk ties, and drop burlap to bottom of planting pit. Place backfill then "water in" all plant materials to avoid settling. Any settling shall immediately be repaired by the contractor.

2. Irrigation. Prior to beginning work, the Contractor shall prepare and submit a complete set of sprinkler system shop drawings for CSSD #11 review and approval indicating proposed layout, coverage, and all applicable parts. Quantities of materials and equipment need not be included. **No deviations from the specifications shall be allowed.** All new lawn irrigation systems shall be automatic electric systems with programmable controllers. Separate irrigation meters are required and backflow prevention devices shall be provided and installed in accordance with applicable State & local plumbing codes and CSSD #11 specifications. Contractor shall coordinate with the Architect and Owner for meter and backflow preventer locations. CSSD #11 reserves the right to approve/disapprove irrigation subcontractors that are used for large or small scope irrigation system installations or repairs prior to performing work on a District site.

a. Large Area Sprinkler Systems (i.e.) Athletic Fields:

Materials:

i. Pipe: Mains: PVC Class 200 rating, solvent welded
ii. Pipe: Lateral Lines: PVC Class 160, solvent welded
iii. Fittings: PVC Schedule 40 or 80
iv. Heads: Hunter PGP 125 gear driven rotors with stainless riser
v. Heads: Hunter I 40 Gear Driven Rotors with stainless riser
vi. Valves: Rainbird brass PEB series
vii. Wire: Size - #14 AWG solid
viii. Valve Box: Ametek, Carson or equal with snap – lock lids
ix. Controller: Rainbird ESP, metal enclosure wall mount for exterior use (plastic lockable acceptable for interior use)
x. Backflow Preventor: Febco – Models 825y, 825YA, 880V, 880, 860, 765, 850, 805, 870, 876V, (805, 825 ¾" thru 2" only)

Installation details:

i. Pipe Depth – Mainlines 30" cover, Laterals 24" cover

ii. Install pre-manufactured swing joints on each gear driven sprinkler head.
iii. Install a PVC Ball Valve upstream of each zone valve and PVC Unions at each valve. Valve box installation will be installed with brick stabilizers under each valve box to prevent settling, valve box will have fabric liner and rock bedding to separate valve from surrounding ground. Use valve box extensions wherever necessary. Valve type will be as specified in materials list.
iv. Install Thrust Blocks on the Main Line as Needed to Meet Industry Standards
v. Control Wires shall be bundled and run on the underside of main line wherever possible. No underground splices will be permitted. Spices will only be permitted when wire runs are over 1000 feet. Control wire box will be installed at these locations. Extra wires shall from the controller to the last valve box on the system. One extra common and one extra live wire for every 8 zone wires shall be provided.
    a. Live wires- Red or Orange
    b. Common/Ground – White
    c. Extra Common – Yellow
    d. Extra Live wires – Green
    e. Sleeves shall be installed for all piping and wires that are ran under sidewalks or other hard surfaces.

b. Ornamental Sprinkler Systems:

Materials:
i. Pipe: Mains: PVC Schedule 40, Solvent welded
ii. Pipe: Laterals: PVC Schedule 40, Solvent Welded
iii. Fittings: Fittings: PVC Schedule 40 or 80
iv. Heads: Rainbird 1804 PRS
v. Valves: Rainbird brass PEB Series
vi. Wire: Size - #14 AWG solid
vii. Valve Box: Ametek, Carson or equal with snap – lock lids
viii. Controller: Rainbird ESP, metal enclosure wall mount for exterior use (Plastic lockable acceptable for interior use
ix. Backflow Preventor: Febco – Models 825y, 825YA, 880V, 880, 860, 765, 850, 805, 870, 876V, (805, 825 ¾" thru 2" only)

Installation details:
i. Pipe Depth – Mainlines 24" cover, Laterals 18" cover
ii. Install pre-manufactured swing joints on all gear driven sprinkler heads.
iii. Valve boxes will be installed with brick stabilizers under each valve box to prevent settling, above use valve box extensions wherever necessary. Valve type will be as specified in materials list.
iv. Control Wires shall be bundled and run on the underside of main line wherever possible. No underground splices will be permitted. Spices will only be permitted when wire runs are over 1000 feet. Control wire box will be installed at these locations. Extra wires shall run from the controller to the last valve box on the system. One extra common and one extra live wire for every 8 zone wires shall be provided.
    a. Live wires - Red or Orange
    b. Common/Ground – White
    c. Extra Common – Yellow
    d. Extra Live wires – Green

c. Low-Volume/Drip Sprinkler Systems:

Materials:

i. Backflow Preventors: Febco – Models 825y, 825YA, 880V, 880, 860, 765, 850, 805, 870, 876V, (805, 825 ¾" thru 2" only)
ii. Sleeves: Class 160or SDR 35 PVC sewer and drain pipe
iii. Supply Lines/Point of Connection: Type K copper w/silver solder used on joints.
iv. Main Lines: Class 200 PVC pipe bell end for solvent welding
v. Lateral Lines: Class 160 PVC pipe bell ended for solvent welding
vi. Fittings for Solvent Welding: Schedule 40
vii. Threaded Nipples : Schedule 80
viii. Fittings for Flexible Plastic Pipe: Type 1 ASTM 2609
ix. Clamps: Stainless Steel, screw type or ear type clamps
x. Fittings for Drip Systems: Type and make as recommended by tubing manufacturer.
xi. Manual Drain Valves: Bronze body, angle type 200 lb class
xii. Automatic Control Valves: Rainbird 1" Xerigation commercial
xiii. Quick Coupler Valves: 2 piece, 150 psi rated, brass construction
xiv. Sprinkler Heads: Rainbird Xerigation drip emitters:
xv. Single-port emitters : pressure compensating type with outlets supplying 1 gph
xvi. Two (2) - emitters for shrubs
xvii. Three (3) - emitters for evergreen trees
xviii. Four (4) emitters for deciduous trees
xix. Controller: Rainbird ESP 8 Station LX Base Modular, metal enclosure wall mount for exterior use (plastic lockable acceptable for interior use)
xx. Valve Box: Ametek, Carson or equal with snap – lock lids
xxi. Control Wires: #14 AWG
xxii. Wire Connectors: Socket Seal Type and Water

Installation details:

i. Pipe Depth – Mainlines 18" cover, Laterals 12" cover
ii. Install fittings, valves, and accessories in accordance with manufacturer's recommendations, unless specified otherwise.
iii. Valve boxes will be installed with brick stabilizers under each valve box to prevent settling. Use valve box extensions wherever necessary. Valve type will be as specified in materials list.
iv. Control wires shall be bundled and run on the underside of main line wherever possible. No underground splices will be permitted. Splices will only be permitted when wire runs are over 1000 feet. Control wire box to be installed at these locations. Extra wires shall run from the controller to the last valve box on the system. One extra common and one extra live wire for every 8 zone wires shall be provided.

    a. Live wires- Red or Orange
    b. Common/Ground – White
    c. Extra Common – Yellow
    d. Extra Live wires – Green

d. Irrigation Systems Backfill. After system is operating and required tests and inspections have been made, backfill excavations and trenches with clean soil, free of rubbish. Backfill for all trenches, regardless of the type of pipe covered, shall be compacted to a minimum of 90# density.

Compact trenches in areas to be planted by thoroughly flooding the trench during backfill operations. Dress off all areas to finish grades.

e. As-built Drawings and System Demonstration: Contractor shall furnish fully revised and accurate as-built drawings of the piping, heads, and control wiring in accordance with CSSD #11 as-built submittal requirements for all irrigation projects regardless of size or complexity. The installer shall satisfactorily demonstrate coverage, operation, and sequencing of zones by scheduling a meeting with the Owner's Representative to review the as-built drawings and fully demonstrate the completed system.

<<<<END OF DIVISION 2>>>>