SECTION 1000 PARKS AND RECREATION CONSTRUCTION

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1001.00 PLAN SUBMITTALS

1001.01 Notification Prior To Digging

All parties wishing to install trees, shrubs, plants or other landscape materials MUST contact Colorado 811 and receive confirmation clearance prior to any project commencement.

1001.02 All Plans

1. All landscape and irrigation plans shall include the following components prior to submitting to the City for review:
2. Name of project and address in title block
3. Designer or firm name, address, and phone number
4. Gross acreage
5. Submittal date
6. North arrow
7. Vicinity map
8. Plan scale (both written and graphic). Irrigation and Landscape plan must be drawn to the same scale.
9. Sheets numbered with total preceded with "L" to denote landscape and "I" to denote irrigation. (Example: L1 of 8, L2 of 8, etc.) (Example: I1 of 5, I2 of 5, etc.)
10. Existing and proposed easements showing type, location, and width
11. Property, lot, and project boundary lines
12. Existing and proposed topographical contour lines. Height and slope of all changes in elevation such as berms, swales, ditches, etc. shall be identified.
13. Scalable plans shall be submitted in the size of 24"x 36" with half sets available on request
14. City of Brighton Standard Landscape and Irrigation General Notes.

1001.03 Landscape Plans

1. All landscape plans shall include the following components if applicable prior to submitting to the City for review if applicable:
2. Cloud, delta, and date all revisions to any plans previously reviewed by staff
3. Existing and proposed lighting elements including locations and details
4. Traffic and street signage locations and dimensions
5. Existing and proposed above and below ground utilities and easements
6. Existing and proposed driveways, sidewalks, trails, access roads to oil and gas facilities, parking areas, etc. locations and details. Label and specify surface materials and thickness. For parking lots, breakdown by types and number of vehicles
7. Existing and proposed structures and dimensions

8. Major site furnishings shall be identified (exterior signs, benches, water features, planters, walls, enclosures, bike racks, trash receptacles, sculptures, etc.) including locations, details, and legend
9. Fencing materials including locations and details
10. Plant materials list that specifies plant symbols, plant names (both botanical and common), legend of abbreviations, quantities, container or caliper sizes at time of installation, and root containment.
11. Above and below ground planting pits, containers, and tree grate details
12. Exploded views of densely vegetated areas or areas of great detail
13. Existing vegetation to be retained or removed including sizes and species. Vegetation and Tree Protection Zones shall be included on all applicable landscape plans.
14. Delineation of all corner sight triangles. Street trees shall be placed a minimum of fifty-five feet (55') from all intersections
15. Labeled or keyed all areas of mulch and indicate type and square footage
16. Labeled or keyed all areas to receive soil amendments
17. Labeled locations of proposed turf species including information on method of installation (sod, plugs, seeding rate)

1001.04 Irrigation Plans

All irrigation plans shall include the following components if applicable prior to submitting to the City for review:

1. Cloud, delta, and date all revisions to any plans previously reviewed by staff
2. Site specific conditions
3. System component legend with clear, consistent symbols
4. Symbols of other major components
5. Type and size of main irrigation system components
6. Sprinkler/emitter legend including symbols, operating pressure (PSI), flow rate (GPM)
7. Backflow prevention unit location, size, and type and installed pursuant to applicable plumbing and local codes
8. Submit a watering schedule with run times and application rates
9. Static pressure and design pressure shall be provided
10. Provide pressure loss calculations on request
11. The point of connection (POC) shall indicate the location and size of meter
12. Show and label locations to be irrigated with potable and non-potable water and identify the total square footage of each
13. Number and type of irrigation system controllers
14. Shut off and isolation valves
15. Zone valves with locations, type, size, flow, and number
16. Frequency of cycle for each control valve
17. Turf and non-turf zones shall be irrigated on separate valves
18. Show mains and laterals piping
19. Show spray heads, location, and type
20. Sprinkler heads must provide head to head water coverage

21. No single zone shall mix head types
22. Minimum acceptable distribution uniformities shall be 55% for pop up sprinkler heads or spray zones and 70% for rotor zones, or current irrigation association accepted minimums
23. Indicate location and size (area) of each hydro-zone – including any zones using non-potable water, total water budget broken down by each hydro-zone, location and size of water tap and meter, existing and design water pressure, type of irrigation technique (such as drip, micro-spray, spray, rotor, underground, etc.), and other general information
24. Irrigation zones substantially corresponding to hydro-zones on the landscape plan and labeled by precipitation rates and method of application
25. Show and label locations of proposed (low, moderate, high) hydro-zones and identify the total square footage of each
26. Total water budget and calculations by hydro-zone
27. Design for berms and slopes should minimize runoff. (Berms and slopes may need repetitive, shorter watering cycles.)
28. All systems shall be capable of supplying a sufficient number of inches of water per week to the total irrigated area in order to maintain the health of the plant material
29. Sleeve all lines under hardscapes
30. Install all temporary irrigation for City-owned and maintained sites below ground.

1000 1002.00 Pre-Construction Meeting Required

A pre-construction meeting, to be scheduled at a mutually agreeable time with staff from Parks & Recreation Department, the Utilities Department, the Streets and Fleet Department, and all contractors. Agendas shall consist of the following agenda items:

1. Attendance Sheet (includes all contact and emergency contact information)
2. Introductions
3. Required Documentation (Permits, licensing needs, etc.)
4. Standards and Specifications
5. Utility Locates
6. Water Availability on Site, Hydrant Meter
7. Erosion and Tracking Controls (if needed)
8. Notice To Proceed
9. Project Scheduling
    a. Project Timeline (Includes weekly project update meetings-date, time, location)
    b. Work Hours
10. Safety
11. Rights of Way and Easements
12. Traffic Control (if needed)
13. Changes and Deviation From Approved Plans (Change Orders)
14. Daily and On-Going Inspections
15. Concrete Inspections (through Streets and Fleet)
16. Grade/Soil Prep/Sod and Seed Inspections

17. Irrigation, Water Tap, Backflow Inspection, Mainline Pressure Test, Irrigation Coverage Test
18. Tree Inspections, Tree Tagging
19. Plant Material-Sizes, Quality, etc.
20. Playground Inspections (if applicable)
21. Acceptance and Warranty Procedures
22. As Builts (requires Mylar set, CD)
23. Miscellaneous

1010.00 SITE PREPARATION

1011.00 General

Site preparation shall be completed in accordance with Section 1000.00, Site Work and Earthwork, of these STANDARDS AND SPECIFICATIONS.

Contractor will identify, verify and protect control point. Control point to be identified on all plans and as- builts. Contractor will verify location of control point weekly. Original condition of control point pin must be maintained throughout the entire project.

1012.00 Protection of Existing Vegetation

1012.01 Protection of Existing Vegetation on City Owned Properties.

Prior to commencement of any site work, the Contractor, in conjunction with the Parks & Recreation Director or designee, shall identify all designated vegetation (or remnant native areas) suitable for preservation located on City owned properties. Vegetation that is to be preserved on the site shall be protected by creating adequate Vegetation and Tree Protection Zones. Protective fencing and signage shall be placed along the perimeter of designated Vegetation and Tree Protection Zones.

1012.02 Existing and Native Vegetation Representation

All significant existing and native vegetation shall be depicted on the design plans prior to adopting any "approved" plans.

1012.03 Protective Fencing

Vegetation and Tree Protection Zones shall be protected by orange vinyl construction fencing, chain link fencing, or snow fencing at least (4) feet high and supported at (10) foot intervals by metal T-posts. Wooden stakes and rebar posts shall not be used as supports. Fencing shall be maintained

upright and in place. All fencing shall be in place prior to commencement of any site work and remain in place until all work has been completed.

1012.04 Signage

All protective fencing shall have a waterproof vegetation protection sign affixed to the fence every (20) feet in such a manner to be clearly visible to workers on the site. Signage shall be maintained visible and legible. Signage shall be written in both Spanish and English and read as follows: "Protected Vegetation: NO traffic, vehicles, or material storage in this area."

1012.05 Prohibited Practices in Vegetation and Tree Protection Zones

Prohibited practices within Vegetation and Tree Protection Zone(s) shall include, but not limited to the following: removal, relocation, or trimming of vegetation without permission of Parks & Recreation Director or designee; breaking of branches or scraping of the bark; changes to existing grade by excavating, filling, trenching, or use of augers; nailing, bolting, or using vegetation as a temporary support in any way; parking or storing equipment or building materials; dumping of construction waste or materials, disposing of liquids or contaminants; driving equipment through; or removal of protective fencing until all work has been completed.

1012.06 Vegetation Protection Zones

All vegetation types that have been deemed suitable for preservation, with the exception of trees, shall be adequately preserved in Vegetation Protection Zones. Protective fencing shall be placed a minimum of five (5) feet away from the edge of the vegetation's canopy and encompass the entire plant species/community.

1012.07 Tree Protection Zones

The Contractor, in conjunction with the Parks & Recreation Director or designee, shall identify the critical root zone area by all of the trees that are to be preserved on the site and create adequate Tree Protection Zone(s). The critical root zone shall be determined by whichever encompasses the greatest area: (1) the irregular shape formed around a tree by a series or vertical lines that run through the outermost portion of the canopy of the tree and extend to the ground, often referred to as the drip line; or (2) one and a half (1 1/2) feet of space from the trunk for each inch of trunk diameter in every direction. The critical root zone dimensions will serve as the required dimensions of the Tree Protection Zone.

1012.08 Tunneling and Boring

There shall be no trenching permitted within a Vegetation or Tree Protection Zone. Utilities shall be bored under the Vegetation or Tree Protection Zone in circumstances where it is not possible to

trench around the protected area(s). When required, the length of the bore shall be the width of the critical root zone at a minimum depth of forty-eight (48) inches.

1012.09 Soil Protection

Under special circumstances, where vehicle and equipment access is needed through a Vegetation or Tree Protection Zone, permission must be obtained from the Parks & Recreation Director or designee. Any access roads through a Vegetation or Tree Protection Zone shall be created using six (6) inches of wood mulch to reduce soil compaction in areas subject to repeated construction traffic. The mulch shall be replenished as necessary to maintain a six (6) inch depth. Upon completion of all site work, the mulch shall be removed with care taken not to change existing grade.

1012.10 Penalties

Contractor shall be held responsible for any damage to vegetation that was designated to be preserved within designated Vegetation and Tree Protection Zones.

Failure to comply with Protection of Existing Vegetation specifications may result in penalties. If the violation results in damage to a tree or other woody plant, there shall be, in addition to any other applicable penalty, a penalty of three (3) times the damage caused to the tree or other woody plant, or $500, whichever is greater. In the event a tree or other woody plant is removed in violation of any of the provisions of this section, the additional penalty shall be three (3) times the value of the tree. For purposes of calculating the damage to the tree, the most recent edition of the "Guide for Establishing Values of Trees and Other Plants" by the Council of Tree and Landscape Appraisers shall be presumed to provide the appropriate basis for determining damages.

1012.11 Maintenance of Retained Trees

All vegetation that was designated to be preserved within designated Vegetation and Tree Protection Zones shall be maintained by Contractor including watering and pruning until final acceptance has been granted.

1020.00 TOPSOIL PREPARATION

1021.00 General

The Contractor will provide all labor, equipment and materials necessary to complete the topsoil preparation for seeding and/or sodding as required by the accepted plans and these STANDARDS AND SPECIFICATIONS.

Areas to be developed or otherwise re-seeded (including native seeding areas which are currently weed dominated) which are infested with annual, biennial or perennial weeds, such as bindweed, Canadian thistle, Scotch thistle, Russian thistle, Kochia, Diffuse knapweed, or annual ryegrass , and not bearing significant remnant native species, shall be treated with Round-up or another generic Glyphosate based broad spectrum herbicide at a rate recommended on the chemical's label for controlling all existing vegetation. Do not treat remnant native grasses, shrubs or trees in designated open space areas. Do not till, reseed or plant herbicide treated areas for at least seven (7) days following treatment. More time may be needed to neutralize the herbicide in cold weather or on sandy soils. All applicable portions of Section 1032.01, Topsoil, of these STANDARDS AND SPECIFICATIONS shall apply.

Landscape plans must show amount of organic amendments needed at a rate of five (5) cu. yards per thousand (1000) square feet for all landscaped areas. Native areas soil amendments will be shown at a rate of three (3) cu. yards per thousand (1000) square feet. Plans will provide detailed square feet/acreage measurements for all landscaped areas.

1021.01 Soil Test

Contractor shall notify the Parks & Recreation Director or designee upon completion of rough grading and prior to commencement of soil preparation work. For parcels to be maintained by the City of Brighton, the Contractor shall obtain agronomic soils tests for all planting areas after completion of rough grading and prior to start of soil preparation work to determine what amendments and method of application are required to support trees, shrubs and groundcovers, seeds and sod identified on the landscaping plan. Tests shall be performed by an approved agronomic soils testing laboratory and shall include a fertility and suitability analysis with written recommendations for soil preparation, planting backfill mix, and post plant fertilization program. The soils report recommendations will take precedence over the minimum amendment and fertilizer application rates specified herein only if the soils report recommendations exceed the specified minimums.

Soil tests shall include the following at a minimum:

1. Particle size analysis of soil for percentage of sand, silt, and clay
2. Chemical analysis, including the following:
3. pH and buffer pH
4. Percentage of organic content by oven-dried weight.
5. Nutrient levels by parts per million, including nitrogen, phosphorus, potassium, manganese, iron, zinc, and calcium. Nutrient test shall include the testing laboratory recommendations for supplemental additions to the soil based on the requirements of horticultural plants.

6. Soluble salt by electrical conductivity of a 1:2, soil: water, sample measured in millimho per cm.
7. Cation exchange capacity (CEC).

1022.00 Materials

1022.01 Organic Materials

Organic amendments shall be certified as "Class 1 Compost" and consist of an organic product containing a mixture of well rotted/composted cow or sheep manure and or composted aspen humus or wood residue or approved equal (sphagnum or native mountain peat is not acceptable). Organic product shall have been aerobically and naturally processed in such a manner as to maintain a consistent temperature of 140 degrees Fahrenheit 30 degrees Celsius or greater for 70 to 90 days. The pH after composting shall be between 6.0 and 7.8, with dry organic matter content of not less than 30% and soluble salts not greater than 5mmhos/cm. Certification must be provided to prove the product has gone through this process.

1022.02 Fertilizer for Parks or Conventional Landscape Areas

Fertilizer will be a complete starter fertilizer having a ratio of approximately 5-15-1, with a minimum acceptable nitrogen level of 15%, and minimum acceptable Phosphorus level of 45%. An example is fertilizer with the chemical analysis of Nitrogen-18, Phosphorous-46, Potash-0. Fertilizer will be delivered to the site in new, unopened bags bearing the manufacturer's name and the chemical analysis. Fertilizer will conform to all Colorado Department of Agriculture fertilizer laws.

1022.03 Fertilizer for Open Space and Native Seeded Areas

Forte Biosol or approved equal, a slow release organic fertilizer shall be applied to all native seeded areas at a minimum rate of eight hundred (800) pounds per acre. Forte Biosol shall be applied following seeding and before mulch application.

1023.00 Process (Seedbed preparation)

1023.01 Seedbed Prep Process for Parks or Other Conventional Landscape Areas

The Contractor will cultivate the area to be seeded / sodded to a depth of six (6) inches so as to free the site of weeds and other plants that may interfere with turf establishment. All stones, sticks, and debris brought to the surface over one and one-half inches (1.5") diameter will be removed from the site. Prior to seeding / sodding, the Contractor will uniformly apply the specified Class 1 organic

material at the rate of five (5) cubic yards per one thousand (1,000) square feet along with a complete starter fertilizer. An example is fertilizer having a ratio of approximately 5-15-1, with a minimum acceptable nitrogen level of 15%, and minimum acceptable Phosphorus level of 45%, at the rate of five (5) pounds per one thousand (1,000) square feet and incorporate both materials into the soil to a depth of six (6) inches with a disc, rototiller, or other suitable tilling equipment. Organic materials shall be applied when the surface is within two (2) percent of final grade. No organic material containing manure shall be stockpiled on the site for more than eight (8) hours before it is incorporated into the soil. After tilling, the areas to be seeded or sodded will be raked, graded, and rolled to the desired finished grades according to the grading plan within a tolerance of one-tenth (0.1) foot, with gently sloping surfaces to adequately drain all surface water run-off. The finished surface will be even and uniform, and no dirt clumps or other debris larger than one and ½" inches (1.5") in diameter will appear on the surface. The finished surface will be on an even plane with all sidewalks, curbs, or borders. Slopes will not be greater than four horizontal to one vertical (4:1) for all seeded or sodded areas without approval from the Parks & Recreation Director or designee. All property pins will be set and clearly marked before construction begins and will be preserved until final acceptance by the City. On sloping ground, the final harrowing or disking operation will be on the general contour.

1023.02 Seedbed Preparation Process for Open Space and Native Seeded Areas

1023.03 Annual Weed Removal Procedure

Open space areas, which are covered by weedy plant communities dominated by such species as: Kochia, Cheatgrass, Russian thistle, Blue mustard, annual ryegrass, diffuse knapweed, Scotch, Bull or Musk thistles, Puncture vine, etc. must be prepared for seeding by moldboard plowing in order to turn over and bury the weed seeds well below the seed bed surface prior to seeding. These areas should first be rotary mowed, moldboard plowed, spread with required organic amendments (below), and then disked to prepare the seedbed for planting. This treatment does not substitute for the requirement to pre treat weedy areas with broad spectrum herbicides (Section 1021, above).

1023.04 Organic Matter for Native Seeded Areas

Native seeded areas in open space will receive the specified Class 1 organic material at the rate of three (3) cubic yards per one thousand (1000) square feet. Native areas shall be amended with Forte Biosol after seeding, but prior to hydromulching at a minimum rate of eight hundred (800) pounds per acre. Organic materials shall be applied when the surface is within two (2) percent of final grade. No organic material containing manure shall be stockpiled on the site for more than eight (8) hours before it is incorporated into the soil. After tilling, the areas to be seeded or sodded will be raked, graded, and rolled to the desired finished grades according to the grading plan within a tolerance of one-tenth (0.1) foot, with gently sloping surfaces to adequately drain all surface water run-off. The finished surface will be even and uniform, and no dirt clumps or other debris larger than 1 and ½ inches (1 ½") diameter will appear on the surface. The finished surface will be on an even plane with all sidewalks, curbs, or borders. Slopes will not be greater than four horizontal to one vertical (4:1) for all seeded or sodded areas. All property pins will be set and clearly marked

before construction begins and will be preserved until final acceptance by the City. On sloping ground, the final harrowing or disking operation will be on the general contour.

1024.00 Inspections

When the Contractor is prepared for one (1) of the required inspections, he will give the City forty-eight (48) hours' notice to visit the site and perform the inspection. This does not preclude the right of the City to make informal inspections at any time. The Contractor must notify the City for inspections of materials and soil preparation.

Written confirmation shall be provided to the Parks & Recreation Director or designee that all punch list items are fully completed prior to any punch walk being scheduled.

1024.01 Materials Inspection

The City will inspect all compost, manure, organic materials, seed and seed tags, mulch, and fertilizer upon delivery to the site. Any unsatisfactory materials will be removed and replaced with materials conforming to these STANDARDS AND SPECIFICATIONS. Weight tickets and/or grass seed analysis labels for all materials must be submitted to the City. The City Inspector will confirm receipt of the order before materials are spread.

1024.02 Soil Preparation Inspection

The City will inspect the soil preparation for conformance to the accepted plans and these STANDARDS AND SPECIFICATIONS during or immediately following the completion of each segment of the project. Any workmanship deemed by the City to be faulty or not in accordance with the accepted plans and these STANDARDS AND SPECIFICATIONS will be corrected at this time by the Contractor. The following is a list of the required inspections in their order:
Prior to the commencement of any landscape or irrigation, Contractor must certify through a field survey that the grade is within plus or minus 0.1 feet of final grading elevation, at the following times during the construction process:
During or after first cultivation
After application of specified organic materials
During or after second cultivation
After final grade is completed.

1030.00 SEEDING SPECIFICATIONS

1031.00 General

The Contractor will provide all labor, equipment and materials necessary to furnish and install seed as required by the accepted plans and these STANDARDS AND SPECIFICATIONS.

1032.00 Materials

1032.01 Topsoil

Topsoil shall have an acidic reaction of 6.0 to 7.8 pH and shall not include any minerals or elements detrimental to plant growth. Soluble salts measured in saturation extract shall be 5 mmhos/cm or less.

Topsoil preparation will be as described in Section 1020.00, Topsoil Preparation, of these STANDARDS AND SPECIFICATIONS.

1032.02 Booster Fertilizer

All fertilizer requirements will meet the requirements of Section 1020.00, Topsoil Preparation, of these STANDARDS AND SPECIFICATIONS.

In conventional landscape and park areas a booster fertilizer with the chemical analysis of having a fertilizer with a ratio of approximately 5-15-1, with a minimum acceptable nitrogen level of 15%, and minimum acceptable Phosphorus level of 45%, with four (4) percent iron and eight (8) percent sulfur applied on the prepared soil at the rate of five (5) pounds per one thousand (1,000) square feet immediately prior to seeding.

Native seeded areas shall receive an application of 800 pounds per acre of Forte Biosol following seeding and before mulching.

1032.03 Bluegrass, Fine Fescue, Tall Fescue and Rhyzomatous Tall Fescue Seed

Seed will be furnished in sealed, unopened, standard containers and labeled in accordance with the USDA Rules and Regulations and the Federal Seed Act. Seed will be fresh, clean, pure live seed equal in quality to the standards for "Certified Seed". It will be capable of passing the USDA test for germination of eighty-five (85) percent and for purity of ninety (90) percent. Seed will be free of Poa annua and all noxious or objectionable weed and shall have a maximum weed crop of one-tenth (0.1) percent. Seed shall have been prepared for seeding during the year of installation and shall have been stored away from high heat (over 100 degrees F). The City at the Contractor's expense may require tests of seed verification.

For turf areas to be maintained by the City, all seed varieties used shall be tested within the most recent National Turfgrass Evaluation Program (NTEP) list of varieties, preferably tested in the intermountain west at either Logan UT, Sheridan WY, or other approved testing site for regional adaptability and approved by the Parks & Recreation Director or designee.

1032.04 Native Seed

Seed shall have been prepared for seeding during the year of installation and shall have been stored away from high heat (over 100 degrees F). Seed will be furnished in sealed, unopened, standard containers and labeled in accordance with the USDA Rules and Regulations and the Federal Seed Act. Seed will be fresh, clean, pure live seed equal in quality to the standards for "Certified Seed". Seed tags must be supplied to the Parks & Recreation Director or designee for all seed mixtures, showing overall quantities and species. The City at the Contractor's expense may require tests of seed verification.

1032.05 Top-dressing/Mulch

Hydro-mulch: Hydro-mulch shall be a wood cellulose fiber type and shall be applied at the minimum rate of two thousand five hundred (2,500) pounds per acre with a minimum rate of one hundred and fifty (150) pounds per acre tackifier and shall be applied immediately after seed application.

Straw: Straw consisting of 75% straws longer than 10 inches may be used on native seeding. It shall be applied evenly over the seeded surface at the minimum rate of two tons per acre and partially embedded into the soil using a crimper or similar implement. Due to the potential for wind-blown straw, hydromulch shall be required in native seeded areas close to occupied or neighboring buildings.

1033.00 Seeding Process

1033.01 Bluegrass, Fine Fescue, Tall Fescue and Rhyzomatous Tall Fescue Seeding

1033.01.01 Seeding dates

All seeding will be done between March 15 and September 15 unless otherwise authorized in writing the Parks & Recreation Director or designee. No seeding shall be done when the soil is frozen, snow covered or excessively wet.

1033.01.02 Drill Seeding

Whenever possible, the seed will be applied using a drill seeder to drill the seed into a properly prepared seedbed. The seeder will be equipped with a satisfactory feeding mechanism, an agitator, double disc furrow openers, depth bands and packer wheels. Seed will be sown to a depth of one-quarter (¼) inch into a properly prepared seedbed. Seed drilling will be done in two (2) separate applications crossing the area at right angles to one another to guarantee proper coverage. On sloping land, the final seeding operation will follow the general contour. All seeded areas will be top-dressed with hydro-mulch after the seeding is completed.

1033.01.03 Broadcast Seeding

In areas where the drill method of seeding cannot be used, a broadcast method may be substituted. If the broadcast method is used, the seeding rate must be doubled, and the area must be dragged after seeding followed by a suitable top dressing.

1033.02 Native Seeding

1033.02.01 Seeding dates

Dormant native seeding with standard mixtures of cool season and warm season grasses (Tables 1-7) must occur between October 30th and April 30th. In order to extend the seeding window and minimize erosion on projects, seeding of warm-season grasses will be allowed between April 1st and June 15th without supplemental irrigation, and through July 31st if adequate supplemental irrigation is present, as determined by Parks & Recreation Director or designee. Mixtures containing cool-season grasses only will be allowed between August 1st and October 30th. Dormant seeding shall still be required between October 30th and April 30th at prevailing rates to provide a full mixture of both cool and warm season grasses. Permission for exceptions to this seeding time must be obtained prior to seeding from the Parks & Recreation Director or designee. No seeding shall be done when the soil is frozen, snow covered or excessively wet.

1033.02.02 Drill seeding

Native seed shall be applied using a native grass drill seeder equipped with a seed box agitator and depth bands. Seed will be sown to a depth of one-quarter (¼) to one-half (½) inch into a properly prepared seedbed. On sloping land, the seed shall be applied following the general contour.

1033.02.03 Broadcast seeding

In areas where drill seeding is not possible such as corners, near fences, along walkways, or around posts or boxes associated with electric, gas, irrigation installations or other similar situations, broadcast seeding may be substituted. No hydro seeding shall be permitted, except in wetland seeding areas. When using the broadcast method, the seeding area must be decompacted and harrowed after seeding, followed by mulching.

1033.02.04 Mulch application

Seeded areas will be mulched with twenty-five hundred (2,500) pounds per acre hydromulch immediately following seeding. Hydromulch must include one hundred and fifty (150) pounds per acre organic tackifier. At this rate soil coverage is 100%. Any thin areas in the mulch, where soil is visible, will be cause for a request to reapply mulch until the coverage is satisfactory, at the Contractor's expense. If weather conditions deteriorate, Contractor will delay work until conditions improve. Mulch must be applied in a separate operation on the same day as seeding.

No hay will be permitted on the construction site for any purpose.

1033.02.05 Cleanup

Remove all hydromulch from all plant materials, fences, concrete and other areas except for seed bed. Overly dense applications of straw mulch, or windrows of loose straw mulch which may smother seedling grasses, must be collected and removed. Straw mulch blown offsite during the construction and warranty period onto any adjacent area must be collected and removed by the landscape Contractor responsible for the project.

1033.03 Erosion Control Blankets

All erosion control blankets shall conform to the Erosion Control Technology Council's "Standard Specifications for Rolled Erosion Control Products" (see following chart, reprinted courtesy of Erosion Control Technology Council). Generally, City-owned, City-maintained projects will require a 'short term' blanket, with up to 12 month functional longevity. Other duration products and longevities may be required for specific projects. All erosion control blanket samples must be approved by the Parks & Recreation Director or designee prior to their use.

Table 1. ECTC Standard Specification For Temporary Rolled Erosion Control Products

For use where natural vegetation alone will provide permanent erosion protection

Type	Product Description	Material Composition	Slope Applications*		Channel Applications*	Minimum Tensile Strength[1]
			Maximum Gradient	C Factor[2, 5]	Permissible Shear Stresss[3, 4, 6]	
ULTRA SHORT-TERM - Typical 3 month functional longevity						
1.A	Mulch Control Nets	A photodegradable synthetic mesh or woven biodegradable natural fiber netting.	5:1 (H:V)	≤ 0.10 @ 5:1	= 0.25 lbs/ft² (12 Pa)	5 lbs/ft (0.073 kN/m)
1.B	Netless Rolled Erosion Control Blankets	Natural and/or polymer fibers mechanically interlocked and/or chemically adhered together to form a RECP.	4:1 (H:V)	≤ 0.10 @ 4:1	= 0.5 lbs/ft² (24 Pa)	5 lbs/ft (0.073 kN/m)
1.C	Single-net Erosion Control Blankets & Open Weave Textiles	Processed degradable natural and/or polymer fibers mechanically bound together by a single rapidly degrading, synthetic or natural fiber netting or an open weave textile of processed rapidly degrading natural or polymer yarns or twines woven into a continuous matrix.	3:1 (H:V)	≤ 0.15 @ 3:1	= 1.5 lbs/ft² (72 Pa)	50 lbs/ft (0.73 kN/m)
1.D	Double-net Erosion Control Blankets	Processed degradable natural and/or polymer fibers mechanically bound together between two rapidly degrading, synthetic or natural fiber nettings.	2:1 (H:V)	≤ 0.20 @ 2:1	= 1.75 lbs/ft² (84 Pa)	75 lbs/ft (1.09 kN/m)
SHORT-TERM - Typical 12 month functional longevity						
2.A	Mulch Control Nets	A photodegradable synthetic mesh or woven biodegradable natural fiber netting.	5:1 (H:V)	≤ 0.10 @ 5:1	= 0.25 lbs/ft² (12 Pa)	5 lbs/ft (0.073 kN/m)
2.B	Netless Rolled Erosion Control Blankets	Natural and/or polymer fibers mechanically interlocked and/or chemically adhered together to form a RECP.	4:1 (H:V)	≤ 0.10 @ 4:1	= 0.5 lbs/ft² (24 Pa)	5 lbs/ft (0.073 kN/m)
2.C	Single-net Erosion Control Blankets & Open Weave Textiles	An erosion control blanket composed of processed degradable natural or polymer fibers mechanically bound together by a single degradable synthetic or natural fiber netting to form a continuous matrix or an open weave textile composed of processed degradable natural or polymer yarns or twines woven into a continuous matrix.	3:1 (H:V)	≤ 0.15 @ 3:1	= 1.5 lbs/ft² (72 Pa)	50 lbs/ft (0.73 kN/m)
2.D	Double-net Erosion Control Blankets	Processed degradable natural and/or polymer fibers mechanically bound together between two degradable, synthetic or natural fiber nettings.	2:1 (H:V)	≤ 0.20 @ 2:1	= 1.75 lbs/ft² (84 Pa)	75 lbs/ft (1.09 kN/m)
EXTENDED-TERM - Typical 24 month functional longevity						
3.A	Mulch Control Nets	A slow degrading synthetic mesh or woven natural fiber netting.	5:1 (H:V)	≤ 0.10 @ 5:1	= 0.25 lbs/ft² (12 Pa)	25 lbs/ft (0.36 kN/m)
3.B	Erosion Control Blankets & Open Weave Textiles	An erosion control blanket composed of processed slow degrading natural or polymer fibers mechanically bound together between two slow degrading synthetic or natural fiber nettings to form a continuous matrix or an open weave textile composed of processed slow degrading natural or polymer yarns or twines woven into a continuous matrix.	1.5:1 (H:V)	≤ 0.25 @ 1.5:1	= 2.00 lbs/ft² (96 Pa)	100 lbs/ft (1.45 kN/m)
LONG-TERM - Typical 36 month functional longevity						
4	Erosion Control Blankets & Open Weave Textiles	An erosion control blanket composed of processed slow degrading natural or polymer fibers mechanically bound together between two slow degrading synthetic or natural fiber nettings to form a continuous matrix or an open weave textile composed of processed slow degrading natural or polymer yarns or twines woven into a continuous matrix.	1:1 (H:V)	≤ 0.25 @ 1:1	= 2.25 lbs/ft² (108 Pa)	125 lbs/ft (1.82 kN/m)

Notes:

** "C" factor and shear stress for Types 1.A., 2.A. and 3.A mulch control nettings must be obtained with netting used in conjunction with pre-applied mulch material.*

[1] Minimum Average Roll Values when tested in the machine direction using ECTC Modified ASTM D 5035.

[2] "C" Factor calculated as ratio of soil loss from RECP protected slope (tested at specified or greater gradient, h:v) to ratio of soil loss from unprotected (control) plot in large-scale testing.These performance test values should be supported by periodic bench scale testing under similar test conditions using ECTC Test Method # 2.

[3] Minimum shear stress RECP (unvegetated) can sustain without physical damage or excess erosion [> 12.7 mm (0.5 in) soil loss] during a 30-minute flow event in large-scale testing. These performance test values should be supported by periodic bench scale testing under similar test conditions and failure criteria using ECTC Test Method #3.

[4] The permissible shear stress levels established for each performance category are based on historical experience with products characterized by Manning's roughness coeffecients in the range of 0.01 - 0.05.

[5] Acceptable large-scale test methods may include ASTM D6459 or other independent testing deemed acceptable by the engineer.

[6] Acceptable large-scale testing protocol may include ASTM D6460 or other independent testing deemed acceptable by the engineer.

1034.00 Seeding Rates and Mixtures

1034.01 Bluegrass Seed Rate

All bluegrass seed will be drilled at the rate of three and one-half (3.5) pounds pure live seed (PLS) per 1,000 square feet, or one hundred-fifty (150) pounds pure live seed (PLS) per acre. If broadcast seeding is required, rates should be doubled. The seed mixture will consist of a blend of at least four (4) varieties of bluegrass. The specific varieties and percentages of each variety will be determined by the Parks & Recreation Director or designee.

1034.02 Tall Fescue and Rhizomatous Tall Fescue Seeding Rate

Seed shall be applied at the rate of five (5) pounds of pure live seed (PLS) per 1,000 square feet (220 pounds PLS/acre), consisting of a minimum of three (3) varieties of Tall Fescue and/or Rhizomatous Tall Fescue seed using a drill seeder. If broadcast seeding is required, rates should be doubled. Specific varieties and percentages of each variety shall be determined by the Parks & Recreation Director or designee.

1034.03 Fine Fescue Seeding Rate

Fine fescue seed shall be applied at the rate of five (5) pounds of pure live seed (PLS) per 1,000 square feet (220 pounds PLS/acre), consisting of a minimum of three (3) varieties of Fine Fescue seed using a drill seeder. If broadcast seeding is required, seeding rates should be doubled. Specific varieties and percentages of each variety shall be determined by the Parks & Recreation Director or designee.

1034.04 Native Seed Rates and Mixtures

The following seed mixtures may be used for native seeded areas. Substitution of other mixtures may be made only with prior approval by the Parks & Recreation Director or designee.

Table 1. Mixed Grass Prairie Native Seed Mixture: For use in open space native seeding at least 25 feet away from road and trail edges, or beyond the top of slope above roadway/trail and outside the toe of slope below roadway/trail if sloped areas are present adjacent to roadway or trail. This mixture is for general usage, is dominated by short to mid sized native prairie grasses (6-18 inches in height), but includes a few taller species (up to 36 inches) and a limited amount of native wildflowers (identified with the *, below). Best for use in larger open space areas. Be sure to over seed any swales or moist areas within this seeding type with the Moist Swale Seed Mixture (Table 3). While seeding is preferred beginning in late winter (After February 1st), this mixture may be used between October 30th and April 30th only without supplemental irrigation. If adequate supplemental irrigation is in place, this mixture may be seeded through June 15th.

COMMON NAME	SCIENTIFIC NAME	VARIETY	OZ/ACRE	PLS LBS/ACRE
Buffalo grass	*Buchloe dactyliodes*	Native,Bison or Texoka		3
Sideoats grama	*Boutelua curtipendula*	Butte, Niner or El Reno		5
Prairie sandreed	*Calamovilfa longifolia*	Goshen or Bowman		1
Blue grama	*Chondrosum gracile*	Lovington, Alma,Native or Hachita		3
Western wheatgrass	*Pascopyrum smithii*	Arriba, Oahe or Rosana		5
Little bluestem	*Schizachryium scoparium*	Pastura, Cimarron, Aldous Camper		4
Alkali sacaton	*Sporobolus airoides*	Common		1
Sand dropseed	*Sporobolus cryptandrus*	Common		1
Switchgrass	*Panicum virgatum*	Blackwell		5
Fringed sage*	*Artemisia frigida*	Common	1	
Purple prairie clover*	*Dalea purpurea*	Common	6	
Blanketflower*	*Gaillardia aristata*	Common	6	
Gayfeather*	*Liatris punctata*	Common	4	
COMMON NAME	SCIENTIFIC NAME	VARIETY	OZ/ACRE	PLS LBS/ACRE
Blue flax*	*Linum perenne*	Common	3	
Tansy aster*	*Machaeranthera tanacetafolia*	Common	3	
Prairie coneflower*	*Ratibida columnifera*	Common	3	
Yarrow*	*Achillea millefolium*	Western	2	
OUNCES			28	1.75
SEEDING RATE POUNDS PLS/ACRE				**29.75**

Table 2. Shortgrass Prairie Native Seed Mixture. For use in open space native seeding less than 25 feet from road and trail edges, or within the top of slope above roadway/trail and inside the toe of slope below roadway/trail if sloped areas are present adjacent to roadway or trail. This mixture is for specific usage near trails or where shorter grasses are desired (such as smaller park sites). It is dominated by short to mid sized native prairie grasses (6-18 inches in height), but includes a few native wildflowers (identified with the *, below). Best for use along roads and trails and in smaller native seeded park areas. Be sure to over seed any swales or moist areas within this seeding type with the moist swale seed mixture (Table 3). While seeding is preferred beginning in late winter (after February 1st) this mixture may be used between October 30th and April 30th only without supplemental irrigation. If adequate supplemental irrigation is in place, this mixture may be seeded through June 15th.

COMMON NAME	SCIENTIFIC NAME	VARIETY	OZ/ACRE	PLS LBS/ACRE
Buffalograss	*Buchloe dactyliodes*	Native, Bison or Texoka		10
Blue grama	*Chondrosum gracile*	Lovington Alma,Native,or Hachita		8
Sand dropseed	*Sporobolus cryptandrus*	Common		4
Prairie Junegrass	*Loeleria macrantha*	Common		4
Hard Fescue	*Festuca brevipila*	'Durar'		4
Fringed sage*	*Artemisia frigida*	Common	1	
Purple prairie clover*	*Dalea purpurea*	Common	4	
Gayfeather*	*Liatris punctata*	Common	4	
Tansy aster*	*Machaeranthera tanacetafolia*	Common	3	
Yarrow*	*Achillea millefolium*	Western	2	
OUNCES			14	.875
SEEDING RATE POUNDS PLS/ACRE				**30.875**

Table 3. Moist Swale Seed mixture. This mixture is intended to be seeded over the top of either Table 1 or Table 2 seed mixtures in locations which may be moist at least some of the year (such as pond edges, small or larger swales or ditches within the open space areas or along roads, in detention or retention basins, or along the inner banks of irrigation ditches. Be sure to seed one of the other seed mixtures first and then add this mixture to provide adequate species adapted to moist conditions. This mixture may be used between October 30th and June 15th without supplemental irrigation, and from June 16th through July 31st if adequate supplemental irrigation is present and acceptable to the Parks & Recreation Director or designee.

COMMON NAME	SCIENTIFIC NAME	VARIETY	PLS LBS/ACRE
Woolly sedge	*Carex lanuginosa*	Native	0.5
Nebraska sedge	*Carex nebrascensis*	Native	0.1
Blue grama	*Chondrosum gracile*	Lovington, Alma,Native or Hachita	1.5
Buffalograss	*Buchloe dactyloides*	Native, Bison or Texoka	0.5
Inland saltgrass	*Distichlis stricta*	Native	0.5
Baltic rush	*Juncus balticus*	Native	0.1
Prairie cordgrass	*Spartina pectinata*	Native	1
Alkali sacaton	*Sporobolus airoides*	Native	3
Switchgrass	*Panicum virgatum*	Blackwell	3
Western wheatgrass	*Pascopyrum smithii*	Arriba or Rosana	5
Aster	*Aster laevis*		0.05
Yarrow	*Achillea millefolium*	Western	0.05
Prairie coneflower	*Ratibida columnifera*		0.05
SEEDING RATE POUNDS PLS/ACRE			**15.35**

Table 4. Roadside Native Seed mixture. This mixture is intended for use for seeding of City roadside re-vegetation projects. It is an adaptable mix of short to mid-size native and introduced warm and cool season grasses. Use for City roadside and right-of-way seeding projects only. This mixture may be used between October 30th and April 30th only.

COMMON NAME	SCIENTIFIC NAME	VARIETY	PLS LBS/ACRE
Western wheatgrass	*Pascopyrum smithii*	Arriba, Oahe or Rosana	7.0
Crested wheatgrass	*Agropyron cristatum*	Ephriam	4.0
Streambank wheatgrass	*Elymus lanceolatus*	Sodar	4.0
Sideoats grama	*Bouteloua gracilis*	Butte, Niner or El Reno	2.0
Blue grama	*Bouteloua gracilis*	Lovington, Alma,Native or Hachita	5.0
Buffalograss	*Buchloe dactyloides*	Native, Bison or Texoka	3.0
Sand dropseed	*Sporobolus cryptandrus*	Common	1.0
Prairie Junegrass	*Loeleria macrantha*	Common	3.0
Hard Fescue	*Festuca brevipila*	'Durar'	3.0
SEEDING RATE POUNDS PLS/ACRE			**32.0**

Table 5: Warm Season Mixed Grass Prairie Native Seed Mixture For use in open space native seeding at least 25 feet away from road and trail edges, or beyond the top of slope above roadway/trail and inside the toe of slope below roadway/trail if sloped areas are present adjacent to roadway or trail. This mixture is for general usage, is dominated by short to mid sized native prairie grasses (6-18 inches in height), but includes a few taller species (up to 36 inches). Best used in larger open space areas. This mixture is to be used between April 1st and June 15th ONLY, unless sufficient supplemental irrigation is present. Irrigation must be approved by Parks & Recreation Director or designee. If present, mixture can be seeded between June 16th and July 31st.

COMMON NAME	SCIENTIFIC NAME	VARIETY	PLS POUNDS/ACRE
Side Oats Grama	Bouteloua curtipendula	Butte, Niner or El Reno	4
Blue Grama	Bouteloua gracilis	Lovington, Alma,Native or Hachita	4
Buffalograss	Buchloe dactyloides	Native, Bison or Texoka	4
Switchgrass	Panicum virgatum	Blackwell	6
Little Bluestem	Schizachyrium scoparium	Pastura, Aldous,Cimarron or Camper	6
Alkali Sacaton	Sporobolus airoides	Sabado	6
Sand bluestem	Andropogon hallii	Garden	6
Sand Lovegrass	Eragrostis trichodes	Nebraska 27	3
Sand Dropseed	Sporobolus cryptandrus	Common	3
SEEDING RATE POUNDS PLS/ACRE			**30.00**

Table 6: Warm Season Shortgrass Prairie and Roadside Native Seed Mixture: This mixture is an adaptable mix of short to mid-size native warm season grasses with specific usage near trails or where shorter grasses are desired (such as smaller park sites). It is dominated by short to mid sized native prairie grasses (6-18 inches in height). Use for areas within 25 feet from road and trail edges, or within the top of slope above roadway/trail and inside the toe of slope below roadway/trail if sloped areas are present adjacent to roadway or trail, as well as for City roadside and right-of-way seeding projects between the months of April 1st and June 15th ONLY, unless sufficient supplemental irrigation is present. If sufficient irrigation is present as determined by the Parks & Recreation Director or designee, this mixture can be seeded between June 16th and July 31st.

COMMON NAME	SCIENTIFIC NAME	VARIETY	PLS POUNDS/ACRE
Side Oats Grama	Bouteloua curtipendula	Butte, Niner or El Reno	8
Blue Grama	Bouteloua gracilis	Lovington, Alma,Native or Hachita	10
Buffalograss	Buchloe dactyloides	Native, Bison or Texoka	12
SEEDING RATE POUNDS PLS/ACRE			**30.00**

Table 7: Cool Season Grass Native Seed Mixture: This mixture shall be used for Mixed Grass Prairie, Moist Swale and Roadside locations ONLY between the dates of August 1st and October 30th . Areas adjacent to trails shall be seeded with the standard Shortgrass Prairie Native Seed Mixture between the months of October 30th and April 30th ONLY.

COMMON NAME	SCIENTIFIC NAME	VARIETY	PLS POUNDS/ACRE
Western Wheatgrass	Pascopyrum smithii	Arriba, Oahe or Rosana	12
Crested Wheatgrass	Agropyron cristatum	Ephriam	9
Streambank Wheatgrass	Elymus lanceolatus	Sodar	9
SEEDING RATE POUNDS PLS/ACRE			**30.00**

1034.05 Additional Seed Varieties

Additional native and/or non-native seed varieties may be considered on a case-by-case basis. All varieties, mixtures, seed rates and dates of application not within Tables 1-7 above MUST be approved by the Parks & Recreation Director or designee prior to seeding.

1035.00 Maintenance Procedures

1035.01 Maintenance Procedures for Bluegrass, Fine Fescue, Tall Fescue and/or Rhyzomatous Tall Fescue Grasses.

1035.01.01 Warranty

The Contractor will warranty the life and good health of the seed installed until the entire project has been accepted by Board of Trustees. Any areas deemed by the City to be thin, weak, or dead will be reseeded according to these STANDARDS AND SPECIFICATIONS and germinated prior to the beginning of the two year warranty period.

1035.01.02 Signage

The Contractor will erect suitable signs at strategic points notifying the public to keep off the seeded areas until the lawn is well established. Any traffic damage that may occur prior to final acceptance of the work will be repaired and reseeded at the Contractor's expense.

1035.01.03 Mowing

During the maintenance period, after a suitable stand of grass has been established, the Contractor will begin mowing all lawn areas on a routine basis using a mowing height of three inches (3") for bluegrass and fine fescue, and four inches (4") for tall fescue or rhizomatous tall fescue. Frequency of mowing will be determined by the growth rate of the grass but at no time should the clippings exceed 1/3 of the total grass blade height.

Only turf-type mowers will be used for this operation.

1035.01.04 Additional Fertilizing

At the time of the first mowing, the Contractor will apply a commercial fertilizer with a ratio of 4-1-2 NPK, such as Nitrogen-20, Phosphorous-5, Potash-10, plus two percent (2%) iron at the rate of five (5) pounds per one thousand (1,000) square feet. Care should be taken to prevent burning. Any areas disturbed or damaged by the Contractor during fertilizing operations will be repaired in accordance with these STANDARDS AND SPECIFICATIONS at the Contractor's expense.

1035.01.05 Watering

The Contractor will be responsible for watering the newly seeded area(s) a minimum of two (2) times per day (mid-morning and late afternoon) and for keeping the areas moist until the lawn is established. For City owned and maintained native areas, the Contractor must coordinate with City staff to adjust watering times once seed establishment has begun. The Contractor will be responsible for obtaining a temporary meter from the Utilities Department, and for all water usage until such time as the project is accepted by the City.

1035.02 Maintenance Procedures for Native and Open Space Areas

1035.02.01 Maintenance period

Contractor maintenance period minimum shall be the two (2) year warranty period or until City acceptance of the site (Final Acceptance). Extended warranty period may be required as determined by the City's representative. Seeded areas must be maintained in a weed free manner. Weed infestations must be mowed, or spot treated with approved herbicides starting during construction phase and during two year post installation warranty period. It is recommended maintenance activities be reported regularly to the Parks & Recreation Director or designee, to assure a complete record of activities is on file in support of the Final Acceptance Inspection (at the closure of the two year warranty period).

1035.02.02 Signage

The contractor is responsible for providing and installing barriers as required to protect seeded areas from pedestrian and vehicular damage. Provide signage and barricades as needed.

1035.02.03 Litter removal

All litter or trash from construction sites or other sources which may blow onto Open Space must be collected and removed from the area weekly, in order to prevent smothering of establishing vegetation. Placement of an orange construction fence between construction areas and Open Space may facilitate litter collection.

1035.02.04 Access

Vehicular traffic is not permitted on Open Space areas, except for approved maintenance vehicles on established trails and sidewalks. Mowing, re-seeding, and spray equipment are allowed off trails, but must avoid all access immediately following precipitation or irrigation events which may lead to rutting. All damage to irrigation installations must be repaired at the Contractor's expense, according to the original specifications.

1035.02.05 Weed Control Maintenance

Annual weeds must be mowed when they exceed 12 inches in height. Rotary mowers must be used for mowing operations. Dense accumulations of mowed weeds must be collected to prevent smothering of desirable vegetation. At a minimum, this will require mowing at least twice (late May and late August) during normal years; and could require mowing more frequently in wet years or if the site is heavily irrigated.
State listed noxious weeds or other problematic weedy species of concern (some of which are listed below) shall be spot treated with approved herbicides with approved application methods at approved times for effective control, at least twice each year. For acceptable results, most of these

species should be sprayed during late May/early June and again in late August/September. Other non-native weedy species of concern in the Brighton area include, but may not be limited to: Common (or great) mullein (*Verbascum thapsus*) Thistles (including Bull, Canada, Scotch and Musk Thistles), Purple Loosestrife (*Lythrum salicaria),* Field Bindweed (*Convolvulus arvensis*), Blue Mustard *(Chorispora tenella*), Diffuse Knapweed *(Centaurea diffusa),* Kochia (*scoparia*) and Curly dock (*Rumex crispus*). For a full listing of problematic weeds which must be eradicated or controlled, refer to the most recent edition of 'Noxious Weeds of Colorado', using Lists A, B, and C.

Herbicide selection, concentration, and timing of application must be approved by the City's representative prior to application. Broadcast application of herbicides with boom sprayers will not be allowed unless approved by the City's representative in writing. Spot treatment of weeds with spray guns on 4 wheelers or back packs is acceptable. Permission must be obtained from the Parks & Recreation Director or designee for exception to this regulation.

1035.02.06 Irrigation

The Contractor will be responsible for temporary irrigation on all native seed areas and for water usage until such time as the seeding is established and accepted. The Contractor will be responsible for initial watering the native seeded area and for keeping the area adequately moist until seed is established. Over watering can be detrimental to the success of native seeding. Failed seedling establishment due to over or under watering must be reseeded and re-mulched. Assistance in preparation of site specific irrigation schedule for native seeded areas is available from the Parks Division upon request.

General recommended watering schedule for native seeded areas. Watering is generally unnecessary until May or June following winter or early spring seeding.

WEEKS AFTER SEEDING	FREQUENCY	DURATION	TIMING
first month, or until initial germination (May or June)	2 times per day	15 minutes or until soil is moist to 1 inch depth	10 AM, 10 PM (to provide extended period of soil moisture at night)
4-6 weeks	2 times per week	20 minutes or until soil is moist to 2 inch depth	10 PM (after evening winds subside)
7-10 weeks	1 time week	30 minutes or until soil is moist to 3 inch depth.	10 PM (after evening winds subside)
11 weeks to late September	every other week	30 minutes or until soil is moist to 3 inch depth	10 PM (after evening winds subside)

1035.02.07 Standard of acceptable establishment for native seeding:

Warrant seeded areas for consistency and completion of coverage. The standard of acceptable establishment shall be at least six (6) desirable seeded plant seedlings per square foot. All bare areas over 10 square feet in size shall be re-seeded and re-mulched.

TWO YEAR WARRANTY PERIOD SEEDING MAINTENANCE REQUIREMENTS

ACTIVITIES	SEASONAL FREQUENCY	APPROXIMATE DATES	COMMENTS
Installation protection	Keep initial installation repaired	As required	Place fencing and signage to prevent unauthorized vehicle access and disturbance to seeded and planted areas. Maintain fencing and signage on preserved remnant areas and trees.
Collect wind drift of straw mulch	After initial installation and before germination	As required before germination	Incompletely crimped straw mulch may blow into dense drifts which can smother seeded areas. Check for these and remove excess straw prior to germination.
Litter collection	Collect litter to prevent smothering	As required	Collect construction or other litter which blows onto open space to prevent smothered vegetation and repairs. Placing an orange fence between construction site and the edge of open space may help concentrate litter off the vegetation and reduce clean up time.
Repair seeded or planted areas damaged by irrigation malfunction, tire ruts, erosion		As required	Construction damage to open space vegetation should be repaired immediately.
Annual weed control	Two or more times per growing season	Late May to early June and again in late August to early September	Annual weeds, including Annual ryegrass, Russian thistle, and Kochia should be mowed when they exceed 12 inches in height. Generally mowing is necessary at least twice a year for a couple years. More frequent mowing could be needed in wet years. Do not mow when the site is muddy to prevent ruts and repairs.
Noxious weed control	Two or more times per growing season	Late May to early June and again in late August to early September	Several species of noxious weeds occur in the Brighton area: Canada thistle*, Musk thistle, Scotch thistle, Diffuse knapweed*, Blue mustard. All noxious species (if they occur on the development site) must be treated (*treat twice a year) with the proper concentration of effective chemicals, with the proper equipment, at the correct times in order to receive full credit for the warranty period. Consult a certified weed control specialist for best results.
Irrigation	See irrigation table in Standards and Specifications (Section 1035.02.06)	May through September of first year following winter to early spring seeding	Temporary irrigation during establishment is required for native seeding in Brighton Open Space.
Reporting activities	Regularly	As completed	To assure full credit for proper warranty period activities, it is recommended that regular reports for all required two year warranty maintenance activities be filed with the City of Brighton Parks & Recreation Director or designee to provide a complete record for consultation during the Final Acceptance Inspection. (Regularly submitted reports help prove due diligence.)

1036.00 Inspections

Inspections shall be completed in accordance with Section 1024.00, Inspections, of these STANDARDS AND SPECIFICATIONS. The Contractor must notify the City for inspections of seed certification and germination.

1036.01 Inspection of Seed Certifications

Seed certification tags shall be delivered to the City to verify compliance with these STANDARDS AND SPECIFICATIONS.

1036.02 Germination Inspection

When germination is complete and plants are visible, the Contractor will notify the City and request an initial germination inspection for approval in order to begin the guarantee period (warranty period, two year maintenance period). Any areas deemed by the City to be thin, weak or dead will be replaced at this time. All washouts will be reseeded immediately after the germination inspection. No partial acceptance will be made.

1040.00 SODDING SPECIFICATIONS

1041.00 General

The Contractor will provide all labor, equipment and materials necessary to furnish and install all sod as required by the accepted plans and these STANDARDS AND SPECIFICATIONS.

1042.00 Materials

1042.01 Topsoil

Topsoil preparation will be as described in Section 1020.00, Topsoil Preparation, of these STANDARDS AND SPECIFICATIONS.

1042.02 Booster Fertilizer

All fertilizer will meet the requirements of Section 1020.00, Topsoil Preparation, of these STANDARDS AND SPECIFICATIONS. A booster fertilizer with a ratio of 4-2-1 NPK, with a sample chemical analysis of Nitrogen 20, Phosphorous 10, Potash 5 with three percent (3%) iron will be applied at a rate of five (5) pounds per one thousand (1,000) square feet immediately prior to sodding. For Buffalograss sod, the rate of fertilization shall be two (2) pounds per one thousand (1,000) square feet.

1042.03 Sod

The sod will consist of a blend of at least four (4) varieties of bluegrass, or a blend of at least three varieties of fine fescue or tall fescue/rhizomatous tall fescue. This blend is to be approved by the Parks & Recreation Director or designee prior to installation. Additionally, the use of Buffalograss sod is a viable alternative for low water xeriscape plantings. Varieties chosen shall be either 'Native', 'Bison' or 'Texoka', or a combination thereof.

Sod will be strongly rooted and free of noxious weeds, undesirable plants, roots, stones, and other foreign materials that will be detrimental or will hinder the proper development of the sod. The sod will be procured from areas where the soil is reasonably fertile and contains a high percentage of loamy topsoil. The sod will be cut from living, thickly matted turf. The sod will be mowed to a height not to exceed two inches (2") and thoroughly watered before the sod is cut. All sod will be cut to provide a minimum thickness of three-fourths inch (3/4") of soil adhering to the roots. The Contractor will furnish written proof of sod variety to the City. Sod must be tested by the Colorado State University laboratory or a certified laboratory at the Contractor's expense if requested by the City.

1043.00 Sodding Process

1043.01 Care and Handling

Care will be exercised at all times to retain the native soil on the sod roots during transportation, handling and planting. Dumping sod from vehicles will not be permitted. The sod will be transported to the site within twenty-four (24) hours from the time it is cut, unless it can be stored to the satisfaction of the City. During delivery and while in stacks, all sod will be kept moist and protected from exposure to the wind, sun and freezing. All damaged or dry sod will be rejected.

1043.02 Transporting Sod On-Site

Sod can be transported on or across the site on pallets by forklift. Damage to the sod bed by the vehicles will be kept to a minimum and will be re-graded before sodding of the area. Damage caused to paving, curbs, fence, plants or other objects during sodding, will be repaired or replaced by the Contractor at his expense as directed by the City.

1043.03 Sodding

The sod bed will be lightly sprinkled just prior to laying the sod. Do not create muddy soil. All sod strips will be placed tightly against each other so no open joints are apparent. Joints between ends of strips will be staggered at least one foot (1') between adjacent rows. At the end of walks and drives, the sod will have the same finish grade as the abutting surfaces. At curbs the sod will have the same finish grade as the top of the curb. Sod placed on slopes equal to four horizontal to one vertical (4:1) will be staked with wire pins not less than six inches (6") long and spaced not more

than thirty inches (30") apart. The pins shall be driven into the ground at an angle against the flow of the water until the top of the stake is three inches (3") above the sod. Sod laying will begin at the bottom of the slope and progress upward with strips laid transverse to the slopes. Immediately after the sod has been laid, it should be tamped or rolled as needed with approved equipment to eliminate all air pockets and to provide a smooth, even surface. Immediately after rolling or tamping the sod, sufficient water will be applied to completely saturate the sod. The sod will be watered as often as required to prevent it from drying out. Settled sod areas will be pulled up, re-graded, relayed, and retamped.

1044.00 Cleanup

Any remaining peat, soil, sand, rock, or similar material which has been brought onto the site by work operations or otherwise, will be removed, and all other remaining debris will be disposed of. All ground area disturbed as a result of the sodding operations will be renovated to its original condition or to the required new condition.

1045.00 Maintenance

The proper care and maintenance of the sodded areas will be the responsibility of the Contractor until the work has been completed and accepted by Parks & Recreation Director or designee. The maintenance operations will begin as soon as each portion of the area is sodded. Maintenance will consist of repair and replacement of eroded areas, watering, mowing (when the sod is established), weeding, fertilizing, and re-sodding as necessary to provide an even, consistent stand of grass. All replacement sodding deemed necessary by the City will be done by the Contractor at his own expense.

1045.01 Mowing

During the maintenance period, after the sod is established, the Contractor will begin mowing all lawn areas on a routine basis using a mowing height of three inches (3") for bluegrass and Buffalograss sod, and four inches (4") for tall fescue/rhizomatous tall fescue sod. Frequency of mowing will be determined by the growth rate of the grass but at no time should the clippings exceed 1/3 the height of the grass blade

Only turf-type mowers will be used for this operation.

1045.02 Additional Fertilizing

Forty-five (45) days after sod is laid, an application of fertilizer with a ratio of 3-3-1 NPK, with a sample chemical analysis of Nitrogen-12, Phosphorous-12, Potash-4, with four percent (4%) iron and eight percent (8%) sulfur will be applied at the rate of six (6) pounds per one thousand (1,000)

square feet. Buffalograss sod shall be fertilized at the rate of one (1) pound per thousand (1,000) square feet. When applied, the fertilizer must be dry and free flowing. All damage caused to the sod during fertilizer application will be repaired by the Contractor at his expense.

1045.03 Watering

The Contractor will be responsible for watering the sodded area(s) a minimum of two (2) times per day (mid-morning and late afternoon) and for keeping the areas moist until the sod is established. The Contractor will be responsible for water usage until such time as the project is accepted by the Board of Trustees.

1046.00 Inspections

Inspections shall be completed in accordance with Section 1024.00, Inspections, of these STANDARDS AND SPECIFICATIONS. The Contractor must notify the City for inspection of sodding .

When sodding operations are complete, the Contractor will notify the City and request a sodding inspection. Any areas deemed by the City to be thin, weak or dead will be replaced at this time. Sod must be installed a minimum of three weeks before Contractor calls for a landscape or sod inspection. No partial acceptance will be made.

1050.00 SPRINKLER SYSTEMS

1051.00 General

All irrigation design plans and specifications will be submitted to the City in accordance with Section 160.00, Plans and Specifications, and Section 161.00, Construction Plan Requirements, and Section 1001.03 Irrigation Plans, of these STANDARDS AND SPECIFICATIONS. The Director(s) must review and accept the design plans prior to the commencement of any work. Three (3) sets of plans and specifications will be provided to the City for this purpose. This review and acceptance process normally will take fourteen (14) calendar days from the time the plans and specifications are submitted to the City.

The work will be performed in accordance with the best standards of practice relating to the various trades and under the continuous supervision of a competent foreman capable of interpreting drawings and specifications. The Contractor of record will notify the City as soon as any discrepancies between plans and specifications are discovered. The work will include all labor, materials, equipment and appliances and obtaining of all permits required by governing codes to complete the work as indicated on the accepted plans and as herein specified. All work will comply with the building codes adopted by the City of Brighton. During progress of the work, the Contractor of record will keep the site as clean and free of rubbish as possible. All surplus and useless material resulting from this work will be removed from the site by the Contractor of record.

The Contractor will guarantee all material and workmanship for a minimum period of one (1) year from the date of acceptance of the work.

The Contractor will furnish the City with:

1. Quick coupler key with hose swivel (1)
2. Drain key (1)
3. Turn-off key (1)
4. Control clock keys (2)
5. Valve box key
6. Head wrench (1 for each type of head)
7. Sprinkler heads (2 of each type)
8. Maintenance manuals for all components
9. As built drawings as outlined in section 220, Construction Acceptance Procedures, with additional dimensions shown to locate the following onsite improvements:
    a. Contractor connections to City water mains and wherever an existing irrigation water main or lateral line is extended.
    b. Routing of sprinkler control pressure line (dimension maximum 100 feet along routing).
    c. Sprinkler control valves.
    d. All quick coupling valves.
    e. Manual drains and stop waste valves.
    f. Drop line blow-out stubs.
    g. Control wire routing if not with pressure mainline.
    h. All gate and isolation valves.
    i. Control wire and communication cable splices.
    j. Water meters
    k. Location of all sleeving including size, quantity and depth of sleeve.
    l. Flow sensors (i.e., A-ROD Valves)
    m. Pressure regulation valves.
10. Controller charts at each field controller
    a. Controller chart must be legible and may be a copy of the as-built drawing.
    b. Chart shall be sealed using 20-mm lamination
11. Sample program
12. Coverage chart indicating the coverage area for each remote control valve (also zone or station,) using distinctly different graphics for each valve/zone/station.
    a. Chart shall be sealed using 20-mm lamination

The location of all utilities will be completed by Contractor before any excavation work is started.

1051.01 Temporary Irrigation Systems

Native grasses are generally not to be irrigated with a permanent irrigation system, with the exception of arterial medians and rights of way which shall require permanent irrigation. Therefore, temporary irrigation systems shall be allowed to water these areas during the grow-in/warranty period. Water for temporary systems must be metered, although this water is not calculated in the permanent water budget for the project. For City owned and maintained systems, temporary irrigation shall be placed below ground.

At the conclusion of the warranty period (Final Acceptance), the system is to be disabled either prior to or past the main isolation valve, with a clear break between the permanent and temporary systems. The property owner shall remove any above ground temporary system at the conclusion of the warranty period.

1051.02 Coverage

For permanent irrigation systems, system must be designed to provide 100% head to head coverage with matched precipitation rates. For temporary irrigation systems, irrigation heads must reach at least 80% of the distance to the next head. Shrub and perennial beds are to be zoned separately. Heads shall not overspray walkways, pavements or other hard surfaces. Spray radius of heads will be limited to water only areas intended to be watered.

1052.00 Materials

1052.01 Water and Tap Fee

The Contractor will pay all applicable tap and meter fees prior to connecting into the City's water system. The size of the water tap will be determined and approved by the Director of Utilities.

1052.02 Water Tap

All taps into City water mains shall comply with the requirements of Section 643.00, Tapping the Main, of these STANDARDS AND SPECIFICATIONS.

1052.03 Water Service Line

The Contractor will be responsible for installing the water service line from the corporation stop valve to the meter pit. This will include a curb stop valve installed just behind the curb, between the curb and the meter pit and all plumbing inside the meter pit. Reference Section 640.00, Water Service Line Construction, of these STANDARDS AND SPECIFICATIONS. Also refer to the Standard Drawings.

1052.04 Meter Pit

Refer to Section 632.124, Vaults, of these STANDARDS AND SPECIFICATIONS.

1052.05 Water Meter

The water meter will be provided by the City. The fee is covered in Section 1052.01, Water License and Tap Fee, of these STANDARDS AND SPECIFICATIONS.

All water meters for irrigation systems shall comply with all applicable portions of Section 642.00, Equipment and Materials, of these STANDARDS AND SPECIFICATIONS.

1052.06 Electronics

1502.06.01 Low Voltage

1. Electrical Control Wire – AWG UFUL approved No. 142 direct burial copper wire.
2. Electrical Common Wire – AWG UFUL approved No. 12 direct burial copper wire.
3. Wire Colors:
    a. Control Wires – Red
    b. Common Wires – White
    c. Master Valve Wires – Blue (two wires going to each master valve)
    d. Spare Control Wires – Black
    e. Spare Common Wires – Yellow
    f. Flow Wire – Purple (two flow wires to each flow unit)
4. If multiple controllers are utilized, and wire paths of different controllers cross each other, both common and control wires from each controller shall be different colors approved by the Director of Parks and Recreation.
5. Control and Tracer wire connections and splices shall be made with 3M DBY or approved similar dry splice method in an approved splice box, such as Carson #910-10

1502.06.02 High Voltage

Shall be type required by local codes and ordinances and of proper size to accommodate needs of equipment serviced.

1502.06.03 Controller

For all city projects, an eclectic controller will be supplied, installed, and operated by the Contractor during construction and until any contract-related turf/landscape is established and approved by the City.

All Controllers shall be Toro Sentinel type either wireless output board or hardwired. Equipment shall include proper grounding per manufacturing specifications, radio communication devices

and antennas. All irrigation controllers' equipment to be compatible with City Central Control Equipment and Software. Requirements to include master valves and flow sensing devices.

1502.06.04 Electric Control Valves

Size and type shown on Drawings having manual flow adjustment and manual bleed nut. For all control valves, the contractor will include a true union ball valve, the same size as the control valve, installed on the inlet side of the valve per manufacturer's recommendations.

All service lines shall be run underground and in electrical PVC conduit. All wire shall be copper and shall be properly sized. If a booster pump is required, a sixty (60) amp (minimum) metered service shall be required. If the irrigation controller is the only electrical demand, an unmetered flat rate service can be installed. All electrical service lines shall have electrical warning tape in the trench six (6) inches above the conduit pipe. An electrical disconnect shall be mounted on the irrigation controller. Electrical box will be weather proof, vandal resistant. Box will be securely mounted and lockable. Electrical box will be grounded and installed according to local codes. All electrical buried within Parks and Open Space boundaries need to have a minimum of 36 inches of cover.

1052.07 Backflow Preventer

The backflow prevention device for water taps two (2) inches and smaller will be a Feb-Co 825-YA Series reduced pressure backflow preventer or approved equal.

Each backflow preventer shall be enclosed in a locked, stainless steel strong box with the following features:

1. Marine grade aluminum alloy construction
2. 100% stainless steel hardware
3. Flush, mounted, locking mechanism for security
4. Full-release locking mechanism for service and repair access
5. Pre-punched viewing ports

Strongboxes shall be sized in accordance with manufacturer's recommendations, and must be approved by the Director(s).

For taps 3" and larger, the backflow prevention device will be a Febco 880 Series or approved equal. It will be sized in accordance with manufacturer's recommended velocities, but no velocities shall exceed the normal industrial practice of seven and a half (7.5) feet per second through the backflow device. The device will meet the requirements of ASSE Standard 1013; AWWA Standard Code C 506-78; and USC Foundation for Cross Connection Control and Hydraulic Research, latest edition.

Backflow preventer(s) shall be installed in accordance with the applicable sections of the UBC and in accordance with the Standard Drawings. It shall have either a brass union or a bolted flange connection on both the inlet and discharge side of the device.

All backflow prevention devices will be tested and certified before acceptance.

A Rain Bird 44QC quick coupler or approved equal will be installed adjacent, and downstream to backflow prevention device for winterization blow out connection.

1052.08 Booster Pump

The requirement for a booster pump will be determined by the City water main static pressure and the design requirements of the irrigation system. When a booster pump is needed, it will be a Peerless-type P.E. or approved equal, with magnetic starter and heater and a time delay circuit. The heater, starter, and time delay will be approved by the City prior to installation.

1052.09 Pump House

When a booster pump is needed, it will be enclosed in a concrete pump house similar to that manufactured by ADPC, Inc. The pump house will have an exposed aggregate finish; heavy duty hollow steel door and door jamb; and locking door knob with latch, matching the City's current lock series as determined by Parks & Recreation Director or designee. The pump house will enclose all above ground plumbing, such as piping fittings, backflow preventer, and booster pump; all electrical equipment, such as breaker panels, switches, overhead light and outlets; and irrigation controllers. It shall have a minimum ceiling height of seven (7) feet.

All electrical equipment will be Square D, Cutler Hammer, G.E., or equivalent, and a waterproof type. All wire will be copper conductor and run in conduit.

1052.10 Controllers

The controller will be Hunter ACC or approved equal electrical type, compatible with operating 24-volt electric solenoid zone valves. It will feature a pump start, manual advance switch, lightning protection, manual operating mode and weatherproof turf cabinet. The included Hunter Smart Port (ROAM-WH) shall be installed on the exterior of pedestal/cabinet. Hunter ACC-COM-GPRS communication module shall be installed at all properties that are specified as City maintained. Each controller shall have a Rain Bird WR2-RFC wireless rain/freeze click. Each controller will have a minimum of four (4) extra stations, and will not exceed forty-eight (48) stations. Controllers will be properly grounded with an eight (8) foot ground rod. When the controller is not installed in a pump house, it will be mounted on a turf pedestal and enclosed in a strong box or similar type enclosure if needed. All installation shall be in accordance with the Standard Drawings

1052.11 Zone Valves

The zone valves will be direct burial, diaphragm type with a contamination-proof filter, a flow control and a manual bleed screw, such as the Rainbird PEB series, for "dirty water" applications PESB-R valves shall be used. They will be operated with a twenty-four (24) volt solenoid and will be capable of allowing compressed air to flow through them. All zone valves will be placed in a locking Rain Bird or equal valve box approved by the Parks & Recreation Director. Install valve at proper depth so that the top of the flow control handle is one (1) to three (3) inches from the bottom of the valve box lid. All valves will be installed with a PVC, true-union ball valve upstream of valve, and a PVC union downstream of valve, in valve box over three (3) inches depth of three-quarter (¾) inch gravel. Install only one valve per valve box. Install all valve boxes a minimum of twelve (12) inches apart, and at least twelve (12) inches from and aligned with all adjacent walls or pavement edges. Stamp all valve box lids with corresponding controller station number.

All valve boxes must be installed plumb and level with finish grade and in accordance with the Standard Drawings.

1052.12 Heads

Will be provided and installed as indicated on drawings. The Contractor of record will use fabricated riser units in accordance with details, or as otherwise specified, with riser nipples of same size as the rise opening in the sprinkler body.

1052.13 Field Wiring

Lead wire: For runs less than seven thousand seven hundred (7,700) feet, the lead wire connecting the valves to the controller shall be #14 UF single strand, direct burial, PVC jacketed, copper wire with the insulation being red in color throughout the entire jacket. For runs in excess of seven thousand seven hundred (7,700) feet, the lead wires shall be #12 UF. A minimum of four (4) spare wires will be pulled and will be of a different color (yellow).
Common wire: All common wire shall be #12 UF single strand, direct burial, PVC jacketed, copper wire with the insulation being white in color throughout the entire jacket. One spare common wire will be pulled and shall be of a different color (black). Where multiple controllers are used, a separate common wire will be installed for each controller.
Connectors: 3M's DBYR6 (or approved equivalent) water resistant connectors will be used in making wire connections, including connections in valve boxes.

All wire shall be taped every 10 feet and coiled with a 36 inch coil every 100 feet and at every change in direction of main line.

1052.14 Pipe

No galvanized pipe will be allowed on any irrigation system, unless specifically approved in the project specifications.

All pipe will be continuously and permanently marked showing the manufacturer's name, the size, National Sanitation Foundation seal of approval, pressure rating, date of extrusion and the class of the pipe. All PVC pipe will conform to the requirements of the United States Department of Commerce commercial standard Type 1-ASTM-D-2241 and in accordance with the Standard Drawings.

The velocity of the water through PVC pipe shall not exceed five (5) feet per second. The velocity of the water through copper pipe shall not exceed nine (9) feet per second. The velocity of water used for temporary irrigation systems (either above or below ground) shall not exceed nine (9) feet per second.

1052.14.01 Irrigation System Piping

Primary water service line (from City water main to water meter) shall be as described in Section 642.02, Service Lines, of these STANDARDS AND SPECIFICATIONS.
Secondary water service line (from water meter to backflow preventer) shall be either ductile iron as specified in Section 632.02, Pipe, of these STANDARDS AND SPECIFICATIONS, or type "K" rigid copper.

Pressure Supply Line pipe shall be either Class 200 PVC BE for one (1) inch to two and a half (2 ½) inch diameter pipe or Class 200 PVC RT for three (3) inch to ten (10) inch diameter pipe. Pipe shall be provided with proper thrust blocks or restraints as recommended by the manufacturer and as may be required by Section 633.06, Thrust Blocks, Restrained Joints and Fittings, of these STANDARDS AND SPECIFICATIONS.

Non-Pressure Lines shall be Class 200 PVC BE pipe.

No main line pipe shall be smaller than one inch (1").

1052.14.02 Gasketed End Pipe

Shall be manufactured from virgin polyvinyl chloride compound in accordance with ASTM D2241 and ASTM D1784; cell classification 1254-B, Type 1, Grade 1. Lubricant shall be type recommended by manufacture of pipe fittings. Gaskets will be factory installed in pipe fittings, having a metal or plastic support within gasket or a plastic retainer ring for gasket.

1052.15 Gate Valves

Gate valves for three quarter (3/4) inch through two (2) inch pipe will be Ford B-44 Curbstop Ball Valve or approved equal. Gate Valves for lines greater than three (3) inches in diameter or greater will be iron body, brass or bronze mounted AWWA gate valves with a clear waterway equal to full nominal diameter of valve, or mechanical joint type only. Valves shall be able to withstand a continuous working pressure of 200 psi and be equipped with a square operation nut and resilient wedge seat.

1052.16 Quick Coupler Valves

Each system will have a minimum of one quick coupler valve located adjacent to the downstream side of the backflow preventer. This valve will be a brass two-piece body designed for working pressure of 150 psi operable with quick coupler. Equip quick coupler with locking rubber cover. Key size and type as shown on plans and specifications for each project. The quick coupler valve shall be Rainbird 44 R.L.C. one (1) inch locking cover or approved equal. Installation shall be in accordance with the Standard Drawings

1052.17 Stop and Waste Valve

All main lines will have a stop and waste valve installed on the upstream side of the backflow preventer. Recommend stop and waste valve be installed with compression type S&W (Mac - Pac).

1052.18 Isolation Valves

Isolation valves shall be installed at locations noted on the accepted plans or as required by the City Engineer and in accordance with the Standard Drawings. Isolation valves two (2) inches and larger shall be Matco or acceptable substitute, and conform to the requirements of Section 632.05, Gate Valves, and Section 642.11, Valves For Use With Meter, of these STANDARDS AND SPECIFICATIONS. Isolation valves will have a square operating nut and resilient seat.

Install isolation valve in a separate 10” Rain Bird round locking box with stand pipe over a three (3) inch depth of three-quarter (¾) inch gravel for each assembly.

1052.19 Pressure Reducing Valves

When the City main line static pressure exceeds ninety (90) psi, a Watts pressure reducing valve shall be installed downstream from the reduced pressure backflow preventer and in accordance with the Standard Drawings. All applicable portions of Section 632.07, Pressure Reducing Valves, of these STANDARDS AND SPECIFICATIONS, shall apply.

1052.20 Sleeving

All piping shall be sleeved under sidewalks, curbs, roadways, or similar structures. Sleeves shall be placed in an excavated trench that provides the proper alignment for the pipe. Trenches shall be excavated and compacted in accordance with Section 660.00, Trenching, Backfilling and Compacting, of these STANDARDS AND SPECIFICATIONS, prior to the installation of any sidewalks, curbs, roadways or similar structures.

Sleeves shall be class 200 PVC or heavier pipe and shall be double the size of the pipe to be installed through it. Sleeves shall extend a minimum of twelve (12) inches beyond the edge of the sidewalk, curb, roadway or similar structure.

1052.21 Valve Boxes

All valve boxes shall have the valve ID branded on box lid. The valve box will also be supported by four bricks of pavers beneath the corners of each valve box.

Gate, Isolation, Quick Coupling, and Drain valves as well as Wire Stub Boxes require a Carson/Brooks #910-10 valve box or approved equal.

Three quarter (¾) inch through one and one half (1 ½) inch Control valves which include a true union ball valve in the same box require a Carson/Brooks #1220-12 jumbo box.

Two (2) inch and larger Control valves will have the true union ball valve in a separate Carson 1220-12 jumbo valve box. Each control valve will in a separate Carson 1220-12 jumbo box.

1052.22 Drip Irrigation

Rain Bird Xerigation (or approved equivalent) drip irrigation components will be used. Xeribug emitters and pressure compensating nozzles, Xeri tube distribution line, and Rainbird one-quarter (¼) inch distribution tubing will be used. Bug caps shall be installed in distribution tubing. Valve assemblies will consist of a PVC true-union ball valve, inline Basket filter and Rainbird PEB Valve assembly model XCZ-100-PRB-COM a pressure regulating device and PVC union must be installed downstream of valve and in accordance with the Standard Drawings.

Drip lateral lines to shrub beds will consist of 160 1" class PVC solvent weld pipe or eighty (80) psi 1" Commercial Poly pipe. PVC insert fittings for poly pipe or Rain bird compression fittings will be used at distribution line connections.

All clamps shall be stainless steel screw clamps, no pinch clamps.

All drip lateral lines will be minimum of ¾". (No 1.2" drip lines is allowed in the City of Brighton.)

A flush cap will be installed at the end of each distribution line. Install flush cap in appropriate round box over three (3) inches of three-quarter (¾) inch gravel.

Use manufacturer's guidelines to determine flow rate, number of emitters and water application rate for each plant. Place emitters so that they are evenly spaced around the plant. Distribution lines will not exceed two hundred and fifty (250) feet in length. System must be designed to provide at least a minimum of 15PSI available at the end of each tubing run to flush the system. Place emitters halfway between the main trunk of the plant and the edge of its canopy. Design approach of drip irrigation installation will be specific to soil type, the type of plants used, their water requirements and the suitability of the components in the landscape.

Drip laterals minimum of 12" deep in paved, sodded, seeded areas.

Where drip laterals enter shrub beds from turf areas, elbow up to finish grade. All drip irrigation components will be installed below finish grade of beds. Where mulch or rock are used with landscape fabric, place distribution lines under the fabric with a minimum of 4" of rock or mulch. Secure distribution tube with galvanized tie down stakes.

Do not use risers, bubblers, or any drip components that extend above finish grade of beds.

1052.23 Fittings

1052.23.01 Solvent Weld Pipe

Shall be standard wright, schedule 40, and injection molded PVC: complying with ASTM D2241 and ASTM D1784; cell classification 12454-B, Type 1, Grade 1. Threaded Nipples shall be ASTM D 2464, Schedule 80 with molded threads. Joints shall be sealed using the Primer and Cement type recommended by manufacturer of pipe and fittings. Only Weldon P-70 Primer, Weldon 711 Grey Glue, and Weldon 725 Wet and Dry Glue will not be allowed.

1052.23.02 Gasketed End Pipe

Fitting and service Tees three (3) inches to four (4) inches shall be ductile iron, grade 70-55-05 in accordance with ASTM A-536. Fitting shall have deep bell push on joints with gaskets meeting ASTM F-47. Unless otherwise indicated in the project specifications, all fitting will have pipe restraints and thrust blocks.

1053.00 Site Conditions

The Contractor will coordinate his work with that of other trades whenever possible to prevent conflicts. Before starting work, the Contractor will inspect the site and check all grades to ensure that he may safely proceed. All scaled dimensions are approximate. Before proceeding with any work, the Contractor will carefully check and verify all dimensions.

Changes or alterations in the system to meet site conditions will be subject to the approval of the City Engineer and will be made at the Contractor's expense. If any work requires that it be installed in locations other than shown in the accepted plans, the Contractor will prepare a set of "as built" drawings in accordance with Section 222.00, Construction Acceptance Procedures, of these STANDARDS AND SPECIFICATIONS, noting the exact locations of those changes. Exact measurements of buried valves and wire locations will be shown. The Contractor will supply the "as built" Mylar to the City prior to receiving final acceptance. "As-built" drawings will be completed daily and kept on site for review and inspection during construction.

The Contractor will be responsible for all costs incurred for supplying the electrical needs required for the job. Xcel Energy or United Power should be contacted for information on possible electrical sources. All electrical work, except twenty-four (24) volt, will require a separate inspection from the City Building Official.

All applicable portions of Section 1000.00, Site Work and Earthwork, of these STANDARDS AND SPECIFICATIONS, shall apply.

1054.00 Excavation

All applicable portions of Section 660.00, Trenching, Backfilling and Compacting, of these STANDARDS AND SPECIFICATIONS, shall apply. When approved by the Director(s), trench excavation and backfill for irrigation systems in excess of the limits noted in Section 660.00 may be allowed.

1055.00 Process

1055.01 Staking

Prior to excavating or trenching, the Contractor will stake all proposed and existing utilities and all sprinkler head and line locations. Stakes will be suitable wooden stakes color coded for materials and maintained throughout the sprinkler installation process. The Contractor of record will contact the Parks and Recreation department forty-eight (48) hours this work will be completed and request an inspection of the staking based on the design plans with the Contractor's recommended site adjustments.

1055.02 Sprinkler Heads

Install sprinkler heads in positions approved by the Parks and Recreation department. Set each head in the specified position relative to finished grade to comply with the manufacturer's recommendation or as otherwise detailed. Spacing of heads shall not exceed the maximum indicated on the Irrigation Plans, unless approved by the Parks and Recreation department. Install heads on a double swing-joint risers of schedule 40 PVC pipe. Angled nipple relative to non-pressure line shall be no more than 45° or less than 10°. Adjust part of circle heads for full coverage of the landscaped area, avoiding paved surfaces. Adjust heads, as needed, to the correct height after sod is installed. Plant placement shall not interfere with intended sprinkler head coverage piping or other equipment. If a distribution problem is identified by the Parks and Recreation department or project manager, the Parks and Recreation department may request nozzle changes or other adjustments without additional cost to the city.

1055.02 Pump house

When a pump house is used, the secondary water service line shall be extended a minimum of twenty-four (24) inches below grade on the discharge side of the pump house and a minimum of twenty-four (24) inches beyond the pump house slab or footing.

1055.03 Pipe assembly

The adaptation from copper to PVC will be made by using a female copper adapter receiving a male PVC adapter.

PVC pipe shall be assembled in accordance with Section 1052.14, Pipe, of these STANDARDS AND SPECIFICATIONS. All excess glue will be wiped from the joint with a cloth rag or similar material after assembly.

All PVC pipe shall be snaked in trench as much as possible to allow for expansion and contraction. Do not install pipe when air temperature is below 40° Fahrenheit.

All threaded PVC fittings and nipples shall receive a double wrap of Teflon tape prior to assembly.

When pipe installation is not in proves or at the end of each day, the Contractor will close pipe ends with tight plug or cap.

1055.04 Trenching

All pipe will be installed in an excavated trench. Trenches will be dug true to the alignments shown on the accepted plans. Excavation of the trenches will be done in a workman-like manner, providing a trench that is straight and true with a flat bottom containing no rocks or other deleterious material that may damage the pipe.

Separate trenches will be dug for each line. No doubling up of lines in a single trench will be allowed. Trenches will be dug deep enough to allow the following cover over the top of the pipe:

Main Line Size	**Minimum Cover**	**Maximum Cover**
1" - 1-1/2"	24"	24"
2" - 3"	24"	36"
Greater than 3"	36"	48"

Lateral Line Size		**Minimum Cover**	**Maximum Cover**
1"- 3"	(where rotors are used)	18"	24"
1"- 3"	(where spray heads 4" - 8" pop up height are used)	12"	24"
1"- 3"	(where spray heads 12" or over pop-up heights are used)	18"	24"

No trench will be left open overnight without specific prior approval by the Parks & Recreation Director or designee and without sufficient barricades to protect the public. Barricades shall meet the requirements of Section 141.08, Traffic Control, Barricades and Warning Sign, of these STANDARDS AND SPECIFICATIONS and in accordance with the Standard Drawings.

1055.05 Electric Control valves

The Contractor will install the valve cross-handle three (3) inches below finished grade where shown on the Drawings and as detailed. When grouped together, allow at least 12 inches between valve box sides. Install each remote control valve in a separate valve box. Install each valve box lid flush with grade. All Electric Control Valves will have a true-union ball valve installed on the inlet side of the valve.

1055.06 Manual Drain Valves

The Contractor will install three quarter (¾) inch clotted, manual drain valves at location shown on plans. Provide a six (6) foot drainage sump under each drain valve.

1055.07 Quick Coupling valves

The Contractor will install quick couplers on double swing joint assemblies of schedule 80 PVC pipe, plumb and flush to grade. Angled nipple relative to pressure supply line shall be no more than 45° and no less than 10°. Install quick coupling valves as detailed.

1055.09 Valve Boxes

1. Install one valve box for each type of valve installed as detailed. Valve box xtension are not acceptable. Install gravel sump at each valve location after compaction of all trenches. Place gravel inside valve box after valve box is backfilled and compacted.
2. Brand the controller letter and station number on the lid of each valve box. Letter nad number size shall be no smaller than one (1) inch and no greater that one and one half (1 ½) inches. Depth of branding shall be no more than one eighth (1/8) into valve lid box.

1055.08 Control Wiring

The Contractor will position wire alongside pressure supply mainline or sub-mainline, where possible. If wire is not located with mainline, the Contractor will position it alongside non-pressure piping. These requirements will be verified by the Parks and Recreation department.

1055.08.01 Low Voltage Wiring

1. Bury control wiring between controller and electric valves in pressure supply line trenches, strung as close as possible to the pressure supply lines. The Contractor will position this wire consistently below and to one side of pipe, or in separate parallel trenches.
2. Bundle all 24 volt wires at ten (10) foot intervals and lay with pressure supply line pipe or other pipe to one side of the trench.
3. Provide an expansion loop at every pressure pipe angle fitting, every electronic control valve location, and every five hundred (500) feet. The Contractor will form an expansion loop by wrapping wire at least eight (8) times around a three quarter (¾) inch pipe.
4. Make all splices and E.C.V. connections using 3M DBY or approved similar dry splice method.
5. Install all control wire splices not occurring at control valves in separate wire stub box.
6. Install one control wire for each control valve.
7. Run two spare #14 AWG UF control wires and one #12 AWG UF common wire from controller pedestal to the end of each and every leg of the pressure supply mainline. The Contractor will label spare wires at the controller and at the wire stub box.

1055.09 Automatic Controller

1. Install the controller in accordance with manufacturer's instructions as detailed and where shown on Drawings.
2. Connect remote control valves to the controller in the same numerical sequence that is shown on Drawings.
3. Coordinate with the Parks and Recreation department for the review and approval of the final location for the controller prior to installation.
4. Ensure that each controller installation shall include a dedicated separate ground wire and grounding rod, per the manufacture's recommendations.

5. Install all above ground conduits with rigid galvanized pipe and appropriate fittings. Likewise the Contractor will install all below ground conduits with schedule 40 PVC
6. Furnish a temporary electric controller during the contract period.

1055.10 Backfill

All backfill material will be free of rocks one (1) inch in diameter and larger. Backfill shall be completed in accordance with Section 660.00, Trenching, Backfilling and Compacting, of these STANDARDS AND SPECIFICATIONS.

1055.11 Turn on and winterization

The Contractor shall winterize the system in the fall, put it into operation in the spring, and perform all other necessary service work needed to insure proper operation of the system.

1056.00 Inspections

Inspections shall be completed in accordance with Section 1024.00, Inspections, of these STANDARDS AND SPECIFICATIONS. The Contractor must notify the City for inspections of sprinkler location staking, main line installation, wiring installation and coverage test.

1056.02 Main Line Inspection

The City will inspect the depth of pipe, manual drain valves, sumps and control valves for conformance to the accepted plans and these STANDARDS AND SPECIFICATIONS prior to covering the pipe. All main lines will be pressure tested in accordance with Section 633.14, Leakage, of these STANDARDS AND SPECIFICATIONS.

1056.03 Wiring Inspection

When the wiring installation has been completed, the City will inspect it for conformance to the accepted plans and these STANDARDS AND SPECIFICATIONS.

1056.04 Coverage Test

After the sprinkler heads have been installed and backfilling operations are complete and prior to ordering any sod or seed, the Contractor, in the presence of the City, will perform a coverage test to determine the conformance to the accepted plans and these STANDARDS AND SPECIFICATIONS. No partial acceptance will be made.

1056.05 Pressure Test

Sprinkler mains will be pressure tested for two (2) hours at one hundred and twenty (120) psi, and shall be observed by the City Inspector. No leakage or pressures losses shall be accepted. Leakage will be detected by hydrostatic testing and visual inspection. Cement or caulking to repair leaks is prohibited. Repeat test until all leaks are corrected.

1057.00 Warranty Period

The Contractor shall be responsible for the entire sprinkler system for a period of two (2) years from the date of acceptance of the entire project. If any trouble should develop within this time period due to faulty workmanship or material, the defect will be corrected in a timely fashion by the Contractor without expense to the City. The Contractor will not be responsible for repair of the sprinkler system due to vandalism or due to erosion after the work has been accepted by the City.

Repair damages to the premises caused by defective items within a maximum of five (5) days of notification from the owner.

Make adjustments, repairs and replacements at no additional cost to the contract price.

System must provide head to head coverage. Contractor will guarantee head to head coverage and make any adjustments or field changes to ensure proper coverage during construction or during the warranty period at no additional cost to the contract price.

Any settling of backfilled trenches, which may occur during the guarantee period, will be repaired without expense to the City, including the complete restoration of all damaged property.

Turn on and winterization: The Contractor shall winterize the system in the fall, put it into operation in the spring, and perform all other necessary service work needed to insure proper operation of the system.

Approved construction drawings shall be on site daily and updated weekly with As Built markups. Contractor will make As Builts available for review and inspection to City staff on site at all times on request. Record all changes which are made from the contract drawings. Irrigation As Builts will identify and record dimensioned locations for all components installed in valve boxes and locate all dimensions from two permanent reference points. Record all required information on as built drawings. Do not use these prints for any other purpose.

1060.00 PLANTING SPECIFICATIONS

1061.00 General

The scope of work involves furnishing all plants, equipment, materials, labor and supervision necessary for the installation of plant materials as indicated on the accepted plans and in these STANDARDS AND SPECIFICATIONS.

1062.00 Materials

1062.01 Mulch

Wood chip mulch shall be of a high quality fibrous nature, such as shredded wood chips or shavings, which are between one (1) inches and four (4) inches in length. Mulch shall be clean and free of soil, chipped invasive plant species, or man-made debris and shall be uniformly placed at a depth of three inches.

Rock mulch shall be clean and be between, three-quarter (3/4) to two (2) inch rounded, washed river rock. Rock Cobble shall be 2 – 4 inch or 3 – 6 inch washed cobble. Rock Mulch and Cobble shall be clean and free of soil or man-made debris and shall be of good quality. All Rock mulch or Cobble samples shall have the size, product name and supplier listed with the sample provided.

Different mulch types shall be separated by three-sixteenths (3/16) inch wide by six (6) inches deep green painted steel edger. Formal shrub beds shall exclusively utilize rock mulch. Shrub beds which consist solely of perennials, native shrubs and/or trees shall exclusively use wood chip mulch.

1062.02 Organic Amendments

Organic material will be dry, well-rotted, minimum one (1) year old poultry, horse, sheep or dairy cow manure. Manure will be free of sawdust, wood chips, and excessive salt and chemical additives. See Standards and Specifications sections 1022 and 1023 for further information.

1062.03 Landscape Fabric

All landscape fabric shall be Typar 3401 4 ounce/sq. yard geo-textile polypropylene fabric or an approved equivalent.

1062.04 Edging

All edging shall be three-sixteenths (3/16) inch wide by six (6) inches deep green painted steel. Use of approved steel edging is required to separate bluegrass with formal shrub plantings, perennial plantings and irrigated native shrub plantings. No edger is necessary with non-irrigated native shrub or tree plantings.

1062.05 Staking and Guying

All trees shall be staked and guyed using the following material:
Stakes: Six (6) foot steel tee posts for deciduous trees
Two (2) foot steel tee posts for coniferous trees
Wires: A double strand of number twelve (12) gauge galvanized wire
Nylon straps: One and one-half inch (1½) wide nylon strap with eyelets at each end.

1062.06 Submittals

Contractor shall furnish material samples (mulch, amendments, etc.) on request by the City.

1062.07 Plant Materials

The Contractor will furnish and install all plants shown on the accepted plans. All plant material shall conform to the measurements as noted in the size requirements and on the accepted plans. Nursery stock shall meet the minimum dimensions for height and/or caliper. All plant material shall comply with the American Standard for Nursery Stock ANSI Z60.1-2004 at installation and throughout the project warranty period.

Distribution of Tree Species

Tree diversity is necessary to prevent uniform insect or disease susceptibility and extensive monocultures. Deciduous trees shall constitute at least fifty (50) percent of all tree plantings to any development plan. Tree diversity shall follow the minimum requirements on any development plan:

Number of trees on site	*Maximum percentage of any one species*
10-19	50%
20-39	33%
40-59	25%
60 or more	15%

Size Requirements

All deciduous and ornamental trees shall be one and one-half (1.5) inch caliper or larger. Caliper measurement shall be taken six (6) inches above the root flare if four (4) inches or less and twelve (12) inches above the root flare for larger tree sizes.

All evergreen trees shall be a minimum of eight (8) feet tall or larger. Height dimensions refer to the main body of the tree, from the root collar and above.

Shrubs shall be number five (5) size containers or larger. Smaller containerized stock or dormant bare root shrubs and trees may be planted at the edge of drainages in native areas.

Perennials and groundcovers shall be number one (1) size container or larger

Quality

Trees shall be typical of their species and/or variety. Plant materials shall be live, healthy, vigorous, structurally sound, and free of disease and insect infestations.

Trees shall have a symmetrical form as typical for the species/cultivar. Trees must be self-supporting and shall have a single, relatively straight central leader and tapered trunk, free of co-dominant stems and vigorous, upright branches that compete with the central leader. The tip of the dominant leader shall be the tallest part of the tree.

Branches shall be distributed radially around and vertically along the trunk, forming a symmetrical crown typical for the species. Branches shall be no larger than two-thirds (2/3) the diameter of the trunk. The attachment of scaffold branches shall be free of included bark. Evergreens shall have branches that extend to the ground. Trees shall be free of twig and/or branch dieback

Plants shall exhibit good annual growth and buds shall be plump and well fitted for the species. Foliage shall be full and display a healthy and consistent color when in leaf. Evergreen foliage will be good intense color.

Trees shall be free of wounds (except properly-made pruning cuts), disfiguring knots, sunscald injury, evidence of previous or current disease or insect infestations, fungal fruiting-bodies, wood cracks, and bleeding areas.

Plant tags stating the correct plant name and size will be securely attached to all plant materials. Plants shall be true to their name as specified.

Balled and Burlapped trees shall have a solid ball of earth of minimum or greater specified size firmly wrapped with burlap or similar materials and held in place securely bound with twine or rope. No balled plant will be planted if the ball is broken, either before or during the planting process. Any plant that is loose in the ball will be removed from the site and replaced.

The minimum ball size for B & B trees is as follows:

Tree Size	**Ball Depth Minimum**	**Ball Diameter Minimum**
1½" - 2" caliper	18"	22"
2" - 2½" caliper	20"	24"
2½" - 3" caliper	22"	28"
3½" - 4" caliper	30"	38"

Tree Size	Ball Depth Minimum	Ball Diameter Minimum
5’ - 6’ height	14”	16”

Container grown trees shall be well rooted and established in the container in which they are growing. They shall be grown in the container for a sufficient length of time for the root system to hold the earth when taken from the container, but not long enough to become pot bound. They should have few, if any, roots on the outside surface of the media. The root collar and large roots shall be free of circling and/or kinked roots. The upper-most roots or root collar shall be within one (1) inch above or below the soil surface. The soil level should be within two (2) inches of the top of the container. Containers shall be stable and not deteriorated to a degree that will cause breaking up of the root ball during the planting operations.

Bare-root trees shall have a heavy fibrous root system that has been developed by proper cultural treatment, transplanting and root pruning. The spread of the root system shall be twelve (12) times the trunk diameter (caliper) in inches, plus an additional six (6) inches. Any damaged, injured, or broken roots shall be cut with sharp, clean pruning shears, leaving no damaged, frayed, or splintered cut surfaces.

Plant materials not meeting these standards are subject to rejection.

City of Brighton Approved Tree List

Thoroughly research all trees before ultimately choosing a tree to assure that the species you select is suitable for the desired site in regards to mature sizes and growing conditions. Size at maturity figures are estimates and can be highly variable depending on the variety or cultivar chosen. All of the listed trees are suitable for planting on private properties (i.e. lawns/yards) and in public access areas (i.e. parks/tot lots). Only thornless varieties of thorn bearing species shall be planted in any public access areas.

Size at Maturity: S = Small, M = Medium, L = Large

Moisture Needs: L = Low (Drought Tolerant), M = Moderate, H = High (Moisture needs refer to their requirements after establishment)

Deciduous Trees

Botanical Name	Common Name	Variety	Size at Maturity	Moisture Needs	Comments
Acer	Maple				
Acer campestre	Hedge		S	L/M	Variable hardiness from seed; Prone to winter dieback in hard early freezes
Acer x freemanii	Freeman	Autumn Blaze, Armstrong, Celebration, Autumn Fantasy, Sienna Glenn	M/L	M	Develops chlorosis in alkaline soils
Acer ginnala	Amur/Ginnala	Flame	S	L/M	Can develop chlorosis in alkaline soils
Acer glabrum	Rocky Mountain		S	M/H	Prefers more moisture
Acer grandidentatum	Big Tooth	Manzano	S/M	L/M	Tolerant of dry conditions and of alkaline soils.
Acer griseum	Paperbark		S	M	Needs a protected site; does not transplant well when bare rooted
Acer miyabei	Miyabe		M	L/M	Typically budded to A.campestre that shows variable hardiness from seed
Acer platanoides	Norway	Columnare, Crimson King, Crimson Sentry, Deborah, Emerald Lustre®, Emerald Queen, Fairview®, Royal Red	M/L	M	Prone to sunscald and leaf scorch in hot dry sites; Performs best in areas with low reflective heat.
Acer saccharum	Sugar	Green Mountain®, Legacy®, John Pair, Autumn Splendor	M/L	L/M	Prefers well drained, neutral to acidic soils; Can develop chlorosis in alkaline soils; Performs best in areas with low reflective heat.
Acer tataricum	Tartarian	Hot Wings®, Pattern Perfect™	S	L/M	

Acer truncatum x platanoides	Shantung/Norway Hybrid	Norwegian Sunset®, Pacific Sunset®	M	L/M	Prone to winter dieback in early hard freezes & possible death at -30°
Aesculus	Buckeye/ Horsechestnut				
Aesculus arguta	Texas		M	M	More heat tolerant than A.glabra
Aesculus glabra	Ohio		S/M	M	Some chlorosis; Prone to leaf scorch in hot dry sites
Aesculus hippocastanum	Horsechestnut		M/L	M	Prone to leaf scorch in hot dry sites
Aesculus carnea		Briotti, Ft McNair	S/M	M	
Alnus	Alder				
Alnus glutinosa	Common/Black		M	M/H	Leaf miner; Leaf scorch in hot dry sites
Alnus tenuifolia	Thinleaf/Mountain		S	M/H	Leaf miner; Leaf scorch in hot dry sites
Amelanchier	Serviceberry				
Amelanchier alnifolia	Saskatoon		S	L/M	Prone to basal suckering
Amelanchier canadensis	Shadblow		S	L/M	Best used as multi-stem; Prone to basal suckering
Amelanchier laevis	Allengheny	Snowcloud, Spring Flurry®	S	M	Best used as multi-stem; Prone to basal suckering
Amelanchier lamarckii	Lamarck		S	M	Best used as multi-stem, Prone to basal suckering
Amelanchier x grandiflora	Apple Serviceberry	Autumn Brilliance®, Princess Diana, Robin Hill	S	M	Prefers acid soil; Develops chlorosis in alkaline soils; Prone to basal suckering; best used as multi-stem shrub
Carpinus betulus	Hornbeam	Frans Fontaine, Fastigiata	M	M	Needs protected site
Catalpa	Catalpa				
Catalpa ovata	Chinese		S/M	L/M	
Catalpa speciosa	Northern/Western		M/L	L/M	
Celtis occidentalis	Hackberry		L	L/M	
Cercis	Redbud - Eastern	Alba, Forest Pansy, Lavender Twist™	S	M	Northern seed source; Needs protected site
Cladrastis kentukea	Yellowwood		M	M	Able to fix nitrogen from the atmosphere; Tolerant of alkaline soils
Cornus	Dogwood				
Cornus controversa	Giant	June Snow	S	M	
Cornus mas	Cornelian Cherry		S	M	
Corylus colurna	Turkish Filbert		M	L/M	
Cotinus obovatus	Smoketree		S	L/M	

Crataegus	Hawthorn				
Crataegus crusgalli	*Cockspur*		S	L/M	
Crataegus ambigua	*Russian*		S	L	
Crataegus douglasii	*River/Douglas*		S	M	Prone to basal suckering
Crataegus laevigata	*English*	Crimson Cloud, Pauls Scarlet	S	M	Fireblight
Crataegus mollis	*Downy*		S	L/M	Rust
Crataegus x mordenensis	*'Toba'*		S	M	
Crataegus phaenopyrum	*Washington*		S	M	
Crataegus viridis	*Green*	Winter King	S	L/M	
Crataegus x lavallei	*Lavalle*		S	M	
Eucommia ulmoides	Hardy Rubber Tree		M/L	M	
Fagus sylvatica	Beech - European	Roseomarginata, Tricolor	L	M	Best in well drained soils
Fraxinus	Ash				
Fraxinus americana	White	Autumn Purple®, Empire	M/L	M	EAB not yet detected in CO.
Fraxinus manshurica	Manchurian	Mancana	M/L	M	EAB not yet detected in CO.
Fraxinus nigra	Black	Fallgold	M/L	M	EAB not yet detected in CO.
Fraxinus pennsylvanica	Green	Bergeson, Cimmaron®, Dakota Centennial™, Patmore , Marshall's Seedless, Prairie Spire®, Summit	M/L	M	EAB not yet detected in CO.
Ginkgo biloba	Ginkgo		M/L	M	
Gleditsia	Honeylocust		M/L	L/M	
Gleditsia triacanthos v. inermis	Thornless Common	Imperial®, Halka™, Shademaster®, Skyline®, Sunburst®	M/L	L/M	Tolerant of harsh and dry sites.
Gymnocladus dioicus	Kentucky Coffeetree	Expresso	L	L/M	Tolerant of poor soil and drought.
Heptacodium miconiodes	Seven-Son Flower		S	M	
Hibiscus syriacus	Rose-of-Sharon	Aphrodite, Ardens, Coelistis, Lucy, Red Heart, Woodbridge	S	M	
Koelreuteria paniculata	Goldenrain Tree		M	L	Tolerant of poor soils and drought.
Liquidambar styraciflua	Sweetgum		L	M	Needs a well-drained soil

Liriodendron tulipifera	Tuliptree		L	M	Tree will perform best in a well-drained, more acidic soil
Maackia amurensis	Amur Maackia		S	L/M	
Magnolia	Magnolia				
Magnolia acuminata	*Cucumbertree*		M/L	M	
Magnolia x 'Galaxy'	*Galaxy*		S	M	
Magnolia x soulangiana	*Saucer*		S	M	
Malus spp.	Apple (Fruit)	Granny Smith, Gala, Haralred, Honeycrisp, Jonathan, Liberty, McIntosh, Red Delicious, Royal Gala, Sweet Sixteen, Yellow Delicious, Zestar	S	M	Fireblight
Malus spp.	Crabapple	Centurion®, Coralburst™, David, Dolgo, Hopa, Indian Magic, Indian Summer, Prairiefire, Prairie Rose, Profusion, Radiant, Red Barron , Robinson, Royal Raindrops, Sargent, Sargent Tina, Spring Snow, Thunderchild, Velvet Pillar	S	L/M	Spring blossoms of white, pink, or red; Foliage can range from green to purple with mature canopy forms of various shapes and sizes; Always ask about an individual varirties resistance to fireblight.
Morus alba	Mulberry- *White*	Chaparral	S	M	
Nyssa sylvatica	Tupelo		M	M/H	
Phellodendron amurense	Amur Corktree		M	M	
Platanus	Sycamore				
Platanus occidentalis	Sycamore		L	M/H	
Platanus x acerifolia	*London Planetree*	Bloodgood	L	M/H	
Prunus	Plum/Cherry/ Apricot				
Prunus armeniaca	Apricot	Chinese, Moongold, Moorpark	S	M	
Prunus avium	*Cherry*	Bali, Bing, Stella Compact	S	M	Seldom sets fruit along the front range
Prunus cerasifera	*Plum*	Newport	S	M	Borers
Prunus cerasus	*Cherry*	Montmorency, North Star	S	M	

Prunus 'Frankthrees'	*Cherry*	Mt. Saint Helens®	S	M	
Prunus maackii	*Amur Chokecherry*		S	M	Root diseases if too wet
Prunus' Mount Royal'	*Cherry*		S	M	Self-fruitful plum
Prunus padus	*European Birdcherry*	Summer Glow®	S	M	
Prunus persica	*Peach*	Elberta, Polly, Reliance	S	M	Seldom sets fruit along the front range
Prunus 'Santa Rosa'	*Plum*		S	M	Needs a cross pollinator
Prunus 'Stanley'	*Plum*		S	M	Self-fruitful plum
Prunus 'Superior'	*Plum*		S	M	Needs a cross pollinator
Prunus 'Toka'	*Plum*		S	M	Needs a cross pollinator
Prunus virginiana	*Common Chokecherry*	Canada Red, Schubert	S	L/M	Prone to basal suckering
Prunus x fontanesiana	*Plum*	Des Fontaines	S	M	
Ptelea trifoliata	Wafer ash, Hoptree		S	L/M	Best as a multi-stem; tolerant of very dry conditions; Leafs out late
Pyrus	Pear				
Pyrus	(Fruit)	Bartlett, Early Gold, Golden Spice, Luscious, Parker, Summercrisp	S	M	
Pyrus calleryana	Callery (ornamental)	Aristocrat, Chanticleer, Autumn Blaze, Redspire, Capital, Cleveland Select	S/M	L/M	Fireblight; Many cultivars of this species are available, and all have outstanding spring displays of white flowers before leaves emerge. Can be susceptible to early and late season freeze damage.
Pyrus ussuriensis	Ussurian (ornamental)	Prairie Gem, Burgandy, 'Mt. Frost	S	L/M	Most cold hardy of all the ornamental pears. White spring flowers before leaves emerge are very showy. Fall color ranges from yellow to orange to burgundy red. Tree has shown good fire blight resistance. Larger fruit potential
Quercus	Oak				
Quercus alba	*White*		L	L/M	Develops chlorosis in alkaline soils
Quercus bicolor	*Swamp White*		L	M	Develops chlorosis in alkaline soils
Quercus buckleyi	*Texas Red*		M/L	L	Many seed sources not predictably hardy
Quercus ellipsoidalis	*Northern Pin*		M/L	M	Develops chlorosis in alkaline soils
Quercus gambelii	*Gambel*		S	L	

Quercus macrocarpa	*Bur*		L	L/M	Tolerates poor soils and drought; Rugged corky branches and stems give this long-lived tree good winter interest.
Quercus muehlenbergii	*Chinkapin*		M/L	L/M	From northern seed source
Quercus robur	*English*	Columnaris, Skyrocket, Skymaster	M/L	L/M	
Quercus rubra	*Red*		L	M	Develops chlorosis in alkaline soils
Quercus shumardii	*Shumard*		L	L/M	From northern seed source
Quercus undulata	*Wavyleaf*		S	L	
Quercus alba x robur		Crimson Spire®	M/L	L/M	
Quercus robur x bicolor		Regal Prince®	M/L	L/M	
Sophora japonica	Japanese Pagodatree		L	M	Good tolerance of urban conditions; Prone to storm damage.
Sorbus	Mountain-ash				
Sorbus intermedia	*Swedish* Whitebeam		S	M	Prone to sunscald
Sorbus aucuparia	*European*	Cardinal Royal®	S	M	Fireblight; Prone to sunscald
Sorbus x hybrida	*Oak Leaf*		S	M	
Syringa	Lilac				
Syringa pekinensis	Peking	Summer Charm	S	L/M	
Syringa reticulata	Japanese	Ivory Silk	S	L/M	
Tilia	Linden				
Tilia americana	American	Legend, American Sentry	L	M	Not tolerant of road salts; Avoid use in areas with high reflective heat.
Tilia cordata	Littleleaf	Greenspire®	M/L	M	Not tolerant of road salts; Avoid use in areas with high reflective heat.
Tilia tomentosa	Silver	Sterling Silver	L	M	Not tolerant of road salts; Avoid use in areas with high reflective heat.
Tilia cordata x mongolica		Harvest Gold	M	M	Avoid use in areas with high reflective heat.
Tilia x flavescens		Glenleven	M/L	M	Not tolerant of road salts; Avoid use in areas with high reflective heat.

Tilia x euchlora		Redmond	M/L	M	Not tolerant of road salts; Avoid use in areas with high reflective heat.
Ulmus	Elm				
Ulmus spp. (Dutch Elm Disease resistant cultivars)	American	Princeton, Valley Forge, Triumph, Emerald Sunshine, Prospector, Accolade, Vanguard, Frontier, Patriot, Commendation, Allee, Homestead, Pioneer, New Horizon, New Harmony	M/L	L/M	Some susceptibility to DED, scale, leaf miners
Xanthoceras sorbifolium,	Yellowhorn	Clear Creek®	S	L/M	Unusual smaller ornamental often with a form closer to a large shrub; Tolerant of alkaline soils.
Zelkova serrata	Japanese Zelkova	Musashino, Green Vase, Village Green	M/L	M	

Evergreen Trees

Botanical Name	Common Name	Variety	Size at Maturity	Moisture Needs	Comments
Abies concolor	Fir - White		M/L	M	Needs more moisture; Performs best in well-drained soil; Chlorosis
Juniperus	Juniper				
Juniperus chinensis	Chinese	Blue Point, Spartan, Hetzi Columnaris, Spearmint	S	L/M	
Juniperus monosperma	One -Seed		S	L	Needs a dry site.
Juniperus osteosperma	Utah		S	L	Needs a dry site.
Juniperus scopulorum	Rocky Mountain	Welchii, Gray Gleam, Cologreen, Sky Rocket, Wichita Blue, Moonglow, Medora	S	L	
Juniperus virginiana	Eastern Red Cedar	Hillspire, Idyllwild, Blue Arrow, Taylor, Manhattan Blue	S	L/M	Will not take windy sites
Larix decidua	European Larch		L	M/H	
Metasequoia glyptostroboides	Dawn Redwood		L	M/H	
Picea	Spruce				
Picea abies	Norway	Cupressina	S/M	M/H	
Picea glauca	Black Hills	Densata	M	M/H	
Picea omorika	Serbian		L	M/H	

Picea pungens	Colorado Blue	Baby Blue Eyes, Bakeri, Hoopsi, Fastigiata, Fat Albert, Colorado Weeping, Sester's Dwarf	S/M/L	M/H	Possible IPS problem, Tussock moth in large trees
Pinus	Pine				
Pinus aristata	Bristlecone		S/M	L/M	Slow growing
Pinus bungeana	Lacebark		M	M/H	
Pinus cembra	Swiss Stone Pine		L	L/M	
Pinus edulis	Pinyon		S	L/M	Pitch borer, Tip moth, Pine Beetle.
Pinus flexilis	Limber	Vanderwolf's Pyramid	M/L	L/M	
Pinus heldreichii	Bosnian	Emerald Arrow, Iseli Fastigiata	S	M	
Pinus monophylla	Singleleaf Pinyon		S/M	L	
Pinus mugo	Mugo	Big Tuna, Tannenbaum	S	L/M	
Pinus nigra	Austrian		M/L	M	Some Zimmerman Pine Moth
Pinus ponderosa	Ponderosa		L	L/M	Mountain Pine Beetle
Pinus strobus	Eastern White		L	M	
Pinus strobiformis	Southwestern White		M/L	L/M	
Pinus sylvestris	Scotch		M/L	M	Mountain Pine Beetle
Sequoiadendron giganteum	Giant Sequoia	Hazel Smith	L	M/H	
Taxodium distichum	Baldcypress	Frio River	L	M/H	
Thuja occidentalis	Eastern Arborvitae	Emerald, Techny, Degroots Spire	S	M/H	More protected area

Approved Street Trees

Small/Ornamental Deciduous Trees

Under 30' Mature Height
12' Minimum Spacing Between Trees, 20' Recommended
Required 4' Minimum Planting Strip Width
Tree Form Only
No Multi-Stemmed/Clump Forms
Thornless Varieties Only

Pruning may be required for clearance above sidewalks and streets

Amur Chokecherry *Prunus maackia*
Amur Maackia *Maackia amurensis*
Chokecherry *Prunus virginiana'shubert'*
Dogwood *Cornus spp.*
Hawthorn *Crataegus spp***.**
Lilac, Japanese Tree *Syringa reticulata*
Lilac, Peking Tree *Syringa pekinensis*
Maple, Bigtooth/Wasatch *Acer grandidentatum*
Maple, Ginnala *Acer ginnala*
Maple, Hedge *Acer campestre*
Maple, Paperbark *Acer griseum*
Maple, Rocky Mountain *Acer glabrum*
Maple, Shantung *Acer truncatum*
Maple, Tatarian *Acer tataricum*
Maple, Trident *Acer buergeranum*
Mayday Tree *Prunus padus*
Pear *Pyrus spp.*
Serviceberry *Amelanchier spp.*
Smoketree *Cotinus obovatus*

Medium Deciduous Trees

30' – 45' Mature Height
20' Minimum Spacing Between Trees, 30' Recommended
Required 6' Minimum Planting Strip Width

All Trees Listed Under Approved Small/Ornamental Street Tree Are Acceptable

Amur Corktree *Phellodendron amurense*
Filbert, Turkish *Corylus colurna*
Ginkgo *Ginkgo biloba*
Goldenrain Tree *Koelreuteria paniculata*
Honeylocust *Gleditsia tricanthos inermis*
Hop Hornbeam *Ostrya virginiana*
Hornbeam, European *Carpinus betulus*
Katsura *Cerdidiphyllum japonicum*
Linden, Crimean *Tilia x euchlora*
Linden, Littleleaf *Tilia cordata*
Maple, Freeman *Acer x freemanii*
Maple, Miyabe *Acer miyabe*
Ohio Buckeye *Aesculus glabra*
Tupelo *Nyssa sylvatica*
Yellowwood *Cladrastis kentuckea*

Large Deciduous Trees

Over 45' Mature Height
30' Minimum Spacing Between Trees, 40' Recommended
Required 8' Minimum Planting Strip Width

All Trees Listed Under Approved Small/Ornamental and Medium Street Trees Are Acceptable

Ash *Fraxinus spp.*
Catalpa *Catalpa spp.*
Elm *Ulmus spp.*
(use only Dutch Elm Disease resistant hybrids)
Hackberry *Celtis occidentalis*
Hardy Rubber Tree *Eucommia ulmoides*
Horsechestnut *Aesculus spp.*
Kentucky Coffeetree *Gymnocladus dioicus*
Linden *Tilia spp.*
London Planetree *Platanus acerifolia*
Maple, Norway *Acer platanoides*
Maple, Sugar *Acer saccharum*
Oak, Bur *Quercus macrocarpa*
Oak, Chinkapin *Quercus muehlenbergi*
Oak, English *Quercus robur*
Oak, Shumard *Quercus shumardii*
Oak, Swamp White *Quercus bicolor*
Oak, Red *Quercus rubra*
Sycamore *Platanus occidentalis*
Tuliptree *Liriodendron tulipifera*
Zelkova *Zelkova serrata*

Street Tree Spacing Requirements & Recommendations

Small Deciduous Trees	Medium Deciduous Trees	Large Deciduous Trees
under 30' mature height	30' – 45' Mature Height	Over 45' Mature Height
Required 4' Minimum Planting Strip Width	Required 6' Minimum Planting Strip Width	Required 8' Minimum Planting Strip Width
12' Minimum Spacing Between Trees, 20' Recommended	20' Minimum Spacing Between Trees, 30' Recommended	30' Minimum Spacing Between Trees, 40' Recommended

Small Evergreen Trees	Large Evergreen Trees
Under 30' Mature Height	Over 30' Mature Height
12' Minimum, 20' Recommended Spacing Between Trees	20' Minimum, 30' Recommended Spacing Between Trees
Do Not Use as a Street Tree	Do Not Use as a Street Tree

Street Tree Requirements

All street trees shall conform with both the required minimum planting strip width and mature heights as detailed in the above table. A permit is required for all trees to be planted in the public right-of-way planted after the approved development landscape design plan.

The following are not acceptable as street trees:

- Russian Olive - *Elaeagnus angustifolia*
- Willow - *Salix spp.*
- Poplars (Cottonwood, Aspen, Lombardy) - *Populus spp.*
- Silver Maple - *Acer saccharinum*
- Boxelder – *Acer negundo*
- Evergreens (Pines, Spruce, Fir) - Pinus spp., Picea spp., Abies spp.
- Multi-Stemmed or Clump Forms
- Thorn-bearing trees

These trees are easily damaged by storms, prone to insect and disease infestations, or predisposed to decay. Some require more space than the public right-of-way provides, and evergreens can cause sight obstructions. Pruning may be required for clearance above sidewalks and streets.

Approved Trees for Native Plantings

Scientific Name	Common Name(s)	Planting Altitude in feet	Native Colorado Life Zone	Moisture	Evergreen/ Deciduous	Comments
Large trees (45+ ft when mature)						
Abies concolor	white fir, concolor fir	4,000 - 10,000	Foothills - Montane	M - H	E	Symmetrical, pyramidal shape; for large landscapes; attractive soft, blue-green needles; grows best where protected from wind.
Acer negundo	box-elder	4,500 - 7,500	Plains - Foothills Upper Sonoran	M - H	D	Maple with compound leaves found along streams; rapid grower, weak-wooded, short-lived; female trees attract nuisance box-elder bugs.
Picea pungens	Colorado spruce	4,000 - 9,500	Foothills - Montane	M - H	E	Colorado State Tree; sharp, stiff needles ranging from green to silvery blue; horizontal branching.
Pinus ponderosa	ponderosa pine	4,000 - 9,000	Foothills - Montane	L - M	E	Longer, yellow-green needles; bark becomes cinnamon color with age; vanilla fragrance on warm days.
Pinus	Southwestern	4,000 -	Foothills -	L - M	E	Blue-green needles, large cones,

strobiformis	white pine	8,500	Montane			scaly bark when mature, faster-growing, less commonly available.
Populus angustifolia	narrowleaf cottonwood	4,000 - 9,500	Foothills - Montane	H	D	Vertical growth habit; willow-like leaves, suckers heavily, best in natural areas along streams; males do not produce cotton; yellow fall color.
Populus sargentii	Plains cottonwood	4,000 - 7,000	Plains - Foothills Upper Sonoran	H	D	Fast-growing, broad, irregular canopy; triangular leaves; males do not produce cotton.
Populus x acuminata	lanceleaf cottonwood	4,500 - 8,500	Foothills	H	D	Fast-growing, upright, rounded, dense branching; spear-shaped, drooping leaves; less suckering; natural hybrid between Plains and narrowleaf cottonwoods; males do not produce cotton.
Pseudotsuga menziesii	Douglas-fir	4,500 - 11,000	Foothills - Montane	M	E	Fast-growing; soft, medium to dark green needles; pyramidal shape; unique cones; alternate host for gall insects on spruce.
Small - Medium trees (10-45 ft when mature)						
Acer grandidentatum	bigtooth maple, Wasatch maple	4,500 - 7,000	Foothills - Montane	L - M	D	Native to southwest, with occurrences in Montezuma County; often multi-stem form; degree of orange-red fall color varies.
Alnus tenuifolia	thinleaf alder	5,000 - 10,000	Foothills - Subalpine	H	D	Large shrub or small tree, often multi-stemmed; yellow fall color not reliable; persistent fruits resemble miniature pine cones, found along streams; bark gray; sun to part shade.
Betula fontinalis (Betula occidentalis)	Rocky Mountain birch	5,000 - 9,000	Foothills - Montane	H	D	Small tree or large shrub; bronze-red bark; found along streams, often with thinleaf alder; yellow fall color; requires additional moisture in dry winters.
Juniperus monosperma	oneseed juniper	4,000 - 7,500	Plains - Foothills	L	E	Multi-stemmed tree with small, scale-like leaves, found on dry rocky slopes, often with pinon.
Juniperus osteosperma	Utah juniper	5,000 - 9,000	Upper Sonoran - Foothills	L	E	Spreading, multi-stemmed evergreen with small, scale-like leaves; large, grayish-blue berry-like fruits are important food for small mammals & birds.
Juniperus scopulorum	Rocky Mountain	4,000 - 8,000	Foothills - Montane	L	E	Variable growth habit, often upright to columnar; male and

	juniper					female flowers on separate plants; found on dry mountain slopes and mesas; berry-like fruit important food for small mammals and birds.
Pinus aristata	bristlecone pine	5,000 - 11,000	Montane - Subalpine	L - M	E	Rounded to pyramidal shape; branches have bottlebrush appearance; short, dark-green needles with specks of white resin; spiny cones; needs well-drained soil; slow-growing.
Pinus edulis	pinon, pinyon pine	4,000 - 7,500	Foothills - Montane Upper Sonoran	L	E	Compact, bushy growth form with grayish green needles in bundles of two, small rounded cones; edible seeds develop when planted in grove for cross-pollination; best in dry, well-drained site.
Quercus gambelii	Gambel oak, scrub oak	4,000 - 8,500	Foothills - Montane	L - M	D	Small tree to large shrub, best on well-drained soils; often thicket-forming; shades of red, orange, yellow and brown in fall; acorns provide excellent wildlife food.
Salix amygdaloides	peachleaf willow	3,500 - 7,000	Plains - Foothills Upper Sonoran	H	D	Fast-growing; lance-shaped leaves; new twig growth orange-yellow; ascending branches; found along streams.

Approved Shrub List

SHRUBS, ORNAMENTAL GRASSES AND PERENNIALS

Acceptable shrubs, ornamental grasses and perennials for landscaping in Brighton are included in the following lists. Other plant materials may be submitted for review and approval by the Parks & Recreation Director or designee. Preference shall be given to drought resistant species.

Table 1: Narrowleaved evergreen shrubs.

Plant Name	Height (H'xW')	Growth Rate	Soil Moisture	Exposure	Comments and Cultural Hints
Arborvitae					
Thuja occidentalis Eastern Arborvitae					
'Hetz Midget'	3 x 3	S	M	S to PS	Dense, globe-shaped.
'Holmstrup'	5 x 3	S	M-H	S to PS	Compact pyramid; holds foliage color in winter.
'Little Giant'	4 x 4	S	M	S to PS	Globe-shaped.
Juniper					
Juniperus communis Blueberry Delight®	2 x 6	M	L	S	Spreading & mounded with lacy bright green foliage.
'Effusa'	4 x 8	M	L	S	Spreading and mounded with tiered branching – Also known as Tammy.
Juniperus sabina Savin Juniper					
'Arcadia'	2 x 6	M	L	S	Spreading & mounded with lacy bright green foliage.
'Broadmoor''	2 x 6	M	L	S	
'Buffalo'	2 x 6	M	L	S	Dense, mounding, dark green form.
'Tamariscifolia'	4 x 8	M	L	S	Bright green foliage on a flat top form. Spreading and mounded with tiered branching – Also known as Tammy.
Juniperus scopulorum Rocky Mountain Juniper					
'Table Top Blue'	6 x 8	M	L	S	Silvery-blue foliage; broad, flat-topped habit.
Juniperus squamata Singleseed Juniper					
'Blue Star'	3 x 4	S	L	S-PS	Silvery-blue needles arranged in a star-like pattern; compact mounded habit.
Juniperus x *media* Spreading Juniper					
'Armstrong'	4 x 8	M	L	S	Gray-green lacy foliage on arched branches.
'Holbert'	3 x 8	M	L	S	Silver-blue foliage with wide spreading growth habit.
'Old Gold'	3 x 6	M	L	S	
'Pfitzeriana Compacta'	4 x 9	M	L	S	Golden-yellow arching branch tips. Gray-green foliage; dense, spreading habit.
'Sea Green'	6 x 8	M	L	S	Mint green foliage, vase-shaped habit, also known

					as Mint Julep™.
Pine					
Pinus densiflora Japanese Red Pine 'Umbraculifera' Tanyosho Pine	10 x 10	S	M	S	Umbrella form with orange bark and medium green needles.
Pinus mugo Mugo Pine 'Big Tuna' 'Mops' 'Slowmound' 'Pumilio' 'White Bud'	 10 x 7 3 x 3 4 x 6 6 x 8 3 x 4	 S S S S S	 L L L L L	 S S S S S	 Dense, upright habit; dark green needles. Dense, compact globe; dark green needles. Dense, compact mushroom-shaped; dark green needles. Variable habit; multi-stemmed. White buds contrast with dark green needles.
Pinus nigra Austrian Pine 'Hornibrookiana'	 3 x 6	 S	 L	 S	 Broad shrubby form with dark green needles.
Pinus strobus Eastern White Pine 'Blue Shag'	 4 x 4	 S-M	 M	 S-PS	 Globe-shape form with blue-green foliage. May turn yellowish in alkaline soils.
Pinus sylvestris Scotch Pine 'Albyn Prostrata' 'Glauca Nana' 'Hillside Creeper' 'Pumila'	 3 x 8 8 x 6 3 x 8 10 x 6	 S-M S M S-M	 L L-M L-M L-M	 S S-PS S-PS S-PS	 Spreading form with shiny green needles. Dense, rounded habit; blue-green needles. Spreading form with medium green needles that become lighter in winter months. Broad, upright habit; bluish-green needles.
Spruce					
Picea abies Norway Spruce 'Elegans' 'Nidiformis' 'Pendula' 'Pumila'	 4 x 6 3 x 5 6 x 8 4 x 5	 S S S S	 M M M M	 S-PS S-PS S-PS S-PS	 Nest-shaped with short needles. Nest-shaped with short green needles. Weeping habit, short dark green needles. Compact, nest-shaped mound with dark needles.
Picea glauca White Spruce 'Conica' Dwarf Alberta Spruce	 8 x 4	 S	 M	 S-PS	 Dense, conical shape with short green needles; best with winter protection.
Picea pungens Colorado Spruce 'Globe' 'Mesa Verde' 'St Mary's Broom' 'Walbrunn'	 3 x 4 2 x 5 3 x 4 3 x 4	 S S S S	 M M M M	 S-PS S-PS S-PS S	 Globe-shaped with green needles. Nest-shaped with green needles. Globe-shaped with blue-green needles. Nest-shaped with blue green needles.

Yew					
Taxus cuspidata Japanese Yew 'Monloo' Emerald Spreader™	3 x 8	S	M	PS-Sh	Compact, spreading form, dk green needles/red fruit.
Taxus x *media* Anglojap Yew					Dense, rounded form with dk green needles/red fruit.
'Densiformis'	3 x 7	S	M	PS-Sh	Columnar form with dark green needles and red
'Hicksii'	8 x 3	M	M	PS-Sh	fruit.
'Tauntonii'	3 x 5	S	M	PS-Sh	Dense, wider than tall with dark green needles.
Key: Growth Rate: S=slow; M=moderate; F=fast Soil Moisture: H=high; M=medium; L=low Exposure: S=sun; PS=partial sun; Sh=Shade Plant Select® plants may be viewed online at www.plantselect.org					

Deciduous Shrubs

Alnus tenuifolia Alder Thinleaf
Amelanchier alnifolia Serviceberry
Amphora canescens Leadplant
Atriplex canescens Fourwing Saltbush
Berberis Barberry
Buddleia davidi Butterfly Bush
Cargana arboresens Siberian Pea Shrub
Caryopteris x clandonensis "Dark Knight" Dark Knight Spirea
Caryopteris x clandonensis Blue Mist Spirea
Cercocarpus montanaus Mountain Mahogony
Cercocarpus intricatus Mahonia Littleleaf Mountain Mahogony
Cercocarpus ledifolius Curl Leaf Mountain Mahogony
Chaenomeles japonica Red Quince
Chamaebatiara millefolium Fernbush
Chrysothamnus nauseosus Rabbit Brush
Chrysothamnus nauseosus nauseosus Dwarf Rabbit Brush
Cornus sericea 'Isanti' Isante Dogwood
Cornus alba 'Argenteo-marginata Varigated Dogwood
Cornus mas Cornelian Cherry
Cornus sericea 'Baileyi' Redtwig Dogwood
Cornus sericea ' flaviramea Yellow twig Dogwood
Cornus sericea 'Kelseyi' Kelsey's Dogwood
Corylus avellana 'Rote Zeller' Filbert - Red Leaf
Cotinus coggygria Purple Smoke Tree
Cotoneaster apiculatus Cranberry Cotoneaster
Cotoneaster dammeri Coral Beauty Cotoneaster
Cotoneaster horizontalis Lowfast Cotoneaster

Physocarpus opulifolius 'Nanus' Dwarf Ninebark
Potentilla fruticosa ' Golden Drop' Golden Drop Potentilla
Potentilla fruticosa 'Goldfinger' Goldfinger Potentilla
Potentilla fruticosa 'Katherine Dyke' Katherine Dyke Potentilla
Potentilla fruticosa 'McKay's White' McKay's White Potentilla
Potentilla fruticosa 'Tangerine' Tangerine Potentilla
Prunus besseyi Western Sand Cherry
Prunus besseyi 'Pawnee Buttes' Pawnee Buttes Sand Cherry

Prunus frutisosa Flowering Almond
Prunus tomentosa Nanking Cherry
Prunus virginia Choke cherry Native
Prunus x cistena Cistina Plum

Qurcus gambelli Gambel Oak
Qurcus unulata Wavyleaf Oak
Rhamnus frangula ' Columnaris Buckthorn

Rhamnus frangula 'Aspenifolia Fernleaf Buckthorn
Rhamnus frangula 'Smithii' Smith Buckthorn
Rhus aromatica Gro-low Sumac
Rhus glabra Dwarf Smooth Sumac
Rhus trilobata Threeleaf Sumac
Rhus typhina 'lanciniata' Cutleaf Sumac
Ribes alpinum Alpine Currant
Ribes alpinum 'Greenmound' Greenmound Current
Ribes aureum Yellow Flowering Currant

Cotoneaster lucidus Peking Cotoneaster
Cytisus purgan'Spanish gold' Spanish Gold Broom
Euonymus alatus compacta Burning Bush – Compact
Euonymus alatus Burning Bush
Euonymus fortunei 'Emerald Gaiety' European Euonymus
Euonymus fortunei radicans 'Harlequin' Euonymus Emerald Gaiety
Euonymus fortunei 'Emerald and Gold' Emerald n'Gold Euonymus
Euonymuskiautschovica 'Mannhattan' Manhattan Euonymus
Fallugia paridoxa Apache Plume
Forsythia Arnolds Dwarf' Arnolds Dwarf Forsythia
Forsythia Arnolds Gold Arnolds Gold Forsythia
Forsythia x intermedia 'Spring Glory' Spring Glory Forsythia
Hippophae rhamnoides Sea Buckthorn

Kolkwitzia amabilis Beauty Bush
Ligustrum vulgare 'Cheyenne' Cheyenne Privet
Ligustrum vulgare 'Lodense' Lodense Privet
Lonicera korolkowii v. floribun Honeysuckle Blue Velvet da' BlueVel'
Lonicera xylosteum compactum Honeysuckle - Emerald Mound
Mahonia aquifolium Mahonia
Mahonia aquilolium compacta Compact Mahonia
Perovskia atripicifloria Russian Sage
Philadelphus Virginalis Littleleaf Mockorange
Philadelphus lewisii 'Cheyanne' Cheyenne Mockorange
*Philadelphus x Virginalis'Minnesota snowflak*e' Minnesota Snowflake Mockorange
Philadelphus x. virginalis Mock orange Virginal
Physocarpus momogynus Mountain Ninebark
Physocarpus opulifolius 'Lutus' Golden Ninebark

*Ribes uva-crispa '*Comanchee' Gooseberry Comanche
Rosa sp. Roses Shrub
Salix purpurea Dwarf Artic Willow
Sambucus canadensis Elder, Golden
Spirea japonica 'Goldflame' Goldflame Spirea

Spirea japonica 'Little Princes' Little Princess Spirea

Spirea japonica 'Froebel' Froebel Spirea
Spirea nipponica Cheyenne Snowmound Spirea
Spirea x bumalda 'Gumball' Gumball Spirea
Spirea x bumalda 'goldmound' Goldmound Spirea
Spirea x bumalda Anthony Waterer Spirea
Symphoricarpos occindentalis Western Snowberry
Symphoricarpus x chenault 'Hancock' Hancock Coralberry
Symphoricarpus x orbiculatus Indian Current/Red Snow Coralberry
Syringa meyeri , 'Palibin's Dwarf Korean Lilac
Syringa patula 'Miss Kim' Miss Kim Lilac

Syringa vilgaris French hybrids Lilac
Syringa vulgaris alba Common White Lilac
Syringa vulgaris Common Purple Lilac
Syringa x chinensi Chinese Lilac
Viburmum opulus 'Nanum' Dwarf European Cranberry
Viburnum lantana Lantana Viburnum
Viburnum trilobum Highbush Cranberry Viburnum

Viburnum trilobum 'Compactum' American Compact Cranberry
Viburnum x burkjwoodii Burkwood Viburnum
Yucca baccata Banana Yucca
Yucca filamentosa Filamentosa Yucca

Shrub Roses

Adeleide Hoodless
Agnes
Austrian Copper
Bonica
Cuthberg Grant
F.J. Grootendorst
Hansa
Heritage
Meidiland Series (several var.)
Morden Centennial
Nearly Wild
Pink Grootendorst
Pink Prairie
Rugosa
Sea Foam
Sunblaze
The Fairy
Therese Bugnet
The Hunter
Knockout (All varieties)

Ornamental Grasses

Scientific Name	**Common Name**
Andropogon gerardii	Big Bluestem
Bouteloua gracilis 'Blonde Ambition'	'Blond Ambition' Blue Grama Grass
Calamagrostis arundinacea 'Karl Forester	Feather Reed- Karl Forester
Chasmanthium latifolium	Northern Sea Oats
Descampsia caespitosa	Tufted Hair Grass
Erianthus ravennace	Pampas Grass
Festuca glauca 'Elijah Blue	Blue Fescue
Helictotrichon sempervirens	Blue Avena / Oat Grass
Imperarata Cylindrica 'rubra'	Blood Grass
Miscanthus sinensis 'Gracillimus'	Maiden Grasses
Misicanthus sinensis 'Zebrinus'	Zebra Grass
Panicum virgatum 'Heavy Metal'	Heavy Metal Switch Grass
Pennistum alorecuroides 'Hameln'	Hardy /Fountain Grass
Phalaris arundinacea 'Pieta'	Ribbon Grass
Schizachyrium scoparium	Little Bluestem

Perennials

Achillea spp. Yarrow
Agastache aurantiaca Coronado Hyssop
Agastache cana, Sinning Hyssop Sonoran Sunset
Agastache rupestris Sunset Hyssop
Armeria maritime Thrift
Anchusa azurea Anchusa (Italian bugloss)
Aquilegia spp. Columbine
Asclepias tuberose Butterfly weed
Aster novae-angliae Aster (New England)
Aurinia saxatilis Basket-of-gold
Callirhoe involucrate Winecups
Campanula medium Canterbury bells
Campanula spp. Harebell
Centaurea cyanus Cornflower
Coreopsis lanceolata Coreopsis
Crysanthemum morifolium Hardy Mum
Delosperma floribundum Starburst Iceplant- Mesa Verde
Delphinium hybrids Delphinium
Dendranthema coccineum Painted daisy
Dianthus barbatus Sweet Shalliam
Gypsophila paniculata Baby's breath
Hemerocallis spp. Daylily
Heuchera sanguinea Coral Bells Snow Angel
Hosta spp. Hosta
Iberis sempervirens Candytuft
Iris hybrids Bearded iris
Lavandula angustifolia Lavender
Leucanthemum x superbum Shasta daisy
Liatris scariosa Gayfeather
Linum perenne Blue flax
Lobelia cardinalis Cardinal flower
Lupinus polyphyllus Lupine
Monarda didyma Beebalm
Oenothera macrocarpa subsp.incana Silverblade, Evening Primrose
Osteospermum barberia var. compactum Purple Mountain Sun Daisy
Osteospermum Lavender Mist
Paeonia hybrids Peony
Papaver nudicaule Iceland poppy
**P. orientale* Oriental poppy
Penstemon spp. Penstemon

Dianthus First Love
Diacia integerrim
Dicentra spectabilis
Coral Canyon Twin Spur Bleeding heart
Dictamnus albus Gas plant
Echinacea purpurea Purple coneflower
Echinacea purpurea white coneflower
Eriogonum umbellatum Sulphur flower
Fraxinus 'Pink Lipstick'
Gaillardia aristata Gaillardia, blanket flower
Gazania linearism Colorado Gold Gazania
Gazania krebsiana Tanager Gazania
Geranium magniflorum Geranium, La Veta Lace
Geranium sanguineum Bloody Cranesbill
Penstemon grandiflorus Prairie Jewel, Pikes Peak Purple, Red Rocks
Phlox paniculata Garden phlox
Physostegia virginiana Dragonhead (false)
Rudbeckia hirta Black-eyed Susan
Rudbeckia laciniata 'Hortensiana' - Golden glow
Scabiosa caucasia Pincushion flower
Sedum spp. Sedum, stonecrop
Thermopsis rhombifolia Golden banner, false lupine
Veronica spicata Veronica
Viola corneta Horned violet, viola
Viola odorata Sweet violet
Zauschneria garrettii Orange Carpet Hummingbird Trumpet

Approved Native Trees and Shrubs to be installed to provide erosion control, slope stability, and diversity along drainages in open space areas. Woody plants must be installed no closer than 25 feet from drainage inlets, outlets, or bridges. Native shrubs and trees must be installed along the toe of slope of drainages with adequate hydrologic conditions to support them. Do not plant across the floor of the drainage area.

Common Name	Scientific Name	Variety	Mature Height (feet)	Location
Netleaf hackberry	*Celtis reticulata*	Native	15 – 35	Drainages, 2 - 4' above saturated soil
Rabbitbrush	*Chrysothamnus nauseosus*	Native	3 – 5	Drier areas
Dwarf rabbitbrush	*Chrysothamnus nauseosus var. naus.*	Native	2	Drier areas
Plains Cottonwood	*Populus sargentii*	Native	45 – 60	Drainages, 2 - 4' above saturated soil
Narrowleaf cottonwood	*Populus angustifolia*	Native	25 – 40	Drainages, 2 - 4' above saturated soil, plants will spread by root sprouts
Chokecherry	*Padus virginiana (aka Prunus)*	Native	10 – 12	Drainages, 1 - 5 above
Wild plum	*Prunus americana*	Native	6 – 8	Drainages 2 - 8' above saturated soil
Golden current	*Ribes aureum*	Native	3 – 4	Drainages, 2 - 10' above saturated soil
Three-leaf sumac	*Rhus trilobata*	Native	4 – 8	Drier prairie areas and drainages 2+ feet above saturated soils.
Peachleaf willow	*Salix amygdaloides*	Native	15 – 35	Drainages 1 - 4' above saturated soil.
Sandbar willow	*Salix exigua*	Native	5 – 6	Drainages, 0 - 3' above saturated soil
Snowberry	*Symphoricarpos occidentalis*	Native	2	Drainages, 2 - 10' above saturated soil,
Yucca	*Yucca glauca*	Native	2	Drier prairie sites (north facing slopes preferred).

1063.00 Plant and Tree Handling, Transportation, and Storage

All plants shall be packed, transported, and handled with utmost care to insure adequate protection against injury. Trees shall be protected from extreme temperatures, freezing or extreme heat. Trees shall be transported to the site in a covered vehicle that prevents wind and temperature extremes. Shade cloth shall be used to cover plant materials during transportation to protect the plant canopies and roots from drying winds in transit.

Trees shall be planted as soon as possible. If not planted on the day of delivery all plants shall be placed in a temporary nursery, irrigated daily, shaded and protected from sun or wind. Balled and Burlapped trees shall be heeled in within 24 hours of delivery in a compact group with a suitable mulch material placed around and between the balls so they are completely covered. No plant

shall remain on the job site in temporary storage for over a month unless otherwise approved by the Parks & Recreation Director or designee.

Tree stock will be protected from excessive vibration; avoiding being thrown or bounced off mobile equipment to the ground. Trees shall not be dragged, lifted, or pulled by the trunk or foliage parts in a manner that will loosen the roots in the ball. To avoid damage when setting the tree in the hole, lift the tree with straps or rope around the root ball, not by the trunk.

1064.00 Planting

1064.01 Location Staking

The Contractor is responsible for arranging to have the locations of all utility lines (including but not limited to water, sewer, gas, electrical, phone and irrigation) marked prior to the inspection to assure safety and protection. The Contractor will be required to stake the proposed locations of all trees and shrubs on-site for approval by the City prior to planting. The City reserves the right to move, shift or adjust any or all of the stakes to better achieve the planting design intentions as shown on the accepted drawings.

1064.02 Placement

A. General. All trees shall be placed a minimum of ten (10) feet from all buildings. When space is limited or a special design effect or function is desired, closer spacing can be allowed upon permission of the Parks & Recreation Director or designee.

B. Near Fire Hydrants. No street trees shall be planted within ten (10) feet of any fire hydrant.

C. Near Streets, Sidewalks, Alleys, or Curbs. No tree shall be planted within four (4) feet of any street, sidewalk, alley, or curb, except where authorized by the Parks & Recreation Director or designee. Coniferous trees shall be planted a minimum of six (6) feet away from hardscapes (sidewalks, trails, curbs, etc.). Fruit-bearing and thorny trees shall be placed a minimum of ten (10) feet away from sidewalks and trails.

D. Sight Triangles. Regardless of the presence of warning signs, no trees shall be planted within landscape beds or tree lawns located between a sidewalk or curb closer than 55’ from the visibility triangle of an intersection unless authorized by the Parks & Recreation Director or designee.

E. Near Utility Lines. No street trees, other than those species designated as ornamental/small trees in the City of Brighton Approved Tree List, shall be planted under or within ten (10) lateral feet of any overhead electrical, telephone or other utility wire or line, or over or within five (5) lateral feet of any underground water, sewer, electrical, telephone or other utility wire, line or main.

F. Within Tree Grates: All placement considerations listed above, as well as planting and cultural practices listed within this section also apply to trees planted within tree

grates. Trees grate design must be approved by the TOE Parks & Recreation Director or designee.

1064.03 Placement of Native Trees and Shrubs in Native Areas.

Native trees and shrubs are to be added to the open space areas in order to help stabilize slopes, provide diversity for wildlife and improved natural aesthetics. One tree or one thicket consisting of 15 shrubs shall be planted along all drainages for each 50 feet of drainage. Trees and thickets may be grouped more closely than 50 feet, if desired for design purposes. Woody riparian plants may be installed no closer than 25 feet from drainage inlets, outlets, or bridges. Native riparian shrubs and trees must be installed along the toe of slope of drainages with adequate hydrologic conditions to support them. Do not plant shrubs and trees across the floor of the drainage, blocking the flow. A City of Brighton representative will assist with field locations, upon request. Please give at least 3 working days' notice prior to planting to obtain assistance with proper tree location in native drainages. If properly located, these native trees and shrubs may be exempted from drip irrigation requirements.

1064.04 Seasons of Planting

Planting may occur whenever the soil conditions are favorable or as authorized by the Parks & Recreation Director or designee. Optimum planting periods are from March 15 to June 15 and from September 1 to October 15. Dormant bare root native shrubs and trees, for planting in open space areas, must be installed while still dormant, from March 1- April 15th.

1064.05 Planting Procedures

Tree Planting Procedures

Tree pits shall be excavated a minimum of two (2) times greater than the diameter of the root ball and shall be saucer shaped. The root flare shall be identified to assure that the hole has been dug to the proper depth—and no more. The planting pit shall be deep enough to allow for the root flare to remain two (2) inches higher than the surrounding finish grade.

If tree pits are dug utilizing mechanical equipment, edges of planting hole shall be flared down to create a saucer shaped planting pit and the sides of the hole shall be scored to prevent glazing or compaction of planting hole and potential obstruction of lateral root growth. Care shall be taken to assure that the holes are the proper depth.

When planting on a sloping site, the root flare shall be even with the grade on the uphill side of the tree. Site soil will need to be added on the downhill side to cover the sides of the root ball and to construct the soil berm to hold water.

All containers shall be removed prior to backfilling. This includes any organic manufactured containers. If the root system of a container grown plant has become container-bound, the entire

outer and bottom one (1) inch of the root system shall be shaved prior to planting. Vertically slicing the root system shall not be utilized as a substitution for root shaving.

The root ball shall be placed on firm, undisturbed soil in the planting pit to prevent settling.

Remove wire baskets in their entirety. Remove the bottom of the wire basket first, prior to setting in hole. Adjust the root ball into the planting pit to check for desired depth. All plants shall be set plumb and straight and in the center of the pits and faced for best effect. After the tree has been correctly positioned in the planting pit, remove the sides of the wire basket. All wire, burlap, twine, string, etc. shall be removed from the

Planting pit backfill mixture shall consist of two (2) parts of excavated native soil and one (1) part organic soil amendment. Organic amendments shall be as specified in Section 1062.02. Backfill mixture shall be thoroughly blended to homogeneous condition in specific area away from plant excavations.

Backfill the hole 1/3 full to thoroughly stabilize the lower part of the root ball at planting to keep the root ball from shifting. Fill the remainder of the hole by adding the soil a few inches at a time and settle with water. Continue this process until the hole is filled and the tree is firmly planted. The tree will be thoroughly watered to fill any voids and eliminate air pockets. Do not backfill over crown of the root ball.

A soil berm (water ring) can be constructed around trees to serve as temporary irrigation for trees only if the trees will be watered with a hose or other high volume device. Soil berms should not exceed a height and width of 3 to 4 inches. Soil berms shall be removed and graded once permanent irrigation has been installed.

All plant tags, flagging tape, labels, string, etc. shall be removed from the trunk and canopy.

Shrub Planting Procedures

Prior to the planting of Perennial or Groundcover plants, the Contractor will cultivate the area to be planted to a depth of six (6) inches so as to free the site of weeds. All stones, sticks, and debris brought to the surface over one and one-half inches (1 ½) in diameter will be removed from the site. Prior to planting, the Contractor will uniformly apply the specified organic material at the rate of five (5) cubic yards per one thousand (1,000) square feet. And then incorporate both materials into the soil to a depth of six (6) inches with a disc, rototiller, or other suitable tilling equipment.

All containers shall be removed prior to backfilling. This includes any organic manufactured containers. If the root system of a container grown plant has become container-bound, the roots shall be cut vertically on a minimum of two sides of the root mass prior to planting.

All plant tags, flagging tape, labels, string, etc. shall be removed.

The Contractor shall install Perennial or Groundcover plants taking note of required on-center spacing and required distances from edges. Plants will be planted within the amended soil, 1" (inch) above finished grade. A layer of weed barrier fabric will be installed, and three (3) inches of specified mulch will be placed over it. All seams in the fabric will overlap a minimum of twelve (12) inches. All perennial or groundcover beds will have a continuous layer of weed barrier fabric installed under the mulch. Landscape fabrics shall be as specified in Section 1062.03

The Contractor shall insure that all Perennial or Groundcover beds are watered as necessary until establishment is achieved.

The diameter of all shrub planting pits shall be twelve (12) inches greater in diameter than the diameter of the container. Shrub pits shall be excavated so that the top of the ball shall be one (1) inch above finish grade.

1064.06 Staking and Guying

All deciduous and coniferous trees will be staked and guyed immediately after they are planted. The position of the stakes shall be oriented with regards to prevailing winds. Staking for deciduous trees must be done using two (2) six (6) foot steel T-posts driven perpendicular to the tree at 180 Degrees. Staking for coniferous trees must be done using three (3) two (2) foot steel T-posts driven at 120 Degrees. All stakes shall be driven outside of the root ball and in undisturbed soil. All exposed ends of T-posts shall be capped with vinyl/plastic T-post caps. Three (3) stakes in a triangle formation shall be used for coniferous trees, and two (2) stakes shall be used for deciduous trees. The tree will be guyed using a one and one-half (1½) inch wide nylon strap with eyelets in each end. Nylon straps shall be long enough to accommodate one and one-half (1½) inch of growth and buffer all branches from wire. A double strand of twelve (12) gauge galvanized wire will be used to connect the nylon strap to the steel tee post. Proper tension on the guy wires will be obtained by twisting the double strands of wire and shall be only tightened enough to prevent straps from slipping. Half (½) inch PVC sleeving shall be installed over tree guy wires for visibility and safety with a maximum of two (2) inches of exposed wire on each side. Large trees may require additional tree posts and guying. Stakes shall remain on deciduous trees for one (1) year and on coniferous trees for two (2) years. Contractor is responsible for periodically re-tensioning and the removal of tree stakes. Staking materials shall be as specified in Section 1062.06.

1064.07 Mulching

1064.07.01 Trees

Upon completion of the planting operations, the Contractor shall prepare tree pits and planter beds for mulch. All deciduous trees shall have a sod-free base at least four (4) feet in diameter and evergreens shall have a sod-free base extending to the drip line. Mulch shall be placed evenly in

the saucer to the depth of three (3) inches and a minimum of four (4) feet in diameter. Mulch shall be placed two (2) inches from and not make contact with tree trunks. In specific cases, when approved by the Parks & Recreation Director or designee, rock mulch may be substituted for the fibrous mulch. Mulch shall be as specified in Section 1062.01.

1064.07.02 Shrub Beds

In areas where plants are grouped into beds, or in areas where gravel, rock or wood mulch is to be used as a ground cover, the entire bed will be excavated to a depth of three (3) inches, a layer of weed barrier fabric will be installed, and three (3) inches of suitable ground cover, such as wood mulch or rock, will be placed over it. Different mulch types shall be separated by three-sixteenths (3/16) inch wide by six (6) inches deep green painted steel. All seams in the fabric will overlap a minimum of twelve (12) inches. Landscape fabric pins will be used a minimum of every three feet along the edge of the fabric as well as a minimum of three feet on center throughout the fabric. All shrub beds will have a continuous layer of weed barrier fabric installed under the mulch. Landscape fabrics shall be as specified in Section 1062.03.

1064.08 Pruning

All pruning shall comply with ANSI A300 standards shall only be performed by an I.S.A. Certified Tree Worker, Arborist or Municipal Specialist and shall be done with clean, sharp, sterile tools. Pruning shall be limited to the removal of dead, diseased, broken, and damaged limbs or twigs at the time of planting.

All necessary corrective pruning shall be performed after a full season of growth in the new location by a trained professional. All plant materials will be pruned to preserve its natural form and character and in a manner appropriate to its particular requirements. Pruning shall be the responsibility of the Contractor. Contractor shall remove and replace excessively pruned or malformed stock resulting from improper pruning.

1064.09 Fertilizing

Trees and shrubs shall not be fertilized during installation or for the first twelve (12) months following installation.

1068.00 Inspections

Inspections shall be completed in accordance with Section 1024.00, Inspections, of these STANDARDS AND SPECIFICATIONS. The Contractor must notify the City for inspections of plant location staking, plant materials, and planting operations.

1068.01 Plant Location Staking

The City will inspect the plant location stakings prior to the installation of any plant materials as specified in Section 1064.01, Location Staking, of these STANDARDS AND SPECIFICATIONS.

1068.02 Quantity and Quality of Plant Material

The City will inspect the plant material following their delivery to the site and prior to the planting on the site. The City reserves the right to reject any plant not meeting the accepted design requirements for size, shape, form and conditions at that time.

All new and replacement plant materials require inspection and shall be tagged by the Parks & Recreation Director or designee for all City of Brighton maintained areas prior to planting. Contact appropriate City of Brighton staff to arrange for materials to be tagged.

Substitutions – Any changes in species and plant locations shall be submitted to City of Brighton inspectors for review and approval. Overall quality and design concept to be consistent with approved landscape plan.

1068.03 Planting Operations

The City will inspect the planting operations, including digging, planting, pruning, fertilizing and mulching.

1069.00 Maintenance

1069.01 Pruning

All tree pruning shall comply with ANSI A300 standards and shall only be performed by an I.S.A. Certified Tree Worker, Municipal Specialist or Arborist. Contractor shall remove and replace excessively pruned or malformed stock resulting from improper pruning. All necessary corrective pruning shall be performed after a full season of growth in the new location. All plant materials will be pruned to preserve its natural form and character and in a manner appropriate to its particular requirements. All plant material shall be kept maintained free of dead, diseased, broken and damaged limbs or wigs. Pruning shall be the responsibility of the Contractor.

1069.02 Replacements

All replacement plant materials shall be the responsibility of the Contractor until final acceptance has been granted. Refer to Quantity and Quality of Plant Material (sec. 1068.02)

Replacement of plant materials shall occur at the following rate:

Type	1 Year	2 Years
Deciduous Tree	Increase caliper by one (1) inch	Increase caliper by one and one-half (1 ½) Inch
Evergreen Tree	Increase height by one and one-half (1 ½) foot	Increase height by two(2) feet

1069.03 Fertilization

Trees and shrubs shall not be fertilized during installation or for the first twelve (12) months following installation.

1069.04 Watering

The Contractor shall ensure that all plant materials are watered as necessary until final acceptance has been granted.

All plant materials shall be given supplemental water as required throughout the winter months.

1069.05 Staking

All deciduous trees shall be staked for twelve (12) months and evergreen trees for twenty –four (24) months. Contractor is responsible for periodically re-tensioning and the removal of tree stakes throughout this period. Refer to Staking and Guying (sec 1064.06)

1069.07 Weeding

All tree wells, shrub and perennial beds, and areas where gravel, rock or wood mulch is to be used as a ground cover shall be kept free of grass, weeds and other contaminates until final acceptance has been granted.

1069.08 Mulching

Contractor is responsible for maintaining adequate (3") mulch depth for the duration of the warranty period.

1070.00 PARK AMENITIES AND RECREATION EQUIPMENT

1071.00 General

Selection of recreation equipment and park amenities must be approved by the Parks & Recreation Director or designee prior to purchase by the Contractor. In selecting equipment and amenities, the

brand, style, color, size and other criteria will be considered and selected by the City. All installations of equipment and amenities will be done by the Contractor.

1072.00 Softball and Baseball Field Specifications

Adequate drainage must be taken into account in ballfield designs. Infield slopes will be between one half (1/2) percent and one (1) percent. Outfield slopes will be between one (1) percent and two (2) percent.

1072.01 Softball

1072.01.01 Infield Dimensions

Infields shall be cut on a sixty-five (65) foot arc from the front center of the pitching plate. Home plate shall be twenty-five (25) feet from the backstop, and the foul line shall be twenty-five (25) feet from wing fences. Pitching plate anchors shall be installed at forty feet (40'), forty-three feet (43') and fifty feet (50') from the rear point of home plate, measured to the front center of the pitching rubber. Base anchors will be set to accommodate base path lengths of sixty feet (60'), sixty-five feet (65'), and seventy feet (70'). All other dimensions related to base baths shall conform with United States Specialty Sports Association standard field dimension standards. Distances from home plate to second base shall be measured from the back point of home plate to the center of second base.

1072.01.02 Infield Composition

The infield area will be excavated four (4) inches below grade. Subgrade will be laser graded prior to infield material installation. Four (4) inches of suitable infield mixture consisting of approximately seventy (70) percent sand and thirty (30) percent clay/silt with eight (8) pounds Stabilizer™ organic binder per ton shall be installed. Infield mixture will be installed, laser graded, and compacted to a firm, smooth surface according to manufacturer's specifications. All mixtures will be approved by the Parks & Recreation Director or designee prior to installation.

1072.02 Baseball

1072.02.01 Infield Dimensions

Skinned infields shall be cut on a ninety-five foot (95') arc from the center of the pitching plate. Home plate shall be fifty feet (50') from the backstop with foul lines a minimum of thirty-five feet (35') from wing fences. Pitching plate anchors shall be installed at thirty feet (30'), forty feet (40'), forty-six feet (46'), fifty feet (50'), and sixty feet six inches (60'6") from the rear point of home plate, measured to the front center of the pitching plate. Base anchors will be set to accommodate base path lengths of forty-five feet (55'), sixty feet (60'), sixty-five feet (65'), seventy feet (70'), and ninety feet (90'). One pitching plate shall be installed at a distance chosen by the Parks &

Recreation Director or designee. Distances from home plate to second base shall be measured from the back point of home plate to the center of second base.

Grass infields with raised mounds shall be designed and constructed to accepted industry standards. Base anchor and pitching anchor distances shall be approved by the Parks & Recreation Director or designee

1072.02.02 Infield Composition

The skinned infield area will be excavated four (4) inches below grade. Subgrade will be laser graded prior to infield material installation. Four (4) inches of suitable infield mixture consisting of approximately seventy (70) percent sand and thirty (30) percent clay/silt with eight (8) pounds Stabilizer™ organic binder per ton shall be installed. Infield mixture will be installed, laser graded, and compacted to a firm, smooth surface according to manufacturer's specifications. All mixtures will be approved by the Parks & Recreation Director or designee prior to installation.

1072.03 Sports Equipment

The following products shall be used during installation. Any other products must be reviewed by Parks & Recreation Director or designee to be accepted as equal.

1072.03.01 Softball and Baseball Equipment

Any substitutions of the following materials must be approved by the Parks & Recreation Director or designee to be accepted as equal

A. Anchors
    a. Anchors shall be constructed of a single one and one half (1 ½) inch square, corrosion resistant coated, square, Hollywood style sleeve centered inside a eight (8) inch square by eight inch (8) by eight (8) inch half cinder block. Concrete shall be cured for twenty-four (24) hours prior to final installation.
    b. Anchors placed on the first base line shall be constructed of a Hollywood Double Stanchion (or approved equivalent), able to accommodate the use of a Hollywood Impact Double First Base, centered inside a five inch (5') by five inch (5') by twenty-one inch (21") concrete form. Concrete shall be cured for twenty-four (24) hours prior to installation.
    c. Anchor shall be installed to allow for the anchor sleeve to be one and one half (1 ½) inches below finished grade at completion. Accepted models of ground anchor mounts: Schutt ™, model #12916550, for single anchor applications or Schutt™, model # 12920705, for double anchor applications (or approved equivalent)
B. Bases

a. Bases shall be Schutt ™ Jack Corbett Hollywood bases, model #129010XX (or approved equivalent)

C. Pitching Rubbers
   a. Pitching rubbers shall be Schutt ™Hollywood Double Stanchion style, model # 12920706,regulation 6 inch (6") by 24 inch(24") (or approved equivalent)

D. Home Plate
   a. Home Plates shall be Bolco™ permanent in ground style, 3 inch thick, with ¾ inch wood bottom (or approved equivalent)

1072.03.02 Soccer Equipment

Any substitutions of the following materials must be approved by the Parks & Recreation Director or designee to be accepted as equal.

A. Soccer goals shall be JayPro™ (or approved equivalent) with square face, white powder coated, and an aluminum frame
B. Goals equal to or larger in width than 18 feet, 6 inches - shall also have a Jaypro™ (or approved equivalent) cross-bar and wheel transport kit
C. Goal anchors shall be auger style that utilize plastic coated metal cord as means of securing goal to auger anchor
D. Nets shall be made of five and one half (5 ½) inch square mesh made of three (3) mm twisted twine, white in color

1073.00 Playground Equipment

1073.01 Proposal Submittals

The manufacturer's representative shall provide the following items and information to the City with each playground proposal:

A. Complete three-dimensional drawings of equipment.
B. Individual components specifications and schematic drawings of the play system.
C. A minimum of three (3) references for similar work recently completed to the City. Each reference shall include a brief summary of work completed, location, the owner's representative name and phone number.
D. A schedule of work that includes the time it will take to order and receive the play equipment and the time it will take to install once the play equipment is delivered.
E. Playground installer must provide documentation of current NPSI Certified Playground Safety Inspector (CPSI) certification.
F. Playground installer must provide documentation of current certification in playground construction by either a) NPCAI Playground Construction School and/or b) by the selected equipment manufacturer.

G. A letter from the manufacturer stating that the playground equipment will meet or exceed the latest CPSC Guidelines and the ASTM F-1487-07ae1 Standards. Letters from the manufacturers must reference the model number or drawing numbers of each unit.

H. Copies of warranty information for play equipment to the City. Warranties shall include minimum: ten (10) years on posts and decks; five (5) years on plastic; ten (10) years on clamps, and one (1) year on all other parts.

1073.02 Accessibility Requirements

Playgrounds shall comply with the Department of Justice (DOJ) 2010 Standard for Accessible Design where applicable.

1073.03 Protective Ground Space Area

The play system layout for each site shall include a safety surface area surrounded by a protective barrier. The Protective Surfacing within the use zone of each play structure must meet or exceed ASTM F-1292-09 and ASTM F-1951-09b, where applicable. A sub-surface drainage system shall be installed under each protective surface area. The design of the drainage system must be approved in writing by the Director(s) or their designee.

1073.03.01 Approved Protective Surfacing

A. The following surface materials may be used when installed in accordance with ASTM F1292-09, ASTM F1951-09b, ASTM 1487-11.
   a. Engineered Wood Fiber mulch
   b. Poured in place resilient matting
   c. Unitary rubber tiles

B. Any other form of protective surfacing must be approved by the Parks & Recreation Director or designee.

1073.03.02 Prohibited Protective Surfacing

A. The following surface materials, in addition to those failing ASTM 1292-09, may not be used as a protective surfacing.
   a. Pea gravel
   b. Sand
   c. Shredded recycled rubber mulch

The composition of the barrier for protective ground space area shall be approved by the Parks & Recreation Director or designee.

1073.04 Component Requirements

A. All protective barriers, handrails, and guard rails shall meet requirements of ASTM F-1487-07ae1.
B. Upper body equipment shall meet requirements of ASTM F-1487-07ae1.
C. All equipment shall come with an structural integrity test results from the manufacturer.
D. Platforms, Landings, Walkways, Ramps, and similar Transitional Play surfaces shall meet requirements of ASTM F-1487-07ae1.

The following requirements for equipment components apply:

A. Slides must be double walled except for tube slides.
B. Components of the play system(s) for specific sites shall be approved by the City. Each play system shall include and not be limited to: roofs, climbers, slides, bridges, ladders, arches, overheads, play panels, transfer points, decks, barriers, guard rails, protective barriers, and swings.
C. Component colors must be approved by the Parks & Recreation Director or designee.
D. Wear mats shall be installed at all entrances and exits of composite structures, slide exits, and swing bay areas. When used in conjunction with engineered wood fiber, mats shall be installed six inches (6") below the finish surfacing level.
    a. Three feet by three feet (3' x 3') mats are required for composite structures entrances and exits.
    b. Six feet by three feet (6'x3') mats are required for belt swing centered under each belt swing oriented in the direction of travel.

1073.05 Play Equipment

1073.05.01 New Play Equipment

A. New play equipment will be built of durable materials resistant to degradation. All steel decks must have a punched surface and all steel surfaces shall have a baked polyester powder coating finish.
B. All plastics and other materials that experience ultraviolet (UV) degradation shall be protected against UV and shall be Polyvinyl Chloride (PVC) free.
C. Contractor shall provide all necessary posts, kickplates, fittings, clamps, railings, protective barriers, fasteners, and other fixtures as necessary to complete the structure, as indicated on the construction drawings.
D. All play components used must meet current applicable ASTM standards: specifically ASTM 1487-11, and 2010 DOJ Standard for Accessible Design where applicable.

1073.05.02 Prohibited Play Equipment

The following play equipment items are prohibited, in addition to those not meeting ASTM 1487-11:

A. Metal slides of any dimension and shape, regardless of finishing
B. Log rolls
C. Equipment constructed of wood

1073.06 Site Requirements

1073.06.01 Protection

The Contractor shall be responsible for the protection of the play area site during the construction process. The Contractor shall also be responsible for the protection of surfacing during the construction process. It is required that a temporary chain link security fence a minimum of six feet (6') high be installed around the perimeter of all playgrounds from the start of construction through project final acceptance.

1073.06.02 Damages

Any damages to the play structure, play elements, hardware, surfacing or any other element associated with playground installation shall be paid for at the Contractor's expenses.

1073.07 Inspections

Inspections shall be completed in accordance with Section 1024.00, of these standards and specifications. The Contractor must notify the Parks & Recreation Director or designee for inspection of drainage installation prior to surfacing installation.

1073.07.01 Play Environment inspection

An audit of the play area must be conducted by a third party National Playground Safety Institute (NPSI) Certified Playground Safety Inspector (CPSI), at the expense of the Contractor, to verify compliance. If any non-compliance issues are identified during this process these issues must be addressed and appropriate action taken, at the expense of the Contractor, to bring items into compliance. All components of the play environment must be in compliance prior to final acceptance.

1073.08 Maintenance and Training

The Contractor shall develop and conduct a training program to allow the City maintenance personnel to become knowledgeable with the play equipment. Training shall include, but not be limited to: proper routine and preventative maintenance practices, common issue associated with

play features, and how to optimize use of features. The Contractor shall also supply surfacing maintenance guidelines.

The Contractor shall provide wrenches or other tools needed to adjust or replace vandal resistant fasteners. The Contractor shall also provide primer and touch-up paints. Paints and primers shall be colors that match the structures and shall be compatible with the structure's powder coat finishing.

The Contractor shall provide a complete parts manual.

1073.09 Warranty

The following minimum warranties are required for all playground equipment:

A. Ten (10) year warranty on all steel posts, clamps and decks against structural failure due to natural corrosion, deterioration, or workmanship.
B. Five (5) year warranty for structural failure of plastic or rubber components.
C. Three (3) year warranty for structural failure of all spring equipment.
D. One (1) year warranty for structural failure of moving parts, and any other materials not covered by the above mentioned warranties.
E. All other site furnishings: Warranty all products and workmanship for one year or manufacturer's warranty, whichever is greater, beyond the date of final acceptance.

1080.00 TRAILS, WALKWAYS AND MAINTENANCE PATHS

1081.00 Concrete Trails, Walkways and Maintenance Paths

All sidewalks and maintenance paths within the parks, open space, or greenbelts, which could be utilized by the general public for conveyance, will be a minimum of eight (8) feet wide and six (6) inches thick concrete and shall have fiber mesh included in the mix. The concrete shall have minimum twenty-eight (28) day compression strength of four thousand (4,000) pounds per square inch (PSI) and shall meet all applicable requirements of Section 400.00, Concrete Work, of these STANDARDS AND SPECIFICATIONS.

1082.00 Soft Trails

Soft trails will conform in accordance with the Standard Drawings unless otherwise approved by the Parks & Recreation Director or designee.

1083.00 Trail Specifications

1083.01 Location of Trails

To the extent possible, trails should be located, configured and set back from natural creeks or bodies of water so that recreation use will not significantly impact native plant and animal habitat, or be damaged by high water events.

1083.02 Alignment of Trails

Trails should be generally sinuous in nature, avoiding overlong and straight runs greater than 300 feet.

1083.03 Width of Trail Corridor

Spaces used to accommodate trails should be generally no less than three (3) times the width of the trail and shall accommodate development of Americans with Disabilities Act (ADA) compliant trails.

1083.04 Crusher Fines Specifications

Crusher fines shall be gold or grey colored, depending upon project requirements. 100% of crusher fines are to pass through a ¼" screen; no larger material shall be included within the crusher fines mixture. The mixture should be approximately 25% pebbles (screen sizes >#4 and <#10); 35% grit (screen sizes >10 and <100); and 40% dust (screen sizes >#100 and <#270). Vendor must supply a material sample for approval by the Parks & Recreation Director or designee, as well as a written composition analysis showing the sieve size and amount of material retained within each sieve.

1083.05 Use of Stabilized vs. Unstabilized Crusher Fines

Normally, unstabilized crusher fines are adequate for most trail applications. However, if pathway (or a portion of the pathway) is to be located within an area that is subject to a 1% or greater probability of flooding in any one year (100 year flood plain or greater), than polymer-stabilized crusher fines are to be used. Suitable polymers include Soiltac, StaLoc, and NaturalPave (or equivalent). Vendor must supply a material sample for approval by the Parks & Recreation Director or designee, as well as a written composition analysis showing the sieve size and amount of material retained within each sieve, as well as the polymer content. Petroleum-based polymer products are unacceptable and will be rejected.

1084.00 Types of Trails

1084.01 Spine Trail

Spine Trails consist of a wide concrete trail (8'-10') with an attached crusher fines trail (4'). In areas with low water conditions that may experience regular flooding, a ten foot (10') concrete trail

may substitute for the standard spine trail configuration of a concrete trail with an attached crusher fines trail.

A A.1. Shoulders maximum slope 1:6.
A.2. The cross slope across travel surface shall not exceed 2%.

B. Soft surface width – 4' crusher fines with geo textile fabric underlayment.
B.1. Shoulders must be a minimum width of 2', with up to 6' preferred.
B.2. Slope along the direction of travel not to exceed 5%.

C. All spine trails must meet ADA standards.

D. Minimum trail corridor width 30 – 40' or greater preferred.

E. Trails shall be designed to minimize crossings of streets and other hazards.

F. On grade street crossings will be clearly marked with signage and cross-walks. Must conform to American Association of State Highway & Transportation Officials (AASHTO) Standards.

G. Stop signs shall be installed at all street crossings.

H. Prefer on grade street crossings at intersections rather than mid-block.

I. Trails shall be located away from nuisance areas such as oil and gas facilities, dangerous ditches, steep slopes and mining areas that include tailings and shafts.

J. Minimum overhead clearance shall be 10'. Minimum side clearance shall be 8' from edge of trail.

K. Spine trails shall be designed to accommodate maintenance vehicles such as pick up trucks and utility vehicles for routine all weather maintenance.

L. Locate spine trails in open space areas whenever possible.

M. Avoid locations which impact native plant and animal habitat.

N. Where the path is located next to a steep drop off or embankment, an ADA-compliant railing with a minimum height of 36" and/or a 5' separation between the trail and top or bottom of embankment is required.

O. Minimum turning radius for 20 mph trails shall be 100 ft, 25 mph trails 156 ft, 30 mph trails 225 ft. In cases where substandard curve radius is unavoidable curve warning signs and centerline striping shall be used.

P. Stormwater and drainage control shall be installed to prevent standing water, soil accumulation, moss and algae on trail surface.

Q. Adequate sight distance at curves and intersections must be maintained. Must conform to AASHTO Standards.

R. General design speed of 20 mph should be used for all spine trails.

S. Follow AASHTO Guide for the Development of Bicycle Facilities.

1084.02 Local Trails

A. Local trail width equals the width of the spine trail to which it connects.

B. Local trails are made of concrete, using the specifications shown above in 1084.01.

C. At no time will the width of a local trail be less that 6'.

D. Slope across trail not to exceed 2%.

E. Slopes along direction of travel not to exceed 5%.
F. Trails should be located away from nuisance areas, including above ground oil and gas facilities, pipelines, dangerous ditches, steep slopes, and mining areas that include tailings and shafts.
G. All local trails must meet ADA Standards.
H. Local trails shall be designed to accommodate maintenance vehicles.
I. Adjacent slopes, grades and separations shall comply with those described under Spine Trails (section 1084.01).
J. Minimum overhead clearance shall be 10'; minimum side clearance shall be 8'.

1084.03 Primitive Trails

A. Primitive trails shall be located away from steep slopes, sensitive habitat and natural areas and nuisance areas.
B. Minimum width shall be no less than 4'.
C. Primitive trails shall consist of stabilized crusher fines with geo textile fabric underlayment.
D. Erosion control components shall be installed at appropriate locations.
E. Adjacent slopes, grades and separations shall comply with those described under Spine Trails (section 1084.01)
F. Minimum overhead clearance shall be 10'; minimum side clearance shall be 8'.

1084.04 Trailheads

A. Trailheads shall be provided where primary trail routes converge and where access from street to parking is convenient.
B. Adequate number of parking spaces is required based upon projected use of trailhead including the required number of parking spaces meeting current ADA guidelines, including hard surfacing, signage, ramps, detectable warnings, etc.
C. Adequate location and informational signage is required at trailhead, including trail name and map and ordinances. Signage must comply with City of Brighton sign specifications and include City logo.
D. Trash containers shall be provided, number based upon projected use. Containers must be of an approved design, be anchored, expanded metal, and covered to exclude animals.
E. Pet Waste stations shall be provided that match to current model in use by Parks & Recreation Department.
F. Benches and tables shall be provided based on projected use. 6' expanded metal and surface mounted on concrete pad.
G. All amenities shall be ADA accessible and selected for durability and vandal resistance, consistency of color, material and form. All amenities shall be approved by the Parks & Recreation Director or designee.
H. Portable restrooms in a permanent enclosure may be installed as appropriate using MZI enclosures or approved equivalent.

1084.05 Waysides

A. Located every ½ mile.

B. Will include 6' benches or tables of expanded metal which shall be surface mounted on concrete pad. Tables should be ADA accessible.

C. Adequate number of seating elements based on projected trail use.

1084.06 Bridges

A. All bridge designs must be stamped as certified by a licensed Engineer and be approved by the Parks & Recreation Director or designee.

B. Bridges must meet all current ADA accessibility guidelines.

C. Bridges shall be of steel construction.

D. Bridges shall have a minimum clear width of 10'.

E. Bridges must accommodate a minimum load weight of 10,000 pounds for maintenance vehicles. Depending upon location, higher load weights may be required.

F. Concrete floors are preferred. Wood or TREX-type recycled plastic lumber may be acceptable, but must be approved in writing by the Parks & Recreation Director or designee.

G. Bridges must conform to all current standards, including the AASHTO Guide Specifications for Design of Pedestrian Bridges, the AASHTO Standard Specifications for Highway Bridges, and the CDOT Standard Specifications for Road and Bridge Construction