CITY OF LONGMONT
SECTION 600 – LANDSCAPE AND IRRIGATION (DRAFT)
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600.00 DESIGN CRITERIA

600.01 GENERAL

A. Section 600 shall apply to all landscaping and irrigation facilities considered public improvements and other landscape areas as addressed in the City Code or identified in the landscape and irrigation plan notes and checklists of these City Standards.

B. Landscaping and irrigation public improvements include Arterial street rights-of-way (ROW), primary greenways, secondary greenways, park sites, municipal buildings, and other areas owned and/or maintained by the City. These areas shall comply with these City Standards, the approved plans, applicable City Code and Envision Longmont provisions and, if required, the terms and provisions of the Public Improvement Agreement.

(1) Projects adjacent to Ken Pratt Boulevard between Main Street (Highway 287) and the eastern extent of the City limits shall follow the Ken Pratt Boulevard Landscaping Guidelines located in the Appendices for the design of Arterial street ROW improvements. Plant quantity requirements shall be per the current Development Standards, Chapter 15.05, City Code.

(2) Trees designated for saving or protection in a development submittal, capital improvement project, or tree preservation plan approved by the City, regardless of a tree's location on publicly-dedicated land or private property, shall be protected per the applicable criteria of Section 601 of these City Standards.

(3) For all areas to be owner or maintained by the City, the Contractor shall submit to the City a watering schedule for establishment with the Approved Plans for all planted and seeded plant material. The watering schedule shall be for one full growing season and specified by the Contractor based on generally accepted best management practices.

C. Landscape and irrigation plans shall be included as part of City capital improvement projects and development submittals. Public Improvement Plans shall provide separate landscaping and irrigation plans for City owned and/or maintained areas including all Arterial street rights-of-way, primary greenways, secondary greenways, park sites, or other areas as outlined in the Public Improvement Agreement.

D. Consideration is to be given to provide for uniformity and proper alignment of sidewalks or side paths and associated landscaping within the regulated areas. Intersections, sidewalk, or side path alignment and landscaping shall provide for safety, turning movements, and maintenance considerations. Refer to Section 200 for more information.

E. Any deviation in layout of the landscaping design, irrigation system, sidewalk, or sidepath location from the approved construction plans shall require approval by the City Engineer prior to installation. If modifications are extensive, plan re-submittal and approval shall be required. For minor modifications, correction on record drawings may be sufficient. Determination on modification type shall be made by the City Engineer prior to work being completed.

F. Required landscape and irrigation design criteria checklists and plan note information are outlined for each type of submittal and are located in the Appendices of these City Standards.

G. The Contractor shall schedule a separate pre-construction meeting for landscaping and irrigation with the City Project Manager and City Inspector prior to commencement of work for any City-owned and/or maintained landscaped areas, including primary greenways and Arterial street rights-of-way. The landscaping and irrigation pre-construction meeting shall cover clarification of work, contacts, and questions. Failure to schedule this meeting or to perform necessary field inspections during construction

shall in no way relieve the Contractor of any obligations, performance standards, or construction specifications as outlined in these City Standards. Any work that proceeds without an approved City inspection shall be corrected at no cost and no liability to the City.

H. The City will consider exceptions to these City Standards to reduce water consumption in accordance with Section 100.08. Tree canopy shall be taken into consideration prior to granting exceptions.

I. Untreated (raw) water sources for irrigation systems shall be used when available per the Water Efficiency Master Plan, as amended, as found on the City of Longmont website.

J. Water wise-landscaping within these City Standards includes concepts such as xeriscaping and other best practices that create landscapes that are best designed for the local climate through: proper planning and design (zoning plant materials, native plants, and pollinators); soil improvement (topsoil and soil amendment); limiting functional turf areas and using low water turf types (see Longmont Urban Landscaping Native Plant Species and Mixes and Denver Water's Water Wise Landscape Handbook located on the City of Longmont website); efficient irrigation (hydrozoning irrigation to separate turf areas from shrubs, watering deeply and infrequently, minimizing overspray onto hard surfaces, use of water saving equipment such as high efficiency nozzles, rain and soil moisture sensors, and smart irrigation systems); use of mulches (and avoidance of impermeable weed barriers); and use of low water plant materials (natives are encouraged, see Longmont Urban Landscaping Native Plant Species and Mixes located on the City of Longmont website). See Denver Water's Water Wise Landscape Handbook for additional guidance.

K. Additional design criteria as relevant are included in each subsection in this Section 600 of the City Standards.

L. The width of tree lawns between sidewalk or sidepath and back of curb or other hard surfaces shall be a minimum of eight (8) feet for ease of maintenance operations and long-term tree health. Where width of root zone is insufficient for tree species, a root barrier shall be required to prevent concrete heaving.

M. Contractor shall provide optimally-sized landscape areas on both sides of sidewalk or sidepath within the rights-of-way to allow for efficient irrigation and to eliminate narrow strips. The optimal size for shrub areas is four (4) feet minimum, with eight (8) feet preferred. The optimal size for turf areas is 12 feet.

N. Contractor shall place the sidewalk or sidepath at the edge of the rights-of-way where additional common areas are available behind the rights-of-way line. This layout shall provide maximum separation between curbline and sidewalk or sidepath and provide a visual delineation of the boundary between private and public areas.

O. Where shrub beds are adjacent to curbs in Arterial streets rights-of-way, an 18-inch wide, four (4) inch thick stamped and colored concrete strip along the curb edge shall be required. Color and pattern are to be determined in the project design.

P. Where a fence abuts an irrigated turf area owned and/or maintained by the City, an 18-inch wide (centered on fence, thus nine (9) inches each side of fence), six (6)-inch thick mow band shall be required along the fence. The mow band shall be concrete.

Q. For detention storage facilities to be owned and/or maintained by the City after Final Acceptance, the following improvements shall also be provided by Contractor: a perimeter landscaped area, ten (10) feet in width, around the top of the detention storage facility above the 100-year flood elevation to allow for landscaping and other amenities including, but not limited to, benches, picnic tables, play equipment, sports courts, and/or fields. Required improvements shall be determined by the City and shall be in scale with the size of the detention storage facility. All equipment (benches, picnic tables, etc.) shall be placed on concrete pads, per the direction of the City Engineer. Fruit bearing trees shall not be permitted within the landscaped area or within the detention storage facility.

R. Where an Arterial street right-of-way is being improved prior to the construction of the ultimate curb and gutter, the Developer shall be responsible for accounting for the road construction in the design. Ultimate right-of-way improvements shall be designed and built to within five (5) feet of future curbline (horizontal and vertical elevation), as determined by the City Engineer. Refer to Section 603 of these City Standards for additional temporary seeding information.

600.02 CONSTRUCTION AND FINAL ACCEPTANCE

A. Generally, between the months of November and April, City inspectors will not schedule inspections of the landscape portions of Development projects due to this being the dormant season. If all other City Divisions and Departments are able to approve Construction Acceptance for other areas during the dormant season, a Partial Construction Acceptance may be granted for weather and season-dependent improvements, in the determination of the City. If the Developer and Contractor can finalize all work and obtain a Landscape and Irrigation Construction Acceptance prior to June 1 of the next growing season, then the City will allow for a less than one year warranty period for landscape and irrigation improvements and will grant Final Acceptance at the same time as the other City Divisions and Departments. This shortened warranty period may not be available in seeded areas where establishment is unsatisfactory in the determination of the City. In the event that the Developer and Contractor are not able to obtain a full Construction Acceptance from the City for outstanding items prior to June 1, then a delay of the Final Acceptance for all public improvements may be required.

B. At the City's discretion, an extended warranty may be accepted for portions of a project that do not fully meet City Standards and Specifications at the time of Final Acceptance inspections, in order to facilitate Final Acceptance. Securities for extended warranty periods will be required.

601.00 SITE GRADING

601.01 GENERAL

The site grading requirements in this section apply specifically to landscaped areas, including Arterial streets rights-of-way, primary greenways, secondary greenways, park sites, other areas owned and/or maintained by the City.

601.02 MINIMUM DESIGN CRITERIA

A. Grades in all areas are to be designed to allow for proper drainage and ease of maintenance operations. Grass swales shall drain at a minimum longitudinal slope of 2%. Hard surface routes shall drain at a minimum slope of 0.5% but shall match existing slopes when applicable. Berms and other slopes shall not exceed 3H:1V (3 feet horizontal to 1 foot vertical) for shrub beds and native grass areas that will be unmowed or mowed only during establishment. Berms and other slopes shall not exceed 4H:1V (4 feet horizontal to 1 foot vertical) for areas scheduled to be irrigated and mowed turf.

B. Irrigation ditch embankments shall be graded to 4H:1V maximum slope from the normal water surface elevation of the waterway, or as determined in the field by the City Engineer. A 2% maximum grade area should be maintained at the top of slope with a width adequate for landscaping and ditch maintenance access including sidepaths, as determined by the City, taking into account relevant information from the Ditch Company, when applicable.

C. Retaining walls, riprap, or other structures may be required to bring grades into conformance with these City Standards. Retaining wall design shall conform to these City Standards and the International Building Code (IBC) as currently adopted by the City and subject to additional requirements from the City Engineer.

D. Retaining walls shall maintain a minimum eight (8) foot separation from trees, as measured from the edge of the retaining wall.

E. Site preparation shall take into account all existing desirable vegetation that is to remain.

F. Tree Mitigation Plans shall indicate a Tree and Plant Protection Area, defined as the area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction. Tree preservation is typically indicated on the plans by a circle centered on the trunk of each tree, with a radius equal to the tree's dripline (outer edge of the branch crown), unless otherwise specified on plans or identified by the City Inspector. Where no limit of the Tree and Plant Protection Area is defined on the drawings, the limit shall be the drip line (outer edge of the branch crown) of each tree. Only hand grading with cut or fill not exceeding six (6) inches shall be allowed within the drip line of existing trees identified to remain as part of the Tree Mitigation Plans. Tree protection fencing shall be utilized to protect existing trees and the Tree and Plant Protection Area per installation requirements in Detail 600-27, “Tree Protection”. Landscaping shall be designed to save as many mature, good quality, and desirable species of trees as possible, as well as to provide for the removal of all invasive or undesirable trees, shrubs, vegetation, and weeds per the Colorado Noxious Weed Act and Noxious Weeds List, as may be amended.

G. Contractor shall protect the Tree and Plant Protection Area at all times from compaction of the soil; damage of any kind to trunks, bark, branches, leaves, and roots of all plants; and contamination of the soil, bark, or leaves with construction materials, debris, silt, fuels, oils, and any chemical or other damaging substances. Contractor shall notify the City Inspector of any spills, compaction, or damage and take corrective action immediately using methods approved by the City Inspector. The Contractor shall not

engage in any construction activity within the Tree and Plant Protection Area without the approval of the City Inspector including: operating, moving, or storing equipment; storing supplies or materials; locating temporary facilities including trailers or portable toilets, and shall not permit employees to traverse the area to access adjacent areas of the project or use the area for leisure or any other non-permitted activity. Permitted activity, if any, within the Tree and Plant Protection Area shall be indicated on the drawings.

H. Contractor shall directionally bore under the crown of trees for new utility lines to protect dripline. Open trenching can be used outside of the dripline of trees.

I. After grading, weed control efforts shall be scheduled to remove weed seeds and plants. Herbicide application records shall be submitted to the City for all areas owned and/or maintained by the City. The Contractor shall continue to perform weed maintenance for the duration of construction in accordance with the Weed Management Plan as described in Section 601.4.B.

J. Where slopes adjacent to concrete paths are steeper than 4:1, grading adjacent to concrete paths shall include a six (6) foot minimum shoulder on the downhill side of the path, and one (1) foot shoulder on the uphill side at +/- 2% slope.

K. Contractor shall provide a minimum of two (2) feet of buffer between the edge of concrete paths and any side obstructions or permanent objects such as fencing or light poles.

L. Site preparation operations shall utilize all existing topsoil on site. Where excavation is needed to attain final design grades, topsoil shall be stripped and stockpiled; subsoil excavated, and final grades shaped; and then topsoil shall be replaced at six (6) inch minimum depth. Additional topsoil needed to attain the six (6) inch depth shall be imported from sources approved by the City.

M. Grading and landscaping shall adequately allow for a six (6) foot wide mowing deck, including, but not limited to, berms and swales.

N. Grading where shrub beds are steeper than 4H:1V and are adjacent to a sidepath, sidewalk, or curb shall require a one (1) foot minimum width area at the toe of slope with a 2% maximum slope

601.03 MATERIALS

For the list of specific materials accepted by the City, reference the Approved Materials List for Section 600 located in the Appendices.

A. TOPSOIL

(1) Topsoil shall be taken from a well-drained, arable site and shall be reasonably free of subsoil, stones, clods, sticks, roots, and other objectionable extraneous matter or debris. It shall not contain any weeds or weed seeds. No stones or other materials over one-half (½) inch in size shall be allowed. Topsoil shall contain no toxic or otherwise hazardous materials. Topsoil shall have an acidity in the range of pH 6.0 to pH 8.4, consist of a friable loam, not exceed an electrical conductivity of 2.0 mmhos/cm, and contain at least 2% humus. Topsoil may require additional testing, including screen analysis, to determine acceptability per the direction of the City Engineer.

(2) Soil testing shall be completed and submitted to the City for review for all City-owned and/or maintained landscaped areas to determine pH, soluble salts, organic matter, nitrate, nitrogen, phosphorus, potassium, zinc, iron, copper, manganese, lime, and soil texture and shall be conducted by the Colorado State University Soils Lab or other approved certified lab. Quantity and

location(s) of tests shall be determined by the Landscape Architect and test locations shall be shown on the drawings. Recommendations in the lab reports shall be followed in all cases. Generally, recommendations will include soil amendment and fertilizer; in some cases, new or additional topsoil will be required. The intent is for the soil tests to provide representative samples of all different soil types in disturbed areas on-site or for imported topsoil.

B. SOIL AMENDMENT

(1) City-approved compost, identified as high-quality composted materials classified as either Class I or Class II, shall be applied at a minimum rate of three (3) cubic yards (CY) per 1000 square feet across the soil surface of all City-owned and/or maintained landscaped areas or per the recommendations of the soil test results. The mixture shall be free from clay subsoil, stones, lumps, plants or roots, sticks, weeds, seeds, high-sodium content, and other materials harmful to plant life. The compost shall be coarsely ground with an even composition, contain a minimum of 30 percent organic matter by dry weight, not exceed an electrical conductivity limit of 2.0 mmhos/cm, and have a pH in the range of 6.0 to pH 8.4. All material shall be sufficiently composted such that no material used is recognizable.

(2) Contractor shall submit a sample and written confirmation from the supplier of material composition, including percent organic matter, sodium, nitrogen, phosphorus, potassium, and salts, along with nutrient composition and trademark. The sample shall be representative of all soil used. Reference the Approved Materials List for Section 600 located in the Appendices for pre-approved amendment types.

(3) Soil amendments shall be applied to all areas as recommended by soil test results.

C. FERTILIZER

(1) Contracotr shall be apply fertilizer as recommended per soil test results. Application of fertilizer to native grass areas shall only be allowed per the direction of the City Engineer. Contact the City Engineer for a list of approved fertilizers prior to planting, seeding, or sodding.

S. HERBICIDE

(1) A selective or general herbicide may be applied as needed to control weeds and as determined by a State of Colorado Certified Pesticide Applicator, Qualified Supervisor.

601.04 EXECUTION

A. GENERAL

(1) The Contractor shall install construction fencing, tree protection fencing, and/or erosion control measures as needed prior to any grading activities per installation requirements in Detail 600-27 “Tree Protection” and Section 104.06 of these City Standards.

(2) The Contractor shall inspect the work area monthly for weed control needs.

(3) The Contractor shall clear and grub the site by removing unsuitable vegetation, wood materials, and rocks over one-half (½) inch size in turf areas or two (2) inches in dryland areas present in the surface grade.

(4) The Contractor shall strip topsoil for sites scheduled for cut and fill when the ground is moist, but not muddy or completely dry, to a maximum depth as determined by field inspection to maximize the recovery of quality topsoil material. If existing grades are to be maintained, topsoil can remain undisturbed. Topsoil shall be stockpiled at an optimum depth of two (2) feet and a maximum depth of fifteen (15) feet in an approved location separated from grading activities to protect from weed establishment, wind, and other erosion.

(5) Contractor shall proceed with earthwork operations per approved plans. When complete with rough grading, Contractor shall obtain approval from the City Inspector before proceeding. Rough grade inspection allows for the installation of six (6) inch minimum depth of topsoil and specified soil amendments as part of the fine grading work. Swales and drainage shall be established as required per plans.

(6) Contractor shall accommodate proper drainage and flow during and after grading operations and soil preparation. Erosion control measures shall be installed and managed while providing a consistent grade.

(7) For Arterial street right-of-way landscaping adjacent to roadways slated for future expansion, Contractor shall survey and stake the future horizontal and vertical alignment of the ultimate curb at the time of overlot grading. These stakes are to be maintained throughout the right-of-way construction process, including final grading, irrigation layout, seeding, and sodding. Disturbed stakes are to be re-surveyed, as necessary, to maintain the required information during construction. Grades outside the ultimate roadway are to be graded to anticipate future road improvements. Grades between the existing road edge and the ultimate curbline are to be graded to provide drainage and a safe shoulder for vehicles.

(8) Contractor shall rip subgrade to 12-inch depth prior to placement of topsoil in all areas to receive plantings.

(9) Topsoil shall be re-spread or imported to achieve six (6) inch minimum depth in all landscaped areas and graded to smooth and even lines.

(10) Contractor shall evenly distribute soil amendment as required by the City per the recommendations of the soil test results.

(11) Contractor shall ill topsoil and amendments, if amendments are required, to the full depth of topsoil placement, plus two (2) inches, and compact to 80% of Standard Proctor Density at 2% optimum moisture. Soil amendment shall be applied no more than 15 days prior to planting operations.

(12) All rocks, dirt clods, roots, vegetation, etc. greater than one-half (½) inch diameter in all irrigated turf areas (seed or sod) shall be removed. For native grass areas, two (2) inch diameter objects or greater are to be removed.

(13) Finish grade elevations adjacent to paved areas shall be trimmed to one (1) inch below pavement finish grade for sodded areas and one-half (½) inch for seeded areas at specified compaction.

(14) Fertilizer shall be applied at recommended rates per the soil test results.

(15) All debris piles and other stockpiles shall be removed from the site. Walkways and streets shall be cleaned on daily basis to minimize mud tracking and siltation into drainage structures.

B. WEED MANAGEMENT PLAN

(1) A Weed Management Plan shall be provided for greenways, parks, or other areas that will be owned and maintained by the City. The Weed Management Plan shall be submitted to the City Engineer at the time of the pre-construction meeting.

(2) A Weed Management Plan shall contain/address the following:

a. Identification of areas to be managed, including a visual exhibit.
b. Identification of species to be mitigated.
c. Methods of mitigation, either chemical or mechanical control. If chemical control is proposed, specify the type of chemicals to be used.
d. Frequency of inspection for weeds by Contractor, requiring at minimum a monthly inspection.

(3) Upon inspection, the Contractor shall submit to the City Engineer an inspection report detailing their findings and providing a plan to address any concerns. If herbicides are applied, the type of chemical control used and the date of application shall be included.
(4) It is the Contractor's responsibility to execute the Weed Management Plan from the start of construction until the time of Final Acceptance. The Contractor shall inspect the work area monthly for weed control needs.

C. HERBICIDE
(1) The Contractor shall be required to notify residents in advance of herbicide application per the City of Longmont's Integrated Weed Management Plan, which can be provided by the Parks and Natural Resources Department upon request.
(2) Contractors applying herbicides shall possess a current Commercial Pesticide Applicators license, as required by the Colorado Department of Agriculture. All individual applicators working for the contractor shall possess a current Qualified Supervisor or Certified Operator license with the appropriate site categories as required by the Colorado Department of Agriculture.
(3) Herbicides shall be applied at a legal rate in accordance with the herbicide label. Herbicide application records meeting all Federal and State laws and regulations shall be submitted to the City for all City-owned and/or maintained lands.
(4) Precautions shall be taken to avoid drifting of spray onto other properties and application shall not be done in windy or rainy conditions. Plant material that is damaged and was not designated for herbicide application shall be replaced by the Contractor.
Timing of application shall allow complete weed kill prior to grading operations and again prior to final grade if re-growth has occurred. Note that seeding shall not be permitted in any areas with established, live weeds.

602.00 IRRIGATION

602.01 GENERAL

A. Irrigation system design and construction shall comply with these City Standards and the adopted International Plumbing Code, Electrical Code, and general industry standards, where applicable, for all areas unless stated otherwise in these City Standards. In the event any of the previously listed standards conflict, the stricter standard shall govern.

B. All Arterial street rights-of-way, primary greenways, secondary greenways, park sites, municipal buildings, and other areas owned and/or maintained by the City shall have an automatic, clock-activated irrigation system of sufficient coverage to irrigate all plant material.

C. Installation of an irrigation system within City-owned and/or maintained areas shall include a sufficient number and size of taps, reduced pressure zone (RPZ) backflow prevention assemblies, irrigation meters, meter vaults, and power sources for each irrigation controller. Where raw water is used, potable water back-up shall also be provided in a manner acceptable to the City. No sub-meters shall be allowed.

D. All potable irrigation systems shall be equipped with a RPZ backflow prevention assembly meeting these City Standards.

E. Backflow prevention assemblies shall be installed above ground in an insulated enclosure per Detail 600-01 “Irrigation Meter Vault and Downstream Assemblies,” in the Appendices. The irrigation controller shall either be the pedestal-mounted or wall-mounted variety with a lockable, weatherproof cabinet.

F. Any deviation in taps from the approved construction plans shall require approval by the City Engineer prior to installation. Refer to Section 500 for tapping requirements.

G. Applications for tap fee waivers (water system development fee waivers) are to be submitted to the City and shall indicate the size of the tap, address of the tap, and type of area to be irrigated from the tap. Eligible taps for the fee waiver include irrigated areas owned and/or maintained by the City including Arterial street rights-of-way, primary greenways, secondary greenways, and park site improvements. No water from these waived taps shall irrigate areas outside of designated City-owned and/or maintained areas.

H. All irrigation taps and electric services shall have an address and building permit before installation. The billing information shall be required at the time of building permit issuance. Addresses are determined by the Planning and Development Service Department and building permits are obtained from the Building Services Department.

I. The final location of the irrigation controller shall be coordinated and approved by the City Engineer for all City-owned and/or maintained areas. Electric sources shall be coordinated and approved by Longmont Power & Communications (LPC) for all areas. For controllers on irrigation systems with a fee waived tap and per the approval of LPC, the electrical connection will not be metered provided there are no additional loads on the service. Electric services with any additional loads shall be metered. The Developer shall be responsible for all applicable LPC connection costs and fees. Maintenance of the service from the LPC source shall be the responsibility of the property owner or HOA.

J. WATER WISE IRRIGATION GUIDELINES

(1) The City of Longmont encourages residents to follow voluntary watering schedules to support water conservation efforts. While mandatory restrictions are only in place during times of drought, it is recommended to avoid watering between 10:00 a.m. and 6:00 p.m. to minimize evaporation losses. To see if mandatory restrictions are in place, please reference the Water Supply and Water Shortage Implementation Plan found on the City of Longmont website.
(2) Longmont's clay soils absorb water slowly, making them prone to runoff. The City recommends implementing “cycle and soak irrigation”. This method involves watering in shorter intervals with breaks in between, allowing water to penetrate deeply, promoting healthier root systems, and reducing waste.
(3) It is recommended to water lawns and gardens in the early morning or late evening to reduce evaporation and ensure more water reaches plant roots and to avoid watering during the hottest parts of the day.
(4) Contractors shall consider utilizing efficient irrigation systems by installing drip irrigation systems or micro-sprinklers, which deliver water directly to plant roots, minimizing evaporation and runoff. These systems are particularly effective for gardens and landscaped areas.
(5) Irrigation equipment should be regularly inspected and maintained by checking irrigation systems for leaks, misaligned sprinkler heads, and clogged emitters. Regular maintenance ensures efficient water use and prevents unintended water waste in contravention of Code Section 14.04.490.

602.02 MINIMUM DESIGN CRITERIA

A. Irrigation systems are to be designed to provide head-to-head coverage with matched precipitation rates. Sprinkler heads shall not overspray walkways, pavements or other hard surface areas, unless approved by the City Engineer. Principles of water wise landscaping, as described in Denver Water’s Water Wise Landscape Handbook, shall be utilized in the design of irrigation systems.

B. Use of untreated raw water for irrigation may be approved by the City Engineer. The contractor shall install an approved pump located within an approved, secure pump enclosure. The pump system shall include filtration equipment with self-flushing screens. Typical “raw water” equipment shall be required for these systems including purple valve boxes, scrubber valves, and sprinkler heads. At all times of use, a visible notice shall be posted warning that non-potable water is being used for irrigation, as required by the Colorado Department of Public Health and Environment (CDPHE). Reference Section 606 of these City Standards for more information on signage.

C. For dryland grass irrigation systems, an underground permanent irrigation system shall be installed for establishment of dryland grasses, and for on-going irrigation to shrubs and trees unless otherwise approved by the City Engineer. Exceptions to City Standards may be allowed on a case-by-case basis but shall be required to provide a minimum 80% coverage and may include additional design requirements.

D. For trees installed in xeric landscaped areas, trees shall have their own dripline, or other form of supplemental, dedicated water source in addition to the xeric irrigation.

E. Only materials, sizes, and other requirements listed in this section, and in the Approved Materials List for Section 600, found in the Appendices, shall be specified for use per type of landscaped area indicated.

F. Available design pressure and flow rates can be obtained from the City. For City-owned and/or maintained areas, system design shall not exceed available pressure at the time of final build-out of the area per Envision Longmont. Where available pressure exceeds 85 psi, the system shall be designed to 85 psi and a pressure regulator shall be installed at each valve to reduce actual system pressure to 85 psi. Any pump system directly connected to the City Water Distribution System requires approval from the City Engineer. See Section 505.04 "Service Line Booster Pumps" of these City Standards for more information.

G. The following irrigation tap sizing calculation is to be used to calculate the area served by each separate tap. The calculation shall be based on maximum use from the tap including irrigation needed for establishment of all phases or off-site areas served from the tap.

The tap sizing calculation shall use the following formula:

_____Total square feet of irrigated area (from that tap, including future build-out if applicable) / 8 = _____ x 7.48 (gallons per cubic feet per week) / 5 (days per week) / 7 (hours per day) / 60 = _____ gpm (gallons per minute).

Calculation plan note should read: _____sf /8 = ____ x 7.48 / 5 / 7 / 60 = _____ gpm

The number of days per week and hours per day may be adjusted with City Engineer approval, but those given above shall be considered typical.

H. The size of the tap shall be the smallest copper pipe (Type K) that does not allow the water flow velocity to exceed ten (10) feet per second, based off the flow demand in gallons per minute calculated.

I. Remote control valves shall be located to minimize lateral piping and sleeving under walkways and hard surface areas.

J. Resilient seat gate valves shall be placed at both sides of each road crossing, at the upstream end of each leg in the irrigation main and at other areas as required to provide isolation and minimize disruption to overall irrigation system in the event of system failure.

K. No cross-connections between City potable water and untreated non-potable raw water shall be permitted.

L. Lateral piping shall be sized based on flow demands (GPM's):
   (1) velocities shall not exceed five and a half (5 ½) feet per second in any Class 200 piping.
   (2) Copper pipe velocities shall not exceed eight (8) feet per second.

M. Irrigation valve numbering shall be sequenced in a logical, continuous manner throughout the site.

602.03 MATERIALS

(1) For a specific list of materials pre-approved by the City, reference the Approved Materials List for Section 600 located in the Appendices. Equipment proposed that is not on the Approved Materials List shall require approval by the City Engineer prior to installation.

A. TAPS

(1) The contractor is responsible for supplying the saddle specific to the water main pipe material. Reference the Approved Materials List for Section 500 located in the Appendices for approved saddles.

B. BACKFLOW PREVENTION ASSEMBLY & IRRIGATION METER

(1) RPZ backflow prevention assemblies and irrigation meters shall meet the requirements in Section 507.00 “Backflow Control” of these City Standards.

(2) Above ground enclosed RPZ backflow prevention assemblies shall be required for all potable irrigation systems.

C. IRRIGATION MAINS

(1) Irrigation mains shall be Class 200 PVC, NSF approved.

(2) Irrigation pipe sizes larger than three (3) inches shall be gasketed pipe. For pipe sizes larger than three (3) inches, self-restrained mechanical joints shall be used. Thrust blocks are not required for three (3) inch diameter or larger irrigation piping unless directed by the City Engineer.

(3) Use ductile iron pipe and fittings for irrigation main crossings at bridges and other above ground locations as directed by the City Engineer.

(4) Use HDPE pipe for irrigation main crossings at streams and other water crossing locations as directed by the City Engineer.

(5) No cold weather glue shall be permitted.

D. LATERALS

(1) Irrigation laterals shall be Class 200 PVC, NSF approved.

(2) No laterals smaller than one (1) inch or sized at one and a quarter (1 ¼) inch shall be allowed in City-owned and/or maintained areas.

(3) Polyethylene drip pipe utilized for drip applications shall be weather and UV resistant material, NSF approved, and SDR pressure rated pipe. An electrical tracer wire shall be installed with the drip pipe in areas with native vegetation to facilitate irrigation system maintenance.

(4) No cold weather glue shall be permitted.

E. PIPE FITTINGS

(1) Pipe fittings shall be molded fittings manufactured of the same material as the pipe.

(2) Funny pipe is allowed for pop-up sprinkler head installation only and shall be compatible with the elbows required for sprinkler heads with appropriately sized crimp-type clamps.

(3) PVC shall be Schedule 40, Type 1, PVC solvent weld with ASTM Standards D2466 and D1784.

(4) No cold weather glue shall be permitted.

(5) Copper irrigation service lines shall be wrought copper or cast bronze fittings, soldered, or threaded per installation details.

F. SLEEVING

(1) Sleeving shall be Class 200 PVC under all paved surfaces. Ductile iron pipe shall be used for bridge crossings and other above ground situations. Each main, lateral, or wire crossing for any paved area shall be installed in a separate sleeve.

(2) Sleeving size shall be a minimum of two (2) sizes larger than the diameter of the pipe diameter being sleeved, with a minimum diameter of four (4) inches.

(3) Wires shall be in separate sleeve from pipe with a minimum two (2) inch size pipe for control wire sleeves. Sleeves for large systems shall be a minimum of two (2) inches larger than the full wire bundle.

G. VALVES

(1) Remote control zone valves, including the systems master valve, shall be electrically operated, appropriate for the water supply (scrubber type for raw water applications), and have a manual bleed device and flow control stem. Valves shall have a slow-opening and slow-closing action for protection against surge pressure. Reference Detail 600-06 "Remote Control Valve Assembly" for installation information.

(2) Pressure regulating valves shall be used as needed per requirements in this Section of the City Standards.

(3) Drip remote control valves shall be the same as the remote-control zone valves, sized to match system requirements, including upstream filter, pressure regulator, and basket strainer with indicator. Reference Detail 600-07 "Drip Remote Control Valve Assembly" and Detail 600-17 "Two-Wire Drip Remote Control Valve Assembly" for installation information.

(4) Manual drain valves shall be three-quarter (¾) inch ball valves. Reference Detail 600-08 "Main Drain Valve Assembly" for installation information.

(5) Quick coupling valves shall be one (1) inch brass units with a rubber cover and one (1) inch brass key. Reference Detail 600-09 "Quick Coupler Assembly" for installation information.

(6) Isolation gate valves with a resilient seat shall be able to withstand a continuous operating pressure of 150 psi. Waterway shall be clear equal to the full diameter of the pipe. Isolation gate valves shall be opened by turning the square operating nut to the left; wheel operation gate valves shall not be acceptable. Valve size shall be the same as the irrigation main size, however no isolation gate valves smaller than one (1) inch shall be permitted. Reference Detail 600-10 "Gate Valve Assembly" for installation information.

(7) Master valves shall be sized to match the size of the irrigation mains.

H. VALVE BOXES

(1) Each valve shall be in a separate valve box with a matching locking cover. Jumbo size box installations shall be required as specified in the Approved Materials List located in the Appendices. A waterproof tag shall be attached directly to each valve utilizing permanent marker to indicate the valve number for each tag. All irrigation valve box lids shall be labeled by branding the irrigation valve number for maintenance purposes.

I. CONTROL SYSTEM

(1) Controllers for public irrigation systems shall include a minimum of three (3) extra stations for possible future use. The controller box shall be weather tight and vandal resistant with locking exterior disconnect.

(2) Control system enclosures shall be weatherproof, secure enclosures with a floor stand kit and a lock kit.

(3) Satellite control field units for systems to be owned and/or maintained by the City shall include the following:

a. One (1) Toro DXi Central Control System with cellular communications field unit required per each irrigation tap.

b. Number of stations shall include a minimum of three (3) extra stations for possible future use. System shall come pre-assembled with security enclosure.

c. DXI Control Controller shall include the cellular communication kit with antenna and ProMax Connect App.

(4) Surge protection and electrical grounding rods or plates shall be required in all areas per manufacturer's recommendation.

(5) Reference Detail 600-05 "Controller, Satellite & Enclosure" for installation information.

J. ELECTRONIC CONTROL WIRING

(6) Tracer wire shall be 14 AWG solid copper direct burial underground feeder (UF) or polyethylene (PE) cable, Underwriters Laboratories Inc. (UL) approved, for systems up to 2,000 feet in length. For larger systems, tracer wire shall be 12 AWG solid copper direct burial UF or PE cable, UL approved per system design and manufacturer's recommendations.

(7) For conventional wiring, the following shall be required:

a. Five (5) wires with consistent color scheme throughout:

1. Red = live
2. White = ground
3. Black = extra (to farthest end of main including each branch)
4. Blue = extra (to farthest end of main including each branch)
5. Green = extra (to farthest end of main including each branch)

b. Identification shall be provided for each wire with waterproof label and permanent marking at the controller, at each splice box, and the furthest end of each wire.

(8) Wire connectors and waterproofing sealant specific for direct burial are to be used to join control wires to remote control valves.

(9) Two-Wire Systems

a. The ground path shall be as direct as possible, having no sharp bends, and shall not exceed 30 Ohm resistance (when measured with an earth ground resistance device). All electrical components throughout the irrigation system should be grounded similarly to provide the same ground potential.

b. Grounding the communication cable: The lightning arrester (Toro P/N SB-BLA) shall be required to protect the decoder module from lightning damage. In order for these arresters to discharge lightning energy efficiently, they shall be properly grounded and a resistance of ten (10) Ohms or less shall be achieved at each earth ground point.

c. Recommended Controller-to-Decoder cable: 14 AWG (2.5mm2), solid copper, jacketed 2-conductor, direct burial. The preferred wire make and model is the Paige Irrigation Wire, Spec P7350D.

d. Recommended Decoder-to-Solenoid cable: 14 AWG (2.5mm2), solid copper, 2-conductor, direct burial. The preferred wire make and model is the Paige Irrigation Wire, Spec P7351D.

K. SPRINKLER HEADS

(1) All sprinkler heads shall be of the same manufacturer as specified on the plans and marked with the manufacturer's name and model in such a way that materials can be identified without removal from the system.

(2) Sprinkler head installations for City-owned and/or maintained areas shall be coordinated with the City Engineer to specify brands and models to match equipment used in public irrigation systems in the vicinity.

(3) All sprinkler heads installed shall have a check valve.

(4) Gear-driven rotor sprinkler heads with a stainless riser shall only be installed within athletic fields. Reference Detail 600-11 "Rotor Sprinkler Head Assembly" for installation information.

(5) Sprinkler head selection shall be made to provide adequate head-to-head coverage based on turf type.

L. DRIP SYSTEM

(1) Spiral barb emitters shall be run to individual plants. Tracer wire shall be installed over all buried drip pipes between shrub beds and/or individually spaced trees in native areas. Wire shall be buried a minimum of six (6) inches under the soil. Reference Details 600-13 "Drip to Shrub Bed" and 600-14 "Drip to Trees and Large Shrubs" for installation information.

(2) Spaghetti tubing is allowed in City-owned and/or maintained areas.

(3) In native areas, the drip shall be zoned separately to each of the following areas:

a. Ornamental shrub beds, including beds with trees;

b. Individual trees;

c. Naturalized shrub beds.

(4) Drip shall not be provided for individual trees located outside of shrub beds in irrigated turf areas.

M. JOINT RESTRAINTS

(1) Joint restraints shall be required for all mechanical fittings for pipe sizes equal to or greater than three (3) inches.

(2) Concrete thrust blocks shall not be permitted.

N. RAW WATER SYSTEMS

(1) Raw water equipment shall be required for all non-potable raw water irrigation systems, to include purple above ground pipe, valve boxes, sprinkler heads, and scrubber valves. Drip equipment is allowed with proper filtration. Raw water systems shall include a supply turn-out structure and a storage pond sized for three (3) days of storage. Storage ponds shall be lined and lining material product specifications shall be submitted to the City Engineer for review and approval. Riprap shall be installed around pond perimeter from the normal high-water elevation to a minimum of 12 inches below the lowest water elevation seen during irrigation draw-down. Water inlet and outlet areas shall be armored with riprap and other material as needed to preserve pond liner. Flow metering shall be required to meet State regulations for all raw water systems.

(2) All raw water systems shall include a provision for potable back up in the event of a raw water delivery system failure. Potable backup shall be designed as a temporary, secondary supply with physical disconnect from the irrigation system as determined by the City. These secondary systems may utilize a piped connection from the potable system with a physical disconnect. The secondary system is to have sufficient pressure to run the irrigation system. On a strict case-by-case basis, to be approved by the City Engineer, the secondary system may utilize a fire hydrant near the storage pond under the following conditions:

a. The use of a fire hydrant shall be under the full supervision of the City Inspector at all times.

b. The appropriate level of backflow prevention shall be implemented.

c. A Temporary Water Use Permit shall be obtained.

O. PUMP SYSTEMS

(1) Irrigation pump systems for non-potable water use in City-owned and/or maintained areas shall be coordinated with the City Engineer. Pump equipment information shall be submitted to the City Engineer for review and approval prior to plan approvals.

(2) Basic system requirements shall include, but are not limited to, the following:

a. Skid-mounted pump system with variable frequency drives capable of water delivery at required flows and pressure for final landscape build-out.
b. Pump control system with interface to irrigation controller(s).
c. Filter with self-flushing screen.
d. Pump enclosure heating and fan systems to maintain a minimum 49 °F temperature at outside temperatures of 0 °F and maximum 95 °F temperatures within the enclosure.
e. Lighting, power, and GFCI outlet on separate breaker from pump.
f. Precast enclosure with vandal resistant coatings and steel screen over vent openings.
g. Pump access hatch centered over pump.
h. Man door access using steel door with lock guard over door hardware.
i. Pump enclosure sized to provide adequate walking room around pump skid and controller systems.
j. Automated inlet pipe screen filter
k. Mission control flow monitoring system with mag flow meter

602.04 EXECUTION

A. GENERAL

(1) All utilities shall be located prior to trenching and protected from damage per Section 107.01 of these City Standards. The Utility Notification Center of Colorado, Colorado 811, can be called for existing City irrigation system locates.

(2) Existing irrigation taps or other irrigation system appurtenances, as applicable, shall be inspected prior to work.

(3) Contractor shall contact the Customer Service Team at 303-651-8416 a minimum of 48 hours prior to irrigation tap installation to schedule the water main tap and to coordinate purchase and installation of equipment. Reference Section 501.05 and the Tapping sub-sections under Section 502.00 of these City Standards for tapping information specific to pipe material. All taps and installations are subject to approval by the City Inspector. Tap fee waiver request forms need to be submitted to the City Engineer and approved prior to tapping.

(4) A ball valve shall be installed for water shut off, irrigation meter, and drain valve inside the irrigation meter vault per the Water Distribution Detail 500-25 “1-1/2” to 2” Irrigation Meter in Vault”. To schedule inspections of the water service line, irrigation meter vault, irrigation meter, and RPZ backflow prevention assembly, schedule the inspections through the building permit by contacting Building Services. Section 505.00 shall be followed during installation of irrigation meters and includes the requirement that no soldered joints or fittings are allowed on buried water service lines. Soldered joints or fittings are permissible above grade or inside a vault.

(5) Meter vaults are to be sixty (60) inches in diameter for taps two (2) inches or smaller in size. For taps larger than two (2) inches, the pipe layout inside the meter vault shall be designed by a Professional Engineer to determine the vault size. Design shall be approved by the City during construction plan review.

(6) The RPZ backflow prevention assembly, drain valve, winterization assembly, master valve, and flow meter shall be installed after the irrigation meter vault, as specified per Detail 600-01 “Irrigation Meter Vault and Downstream Assemblies”.

(7) RPZ backflow prevention assembly shall be installed in an above ground enclosure.

(8) Non-potable (raw water) irrigation systems with in-line injection systems shall be required to have RPZ backflow prevention assemblies upstream of the injection nipple, which cannot be placed in the vault.

(9) Copper pipe shall be soldered so that a continuous bead shows around the joint circumference. A dielectric union shall be inserted wherever a copper-based metal (copper, brass, bronze) and an iron-based metal (iron, galvanized steel, stainless steel) are joined.

(10) Winterization assemblies shall be installed in the downstream assemblies located after the irrigation meter unit and RPZ backflow prevention assembly on PVC pipe that has not been reduced in pipe size. Reference Detail 600-02 “Winterization Assembly” for installation information.

(11) Master valves shall be installed in the downstream assemblies located after the irrigation meter vault and RPZ backflow prevention assembly within a reasonable distance upstream of the flow meter and no closer than the distance equivalent to ten (10) pipe diameters. Reference Detail 600-03 “Master Valve Assembly” for installation information.

Flow meters shall be installed at the last downstream assembly located after the irrigation meter vault and RPZ backflow prevention assembly. The following minimum spacing requirements shall be met upstream and downstream of flow meter from the first joint, bend, or other fittings: ten (10) pipe diameters straight pipe upstream; five (5) pipe diameters straight pipe downstream. Reference Detail 600-04 “Flow Meter Assembly” for installation information.

B. PIPE TRENCHING

(1) Irrigation pipe shall be installed in open cut trenches with sufficient width to facilitate thorough tamping (puddling) of suitable backfill material under and over pipe. Puddling is not allowed where trench is located adjacent to sidewalks, curbs, and side paths. Irrigation mains and laterals shall be installed in separate trenches.

(2) Irrigation pipes shall be located within two (2) feet of the edge of walk and curb to maximize tree planting zones for all City-owned and/or maintained areas. Field adjustments to these City Standards shall require approval by City Engineer prior to installation.

(3) Trench Depths:

a. Irrigation main line pipes shall be a minimum of 24-inches deep from top of pipe to finished grade. Tracer wire shall be buried at the same depth as irrigation main line pipe.

b. Irrigation lateral line pipe shall be a minimum of 18-inches deep from top of pipe to finished grade. No shared trenches for laterals shall be allowed.

c. Irrigation drip line lateral pipes shall be a minimum of 12-inches deep from top of pipe to finished grade in paved and/or sodded or seeded areas, and at grade with four (4) inch minimum mulch cover in planting beds (over weed barrier).

d. Sleeving pipes shall be installed at a depth that permits the encased pipe or wiring to remain at the specified burial depth.

(4) Tracer wire shall be buried at the same depth as irrigation drip lines in native vegetation areas.

C. SLEEVING

(1) Hand boring, or any method that disturbs sidewalk or sidepath subgrade, shall not be permitted unless the obstruction in the irrigation pipe path cannot be moved or irrigation pipe cannot be re-routed. Sleeves shall be installed before surface paving.

(2) Irrigation main line pipes installed in existing sleeves at greater depth than adjacent pipe shall have a manual drain valve at the end that has the lowest elevation.

(3) Sleeves shall be installed so both ends extend past edge of curb, gutter, sidewalk, sidepath, or other obstruction a minimum of two (2) feet.

(4) All sleeves shall be marked with a "V" or “X” chiseled in pavement directly over sleeve location at both ends of sleeve within five (5) days of installation. Temporary marking of sleeve location shall be provided prior to permanent marking.

(5) Sleeves shall be laid to drain at a minimum grade of 20H:1V.

(6) Sleeves installed for future use shall be capped at both ends.
(7) Separate sleeves, two (2) inch minimum in size, shall be used for all wiring.
(8) Sleeves should not have joints due to length of sleeve run. If joints are necessary, only solvent welded joints shall be allowed.
(9) Compaction of backfill for sleeves shall be 95% of Standard Proctor Density, ASTM D698-78. Use of water (puddling) around sleeves for compaction is not allowed.

D. PIPE INSTALLATION

(1) Teflon tape shall be used on all threaded joints; only Schedule 80 pipe shall be threaded. All threaded joints shall be tightened to eliminate leaks per industry standards.
(2) Reducing pipe size shall be achieved through the insertion of a reducing coupling installed at least six (6) inches beyond the last tee of the larger pipe size.
(3) Pipe ends shall be cut to be square and deburred. Pipe ends must be cleaned before using primer and solvent cement, joined in the manner recommended by the manufacturer and in accordance with accepted industry practices. No leaks shall be permitted. Pipe ends shall be cured for 30 minutes before handling and 24 hours before allowing water in pipe.
(4) In the determination of the City, gluing of pipe may be suspended if weather conditions, pipe temperatures, and/or soil temperatures are not conducive to quality work or strong pipe joints.
(5) Mid-sections of irrigation mains and the entirety of irrigation lateral piping shall be backfilled. Irrigation main joints shall not be backfilled until inspection and hydrostatic testing is complete. Contact the Customer Service Team at 303-651-8416 to schedule inspections on all City-owned and/or maintained areas. Contact the City Inspector to schedule inspections on all non-City owned areas. Inspections shall be scheduled after installation of all irrigations lines. Failed tests may result in the Contractor exposing all covered joints. After the test passes, Contractor shall backfill remaining irrigation pipes.
(6) Backfill shall be free from rubbish, rocks larger than two (2) inches in diameter, frozen material, and vegetative matter. Do not backfill in freezing weather. If backfill material is rocky, the pipe shall be bedded in two (2) inches of fill sand covered by six (6) inches of fill sand.
(7) After tamping (puddling), Contractor shall leave all trenches slightly mounded to allow for settling.
(8) Compaction to proper densities shall be as specified in the geotechnical report depending on surface type over the irrigation pipe and location of irrigation pipe.
(9) Self-restrained mechanical joints shall be installed for changes in direction over 20° when PVC irrigation mains are three (3) inches in diameter or larger.
(10) Drip system installation:
    a. Contractor shall snake polyethylene hoses in trenches at 12-inch minimum depth. Where drip laterals enter shrub beds from turf areas, they shall be elbowed up to finish grade. Contractor shall snake hoses in beds above grade and below mulch. Where sloped, the drip line shall be placed on the uphill side of each plant. Pipes shall be secured using enough galvanized tie-down stakes to keep pipes stationary. Contractor shall provide a tee connection to the drip line circling each tree for all City-owned and/or maintained areas.
    b. Drip pipes shall be extended to all trees located in native seeded areas. Drip lines shall be extended within shrub beds near each shrub or planting, with hoses snaked to the backfill area of each plant. Where sloped, the drip line shall be placed on the uphill side of each plant.
    c. Reference Details 600-13 “Drip to Shrub Bed” and 600-14 “Drip to Trees and Large Shrubs” for installation information and Section 605 “Trees, Plants, and Ground Cover” regarding separate zoning for drip systems based on specific landscape areas.

d. Flush caps and visual flow indicators shall be installed in separate valve boxes and at the ends of each lateral or branch. Reference Detail 600-15 “Flush Cap Assembly” for installation information.
e. Drip lines shall be flushed with full head of water for three (3) minutes prior to installing emitters.
f. Buried tracer wire shall be installed on top of all drip pipes buried a minimum of six (6) inches under the soil.
g. Emitters shall be provided to each plant per requirements in this section of the City Standards.
h. Contact the Customer Service Team at 303-651-8416 to schedule an inspection to evaluate the operation of the drip system after emitters are installed prior to installation of mulch in shrub beds.

(11) Attach Funny pipe to elbows using appropriately sized crimp-type clamps to secure.

E. VALVE INSTALLATION

(1) Refer to valve details in the Appendices.
(2) Valves shall be installed at least 24 inches from, and align with, adjacent walls or paved edges.
(3) Electrical connections shall allow pigtail so solenoids can be removed from valves with 24 inch minimum slack to allow ends to be pulled 12 inches above ground. Valves shall be aligned and located a minimum of 24 inches from curbs, sidewalks, sidepaths, retaining walls, etc.
(4) The piping system shall be thoroughly flushed under full head of water for three (3) minutes through furthest valve before installing new valve.
(5) Valve assembly shall include ball valves and unions for ease of maintenance and repair.
(6) Valves shall be installed within locking valve box.
(7) A waterproof tag shall be installed with permanent marker with each valve number. One tag shall be attached to each valve. Valve boxes shall be branded with the identifying valve number.
(8) Reference Details 600-06 “Remote Control Valve Assembly” and 600-07 “Drip Remote Control Valve Assembly” for installation information.
(9) Manual drain valves shall be installed per plans and at the end of each irrigation main line pipe. Drain valve shall be installed in a six (6) inch Class 200 PVC sleeve access with ten (10) inch locking valve box lid. A sump shall be installed consisting of four (4) cubic feet of pea gravel over filter fabric at the drain discharge location. Reference Detail 600-08 “Main Drain Valve Assembly” for installation information.
(10) Quick coupler valves shall be installed per plans within ten (10) inch locking valve boxes. The system shall be completely flushed before installing valves. The irrigation system shall be thoroughly flushed under full head of water for three (3) minutes through furthest extent of the system before installing any new valves. Reference Detail 600-09 “Quick Coupler Assembly” for installation information.
(11) Valve Boxes:
a. Valve boxes shall be “jumbo” sized.
b. Contractor shall:
1. Brand all valve boxes with the following codes as appropriate: "SV" and the controller valve number per as-built plans for all remote-control valves; “DV" for all drain valves; "GV" for all isolation gate valves; "DRGV" for all drip system isolation gate valves; "QC" for all quick coupling valves; "WA" for all winterization assemblies; "FM" for all flow meter assemblies; "MV" for all master valve assemblies; and “WS” for wire splice. Use a branding iron stamp with three (3) inch high letters.

2. Brand boxes on top of the lids where brand is clearly identifiable with appropriate code designation of valve type and automatic remote valve number.
3. Valve boxes shall not rest on irrigation main; use bricks or other approved non-compressible materials. The top of valve box shall be one-half (½) inch above finish grade.
4. All equipment shall be centered in valve boxes with adequate space to access equipment with ease. A hand should be able to pass unobstructed under the valve.
5. Valves shall be installed at a depth accessible for repairs. Three (3) inch depth of three-quarter (¾) inch washed gravel shall be placed in the bottom of each valve box (without fabric) with three (3) to four (4) inches of space under the valve for union operations and valve removal.
6. Three (3) spare wires shall be looped and coiled up into each valve box.

c. Reference Detail 600-06 "Remote Control Valve Assembly" for installation information.

F. SPRINKLER HEAD INSTALLATION

(1) Sprinkler heads shall be plumb and level with finish grade. In sloped areas, sprinkler heads are to be tilted to match the slope to provide a full radius spray pattern.

(2) Lateral pipes shall be flushed before installing sprinkler heads. Irrigation systems shall be thoroughly flushed under full head of water for three (3) minutes through furthest extent of the system before installing sprinkler heads. Risers shall be capped if sprinkler head installation is delayed.

(3) Pop-up sprinkler heads shall be installed along walks and bikeways. Sprinkler heads shall be embedded in a six (6) inch layer of sand or clean fill material under the base of the sprinkler head. Reference Detail 600-12 "Pop-Up Spray Sprinkler Head Assembly" for installation information.

(4) Contractor shall supply appropriate nozzles for best performance and adjust nozzles and radius of throw to minimize overspray onto hard surfaces.

(5) Contractor shall schedule a field inspection with the City for the proposed sprinkler head layout prior to irrigation installation for all native or dryland seeded areas. Contact the Customer Service Team at 303-651-8416 to schedule an inspection.

G. ELECTRICAL CONNECTIONS

(1) All wire connections and exposed ends shall be sealed using wire connectors and waterproof sealant specific to direct burial applications.

(2) Electrical installations shall be checked by the City Building Inspector. All work, including the low voltage installation to the electric source where applicable, is to be performed by the Contractor. All materials are to be provided by the Contractor. Prior coordination and approval is required by LPC when working near LPC equipment.

(3) Contractor shall identify each wire with a waterproof label and permanent marking at the controller and the furthest end of each wire, or as noted on the valve box brand, and at all wire splice connections.

H. CONTROLLER INSTALLATION

(1) The controller shall be installed in an above-ground location, per the City Inspector, suitable to prevent vandalism and provide protection from adverse weather and traffic conditions. All exposed wiring to and from the controller shall be encased in a galvanized metal conduit. Exterior controllers are to be installed on four (4) inch thick concrete pads with compacted subgrade per Section 200 of these City Standards.

(2) Contractor shall install controller system per Detail 600-05 “Controller, Satellite, & Enclosure” and in accordance with manufacturer's specifications. Surge protection, grounding rods, and other accessory components shall be installed as needed.
(3) Wire labels shall be attached to the ends of control wires inside the controller unit. Wires shall be labeled with the identification number of the remote-control valve activated by the wire.
(4) For City owned and/or maintained areas installed by Developers, the City does not adjust watering schedules via the Toro Sentinel system during the warranty period. The Toro Sentinel system shall be fully operational by the Final Acceptance site inspection. If the Contractor requires City instruction on use, the City shall charge $100 per hour.
(5) It is recommended for development projects to install an additional control clock instead of the Toro Sentinel unit during the warranty period for ease of Contractor operation. Contractor shall replace this temporary clock with the Toro Sentinel unit at the end of the warranty period.

I. WIRING
(1) The contractor shall comply with City adopted electrical codes.
(2) Power sources shall be brought to the controller to a GFCI (grounded fault) receptacle installed within the controller casing for all City-owned and/or maintained areas. The clock shall be plugged into the receptacle.
(3) A minimum loop of 24 inches shall be left at each valve, controller, splice, at the ends of each sleeve, at 100-foot intervals along continuous runs of wiring, and changes in direction of 90° or more. Wires shall be banded together at ten (10) foot intervals with pipe wrapping tape.
(4) Grounding the Communication Cable
    a. The lightning arrester (Toro P/N SB-BLA) shall be required to protect the decoder module from lightning damage. In order for these arresters to discharge lightning energy efficiently, they shall be properly grounded and a resistance of ten (10) Ohms or less shall be achieved at each earth ground point.
    b. Ground rod(s) shall have a buried depth of eight (8) feet.
    c. The soil surrounding the ground rod(s) shall remain well-moistened at all times. The addition of some form of irrigation may be required if the cabinet is installed in a non-irrigated location.
    d. The ground resistance shall be measured per the instructions provided with the ground test instrument. A reading of 10 or less is preferred, 10-20 is acceptable, 20-30 is marginal, and 30+ should be improved. If the resistance exceeds the acceptable limit, additional ground rod(s) can be installed at a distance equal to twice the buried depth of the first rod; i.e., 16 feet (4.9 m). The ground rods shall be interconnected using eight (8) AWG (8 mm2) solid copper wire and tested again. If the measured ground resistance continues to read above the acceptable limit, contact your local Toro distributor for further assistance and recommendations.
    e. A round valve box shall be installed over the ground rod to enable the ground rod to be easily located, and to provide access to the ground wire connection(s).
(5) Station Decoder Installation
    a. The station decoder module is available in 1-station, 2-station, or 4-station configurations. The stand-alone Sentinel 2-Wire model can handle up to 204 stations. The decoder modules can be connected in parallel anywhere on the two-wire communication line connected to the station terminals. Each station can activate two standard solenoids. Decoder modules shall be installed in an approved valve box to provide easy access to the wiring.

b. Recommended Controller-to-Decoder cable: 14 AWG (2.5 mm2), solid copper, jacketed 2-conductor, direct burial. The preferred wire make and model is the Paige Irrigation Wire, Spec P7350D.
c. Recommended Decoder-to-Solenoid cable: 14 AWG (2.5 mm2), solid copper, 2-conductor, direct burial. The preferred wire make and model is the Paige Irrigation Wire, Spec P7351D.
d. The maximum communication wire length between the decoder module and the solenoid is 150' (45.7 m). Required cable for Decoder-to-Solenoid is 14 AWG, Solid Copper, 2-Conductor, Direct Burial cable. To easily identify stations for troubleshooting, install wires with the same color code as the station wires.

(6) Contractors shall identify the two wire pathways to each decoder.
a. Color coding: Use contrasting colors for the two (2) wires (e.g., red/blue, orange/black). This provides immediate visual differentiation.
b. Numbered tags: Weatherproof tags with unique numbers shall be attached to each wire pair at the controller and valve manifold to allow for easy tracing with each pathway.

J. DRIP EMITTER INSTALLATION

(1) The specified number of emitters shall be installed directly onto lateral pipe.
a. Groundcover: one (1) single outlet emitter per square foot planting area.
b. Shrubs: two (2) single outlet emitters per shrub.
c. Trees: four (4) single outlet emitters per two (2) to three (3)-inch caliper tree or six (6) to eight (8) foot height conifers; additional emitters may be required for larger trees.

(2) Reference Details 600-13 “Drip to Shrub Bed” and 600-14 “Drip to Trees and Large Shrubs” for installation information.

(3) All drip emitter operations are to be part of system-wide operations test after weed barrier placement and prior to mulch installation.

K. SIGNS

For non-potable irrigation systems, the Ditch Water sign conforming with Section 606 signage shall be installed per CDPHE requirements.

602.05 TESTING

A. All tests shall be run in the presence of the City Inspector for City-owned and/or maintained areas. To schedule City irrigation inspections, contact the Customer Service Team at 303-651-8416. For capital projects, coordinate with the City Inspector to schedule City irrigation inspections.

B. All tests and inspections shall be scheduled a minimum of 48 hours in advance of testing. Any failed tests shall be repeated until full acceptance is obtained. No testing shall be done when seasonal conditions minimize the ability to sufficiently inspect the system. Generally, testing is not available between the months of November and April. All required testing shall be completed and approved before Construction Acceptance can be granted for the project. At the City Inspector’s discretion, a repeat of tests may be required prior to Final Acceptance.

C. No chemical spraying shall be done within two (2) days of any irrigation inspections.

D. Required Tests:

(1) Hydrostatic Test: Occurs during irrigation installation before sleeving and backfilling irrigation pipe joints. 120 psi shall be maintained for four (4) hours. No leakage or loss of pressure shall be

accepted during the test period. The test shall be run in the presence of the City Inspector. The contractor shall provide, at their own expense, the hydrostatic pump, water, and other materials as necessary for the test. The pressure gauge shall be installed onto the end of a fitting, rather than connected directly into a quick coupler. Pumps shall be disconnected after the system reaches 120 psi at the start of the test. The Contractor shall perform an independent pressure test prior to scheduling the required inspection for City-owned and/or maintained areas. If numerous tests are required for a system, the City reserves the right to bill the Contractor for each additional test at $100 per hour with a one (1) hour charge at minimum.

(2) Operational Test: Each remote-control valve shall be activated from the controller in the presence of the designated inspection authority. Contractor shall replace, adjust, or move sprinkler heads and nozzles as needed to obtain acceptable performance of the system. Defective valves, wiring, or other appurtenances shall be replaced to correct deficiencies.

(3) Drip Operational Test: Occurs after drip lateral and weed barrier installation, but prior to mulch installation. Remote control valves shall be activated in the presence of the City Inspector. Any emitters that are clogged or not operational shall be replaced. Contractor shall adjust laterals as needed to effectively irrigate plantings.

(4) Central Control System Acceptance Test: Required for City-owned and/or maintained areas only. Each remote-control valve shall be activated from the Central Control System base station using the ProConnect App on a phone or tablet to ensure proper function. The City Inspector shall ensure the Satellite Control Field Unit communicates with the Central Control Station.

(5) The Contractor may elect to install an additional controller for use during the warranty period between Construction Acceptance and Final Acceptance. If this option is selected, the Satellite Control Field Unit shall be installed and fully operational prior to Final Acceptance.

(6) Raw Water Pump Control Inspection: The Contractor shall obtain a certified control start up in the presence of the City Inspector. The pump supplier shall be required to attend this inspection and provide any training necessary.

602.06 COMPLETION SERVICES AND CONSTRUCTION ACCEPTANCE

A. GENERAL

(1) All excess materials, tools, trash, and debris shall be cleaned up and removed from site.

(2) Additional checklist items shall be completed if determined necessary by the City Inspector or Irrigation Design Professional. Contractor shall schedule re-inspection by City Inspector or Irrigation Design Professional to verify completion and acceptance of all checklist items if necessary.

(3) An irrigation operator's training session with City personnel may be requested during acceptance.

B. INSPECTIONS AND DEMONSTRATION OF SYSTEM TO INSPECTOR

(1) When a project is ready for Construction Acceptance, the Contractor shall request an inspection from the City Inspector per Section 108.03 of these City Standards. The City Inspector shall inspect all items downstream of the reduced pressure zone (RPZ) backflow prevention assembly. For items upstream of the reduced pressure zone (RPZ) backflow prevention assembly, inspections shall be scheduled through the Building Permit.

(2) The Contractor shall pass a mainline pressure test and an operations test in order to receive Construction Acceptance.

C. SUBMIT TURN-OVER ITEMS

The following items shall be accompanied by a transmittal letter and submitted to the City Engineer:

(1) Certificate from Colorado Pipe Supply for the Irrigation Controller.

(2) Certificate for Pump Station, when applicable.
(3) Documentation of a passing backflow test for the irrigation meter, when applicable.
(4) Initial Toro System programming.
(5) List of equipment ordering information including model numbers, size, and style for all components.
(6) An irrigation schedule, including zone descriptions, and system run times for each zone shall be included with the record drawings.
(7) One (1) each of all operating keys, servicing tools, warranties/guarantees, and maintenance manuals as needed for ongoing maintenance of the area shall be provided for all areas.
(8) One digital set of all two (2) wire pathways sheets, with each pathway to match the field identifying color and number.
(9) Record drawings per Section 108.02 of these City Standards. Irrigation plans shall contain the information identified in the Record Drawings Checklist, located in the Appendices, as well as the following:
    a. The actual record drawings of the irrigation system; redlines of the construction drawings will not be accepted.
    b. Mainline is to be black with all icons depicted in black.
    c. Each irrigation zone shall be color coded, with one color to each zone, that includes everything in that zone: the flush assembly cap, drains, control valves, etc.
    d. The name of the project, date of installation, date of as-built drafting, company name of installer, name and company of as-built drafter, installer company phone number, and back-up phone number for night and weekend contacts.
    e. Sleeves and valves shall be noted with dimensions to each from two different permanent objects.
    f. Control valves shall be noted with gpm, valve number, and valve size clearly indicated for each valve.
    g. Valve numbering shall match as-built controller sequencing.
    h. Horizontal verification of all irrigation pipes, irrigation heads, valve boxes, wiring, electrical boxes, controllers, meters, and backflow prevention devices.
    i. All pipe sizes, zone numbers, valve locations, head types, valve types and model numbers, controller type and model number, and drip emitter chart.
    j. No contour lines shall be shown on irrigation record drawings unless required by the City.

D. FINAL ACCEPTANCE INSPECTION
(1) Contractor shall request Final Acceptance inspection per Section 108.04 of these City Standards.
(2) Issues during the warranty period shall be identified by a site inspection and documented in a Final Acceptance checklist performed by either the City Inspector or Irrigation Design Professional, with solutions executed by the Contractor. Contractor shall complete Final Acceptance checklist items prior to issuance of Final Acceptance.
(3) A new pressure test may be required at the time of Final Acceptance inspection, in the determination of the City Inspector or Irrigation Design Professional.
(4) A project re-inspection shall be scheduled with the City Inspector or Irrigation Design Professional to verify completion of checklist items if necessary.
(5) Additional project clean-up shall be provided as necessary, as determined by the City.

602.07 WARRANTY PERIOD
A. For a one (1) year period following Construction Acceptance and until Final Acceptance, all irrigation materials, equipment, workmanship, and other appurtenances shall be warrantied against defects by the

Contractor. Settling of trenches or other depressions, damages to structures or landscaping caused by settling, straightening of sprinkler heads, and other defects shall be corrected by the Contractor at no cost to the City or homeowners' association. Repairs shall be made within seven (7) days of notification by the City Inspector or Irrigation Design Professional, unless an emergency or hazardous situation dictates immediate correction. The warranty shall apply to all originally-installed materials and equipment and to replacements made during the warranty period.

B. The Contractor shall make periodic adjustments to the irrigation system to achieve the most desirable application of water. Watering shall be reduced seasonally as appropriate. All necessary maintenance shall be performed as needed by the contractor, including irrigation maintenance and damage repair as needed.

Maintenance shall ensure optimal health and vigor of plant materials as needed to maintain specifications. The contractor is responsible for all winterization or activation of irrigation system and other adjustments until Final Acceptance. Icing of walks due to irrigation water and/or seasonal conditions shall be immediately addressed by Contractor. Maximum allowable snow removal response time is 24 hours.

603.00 SEEDING

603.01 GENERAL

A. Seeding shall be done in accordance with industry standards for all landscape areas. All proposed seeded areas are to be approved by the City Engineer.

B. Seeding is allowed in the following areas:
   (1) Primary greenways with City Engineer approval.
   (2) Detention storage facilities.
   (3) Dryland applications.
   (4) City Parks and facilities on a project-specific basis.
   (5) Arterial street rights-of-way. Non-functional turf is not allowed within the Arterial street rights-of-way.

C. Seeding shall not be permitted in City Parks and facilities around high-use areas (playgrounds, etc.).

D. All dryland-seeded areas shall have an in-ground irrigation system for establishment purposes, unless otherwise allowed by the City Engineer.

E. Drought-tolerant turf grasses are required in all areas, including City-owned and/or maintained areas, with the exception of athletic fields.

F. All seeded areas shall be brought to final grade prior to seeding.

G. Design and planning criteria shall be in conformance with the Water Efficiency Master Plan, as amended, as found on the City of Longmont website.

603.02 MINIMUM DESIGN CRITERIA

A. The Seed mix shall be approved by the City Engineer based on the activity to take place, planned irrigation method, and maintenance to be performed in the area being seeded.

B. For a specific list of pre-approved grass mixes accepted by the City, reference the Longmont Urban Landscaping Native Plant Species and Mixes list, as found on the City of Longmont website.
   (1) Custom seed mixes shall be submitted to the City for approval along with soil test results; additional plan review time may be required.

C. Turf grass seed mix shall be used between the property line and the sidepath in primary greenways adjacent to residential developments. A dryland grass and forb seed mix shall be used in greenway areas between the trail and ditch and on the opposite side of the greenway from the trail.

603.03 SUBMITTALS

The following items shall be submitted to the City of Longmont for approval prior to any seeding activities:

A. Certificates showing source and origin of all seed and weed-free mulch materials per applicable Local, State, Federal or other regulations.

B. Seed mix and seed lab analysis for each seed lot in the proposed mix prior to purchase of seed.

C. Seed tags from bags prior to seeding operation.

D. Soils test results per Section 601 of these City Standards for custom seed mixes.

603.04 MATERIALS

A. SEED

(1) Seed shall be of fresh, clean, new crop seed composed of the varieties approved by the City. Viability testing shall be shown on the seed tag. Tetrazolium chloride testing of seed viability shall not be acceptable as a method for germination testing. All seed shall be free of Poa annua, all noxious weeds listed by the State in accordance with the State Noxious Weed Act, and all objectionable weeds such as kochia and Russian thistle, with a maximum crop of 0.10% and maximum weeds of 0.10% weeds.

(2) All seed shall be furnished in bags or containers clearly labeled to show the name and address of the supplier, the seed name, the lot number, net weight, origin, the percent of weed seed content, the guaranteed percentage of purity and germination, pounds of pure live seed (PLS) of each seed species, and the total pounds of PLS in the container.

B. MULCH

(1) For slopes 3H:1V and flatter, certified weed-free straw, or native grass hay for dryland seeded areas, shall be installed. Certification shall be submitted to the City Engineer prior to transportation to the site. Delivered straw or native grass hay shall have a visual indicator of weed-free status. At least 75% of the straw or hay by weight shall be ten (10) inches or more in length.

a. Straw shall be from the State of Colorado and comply with the Colorado Department of Agriculture Weed Free Forage regulations on the Colorado Department of Agriculture's website.

b. Native hay or straw mulch shall consist of native hay or straw that is certified by the Colorado State Department of Agriculture as "Weed-Free Mulch".

c. All Colorado certified weed-free straw bales shall be identified by a marking system of colored twine. Bales without certified weed-free twine marking will be rejected.

d. Preference will be given to straw from irrigated fields.

e. Preference will be given to straw from current or previous year's harvest.

f. Straw mulch shall only be wheat, sorghum, sorghum-sudan, milo, or millet.

g. Rye and barley straw shall not be accepted. This specification shall override CDOT Standards and Specification for Road and Bridge Construction, Section 213.02, and as amended.

h. In addition to the weeds not accepted on the Colorado weed-free forage list, cheatgrass (Bromus tectorum and Bromus japonicus) shall also be rejected. The City Engineer reserves the right to reject straw that contains excessive amounts of problematic weeds that are not on the Colorado Weed Free Forage list.

i. The City Engineer reserves the right to inspect and approve the hay or straw at the place of harvest, where possible, prior to the Contractor's purchase of the hay or straw.

(2) For slopes steeper than 3H:1V, inaccessible areas, or irrigated turf areas, with City approval, utilization of a hydromulch application containing wood cellulose fiber that does not contain any substance or factor which might inhibit germination or growth of grass seed may be permitted.

j. The use of aspen fiber is prohibited.

k. Hydromulch shall be dyed an appropriate color to allow visual metering of its application.

l. Weight specifications from suppliers, and for all applications, shall refer only to air-dry weight of the fiber, a standard equivalent to 10 percent moisture.

m. The mulch material shall be supplied in packages having a gross weight not in excess of 100 pounds and shall be marked by the manufacturer to show the air-dry weight content.
n. Suppliers shall certify that laboratory and field-testing of their product has been accomplished, and that it meets all of the foregoing requirements pertaining to wood cellulose fiber mulch.
o. Other areas too small to adequately apply straw and crimp may also utilize hydromulch, with City approval.

(3) WoodStraw brand material may be used according to manufacturer's direction

(4) Reference the Approved Materials List for Section 600 in the Appendices for Tackifier requirements. Tackifier shall be mandatory for hydromulch and straw crimp applications.

C. EROSION CONTROL BLANKET

For slopes steeper than 3H:1V, the blanket shall consist of a machine produced mat of 100% biodegradable materials, including the netting. Mat materials may include curled wood excelsior, or a combination of straw (certified weed-free) and coconut fibers. Photodegradable polypropylene (plastic) netting will be rejected. Mats shall be designed for erosion control on 2:1 slopes and able to handle moderate water velocities of at least seven (7) ft/sec. Erosion blankets shall have a functional longevity of two years.

D. FERTILIZER

Slow-release type Nitrogen shall be incorporated for irrigated turf areas and per the soil test result recommendations. Application of fertilizer to native grass areas shall only be allowed per the direction of the City Engineer. Soil test results for fertilizer recommendations shall be provided to the City Engineer prior to application.

603.05 EXECUTION

A. HERBICIDE

(1) Seed shall only be sown into a weed-free seed bed. Application of herbicides shall be timed to break down sufficiently to avoid seed germination damage and provide a full kill of weeds prior to seeding operations.

(2) Application of herbicide shall follow requirements in Section 602.

B. FERTILIZER

Fertilizer shall be applied per the soil test result recommendations to all irrigated turf seeded areas and raked lightly into top one-eighth (1/8) inch of soil just prior to seeding operation.

C. SEEDING

(1) Seed shall be sown within 15 days of soil amendment and/or topsoil tilling. Seed shall not be sown in windy weather or when the ground is frozen, muddy, or otherwise untillable. Seeding is preferred to be installed between March 1st and October 15th when supplemental irrigation will be used. Dormant seeding for dryland areas without supplemental irrigation shall be done after October 15th and prior to March 1st as long as soil conditions allow.

(2) Seed bed shall be firmed to the point that a footprint does not sink more than one-quarter (¼) to one-half (½) inches into the soil. No rutting of finished grade from seeding operations shall be allowed.

(3) Equipment:

a. All equipment shall be clean prior to mobilization. The hopper shall be free of previous seed materials.

b. Brillion seeder or approved equivalent shall be used for turf grass installation on slopes less than 3H:1V in grade. Seed shall be drilled in a manner such that after surface is raked and rolled, seed shall have one-quarter (¼) inch of cover.
c. Rangeland no-till drill shall be used for dryland grasses and forbs where applicable on slopes less than 3H:1V in grade. Seed shall be drilled between one-quarter (1/4) and one-half (½) inch depth. Seeding shall be perpendicular to slopes to reduce erosion. The drill shall include the following features:
    i. Multiple seed boxes for different types of seed.
    ii. Double disc furrow openers.
    iii. Depth bands with functioning scrapers.
    iv. Seed tubes of a diameter large enough to allow fluffy seed to pass through without clogging.
    v. Packer wheels with adjustable tension.
    vi. Coulter wheels.

(4) Hand (Broadcast) seeding shall be used only on areas not accessible to drilled seeding equipment, as approved by the City Engineer. The soil bed shall be hand-raked or harrowed immediately before seeding to eliminate any soil crusts. Broadcasted seed shall be hand-raked or harrowed over to cover at one-quarter (1/4) to one-half (½) inch depth. Soil covering seed shall be lightly compacted to ensure good seed to soil contact.

(5) Hydraulic seeding methods shall be used only if hand seeding has not been approved by the City Engineer on slopes steeper than 3H:1V or in areas that are not accessible to drilled seeding methods. A hydraulic pump capable of being operated at 100 gallons per minute with 100 pounds per square inch pressure shall be used. The equipment shall have an acceptable pressure gauge and a nozzle adaptable to hydraulic seeding requirements. Storage tanks shall have a means of agitation and of estimating the volume used or remaining in the tank. Mixing seed and mulch together shall not be allowed in the same application.

(6) Contractor shall use seeding rate as specified by seed supplier based on soil test results, as approved by the City Engineer.

(7) Upon seeding, seed tags shall be turned over to the City Inspector to verify that the seeded mixture matches approved plans.

D. MULCHING

(1) Native Grass Hay shall be applied at a rate of two (2) tons per acre. Hay shall be crimped into seed bed with disk set straight forward and two (2) inches deep. Seeded areas shall be crimped in two directions perpendicular to each other to maximize hay stability. Seed beds shall be mulched within 24 hours after seeding.

(2) Wood Straw shall be applied according to manufacturer's recommendations with City Engineer approval. Seed beds shall be mulched within 24 hours after seeding.

(3) Hydromulching requires the wood cellulose fibers to become evenly dispersed when agitated in water during the application. When sprayed uniformly on the soil surface, the fibers shall form a blotter-like ground cover, which readily absorbs water and allows infiltration to the underlying soil. Cellulose fiber mulch shall be added with the proportionate quantities of water and other approved materials in the slurry tank. All ingredients shall be mixed to form homogenous slurry. Using the color of the mulch as a metering agent, apply the slurry mixture by spraying uniformly over the seeded area. Apply with tackifier at a rate of 120 pounds per acre. Unless otherwise indicated for specific areas, fiber mulch shall be applied at the rate of 2,000 pounds per acre.

(4) Hydraulic mulching shall not be performed in the presence of free surface water resulting from rain, melting snow, or other causes.

(5) Contractor shall install erosion control fabric in areas with slopes greater than 3H:1V per manufacturer's specifications. If Contractor fails to install fabric and subsequent soil erosion occurs, Contractor shall re-establish finish grade, soil preparation, and seed bed, reseed, and re-apply erosion control fabric at no cost to the City.

(6) Immediately after seeding and mulching, seeded areas shall be lightly watered to a depth of two (2) inches, but with care, so that no erosion takes place and gullies are not formed. Contractor shall water lightly as needed to maintain moist seedbed until grass is established. Sloped areas shall be hand-watered until grass is established to prevent erosion and shall require watering more often, but for shorter periods of time. No water shall be applied if application is for a dormant seeding.

(7) All hydromulch and other mulch materials shall be removed from all areas outside seed bed including plant materials, fences, site furnishings, crusher fines, signs, and concrete.

(8) Barriers and signage shall be provided and installed as needed, or as directed by the City, to protect seeded areas from pedestrian and vehicular damage.

E. MISCELLANEOUS

(1) A temporary sign shall be installed in all permanent native areas after seeding per Section 606 of these City Standards. Signs shall be located at the entrance point of each large native grass area located within that project, as determined by the City Engineer.

(2) Reference Section 606 of these City Standards for traffic delineators required along Arterial streets with no curb and gutter for protection and indication of areas seeded along roadways.

(3) A mow band shall be required beneath fencing where it abuts irrigated or dryland grass areas owned and/or maintained by the City.

603.06 MAINTENANCE

A. All necessary maintenance shall be performed as needed by the Contractor, including mowing and fertilizing grass areas, restoring mulch areas, removing trash and debris, sweeping and removing snow or ice from walks, reseeding areas until established, weed control, and erosion control.

B. Mowing equipment shall be maintained with sharp blades and clean of vegetative debris.

C. When turf grass reaches four (4) inches in height, it shall be mowed to three (3) inches in height. In areas where mowing is to be standard maintenance practice, continue to mow grass as needed to maintain a height of three-and-a-half (3 ½) inches. More than one-third (1/3) of grass leaf shall not be cut off in a single mowing operation. Excessive clippings shall be removed from turf areas.

D. Dryland grass areas shall be mowed to control weeds to a height of five (5) inches, and at the end of the growing season to disperse seed heads. Mowing at the end of the growing season shall be done at a height of five (5) inches. Adjacent paved areas shall be swept clean after mowing.

E. During establishment, proper timing of mechanical weed control shall be employed to prevent weed flowering and seed set. Mowing of weeds shall be done selectively, or at a height above the tops of dryland grasses and forbs, yet low enough to remove flowers from weeds. If necessary to remove seed heads of weeds, cutting of seedling grass and forbs shall be kept to the least amount possible. Excessive weed debris that would inhibit growth of seeded grasses shall be removed from dryland areas. When grasses are sufficiently established, chemical weed control can be applied to selectively eradicate weeds.

F. Balanced fertilizer shall be applied to maintain turf grass vigor during warranty period. Fertilizer shall not be applied to dryland grass areas unless recommended by the soil test results.

G. Re-seeding shall be performed as needed to ensure a successful stand of grass as accepted by the City.

H. Erosion control measures shall be removed per the requirements located in Section 104.06 of these City Standards. Re-grading and reseeding shall be performed as necessary during the warranty maintenance period to result in a fully established stand of grass prior to Final Acceptance.

603.07 INSPECTION, WARRANTY PERIOD, CONSTRUCTION AND FINAL ACCEPTANCE

A. The Contractor shall schedule an inspection with the City Engineer within four to six weeks of initial seeding. The inspection shall be scheduled within the growing season, between May and October.

B. Seeded areas are not required to be established in order to receive Construction Acceptance but shall be planted. All seeded areas shall be free of weeds in order to receive Construction Acceptance. Efforts towards establishment need to be observed at the time of Construction Acceptance in order to receive Construction Acceptance.

C. For a one (1) year period following Construction Acceptance and until Final Acceptance, seeded areas shall be warrantied to achieve consistency and completion of coverage. Once a vigorously growing stand of grass is achieved and after the one (1) year warranty period, the request for Final Acceptance may be made. A stand of grass is considered to be acceptable when each square foot of grass area has at least 90% coverage in turf grass areas. In dryland grass areas, it is considered established when the grass area has at least 70% coverage of species seeded. The maximum single bare spot acceptable in turf grass areas is one (1) square foot, and in dryland areas is two (2) square feet. All seeded areas that do not meet the satisfactory standard of establishment qualifications shall be re-seeded, mulched, and maintained until the establishment criteria are met.

D. It shall be the Contractor's responsibility to maintain seeded areas in a weed-free manner. Eradication of weeds prior to Final Acceptance shall be done on an as-needed basis to generally eradicate all weeds. Seeded areas shall be inspected at least monthly for weed control.

604.00 SODDING

604.01 GENERAL

A. All sod shall be installed according to current industry standards for all landscaped areas.

B. Sod shall not be installed in areas to be owned by the City without approval from the City Engineer.

C. Design and planning criteria shall be in conformance with the Water Efficiency Master Plan, as amended, which can be found on the City of Longmont website. Water wise landscaping shall be required within all City-owned and/or maintained areas.

D. The City will consider exemptions to the minimum design criteria below in an effort to reduce water consumption.

604.02 MINIMUM DESIGN CRITERIA

A. Turf mix for all areas shall be approved by the City Engineer based on the activity to take place, planned irrigation method, and maintenance to be performed in the area being sodded. A drought-tolerant mix shall be required unless otherwise approved by the City Engineer.

B. Irrigated turf areas shall be designed to minimize narrow, hard to maintain strips of turf.

604.03 SUBMITTALS

The following items shall be submitted to the City of Longmont for approval prior to any sod-related activities:

A. Certificates showing source and origin of sod per applicable Local, State, Federal or other regulations.

B. Sod composition from grower showing types of seed in the mix and percentages of each.

604.04 MATERIALS

A. SOD

Sod shall have a clay-loam base that does not break, crumble, or tear during sod installation. Netted sod is acceptable. It shall have a healthy, vigorous root system that has undergone a program of regular fertilization, mowing, and weed control to obtain thick turf free of weeds. It shall be free of nematodes, pests, and pest larvae as certified by the Colorado State Department of Agriculture.

(1) Thickness: one (1) inch thick excluding top growth and thatch.
(2) Thatch: Not to exceed one-half (½) inch uncompressed.

B. FERTILIZER

Sod fertilizer shall be incorporated per recommendations and rates identified in the soil test results.

604.05 INSPECTION

The Contractor shall inspect finished grade, trim, and verify that the irrigation system is fully operational prior to sodding.

604.06 EXECUTION

The Contractor shall:

A. Clean out drainage inlet structures prior to initiating irrigation.

B. Adjust sprinkler heads to proper height according to depth of sod material and lower than the mower blade height to enable lawn mowers to cut grass freely without damage to irrigation system.

C. Cut sod no more than 24 hours prior to delivery. Sod shall be installed within 24 hours of delivery.

D. During delivery process, protect roots from exposure to drying sun, winds, and heat. Store in shady area and keep moist or store covered with moistened burlap.

E. Sod is recommended to be installed between spring and fall. Sod shall not be installed on frozen or saturated soil.

F. Distribute fertilizer uniformly on finished grade at rates recommended by soil test results. Apply within 48 hours before sod installation.

G. Soil Preparation:
Contractor shall:
(1) Make any permanent grade changes needed at the site for proper drainage to move water and ensure it does not pool.
(2) Add a compost material at three (3) to five (5) cubic yards per 1000 square feet as needed by soil tests. Spread material evenly over entire area and till into the top six (6) to eight (8) inches.
(3) Remove large debris like sticks and rocks that may prevent rooting of new sod and make the area unlevel.
(4) Rake smooth entire area and slightly wet top six (6) inches of soil before laying new sod.

H. Sodding:
Contractor shall:
(1) Lay sod on slightly moist soil.
(2) Lay with longest dimension parallel to contours in continuous rights-of-way.
(3) Tightly butt ends of sod together and stagger joints. Compact vertical joints between sod strips by rolling so that sod is in contact with the ground surface. Cut sod terminating at property lines to a straight line.
(4) Cut sod around sprinkler heads, valve boxes, and other permanent features.
(5) After first watering, when sod and soil are moist, roll sod with enough weight to ensure contact with soil for proper rooting and smooth surface.
(6) Add topsoil along exposed edges to match existing grades adjacent to sodded areas; feather topsoil out approximately one (1) foot.
(7) Pin sod on slopes as directed by the City Inspector.
(8) Make sure finished sodded areas positively drain so that no irrigation water or storm water ponds in sodded areas. Re-install sod if necessary to correct.
(9) Water thoroughly immediately after planting and as needed to establish sod.
(10) Prevent access onto newly laid sod to avoid damage to grade. Add barricades, fencing, and signage as needed to protect sod until rooted. Reference Section 606 of these City Standards for more information.

604.07 MAINTENANCE

A. All necessary maintenance shall be performed as needed by the Contractor including mowing and fertilizing turf areas, restoring mulch areas, removing trash and debris, sweeping and removing snow or ice from walks, weed control, and erosion control.

B. After sod rooting, Contractor shall begin mowing. When turf grass reaches four (4) inches in height, it shall be mown to three (3) inches in height. Where mowing is to be standard maintenance practice, Contractor shall continue to mow as needed to maintain grass height at three and a half (3 ½) inches. More than one-third (1/3) of grass leaf shall not be cut off in a single mowing operation. Grass clippings shall be removed from all paved surfaces immediately after each mowing. Mowing operations shall only take place in non-saturated conditions; ruts are to be repaired and resodded immediately.

C. Contractor shall distribute a balanced starter fertilizer uniformly at a rate of one-half (1/2) to one (1.0) pounds of nitrogen per 1000 square feet of sodded area, unless otherwise recommended by soil test results four (4) to six (6) weeks after sodding is complete. Fertilizing thereafter shall be in accordance with standard maintenance practices for turf areas, and as needed to achieve and maintain a vigorous and healthy stand of grass.

D. During establishment, Contractor shall use mechanical means to control weeds. When sod is sufficiently established, chemical weed control can be applied to selectively eradicate weeds.

604.08 WARRANTY PERIOD, CONSTRUCTION AND FINAL ACCEPTANCE

A. All sodded areas shall be installed, rooted, and free of weeds in order to receive Construction Acceptance. No dead sod can be present at the time of Construction Acceptance.

B. For a one (1) year period following Construction Acceptance and until Final Acceptance, sodded areas shall be warrantied to achieve full coverage in a weed-free condition with no dead areas. Contractor shall re-sod spots larger than one (1) square foot not having uniform stand of grass prior to Final Acceptance. Once a vigorously growing stand of grass is achieved, the request for Final Acceptance may be made.

605.00 TREES, PLANTS, AND GROUNDCOVER

605.01 GENERAL

A. All nursery stock shall conform to the American Standard for Nursery Stock ANSI Z60.1 and the Colorado Nursery Act Title 35, Article 26.

B. Design and planning criteria shall be in conformance with the Water Efficiency Master Plan, as amended, which can be found on the City of Longmont website. Water wise landscaping shall be required within all City-owned and/or maintained areas. See Longmont Urban Landscaping Native Plant Species and Mixes on the City of Longmont webiste, for guidance on water wise species.

605.02 MINIMUM DESIGN CRITERIA

A. Tree species shall be selected from the Recommended Trees for Longmont Regulated Areas located on the City of Longmont website. Plants with aggressive, shallow root systems are not permitted to be planted within 25 feet of any roadway, structure, or utility.

B. Plant material is to be selected and installed for ease of maintenance operations and safety. Restricted planting areas are as follows:
   (1) No shrubs, ground cover, boulders, berms, fences, or other improvements exceeding 36 inches in height measured from surface of travel lane adjacent to planting area shall be planted within the site distance triangle or within six (6) feet of a vehicle travel lane.
   (2) No trees shall be planted such that they obstruct traffic control signs, either presently or at mature height.
   (3) No trees shall be installed within the Clear Zone of Arterial roadways. Refer to the AASHTO Road Side Design Guide and Section 200 of these Standards for more information.
   (4) No trees shall be planted within the ten (10) year water surface level elevation of a detention storage facility. No fruit bearing trees shall be planted within any portion of a stormwater facility.
   (5) No trees shall be planted on slopes that are steeper than 3H:1V.

C. Landscape is to be designed and plant materials are to be installed for long term vigor of urban forest. Diversity of species or cultivars within a species, selection for hardiness based on the USDA Plant Hardiness Zone Map, and suitability for areas shall all be considered in the design. Native area plantings may allow some restricted species with the approval of an exception request made to the City Engineer.

D. Diversity requirements shall ensure that no more than 10% of any one species of tree (5% of any one species considered average or marginal in this area), or 20% of one genus are proposed. Cultivars shall be considered part of the species total. This shall be measured per total trees in the area of the project, including existing trees.

E. Exceptions from the above diversity requirement may be allowable in landscaped areas that are too small to make minimum diversity percentages reasonable. In such cases, a specific request for an exception is to be made by the Developer citing reasons that diversity requirements are unreasonable. The exception request is to be added as a note on the landscape plans and must be approved by the City Engineer.

F. Large canopy deciduous trees are encouraged in the landscape design when placed between the curb and the sidewalks or sidepaths along streets. Small canopy deciduous trees shall be used in areas where space is limited, and species shall be selected to avoid low limb conflicts with sidewalks or sidepaths.

G. Where approved by the City Engineer, ornamental trees can only replace large canopy deciduous trees at a rate of three ornamental trees to one large canopy deciduous tree and not to exceed 25% of the total tree requirement when calculating plant materials per City Code requirements in Title 15. Ornamental trees may be used in addition to large canopy deciduous trees. Fruit bearing and thorny trees are not allowed in a stormwater facility or within five (5) feet of sidewalks, sidepaths, or streets as calculated from mature canopy width of tree. Trees are to be selected based on size of the mature canopy.

H. Coniferous trees shall comprise 25% of any landscape area where suitable. Unsuitable areas include areas where icy conditions may be created with the use of conifers at road intersections, curb ramps, road curves, sidewalk or sidepath intersections and curves, site distance restricted areas, or narrow areas. Design Professional shall select species and place conifers so mature spread does not overgrow walks or streets. Low limb pruning on coniferous trees is not desired.

I. There shall be a minimum distance of eight (8) feet between trees and any adjacent vertical surface unless an exception is obtained from the City Engineer. Trees are to be spaced to accommodate the full canopy of the mature tree and proper root zone. Large deciduous trees should have a minimum spacing of 40 feet, mid-sized trees a minimum spacing of 25 feet, and small trees (ornamental) a minimum spacing of 15 feet. Coniferous trees should have a minimum spacing of 30 feet for large, spreading varieties and ten (10) feet for upright, columnar varieties.

J. Trees shall be planted in the center of the tree lawn area between edge of sidewalk and back of curb when space is less than 12 feet wide. No trees shall be planted in areas narrower than eight (8) feet in width without approval from the City Forester.

K. Shrubs should be a mixture of evergreen and deciduous species of reasonable diversity. Consideration for water wise species is encouraged. All shrubs are to be arranged/spaced based on their mature size and to prevent encroachment on walks, roads, etc. Large species over four (4) feet in height should be placed between the sidewalk or sidepath and the property line to provide buffering. Shrubs four (4) feet and smaller in height are to be used between the sidewalk or sidepath and curb along street rights-of-way to create a landscape buffer while maintaining pedestrian visibility. Shrubs four (4) feet and smaller in height are to be used between the nearest road or parking area and restroom or other structures to enhance visibility. Water wise shrubs should be selected for wildlife habitat value along primary greenways, with an emphasis on native shrubs that occur within Longmont's elevation band. Water wise shrubs along primary greenway riparian corridors shall be selected for water tolerance, flood frequency, and velocity, with an emphasis on native shrubs that occur within Longmont's elevation band. See the Longmont Urban Landscaping Native Plant Species and Mixes and Denver Water's Water Wise Landscape Handbook on the City of Longmont website for lists of recommended water wise and native species.

L. Shrubs are to be spaced no closer than two-thirds (2/3) of mature width on center and no further than one and one-quarter (1-¼) times mature width on center. Spacing shrubs at the distance of mature width on center is preferred to minimize large open areas in shrub beds after plants are established.

M. Trees, plants, and groundcovers shall be installed within hydrozones when possible.

N. No Juniper shrubs shall be within five (5) feet of back of curb, as they are easily damaged by de-icing chemicals.

O. No Juniper species shall be within five (5) feet of structures (i.e. fences, buildings, etc.).

P. No Juniper shrubs whose mature width exceeds six (6) feet shall be allowed within the City.

Q. No artificial or synthetic plant materials such as artificial grass, shrubs, trees, or flowers shall be used to fulfill any landscaping requirement.

R. All landscaping materials shall consist of healthy specimens compatible with the local climate, soil characteristics, drainage, and water supply. Species selected shall be approved for the hardiness zone of the area.

S. All plant material shall be reasonably resistant to drought and disease. The use of water wise, native species that occur within Longmont's elevation band is encouraged. Non-nursery derived stock shall not be used to satisfy these requirements.

T. Ground cover other than grass may be planted in landscape areas as approved by the City Engineer, if the Contractor is reasonably able to provide complete coverage within two growing seasons, can provide cover year-round, and is in compliance with Section 300 of these Standards and the LSDCM. Refer to Longmont Urban Landscaping Native Plant Species and Mixes for acceptable ground covers.

U. Vines shall not be used adjacent to pedestrian areas.

V. Materials such as river rock, cobble, boulders, patterned concrete, and approved wood mulch shall be limited to shrub beds and other small areas that shall not exceed 10% of the landscape area. Lightweight matter such as bark mulches shall not be used in areas unshielded from high wind.

W. No wood mulch shall be used as the primary groundcover between curb and sidewalk or sidepath or in center medians on Arterial streets.

X. Cobble aggregate size shall be two (2) to four (4) inch cobble or four (4) to eight (8) inch cobble, in the determination of the City Engineer. In commercial areas where on-street parking is prevalent and the sidewalk is offset from the curb, the area between the curb and sidewalk shall be landscaped to safely and comfortably accommodate pedestrians crossing to the sidewalk. Cobble, gravel mulches, and other uneven surfaces shall not be permitted.

Y. Spade-cut edging with no weed barrier shall be required in shrub beds detached from sidewalks or sidepaths where native grasses are adjacent to the bed in City-owned and/or maintained areas. Steel edging and weed barrier shall be required when beds abut irrigated turf or are adjacent to a sidewalk or sidepath with native turf.

Z. CPTED practices are to be utilized during project landscaping design.

AA. Snow storage areas are to be considered as part of the design for large, paved areas that include areas that are free of trees and shrubs.

BB. All trees identified for removal on a project shall be cut to grade and treated with blue hi-light dye herbicide, as directed by City Forester, within 15 minutes of the cut to prevent re-growth. In other areas, including where hardscape is proposed, stumps shall be completely pulled, ground, and removed. All trees that are on the A list of the Colorado Noxious Weeds shall be removed.

CC. Site distance triangles at intersections and offset of plant material from the edge of street curbing shall comply with Section 200 of these City Standards. Street tree clearance standards shall conform to Section 13.24, City Code.

DD. The Contractor shall be required to prune any existing trees and shrubs designated to remain within the project limits per the City of Longmont Forestry Standards and Specifications (Forestry Standards), and under the direction of the City Inspector. A City-Licensed Tree Contractor shall be utilized. The Forestry Standards and a current list of licensed Contractors are available by calling 303-651-8416 or visiting the City website.

EE. Trees shall be located a minimum of ten (10) feet away from all water, sewer, and gas utilities, measured from the edge of the utility pipe.

FF. Where underground or overhead utilities unduly restrict planting areas within the rights-of-way, planting in areas immediately adjacent to the rights-of-way may be allowed by exception on a case-by-case basis. The exception request is to be added as a note on the landscape plans during project design.

GG. No landscape improvements exceeding six (6) inches in height measured from ground level at the base of the plant shall be placed within five (5) feet of a fire hydrant. Grass or two (2) to four (4) inch cobble stone are recommended around fire hydrants.

HH. Contractors shall abide by the following electrical facility restrictions:

(1) Residential metering pedestal or pit: six (6) inch maximum height within four (4) feet of the window (meter) side of the cabinet and 40 inches maximum height within two (2) feet elsewhere.
(2) Utility poles: no climbing vines.
(3) Electrical Vaults: no landscape material on top of the vault and six (6) inch maximum height within four (4) feet.
(4) Pad mount switchgear and cabinets: only sod, cobble, mulch, or other low-growing shrubs or groundcover shall be used within ten (10) feet of the unit doors.
(5) Residential pad mount transformers: no landscape material on top or in front (street side) shall be used.
(6) For additional required clearances between plants and existing or proposed electrical cabinets, vaults, or other infrastructure, refer to Section 700.05 of these City Standards.

II. Where overhead lines or other site-specific restrictions prohibit use of large canopy deciduous trees, ornamental trees can be used at a 1:1 ratio for large canopy deciduous trees. Large canopy deciduous trees shall not be planted under existing overhead power lines that are not identified for burial within ten (10) years. Ornamental trees with mature height less than the power line height shall be used.

605.03 SUBMITTALS

The following items shall be submitted to the City of Longmont for approval prior to any planting, transplanting, or mulching activities.

A. Certificates showing source and origin per applicable Local, State, Federal, or other regulations.

B. Samples for mulch, canvas strap, or approved equal when requested by City.

605.04 MATERIALS

Reference the Longmont Urban Landscaping Native Plant Species and Mixes on the City of Longmont website for all approved plant species as well as restrictions such as limitations on quantities, offset location from walks, and trees prohibited in the City.

A. PLANTS

(1) Plants shall be high-quality representatives of specified species or variety, in healthy condition with normal developed branch and root systems. Plants shall conform to the American Joint Committee on Horticulture, American Standard for Nursery Stock ANSI Z60.1, and the Colorado Nursery Act.

(2) Only plants grown in hardiness zones 2, 3, 4, and 5 are acceptable.

(3) Plants classified by the State of Colorado as a noxious weed or on the watch list are not allowed.

(4) All materials shall be free of insect pests and diseases.

(5) Plants shall meet minimum size requirements identified on the plans. Trees shall have one dominant central leader unless specified as multi-stemmed. Canopy shall be mostly symmetrical and free of large voids, and trunks and limbs shall be free of wounds or damage.

(6) The following are minimum plant sizes and conditions:

a. Trees larger than 30-foot mature height: minimum two (2) inch caliper measured six (6) inches above ground, balled, and wrapped in burlap.

b. Trees smaller than 3-foot mature height: Minimum one-and-a-half (1 ½) inch caliper measured six (6) inches above the ground, balled, and wrapped in burlap.

c. Evergreen trees: six (6) feet minimum in height, balled, and wrapped in burlap.

d. Shrubs: #5 minimum plastic container with deciduous shrubs approximately two (2) feet high and spreading shrubs having 18- to 24-inch spread.

e. Groundcovers, vines, perennials: #1 minimum plastic container.

(7) Substitutions for where plant species, size, or condition are not available shall require approval by the City Engineer. The City may reject any proposed plant species, size, or condition.

B. BACKFILL MIX

Mix shall consist of the following and be used in the backfill of all plant materials:

(1) One (1) part composted soil amendment; three (3) parts native soil from planting pits.

(2) All materials to be thoroughly blended.

C. STAKES

For stakes, guys, and other materials related to this section, reference both the Approved Materials List for Section 600 located in the Appendices and the Section 600 planting details.

D. MISCELLANEOUS

(1) For mulch and steel edging, reference the Approved Materials List for Section 600 in the Appendices for more information.

(2) For wildlife protection information, reference Section 606 of these City Standards.

605.05 INSPECTION

A. For City projects with tree deliveries of 40 trees or more, a pre-delivery inspection with the City Forester is required. This inspection shall be coordinated by the Contractor at a single nursery within 40 miles of

Longmont. Quantities of trees less than 40 trees may be delivered to the site for inspection and tagging by the City Forester.

B. Trees shall be inspected for form, condition, and health. Rejected trees shall be removed from the site and replaced in a timely manner. Contact the City Forester for a follow-up inspection. Trees shall be off-loaded from trucks during inspection to allow for full access. Binding material and trunk protection are to be removed by Contractor prior to inspection.

C. Shrubs and perennials shall be inspected on-site once off-loaded.

D. For all capital projects, a tree planting demonstration is needed prior to tree planting operations. Contractor shall schedule a tree planting demonstration with City Forester to verify planting practices are consistent with these City Standards.

605.06 EXECUTION

(1) Contractor shall locate all utilities prior to trenching and protect them from damage, per Section 107.01 of these City Standards. Call the Customer Service Team at 303-651-8416 to schedule irrigation system locates.
(2) Trees, shrubs, and plantings preferred installation date is between March 1st and October 15th.

A. DELIVERY AND STORAGE OF PLANT MATERIALS

Shade cloth shall be used to cover trees during transportation. Balled-and-burlapped (B&B) trees shall have limbs bound to prevent injury during delivery. Root systems shall be kept moist and plants shall be protected from adverse climate and transportation conditions. B&B stock shall be heeled in immediately upon delivery to the site unless planted within one (1) day. Other plants shall be stored in shade and protected from adverse weather and drying out. When handling, plants shall not be lifted by trunk or stem; handle only ball or container.

B. LAYOUT

(1) Plant locations shall be staked, or plants shall be set out per plans. Contractor shall verify prior to planting that plants, when mature, shall not interfere with adjacent roads and trails, existing trees, irrigation, lighting, utilities, and other equipment, both underground and overhead. Contractor shall also verify proper spacing between trees and other hard surfaces and notify the City Engineer for approval if plant locations require change.
(2) Tree layout inspection shall be done concurrently with the tree materials delivery. Utility line locates (and property lines if applicable) are to be visible in all planting areas. Proposed tree locations shall be staked or flagged with species identification on the project for approval by the City Inspector.
(3) Shrub and perennial inspections shall be performed in two separate inspections; the first to occur after materials are off-loaded and inspected for approval, and the second to occur when materials have been moved to final planting locations.
(4) Contractor shall obtain new utility locates and property line staking if required. All utilities shall be clearly visible at the time of plant material layout inspection by the City Inspector.
(5) Shrub quantities or the shrub bed size may require adjustment to allow for mature plant size without resulting in large open areas in shrub beds per the direction of the City Engineer. An increase in the shrub bed size may require additional irrigation facilities.

C. EXCAVATION OF PLANTING SITE

(1) Planting pits shall be excavated per Details 600-23 “Tree Planting Irrigated Turf”, 600-24 “Tree Planting Dryland with Drip Irrigation”, 600-25 “Tree Planting on a Slope”, 600-26 “Tree Planting in Sidewalk/Pavement”, and 600-27 “Shrub Planting”. Contractor shall dispose of any rocks off-site.

(2) The Contractor shall excavate the top of the root ball to identify root flare prior to planting. Trees shall be planted at a depth where the root flare meets finished grade for trees in irrigated turf, and at or one (1) inch below finished grade for dryland areas with drip irrigation. The minimum diameter of the planting pit shall be one and a half (1 1/2) times the width of the root ball. The sides of the hole shall be scarified.

(3) For shrubs, perennials, and ground cover, the top of the root ball shall be positioned slightly higher, one (1) to two (2) inches, than finished soil grade so that water drains away from the plant in spray irrigated areas and at grade in drip irrigated areas. The depth of the pit shall be modified if soil type or conditions warrant, and/or per direction of City Inspector. The minimum diameter of the pit shall be two (2) times the diameter of the root ball.

D. PLANTING

(1) Balled-and-burlapped trees:

a. A tree shall not be planted if the trunk is loose in the root ball or if the ball is cracked or broken before or during the planting process.

b. Contractor shall:

1. Remove the bottom one-third (1/3) of the wire basket from the root ball.
2. Place the root ball in the pit with burlap intact on undisturbed soil in center of pit to proper grade and plumb.

c. Face the tree for best effect.

d. Cut and remove remaining wire and twine. Wrapping or wire shall not be pulled from under ball as it may damage the root ball.

e. Completely remove the wire basket. Place wire on tree stakes for City Inspector confirmation of removal prior to Contractor disposal.

f. Backfill two-thirds (2/3) of the pit; remove the top one-third (1/3) of burlap; and complete backfill. Contractor shall not compact backfill mix by tamping, backfill over the crown of the root ball, or exceed soil depth of the root ball. The crown shall be at proper planting depth.

(2) In dryland area plantings, Contractor shall use the excess soil to build a four (4) to five (5) inch berm at the edge of the excavation area to hold water during waterings. In irrigated turf areas, excess soil shall be removed and disposed of. For container grown stock:

g. Do not plant if root ball is cracked or broken before or during planting process.

h. Carefully remove plants from containers without injury or damage to root ball. Do not cut containers with spade or ax.

i. Vertically score root ball using a sharp knife, about one-eighth (1/8) inch deep and about every two (2) to three (3) inches in circumference. If encircling roots are present, use a pruner to cut excess root from the edge of the root ball so that all roots are growing radially from the center of the root ball.

j. Set plant plumb, face for best effect, and make sure the crown of the root ball is at correct grade.

k. In dryland area plantings, use the excess soil to build a four (4) to five (5) inch berm at the edge of the excavation area to hold water during waterings. In irrigated turf areas, remove and dispose of excess soil.

(3) Completion of planting:

l. The surface of finished grade around the root ball shall be shaped so water drains away from the trunk or stems and matches finished grade at the edge of the planting pit.
m. Plant tags, flagging, etc. shall be removed from trees and shrubs.

E. EDGING
(1) Contractor shall install steel edging so the top of the edging is a maximum of two (2) inches above finished grade and flush with the top elevation of the paved surface that it abuts. Edging shall meet the paved surface at a 90° angle and bend with a minimum of 18-inches running parallel to the paved surface with a minimum of three (3) stakes. Staking shall occur at manufacturer's recommended intervals, bends, and corners to create a smooth radius using steel stakes. Additional stakes shall be added adjacent to trails to avoid safety issues. Holes shall be punched as needed for drainage.
(2) Where steel edging is not utilized, Contractor shall cut a six (6) inch deep vertical, straight-sided trench at shrub bed edge, with approval by the City Engineer. For individual trees, edger-cut shall be a three (3) foot radius from the trunk of the tree. Contractor shall transition six (6) inch deep cut edge to specified mulch depth of four (4) inches at a 45° angle.

F. WEED BARRIER AND MULCHING
(1) Geotextile landscape fabric shall only be installed when the mulched area is being used as drainage infrastructure as part of a drainage feature. Geotextile landscape fabric shall not be installed otherwise.
(2) Reference Section 602 of these City Standards for drip irrigation testing prior to mulch installation.
(3) The following mulch depth shall be applied:
n. Tree rings: three (3) inches deep, keep two (2) inches from trunk, and spread to the edge of excavation for the root ball.
o. Shrub beds: four (4) inches deep.
p. Groundcover beds: three (3) inches deep.

G. STAKING, GUYING, AND TREE PRUNING
(1) Contractor shall pound five (5) foot long metal or wood stakes with a minimum four (4) feet of post exposed into undisturbed soil beyond the planting pit so that the stake is secure. Guying straps shall be secured through metal grommets on canvas straps to the tree and wrapped above the first branch on deciduous trees, or the mid-point of the tree on coniferous trees. Contractor shall secure the guy to the stake so that it is taut but allows some movement. Tension should be adjusted on the guy as needed to be taut, but not tight.
(2) Trees shall only be pruned if the branches have been damaged during transport.

605.07 MAINTENANCE

All necessary maintenance shall be performed as needed by the Contractor, including wrapping or unwrapping trees (at beginning and end of dormant season), securing and removing tree stakes and guys, restoring mulch areas, removing trash and debris, sweeping and removing snow or ice from walks, pruning broken limbs and replacing dead plant materials, weed control, and erosion control.

605.08 COMPLETION SERVICES

Contractor shall:

A. Remove all excess materials, tools, rubbish, and debris from site. Leave plant identification tags until City Inspection; remove prior to Final Acceptance.

B. Include on the Record Drawings a list of all plant materials installed, including sizes and quantities, as certified by a Landscape Architect.

605.09 WARRANTY PERIOD, CONSTRUCTION AND FINAL ACCEPTANCE

A. All landscaped areas shall be free of weeds in order to receive Construction Acceptance.

B. All trees, plants, and groundcovers shall be installed at the time of Construction Acceptance. No dead trees, plants, or groundcovers can be present at the time of Construction Acceptance. Efforts to reach establishment need to be observed at the time of Construction Acceptance in order to receive Construction Acceptance.

C. For a one (1) year period following Construction Acceptance and until Final Acceptance, all plant materials, landscape materials, workmanship, and other appurtenances shall be warrantied against defects. Settling of depressions, replacement of dead or diseased plant materials, and other defects are to be corrected by the Contractor at no cost to the City. Plant materials that are in an unhealthy or unsightly condition, or that have lost natural shape due to dead branches or excessive pruning of dead branches, are to be replaced at no cost to the City. Warranty applies to all originally-installed materials and to replacements made during the warranty period.

606.00 SIGNAGE, SITE FURNISHINGS, AND WILDLIFE PROTECTION

606.01 GENERAL

A. Signage used in all off-street areas owned and/or maintained by the City shall follow the Longmont Parks, Opens Space and Trails Sign System Guidelines, available upon request, and shall be approved by the City Engineer. The Signage manual can be provided upon request.

B. Site furnishings and wildlife barriers used in all public parks, greenways, and open space areas (refer to City Code in Title 15 for definition) shall comply with the Approved Materials List for Section 600 located in the Appendices.

606.02 MINIMUM DESIGN CRITERIA

A. Contractor shall consider appropriate signage messages and placement.

B. Projects shall consider all signs found in the Longmont Parks, Opens Space and Trails Sigh System Guidelines, available upon request, as well as additional custom signs as needed.

C. All project signs shall conform to the material requirements listed in this section of these City Standards.

D. Projects with prairie dogs shall be required to comply with City Code Section 7.06 regarding relocation, removal, and extermination of prairie dogs. The City shall determine if prairie dogs are to remain on a property or be removed according to the City of Longmont Wildlife Management Plan or other plans that cover the project area. The City may require the installation of an approved prairie dog barrier to keep prairie dogs located outside of public property from entering the project area. Projects with prairie dogs established within the project limits and scheduled to remain shall be required to install a prairie dog barrier to contain the prairie dogs to a specific location within the public property. The size of the area to be enclosed shall be determined by the City Engineer.

E. Projects near or adjacent to waterways, including ditches, streams, lakes, ponds, and creeks may be required to include wildlife protection against beavers or other wildlife active in the area with barriers installed per the requirements of this Section. Contractor shall coordinate with the City Engineer to identify wildlife issues as part of the design.

606.03 MATERIALS

A. SIGNAGE

(1) Signage shall comply with applicable sections of MUTCD and Longmont Parks, Opens Space and Trails Sigh System Guidelines, available upon request, including sign faces, specifications, and construction details. The City Engineer shall provide electronic formats for signs included in the manual.

(2) Aluminum signs shall meet ASTM B209, alloys 6061-T6, 5052-H36, or 5052-H38. Graphics shall be silk-screened with 3M ink on 0.080-inch-thick aluminum blanks for 14 x 14-inch sign sizes or smaller, and one-eighth (1/8) inch thick for larger signs. All corners shall be rounded with a radius of 1 in x 14 in x 14 in signs and one and a half (1 ½) inch for larger signs. No electronically-cuttable “EC” film shall be permitted, unless approved by the City Engineer.

(3) All MUTCD signs, low clearance signs, and bicycle signs shall be retro-reflective to show the same shape and color both day and night, regardless of light conditions. “Path Closed” and wayfinding signs shall also include retro-reflectivity. Retro-reflectivity shall be achieved by using sheeting that conforms to the requirements of ASTM D4956 and shall be applied in accordance with the manufacturer’s specifications.

(4) Signs shall include Spanish translation when required by the City Engineer.
(5) Sign faces are to be color-matched to specific project specifications. Font size and color contrast should be maximized for readability and accessibility. Text, color samples, and full color proof of each sign shall be reviewed and approved by the City Engineer prior to manufacturing.

B. Posts shall be specific to the sign type per the Longmont Parks, Open Space and Trails Sign System Guidelines, which are available upon request. SITE FURNISHING
(1) Trash containers, recycling containers, bicycle racks, grills, and benches shall be included.
(2) Benches shall be required along primary greenways at one-half (½) mile intervals or as directed by the City Engineer. All concrete pads for benches along accessible routes are to meet ADA regulations.
(3) Trash and recycling stations are to be installed at trailheads and major congregation points or as directed by the City Engineer.
(4) Six (6) inch thick concrete pads shall be required for surface mounting site furnishings and shall meet the requirements in Section 200 of these City Standards.
(5) Refer to the Downtown Implementation Maintenance Manual for required site furnishings within the Longmont Downtown Development Authority (LDDA) boundary as defined in the 2017 update of the Downtown Longmont Master Plan of Development, and as amended. The LDDA site furnishings shall also be required in the Midtown and Downtown Character Areas as defined in the Main Street Corridor Plan, and as amended. The LDDA site furnishings may be applied in other urban developments at the discretion of the Planner. When used, all LDDA details shall be included in the Site Plan.

C. TRAFFIC DELINEATORS
Traffic delineators are to be in-ground, mounted, and white with reflectors.

D. WILDLIFE PROTECTION
The following shall apply to wildlife barriers:
(1) Prairie Dog Barrier: Four (4) foot cedar fence using four inch by four inch by five foot (4 in x 4 in x 5 ft) cedar fence posts, with two (2) two inch by four inch by eight foot (2 in x 4 in x 8 ft) cedar rails for attaching one inch by six inch by three foot (1 in x 6 in x 3 ft) cedar pickets. Barriers shall also include four (4) foot width of one (1) inch poultry wire and six (6) inch minimum fabric pins.
(2) Beaver Barrier:
a. Four (4) foot minimum width with two (2) x four (4) inch mesh poultry wire, six (6) foot steel tee stakes and six (6) inch galvanized fabric pins.
b. 25 pounds of playground sand shall be mixed with two and a half (2 ½) gallons of flat exterior latex paint with color that resembles tree bark to be painted.

606.04 EXECUTION

Contractor shall:

A. Locate all utilities prior to installation of all signs and fencing per Section 107.01 of these City Standards.

B. Notify City Inspector to verify sign placement, orientation, and concrete pad layout for benches and trash & recycling containers.

C. Install signs in concrete footing per direction from the City Inspector and per the Longmont Parks, Opens Space and Trails Sigh System Guidelines, available upon request. Install posts to meet MUTCD standards with a minimum of 24 inches between sign edge and the sidewalk or sidepath edge. The City Engineer may

require additional concrete pads between trail edge and signs for “Rules and Regulations” and “Dog Waste Signs” as needed. Signs shall be installed with faces in the correct orientation to sidewalk or sidepath for sign message as directed by the City Inspector. Sign face shall be installed using vandal-resistant fasteners per the Longmont Parks, Opens Space and Trails Sigh System Guidelines, available upon request.

D. Install site furnishings on six (6) inch thick concrete pads per approved plans and per these City Standards. Trash Receptacles are to have lids attached using a galvanized chain.

E. Install traffic delineators with reflectors in areas where seed is installed along roadways without curb and gutter at 50-foot intervals set two (2) feet off the edge of roadway. Posts shall be installed to breakaway for on-coming traffic per Section 200 of these City Standards.

F. Prairie dog barrier requires installation of corrugated metal panels such as ProPanel roofing material buried two feet deep with three (3) feet above ground level with a j-channel cap. Panel color shall be a neutral earth tone and attached to four inch by four inch by four foot (4 in x 4 in x 4 ft) posts eight (8) foot on center with two inch by six inch by eight foot (2 in x 6 in x 8 ft) rails across the top edge of the posts. Panels shall be attached to the post and rails so that the panel side faces the prairie dog colony. Disturbed ground adjacent to the barrier shall be compacted. Poultry wire shall be secured to the side of the barrier facing the prairie dog colony with 12 inches of wire secured to the interior of the cedar fencing with metal screws and washers and the remaining 36 inches of mesh bent at a 90° angle to ground level and secured with at least nine inch by six inch (9 in x 6 in) long landscape staples. The landscape staples are to be placed in one (1) foot intervals alternating every six (6) inches, one directly up against the fence and the next on the outside edge of the poultry wire. Additional pin anchors shall be placed in a consistent 12-inch pinning pattern to fully secure the fencing to the ground with no raised areas or loose edges.

G. For beaver barriers, Contractor shall inspect the site with the City Forester prior to tree installation to select trees to be protected (trees to be protected shall be greater than two (2) inches in diameter and within 150 feet of a waterway).
    (1) Fencing option: fencing may be installed in a circle around all deciduous trees (existing and new) and shrubs in areas prone to harvesting or damage by wildlife, and as determined by the City Engineer. Fencing shall be cut in lengths long enough to provide full enclosure around each tree or shrub bed with a minimum 12-inch separation between shrubs or trunks, branches, and fencing on all sides. Fencing shall consist of 14 gauge galvanized, welded wire with two inch by four inch by four-foot (2 in x 4 in x 4 ft) mesh. Ends and additional sections of wire fence loop shall be securely fastened with additional steel posts added as needed for fence stability. A minimum of two (2) wood stakes or t-posts shall be installed opposite each other and attached to the wire fencing for each tree. Fencing shall be cut into lengths in such a manner as to allow cut ends to be bent to secure enclosure around trees or shrub beds. The ends are to be bent in towards the tree or shrub to prevent safety hazards and projections to the exterior side of the enclosure. Fencing shall be in contact with the ground around the entire enclosure and secured using nine (9) inch minimum length galvanized landscape staples.
    (2) Painted Option: For trees with a minimum trunk diameter of two (2) inches, Contractor may paint the trunks as follows: thoroughly mix two and half (2 ½) gallons of flat exterior, latex paint and 25 lbs. of play sand (the paint should be a color to match the trunk color of the tree); apply a thick coat of paint and sand mixture using brushes or spray guns; and apply from three (3) inches above the base of the tree up to three (3) feet above the base all the way around the trunk. Temperature recommendations for application of the paint shall be followed.

606.05 COMPLETION SERVICES

Contractor shall clean up site debris and materials.

606.06 WARRANTY PERIOD

For a one (1) year period following Construction Acceptance and until Final Acceptance, all signs, site furnishings and wildlife protection shall be warrantied against defects.