

Town of Mead Design Standards and Construction Specifications

SECTION 33 47 00 LANDSCAPE AND IRRIGATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Specifications for concrete paths and bridges and all associated signage, railings, lighting and root barrier
- B. Specifications for grading and fine grading, top soil, soil amendments, fertilizer
- C. Specifications for installation of irrigation improvements including taps, backflow prevention, valves, piping, sprinkler heads, control systems, pumps and signage.
- D. Minimum requirements for seeding, mulching, fertilizer and weed control during establishment of seeded areas to be owned by the Town and common open space owned by the Homeowners Association.
- E. Minimum requirements for sodded areas to be owned by the Town and common open space owned by the Homeowners Association.
- F. Materials and practices to install trees, shrubs and groundcover.

1.2 REFERENCES

- A. AASHTO – American Association of State Highway and Transportation Officials.
- B. USACE – US Army Corps of Engineers
- C. USFWS – US Fish and Wildlife Service
- D. CDPHE – Colorado Department of Health and the environment
- E. UPC – Uniform Plumbing Code
- F. NSF – NSF International (National Science Foundation)
- G. ANSI – American National Standards Institute
- H. ASTM – ASTM International (American Society for Testing and Materials)
- I. Water Provider - Little Thompson Water District or Longs Peak Water, District of Central Weld County Water District
- J. Electric Provider – United Power
- K. Electric Code as currently adopted
- L. UL – Underwriters Laboratory
- M. PE – Polyethylene cable
- N. UF - underground feeder cable; rated for in-ground and damp-area installation
- O. HOA – Homeowners Association or other entity responsible for installation and maintenance of these improvements
- P. B&B – Balled and Burlapped nursery stock

1.3 SUBMITTALS

- A. Submit on all products required for construction to verification of compliance with these Specifications.
- B. Seeding and fertilizers: certificates showing State, Federal or other inspection showing source and origin.
- C. Samples: Mulch; canvas strap or approved equal (when requested by Town).

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1.4 REGULATORY REQUIREMENTS

- A. Conform to all Town codes and ordinances, laws and regulations of Weld County, Town of Mead, CDPHE, USACE, USFWS, the notes and details on the drawings, and as specified herein.
- B. In case of apparent conflict, CDPHE, USACE, USFWS requirements govern over these specifications.
- C. Contractor shall prepare, submit, pay, and otherwise obtain all necessary permits from all appropriate entities.

1.5 SCHEDULING

PART 2 PRODUCTS

2.1 GENERAL

- A. The **Town of Mead List of Approved Landscape Materials** is attached to this Section as a separate document, herein referred to as Town Approved Materials List.
 1. The **Town of Mead List of Approved Landscape Materials** is periodically updated. Please contact the Town Engineer for the most current list.

2.2 CONCRETE PATHS AND BRIDGES

- A. For specific list of materials accepted by the Town please see Town Approved Materials List.
- B. Concrete mix design: see Section 32 13 00 of these Specifications. Control joints: zip strips or saw cut (soft cut) to one quarter (1/4) the total slab thickness. Curing compound: for all exposed concrete surfaces - white pigmented sealant.
- C. Bridge steel to be CorTen self-weathering steel (preferred) or zinc enamel painted structure (color gloss black or as approved by Town). Concrete reinforced bridges are acceptable. Concrete decking is preferred, however, alternate ironwood decking also acceptable (three inch (3") minimum thickness planks). See approved materials list for pre-approved decking. Approach railing to match bridge steel and paint (if applicable). Safety plate at abutment to be 1/4" minimum textured, galvanized steel plate.
- D. Barrier Railings shall be constructed of minimum two-inch (2") round tubing with three-eighths inch (3/8") walls. All welds shall be ground smooth and railings shall be painted (color per Town approval) with zinc enamel paint. All railing design is to meet current AASHTO standards.
- E. Signage: All non-traffic regulation signs in recreational areas shall be silk-screened with 3M ink on .080" thick aluminum backing plate backing plates. No Electronically Cuttable Film (E.C. Film) shall be permitted unless approved by the Town. All signs shall have a border the same color as the sign text. All signs to include Spanish translation if possible (to be provided by Town). Sign faces to be secured using tamper resistant fasteners.
 1. Street identification sign (English only) at underpass – Street name (only) to be secured to the face of the underpass: Color: Royal blue with white letters.
 2. Bridge caution loading sign (English only) (with manufacturer's maximum bridge loading information) to be secured to the bridge by the manufacturer: Color: White with black letters
 3. Stop sign (English only) at concrete path intersections with roads (standard street sign or smaller version allowed) to be mounted on wood post: Sign Color: red with white letters.
 4. Path intersection sign to be mounted on wood post: "Warning: Intersection ahead. Aviso: Intersection a continuation." sign: Color: White Yellow with black letters.
 5. Bridge caution sign: "Caution: Slippery when wet. Precaución: Área resbaloso cuando esta mojado." Or, International graphic symbol to be secured to bridge end posts without extending into path or on separate free-standing wood post. Color: yellow with black letters.

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6. Designated ID sign: Name of designated greenway (English only) to be mounted on wood post, Sign Color: White with green letters. Sign to run vertically up post.
 7. Dog waste sign: Copy and color to be provided by Town. Sign face to be mounted on wood post.
 8. Dog waste dispenser: 24" long 4" PVC (Class 200) pipe with 2 end caps – painted black. (2 ea.) 4" diameter holes cut into one side of pipe top and bottom. Dispenser to be mounted on wood post.
 9. Trail Courtesy sign – Color – Green. Copy to be provided by Town. Two sign faces are to be provided (English and Spanish). Mount to wood post with one sign face on each side.
 10. Sign Posts – 4x4" or 6x6" (size as appropriate for sign face) pressure treated wood posts stained gray (Stain Color – Sherwin Williams Grey Birch). Top edges beveled and posts free of significant checking.
- F. Lighting:
1. Vandal resistant, Lexan lens fixtures with metal guard. See approved materials list for pre-approved fixtures.
 2. Root Barrier: See approved materials list for pre-approved barriers.

2.3 FINE GRADING

- A. For specific list of materials accepted by the Town, please see Town Approved Materials List.
- B. Topsoil: a friable loam, typical of cultivated local top soils, containing at least 2% humus. It must 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. No stones or other materials over two inches (2") in size shall be allowed. It shall contain no toxic materials. Topsoil shall have an acidity in the range of ph 5.5 to ph 8.5.
 1. Submit sample and written confirmation from supplier of material composition including the percent of organic matter, salts, and nutrient composition. Sample is to be representative.
- C. Soil Amendment: A high quality composted material containing a minimum of 30% organic matter by dry weight. The mixture shall be free from clay subsoil, stones, lumps, plants or roots, sticks, weed stolons, seeds, high sodium content and other materials harmful to plant life. The compost shall be coarsely ground with an even composition and have an acidity in the range of PH 5.5 to PH 7.0. All material shall be sufficiently composted such that no material used is recognizable. The following nutrient analysis should be provided on a dry basis: Nitrogen: 1% min; Phosphorus: 0.4%; Potassium: 1.2%; Salts: 6.5% (as received basis).
- D. Submit sample and written confirmation from supplier of material composition including: percent organic matter, sodium, nutrient composition and trademark. Sample is to be representative.
- E. Fertilizer: Triple superphosphate with a chemical analysis of (0-46-0).

2.4 IRRIGATION

- A. For a specific list of materials accepted by the Town, please see Town Approved Materials List.
- B. Taps: Contractor is responsible for supplying saddle to connect the service pipe.
- C. Backflow Prevention Device and Water Meter: Backflow devices and water meters to be purchased to meet Town and Water Provider specifications.
 1. Above ground reduced pressure backflow preventers are required for all potable systems and for all untreated raw water (non-potable) or with in-line injection system designs.
- D. Master valve: sized to match size of mainline.
- E. Copper: Type K rigid conforming to ASTM Standard B88.

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F. Mainline:

1. Class 200 PVC, NSF approved.
2. Town Owned Areas: For pipe sizes larger than three-fourths of an inch (3/4-inch) use gasketed pipe.
3. Town Owned Areas: No mainline to be sized at 1-1/4 inch.
4. Use ductile iron fittings for mainline sizes larger than four (4) inches.
5. No cold weather glue permitted.

G. Laterals:

1. Class 200 PVC, NSF approved.
2. Town Owned Areas: No laterals smaller than one inch (1") or sized at 1-1/4".
3. Polyethylene Drip Pipe: weather and UV resistant material, NSF approved, SDR pressure rated pipe, only as approved for drip applications.

H. Pipe Fittings:

1. Pipe fittings shall be molded fittings manufactured of the same material as the pipe.
2. Funny Pipe (pop-up heads only): to be compatible with the elbows needed for the sprinkler heads and appropriately sized crimp-type clamps to be used.
3. PVC: Schedule 40, Type 1, PVC solvent weld with ASTM Standards D2466 and D1784. No cold weather glue permitted.
4. Copper pipe: Wrought copper or cast bronze fittings, soldered or threaded per installation details.
5. Use ductile iron fittings for mainline sizes larger than 4".

I. Sleeving:

1. Ductile Iron Pipe or Class 200 PVC under all paved surfaces. Each mainline, lateral or wire crossing of any paved area to be installed in a separate sleeve.
2. Sizes to be a minimum of two sizes larger than the pipe being sleeved. Minimum four-inch (4") diameter, or larger where appropriate, for irrigation lines.
3. Wires to be in separate sleeve from pipe, two inch (2") minimum size pipe for control wire sleeves.
4. Shall have marker tape on upper side and both ends for future locates.

J. Valves:

1. Remote Control Zone Valves (including Master Valves): Electrically operated, appropriate for the water supply (scrubber type for raw water applications), with manual bleed device and flow control stem. Shall have a slow-opening and slow-closing action for protection against surge pressure.
2. Pressure regulating function to be used as needed.
3. Drip Remote Control Valves: Same as remote control zone valves sized to match system requirements, including upstream filter, pressure regulator and y-strainer.
4. Isolation Gate Valves: Able to withstand a continuous operating pressure of 150 psi. Clear waterway equal to full diameter of pipe. Shall be opened by turning square nut to the left (wheel opening is unacceptable).
5. Manual Drain Valve: 3/4" ball valve with tee handle.

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6. Quick Coupling Valves: one-inch (1") brass units with rubber cover and one-inch (1") brass key.
- K. Valve Boxes:
1. House valves in valve box with matching locking cover: One valve per box. Install in Jumbo box sizes, as specified. Also, install a waterproof tag with permanent marker with each valve number. One tag shall be attached to each valve.
- L. Control System:
1. Controller (for systems including Town owned and HOA Owned Common Open space areas): Number of stations shall include two extra stations for possible future use. Controller box shall be weather tight and vandal resistant with locking exterior disconnect.
 - a. Control System Enclosure: Weatherproof security enclosure with floor stand kit and lock kit.
 - b. One per water tap. Number of stations shall include three (3) extra stations for possible future use. System shall come pre-assembled with security enclosure.
- M. Electric Control Wiring:
1. #14 solid copper direct burial UF or PE cable, UL approved, for systems up to 2,000 feet in length. For larger systems, wire is to be #12 solid copper direct burial UF or PE cable, UL approved, or larger, per system design and manufacturer's recommendations.
 2. Five wires with consistent color scheme throughout:
 - a. Red = live White = ground Black = extra (to farthest end of mainline including each branch). Blue = extra (to farthest end of mainline including each branch) Green = extra (to farthest end of mainline including each branch)
 - b. Label each wire with waterproof tape and permanent marker at the controller and the furthest end of each wire.
 - c. Wire connectors and waterproofing sealant specific for direct burial to be used to join control wires to remote control valves.
- N. Sprinkler heads:
1. All 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.
 - a. Include check valve in head.
 - b. Gear driven rotor heads: with stainless riser.
- O. Drip system:
1. Spiral barb emitters. No spaghetti tubing allowed. Install tracer wire over all drip pipes, buried a minimum of six inches (6") under the soil.
- P. Thrust blocks:
1. 3000 psi concrete with #4 rebar wrapped with asphalt tar based mastic coating.
- Q. Raw Water Systems:
1. For all raw water irrigation systems, typical "dirty water" equipment shall be required, including purple valve boxes, pipes and rotor heads, scrubber valves and bubblers instead of drip emitters. Raw water systems typically include supply turn-out structure (where applicable), storage pond for 3 days storage (typical). Storage pond to be lined – submit lining material product literature for Town review and approval, and rip rap will be installed 12" minimum below the lowest water level at draw down of irrigation. All raw water systems to include provision for potable back up in the event of raw water delivery system failure.

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R. Pump Systems:

1. Irrigation pump systems for raw water use to be coordinated with Town. Submit information on pump equipment for Town review and approval – using Approved Materials list for equipment as appropriate. Basic system requirements include: Pump system capable of water delivery at required volume and pressure for ultimate landscape build out (Variable Speed Pump to be used if drip irrigation is included in the design or if there is a varying depth of water storage); skid-mounted pump system (typical) with manufacturer per Town approval; pump control system with interface to irrigation controller(s); pump enclosure heating system to maintain 49 degrees minimum temperature at 0 degrees F; lighting and power (GFI) on separate breaker from pump; masonry (typical) enclosure with vandal resistant coatings and steel screen over vent openings; pump access hatch centered over pump; man door access using steel door with lock guard over door hardware; pump enclosure sized to provide adequate walking room around pump skid and controller systems.

S. Signs:

1. Raw Water in Use signs for all raw water systems.

2.5 SEEDING

A. For a specific list of materials accepted by the Town, please see Town Approved Materials List.

B. Seed:

1. Seed shall be of fresh, clean, new crop seed composed of the varieties approved by the Town with tested minimum percentages of purity and germination clearly labeled on the package. All seed shall be free of Poa annual grass and all noxious objectionable weeds with a maximum crop of 0.10% weeds.

C. Mulch:

1. For slopes 3:1 and less: Certified weed free hay for dryland seeded areas and hydromulch for irrigated turf seeded areas.
2. For slopes steeper than 3:1, and inaccessible areas: Hydromulch using wood cellulose fiber.
3. Hydraulic mulching shall not contain any substance or factor which might inhibit germination or growth of grass seed. It shall be dyed a green color to allow metering of its application.

D. Tackifier: Per approved materials (Mandatory for hydromulch).

E. Netting:

1. For slopes steeper than 3:1, use Soil Saver jute netting, or approved equal. Netting to be stapled with No. 11 gauge steel wire forged into a six inch (6") long U shape, and painted for viability in mowed areas.

F. Fertilizer:

1. Slow release type Nitrogen

G. Native grass seeded area signs:

1. A sign is to be erected in all permanent dryland seeded areas in designated pathways reading "Native dryland grass seeding is being established in this area. Prior to establishment, the grasses will be mowed approximately 4-5 times per year to help control noxious weeds. After establishment, the dryland grass will be maintained according to approved maintenance procedures and accepted industry standards, including growth heights of over twelve inches (12") and the irrigation system will be turned off. Eventually, these grasses will provide habitat for wildlife in the area and will help conserve water.

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Thank you for your cooperation." The sign shall be brown with white letters with Town logo and shall be mounted on 6"x6" wood post, mounted 5'-6' above grade.

2. Breakaway Traffic Delineators: Durapost or SafeHit. In-ground mounted, white with reflectors. See Approved Materials List.

2.6 SODDING

A. For a specific list of materials accepted by the Town, please see Approved Materials List.

B. Sod:

1. Sod shall have a clay-loam base that will 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 objectionable weeds. It shall be free of nematodes, pests and pest larvae as inspected by the entomologist of the Colorado State Department of Agriculture.
 - a. Thickness: one inch (1") thick excluding top growth and thatch.
 - b. Thatch: Not to exceed 1/2" uncompressed.
 - c. Width: Eighteen inch (18") wide strips or forty two inch (42") wide rolls.
2. Fertilizer:
 - a. Ammonium sulfate and diammonium phosphate, with chemical analysis of N 20%, P 10%, K 5%, S 8%, Fe 3% (Urea and sulphur coated Urea only), unless soil test recommendation provides alternative rates.

2.7 TREES PLANTS AND GROUND COVER

A. Nursery Stock: All nursery stock shall conform to the American Standard for Nursery Stock (ANSI Z60.1) and the Colorado State Nursery Act.

B. Plants

1. Plants shall be first class representatives of specified species or variety, in healthy condition with normal developed branch and root systems, free of objectionable features. Must conform to: American Joint Committee on Horticulture (plant names); American Standard for Nursery Stock (ANSI Z60.1); Colorado Nursery Act.
2. Only plants grown in hardiness zones 2, 3, 4, and 5 are acceptable.
3. All material shall be free of disease, insects, eggs, larvae, and parasites of objectionable or damaging nature.
4. Inspect plants to make sure they meet minimum size requirements of the ordinance and the plans, and for proper form including strong central leader and good branching pattern on trees and number and length of canes on shrubs:
 - a. Large or small canopy deciduous trees (>30' mature height): two inch (2") caliper measured six inches (6") above ground, balled and burlapped.
 - b. Ornamental deciduous trees (<30' mature height): 1-1/2" caliper measured six inches (6") above the ground, balled and burlapped.
 - c. Evergreen trees: six feet (6') in height, balled and burlapped.
 - d. Shrubs: # 5 plastic container with deciduous shrubs approximately two feet (2') high and spreading shrubs having 18" – 24" spread.
 - e. Groundcovers, vines, perennials: #1 plastic container.

C. Backfill mix:

1. Mix shall consist of the following and be used in backfilling all plant materials:

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2. One part composted soil amendment; two parts topsoil; three parts native soil from planting pits; superphosphate amendment.
 3. All materials to be thoroughly blended.
- D. Stakes and guys:
1. Shall be standard guying system unless previously approved by town.
 2. Standard guying system:
 - a. Stakes – see approved materials list.
 - b. Guys - see approved materials list.
- E. Miscellaneous: See approved materials list.
- F. Mulch: See approved materials list.
- G. Weed barrier fabric: See approved materials list.
- H. Steel edging: See approved materials list.
- I. Beaver protection: See approved materials list.
- J. Prairie dog enclosure: If required, contact Town or the Colorado Division of Wildlife for recommended enclosures.

PART 3 EXECUTION

3.1 GENERAL

- A. Locate all utilities prior to grading and trenching and protect from damage, per Section 31 00 00 of these Specifications.

3.2 CONCRETE PATHS AND BRIDGES

- A. Submit concrete mix design to Town for approval.
- B. Alignment to be per approved plans. Field modifications in alignment must be approved by Town Engineer prior to formwork.
- C. Coordinate with irrigation installation so necessary sleeves are placed beneath concrete path as needed. Sleeves to be set at standard trench depth per Section 3.4.E.3.
- D. Obtain testing of compaction and moisture and re-compact as needed in order to obtain minimum compaction requirements. Compaction testing needed in accordance with 31 00 00.
- E. Timing of concrete placement to allow for proper finish and product. No placement allowed if rain or snow is pending prior to reasonable cure. Excessively hot or cold weather may be reason for placement rescheduling by the Town of Mead. Weather damage due to precipitation may be cause for rejection of paving.
- F. Slab thickness to be six inch (6") minimum.
- G. No tooled joints are allowed on concrete path construction. Place expansion joints at maximum spacing of four hundred (400) lineal feet or three thousand, two hundred (3,200) square feet, whichever is less. Install expansion material at sufficient depth to allow for sealant and remain flush with finish surface elevation. Expansion joints where flatwork intersects vertical concrete. Dowel per Section 32 13 00 between all cold joints and between concrete path and bridge abutment.
- H. Install control joints on eight foot (8'-0") centers using zip-strip during placement operation so lines are straight and perpendicular to the edge of the concrete path or saw-cut after placement operation with straight and perpendicular cuts. Control joints also to be placed at intersections, radius points and elsewhere as needed to prevent cracking. Saw-cut joints to be timed properly with the setting of the concrete. Cutting shall be started as soon as the concrete has hardened

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- sufficiently to prevent aggregates from being dislodged by the saw, and shall be completed before shrinkage stresses has developed sufficiently to induce cracking.
- I. Testing to be done by an independent testing lab per 32 13 00 of these Specifications.
 - J. Concrete finish to be smooth and consistent with a light broom finish. Heavy broom finish will not be permitted. Irregularities, poor finish and other deficiencies of workmanship or vandalism will require concrete work to be removed and replaced. Weather damage to finish will also be cause for removal and replacement. Contractor has option to provide sample panel of finish prior to work for Town approval.
 - K. No concrete wash is to be dumped onto landscape areas. Any concrete water or spillage is to be contained and removed from the site prior to any landscaping.
 - L. Protect concrete with curing compound and other means to prevent premature drying, and protect from frost and rain. Provide watchmen as needed to protect from vandalism until reasonable cure is obtained.
 - M. Remove forms twenty four (24) hours after pour unless otherwise approved. Avoid damage to edges of pavement.
 - N. Backfill edges of concrete path prior to opening to public use.
 - O. Install signs at locations field verified by Town inspectors. Install posts with 30" minimum bury – backfill excavation with washed rock. Offset post from path edge so that edge of sign face is a minimum of 24" from the path edge. Install sign faces in correct orientation to path for sign message readability. Install sign face using vandal resistant fasteners.

3.3 FINE GRADING

- A. Locate all utilities prior to grading or trenching and protect from damage, per Section 31 00 00 of these Specifications.
- B. Install construction fencing and/or silt fencing Storm Water Construction Activity BMP's as needed prior to any grading activities in accordance with Section 31 25 00 – Erosion and Sedimentation Controls
- C. Apply general herbicide or broadleaf herbicide (2-4-D amine 4% A.I.) as applicable to areas where noxious weed beds have been established or where seed mix is to be planted. Herbicide must be applied by certified contractors at the rate recommended by the manufacturer after proper notification has been done in accordance with chemical applicator's standards. Precautions must be taken to avoid drifting of spray onto other properties and shall not be done in breezy conditions. Plant material not designated for herbicide application that is damaged 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.
- D. For arterial ROW development adjacent to a road slated for future expansion, survey and stake future horizontal and vertical alignment of the ultimate curb. These stakes are to be maintained throughout the ROW construction process, including 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 set to anticipate future road improvements. Grades between the existing road edge and the ultimate curb line are to be graded to provide drainage and a safe shoulder for vehicles.
- E. Take precautions to accommodate proper drainage and flow during and after grading and soil preparation.
- F. Clear and grub the site by removing unsuitable vegetation, woody and rock material present in the surface grade.
- G. Strip topsoil to a maximum depth, as determined by field inspection to recover as much quality topsoil material available and where site is scheduled for cutting or filling. If existing grades

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- are to be maintained, topsoil can remain undisturbed. Stockpile stripped topsoil in location separated from grading activities and cover to protect from wind and other erosion.
- H. Proceed with earthwork operation per approved plans. When complete with rough grading, obtain approval from Town. Rough grade inspection is to allow for six inch (12") minimum depth of topsoil and specified soil amendments as part of the fine grading work.
 - I. Rip to twelve-inch (12") depth with agriculture subsoiler to receive plantings.
 - J. Re-spread or import topsoil to achieve twelve inch (12") minimum depth in all landscaped areas and grade to smooth and even lines. Establish swales and drainage as required per plans.
 - K. Evenly distribute soil amendment at rate of three (3) cubic yards per 1,000 square feet of area, or as recommended by Soil Test, over the entire area to be prepared. Till amendments and topsoil into top twelve inches (12") of soil. Compact to a firm, but not hard (80% of Standard Proctor Density at 2% optimum moisture) seed bed. Soil amendment shall be applied no more than thirty (30) days before planting operations.
 - L. Remove all objects greater than one-half inch (1/2") in diameter in all irrigated turf areas. For native grass seeded areas, two-inch (2") diameter objects or greater are to be removed.
 - M. Trim finish grade elevations adjacent to paved areas to one inch (1") below pavement finish grade.
 - N. Evenly distribute triple superphosphate fertilizer at the rate of fifteen (15) pounds per thousand square feet; modify type and rate if soils test recommends otherwise.
 - O. Remove all debris piles and other stockpiles from site.
 - P. Clean walkways and streets on daily basis to minimize mud tracking and siltation into drainage structures.
 - Q. Maintain silt fencing until site is re-vegetated.

3.4 IRRIGATION

- A. Inspect tap or other existing irrigation system, as applicable, prior to work.
- B. Water Service Connections (Taps): Contact Town and Water Provider 48 hours prior to schedule work for water taps and inspections. Backflow prevention devices shall meet Town and Water Provider requirements. Minimum two weeks prior notice to be given for installations which will require meters or backflow devices larger than two inches. Larger devices and meters are not always kept in stock and may have ordering stocking delay.
- C. Contractor is responsible for excavation, connection to corporation stop at the water main, providing the saddle for the PVC or A.C. pipe, making the connection to the existing water service, backfill and compaction, and pavement or shoulder surface treatment or replacement as needed. No soldered joints or fittings are allowed on water service lines where buried. Soldered joints or fittings are permissible above grade or inside a vault. No solder, sealants, fluxes, pipe dope, and other materials shall contain any lead. The contractor shall install all irrigation taps per the Water Provider Standards and IIT all taps and installations are subject to approval and inspection by Town and the Water Provider.
- D. Install meter, master valve, and drain valve inside specified areas and vaults. Inspection of service line (where appropriate), vault, water meter and backflow is to be coordinated with Town and Water Provider. Install meter, master valve, flow meter and drain valve and backflow inside specified vault per Town detail. Install flow meter, backflow, winterization assembly and drain valves as specified adjacent to precast vault per Town detail. Inspection of service line (where appropriate), vault, water meter and backflow is to be coordinated with Town and Water Provider.
 - 1. Meter vaults are to be 60" diameter for taps 2" or less in size. For taps larger than 2", the pipe layout inside the meter vault must be designed to determine the vault size.

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2. Town Owned Areas: Non-potable (raw water) irrigation systems or systems with an in-line injection system are required to have a reduced pressure backflow device upstream of injection nipple, and which cannot be placed in vault.
 3. Install flow meter downstream of meter unit within meter vault with the following minimum spacing upstream and downstream of flow meter the first joint, bend or other fittings: 10 pipe diameters straight pipe upstream; 5 pipe diameters straight pipe downstream.
 4. Install master valve in meter vault within a reasonable distance downstream of flow meter (no closer than 10 pipe diameters).
 5. Copper pipe to be soldered so that a continuous bead shows around the joint circumference. Insert a dielectric union wherever a copper-based metal (copper, brass, bronze) and an iron-based metal (iron, galvanized steel, stainless steel) are joined.
 6. Install winterization assembly downstream of meter vault on copper PVC (with no size reduction) for mainlines greater than two inch (2"). Install winterization assembly on PVC (no size reduction) for mainlines two inch (2") or less.
- E. Pipe trenching:
1. Install pipe in open cut trenches of sufficient width to facilitate thorough tamping/puddling of suitable backfill material under and over pipe. Puddling is not allowed where next to walks, curbs and concrete paths. Install mainline and lateral lines in separate trenches.
 2. Pipe location to be offset two foot (2') maximum from walks and curbs to maximize tree planting zones. Field adjustments to this standard must be approved by Town inspectors prior to work.
 3. Trench depths:
 - a. Mainline: Minimum of twenty four inches (24") deep from top of pipe to finished grade.
 - b. Lateral: Minimum of eighteen inches (18") deep from top of pipe to finished grade.
 - c. Drip laterals: Minimum of twelve inches (12") deep from top of pipe to finished grade in the paved and sodded/seeded areas, four inch (4") minimum mulch cover in planting beds.
 4. Sleeves: Install sleeving at a depth that permits the encased pipe or wiring to remain at the specified burial depth.
 - a. Sleeving: Boring shall not be permitted unless obstruction in pipe path cannot be moved, or pipe cannot be re-routed.
 - b. Mainline installed in existing sleeves at greater depth than adjacent pipe, shall have a manual drain valve at the low end.
 - c. Install sleeve so both ends extend past edge of curb, gutter, sidewalk, concrete path or other obstruction, a minimum of two feet (2').
 - d. Mark all sleeves with a "V" chiseled in walk (or other surface) directly over sleeve location.
 - e. Shall be laid to drain at minimum grade of 5"/100'.
 - f. Shall be bedded in two inches (2") of fill sand and covered by six inches (6") of fill sand.
 - g. Sleeves installed for future use shall be capped at both ends.
 - h. Separate sleeve (two inch (2") minimum size) shall be used for all wiring.
 - i. Sleeving shall not have joints unless necessary due to length of sleeving run. If joints are necessary, only solvent welded joints are allowed.
 - j. Compaction of backfill for sleeves shall be 95% of Standard Proctor Density, ASTM D698-78. Use of water (puddling) around sleeves for compaction, will not be allowed.
- F. Pipe Installation:

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1. Use Teflon tape on all threaded joints; only schedule 80 pipe may be threaded. All threaded joints shall be tightened to eliminate leaks per industry standards.
 2. Reducing pipe size shall be with reducing insert couplings: at least six inches (6") beyond last tee of the larger pipe.
 3. Snake PVC lateral pipe from side to side within trench.
- G. Provide emitters to each plant per these standards. Do not use spaghetti tubing.
1. Funny Pipe: Attach funny pipe to elbows using appropriately sized crimp-type clamps to secure.
- H. Thrust blocks:
1. Shall be installed where PVC mainline (2 1/2" or larger) changes direction over 20 degrees.
 2. Minimum of one cubic foot of concrete bearing against undisturbed soil.
 3. Keep pipe joint clean of concrete. Do not encase.
 4. Place wiring away from thrust block to avoid contact with concrete.
 5. #4 rebar wrapped with asphalt tar based mastic coating.
- I. Valve Installation: Install at least twelve inches (12") from and align with adjacent walls or paved edges.
1. Automatic Remote Valves: Install in such a way that valves are accessible for repairs. Make electrical connection to allow pigtail so solenoid can be removed from valve with twenty four inch (24") minimum slack to allow ends to be pulled twelve inches (12") above ground. Locate minimum twelve inches (12") from and align with walks, walls, etc.
 - a. Thoroughly flush piping system under full head of water for three minutes through furthest valve, before installing valves.
 - b. Valve assembly to include ball valve and union per detail for ease of maintenance and repair. Install in locking valve box per details.
 - c. Install a waterproof tag with permanent marker with each valve number. One tag shall be attached to each valve.
 2. Manual Drain Valve: Install per plans, but in no case shall be less than at the low points of the system and at the end of the mainline. Install in six inch (6") CL 200 PVC sleeve access with ten inch (10") locking valve box lid. Install valves on swing joint assembly per detail. Sump to be four (4) cubic feet of crushed gravel over filter fabric.
 3. Quick Coupler Valve: Install in ten inch (10") round locking valve box. Flush completely before installing valve. Thoroughly flush piping system under full head of water for three minutes through furthest valve, before installing valves.
 4. Isolation Gate valves: Install in valve box.
 5. Valve Boxes:
 - a. 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 valves; "DRGV" for all drip system isolation valves; "QC" for all quick coupling valves; "WA" for all winterization assemblies; "FM" for all flow meter assemblies; and "MV" for all master valve assemblies. Use a branding iron stamp with three inch (3") high letters.
 - b. Brand boxes in the center of the lids.
 - c. Valve box shall NOT rest on mainline; use brick or other approved non-compressible material per detail. Top of valve box to be flush with finish grade.

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- d. 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.
 - e. Valves shall not be so deep as to be inaccessible for repairs. Three inch (3") depth of 3/4" washed gravel to be placed in the bottom of each valve box with enough space to fully turn valve for removal (see detail).
- J. Head Installation:
1. Set heads plumb and level with finish grade. In sloped area, heads to be tilted to match slope to provide full radius spray pattern.
 2. Flush lateral lines before installing heads. Thoroughly flush piping system under full head of water for three minutes through furthest head before installing heads. Cap risers if delay of head installation occurs.
 3. Pop-Up Heads along walks and bikeways: Bed heads in six inch (6") layer of sand under the base of the head.
 4. Nozzles: Supply appropriate nozzle for best performance.
 5. Adjustment: Adjust nozzles and radius of throw to minimize overspray onto hard surfaces.
- K. Wiring and Electrical Connections:
1. All wire connection and exposed ends to be sealed using wire connectors and waterproof sealant specific for direct burial applications.
 2. Electrical installations will be inspected by the Town of Mead's Building Inspection Division and the final connection made by Electric provider. All work, including the low voltage installation to the electric source where applicable, to be supplied by the contractor. All materials to be provided by the contractor. When working near any electric facility, prior coordination and approval is required. Reference the building permit for telephone numbers to request an electrical inspection by the Building Inspector.
 3. Label each wire with waterproof tape and permanent marker at the controller and the furthest end of each wire.
- L. Controller Installation:
1. To be installed in an above-ground location suitable to prevent vandalism and provide protection from adverse weather conditions, and per Town field direction. All exposed wiring to and from the controller shall be encased in galvanized metal conduit. Exterior controllers to be installed on six inch (6") thick concrete pad with compacted subgrade per concrete specification.
 2. Install Controller in accordance with manufacturer's specifications. Install surge protection, grounding rods and other accessory components as specified.
 3. Attach wire markers to the ends of control wires inside the controller unit. Label wires with the identification number of the remote control valve active by the wire.
 4. Sequence wiring for irrigation zones in logical manner and so it matches as-built drawings.
- M. Wiring:
1. Comply with Town electrical codes.
 2. Power source brought to controller to a ground fault receptacle installed within controller casing. Clock shall be plugged into receptacle.
 3. String control wires as close as possible to mainline, consistently along and slightly below one side of the pipe.

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4. Leave minimum loop of twenty four inches (24") at each valve and controller, at each splice, at the ends of each sleeve, at one hundred foot (100') intervals along continuous runs of wiring, and change of direction of 90 degrees or more. Band wires together at ten foot (10') intervals with pipe wrapping tape.
5. Install common ground wire and one control wire for each remote control valve. Multiple valves on a single control wire are not permitted. Install three extra wires, as specified, to the furthest valve on the system and each branch of the system.

N. Drip Emitter Installation

1. Install specified number of emitters directly onto lateral hose (spaghetti tubing not allowed).
 - a. Groundcover: one single outlet emitter per square foot planting area.
 - b. Shrubs: two single outlet emitters per shrub.
 - c. Trees: four single outlet emitters per 2-3" tree; six single outlet emitters per four inch (4") tree; eight single outlet emitters per six inch (6") + tree. No spaghetti tubing permitted.
2. All drip emitters are to be tested for operation prior to weed barrier and mulch installation.

O. Signs

1. Install Raw Water in use sign in prominent location.

P. Testing

1. All tests to be run in the presence of Town and Irrigation Design Professional. Irrigation Design Professional conducting inspections is to sign the certification statement on the as-built drawings. All irrigation inspections to be scheduled by coordinating with Town inspector. Schedule all tests and inspections a minimum of 48 hours in advance of tests. Repeat any failed tests 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. No chemical spraying shall be done within ten (10) days of any irrigation inspections.
 - a. Hydrostatic Test (during irrigation installation before sleeving and backfilling pipe joints): Maintain 120 PSI for four hours. No leakage or loss of pressure is accepted during test period. Test must be run in the presence of Town inspector as noted above. Contractors to provide at their own expense hydrostatic pump, water and other materials as necessary for test. The pressure gauge is to be installed on the end of a fitting, rather than directly into a quick coupler. The pump is to be disconnected at the start of the test.
 - b. Town requires that the Contractor perform an independent pressure test prior to scheduling the required inspection. If numerous tests are required for a system, Town reserves the option to bill the Contractor for numerous tests at \$50/hr. (with a one hour minimum).
2. Operational Test (at Construction Acceptance punch list walk-through): Activate each remote control valve from the controller in the presence of Town inspector and irrigation professional for Town Owned and Common Open Space areas. Replace, adjust or move heads and nozzles as needed to obtain acceptable performance of system. Replace defective valves, wiring or other appurtenances to correct operational deficiencies.
3. Drip Operational Test (after drip lateral installation, but prior to weed barrier and mulch installation): Activate remote control valves in presence of Town inspector and Irrigation Design Professional for Town owned and common open space areas. Replace any emitters that are clogged or not operational. Adjust lateral hose as needed to effectively irrigate plantings.

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4. Central Control System Acceptance Test (at Construction Acceptance punch list walk-through): Town inspector and Irrigation Design Professional will activate each remote control valve from the Central Control System base station using the hand-held remote device.
5. Raw Water Pump Control Inspection: Demonstrate to Town inspectors for and Irrigation Design Professional at pump start up that pump system correctly operates automatically, all sensors perform properly and the system is built per approved plans. The pump designer and/or supplier will be required to attend this inspection.

3.5 ESTABLISHING SEEDING

- A. Inspection: Inspect finish grade and trim where needed to obtain finish grades of one inch (1") below adjacent pavements. Verify positive drainage away from all structures. Verify or complete removal of rock and debris larger than one half inch (1/2") from all irrigated turf grass areas to be seeded, and rock larger than two inches (2") from all dryland native grass areas to be seeded.
- B. Fertilizer
 1. Apply 8 lbs. per 1000 sq. ft. of irrigated turf grass seeded area (2 - 3 lbs. per 1000 sq. ft. of native grass seeded areas), unless soil test recommendation provides alternative fertilization rates, and rake lightly into top 1/8" of soil just prior to seeding operation. Native grass areas do not require fertilizer unless recommended on Soil Fertility test report.
- C. Seeding
 1. Do not sow seed in windy weather or when ground is frozen or otherwise untillable.
 2. Use billion type drill for slopes less than 3:1 in grade. Drill seed in manner such that after surface is raked and rolled, seed has 1/4" of cover.
 3. Hydraulic seeding methods can be used only on slopes steeper than 3:1 or in areas that are not accessible for machine methods. Hydraulic pump capable of being operated at 100 gallons per minute and at 100 pounds per square inch pressure to 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 a means of estimating the volume used or remaining in the tank. Do not seed and mulch in the same operation.
 4. Broadcast seeding can be used only on areas not accessible for machine methods and too small to justify hydraulic seeding. Where broadcast seeding is done, seeding rates are to be doubled. Hand rake seed to cover at 1/4" depth.
 5. Seeding rates (drilled and hydraulic):
 - a. Urban, Non-Native Grass Mix - 20 lbs. pure live seed per acre.
 - b. Native Grass Mix - 12 lbs. pure live seed per acre.
 - c. Irrigated Turf Grass Mix - 150 lbs. pure live seed per acre.
- D. Mulching:
 1. Native Grass Mulch: Apply at a rate of two (2) tons per acre. Crimp into seed bed with disk set straight forward and two inches (2") deep. Disk mulch across slopes to prevent erosion. Mulch seed beds within 24 hours after seeding.
 2. Hydromulching: Wood cellulose fibers must become evenly dispersed when agitated in water. 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 a 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 the specified tackifier at a rate of 120 lbs. per

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acre. Unless otherwise ordered for specific areas, fiber mulch shall be applied at the rate of 2,000 pounds per acre.

- a. Hydraulic mulching shall not be performed in the presence of free surface water resulting from rains, melting snow or other causes.

E. Netting:

1. Net areas with slopes greater than 3:1. If Contractor fails to net and subsequent soil erosion occurs, contractor shall re-establish finish grade, soil preparation, seed bed and apply netting at no cost to the Town. Staple per manufacturer's specifications.

F. Watering:

1. Immediately after seeding and mulching, water seeded areas lightly to a depth of two inches, but with care so that no erosion takes place and no gullies are formed. Water lightly as needed to maintain moist seedbed two times per day and keep seeded area moist until turf is established. Sloped areas should be hand watered until turf is established to prevent erosion; water these areas more often but for shorter periods of time.

G. Clean up:

1. Remove all hydromulch and other mulch materials from all plant materials, fences, site furnishings, signs, concrete and other areas except for seed bed.

H. Protection:

1. Provide and install barriers as required to protect seeded areas from pedestrian and vehicular damage. Provide signage and barricades if needed.

3.6 SODDING

A. Inspection: Inspect finish grade and trim where needed to obtain finish grades of one inch (1") below all adjacent paved surfaces. Verify or complete removal of rock larger than one half inch (1/2") which may hinder sodding and perform fine grading as necessary to maintain drainage per plans. Verify that irrigation system is fully operational prior to sodding.

B. Preparation: Clean up and irrigation adjustment

1. Clean out drainage inlet structures.
2. Adjust irrigation heads to proper watering height according to depth of sod material, but lower than mower blade height, to enable lawn mowers to cut grass freely without damage to sprinkler system.

C. Sod cutting and delivery:

1. Cut no more than 24 hours prior to delivery, laid in place within 24 hours of delivery.

D. Transportation:

1. Do not pile sod more than two feet (2') deep. 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. Timing:

1. Install sod only between spring and fall. Do not install on frozen or saturated soil.

F. Watering:

1. Lightly water area to be sodded.

G. Fertilizer:

1. Distribute fertilizer uniformly at a rate of 50 lbs. per acre, unless otherwise recommended by soils test. Apply within 48 hours before laying sod.

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H. Sodding:

1. Lay sod on slightly moist soil.
2. Lay with longest dimension parallel to contours in continuous right-of-ways.
3. Tightly butt ends of sod together. Stagger joints. Compact vertical joints between sod strips by rolling so sod will be in contact with the ground surface. Cut right-of-ways terminating on property lines to straight line.
4. When sod and soil are moist, roll sod lightly as soon as possible after laying. Roll with enough weight to ensure contact with soil for proper rooting.
5. Add topsoil along exposed edges to match existing grade; feather topsoil out approximately one foot (1').
6. Make sure finished sodded areas positively drain so that no irrigation water or storm water will pond in sodded areas. Relay sod if necessary to correct.
7. Water thoroughly with fine spray immediately after planting.

I. Re-sodding:

1. Re-sod spots larger than 1 sq. ft. not having uniform stand of grass prior to Final Acceptance.

3.7 TREES, PLANTS AND GROUNDCOVER

A. Inspection

1. Schedule a tree delivery and layout inspection with Town. Trees will be inspected for form, condition and health. Rejected trees to be removed immediately from site and replaced. Replacements are subject to re-inspection by Town. Inspection requirements include trees to be off-loaded from trucks to allow for full access. Binding material and trunk protection to be removed by Contractor prior to inspection.
2. Tree layout inspection shall be done at the same time the tree materials are delivered. Utility line locates to be visible in all planting areas. Stakes for proposed tree locations to be placed in planting areas requiring Town inspection.

B. Delivery and storage of plant materials:

1. Shade cloth shall be used to cover trees during transportation. B&B trees should have limbs bound to prevent injury during delivery. Keep root systems moist and protect plants from adverse climate and transportation conditions. B&B stock shall be heeled in immediately upon delivery to the site unless it is planted within 4 hours. Store other plants in shade and protect from adverse weather and from drying out. When handling, do not lift plants by trunk or stem; handle only ball or container. Obtain Town inspection.

C. Layout:

1. Stake plant locations or set out plants per plans. Verify prior to planting that plants when mature will not interfere with existing trees, irrigation, lighting, utilities and other equipment, both underground and overhead. Also verify proper spacing between trees and other hard surfaces. Notify Town for approval if plant locations must be changed.
2. Obtain new utility locates if needed – all utilities must be clearly visible at the time of Town plant material layout inspection.
3. Obtain Town inspection.

D. Excavation of planting pits:

1. Excavate planting pits per Town details; dispose of any rocks off site.
2. Trees: Trees shall be planted at a depth where the root flare above the solid rootball is at grade in depth of pit shall be two inches (2") (non-irrigated areas) and four inches (4")

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(above grade in irrigated turf areas) less than the depth of the root ball so that water will drain away from trunk. Contractor to contact Town staff if they are not sure where the root flare is located on the tree. Modify depth of pit if soil type or conditions warrant and/or per Town direction. Minimum diameter of the base of the planting pit shall be 2 times the diameter of the root ball (minimum). The width of the hole at the top of the pit shall be three (3) times the diameter of the root ball

3. Shrubs, perennials and ground cover: top of root ball shall be positioned slightly higher (1"-2") than finish soil grade so that water will drain away from plant. Modify depth of pit if soil type or conditions warrant and/or per Town direction. Diameter of the pit shall be 2 times the diameter of the root ball (minimum).

E. Planting:

1. Balled and Burlapped trees (B&B) (Do not plant if tree trunk is loose in root ball or if ball is cracked or broken before or during planting process.)
 - a. Remove bottom 1/3 of wire basket from root ball. Wire basket must be completely removed. Place wire on tree stakes for Town inspection prior to removal from site.
 - b. Place in pit with burlap intact on undisturbed soil in center of pit to proper grade, and plumb.
 - c. Face for best effect.
 - d. Cut and remove remaining wire and twine. Do NOT pull wrapping or wire from under ball as it may damage the root ball.
 - e. Backfill 2/3 of pit; remove top 1/3 of burlap; complete backfill. DO NOT compact backfill mix by tamping. DO NOT backfill over crown of root ball or exceed soil depth of root ball; crown must be at proper planting depth.
 - f. Install five inch (5") high watering basin around trees.
 - i. Remove and grade out berm around basin after two thorough waterings in irrigated areas. Mulch after berm basin is removed.
 - ii. Mulch and leave basin in dryland areas.
2. Container grown stock (Do not plant if root ball is cracked or broken before or during planting process.)
 - a. Carefully remove plants from containers without injury or damage to root ball; do not cut cans with spade or ax.
 - b. Vertically score root ball using sharp knife, about 1/8" deep and about every 2-3" in circumference. If stock is root bound, butterfly root ball by cutting ball in half, halfway up from the bottom; flair root ball out to sides when planting.
 - c. Set plant plumb, face for best effect, make sure crown of root ball is at correct grade.
 - d. Backfill and install four inch (4") high watering basin around planting pit. DO NOT compact backfill mix by tamping. DO NOT backfill over crown of root ball or exceed soil depth of container; crown must be at or slightly above finished ground level. Mulch after two thorough waterings.
3. Completion of planting:
 - a. Shape surface of finish grade around root ball so water drains away from trunk or stems and to match finish grade at the edge of the planting pit.
 - b. Remove plant tags from trees and shrubs.

F. Edging:

1. Steel Edging: Install so top of edging is two inch (2") maximum above finish grade and flush with the top elevation of curb or pavement which it abuts. Edging shall meet pavement or

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curb at right angle. Stake at manufacturer's recommended intervals on smooth radius using steel stakes. Punch holes as needed for drainage.

2. Cut Edging: Where steel edging is not used, cut 6" deep vertical straight sided trench at mulch shrub bed edge. For individual trees, edger cut is to be a 3' radius from trunk of tree. Transition 6" deep cut edge to specified mulch depth (4") at a 45 degree angle.
- G. Mulching:
1. Mulch depth:
 - a. Tree pits - four inch (4") deep, keep two inch (2") from trunk.
 - b. Shrub pits – three inch (3") deep (minimum).
 - c. Remaining shrub bed - four inch (4") deep (minimum).
 - d. Groundcover beds – three inch (3") deep (minimum).
 2. Place geo-textile landscape fabric under mulch except in individual tree rings or where any other areas specifically approved for omission. Lay straight and even with eight inch (8") overlap at edges. Staple along edges with steel U pins on twenty four (24") spacing. Staple folds in fabric to keep below mulch material.
 3. Tree rings – mulch to extend to edge of planting pit and shall encompass tree stakes in mulch area.
 4. Timing: The Town recommends delaying mulch application at tree rings in irrigated turf areas until after turf is established to minimize moisture build-up at tree bases. All other plants shall be mulched within two days of planting or after specified number of waterings for individual trees and shrubs.
- H. Staking and guying:
1. Standard Guying System: Pound six-foot (6') long metal or wood stakes into undisturbed soil beyond the planting pit so that stake is secure. Where possible, locate stakes within the required mulched tree ring area. Secure STRAP-X or wire through metal grommets on canvas strap to tree and wrap above first branch on deciduous trees or at mid-point of tree on coniferous trees. Secure guy to stake so that it is taut but allows some movement. Where wire is used as a guy, secure it so that no sharp projections are extending from post and flag it with ½" PVC pipe or white plastic flagging for visibility. Adjust tension on guy if needed. If metal t-posts are used, place PVC caps on top of stakes. Wooden pole stakes (2"x6") may be used without PVC caps.
- I. Pruning:
1. Prune minimum necessary to remove injured twigs and branches, deadwood and suckers to insure healthy tree. Do not prune central leader.
- J. Beaver protection:
1. Install fencing in circle around all deciduous trees (existing and new) in areas prone to harvesting by beaver, as determined by Town. Fencing to be cut in lengths long enough to provide a minimum twelve inch (12") separation between trunk and fence (all sides). Additional sections of fencing are to be wired together in sections if needed to fully cover trunk from ground to first branch. Ends and additional sections of wire fence loop to be securely fastened. Fencing to be cut into lengths in such a manner as to allow cut ends to be bent to secure enclosure around trees. Ends to be bent in to tree to prevent safety hazards and projections. Fence must be in contact with ground around entire tree using steel U pins to secure, if needed.
- K. Prairie dog enclosure:
1. Contact Town or Colorado Division of Wildlife for recommended installation.

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3.8 COMPLETION SERVICES

- A. Provide to Town record drawings including horizontal verification of concrete path and all other structures.
- B. Irrigation Systems:
 - 1. When project construction is substantially complete, request from Town inspector and coordinate with Irrigation Design Professional for inspection and demonstrate system to Town inspector.
 - 2. When project construction is ready for Construction Acceptance, request from Town inspector for an inspection (all punch list items must be complete) and coordinate with Irrigation Design Professional for inspection.
 - a. Demonstrate system to Town inspector and Irrigation Design Professional.
 - b. Submit turn-over items (items must be accompanied by a transmittal letter and delivered to the Town inspectors' offices. Delivery at the project site is not acceptable.
 - c. Provide Town personnel with list of equipment ordering information including model numbers, size and style for all components.
 - d. Provide one mylar, one blue line set and one pdf format electronic file (for all projects), and one electronic file to be able to be opened in AutoCAD Release 2006, in .dwg format (for all Town capital projects), of as-built irrigation drawings no larger than 24" x 36". Common Open Space as-built drawings are to be a separate drawing package from Town Owned areas as-built drawings. The Town may require .dwg AutoCAD files for development projects if future development is anticipated in the area. (Construction plans may be used for as-built base map information. Coordinate with developer and consultant team to obtain). Drawings to have the following information as a minimum:
 - i. System shown as installed with each sheet clearly marked "RECORD DRAWINGS".
 - ii. The name of the project, date of installation, date of as-built drafting, company name of installer, name of as-built drafter, installer company phone number and back-up phone number for night and weekend contact.
 - iii. Sleeves and valves noted with dimensions to each from two different permanent objects.
 - iv. Control valves noted with gpm, valve number and valve size clearly indicated for each valve. Valve numbering to match as-built controller sequencing.
 - v. Horizontal verification of all irrigation pipes, irrigation heads, valve boxes, wiring, electrical boxes, controller, meter, and backflow prevention devices. Noted information shall include all pipe sizes, zone numbers, valve locations, head types, valve types and model numbers, controller type and model number, and drip emitter chart.
 - vi. Irrigation record drawings shall include all pertinent physical features (such as concrete paths, sidewalks, fences, ponds, buildings, pump house, parking lots and athletic fields).
 - vii. No contour lines shall be shown on irrigation record drawings unless required by the Town.
 - viii. Certification statement signed and executed by Irrigation Design Professional and Contractor.
 - e. Provide two sets of all irrigation sheets reduced to 11" x 17", with each zone color coded, and each sheet plastic laminated.
 - f. Provide Town and on-going HOA maintenance personnel with 1 each of all operating keys, servicing tools, test equipment, remote hand-held radios (programmed to Town frequency – for Town Owned areas only), warranties/guarantees, and maintenance

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manuals as needed for on-going maintenance of area. Any exceptions to this requirement are to be obtained in writing from Town inspector staff.

- g. Clean Up: Remove all excess materials, tools, trash and debris from site.
- h. Complete additional punch list items if determined necessary Town Inspector and Irrigation Design Professional.
- i. Schedule re-inspection by Town and Irrigation Design Professional to verify completion and acceptance of all punch list items if necessary.
- j. Request Final Acceptance inspection.
 - i. Problems identified during the punch list inspection and project work-through will be coordinated with Town inspector and Irrigation Design Professional with solutions executed by the Contractor. Contractor shall complete punch list of items requiring resolution prior to issuance of Final Acceptance.
 - (a) At the discretion of Town inspector or Irrigation Design Professional, a new pressure test may be required at the time of Final Acceptance inspection.
 - (b) Clean up: Remove all excess materials, tools, trash and debris from site.
 - ii. Schedule a project re-inspection with Town inspectors and Irrigation Design Professional to verify completion of punch list items and project work-through issues if necessary.

C. Seeding

1. Turn over items to town inspector:
 - a. Seed tags to verify seeded mixture matches approved plans.
2. Maintenance
 - a. Mowing: When grasses reach three inches (3") in height, mow to two inches (2") in height. Repeat as needed in dryland areas to encourage spread of grass stolons and prevent seed development of weeds. Repeat in areas where mowing is to be standard maintenance practice, to maintain grass height at 2-1/2". Do not cut off more than 1/3 of grass leaf in a single mowing operation. Excessive clippings to be removed from turf areas. Adjacent paved areas to be swept after mowing.
 - b. Weed control: During establishment mechanical weed control should be employed to prevent weed flowering and seed set. When grasses are sufficiently established, chemical weed control can be applied to selectively eradicate invasive and noxious weeds.
 - c. Fertilizing: Apply balanced fertilizer to maintain turf vigor during warranty period.

D. Sod Maintenance

1. Mowing: When grass reaches three inches (3") in height, mow to two inches (2") in height. Mow weekly and maintain grass between two inches (2") and 2-1/2" in height. Do not cut off more than 1/3 of grass leaf in a single mowing. Remove grass clippings from all paved surfaces.
2. Fertilizing: Distribute fertilizer uniformly at a rate of 5 pounds of balanced fertilizer per 1000 square feet of sodded area unless otherwise recommended by soils test, three weeks after sodding is complete. Fertilizing thereafter is to be in accordance with standard maintenance practices for turf areas, and as needed to achieve and maintain a vigorous and healthy stand of grass.
3. Weed Control: During establishment use mechanical means to control weeds. When sod is sufficiently established, chemical weed control can be applied to selectively eradicate invasive and noxious weeds.

E. Record Drawings of trees, plants and groundcover

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1. List of all plant material installed, including sizes and quantities as certified by a Landscape Architect.

3.9 GUARANTEE/WARRANTY

- A. Prior to final acceptance, all bridges, concrete paths and other miscellaneous improvements under this section are to be warranted against defects. Cracking, settling, displacement and damage to those improvements are to be repaired or replaced by the Developer at no cost to the Town. Repairs and replacements are to be covered by warranty.
- B. Irrigation Systems:
 1. For the period following Construction Acceptance notice by Town and prior to Final Acceptance, all irrigation materials, equipment, workmanship and other appurtenances are to be guaranteed/ warranted against defects. Settling of trenches or other depressions, damages to structures or landscaping caused by settling and other defects to be corrected by the contractor at no cost to the Town or homeowners association. Make repairs within seven days of notification by the Town staff representative or Irrigation Design Professional unless an emergency or hazardous situation dictates immediate correction. Guarantee/Warranty applies to all originally installed materials and equipment, and to replacements made during the guarantee/ warranty period.
- C. Seeding
 1. Warranty seeded areas for consistency and completion of coverage. Re-seed as needed to ensure a successful stand of grass as accepted by the Town. Once a vigorously growing stand of grass is achieved, 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 irrigated turf grass areas. In native grass areas, it is considered established when the grass area has at least 70% coverage. Maximum single bare spot acceptable in dryland areas is 2 sq. ft. All seeded areas that do not meet the satisfactory standard of establishment qualifications shall be re-seeded and mulched.
 2. It is the developer'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 the noxious weeds.
 3. Extended warranty period may be required as determined by Town inspector.
- D. Sodding
 1. Warrant sodded areas for consistency and completion of coverage. Re-sod areas as needed to obtain acceptance by the Town. Once a vigorously growing stand of grass is achieved, the request for Construction Acceptance may be made.
- E. Trees Plants and Groundcover
 1. For the period prior to Final Acceptance, all plant materials, landscape materials, workmanship and other appurtenances are to be guaranteed/warranted 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 Town or Homeowners Association . Plant materials that are in an unhealthy or unsightly condition or that have lost their natural shape due to dead branches or excessive pruning of dead branches are to be replaced at no cost to the Town. Guarantee/Warranty applies to all originally installed materials, and to replacements made during the guarantee/warranty period.
 2. For areas to be maintained by Developer or subsequent property owners/HOAs, requirements per 3.9.C.2 apply in perpetuity.

END OF SECTION 33 47 00