32 00 00 – EXTERIOR IMPROVEMENTS

GENERAL INFORMATION

- Designate and enforce project limits, staging areas and site access in order to limit construction damage to areas adjacent to the construction. Refer to specific requirements in Division 1.

- Do not allow parking or storage on turf areas unless approved by UNC Grounds Department. If approved, contractor must relieve compaction, repair damaged irrigation and replace sod as needed.

- Define adequate protection of trees and other plantings. This should include substantial fencing when appropriate. Protected area should be large enough to prevent compaction of soil within the root / drip zone. If passage beside a tree is mandatory, a bridge shall be constructed over the root zone of the tree and the trunk shall be protected. Do not trench within the drip line.

- Provide storm water management plan and controls in accordance with City of Greeley requirements.

- Landscape designers shall review the UNC Landscaping Master Plan (available on the Facilities Management website) and incorporate relevant requirements as appropriate.

SECTIONS INCLUDED:
32 01 00 – OPERATION AND MAINTENANCE OF EXTERIOR IMPROVEMENTS
32 10 00 – BASES, BALLASTS, AND PAVING
32 14 00 – UNIT PAVING
32 33 00 – SITE FURNISHINGS
32 80 00 – IRRIGATION
32 90 00 – PLANTING

32 01 00 – OPERATION AND MAINTENANCE OF EXTERIOR IMPROVEMENTS

SITE RESTORATION

- Scarify all planting areas for ground covers and lawns to a depth of at least 12”. Scarify in two directions. Include all areas subject to traffic during construction.

- Restore and test all sprinkler systems damaged by construction.

- The following activities require review by the owner prior to commencement:
  - inspection of plant materials

- review of amended topsoil prior to placement
- subgrade examination and scarification
- sample stake and tie set-up
- irrigation testing

32 10 00 – BASES, BALLASTS, AND PAVING

WALKS, PAVING and SURFACING

- Sidewalks and bike paths shall be a minimum of 6’-0” wide to allow for use of snow removal equipment. Do not locate walks immediately adjacent to the edge of parking lots or streets.

- Provide a minimum of 6’-0” radius at all intersecting walks to accommodate snow removal equipment.

- Layout walks to match probable pedestrian traffic patterns in order to limit foot traffic on planted areas.

- Specify “skate stoppers” on handrails.

- Allow space for a bicycle parking area adjacent to the main building entrance. The type of bicycle rack proposed for use shall be coordinated with the site furnishing specification 32 33 00. Final selection shall be reviewed and approved by the owner. Provide appropriate landscaping to screen bicycle parking areas.

32 14 00 – UNIT PAVING

- Pavers are typically Medium Ironspot by Endicott Clay Products or Pacific Clay Manufacturing.

32 33 00 – SITE FURNISHINGS

SITE FURNISHINGS

- Standard site furnishings such as benches, trash containers, tables, bicycle racks are as follows:
  - Benches w/ backrest – Victor Stanley (or approved equal) RB–28 Powder Coat color RAL 5003 Sapphire Blue

  - Benches w/out backrest – Victor Standley (or approved equal) RB-12 Powder Coat RAL 5003 Sapphire Blue

- Tables w/ benches (Fixed) – Victor Stanley (or approved equal) Powder Coat color RAL 5003 Sapphire Blue
  - Tables IPR-4 48”
  - Seats FTRS-36

- Café Table – Victor Stanley – PRSCT-36R Powder Coat RAL 5003 Sapphire Blue

- Café Chairs – Victor Stanley – PRSCA-8 Powder Coat RAL 5003 Sapphire Blue

- Exterior Trash containers – Victor Stanley (or approved equal) VS SD-35 24 gallon Powder Coat color RAL 5003 Sapphire Blue

- Exterior Trash – Victory Stanley – SD-242 Powder Coat RAL 5003 Sapphire Blue, side-door recycling

- Exterior Trash and Recycling containers – MaxR Verde Collection, Triple stream (double stream can be used but must be approved by Project Manager), Navy Color, Resin Rings – PMS 368 C (Custom Green) Cam locks and custom graphics
  - Exterior to be front load with curved top
  - Prior approval for use of this container required

- Bicycle racks – Ground Control Systems DB-215 Varsity Bike Dock. Surface mount, no logo, Powder Coat RAL 5003 Sapphire Blue

- Bollards – Surface mount, Foldable, Stainless Steel rectangular bollard. Baseplate no larger than 3” above ground for cart/vehicle clearance when folded.
  - Manufacture/Model: Todoin GH-YDW4-2543
  - Yellow reflective tape should be installed around the top and bottom of the bollard for better visibility

32 80 00 – IRRIGATION

IRRIGATION SYSTEMS

GENERAL INFORMATION

- The primary purpose of a landscape irrigation system is to deliver supplemental water when rainfall is not sufficient to maintain the turfgrass and plant materials to meet their intended purpose. A quality irrigation system and its proper management are required to efficiently distribute water in a way that adequately maintains plant health while conserving and protecting water resources and the environment.

Assuring the overall quality of the system requires attention to system design, installation, and management. In particular, this includes the following:

- The irrigation system shall be designed to efficiently deliver water to the landscape by an IA certified professional or aquatic engineer based on complexity of the project scope
- The irrigation system shall be installed according to the irrigation design specifications of the University.
- The irrigation system shall be managed to maintain a healthy and functional landscape while conserving and protecting water resources.

- Water conservation is a primary focus and mission at the University. Irrigation designs are to incorporate innovations that encourage water conservation. Rain gauge, water conservation monitoring and master control systems are required. Designs should designate a portion of the irrigation as inline drip tubing (Netafim or equivalent) when practical.

- Provide class 200 PVC sleeves (minimum 2x pipe diameter) under all walks and drives for irrigation piping. Water lines and wire to be sleeved separately. Scribe all hard surfaces with an X at sleeved crossing

- Sprinkler systems shall be designed to minimize sprinkler heads located in sports fields, vehicular traffic areas or near building surfaces/foundations. System layout shall minimize impact on pedestrian ways.

- Verify available water pressure prior to design. Booster pumps may be required on systems located on Central Campus due to highly variable water pressure. Booster pumps shall be protected in a suitable enclosure. Coordinate location with University.

- Do not locate valves or similar equipment at the intersection of walks or with in 3’ of driveways or walks where vehicle or cart traffic may cause damage.

- Sprinkler contractor shall winterize new sprinkler systems at the end of the first season of operation. Owners sprinkler specialist shall be present.

- Provide as-built drawings, O&M manuals, keys, valves keys, etc. as required in Division 1.

- All shop drawings and submittals shall be reviewed by UNC Facilities Management prior to installation.

IRRIGATION TESTING

- Notify the Owner’s Representative three days in advance of testing. Testing to be performed in the presence of owner’s Irrigation Technician prior to backfilling

- Pipelines jointed with rubber gaskets or threaded connections may be subjected to a pressure test at any time after partial completion of backfill. Pipelines jointed with solvent-welded PVC joints shall be allowed to cure at least 24 hours before testing.

- Subsections of mainline pipe may be tested independently, subject to the review of the Owner's Representative.

I. Hydrostatic Pressure Test (Solvent Weld Mainline Pipe):
   A. Subject mainline pipe to a hydrostatic pressure equal to 140 PSI for two hours **with a limit of 5.0 psi loss allowable.** Test with mainline components installed.
   B. Backfill to prevent pipe from moving under pressure. Expose couplings and fittings.
   C. Expose all remote control valves their riser pipe and service tee fittings.
   D. Observe pressure loss on pressure gauge. If pressure loss is greater than 5 PSI, identify reason for pressure loss. Replace defective pipe, fitting, joint, valve, or appurtenance. Repeat test until pressure loss is equal to or less than 5 PSI.
   E. Cement or caulking to seal leaks is prohibited.

II. Operational Test:
   A. Activate each remote control valve in sequence from controller. The Owner's Representative will visually observe operation, water application patterns, and leakage.
   B. Replace, adjust, or move water emission devices to correct operational or coverage deficiencies.

III. Control System Grounding:
   A. Test for proper grounding of control system per manufacturer's recommendations. Test results must meet or exceed manufacturer's recommendations guidelines for acceptance.
   B. Replace defective wire, grounding rod, or appurtenances. Repeat the test until the manufacturer's guidelines are met.

IV. Testing must be completed and passed to reach Substantial Completion in which time the warranty/guarantee period starts.

IRRIGATION COMPONENTS

PIPE AND FITTINGS:

I. Mainline Pipe and Fittings:
   A. Use rigid, unplasticized polyvinyl chloride (PVC) 1120, 1220 National Sanitation Foundation (NSF) approved pipe, extruded from material meeting the requirements of Cell Classification 12454-A or 12454-B, ASTM Standard D1784, with an integral belled end.

B. Use Class 200, SDR-21, rated at 200 PSI, conforming to the dimensions and tolerances established by ASTM Standard D2241. Use PVC pipe rated at higher pressures than Class 200 in the case of small nominal diameters that are not manufactured in Class 200.
C. Use solvent weld pipe for mainline pipe with a nominal diameter less than 3-inches or where a pipe connection occurs in a sleeve. Use Schedule 40, Type 1, PVC solvent weld fittings conforming to ASTM Standards D2466 and D1784. Use primer approved by the pipe manufacturer. Solvent cement to conform to ASTM Standard D2564.

II. Lateral Pipe and Fittings:
A. Use rigid, unplasticized polyvinyl chloride (PVC) 1120, 1220 National Sanitation Foundation (NSF) approved pipe, extruded from material meeting the requirements of Cell Classification 12454-A or 12454-B, ASTM Standard D1784, with an integral belled end suitable for solvent welding.
B. Use Class 200, SDR-21, rated at 200 PSI, conforming to the dimensions and tolerances established by ASTM Standard D2241, for pipe with a nominal diameter greater than one inch and a quarter (1 ¼"). Use PVC pipe rated at higher pressures than Class 200 in the case of small nominal diameters that are not manufactured in Class 200.
C. Use Schedule 40, conforming to the dimensions and tolerances established by ASTM Standard D2241, for pipe with a nominal diameter less than one inch and a half (1 ½").
D. Use solvent weld pipe for lateral pipe. Use Schedule 40, Type 1, PVC solvent weld fittings conforming to ASTM Standards D2466 and D1784 for PVC pipe. Use primer approved by the pipe manufacturer. Solvent cement to conform to ASTM Standard D2564, of a type approved by the pipe manufacturer.

III. Specialized Pipe and Fittings:
A. Low Density Polyethylene Hose (swing pipe):
    1. Use pipe specifically intended for use as a flexible swing joint.
    Inside diameter: 0.49_+0.01 inch.
    Wall Thickness: 0.10+0.01 inch.
    Color: Black
    2. Use spiral barb fittings as manufactured to fit above mentioned swing pipe.
B. Assemblies calling for flanged connections shall utilize stainless steel studs and nuts and rubber gaskets.
C. Swing Joints, to be factory pre-assembled LASCO Schedule 40 PVC for Mainline assemblies and Rotor-type heads.
D. Swing-pipe *(FunnyPipe*) to be used with Pop Up-Spray type sprinkler heads only with appropriate barb fittings.
E. Assemblies calling for threaded pipe connections shall utilize PVC Schedule 80 nipples and PVC Schedule 40 threaded fittings.

F. Joint sealant: Use non-hardening, nontoxic pipe thread sealant formulated for use on threaded connections and approved by the pipe fitting and valve manufacturers. Where directed by valve manufacturers, use thread tape for threaded connections at valves instead of thread paste.

IV. Joint Restraint Harness:
A. Use a joint restraint harness wherever joints are not positively restrained by flanged fittings, threaded fittings, and/or thrust blocks.
B. Use a joint restraint harness with transition fittings between metal and PVC pipe, where weak trench banks do not allow the use of thrust blocks, or where extra support is required to retain a fitting or joint.
C. Use bolts, nuts, retaining clamps, all-thread, or other joint restraint harness materials that are zinc plated or galvanized.
D. Use on pipe greater than or equal to 3-inch diameter or any diameter rubber gasket pipe.

V. Drip Systems
A. Valve Assembly: Use combination Y-Strainer and Pressure reducer, instead of separate units. This assembly will require PVC Union the same size as valve. Y Strainer unit to be installed before the valve.

MAINLINE COMPONENTS:

- Please include a 1-inch Quick couplers (Rain Bird model) in design to assist with watering and winterizing.

SPRINKLER IRRIGATION COMPONENTS:

I. Remote Control Valve (RCV) Assembly for Sprinkler Laterals: Use wire connectors and waterproofing sealant to join control wires to solenoid valves. Use standard Christy I.D. tags with hot-stamped black letters on a yellow background. Install a separate valve box over a 3-inch depth of ¾-inch gravel for each assembly. Provide ACCU-SET pressure regulator at all spray and rotor sprinkler remote control valves.
II. Valve Boxes to be Armour or Ametek with Green lids. Non-Potable systems to have Purple lids installed.
a. Acceptable alternate manufacturer is Carson

CONTROL SYSTEM COMPONENTS:

I. Irrigation Controller Unit:
A. Recommended Unit to be Pedestal or wall mount *Baseline BaseStation 3200.* Please work with Facilities Management Irrigation Tech for best set-up for each project.
B. Work with Facilities Management on wiring type (conventional vs two wire) for each project.

i. Note - Use of two-wire method will require Baseline BiCoder for each valve
ii. When possible, provide hardline data connection for controller to talk to main controller
    1. Wireless card communication is acceptable when hardline connections cannot be made.
iii. Please include moisture sensors in design of irrigation system.

C. Lightning protection: Provide one 12” x 36” x 0.0625” ground plate, one 5/8” x 10 foot copper clad UL listed grounding rod, 30 feet of #6 AWG bare copper grounding wire, and one CADWELD connector, and two 10-inch round valve boxes at each irrigation controller.
D. Wire markers: Pre-numbered or labeled with indelible non-fading ink, made of permanent, non-fading material.

II. Power Wire:
A. Electric wire from the power source to satellite control unit shall be solid or stranded copper. Type UF single conductor cable or multi-conductor with ground cable, UL approved for direct underground burial. Power wires shall be black, white, and green in color. The Contractor is responsible for verifying that the power wire sizes are compatible and adequate for the control system being used.
B. Splices: Use 3M 82-A series connectors.
C. Conduit: PVC Schedule 40.
D. Warning tape: Inert plastic film highly resistant to alkalis, acids, or other destructive chemical components likely to be encountered in soils. Three inches wide, colored yellow, and imprinted with “CAUTION BURIED ELECTRIC LINE BELOW”

III. Control Wire:
A. Use American Wire Gauge (AWG) No. 14 solid copper, Type UF or PE cable, Ul approved for direct underground burial from the controller unit to each remote control valve.
B. Common Wire: Use American Wire Gauge (AWG) No. 12 solid copper, Type UF or PE cable, UL approved for direct underground burial from the controller unit to each remote control valve.
C. Color: Wire color shall be continuous over its entire length.
    1. Control wire: Red
    2. Common wire: White
    3. Spare control wire: Any color except Red or White.
    4. Spare common wire: Any color except those above.
D. Splices: Use 3M DBY or equivalent.
E. Warning tape: Inert plastic film highly resistant to alkalis, acids, or other destructive chemical components likely to be encountered in soils. Three inches wide, colored yellow, and imprinted with “CAUTION BURIED ELECTRIC LINE BELOW”

OTHER COMPONENTS:

I. Some projects may require a Hydrometer to be installed on the mainline and tied into the Baseline Controller for monitoring water use and detecting leaks. Work with Facilities Management on this requirement.
   a. Netafim Hydroman HydroMeter is preferred manufacturer.

IRRIGATION WORK

LAYOUT:

I. Stake out the irrigation system. Items staked include: back flow device, sprinklers, mainline and lateral pipe, control valves, quick coupling valves, controller, and isolation valves.
II. System layout shall minimize impact on pedestrian ways, vehicular traffic, building surfaces or foundations.
III. Sports field layouts to minimize impact on play in regards to head location.
IV. Owner's Representative & Irrigation Tech will determine the exact site location during sprinkler layout review.

EXCAVATION, TRENCHING, AND BACKFILLING:

I. Excavate to permit the pipes to be laid at the intended elevations and to permit work space for installing connections and fittings.

II. Minimum cover (distance from top of pipe or control wire to finish grade):
   A. 24-inches over mainline pipe and over electrical conduit.
   B. 28-inches over control wire.
   C. 14-16-inches over lateral pipe.

III. Maintain at least 15-feet clearance from the centerline of any tree.

IV. All wiring and piping shall be reviewed in the trench by the owners sprinkler specialist prior to backfilling.

V. Where utilities conflict with irrigation trenching and pipe work, contact the Owner's Representative for trench depth adjustments.

SLEEVING AND BORING:

I. Extend sleeve ends six inches beyond the edge of the paved surface. Cover pipe ends and mark with stakes.

II. Bore for sleeves under obstructions that cannot be removed. Employ equipment and methods designed for horizontal boring.

32 90 00 - PLANTING

LANDSCAPING - SOD

- Do not specify turf adjacent to buildings. Provide minimum 12” wide mowing strips to reduce the need for hand edging and to reduce the amount of water applied adjacent to the building. Landscaped zones adjacent to the building may also be specified.

- Sod used for repair or replacement of existing sod shall match the pre-existing or surrounding sod.

- New sod shall be equivalent of a current 5 blend blue grass cultivars with 25% perennial Rye. Provide submittals of proposed seed varieties and description.

- Areas to receive sod shall be thoroughly scarified to a minimum of 12” deep. Premium 3 contractor, Class II Compost from A1 Oreganics, or approved equal, shall be spread over the surface at a rate of three cubic yards per thousand square feet. Specify other soil amendments as appropriate. Areas shall then be tilled to a minimum of 6 inches until no manure or amendments appear on the surface.

- Contractor shall be responsible for watering necessary for initial establishment of new sod. Contractor shall also be required to maintain the sod until the time of substantial completion of the project. Maintenance shall include watering, mowing and rolling. Mowing to occur at least once per week and cut to a height of 2 ½ to 3 inches.

LANDSCAPING – TREES, SHRUBS and PLANTINGS

- Shrub beds shall be mulched 3”-4” deep with shredded wood mulch or approved cobblestone. Fabric weed barrier is generally not required. Specify pre-emergent application prior to installation of mulch.

- Specify heavy gauge steel edging around all planting areas at a minimum. Poured concrete landscaping edging is preferred.

- Ground covers should be specified with close plant spacing to allow beds to be established as quickly as possible.

- Minimize the use of small planting areas. These are very labor intensive to maintain.

- Plantings shall not interfere with site or security lighting.

- All trees in lawn areas shall have a 3 foot diameter circle of shredded wood mulch. No steel edging required.

- Tree stake should include protective cap and painted RAL5003 Sapphire Blue. Specify nylon tree strap with galvanized steel wire.

- Layout of trees shall consider the location of existing utilities, walks, signs and lighting.

    - Maintain the following minimum clearances:
        - 10 feet from sewer lines
        - 5 feet from water, gas and electrical lines
        - 5 feet from walks and curbs. Minimum of 80 inch vertical clearance above pedestrian walks
        - 15 feet from building walls for most shade trees
        - Recommended Street Tree spacing is 30-35 feet, depending on purpose, species and design.
        - Maintain minimum of 25 ft clearance from Exterior light poles when locating shade trees.; 10ft for Ornamental trees.
        - Avoid Tree and landscape plantings along designated “Snow Pile” locations in Parking lot perimeter areas.

Tree and Ornamental Shrub Selection

- The university campus maintains arboretum status, and that includes the promotion of a healthy diversity of trees and ornamental shrubs. The university encourages the planting of both non-native and Colorado native plants as well as plants suitable for the Front Range climate. The University does not encourage the planting of many undesirable species. The University does have a collection Cottonwoods, White Poplars, Russian olives and many Silver Maples. Many of these “*undesirables”* were planted in the early 1900’s and are now our most prized old-growth trees. In the future, the university will continue to maintain our native tree collection and plant token specimen trees for educational purposes.

PROHIBITED TREES and ORNAMENTAL SHRUBS

- <u>Tree Genus: Populus</u> All species, cultivars of this genus are not desirable trees for the university campus. All poplars are soft-wooded, short-lived and prone to storm damage and aggravated by their susceptibility to serious stem and trunk canker diseases. This genus is notorious for shallo
- w root systems that produce abundant root sprouts resulting in lawn maintenance problems. This genus is not to be included into new designs or replacement schedules.

- Tree Genus: Salix all species and cultivars of Willows are strongly discouraged. They are typically a wet soil species that require abundant water to survive. Willows again are typically weak-wooded, short-lived and produce abundant litter in form of broken twigs and branches.

- Silver Maple (Acer Saccharinum) The species is fast –growing, is also soft-wooded and prone to storm damage. It also has a shallow root system which causes lawn maintenance problems.

- Autumn Flame Maple (Acer X freeman) and Autumn Blaze Maples develop chlorotic symptoms as trees age due to alkaline soils.

- Siberian Elm (Ulmus pumila). Although highly resistant to Dutch elm disease, it is fast growing and soft-wooded and also very prone to storm damage. The species is also prone to insects including scale and various leaf beetle infestations. It produces mass amount of seed that result in many weed seedlings that invade the landscape.

- Salt Cedar (Tamarisk). This species is prohibited in the State of Colorado. It is considered an invasive species that will eventually displace Colorado native vegetation.

- Russian Olive (Eleagnus angustifolia). This species is also considered invasive and is no longer planted in the State of Colorado. As existing trees on campus fail or die, they will not be replaced.

- Ginkgo biloba (Female). Female trees produce fruit that constitute a serious litter problem and that also give off an unpleasant odor as they decay. Male cultivars are currently available that make excellent use in the landscape.

- Tree Genus: Fraxinus All species and cultivars are prohibited due to the recent introduction of Emerald Ash Borer in Colorado

- PROHIBITIVE ORNAMENTAL SHRUBS, VINES
- Cornus sericea Kelseyi or other dwarf cultivars.
- Rose of Sharon and cultivars (Hibiscus syriacus)
- Caryopteris and cultivars
- Juniperus chinensis “pfitizeraiana”
- Parthenocissus quinquefolia
- Parthenocissus tricuspidata
- Taxus Genus and all cultivars
- Viburnum Opulus and cultivars

- Also review City of Greeley Forestry Website for extensive recommended and Prohibited Tree list.

- Refer to the Landscape Master Plan guidelines for specific information regarding tree selection