

### INTRODUCTION

Streetscape Project Phases 1 and 2 designed and constructed many improvements in Brookfield's Town Center District. This design was developed after receiving community input, conducting studies from professional consultants at Fitzgerald and Halliday and consulting with the various Land Use Commissioners and Department Managers. The final product was a Revitalization Plan that is highlighted in the Town's Plan of Conservation and Development (POCD). The goal of this plan is to transform our downtown into a pedestrian friendly area, connecting it to the Still River Greenway Trail, so to attract commercial and residential development.

#### DISCUSSION

This document describes the technical specifications and construction methods for the streetscape and amenities design used for Streetscape Phases 1 and 2 and all future Streetscape phases as well as any other development in the TCD. To assure a consistent design for future developments in the TCD and to secure funding for future Phases, the Town is requesting the Zoning Commission incorporate these design and standard guidelines as <u>Streetscape Sidewalk and Amenity Specifications</u>.

A key element of this Plan is the sidewalk and multi-use trail design, associated amenities and roadway improvements. This "streetscape" design includes the following elements.

- Granite curbing.
- Sidewalk lights with banner and hanging basket arms every 50 feet on alternating sides of the road, including an integrated electrical supply network. Hanging basket and banner arms are required on all sidewalk light poles of Federal (Rt 202), Station, and Whisconier (Rt 25) Roads. Light poles on other streets in the TCD are not required to have hanging basket and banner arms. [amended eff. 2020-Apr-27]
- Brick pavers between the granite curb and walkway or multi-use trail.
- The multi-use trail must be 10 feet wide when located on Federal (Rt 202) Road, otherwise the trail can be 8 feet wide. [amended eff. 2020-Apr-27]
- ADA-compliant concrete sidewalk with SaltGuard and/or bituminous multi-use trail with cast iron detectible warning tiles.
- Concrete driveway aprons with SaltGuard, 8" Class A concrete with wire mesh.
- Decorative crosswalks with Rapid Rectangular Flashing Beacons (RRFB), push buttons and pedestrian signals in accordance with CT DOT Standards.
- Ornamental trees and shrubs with root barrier, where space allows, under utility poles.
- Shade trees and shrubs with root barrier, where space allows, where no utility poles.
- Bus shelters (with location approved by HART).
- Bike Racks.
- As much road side parallel parking as possible on Federal Rd.
- Under Federal Road utility conduit to eliminate overhead utility crossings (future).
- Revised storm drainage system, were necessary, to handle discharge water behind new sidewalks.
- The elimination of postal mail boxes on Federal Rd, replaced by Cluster Box Units (CBU).\*
- For business signs that have to be relocated, replace with signage following the new sign regulations. \*
- The elimination of cobra street lights and parking lot flood lights. \*
- Relocation of utility poles that would have otherwise been in the walkway. \*



- "Pocket Park" with benches and landscaping where space allows (Phase 3). \*
- Under sidewalk utility conduit to eliminate overhead utility crossings (future). \*
- Potable water and sewer connections from the mains under the new sidewalk to property lines so to avoid future construction under the new sidewalks and roadway.\*

The items above marked with an asterisk (\*) do not show specifications in the Table of Standards below. These items require coordination with the utility companies and/or property owners.

Some work may take place on state right-of-way requiring a CT DOT Encroachment Permit and some on private property requiring easements from property owners.

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Figure 1: Typical Section: Granite Curb, Paver and Bituminous Overlay Detail





#### Figure 2: Misc. Details 1: Radial Granite, Detect. Warning Tile, Ramp & Bike Rack Detail





Figure 3: Misc. Details 2: Granite CB, Ornamental Light, Paver and Planting Bed Detail





Figure 4: Granite Curb - Concrete

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Figure 5: Granite Curb - Stone





Figure 6: Driveway Ramps and Sidewalk Detail



Figure 7: Planting Details for Trees





**Figure 8: Planting Details for Shrubs** 



Figure 9: Typical Section: Under Road Utility Crossing

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# NOTE: all below items to match existing to promote consistency of design and look.

### 6" GRANITE STONE CURBING and 6" GRANITE CURVE STONE CURBING

The finish product shall include ¼" Bevel & Thermalize Top, rounded edge (bull nose) at driveway corner.

#### CONCRETE SIDEWALK

The item shall include furnishing and applying water and salt repellent sealer to the surface of the finished concrete sidewalk.

#### Materials:

Acceptable Manufacturers:

- 1. Consolideck<sup>®</sup> Saltguard<sup>®</sup> WB by Prosoco www.prosoco.com 1-800-255-4255
- 2. Powerseal 40 water repellent sealer by Vexcon www.vexcon.com 1-888-839-2661 or approved equal

**Construction Methods:** Water and salt repellent shall be installed per the manufacturer's recommendation and installation instructions.

#### **BRICK PAVERS**

#### Description:

This item shall consist of furnishing and installing brick pavers on a processed aggregate base to the dimensions and details as shown on the plans and in accordance with these specifications.

#### Materials:

No expansion joint is required. The brick is proposed to be placed on sand setting bed with joint filler sand. Acceptable brick paver shall be manufactured by the following:

- 1. Pine Hall 2 ¼" x4" x8" English Edge F/R Pavers or 2701 Shorefair Drive, P.O. Box 11044 Winston-Salem, NC 27116
- 2. The Belden Brick Company Regimental Full Range Paver 4x8x2-1/4 or P.O. Box 20910, Canton, Ohio, 44701-0910
- 3. Whitacre Greer Shade #36 4x8x2-1/4 1400 S Mahoning Ave, Alliance, OH 44601

Joint Filler Sand: Acceptable polymeric joint filler sand shall be manufactured by the following or approved equal. The color shall match what was installed in the Streetscape Phases 1 and 2.

- 1. Silpro Silpro Paver Sand Polymeric Joint Sand, 2 New England Way Ayer, MA, 01432-1514
- 2. The Quikrete Companies Atlanta, Georgia 30305 www.quikrete .com
- 3. Sakrete of North America Charlotte, North Carolina <u>www.Sakrete.com</u>

#### **Construction Methods:**

The pavers will be free from excessive chips, cracks, voids, discoloration or other defects that might be visible or cause staining in finished work. The brick pavers will be mixed from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures. The brick pavers will be cut with motor-driven masonry saw equipment to provide clean, sharp, un-chipped edges. Cut units to provide



pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

1 – Excavation: Excavation shall be made to required depths below finish grade, as shown necessary to achieve the desire surface drainage for the finish surface. The Contractor shall be careful of the adjacent concrete sidewalks, building and bituminous concrete driveway and curbing. Any damage caused to the surrounding features will be replaced at the Contractor's expense.

2 – Base Course: The Processed Aggregate Base for the base course shall be uniformly spread upon the compacted subgrade to the require depth and thoroughly compacted.

3 – Brick Pavers: The brick pavers shall be set to the line and grade to achieve the desired finished surface drainage using the running bond pattern. The brick pavers shall be installed hand tight with a maximum joint not to exceed 1/8". After the brick pavers have been completely laid, sweep joint sand into the joints until full. Lightly fog with water and continue to fill with sand until no further settlement occurs. The brick will be confined with curb and sidewalk throughout the project. No edge restraints are required.



### INLAID THERMOPLASTIC PAVEMENT MARKING SYSTEM

### Description:

This work shall consist of the installation of a durable imprinted aggregate reinforced preformed thermoplastic pavement marking system herein referred to as "the System", that provides a colorized, textured, highly attractive and durable topical treatment to the surface of asphalt pavement. Typically, the system replicates, in relief, the grout lines common to brick or other types of unit pavers but may also be used to create other patterns. It is intended for use on asphalt pavements to create traffic calming solutions and decorative crosswalks, medians, intersections and through areas in parking lots.

#### Materials:

Inlaid Thermoplastic Pavement by

- 1. "Traffic Patterns XD<sup>®</sup>" by Ennis-Flint of Thomasville, NC, telephone 336.475.6600, <u>www.ennisflint.com</u>
- 2. "StreetPrintXD" by Alternative Paving Concepts, Reston, VA, telephone 1-866-697-4338, www.alternative-paving.com
- 3. or approved equal

The aggregate reinforced preformed thermoplastic is typically supplied in panels measuring 2 ft. x 2 ft.  $[\pm \frac{1}{3} \text{ in.}]$  The System shall be provided in a colonial brick color and herringbone pattern.

The System shall utilize a resilient, aggregate reinforced preformed thermoplastic product which contains a minimum of thirty percent (30%) intermixed anti-skid/anti-slip elements and where the top surface contains anti- skid/anti-slip elements. These anti-skid/anti-slip elements must have a minimum hardness of 6 (Mohs scale).

The System must be resistant to the detrimental effects of motor fuels, antifreeze, lubricants, hydraulic fluids, etc.

The System manufacturer must be ISO 9001:2008 certified for design, development and manufacturing of preformed thermoplastic, and provide proof of current certification.

Must be composed of an ester modified rosin impervious to degradation by motor fuels, lubricants, etc. in conjunction with aggregates, pigments, binders, and anti-skid/anti-slip elements. Pigments and anti-skid/anti-slip elements must be uniformly distributed throughout the material. The material conforms to AASHTO designation M249, with the exception of the relevant differences due to the material being supplied in a preformed state, being non-reflective, and potentially being of a color different from white or yellow.

#### Pigments:

**White:** The material shall be manufactured with sufficient titanium dioxide pigment to meet FHWA Docket No. FHWA-99-6190 Table 5 and Table 6 as revised and corrected.

**Other Colors:** The pigment system must not contain heavy metals nor any carcinogen, as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations. **Skid Resistance:** The surface of the material shall contain factory applied anti-skid/anti-slip elements with a minimum hardness of 6 (Mohs scale). Upon application the material shall provide a minimum skid resistance value of 60 BPN when tested according to ASTM E 303.

**Slip Resistance:** The surface of the material shall contain factory applied anti-skid/anti-slip elements with a minimum hardness of 6 (Mohs scale). Upon application the material shall provide a minimum



static friction of coefficient of 0.6 when tested according to ASTM C 1028 (wet and dry), and a minimum static coefficient of friction of 0.6 when tested according to ASTM D 2047.

Thickness: The material must be supplied at a minimum thickness of 150 mil.

**Environmental Resistance:** The material must be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to oil and gasoline.

**Storage Life:** The material may be stored for 12 months, if stored indoors and protected from the elements.

**Transverse Lines to Supplement System Application:** Supplied as white, retroreflective epoxy resin line stripe meeting requirement of Form 817, section 12.10. Consult the manufacturer's published application instructions for the line stripe material selected, for proper application methods.

#### **Construction Methods:**

The System must be able to be applied to asphalt surfaces without preheating the application surface to a specific temperature.

The System must be able to be applied in temperatures down to 45°F (7°C) without any special storage, preheating or treatment of the material before application.

The System is applied to asphalt pavement using proprietary reciprocating infrared heating equipment. A two-part epoxy sealer specified by the manufacturer must be applied to the substrate prior to preformed thermoplastic application to ensure proper adhesion, and to provide reinforcement for larger volumes of material. Immediately following sealer application, panels of aggregate reinforced preformed thermoplastic are positioned properly on the asphalt substrate. The preformed thermoplastic is then heated to the required melting temperature. Additional aggregate may be applied to the preformed thermoplastic surface as needed following the melting process, to achieve added friction properties and a uniform surface appearance. As the material is cooling, it is imprinted with a vibratory plate compactor and a template made from 3/8 in. (9.5 mm) flexible wire rope in the required design to create crisp, clean lines which define the pattern.

**Stamping Templates:** A wire rope template is required in the execution of the System. The template is used for imprinting the defined pattern once the preformed thermoplastic has been applied. The wire rope diameter for the imprinting template used for the specified pattern is 3/8 in. (9.5mm). The stamping templates are distributed by the System manufacturer.

**Heating Equipment:** The System manufacturer shall distribute reciprocating infrared heating equipment designed specifically to elevate the temperature of the preformed thermoplastic material and asphalt pavement without adversely affecting it. The primary heating unit must employ a bank of propane-fired infrared heaters, mounted on a track device that allows the heater bank to reciprocate back and forth over a designated area, thereby allowing the operator to monitor the temperature of the preformed thermoplastic at all times during the pavement heating process.

A smaller, mobile infrared heater distributed by the System manufacturer is designed specifically to heat areas such as borders and narrow areas that are inaccessible to the primary heaters. This secondary heater also allows the operator to monitor the temperature of the preformed thermoplastic at all times during the heating process.

An approved hand-held propane heat torch distributed by the System manufacturer shall be used to heat isolated areas of the preformed thermoplastic.



**Sealer:** A two-part epoxy sealer specified and distributed by the System manufacturer must be applied to the substrate prior to material application to ensure proper adhesion, and to provide reinforcement for larger volumes of material.

**Specialized Sealer Dispensing Gun:** Used to dispense the required two-part epoxy sealer onto the substrate. The sealer dispensing guns are distributed by the System manufacturer.

**Hand Held Finishing Tool:** Enables the applicator to complete the imprinting of the thermoplastic in areas around permanent structures, such as curbs and manholes covers, which may be inaccessible to the stamping template. The hand-held finishing tools are distributed by the System manufacturer.

**Aggregate:** Supplemental anti-skid/anti-slip elements to be applied to the surface of the molten thermoplastic as needed, if the factory applied anti-skid/anti-slip elements embed too deeply into the surface of the molten thermoplastic material during the heating process. (Embedded aggregate is exposed upon wear for extended skid resistance.) The aggregate is distributed by the System manufacturer.

**Air Powered Spray Hopper:** Used to spray supplemental anti-skid/anti-slip elements (aggregate) on the surface of the molten preformed thermoplastic in a uniform manner. The air powered spray hoppers are distributed by the System manufacturer.

**Vibratory Plate Compactor (700-900 lb.):** Shall be used for pressing the 3/8" (9.5mm) wire rope stamping templates into the thermoplastic to create the specified pattern in both the thermoplastic and asphalt substrate. The System manufacturer does not supply vibratory plate compactors.

**Manufacturer Certified Applicator Requirement:** The System shall be supplied and applied only by an applicator certified by the System manufacturer. The applicator shall provide proof of current certification before commencing work. The Certified Applicator shall follow the System manufacturer's current published application procedures.

**Substrate Condition:** The System must only be applied to a stable, high quality asphalt pavement substrate over a stable base that is free of defects, as per the manufacturer published Substrate Guide. The asphalt pavement surface shall be dry and free from all foreign matter, including but not limited to dirt, dust, de-icing materials, and chemical residue.

**Procedure:** The System is applied to asphalt pavement using proprietary reciprocating infrared heating equipment. The material must be able to be applied at ambient and road temperatures down to 45°F (7°C) without any preheating of the pavement to a specific temperature. A two-part epoxy sealer specified by the manufacturer must be applied to the substrate prior to preformed thermoplastic application. Immediately following sealer application, the panels of aggregate reinforced preformed thermoplastic are positioned properly on the asphalt substrate with the aggregate side facing up. The preformed thermoplastic is then heated to the required melting temperature. Additional aggregate may be applied to the preformed thermoplastic surface as needed following the melting process. As the material is cooling it is imprinted with a stamping template made from 3/8 in. (9.5 mm) flexible wire rope in the required design using a vibratory



plate compactor. The preformed thermoplastic material is then allowed to cool thoroughly before being opened to vehicle or pedestrian traffic. (Consult the manufacturer's published application procedures for complete information.)



#### TREES AND SHRUBS

#### **Description:**

The work under this item shall consist of furnishing, planting, staking, and mulching trees including the following items:

Syringa Reticulata 'Ivory Silk' – Ivory Silk Japanese Tree Lilac 2" - 2 1/2 " Cal. B&B

Pennisetum Alopecuroides 'Hameln' – Hameln Dwarf Fountain Grass 2 Gal Cont.

Perovskia Atriplicifolia 'Little Spires' – Little Spires Russian Sage 2 Gal Cont.

Liquidambar Styraciflua 'Moraine' – Moraine American Sweetgum 2 ½" - 3" Cal. High Branched B&B

Gleditsia Triacanthos Inermis 'Shademaster' – Shademaster Thornless Honeylocust 2 ½"-3" Cal. High Branched B&B

It shall also include all incidental operations, such as the care of the plant material and the replacement of dead or unsatisfactory materials before final acceptance of the contract.

#### Materials:

<u>Manufactured Topsoil</u>: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

<u>Topsoil</u>: A mineral soil taken from the A Horizon of a well-drained site and having a USDA soil texture classification of a Clay Loam or Loam. ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth.

<u>Planting Soil</u>: Native, imported or manufactured soil modified to become topsoil; mixed with soil amendments.

Soil shall be loose and friable, free from refuse, stumps, roots, brush, weeds, rocks and stones 1" in overall dimensions.

<u>Soil Test Analysis</u>: Submit certified soil physical and chemical test analysis for planting soil by approved, independent testing agencies stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of planting soil. Make submittals at least three (3) weeks prior to delivery of material to site.

The acceptable textural classes for planting soil shall be:

- \* Loamy Sand, with not more than 80% sand
- \* Sandy Loam
- \* Loam
- \* Silt Loam, with not more than 60% silt
- \* Clay Loam, with not more than 30% clay
- \* Sandy Clay Loam, with not more than 30% clay



Fertilizer shall be commercial grade as recommended by soil test report.

<u>Organic Mulch</u> material shall be a native shredded pine bark, 100 percent organic, having a moisture content not exceeding 40 percent, free of any disease or insects. The particles shall pass a 1-inch square mesh and be retained on a 1/8-inch square mesh.

All plants shall be nursery-grown, first-class representatives of their normal species or varieties. They shall have well-furnished branch systems together with vigorous fibrous root systems. Plant List: Investigate sources of supply prior to submitting bid. Confirm that size, variety and quantity of plant material specified on Plant List can be supplied. Failure to take this precaution will not relieve the successful bidder from his responsibility for furnishing and installing all plant material in strict accordance with the Contract requirements and without additional expense to the Owner.

Substitutions will not be permitted unless substantiated written proof is supplied that a specified plant is not obtainable. In this situation a proposal to use the nearest equivalent size or variety with an equitable adjustment of Contract Price will be considered.

Plant material sources: Submit proposed sources for all plant material within 30 days of award of contract. Provide name and location of nursery, contract person, and telephone number.

Nursery-grown trees shall conform to the requirements as specified in the current edition of "U.S. American Standards for Nursery Stock."

All plants shall be subject to inspection and approval by a ConnDOT Landscaping Department representative, Engineer, and the Contractor shall be represented during the inspection.

All trees shall be high branched, having a 5-foot minimum branching height.

#### **Construction Methods:**

<u>Schedule and Work Plan</u>: If planting work is being installed in phases, submit plan with definable areas outlined and keyed, and provide schedule for planting work within each area.

<u>Planting Season</u>: Unless otherwise specified or directed by the Engineer, the planting seasons shall be those indicated below. No planting shall be done in frozen ground or when snow covers the ground, or the soil is otherwise in an unsuitable condition for planting.

Deciduous Material Planting Seasons Spring: March 1 - May 15 (inclusive) Fall: October 15 to Ground Freezes

Evergreen Material Planting Seasons Spring: March 1 – June 1 (inclusive) Fall: August 15 - October 1st (inclusive)

<u>Locations</u>: Plants shall be planted in locations as shown on the plans or as directed by the Engineer. The Contractor shall properly locate trees to carry out the intent of the plans. Trees near street intersections



shall be planted no less than 25' from any street corner for safety in sight at cross streets. In the event that rock or underground construction work or other obstructions are encountered in any planting pit, the Engineer shall be notified immediately, and the plant not planted until special instructions are given, or alternative locations are selected.

<u>Digging, Handling and Protection</u>: Plants shall be handled at all times in accordance with the best horticultural practices, so the roots or balls are adequately protected from sun and drying winds. Balled and burlapped plants shall be dug with firm, natural balls of soil of a sufficient diameter to encompass fibrous and feeding roots. The depth of the planting pit shall be coordinated with the height of the root ball in the field and adjusted accordingly. The soil below the ball must be well compacted to avoid settling.

<u>Preparation for Planting</u>: Pits - Reasonable care shall be exercised to have pits dug and prepared prior to moving trees to their respective locations for planting to ensure that they will not be unnecessarily exposed to drying elements or physical damage.

Pit preparation shall include the excavation to the required depth, removal and disposal of existing unsuitable material and the furnishing of planting soil and peat backfill mixture.

<u>Diameter</u>: Diameter of pits for trees shall be as indicated on the plans and details. The depth of pits for trees shall be enough to accommodate the ball when the tree is set to finished grade allowing for 12" of compacted soil in the bottom of tree's pits.

<u>Soil Preparation</u>: Soil used in the pits shall be planting soil as herein before specified, thoroughly mixed equally with a mixture of five parts of peat humus and one part of fertilizer (5-10-5) to twenty parts of acceptable planting soil.

<u>Tree Staple Staking</u>: Install in accordance with manufacturer's recommended installation instructions for project conditions and the following.

- Leaving burlap intact, heel the plant's root ball into place.
- Remove plastic safety caps from tree staples.
- Set each tree staple opposite the other and against the outside edge of the root ball. The shorter prong shall be positioned over the root ball, halfway between the trunk and the ball's outer edge.
- Drive each tree staple into the ground until the cross bar is recessed one to two inches below the surface of the root ball. Alternate between hitting either of the prongs to ensure that the tree staples are completely below-grade.
- Place safety caps on exposed ends.
- Cut back burlap, leaving material under cross bars.
- Fill and finish planting using best practices.

When balled and burlapped trees are set, planting soil mixture shall be compacted and watered to fill all voids. All burlap, ropes or wires shall be rolled down one-third of the way from the top of the ball. A shallow basin slightly larger than pit shall be formed to contain water. Backfill for the planting pits shall be with approved planting soil mixture, up to the surrounding elevations.



- Pruning All dead wood, sucker branches, and all broken or badly bruised branches shall be removed with a clean cut. Perform pruning with clean, sharp tools. If other pruning is required and approved by engineer, perform in accordance with American Association of Nurseryman Standards to preserve the nature and character of the plant.
- Mulching All trees shall be mulched with a 3" layer of pine bark mulch within two days of planting. This mulch shall entirely cover the area of the planting pit.
- Water Water used in this work will be clean, pure water furnished by the Owner. Hoses, connections, and other watering equipment required for the work shall also be furnished by the Contractor.

Maintenance: Submit full and complete written program for maintenance of the planting including detailed watering program specific to plant type Requirements. Maintenance shall begin immediately after each plant is planted and shall continue for two (2) years after initial acceptance. The two-year period does not begin until all plant materials stipulated in the contract have been planted. When the plant establishment period begins at the end of the spring planting season, an inspection to determine the acceptability of plant establishment will be held by the Contractor and the Engineer no later than November 1st in the following year. When the plant establishment period begins at the end of the fall planting season, an inspection to determine the acceptability of plant establishment will be held by the Contractor and the Engineer by August 1st of the second year. All plants shall be watered (a minimum of once per week from April 1st to October 1st or as necessary to keep the plant materials in their best condition-applied slowly to penetrate the entire root zone), re-mulched, weeded, pruned, sprayed, fertilized, cultivated and otherwise maintained and protected until two-year final acceptance. Ornamental grasses shall be cut to 4" above the crown of the plant using a sickle or a hedge trimmer in late February or March. Settled plants shall be re-set to proper grade and position, planting saucer restored, and dead material removed. Defective work shall be corrected as soon as possible after it becomes apparent and weather and season permit. Upon completion of planting and prior to initial acceptance, the Contractor shall remove any excess soil and debris from the site and repair any damage to structures, etc., resulting from the planting operation. Dangerous conditions shall be repaired immediately.

Any damage to lawn areas, sidewalks or pavement as the result of planting operations shall be repaired by the Contractor at no additional cost to the Town or State and to the satisfaction of the Engineer.

All replacements shall be plants of the same kind and size as specified in the plant list. They shall be furnished and planted as specified under Planting Operations. The cost shall be replacement resulting from removal, loss, or damage due to vandalism.

<u>Warranty</u>: All plants shall be warranted by the Contractor to be true to name and size, and in vigorous growing conditions and shall be warranted by the Contractor for two (2) years after all plant material is installed.

During the warranty period, the Contractor shall replace, in accordance with the contract, any plants that are dead, or in the opinion of the Engineer or representative, in an unhealthy or unsightly condition due to dead branches, excessive pruning, or other causes at no additional cost to the Town or State. Replacement shall be made as soon as weather or season conditions permit as directed by the Engineer. The Contractor's responsibility for replacing plants shall end with final acceptance by the Town. Cost is



considered to be included in the Bid and Contract price. Guarantee all replaced material for a period of 2 years from date of replacement.



### **BICYCLE RACK**

#### Materials:

The materials for the work shall conform to the following:

Acceptable stainless steel 316 satin surface finish bicycle rack shall be by one of the following approved manufacturers:

- Reliance Foundry Unit 207, 6450 -148 Street, Surrey, BC V3S 7G7, Canada 1-877-789-3245, www.reliance-foundry.com Model: R-8239-FL-SS
- AAA Ribbon Bike Rack Co. Division of Brandir International, Inc. 521 Fifth Ave.,17th Floor New York, Ny 10175 1-800-849-3488 ribbonrack.com. Model: RB 05-S-S
- 3. Or approved equal

#### **Construction Methods:**

The bicycle rack shall be surface mounted in accordance with the manufacturer's recommendations at the location and in the method as shown on the plans or as directed by the Engineer.

#### **BUS SHELTER**

Bus Shelter shall be installed per the manufacturer's recommendation and installation instructions, including size and depth of concrete foundation and at locations shown on the Contract Documents. The bus shelter shall be as follows:

One (1) Brasco SL-0408-F-0-HI-AL-TG-0-0-0 4' x 8' - Slimline Series Aluminum Structure, Four Sides, Front Windscreen with One ADA Opening, Dark Bronze Anodized Aluminum Finish, ¼" Clear Tempered Glass, Standing Seam Aluminum Hip Roof with 2.5" Fascia and Integral Gutter, 4' Wall-Mount Aluminum Bench with Backrest or equivalent

One (1) Brasco A/C Power LED Lighting - A/C Powered LED Light and Photocell with Dusk- to-Dawn Illumination or equivalent

One (1) Brasco Schedule Holder - 23" x 36" Schedule Holder or equivalent

#### **CLUSTER BOX UNITS (CBU'S)**

CBU shall be installed per the manufacturer's recommendation and installation instructions, including size and depth of concrete foundation and at locations directed by the Engineer. CBU shall be Salsbury Industries Model 3313 or equal.



### **ROOT BARRIER**

#### **Description:**

This item shall include furnishing material for and placing tree root barrier on a prepared base or subbase in accordance with these specifications and in conformity with the lines, grades and compacted thickness as shown on the plans, details, or as ordered by the engineer.

#### Materials:

Root Barrier: Acceptable root barrier shall be by one of the following approved manufacturers:

- Deep Root Tree Root Barrier (UB24-2) 24" wide by 24" depth; black 85 mil wall thickness injection molded 50% post-consumer recycled polypropylene panels with UV inhibitors. 7/16" wide integral molded 85 mil thickness double top edge attached to vertical root deflecting ribs; bottom edge attached to vertical root deflecting ribs, integral molded 85 mil thickness by 2-inch deep vertical root directing ribs spaced at 6-inch on center; integral molded 85 mill thickness by 2-inch-long by 3/8-inch-wide horizontal anti-lift ground lock tabs, min. 9 per panel. By Deep Root Partners, L.P. San Francisco, CA 1-800-458-7668
- 2. Green Blue Urban ReRoot 600, 24" depth, ribbed. By GreenBlue Urban, 4405 Anderson Road, Knoxville, TN 37918, 1-866-282-2743, <u>www.greenblue.com</u>
- 3. Century CP Root Barrier, 24" depth, ribbed. By Century Products, 1144 N. Grove St. Anaheim, CA 92806, 1-800-480-8084, <u>www.centuryrootbarrier.com</u>
- 4. Or approved equal.

#### **Construction Methods:**

Install on properly prepared base and subgrade with accordance with manufacturer's instructions. Connect panels together as required. Dig the trench, place the tree root guide in the trench with the vertical root directing ribs facing inwards to the root ball and align with the hardscape, set 2" below finish grade of sidewalk. The double top edge shall be ½" above finished soil grade. Using the hardscape as a guide, backfill and compact to requirements against the tree root guides to promote a clean, smooth fit to the paving. Trees and plants shall be immediately installed after placement of root barrier.



### **ORNAMENTAL LIGHTING SYSTEM**

#### Description:

Work under this item shall consist of furnishing and installing an ornamental

street light system at the locations and to the dimensions and details shown on the plans or as directed by the Engineer and in conformity with these specifications. The work shall include furnishing and installing all necessary components of the system, including the pole, concrete foundation, fixture, accessories, conduit, power and control cable, lighting controller, controller foundation, metered service, bedding, backfill, and appurtenances, along with coordinating with local utility representatives. The work shall include furnishing mounting and assembling all components, receptacle installation, and wiring. The work shall also include verifying the proper operation of the pole, fixture(s) and GFI receptacle to the satisfaction of the engineer.

#### Materials:

**General:** The Ornamental Street Light Standards shall be installed at the locations shown on the plans, typically every 50 feet on alternating sides of the road (100 feet on the same side of the road).

SL3C: 12' Pole, Type 3 Optics, Dimming Resistor Board

**Pole:** The pole and accessories shall be designed in accordance with AASHTO Standard Specification for Structural Support of Highway Signs, Luminaires and Traffic Signs. Wind pressures for design purposes shall be determined in accordance with the above AASHTO Standard utilizing a 93 mph wind speed. The pole shall be aluminum, one- piece construction with an 18" diameter cast aluminum fluted base, Sternberg Lighting Model #6200 (Oxford Series). The pole shall be a 12-foot tall smooth tapered shaft, made of ASTM 6063 extruded aluminum and tempered to a T6 condition, tapering from 5" to 4" in diameter (Catalog number 6212T5-4.188/GFI-LPIUC/DBA/SSPA/BKT).

**Anchor Bolts:** Light Standards shall use four ¾" diameter, hot-dipped galvanized "L" type anchor bolts in accordance with the requirements of ASTM A-153-03, Class C. Field welding and field bending of anchor bolts is prohibited.

**Fixture:** The fixture shall be designed in accordance with AASHTO Standard Specification for Structural Support of Highway Signs, Luminaires and Traffic Signs. Wind pressures for design purposes shall be determined in accordance with the above AASHTO Standard utilizing a 93 mph wind speed. The fixture shall meet the design requirements and style as shown on the plans, Catalog number 6130CLED/PT/FDRB/6ARC35T3/MDL03/FHC/PEC/CSA/BKT.

The fixture shall be wired using No. 10 AWG stranded copper conductors with 600V, 167- degree F, type THHN/THWN insulation, or as required by the manufacturer. The luminaire shall be connected to the wiring provided within the pole.

The fixture shall include:

- an individual photo cell
- Black Textured Finish
- Frosted Hurricane Chimney (not lighted)
- Clear Seeded Acrylic Lens
- Solid Roof

**Optional Equipment:** The Ornamental Lighting poles shall be supplied with the following options:



**Double Banner Arms:** The banner arms shall be part "DBA" as manufactured by Sternberg Lighting, and shall meet the style as shown on the details.

**Single Planter Arm:** The single planter arm shall be part "SSPA" as manufactured by Sternberg Lighting, and shall meet the style as shown on the details.

**Ground Fault Receptacle:** The pole shall be equipped with a GFI duplex receptacle with a weatherproof cover. The receptacle shall be part "GFI" as manufactured by Sternberg Lighting, and shall meet the style as shown on the details.

**Construction Methods:** Construction methods for this work shall be in accordance with the manufacturer's recommendations. The contractor shall be responsible for coordinating all necessary prerequisite work with the utility company. This shall include, but not be limited to de-energizing existing light poles, energizing new light poles, coordinating and verifying new conduit installations, and coordinating and verifying the location of the service control box. Eversource shall be responsible for pulling new wiring from energy source to service control box location and energizing new lighting system. The contractor shall be responsible for installing all underground conduit between the service control box and the service pole, in accordance with Eversource requirements.

The Contractor shall be responsible for all coordination with the Utility company that is required to obtain the required metered service connection to the lighting system.

The contractor shall be responsible for installing the poles plumb, connection to the power supply, wiring, attaching the ground connection to the pole and all testing.

#### **REQUIRED SUBMITTALS:**

The contractor is responsible for providing the complete lighting design to provide an operational lighting system as shown on the plans and these specifications. The design will include selecting the appropriate load and service equipment to be installed in the service control box, selection of the control box and foundation, and design of all lighting circuits, including cable routing and sizing to supply the luminaires and GFI receptacles at each pole. Structural design computations are to be provided for each pole to demonstrate adequacy of the pole, foundation, and anchor bolt design, taking into account loading produced by the pole accessories, such as the banner arms, in accordance with AASHTO Standard Specification for Structural Support of Highway Signs, Luminaires and Traffic Signs. Wind pressures for design purposes shall be determined in accordance with the above AASHTO Standard utilizing a 93 mph wind speed. Details provided with the plans are for guidance only, and may be modified as necessary to provide adequate design to meet AASHTO requirements. Proposed modifications should be provided with the design submittal.

All electrical calculations, structural calculations, working drawings, shop drawings and catalog cuts shall be submitted to the Engineer in a single submittal package for review and approval.

The submittal shall demonstrate the adequacy of the design and the adherence to the details provided. The assembly, in its completed form, shall meet the design requirements and style as shown on the plans.



### **RECTANGULAR RAPID FLASHING BEACON (RRFB) – TYPE B**

**Description:** Furnish and install a rectangular rapid flashing beacon (RRFB) at the location indicated on the plan or where directed by the Engineer.

Each RRFB will be a complete assembly consisting of but not limited to the following:

- RRFB unit with two rapidly flashed rectangular-shaped yellow LED indications
- Controller cabinet (circuit breaker, timer or solid-state circuit boards etc.) or any electrical component hardware
- Pedestal
- Pedestal Foundation
- Pushbutton
- Push button Signs
- Mounting hardware
- If Solar, all solar equipment

**Type A:** Single sided RRFB will contain two rapidly flashed rectangularshaped yellow LED indications (two indications on one side facing traffic)

**Type B:** Double sided RRFB will contain four rapidly flashed rectangular- shaped yellow LED indications (two indications on each side facing traffic)

**Materials**: The materials for the work shall be specified and include Pedestals, Pedestrian Push Buttons and Electrical Cabinetin the following:

#### **Construction Method:**

Each RRFB indication will be mounted on a standard aluminum pedestal and in accordance with dimensions and details shown on the plan.

Each Solar RRFB will require a location free of any vegetation or obstruction which will inhibit solar charging.

Each RRFB shall initiate operation only upon pedestrian actuation and shall cease operation after a programed time as shown on the plan or determined by the Engineer (based on MUTCD procedures).

All RRFBs associated with a given crosswalk (including those with an advance crossing sign, if used) shall, when activated, simultaneously commence operation of their rapid-flashing indications and shall cease operation simultaneously.

#### Mechanical and Electrical Requirements:

- a) Dimensions:
  - $\square$  Each indication shall be at least 5" wide by 2" high.
  - □ The indications shall be aligned horizontally, with the longer dimension horizontal and with a minimum space of 7" between the two indications
  - The outside edges of the indications, including any housing, shall not project beyond the outside edges of the sign that it supplements.



b) Power: □ Hardwired: o AC input, 100-240 Vac, 50/60 Hz o DC output, 12 Vdc, +/- 1% □ Solar: o DC input, 12 Vdc, 55 W o DC output, 12 Vdc, +/- 1% c) Temperature & Humidity: □ All components will be capable of continuous operation in accordance with NEMA Standards d) Indications: □ Flash Pattern: o When actuated, the two yellow indications in each RRFB unit shall flash in a rapidly flashing sequence and shall provide 75 flashing sequences per minute. o Shall comply with MUTCD https://mutcd.fhwa.dot.gov/resources/interim\_approval/ia21/ ia21.pdf □ Optics: o ITE LED □ Light Intensity: o During daytime conditions: shall meet the minimum specifications for Class 1 yellow peak luminous intensity in the Society of Automotive Engineers (SAE) Standard J595 (Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles) dated January 2005. o During nighttime conditions: an automatic signal dimming device shall be used to reduce the brilliance of the indications. □ Housing Color: o Federal Yellow e) Control Cabinet: □ Shall be NEMA 3R type



### **CONCRETE DUCT BANK**

#### **Description:**

Construct a concrete duct bank at the location indicated on the plan or where directed by the Engineer and approved by the utility companies.

Materials: The materials for the work shall be specified and approved by the utility companies.

#### **Construction Method:**

<u>Excavation</u>: The roadway surface shall be cut in reasonably straight and parallel lines using a jackhammer, saw or other accepted method to insure the least amount of damage to the roadway surface. Sheeting and bracing shall be required for excavations in excess of 5 feet deep in accordance with the latest OSHA Standards.

#### Backfill:

- 1. Backfill shall be mechanically compacted in eight (8") loose layers to 95% of the maximum density.
- 2. Excavated material that has been evaluated as unsuitable for backfill shall be removed from the site and disposed of properly.
- 3. Backfilling shall not commence less than 2 hours after the duct bank concrete has been placed

<u>Street Restoration</u>: All street paving of open excavations shall be restored using temporary or interim pavement with two 1-1/2 inch lifts of compacted hot mix asphalt binder.

<u>Duct Bank Forms</u>: In general duct banks shall be constructed using forms for the sidewalls. Where suitable stable soil conditions exist the trench walls may be used to form the sidewalls. Duct bank standards shall be maintained.

<u>Cutting Duct</u>: Use a fine tooth wood saw to cut conduit. All ruff or abrasive edges shall be sanded smooth.

<u>Duct Plugs</u>: Eversource approved duct plugs shall be installed in all open conduit. The plugs shall be installed during construction when a conduit installation is partially complete to manhole or equipment as well as at all terminations in manholes.

<u>Joining Duct</u>: All conduit ends shall be cleaned by wiping off all dust, dirt and moisture from the surfaces to be cemented and brushed gently with a fine abrasive paper or cloth. Apply the approved PVC solvent cement with a non- synthetic bristle brush evenly coating the full length PVC socket of the fitting. Refer to manufacturers' instructions for additional detail.

<u>Depth of Cover:</u> The minimum depth of cover over a single conduit or multiple duct bank shall be 36 inches unless otherwise directed by Eversource. In limited situations Eversource may allow shallow depth duct bank installations less than 36 inches. Prior approval from Eversource is required for shallow depth construction as well as the requirement to use ¼ inch thick steel plates above and adjacent to the side wall of the duct bank.

<u>Clearance</u>: The minimum clearance between an Eversource conduit or duct bank and any other subsurface structure or utility shall be 12 inches unless otherwise approved by Eversource.



<u>Conduit Spacers</u>: Conduit Spacers shall be of the approved type per Eversource Material Standard, "M1000, PVC Conduit and Fittings". Spacers shall be installed at typically 5 ft. spacing (7 ft. maximum) along the duct bank.

<u>Conduit Sweeps and Bends</u>: Conduit heat bending is not allowed. All sweeps and bends shall be constructed using pre-fabricated approved fittings.

<u>Mandrel:</u> Upon completion of the duct bank installation or direct buried ducts, a standard flexible mandrel, (not less than 12 inches long with a diameter not less than ½ inch less than the inside diameter of the duct) shall be pulled through each duct to loosen particles of earth, sand and other foreign material left in the line. A brush with stiff bristles shall then be pulled through each duct to remove the loosened particles. The diameter of the brush shall be the same as, or slightly larger than the diameter of the duct.

All conduit shall have "mule tape" or equal, i.e. pulling tape made of woven polyester with a strength of 2500 lbs. installed within.