



95th Street Corridor Streetscape Manual and the 95th Street/Western Ave. Business District Improvement Plan, Amended



Prepared by:
Chicago Department of Transportation
Division of Project Development
Streetscape and Sustainable Design Section,
8 August 2008



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I. Purpose

This manual amends and supercedes the 95th Street Corridor Streetscape Manual and the 95th Street/Western Ave. Business District Improvement Plan. The purpose of this document is to update the specific recommended materials, elements, and specifications for the proposed improvements in the public right of way, in particular those elements shown in the 14' wide sidewalks along 95th street between Western and Ashland. This document does not address the intent or overall layout of the original plan, nor the suggested changes and proposed improvements for private property contained in the plan. For the most part, the original plan sections remain valid, except for those items which are effected by updates to the City's codes, ordinances, and design guidelines, as outlined in section II of this document, entitled "Standards". In addition, this amendment does not attempt to provide any further design guidance or permit authorization by way of updating materials or specifications. Property owners making improvements within the public right of way must still follow standard City of Chicago procedures for obtaining a permit for construction and openings within the public right of way. What this manual is dedicated to is the standardization of all materials, streetscape elements, specifications and details for joint maintenance purposes by the Beverly Hills community and City forces.

II. Standards

This manual amends and supercedes all previous manual and procedures by referencing the following Right of Way standards:

- CDOT Streetscape Guidelines, latest edition
- Chicago Department of Transportation's latest Standard Drawings for Curb Ramps for People with Disabilities, Street & Site Plan Design Guidelines for the Public Way, Streetscape Guidelines, Roadway Plant List, and Public Way Construction Regulations are available on the City's website: www.cityofchicago.org/transportation
- City of Chicago Landscape Ordinance and Guidelines, available on the City Website under the Department of Streets and Sanitation, Bureau of Forestry
- City of Chicago Lighting Standards, available on the City Website under the Department of Streets and Sanitation, Bureau of Electricity
- "Standard Specifications for Road and Bridge Construction", dated **January 1, 2007** issued by the Division of Highways, Department of Transportation, State of Illinois, including any supplemental specifications and recurring special provisions

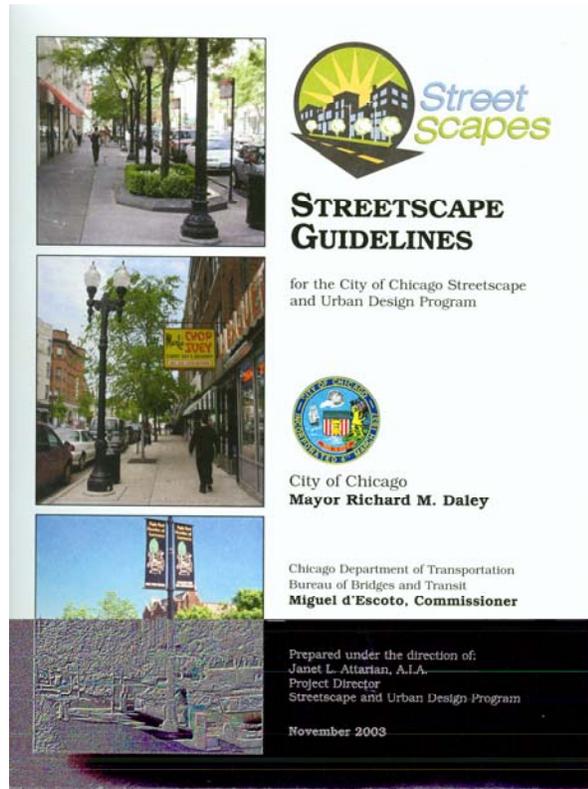
III. Streetscape Elements

The Streetscape Guidelines, developed by the Chicago Department of Transportation, Streetscape and Sustainable Design section, seek to address fundamental quality of life issues within a streetscape, such as safety, accessibility, and neighborhood identity. In addition, the Guidelines provide a framework that encourages the development of Chicago's commercial streets as vital places for residents, tourists, shoppers, and commuters to live, work, and play.

As streetscapes in urban environments are subject to heavy use and adverse environmental conditions, they require consistent maintenance to remain appealing. By establishing the guidelines, the Chicago Department of Transportation (CDOT) seeks to standardize elements that are not only beautiful and functional, but also easy to repair and maintain whenever maintenance is required.

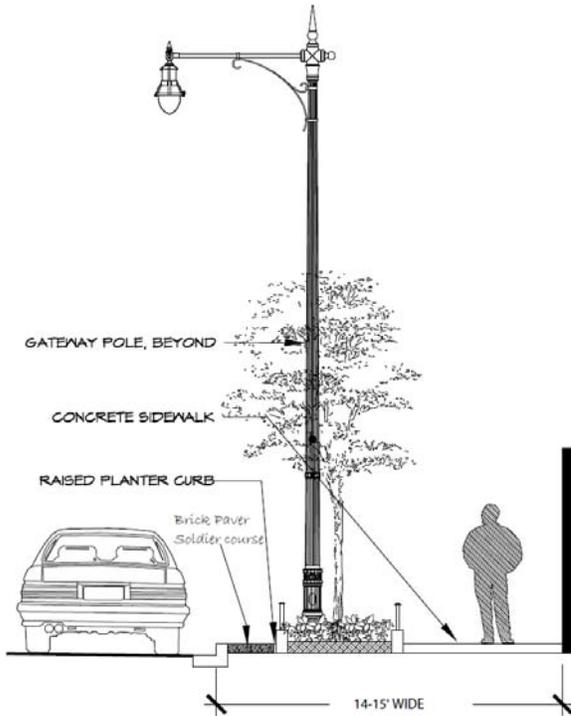
In updating the existing conditions and the proposed streetscape elements first presented in the July 1998 95th Street Corridor Streetscape Manual, we have selected the following elements for the corridor:

- Standard cross section- 14' sidewalk width
- Scored Sidewalks, Standard IDOT concrete mix
- Brussel Block Pavers, color- New York Blue
- Low Cast in Place in ground irrigated planter
- Orchard bowl above ground planter
- 14" Planter fencing
- 5' x 5' Cast Iron Tree grates
- Street Furniture
 - Bench
 - Trash Can
 - Bike Rack
- Lighting
 - Gateway 2000 Fixture
 - Double Acorn fixture



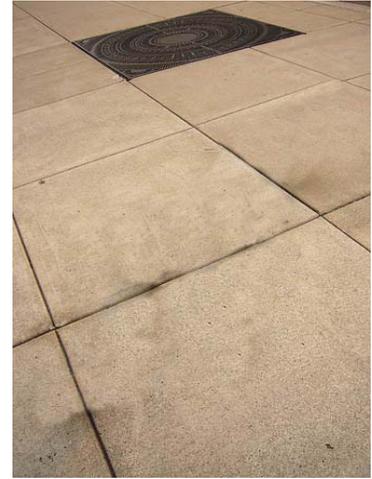
Standard Cross Section- 15'+ sidewalk width

The 95th Street Corridor is unique in that it has very wide sidewalks (14-15') capable of allowing for multiple streetscape elements along the curbline, while accommodating a wide walking path along the building line. The below figures illustrate how this could look in both plan and elevation:



Exposed Aggregate Sidewalk

The existing walk within the 95th Street Corridor is currently a large exposed aggregate surface treatment, which was installed during the late 1960's. CDOT recommends a similar exposed aggregate mix design and treatment, but with smaller aggregate particles. This is the same surface treatment that is currently on N. Michigan Ave in the downtown area. Standard details include 5" thickness, minimum 3500 pounds per square inch strength, non-reinforced on a sand subgrade.



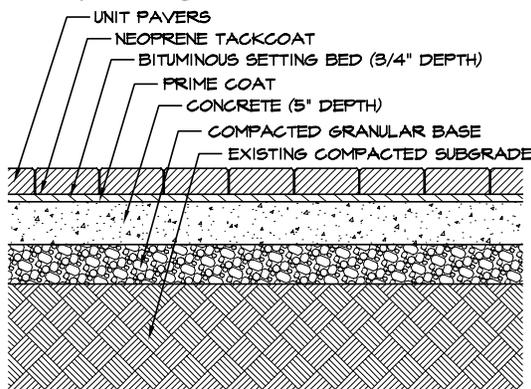
Unit Pavers

In the previous plan, a blue sandstone paver was utilized as a running accent line behind the curb. Because of their proximity to the roadway, these pavers have deteriorated over time due to exposure to salt and other roadway substances. With this in mind, we are recommending a concrete Brussel Block, also in blue, manufactured by Unilock, inc. This type of paver, made of PCC concrete, is more durable and able to withstand intense pedestrian and vehicle environments.



Related to the sidewalk width mentioned above, and based upon previous experience utilizing pavers in the public way, we are recommending placing a 6' wide paver band 1' away from the back of the curb. This will allow for both protection of the pavers from salt, and a greater prominence of the paver band within the sidewalk area.

We also recommend a more rigid base system, comprised of a bituminous setting bed on a concrete base. Essentially, this "glues" the pavers in place, thereby securing them from movement or heaving due to changing temperatures and seasons.

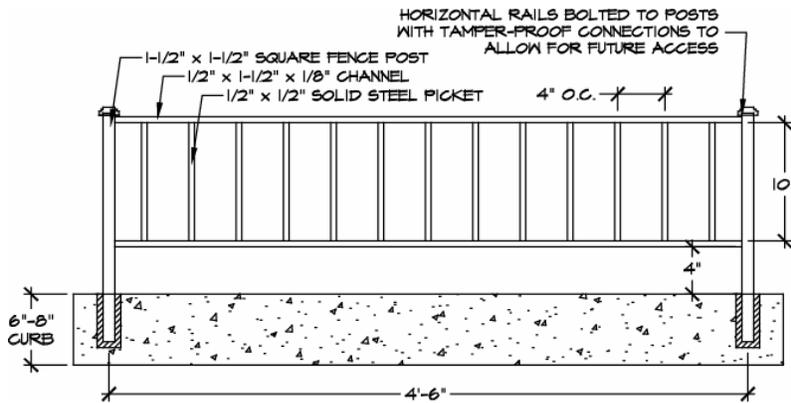


Planters and Tree Grates

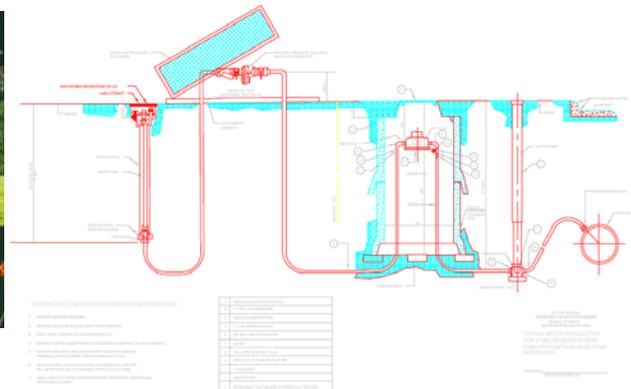
In the previous plan, 4' tall , above ground, non-irrigated planters were designed and custom built. Over time, these planters have also deteriorated from design flaws and their proximity to the roadway, thereby making them susceptible to road salt, snow, and water spray. With this in mind, we are recommending 2 types of planters, an irrigated low curb cast in place planter, and an above ground planter. Where space allows, trees may be planted in raised planters. Planters should be placed a minimum of 1 1/2' from the back of the curb and have a minimum inside width of 4'. Curbs form the edge of the planters and should be 6"-8" wide, and 6" high. Planters will be no more than 35' in length, and will have a minimum of 10' spacing between each planter.

Low Curb Cast in place planter

The low curb planter is an in ground planter surrounded by a 6" curb, equipped with an 14" wrought iron.. The fence is a standard 14" fence installed directly into the curbing.



Irrigation should be provided so as to promote the health of the plants, and to create a cost savings for the community in terms of maintenance. Typically, most in ground planters near roadways also require irrigation to provide a flushing out of roadway substances, and to alleviate heat build up inside the planter during the day. All irrigation systems require back flow preventers and other pumping equipment to provide for the automatic transport of water from the nearest water main tap.



Street Furniture

Due to the nature of adjacent activities within the public right of way, the Streetscape and Sustainable Design Section has developed a palette of standardized street furniture for ease of maintenance and durability.

Benches

The Victor Stanley Ornamental Bench (CR-10) was selected for its durability under the most extreme environmental conditions and its vandal-proof protection against destruction and defacing. Benches are typically provided with a center arm. Black is the standard color. Benches are usually placed at bus stops, mid-block, corner intersections, or other locations within the streetscape where people tend to gather.



Trash Cans

The Victor-Stanley Steelsites (S-42) container, in the color black, was selected as the standard waste receptacle for use in the public way. As with the benches, this waste receptacle was selected for its durability under the most extreme proof protection against destruction and defacing. Waste receptacles are usually placed two per block, on opposite corners at intersections.



Bike Racks

The standard style of bike rack is a square tube, black powder-coat finished, U-shaped rack bolted to the sidewalk. This type of bike rack allows several bicycles to be locked at once without being damaged.

Depending on the other street furniture proposed in the streetscape, bike racks are located with an average frequency of two per block.

CDOT's Bike Program, independent of the Streetscape and Sustainable Design Section, surveys, advises and installs bike racks on a City-wide basis.



Street Lighting

One of the goals of the Streetscape and Sustainable Design Section is to move overhead wires to an underground trench beneath the sidewalk. This change removes from the landscape the mass of overhead wires that often defined the City street, and has brought back the light fixture as a clarifying element of the streetscape.

The City of Chicago has adopted the Loop Light Master Plan and the Chicago Street Lighting Master Plan to standardize lighting in the City. Both of these resources are available through the Chicago Department of Planning and Development.

The two types of light fixtures recommend for this area are the Gateway Pole and the Historic Twin Acorn Pedestrian Pole. Each fixture serves a unique purpose in terms of bringing light to the streetscape.

Gateway Pole

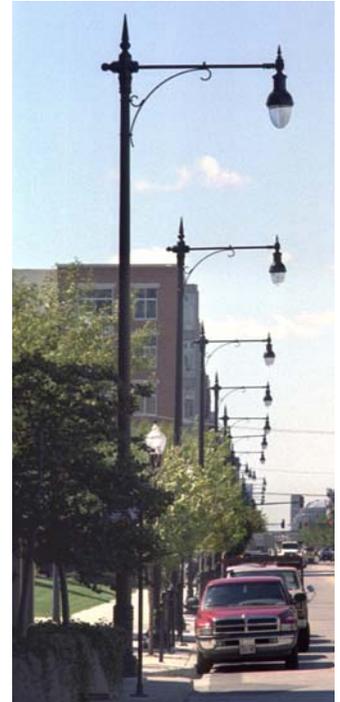
These poles are designed to provide illumination over large areas of the right-of-way as efficiently as possible. They are usually about 34' in height and have high wattage focused luminaires. This means that they direct the light down onto the roadway and sidewalk, instead of up or out. This saves electricity and helps maintain "dark skies." They also reduce glare and therefore increase driver visibility. The Gateway fixture also has a unique lense that spreads light in an oval pattern along the length of the street. This concentrates light on the right-of-way where it is needed, as opposed to the building facades, and allows for greater spacing of fixtures, thereby reducing costs.

Historic Twin Acorn Pedestrian Pole

This pole provides both vehicular and pedestrian lighting. It is 16' in height, and has two fixtures that provide enough light to illuminate the street, and the shorter height, acorn-shaped fixtures provide face-to-face lighting and ambience. Face-to-face lighting refers to an illumination level that enables a pedestrian to comfortably see the features of oncoming pedestrians and provides a sense of safety.

While the Historic Twin Arm pole has distinct advantages, it is not appropriate for all locations due to its glare and height. Furthermore, as the right-of-way gets wider, this pole is unable to provide the proper lighting levels without supplemental lighting. this pole cannot be used at intersections, where lighting levels must be doubled. Due to its shorter height, the poles must be spaced closer together.

While we have provided the best selection of lighting fixtures for the area, any streetlighting design, along with photometric analysis, fixture layouts, and wiring diagrams must be submitted to the Department of Streets and Sanitation, Bureau of Electricity, for final approval before a permit for construction in the public right of way is issued.



CITY OF CHICAGO
BASIC DESIGN CRITERIA

City Streets

- CROWN: (Pavement Cross Slope)
 - 0.014 ft/ft minimum (C.L. to edge of pavement) - 1.4%;
 - 0.036 ft/ft maximum (C.L. to edge of pavement) - 3.6%;
- CURB FACE: (Exposure)
 - 3" Minimum at Summit (4" Desirable)
 - 9" Maximum at drainage structures (7" Desirable)
- GUTTER SLOPE: (Longitudinal Gradient)
 - 0.4% minimum for straight concrete gutter section
 - 0.65% minimum for curved concrete gutter section

Sidewalk

- CROSS SLOPE:
 - 3/16 in/ft Maximum - 1:64; (ADA)
 - Flat allowable at a single location when absolutely necessary.

Alleys (8" PCC Uncrowned Pavement and Low Center Line with Trough)

- LONGITUDINAL GRADIENT:
 - 0.5% minimum (summit to low point) - 0.005 ft/ft - 6" per 100';
- CROSS SLOPE:
 - 3/8" per ft. or 0.03125 ft/ft minimum (Edge of pavement to Center Line with Trough). Steeper cross slope is allowed for high and low property line type alleys. Trough line and C.B. can be offsetted 4' from low property line.

Alley Return and Driveways-Excluding Sidewalk Crossing

- LONGITUDINAL GRADIENT:
 - See latest construction standards at:
www.cityofchicago.org/departments/transportation/constructionstandards

Ramp Sidewalks

- See latest construction standards at:
www.cityofchicago.org/departments/transportation/constructionstandards

When determining the first floor elevations of a building, the architects MUST take into account the City's Ordinance grades and basic design criteria for work in the public way.

PERMITS FOR WORK IN THE PUBLIC WAY WILL NOT BE ISSUED UNTIL PLANS FOR THE PROPOSED WORK HAVE BEEN REVIEWED AND APPROVED BY THE DEPARTMENT OF TRANSPORTATION !

 <p>City of Chicago Richard M. Daley, Mayor Chel Heramb, Acting Commissioner Department of Transportation Division of Engineering</p>  <p>CHICAGO DEPARTMENT OF TRANSPORTATION</p>	DATE	REVISION	CITY OF CHICAGO		
	—	—	BASIC DESIGN CRITERIA		
			DATE	SHEET	DRAWN BY
			01/02/2007	A-1-0	CDOT

Technical Specifications

This section provides for the actual construction specifications of many of the elements presented in this manual. Where specifications are not present, consult the Streetscape and Sustainable Design Section at 312-744-5900.

Standard Specifications

The following Detailed Specifications supplement the "Standard Specifications for Road and Bridge Construction," adopted January 1, 2007, (hereinafter referred to as the Standard Specifications); the latest edition of the "Illinois Manual on Uniform Traffic Control Devices for Streets and Highways; and the "Manual of Test Procedures for Materials"; and the Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein, and in case of conflict with any part of parts of said specifications, the said Detailed Specifications shall take precedence and shall govern. For purposes of clarification, a copy of the said Standard Specifications, Supplemental and Recurring Special Provisions are not contained herein but are on file in the office of the Commissioner or through the State of Illinois, Public Libraries, or can be electrically downloaded from IDOT's website (<http://www.dot.state.il.us/desenv/hwyspecs.html>). All applicable portions of these documents must be followed.

Landscaping

PLANTER SOIL MIX

Effective: June 1, 2008

Description. This work shall consist of furnishing and placing planter soil mix at locations shown on the plans or as directed by the Commissioner.

Materials. Materials shall be according to the following Articles of Division 1000 – Materials of the Standard Specifications:

	Article/Section
(a) Fine Aggregate (Note 1).....	1003.06
(b) Topsoil.....	1081.05(a)

Note 1. The fine aggregate shall consist of natural sand.

General Requirements. In general the planting soil mixture shall consist of (2) parts pulverized topsoil and (1) part coarse sand. The sand, in the amount required to produce an acceptable planting soil, shall be added and mixed during the pulverization process only. The soil mix shall be stored in stockpiles at the producer’s or supplier’s facility and be protected from erosion, absorption of excess water, and contamination at all times. Delivery to the job site shall only occur after the Commissioner has reviewed and approved the testing results obtained by Quality Control (QC). Final approval of the soil mix shall be based on testing performed by CDOT Quality Assurance (QA) on project site samples.

A mechanical and chemical analysis shall be performed on the soil mix sample and the results shall fall within the following limits. The mechanical analysis may be completed prior to performing the chemical analysis. If the results of the mechanical analysis are within the specified limits, then a chemical analysis shall be performed on the soil mix sample to determine if the results fall within the specified limits.

Mechanical Analysis

Component Ingredient Contents	<u>Minimum</u>	<u>Maximum</u>
Clay content	0%	28%
Silt content	45%	77%
Sand content	25%	33%
Organic content	5%	10%

Chemical Analysis

General Components	<u>Minimum</u>	<u>Maximum</u>
pH value	5.5	7.5
Cation Exchange Capacity	*	*
Soluble salt content	*	*
Miscellaneous Constituent Chemical Contents		
Phosphorous content	*	*
Potassium content	*	*
Micro nutrient content	*	*
Residual agricultural chemical content	*	*

* The content of these items do not have a minimum or maximum amount. The resulting content will be evaluated by the Commissioner and if found to be reasonable by the Commissioner the stockpile represented by the sample(s) will be deemed acceptable as it relates to these items only. The sample(s) must also meet the remaining mechanical and chemical requirements for final approval.

Submittals. Upon the completion of all mechanical and chemical analyses, a final report prepared by the certified testing laboratory (according to the Certifications paragraph within the QC/QA Requirements section) detailing these results shall be submitted to the Commissioner for review by the Commissioner. The final report shall include the project number, project name, source of material, quantity of material represented by the samples, and the recommendations for chemically enhancing the soil's characteristics in order to meet the intent of the application.

Placement. Prior to placing the planter soil mix, all final adjustments to any utility structures within the planters must be completed and accepted by the Commissioner. Planters shall be free of all trash and debris before placement begins. If geotechnical fabrics and/or drainage layers have been specified, the condition of these items shall be intact and free of holes, tears, or defects that may inhibit their function. Any deficiencies found shall be repaired by the Contractor without any additional cost to the City. Irrigation systems located within the planters shall not be placed until the planter soil mix is approved by the Commissioner.

Place, spread, and rough grade the soil to depths specified on the plans. The soil mix shall be placed in two lifts. The first lift shall be 2/3 of the planter soil depth. After placing each lift, moisten the surface at a rate sufficient to hydraulically settle the soil, or as determined by the Commissioner. Allow the water to thoroughly percolate through the soil before placing the next lift. Soil mix placed and found to be unacceptable by the Commissioner shall be removed and replaced at no cost to the City with a soil mix in accordance with the specifications and as approved by the Commissioner. The contractor shall be responsible for repairing any damage caused during the removal and replacement operation, which includes, but is not limited to, plant material, irrigation system(s), water proofing membrane, adjacent sidewalk, curb and gutter, pavements, planters, etc. Any additional traffic control required to remove and replace any soil mix found to be unacceptable by the Commissioner and / or perform said repairs shall be at no cost to the City.

Rake smooth and finish grade all planted areas. The removal of excess material or the addition of planter soil mix may be required prior to landscaping. This shall be considered incidental to the cost of planter soil mix and will not be paid for separately. Any areas disturbed by irrigation installation shall be restored to finish grade and raked smooth. The finished grade shall be within ± 0.10 feet of the design grade while allowing the necessary room for placement and mixing of organics as required by the Commissioner.

All debris, litter, tire tracks, dirt, and unintended materials shall be removed, swept, or washed off of all landscape, hard median surfaces, and pavement on a daily basis.

QC/QA Requirements. Quality control testing is required by the producer or supplier to verify compliance with the specification prior to delivery. The pH and mechanical results must be within the tolerances specified in this specification prior to performing any Quality Assurance testing by the Commissioner. Upon the completion of acceptable QC results for both mechanical and chemical properties, the Commissioner will conduct job site Quality Assurance testing to verify the results obtained by QC and determine if the mechanical and chemical results are acceptable.

Testing. The mechanical testing and chemical analysis requirements listed above must be conducted by QC at the frequency listed below. Confirmation or QA testing conducted by CDOT QA under the direction of the Commissioner will be a percentage of the total tests performed by QC as determined by the Commissioner. Testing performed by CDOT QA will only be conducted once all of the soil mix has been delivered to the site and a final representative composite sample can be obtained.

<u>Soil Quantity (c.y.)</u>	<u>Number of Tests**</u>
< 200	1
200 – 1000	3
> 1000	$\left[\frac{\text{Quantity} -}{50} \right] +$

** When more than one test is performed, the average of the test results will be used to determine acceptance.

*** The resulting value shall be rounded up to the nearest whole number.

Certifications. All testing shall be completed by laboratories approved to perform the testing detailed above. Mechanical testing and chemical testing may be completed by different laboratories as long as each laboratory is certified to perform the tests for which they have provided results. Agricultural laboratories conducting the testing must be an active member with the Illinois Soil Testing Association (ISTA) and currently certified under ISTA’s Laboratory Proficiency Testing Program. Standard material testing laboratories may only perform the mechanical tests provided they are AASHTO accredited to conduct those testing procedures.

Acceptance. Due to shipping and sampling variances, an additional tolerance of ± 5% will be used to evaluate the acceptance of the planter soil mix based on CDOT QA test results as they relate to the sand, silt, and clay contents. Mechanical test results that are within these tolerances will be considered acceptable. Results from the remaining Mechanical and Chemical Analysis will be evaluated based on the applicable tolerances and the recommendations provided by the testing laboratories. Soil placement shall only occur after final review and approval by the Commissioner.

STRUCTURAL SOIL

Description: Work under this item shall consist of furnishing and placing Engineered Soil to meet finish grade elevations as specified on the plans or herein and be performed in accordance with Section 310 of the Standard Specifications and US Patent #5,849,069 for 'CU-Structural Soil TM'(see material specification), except as herein modified. Structural soil is designed to function as a sub-base material under sidewalk and pavement, as well as a growing media outside the tree pits.

Definitions: The following references are abbreviated and used herein and shall be interpreted as follows:

“CBR” means “California Bearing Ratio”.

“Structural Soil” refers to “CU Soil” as defined and specified by the patent for “CU Soil” and as specified here.

“USDA” means “United States Department of Agriculture”.

Quality Assurance: Material provided shall be 'CU-Structural Soil TM', US Patent #5,849,069. The material shall be produced and obtained from the exclusively licensed vendor, Amereq, Inc. (800) 832-8788, or from a sub-licensed vendor such as Midwest Trading in St. Charles, IL, (847) 742-1840.

At least 10 days prior to installation, the Contractor shall submit to the Commissioner a copy of the vendor's license, proof of purchase from that vendor, and a copy of the vendor's material test reports for that specific batch of material. No materials shall be ordered until the required submittals have been reviewed and approved by the Commissioner. Approval shall not constitute final acceptance. The Commissioner reserves the right to reject, on or after delivery, any material that does not meet these specifications.

Submit material test reports for the following, certifying the materials comply with the following criteria:

A. Clay Loam

1. Clay Loam shall be a “clay loam” based on the “USDA classification system” as determined by mechanical analysis (ASTM D-422) and it shall be of uniform composition, without admixture of subsoil.

2. Mechanical analysis for a Loam / Clay Loam shall be as follows:

<u>Textural Class</u>	<u>% of total weight</u>
Gravel	less than 5%
Sand	20 - 45%
Silt	20 - 50%
Clay	20 - 40%

3. Chemical analysis: Meet or be amended to meet the following criteria.

- a. pH between 7.0 and 7.5
- b. Percent organic matter 2 -5% by dry weight.
- c. Nutrient levels as required by the testing laboratory recommendations for the type of plants to be grown in the soil.
- d. Toxic elements and compounds below the United States Environmental Protection Agency Standards for Exceptional Quality sludge or local standard; whichever is more stringent.
- e. Soluble salt less than 1.0 Milliohm per cm.
- f. Cation Exchange Capacity (CEC) greater than 10

- g. Carbon/Nitrogen Ratio less than 33:1.
 - 4. Clay Loam shall be the product of a commercial processing facility specializing in production of stripped natural topsoil.
- B. Crushed Stone
- 1. Crushed Stone shall be a DOT certified crushed stone. A non-limestone aggregate will be preferred. The maximum allowable aggregate able to pass the ½ inch sieve is 10 percent. A ratio of nominal maximum to nominal minimum particle size of 2.
 - 2. Acceptable aggregate dimensions will not exceed 2.5:1.0 for any two dimensions chosen. Minimum 90 percent with one fractured face, minimum 75 percent with two or more fractured faces.
 - 3. Results of Aggregate Soundness Loss test shall not exceed 18 percent.
 - 4. Losses from LA Abrasion tests shall not exceed 40%.
- C. Hydrogel
- 1. Hydrogel shall be a potassium propenoate-propenamide copolymer Hydrogel as manufactured by Gelscape by Amereq Corporation. (800) 832-8788.
- D. Water
- 1. The Contractor shall be responsible to furnish his own supply of water to the site at no extra cost. All work injured or damaged due to the lack of water, or the use of too much water, shall be the Contractor's responsibility to correct. Water shall be free from impurities injurious to vegetation.
- E. Final Mix Criteria
- 1. A uniformly blended mixture of Crushed Stone, Clay Loam and Hydrogel, mixed to the following proportion:

MATERIAL	UNITS OF WEIGHT (either metric or English)
Crushed Stone	100 units or 80-84% of total weight
Loam (dry)	Approx. 20 units or 15-16% of total weight
Hydrogel	0.03 units or 12 oz./ cubic yard
Total moisture	8.5 -11.0 % of total weight (AASHTO T-99 optimum moisture)
 - 2. Submit certification that CBR test results meet acceptance (CBR # 50).
 - 3. Submit certification that Proctor test standard is met (> or equal to 95%).

Delivery, Storage and Handling

- 1. Do not deliver or place soils in frozen, wet, or muddy conditions. Material shall be delivered at or near optimum compaction moisture content as determined by AASHTO T 99 (ASTM D 698). Do not deliver or place materials in an excessively moist condition (beyond 2 percent above optimum compaction moisture content as determined by AASHTO T 99 (ASTM D 698).
- 2. Protect soils and mixes from absorbing excess water and from erosion at all times. Do not store materials unprotected from large rainfall events. Do not allow excess water to enter site prior to compaction. If water is introduced into the material after grading, allow material to drain or aerate to optimum compaction moisture content.

General Requirements:

1. Locate and confirm the location of all underground utility lines and structures prior to the start of any excavation. Repair any underground utilities or foundations damaged by the Contractor during progress of work incidental to contract.
2. Complete all walls, curb footings and utility work in the work area prior to installing Structural Soil.
3. Verify that sub-base is adequately graded and compacted prior to placement. Notify the Commissioner of any subsurface conditions which will effect the Contractor's ability to complete the work.
4. Excavate and compact the proposed sub-grade to depths, slopes and widths as shown on the contract plans. Confirm that the sub-grade is at the proper elevation and compacted as required. Sub-grade elevations shall slope parallel to the finished grade and or toward the subsurface drain lines as shown on the drawings.
5. Clear the excavation of all construction debris, trash, rubble and any foreign material. In the event that fuels, oils, concrete washout, silts or other material harmful to plants have been spilled into the sub-grade material, excavate the soil sufficiently to remove the harmful material. Fill any over excavation with approved fill and compact to the required sub-grade compaction.
6. Stockpiling of material on site will not be permitted, unless otherwise directed by the Commissioner.
7. Protect adjacent walls, walks and utilities from damage or staining by the soil. Use 1/2" plywood and or plastic sheeting as directed to cover existing concrete, metal and masonry work and other items as directed during the progress of the work. Any damage to adjacent facilities incurred during the installation of structural soil shall be repaired incidental to this item.
8. Install CU Soil in 6 inch lifts to the depth indicated on the contract plans and compact each lift as specified here.
9. Compact all materials to peak dry density from a standard AASHTO compaction curve (AASHTO T 99). No compaction shall occur when moisture content exceeds maximum as listed herein. Delay compaction 24 hours if moisture content exceeds maximum allow-able and protect CU Soil during delays in compaction with plastic or plywood as directed by the Commissioner.
10. Bring Structural Soils to finished grades as shown on the contract plans. Immediately protect the Structural Soil from contamination by toxic materials, trash, debris, water containing cement, clay, silt or materials that will alter the particle size distribution of the mix with plastic or plywood as directed by the Commissioner.
11. Clean up work area at the end of each working day. Do not track soil from the site onto adjacent property and the public right of way.
12. Upon completion of the of this work, remove all excess fills, soils and mix stockpiles and legally dispose of all waste materials, trash and debris. Remove all tools and equipment and

provide a clean, clear site. SWEEP, DO NOT WASH SURFACES OF DIRT AND MUD UNTIL SIDEWALK HAS BEEN INSTALLED OVER THE ENGINEERED SOIL.

IRRIGATION SYSTEM

Description:

- A. This work includes design and installation of the irrigation system as indicated on the drawings and as specified herein.
 1. Contractor must prepare design drawings and shop drawings for approval by the Commissioner and the Department of Water Management prior to commencement of any work on this item.
 2. This work must include all labor, material, equipment, permits, and services to construct the irrigation system as designed in approved shop drawings, in accordance with sections 561, 562, 563, and 565 of the Standard Specification for Road and Bridge Construction and the Standard Construction Details, except as herein modified.

Water Services:

1. Work described in the items WATER TAP, WATER VALVE ASSEMBLY, WATER METER IN VAULT, BACKFLOW PREVENTER (R.P.Z.), and WATER SERVICE LINE will collectively be described as Water Service Components within this specification.
2. Water Service Components must be installed prior to the installation of the irrigation system, unless otherwise approved by the Commissioner.
3. The Water Service Components to be provided in this contract are shown in the plans. The numbers of water services and sizes shown in the plans have been designed to provide an adequate amount of water supply to service the areas to be irrigated (based on City of Chicago average water main pressure). If it is determined the Irrigation System requires a greater water supply to conform to the requirements of this specification the Contractor must notify the Commissioner immediately.
4. The locations of Water Service Components are shown on the plans schematically. The Resident Engineer in the field will determine the location the Water Service Components. The irrigation system must be designed to accommodate the location of the Water Service Components as installed.

Electrical Services:

- a) The items contained in this contract used to supply electrical power for the irrigation system will be collectively described as the Electrical Service within this specification.
- b) This specification includes requirements for electrical powered components. Therefore, some items are dependent on the type of system to be installed.
- c) Electrical Services will be obtained from either a new service from a Commonwealth Edison power source, or from a street lighting controller.
- d) Electrical services for pump stations must be obtained from a Commonwealth Edison power source.
- e) Electrical Service will extend to the pump station or irrigation system controller, and paid for using appropriate items. All electrical components including 2" PVC conduit and wiring, from the pump station or irrigation system controller required to operate the irrigation system in

accordance with this specification is considered incidental to this item and must be shown on the shop drawings.

Codes and Standards:

5. Codes: All plumbing work must be installed within applicable provisions of the City of Chicago building codes.
6. All devices and their installation must be in accordance with the City of Chicago Plumbing Code.
7. Standards: Items listed to conform to ASTM, ANSI, or manufactures recommendations, for installation.

Design:

The design will be completed, reviewed, and signed by a Licensed Professional Engineer or a Licensed Plumber. The design will follow these guidelines:

8. Max velocity = 5 feet per second.
9. Spray head distribution system must be designed, unless the existing water main pressure is not sufficient. If main pressure is not sufficient a drip line system could be designed if approved
10. by the Commissioner.
11. Spray Heads Minimum Height:

Non-Turf Areas:	12 inches expandable to 18 inches
Turf Areas:	minimum 4 inches or sufficient height to account for grade differentials
12. PSI variance:

All spray heads should operate at ± 3 psi of every spray head within a zone.
All zones should operate at ± 3 psi of every zone within a system.
13. Isolation Valves:

Median Planters	Isolate each median planter
Parkway Planters	Isolate every 300 feet
Turf, Parks, & Malls	Per Commissioner's Approval
14. Head Spacing:

Median and Parkway Planters:	10 feet max spacing
Turf, Parks, Malls, and Plazas:	50% of the diameter of throw minimum.

Square or triangular spacing must be used. The heads should have a matched precipitation rate.
15. Angle of Trajectory: Should be calculated so that the spray will be above the mature plant height.
16. Precipitation:

Non-turf:	Minimum 1 ½ Inch per week
Turf:	Minimum 1 Inch per week
17. Watering Run Times:

Spray Head: Three (3) waterings per week, eight (8) hour per watering maximum duration.
Drip: Three (3) run times per week, twenty-four (24) hour per watering maximum duration.

18. Wiring size: calculations must be made to account for voltage drops and any splicing must be reflected on the shop drawings.

19. Quick Couple Valves Spacing:

Median Planters: 200 feet or 1 per median
Parkway Planters: 200 feet or 3 per block
Parks, Malls and Plazas: 100 feet radius between valves, minimum 1.

Submittals:

20. Shop drawings must be prepared by a Licensed Professional Engineer or a Licensed Plumber with proven experience in the design of irrigation systems of the magnitude of this project.
21. Shop drawings must include pipe detailing, controller layout, fabrication and installation of irrigation systems. Indicate plans, elevations and dimensions, including all accessories.
22. Submittals must include hydraulic calculations for circuit pressure losses.
23. Submittals must include wiring sizes and electrical calculations.
24. Submittals must include a complete package of catalog cut sheets for all equipment used in this irrigation system.

Manufacturers and Minimum Requirements:

Manufacturers: All products list herein are as suggested. However, the Contractor can specify other products. These will be subject to review for approval prior to installation. Judgment of whether a product is as suggested will be based on the product information sheet, and the Commissioner's past experiences with products.

25. **PVC or Polyethylene Piping & Fittings:**

All sprinkler piping mainlines and lateral pipe must be SDR-21, Class 200, Polyvinyl Chloride (PVC) with a minimum pressure rating of 200 PSI. Pipe must be permanently and continuously marked with the manufacturer's name, trademark, size, type, and National Sanitation Foundation (NSF) seal of approval. Pipe must conform to the requirements of Commercial Standard CFS-256 and ASTM D-2241. PVC pipe must be as manufactured by Crestline Industries as suggested.

All PVC fittings must be solvent weld, Schedule #40 and must conform to ASTM D-2466. Fittings must be manufactured from PVC Type I materials and must meet National Sanitation Foundation (NSF) standards. PVC fittings must be as manufactured by Spears Manufacturing Company as suggested. PVC fittings must be joined with an as suggested PVC primer and cement.

Polyethylene piping 1 inch thru 1 ½ inch can be used for lateral piping, (down stream of the control valve). The pipe must be polyethylene NT80 irrigation pipe SDR-15 PE2406 NSF-PW ASTM D 2239 PPFA manufactured by Crestline. The pipe must be permanently continuously labeled accordingly. The insert fittings are to be constructed of PVC and must conform to ASTM D 2609 and National Sanitation Foundation Standard #14 plastic fittings

for potable water. Insert fittings must be clamped to pipe with two (2) stainless steel crimp type clamps on each pipe end.

Spears Manufacturing Company manufactures plastic insert fittings for polyethylene plastic pipe. Oetiker must manufacture clamps.

26. Installation Main & Lateral Piping:

All sprinkler main lines must be installed by open trench method using either a chain type trencher or hand excavated. Trenches must be excavated so as to provide sufficient depth and width to permit proper handling and installation of pipe and fittings. Excavate the trench deep enough to provide a minimum of 18 inches of cover over the pipe. Ensure that the bottom of the trench is clean and smooth with all rock, loose soil and organic matter removed. Trench bottom must provide a smooth and continuous bearing surface to support the pipe.

When the cutting of pipe is required the pipes must be cut clean and square with all burrs removed prior to solvent welding. Pipe must be free of all dust, dirt, moisture, grease, oil, or any other foreign material.

Solvent welding method using a quality primer and cement applied according to the manufacturer's recommendation must join pipe. Excess solvent must be wiped cleaned from the pipe and fittings.

Sprinkler lateral piping may be installed by either open trench method or with an approved "vibratory plow". Where the open trench method is employed, the above specifications must apply. In both the "open trench" method and the "vibratory plow" method, the minimum depth of cover for the lateral lines must be 18 inches.

Where the "vibratory plow" method is used, the "mole" or "bullet" of the plow that precedes the pipe and is used to form the opening for the pipe must not be less than 1-inch larger diameter than the outside diameter of the pipe. Starting and finishing holes must be of sufficient size to allow for proper connection of the required fittings.

For polyethylene pipe, the insert fittings are to be clamped with stainless steel clamps. All fittings are to be double clamped securely over the barbs on fittings. Detectable Warning Tape must be installed over all pipes. The tape will be placed so that it is 6 inches above the top of the pipe. Polyethylene film warning tape manufactured for marking and identifying underground utilities, 4 inches wide and 5 mils thick minimum continuously inscribed with "Irrigation" detectable by metal detector when tape is buried up to 30 inches deep.

3a. Irrigation Controllers (Electric Operated):

The irrigation controllers must accommodate all zones plus 3 extra zones, providing for complete automatic operation of the system. Run time for the controller must be 0-2 Hours per station and must provide for schedules of up to 2 weeks with interval scheduling available as an alternate method. The controllers must have a seasonal adjust features capable of increasing or decreasing station timing from 0% to 200%. The controllers must have a non-volatile memory capable of holding program information during power outages. The controllers must have a 365-day calendar, which automatically adjusts for leap year.

The controllers must be programmable for up to 32 start times per day per program and must be capable of operating 24 Volt AC electric remote control valves via a 30 Volt AC transformer.

The controller cabinets must be constructed of cold forged stainless steel, and have a key-lockable door for vandal resistance.

The controllers must be UL listed.

The controllers must be Rainbird model ESP-MC.

4. Install Irrigation Controller (Electric Operated):

The irrigation controller is to be installed in a cabinet. The cabinet must be brown in mulched areas and green in turfed areas or as directed by the Commissioner. The cabinet must have a single duplex outlet securely fastened. The cabinet will be able to be locked with a single lock. The commissioner will provide the lock. The cabinet will have the dimensions and installed per the details in the plans.

Weatherproof breakaway in-line fuses must be installed in the electrical service cable prior to the connection to the controller. The fuses must be in the controller cabinet.

The low voltage irrigation control wiring is to be installed in 2 inch steel heavy wall electrical conduit for protection. The conduit must run from the controller, down and out 12 inches into the soil area. Conduit fittings are to be used to make 90 degree turn backs on the conduit at points of exit from the walls. (In no case must the low voltage irrigation control wiring be installed in Class 160 or 200 PVC sprinkler pipe and Schedule 40 PVC 90-degree elbows).

The locations of all zones and recommended run times must also be labeled on the controller along with the name, address, and phone number of the irrigation Installer.

The Contractor is responsible for obtaining any electric permits required for the low voltage wiring.

The irrigation controller must be installed in a secured enclosure (cabinet). The enclosure must be UL NEMA 4X Hinge Clip with provisions for a padlock and safety chain for doorstops. The approximate dimensions are 20"x20"x8" with 4 legs. It must be constructed of all stainless steel type 316 code gauge all seam weld grinded smooth. All conduits must enter from the bottom. The enclosure must be equipped with proper ventilation. The enclosure must be primed and painted (brown in mulch area and green in turf area or black if determined by the Commissioner). The controller and equipment must be mounted on a back plate. It must include a disconnect, GFI protection, duplex outlet, and protected fuses. All equipment housed in the enclosure must be labeled as UL assembly. The enclosure must be securely fastened square and level to the concrete pad using all stainless steel fasteners.

5a. Automatic Control Valves (Electric Operated):

Automatic Control Valve must be female pipe inlet and female pipe outlet connection. The diaphragm must be of rubber construction to retain flexibility and provide maximum sealing throughout its area.

The valve must have a manual flow control, with a hand-operated, rising-type flow control stem with control wheel/handle. All parts must be serviceable without removing valve from the line.

18-inch solenoid lead wires must be attached to a 24 VAC, 50/60-cycle solenoid with waterproof molded coil. The valves must be normally closed.

The automatic control valve must be model PEB series as manufactured by Rainbird.

6a. Installation Automatic Control Valves (Electric Operated):

The automatic control valves are to be installed at the locations indicated on the shop drawings. All PVC must conform to the Section 1. PVC Piping and Fittings. Schedule 80 toe-nipples are to be used on the up stream and down stream sides of the valve. Wire splicing for valves to follow Section 12 of this specification, CONTROL WIRING. Valves must be assembled so that they fit comfortably and properly in the valve boxes allowing sufficient room for service. Every effort should be made to install the valves, and valve boxes, in a location where they will not interfere with foot traffic or the maintenance of the landscape.

7. Heads; Rotary, Spray, Swing Joints:

- a. Median and Parkway Planters: The Sprinkler Heads must be fixed spray type designed for in-ground installation. The body of the sprinkler must be constructed of non-corrosive heavy-duty cyclac. The sprinkler heads must have a riser screen filter to prevent entry of foreign materials to the nozzle. All parts must be removable through the top of the sprinkler case. The sprinkler heads must have a stainless steel retraction spring to ensure positive pop-down and must have a Conilip seal and cap to provide proper sealing.

The sprinkler heads must be of pop-up design with an overall body height of 16 inches, and have a pop-up stroke of 12 inches.

The Spray Heads must be Model 1812 for landscaped areas as manufactured by the Rainbird, for turf areas Model 1804 is permitted provided that available pressure does not allow for the use of rotary heads.

- b. Turf Areas (when approved by the Commissioner): Full and Part Circle Rotary Sprinkler Heads must be gear drive rotary sprinkler heads with a built in check valve to eliminate low head drainage. Radius reduction must be adjustable by up to 25% by means of radius adjustment screw accessible from the top of the cap. Water distribution must be via two (2) nozzles mounted in a stainless nozzle turret. The dual nozzles must elevate 2-3/8 inches when in operation.

Retraction must be achieved by a heavy-duty stainless steel retraction spring. The sprinkler head must have a riser seal and a wiper which permits limited flushing on the up and down stroke. A planetary gear assembly must accomplish rotation. The sprinkler head housing must be of high impact molded plastic with a 1 inch NPT connection.

The rotary heads must be I-25 ADS series with stainless steel sleeve, manufacturing by Hunter.

- c. All heads will be installed with swing joints. Sprinkler head swing joints are to be factory assembled PVC swing joints constructed of 315-psi pressure rated materials. Swing joints must be three-elbow construction with pre-lubricated buttress threaded connections and double O-Ring seals.

Spears Manufacturing Company, Sylmar, California, must manufacture sprinkler head swing joints.

8. **Installation Heads; Rotary, Spray, Swing Joints:**

Sprinkler heads must be installed flush and level with existing grades. Where sprinkler heads are installed along curbs or sidewalks, heads are to be placed 4 inches from the curb or sidewalk to allow for mechanized trimming. Where sprinkler heads are installed in plant beds, the sprinkler heads must be installed 2 inches from the edge of planter wall. Soil around sprinkler head must be tightly compacted.

All lines are to be flushed clean of debris prior to the installation of sprinkler head. Sprinkler heads and spray arcs are to be adjusted so that spray does not encroach into roadways or wet buildings and other structures.

9. **Quick Couple Valves:**

Quick Couple Valves must be 1 inch with one-piece body construction from heavy cast bronze.

Quick Couple Valves must be model QCV100N manufactured by Storm irrigation Products.

Two quick Coupler Keys must be provided. The keys must be one (1) inch single lug coupler made from heavy cast bronze.

Quick Couple Keys must be model C-100 with hose swivel model HS100 manufactured by Storm irrigation Products.

10. **Installation of Quick Couple Valves:**

Quick coupler valves are to be installed plumb in a 10 inch round valve box (see Valve Box for product) The quick coupler valves are to be secured with a 3/8 inch x 5/8 inch epoxy coated steel rebar driven into stable ground. The quick coupler valve and rebar are to be secured together with three separate heavy-duty stainless hose clamps. All quick coupler valves must be mounted on a prefabricated triple swing joint assembly.

The swing joint assembly must be model 5806-01-012 manufactured by Spears Manufacturing Company.

11. **Control Wiring:**

The irrigation control wire must be a minimum of 14 gauge, single conductor, and low energy circuit cable. A single 12-gauge single conductor white control wire must be utilized as the common wire and connected in series to each valve. Zone wire must be red, yellow, or orange in color. Irrigation Control Wire must be a 14-gauge minimum PVC jacketed, single conductor, 600 volt rated, low energy direct burial circuit cable. The irrigation control wire must be UL listed.

Paige Electric Company, Union New Jersey, must manufacture irrigation control wiring.

12. **Installation of Control Wiring:**

Every other solenoid valve should have a spare control wire running from the irrigation controller. The spare wires should be marked at both termination points. The irrigation control wires are to be bundled and taped together at five-foot intervals. An expansion loop must be provided every 100 feet, at every 90-degree angle, and at each valve location. Where irrigation control wiring is installed by itself, the minimum depth of cover must be 24 inches. Under no circumstance must the control wires be pulled through the ground. If a vibratory plow is utilized to install control wire, the plow must be used with a wire or cable-laying blade, which allows for cable installation without pulling the wire through the ground.

Splicing is not permissible unless approved on the shop drawings. If splicing has been approved all splices must be waterproof. Should splices be required other than at valve locations, those splices must be installed in a valve box and noted on the As Built Plans. Under no circumstances must splices be buried.

Splice Kits must be Scotch DBY Direct Bury Splice Kit as manufactured by Electric Products Division/3M, St. Paul, MN.

13. Valve Boxes:

Valve Access Boxes must be constructed of a combination of polyolefin and fibrous inorganic components (Superflexon Plastic) that is chemically inert and normally unaffected by moisture, corrosion and the effects of temperature change. Valve Boxes must have a tensile strength of 3,400 psi.

For the automatic control valves, the Valve Box Base must be #170101 and Valve Box Lid must be #17314 as manufactured by Ametek Plymouth Products Division, Sheboygan, Wisconsin.

For the quick couple valves, the Valve Box must be Model #181014 as manufactured by Ametek Plymouth Products Division, Sheboygan, Wisconsin.

The lids and boxes will be green for turfed areas and brown for mulched areas.

14. Installation of Valve Boxes:

Each automatic control valve must be installed in a valve box. A minimum of two valve boxes must be stacked. The valve boxes must be installed so that the valve is centered in the box allowing sufficient room for servicing of the valves. Clearance between the highest part of the valve and the bottom of the valve box lid must be 2-inch minimum. The lid must not be too deep for convenient service. The valve box must not rest on the pipe. Clearance between the top of the piping and the bottom of the valve box must be a minimum of 1 inch. Each valve box is to be installed flush and plumb to grade.

As a part of the valve box installation 3 to 4 inches of ½ to 1-inch stone, free of fines should be placed so that the top of the stone is 2" below the valve.

27. Drip Lines:

The drip system must include all necessary components for a drip system. Such as, filter for solenoid, drip tubing, and check valves, air vacuum relief valve, lateral piping, and line flush valve and fittings.

The drip tubing is to have a root barrier which makes it resistant to root intrusion. The drip tubing is to be Netafim Techline pipe with a dripper flow rate of 0.9 GPH part # TLDL 9-1210 with 12 inch on center spacing for the drippers.

28. **Drip Lines Installation:**

The drip tubing will be installed in rows 12 to 16 inches apart. The rows closest to the walls of the landscaped planter must be 2 to 4 inches from the edge of the walls. The drip tubing must be laid on the finished grade of the soil mixture. The drip tubing must be secured a minimum of every 3 feet with Techline Staples (ILS6). The drip tubing must be installed parallel to the longest wall of the landscaped planter. If the drip tubing needs to go around a plant or obstacle, the tubing must return to its original line as soon as possible. The installation must be complete prior to mulch installation.

When possible the system must use a center feed layout. The drip tubing must feed from a PVC or Polyethylene supply header in a grid layout. The exhaust header and the supply header must form a continuous loop with PVC or Polyethylene piping. The maximum distance between each supply header and exhaust header is 70 feet. The furthest distance in each direction of the solenoid valve must contain a Netafim Line Flushing Valve, model TLFV-1. The flush valve will be below grade in a valve box with a sump. A filter must be installed down stream of the solenoid valve with the appropriate filter mesh in accordance with Techline design manual. An air vacuum relief valve is to be installed at the highest points of each zone. The air vacuum relief valve is to be installed in a valve box. A single micro-spray head is required for each zone. The spray head is required to indicate that a zone is on and working. It should not be used as a main watering source for an area.

In situations where the slope is greater than or equal to 4% install the drip tubing perpendicular to the slope. Check valves must be installed to prevent water from draining to the lower elevations.

Hydrostatic Testing:

29. The test must consist of pressurizing the mainline piping system to a minimum of 150 psi for a period of four (4) hours.
30. During the test, the piping system must maintain 150 psi with an allowable pressure drop of not more than 5-psi, if any deficiencies in the piping system are found, the piping or fittings must be repaired or replaced at no additional cost to the contract.

Pressure & Flow Testing:

31. A test will be taken of the static pressure on the upstream and downstream sides of the RPZ valve.
32. A pressure reading must be taken at each zone while each zone is running.
33. The flow rate must be recorded from the water meter at each running zone for a 5-minute period.
34. This information must be recorded on the As-Built drawings.

As Built Drawings:

Upon completion of the installation the Contractor must prepare and submit an "As-Built" drawing of the completed project. The drawings will show the accurate locations of all valves, quick couplers, mainline, wire splices, backflow devices, and controllers. The drawing must also show the approximate location of sprinkler heads and lateral lines. Each controller must be labeled on the plan alphabetically starting with A and the zones controlled by that controller must be labeled A-1, A-2, A-3...etc.

The drawings must also show the locations of Water Service Components and Electrical Service Components.

Demonstration:

Demonstrate to Commissioner's maintenance personnel operation of equipment, sprinklers, specialties, and accessories. Review operating and maintenance information. Provide 7 days notice to all parties in advance of each demonstration.

Irrigation system startup, shutdown and inspection

The work to be performed under this section consists of placing the irrigation systems into operation (start-up), preparing the irrigation systems for winter (shutdown), performing inspections and adjusting the irrigation systems in accordance with the detailed specifications herein and generally accepted practices for operating, adjusting, and maintaining irrigation systems. The period covered by this work will begin with the date of acceptance by the Commissioner (i.e., substantial completion/beneficial occupancy date) and complete with the end of the Fall Shut-Down in October of the following year.

1. The Contractor is responsible for the shutdown, startup, and inspection of the irrigation system the year following the original date of installation.
2. The Contractor is responsible for storing the RPZ's, irrigation keys, and other hardware or software related to the irrigation system between shutdown and startup the year following installation. Once the system has been restarted the following year, all hardware and software are to be transferred to the City of Chicago.
3. All work on the irrigation systems must be performed between April 1 and November 30 or as specified
4. All plumbing work must be done by licensed plumbers as per the applicable requirements of the Chicago Building Code and Illinois Plumbing Code (latest edition)

General Requirements: The Contractor must coordinate all activities required for the completion of contract requirements with the Commissioner's vendors, suppliers, all subcontractors, and CDOT personnel. The procedures described below represent the intended minimum requirements for irrigation system maintenance; however, the Contractor's design may require different or additional procedures. The Contractor must submit his recommended maintenance procedures in similar detail for review and approval by the Commissioner.

1. Irrigation Systems Spring Startup (April 1st - May 1st):
 - A. The Contractor must place the entire irrigation system(s) into operation by reinstalling and/or reactivating, testing, operating, and adjusting applicable components of the irrigation systems including manual valves, meters, backflow prevents, and water outlets. Spring start-up may be performed after April 1st and must be completed not later than May 1st. This work includes, but is not limited to, the following activities:
 1. Coordination of the start-up with the Plumbing Inspector-In-Charge, Department of Water Management (744-3768), a minimum of 48 hours in advance of start-up on each irrigation system so the Water Department can witness the annual testing and recertifying of the reduced pressure backflow preventers (RPZ's) and reestablish

service. Such testing and recertification of the backflow preventers is the responsibility of the Contractor. Illinois Plumbing and Backflow Testing Licenses are required. Any permits required from the Water Department, to perform this work, must be included in the cost of this pay item.

2. Coordination of pick-up and/or delivery of stored RPZ units with the CDOT storage facility and reinstallation of the RPZ units in the same locations from which they were removed.
 3. Full inspection as detailed in the 'Irrigation Systems Inspection' section.
 4. Full mainline activation and pressurization of each zone and sub-zone in each irrigation system.
 5. Flushing each mainline system at each end of each system for a minimum of 15 minutes at each end.
 6. Flushing and testing each water outlet.
 7. Verifying satisfactory activation of each solenoid valve. Inspecting of all wire connections within valve boxes related to these solenoid valves.
 8. Inspecting and adjusting (if necessary) all wire connections within each Irrigation System Controller.
 9. Verifying satisfactory operation of all functions of each controller. Replacing any batteries each Spring. Placing the Spring program into the controller.
 10. Testing the operation of each moisture sensor. If moisture conditions do not allow testing, a thorough soaking of the sensor area will be necessary. Placing sensor in active and then in bypass modes to test each operation.
 11. Closing and then opening each isolation valve.
 12. Lubricating hinges and locks on all controller and RPZ cabinets.
 13. Testing and tagging each RPZ
 14. Re-compacting soil within valve box of each water outlet. Additionally, the Contractor must verify that the concrete pads for valves or control boxes have compacted soil under them; not just mulch. If necessary, soil must be placed completely under the pads to ensure continuing proper support and avoidance of stress loads on attached water lines or conduits.
 15. Observing for visual evidence of water leaks.
 16. Submitting a field report to the Commissioner, the following day after each inspection/spring turn-on, as an overview of each system's operation, performance and required repairs.
- B. Any damage caused by improper or inadequate irrigation systems' start-up must be repaired immediately at the Contractor's expense.
2. Syringing Plants/Flushing Beds (April 1st - May 1st):
- A. The objective of syringing (washing) plants and flushing beds is to reduce damage from winter salt.
 - B. In early spring, when temperatures are anticipated to remain above 35 degrees Fahrenheit for a minimum of 24 hours and the threat of snowfall and road salting has diminished, the Contractor must wash all plant material with a gentle spray of water to remove accumulated salt from stems, bark and crowns. Contractor is responsible for supplying water.
 - C. Between April 1st and May 1st, after irrigation system start-up, apply water at double the normal rate for a period of one (1) week to flush salts from mulch, beds and soil.
 - D. Syringing of plants and flushing of beds must be included on a Maintenance Report that must be submitted to the Commissioner. This report must be faxed or delivered to CDOT personnel. If the Maintenance Report is not received, it will be assumed that no work was performed and no payment will be made.

- E. Syringing the plants and flushing the beds at irrigated planters will be considered incidental to IRRIGATION SYSTEM.
3. Irrigation Systems Inspection:
- A. The Contractor must perform Irrigation Systems Inspections once during the period between June 15th and June 30th and once again during the period between August 15th and August 30th. The Contractor must be responsible for notifying the Commissioner 48 hours prior to any inspections.
 - B. Inspection must be performed while the system is in operation. Each inspection must include the following activities:
 - 1. Testing all zones. Verifying each flushing valve operation. Cleaning each filter of each circuit.
 - 2. Verify each manual water outlet valve operation.
 - 3. Cleaning all clogged water outlets.
 - 4. Trimming plants or grass around water outlets and valve boxes as required.
 - 5. Testing each entire system for overall performance.
 - 6. Observing for visual evidence of water leaks.
 - 7. Making necessary adjustments.
 - 8. Submitting a written field report to the Commissioner the following day after each inspection and including an overview of the system's operation and performance. Identifying any items requiring repairs.
 - C. Any damage caused by improper or inadequate inspection must be repaired immediately at the Contractor's expense.
4. Irrigation Systems Fall Shut-Down (October 1st - 31st):
- A. The Contractor must prepare the entire irrigation system(s) for winter and protect its components against damage due to freezing or exposure.
 - B. Fall shutdown must occur after October 1st and must be completed not later than October 31st. The following descriptions of work are minimum requirements applicable to all parts of the irrigation systems within the limits shown on the plans:
 - 1. Full inspection as detailed in "Irrigation Systems Inspection" section.
 - 2. Close valve in service line between city water main and water meter vault and, in the water meter vault, close both valves at the water meter (supply side and discharge side). The piping drain valve downstream of the meter discharge valve must remain closed and plugged at this time.
 - 3. Open water outlets on ends of main piping to depressurize piping. Using the controller, activate each circuit to permit depressurization.
 - 4. Remove the reduced pressure zone (RPZ) backflow preventer and prepare it for winter storage, including draining all water from the unit.
 - 5. Provide compressed air (minimum one compressor - 160 C.F.M.). Open each water outlet until all water and water vapor is released.
 - 6. Carefully introduce compressed air into the water service line at the downstream (output) side of the RPZ. The Contractor must provide any necessary special fittings for connection to the pipe flanges where the RPZ was removed.
 - 7. Purge the water service line, the water supply pipe, and each circuit with compressed air. Purge each circuit for a minimum of five (5) minutes.
 - 8. In the meter vault, remove the plug from the drain valve and open the drain valve to allow water in the water service line between the RPZ and the water meter to drain into the meter vault. Open the meter discharge side valve and allow water to drain from the water meter. Leave both the drain valve and the meter discharge valve open (until Spring Startup).

9. Remove all standing water from within the water meter vault. Record the water meter reading, serial number, and location.
 10. Store RPZ units for the winter in a secured, frost-free storage facility.
Important: RPZ units must be reinstalled in the spring on the same water service lines from which they were removed in the Fall. After an RPZ is removed, record its serial number and location to facilitate reinstallation at the correct location in the spring.
 11. Lubricate hinges and locks on all controller and RPZ cabinets.
 12. Cover the exposed pipe connection fittings on RPZ units and water service lines with black or gray pipe caps. If caps are not available, the Contractor must provide them at no additional cost to the contract. Covering the fittings with duct tape is not acceptable.
- C. Any damage caused by improper or inadequate irrigation systems' fall shutdown must be repaired immediately at the Contractor's expense.
 - D. Contractor is responsible for any equipment losses during winter storage. Cost of storage must be included in the cost of this pay item.
 - E. Any lane closures required to perform any of this work must be done in accordance with Section 701 of the Standard Specifications and as stated under Traffic Control and Protection. Traffic Control and Protection will not be paid for separately, but will be considered incidental to this pay item.

BACKFLOW PREVENTER (RPZ)

Description: This item must consist of excavation, installation of ASSE Standard backflow preventers, installation Type K copper water pipe, and sand backfill as indicated on the plans, and as directed by the Commissioner.

General Requirements: Backflow preventers must be of the size indicated for maximum flow rate and maximum pressure loss required. City approved with AGD Series air gap.

1. Working Pressure: 150-psi minimum except where otherwise indicated.
2. 2 Inches and Smaller: Bronze body with threaded ends.
3. 2-1/2 Inches and Larger: Bronze, cast-iron, steel, or stainless steel body with flanged ends. Provide AWWA C550, interior protective epoxy coating for backflow preventers with cast-iron or steel body.

Interior Components must be Corrosion-resistant materials.

Other incidental items:

1. Strainer supplied within RPZ and compatible with size and capacity of unit, on the inlet.
2. Winterizing pipe caps.
3. RPZ Enclosure fastened to concrete base, complete with lock and powder coating

Reduced-Pressure-Principle Backflow Preventer: ASSE 1013, with (OS&Y) gate valves on inlet and outlet, and strainer on inlet. Include test cocks and pressure-differential relief valve with ASME A112.1.2 air-gap fitting located between 2 positive-seating check valves for continuous pressure application.

1. Pressure Loss: 15 psi maximum, through middle third of flow range.
2. Gate valves supplied with and compatible for size and testing of unit on inlet and outlet. Valves 2 inches (50 mm) and smaller may be ball valves if these are unit manufacturer's standard valve for this application.
3. Test Kit: Unit manufacturer supplied, complete calibrated backflow preventer testing equipment kit with carrying case.

Anti-siphon, Pressure-Type Vacuum Breakers: ASSE 1020, with valves, spring-loaded check valve, and spring-loaded floating disc. Include test cocks and atmospheric vent for continuous pressure application.

1. Pressure Loss: 6 psi maximum, through middle third of flow range.
2. Gate valves supplied with and compatible for size and testing of unit on inlet and outlet. Valves 2 inches and smaller may be ball valves if these are unit manufacturer's standard valve for this application.
3. Test Kit: Unit manufacturer supplied, complete calibrated backflow preventer testing equipment kit with carrying case.

Pressure Gauge:

ASME B40.1, 4-1/2-inch (115 mm) diameter dial, with dial range of 2 times system operating pressure and bottom outlet.

Concrete Base: Concrete: Portland cement mix, 3000 psi.

1. Cement: ASTM C 150, Type I.

2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

Reinforcement: Steel conforming to the following:

1. Fabric: ASTM A 185, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615, Grade 60, deformed.

Backflow Preventers: RPZ's must be FEBCO Model No. 825YA complete with shutoff valves, wye strainers must be FEBCO Model 650 as suggested RPZ's must be furnished with flanged unions to facilitate field removal for freeze protection or maintenance. All work must be in accordance with Chicago Department of Water Management Standards.

Valves for above ground installation must be

- A. Grinnell Supply Sales Co., Grinnell Corp.
- B. Milwaukee Valve Co., Inc.
- C. Nibco, Inc.
- D. Hammond Valve Div., Prairie Manufacturing Corp.

RPZ Enclosure

Enclosure must be lockable.

Steel must meet the requirements of ASTM Specification A-36.

Coating

1. Phosphating must be performed by totally immersing parts in a heated phosphate solution to provide the transition coating between the metal and the electrodeposition coating.
2. All parts must then be rinsed by total immersion in a continuously overflowing rinse tank to remove any excess phosphate solution.
3. Powder coating preparation for electrodeposition coating must require all parts to be totally immersed in a continuously overflowing tank containing PPG Powercron 590, or equivalent, heavy metal free cationic Electrodeposition coating. All parts must then be rinsed by total immersion in a continuously overflowing tank to remove any excess electrodeposition coating solution.
4. All parts must be cured by heating to the exact time and temperature requirements of the electrodeposition coating by precisely controlled gas ovens.
5. Powder coating must be applied by electrostatic ally depositing a uniform coating on all parts to a thickness of 8 mils minimum in two applications utilizing the electrodeposition coating preparation and 2.5-3 Mils utilizing the hot dip galvanizing preparation. Powder Coat specifications:
 - a. Color: black.
 - b. Resin Type: Polyester Urethane
 - c. 60 Degree Gloss: 92+
 - d. Specific Gravity: 1.36+/-0.05 g/cm³
 - e. Cure schedule: 20 min. at 380° F peak metal temperature
 - f. Impact Resistance 60 in. lbs/60 in lbs.
 - g. Pencil Hardness: 2H
 - h. 1/8 conical mandrel bend pass
 - i. Storage Stability: Min. 6 months at or below 30° F
6. All parts must be cured by heating to the exact time and temperature requirements of the powder in a precisely controlled oven.

An acceptable alternate to the above phosphating process is hot dip galvanizing all parts to ASTM 123 followed by an etch priming to prepare for powder coating

This item includes excavation, furnishing and installing the Type K, 2 inch copper pipe, and trench backfill from the backflow preventer (RPZ) to a point five (5) feet downstream. From that point the system will either be paid as IRRIGATION SYSTEM or WATER SERVICE LINE.

Excavation must be in accordance with applicable portions of Section 202 of Standard Specifications. Excavation must be limited to the area shown on the plans and details, or as directed by the Commissioner. All shoring required must be considered incidental to this item.

Pavement removal and replacement must be paid for using applicable line items. Restoration of non-paved areas must be paid using applicable line items.

Trench Backfill placed and compacted in accordance with Section 208 of the Standard Specification and must be included in the cost of this item. Trench backfill must be FA 2 gradation.

PLANT INSTALLATION

Description: This work shall consist of the purchase, transportation, storage, preparation and all tools required to plant balled and burlapped (B&B) trees and shrubs, container shrubs, perennials, grasses, ground covers and bulbs. A two (2) year guarantee on all trees and a one (1) year guarantee on all other planted material is included under these pay items.

References:

- A. ANSI Z60.1-2004 -- American Standard for Nursery Stock; 2004 (or latest edition)
- B. Section 253 of the Standard Specifications
- C. Guide to the Chicago Landscape Ordinance, latest edition.

35.

Submittals:

- A. Request for Materials Inspection Sheet.
- B. Anti desiccant – Material Safety Data Sheet
- C. Tree wrap – sample

Quality Assurance:

- A. Provide plant materials complying with ANSI Z60.1-2004 (or latest edition).
- B. All plants shall be obtained from Illinois Nurserymen Association or appropriate state chapter nurseries, in hardiness zones of comparable local climatic range to the City of Chicago and approved by the Commissioner. All trees and shrubs shall be dug prior to leafing out (bud break) in the spring or when plants have gone dormant in the fall, except for the following species which are only to be dug prior to leafing out in the spring: (The Commissioner reserves the right to expand this list upon submittal of the Planting Schedule.)
 - 1. Pyrus calleryana (Ornamental Pear)
 - 2. Syringa reticulata (Japanese Tree Lilac)
 - 3. Robinia Pseudoacacia (“Chicago Blues” Black Locust)
 - 4. Quercus (Oaks)

Inspections:

- A. The Commissioner will inspect plant materials at the nurseries prior to being delivered on site. This will be done upon submittal of “Request for Material Inspection” sheets. These sheets must be turned in to the Division of Engineering at least 7 weeks prior to the expected date of installation. No trees shall be delivered without CDOT Seal. Plant material not installed within 60 days of initial inspection will be required to be re-inspected.
- B. An on-site inspection will be made prior to the installation of plant material. Any plant material not meeting specification (that being of good health) must be moved off the site.

Plant Delivery, Storage and Handling:

- A. Schedule delivery to avoid storage on site. If planting does not occur immediately, store plants in a location protected from sun, weather and theft.
- B. Do not prune trees and shrubs unless directed by the Commissioner.
- C. Cover to protect stock during transport. Plant material transported without cover

shall be automatically rejected.

- D. Bind stock to protect branches, bark, and overall shape during transport.
- E. Balled and burlapped stock: Provide freshly dug stock unless otherwise approved.
- 36. F. Do not drop stock. Load and unload with care.
- F. Protect tree trunks prior to loading and unloading. Damaged trees will be rejected on site.

Guidelines:

A. Planting season: (As herein specified or as directed by the Commissioner)

Herbaceous Plants:

Where Irrigated: April 15 to October 15

Non-Irrigated: April 15 to June 15
September 15 to October 15

Woody Plants:

Where Irrigated: March 15 to November 30

Non-Irrigated: March 15 to June 30
October 1 to November 30

Bulbs:

October 15 to November 30

- B. Do not plant when soil is muddy or during frost.
- C. Dates are dependent on species of plant material and weather. Planting might begin or end prior or after above dates as approved by Commissioner.
- D. No plant material shall be installed prior to the final grade of the planting soil.
- E. No plant material shall be installed before below-ground irrigation system components have been installed and operational.
- F. Trees must be installed first to establish proper layout and to avoid damage to other plantings.

Warranties:

- A. From the date of Final Punch-list Completion and acceptance, the Contractor shall warranty all trees for a period of two (2) years and all other plant material for a period of one (1) year.
- B. During this warranty period, when so directed by the Commissioner, the Contractor shall repair and replace at his own expense all defective or unsatisfactory landscape plant materials including those that are dead, dying, diseased or lacking vigor.
- C. The Commissioner shall transmit a list of plant material under warranty to be replaced. The Contractor must replace all items within 30 days from transmittal or as directed by the Commissioner. Failure to replace plant material within the time allowed will result in liquidated damages being applied in the amount of \$250 per day.
- D. At the end of the warranty period, plant material in borderline condition will either be

replaced or an extension of the warrantee for one (1) year will be granted to the City, for that specific plant.

- E. If plant material is damaged by the Contractor during construction or the warranty period, the Contractor must replace the plants at his expense.

Initial Maintenance:

- A. Initial Maintenance: The Contractor is responsible for maintenance of each area until it has been accepted by the Commissioner by issuance of Final Punch-List Completion letter, and the warranty period is formally started.
- B. Begin maintenance when the final grade has been achieved in any one location.
- C. Initial maintenance includes weeding, staking and guying of trees and trash removal from the area to be landscaped. The contractor will provide initial maintenance a minimum of once per week, or as directed by the Commissioner.
- D. Plants shall be watered immediately upon installation and on a regular basis thereafter. If the irrigation system is not able to provide enough water to establish the plants, the contractor will provide supplemental watering at no additional cost.
- E. Initial Maintenance is intended to maintain all plants in a healthy and vigorous condition. This may require pruning, cultivating, replanting, tightening and repairing of supports, repair of wrapping, and furnishing and applying sprays as necessary to keep the plants free of insects and disease.
- F. Initial Maintenance is incidental to these pay items.

Products:

- A. Trees and Shrubs
 - 1. Provide nursery grown stock unless specifically indicated otherwise.
 - a. General: Well-branched and well-formed, sound, fibrous, healthy and free from disease, sun-scald, wind burn, abrasion and harmful insects or insect eggs. Healthy, normal and unbroken root systems.
 - b. Deciduous trees and shrubs: Symmetrically developed of uniform habit of growth with straight trunks or stems and free from objectionable disfigurements.
 - c. Coniferous evergreen trees and shrubs: Well-developed symmetrical tops with typical spread of branches for each particular species or variety.
 - d. Provide stock complying in all respects with ANSI Z60.1 and in sizes indicated, measured in accordance with ANSI Z60.1. Larger sizes with larger roots and root containment may be furnished if approved by the Commissioner.
 - i. Do not spread or compress branches when measuring. Measure main body of branches; do not measure extreme tips of single branches.
 - ii. Pruning to size is not acceptable.
 - iii. Up to 4 inches caliper, measure caliper at 5 inches above ground.
 - e. Tag each specimen of each variety of tree or shrub to indicate common and botanical name.
 - 2. Shade and ornamental trees

- Balled and Burlapped (B&B)
- 3. Deciduous shrubs
Container grown only
- 4. Coniferous evergreens
Container grown only
- B. Ground Cover, Perennials and Ornamental Grasses
 1. General: Provide field-grown or acclimatized container-grown plants from a commercial nursery, healthy, vigorous, of sizes indicated, and in accordance with ANSI Z60.1, Section 6, Young Plants.
- C. Bulbs, Corms and Tubers
Provide bulbs, corms, or tubers, free of rot or disease, of types and sizes indicated in accordance with ANSI Z60.1, Section 11, Bulbs, Corms and Tubers. Topsized bulbs shall be provided unless otherwise specified.
- D. Miscellaneous Landscape Materials
 1. Anti-desiccant: Film-forming emulsion, permeable to transpiration, while retarding excessive moisture loss. Anti-desiccant shall be Wilt-Proof or approved equal.
 2. Staking and guying materials: (per Commissioner request only)
 - a. Stakes: Sterling Fence Post or approved equal.
 - b. Wire: Galvanized mild steel wire, minimum 12 gage; provide double strands.
 - c. Hose: Rubber or plastic garden hose.
 - d. Turnbuckles: Aluminum or galvanized steel.
 - e. Warning flaps: Fluorescent orange plastic surveyor's tape.
- 37. 3. Tree wrap tape: Nurseryman's standard protective tape.
- 38. Tree wrap shall be Tuttle Tree Wrap or approved equal.

Preparation and Execution:

- A. Installation can not begin until the final grade has been achieved.
- B. The Contractor shall be responsible for all plant layout. The layout must be performed by qualified personnel. The planting locations must be laid out as shown in the landscape plan this will require the use of an engineer's scale to determine some dimensions. The tree locations must be marked by staking and bed limits must be painted. The Commissioner will approve the layout prior to installation.
- C. In temperatures above 84 F, all plant material will be treated with anti-desiccant prior to installation. The commissioner may direct the contractor to treat with anti-desiccant for installations after September 1st.
- D. Excavation for Trees and Shrubs
 1. Pits, beds and trenches: Excavate with sides vertical, bottom flat but with high center for drainage. Deglaze sides and loosen bottom.
 2. Minimum dimensions, individual pits (unless prevented by planter wall):
 - a. The diameter of the hole shall be 1 foot wider than the root spread.
 - b. The depth of the hole shall be such that the top of the root ball is 2 to 3 inches above finish grade (allow for settling).
 3. Remove all excavated subsoil from the site and dispose of legally. Do not backfill excavation with subsoil.
- E. Planting Trees and Shrubs

1. Setting layer: Place and compact a layer of planting soil, of thickness indicated, in bottom of excavation.
 2. Balled and Burlapped Stock: Set plants in excavation with top of ball 2 to 3 inches above finished grade. Add soil as required under ball to achieve plumb.
 - a. Untie all cords binding burlap to trunk. Remove all burlap and wire baskets from top 1/3 of the root ball.
 - b. Place backfill in 6" inch-thick layers. Work each layer by hand to compact backfill and eliminate voids. Maintain plumb during backfilling.
 - c. When backfilling is approximately 2/3 complete, saturate backfill with water and repeat until no more can be absorbed.
 - d. Place and compact remainder of backfill and water again.
 3. Inspect and, if necessary, treat trunks for physical damage or insect infestation. Wrap trunks of smooth barked trees. Apply tree wrap in November and remove in April.
- F. Container-Grown Plants: Place and backfill as specified for balled and burlapped stock and as follows:
1. Immediately before placing, remove container, taking care not to damage the root system.
 2. Set and plumb plants even with grade. Place backfill to thoroughly cover all roots.
- G. Form watering basin around trunk with backfill holding at least 5 gallons for shrubs and 10 gallons for trees. Apply moisture retaining mulch.
- H. Pruning
1. Remove dead or broken branches.
 2. Make cuts with sharp instruments within the branch collar. Do not remove leaders from trees. All pruning must be performed under the direct supervision of a certified arborist.
- I. Planting Ground Cover and Small Plants
1. Open holes sized to accommodate roots, place plants at proper elevation and backfill with planting soil, working carefully to avoid damage to roots and to leave no voids. Build up a small water basin of planting soil around each plant.
 2. Immediately after planting water well. Do not wash soil onto crowns of plants.
- J. Bulbs
- Plant all bulbs as detailed and as shown on the landscape drawings.

Staking and Guying of Trees (per Commissioner Directive Only):

- A. Guy and stake trees the same day as planting (per Commissioner directive only).
- B. Staking
 1. Tree stakes: six (6) foot Sterling Fence T-posts or approved equal. The stake shall be embedded two (2) feet.
 2. Ties: Provide length of rubber or plastic hose to prevent wire loop from contracting tree trunk. Adjust to provide firm but not rigid support.
 3. Place guys equally spaced around trunk, with top of guy 6 to 7 feet above grade, and at 45 degree angle to vertical.
 4. Provide one turnbuckle per guy.
 5. Securely tie caution tape at the 1/3 and 2/3 points of each guy wire.

TREE INSTALLATION, TREE PITS AND PARKWAYS

Description: This item shall include all labor, materials and equipment necessary to furnish, transport and plant balled and burlapped trees in tree pits or parkways. The item shall also include all excavation and preparation of tree pits and parkways prior to planting, pulverized topsoil, wrapping, mulching (for trees without tree grates), watering, and two (2) year replacement guarantee on all trees.

Except as modified herein, the work shall be done in accordance with applicable parts of Section 253 of the Standard Specifications at locations shown and details included in the plans and as directed by the Commissioner.

References:

- A. ANSI Z60.1-2004 -- American Standard for Nursery Stock; 2007 (or latest edition)
- B. Section 253 of the Standard Specifications
- C. Guide to the Chicago Landscape Ordinance, latest edition.

Submittals:

- A. Soil Test – laboratory results
- B. Shredded hardwood bark mulch – sample
- C. Request for Material Inspection Sheet.
- D. Anti desiccant – Material Safety Data Sheet
- E. Tree wrap – sample
- F. Pre-emergent herbicide – Material Safety Data Sheet
- G. Permits: Contractor is responsible for obtaining two (2) permits from the City of Chicago Permits of the opening of parkways and traffic control and protection required under this contract and for any type of barricade or signs to be utilized for public notice of work shall be obtained from The Office of Emergency Management and Communications, City Hall, Room 905, 121 North LaSalle Street, Chicago, IL, 60602. Permits for actual planting work shall be obtained from the Department of Streets and Sanitation, Bureau of Forestry, Plans and Permits Section, 3200 S. Kedzie, Chicago, IL, 60623.

Quality Assurance:

- A. Provide plant materials complying with ANSI Z60.1-2007 (or latest edition).
- B. All plants shall be obtained from Illinois Nurserymen Association or appropriate state chapter nurseries, in hardiness zones of comparable local climatic range to the City of Chicago and approved by the Commissioner or Authorized Representative. All trees shall be dug prior to leafing out (bud break) in the spring or when plants have gone dormant in the fall, except for, but not limited to, the following species which are only to be dug prior to leafing out in the spring: (The Commissioner reserves the right to expand this list upon submittal of the Planting Schedule.)
 - 1. *Pyrus calleryana* (Ornamental Pear)
 - 2. *Syringa reticulata* (Japanese Tree Lilac)

3. Robinia Pseudoacacia ("Chicago Blues" Black Locust)
4. Quercus (Oaks)

Inspections:

39. A. The Commissioner will inspect plant materials at the nurseries prior to being delivered on site. This will be done via the normal "Request for Material Inspection" sheets. These sheets must be turned in to the CDOT Division of Engineering at least 7 weeks prior to the expected date of installation. No trees shall be delivered without CDOT Seal.
- B. An inspection on site will be made prior to the installation of plant material. Any plant material not meeting specification (that being of good health) must be moved off the site.

Plant Delivery, Storage and Handling:

40. A. Schedule delivery to avoid storage on site. If planting does not occur immediately, store plants in a location protected from sun, weather and theft.
41. B. Do not prune trees unless directed by the Commissioner.
42. C. Cover to protect stock during transport. Plant material transported without cover shall be automatically rejected.
43. D. Bind stock to protect branches, bark, and overall shape during transport.
44. E. Balled and burlapped stock: Provide freshly dug stock unless otherwise approved
45. F. Do not drop stock. Load and unload with care. Do not lift trees by wire basket or trunk.
46. G. Protect tree trunks prior to loading and unloading. Damaged trees will be rejected on site.
- 47.
- 48.
- 49.

Guidelines:

50. A. Planting season: (As herein specified or as directed by the Commissioner)

March 15 to June 30
October 1 to Nov 30
51. B. Do not plant when soil is muddy or during frost.
- 52.
53. C. Dates are dependent on species of trees and weather. Planting might begin or end prior or after above dates as approved by Commissioner.
54. D. No trees shall be installed prior to the final grade of the planting soil.
55. E. No trees shall be installed before below-ground irrigation system components have been installed and operational.
- 56.
- 57.

Warranties:

- F. From the date of Final Punch-list Completion and acceptance, the Contractor shall warranty all trees for a period of two (2) years.
- G. During this warranty period, when so directed by the Commissioner, the Contractor shall

repair and replace at his own expense all defective or unsatisfactory trees including those that are dead, dying, diseased or lacking vigor.

- H. The Commissioner shall transmit a list of trees under warranty to be replacement. The Contractor must replace all items within 30 days from transmittal or as directed by the Commissioner. Failure to replace plant material within the time allowed will result in liquidated damages being applied in the amount of \$250 per day.
- I. At the end of the warranty period, trees in borderline condition will either be replaced or an extension of the warranty for one (1) year will be granted to the City, for that specific plant.
- J. If trees are damaged by the Contractor during construction or the warranty period, the Contractor must replace the plants at his expense.

Initial Maintenance:

- K. Initial Maintenance: The Contractor is responsible for maintenance of each area until it has been accepted by the Commissioner by issuance of Final Punch-List Completion letter, and the warranty period is formally started.
- L. Begin maintenance when the final grade has been achieved in any one location.
- M. Initial maintenance includes weeding, staking and guying of trees and trash removal from the area to be landscaped. It is expected that this will require 1 or 2 visits per week, or as directed by the Commissioner.
- N. Plants shall be watered immediately upon installation. There after, if the irrigation system is not able to provide enough water to establish the plants, then supplemental watering will be supplied, at no additional cost.
- O. Initial Maintenance is intended to maintain all plants in a healthy and vigorous condition. This may require pruning, cultivating, replanting, tightening and repairing of supports, repair of wrapping, and furnishing and applying sprays as necessary to keep the plants free of insects and disease.

Initial Maintenance is incidental to these pay items.

Products:

- A. Trees
 - 1. Provide nursery grown stock unless specifically indicated otherwise.
 - a. General: Well-branched and well-formed, sound, fibrous, healthy and free from disease, sun-scald, wind burn, abrasion and harmful insects or insect eggs. Healthy, normal and unbroken root systems.
 - b. Symmetrically developed of uniform habit of growth with straight trunks or stems and free from objectionable disfigurements.
 - c. Provide stock complying in all respects with ANSI Z60.1 and in sizes indicated, measured in accordance with ANSI Z60.1. Larger sizes with larger roots and root containment may be furnished if approved by the Commissioner.
 - i. Do not spread or compress branches when measuring. Measure main body of branches; do not measure extreme tips of single branches.
 - ii. Pruning to size is not acceptable.
 - iii. Up to 4 inches caliper, measure caliper at 5 inches above ground.

- d. Tag each specimen of each variety of tree or shrub to indicate common and botanical name.

B. Pulverized Top Soil

Topsoil shall be pulverized, natural, fertile, friable soil possessing characteristics of rich productive soil in the Chicago area. It shall be obtained from naturally well drained areas, not excessively acidic or alkaline and contain no toxic substances which may be harmful to plant and lawn growth. It shall be free from clay lumps, roots, stones and other debris. Topsoil shall not be handled in a frozen or muddy condition.

Backfill (as directed by Commissioner)

- 1. Existing sites:
 - Backfill for tree pits and parkways shall be a variable mixture, dependent upon the material. To avoid interfaces created by adjacent dissimilar soils with different textures, structures and organic matter utilize soil from the existing site as backfill. Or, if existing soil is of poor quality, Backfill shall be a mixture of ½ excavated soil, and ½ pulverized top soil, as specified. The two soils shall be adequately mixed.
- 2. New Construction:
 - a. Tree pits/Parkways with adjacent STRUCTURAL SOIL
 - Pulverized topsoil shall comply with the criteria for Clay Loam as set forth in STRUCTURAL SOIL.
 - b. Tree pits/Parkways without adjacent STRUCTURAL SOIL
 - All parkways shall be filled with a soil mix of two parts topsoil and one part coarse sand. Topsoil will consist of a natural sandy loam which is fertile, friable and typical of the locality and without mixture of subsoil. pH of 6.3 to 6.8 is desired. Soil mix may be adjusted with soil amendments to adjust pH (quantity determined by soil test) and thoroughly mixed by hand or by mechanical means prior to placement. The sand will consist of clean, sharp, well-graded, coarse sand passing 1/4" mesh screen, free of foreign and organic matter, with a pH of 6.5 to 7.0.

The Contractor shall inform the Commissioner in writing, ten (10) days in advance of the delivery of topsoil to the job site, as to the location from which the topsoil is to be obtained, the crops or plants which have been grown in the soil during the past five (5) years and the depth to which the top soil is to be taken. A minimum of three (3) samples of the topsoil proposed for this work shall be furnished a minimum of ten (10) days before delivery of topsoil to the job site. Each sample submitted shall be in a separate container, approximately one quart in size, appropriately labeled and taken from a different location at the source. Each container shall be completely filled with uncompacted topsoil. Do not deliver soil to the site until Commissioner has approved required submittals.

Soil Testing: No topsoil shall be delivered to the site until the Commissioner has reviewed test results and has accepted the topsoil. The Contractor shall employ a soil testing agency acceptable to the Commissioner, which uses test methods approved by the Association of Agricultural Chemists. Test frequency shall be as follows:

<u>Quantity of Soil Placed (c.y.)</u>	<u>Number of Tests</u>
1-200	1
200 -1000	3
1000<	(Quantity - 1000) / 500 + 3 round up to whole number

When more than one test is performed, the average of the test results will be used to determine acceptance.

- C. Shredded Hardwood Mulch (Parkways and Tree pits without grates)
Hardwood bark mulch shall be clean, finely shredded mixed-hardwood bark, not to exceed two (2) inches in its largest dimension, free of foreign matter, sticks, stones, and clods. All hardwood mulch shall be processed through a hammer mill. Hardwood bark not processed through a hammer mill shall not be accepted. A sample and request for material inspection form must be supplied to the Commissioner for approval prior to performing any work.
- D. Pre-emergent Weed Control
Pre-emergent weed control shall be Treflan 5G or as directed by the Commissioner.
- E. Miscellaneous Landscape Materials
 - 1. Anti-desiccant: Film-forming emulsion, permeable to transpiration, while retarding excessive moisture loss. Anti-desiccant shall be Wilt-Proof or approved equal.
 - 2. Staking and guying materials: (per Commissioner request only)
 - a. Stakes: Sterling Fence Post or approved equal.
 - b. Wire: Galvanized mild steel wire, minimum 12 gage; provide double strands.
 - c. Hose: Rubber or plastic garden hose.
 - d. Turnbuckles: Aluminum or galvanized steel.
 - e. Warning flaps: Fluorescent orange plastic surveyor's tape.
 - 3. Tree wrap tape: Nurseryman's standard protective tape. Tree wrap shall be Tuttle Tree Wrap or approved equal.
 - 4. Weed Barrier: See CAST IRON TREE GRATE, Materials under grate.

Preparation and Execution:

- 59. A. Installation cannot begin until the final grade has been achieved.
- B. The Contractor shall be responsible for all plant layout. Qualified personnel must perform the layout. The planting locations must be laid out as shown in the landscape plan; this will require the use of an engineer's scale to determine some dimensions. Otherwise, trees planted in the parkway shall be planted in the center of the parkway, and/ or in line with existing trees in the parkway, unless notified otherwise by the Commissioner. The tree locations must be marked by staking and bed limits must be painted. Trees planted in tree pits shall be planted in the center of the tree pit. The Commissioner will approve the layout prior to installation.
- 60. C. In temperatures above 84 F, all plant material will be treated with anti-desiccant prior to installation. The Commissioner may direct the contractor to treat with anti-desiccant for installations after September 1st.
- 61. D. Excavation for Trees.
 - 1. Tree pits
Where tree grates are present, Contractor shall remove tree grate using due and reasonable care not to damage tree grate. Tree grates shall be replaced upon completion of planting operation. Contractor shall be held responsible for any damage to tree grates and shall replace tree grates, when damaged, at no cost to the City. Excavation of tree pits shall occur at the time of tree planting. Excavated tree pits shall not be left open. Excavation for tree pits shall include the removal of soil from the pits to a depth of at least three (3) feet and no more than three and one

half (3-1/2) feet with vertical sides at the edge of the pit. Excavate with sides vertical, bottom flat but with high center for drainage. Deglaze sides and loosen bottom.

a. Minimum dimensions

- i. The diameter of the hole shall be 1 foot wider than the root spread.
- ii. The depth of the hole shall be such that the top of the root ball is slightly higher than soil level (see Drawings).

2. Parkways

a. Minimum dimensions

- i. The excavation for planting in a Parkway shall be of sufficient depth to accommodate the tree root ball and shall be a minimum of twice (two times) the diameter of the root ball or as directed by the Commissioner or Authorized Representative.
- ii. The depth of the hole shall be such that the top of the root ball is 2-3" above grade. The sides shall slope gradually making the hole saucer shaped. All soil shall be stockpiled for reuse or as otherwise directed (see Backfill). Proven conflict between tree planting and existing utility shall be an acceptable reason for not fulfilling the tree planting as contracted at a given location and is subject to the approval of the Commissioner or Authorized Representative.

3. Remove all excavated subsoil from the site and dispose of legally. Do not backfill excavation with subsoil.

62.

E. Planting Trees

63. All plant roots and earth balls shall be kept damp and thoroughly protected from sun and drying winds at all times during transportation, and on the ground until the final operation of planting is completed.

64.

65. Tree planting method shall be approved by Commissioner or Authorized Representative prior to full scale installation.

66. All trees shall be planted completely, before leaving the planting location. Trees shall not be allowed to remain above ground at the planting site. Planting holes shall not be left excavated and open beyond the accepted hours of operation, i.e. 7:00 a.m - 3:00 p.m., Monday thru Friday, unless directed otherwise by the Commissioner.

67.

68.

1. Tree Pits

- a. Setting layer: Set tree on sub grade for stabilization.
- b. Set plants in excavation with graft and flare of root ball slightly higher than soil level in pit allowing space for Volcanic rock and tree grate. (See Drawings and CAST IRON TREE GRATE, Materials under grate.) Untie all cords binding burlap to trunk. Remove all burlap and wire baskets from top 1/3 of the root ball.
- c. **Backfill**
 - i. Place backfill in 6" inch-thick layers. Work each layer by hand to compact backfill and eliminate voids. Maintain plumb during backfilling.

- ii. When backfilling is approximately 2/3 complete, saturate backfill with water and repeat until no more can be absorbed.
- iii. Place and compact remainder of backfill and water again with a minimum of 10 gallons of water.

2. Parkways

- a. The existing nursery line on the tree shall be two (2) to three (3) inches above ground level upon completion of the planting operation. Trees planted with the nursery line below such level will not be accepted. Untie all cords binding burlap to trunk. Remove all burlap and wire baskets from top 1/3 of the root ball.
- b. **Backfill**
 - i. Place backfill in 6" inch-thick layers. Work each layer by hand to compact backfill and eliminate voids. Maintain plumb during backfilling.
 - ii. When backfilling is approximately 2/3 complete, saturate backfill with water and repeat until no more can be absorbed.
 - iii. Place and compact remainder of backfill and water again.
 - iv. Form watering basin around trunk with backfill holding at least 10 gallons. Apply moisture-retaining mulch.

F. Pruning (as directed by Commissioner)

- 3. Remove dead or broken branches.
- 69. Make cuts with sharp instruments outside the branch collar. Do not remove leaders from trees. All pruning must be performed under the direct supervision of a certified arborist.
- 70.

71.

G. Protection of tree trunks

- 1. Inspect and, if necessary, treat trunks for physical damage or insect infestation.
- 2. Wrap trunks of smooth barked trees. Tree wrap shall be Tuttle Tree Wrap or approved equal. Apply tree wrap in November and remove in April.

H. Place mulch layer around Parkway trees or Tree pits without grates as follows:

Three (3) inches deep - keep mulch away from the trunk of the tree. Trees installed in grass parkways shall have a 3' minimum diameter mulch ring. Contractor shall make inspections of all tree pits without tree grates periodically (every six months during the guarantee period as specified) to ensure that level of mulch has been maintained.

I. Pre-emergent weed control as specified shall be applied to each tree pit or mulch ring at the rate of once (1) per tree. This shall be applied prior to mulch application.

Staking and Guying of Trees (per Commissioner Directive Only):

A. Guy and stake trees the same day as planting (per Commissioner directive only).

B. Staking

- 1. Tree stakes: six (6) foot Sterling Fence T-posts or approved equal. The stake shall be embedded two (2) feet.
- 2. Ties: Provide length of rubber or plastic hose to prevent wire loop from contracting tree trunk. Adjust to provide firm but not rigid support.
- 3. Place guys equally spaced around trunk, with top of guy 6 to 7 feet above grade, and at 45-degree angle to vertical.

4. Provide one turnbuckle per guy.
5. Securely tie caution tape at the $1/3$ and $2/3$ points of each guy wire.

Sidewalk and concrete items

EXPOSED AGGREGATE PORTLAND CEMENT CONCRETE SIDEWALK

Description. Work under this item must be performed in accordance with Section 420, 424, and 606 of the Standard Specifications for Road and Bridge Construction and subsequent special provisions. The work under this item must consist of constructing concrete sidewalk as shown on the plans or specified herein. These items must be constructed on prepared subgrade, with or without forms, with or without reinforcement, & sealed with a protective coat as shown on the plans or specified herein.

General Requirements

Submittals

- a) Concrete Mix Designs: Certified report identifying the design mixes, mix proportions, and additional design information
- b) Preformed Expansion Joint filler
- c) Packaged Rapid Hardening Mortar or Concrete
- d) Protective Coat

Materials. Materials shall be according to the following.

Item	Article/Section
1. Portland Cement Concrete, Class PV.....	1020
2. Preformed Expansion Joint Fillers	1051.08, 1051.09
3. Protective Coat	1023.01
4. Concrete Surface Retarder:	
a. Euclid Chemical "Concrete Surface Retarder"	
b. L.M. Scofield "Lithotex"	
c. Sika Chemical "Rugasol-S"	

	<u>'Weight per</u>			
	<u>Cubic Yard</u>		<u>source</u>	
Portland Cement –Class PV	735	lbs	MEDUSA	1273-01
Fine Aggregate FA-2 Limestone Chip	1,168	lbs	MSC(ROMEOVILLE)	51972-02
Coarse Aggregate CA- 16 washed pea gravel	1,649	lbs	MSC(THORNTON) .	50312-04
Water 34.5 Gals.	287	lbs	City Potable	
			EXCEL IND. (EXCEL	
Air Entrainment Agent	As needed		AIR)	42131M
			EXCEL IND. (REDI-	
Water Reducer/Retarder Type A/D	As needed		SET)	43707M/
			MATRL	
			BLDRS.(RHEOBUILD	
SUPERPLASTICIZER	As needed		1000)	43746M

Type of Construction:	PV, MS, SI
Strength Required:	3500 PSI @ 14 DAYS
Air Entrainment Required:	5% to 7%
Concrete Supplier:	Prairie Material Sales Yard #32/33
Supplier Mix Number:	71PCC0789- 7.8 Bag Mix with Limestone Chips

1. FIELD QUALITY CONTROL

- a. **General:** Remove and replace concrete which does not satisfy the performance requirements of this specification, which does not conform to grades and profiles shown on the Drawings, contains cracks, spalling or other defects which impairs the strength, safety or appearance of the work, or has been damaged or discolored during construction. Protect the Work from damage until accepted.
- b. The contractor is responsible for protecting fresh concrete. Any damage to the new sidewalk from graffiti, footsteps, rain, etc. should be corrected immediately. No payment for the sidewalk will be made until the corrections are made. All corrections including removal and replacement will be at the contractor's expense
- c. For all concrete items, no slip forming is allowed without prior acceptance/approval from the Commissioner.
- d. Final finish and installation of tactile detectable warning surface will be in accordance with the latest CDOT ADA Standards.
- e. The Contractor must match the sidewalk joint spacing and finish of the existing sidewalk.
- f. The use of steel forms will not be permitted. Form depth must equal to or exceed depth of walk being poured. Use of "2x4" as forms will not be allowed.
- g. When directed by the Commissioner, a 3-inch sand cushion must be placed under new sidewalks. Otherwise, sidewalks must be constructed on the existing sub-base. The sand cushion will be paid for under the item for SAND CUSHION, 3 INCH.
- h. **Exposed Aggregate Finish.**
 - i. *Precautions:* Contractor is solely responsible for safety and protection of persons and property, for containment and collection of hazardous materials or abrasive grit, and for damage or claims resulting from blasting or finishing operations.
 - ii. *Finishing:* As soon as possible after consolidation, smooth and level the concrete to grade and cross-section by floating. Remove laitance and excess water from the surface. After completion of floating, and while the concrete is still plastic, test the surface with a 10' straightedge. Correct the surface variations exceeding 1/8" in 10 feet.
 - iii. ***Exposed Aggregate Finish.*** Employ consolidation and finishing methods which avoid uneven settlement of aggregate above reinforcing bars and prevent uneven surface when combined with retarder application. Upon completion of floating, the concrete surfaces to a uniform granular texture, spray-application surface retarder on areas to receive exposed aggregate finish. Cover retarded surface with plastic sheeting, seal laps with tape, and remove when ready to continue finishing operations. When concrete has taken initial set, and after the finishing operations are completed, direct a fine spray of water at an approximate 15 degree angle to the surface of the concrete. Wash the laitance and retarder from the surface without both disturbing the small aggregate and causing sand runs to appear. Remove laitance, retarder residue, and dirty wash water from finished surfaces as soon as washing operations are complete. Uniformly expose the aggregate at depth matching the accepted sample.
- i. **Curing Method:** Moist cure only. Do not allow the burlap or other covering used in curing period to affect the finish appearance.

SAND CUSHION, VARIABLE DEPTH

Effective: August 1, 2008

Description. Work under this item shall be performed according to Section 310 of the IDOT Standard Specifications for Road and Bridge Construction, except as herein modified. This work consists of replacing unsuitable subbase material from beneath proposed sidewalks with a minimum 3-inch sand cushion at locations shown on the plans or as directed by the Commissioner.

Materials. The sand cushion shall be fine aggregate having an FA-2 gradation according to Section 1003 of the Standard Specifications.

Equipment. A mechanical vibratory compactor is required.

General Requirements. If unstable or unsuitable subbase conditions are encountered after excavation to proposed subbase elevation for sidewalks, driveways or shared use paths, the Commissioner may require removal and replacement of the unsuitable material and replacement with a minimum of 3-inches of sand cushion and compacted to the satisfaction of the Commissioner. Preparation of subbase beneath proposed sidewalks that requires placement of less than 3-inches of sand cushion shall be considered incidental to this item.

TACTILE/ DETECTABLE WARNING SURFACE SYSTEM, LINEAR TILES

TACTILE DETECTABLE WARNING SURFACE SYSTEM, RADIUS TILES

Description: This work consists of providing all labor, materials, tools, and equipment necessary to install a TACTILE/ DETECTABLE WARNING SURFACE SYSTEM, LINEAR TILES and TACTILE DETECTABLE WARNING SURFACE SYSTEM, RADIUS TILE, of the specified type having a surface color and a truncated dome pattern.

General Requirements: This work consists of installing Tactile/Detectable Warning Surface System on Curb ramps. This work will be done in coordination with PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH, SPECIAL or PORTLAND CEMENT CONCRETE SIDEWALK 8INCH, SPECIAL, where shown on the plans or as directed by the Commissioner. Tactile/ Detectable Warning Surface Systems must be installed per the latest CDOT ADA Standard details.

Submittals: Product Data: Submit manufacturer's specifications describing products, installation procedures and routine maintenance procedures.

Samples: Submit two (2) samples (minimum 8" square) of the tile type proposed for use.

Maintenance Instructions: Submit copies of manufacturer's specified maintenance practices for each type of tactile detectable warning system and accessory as required.

Quality Assurance:

- A. Provide tactile detectable warning system and accessories as produced by a CDOT approved manufacturer.
- B. Americans with Disabilities Act (ADA): Provide a tactile detectable warning surface system which complies with the Americans with Disabilities Act (Title 49 CFR TRANSPORTATION, Part 37.9 STANDARDS FOR ACCESSIBLE TRANSPORTATION FACILITIES, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES.
- C. Tactile detectable warning surface system shall consist of a surface of truncated domes aligned in a square or radial grid pattern. Truncated domes in a detectable warning surface shall have a base diameter of 0.9" minimum to 1.4" maximum, a top diameter of 50% of the base diameter minimum to 65% of the base diameter maximum, and a height of 0.2". Truncated domes in a detectable warning surface shall have a center to center spacing of 1.6" minimum and 2.4" maximum, and a base-to-base spacing of 0.65" minimum, measured between the most adjacent domes on a square grid. Detectable warning surface shall contrast visually with adjacent walking surfaces either light-on-dark, or dark-on-light and the field area must consist of a non-slip surface.

Delivery, Storage and Handling:

- A. Deliver tactile detectable warning surface system materials to the worksite in such quantities and at such times as to assure continuity of installation. Handle and transport material in a position consistent with their shape and design in order to avoid excessive stresses or damage.
- B. Store material at worksite to prevent cracking, distorting, warping, staining or other physical damage and so that markings are visible.

- C. Keep material under cover and protected until installed.
- D. Deliver anchors in sufficient quantity for the work to be done before the start of construction.

Site Conditions:

- A. Maintain a minimum temperature of 40 degrees F in spaces to receive tactile tiles for at least 48 hours prior to installations, during installation, and for not less than 48 hours after installation.
- B. Store and protect tactile tile material in the area(s) where they will be installed for at least 48 hours before beginning installation.

Warranty:

The detectable warning system shall come with a Manufacturer’s five year warranty. The warranty period will begin upon final acceptance of the project.

Material:

POLYMER CONCRETE- REPLACEABLE TILE

The Contractor must provide a Manufacturer’s written certification that the material complies with these specifications.

Materials Requirements

Polymer concrete Detectable Warning tiles shall be manufactured using polymer concrete material. Polymer concrete material shall consist of calcareous and siliceous stone, glass fibers and thermo set polyester resin. The polymer concrete material shall be tested by an independent testing laboratory for chemical resistance and mechanical properties.

Chemical Resistance

Chemical Resistance	Pass	ASTM D-543
Simulated Sunlight	Pass	ASTM D-1501
Accelerated Service Test	Pass	ASTM D-756
Water Absorption	<1%	ASTM D-570

Material shall be determined to be acceptable if the following criteria are met. For chemical resistance, simulated sunlight, accelerated service test, and water absorption: retention of 75 percent of the control specimen values for load and deflection and no more than 2 percent change in weight. For flammability test, specimen should be self-extinguishing. For fungus resistance test the material should not allow any fungus growth. Smoke density shall be less than 0.5 at 1.5 minutes and less than 15 at 4 minutes. Surface flammability shall be less than 25.

Mechanical Properties

The mechanical properties of polymer concrete material shall be tested by an independent testing laboratory. Polymer concrete material shall have the following mechanical properties:

Mechanical Properties	Average Value	Test Method
Compressive Strength	11,430 PSI	ASTM C-170-99
Flexural Strength	3,330 PSI	ASTM C-580-02
Tensile Strength	1,710 PSI	ASTM C307-99

Shear Strength	11,670 PSI	ASTM D-372-02
Modulus of Elasticity	1,776,400 PSI	ASTM C-580

Fabrication

- a. For consistency, detectable warning tiles shall be manufactured using matched die molds under heat and pressure for superior material compaction, controlled chemical curing and uniform dimensions.
- b. Polymer concrete detectable warning tiles shall have 1/4" thick material sectional thickness excluding truncated domes height or reinforcement ribs.
- c. Polymer concrete detectable warning tiles shall have a 1/8" tapered edges on the outside of the finished detectable warning tile.
- d. Slip Resistance of Polymer concrete detectable warning tile when tested by ASTM-C 1028 shall not to be less than 0.80.
- e. Chemical Resistance of Tile when tested by ASTM-D 543 to withstand without any degradation or discoloration-1% hydrochloric acid, Acetic Acid, Sulfuric Acid, Sodium Chloride Sodium Hydroxide, Sodium Sulfate, Sodium Carbonate, Kerosene and Oil.
- f. The material shall be abrasive resistant and shall be warranted for 5 years against excessive wear.
- g. The polymer concrete material shall not sustain burning and be self extinguishing when tested in accordance with ASTM D 635.
- h. The polymer concrete material shall not promote fungus growth when tested in accordance with ASTM G21.
- i. The polymer concrete material surface flammability shall be tested in accordance with ASTM E-162 and shall be less than 25.
- j. Smoke density shall be tested in accordance with ASTM E-662-03 and shall be less than 0.5 at 1.5 minutes and less than 15 at 4 minutes.
- k. Color: Federal Brick Red 30166 Color must be homogeneous throughout the tile.

Anchors and Subsystems:

Each PC panel is to be attached to the supporting concrete with a minimum of 4- 2" concrete anchor and bolt assemblies. Bolts are to be a nominal 3/8" stainless steel with lock washers. Bolts shall be installed through a 1x1 steel angle tightened snug to the underside of the tile panel.

Dimensions:

Tile Assemblies must be held within the following dimensions and tolerances:

Length and Width:	24"x 24" nominal square $\pm 1/16$ "
	12" x 24" nominal triangle $\pm 1/16$ "
Depth:	1.500" $\pm 5\%$ max.
Face Thickness:	0.1875 $\pm 5\%$ max.
Warpage of Edge:	$\pm 0.5\%$ max.

INSTALLATION

Installation shall be per the manufacturers recommendations.

General Requirements:

- A. The physical characteristics of the concrete must be consistent with the contract specifications.

- B. PRIOR TO PLACEMENT OF THE TACTILE/ DETECTABLE WARNING SURFACE SYSTEM, THE LAYOUT IS TO BE REVIEWED AND APPROVED BY THE RESIDENT ENGINEER.
- C. The concrete pouring and finishing operations require typical mason's tools, however, a 2' long level with electronic slope readout (SMART LEVEL), 25 lb. weights, vibrator and small sledge hammer with 2" x 6" x 20" wood tamping plate are specific to the installation of the TACTILE/ DETECTABLE WARNING SURFACE SYSTEM.
- D. The concrete must be poured and finished, true and smooth to the required dimensions and slope prior to tile placement. Immediately after finishing the concrete, the electronic level should be used to check that the required slope is achieved. The tile must be placed true and square to the ramp in accordance with the contract drawings. The TACTILE/ DETECTABLE WARNING SURFACE SYSTEM must be tamped or vibrated into the fresh concrete to ensure that the field level of tile is flush to the adjacent concrete surface. The contract drawings indicate that the tile field level (base of truncated dome) is flush to adjacent surfaces to permit proper water drainage and eliminate tripping hazards between adjacent finishes. The tolerance for elevation differences between tile and adjacent surface is 1/16". Place the second panel next to the first, leaving no gap (tiles must be abutted to one another) and press into the wet concrete using a twisting back and forth motion. Be certain that the second panel is even and level with the first and with the surrounding concrete.
- E. Immediately after tile placement, the tile elevation is to be checked to adjacent concrete. The tile elevation and slope should be set consistent with contract drawings to permit water drainage to curb as the design dictates. While concrete is workable a steel trowel must be used to trowel the concrete around the tile perimeter to the field level of the tile. - Trowel concrete flat, remove any excess concrete and leaving no gap (tiles must be abutted to one another) between the panels. Apply broom finish or other recommended finish to the area immediately surrounding the panels
- F. Following tile placement, review installation tolerances to contract drawings and adjust tile before the concrete sets, 2 suitable weights of 25 lb each must be placed on each tile as necessary to ensure solid contact of tile underside of concrete.
- G. During and after the tile installation and the concrete curing stage, it is imperative that there is no walking, leaning or external force placed on the tile to rock the tile, causing a void between the underside of tile and concrete.
- H. Following the curing of the concrete, the protective plastic wrap is to be removed from the tile face by cutting the plastic with a sharp knife tight to the concrete/tile interface.

Cleaning and Protecting:

- A. Protect the tactile detectable warning surface system against damage during the construction period to comply with tactile tile manufacturer's specification. Materials damaged prior to placement will be replaced at the Contractor's cost.
- B. Protect the tactile detectable warning surface system against damage from rolling loads following installation by covering with plywood or hardwood.
- C. Clean the tactile detectable warning surface system not more than four days prior to the scheduled inspection intended to establish date of completion of project. Clean tactile tile by methods specified by the manufacturer.

HIGH-EARLY-STRENGTH PORTLAND CEMENT CONCRETE PAVEMENT 8"

Description. Work under these items must be performed in accordance with Section 420, 423 of the Standard Specifications for Road and Bridge Construction and subsequent special provisions except as herein modified. This work shall consist of constructing High-Early-Strength Portland Cement Concrete Pavement for Driveways and Alley aprons on a prepared subgrade.

General Requirements: Alleys or driveways must not be poured monolithically with adjacent walks or curbs. The use of a mechanical vibrator meeting the requirements of Section 1103.12 will be required.

A driveway must never be closed completely. Access must be maintained at all times. Failure to provide access will result in a deficiency charge per day as described in MAINTENANCE OF ACCESS TO ABUTTING PROPERTY.

Membrane curing will not be permitted where a protective coat is to be applied. Concrete at these locations must be cured by another method specified in Article 1020.13 at no additional cost to the City.

Submittals

- a) Concrete Mix Designs: Certified report identifying the design mixes, mix proportions, and additional design information
- b) Preformed Expansion Joint filler
- c) Packaged Rapid Hardening Mortar or Concrete
- d) Protective Coat

The Contractor must submit an IDOT- approved mix for all projects.

Materials. Materials shall be according to the following.

Item	Article/Section
Portland Cement Concrete, Class PV.....	1020
Packaged Rapid Hardening Mortar or Concrete	1018
Preformed Expansion Joint Fillers	1051.08, 1051.09
Protective Coat	1023.01

Sawcut Contraction Joints and Scoring: All sawcutting and scoring is to be accomplished as shown in the plans or as specified herein. Make joint depth not less 1/4 of the slab thickness. In general, cut joints between 24 hours and 3 days after the concrete is placed. The Contractor must determine the exact time. Provide close control of type of aggregate, mix and curing methods in order that the joints may be cut early enough to control cracking but late enough to prevent any damage to the concrete surface. All sawcutting will be incidental to all concrete pay items.

MISCELLANEOUS CONCRETE

Description: Work under this item shall be performed in accordance with Sections 420, 424, 503, and 606 of the Standard Specifications except as herein modified. The work under this item must consist of constructing concrete pavement, sidewalk, curb and gutter, and miscellaneous concrete or concrete structures as shown on the plans or specified herein. These items must be constructed on prepared subgrade, with or without forms, with or without reinforcement, & sealed with a protective coat as shown on the plans or specified herein.

General Requirements

Submittals

- e) Concrete Mix Designs: Certified report identifying the design mixes, mix proportions, and additional design information
- f) Preformed Expansion Joint filler
- g) Packaged Rapid Hardening Mortar or Concrete
- h) Protective Coat
- i) The Contractor must submit an IDOT- approved mix for all projects.

Materials. Materials shall be according to the following.

Item	Article/Section
Portland Cement Concrete, Class MS.....	1020
Preformed Expansion Joint Fillers	1051.08, 1051.09
Protective Coat	1023.01

Sawcut Contraction Joints and Scoring: All sawcutting and scoring is to be accomplished as shown in the plans or as specified herein. Make joint depth not less 1/4 of the slab thickness. In general, cut joints between 24 hours and 3 days after the concrete is placed. The Contractor must determine the exact time. Provide close control of type of aggregate, mix and curing methods in order that the joints may be cut early enough to control cracking but late enough to prevent any damage to the concrete surface. All sawcutting will be incidental to all concrete pay items.

Curing Method: Moist cure only. Do not allow the burlap or other covering used in curing period to affect the finish appearance.

Protective Coating: Surfaces to be sealed must be free of dirt, dust, and other foreign material immediately prior to application of the sealer. Mask areas to receive joint sealers before application of the surface coating. After proper curing of the exposed concrete paving, provide specified clear penetrating sealer and saturate the concrete finish surfaces in accordance with manufacturer’s application instructions for type and porosity of concrete. **THE USE OF LINSEED OIL WILL NOT BE PERMITTED.**

Field Quality Control

- Remove and replace concrete which does not satisfy the performance requirements of this specification, which does not conform to grades and profiles shown on the Drawings, contains cracks, spalling or other defects which impairs the strength, safety or appearance of the work, or has been damaged or discolored during construction. Protect the Work from damage until accepted.
- The contractor is responsible for protecting fresh concrete. Any damage to the new concrete from graffiti, footsteps, rain, etc. should be corrected immediately. No payment for this item will be made until the corrections are made. All corrections including removal and replacement will be at the contractor's expense

- For all concrete items, no slip forming is allowed without prior acceptance/approval from the Commissioner.

COMBINATION CONCRETE CURB AND GUTTER, TYPE BV.12

Work under these items must be performed in accordance with Section 606 of the Standard Specifications except as herein modified.

Description: This work consists of constructing combination Concrete Curb and Gutter per CDOT Standard Details.

Materials: Materials shall be according to the following:

Item	Article/Section
(a) Portland Cement Concrete	1020
(b) Reinforcement Bars and Fabric	1006.10
(c) Preformed Expansion Joint Fillers	1051
(d) Concrete Sealer	1026
(e) Dowel Bars	1006.11
(f) Tie Bars	1006.10
(g) Polysulfide Joint Sealant	1050.03

General Requirement: Joints in the combination concrete curb and gutter must be prolongations of the joints in the adjacent PCC pavement or base course. Expansion joints adjacent to drainage castings may be placed in prolongation with other joint types.

Utility and drainage structures must be properly adjusted prior to pouring combination curb and gutter.

A ten foot (10') gap must be left in the combination concrete curb and gutter at locations where structures have yet to be adjusted.

Areas of adjacent base course less than 6 inches wide must be poured monolithically with the combination concrete curb and gutter. These areas of base course will not be measured for payment but will be considered part of the item COMBINATION CONCRETE CURB AND GUTTER, TYPE BV.12.

Locations where sidewalk, driveway or alley pavement is to be placed adjacent to the combination concrete curb and gutter shall be backfilled with material meeting the requirements of Article 1004.04; however, no separate payment will be made for this material but the cost shall be considered included in COMBINATION CONCRETE CURB AND GUTTER, TYPE BV.12. All other locations shall be backfilled with material meeting the approval of the commissioner

Street Furniture

CAST IRON TREE GRATES, GRATE FRAMES AND THICKENED SLAB, 5' x 5' RETROFIT CAST IRON TREE GRATES, 5' x 5'

Description: Work under this item must consist of furnishing and installing the cast iron tree grates, grate frame, P.C.C thickened slab, and volcanic rock mulch, as shown on the plans or as ordered by the Commissioner, and specified herein, and must conform to the requirements of applicable portions of the Standard Specifications for Road and Bridge Construction.

General Requirements:

Material

The material must be gray iron castings conforming to A.S.T.M. A48 or A-48-75, class 35 or 35B, and Article 1006.14 of the Standard Specifications. Concrete must be Class SI and conform to the requirements of Section 1020 of the Standard Specifications.

Design

Grate pattern must comply with ADA Guidelines for equal access. Tree grates will be 1.5" thick with accompanying frame. Grate will consist of two halves with 16" minimum diameter opening for trees. Retrofit grates will be 1.5" thick with a 3/4" thick lip extending 2" beyond the edge of the tree pit opening. Grate openings must meet or exceed ADA Standard. Grate dimensions will be specified in plans or by the Commissioner. Grate halves must be able to be bolted together with tamperproof bolts, and the grate must also be bolted to the frame with tamperproof bolts.

Frame

Frame must be 1 3/4" x 1 3/4" x 1/4" steel frame, or must coordinate with grate dimensions, surrounding the entire perimeter of the tree pit. Frame must be manufactured with anchor tabs for concrete installation.

Finish (applies to all tree grates, new and retrofit)

1. Surface Preparation :

The top surface must be cleaned in accordance with Section 506 of the Standard Specifications for Method 2 (power or hand tool cleaning) and must be free of all loose rust and loose mill scale.

2. Coating:

Before installation, in an effort to reduce the appearance of oxidation, all surfaces (top, bottom and edges) of the grates are to be coated and rubbed with two applications of a Type 1 Membrane Curing Compound meeting the requirements of Article 1022.01 of the Standard Specifications, or alternative compound as approved by the Commissioner.

Surface preparation and coating will not be measured and paid for separately but will be included in the cost of all items listed herein.

Shop Drawings

Shop drawings of all items related to the manufacture and installation of the tree grate and frame must be submitted and approved by CDOT before fabrication.

Manufacturer

Tree grates can be supplied by the following suggested manufacturers:

Neenah Foundry, Neenah, Wisconsin
Urban Accessories, Woodinville, WA;
Ironsmith, Palm Desert, CA;
Fairweather/Olympic Foundry, Seattle, WA)

And must match in similarity the following Neenah tree grate styles; (square)R-8713, (rectangle)R-8811; (retrofit square) R-9002-A, Retrofit rectangular (R-8811 retrofit).

Fasteners

Tree grate halves must be joined together with tamper resistant bolts and fastened to grate frame with tamper resistant bolt assembly packages as provided by the manufacturer.

Inspection

Installation assumes responsibility for performance.

Surface conditions

Examine frame, concrete ledge, or ground surface to receive grate. The seat for the grates must be cleaned prior to setting the grates. Correct conditions to comply with manufacturer's recommended installation procedures.

Opening to receive grates

Sub-base granular material Type B must be placed and compacted to 95% proctor prior to installation of frame. Frame will then be placed on top of compacted sub-base surface. Wood forms must be placed inside frame to prevent concrete seepage into pit area, and expansion joints place on the outside of the frame. Concrete walk will then be poured around frame, and allowed to set until firm. The installation of Sub-base Granular Material Type B will not be paid for separately but will be incidental to the cost of these items.

If installing grate at back of curb, a C-channel must be installed at curb to accept tree grate frame. Hilti-type Anchoring system for C-channel must have a minimum shear capacity of 12 kips live wheel load. Detailed product information must be submitted for approval prior to installation.

Join Grate Halves

Bring tree grate halves together around tree at a level to allow easy access to underside. Join sections at preformed holes using temper-resistant bolt packages provided by manufacturer as suggested. Lower grate into place and bolt to frame with tamper-proof resistant bolts. If grate manufacturer cannot accomplish this, then the grates and frame must be tapped, field drilled, and bolted on site. The cost for this work and equipment will be incidental to these items.

Warranty

Manufacturer's written warranty must be handed over to CDOT prior to installation of grates.

Material under Grate

Mulch must be Volcanic Rock, Large Rock, Black, 2" in depth, free of foreign materials, as distributed by Robert Schwake Stone Co., INC. of Desplaines, Illinois as suggested. The cost of furnishing and installing mulch will be incidental to these items.

The Contractor must remove all litter and plant debris before mulching. The Contractor must repair grade by raking and adding Planter Soil Mix as needed, before mulching. Care must be taken not to bury leaves, stems, or vines under mulch material.

All finished mulch areas must be left smooth and level to maintain a uniform surface and appearance. All tree grate areas or work areas must be clean of debris and mulch, prior to leaving the site.

ITEM NO. 84 BENCH, TYPE A

ITEM NO. 85 **BENCH, TYPE B**

Description: Work under this item must be in accordance with the Standard Specifications for Road and Bridge Construction and subsequent special provisions, except as herein modified.. This work must consist of furnishing and installing benches at the locations specified in the Contract plans or as directed by the Commissioner.

General Requirements: Each bench will be placed at the location indicated in the plans. The locations will be field marked and verified for approval by the Commissioner.

ASSEMBLY

Anchor bolts must be located with assembled bench in place. Benches must be mounted as detailed in the plans. Anchor bolts must be drilled and grouted into the concrete base for pavers, concrete wearing surface or concrete sidewalk.

MATERIALS

Materials must be as specified in the plans and must be "Gloss Black" in color , Standard 6 Foot Length with Center Armrest by the following suggested manufacturers:

Victor Stanley, Inc.,
Wausau Tile, Inc.
Trystan, Inc.

BENCH TYPE A should be similar to the Victor Stanley Model "Classic Series CR-10". BENCH TYPE B should be similar to the Victor Stanley Model "Ribbon Series CB-28".

FINISH- Finish must be powder coating or similar coating process.

SUBMITTALS

Submit manufacturer's technical data for each manufactured product, including certification that each product complies with the specified requirements. In accordance with the Standard Specifications, the Contractor must submit shop drawings for the Commissioner's approval showing the bench completely assembled including shop drawings of its component parts.

ITEM 86

TRASH RECEPTACLE

Description: This work must consist of furnishing and installing a new trash receptacle with a plastic liner at the locations specified in the Contract plans or as directed by the Commissioner.

General Requirements: Each trash receptacle will be placed at the location indicated in the plans. The locations will be field marked and verified for approval by the Commissioner.

ASSEMBLY

The anchor bolt must be drilled and grouted into the sidewalk surface only after the Trash Receptacle location has been finalized.

MATERIALS

Materials must be as specified in the plans and must be "Gloss Black" in color , steel trash receptacle , 36 gallon capacity with plastic liner by the following suggested manufacturers:

Victor Stanley, Inc.,
Wausau Tile, Inc.
Trystan, Inc.

Materials should be similar to the Victor Stanley Model, Ironsites Series S-42.

FINISH- Finish must be powder coating or similar coating process

SUBMITTALS

Submit manufacturer's technical data for each manufactured product, including certification that each product complies with specified requirements. Submit shop drawings showing complete information for fabrication. Include anchoring detail.

ITEM 87 **BICYCLE RACKS**

Description: Work under this item must be in accordance with the Standard Specifications for Road and Bridge Construction and subsequent special provisions, except as herein modified. This item must consist of furnishing and installing new bicycle racks.

General requirements:

Contractor to coordinate with CDOT Bike Program at 312-744-4600 prior to siting of racks. Contractor is responsible for furnishing and installing of new bike racks according to the standard details in the construction plans, and for any damage incurred to racks during installation. Removal of existing racks and abandoned bicycles attached to existing racks will be addressed under the item **BICYCLE RACKS TO BE REMOVED AND REPLACED.**

RACK:

Type B, A3, A5 rack, and related quantity to be specified in the detail drawings.

Materials:

Bicycle Rack - The bicycle rack must be fabricated from square Domestic (U.S. manufactured) Steel tubing, in accordance with ASTM A500 Grade B, 2" X 2" in size with 0.25" wall mechanical and structural mild steel tubing. The tubing must be bent in a one piece width as shown on the contract documents. The bicycle racks must not be welded in sections. Only the base plate must be welded to the steel tubing by using stainless steel A.C.D.C. 309L 16 or 17 electrode rod for welding. Color of the coating must be Black.

The coating must be applied only after the bicycle rack has been fabricated.

The final product will be rejected if the coating cracks, ripples in the curved areas or is otherwise damaged due to the fabrication and/or shipping.

Fastener-Expansion anchor to be stainless steel mushroom head spike, 1/2" x 4", as manufactured by Rawlplug Co., Inc. (New Rochelle, N.Y. 10802, tel. 914/235-6300 or as suggested.

Base plates - Base plates must be fabricated from Domestic (U.S. manufactured) Stainless Steel, 3/8" thick, in accordance with ASTM-T-304.

Coating of Bicycle Rack

- 1) Steel:
 - a) Shot blast to near white steel.
- 2) Iron phosphate pre-treatment.
- 3) Primer:
 - a) Thermosetting epoxy powder coating (Corvel Zinc Gray 13-7004).
 - b) Electrostatic application, cure schedule approximately 6 minutes at 250 degrees.
 - c) Thickness 1.8 - 10 mils.
- 4) Topcoat:
 - a) Triglycidyl Isocyanurate (TGIC) Polyester powder coating.
 - b) Electrostatic application cured in oven for approximately 20 minutes at 250 degrees.
 - c) Total coatings: 8-10 mils.
 - d) Finish color to be black.
- 5) Submittals
 - a) Bicycle Rack- Shop drawings or catalog cut.

- b) Fastener - Catalog cut.
- 6) Certifications -
 - a) Submit manufacturer's certification that the tubing and coatings meet the project specifications.
 - b) Prior to production, the manufacturer of the bicycle racks is to submit certification that the steel to be used is in compliance with the "Steel Products Procurement Act" as described in Article 112.11 of the Special Conditions.

Samples: Submit 3-12" long samples of the tubing with finish coat and 4 fasteners.

Installation: Bicycle Racks must be located according to the plans and as designated by the Commissioner. Fastening of the bicycle rack must be surface mounted on concrete only. Locations of racks to be verified in the field. Drilling through rebar, furnishing electricity, traffic control and shims are incidental to bicycle rack installation. The Contractor must replace "wave" racks with three new racks. Siting of racks will be coordinated at the end of the job with CDOT, Division of Project Development, Bike Program staff.

Planters

LOW PLANTERS, CAST IN PLACE

Description: This item shall consist of furnishing all labor, materials, tools and equipment required to construct cast-in-place Concrete Curb, Low Planters in accordance with the drawings and as herein specified. In addition to the concrete, the work shall include, but is not limited to, the furnishing and installation of all; joints, preformed expansion joint filler, dowel bars, necessary reinforcement, subgrade preparation and other appurtenant items required for construction of cast-in-place Concrete Curb, type IV.

Except as modified herein, the work shall be done in accordance with applicable articles of Section 606 of the Standard Specifications at locations as shown on the plans or as directed by the Commissioner.

General Requirements:

Product: Membrane curing compound shall be approved by the Commissioner. Technical information shall be submitted no less than two weeks before application.

Execution: Additional granular subbase material, shall be placed below all curbs when directed by the Commissioner.

Protective coat shall be applied to all faces and tops of curb in accordance with requirements of Article 420.21 of the Standard Specifications, when constructed after October 15.

To provide a straight edge to the curb, face boards, or an equivalent method will be used. Radius plates will be used at corners.

Backfilling behind the curb with suitable material shall be incidental to this item and shall be placed immediately after the concrete pour. All additional debris shall be removed from the parkway in preparation for topsoil placement.

ITEM NO. 83**ORNAMENTAL METAL FENCE**

Description: Work under this item must be in accordance with the Standard Specifications for Road and Bridge Construction and subsequent special provisions, except as herein modified. This work includes: furnishing and installing ornamental metal fencing; coring, preparation, cleaning and painting of all metal work, including excavating, backfilling and all related work, complete as shown on drawings and as specified.

General:

Shop Drawings: Show location of fencing and posts, and details of post installation, expansion joints, and attachment details.

Welding and cutting must be in accordance with the Standard Code for Arc and Gas Welding of the American Welding Society. Welding must be done in a manner that will prevent permanent buckling in the finished work. Certified welders using E 70xx electrodes must do the welding. All welds and spatter must be ground smooth prior to coating with galvanizing primer and finished with epoxy enamel.

Quality Assurance

Installer Qualifications: Engage an experienced Installer who has substantial experience and has completed at least five fence projects with similar material and scope to that indicated for this Project with a successful construction record of in-service performance.

Project Conditions

Field Measurements: Verify layout information for fencing shown on the Drawings in relation to the property survey and structures. Verify dimensions by field measurements.

Products

Steel Fencing

Steel Fencing Materials: Use only materials that are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

Steel must meet the requirements of ASTM Specification A-36.

1. 3/8" Diameter carriage bolt with tri-groove tamper-proof nut.
2. 1/2" x 1/2" solid bars pickets and 1/2" x 1 1/2" x 1/8" punched channel rail must meet the requirements of ASTM Specification A-108, cold finished, mild steel.
3. 1 1/2" x 1 1/2" square fence post must meet the requirements of ASTM Specification A-570.
4. Cap Detail must conform to design as specified on drawings.

Form fencing of welded construction to forms and profiles indicated; provide for field.

Form exposed work true to line and level with accurate angles and surfaces and straight edges. Weld corners and seams continuously, complying with AWS recommendations. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

Provide for anchorage of panels to posts as shown on drawings.

Expansion Joints: Provide expansion joints at intervals not to exceed 40 feet.

Fabricate joints in a manner to exclude water or provide weep holes where water may accumulate.

Miscellaneous Items: This specification is intended to include complete fence materials, and the Contractor must furnish all necessary bolts, nuts, latches, fittings, and, connections necessary to securely and rigidly install the fence. Color must be black. All materials to be the same color; black.

Finish

Surface Preparation:

1. All surfaces of the fence system must be sandblasted to prepare for the electrodeposition coating and powder coating process. Blasting must take place no more than 8 hours prior to the coating process. All parts must then be cleaned in a heated two-stage process including spray washing and cleaning all areas utilizing a total immersion cleaning process. Both stages must use a heated alkaline cleaner to remove all grease, dirt or other contaminants.
2. Rinsing must be performed by totally immersing parts in a continuously overflowing rinse tank and then totally immersed in a continuously overflowing conditioner to prepare surface for phosphating.

Coating

1. Phosphating must be performed by totally immersing parts in a heated phosphate solution to provide the transition coating between the metal and the electrodeposition coating.
2. All parts must then be rinsed by total immersion in a continuously overflowing rinse tank to remove any excess phosphate solution.
3. Powder coating preparation for electrodeposition coating must require all parts to be totally immersed in a continuously overflowing tank containing PPG Powercron 590, or equivalent, heavy metal free cationic Electrodeposition coating. All parts must then be rinsed by total immersion in a continuously overflowing tank to remove any excess E-coat solution.
4. All parts must be cured by heating to the exact time and temperature requirements of the electrodeposition coating by precisely controlled gas ovens.
5. Powder coating must be applied by electrostatically depositing a uniform coating on all parts to a thickness of 8 mils minimum in two applications utilizing the Electrodeposition coating preparation and 2.5-3 Mils utilizing the hot dip galvanizing preparation. Powder Coat specifications:
 - a. Color: black.
 - b. Resin Type: Polyester Urethane
 - c. 60 Degree Gloss: 92+
 - d. Specific Gravity: $1.36 \pm 0.05 \text{ g/cm}^3$
 - e. Cure schedule: 20 min. at 380° F peak metal temperature
 - f. Impact Resistance 60 in. lbs/60 in lbs.
 - g. Pencil Hardness: 2H
 - h. 1/8 conical mandrel bend: pass
 - i. Storage Stability: Min. 6 months at or below 30° F
6. All parts must be cured by heating to the exact time and temperature requirements of the powder in a precisely controlled oven.
7. An acceptable alternate to the above phosphating process is hot dip galvanizing all parts to ASTM 123 followed by an etch priming to prepare for powder coating.

EXECUTION

Submittals

The following items must be submitted to the Commissioner for approval before production can begin:

1. Complete, signed, and sealed manufacturer's shop drawings.
2. Specifications and color sample for all coatings, epoxy sealers and grouts.

3. Individual piece samples and full mock-up of fence segment. Samples must include the post, fence segment, post cap, and tamper-proof bolts.

Setting Posts:

- i. Center and align posts in predrilled holes (minimum 6" deep), 72" to 75" on center, of PCC curbing or foundations at correct height, 3' above bottom of excavation unless otherwise indicated (see details in plans where applicable).
- ii. Place epoxy grout around posts flush with top of concrete to avoid ponding. Check each post for vertical and top alignment, and hold in position during placement and finishing operations. Protect portion of posts above ground from concrete splatter.

Epoxy Grout: The epoxy grout must be a two component, epoxy-resin bonding system conforming to the requirements of ASTM C 881, Type IV, Grade 2, Class B or C. The Class supplied must be governed by the range of temperatures for which the material is to be used. The resin must contain a white pigment and the hardener must contain a black pigment in such proportions that the resulting mixture is concrete gray.

The two component, epoxy-resin grout must be furnished by the manufacturer in premeasured, preassembled cartridges suitably designed for mixing and application of the grout or in containers individually marked to clearly identify each component.

The epoxy adhesive must be packaged in a kit with each component in a separate container. The containers of each kit must be filled with the adhesive components in exact mixing proportions and one container must be large enough to mix both of the components. The size of the kit must be the total volume of the mixed adhesive which must be 4 L (1 gal) or 20 L (5 gal) as specified. Regardless of how it is furnished, the manufacturer must supply mixing instructions.

Prior to approval and use of the epoxy-resin grout, the Contractor must submit a notarized certification by the formulator, stating that the epoxy-resin grout meets these requirements.

Install fencing plumb, level, true to line and location, and secure.

Cleaning

Clean connections and abraded areas and apply two (2) coats of repair paint compatible with finish preparation utilized. Apply primer and finish paint according to manufacturer's directions. Match original color.

Disposal

All excess excavated and unsuitable material is to be legally disposed of off site

PRECAST SANDSTONE PLANTER, 42-INCH DIAMETER

Description: Work under this item must be in accordance with the Standard Specifications for Road and Bridge Construction and subsequent special provisions, except as herein modified . This work must consist of furnishing and installing a new precast planter of the size and material indicated at the locations specified in the Contract plans or as directed by the Commissioner.

General Requirements: Prior to finishing, the Contractor must field mark locations of all precast sandstone planters for approval by the Commissioner.

- Materials:
- A. Center-Portland Type I White Meets ASTM C 150
 - A. Fine Aggregate – carefully graded and washed natural sands meeting ASTM 33 except that graduation may vary to achieve desired finish and texture.
 - B. Coarse aggregate – carefully graded and washed natural gravels meeting ASTM 33 except that graduation may vary to achieve desired finish and texture.
 - C. Color - All color is achieved from mixture of natural sands or silica except where custom pigment (inorganic) meeting ASTM C 979 is required. Pigment must be guaranteed lime-proof by manufacture and must not exceed 10% weight of cement used.
 - D. Water – Must be portable tap-water free from impurities.

Properties:

- A. Dry-cast sandstone is a mix designed to achieve both strength and surface finish desired.

A. Compressive strength must not be less than 6500 psi at 28 days when tested in accordance with the requirements of this specification.

B. The average water absorption of Cast Stone must not exceed 6% by dry weight when tested in accordance with the requirements of this specification.

Reinforcement:

- A. Cast Stone must be reinforced with stainless or new billet steel meeting ASTM A 615 Grade 40 / 60 when necessary for safe handling setting and structural stress. Ring reinforcement 1 “galvanized, Bowl / 1/4” stainless cable.

Submittal: Product Data: Submit manufacturer’s technical data for each manufactured product, including certification that each product complies with specified requirements.

Acceptable Manufacturers: Subject to compliance with requirements, provide precast sand stone planters as suggested:

- Model no. 42-std Orchard Bowl. by Nichols Bros. Stoneworks, Stoneworks Tan finish , 20209 Broadway, Matlby, WA 98296 Phone: (360) 668-5434;

Shop Drawings: Submit shop drawings showing complete information for fabrication.

Pavers

BRUSSEL BLOCK PAVER, 3-STONE RANDOM PATTERN, ON BITUMINOUS/CONCRETE BASE, INCLUDING SUB-BASE

GENERAL WORK INCLUDED

A. Contractor must provide all equipment and materials, and do all work necessary to construct the unit paving as indicated on the Drawings and as specified, including but not limited to subgrade preparation, including grading and compaction, construction of concrete base, placement of bituminous setting bed with asphalt adhesive, placement of sand bed, chemically cleaning, and other items associated with construction of this item. Work must be installed to the satisfaction of the Commissioner.

RELATED WORK

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this Section.

QUALITY ASSURANCE

A. Except as modified herein, the work must be in accordance with the applicable portions of the Standard Specifications.

QUALIFICATIONS

A. Contractor must provide evidence that his firm or other entity propose for the unit paving work has specific experience meeting the following criteria:

1. Experience installing unit pavers using sand and bituminous setting beds.
 2. Installed (within past three years) a minimum of 100,000 square feet per year for the past three years of unit paving using both sand and bituminous setting beds.
 3. The same experienced supervisory personnel must be made available for this project.
 4. Bituminous setting bed work must not be sublet.
- B. The paving firm must submit list of comparable projects setting forth description, square footage, location and knowledgeable references with addresses and phone numbers.

SAMPLES

A. Contractor must submit to the Commissioner a minimum of 16 square feet of unit pavers for approval. Submittal must indicate the full range of unit pavers in the specified color.

EXTRA MATERIAL STOCK

- A. The Contractor must supply and deliver two (2) extra standard pallets of unit pavers to the Commissioner upon completion of the work. Pavers must be new, banded on a pallet, and must be as shipped from the factory. The Contractor must deliver and off-load the pavers to a location approved by the Commissioner.
- B. This extra material stock must be considered incidental to the unit paver work and must not be paid for separately.

SUBSTITUTIONS

- A. All material substitutions must be submitted to the Commissioner for review no later than ten (10) days prior to submitting bids.
- B. Submittals for consideration must include full-sized samples and technical specifications.
- C. Commissioner will review substitution submittal and, if approved, will issue written approval.
- D. Substitution submittals received after time outlined above will not be considered.
- E. Substitutions during construction will not be allowed.

ACCESS TO BUSINESSES AND HOMES

A. During the installation of the paver units and base Contractor must keep driveways and entrances serving the businesses and homes clear and available to the Commissioner and the business' employees at all times. Customer access must be maintained during normal business hours. Contractor must be responsible for providing temporary structures such as wooden bridges,

ramps, or walkways as required to provide the public safe, secure, and recognizable access ways to businesses during construction.

PRODUCTS

PAVERS

A. Pavers must be as manufactured by Unilock, 301 East Sullivan Road, Aurora, Illinois 60504, (630) 892-9191, or approved equal.

1. All pavers must meet the requirements for ASTM Designation C902, Standard Specification for Pedestrian and Light Traffic Paving Brick, Class SX, Type 1,

PS. PX 3. Pavers must conform to severe freeze-thaw test requirements of ASTM Designation C67 on sampling and testing brick.

2. Tolerances on Dimensions must be within the allowable range as classified under the ASTM Designation C902.

3. Texture and color variation on pavers will meet ASTM Designation C216, Type FBS.

BITUMINOUS SETTING BED COMPONENTS

A. Asphalt Cement: Must conform to ASTM D3381 with a viscosity grade of A.C. 10 or A.C. 20.

B. Aggregates: Clean, hard sand with durable particles and free from adherent coating, lumps of clay, alkali salts, and organic matter. Sand must be uniformly graded from coarse to fine with all passing the No. 4 sieve and must meet screen analysis test, ASTM

C. Mix Ratios: 7 percent asphalt (by weight), 93 percent aggregates (by weight). Each ton must be apportioned by weight in the approximate ratio of 145 pounds asphalt cement to 1,855 pounds aggregate.

D. Mix Requirements: Bituminous setting bed must be plant mixed and heated to approximately 300°F.

E. Contractor must determine exact proportions to produce the appropriate mixture for construction of the bituminous setting bed to meet construction requirements.

F. Setting Bed Primer: Must conform to ASTM D 2028 - Standard Specification for Cutback Asphalt (Rapid-Curing Type).

NEOPRENE TACK COAT COMPONENTS

A. Mastic (asphalt adhesive):

Solids (base): 75 percent \pm 1 percent.

Pounds/gallon: 8-8.5 pounds/gallon

Solvent: Varsol (over 100° F. flash)

B. Solids (base): 2 percent Neoprene.

10 percent Fiber.

88 percent Asphalt.

Melting Point: ASTM D 36, 200°F. minimum.

Penetration: 77 ° F 100 gram load,

5-second (.1 mm) 23-27.

Ductility: ASTM D 113 at 25°C., \pm 0.5°C (77°F + 0.9°F)

5 cm per minute (+ 5%)

PAVER JOINT MATERIAL

A. Sand: Dry sand conforming to ASTM C-144 with all particles passing the No. 16 sieve.

JOINT SAND STABILIZER

A. Manufacturers: The joint sand stabilizing material must be the following.

Surebond SB-1300 as manufactured by Surebond Inc (telephone 847 843 1818) and distributed by Surebond California Inc. (telephone 949 360 4446). or approved equal.

EXECUTION

GENERAL

- A. All pavers must be installed per the respective manufacturer's recommendations.
- B. No paver setting work must be performed when the underlayment has free moisture, ice, or snow, or when the underlayment is frozen.
- C. Concrete underlayment must be sound, clean, and free from debris and materials or substances which will hinder the bond of the setting bed. The top surface of concrete underlayment slab must not vary more than one half (1/2) inch of its proposed elevation.
- D. No bituminous setting bed work must be performed when the ambient temperature is below 40°F. or at 40°F. and falling, or at any time when the setting bed stiffens before paver units are installed.

PAVER CUTTING

- A. To reduce dust during paver installation, unit pavers must only be cut using wet saws. No dry cutting permitted.
- B. Cut pavers must be placed in areas shown on the details in the plans. "L" shaped pavers must be avoided where possible.
- C. Pavers must be cut radially when joints between pavers on curves exceed 1/8 inch.
- D. Radial cut pavers must be created by trimming both sides of paver.

BITUMINOUS SETTING BED PREPARATION

- A. Where required, install steel paver edging as shown on drawings.
- B. Place 3/4-inch deep control bars in parallel directly over base to be used as guides for striking board. Use wood shims under control bars to set proper grade.
- C. Place hot (250°F+) bituminous setting bed material between control bars and strike with striking board to create a smooth, firm, and even setting bed. Additional bituminous material may be necessary to achieve consistent quality setting bed.
- D. After completion of first setting bed panel, advance first control bar and wood shims to next position to prepare next panel. Contractor must carefully fill depressions that remain between panels.
- E. Repeat procedure for successive setting bed panels. No wood shims or control bars must be allowed to remain in the bituminous setting bed.
- F. Roll hot setting bed with a power roller (not over one (1) ton in weight) to a nominal depth of 3/4 inches. This thickness must be adjusted so that when the pavers are placed and rolled, the top surface of the pavers will be at the required final grade.
- G. Apply neoprene tack coat to surface of bituminous setting bed by mopping, squeegeeing, or troweling.

PAVER INSTALLATION - BITUMINOUS SETTING BED

- A. Place pavers by hand in straight courses with hand tight joints and uniform top surface. Good alignment must be kept and patterns must be as shown on plans and details.
- B. Protect the alignment and elevations of the newly laid pavers with plywood sheeting at all times. Advance the plywood as work progresses and maintain plywood protection over all areas subject to movement of materials, workers, and equipment.
- C. Pavers must be cut only when necessary and used in courses as indicated on plans and details.
- D. Joints in the underlayment, if any, must not reflect up through the setting bed and paver system.
- E. When all pavers are installed, apply joint sand to paving and sweep into all joints until joints are completely filled. Sweep clean the entire surface and remove all excess sand. Do not allow traffic on pavers prior to joints being filled.

F. Protect newly laid pavers, slabs and curbs with plywood panels on which workers stand. Advance protective panels as work progresses but maintain protection in areas subject to continued movement of materials and equipment to avoid creating depressions or disrupting alignment of installed pavers, slabs or curbs.

G. Replace cracked or chipped unit pavers at no additional cost to the Commissioner.

PATTERN INSTALLATION

A. The paving units must be installed in an a Soldier Course (Border) Pattern and a Running Bond (Filler) Pattern as shown on the plans.

CLEANING OF PAVED SURFACE

A. After completion of the unit pavers, paver installation areas must be thoroughly swept clean and surface must be left unsoiled. Where required by the Commissioner, surface must be cleaned with water or an approved cleaner.

Jointing sand stabilizer:

A. On completion of the entire pavement installation the surface must be further compacted using an 8-10 Ton pneumatic tired roller having tire pressures of 90 psi. Rolling must be continued for a minimum of 2 days. At the completion of rolling jointing sand must be brushed off the surface so that the sand level is at the bottom of the chamfers.

B. The surface must be made clean and free from oil, laitance, dust and any loose material prior to the application of joint sand stabilizer. The surface and joint sand should be dry for it's full depth prior to commencing work.

C. The joint sand stabilizer must be applied evenly at the appropriate coverage as follows:

Surebond must be applied form a low pressure regulated backpack sprayer at a coverage rate of 150sqft/gallon. Work the material into the untreated joints with a floor squeegee ensuring that all joints are adequately flooded and that no surplus material is left on the surface. This work to be in strict accordance with the manufacturers recommendations.

D. The treated area must be protected from rain or moisture and not be trafficked for 24 hours after completing to the stabilizer. Work must cease if inclement weather (rain or strong wind) will affect the stabilizing operation and must not recommence until the joint sand has dried sufficiently to allow penetration of the sealant.

FLOWABLE BACKFILL

Description This work shall consist of furnishing and placing flowable backfill in trenches for pipe structures, culverts, utility cuts; for backfilling vaulted sidewalks and other work areas extending under pavement locations; to fill cavities beneath slope walls and other locations as approved by the Commissioner and in accordance with the plans and specifications contained herein.

Materials: The materials shall conform to Articles 1000 through 1004 of the SSRBC. The contractor shall provide a mix that does not contain fly ash or any other materials with corrosive properties.

Flowable Backfill Mix Design The Contractor shall submit a flowable backfill mix design (FBMD) to the Commissioner and arrange a trial batch. The FBMD will be approved based on compliance with the criteria described below. The FBMD shall be submitted in a format acceptable to the Commissioner and shall include the following:

- a) a list of all ingredients
- b) the source of all materials
- c) the gradation of the aggregates
- d) the quality of the aggregates
- e) the specific gravity(s) of the aggregates
- f) the batch mass (weight)
- g) the names of all admixtures
- h) the admixture dosage rates and manufacturer’s recommended range

After the completion of the trial batch, and after all test results have been reviewed for compliance with the specifications, the Commissioner will assign a mix design number.

Mix design changes will not be allowed after the FBMD approval, except for adjustments to compensate for routine moisture fluctuations. All other changes require a new FBMD.

Flowable Backfill Mix Design Criteria The FBMD shall be a workable mixture with the following properties:

- a) Non-corrosive in nature
- b) Initial Set¹60 minutes
- c) Maximum Compressive Strength (@28 days).....150 psi
- d) Minimum Spread Diameter (Note 3).....20 inches
- e) Unit Weight (Field Tolerance)².....5.0%

Note 1. Initial set must be determined in accordance with ASTM C 403. Initial set shall be a minimum of 20 psi at one (1) hour, and a minimum of 40 psi at three (3) hours.

Note 2. Unit weight is to be determined in design process in the field in accordance with AASHTO T 121 utilizing the certified equipment as stated in the aforementioned test method. The contractor has the option to use nuclear density gauge (ASTM D2922) to determine unit weight field verification. Unit weight must be field verified at minimum one per week. Results of these tests shall be provided to the Commissioner.

Note 3. Spread will be determined by inverted slump cone method with an approved Illinois Department of Transportation slump cone.

Flowable Backfill Trial Batch A trial batch shall be produced by the Contractor and tested by the Commissioner to verify that the FBMD meets the flowable backfill mix criteria. The flowable backfill shall be batched within the proportioning tolerances of Articles 1020 and 1103 of the SSRBC. The Commissioner will test and provide the Contractor with test results performed and the flowable

backfill spread diameter. The trial batch shall be of sufficient quantity to allow the Commissioner to perform all required tests from the same batch. Trial batch flowable backfill shall not be used for more than one test.

Compressive strength testing shall be conducted in accordance with AASHTO T22 and T23. Flow testing shall be conducted in accordance with ASTM D 6103.

Quality Control / Quality Assurance The Contractor must perform quality control inspection, sampling, testing, and documentation to meet the requirements as defined in IDOT's Supplemental Specifications and Recurring Special Provisions, "Special Provision for Quality Control / Quality Assurance of Concrete Mixtures (Check Sheet #31)." The Commissioner will be responsible for the performance of Quality Assurance tests.

Mixing Equipment The mixing equipment shall be in accordance with the applicable requirements of Articles 1103.02, 1103.03 and 1103.04 of the SSRBC.

Placement The flowable backfill shall not be placed on frozen ground or in places where standing water is present. Flowable backfill shall be protected from freezing until the material has set. The diameter of the flowable backfill spread shall be at least 20 inches at time of placement. The flowable backfill shall be brought up uniformly to the grade(s) as shown on the plans or as directed by the Commissioner. The flowable backfill shall not be subject to load nor disturbed until the compressive strength has been achieved.

Lighting

The latest Lighting specifications should be obtained from the Department of Streets and Sanitation, Bureau of Electricity, 2451 S. Ashland Avenue, Chicago, IL 60608.

Standard Details

The following standard details are subject to change by CDOT , Bureau of Forestry, and Bureau of Electricity. The latest standards should be obtained from these Departments.