Rest Area Site Work

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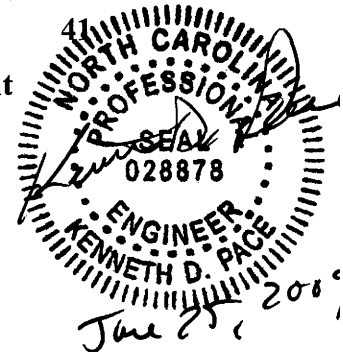

1 - TREE PRESERVATION / PROTECTION FENCE

General Requirements and Restrictions

The aesthetics and comfort of the rest area is greatly enhanced by the maturing trees on the site. The Department has dedicated much effort to preserve all the existing trees possible during this renovation project. This will require the utmost care during the construction process since the construction is located very close to many of the trees we desire to preserve. The contractor will assist the department by educating its employees, subcontractors and any utility companies conducting work in the vicinity, of the efforts and the preservation measures required herein.

Tree Preservation/Protection Fence consist of furnishing, installing, maintaining, and removing wood slat, polyethylene, or polypropylene fence as specified or as directed by the Engineer and in accordance with the special provisions included herein.

Install tree protection fence prior to any demolition. All construction unless approved by the Engineer will occur within the construction fence. *Do not trespass* with vehicles or machinery in the areas indicated for tree preservation. Do not park, refuel, repair or maintain vehicles or equipment in the tree preservation areas. Do not stockpile materials or store equipment in the tree preservation areas.

Do not release petroleum products, fuels, paints, or lubricants anywhere within this project in the vicinity of the tree preservation areas or in areas that drain into this vicinity. Do not apply or release herbicides, fertilizers or chemicals of any kind that may be toxic to plant life and do not 'clean out' concrete trucks in the vicinity of the tree preservation areas, or into areas that drain into this vicinity. Do not burn trash, debris or vegetation in the vicinity of tree preservation areas.

Demolition, ground disturbing activities and construction that occurs within the drip line of the tree(s) or within a radius three times the drip line of the tree(s) will be done with utmost care. Accomplish all grading in such a manner as to avoid standing water or saturated soils around root systems of trees that are to remain. Install erosion control devices in a timely manner to prevent sedimentation of the tree root zone in the tree preservation areas. In areas to be 'cut' by grading or where utility trenches or building footings occur, prevent shredding, tearing or exposing roots by excavating a trench not less than 6" wide and to the maximum depth of the cut up to 24" deep. Hand saw any roots 2" or greater in diameter that are encountered to make a clean smooth cut. If necessary, dig out enough soil to reach an undamaged portion of the root to make the smooth cut. To prevent drying out of roots, immediately cover any exposed root surfaces with 6" of approved mulch or soil until 'finish' construction operations dictate removal. Supplemental irrigation may be necessary during periods of drought or stress. Irrigate as directed and approved by the Engineer.

Branches that protrude into the construction area that interfere with construction operations will be tied back if possible or pruned if not. Follow proper pruning techniques as established in American National Standards Institute ANSI Z133.1 and

perform pruning by a professional arborist. Submit description of proposed work along with arborist credentials to the Engineer for approval prior to conducting work.

Violation of any of these tree preservation measures will result in suspension of all work until the violation is resolved or repaired to the satisfaction of the Engineer. Such suspension of work will not be considered justification for additional compensation in accordance with Section 104 of the Standard Specifications or extension of the contract time.

Materials
Posts will be nominal 2" x 4" or 4" x 4", lengths as required, structural light framing, grade no. 2, southern yellow pine or steel posts will be a minimum of 1 3/8" wide measured parallel to the fence, with a weight of 1.25 lbs/ft of length. Wood posts will be treated with a preservative in accordance with Section 1082-3 of the Standard Specifications.

Fence fabric will be a barricade or safety barrier type highly visible orange polyethylene or polypropylene mesh that is approved by the Engineer. Fabric will be UV stabilized, flexible and inert to most chemicals and acid.

Signs will be fabricated of a durable, weatherproof lightweight material. Signs will have a white background with red lettering. They will be a minimum of 4.5 square feet and clearly display the following message in both English and Spanish:

TREE PROTECTION ZONE

DO NOT ENTER

Submit sample for approval prior to placing.

Installation
Erect fence to conform to the general contour of the ground. Do not remove existing plant material in order to install fence unless directed by the Engineer.

Set post and maintain in a vertical position. Post may be hand set or set with a post driver. If hand set, thoroughly tamp all backfill material, if power driven, wood posts may be sharpened to a dull point. Remove and replace any post damaged by power driving prior to final acceptance. Cut the tops of all posts at a 30-degree angle. The posts may, at the option of the Contractor, be cut at this angle either before or after the posts are erected. Contractor is responsible for locating all utilities prior to installation of fence posts.

Stretch fence fabric taut and attach to post with appropriate means according to post type utilized. In sections where signs will be located, reinforce top of fabric by weaving a 12 gauge galvanized wire in the fabric and firmly attach to the post at each end of section. Place signs every 100 linear feet with a minimum of one sign for each segment facing in a different direction. Secure sign to fence fabric at all four corners placing near the top of the fence fabric where clearly visible.

Tree Protection Fence Maintenance
At any time during the duration of the project if the tree protection fence is not in an upright secure position with no gaps and properly signed, work on the project will be suspended wholly until the fence is properly repaired and determined to be in satisfactory condition by the Engineer. Remove tree protection fence, fill post holes, weed/mow and dispose of debris off site as a last item of work on the project.

Compensation
Tree Protection / Preservation Fence will be paid for as 'Tree Protection Fence' in linear feet as measured along the surface of the installed and accepted work.

Such payment will be full compensation for the work described above including furnishing, installing, and removing; fence post, fence bracing, fence fabric, staples, tie wires; all tools, equipment and any other incidentals necessary to complete the work. Mulch and/or watering required herein will be incidental to the completion of the work.

Payment will be made under.
Tree Protection Fence ..... LF

2 – CONSTRUCTION FENCE (TEMPORARY)

General
The work covered by this provision consist of furnishing, erecting, maintaining and removing (72") temporary chain link fence and gates at locations shown on the plans and/or as directed by the Engineer.

Unless at the direction of the Engineer, the entire rest area is closed and rest area access ramps are barricaded, install construction fence prior to beginning construction as indicated on the Construction Limits and Staging Plan.

The estimated quantity of chain link construction fence may be increased, decreased, or eliminated entirely by the Engineer based upon the contractor's approved work schedule and status of rest area - open or closed to the public at the time of construction. Such variations in quantity will not be considered an alteration in the plans or detail of construction that materially change the character of the work and the cost of performing the work. Standard Specifications Section 104-5 pertaining to overruns and underruns of contract quantities will not be applicable to the item of construction fence.

Construction fence and gate will conform to all applicable sections of the Standard Specifications and Standard Drawings Section 866.

Materials
Construction fence will be chain link 72 inch fabric. Double gates will be chain link, 72 inches high and 8 feet wide with a 16 foot opening.

Installation
Erect fence to conform to the general contour of the ground. When determined necessary by the Engineer, perform minor grading along the fence line to provide for installation and proper drainage. Set all posts in a true vertical position and thoroughly tamp to secure position.

Stretch fence fabric taut and securely attach to each post. Do not splice fabric between posts.

Maintain the construction fence in a satisfactory condition until directed by the Engineer to remove. Upon removal all fence materials will become the property of the Contractor and will be removed from the project promptly.

Compensation
Construction Fence (Temporary) will be paid for as 'Temporary Chain Link Fence , 72" Fabric' measured in linear feet satisfactorily installed and accepted and 'Double Gates, 72" High, 8' Wide, 16' Opening' for each satisfactorily installed and accepted. Double gates will be measured as one gate. No direct payment will be made for gate posts, terminal posts, post bracing and other miscellaneous materials necessary to construct the fence as these will be considered incidental to the fence installation. There will be no additional compensation for construction fence and gates relocated to another area on site during different phases of the project. Should relocation to accommodate a subsequent phase require additional length, thus additional materials, payment will be made for the additional length measured in linear feet and/or actual number each of gates at the contract prices as provided herein.

Such payment will be full compensation for the work as described above, including but not limited to clearing and grading; furnishing, installing, relocating and removing gates, fence fabric with necessary posts, bracing, staples, tie wires, fittings, tools, equipment and all incidentals necessary to complete the work.

Payment will be made under:

Temporary Chain Link Fence, 72" Fabric ..... LF
Double Gates, 72" High, 8' Wide, 16' Opening ..... EA

3 – DEMOLITION

General
Demolition consists of the removal and disposal of all paving, structures and site amenities as indicated on the plans and as directed by the Engineer. Selected structures and site amenities to be salvaged will be handled and stored with the upmost care so as not to damage. Terrazzo table tops to be salvaged by contractor for reuse in this contract will be reinstalled on the NBL Picnic Table; all others will be delivered to NCDOT. Demolition for purposes of rest area building renovations is covered elsewhere in the Special Provisions.

All methods and operations used for removal of paving, structures and site amenities will meet prior approval of the Engineer. All materials removed will become the property of the Contractor, unless they are to be relocated on site or delivered to NCDOT, and will be properly disposed of by the Contractor off site. Prevent damage to adjacent property and structures to remain during the removal and demolition operations. The contractor is responsible for repairing any and all damaged areas to its original condition and/or to the satisfaction of the Engineer.

Make a saw cut providing a clean edge at locations where concrete paving is removed.

Vegetative materials will be removed as part of the Landscape Clearing and Grubbing operation.

Compensation
Payment for the work of removing and disposing of all paving, structures, and site amenities as described above, indicated on plans and directed by the Engineer, will be paid for at the contract lump sum price for 'Site Demolition'.

Such price and payment will be full compensation for all work covered by this provision; including but not limited to furnishing all labor, tools and equipment and any other incidentals necessary or required to complete the work.

Payment will be made under:
Site Demolition ..... LS

4 – LANDSCAPE CLEARING AND GRUBBING

General
The work covered by this provision consists of removal and disposal of vegetative material to include trees, stumps, above and below ground, shrubs and plant beds as designated on the plans and as directed by the Engineer on site. Others will remove trees, shrubs and other plant materials to be salvaged prior to the Contract. All methods and operations used for landscape clearing and grubbing will meet prior approval of the Engineer.

Satisfactorily complete landscape clearing and grubbing operations prior to building and landscape grading operations. Perform all work so as to cause minimum soil erosion and comply with the requirements of Section 107-13.

Conduct clearing and grubbing operations in a manner to prevent limb, bark or root injuries to trees, shrubs, or other types of vegetation that are to remain and to prevent damage to adjacent property and structures which are to remain. If damage should occur repair the damaged area to its original condition and to the satisfaction of the Engineer. Should damage occur to adjacent trees to remain take all steps necessary as directed by

the Engineer to repair or minimize the effects of the damage to the tree. Should any tree to remain be damaged to the extent that its value as a desirable landscape tree is compromised in the opinion of the engineer, the tree will be removed by the Contractor with no additional compensation. Furthermore, the contractor will be reimbursed the owner for the aesthetic value of the tree, as determined by a certified arborist using the current International Society of Arboriculture plant appraisal standards.

Dispose of all debris created by the landscape clearing and grubbing operation off the site and out of sight of the project.

Compensation
Payment for the work of Landscape Clearing and Grubbing as described above, indicated on the plans and directed by the Engineer will be paid for at the contract lump sum price for 'Landscape Clearing and Grubbing'.

Such price and payment will be full compensation for all work covered by this provision; including but not limited to furnishing all labor, tools and equipment and any other incidentals necessary or required to complete the work.

Payment will be made under:
Landscape Clearing and Grubbing ..... LS

5 – LANDSCAPE GRADING

General
Landscape grading consists of placing topsoil material within seeding and planting beds, and backfilling around buildings, sidewalks, etc., to provide proper drainage as indicated on the grading plans and as directed by the Engineer.

Material
Topsoil will be as specified herein and will be utilized for all fill/backfill operations as directed by the Engineer.

Topsoil will be a sandy loam, silt loam or clay loam that contains a reasonable amount of humus material. Topsoil will be of good texture, loose and friable and will be representative of topsoil in the general vicinity. It will be reasonably free from sod, hard lumps, subsoil, large roots, rocks and gravel, noxious weed seeds and/or toxic substances or other material, which would be harmful to plant growth. Topsoil when delivered to the job site will be approved by the Engineer prior to placement, whether or not the source of topsoil has been previously approved.

Fill material to bring building site to finished grade will be as specified in the building specifications under earthwork.

Installation
Place building fill and compact as described in the building specifications. Place topsoil fill and spread evenly to a depth of 18 inches or as directed by the Engineer, which after settlement constitutes finish grade. Do not place topsoil when the ground is frozen, is excessively wet, or is in a condition that the soil cannot be worked easily and dressed smoothly. Compact fill material under elevated sidewalks/concrete paving to a density equal to or greater than undisturbed soil in the area.

Placement of fill/topsoil within the vicinity of existing trees will be coordinated with the Engineer in the field. Any fill exceeding 3 inches in depth within those areas will be approved by the Engineer prior to placement. Where fill material is needed within wooded areas, precautionary measures will be taken to prevent damage to trees and the roots of trees to be retained for landscape purposes. When placing or compacting fill material in or adjacent to wooded areas heavy machinery will not be allowed. Equipment for placing fill material will be approved by the Engineer prior to any grading work.

Compensation
'Landscape Grading' will be paid for at the contract lump sum price for the work detailed in this section that has been successfully accomplished and accepted. Building fill will be included as part of the building lump sum payment. 'Topsoil' will be paid for in the actual number of cubic yards of topsoil placed and accepted. Topsoil will be measured by truck measurement. Each truck will be measured and will have a legible identification mark indicating its capacity. Load each truck to at least its measured capacity at the time it arrives at the point of delivery. The recorded capacity will be adjusted by making a 25 percent deduction to allow for shrinkage, and the adjusted capacity will be the quantity to be paid for.

Such price and payment will be full compensation for furnishing, all labor, equipment and all incidentals necessary to complete the work satisfactorily.

Payment will be made under:
Landscape Grading ..... LS
Topsoil ..... CY

6 – SITE STORMWATER DRAINAGE

Applicable parts of the supplementary General Conditions and the Standard Specifications govern work under this division which includes all labor, materials, equipment and services necessary for the proper completion of storm drainage and related work indicated on the drawings or in the specifications in general as follows:

- Landscape Drainage Drop Inlets
- Trench Drains
- Drain Pipe with Concrete Apron
- Storm Drainage Pipe
- Storm drainage system from building downspouts to Rain Gardens

- Adapters at each building downspout
- Cleanouts in drain lines

General
The work covered by this provision consists of excavation, fabrication, furnishing, installing drop inlets, junction boxes, trench drains and drainage pipe, and making proper connections to the existing storm water drainage system as shown on the plans and as directed by the Engineer.

Masonry Drainage Structures

Materials
Masonry drainage structure will be as specified in Section 840 of the Standard Specifications. Brick Drop Inlet will be as shown in Roadway Standard Drawing 840.15 with grate as shown in 840.16 at locations as indicated on the plans. Modify grate hole opening width to be pedestrian friendly if located in Rest Area Lawn areas. Submit shop drawings for approval of modification.

Trench Drains will be Class B concrete and comply with Section 825 of the Standard Specifications. Trench Drain Grates will be pedestrian friendly, ductile cast iron with Type 'L' frames, 6" wide to cover a 4" trench with 1 ½" edge thickness. Slots are to be 5/16" wide. Submit Manufacturers catalog sheets for approval prior to ordering.

Drain Pipe will be 8" as specified below under storm drainage pipe. Concrete apron will be Class B and comply with Section 825 of the Standard Specifications.

Installation
Exact placement of structures will be optimized in the field to align with existing drainage structures and necessary connections. Invert elevations will be as shown on plans, verified in the field prior to construction and adjusted in the field based on existing drainage structures if needed.

Trench drains will be constructed at locations shown on plans and according to details.

Drain pipe with apron will be set in place at proper grade to achieve positive drainage away from structures. Pipe under sidewalk will extend a minimum of 24 inches beyond the edge of the sidewalk. Installation of pipe will be the same as for drain pipe installation below.

Compensation
Compensation will be as specified in Section 840 of the Standard Specifications for Masonry Drainage Structures, Std. 840.15 and Frame with Two Grates, Std. 840.16.

Trench Drains will be measured and paid for per linear foot when properly installed and accepted by the Engineer. Such price includes but is not limited to forming and placing concrete, furnishing and placing frames and grates and all labor, materials and equipment and any incidentals required to complete the work.

Drainage pipe with concrete apron will be measured and paid for on an each basis when properly installed and accepted by the Engineer. Such price includes but is not limited to forming and placing concrete, furnishing and placing pipe and all labor, materials and equipment and any incidentals required to complete the work.

Payment will be made under:
Masonry Drainage Structures ..... EA
Frame with Two Grates, Std. 840.16 ..... EA
6" Trench Drain ..... LF
8" PVC/ABS-DWV, SCH 40 Drain Pipe with Concrete Apron ..... EA

Downspout Connections

Downspout Conversion Unit
Building downspout to drain pipe adapter will consist of metal downspout conversion unit to adapt from rectangular downspout to drain pipe as shown on drawings. These conversion units will be incidental to drain pipe installation and there will be no separate compensation

Cleanouts
Cleanouts will be proper shape, length, and degree of bend, to fit conditions. Cleanouts will be set at locations shown on the plans but not more than 50 feet apart. Cleanout plugs will be a minimum of 4", with finish elevation at proposed finish grades for lawn, plant bed or sidewalk. Cleanouts in sidewalks will be brass stem and cap mounted flush with sidewalk.

Compensation
Cleanouts installed, complete and accepted will be paid for at the contract unit cost each.

Payment will be made under:
4" Storm Drain Cleanout ..... EA

Storm Drainage Pipe

Materials
Storm drainage pipe will be PVC/ABS-DWV meeting requirements of ASTM D-2661, Schedule 40 with solvent cement for fittings complying with ASTM D-2235, ASTM D-87.

Installation
a) Excavate trench to a sufficient width to receive pipe and allow for tamping equipment and to the depth established by the Engineer. Follow precautions under 'Tree Preservation' if working in the vicinity of trees to be preserved.
b) Join pipe sections and fittings together in accordance with manufacturer's recommendations.
c) Where the pipe foundation material is found to be of poor supporting value or of rock the foundation will be conditioned by removing the existing foundation material. Remove existing foundation material by undercutting one foot or to a depth as directed by the Engineer, and backfill with either a suitable local material or a foundation condition material. Foundation condition material consists of crushed stone or gravel or a combination of sand and crushed stone and will be approved by the Engineer as being suitable for the purpose intended. The selection of the type of backfill to be used for foundation conditioning will be made by the Engineer.
d) Connect to existing or proposed drainage structures as indicated on the plans and as directed by the Engineer.
e) Backfill material will be carefully placed so that the pipe will not be disturbed after it has been laid. Firmly tamp the Engineer approved earth backfill material in 6 inch layers to a density equal to that of the surrounding undisturbed soil.
f) Maintain all drainage installations in a continuously functioning condition from the time the pipe is installed until the project is accepted.

Compensation
Storm drainage pipe will be measured and paid for per linear foot when properly installed and accepted by the Engineer.

Payment will be made under:
6" PVC/ABS-DWV, SCH 40 Drain Pipe . . . . . LF
8" PVC/ABS-DWV, SCH 40 Drain Pipe . . . . . LF
12" PVC/ABS-DWV, SCH 40 Drain Pipe . . . . . LF

7 - SIDEWALK SLEEVE PIPE

General: The work covered by the provision shall consist of furnishing and installing duct pipe as shown on the plans under sidewalks before they are poured (open cut).

Material: The duct shall be rigid PVC (Polyvinyl Chloride) heavy wall, UL approved for underground use without concrete encasement per UL 651"Rigid Non-Metallic Conduit or Encasement".

Installation: Excavate, place encasement pipe and backfill so that encasement is in line with piping. Backfill shall be compacted to 95% where beneath walks, drives or other concrete pads.

Method of Measurement and Basis of Payment:
Measurement and payment for PVC Duct shall be at the contract unit price per linear foot for "4" PVC SCH 40 Sidewalk Sleeve Pipe" as installed, and will be full compensation for all work covered by this section.

Payment will be made under:
4" PVC SCH 40 Sidewalk Sleeve Pipe.....LF

8 – SITE WATER DISTRIBUTION SYSTEM

The work covered by these provisions consists of constructing waterlines within the rest area as required by the plans and provisions herein or directed by the Engineer. The Contractor will furnish all materials, labor, equipment, and incidentals necessary to complete the proposed utility work.

General Construction Requirements

Specifications
The proposed utility construction will meet the applicable requirements of the N. C. Department of Transportation's "Standard Specifications for Roads and Structures" (latest edition) July 2006 and the following provisions:

Plumbing Ordinances
All plumbing work in connection with the water distribution system installation will be done in accordance with local and State ordinances, and will be subject to inspection by the particular County Health Authorities or by authorities of the Sanitary Engineering Section, Division of Health Services, Department of Human Resources and/or authorities of the Water quality Section's, Division of Environmental Management, Department of Natural Resources and Community Development.

Trenches and Backfill for Utility Pipe Line Construction
The utility excavations will be made and the pipes will be laid in accordance with Section 300 of the Standard Specifications and as specified herein.

Clearing and Grading
The Contractor will limit his clearing to only that absolutely necessary to construct the water system (lines for distribution, etc.).

General
The Contractor will furnish and install all material for the water distribution system within the rest area as shown on the Site Development drawings and as specified herein, consisting of water lines, fittings, gate valves, stop and drain valves and valve boxes. Also included will be water line tests, sterilization and flushing of the entire water system and all other items not specifically mentioned but necessary to complete the work. Type of pipe material to use in the water line distribution system will be PVC Schedule 80. All pipe tees and bends will be ductile iron (incidental to water line installation).

Polyvinyl Chloride Water Pipe
PVC water pipe will be schedule 80 with a minimum of 200 psi pressure rating, and sized as shown on the plans. The pipe, when used for conveying drinking water, will meet the requirements of the National Sanitation Foundation Seal of approval for potable water.

Gate Valves
Gate valves in the water system where shown on the plans will be bronze, non-rising stem type, with body conforming to ASTM B62; stem will be of best silicon brass and the threads conforming to ANSI B2.1.

Valve Boxes
Valve boxes will be polyester/fiberglass, constructed with ultraviolet inhibitors. Valve box assembly will be constructed in two sections: bottom, and cap. Bottom section of valve box assembly will be adjustable for height and variances. Install valve box with cap flush with the proposed finished grade. Place three inches of crushed stone (No. 67 aggregate under valve and bottom section. Valve box size will accommodate valves and piping as shown on the plans and approved by the Engineer. Submit shop drawing for approval by Engineer.

Construction
Piping will consist of 1/2 inch thru 4 inch pipe, which will be installed as shown on the plans. Pipe fittings needed to complete the work and not individually noted herein will be considered part of the work of 1/2 inch thru 4 inch pipe.

The limits of clearing for installing water lines will be held to a maximum of 6 feet, except in critical areas where the Engineer may establish greater limits. Trees and shrubs, which are damaged, will be repaired and/or removed in accordance with applicable provisions of Section 894-4 of the Standard Specifications.

All PVC pipe must be installed according to manufacturer's recommendations. Pipe will be cut square, burrs removed from cut end, cleaned and dried. Apply cement to pipe and fitting with rapid and thorough coverage, assemble parts quickly, using 1/8 to 1/4 turning motion. Hold in place for two minutes to offset tendency to move out of fittings.

Pipe will be laid in a snaking manner to allow for expansion and contraction, and in such a way to avoid bumps, boulders, and holes that might result in stress on the pipe. If, at any time before completion of the contract, any broken pipe or any defects are found in the lines or in any of their fittings or appurtenances, they will be replaced or corrected. All pipe, fittings and appurtenances will be carefully examined for defects before placing and any found defective will not be used.

The pipe trenches will be conditioned by removing the existing foundation material by undercutting one foot or to a depth as directed by the Engineer, and backfilling with either suitable local material or foundation condition material consisting of clean sand as approved by the Engineer as being suitable for the purpose intended. The selection of the type of backfill to be used for foundation conditioning will be made by the Engineer. **(Note: Foundation material is 6" around pipe incidental to water line installation).**

Pipe will not be laid upon a foundation into which frost has penetrated, or at any time, that in the opinion of the Engineer, there is danger of the formation of ice or frost at the bottom of the excavation. The Engineer may at his discretion allow construction of the pipeline to continue under freezing conditions provided the Contractor promptly backfills the trench as directed.

PVC pipe will have its location marked by using a detectable marking tape, installed 12 to 18 inches below finished grade. Such tape will be as approved by the Engineer. The proposed pipe will be laid in trenches not less than 24 inches in depth below the finished grade. After the installation of pipe has been tested, inspected, and approved by the Engineer, it will be promptly backfilled and compacted to a density equal to that of the surrounding undisturbed soil.

The locations for water lines and valves with valve boxes, as shown on the plans, are substantially correct; however, the Engineer will establish the exact location.

Water Line Test

Prior to backfilling the Contractor will test all waterlines in the water system for eight (8) hours under a water pressure of 150 PSIG. Leaks will be repaired by tightening the joint or by remaking the joint if the tightening fails to stop the leak.

Sterilizing and Flushing Piping System

All water piping will be sterilized with chlorine concentration. All lines will be filled with water and chlorine concentration so that an overall chlorine residual to the water of at least 100-ppm will result. During the filling all trapped air through drinking fountains, yard hydrants, valves, etc., will be released. After the lines have been filled with water and chlorine, the pipe system will be valved off and the chlorinated water allowed to remain in the system for a 24-hour period. At the end of this period, the chlorine residual count should be at least 10 ppm. The lines will then be thoroughly flushed to insure the removal of all sediment, pipe seals, etc. This process will be subject to inspection and/or supervision by the local Health Authorities.

Compensation
The work of furnishing and installing ½ inch thru 4 inch water lines with sand bedding as described above when completed, tested, and accepted will be paid for at the contract unit price per linear foot measured in place. The work of furnishing and installing Gate valves and boxes will be paid for at the contract unit price per each for 'Gate Valve and Box' in the sizes shown below complete in place and accepted. The work of repairing existing water pipe, any size up to 4", complete, tested, and accepted will be paid for at the contract unit price per linear foot for 'PVC, Water Pipe, SCH 80 Repair'.

Payment will be made under:
1" PVC Water Pipe, SCH 80 ..... LF
3" PVC Water Pipe, SCH 80 ..... LF
1" Gate Valve and Box ..... EA
3" Gate Valve and Box ..... EA
PVC Water Pipe, SCH 80 Repair ..... LF

9 – SITE SANITARY SEWER SYSTEM

Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
Polyvinyl chloride (PVC) sewer pipe and fittings will conform to ASTM D-3034 - (SDR-35) specifications. The pipe will be installed in accordance with the applicable utility provisions herein, and as shown on the utility plans and as directed by the Engineer. PVC sewer pipe will be of the size and wall thickness (SDR) as noted on the utility plans, and will be installed in accordance with approved bedding methods.

PVC sewer pipe will be of sufficient wall thickness and strength to withstand the various earth and impact loads that bear on the installed pipe. The pipe will be circular in shape with no appreciable distortion. The pipe will have a gasket joint, used in conjunction with an integral bell, which will be a homogeneous part of the pipe.

The joints for PVC sewer pipe will be of the push-on-type, with flexible elastomeric seals conforming to ASTM D-1784 Specifications. Other types of seals may be used, if approved by the Engineer. The PVC pipe bells made as an integral part of the PVC pipe will conform to ASTM D-3212 Specifications. The pipe will be assembled in accordance with the recommendations of the manufacturer and in accordance with the specifications. Compression type couplings may be used to joint plain-end PVC sewer pipe sections, if approved by the Engineer. However, such joints will allow for pipe expansion.

Polyvinyl (PVC) sewer pipe installed in accordance with the plans utility provisions herein and accepted will be measured along the pipe and paid for at the contract unit price per linear foot '6" Sanitary Gravity Sewer'. Such prices and payments will be full compensation for furnishing all labor, equipment, material, pipe accessories, fittings, gaskets, seals, excavation, bedding material, backfill, leakage tests, and incidentals necessary to complete the work as required.

Payment will be made under:

6" Sanitary Gravity Sewer ..... LF

Sanitary Sewer Clean Out
Contractor will install sanitary sewer cleanouts where shown on the plans but not less than every 50', with screw type brass covers, encased in 4"x 12"x 12" concrete pad flush with ground. Sanitary Sewer Cleanouts will be paid for at the contract unit price for each upon satisfactory completion of the work.

Payment will be made under:
Sanitary Sewer Cleanout 4" ..... EA

Connection to Existing Sewer Manhole/Sewer Line
The contractor will install Sanitary Sewer Line and connect to existing sanitary sewer manhole/Sewer Line as shown on the plans and as directed by the Engineer.

Connection to the sewer manhole/sewer line will be paid for at the contract unit price for each upon satisfactory completion of the work.

Payment will be made under:
Connection to Sewer Manhole/Sewer Line ..... EA

10 – RELOCATION OF DIRECT BURIAL POST TOP LIGHT AND RELOCATION OF OUTDOOR PHONES

This provision covers relocation of existing post top lights and poles and relocation of existing exterior payphones

General
Relocate existing post top lights with direct burial poles and existing exterior payphones as shown on the plans and as directed by the Engineer. Relocation will include, but not be limited to, dismounting the light and pole or phone and pedestal; removing the existing concrete foundation, storing items during construction, constructing a new pad for phone with conduit and anchor bolts, reinstallation of the light and direct burial pole or phone and pedestal and reconnecting to electrical lighting circuit and/or new phone service.

Note: The site will remain open to the public during the majority of the project. The site lighting system must be maintained for the safety and security of the public. Electrical and/or phone lines damaged during construction must be repaired within 48 hours.

See Standard Specifications Section 1411 Electrical Junction Boxes.

Install electric service (120/240 volt) and/or phone service (10-Pair) lines in (2" conduit) as shown on the details or as directed by the Engineer.

Service will be reconnected immediately after the area where they are to be relocated to is available and prepared.

Compensation
Relocation of post top light and pole and relocation of payphone and pedestal will be paid for at the contract unit price each successfully relocated and accepted. 2" Sleeves for underground elec. / phone service (Sch 40 PVC) will be paid for in linear feet successfully installed and accepted.

Electrical Junction Box 12" will be measured and paid for as described in Standard Specifications Section 1411-4.

Such price and payment will be full compensation for all work covered by this special provision; including but not limited to furnishing all labor, materials, equipment and any other incidentals necessary or required to complete the work and restore service.

Payment will be made under:
Relocate Post Top Light and Pole ..... EA
Relocate Payphone and Pedestal ..... EA
2" Sleeve for Underground Elec./ Phone Service (Sch 40 PVC) .... LF
Electrical Junction Box 12 Inch ..... EA

11 – RELOCATION AND INSTALLATION OF SITE AMENTITIES

General
This provision covers the work of relocating existing site amenities including but not limited to precast exposed aggregate trash receptacles and ash urns and molded plastic recycling centers. These amenities will be those existing on site or furnished to the contractor and will be shifted as necessary during the phasing of construction to allow continued usage and to avoid damage from the construction operations. At the appropriate stage of completion and as directed by the Engineer in the field the amenity will be installed in its final location on a 4" concrete pad or on proposed sidewalk areas.

The contractor will be responsible for replacing any trash receptacles, ash urns or recycling centers that are damaged during construction because of construction activities or the relocation process.

Compensation
There will be no direct compensation for the relocating and installation of site amenities. The 4" concrete pad that the amenity sits on will be paid for as 4" Concrete Sidewalk.

12 – 4" CONCRETE SIDEWALK, 4" CONCRETE PAVEMENT AND DECORATIVE PAVERS

General
This provision covers 4" concrete sidewalks and 4" Concrete Pavement with Decorative Pavers. All sidewalks and concrete plaza as indicated on plans will be 4" concrete. All applicable sections of the Standard Specifications Section 825, Incidental Concrete Construction - General and Section 848, Concrete Sidewalks, Driveways and Wheelchair Ramps, will apply.

Materials
See Standard Specifications Section 848 for concrete specifications. Decorative Pavers will be interlocking concrete pavers, size shall be a large modular square- 3 1/8 inch by 11 ¾ inch by 11 ¾ inch in the 'River Street Blend' color or the equivalent. Submit sample (at least 3 paver units but enough to show color variations that will be provided in the full installation) for approval prior to beginning installation.

Pavers will be first class representation of the type specified and meet all applicable standard specifications of the concrete paver industry.

Installation
Remove all construction and vegetative debris and compact subgrade in area to be paved. Construct expansion joints and place groove joints as shown on plans and as directed in Section 825-10 of the Standard Specifications and as detailed in Section 848.01 of the Standard Drawings. Scoring patterns will be as shown on Layout Plan unless field revisions necessitate changes. Any revisions will be at the direction of the Engineer in the field.

Form channels or ledges for decorative paver banding and edges with stepped concrete pavement beneath to accommodate paver depth as shown on plans and details. Install pavers in preformed channels within the concrete pavement as detailed on the plans and details. Lay pavers on full mortar beds and fill all joints with mortar. Mortar joints will be tight, uniform and of a consistent width. Install pavers so that surface level of pavers and concrete paving create a smooth continuous surface with no raised edges and no changes in level other than the intended surface slope for drainage.

Compensation
Concrete sidewalk will be paid for as indicated in the Standard Specifications. Concrete pavement will be paid for as '4" Concrete Pavement' in square yards, measured along the surface of the completed and accepted work. Such price includes, but is not limited to excavating and backfilling, sawing the existing sidewalk, furnishing and placing concrete, and constructing and sealing joints.

Decorative pavers will be paid for as 'Decorative Paver on Concrete Base' in square feet, measured along the surface of the completed and accepted work. Such price includes, but is not limited to furnishing and placing pavers, mortar bed and mortar joints.

Payment will be made under:
4" Concrete Pavement ..... SY
Decorative Paver on Concrete Base .....SF

13 – CONCRETE STEPS WITH CONCRETE CHEEK WALLS AND HANDRAILS

General

This provision consists of constructing concrete steps, cheek walls and handrails as shown on the plans and details, including all materials, labor, equipment and grading to complete the work.

All applicable requirements of Incidental Concrete Construction-General, Section 825, Reinforced Brick Masonry Construction – General, Section 832 and Fabricating and Placing Reinforcement, Section 425 of the Standard Specifications will apply.

Materials

Concrete will be Class B. Handrails will be Schedule 40, 1 ½" outside diameter aluminum pipe with a clear brushed anodized finish.

Construction/Installation

Construct concrete in accordance with Section 825, except as otherwise noted herein. Furnish and place reinforcement, as shown on the plans and details, in accordance with the provisions of Section 425. Give formed surfaces of the concrete a rubbed finish. Give unformed surfaces a float finish.

Erect handrails as shown on the details, straight and true to line and grade. They will be core mounted into pipe sleeve as recommended by manufacturer. All welds will be filed smooth to the touch.

Compact backfill to a degree comparable to the adjacent undisturbed material.

Compensation

Concrete steps and concrete cheek walls will be paid for as 'Concrete Steps with Concrete Cheek Walls' in cubic yards of concrete, computed from the dimensions shown on the plans or established by the Engineer, which has been completed and accepted.

Handrails will be paid for as 'Handrail on Steps' in linear feet as measured along the surface of the completed and accepted work.

Such price and payment will be full compensation for all work covered by this special provision; including but not limited to furnishing all labor, materials, equipment and any other incidentals necessary or required to complete the work.

Payment will be made under:
Concrete Steps with Concrete Cheek Walls ..... CY
Handrail on Steps ..... LF

14 - CONCRETE CURB

All applicable sections of the Standard Specifications Section 825, Incidental Concrete Construction - General and Section 846, Concrete Curb, etc. will apply.

Concrete curb will be 6 inch by 15 inch as detailed in the plans.

Payment will be made under:
6" x 15" Concrete Curb .... LF

15 - GRANITE SCREENINGS

General
The work covered by this special provision consist of furnishing and installing granite screenings as shown on the plans and details and as directed by the Engineer in the field.

Materials
Granite screenings will be ¼" and less with fines. They will be free of foreign materials and any organic matter.

Construction/Installation
Place screenings on well compacted sub-grade in lifts of 2 inches slightly dampening and compacting between each lift to bring to proposed grade. Finished grade will be smooth without depressions and will have positive drainage.

Compensation
Granite screenings will be measured and paid for as 'Granite Screenings' in tons that have been satisfactorily installed and accepted by the Engineer.

Such price and payment will be full compensation for all work covered by this special provision; including but not limited to furnishing all labor, materials, equipment and any other incidentals necessary or required to complete the work.

Payment will be made under:
Granite Screenings..... TON

16 - MODULAR CONCRETE WALLS

1.01 Description

A. Work shall consist of furnishing and constructing of a modular block Retaining/Freestanding Wall System in accordance with these specifications and in reasonably close conformity with the lines, grades, design, and dimensions shown on the plans.

B. Work includes preparing foundation soil, furnishing and installing leveling pad, unit drainage fill and backfill to the lines and grades shown on the construction drawings.

C. Work includes furnishing and installing geogrid soil reinforcement of the type, size, location, and lengths designated on the construction drawings.

1.02 Related Sections

A. Section 02100 - Site Preparation
B. Section 02200 - Earthwork

1.03 Reference Documents

A. American Society for Testing and Materials (ASTM)

1. ASTM C-1372 Specification for Segmental Retaining Wall Units
2. ASTM D-422 Particle Size Analysis
3. ASTM D-698 Laboratory Compaction Characteristics of Soil - Standard Effort
4. ASTM D-4318 Liquid Limit, Plastic Limit and Plasticity Index of Soils
5. ASTM D-4595 Tensile Properties of Geotextiles - Wide Width Strip
6. ASTM D-5262 Unconfined Tension Creep Behavior of Geosynthetics
7. ASTM D-3034Polyvinyl Chloride Pipe (PVC)
8. ASTM D-1248 Corrugated Plastic Pipe
9. ASTM D-4475 Horizontal Shear Strength of Pultruded Reinforced Plastic Rods

B. Geosynthetic Research Institute (GRI)

1. GRI-GG4 Determination of Long Term Design Strength of Geogrids
2. GRI-GG5 Determination of Geogrid (soil) Pullout

C. National Concrete Masonry Association (NCMA)

1. NCMA SRWU-1 Test Method for Determining Connection Strength of SRW
2. NCMA SRWU-2 Test Method for Determining Shear Strength of SRW

1.04 Submittals/Certification

A. Contractor shall submit a Manufacturer's certification, prior to start of work, that the retaining wall system components meet the requirements of this specification and the structure design.

B. Contractor shall submit construction drawings and design calculations for the retaining wall system prepared and stamped by a Professional Engineer registered in the state of the project. The engineering designs, techniques, and material evaluations shall be in accordance with the Manufacturer's Design Manual, NCMA Design Guidelines For Segmental Retaining Walls, or the AASHTO Standard Specifications for Highway Bridges, Section 5.8 (whichever is applicable to designer).

C. Contractor shall submit a test report documenting strength of specific modular concrete unit and geogrid reinforcement connection. The maximum design tensile load of the geogrid shall be equal to the laboratory tested ultimate strength of geogrid / facing unit connection at a maximum normal force limited by the "Hinge Height" of the structure divided by a safety factor of 1.5. The connection strength evaluation shall be performed in accordance with NCMA test method SRWU-1.

1.05 Quality Assurance

A. Contractor shall submit certification, prior to start of work, that the retaining wall system (modular concrete units with fiberglass pins and specific geogrid):

1) Has been successfully utilized on a minimum of five (5) similar projects, i.e., height, soil fill types, erection tolerances, etc.; and

2) Has been successfully installed on a minimum of 1 million (1,000,000) square feet of retaining walls.

B. Contractor shall submit a list of five (5) previously constructed projects of similar size and magnitude by the wall installer where the same retaining wall system has been constructed successfully. Contact names and telephone numbers shall be listed for each project.

C. Contractor shall provide evidence that the design engineer has a minimum of five years of documental experience in the design for reinforced soil structures. The design engineer shall provide proof of current professional liability insurance with an aggregate coverage limit of not less than $2,000,000.

D. Owner shall/may provide soil testing and quality assurance inspection during earthwork and wall construction operations. Contractor shall provide any quality control testing or inspection not provided by the Owner. Owner's quality assurance program does not relieve the contractor of responsibility for quality control and wall performance.

1.06 Delivery, Storage and Handling

A. Contractor shall check all materials upon delivery to assure that the proper type, grade, color, and certification have been received.

B. Contractor shall protect all materials from damage due to jobsite conditions and in accordance with manufacturer's recommendations. Damaged materials shall not be incorporated into the work.

MATERIALS

2.01 Definitions

A. Modular Unit - a concrete retaining wall element machine made from Portland cement, water, and aggregates.

B. Structural Geogrid - a structural element formed by a regular network of integrally connected tensile elements with apertures of sufficient size to allow interlocking with surrounding soil, rock, or earth and function primarily as reinforcement.

C. Unit Drainage Fill - drainage aggregate, which is placed within and immediately behind the modular concrete units.

D. Reinforced Backfill - compacted soil, which is placed within the reinforced soil volume as outlined on the plans.

2.02 Modular Concrete Retaining Wall Units

A. Modular concrete units shall conform to the following architectural requirements:

1. Color will be Colonial Blend.
2. Face finish – "weathered" rock face on multiple sides. Other face finishes will not be allowed without written approval of Owner.
3. Bond configuration – randomly utilize the various shapes to avoid repetition of the same unit size. Avoid stack bonding of unit joint for more than two courses vertically.
4. Exposed surfaces of units shall be free of cracks or major imperfections.

B. Modular concrete materials shall conform to the requirements of ASTM C1372 - Standard Specifications for Segmental Retaining Wall Units.

C. Modular concrete units shall conform to the following structural and geometric requirements measured in accordance with appropriate references:

1. Compressive strength: ≥ 3000 psi (21 MPa) minimum;
2. Absorption: ≤ 8% (6% in northern states) for standard weight aggregates;
3. Dimensional tolerances: ± 1/8" (3 mm) from nominal unit dimensions not including rough split face, ±1/16" (1.5 mm) unit height - top and bottom planes;
4. Unit size: 6" (152 mm)(H) x 10" (254 mm)(D) minimum; width of units varies from 4" (101 mm) to 16" (406 mm) in 2" (51 mm) increments on front and back faces. A minimum of five unit sizes will be used.
5. Unit weight: 25 lbs to 60 lbs (11 kg to 27 kg) per unit;
6. Inter-unit shear strength: 600 plf (8 kN/m) minimum at 2 psi (13 MPa) normal pressure;
7. Geogrid/unit peak connection strength: 300-plf (4 kN/m) minimum at 2-psi (13 MPa) normal force.

D. Modular concrete units shall conform to the following constructability requirements:

1. Vertical setback: vertical (tilt wall back slightly to achieve positive batter) or 1" (25 mm) + per course per the design;
2. Alignment and grid positioning mechanism - fiberglass pins, one for each pin placement series or a minimum of one pin per unit;

3. Maximum horizontal gap between erected units shall be ≤ 1/2 inch (13 mm).

2.03 Shear Connectors

A. Shear connectors shall be 1/2-inch (12 mm) diameter thermoset isopthalic polyester resin-pultruded fiberglass reinforcement rods or equivalent to provide connection between vertically adjacent units. Pins shall be 5 1/4" (130 mm) long and capped with a 3/4" (19 mm) diameter "shoulder". Strength of shear connectors shall be a minimum of 6400 psi (44 MPa) per ASTM D-4475 and shall be applicable over a design temperature of 10 degrees F to + 100 degrees F (-10 to 40 degrees C).

B. Shear connectors shall be capable of holding the geogrid in the proper design position during grid pre-tensioning and backfilling.

2.04 Base Leveling Pad Material

A. Material shall consist of a compacted crushed stone base or non-reinforced concrete as shown on the construction drawings.

2.05 Unit Drainage Fill

A. Unit drainage fill shall consist of clean 1" (25 mm) minus crushed stone or crushed gravel meeting the following gradation tested in accordance with ASTM D-422:

Sieve Size	Percent Passing
1 inch (25 mm)	100
3/4-inch (19 mm)	75-100
No. 4	0 - 10
No. 50	0 - 5

B. One cubic foot (0.028 m3), minimum, of drainage fill shall be used for each square foot (0.093 m2) of wall face. Drainage fill shall be placed within cores of, between, and behind units to meet this requirement.

2.06 Reinforced Backfill

A. Reinforced backfill shall be free of debris and meet the following gradation tested in accordance with ASTM D-422:

Sieve Size	Percent Passing
2-inch (50 mm)	100
3/4-inch (19 mm)	100-75
No. 40	0-60
No. 200	0-35

Plasticity Index (PI) <15 and Liquid Limit <40 per ASTM D-4318.

B. The maximum aggregate size shall be limited to 3/4 inch (19 mm) unless field tests have been performed to evaluate potential strength reductions to the geogrid design due to damage during construction.

C. Material can be site-excavated soils where the above requirements can be met. Unsuitable soils for backfill (high plastic clays or organic soils) shall not be used in the backfill or in the reinforced soil mass.

D. Contractor shall submit reinforced fill sample and laboratory test results to the Architect/Engineer for approval prior to the use of any proposed reinforced fill material.

2.07 Geogrid Soil Reinforcement

A. Geosynthetic reinforcement shall consist of geogrids manufactured specifically for soil reinforcement applications and shall be manufactured from high tenacity polyester yarn. Polyester geogrid shall be knitted from high tenacity polyester filament yarn with a molecular weight exceeding 25,000 g/m and a carboxyl end group values less than 30. Polyester geogrid shall be coated with an impregnated PVC coating that resists peeling, cracking, and stripping.

B. Ta, Long Term Allowable Tensile Design Load, of the geogrid material shall be determined as follows:

Ta = Tult / (RFcr*RFd*RFid*FS)
Ta shall be evaluated based on a 75-year design life.

1. Tult, Short Term Ultimate Tensile Strength
Tult is based on the minimum average roll values (MARV)

2. RFcr, Reduction Factor for Long Term Tension Creep
RFcr shall be determined from 10,000-hour creep testing performed in accordance with ASTM D5262. Reduction value = 1.60 minimum.

3. RFd, Reduction Factor for Durability
RFd shall be determined from polymer specific durability testing covering the range of expected soil environments. RFd = 1.10 minimum.

4. RFid, Reduction Factor for Installation Damage
RFid shall be determined from product specific construction damage testing performed in accordance with GRI-GG4. Test results shall be provided for each product to be used with project specific or more severe soil type. RFid = 1.05 minimum.

5. FS, Overall Design Factor of Safety
FS shall be 1.5 unless otherwise noted for the maximum allowable working stress calculation.

C. The maximum design tensile load of the geogrid shall not exceed the laboratory tested ultimate strength of the geogrid/facing unit connection as limited by the "Hinge Height" divided by a factor of safety of 1.5. The connection strength testing and computation procedures shall be in accordance with NCMA SRWU-1 Test Method for Determining Connection Strength of SRW.

D. Soil Interaction Coefficient, Ci
Ci values shall be determined per GRI:GG5 at a maximum 0.75-inch (19 mm) displacement.

E. Manufacturing Quality Control
The geogrid manufacturer shall have a manufacturing quality control program that includes QC testing by an independent laboratory.
The QC testing shall include:
Tensile Strength Testing
Melt Flow Index (HDPE)
Molecular Weight (Polyester)

2.08 Drainage Pipe

A. If required, the drainage pipe shall be perforated or slotted PVC pipe manufactured in accordance with ASTM D-3034 or corrugated HDPE pipe manufactured in accordance with ASTM D-1248.

EXECUTION

3.01 Excavation

A. Contractor shall excavate to the lines and grades shown on the construction drawings. Owner's representative shall inspect the excavation and approve prior to placement of leveling material or fill soils. Proof roll foundation area as directed to determine if remedial work is required.

B. Over-excavation and replacement of unsuitable foundation soils and replacement with approved compacted fill will be compensated as agreed upon with the Owner.

3.02 Base Leveling Pad

A. Leveling pad material shall be placed to the lines and grades shown on the construction drawings, to a minimum thickness of 6 inches (150 mm) and extend laterally a minimum of 6" (150 mm) in front and behind the modular wall unit.

B. Soil leveling pad materials shall be compacted to a minimum of 95 % Standard Proctor density per ASTM D-698

C. Leveling pad shall be prepared to insure full contact to the base surface of the concrete units.

3.03 Modular Unit Installation

A. First course of units shall be placed on the leveling pad at the appropriate line and grade. Alignment and level shall be checked in all directions and insure that all units are in full contact with the base and properly seated. If vertical unit alignment is chosen, units shall be uniformly tilted back towards the backfill slightly to create and maintain positive wall batter.

B. Place the front (any "weathered" finish side) of units side-by-side. Do not leave gaps between adjacent units along the exposed face(s). Layout of corners and curves shall be in accordance with manufacturer's recommendations.

C. Install shear/connecting pins per manufacturer's recommendations.

D. Place and compact drainage fill within and behind wall units. Place and compact backfill soil behind drainage fill. Follow wall erection and drainage fill closely with structure backfill.

E. Maximum stacked vertical height of wall units, prior to unit drainage fill and backfill placement and compaction, shall not exceed two courses.

3.04 Structural Geogrid Installation

A. Geogrid shall be oriented with the highest strength axis perpendicular to the wall alignment.

B. Geogrid reinforcement shall be placed at the strengths, lengths, and elevations shown on the construction design drawings or as directed by the Engineer.

C. The geogrid shall be laid horizontally on compacted backfill and attached to the modular wall units. Place the next course of modular concrete units over the geogrid. The geogrid shall be pulled taut, and anchored prior to backfill placement on the geogrid.

D. Geogrid reinforcements shall be continuous throughout their embedment lengths and placed side-by-side to provide 100% coverage at each level. Spliced connections between shorter pieces of geogrid or gaps between adjacent pieces of geogrid are not permitted.

3.05 Reinforced Backfill Placement

A. Reinforced backfill shall be placed, spread, and compacted in such a manner that minimizes the development of slack in the geogrid and installation damage.

B. Reinforced backfill shall be placed and compacted in lifts not to exceed 6 inches (150 mm) where hand compaction is used, or 8 - 10 inches (200 to 250 mm) where heavy compaction equipment is used. Lift thickness shall be decreased to achieve the required density as required.

C. Reinforced backfill shall be compacted to 95% of the maximum density as determined by ASTM D698. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer and shall be dry of optimum, + 0%, - 3%.

D. Only lightweight hand-operated equipment shall be allowed within 3 feet (1 m) from the tail of the modular concrete unit.

E. Tracked construction equipment shall not be operated directly upon the geogrid reinforcement. A minimum fill thickness of 6 inches (150 mm) is required prior to operation of tracked vehicles over the geogrid. Tracked

vehicle turning should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.

F. Rubber tired equipment may pass over geogrid reinforcement at slow speeds, less than 10 MPH (15 KPH). Sudden braking and sharp turning shall be avoided.

G. At the end of each day's operation, the Contractor shall slope the last lift of reinforced backfill away from the wall units to direct runoff away from wall face. The Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

3.06 Coping Installation

A. Coping shall be glued to underlying units with an all-weather adhesive recommended by the manufacturer or as approved by the Engineer.

3.07 As-built Construction Tolerances

A. Vertical Alignment: ± 1.5" (40 mm) over any 10' (3 m) distance.

B. Wall Batter: within 2 degrees of design batter.

C. Horizontal alignment: ± 1.5" (40 mm) over any 10' (3 m) distance. Corners, bends & curves: ± 1 ft (300 mm) to theoretical location.

D. Maximum horizontal gap between erected units shall be 1/2 inch (13 mm).

3.08 Field Quality Control

A. Quality Assurance - The Owner shall/may engage inspection and testing services, including independent laboratories, to provide quality assurance and testing services during construction. This does not relieve the Contractor from securing the necessary construction quality control testing.

B. Quality assurance should include foundation soil inspection. Verification of geotechnical design parameters, and verification that the contractor's quality control testing is adequate as a minimum. Quality assurance shall also include observation of construction for general compliance with design drawings and project specifications. (*Quality assurance is usually best performed by the site geotechnical engineer.)*

C. Quality Control – The Contractor shall engage inspection and testing services to perform the minimum quality control testing described in the retaining wall design plans and specifications. Only qualified and

experienced technicians and engineers shall perform testing and inspection services.

D. Quality control testing shall include soil and backfill testing to verify soil types and compaction and verification that the retaining wall is being constructed in accordance with the design plans and project specifications.

PART 4: COMPENSATION

Modular Concrete Block Walls will be measured and paid for as 'Freestanding / Seat Wall', 'Retaining Wall' and Retaining/Planter Seat Wall in square feet, measured along the surface of the completed and accepted work from the top of the leveling pad to the top of the wall. Such price includes, but is not limited to any redesign, leveling pad, drainage material, drain pipe, filter fabric, soil reinforcement, reinforced backfill, labor, equipment and materials necessary to perform the work.

Payment will be made under:
Freestanding Seat Wall . . . . . .SF
Retaining Wall . . . . . .SF
Retaining / Planter Seat Wall . . . . . .SF

17 – PRECAST CONCRETE WALL COPING

General
This special provision consists of furnishing and installing precast concrete coping on walls as shown on plans, details and as described herein.

All applicable requirements of Incidental Concrete Construction-General, Section 825 of the Standard Specifications will apply.

Materials
Coping will be a Portland cement precast unit with reinforcing steel in a minimum height of 3 inches and a width of 12 inches. Edges will be chamfered and will form a comfortable edge for seating. Coping will be colored with a fully integrated pigment to coordinate with the Modular Concrete Block Wall system. Color selection will be made from samples furnished to the Engineer.

Coping will be supplied in consistent and uniform lengths with variances only for radius and to meet total wall lengths.

Installation
Install according to manufacturer's recommendations. Coping will be secure and attached in such a manner to prevent movement. It will provide positive drainage from the surface of the unit.

Submittals
Submit color samples for selection by the Engineer. Submit shop drawings showing proposed layout of coping and attachment detail for approval by the Engineer.

Compensation
Wall coping will be measured and paid for as 'Precast Concrete Wall Coping' in linear feet as measured along the surface of the completed and accepted work.

Such price and payment will be full compensation for all work covered by this special provision; including but not limited to furnishing all labor, materials, equipment and any other incidentals necessary or required to complete the work.

Payment will be made under:
Precast Concrete Wall Coping. . . . . LF

18 – PICNIC SHELTER AND SINGLE PICNIC TABLE

General: The work covered by this provision consists of furnishing and constructing a picnic shelter with table and concrete pad (Handicapped Accessible) as shown on the

drawings and herein specified; including all labor, materials, services and incidentals required to complete the work.

Site Preparation: After picnic shelter location and orientation are staked and approved by the Engineer, perform any necessary clearing and grubbing in accordance with Section 200 "Clearing and Grubbing" of the Standard Specifications. Grade area for the concrete pad level with drainage swale cut on high side and fill on low side as shown on the details to achieve positive drainage around the pad.

Picnic Shelters
Concrete and Steel
Use Class "B" concrete in all footings and concrete pad. All concrete and all structural and reinforcing steel will comply with applicable portions of Section 825 'Incidental Concrete Construction – General'; Section 1070, 'Reinforcing Steel'; and Section 1072 'Structural Steel' of the Standard Specifications.

Include all fasteners, anchors, ties, gusset plates, etc., as required. Use ½ inch hot-dip galvanized steel thru bolts in diameter and length as required. Install with steel galvanized washers under both bolt head and nut, except for gusset plates; galvanizing will conform to all applicable requirements of Section 1076 of the Standard Specifications.

Carpentry and Millwork
Grading of all lumber, plywood and trim will conform to the association under whose rules it is graded. Moisture content will not exceed 18 percent for framing lumber and 12 percent for millwork and trim.

All lumber in contact with concrete or masonry, and/or soil will be treated with water borne pentachlorophenol or CCA (Chromated Copper Arsenate) in accordance with standards of the American Wood Preserver's Association. Minimum retention will be 0.25 pcf for material 2 inches and smaller and 0.40 pcf for materials greater than 2 inches.

Store all lumber and millwork in a manner that will keep it dry and well ventilated, well off the ground, and adequately covered.

All timbers, rafters and fascia will be full size, rough-cut No. 1 southern yellow pine, thru-bolted where shown on drawings and securely spiked together at all other joints. Stain all timbers, rafters, fascia and underside of roof decking. The Engineer will select color from samples furnished by the contractor.

Coat section of treated wood columns in footing with asphalt paint as shown on drawings. Asphalt paint shall not be visible above concrete footing.

Roof decking will be single tongue and groove, 2 inches by 6 inches with 'v' joints on face side, kiln-dried No. 1 southern yellow pine. Double spike each member at every

rafter. Framing rafters and fascia will be cut square on bearings, closely fitted, accurately set to required lines and levels, and rigidly secured in place.

Moisture Protection
Roof will be shingles to match rest area roof. Furnish and install, where shown on drawings, all items of flashing and caulking as required to properly and completely weatherproof the shelter. Flashing, drips, etc., will be galvanized steel, 26 Ga. or aluminum, .019-inch sheeting, unless otherwise shown on details. Caulking will be installed in accordance with the manufacturer's specifications. Use Dap 'Flex Seal', Dow Corning '790', or Pecora GC-9 'Synthacalk' or approved equal.

Picnic Table (Terrazzo and Steel)
General
The picnic table will include site preparation, grading, concrete footing, welded tubular steel frame with a terrazzo table top and wood benches, all hardware required for assembly and other incidentals as necessary for complete installation in accordance with the details and as described herein.

The Engineer reserves the right to inspect the frames and tops at the place of manufacture in accordance with Section 106-6 of the Standard Specifications.

Submittal
Submit color chart (four copies) on epoxy glaze coatings to be used on table bench seats and steel frames to the Engineer for color selection.

Concrete and Steel
Use class "B" concrete in all table footings and concrete pad. All concrete and all structural and reinforcing steel will comply with applicable portions of Section 825, 'Incidental Concrete Construction – General'; Section 1000, 'Portland Cement Concrete Production and Delivery'; Section 1070 'Reinforcing Steel'; and Section 1072 'Structural Steel' of the Standard Specifications.

Benches
Wood will be nominal size 2" x 10", old growth vertical grain Douglas Fir of "C" or better grade.

Terrazzo Tops
Terrazzo tabletop- reuse the best tabletop from tables that have been removed and the tops salvaged during demolition.

1. Installation of Table Tops:
   A. Bolt top in place without binding.
   B. Clean tops of grease, dirt, etc., and apply two (2) additional coats of sealing solution, buff with electric machine and leave in clean and finished condition.
   C. Leave top in good condition. Chipped tops, rough or chipped edges and cracked slabs will not be accepted.

2. Painting of Table, Wood Benches and Steel Frame:
   A. Bench – Use one coat of epoxy glaze coating mixed with one part of epoxy thinner, and then use two coats of epoxy glaze coating, gloss finish.
   B. Exterior Steel – Use one coat factory priming exterior rust resistant metal primer, then use two coats of epoxy glaze coating, gloss finish.

      NOTE: Painter will spot check a small area with a second coat to determine if primer "lifts off". If it does, obtain from the paint factory a second coat that will not lift from the priming coat actually used by the factory.

Concrete Pad

Use Class "B" concrete. All concrete and structural and reinforcing steel will comply with applicable portions of Section 825 'Incidental Concrete Construction – General'; Section 1000, 'Portland Cement Concrete Production and Delivery'; Section 1070, 'Reinforcing Steel'; and Section 1072 'Structural Steel' of the Standard Specifications.

Form and pour concrete pad to dimensions and with slope as shown in details. Give concrete pad the same finish as sidewalks. Do not place backfill until at least 3 curing days have elapsed. Compact backfill to a degree comparable to the adjacent undisturbed material.

Compensation

The work of furnishing and installing the picnic shelter with table and concrete pad, when completed and accepted, will be paid for at the contract unit price each for 'Picnic Shelter, Single Picnic Table'. Such price will be full payment for each picnic shelter with table and concrete pad, including but not limited to, all labor, materials, and any other incidentals necessary or required to complete the work. There will be no separate payment for the concrete pad.

Payment will be made under:

Picnic Shelter, Single Picnic Table ..... EA

19 - FLAGPOLE

General: The work covered by this section consists of furnishing and installing a 30' Tapered Aluminum Flagpole at the location shown on the plans and details.

Materials: Satin finish aluminum pole will be 6" tapering to 3.5" with a .188" wall thickness. The flagpoles will be 30 foot exposed height with a minimum of 3 feet below ground. Internal halyard flagpole with all standard accessories, including revolving truck, gold anodized ball, stainless steel aircraft cable halyard, snap hooks, stainless steel direct drive winch behind locking access door and ground sleeve. Cabling will be set up to hold two flags. Submit 4 copies of catalogue cut and manufactures specifications for approval of flag pole.

Installation: Follow the manufacturer's recommendations for ground set mounting with an 80 M.P.H. design wind load.

Compensation: The work of furnishing and installing the flagpoles, when completed and accepted, will be paid for at the contract unit price each for 'Flag Pole'.

Such payment will be full compensation for all work covered by this section including, but not limited to, furnishing and installing the flagpole, flash collar, halyard, cleats, flag snaps, and all parts recommended by the manufacturer for a ground-set installation; and all labor, materials and equipment necessary to complete the work.

Payment will be made under:
Flagpole ..... EA

20 - FLAGPOLE SPOTLIGHTS

General: The work covered by this section consists of furnishing and installing two spotlights for the flagpole at the locations shown on the plans, as shown on the details and as directed by the Engineer.

Materials: Provide and install two (2) outdoor spotlights for each flagpole, with 120-volt power supply in conduit. Spotlights will have adjustable tilt, glare control, and die cast aluminum housing with bronze powder coat finish and gasket o-ring sealed tempered glass lens. Provide with 100-watt Metal Halide lamp, mount on aluminum gasket junction box and provide photocell. **Submit (6) copies of catalogue cuts of spotlights for approval prior to installation.**

Installation: Follow the manufacturer's recommendations for installation.

Compensation: The work of furnishing and installing the spotlights, when completed and accepted, will be paid for at the contract unit price each for 'Spotlight'.

Such payment will be full compensation for all work covered by this section including, but not limited to, furnishing and installing the spot lights as recommended by the manufacturer; all labor, materials and equipment necessary to complete the work.

Payment will be made under:
Flagpole Spotlights. . . . . .EA

21 – SPLIT RAIL FENCE

General

The work covered by this special provision consist of furnishing and installing the split rail fence as indicated on the plans and as directed by the Engineer. Split rail fence will be two rail.

Materials

Rails will be split Cedar or Hemlock. Post will be Locust. Stone will be #57. Post and rails will be free of any major defects with no chips or splintered pieces that could cause injury. All posts and rails will be reasonably straight and true with no apparent crooks or bows.

Installation

Fence will be installed at locations shown on plans as shown in detail. Contractor will stake the exact location for approval by the Engineer prior to installation. All sections will be a consistent length with any modifications being made equally to each end section. Posts will be installed using direct burial method. Aggregate will be used at each post location to assist in stabilization of post. Thoroughly tamp aggregate and soil around each post to firm. All rails will be straight and true to line and all post will be plum.

Monitor and maintain post in an upright, plum and stable position throughout the length of the contract. All rail and post attachments will be maintained secure.

Method of Measurement and Basis of Payment

The work of furnishing and installing Split Rail Fence as shown on the plans and details will be measured and paid for in the actual number of linear feet completed and accepted by the Engineer for 'Split Rail Fence'. Such price will be full compensation for furnishing and installing the split rail fence, post and rails; including but not limited to all materials, labor and equipment necessary to satisfactorily complete the work.

Payment will be made under:
Split Rail Fence..... LF

22 – PLANTER SOIL MIX

General
The work covered by this provision consist of furnishing and installing a soil mix in the planter as described herein and as indicated on the details.

Materials
Stone will be #57 Washed Stone.

Filter fabric separator will be manufactured for this purpose and will be of sufficient weight and strength and permeability for use as a soil / stone separator.

The planter soil mix will be a permanent planter mix manufactured specifically for this purpose. It will consist of approximately 60% mineral and 40% organic content or equivalent combination to give desired results. The pH of the mix will fall within a range of 5.8 to 6.5 and is will have a minimum CEC of 35. The components will be thoroughly and uniformly mixed by mechanical means.

All components and final mix will be reasonably free of weed seed, toxic substances or any other material that would be harmful to plant growth. The components and the mix will be stockpiled and transported in such a manner that prevents exposure to weed seed, toxic substances or any other material that would be harmful to plant growth. Stockpile locations on or off site will be approved by the Engineer. The components and mix will be free of any noxious weed and/or seed including and not limited to Johnson Grass, Mugwort, Nutsedge and Canadian Thistle.

The proposed mix specifications, the manufacturer's contact information and a sample in a one gallon resealable plastic bag will be submitted for approval prior to placement.

Installation
Place mix in planter over minimum 6" depth of #57 washed stone and filter fabric in horizontal layers not to exceed 12 inches. Each layer will be thoroughly compacted by means of water saturation using spray or sprinkler before next layer is added. After a minimum of a 24 hour settling period adjust planter mix to achieve a finished grade within 1" of proposed.

Method of Measurement and Basis of Payment
The work of furnishing and installing the Planter Soil Mix as shown on the plans and as approved by the Engineer, when completed and accepted, will be measured and paid for at the contract unit price per cubic yard for "Planter Soil Mix". The filter fabric separator

and the #57 washed stone will be considered incidental to this work and there will be no separate compensation for these items. Such price and payment will be full compensation for all work covered by this special provision; including but not limited to furnishing all labor, materials, and equipment necessary for installation, coordination with engineers and any other incidentals necessary or required to complete the work.

Payment will be made under:
Planter Soil Mix..... CY

23 - RAIN GARDENS

General

Rain Garden construction will be as shown on plans and details and as directed herein. Rain Garden excavation will not begin until all excavation and grading operations are completed and a vegetative cover is established in the vicinity of the garden and the area draining to it. If needed temporary piping of gutters will be utilized until such time the final connection can be made to the Rain Garden outfall location.

Materials

Rain Garden Creek Stone will consist of 'Cane Creek Stone' available from local North Carolina sources in a size range of approximately 4 to 10 inches in length by 2 to 6 inches in width and no more than 3 inches in depth. The Creek Stone will be placed to a depth of no less than 6 inches to approximately 12 inches and in such a manner so as not to restrict flow. A representative sample and the source of the Cane Creek Stone will be submitted for the Engineer's approval prior to delivery and placement.

Rain Garden Dry-stack Stone will consist of 'Blue Ridge' or 'Chocolate' field stone from local North Carolina sources. The stone will be proportioned and suitable for the purpose of this dry stack application. The large flat stone that will top the endwall will be a minimum of 2 inches thick and of sufficient width and length to completely cover the top of the endwall and be keyed into surrounding grade. The stone will have a relatively level surface area. The drain pipe outlets that daylight prior to the edge of the garden will receive the endwall treatment as shown on the Rain Garden Details and as directed by the Engineer in the field. A representative sample and the source for the stone will be submitted for the Engineer's approval prior to delivery and placement.

Rain Garden Soil Mix will consist of a mix composed of approximately 20% organic matter, 50% sand and 30% topsoil by volume. Samples of all components and sources will be submitted in one gallon resealable plastic bags for approval prior to creating the mix. Acceptable organic matter can be thoroughly composted yard waste, aged pine bark fines (probase), etc. Topsoil from the site is preferred if acceptable but should be a good friable loam material. Submit method for mixing along with samples. The final mix will have a permeability of .5 to 1 inch per hour. The pH value, nutrient, micro-nutrient and soluble salt levels will be within the acceptable limits for optimum plant growth as evaluated by the North Carolina Department of Agriculture (NCDOA), Soil Testing Lab.

The contractor will submit the mix sample in a one gallon plastic resealable bag six months prior to construction of the Rain Gardens. If there are minor adjustments needed in the nutrient level or pH level, the mix may be amended as recommended by the NCDOA Soil Test Report. Any amendments will be fully incorporated and evenly dispersed in mix prior to placement. If the ranges are too extreme or the proper drainage properties do not exist the mix components will be changed and/or the percentages of the components will be modified until a satisfactory soil mix can be obtained.

All components and final mix will be reasonably free of weed seed, toxic substances or any other material that would be harmful to plant growth. The components and the mix will be stockpiled and transported in such a manner that prevents exposure to weed seed, toxic substances or any other material that would be harmful to plant growth. Stockpile locations on or off site will be approved by the Engineer prior to producing the mix. The components and mix will be free of any noxious weed and/or seed including and not limited to Johnson Grass, Mugwort, Nutsedge and Canadian Thistle.

Construction
Locations and perimeter of gardens will be staked in the field and approved prior to beginning installation. Verify all elevations pertaining to the site and proposed Rain Garden grades before beginning construction. Excavate the rain garden area to desired depth and install the overflow drop inlet. Scarify the exposed subsoil in the garden area to a depth of at least 6 to 8 inches before placing the Rain Garden Soil Mix. To avoid unnecessary compaction of the existing soils and the Rain Garden Soil Mix, no heavy equipment will be used inside the rain garden area once the rain garden subsoil has been scarified.)

The Rain Garden Soil Mix will be placed over the entire garden area in horizontal layers not to exceed 12 inches. Each layer will be thoroughly compacted by means of water saturation using spray or sprinkler before next layer is added. Final grading of the Rain Garden Soil Mix will be accomplished after a minimum of a 24 hour settling period. The mix will be installed so that the finish grade is within 1" of proposed final grade. Apply 4" mulch layer within twenty-four hour period after rain garden soil mix is placed. Hand lay creek stone to dissipate flow from drain pipe outlets, construct dry-stack endwalls and line swales as shown on plans and details at the appropriate phase of construction. Plant during the appropriate planting season.

Method of Measurement and Basis of Payment: The work of furnishing and installing the Rain Garden Creek Stone as shown on the plans and as approved by the Engineer, when completed and accepted, will be paid for at the unit price per ton for "Rain Garden Creek Stone". The work of furnishing and installing the Rain Garden Dry-stack Stone as shown on the plans and as approved by the Engineer, when completed and accepted, will be paid for at the unit price per ton for "Rain Garden Dry-stack Stone". The work of furnishing and installing the Rain Garden Soil Mix as shown on the plans and as approved by the Engineer, when completed and accepted, will be paid for at the unit price per cubic yard for "Rain Garden Soil Mix". Such price and payment will be full

compensation for all work covered by this special provision; including but not limited to furnishing all labor, materials, and equipment for installation, coordination with engineers and any other incidentals necessary or required to complete the work.

Payment will be made under:

Rain Garden Creek Stone ..... Ton

Rain Garden Dry-stack Stone ..... Ton

Rain Garden Soil Mix ..... . CY

24 – SODDING

See Standard Specifications Sections 1664 – Sodding and Section 1060-7 - Sod. Sod will be a Tall Fescue/Bluegrass mixture. Submit sod source and how sod will be furnished (strips or rolls) for approval.

Fertilizer and limestone application will be based on NCDOA (N.C. Department of Agriculture) soil analysis results. Submit a copy of the soil analysis results along with the proposed type, grade and rate of applications to the Engineer for approval.

Soil samples will be taken according to industry standards and general recommendations by NCDOA from each rest area site.

Water for sodding will be furnished and paid for as 'Water for Planting' as described in Water for Planting contained in these Special Provisions.

25 - PLANTING

See Standard Specifications Sections 1060 - Landscape Development Materials and 1670 - Planting.

Seasonal Limitations: The initial planting and replacement of plants will be accomplished between October 15th and March 31st for all woody plant material (trees, shrubs and ground covers). All herbaceous plants and containerized grasses will be planted between September 1st and November 30th and March 1st and May 15th depending on requirements of each species. Exceptions to these seasonal limitations are at the discretion of the Engineer and will be submitted in writing. Submit for approval proposed schedule for plant installation, along with plant sources and contact information for them, by July 1st of the year that planting is to begin.

Mulch for Planting: Mulch will be double shredded aged hardwood bark from a single source unless otherwise approved by the Engineer. **Submit sample for approval prior to placement.**

Install mulch to a finished depth of 4 inches, rake and compact to create a uniform finish.

Water for Planting: Water for Planting will be applied in accordance with the standard specifications. The water for this project will be provided to the contractor through the on site water system. All applicable sections of Section 1060, 'Landscape Development Materials' and Section 1670, 'Planting' of the Standard Specifications will apply.

Establishment Period for Planting: An establishment period will begin after satisfactory installation and acceptance of all of the planting. All plants must be in an upright healthy condition, planted at the proper depth, mulched areas will be weed free and tidy and any staking or guying that is utilized must be in proper condition prior to beginning the establishment period. During the establishment period the contractor will be responsible for proper care of the plantings in accordance with Section 1670-14 Establishment.

All plants that do not continue to conform to the specifications and quality as approved when they were installed will be unacceptable. The contractor will remove all plants that are determined to be unacceptable from the site within five days of request by the Engineer. Replacements will be installed within the Seasonal Limitations.

Each month during the establishment period a meeting will be held between the Engineer and the Contractor to discuss establishment work required during that period. Additional meetings may be scheduled if deemed necessary by the Engineer. All the required work will be performed in a timely manner and with utmost regard to the safety and convenience of the rest area users. Failure on the part of the contractor to complete the required work in a satisfactory manner will result in the Department having the work performed by others and paid for by the Performance Bond.

All requirements of Section 1670-14 Establishment will also be applicable during the Establishment Period for Planting. The Establishment Period for Planting will last a minimum of twelve months and extend into the seasonal limitations for planting in order to allow replacement plantings to be installed. See contract times for exact time period and dates.

Installation of #7 and #10 Japanese Maples: Plants will be furnished to the contractor on site in #7 or #10 nursery containers. Plant according to Standard Specifications Section 1670.

The work of installing #7 or #10 Japanese Maples will be paid for at the contract unit price for each upon satisfactory completion of the work.

Payment will be made under:
Installation: #7 or #10 Japanese Maples.....EA.

Herbicides
Post-emergence herbicidal treatment and Pre-emergent herbicidal treatment will consist of the following products and rates unless otherwise approved by the Engineer.

Herbicide Chart

Common Name	Formulation	Oral LD/50 (MG/KG)	Amount of Formulation per Acre	Lbs. of Active Ingredient per Acre	Adjuvants	Remarks
Stump Contro						
Triclopyr	3 S	2,574	1 gal./1 gal. of water	3 #	1 - 2 qts. Surfactant/ acre	Paint or spray, add bullseye dye.
Pre-emergen						
Metolachlor + Prodiamine + Isoxaben	Liquid (5G) + 65 WDG + 75 DF	3750 + >5,000 + 5,000	2 - 3 pts. (40#) + 2# + 1#	1.95 - 2.93# (2#) . + 20 lbs. + 1#	NA	Spring application; use tank agitation when mixing.
Post-emergent						
Glyphosate	4 S	>5,000	2 - 4 qts.	2 - 4 #	2 - 4 qts. Surfactant/ 100 gals.	NA