Payment will be made under:

Pay Item	Pay Unit
Fertilizer Topdressing	Ton

SECTION 1667
SPECIALIZED HAND MOWING

1667-1 DESCRIPTION

This work consists of specialized hand mowing around or under fixed objects, including but not limited to guardrails, signs, barriers and slopes in a method acceptable to the Engineer.

Specialized hand mowing shall be completed with mechanically powered trimmers, string trimmers, hand operated rotary mowers or self-propelled mowers of sufficient size and quality to perform the work timely and efficiently.

The quantity of mowing to be performed will be affected by the actual conditions that occur during the construction of the project. The quantity of mowing may be increased, decreased or eliminated entirely as directed. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

1667-2 MEASUREMENT AND PAYMENT

Specialized Hand Mowing will be measured and paid as the actual number of manhours each worker spends hand mowing, as directed. When directed to mow an area more than once, separate measurement will be made each time the area is mowed.

Payment will be made under:

Pay Item	Pay Unit
Specialized Hand Mowing	Man Hour

SECTION 1670
PLANTING

1670-1 DESCRIPTION

Furnish, deliver and plant trees, shrubs, vines, ground covers, bedding plants and seedlings at locations shown in the plans or as directed, in accordance with these Specifications.

The work of planting includes plant bed preparation, initial planting, plant establishment and replacement planting.

Perform the operations carefully to promote the continued life and healthy growth of all plants in their final location.

The actual conditions that occur during the construction of the project will determine the quantity of plant bed fumigation or post-emergent and pre-emergent herbicidal treatment for plant beds. The quantities of plant bed fumigation and post-emergent and pre-emergent herbicidal treatment for plant beds may be increased, decreased or eliminated entirely as directed. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

1670-2 MATERIALS

Refer to Division 10.

Item	Section
Fertilizer	1060-2
Water	1060-9
Plant Materials - Nursery Grown	1060-10
Mulch for Planting	1060-11

Item	Section
Materials for Staking or Guying	1060-12
Herbicide	1060-13

Furnish nursery grown plant materials.

Use methyl bromide as fumigant consisting of a mixture of 80% methyl bromide and 20% chloropicrin. A different ratio of fumigant containing methyl bromide and chloropicrin may be used provided that the amount of active ingredient specified in Article 1670-7 is provided.

Use a 2 mil. polyethylene agricultural plastic sheeting free of holes, punctures and tears to cover the fumigated plant beds. Use an appropriate width of plastic for the width of the plant bed and obtain approval before fumigation.

The contract will state the kind of herbicides to be used.

1670-3 WEATHER AND SEASONAL LIMITATIONS

Perform planting operations only between the dates shown in the contract except where otherwise permitted in writing.

Do not plant when the temperature is below 32°F, when the plant hole is frozen or when soil to excavate and fill the plant hole is frozen or too wet.

Perform fumigation during or within 2 weeks before the time allowed for planting as shown in the contract. Fumigate when the soil temperature is at least 55°F at a depth of 5" and moderately moist (50-85% of field capacity).

Apply post-emergent herbicide when the weeds are near maturity but not when the weeds are under stress from drought, disease, insect damage or any other cause.

Do not apply post-emergent herbicide when rain is likely within the next 6 hours or as restricted on the product label.

1670-4 CARE AND HANDLING PLANTS

(A) General

Exercise utmost care in digging, loading, transporting, unloading, planting or otherwise handling plants and use adequate precautions to prevent injury to or drying out of the trunk, branches or roots; and to prevent freezing of the plant roots. Heel-in plants within 48 hours of delivery from the nursery, if they can not be planted within that time.

Properly maintain all heeled-in plants until planted. Do not have plants remain heeled-in for more than 30 days. Open plants immediately when delivered in boxes or wrapped in bundles or other forms of closed packages and inspect and dampen if necessary.

(B) Balled and Burlapped Plants

Protect the roots of balled and burlapped plants, if not immediately planted after delivery, by adequately covering with a soil, mulch or sawdust that is kept moist constantly in an acceptable manner appropriate to weather or seasonal conditions. Preserve the solidity of the plant ball carefully.

(C) Bare Rooted Plants

Refrigerate or immediately heel-in all plants, if not promptly planted, in moist soil, mulch or sawdust in an acceptable manner corresponding to generally accepted horticultural practice.

Protect the plants from drying out by means of wet canvas, burlap or straw or by other means acceptable while being transported or planted.

(D) Geophytes

Geophytes; bulbs, corms and tuberous plants; that are being shipped shall be packaged in containers that meet industry standards and have been pre-approved by the engineer. All individual packages shall be clearly labeled with quantity and cultivar name.

While bulbs, corms and tuberous plants are being transported or are being distributed in planting beds, or are awaiting planting after distribution, protect them from drying out by means of wet canvas, burlap, or straw, or by other means acceptable to the Engineer and appropriate to weather conditions and the length of time they will be out of the ground. Care shall be taken to avoid unnecessary injury to the bulbs before planting.

Pre-plant cool treatment is required for plants planted in a USDA Climatic Zones 9 and 10. Storage of bulbs, corms and tuberous plants which do not require pre-plant cool treatment shall be stored in open trays and placed in a 55°F - 65°F, dry place away from frost and heat and never allowed to dry out to the point of shriveling. Packing in slightly moist peat is preferred. The storage area shall be well-ventilated and ethylene-free. Do not store bulbs with fruit such as apples or pears which produces ethylene gas which can cause problems with flowering. Do not store bulbs in paper or plastic bags unless otherwise specified or approved. If a refrigerator is used it shall be frequently ventilated.

1670-5 PLANT LOCATION

Locate and mark on the ground locations for plants and outlines for areas to be planted or reforested and obtain approval before digging plant holes for beds.

Where so directed, furnish and install standard identification wires with plastic flags to designate individual plants in major planting areas.

Flags will not necessarily be needed for all plants required by the contract, but use these flags on portions of the project until plant locations in these portions are approved.

Unforeseen conditions may make it necessary to make minor adjustments in plant locations due to utility lines, traffic signs, rock, drainage, etc., and such adjustments will be permitted subject to approval.

1670-6 PRUNING

Prune shrubs and trees after planting as shown in the plans or as directed by the Engineer. Pruning done at any time in no way alters the Department's right to reject plant material. Prune in accordance with the International Society of Arboriculture pruning techniques, and according to shape, size and condition of the individual plant.

1670-7 PLANT BED TREATMENT

(A) General

Treat plant beds by fumigation or by application of herbicides where called for by the plans or directed.

(B) License

Make pesticide applications by or under the direct supervision of an applicator licensed by the North Carolina Department of Agriculture and Consumer Services.

(C) Fumigation

Fumigate the plant beds with an approved fumigant in preparation for planting.

Before fumigation, level the plant bed to a proper planting grade. Till the bed to a depth of 5" to 8". Prepare soil in good tilth with no dry clods over one inch in diameter present. Cover with plastic tarp within 24 hours of soil preparation completion or other approved process.

Apply the approved fumigant gas according to product labeling. If plastic is required then Use envelope folds at the edges of the bed with the edge of the plastic buried 4" to 6" deep.

Keep the plastic over the bed for 48 to 72 hours. Reform the bed to the required shape, after removal of the plastic, with little or no soil inversion. Pursue continuous planting within 24 hours of plastic cover removal.

(D) Post-Emergent Herbicidal Treatment

Post-emergent herbicidal treatment includes applications of a systemic post-emergent total vegetation control herbicide.

The contract will state the rates of application of the post-emergent herbicides.

Apply all herbicides in accordance with the manufacturer's instructions on the product label.

Apply post-emergent herbicide when the weeds are near maturity but not when the weeds are under stress from drought, disease, insect damage or any other cause. If cloudy weather or other poor growing conditions are present, extend this 7 day period until there are visible signs of herbicidal activity. Reapply if necessary to achieve a thorough control.

(1) Post-Emergent Application for Plant Bed Preparation

Apply a systemic post-emergent total vegetation control herbicide to the bed area before any tilling or mowing is performed. Perform no tilling or mowing for at least 7 days after the application. Thoroughly till the bed after the waiting period, or when injury to the vegetation appears. Prepare the soil in good tilth with no clods over one inch present and before planting.

(2) Post-Emergent Application for Plant Bed Maintenance

Apply a systemic post-emergent herbicidal treatment in accordance with product label in a manner to ensure no damage to planted material. Perform no mowing or vegetation removal by other means for at least 7 days after the application.

(E) Pre-Emergent Herbicidal Treatment

Pre-emergent herbicidal treatment includes the application of a pre-emergent herbicide.

Apply a pre-emergent herbicide to the plant bed after the existing vegetation has been completely controlled by a post-emergent herbicide application as specified in Subarticle 1670-7(D) and after installation of planting and mulching as described in Articles 1670-9 and 1670-10. Apply pre-emergent herbicide following planting and mulching of plant bed before germination of weed seeds. An additional application of post-emergent herbicidal treatment may be necessary to control emerged weeds, as directed, if sufficient time has lapsed between tillage and installation of plant material and mulch. No direct payment will be made for additional post-emergent herbicidal work if such work is due to carelessness or neglect on the part of the Contractor.

Apply herbicide evenly over the soil surface with properly calibrated equipment at the specified rate.

If at least 0.5" of rainfall does not occur within 15 days of application of pre-emergent herbicidal treatment, apply at least 0.5" of water (2.8 gal/sy uniformly over the planting area to activate the herbicide.

1670-8 EXCAVATION OF PLANT HOLES

Provide cylindrical shaped plant hole excavations for plants other than reforestation plants, with the plant location stake marking the center of the circle and with the sides of the hole being approximately vertical. When mechanical means are used which make digging of cylindrical holes impractical, the complete hole shall have the minimum dimensions as shown in the plans.

When plants are to be grouped together in a plant bed as contrasted to widely separated individual plants, and when so indicated in the plans, loosen and pulverize clods to a depth of not less than 5" for the entire area of the plant bed by means of a scarifier, disc, spade or other appropriate means before plant holes are dug.

Plant reforestation plants in holes made by a planting spade, planting bar or other means which meet the approval of the Engineer. Make the hole of sufficient size to accommodate the entire extended root system of the plant without cramping.

When geophytes; bulbs, corms and tuberous plants; are to be grouped together in a plant bed as contrasted to widely separated individual plants, and when so indicated in the plans, loosen and pulverize clods to a depth of not less than 8", or as indicated in the plans, for the entire area of the plant bed by means of a scarifier, disc, spade or other appropriate means before plant holes are dug.

Place plants in holes made by a planting spade, planting bar or other means which meet the approval of the Engineer. Make the hole of sufficient size to accommodate the entire plant structure without cramping. Take care to plant all plants at a uniform depth as indicated in the plans or directed by the Engineer.

When geophytes are to be planted separately as individual plants or in small separated groups, loosen and pulverize clods with a spade, auger or other means which meet the approval of the Engineer. Individual planting holes shall be to a depth of not less than 8", or sufficient size to accommodate the entire plant structure without cramping or to a depth as indicated in the plans or directed by the Engineer.

1670-9 PLANTING, BACKFILLING AND WATERING

(A) General

The plans will state the kind and rate of application of fertilizer. Apply fertilizer during backfilling operations in a manner that will ensure proper placement of the fertilizer and avoid injury to the roots.

Scarify the walls and floor of the plant hole after the plant hole is dug. Place the plant in the prepared plant hole at the proper position as regards to depth, alignment, final grade of the surrounding ground level and vertical placement of the trunk. Maintain this position during all subsequent backfilling and watering operations. Set plants with the root collar at the same depth as grown in the nursery or raise above grade as indicated in the plans.

Moisten the soil with water after one-half to two-thirds of the backfilling and tamping has been completed, if the soil in the plant holes is not sufficiently moist. Apply water to moisten all soil but not a quantity that will saturate the soil to the extent of excluding all air from around the roots. Place the remainder of the backfill after complete absorption of water.

Construct water rings around all plants, except reforestation plants, in accordance with details shown in the plans. A water ring consists of a ridge of firmed soil in a ring around the plant and of a minimum inside diameter equal to the diameter of the plant hole. This ridge is approximately 6" high and is compacted firmly enough to hold water.

(B) Balled and Burlapped Plants

Handle balled and burlapped plants by the ball and place in the plant hole so that the soil of the ball will not be loosened from the roots. After the hole has been almost completely backfilled and the soil thoroughly firmed under and around the ball, cut the burlap away and remove from around the stem of the plant. Complete backfilling so as to avoid loosening of the soil of the root ball.

(C) Container Grown Plants

Planting requirements for container grown plants are the same as applicable to balled and burlapped plants. Remove container immediately before planting. During the removal of the container, take sufficient precautions to ensure that the soil and roots inside the container are undisturbed. Scarify roots when directed.

(D) Bare Rooted Plants

Before the plant is placed in the plant hole, cut off smoothly any bruised or broken parts of roots. Place the plant in its proper position in the hole and backfill. Carefully place the backfill material, worked around and under the roots and compacted in a manner that avoids bruising or breaking the roots.

(E) Reforestation Plants

Reforestation includes tree reforestation and shrub reforestation. Type, mixture, size, furnish description and spacing will be as shown on the reforestation detail sheet in the plans.

Before beginning reforestation, each area to be reforested will be measured by the Engineer to determine the exact number of acres for tree reforestation or square yards or shrub reforestation therein and the quantity of each species of seedling to be planted within the area.

Where structures or plantings do not adequately delineate the outline of the area to be reforested, stake the outline of the area as directed by the Engineer. Furnish cypress, cedar, oak, locust or other wood stakes approved by the Engineer. Provide stakes with a minimum industry standard of 2" x 2" (nominal) size and approximately 30" in length with a 15" white top. Drive stakes in the ground with approximately 18" remaining above the ground line and place as necessary to define and delineate the reforestation outline.

Ensure sample stock of reforestation seedlings are inspected by the Engineer, for general health and moisture content, within 24 hours before planting.

After the plant hole has been prepared, place the plant upright in the hole at the correct depth without crowding or bunching the roots. Firm the soil around the root system from the bottom of the plant hole to natural ground elevation.

Upon completion of planting the required number of seedlings within all areas to be reforested, the Contractor will be relieved of further responsibility in connection with reforestation except for damage caused directly by the Contractor.

(F) Geophytes

When planting geophytes; bulbs, corms and tuberous plants; take care to place all plants at a uniform depth as indicated in the plans or directed by the Engineer. All plants shall be set upright as originally grown and at the proper spacing and depth from the natural ground elevation. Soil that is backfilled into the hole to obtain the proper depth shall be firmed before plant placement. Soil backfilled over the plant shall be firmed.

Planting shall be accomplished when the soil temperature is 40°F to 45°F or as directed by the Engineer. No phase of this work shall be performed when the temperature is below 32°F, when the plant holes are frozen or when soil to excavate and fill the plant hole is frozen or too wet.

Geophytes shall be watered as stated in the contract or as directed by the Engineer. Watering will be required for geophytes if the soil in the plant hole is not sufficiently moist. Apply water to moisten all soil, but not in a quantity that will create standing water or saturate the soil to the extent of excluding all air from around the plant.

1670-10 MULCH FOR PLANTING

Place mulch within 7 days of initial planting as a top layer on the backfilled plant hole and water ring. Place mulch approximately 4" deep as shown in the plans or as directed. Place additional mulch as directed during establishment.

No mulching will be required for reforestation plants.

1670-11 WATER FOR PLANTING

Water at the time of planting as specified in Article 1670-9 and at the Contractor's election and the Engineer's approval. Water with gravity flow or low pressure applicators which have been approved, and which will not erode soil around the plant root system or damage to plants. Saturate the soil around each plant thoroughly at each watering.

1670-12 STAKING OR GUYING

Stake or guy plants as shown in the plans or as directed to prevent damage.

Ensure that the plant is attached and held rigid to the support in a manner that will prevent chafing or other injury to the bark, and that will permit normal development of the trunk or branch.

1670-13 INITIAL PLANTING

Initial planting will be complete when the plants have been placed in the plant hole, backfilled, fertilized, watered, mulched, staked and guyed, and the plants are in an acceptable condition.

1670-14 ESTABLISHMENT

Begin establishment for all initial or replacement plants immediately after they are planted. Maintain trees, shrubs, vines and groundcovers, and the area of planting until final acceptance of the project. Mow and maintain the area around trees and shrubs for a distance of 6 ft beyond the outside limits of water rings or 6 ft beyond the limits of the guy stakes, whichever is greater; within shrub beds; and for a distance of 6 ft outside the perimeter of the shrub beds. Establishment includes cutting of grass and control of weeds; watering; fertilization; replacement of mulch; repair or replacement of guy stakes, guy wires and water rings; and other work as directed to ensure the survival and growth of plant material and the satisfactory appearance of the project. Remove dead plant material from the project during the establishment period.

1670-15 REPLACEMENT PLANTING

Replacement planting of trees, shrubs and ground cover consists of replacing those plants which are not in a living, healthy condition or do not conform to the Specifications contained in *American Standard for Nursery Stock* or damaged or stolen. Replacement of reforestation plants will not be required.

Perform replacement planting within the planting season specified in the contract.

1670-16 FINAL INSPECTION

All planting shall be completed and all plants shall be in a living and healthy condition at the time of final inspection.

1670-17 MEASUREMENT AND PAYMENT

(Plant Species and Size Indicated in Contract) will be measured and paid in units of each, other than reforestation plants, planted and accepted.

Reforestation will be measured and paid in acres of land measured along the surface of the ground.

Wetland Reforestation will be measured and paid in acres of land, measured along the surface of the ground.

Plant Bed Fumigation will be measured and paid in square yards of plant bed measured along the surface of the ground.

Post-emergent Herbicidal Treatment will be measured and paid in square yards of plant bed measured along the surface of the ground.

Pre-emergent Herbicidal Treatment will be measured and paid in square yards of plant bed measured along the surface of the ground.

Geophytes (plant species and size indicated in contract) will be measured and paid in units of each that have been planted and accepted.

Mulch for Planting will be measured and paid in cubic yards. Where mulch is furnished in bales or bags, the number of cubic yards in each bale or bag will be determined and then multiplied by the number of bales or bags of the same size which have been acceptably furnished and placed. Where mulch is furnished in trucks, each truck will be measured by the Engineer and shall bear a legible identification mark indicating its capacity. Load each truck to at least its measured capacity at the time it arrives at the site of the work.

Water for Planting will be measured and paid in units of 1,000 gallon units. Measurement of water will be made by means of an approved metering device at the source of supply, or by determining the volumetric capacity of tank trucks used to deliver water to the project and recording the number of loads delivered by each truck.

No payment will be made for plant bed preparation, tillage, staking or guying and fertilization, for this work will be incidental to other work in the contract.

Payment will be made under:

Pay Item	**Pay Unit**
(Plant species and size indicated in contract)	Each
Reforestation	Acre
Wetland Reforestation	Acre
Plant Bed Fumigation	Square Yard
Post-Emergent Herbicidal Treatment for Plant Beds	Square Yard
Pre-Emergent Herbicidal Treatment for Plant Beds	Square Yard
Geophytes	Each
Mulch for Planting	Cubic Yard
Water for Planting	1,000 Gallons