200.00 EARTHWORK AND ROADSIDE DEVELOPMENT

201.00 CLEARING AND GRUBBING

201.01 DESCRIPTION. This work shall consist of clearing, grubbing, removing and disposing of all vegetation and debris which are within designated limits inside the limits of the right-of-way and easement areas, except such objects as are designated to remain or are to be removed in accordance with other Sections of these Specifications. This work shall also include the preservation from injury or defacement of all vegetation and objects designated to remain.

201.04 CONSTRUCTION METHODS.

***A*. *Clearing*.** Trees outside the limits of construction shall be cut only within the areas shown on the Plans. Trees within the limits of construction, when designated by the Engineer, shall be left standing. All branches of trees overhanging a roadbed shall be removed to a clear height of 20 feet above the top of the surfacing. All trimming and pruning of trees left standing shall be done by experienced workmen and in accordance with the best horticultural practice. Trees left in place shall not be damaged during construction operations.

All merchantable timber in the clearing area which has not been removed from the right-of-way prior to the beginning of construction shall become the property of the Contractor, unless otherwise provided.

All other trees, logs, stumps, brush, and objectionable material shall be removed, burned, or otherwise disposed of in an approved manner. If perishable material is burned, it shall be burned under the constant care of competent watchmen at such times and in such manner that the surrounding vegetation, other adjacent property, or anything designated to remain on the right-of-way, will not be jeopardized. Burning shall be done in accordance with applicable laws and ordinances, in particular a burn permit issued by the City Fire Marshall.

When permitted by the Engineer, materials and debris which cannot be burned and perishable materials may be removed from the right-of-way and disposed of at locations off the project outside the limits of view from the project with the written permission of the property owner on whose property the materials and debris are placed. The Contractor shall make all necessary arrangements with property owners for obtaining suitable disposal locations and the cost involved shall be included in the unit price bid, or considered as incidental to excavation.

B. ***Grubbing.*** All stumps and roots within the right-of-way, including channel right-of-way except as defined in C. below, shall be blasted or grubbed out and satisfactorily disposed of.

C. ***Preservation of Areas Outside of Construction.*** Areas outside of construction slopes, except that area necessary for constructing fences, shall be preserved in their natural state. Unless specifically required on the Plans, clearing or grubbing will not be permitted in areas outside construction stakes except for the removal of debris, dead trees and stumps. Care shall be exercised not to disturb areas outside of construction stakes except as necessary to store reserved topsoil from storage areas within the right-of-way. Any areas within the right-of-way damaged by Contractor operations shall be restored to the satisfaction of the Engineer by the Contractor at his own expense.

D. ***Selective Clearing.*** Selective clearing shall include the trimming of selected trees and shrubs, the removal from the ground and disposal of logs, root pods, brush, refuse dumps and other undesirable debris, and the cutting, removal and disposal of all undergrowth, stumps, and standing trees, except those trees and shrubs designated to be preserved. The selective clearing areas will be shown on the Plans. This work shall be performed in a manner as to leave the designated areas in a park-like condition and susceptible to economical maintenance. Disposal of all material shall conform to the methods set out in the Clearing and Grubbing requirements. Trees will normally be selected which will give a spacing of 20 to 30 feet.

Movement and operation of equipment shall be so restricted that trunks, branches and roots of trees and shrubs selected for retention will not be scarred, broken, or otherwise damaged including compaction of soil around trees and shrubs, to the extent that the life of the plant is endangered.

201.05 METHOD OF MEASUREMENT. When shown on the Plans as a contract pay item, Clearing and Grubbing will be measured to the nearest 0.05 acre of the areas cleared within the designated limits, or by the lump sum for the project.

No deduction will be made for areas occupied by existing roads or other bare areas within the limits designated or marked by the Engineer to be cleared and grubbed.

Selective clearing will be measured by the acre or by the lump sum for the project.

201.06 BASIS OF PAYMENT. Clearing and grubbing or selective clearing, measured as provided above, will be paid for at the contract unit price per acre or by the lump sum and such payment shall be full compensation for all

equipment, tools, labor and incidentals necessary to complete the work as specified.

Clearing and Grubbing	AC. or Lump Sum
Selective Clearing	AC. or Lump Sum

All work performed in clearing and grubbing areas not so designated on the Plans shall not be paid for directly but shall be considered as incidental work necessary to the several classes of excavation.

202.00 EXCAVATION AND EMBANKMENT

202.01 DESCRIPTION. This work shall consist of excavation, disposal, or compaction of all material not being removed under some other item which is encountered within the limits of the work necessary for construction in accordance with these Specifications and in reasonably close conformity with the line, grades, thicknesses and typical cross-sections shown on the Plans or established by the Engineer. All excavation will be classified as common excavation, rock excavation, unclassified excavation, muck excavation, or borrow as hereafter described.

202.02 EXCAVATION-CLASSIFICATION.

A*. *Common Excavation. Common excavation shall consist of all excavation not included as rock excavation or excavation which is otherwise classified and paid for.

B. Rock Excavation. Rock excavation shall consist of igneous, metamorphic and sedimentary rock which cannot be excavated without blasting or the use of rippers, and all boulders or other detached stones each having a volume of 0.5 cubic yard or more. Shales that can be graded or ripped will be considered as common excavation.

C. Unclassified Excavation. Unclassified excavation shall consist of the excavation and disposal of all materials of whatever character encountered in the work.

D. Muck Excavation. Muck excavation shall consist of the removal and disposal of saturated or unsaturated mixtures of soils and organic matter or other materials not suitable for foundation material regardless of moisture content or other characteristic.

E. Unclassified Borrow. Unclassified borrow shall be all borrow excavation not classified as Select Borrow.

F. Select Borrow. Select borrow shall be material meeting the requirements provided for in Subsection 705.01. The City may specify on the Plans specific soil groups or group characteristics.

202.04 CONSTRUCTION METHODS.

A. Roadway Excavation. The excavation and embankments shall be finished to reasonably smooth and uniform surfaces. The top of finished sub-grade shall be within the tolerances shown in Subsection 202.04 F. No materials shall be wasted without permission of the Engineer. Excavation operations shall be conducted so that the material outside of the limits of slopes will not be disturbed. Prior to beginning excavation, grading, and embankment

operations in any area, all necessary clearing and grubbing in that area shall have been performed in accordance with Section 201, Clearing and Grubbing.

When Plans shown an item for salvaging topsoil, it shall be removed and stockpiled before roadway excavation begins and will be paid for as a separate item in accordance with Section 205.

Unless otherwise provided for on the Plans, rock or other solid unyielding material in the finished grade of roadbed cut sections shall be excavated to a depth of at least 12 inches below sub-grade and backfilled with approved material. Approved materials for backfilling shall meet the requirements of Select Borrow Subsections 705.01 A. or 705.01 B. Sandstone or as may be otherwise specified on the Plans in accordance with Subsection 202.04 D. 1. Materials. All approved material for use in this work shall pass a 3-inch sieve. Any material which during manipulation does not reduce to less than 3 inches shall be removed from the grading limits. Compacting in cuts shall meet the moisture and density requirements as designated in Subsection 202.04 C. Embankment, or as shown on the Plans. No excavation below sub-grade or backfill will be paid for unless measured by the Engineer before backfill is placed. Excavation more than 12 inches below sub-grade will not be measured for payment unless shown on the Plans, or authorized by the Engineer. No ridges of rock shall be left and all areas of the rock surface shall drain to the ditches. In blasting rock, a reasonably uniform face shall be left regardless of whether or not the excavation is carried beyond the specified slopes. All breakage and slides shall be removed by the Contractor and disposed of in a manner approved by the Engineer.

Obliteration of old roadways shall include all grading operations necessary to incorporate the old roadway into the new roadway and surroundings in order to provide a pleasing appearance from the new roadway.

When the Contractor’s excavating operations encounter remains of prehistoric people’s dwelling sites or artifacts of historical or archeological significance, the operations shall be temporarily discontinued. The Engineer will contact archeological authorities to determine the disposition thereof. When directed by the Engineer, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and shall remove them for delivery to the custody of the proper authorities. Such excavation will be considered for payment under Subsection 104.03.

Where excavation to the finished graded section results in a sub-grade or slopes of unsuitable soil, the Engineer may require the Contractor to remove the unsuitable materials and backfill to the finished graded section with an approved material. The Contractor shall conduct his operations in such a way that the Engineer can take the necessary cross-sectional measurements before the backfill is placed. Suitable material for backfilling

shall be such materials that are equal to or better than approved materials in close proximity to or adjoining those materials removed, as determined by AASHTO M 145, Method of Classification. When shown on the Plans, backfill material shall meet the requirements of subsection 202.04 D. 1. Materials, as specified.

The Engineer may designate as unsuitable those soils that cannot be properly compacted in embankments. All unsuitable materials shall be disposed of by the Contractor as approved by the Engineer.

When the location of unstable soil is shown on the Plans, the removal and replacement shall be as shown.

Channel excavation will be made at locations shown on the Plans or as directed by the Engineer and will be paid for as unclassified excavation.

B. Borrow Excavation. Unless otherwise designated on the Plans or in the proposal, the Contractor shall make his own arrangements for obtaining borrow and shall pay all costs involved. When procurement of borrow from a designated area is mandatory, it will be so shown on the Plans and right-of-way for mandatory borrow areas will be furnished by the City or other Agency purchasing right-of-way for the project.

No excavation for borrow shall be made until it has been determined by the Engineer that the additional material will be needed.

If the Contractor places more borrow than is required without written approval of the Engineer and thereby causes a waste of excavation, the amount of such waste will be determined and deducted from the borrow volume as measured in the borrow area.

The Contractor shall notify the Engineer sufficiently in advance of opening any borrow areas, so that cross-section elevations and measurements of the ground surface, after clearing, may be taken and any necessary required tests may be made.

Widening of roadway cuts and special ditches shall be permitted only when shown on the Plans or authorized by the Engineer, and material moved from these areas will be measured as Unclassified Excavation.

Borrow shall not be excavated from pits closer than 500 feet to the near right-of-way, except by written approval of the Engineer.

The Contractor shall provide and maintain all necessary haul roads from the borrow pits to the work site at his own expense. Unless otherwise provided, clearing, grubbing, stripping and replacement of top soil of

borrow areas and material not used in the embankment will not be measured for payment.

All borrow pits shall be excavated with uniform slopes. Borrow pits shall be left in a neat and workmanlike condition and in full compliance with all applicable State and Federal laws. The Contractor shall shape the pit for cross-sectioning immediately upon completion of borrow excavation.

C. Embankment. General. Embankment construction shall consist of constructing various types and styles of embankments, including preparation of the areas upon which they are to be placed within the right-of-way and the placing and compacting of approved material within areas where unsuitable material has been removed. Only approved materials shall be used in the construction of embankments.

Embankments shall be started at the low point and placed in layers approximately parallel to the finished grade and sloped to provide drainage at all times.

No rock larger than 3 inches in any dimension shall be placed in the top 12 inches of compacted embankment.

Embankment of earth material, including backfill, shall be placed in horizontal layers not exceeding 8 inches (loose measurement). All embankment material and the top 6 inches below Plan grade in cuts or designated grade for backfilling shall be compacted to not less than 95 percent of Standard Density when tested in accordance with Subsection 106.03. The moisture content of the embankment material at the time of compaction shall be within 2 points of the optimum moisture content as determined by AASHTO T-99, unless otherwise specified on the Plan or approved by the Engineer in writing.

The Engineer may designate and adjust the moisture range for compaction of embankment as may be required for specific or unusual conditions encountered in the work.

The Contractor may request in writing a lower moisture range for compaction of A-4 or A-5 soil groups to within 3 or 4 points below optimum moisture. Upon demonstration to the Engineer's satisfaction that the lower moisture range is more practicable, the Contractor's request may be so approved, provided embankment compaction meets the 95 percent minimum requirement.

No embankment shall be constructed on frozen material nor shall frozen material be placed in embankments. Effective spreading and disking equipment shall be used on each lift to obtain an approximate uniform thickness prior to compacting. Construction equipment shall generally be

routed over the entire surface of each layer. As the compaction of each layer progresses, continuous leveling and manipulating will be required to assure uniform density and moisture. Water shall be added or removed, if necessary, in order to obtain the required density and moisture content.

When in the opinion of the engineer, the stability of the foundation area for embankments can be improved, the Contractor shall construct a blanket of material of sufficient depth over the area to support normal hauling equipment half loaded until such time as normal operations can be resumed.

The Contractor shall employ proper and adequate workmanship in the construction of embankments at all times to obtain the required section within reasonable limits.

Rocks, broken concrete, or other solid materials shall not be placed in embankment areas where piling is to be placed or driven.

When embankment is to be placed and compacted on hillsides, or when new embankment is to be compacted against existing embankments, or when embankment is built ½ width at a time, the slopes that are steeper than 4:1 shall be continuously benched, as directed by the Engineer, over those areas where it is required as the work is brought up in layers. Benching shall be of sufficient width to permit operations of placing and compacting equipment. Each horizontal cut shall begin at the intersection of the original ground and the vertical sides of the previous cuts. Material thus cut out shall be re-compacted along with the new embankment material at the Contractor's expense.

Where embankment is to be placed and compacted and end dumping is permitted, the slopes of the original ground or embankment shall be deeply plowed or cut into before starting end dumping. Where end dumping is permitted, the rock will be dumped near the end of the existing lift and pushed over the end.

Unless otherwise shown on the Plans or in the Special Provisions, where the height of an embankment is 4 feet or less to the finished elevation, all sod and vegetable matter shall be removed from the surface upon which the embankment is to be placed, and the cleared surface shall be completely broken up by plowing, scarifying or stepping to a minimum depth of 6 inches. This area shall then be re-compacted. Sod not required to be removed shall be thoroughly disked or scarified before construction of embankment.

In those areas where fills are to be placed which cannot be satisfactorily compacted to stable and durable conditions due to unstable materials such as sod, trash, organic substances and muck, the Engineer may designate

removal and backfilling with suitable material to the original ground line elevation. Suitable material for backfilling shall be such materials that are equal to or better than approved materials as determined by AASHTO M 145, Method of Classification. When shown on the Plans, backfill materials shall meet the requirements of Subsection 202.04 D. 1. Materials, as specified.

Wherever a compacted road surface containing granular materials lies within 3 feet of the sub-grade, such old road surface shall be scarified to a depth of at least 12 inches. This scarified material shall be compacted as specified for embankments.

When shown on the Plans or in the Special Provisions, the foundation areas upon which embankments are to be placed shall be constructed in accordance with prescribed methods. Where the removal of unsuitable material and backfilling is prescribed by the typical cross-sections, unsuitable materials shall be excavated to within plus or minus 0.2 feet of the designated foundation grade. Unsuitable materials to be removed may include unstable materials such as rock, shale and classified silty or highly plastic soils. Unless otherwise specified on the Plans, suitable materials for backfilling shall be such materials that are equal to or better than approved materials as determined by AASHTO M 145, Method of Classification. When shown on the Plans, backfill material shall meet the requirements of Subsection 202.04 D. 1. Materials, as specified.

If embankment is to be placed on one side only of abutments, wing walls, piers, retaining walls or culvert headwalls, care shall be taken that the area immediately adjacent to the structure is not compacted to the extent that it will cause overturning of or excessive pressure against the structure. When embankment is to be placed on both sides of a concrete wall, abutment, end bent or box type structure, operations shall be so conducted that the embankment is always at approximately the same elevation on both sides of the structure. No rocks or boulders larger than 6 inches in the largest dimension shall be placed in the embankment nearer than 5 feet to the structure.

All excess or unsuitable excavated material, including rock and boulders larger than 8 inches in the largest dimension, that cannot be used in embankments may be placed on the side slopes of the nearest fill in a satisfactory manner and shall be placed so as to maintain a distinct shoulder line by keeping all such waste material not less than 3 feet below the finished shoulder elevation, unless otherwise shown on the Plans or directed by the Engineer. In case it is impossible to dispose of all such material in the manner described, the remainder shall become the property of the Contractor and disposed of by him to the satisfaction of the Engineer.

Embankments constructed of material of which a large portion is rock of such a nature that, in the opinion of the Engineer, construction in 8-inch layers is not feasible shall be constructed in layers the depth of which shall not exceed the maximum size of the rock present in the material, and in no case shall the thickness of the layer exceed 24 inches. End dumping will be required. The rock shall be dumped near the end of the existing lift and pushed over the end. Compactive effort on the rock and rocky material shall consist of making multiple coverings of each layer with a tamping type roller or with a vibratory roller as approved by the Engineer. Each layer shall be leveled and smoothed with suitable leveling equipment and by distribution of spalls and finer fragments of earth. The top 12 inches of embankment shall be constructed with approved material, smoothed and placed in layers not exceeding 8 inches in loose thickness and compacted as specified for embankments. When specified on the Plans, approved materials will be classified for acceptance in accordance with Subsection 202.04 D. 1. Materials.

The surface layer of a roadbed shall not be wetted or compacted until final finish grade stakes have been set and all embankment material is in place. The surface layer of the entire embankment shall then be manipulated by scarifying and the moisture corrected as specified for embankments, after which the entire surface layer shall be compacted to not less than 95 percent of Standard Density when tested in accordance with Subsection 106.03.

All material shall be placed in layers and rolled except that which is inaccessible to the roller, such as adjacent to culverts or bridge abutments in which case the material shall be placed in layers not to exceed 6 inches in depth measured loose and compacted to the density and moisture content of the adjacent embankment with mechanical tampers of approved design. No additional compensation will be allowed for tamping.

D*. *Selective Sub-grade Topping. When designated on the Plans, the upper portion of the embankment or fill shall be constructed with selective sub-grade topping materials. The base of the selected sub-grade zone shall be constructed within plus or minus (0.2) foot of the required elevation shown on the Plans.

1. *Materials*. Selective sub-grade topping materials shall meet the requirements specified for the various classes of topping shown below; or as may be otherwise specified by classification or characteristics referenced in AASHTO M 145.

SELECTIVE SUB-GRADE TOPPING CLASS	SPECIFICATION REQUIREMENT
Class I Topping	AASHTO M 145 Granular Materials: A-1, A-2-4, A-2-5 or A-3 Groups
Class II Topping	Subsection 705.01(b)
Class III Topping	Subsection 705.01(a)
Class IV Topping	15 P.I. or less
Class V Topping (Restrictive)	AASHTO M 145 Silt-Clay Materials: 1/ A-7-5 and A-7-6 Groups with a Group Index over (16) A-4 and A-5 Groups with a Group Index over (10)

Note: 1/ These materials will be restricted from use in Class V Topping.

Selective sub-grade topping shall all pass a 3" sieve unless otherwise specified.

1.1 *Testing.* Selective sub-grade topping materials shall be tested in accordance with Subsection 705.01(c).

1.2 *Classification.* The classification of selective sub-grade materials for acceptance by group and sub-group classifications will be in accordance with AASHTO M 145 as shown in Tables 1 and 2 below. The determination of group index values (numbers) specified for acceptance of group and sub-group classifications shown in Tables 1 and 2 will be determined in accordance with the procedures prescribed in AASHTO M 145.

TABLE 1
CLASSIFICATION OF SOILS AND SOIL AGGREGATE MIXTURES

General Classification	Granular Materials (35% or less passing No. 200)			Silt-Clay Materials (More than 35% passing No. 200)			
Group Classification	A-1	A-3 a/	A-2	A-4	A-5	A-6	A-7
Sieve Analysis							
No. 10							
No. 40	50 Max.	51 Min.					
No. 200	25 Max.	10 Max.	35 Max.	36 Min.	36 Min.	36 Min.	36 Min.
Characteristics of fraction Passing No. 40		b/					
Liquid Limit	. . .	. . .		40 Max.	41 Min.	40 Max.	41 Min.
Plasticity Index	6 Max.	N. P.		10 Max.	10 Max.	11 Min.	11 Min.
General Rating as Sub-grade	Excellent to Good			Fair to Poor			

a/ The placing of A-3 before A-2 is necessary in the ^A^Aleft to right elimination process and does to indicate superiority of A-3 over A-2
b/ See Table 2 for values.

TABLE 2.
CLASSIFICATION OF SOILS AND SOIL AGGREGATE MIXTURES
(WITH SUGGESTED SUBGROUPS)

General Classification	Granular Materials (35% or less passing No. 200)						Silt-Clay Materials (More than 35% passing No. 200)			
	A-1		A-3	A-2			A-4	A-5	A-6	A-7
										A-7-5
Group Classification	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-6
Sieve Analysis										
Percent passing:										
No. 10	50	. . .	. . .							
No. 40	Max.30	50 Max.	51 Min.							
No. 200	15 Max.	25 Max.	10 Max.	35 Max.	35 Max.	35 Max.	35 Max.	36 Min.	36 Min.	36 Min.	36 Min.
Characteristics of Fraction Passing No. 40										
Liquid Limit		. . .	. . .	40 Max.	41 Min.	40 Max.	41 Min.	40 Max.	41 Min.	40 Max.	41 Min.
Plasticity Index		60Max.	N.P.	10 Max.	10 Max.	11 Min.	11 Min.	10 Max.	10 Max.	11 Min.	11 Min.
Visual types of Significant Constituent Materials	Stone Fragments Gravel and Sand		Fine Sand	Silty or Clayey		Gravel and Sand		Silty Soil		Clayey Soils	
General Rating as Sub-grade	Excellent to Good							Fair to Poor			

a/ Plasticity Index of A-7-5 subgroup is equal to or less than LL minus 30. Plasticity Index of A-7-6 subgroup is greater than LL minus 30.

2. Sources of Selective Sub-grade Topping Materials.

2.1 Contractor's Option. The Contractor shall develop a plan which demonstrates to the Engineer that an adequate quantity of material will be salvaged or reserved for selective sub-grade topping. During the movement of excavation, it will be the Contractor's responsibility to follow the approved grading plan to the extent that the available quantity of material needed for selective sub-grade topping will be reserved for use.

2.2 Mandatory Sources Designated on the Plans. When selective sub-grade topping material sources are designated on the Plans as mandatory sources, the Contractor shall excavate such materials within the limits designated, haul and place the materials at the locations shown on the Plans.

3. Plan Quantities. Estimated quantities of selective sub-grade topping materials will be shown on the Plans. In the event the Contractor determines that Selective Sub-grade Topping Materials specified on the Plans or in the Proposal are not available in sufficient quantities or of the quality specified, the Engineer shall be so notified in writing in accordance with the provisions of Subsection 104.03.

E*. *Sloping, Shaping, Dressing and Finishing. The slopes of all cuts, ditches, and embankments shall be constructed and dressed in a neat and workmanlike manner, as indicated on the Plans or as directed by the Engineer. Shovel cuts will require the removal of the ridge which a shovel ordinarily leaves along the top of the bank, and such hand work shall be performed as may be necessary to maintain approximately the designated slope and produce a backslope free from humps and hollows. The top and bottom of slopes shall be rounded to the approximate typical cross-section shown on the Plans. When rock extending to the top of cuts makes rounding impractical, it will not be required. Old existing banks shall be sloped, shaped and rounded as specified for new work. Hand trimming of slopes and shoulders will not be required where a neat, uniform face is otherwise obtained. The slopes in all cuts and banks of borrow pits shall be trimmed from top to bottom in firm material.

Dressing shall include all the necessary clearing of the right-of-way of stumps, brush, weeds, and other rubbish, and disposing of same in accordance with Subsection 201.04.

F*. *Tolerances. The embankment shall be brought to a uniform cross-section with a maximum tolerance of + 0.1 foot from the cross-section as given.

202.05 METHOD OF MEASUREMENT.

A. Measured Quantities. When payment is specified on a volume basis, all accepted excavation and borrow shall be measured in its original position by cross-sectioning the area excavated, which measurements will include over breakage or slides in common excavation and unclassified excavation, not attributable to carelessness of the Contractor, and authorized excavation of rock, shale, muck or other unsuitable material. Volumes will be computed from the cross-section measurements by the average end area method. Volumes of structures and obstructions removed, measured and paid for under Section 619 will not be measured and paid for under this Section.

Authorized excavation of rock, shale, muck or unsuitable material below grade shall consist of that excavation necessary to provide the designed thickness of backfill. If the plan of the designated grade line falls within a layer of stratum of rock, the below-grade excavation to the bottom of the layer, not exceeding 12 inches below the designated bottom of excavation, will be considered as authorized and will be measured for payment. Rock excavation more than 12 inches below the designated grade line will not be paid for unless authorized by the Engineer. If the nature of the material, the thickness of the layers or strata and method of operations are such that it is practical to excavate only to the depth shown on the Plans, no measurement will be made of any material removed below the line designated. The measurements will include over-breakage in rock excavation from the backslopes to an amount not to exceed in any half station of 50 feet, 10 percent of the actual quantity required for that half station.

Measurements will be made for unsuitable materials actually excavated and removed to obtain proper compaction in cut sections and in foundations for fill sections.

Measurements will not be made of the suitable material temporarily removed and replaced to facilitate compaction of the material for the full depth shown on the Plans.

Where it is impractical to measure material by the cross-section method due to the erratic location of isolated deposits, acceptable methods involving three-dimensional measurements may be used.

B. Measurements on a Linear Basis. Linear grading shall consist of reshaping the entire existing surface to the typical section as shown on the Plans. When it is specified that an item of excavation is to be measured and paid for on a linear basis, the actual length will be measured along the centerline in the units specified in the Contract for linear grading.

C. Measurement of Excavation Items on a Weight or Truck Measurement Basis. An item of excavation may be specified to be measured and paid for on a weight or truck measurement basis. When a weight or truck measurement basis is specified, the material will be weighed or measured in accordance with Section 109.

D. Measurement of Embankments. When embankment is specified in the Contract for payment as a separate bid item, accepted quantities for payment will be measured in place by the average end area method. The volume so constructed will be computed in cubic yards by the Engineer from the dimensions of the embankment cross-sections and the depths below the completed grade to which this method of construction applies. It will be the Contractor's responsibility to furnish the number of cubic yards of material actually required to meet the Plan typical cross-sections. No allowances will be made for surplus material outside the limits of the typical cross-sections or for any materials or work required to correct settlement, shrinkage or swell of the embankments. No deductions for the volume of culverts, manholes and the like will be made.

Where the Contract does not specifically provide for payment for embankment, the work or embankment construction will not be paid for as such but will be considered incidental to the various classifications of excavation.

E. Pre-splitting of Rock. When specified in the Contract, pre-splitting of rock will be measured by the linear foot of drilling completed and approved.

202.06 BASIS OF PAYMENT. Accepted quantities of excavation and embankment, measured as provided above, will be paid for at the contract unit price for:

(A)	Common Excavation	Cu. Yd.
(B)	Rock Excavation	Cu. Yd.
(C)	Unclassified Excavation	Cu. Yd.
(D)	Muck Excavation	Cu. Yd.
(E)	Unclassified Borrow	Cu. Yd.
(F)	Select Borrow	Cu. Yd. or Ton
(G)	Embankments	Cu. Yd. or Ton
(H)	Linear Grading	Sta. or Mi.

which shall be full compensation for furnishing all materials, equipment, labor and incidentals to complete the work as specified.

When water is not specified as a pay item in the contract, the water used will not be measured or paid for but will be incidental to the work.

203.00 TEST ROLLING

203.01 DESCRIPTION. This work shall consist of the test rolling with heavy pneumatic tired rollers when shown on the Plans or required by the Specifications.

203.02 MATERIALS. In the event test rolling discloses soft, yielding or otherwise unstable areas, such areas shall be corrected by removing all unsuitable material and replacing it with suitable material. The satisfactory correction of any area shall be demonstrated by test rolling of the corrected area.

203.03 EQUIPMENT. Heavy pneumatic tired rollers shall have a minimum of 4 wheels abreast equipped with pneumatic tires of such size and ply that tire pressures shall not be less than 50 + 5 psi for rolling operations. The roller wheels and axles shall be so designed that each wheel will carry an approximately equal load when the roller is operated over uneven ground. The centers of the wheels shall be spaced at not more than 1¾ times the rated tire width of a single tire. The roller shall have a loading platform suitable for loading with ballast sufficient to obtain a total roller weight of not less than twelve (12) tons. The Contractor shall furnish the Engineer with certified weights of the empty roller and weights of the ballast. There shall be a metal plate attached to the roller showing the tare weight and capacity of the load box.

The motivating equipment shall be capable of operation within the limits of the Specification and so constructed that it can be turned without damage to the work being tested. Rolling equipment shall be approved by the Engineer.

203.04 CONSTRUCTION METHODS. The area to be tested shall be rolled with not less than 6 passes or 3 complete coverages. The roller shall be operated at speeds between 2 and 10 miles per hour as directed by the Engineer.

In every case when test rolling is called for on embankment, the sub-grade in both cuts and fills shall be tested, and where the original ground which is to be the foundation of an embankment is accessible to the roller, as determined by the Engineer, this area shall also be tested.

203.05 METHOD OF MEASUREMENT. Test rolling will not be measured for payment. All equipment, labor, water and incidentals as may be required shall be included in the unit price bid on the items for which test rolling is designated.

205.00 SALVAGING TOPSOIL

205.01 DESCRIPTION. This work shall consist of salvaging available natural topsoil from areas of excavation and embankment, stockpiling and/or placing material on the completed areas as shown on the Plans or designated by the Engineer.

205.02 MATERIALS. The salvaged soil shall consist of the surface layer. In all cases, the top one inch of the soil surface shall be a part of the salvage material. The soil shall be salvaged from only those areas shown on the Plans or approved by the Engineer.

205.03 EQUIPMENT. The equipment for salvaging, stockpiling and spreading the soil shall be approved by the Engineer. The equipment for rolling shall conform to Subsection 230.03.

205.04 CONSTRUCTION METHODS. All areas from which soil is to be salvaged shall be cleared of brush, weeds, tall grasses, or other objectionable material such as rock or shale. The soil to be salvaged shall be excavated to a depth of approximately six inches for the full width of excavation and embankment areas unless otherwise determined by the Engineer.

Salvaged topsoil to be stockpiled shall be placed outside of the construction stakes in such a manner that the maximum amount of material may be recovered. The Contractor shall avoid excavating below the original ground surface when removing the stockpiled material.

Type A Salvaged Topsoil. The excavation and embankment areas shall be finished in reasonably close conformity to the lines and grades shown on the Plans or established by the Engineer. Slopes and disturbed areas to be covered with the salvaged soil as shown on the Plans shall be scarified on the contour with approved equipment, prior to placing the salvaged topsoil, and in a manner approved by the Engineer. Prior to placing the salvaged soil, the fertilizer specified shall be applied at the rate shown on the Plans. When satisfactory results can be obtained, disking for slope scarification and incorporation of fertilizer may be accomplished in one operation. The salvaged soil shall be spread approximately 5 inches thick unless otherwise directed by the Engineer. Immediately after spreading, the areas shall be rolled.

Type B Salvaged Topsoil. Type B Salvaged Topsoil shall be that material to be used in accordance with Method B Broadcast Sprigging Operations in Subsection 230.04 E. Prior to placing the Salvaged Topsoil, the fertilizer specified shall be applied at the rate shown on the Plans. The topsoil shall be stockpiled in a manner approved by the Engineer in those areas shown on the Plans or determined by the Engineer.

205.05 METHOD OF MEASUREMENT. Both Type A and Type B Salvaged Topsoil shall be measured by the cubic yard in accordance with Subsection 109.01 A.

Additional or second handling as defined in Subsection 202.04 A. will not be measured for payment. Type A Salvaged Topsoil will be measured as fifty percent complete when the material has been removed from areas of excavation and embankment.

205.06 BASIS OF PAYMENT. Accepted Salvaged Topsoil Type A or B, measured as provided above, will be paid for at the contract unit price for:

Type A Salvaged Topsoil	Cu. Yd.
Type B Salvaged Topsoil	Cu. Yd.

which shall be full compensation for furnishing all materials, equipment, labor and incidentals to salvage, stockpile and otherwise handle the materials as shown on the Plans and meet the requirements of these Specifications.

209.00 MACHINE GRADING

209.01 DESCRIPTION. This work shall consist of that class of grading in which the material to be excavated will approximately make the fills, and which can be completed principally by heavy machine blading supplemented with sufficient equipment to accomplish the necessary drifting or hauling, and borrowing.

209.04 CONSTRUCTION METHODS. Machine grading shall include all necessary drifting or hauling of excavated material, plowing, scarifying, blading, removal of stone and boulders, compacting, and shaping to bring the area to a uniform grade and the typical cross-section and approximate grade elevation shown on the Plans. All side slopes and ditches shall be graded and shaped to conform approximately with the typical cross-section designated on the Plans. Unless otherwise shown on the Plans, rock, hard sandstone, shale, or other solid unyielding material shall be excavated and backfilled with acceptable material in accordance with Subsection 202.04 A. Excavation and embankment shall be constructed in accordance with Subsections 202.04 A. and C. of these Specifications.

Unless otherwise noted on the Plans, all normal inlet and outlet channels shall be cleaned to right-of-way line and this work shall be included in the price bid for machine grading. Grading over and adjacent to culverts and bridges in place, or new structures, shall be done as a part of machine grading and must be performed with special care to prevent damage to the structures. Any damage to structures shall be repaired at the Contractor's expense, as directed by the Engineer.

As soon as any portion of the work is graded, it shall be bladed and shaped to secure a smooth surface of uniform cross-section approximately true to line and grade. Blading operations shall be continued thereafter at such times as directed by the Engineer to maintain a satisfactory condition until final acceptance.

All work performed under this item shall be done in a neat and workmanlike manner acceptable to the Engineer.

209.05 METHOD OF MEASUREMENT. Machine grading will be measured by 100 feet stations to the nearest 0.1 station along the centerline.

209.06 BASIS OF PAYMENT. Machine grading, measured as provided above, will be paid for at the contract price for:

Machine Grading Sta.

and such payment shall be full compensation for drifting, or hauling of excavated material, plowing, scarifying, blading, removal of stone and boulders, compacting, shaping, cleaning all normal inlet and outlet channels to right-of-way lines, and for all labor, tools, equipment and incidentals necessary to complete the work as specified.

210.00 OBLITERATING ABANDONED ROAD

210.01 DESCRIPTION. This work shall consist of obliterating designated sections of old road by removing and disposing of surfacing, structures and other items, in reasonably close conformity with the Plans and these Specifications.

210.04 CONSTRUCTION METHODS. This work shall be done after the sections of the old road to be obliterated are no longer needed for traffic.

Pavement and base courses shall be broken and removed in accordance with Section 619. Steel bridges, culvert pipe, guard rail, posts, bridge timber and other items with salvage value, shall be removed without damage and stockpiled or stored within the limits of the project as shown on the Plans. When salvage or use in the work is not shown on the Plans for any items, they shall become the property of the Contractor.

Concrete structures to be removed will be broken out to the ground level or to an elevation to be covered with earth. Broken concrete and debris may be spread out at locations designated by the Engineer and covered with earth to a depth of at least 12 inches, or shall be removed from the site of the work by the Contractor.

After the surfacing, structures and other items have been removed, the old roadbed shall be scarified or plowed and rounded and smoothed by blading or other suitable methods; the ends of embankments and the top of cuts within the existing right-of-way, except in rock shall be graded, sloped and rounded. Ditches shall be filled and the entire roadway graded.

210.05 METHOD OF MEASUREMENT. Obliterating abandoned road will be measured by the station of 100 feet or fraction thereof measured along the center line of the old roadway obliterated.

210.06 BASIS OF PAYMENT. Obliterating abandoned road, measured as provided above, will be paid for at the contract unit price for:

Obliterating Abandoned Road Sta.

and such payment shall be full compensation for removal, disposal and storing all materials with salvage value and for the satisfactory disposal and obliteration of other materials and debris, regarding and shaping the roadway; and for all equipment, tools, labor and incidentals necessary to complete the work as specified.

220.00 TEMPORARY EROSION AND SEDIMENT CONTROL

220.01 DESCRIPTION. This work shall consist of temporary measures and devices to control erosion and sediment within the project limits and to minimize the pollution of rivers, streams, impoundments and private properties. Such measures may include berms, dikes, slope drains, bale barriers, siltation screens, fabrics, sediment filters, sediment basins, fiber mats, netting, gravel, rip-rap, mulches, grasses and other erosion and sediment control devices and methods.

The temporary erosion and sediment controls shall be coordinated with permanent erosion controls to assure economical, effective and continuous control of erosion and sediment throughout the construction and post construction period.

220.03 CONSTRUCTION METHODS. The Contractor shall submit his proposed schedule for accomplishing the temporary erosion control, temporary sediment control and the permanent erosion control work for his clearing and grubbing operations. He shall also submit his proposed method of erosion control on haul roads and borrow pits, and his plan for disposal of waste materials. The work shall not be started until the proposed erosion and sediment control schedules and methods of operations have been reviewed and approved by the Engineer.

The Engineer may increase or decrease the amount of area exposed by construction operations and direct the Contractor to provide immediate temporary or permanent erosion control measures to prevent siltation as determined by field conditions. Temporary or permanent erosion or sediment control measures shall be initiated on excavation or embankment slopes as work progresses unless otherwise directed by the Engineer.

Clearing and grubbing operations shall be scheduled and performed so that grading and permanent erosion control operations can follow immediately. Should seasonal limitations make such coordination and scheduling unrealistic, temporary erosion and sediment control measures shall be required during successive construction stages.

The Contractor shall conform to the following practices and controls:

A. Waste areas and construction areas shall be located and constructed in a manner to prevent sediment from entering streams.

B. Frequent crossing of live streams will not be permitted until temporary crossing structures of non-erodible materials have been constructed and approved by the Engineer. Unless otherwise approved in writing by the Engineer, mechanized equipment shall not be operated in live streams.

C. When work areas are located in or adjacent to live streams, such areas shall be separated from the main stream by a dike or other approved barrier. Care

shall be taken during the construction and removal of such barriers to minimize the siltation of the stream.

D. All waterways shall be cleared as soon as practicable of falsework, piling, debris, or other obstructions placed during construction and which are not a part of the finished work.

E. Drainage water from material stockpiles and plant sites on the right-of-way shall be controlled by sediment basins, filters or other means to reduce the sediment content.

F. The Contractor shall take sufficient precautions to prevent pollution of streams, lakes and reservoirs from fuels, oils, bitumens, calcium chloride or other harmful materials.

G. In the execution of any work within or adjacent to any State or National forest, park or other public lands, the Contractor shall comply with all of the regulations of the appropriate authority having jurisdiction over those lands and in accordance with Subsection 107.12.

Temporary erosion and sediment control measures which are required due to unforeseen construction problems and are not shown on the Plans shall be constructed when directed by the Engineer. Accountability and payment will be in accordance with Subsection 104.03.

221.00 TEMPORARY SEDIMENT CONTROL SLOPE DRAINS

221.01 DESCRIPTION. This work shall consist of the construction, maintenance and removal of temporary slope drains and diversion dikes at locations shown on the Plans or determined by the Engineer.

221.02 MATERIALS. Materials used for construction of slope drains may be flexible tubing, plastic sheeting, plastic screen, burlap, asphalt, pipe or as shown on the Plans. Inlet materials may be wood, pipe end sections or other solid material. Outlets may be constructed of loose rock, brush, straw, waste concrete or pipe end sections.

221.04 CONSTRUCTION METHODS. Diversion dikes shall be constructed in fill sections at the end of each day's operation. At points along the diversion dikes as specified on the Plans or by the Engineer, the Contractor shall construct or extend slope drains at the end of each day's operations. Slope drains shall be constructed from the toe of slope in order that they may be extended as additional fill is completed. Inlets shall be provided with each slope drain. The type of outlet control will be determined by existing conditions, materials available, and in a manner approved by the Engineer.

Slope drains on backslopes shall be placed on the slope as the excavation of the cut area progresses, until the final grade is obtained and permanent controls are in place.

The slope drains and diversion dikes shall be maintained in such a manner as to be free from debris and open to the flow of water. Slope drains may be removed or left in place as determined by the Engineer as the permanent controls are completed and functioning.

221.05 METHOD OF MEASUREMENT. Slope drains will be measured by the linear foot in place. Measurements will be taken only on the completed cut or fill slope when to grade. Inlets, outlets and diversion dikes will be considered as an integral part of the drain.

221.06 BASIS OF PAYMENT. Accepted slope drains, measured as provided above, will be paid for at the contract unit price bid for:

Temporary Slope Drains Lin. Ft.

which shall be full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

222.00 TEMPORARY SEDIMENT CONTROL BALE BARRIERS

222.01 DESCRIPTION. This work shall consist of the construction, maintenance and removal of temporary bale barriers at locations shown on the Plans or determined by the Engineer. Bale barriers shall be used to trap sediment at the toes of slopes, or across ditches and defined waterways.

222.02 MATERIAL. The vegetative materials shall consist of baled straw or baled hay. The bales of straw or hay shall be standard sized rectangular bales approximately 18 x 20 x 36 inches in size and shall be securely bound with wire or twine.

The stakes used to anchor the bales may be hardwood lumber, timber, or metal approximately 36 inches long, of sufficient strength to be driven firmly in the ground.

222.04 CONSTRUCTION METHODS. As slope barriers, the bales shall be placed end to end and staked down, a maximum distance of 4 feet out from the top of the slope. At locations determined on the site, a bale will be left out and a pile of loose rock or other acceptable filtering material shall be placed in the opening to approximately 2/3 of the height of the bale to act as a spillway type outlet.

As ditch checks, the bales shall be placed in a staggered position across the defined waterways and staked in place. The bales shall be placed up the slope on either side of the flow line, higher than the elevation of the bale in the center of the waterway.

The Contractor shall keep the barrier in good condition by replacing broken or damaged bales immediately after damage occurs. Removal of silt when specified by the Plans shall be measured and paid for in accordance with Section 226.

Bale barriers may be removed or left in place at the discretion of the Engineer.

222.05 METHOD OF MEASUREMENT. Bale barriers will be measured by the linear foot in place. Measurement will include the areas of the spillways, but the spillway material will not be measured as a separate item for payment. Measurements for Type I Bale Barriers will be taken along the ground line perpendicular to the flow line.

222.06 BASIS OF PAYMENT. Accepted bale barriers, measured as provided above, will be paid for at the contract unit price bid for:

Temporary Bale Barrier	Lin. Ft.

which shall be full compensation for furnishing all materials, labor, equipment and incidentals to complete the work as specified.

223.00 TEMPORARY SEDIMENT CONTROL SILTATION SCREEN

223.01 DESCRIPTION. This work shall consist of the construction, maintenance and removal of siltation screens at locations shown on the Plans or as determined by the Engineer. A siltation screen is a barrier constructed specifically to trap sediment and debris.

223.02 MATERIALS. The framework shall be of any type material, capable of supporting various filtering materials and withstanding the force of water flowing through the screen.

Filtering materials may be burlap, wire screen, wire mesh, woven or non-woven fabrics, expanded metal, plastic or plastic sheeting.

The maximum size opening for any type screen, mesh or other filtering material shall not exceed ¼ inch.

223.04 CONSTRUCTION METHODS. Siltation screens shall be installed at least 6 feet from the right-of-way fence. Framework supports shall have a maximum spacing of 10 feet center to center, or as shown on the Plans. Filter materials shall be secured to the ground between supports to prevent the material from curling or rolling up. Siltation screens may be removed or left in place as determined by the Engineer.

Siltation screens shall be kept free of debris that would damage the filtering material or impede the flow of water. Sediment removal when specified by the Engineer will be measured for payment in accordance with Section 226.

223.05 METHOD OF MEASUREMENT. Siltation screens as shown on the Plans or established by the Engineer will be measured by the linear foot in place.

223.06 BASIS OF PAYMENT. Accepted siltation screens, measured as provided above, will be paid for at the contract unit price bid for:

Temporary Siltation Screen	Lin. Ft.

which shall be full compensation for furnishing all materials, labor, equipment and incidentals to complete the work as specified.

224.00 TEMPORARY SEDIMENT CONTROL FILTERS

224.01 DESCRIPTION. This work shall consist of the construction, maintenance, and removal of temporary sediment filters. Sediment filters shall be constructed to trap silt and debris prior to its entry into any drainage inlet or other similar structure which empties into a waterway or its subsidiary.

224.02 MATERIALS. The bales of straw and stakes shall conform to the requirements of Section 222.

Materials for sediment filter may be any type of non-erodible material available, such as: loose rock, broken concrete, or other salvageable materials.

224.04 CONSTRUCTION METHODS. Sediment filters shall be constructed as soon as the inlets are completed sufficiently to receive runoff water, at locations shown on the Plans or determined by the Engineer.

The bales for sediment control shall be placed and staked tightly together in such a manner to cause the waterflow to be slowed and go over the bales, prior to entering the inlet.

The non-erodible filter material shall be placed around the inlet, between the inlet and the flow of water. The placement of this material shall be in such a manner that the water will be slowed and then flow over and through the material prior to entering the inlet.

The Contractor shall keep the filters (bales or other materials) in good condition by repairing any damage or break in the filters immediately. Removal of silt, when specified by the Plans, shall be measured and paid for in accordance with Section 226.

Sediment filters may be removed as determined by the Engineer.

224.05 METHOD OF MEASUREMENT. Sediment filters will be measured by the number of units in place.

224.06 BASIS OF PAYMENT. Accepted sediment filters, measured as provided above, will be paid for at the contract unit price bid for:

Temporary Sediment Filter	Ea.

which shall be full compensation for furnishing all materials, labor, equipment and incidentals to complete the work as specified.

225.00 TEMPORARY SEDIMENT CONTROL BASINS

225.01 DESCRIPTION. This work shall consist of the construction, maintenance, and removal of temporary sediment basins at locations shown on the Plans or determined by the Engineer. The approximate size and shape shown on the Plans may vary depending on the soil type, the drainage area, and available right-of-way at the exact construction locations selected by the Engineer.

225.02 MATERIALS. Materials used for both the inlet and outlet flows of the sediment basins may be loose rock of sufficient size to withstand anticipated water velocity displacement or other non-erodible materials approved by the Engineer. When Type I Sediment Basins are specified, the outflow pipe shall be at least a 12-inch diameter pipe installed in a manner approved by the Engineer.

225.04 CONSTRUCTION METHODS. Inlets shall be shaped to confine the water to the defined channel as it enters the basin. Outlets shall be constructed to slow the velocity of water so sediment will be retained in the sediment basin. Material excavated shall be used on the sediment basin dikes or stockpiled as directed by the Engineer.

Sediment basins shall be maintained by the Contractor until permanent erosion control has been completed and effectively operational. Sediment removal, when specified by the Engineer, will be measured for payment in accordance with Section 226.

225.05 METHOD OF MEASUREMENT. Sediment basins will be measured by the number of units constructed as specified above. Inlets and outlets will be considered an integral part of the basin.

225.06 BASIS OF PAYMENT. Accepted sediment basins, measured as provided above, will be paid for at the contract unit price for:

Temporary Sediment Basin	Ea.

which shall be full compensation for furnishing all materials, labor, equipment and incidentals to complete the work as specified.

226.00 TEMPORARY SEDIMENT REMOVAL

226.01 DESCRIPTION. This work shall consist of removing sediment which has become trapped by the various temporary or permanent erosion and sediment control devices.

226.04 CONSTRUCTION METHODS. Sediment shall be removed at the direction of the Engineer from the control devices. After sediment removal has been completed, the control device shall be left in the operable condition for which it was designed. Any damage to the control devices shall be replaced at the Contractor's expense. Materials removed shall be disposed of at locations and in a manner approved by the Engineer.

226.05 METHOD OF MEASUREMENT. The number of times that the sediment needs to be removed will be determined by the Engineer. Sediment removal will be measured by the cubic yards of material removed and disposed of in an approved manner.

226.06 BASIS OF PAYMENT. Accepted sediment removal, measured as provided above, will be paid for at the contract unit price bid for:

Temporary Sediment Removal Cu. Yd.

which shall be full compensation for furnishing all materials, labor, equipment and incidentals to complete the work as specified.

228.00 NYLON EROSION CONTROL MAT

228.01 DESCRIPTION. This work shall consist of furnishing and installing a nylon erosion control mat for ditch lining and slope protection in accordance with these Specifications and within reasonable close conformity with the lines and dimensions shown on the Plans or established by the Engineer.

228.02 MATERIALS. Materials shall meet the requirements specified in the following Subsections of Section 700 – Materials.

Nylon Erosion Control Mat	735.05
Mat Fasteners	735.06
Seed	735.04

228.03 EQUIPMENT. The Contractor shall furnish equipment required for satisfactory progress and completion of acceptable work in accordance with Subsection 108.06.

228.04 CONSTRUCTION METHODS.

A. Placing Mat.

1. *General.* All surfaces to be protected with nylon erosion control mat shall be graded, shaped and finished so that the surfaces are stable, firm and free of rocks or obstructions which would prevent the mat from lying in direct contact with the soil surface.

2. *Ditches.*

   2.1 Three widths of mat will be required for the standard ditch placement: the center width placed first, then the two side widths. Lap joints of 3 inches shall be used.

   2.2 At the terminal ends of the ditch, the mat shall be buried at least 12 inches vertically in an anchor slot dug into the soil. The mat shall be secured in the anchor slot by fasteners prior to backfilling the slot. The backfilled soil shall be firmly compacted in the anchor slot.

   2.3 On ditches with grades exceeding 6 percent, a 6 inch deep check slot shall be installed every 25 feet and the mat secured in the check slots by fasteners.

   2.4 Seeding, Ditches only. When mats are installed and approved during the normal out of planting season, common Bermuda grass seed at the rate of 6 lbs. per acre shall be uniformly seeded on the exposed areas of soil beneath the mat.

During the planting season, the specified plant material (sodding, sprigging, or seeding) shall be completed prior to placing the mat in ditches.

3. *Slopes.*

3.1 When placing mat on slopes, the top end shall be buried at least 12 inches vertically in an upper anchor slot and the bottom end shall be buried at least 6 inches in the lower anchor slot. The mat shall be secured in the anchor slots by fasteners, prior to backfilling the slot. The backfill soil shall be firmly compacted in the anchor slots.

3.2 The mat shall be installed in a manner that will allow the downgrade edge to overlap the previously laid strip. Lap joints of 3 inches shall be used.

3.3 On slopes exceeding 60 feet in slope length, a 6 inch deep check slot shall be installed every 40 feet and the mat secured in the check slot by fasteners.

3.4 During the planting season, the specified plant material shall be completed prior to placing the mat on the slopes. During the out of planting season, the mat shall be placed as temporary and permanent protection until the specified plant material can be applied during the proper season.

4. *End of Roll.* The ends of the roll of the mat shall overlap 36 inches with the upslope end on top.

B. Fastening the Mat. The normal spacing for fastening the mat shall be 36 inches along the edge lap joint and down the center of each width of mat. The center fasteners shall be offset 18 inches from the edge fasteners.

The mat shall be held firmly in place with fasteners shown on the Plans. Fasteners shall be pressed firmly against the mat and securely driven into the underlying soil.

The mat shall be fastened across the width, in anchor slots, in check slots and end overlaps on 18 inch centers.

C. Seeding. When seeding is required in ditches, due to the out of planting season, it shall be applied by Seeding Method A, as specified in Subsection 232.04 B., or Hand Broadcasting.

D. Maintenance. The Contractor shall be responsible for the proper maintenance of the area until the entire project has been completed. This shall include refilling of washed out areas, reseeding, and replacing mat.

228.05 METHOD OF MEASUREMENT. Nylon erosion control mat installed in place, including the seeding, shall be measured by the square yard of area covered.

228.06 BASIS OF PAYMENT. Accepted quantities, measured as provided above, will be paid for at the contract unit price for:

Nylon Erosion Control Mat	Sq. Yd.

which shall be full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

229.00 DITCH LINER PROTECTION

229.01 DESCRIPTION. This work shall consist of furnishing and installing excelsior mat or solid slab sod as ditch liner protection in accordance with these Specifications and in reasonable close conformity with the areas and locations shown on the Plans or established by the Engineer.

229.02 MATERIALS.

A. Excelsior Mat. This material shall meet the requirements for Subsection 735.05 D.

B. Solid Slab Sod. This material shall meet the requirements for Subsection 735.02 B. 1.

C. Mat Fasteners. Mat fasteners used for anchoring the excelsior mat shall meet the requirements for the type specified on the Standard Drawings

229.03 CONSTRUCTION METHODS.

A. Excelsior Mat. The mat shall be placed as shown on the Plans so that the fibers are in contact with the soil and the netting is on the top. A single strip of mat shall be placed parallel to each side of the ditch liner.

B. Solid Slab Sod. The sod shall be placed as shown on the Plans and in accordance with Subsection 230.04 A. One-hundred, eighty-five gallons of water and five pounds of 10-20-10 fertilizer shall be applied per 100 linear feet of ditch liner.

C. Fastening the Mat. After placement, the excelsior mat shall be held firmly in place with fasteners as shown on the Plans. Fasteners shall be pressed firmly against the mat and securely driven into the underlying soil.

D. Repairs. If the ditch liner protection material becomes damaged, it shall be replaced in kind promptly. If the soil beneath or surrounding the ditch liner becomes eroded, the area shall be restored to the original condition and grade prior to placement of the protection material.

229.05 METHOD OF MEASUREMENT. Ditch liner protection will be measured by the linear foot of ditch liner in place. All materials and work necessary for repairs will not be measured for payment.

229.06 BASIS OF PAYMENT. Ditch liner protection, completed and accepted in place and measured as provided above, will be paid for at the contract unit price for:

Ditch Liner Protection	Lin. Ft.

which shall be full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

230.00 SODDING AND SPRIGGING

230.01 DESCRIPTION. This work shall consist of furnishing and planting viable Bermuda grass sod or sprigs in accordance with these Specifications and in reasonable close conformity with the areas and locations shown on the Plans or as established by the Engineer.

230.02 MATERIALS. Materials shall meet the requirements specified in the following Subsections of Section 700 – Materials.

Bermuda Grass Solid Slab Sod	735.02
Bermuda Grass Mulch Sod	735.02
Bermuda Grass Mulch Sprigging	735.02
Bermuda Grass Row Sprigging	735.02
Bermuda Grass Broadcast Sprigging	735.02

Water shall be free from harmful quantities of toxic salts or other substances that might interfere with the establishment or future subsistence of turf or plants.

230.03 EQUIPMENT. The Contractor shall furnish equipment in accordance with Subsection 108.06 and as prescribed herein.

A. Rolling Equipment. Unless otherwise approved by the Engineer, the machine for compacting mulch sodding or mulch sprigging shall be equipped with a single or tandem axle corrugated roller. It shall weigh not less than 125 or more than 300 pounds per foot of rolling width for each axle. It shall be operated approximately parallel to the contour of slopes.

B. Watering Equipment. Equipment shall apply water as specified without operating on the slopes. Water tanks shall be calibrated. If a sprinkler type irrigation system is used, the Contractor shall furnish approved equipment for metering the water.

C. Fertilizer Equipment. Equipment shall conform to Subsection 234.03 B.

D. Sprigging Equipment.

1. *Sprig Harvester.* This machine shall have been designed and manufactured to harvest sprigs. It shall excavate sprigs from the soil, remove excess adhering soil and load the clean sprigs into a trailing vehicle having solid sides, all in one simultaneous operation.

2. *Sprig Planter for Broadcast Sprigging.* This machine shall have been designed and manufactured to broadcast and plant sprigs. It shall be equipped with an adjustable mechanism for accurately distributing sprigs at specified rates on the surfaces to be planted. It shall be equipped with straight disks spaced on 2-inch centers on tandem axles. The rear disk

wheels shall be placed so they trail between the front disks. The machine shall have an accurate and adjustable mechanism for adjusting the depth of sprig placement. The broadcasting and pressing operation shall be performed simultaneously.

3. *Sprig Planter for Row Sprigging.* The equipment for row planting of sprigs shall automatically open the furrows, place the sprigs in the furrow, then cover the sprigs and furrow with soil all in one continuous operation.

230.04 CONSTRUCTION METHODS.

A. Solid Slab Sodding Operations.

1. Preparation of areas to be sodded shall include filling, reshaping of eroded areas, cleaning ditches, refinishing slopes and medians to the established typical grading section.

2. The area shall be cleared of all litter and debris.

3. The location, placement and seasonal requirements for areas to be solid slab sodded will be as shown on the Plans.

4. The slabs of sod shall be placed soil side down. They shall be placed in rows, which on slopes shall run parallel to the roadway. Each slab shall fit tightly against the edge of adjoining slabs and shall be placed so that the vertical joints are not continuous across adjoining horizontal rows. Voids shall be filled with additional sod. All slabs shall be thoroughly pressed into firm contact with the soil beneath.

5. After the slabs have been placed, the sodded area shall be thoroughly watered. When sufficiently dry, additional voids shall be filled with good soil and watered again. The area shall then be watered daily for a period of at least 7 days after placement. Remaining watering operations shall conform to Subsection 230.04 G.

6. Fertilizer shall be applied in accordance with Subsection 230.04 H.

B. Mulch Sodding Operations.

1. Preparation of areas to be mulch sodded shall include filling, reshaping eroded areas, cleaning ditches and refinishing slopes and medians to the established typical grading section.

2. Prior to placing the mulch sod, the cut and fill slopes shall be tilled to a depth of at least 4 inches.

3. The sod shall be placed on the prepared areas and spread uniformly to such a depth that when thoroughly compacted, with a roller conforming to Subsection 230.03, a thickness of 3 inches shall be obtained. Rolling of slopes shall be carried out along approximate contour lines unless otherwise directed.

4. The mulch areas shall be watered immediately after rolling. The remaining watering operation shall conform to Subsection 230.04 G.

5. Fertilizer shall be applied in accordance with Subsection 230.04 H.

C. Mulch Sprigging Operations.

1. Preparation of areas to be mulch sprigged shall be thoroughly tilled to a depth of at least 4 inches and all foreign material removed.

2. Fertilizer shall be applied in accordance with Subsection 230.04 H.

3. Mulch sprigging material shall be spread over all areas where topsoil exists at the rate of one cubic yard of material per 24 square yards or approximately 1.5 inches thick. All dried out material will be rejected.

4. Immediately after spreading, the mulch sprigging material shall be thoroughly disked into the surface without disturbing the uniform distribution.

5. After disking, the area shall be rolled along the approximate contour lines with a corrugated roller, as specified in Subsection 230.03, until the surface presents a level appearance. In inaccessible places and locations where rolling is impracticable, the Contractor shall hand tamp such areas in an acceptable manner. Tooth harrows, rakes, drags with spikes and other implements which would tear out the sprigs shall not be used.

6. The areas shall be watered immediately after rolling.

D. Row Sprigging Operations.

1. Preparation of areas to be row sprigged shall consist of tilling the specified areas to a depth of at least 4 inches with an offset disk plow or a tandem disk plow.

2. Fertilizer shall be applied in accordance with Subsection 230.04 H.

3. The sprigs shall be planted with an automatic sprig planter conforming to Subsection 230.03 except that hand planting may be used in areas where the sprig planter cannot operate. The sprigs shall be planted in furrows

parallel to the approximate contour lines of the slopes. The distance between furrows shall not exceed 20 inches on centers. The sprigs shall be placed approximately 3 inches deep at the rate of approximately 30 bushels per acre with the ends of sprigs meeting or overlapping.

4. The sprig planter shall not be operated in excess of 4 miles per hour.

5. Immediately following planting, the soil shall be compacted by rolling. The rolling of slopes shall be along approximate contour lines. All sprigged areas shall be rolled the same day they are planted.

6. The row sprigged areas shall be watered immediately after rolling. The remaining watering operation shall conform to Subsection 230.04 G.

E. Broadcast Sprigging Operations.

1. Broadcast Sprigging Method A. Preparation of areas for Broadcast Sprigging Method A shall consist of tillage with either a tandem disk plow, or an offset disk plow until the areas are suitable for sprig planting. The depth of tillage shall be approximately 6 inches. If rains or other conditions should pack the soil before being planted, the tillage shall be repeated. At least 80 bushels of sprigs shall be planted per acre unless otherwise shown on the Plans.

The sprigs shall be broadcast evenly and uniformly on the soil surface and immediately pressed into the soil. The planting depth mechanism shall be adjusted to cause the disk wheels to penetrate 4 inches deep. Within two hours after the sprigs have been planted, the areas shall be disked to a depth of approximately 3 inches with either a tandem or offset disk plow.

2. Broadcast Sprigging Method B. At least 12 bushels of sprigs shall be thoroughly incorporated into 100 cubic yards of stockpiled Method B salvaged topsoil. A method approved by the Engineer shall be used to meter and distribute the sprigs into the stockpiled topsoil. During the mixing operation, both the soil and sprigs shall be kept moist. Preparation of areas for Broadcast Sprigging Method B shall consist of scarifying on the contour, with approved equipment, the designated areas shown on the Plans prior to placing the soil-sprig mixture.

The soil-sprig mixture shall be spread on the designated areas 5 inches thick, within 4 hours of manipulation.

3. Fertilizing, Rolling and Watering. The following procedures shall be used for both Method A and Method B of Broadcast Sprigging:

a. Fertilizer shall be applied in accordance with Subsection 230.04 H.

b. The planted areas shall be rolled and compacted with equipment conforming to Subsection 230.03 A. Rolling of slopes shall be along approximate contour lines and in a manner approved by the Engineer.

c. The sprigged areas shall be watered immediately after rolling. Remaining watering operations shall conform to Subsection 230.04 G.

F. Planting Season and Weather Restrictions.

1. Permanent erosion control operations shall be performed only during the seasonal periods shown on the Plans. As cut and fill sections are brought to grade and constructed to the lines and dimensions shown on the typical sections, the salvaged topsoil shall be promptly placed, finished and the specific erosion control item or items shall be constructed, if in accordance with seasonal limitations, as shown on the Plans. Regardless of the dates specified, the work shall be suspended during excessively wet or dry weather conditions that would cause unsatisfactory results.

2. This work shall begin promptly and shall proceed without undue delay until completed or until interrupted by the out-of-season period. When construction of an operation is interrupted by the out-of-season period, construction shall be resumed immediately with the beginning of the in-season period for that operation. During the out-of-season period, the Contractor shall be responsible for repair and maintenance as specified in Subsection 230.04 I.

3. Temporary erosion control operations shall be applied on all cuts, fills, and other disturbed erodible areas where the permanent operation was interrupted by seasonal limitations. This work shall begin immediately after placement of topsoil or as otherwise directed by the Engineer and shall continue without undue delay.

G. Soil Moisture Requirements.

1. Soil moisture shall exist throughout the zone from one inch below the surface to at least 5 inches below the surface at the time of planting. The required moisture content of the soil may be estimated and judged closely by the hand-squeeze test. The soil should readily form a tight cast when squeezed in the hand. The cast should break into two pieces without crumbling and without leaving excess water on the hand after casting.

2. Sodded or sprigged areas shall be watered for 30 days after planting unless otherwise directed. The depth of watering with moving equipment shall be carried out on short sections until the soil is moist throughout the top one inch.

3. The application rate and fineness of the spray shall be adjusted according to wind velocity to provide uniform infiltration without appreciable erosion or excessive runoff.

H. Fertilizer Operations.

1. Fertilizer shall not be placed on hard or glazed surfaces. Fertilizer shall be applied at the rates shown on the Plans, but shall not exceed one (1) pound actual nitrogen per 1000 sq. ft.

2. When satisfactory results can be obtained, disking for soil preparation, weed removal, and incorporation of fertilizer may be accomplished in one operation.

3. If a fertilizer containing phosphorous is specified, one-half of the fertilizer shall be applied before placement of solid slab sod, mulch sod, mulch sprigging, row sprigging or broadcast sprigging and shall then be incorporated into the soil by disking. After placement and compaction of the sod, the remaining one-half of the fertilizer shall be applied and immediately incorporated into the soil with water.

4. Fertilizer containing nitrogen only shall be applied after the sodding and sprigging operations have been completed.

I. Repair and Maintenance. The Contractor shall be responsible for repairs and maintenance of areas designated for sodding or sprigging until all work on the Contract or designated portion thereof has been completed and approved for final acceptance.

1. Repair. This work shall include recovery, replacement and compaction of soil that has been removed by erosion, filling and reshaping eroded areas, cleaning ditches, and refinishing slopes and medians to the approximate typical grading section shown on the Plans or as determined by the Engineer. Repair shall include re-sodding or sprigging, re-fertilizing, and watering damaged areas, which shall be performed during the specified planting season.

2. Maintenance. This work shall consist of weed control by mowing, hand cutting, herbicides, or other approved methods. Weed growth on sodded areas shall be removed as often as determined by the Engineer. If herbicides are used, they shall be used in accordance with label instructions and shall have prior approval from the Engineer. Mowing shall be in accordance with Section 241.

230.05 METHOD OF MEASUREMENT.

A. Solid Slab Sodding, Mulch Sodding, Mulch Sprigging, Row Sprigging, Broadcast Sprigging Method A and Method B, will be measured by the square yard of sodded area.

B. Watering will be measured by the 1,000 gallons of water. The water will be measured as delivered in calibrated tanks, or by pipe line with a reasonably accurate method of measuring.

C. Fertilizer will be measured and paid for in accordance with Section 234.

D. Mowing, when directed by the Engineer, shall be measured and paid for in accordance with Section 241.

230.06 BASIS OF PAYMENT. Accepted sodding, measured as provided above, shall be paid for at the contract unit price for:

Solid Slab Sodding	Sq. Yd.
Mulch Sodding	Sq. Yd.
Mulch Sprigging	Sq. Yd.
Row Sprigging	Sq. Yd.
Broadcast Sprigging (Method A)	Sq. Yd.
Broadcast Sprigging (Method B)	Sq. Yd.
Watering	M. Gal.

which shall be full compensation for furnishing all materials, equipment, labor and incidentals to complete the work as specified.

231.00 PLANTING

231.01 DESCRIPTION. This work shall consist of furnishing, handling, planting and establishing plant materials in accordance with these Specifications and in reasonably close conformity with the areas and locations shown on the Plans or established by the Engineer.

231.02 MATERIALS. Materials shall meet the requirements specified in the following Subsections of Section 700 – Materials.

Plant Materials	735.03
Planting Soil Mix	735.03
Vegetable Compost	735.03
Asphaltum Tree Paint	735.03
Tree Wrap	735.03

Water shall be free from harmful quantities of toxic salts or other substances that might interfere with the establishment and growth of plants.

231.03 EQUIPMENT. The Contractor shall furnish equipment meeting the requirements of Subsection 108.06 and as prescribed herein.

The Contractor shall furnish an approved tree digging machine for the machine planting of trees with all the necessary accessories capable of digging, lifting, carrying and depositing into an excavation (previously dug by the same or identical type machine), a plant, intact, without damage to the ball of soil or the plant.

231.04 CONSTRUCTION METHODS.

A. General.

1. All work shall be performed under the supervision of a competent and experienced nurseryman.

2. The Contractor shall take adequate precautions to protect all new plants and existing trees, shrubs, and turf from damage or injury before, during and after construction and plant establishment operations.

3. Bare-rooted plants will be designated by BR and the balled and burlapped plants by B&B. Canned plants are those which are container grown.

B. Care and handling of Plants.

1. While BR or B&B plants are being transported to the project site, moved to and from the heeling-in beds, being distributed in planting beds, or awaiting planting after distribution, the Contractor shall protect the roots and balls from drying out.

2. BR plants, if not planted within 2 hours after delivery to the project site or planting location shall be heeled-in, in moist soil or sawdust in accordance with acceptable horticultural practices.

3. B&B plants, if not planted within 24 hours after delivery to the project location, shall have the balls adequately protected with moist soil or sawdust until removed for planting.

4. Containerized plants shall be protected in the same manner as B&B plants.

5. All heeled-in plants shall be properly maintained by the Contractor until planted. Plants remaining heeled-in during the summer will not be acceptable.

6. In digging, loading, unloading, planting and other handling operations, the Contractor shall exercise utmost care to prevent injuries to the roots, stems or branches of the plants. The solidity of the ball of the B&B plants shall be carefully preserved. B&B plants shall be handled by the rootball, not by the stems or trunk. The Contractor shall replace, at his own expense, any plants that are rendered unfit for planting.

7. Collected plants shall be dug with extreme care in a manner satisfactory to the Engineer. Digging, transporting and replanting of collected plants shall be performed in accordance with acceptable horticultural practices. An approved tree digging machine may be used to dig, transport and plant collected plants.

8. Unless plants are dug, transported and planted by approved tree-digging machines, all evergreens shall be balled and burlapped (B&B) except when they are container (canned) grown and are still in the container. Deciduous plants may be either B&B, BR, or canned, as specified on the Plans.

C. Seasonal Planting Restrictions.

1. Planting operations for deciduous plants shall be restricted to the period from November 25th to the following March 31st and the planting operations for evergreen plants shall be restricted to the period from October 1st to the following May 15th.

2. Regardless of the specified planting dates, the work shall be suspended when the temperature is below 25° F., the wind velocity over 25 miles per hour, the natural ground or topsoil is frozen or too wet, or the continuation of prevailing weather would likely cause unsatisfactory results.

3. The Contractor shall complete his planting operations as early in the specified season as practicable.

4. Plants that do not meet specifications for any reason after planting shall be removed immediately, and if within the current planting season, be replanted immediately, or if out of planting season, be replanted the following season all in accordance with these Specifications.

D. Plant Locations.

1. The plant locations shown on the Plans are approximate and may be adjusted to suit actual field conditions as determined by the Engineer.

E. Plant-Hole Excavation.

1. Unless plant holes are dug with an approved tree digging machine, all plant holes shall be cylindrical in shape with approximately vertical sides. Excavations in rocky subsoil or any impervious material that would hamper proper drainage and would likely retard normal root development and growth shall be loosened by methods approved by the Engineer.

2. Holes shall be excavated sufficiently deep to provide space for at least 6 inches of planting soil mix below the roots or balls as the case may be, and to let the plant in its final position stand slightly deeper than it stood in the nursery or collecting field. Regardless of the minimum size holes shown in the following table for BR plants, the diameters shall be large enough to allow at least 8 inches of backfill between the outside tip of fully spread roots and the sides of the hole.

SIZE OF PLANT (Inches)	MINIMUM SIZE OF HOLE EXCAVATION (Inches)	
	DIAMETER	DEPTH
Trees up to 1 in. caliper	36	30
Trees up to 2 in. caliper	44	36
Trees over 2 in. caliper	15x caliper	12x caliper
Shrubs 24-36 high or smaller	30	18
Shrubs 36-48 high or larger	36	18
Roses or Vines	18	18

Caliper determinations shall be in accordance with current USA Standard for Nursery Stock USAS Z 60.1. The minimum size holes for B&B plants are as follows:

BALL DIAMETER (Inches)	MINIMUM HOLE DIAMETER (Inches)
Less than 12 More than 18	Ball diameter 16 Twice the ball diameter
BALL HEIGHT (Inches)	**MINIMUM HOLE DEPTH (Inches)**
Less than 18 More than 18	Ball height 8 Ball height 10

3. Plant holes for potted or canned plants shall be 3 times the diameter of the container and 6 inches deeper than the height of the container, unless otherwise specified on the Plans.

4. When plants are to be grouped together in a plant bed, the entire area of the plant bed shall be loosened and clods broken to a depth of at least 6 inches prior to excavating plant holes.

5. Excess material from plant-hole excavations shall be thinly spread over the surrounding area, forming a neat appearance. Material of such a nature that cannot be spread shall be disposed of in a manner approved by the Engineer.

F. Pruning.

1. Before planting, the root systems of all BR plants shall be examined and any bruised or broken parts shall be cut off smoothly.

2. The tops of all plants shall be pruned in accordance with acceptable horticultural practices, as determined by the type, shape, size and condition of the plant.

3. All cut surfaces one inch or larger in diameter shall be painted with approved orange shellac.

G. Planting Procedures.

1. The subsoil in the bottom of the plant hole shall be loosened 6 inches deep. Then a layer of planting soil mix 6 inches or more in depth shall be placed and firmed in the bottom of the hole, to provide correct final planting elevation, before the plant is placed.

2. The plant shall then be placed in the prepared hole at the proper position with regard to depth, alignment, final grade of surrounding ground level, and vertical placement of the trunk or stems and this position shall be maintained during all subsequent backfilling and watering operations. The plants shall stand, at the time of completion of the planting operation slightly deeper than they stood in the nursery or collecting field, except that spreading evergreen plants shall stand slightly higher than stood in the nursery.

3. After BR plants are placed in the proper position, the hole shall be backfilled with friable planting soil mix conforming to Subsection 735.03 which shall be placed in thin layers and carefully worked and firmed around the roots in such a manner as to avoid bruising or breaking the roots.

4. When ½ to 2/3 of the backfilling has been completed, sufficient water shall be applied to settle the soil mix. The soil mix shall not be saturated to the extent of filling voids and excluding all oxygen from around the roots. After sufficient water absorption has occurred the remainder of the hole shall be filled as previously specified.

5. B&B plants shall be handled by the ball and placed in the hole in such a manner that the soil of the ball shall not be loosened from the roots. Backfilling, firming and settling shall be carefully done in the same manner as specified for BR plants. Just before the final backfilling above the top of the ball, the burlap shall be loosened or cut away from around the stem, the edges laid back and the plant thoroughly watered.

6. On relatively flat areas, a shallow saucer-like depression shall extend from around the plant to 18 inches outside the plant hole. On steeper slopes, a ridge of firmly compacted soil, of sufficient plasticity to withstand washing and approximately 6 inches high, shall be constructed 18 inches outside and around the lower half of the plant hole.

7. Upon completion of planting operations, an area extending 18 inches outside the original plant hole, shall be loosened by spading to a depth of 6 inches. Care shall be taken during spading to prevent injury to plant roots.

H. Vegetable Compost.

1. A 2-inch covering of approved vegetable compost, conforming to Subsection 735.03, shall be placed over the entire spaded area around each plant. When plants are placed in beds, the entire bed shall receive a covering of the compost. This compost shall be maintained as fine textured mulch around the plants until acceptance of the project.

I. Water.

1. Water, in sufficient quantity, shall be furnished and applied by the Contractor, whenever necessary, to keep the plants in a live and healthy condition, from the time of delivery to the final acceptance at the end of the plant establishment period. Plants replanted the following season shall be watered sufficiently to become established.

J. Wrapping.

1. All deciduous trees shall be wrapped with an approved tree wrap as specified in Subsection 735.03. The wrap shall begin just below the ground-line and be wrapped spirally up and around the trunk, much the same way as surgical bandage is applied, at an angle that permits sufficient overlap to make a double thickness. The wrap should extend up to and over the lowest main branch and shall be firmly and securely fastened to the trunk with binder twine wound in the opposite direction of the wrap.

K. Staking.

1. All trees shall be staked as show on the Plans. Staking shall be performed immediately following application of vegetable compost and shall present a neat appearance. Precautions shall be taken during staking operations to prevent damage or injury to the plants and roots.

L. Plant Establishment Period and Replacements.

M. The acceptability of the plant material furnished and planted as specified shall be determined at the end of a period of establishment. The Contractor shall employ all possible means to keep the plants in healthy growing condition during the life of the Contract. The plant establishment period shall be from the initial planting season to the following October 1st. Good horticultural practices during the establishment period may include spraying for insects and disease control, watering, pruning, cultivating, adjustment of guys and stakes and such other work as ordered by the Engineer. Dead, damaged or otherwise unacceptable plants shall be promptly removed from the project and if during the current planting season shall be replaced and planted during the current planting season. Plants removed during the establishment period shall be replaced and planted during the following planting season. A semifinal inspection by the Contractor and the Engineer will be held to determine the acceptability of the plant material 15 days before the end of the full growing season. During the next planting season following completion of spring or fall planting, all dead and unsatisfactory plants shall be replaced in kind or quantity and size with live healthy plants installed as originally specified. Alternate or substitute varieties of plants shall be used only if approved by the Engineer. When replacement plantings are necessary in the following planting

season, the final inspection of the replaced plants shall be at least 30 days after planting.

N. Method of Determining Progress Percentages.

1. When all plants are planted on the project during the initial planting season, the Contractor will have completed 50 percent of the Contract work.

2. If in the opinion of the Engineer, the Contractor has performed all necessary work during the establishment period, as specified in (1) above, an additional 20 percent of the Contract work will have been completed by July 1 and an additional 20 percent by September 1.

3. The remaining 10 percent of the Contract work will be considered complete when the work is accepted.

O. Carryover of Work not Completed During Specified Season.

1. If any of the proposed planting items are not completed at expiration of the initial planting season, planting work on the uncompleted items shall stop immediately, and the period during which the planting may be performed, regardless of the reason for failure to complete work, will not be extended. The work shall be carried over and completed the following planting season in accordance with these Specifications and the Plans.

2. During the carryover period, the Contractor shall be responsible for maintenance of planted areas and plant material. This work shall be as described in Subsection 231.04 L.

3. Time will be charged from the beginning of the following planting season until all carryover work is planted. Time will not be charged during the period from October 1st to November 25th for deciduous plants, or when replanting only is involved.

P. Machine Planting of Trees. For machine planting of trees the following additional requirements shall apply.

1. Digging. Excavated plants shall have a ball of soil encompassing their root systems. The size of the balls of all plants shall conform to the recommended specifications of ANSI-Z-60.1, Nursery Stock.

2. Transporting. The plants shall be transported from the nursery to their new locations on the project by the same machine that dug them.

3. Transplanting. Trees to be transplanted shall be placed in holes previously dug by the same or identical type machine. The top of the ball shall be placed in its final position at a slightly lower elevation than the existing surrounding ground. After the machine is removed, and any necessary backfill is applied, the plant shall be thoroughly watered and mulched, then staked as shown on the Plans.

231.05 METHOD OF MEASUREMENT. Live and healthy plants in satisfactory condition will be measured by each and the quantities to be paid for under this item will be the number of each kind of: (A) trees, (B) shrubs, (C) vines or ground covers, and (D) trees—machine planted.

231.06 BASIS OF PAYMENT. Accepted planting, measured as provided above, will be paid for at the contract unit price for:

(A)	Trees (Kind)	Ea.
(B)	Shrubs (Kind)	Ea.
(C)	Vines or Ground Covers (Kind)	Ea.
(D)	Trees—Machine Planted (Kind)	Ea.

which shall be full compensation for furnishing all materials, equipment, labor and incidentals to complete the work as specified.

232.00 SEEDING

232.01 DESCRIPTION. This work shall consist of seed bed preparation, furnishing and planting seeds in accordance with these Specifications and in reasonably close conformity with the areas and locations shown on the Plans or established by the Engineer.

232.02 MATERIALS. Materials shall meet the requirements specified in the following Subsections of Section 700 – Materials.

Seed	735.04
Fertilizer	735.07

Water shall be free from harmful quantities of toxic salts or other substances that might interfere with the establishment and growth of turf.

232.03 EQUIPMENT. The Contractor shall furnish equipment in satisfactory working condition, and in sufficient quantity to perform the work as specified. The equipment shall be on the project site and approved by the Engineer before work on the corresponding item begins.

A. Hydraulic Seeder.

1. This equipment shall be factory designed and built with sufficient pump capacity to apply specified quantities. The tank shall hold a minimum of 1,000 gallons and be equipped with a mechanical agitation system with an operating capacity sufficient to suspend and homogeneously mix the seed and water. The distribution hoses shall be large enough to prevent clogging and be equipped with spray nozzles that will provide even distribution on designated areas.

2. The equipment shall be mounted on a traveling unit, which may be either self-propelled or pulled, capable of getting the tank and nozzles within sufficient proximity of the area to be seeded without the wheels operating on the areas to be seeded.

B. Grass Seed Drill. **The drill shall be an approved native grass seed drill,** which shall be equipped with two separate planter boxes and planting mechanisms which will plant large chaffy seed and fine clean seed simultaneously. The drill shall be equipped with a mechanism for accurately adjusting the rate of seed flow. The drill shall be equipped with double-disk openers designed to open furrows on 8-inch or less centers, with each disk having a depth regulating band one-inch from the disk edge.

Each furrow opener shall be equipped with heavy press wheels to firm the soil behind the opener and leave the seed covered to an average depth of ½ to ¾ inch.

C. Corrugated Roller Seeder. The seeder shall be equipped with corrugated roller wheels mounted on tandem axles. The roller wheels shall be spaced on approximately 2-inch centers and shall place the seed at a depth of ¼ to ½ inch. The seeder shall be equipped with two separate planter boxes and planting mechanisms, which will plant clean, fine seed and large, chaffy seed simultaneously. The seed shall also be equipped with a mechanism for accurately adjusting the rate of seed flow. The seeder shall weigh approximately 125 to 250 pounds per linear foot of rolling width.

D. General. Rolling, fertilizing and watering equipment shall meet the requirements of Subsection 108.06.

232.04 CONSTRUCTION METHODS.

A. Seed Bed Preparation.

1. Preparation of areas to be seeded shall include filling and reshaping eroded areas, cleaning ditches, refinishing slopes, and medians to the established typical grading sections. All live plants shall be eliminated by mowing and disking.

2. Thick layers of previously applied mulching materials or residues of vegetation shall be completely incorporated into the soil by disking, unless otherwise directed. Soil shall be tilled on the contour to a depth of 4 inches. All clods larger than 1 inch in diameter shall be crushed and then packed. The tillage shall consist of disking, harrowing and rolling. Where necessary, water shall then be applied.

3. When hydraulic seeding is specified, the seed bed surface shall be left rough or made sufficiently rough before seeding.

B. Planting Methods.

1. General. All seed shall be planted uniformly at the specified rate. When several species are specified and cannot be combined due to different characteristics such as size, weight, hulled or unhulled, the seed shall be planted separately to obtain the specified seeding rate. Equipment shall not be operated on areas where rutting or slippage would mar the soil surface.

2. Seeding Method A – Hydraulic Seeder Method. The seed shall be placed in water in the spray tank of a hydraulic seeder conforming to Subsection 232.03 A. The seed shall then be distributed uniformly by power spraying through a suitable nozzle. Inoculants for legumes, if specified, may be placed in the spray tank with the seed in accordance with approved methods. The seed loaded into 1,000 gallons of water in the spray tank shall not exceed the quantity specified for two acres. If less than 1,000

gallons of water is used, the amount of seed, other specified materials, and the area seeded per load shall each be reduced in proportion to the water.

3. *Seeding Method B – Grass Seed Drill Method.* The seed shall be planted with a grass seed drill conforming to Subsection 232.03 B. All drilling shall be carried out on the approximate contour lines.

4. *Seeding Method C – Corrugated Roller Seeder Method.* The seed shall be distributed with a corrugated roller seeder conforming to Subsection 232.03 C. that has been adjusted to accurately apply the specified quantities. Planting on slopes shall be along the approximate contour lines.

5. *Hand Broadcasting Method.* Hand broadcasting shall not be used except in areas that are too small or inaccessible to accommodate the specified equipment.

C. Planting Season and Weather Restrictions.

1. Permanent erosion control operations shall be in accordance with Subsection 230.04 F.

D. Soil Moisture and Watering Requirements.

1. Soil moisture shall exist throughout the zone from 1 inch to at least 5 inches below the surface at the time of planting. The required moisture content of the soil may be estimated and judged closely by the hand squeeze test. The soil should readily form a tight case when squeezed in the hand. The cast should break into two pieces without crumbling and without leaving excess water on the hand after casting.

2. Watering of the areas seeded shall be performed if called for on the Plans or as determined by the Engineer.

E. Fertilizer Application.

1. Fertilizer application shall be in accordance with Section 234 and the following requirements.

2. When a fertilizer with 0 percent nitrogen, but containing either phosphoric acid or potash (0-20-20 or 0-46-0) is specified, it shall be spread on the soil surface and then thoroughly incorporated into the soil by disking. This operation may be performed as a part of seed bed preparation.

3. When a fertilizer containing a percentage of all three nutrients, nitrogen, phosphoric acid and potash (10-20-10), or a fertilizer containing only

nitrogen (33.5-0-0) is designated for seeding; the application of the fertilizer shall be delayed for at least 30 days but not more than 60 days after the seeding operation has been completed.

F. Repairs and Maintenance.

1. General. The Contractor shall be responsible for repairs and maintenance of areas designated for seeding until all work on the Contract or designated portion thereof has been completed and approved for final acceptance.

2. Repair. This work shall include the restoration of all eroded areas to the approximate typical grading section shown on the Plans or as determined by the Engineer. Repair shall include seeding, fertilizing, and watering damaged areas, which shall be performed during the specified planting season.

3. Maintenance. This work shall consist of weed control by mowing, hand cutting, herbicides, or other approved methods. Weed growth on sodded areas shall be removed as often as determined by the Engineer. If herbicides are used, they shall be used in accordance with label instructions and shall have prior approval from the Engineer. Mowing shall be in accordance with Section 241.

232.05 METHOD OF MEASUREMENT.

A. Seeding will be measured by the acre. Work and material used in repair of seeding will not be measured for payment.

B. Watering will be measured by the 1,000 gallons of water. The water will be measured as delivered in calibrated tanks or by pipelines with a reasonably accurate method of measuring. Water used as a carrier for seed in hydraulic seeding operations is considered subsidiary to seeding and will not be measured for payment.

C. Fertilizer will be measured and paid for in accordance with Section 234.

D. Mowing will be measured and paid for in accordance with Section 241.

232.06 BASIS OF PAYMENT. Accepted seeding, measured as provided above, will be paid for at the contract unit price bid for:

(A)	Seeding Method A	Ac.
(B)	Seeding Method B	Ac.
(C)	Seeding Method C	Ac.
(D)	Watering	M. Gal.

which shall be full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

233.00 MULCHING

233.01 DESCRIPTION. This work shall consist of furnishing, applying and fastening mulching materials on the soil surface in accordance with these Specifications and in reasonably close conformity with the areas and locations shown on the Plans or established by the Engineer.

233.02 MATERIALS. Materials shall meet the requirements specified in the following Subsections of Section 700 – Materials. These materials can be used either as a temporary protective item or as protective mulch for seeded, sodded or planted areas.

Vegetative Mulch	735.05 A.
Fiber Glass Rovings	735.05 B.
Asphalt Mulch	735.05 C.
Excelsior Mat	735.05 D.
Jute Mesh	735.05 E.
Excelsior Mulch	735.05 F.
Wood Cellulose Fiber	735.05 G.
Mulch Fasteners	735.06

233.03 EQUIPMENT. The Contractor shall furnish equipment in accordance with Subsection 108.06.

A. Equipment for Vegetative & Excelsior Mulch.

1. *Adhesive Spray Method.* The machine for applying and fastening Vegetative and Excelsior Mulch shall have a blower mechanism for distributing the vegetative material and an asphalt pump for distributing the asphalt. The discharge pipe of the blower and the discharge nozzles of the asphalt hoses shall be arranged so that the asphalt is evenly distributed into the mulch as it emerges from the blower discharge spout. The asphalt hoses shall have suitable valves and nozzles to provide distribution of the asphalt at the prescribed rate. Sufficient power shall be provided on the machine to operate the asphalt pump and the mulch blower and distribute the asphalt-bound mulch over the designated areas at the required rate with a single pass of the machine. The beater mechanism shall be adjusted so that the stem lengths are not materially shortened.

2. *Mulching Tiller Method.* The machine for applying vegetative or excelsior mulch shall be the same as specified for the Adhesive Spray Method, except that the asphalt pump and accessories may be omitted. The mulching tiller shall be a heavy disk-type roller, having flat disks about ¼ inch thick and spaced not more than 12 inches apart.

B. Equipment for Fiber Glass Rovings.

1. Pneumatic ejector capable of applying roving at a minimum rate of two pounds per minute.

2. Air compressor capable of supplying at least 40 CFM at 80 to 100 psi with sufficient air hoses to reach designated areas.

3. Asphalt distributor or equipment meeting the requirement for the vegetative mulching equipment in Subsection 233.03 A. above may be used.

C. Equipment for Wood Cellulose Fiber Mulch.

1. The hydraulic equipment used to apply wood cellulose mulch shall be factory designed and built with sufficient pump capacity to apply specified quantities. The slurry tank shall hold a minimum of 1,000 gallons and be equipped with a mechanical agitation system with operating capacity sufficient to suspend and homogeneously mix the mulch and water. The slurry distribution hoses shall be large enough to prevent clogging and be equipped with spray nozzles that will provide even distribution of the slurry on designated areas.

2. The equipment shall be mounted on a traveling unit which may be either self-propelled or pulled, capable of getting the tank and nozzles within sufficient proximity of the area without tracking into the mulching area.

D. Equipment for Asphalt Mulch.

1. The distributor equipment shall be equipped with a pressure gauge and accurate volume measuring device or a calibrated tank. Also, the distributor shall be equipped with a power unit for the pump, and a full circulation, adjustable, spray bar and hand operated spray bar.

2. A check of distribution rate and uniformity of application shall be made when directed by the Engineer.

E. Equipment for Jute Mesh.

1. A lightweight, smooth roller (lawn type) shall be used to press the mesh into direct contact with the soil.

233.04 CONSTRUCTION METHODS.

A. Mulching Operation.

1. When the mulch material is used as a temporary protective item, eroded areas shall be repaired and the ground shall be cleared of all debris that would hinder the even application of the mulching material.

2. When the mulch material is used as a protective mulch over seeding or sodding, it shall be applied within 24 hours after an area is seeded or sodded. If mulched areas become damaged, the area shall be reshaped and then sodded or seeded and mulched again as originally specified.

3. Mulching operations shall not be performed during weather that would result in non-uniform application or waste of material.

B. Type of Application.

1. Adhesive Spray Method for Excelsior and Vegetative Mulch.

The vegetative or excelsior mulch shall be broadcast into a continuous, unbroken cover of approximate uniform thickness. The vegetative mulch shall be applied at the rate of 2 tons per acre. During the spreading operation, the adhesive material shall be ejected simultaneously into the mulch at the mulch blower discharge spout, giving a uniform distribution on the mulching material. Emulsified asphalt, SS-1 shall be used unless otherwise specified on the Plans at the rate of 200 gallons per acre. If other types of fasteners are to be used, the type and quantity will be shown on the Plans. To avoid displacement of mulch by wind, a bank of soil or a complete coverage of asphalt shall be placed along the edge of the mulched area. Clumps of excess material shall be removed promptly.

2. Mulching Tiller Method for Excelsior and Vegetative Mulch.

The mulching materials shall be uniformly spread as specified in the Adhesive-Spray Method. The rates of application shall be 2.5 tons of vegetative mulch per acre or 2 tons of excelsior mulch per acre. Following closely behind the mulch spreading operation, a tiller shall be rolled over the mulched area, pressing the material into the soil approximately 3 inches. Dry, impermeable soil shall be tilled with a disk plow to the degree necessary to permit the 3-inch incorporation. When mulching loose sandy soil, precautions shall be taken not to incorporate an excess amount of the mulch into the soil. When mulching slopes, the tiller shall be operated along the contour of the slope.

3. Asphalt Mulching.

The mulching asphalt shall be diluted with 3 parts water to one part emulsified asphalt. 1.25 gallons of the mixture shall be applied per square yard of ground surface, unless otherwise specified. If soils to be mulched are impervious and cause appreciable mixture runoff, the water shall be reduced so that the specified quantity 0.3125 gallons per square yard of emulsified asphalt can be applied. When asphalt mulch is to be applied over sodded areas, the sod shall be watered immediately before applying the asphalt mulch.

4. Wood Cellulose Fiber Mulch.

Wood cellulose fiber mulch shall be applied at the rate of not less than 1,200 pounds of air dry material per acre. The quantity of water used in dispersing, suspending and applying the material shall be at the rate of 3.3 gallons of water to one pound of material. The cellulose fiber shall be applied to form an evenly distributed layer over the area. Seed, fertilizer, lime and other erosion control items shall be completed before applying cellulose material.

5. Fiber Glass Rovings.

Fiber glass roving shall be spread uniformly over the designated areas forming a mat of continuous fibers. It shall be applied at the rate of 0.25 to 0.35 pounds per square yard. The rovings shall be anchored with an adhesive fastener, emulsified asphalt (SS-1, undiluted as specified in Subsection 735.06) which shall be applied uniformly over the glass fiber at the rate of 0.18 to 0.25 gallons per square yard. If watering is specified for the seeded or sodded areas, it shall be done prior to the application of the adhesive fastener and after the rovings are in place. When used as a protective device in slope drains and ditches, the upstream edge shall be buried 4 inches below the flow line.

6. Excelsior Mat.

The mat shall be placed as shown on the Plans so that the fibers are in contact with the soil and the netting is on the top. Each strip of mat shall be placed parallel to the direction of the flow of water.

7. Jute Mesh.

When jute mesh is used over sodded or sprigged areas, it shall be placed prior to watering operations. Unless the hydro-seeding method is called for on the Plans, the jute mesh shall be placed after the seed or sod has been planted.

The mesh shall be placed and secured as shown on the Plans. The Contractor shall maintain the jute mesh covered areas until all work on the project is completed and accepted. Damaged slopes shall be reshaped to their original slope lines and shall be fertilized, seeded or sodded and covered with jute mesh again as originally specified.

233.05 METHOD OF MEASUREMENT. The mulching items will be measured as follows:

1. Vegetative mulching, excelsior mulching, and wood cellulose fiber will be measured by the acre.

2. Asphalt mulching will be measured by the gallon of undiluted emulsified asphalt.

3. Fiberglass rovings, excelsior mat and jute mesh will be measured by the square yard of area covered.

233.06 BASIS OF PAYMENT. Accepted mulches, measured as provided above will be paid for at the contract unit price for:

(A)	Vegetative Mulching	Ac.
(B)	Excelsior Mulching	Ac.
(C)	Asphalt Mulching	Gallon
(D)	Wood Cellulose Fiber	Ac.
(E)	Fiber Glass Rovings	Sq. Yd.
(F)	Excelsior Mat	Sq. Yd.
(G)	Jute Mesh	Sq. Yd.

which shall be full compensation for furnishing all materials, equipment, labor and incidentals to complete the work as specified.

234.00 FERTILIZING AND AGRICULTURAL LIMING

234.01 DESCRIPTION. This work shall consist of furnishing and applying fertilizer or agricultural liming materials in accordance with these Specifications and in reasonably close conformity with the areas and locations shown on the Plans or established by the Engineer.

234.02 MATERIALS. Materials shall meet the requirements specified in the following subsections of Section 700 – Materials.

Fertilizer	735.07
Agricultural Limestone	706.04
Hydrated Lime	706.01

234.03 EQUIPMENT.

A. General.

The Contractor shall furnish equipment in satisfactory working condition and in sufficient quantity to perform the work as specified. The equipment shall be on the project site and approved by the Engineer before work on the corresponding item begins.

B. Fertilizer and Lime Spreaders.

1. Vertical Drop and Broadcast Type.

The machine for applying dry fertilizer or lime shall be an approved agricultural type spreader. It shall be capable of distributing the specified material uniformly on the designated area at specified rates of application without damaging the fertilizer granules or lime.

2. Power Spray.

The equipment for distributing fertilizer or lime in water shall comply with the specifications for Hydraulic Seeding, Subsection 232.03 A.

234.04 CONSTRUCTION METHODS.

A. General.

1. Unless otherwise indicated on the Plans, the lime or fertilizer shall be applied with the vertical drop or broadcast spreader. The lime or fertilizer shall not be applied during weather that would result in waste or poor distribution. When lime is specified, it shall be applied prior to or during the ground preparation for seeding or sodding and incorporated into the soil. These areas shall not be seeded or sodded for a minimum of 3 days.

B. Methods of Applying Fertilizer or Lime.

1. Vertical Drop or Broadcast Method.

The fertilizer or lime shall be applied uniformly at the specified rate with a spreader conforming to the requirements of Subsection 234.03. The equipment shall not rut or otherwise damage the prepared surface.

2. Power Spray Method.

The fertilizer or lime shall be applied in water at the rate shown on the Plans. The material shall be distributed without appreciable runoff. The maximum quantity of fertilizer placed in the spray tank with 1,000 gallons of water shall not exceed the quantity specified for two acres of seeding or sodding. The maximum amount of lime placed in the spray tank with 1,000 gallons of water shall not exceed the quantity specified for one acre of seeding or sodding. If less than 1,000 gallons of water is loaded into the spray tank, the quantity of fertilizer or lime loaded and the area treated per load shall be reduced in proportion to the water.

3. Hand Broadcast Method.

On areas inaccessible to large spreaders or power sprayers, the lime or fertilizer shall be applied with hand-operated equipment.

234.05 METHOD OF MEASUREMENT.

A. Fertilizing will be measured by the ton of specified material, as determined by approved scales or guaranteed weights of sacks shown by the manufacturer. If a substitute grade of fertilizer is furnished, the amount of material measured for payment will not exceed the amount called for on the Plans. Fertilizer used in repair of unacceptable work will not be measured for payment.

B. Agricultural limestone or agricultural hydrated lime will be measured by the ton, as determined by approved scales or by guaranteed weights of sacks shown by the manufacturer.

234.06 BASIS OF PAYMENT. Accepted fertilizing and agricultural liming, measured as provided above, will be paid for at the contract unit price for:

(A)	Fertilizing	Ton
(B)	Agricultural Limestone	Ton
(C)	Agricultural Hydrated Lime	Ton

which shall be full compensation for furnishing all materials, equipment, labor and incidentals to complete the work as specified.

240.00 REMOVAL OF TREES

240.01 DESCRIPTION. This work shall consist of removing trees where called for on the Plans and shall include cutting such trees, removing their stumps and roots, and properly disposing of the material.

This Specification is not intended to cover such as would be included under Clearing and Grubbing, Section 201 of these Specifications on ordinary highway work but is to cover only removal of trees on projects where specified on the Plans.

240.04 CONSTRUCTION METHODS. Trees shall be removed and disposed of in a manner approved by the Engineer. All stumps and roots shall be removed to a depth of not less than 12 inches below the finished sub-grade elevation.

240.05 METHOD OF MEASUREMENT. The size of trees will be determined by the average diameter of the tree trunk taken at a point measured four feet above the base of the tree at the ground line. The diameter will be measured to the nearest full inch.

240.06 BASIS OF PAYMENT. Trees to be removed under this item will be measured as provided above and will be paid for at the contract unit price per each tree in accordance with the following schedule of size:

(A)	Removing trees 6-12 inches in diameter	Ea.
(B)	Removing trees 13-18 inches in diameter	Ea.
(C)	Removing trees 19-24 inches in diameter	Ea.
(D)	Removing trees 25 inches in diameter	Ea.

which shall be full compensation for furnishing all materials, equipment, labor and incidentals to complete the work as specified.

Removing trees less than 6 inches in diameter will be considered as incidental work and will not be paid for directly, but the cost will be included in other items.

If the contract does not include a separate item for removing trees, then all work specified in this Section will be considered as incidental work and will not be paid for directly, but its cost will be included in other items.

241.00 MOWING

241.01 DESCRIPTION. This work shall consist of mowing designated areas to a height not less than 6 inches when, and as directed by the Engineer until acceptance of the Contract.

241.03 EQUIPMENT. Equipment used for mowing operations shall be mechanical and have a minimum cutting width of 5 feet.

241.04 CONSTRUCTION METHODS. Mowing shall be done only when the ground is sufficiently firm to prevent rutting. Any damage to the surface shall be repaired by the Contractor at no additional cost to the Department.

Litter, debris and excessive amounts of grass clippings of sufficient magnitude to smother or retard grass growth shall be removed from the areas as necessary to restore the sightliness of the areas. Mowing required for seed bed preparation shall be included in other items of work.

In areas inaccessible to mechanical mowers, hand cutting methods shall be used so the entire designated areas shall be uniform in appearance.

241.05 METHOD OF MEASUREMENT. Mowing, when directed by the Engineer, will be measured by the acre of mowing the designated areas in a manner approved by and accepted by the Engineer.

241.06 BASIS OF PAYMENT. Mowing, measured as provided above, will be paid for at the contract unit price for:

Mowing	Ac.

which shall be full compensation for furnishing all materials, equipment, labor and incidentals to complete the work as specified.