SECTION 200 – EARTHWORK

SECTION 201 – CLEARING AND GRUBBING

201.01 Description

This work shall consist of clearing, grubbing, removing, and disposing of all vegetation and debris, except such objects as are designated to remain or are to be removed in accordance with other sections of these specifications, within the construction limits shown on the plans. If no construction limits are shown, the right-of-way and easement areas will be the construction limits. This work shall include the preservation from injury or defacement of all vegetation and objects designated to remain.

CONSTRUCTION REQUIREMENTS

201.02 General

Right-of-way lines and construction limits will be established. Trees, shrubs, plants, seeded or sodded shoulders, slopes or other things to remain will be designated. All such designated items and vegetation shall be preserved. All areas outside the construction limits shall remain in their original condition. All damage to natural terrain, vegetation, objects designated to remain, or areas outside the construction limits which have subsequently eroded or been damaged, shall be repaired or replaced in accordance with 621.11. Tree wound dressing required for cut or scarred surfaces of trees or shrubs selected for retention shall be in accordance with 914.09(c).

201.03 Clearing and Grubbing

Surface objects, trees, stumps, roots, and other protruding obstructions not designated to remain shall be cleared and grubbed, including mowing as required. Undisturbed sound stumps, roots, and non-perishable solid objects, which are a minimum of 3 ft (1 m) below the final subgrade or slope of embankments, may be left, provided they are as nearly flush as possible. However, they shall not extend more than 4 in. (100 mm) above the ground line or low water level. Sound stumps may be cut off at ground level outside the construction limits of cut and embankment areas if approved.

Except in areas to be excavated, stump holes and other holes from which obstructions are removed shall be backfilled with suitable material and compacted in accordance with 203.23.

Burning of perishable material shall be done in accordance with applicable laws, ordinances, rules, and regulations. All necessary permits approval shall be obtained prior to burning.

Unless burned in accordance with the requirements herein, perishable materials and debris shall be removed from the right-of-way and disposed of at locations off the construction site and outside the limits of view from the traveled roadway. Sod may be disposed of within the right-of-way, but outside the construction limits, if permitted. Written permission shall be obtained from the property owner on whose property the materials and debris are to be placed. All necessary arrangements shall be made with the owner for obtaining suitable disposal locations. The cost involved shall be included in the contract price of pay items.

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. The value of the timber shall be taken into account when the bid is prepared.

Low hanging branches and unsound or unsightly branches on trees or shrubs designated to remain shall be removed as directed. Branches of trees extending over the roadbed shall be trimmed to give a clear height of 20 ft (6.1 m) above the roadbed. All trimming shall be done by skilled workers and in accordance with good tree surgery practices.

201.04 Scalping

Areas where excavations are to be made, or embankments are to be placed, shall be scalped to a maximum of 4 in. (100 mm). Scalping shall include the removal of material such as brush, roots, sod, grass, residue of agricultural crops, sawdust, and decayed vegetable matter from the surface of the ground.

201.05 Hedge Removal

Hedges and shrubs shall be pulled or grubbed in such a manner as to ensure complete and permanent removal.

201.06 Method of Measurement

When specified as a pay item, measurement of this work will be made by one or more of the following methods.

(a) Area Basis

The work to be measured will be the number of acres (hectares) and fractions thereof acceptably cleared and grubbed within the limits shown on the plans or staked for clearing and grubbing. Areas not shown on the plans or not staked for clearing and grubbing will not be measured for payment.

(b) Lump Sum Basis

If clearing and grubbing is specified as a lump sum pay item, no measurement of area will be made.

(c) Linear Basis

If a linear unit pay quantity is shown in the Schedule of Pay Items, the length will be measured along the construction centerline in stations.

(d) Individual Unit Basis

1. The diameter of trees will be measured at a height of 24 in. (610 mm) above the ground. Trees of less than 4 in. (100 mm) in diameter will be classified as brush.

2. Stumps will be measured by determining the average diameter at the cutoff location.

3. Hedge rows will be measured by the station.

4. Scalping will be measured by the acre (hectare).

5. If the Schedule of Pay Items shows measurement to be on an individual unit basis, the units will be designated and measured in accordance with the schedule of sizes as follows:

Measured Diameter at Height of 24 in. (610 mm)	**Pay Diameter**
4 to 8 in. (100 to 200 mm)	6 in. (150 mm)
Over 8 to 12 in. (Over 200 to 300 mm)	10 in. (250 mm)
Over 12 to 24 in. (Over 300 to 610 mm)	18 in. (460 mm)
Over 24 to 36 in. (Over 610 to 910 mm)	30 in. (760 mm)
Over 36 to 60 in. (Over 910 to 1520 mm)	48 in. (1220 mm)
Over 60 in. (Over 1520 mm)	60 in. (1520 mm)

201.07 Basis of Payment

The accepted quantities of clearing and grubbing will be paid for as shown below.

(a) Area Basis

The determined quantities will be paid for at the contract unit price per acre (hectare) respectively for each of the pay items shown in the Schedule of Pay Items.

(b) Lump Sum Basis

If the Schedule of Pay Items show a lump sum pay item, the lump sum price will be paid for all work shown within the construction limits. All clearing the Contractor is directed to perform outside the construction limits, including clearing for utility relocation which is for the benefit of the Department, and not simply for the Contractor's convenience, will be paid for in accordance with 104.03 or 109.03 unless such clearing is shown on the plans or in the Contract Information book.

(c) Linear Basis

If linear quantities are shown in the Schedule of Pay Items, the quantities will be paid for at the contract unit price for such pay item.

(d) Individual Unit Basis

If individual unit quantities are shown in the Schedule of Pay Items, the accepted quantities will be paid for at the contract unit prices for the respective pay items.

Payment for tree removal sizes as designated in requirement 5 of 201.06(d), which are larger than those sizes shown as pay items, will be made on the basis of the largest size shown in the Schedule of Pay Items except as set out below.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Clearing and Grubbing	ACRE (ha)
	STA
	LS
Clearing Right-of-way	LS
Hedge Rows	STA
Scalping	ACRE (ha)
_____, _____, Remove (name size)	EACH

Except as permitted in 621, the cost of repair or replacement of terrain, vegetation, objects designated to remain, or areas outside the construction limits which have been damaged by the Contractor or have subsequently eroded, shall be included in the cost of clearing right-of-way.

(e) Clearing Right-of-Way

If the Schedule of Pay Items contains a lump sum pay item for clearing right-of-way, such pay item shall include the cost of all work described herein within the construction limits except for such work set out specifically as pay items or as otherwise provided for herein. All clearing the Contractor is directed to perform outside the construction limits, including clearing for utility relocation which is for the benefit of the Department, and not simply for the Contractor's convenience, will be paid for in accordance with 104.03 or 109.03 unless such clearing is shown on the plans or in the Contract Information book.

(f) Exclusions

If the Schedule of Pay Items does not contain an estimated quantity or a lump sum pay item for work described herein except as set out above, such work will not be paid for directly. The cost thereof shall be included in the cost of other pay items.

SECTION 202 – REMOVAL OF STRUCTURES AND OBSTRUCTIONS

202.01 Description

This work shall consist of the removal, wholly or in part, and satisfactory disposal of all buildings, fences, structures, old pavement, abandoned pipe lines, abandoned tanks, and any other obstructions which are not designated or permitted to remain, except for the obstructions to be removed and disposed of under other items in the contract. It shall include the salvaging of designated materials and backfilling the resulting trenches, basements, holes, and pits.

CONSTRUCTION REQUIREMENTS

202.02 General Requirements

All buildings and foundations in accordance with 202.06, structures, fences, tanks, and other obstructions, any portions of which are on the right-of-way shall be razed, removed, and disposed of, except utilities and those features for which other

provisions have been made for removal. Designated salvageable material shall be removed without unnecessary damage in sections or pieces which may be transported readily and shall be stored at specified places within the project limits or as otherwise designated. Unless otherwise permitted and except for regulated materials, which are defined in 104.06, and bridge painting debris which is subject to 619, non-salvageable material shall be disposed of in accordance with State, Federal, and local regulations. Unregulated material that may be disposed of on private property, other than approved landfill sites, shall only be done with written approval of the Engineer and the property owner with appropriate permits and shall be outside the limits of view from the traveled roadway. Copies of all agreements with property owners shall be furnished. Unsuitable material shall be removed from cisterns, septic tanks, other tanks, basements, and cavities. The disposition of this material shall be in accordance with all applicable and current State, Federal, and Local Regulations. Cisterns, septic tanks, other tanks, basements, and cavities shall be backfilled in an approved manner. Those which cannot be backfilled satisfactorily shall be removed. If the backfill is within the limits of construction, it shall be completed in accordance with 203.23, unless otherwise directed. All abandoned wells shall be backfilled in accordance with the Indiana Code. A copy of the driller's license shall be furnished prior to commencement of work.

In accordance with IAC 14-10, the Contractor shall complete and submit a demolition/renovation notification to IDEM when demolition or renovation of buildings, houses, canopies, and bridges are part of the contract. This notification shall be submitted regardless of whether asbestos containing material is present. Each notification form submitted to IDEM may have a maximum of 10 structures listed on the form. For the purposes of this form, a structure includes a building, house, canopy, or a bridge. Fees for this demolition/renovation notification are $50.00 per notification and shall be paid to IDEM by the Contractor.

Copies of the demolition/renovation notification form can be obtained at: www.in.gov/icpr/webfile/formsdiv/44593.pdf. Questions concerning the completion of the demolition/renovation notification should be addressed to IDEM's Office of Air Management's toll free number (888) 547-8150. Office hours are Monday through Friday between the hours of 6:30 a.m. and 4:30 p.m. IDEM will assist in proper completion of the notification.

Initial notification to IDEM shall be by certified mail, return receipt requested, or by hand delivery. Verification of this notification shall be provided to the Engineer. The Contractor shall provide such notification 10 work days prior to the date on which demolition or renovation operations are anticipated to begin. If the Contractor postpones the beginning date of demolition or renovation operations, IDEM shall be provided written notice of the new start date, postmarked at least five work days or delivered at least two work days before these operations begin. Verification of this notification shall also be provided to the Engineer.

Unless otherwise specified, salvageable items removed from the construction site shall become the property of the Contractor and proper allowance for their value shall be taken into account in the bid price of the item involved. Where a house or building has been removed previously and the existing utilities and drains or sewer connections have

not been terminated and sealed, this work shall be performed in accordance with 104.03, or as otherwise provided for in the contract.

Unless inspection has previously been conducted by the Department, and the findings are shown in the Proposal book, all facilities to be demolished shall be inspected for the presence of regulated materials as defined in 104.06. Facilities are defined as all institutional, commercial, residential or industrial structures, installations, buildings, and all bridges. Inspection and testing for asbestos shall be in accordance with 202.07. If inspected by the Department, a copy of the findings will be included in the Contract Information book.

At the direction of the Engineer and in accordance with 104.06(b), appropriate tests shall be made by the Contractor of all potentially regulated materials found. The Contractor shall comply with all applicable environmental regulations.

All identified regulated materials shall be reported and removed in accordance with the procedures specified in 104.06 prior to commencing the demolition of the facility. Asbestos removal shall be in accordance with the OSHA Asbestos Standard for Construction Industry, the EPA Asbestos Facts: Demolition and Renovation Regulations, and 202.07.

Except for tank content waste which is classified in 202.08, the Engineer will classify regulated materials as one of the following Department categories for the purpose of disposal requirements and payment.

(a) Type Y Waste

All waste material that may be disposed of in a Resource Conservation Recovery Act approved landfill.

(b) Type Z Waste

All waste material that is prohibited from being disposed of in a Resource Conservation Recovery Act approved landfill.

202.03 Removal of Bridges, Culverts, and Other Drainage Structures

Bridges, culverts, and other drainage structures in use by traffic shall not be removed in whole or in part until satisfactory arrangements have been made to accommodate traffic. Any excavation adjacent to the structure or to its approaches shall be shored adequately to avoid damage to them or to traffic.

When a reinforced concrete arch bridge is to be removed, either in whole or in part, the work shall include the removal of miscellaneous items within the limits of the structure, which must be removed prior to or in conjunction with the removal of the structure. These miscellaneous items shall include but shall not be limited to: concrete and asphalt pavements; concrete and asphalt sidewalks; and fill within the arches regardless of content.

(a) Complete

Unless otherwise directed, the substructures of existing structures shall be removed down to the natural stream bottom and those parts outside of the stream shall be

removed down 1 ft (0.3 m) below natural ground surface. Where such portions of existing structures lie wholly or in part within the limits of a new structure, they shall be removed as necessary to accommodate the construction of the proposed structure. Portions of pre-existing structures that are not visible and not shown on the plans shall be removed as directed. Payment for such removal will be paid as class X excavation in accordance with 206.11.

Unless otherwise specified, structural steel and salvageable material shall become the property of the Contractor. It shall be removed from the site before completion of the work and proper allowance for its value shall be taken into account in the bid price of the item involved. If the structure is to remain the property of the Department, steel or wood bridges shall be carefully dismantled without unnecessary damage, steel members shall be match marked, and all salvaged material shall be stored in accordance with 202.02.

Blasting or other operations necessary for the removal of an existing structure or obstruction, which may damage new construction, shall be completed prior to placing the new work.

If stated in the special provisions, all concrete which is of suitable size for riprap and not needed for such use on the project shall be stockpiled on the project in an approved manner, for use by the Department.

(b) Portions

Portions of the existing structure shall be removed as shown on the plans. Reinforcing bars shall be cut off or allowed to extend into the proposed work as required or as otherwise directed. Explosives shall not be used in the removal of concrete. Where new concrete joins existing concrete masonry, the surface shall be cleaned satisfactorily before new concrete is placed. Adequate safeguards shall be provided to prevent materials from falling below the structure when over or adjacent to traffic; when over bodies of water; as needed to protect life or property; and as needed to comply with laws, regulations, or other contract requirements. A plan shall be submitted for approval showing the proposed method of protection.

Pneumatic hammers, up to a maximum of 45 lb (20 kg) may be used for all removal areas to be patched in the deck and all areas within 24 in. (610 mm) of full depth removal lines. Pneumatic hammers up to 69 lb (31 kg) maximum weight may be used for removal of all parapet walls having a construction joint separating the wall from the coping and all partial curb removals. Pneumatic hammers up to 90 lb (41 kg) maximum weight may be used for all other removals outside these limits. Concrete splitters may be used for partial concrete removal subject to satisfactory performance. Deck areas that are to be removed full depth shall be completely separated from adjacent concrete by sawing before hammers heavier than 45 lb (20 kg) may be used.

Concrete superstructures or deck removal may be accomplished by pneumatic hammers larger than 90 lb (41 kg), except directly over structural members that are to remain in place. Partial concrete removal of columns, piers, and abutments may be accomplished with pneumatic hammers larger than 90 lb (41 kg), provided that the reinforcing steel in the portion to be removed is completely separated from the concrete

that is to remain in place. Alternate methods of removal may be permitted if requested in writing.

Hydro-demolition may be permitted for removal of portions of bridge structures as an alternate method to pneumatic hammers. Hydro-demolition for such removals may be accomplished either by use of a machine or a hand held device. Hydro-demolition shall otherwise be in accordance with 722.05(a)2.

Any portion of the structure that is removed, but which was not included within the limits of the concrete to be removed as shown on the plans or as directed, shall be replaced with no additional payment. If at any time during the removal process the tools or methods being used appear to cause any damage to concrete that is to remain, the work shall cease immediately and shall not resume until the Engineer is assured the tools or methods used will not cause further damage.

(c) Disposal of Concrete

All concrete from complete or partial removals, which is determined to be acceptable for riprap, shall be used on the project as directed. Disposal or placement as riprap will not be paid for directly, but the cost thereof shall be included in the cost of removal.

202.04 Removal of Pipe and Tile Drains

When so provided in the proposal, all pipe and tile drains shall be removed and reasonable precaution taken to avoid breaking or damaging them. The pipe or tile shall be stored neatly on the right-of-way, unless it is to be re-laid as a part of the contract. Otherwise, the conditions in accordance with 104.05 shall apply.

Pipes to be re-laid shall be removed and stored so that there is no loss or damage to the pipe. Replacement will be required of sections lost from storage or from damage through negligence or from improper methods in handling. Removal of pipe or drain tile, any necessary cleaning, removal of headwalls, storage of pipe, and disposal of removed headwall material and unsuitable pipe will not be paid for directly, the cost thereof to be included in the various pay items.

Sanitary or storm sewers no longer in use shall be removed from under the roadway and shoulders if so specified on the plans or in the proposal or if so directed. No payment will be made for this removal if the removal is shown on the plans and no pay item exists, or if this removal is necessary during the placing of other structures or during other excavation operations. The removal of pipes that are not shown in the contract documents and those that are not being replaced at the same location will be paid for in accordance with 109.05.

202.05 Removal of PCCP, Sidewalks, Curbs, etc.

All PCCP, sidewalks, curbs, gutters, etc., designated for removal shall be:

(a) broken into pieces and used for riprap on the project; or

(b) broken into pieces, the maximum weight of which shall be 150 lb (68 kg), and incorporated into the work as directed; or

(c) otherwise disposed of in accordance with 202.02.

Pavement removal shall consist of the removal and satisfactory disposal of PCCP; PCC resurface with its base; or the total of any combination of HMA base, intermediate, and surface course of any pavement on a PCC base, including the base. Pavement removal shall include only the removal and disposal of existing public road, street, and alley pavement as required for the planned construction. Curb removal shall include curb that is separate from the pavement or removed separately. Integral curb that is removed with the adjacent pavement shall be paid for as pavement removal. Prior to performing the work of pavement removal at locations shown on the plans or where directed, cement concrete pavement to be removed shall be cut with a power driven concrete saw along designated lines. Sawing shall be such that any portion of the pavement to remain in place will not be damaged. Any portion that is damaged or removed outside the designated lines shall be replaced with no additional payment. Sawing of pavement to be removed will not be paid for directly, but shall be included in the cost of pavement removal.

202.06 Removal of Houses and Buildings

This item consists of the satisfactory demolition, removal, backfilling, and disposal of all houses and buildings at locations shown on the plans or where directed. The houses and buildings shall be demolished and removed down to a point 1 ft (0.3 m) below the original ground level or the subgrade elevation, whichever is lower. All accumulated debris in existing basements shall be removed and disposed of. Prior to starting demolition operations, or when directed, all existing utilities shall be terminated and all floor drains shall be sealed in a satisfactory manner. Temporary fence in accordance with 107.14 may be required where specified or directed. Basements or depressions left by demolition shall be backfilled with B borrow and compacted in accordance with 203.23. No additional payment will be made for temporary fence, the cost thereof to be included in the lump sum price for removal at the location. Temporary fence shall remain the property of the Contractor.

The removal of houses and buildings shall be arranged and prosecuted such that all Department maintained highways, and all local roads, streets, and alleys within the project limits shall remain open to normal traffic at all times unless otherwise directed.

Demolition and removal of any individual house or building shall not be started without written authorization. Compensation will be paid only for houses and buildings which are actually removed from the right-of-way as authorized. Removed materials shall be disposed of in accordance with 104.05 and 104.06.

In the event the houses and buildings listed for removal from a designated parcel are not in existence at the time of submission of the bid, the lump sum bid for that item shall be indicated at zero dollars and cents.

202.07 Inspection and Removal of Asbestos

The Contractor shall comply with all applicable environmental regulations including but not limited to those as follows:

(a) In accordance with 202.02 and IAC 14-10, a demolition/renovation notification is to be submitted to IDEM 10 work days prior to the start of demolition or renovation operations. During the 10 day period, the IDEM may make a determination of the existence of asbestos materials. Local governmental agencies may have additional regulations that must be followed. The Contractor shall contact IDEM's air management office to determine what local agencies have regulations.

(b) 326 IAC 18-3 which requires the inspector conducting the required inspection to be certified by the IDEM. An accredited asbestos project supervisor shall be required to be present at all asbestos removal projects in accordance with 326 IAC 14-10 and 18-1.

(c) Federal Asbestos National Emission Standard for Hazardous Air Pollutants.

(d) Structurally Unsound and in Danger of Imminent Collapse Building Regulations, in accordance with 326 IAC 14-10-1(b).

202.08 Removal of Underground Storage Tanks Containing Petroleum Products or Other Hazardous Chemicals

Removal of underground storage tanks shall consist of the proper excavation; removal of the tank; removal and disposal of liquids, sludges, and other materials in the tanks; backfilling, and permanent closure of underground storage tanks located as shown on the plans or as identified by the Engineer.

This work shall be performed in accordance with the requirements as follows:

(a) Technical Standards and Corrective Action Requirements for Owners and Operations of Underground Storage Tanks (UST), Code of Federal Regulations, Title 40, Part 280 (40 CFR 280), Subparts F and G;

(b) American Petroleum Institute Recommended Practice 1604, "Removal and Disposal of Used Underground Petroleum Storage Tanks";

(c) American Petroleum Institute Publication 2015, "Cleaning Petroleum Storage Tanks";

(d) Resource Conservation and Recovery Act and the Indiana Environmental Management Act;

(e) Underground Storage Tank (UST) Notification, Reporting and Closure Requirements as prepared by the IDEM Underground Storage Tank Branch;

(f) safety regulations issued by OSHA;

(g) Indiana Fire Prevention Code, Flammable and Combustible Liquids, Article 79, 675 IAC 22;

(h) all applicable Federal and State requirements for certification of underground storage tank removal contractors; and

(i) local fire codes.

An individual who has been certified for underground storage tank closure or removal, as appropriate, through the State Fire Marshall shall be present at all times for tank closure or removal. Evidence of such certification shall be given to the Engineer prior to starting work.

The removal and disposal of all regulated materials in or around the tanks shall be in accordance with 104.06.

The Contractor shall have the responsibilities as follows:

(a) obtain a review of available tank information from the Engineer;

(b) Unless the Department has already done so, provide notification of tank removal operations to appropriate authorities. Notification shall be provided as required to the IDEM, Office of the State Fire Marshall and local fire department in accordance with (a) through (i) above. Notification shall be provided to IDEM at least 30 days prior to closure or removal of regulated tanks in the form of the completed Notification for Underground Storage Tanks Form, and at least 14 days prior to removal or closure to the State Fire Marshall and the local fire department. At least 14 days prior notice, by telephone, shall be given to the IDEM Underground Storage Tank Branch of intended closure or removal date. Such forms are available from the Indiana Department of Environmental Management;

(c) allow the Engineer to visually inspect tanks after removal;

(d) allow the Engineer to visually inspect the excavation zone for contaminated soils;

(e) obtain from the Engineer the limits of excavation for each tank to be removed;

(f) allow the Engineer to verify all documentation for remediation;

(g) sample and classify the tank contents, if access is available, or confirm tank contents by sampling and testing;

(h) submit a site operation plan for the contaminated area to the Engineer for review and approval before beginning removal operations;

(i) provide and maintain pedestrian safety fencing;

(j) remove all liquids and sludges from tanks;

(k) clean tanks and connected piping, including feed lines and drain lines, of contents;

(l) remove tanks from the ground;

(m) dispose of all tank content wastes in accordance with the directions provided by the Engineer in 104.06;

(n) render tanks useless or dismantle tanks and transport to scrap dealer or landfill;

(o) implement the site operation plan for the contaminated area as directed in accordance with 104.06;

(p) backfill excavations in an approved manner. Backfill shall be B borrow in accordance with 211;

(q) maintain accurate records of all operations. Submit reports, including a completed Notification for UST and an UST System Closure Site Assessment Report, to IDEM's UST Branch within 30 days after closure. Two copies of these forms shall be provided to the Engineer with verification that the documents were submitted to IDEM;

(r) obtain disposal approvals for the hauling and disposal of all tank content waste materials from the site; and

(s) if the soil or groundwater surrounding the tank shows evidence of contamination, the hole shall be covered to prevent contamination of rainwater until remediation is complete.

The Engineer will classify the tank contents as one of the following liquid wastes for purposes of disposal requirements and payment.

(a) Type A Waste

Type A waste will consist of direct discharge wastewater which may be discharged to a sanitary sewer system with or without treatment, upon receipt of required permits.

(b) Type B Waste

Type B waste will consist of low flash wastewater which shall be treated off-site at a treatment facility prior to disposal.

(c) Type C Waste

Type C waste will consist of petroleum or other chemical liquid and sludge wastes which are regulated materials under current EPA, U.S. Department of Transportation, or IDEM regulations. Such waste shall be disposed of at a Resource Conservation and Recovery Act approved facility.

202.09 Remediation of Contaminated Soil and Groundwater

This work shall consist of remediation. All work shall be performed in accordance with all applicable Federal, State, and local requirements, and 104.06.

Prior to commencing work, the Contractor shall provide evidence satisfactory to the Engineer that the firm and personnel which are performing the remediation are properly trained or certified as required. The Contractor shall have the equipment for the proper remediation of regulated materials. The Contractor shall be familiar with the required procedures and practices governing such work.

The Contractor shall have the responsibilities as follows:

(a) notify the appropriate authorities regarding remedial operations and provide verification to the Engineer;

(b) take samples and conduct tests as approved by the Department to determine extent of the contamination;

(c) develop a remediation plan and obtain approval for the plan from the Department and the proper authorities;

(d) remediate the site upon plan approval;

(e) verify that remediation has been completed by conducting the appropriate sampling or testing;

(f) backfill excavations and restore ground lines as directed, in accordance with 211;

(g) maintain accurate and complete records of all operations; and

(h) submit reports to the Engineer and the proper authorities as requested for proper cleanup documentation.

202.10 Remediation of Other Regulated Materials

This work shall consist of the remediation of regulated materials not otherwise described herein. This work shall include all necessary excavation, backfilling of resultant excavations, and other handling or storage required.

All work shall otherwise be performed in accordance with all applicable Federal, State, and local requirements, 104.06, and 202.09.

202.11 Transportation and Disposal of Regulated Materials

This work shall consist of determining locations for disposal, treatment, or recycling of regulated materials removed from the project site. This work shall also consist of loading regulated materials into a vehicle or transport container and the movement of such material from the project site to a state or EPA permitted disposal site, storage treatment, or recycling facility by appropriately trained and licensed personnel.

The Contractor shall have the responsibilities as follows:

(a) determine the location for disposal, treatment, or recycling of regulated materials removed from the project site; obtain written approval of the site; arrange with the approved site for the acceptance of the materials; and obtain the Engineer's written approval for the use of the site prior to transporting the materials;

(b) ensure that all packing containers or tank vehicles are in accordance with the applicable Federal, State, and local requirements;

(c) prepare a shipping paper or manifest, as required by Federal and State requirements, for signature of the Engineer or designated Contractor representative;

(d) ensure that the shipping paper or manifest is carried in the vehicle;

(e) ensure that all required placards are properly displayed on the vehicle;

(f) ensure prompt movement of the vehicle to the disposal site; and

(g) return one copy of the signed shipping or manifest documents to the Engineer.

202.12 Blank

202.13 Method of Measurement

If the contract stipulates that payment will be made for removal of obstructions or of houses and buildings, or for clearing right-of-way on a lump sum basis, the pay items for such removals will include all structures and obstructions encountered within the right-of-way in accordance with the requirements herein. No measurement will be made. If it is specified that payment will be made for the removal of specific obstructions on a unit basis, measurement will be made by the unit specified in the Schedule of Pay Items. Material used to backfill excavated areas as directed will be measured by the cubic yard (cubic meter).

If the contract stipulates that payment will be made for removal, transportation, or disposal of regulated materials on a unit basis, measurement will be made by the unit stipulated in the Schedule of Pay Items. However, removal of regulated asbestos, if found, will be measured by the square foot (square meter).

Underground storage tank removal will be measured per each within the size groupings of under 3,000 gal. (11,400 L), from 3,000 through 6,000 gal. (11,400 through 22,800 L), over 6,000 through 10,000 gal. (22,800 through 39,000 L), or over 10,000 gal. (39,000 L). Testing for regulated materials will be measured per each for the type and number of tests required.

The length of pipe removed will be measured by the linear foot (meter), computed by multiplying the number of commercial lengths removed by the nominal laying length, or by measuring in place prior to removal, if practicable.

Removal of present structure or portions thereof will not be measured for payment.

Pavement removal will be measured by the square yard (square meter) of the area removed.

202.14 Basis of Payment

The accepted quantities of removal of structures and obstruction within the construction limits will be paid for at a contract lump sum price. All structures or obstructions the Contractor is directed to remove outside the construction limits, including clearing for utility relocation which is for the benefit of the Department, and not simply for the Contractor's convenience, will be paid for in accordance with 104.03 or 109.03 unless such clearing is shown on the plans or in the Contract Information book. Such price shall be full compensation for removing and disposing of obstructions in accordance with requirements herein. Regulated materials shall be subject to 104.06. If no contract price is listed in the Schedule of Pay Items for a pay item set out in this specification, no direct payment will be made for work necessary to comply with the requirements for such pay item, except as set out herein. The cost thereof shall be included in the cost of other pay items. If unknown regulated materials are discovered during the life of the contract, payment for all work relating to removal, testing, transportation, or disposal of such materials will be in accordance with 104.03.

Specific obstructions, including pipe stipulated for removal and disposal, which are shown as pay items, will be paid for at the contract unit price per the unit specified in the Schedule of Pay Items.

Removal of houses and buildings will be paid for at the contract lump sum price for houses and buildings, of the parcel number shown in the Schedule of Pay Items, remove.

Testing for regulated materials will be paid for at the contract unit price per each for the type and number of tests required. Testing shall include collecting of samples and all necessary laboratory procedures.

Payment for removal of contaminated soils will be based on the actual cubic yards (cubic meters) removed, or by the number of 55 gal. (210 L) drums filled with the contaminated soil.

B borrow required for backfilling basements or depressions left by demolition will not be paid for separately but will be included in the cost of the removal item. B borrow required for backfilling of removed contaminated soils or tank will be paid for in accordance with 211.10.

Underground storage tank removal will be paid for at the contract unit price per each tank within the size groupings of under 3,000 gal. (11,400 L), from 3,000 through

6,000 gal. (11,400 through 22,800 L), over 6,000 through 10,000 gal. (22,800 through 39,000 L), or over 10,000 gal. (39,000 L). Underground storage tank liquid waste disposal will be paid for based on the type of waste and the actual number of gal. (liters) of liquid and sludge removed.

Transportation, disposal, and removal of regulated materials will be paid for based on the type of regulated material and the pay unit shown in the Schedule of Pay Items. If such pay unit is specified as drum, the term drum will mean the contents of a 55 gal. (210 L) drum.

Clearing right-of-way within the construction limits will be paid for at a contract lump sum price. All clearing the Contractor is directed to perform outside the construction limits, including clearing for utility relocation which is for the benefit of the Department, and not simply for the Contractor's convenience, will be paid for in accordance with 104.03 or 109.03 unless such clearing is shown on the plans or in the Contract Information book.

Removal of present structure will be paid for at the contract lump sum price for present structure, for the structure number specified, remove. Removal of present structure portions will be paid for at the contract lump sum price for present structure, for the structure number specified, remove portions.

When directed, portions of the present structure contiguous to the areas shown on the plans or non-contiguous portions of the same character as the planned removal shall be removed. Such additional portland cement concrete acceptably removed will be paid for as measured in its original position, at twice the contract unit price per cubic yard (cubic meter) for class A concrete in superstructures, class A concrete in substructures, class C concrete in superstructures, or $652.00 per cubic yard ($854.00 per cubic meter), whichever is lowest.

Pavement removal will be paid for at the contract unit price per square yard (square meter).

If there is no pay item for pavement removal and such is encountered, payment will be made for each square yard (square meter) removed. Such pavement removal shall apply only to portland cement concrete pavement or base. A unit price for this work will be established based on thickness, quantity, and removal process. Such unit price will be generated prior to the work being performed. If portland cement concrete pavement has an asphalt overlay, its removal will be considered as incidental, for which no direct payment will be made.

Before the Contractor can be paid for any item related to an UST removal in accordance with 202, a detailed explanation of how costs were calculated for those items shown in the Schedule of Pay Items that are related to the UST removal shall be submitted to the Engineer. Such documentation shall include, but is not limited to, a portion of the mobilization and demobilization, a portion of the field office, a portion of the B borrow for backfill of the UST excavation, a portion of the surface removal over the UST, including sawing, and soil borings and laboratory analysis under the testing for waste item. The explanation shall show the type of pavement removed. Contaminated soil

removal shall be broken down into equipment cost, labor, and mobilization of equipment used. Transportation of the regulated materials shall be broken down into loading, hauling, and mileage costs.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Clearing Right-of-Way	LS
Contaminated Soil, Remove	CYS (m3)
Houses and Buildings, Parcel No. _____, Remove	LS
Pavement Removal	SYS (m2)
Present Structure, Str. No. _____, Remove	LS
Present Structure, Str. No. _____, Remove Portion	LS
_____, Remove	EACH
specific work	LFT (m)
	SYS (m2)
Regulated Asbestos Containing Materials, Remove	SFT (m2)
Regulated Materials, Dispose, _____	GAL. (L)
type	CYS (m3)
	TON (Mg)
	DRUM
	EACH
Regulated Materials, Remove, _____	GAL. (L)
type	CYS (m3)
	TON (Mg)
	DRUM
	EACH
Regulated Materials, Transport, _____	GAL. (L)
type	CYS (m3)
	TON (Mg)
	DRUM
	EACH
Structures and Obstructions, Remove	LS
Testing for Asbestos, _____	EACH
type	
Testing for Wastes, _____	EACH
type	
Underground Storage Tank, Liquid Waste Disposal, _____	GAL. (L)
type	
Underground Storage Tank, Remove and Dispose, Under 3,000 Gallons (11 400 Liters) Capacity	EACH
Underground Storage Tank, Remove and Dispose, 3,000 through 6,000 Gallons (11 400 through 22 800 Liters) Capacity	EACH
Underground Storage Tank, Remove and Dispose, 6,000 through 10,000 Gallons (22 800 through 39 000 Liters) Capacity	EACH

Underground Storage Tank, Remove and Dispose,
Over 10,000 Gallons (39 000 Liters) Capacity.....EACH

The cost of removal and disposal of buildings, foundations, debris and unsuitable material, guide posts, delineator posts, temporary road material, existing asphalt patches, the filling of abandoned wells; terminating utilities; sealing floor drains where necessary; breaking basement floors; furnishing and erecting all barricades, fences, and other safety measures necessary for adequate protection of the sites; and backfill of basements or depressions left by demolition shall be included in the cost of the pay items of this section. All fence posts and concrete footings shall be completely removed and the resulting holes backfilled accordingly.

If no contract price is listed in the Schedule of Pay Items for work set out herein, no direct payment will be made for compliance with the requirements for such work, except as set out herein. The cost thereof shall be included in the cost of other pay items.

If the houses and buildings listed for removal from a designated parcel are not in existence at the time of the letting, no payment will be made for removal work on such parcel.

The cost of removing the tanks and all pipe from the ground, removal and disposal of all miscellaneous parts associated with the tank such as concrete pads or holding devices, filing of all required notifications, preparation and implementation of a site operation plan, excavation of all materials necessary in order to remove the tank, compliance with closure requirements, all necessary pedestrian safety fencing, cleaning and draining of tanks and pipes, dismantling or transport, and all required record keeping or reports shall be included in the cost of underground storage tanks, remove and dispose. However, disposal of waste contents and removal of contaminated soil will be paid for separately. No payment will be made for work not performed in accordance with the specifications or not required by the contract.

The cost of all on-site or off-site storage of the materials shall be included in the cost of transportation.

All disposal fees and recycling or treatment costs required for regulated materials found within the project limits shall be included in the cost of regulated materials, dispose. If regulated materials are treated on site and not disposed of at an approved location, payment will be in accordance with 104.03.

The cost of removal of all regulated asbestos-containing materials and all safety procedures shall be included in the cost of regulated materials, remove.

The cost of packaging regulated materials, excavation, restoring ground lines, and maintaining and filing required documents and reports shall be included in the cost of the pay items.

The cost of removal of regulated asbestos containing materials shall include only the removal of material identified in the contract or by the Engineer as regulated

asbestos-containing material. Regulated asbestos-containing materials include the following:

(a) friable asbestos-containing material;

(b) Category I non-friable asbestos-containing material that has become friable or will be subjected to sanding, grinding, cutting, abrading, or burning;

(c) transite-like material; and

(d) other Category II non-friable asbestos-containing material that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of normal demolition operations.

Unless directed by the contract or the Engineer, the cost of asbestos removal shall not include the removal of Category I or II non-friable asbestos-containing material that is not friable or does not have a high probability of becoming friable but which becomes friable because the Contractor uses demolition methods that cause such materials to become regulated. Such cost shall be included in the cost of other pay items.

The cost of all labor; equipment; materials; and documentation required for complying with the applicable laws, regulations and procedures, including but not limited to, licenses, permits, other legal fees, or disposal charges shall be included in the cost of the pay items. No payment will be made for work which is not performed in accordance with the specifications, nor that which is not required by the contract.

The cost of removal of specific work shall include the removal and disposal of such obstructions, the necessary excavation required, salvage of materials removed, their custody, preservation, storage on the right-of-way, and disposal as provided herein. All damage to existing facilities caused by the Contractor's operations or equipment shall be satisfactorily replaced or repaired with no additional payment.

The cost of clearing right-of-way shall include the cost of all work described herein except for that which is set out specifically as pay items, or work which is described in 104.06, 202.08, 202.09, 202.10, or 202.11.

If it is necessary to package the contaminated soil in a container, the cost of the container and all cost related to packaging shall be included in the cost of removal. The cost of all excavation pertaining to contaminated soil, removal of all soil within the limits established by the Engineer, restoring ground lines, maintaining required records and filing of reports shall be included in the cost of contaminated soil, remove. No payment will be made for work beyond the limits established by the Engineer, work not performed in accordance with the specifications, or work not required by the contract unless in accordance with 104.03.

The cost of all handling of the product, removal of the product from the tank, disposal, all required packaging, and transportation shall be included in the cost of underground storage tank, liquid waste disposal.

All necessary cleanup of spills caused by the Contractor will not be paid for.

SECTION 203 – EXCAVATION AND EMBANKMENT

203.01 Description

This work shall consist of embankment construction and excavation, hauling, and disposal or compaction of all material not being removed under some other item which is encountered within the limits of the work and also from intersecting entrance approaches beyond the right-of-way limits necessary for the construction of the roadway in accordance with 105.03. All excavation will be classified as hereinafter described.

203.02 Common Excavation

Common excavation shall consist of all excavation not included as rock excavation or excavation which is otherwise classified and paid for, including asphalt type pavement and all rippable materials.

203.03 Rock Excavation

Rock excavation shall consist of igneous, metamorphic, and sedimentary rock which cannot be excavated without blasting; the use of a power shovel of not less than 1 cu yd (0.76 m^3) capacity, properly used, having adequate power and in satisfactory running condition; or the use of other equivalent powered equipment. Rock excavation shall also include all boulders or other detached stones each having a volume of 1/2 cu yd (0.4 m^3) or more.

203.04 Unclassified Excavation

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

203.05 Peat Excavation

Peat excavation shall consist of the necessary excavation and satisfactory disposal of peat, muck, marl, or any other similar unsuitable material in peat deposits, together with any overlaying material, except pavement, which is not used in embankment construction, except as otherwise provided in 203.16.

203.06 Waterway Excavation

Waterway excavation shall consist of the necessary excavation and satisfactory disposal of all material resulting from excavation for clearing waterways, making channel changes, or both when such are itemized in the Proposal book, but shall not include class Y excavation, or excavation made for a structure in accordance with 206. If not otherwise specified, waterways shall be cleared for the entire distance within the right-of-way lines.

203.07 Class Y Excavation

If there be encountered within the limits of waterway excavation material which can be classified as rock in accordance with 203.03, or material which consists of conglomerate, concrete, masonry, or any similar material which is not part of an existing

structure shown on the plans, shall be defined as class Y excavation. Material as defined in 203.02 will not be considered as class Y excavation.

203.08 Borrow or Disposal

Borrow shall consist of approved material required for the construction of embankments or for other portions of the work and shall be obtained from approved locations and sources outside the right-of-way. Borrow material shall be free of substances that will form deleterious deposits, or produce toxic concentrations or combinations that may be harmful to human, animal, plant or aquatic life, or otherwise impair the designated uses of the stream or area. Unless otherwise designated in the contract, arrangements shall be made for obtaining borrow. Borrow, as designated herein, shall not include material excavated beyond the right-of-way limits at intersecting public roads, private and commercial drive approaches, nor material furnished as B borrow.

Proposed borrow sites and proposed disposal sites for excavated material shall be identified before such material is excavated or disposed of within or outside the right-of-way. Except where a permitted or licensed commercial site is utilized, an inspection of areas outside the construction limits shall be conducted by a qualified wetland professional to determine if wetlands are present on the site. This inspection shall be in accordance with the Federal Manual for Identifying and Delineating Jurisdictional Wetlands. The inspection shall also determine if isolated wetlands as defined by the IDEM are present. The Contractor shall submit a document, signed by the wetland professional, verifying that the site has been inspected for the presence of wetlands in accordance with the federal manual and for isolated wetlands and, if any are present, specifying the area to be demarcated as jurisdictional waters and/or wetland. Once the area to be used for borrow or for disposal of excavated material has been shown not to contain jurisdictional or isolated wetlands, the boundary of the area cleared shall be demarcated. The methods of demarcation shall be as approved by the Engineer.

The Department will maintain a list of qualified wetland professional consultants. A wetland professional certified by the Society of Wetland Scientists, SWS, as a wetland professional-in-training or professional wetland scientists may also be utilized and a list of such scientists can be located at http://www.wetlandcert.org/search.html.

Previously approved sites may be utilized for borrow or disposal operations if the Contractor furnishes a valid permit or document signed by a wetland professional prior to utilizing the site.

If the Contractor elects to use the site, all required permits shall be obtained. The Contractor shall develop and construct all mitigation measures and fulfill all requirements detailed by such permits. The Contractor shall also obtain written permission from the land owner for Department personnel to access the site for monitoring. No excavation shall occur or no material shall be disposed of beyond the boundaries of the demarcated area.

Before borrow or disposal operations are begun, the Contractor shall submit operation plans for approval. Such plans shall include the following:

(a) a detailed sketch showing the limits relative to property and right-of-way lines;

(b) the grade of all slopes;

(c) an erosion control plan in accordance with the requirements of 327 IAC 15-5;

(d) the encasement, finished grading, and seeding procedures; and

(e) archaeological clearance.

Notice shall be given in advance of opening borrow areas so that cross section elevations and measurements of the ground surface after stripping may be taken and the borrow material may be tested before being used.

Except when a commercial source is utilized, a qualified archaeologist shall perform a record check and field survey of borrow or disposal limits to determine if any significant archaeological sites are within the limits. Results of the record check and survey shall be furnished in writing prior to the excavation of any material. If any archaeological sites are identified, the archaeologist shall establish the limits of the site along with a reasonable border. The site shall not be disturbed unless the archaeological site is cleared by established procedures and written authorization to enter the site has been issued. Under no circumstances shall an employee of the Contractor or the State of Indiana share in the ownership or profit from the sale of any archaeological artifacts that may be salvaged. No extension of completion time will be granted due to any delays in securing approval of a borrow or disposal site.

Unless written permission is granted, there shall be no excavation in a borrow area below the elevation of the adjacent properties within 150 ft (45 m) of the nearest right-of-way line of an existing highway, county road, or city street; the nearest right-of-way line of a proposed highway, county road, or city street; or adjacent property lines. If the properties adjacent to the borrow area are privately owned, the setback limit of 150 ft (45 m) may be lessened if written approval or permission is granted by the owner of the adjacent property, the excavation is in accordance with local zoning laws and requirements, and if lessening the limit is in the best interest of the State. Such minimum distance shall not be closer than 50 ft (15 m) to an adjacent property line. All excavated slopes of a borrow area shall not be steeper than 3:1 down to 2 ft (0.6 m) below the ground water elevation. All excavated slopes 2 ft (0.6 m) below the ground water elevation shall not be steeper than 2:1.

Top soil from the borrow or disposal area shall be stockpiled for use in restoring the disturbed area. A minimum encasement of 6 in. (150 mm) shall be placed on the 3:1 or flatter slopes. Final restoration of borrow or waste disposal areas shall include grading, seeding, or other necessary treatments that will blend the area into the surrounding landscape. Restored areas within 150 ft (45 m) of the nearest right-of-way line shall be well drained. Areas beyond 150 ft (45 m) shall be drained unless the landowner desires other treatment of the borrow area. Construction of borrow or disposal areas shall be in accordance with existing laws, regulations, and ordinances. Under no conditions shall

borrow sites detract from the appearance of the natural topographical features nor increase the potential hazard to a vehicle that has inadvertently left the highway.

If granulated slag, dunes sand, or other granular material which is not suitable for the growth of vegetation is used, such material shall not be placed within 1 ft (0.3 m) of the required finished surfaces of shoulders and fill slopes. Additional material required to complete the embankment, such as sandy loam, sandy clay loam, clay loam, clay, or other materials suitable for the growth of vegetation and free from clods, debris, and stones, shall be furnished at the contract price for borrow.

Additional fill material may be secured from within the permanent or temporary right-of-way in lieu of borrow or B borrow either from vertical or horizontal extensions, or both, beyond the lines and elevations of roadway and drainage excavation as shown on the contract plans when authorized in writing. If additional material has been obtained without written approval, the material will be classified either as to source or use, to the best advantage of the Department.

CONSTRUCTION REQUIREMENTS

203.09 General Requirements

The excavation and embankments for the roadway, intersections, and entrances shall be finished to reasonably smooth and uniform surfaces. Excavated materials shall not be wasted without permission. Excavation operations shall be conducted so that material outside 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 201. The area of the exposed materials shall be limited by the Contractor's capacity to adequately maintain permanent and temporary erosion and sediment control features.

The Engineer will direct the Contractor to stabilize an area if the disturbed ground has been or will be left bare and unworked for fifteen consecutive calendar days. Once directed, the Contractor shall stabilize these areas within ten calendar days. These methods shall be installed in accordance with 621 or as otherwise directed.

All spongy and yielding material which does not readily compact, and all vegetation shall be removed from within slope-stake limits and to such depths as directed. Soft or unstable materials which are encountered where the proposed embankment will be placed, shall be removed. If groundwater is encountered, backfilling shall be accomplished using B borrow in accordance with 211.02 to an elevation at least 2 ft (0.6 m) above the groundwater level. Compaction of the B borrow placed above the free water level shall be accomplished using heavy vibratory equipment. If groundwater is not encountered during the removal operation, the backfill shall be placed in accordance with the following paragraph. None of the removed materials shall be used in embankment, except if approved, they may be used if aerated such that proper compaction can be achieved.

After the embankment area has been cleared and before embankment is placed, all pronounced depressions left in the original ground shall be refilled with suitable material and compacted in accordance with 203. The upper 6 in. (150 mm) of the original ground

shall be compacted with a roller weighing no less than 10 t (9.1 Mg), or with other approved compacting equipment. Proofrolling of the natural ground surface shall be performed in accordance with 203.26 within all areas where new fill will be placed.

If the original ground cannot be compacted to the required density because of unstable soils, high water table, or other conditions, the use of stabilizing materials consisting of B borrow in accordance with 211.02, or chemical modification in accordance with 215 may be used. The materials shall be 1 to 2 ft (0.3 to 0.6 m) thick, and shall be extended so as to daylight at the toe of slope. B borrow, when exposed, shall be capped with 6 in. (150 mm) of coarse aggregate No. 2.

When B borrow or chemical modification will not satisfactorily stabilize an area, written approval is required prior to the use of alternate methods. When preliminary exploration indicates the need to remove more than 4 ft (1.2 m) or 250 cu yd (200 m^3) of unsuitable material, approval is needed.

Frozen materials, stumps, roots, all or parts of trees, brush, weeds, sod, or other perishable materials shall not be incorporated in the embankment. Rocks greater than 6 in. (150 mm) in any dimension shall not be left within 6 in (150 mm) of the finished subgrade. The original ground surface, or the surface of any lift in place shall not be frozen and shall be free of snow, ice, or mud.

The embankment shall be kept drained at all times by keeping the center higher than the sides and uniformly graded.

Each embankment lift shall extend transversely over the entire area and shall be kept smooth. If a dragline or similar equipment deposits material in large masses onto the embankment, the material shall be spread out in uniform lifts.

The use of hydraulic methods to construct embankments will be permitted only when authorized in writing. Only B borrow shall be placed below the free water level. Backfill at structures shall be in accordance with 211.04.

If the same or similar material is being used in the upper lifts of embankment as shall be used in the subbase at that location, these lifts shall be placed in smooth uniform layers for the full width of the embankment.

When grading operations are performed in non-daylight hours, artificial lighting shall be provided and maintained, to permit the construction and inspection of the operations.

All slopes which are to be graded and not stabilized with other erosion control measures shall be roughened as described herein, until permanent erosion control measures are placed. Roughening shall take place each day after work is performed on the slopes, or as directed to re-establish the roughening.

The soil slopes shall be roughened to create a series of ridges and depressions parallel to the roadway making grooves at least 1 in. (25 mm) deep and not more than

15 in. (400 mm) apart. When directed, slopes shall be stabilized using temporary seeding in accordance to 621.

Sufficient quantities of excavated materials suitable for the growth of vegetation shall be preserved from within the planned excavation area and used for the encasement of cut, fill, and shoulder slopes which are deemed not suitable for the growth of vegetation. The depth of encasement shall be 6 in. (150 mm) or more, as directed, measured perpendicular to the face of the slope. No additional compensation will be allowed for this work except payment will be made for the class of excavation involved for authorizing undercutting of back slopes. Encasement of rock embankment and cut slopes will not be required unless otherwise directed.

Material suitable for the growth of vegetation shall be as approved and may consist of sandy loam, sandy clay loam, clay loam, clay, and shall be free from clods, debris, and stones. The material placed on backslopes of cut sections shall be placed in accordance with 203.21.

If sufficient excavation materials suitable for the encasement of cut, fill, and shoulder slopes are not available, borrow material shall be furnished. The sources of the borrow material for encasement shall be in accordance with 203.08. Payment for borrow will be made in accordance with 203.28. If the contract does not contain a pay item for borrow, a change order will be executed for payment of borrow. Suitable portions of common excavation may be preserved or borrow material may be furnished for encasement provided all suitable excavation is used constructively.

203.10 Disposal of Excavated Material Except Waterway and Peat Excavation

Excavation material shall be used for the construction of embankments, shoulders, special fill, or other places as may be specified or directed, depending on the nature of the material. Excavated material that is suitable for embankment construction that is not required for maintenance of traffic shall be placed in the embankment before placing any borrow material, unless otherwise authorized in writing.

If more material is excavated from within required cut slopelines than is needed to construct embankments or special fills, the excess may be used to widen embankments, flatten fill slopes, or be used otherwise as directed. All excess excavated material that cannot be used constructively within the project limits shall be disposed of off the right-of-way in accordance with 201.03 and 203.08.

Excavation obtained from the right-of-way and planned to be used in fills may be wasted and replaced with borrow with no additional payment only after written permission is obtained. All required samples of the borrow or the excavation materials involved shall be furnished with no additional payment.

203.11 Disposal of Waterway Excavation

Unless otherwise provided, material resulting from waterway excavation shall be used to fill old channels and, if suitable, in embankment, special fill, and approach embankments, or any combination of these, as specified or directed.

A portion of waterway excavation which is unsuitable for the above uses, a portion which is suitable but is in excess of that required for such uses, or if locations for such disposal are not available, the disposal shall be in accordance with 201.03.

203.12 Disposal of Peat

All material removed as peat excavation, removed or displaced by machine operation, or displaced by the advancing backfilling material shall be uniformly spread between the toes of fill slopes and the swamp ditches or beyond, or otherwise disposed of in accordance with 203.08.

203.13 Slides

Slides encountered during construction shall be removed as directed and their removal will be paid for as the class or classes of excavation encountered.

If the contract involves paving, the omission or delay of paving operations may be required at the location of a slide. If proper treatment of a slide has been obtained prior to completion of the remaining pavement, the gap may be required to be paved, and payment will be at the contract unit price for pavement.

If proper treatment of a slide has not been obtained prior to completion of the remaining pavement, the gap left at the slide location shall become an exception to the contract item for pavement.

203.14 Drainage

Ditches shall be interpreted to mean open ditches and channel changes parallel to and adjacent to the roadbed. Channel changes excavated under the classification of waterway excavation are not included in this definition.

Lines, grades, and cross sections of ditches shall be as shown on the plans, unless otherwise established to obtain proper drainage.

Ditches and gutters emptying from cuts onto embankment shall be constructed to avoid eroding the embankment.

Exploration of underground drainage and sinkholes may be required, and payment will be hereinafter provided. Should any underground drain be encountered, the location of which is not shown on the plans, notification shall be made at once. Drainage shall be explored as directed and, if deemed necessary, taken care of under applicable provisions of these specifications, or as otherwise directed.

If existing surface drains, tile drains, sewers, or other underground drains, or parts thereof, are not to be replaced or are not required by the terms of the contract or directed to be changed, whether such drainage facilities are shown on the plans or not, all such drainage facilities or parts thereof shall be protected, preserved, and satisfactorily continued in use without change. If in the prosecution of the work such existing drainage is changed or interrupted, or through negligence such drainage is interrupted or damaged, satisfactory permanent repairs shall be immediately provided or adequate temporary drainage facilities shall be maintained until permanent repairs are made. If temporary facilities are provided, before the work is accepted, such damage or interrupted drainage

facilities shall be restored to the original condition or to an altered state which is at least equal to their original condition.

If slopes or ditches which were graded for a grading contract become eroded or scoured during the paving contract work, the scoured or eroded areas shall be reshaped to the original cross section and reseeded or resodded as shown on the plans, all in accordance with 208 and 621.

When so provided by the plans or special provisions, or when ordered, all tile drains, sewers, or other underground drains encountered in the prosecution of the contract shall be repaired, replaced, extended, reconstructed, connected, or otherwise changed.

Unless otherwise provided in the contract, the cost of replacing, restoring, or connecting an underground drain which is substantially in its original location and incidental to roadway and drainage excavation, structures, or other drains will not be paid for directly, but the cost thereof shall be included in the cost of various pay items.

Unless otherwise provided, any necessary drainage change or restoration not shown on the plans and not due to negligence or operations of the Contractor will be paid for at the contract unit price or prices thereof. If there is no such contract unit price or prices, such work shall be done and payment made in accordance with 104.03.

203.15 Excavating Rock

If material is encountered during excavation which appears to belong in the classification of rock excavation in accordance with 203.03, notification shall be made in writing. Ample time shall be allowed to make such investigation and measurements that are necessary to determine the class and volume of the material in question.

Exploratory cores shall be taken from the top of the rock to approximately subgrade elevation as directed. The cores shall be cut with standard diamond core bits and series X double tube core barrels to obtain 2 1/8 in. (54 mm) diameter samples. All cores shall be suitably marked and identified to show the location of the core by station, offset from centerline, elevation of top of rock, depth below top of rock, and percent recovery within each core. All cores shall be retained. The cores shall be placed in suitable compartmented wooden boxes in the order in which removed from the boring, with dividers between core runs. The top and bottom of each run shall be appropriately marked. The cores shall be transported to a location as directed.

The top of rock elevations shall be determined prior to locating the top of soil cut slopes where finished rock slopes are planned to be one to one or steeper.

Final breakage of rock excavation shall be in accordance with or closely approximate the slope lines shown on the plans unless different slope lines are fixed, and the Contractor so notified. The final slopes shall be left reasonably smooth and uniform, and all loose and overhanging rock removed. Unless otherwise permitted, no rock shall finally project more than 1 ft (0.3 m) beyond established slopes. If natural seams intersect an established slope, the excavation may be carried, with permission, along the face of such seams for the distance approved.

Rock shall be excavated to the required elevation for the full width of the roadbed as shown on the plans or as directed. Where rock is excavated below the required elevation, the area shall be backfilled to the subgrade elevation with crushed stone, spalls, subbase material, or other approved granular material, which shall be shaped and compacted to the required elevation and cross section.

Exploratory drilling, which shall consist of drilling holes for the purpose of determining the existence of cavities affecting underground drainage and possible sinkholes in cut sections, may be required at locations as directed. Unless otherwise directed, the holes shall be drilled on the centerline of the proposed pavement at approximately 100 ft (30 m) intervals and shall extend for a depth of 7 ft (2 m) below the proposed grade and have a minimum diameter of 1 1/2 in. (38 mm).

Where cavities are discovered on centerline, additional holes shall be drilled at 25 ft (8 m) intervals along the edge of the proposed pavement, and unless otherwise directed, extend for a depth of 7 ft (2 m) below the proposed grade. Where any cavity is discovered or exposed having a minimum cover of less than 5 ft (1.5 m), the cover shall be removed, and the treatment of such areas shall be in accordance with details in the plans or as otherwise directed.

The final surface of rock excavation under the roadbed area shall be left so that drainage between the rock surfaces and any material placed thereon will be substantially complete. Where seams of clay or other soft material 1 ft (0.3 m) or less in thickness are encountered in rock excavation, the volume of such seams will be considered as rock excavation and paid for as such.

Unless otherwise specified or directed, rock shall be pre-split by drilling and the use of explosives in such a manner as results in minimum breakage outside neat lines of the typical cross section and slope stakes as established. Deposits of commercial building stone outside the right-of-way shall not be damaged. Holes for pre-splitting shall be drilled along the established slope stake lines. The holes shall be from 2 to 4 in. (50 to 100 mm) in diameter and, unless otherwise directed, be spaced approximately 3 ft (0.9 m) apart. Holes shall be drilled approximately 2 ft (0.6 m) below the established grade of the cut, or the predetermined bench elevation, or as directed.

The maximum depth of any pre-split lift shall be 30 ft (9 m), unless otherwise directed or permitted. If more than one lift is required, the first line of drill holes shall be set in such a manner as to allow for a specified offset for each succeeding lift and an offset of 2 ft (0.6 m) from the back of the paved side ditch line. The explosives used and the method of loading depends on the material to be blasted. These explosives may vary from a single strand of detonating cord, for blasting unconsolidated formations, to a solid column of dynamite for massive formations. However, the explosive shall be of a type to accomplish the pre-splitting with a minimum of breakage outside the excavated area. After the charges are placed, the holes shall be filled with sand or other suitable granular material.

Except as indicated below, all pre-splitting charges shall be detonated simultaneously by the use of instantaneous electric blasting caps or by means of a detonating cord trunkline. The line holes shall be fired before the main excavation is

blasted. Pre-splitting shall be kept well in advance of regular blasting operations. Primary blasting holes shall be drilled no less than 6 ft (1.8 m) from the pre-split face, unless otherwise permitted or directed. If additional charges are required, holes shall be placed at half the distance of a full depth hole to a depth such that the bottom of the hole clears the pre-split face approximately 2 ft (0.6 m). The pre-split face shall deviate no more than 6 in. (150 mm) from the front line of drill holes or more than 12 in. (300 mm) from the back line of drill holes except where the character of the rock will unavoidably result in some irregularities.

The amount of explosives per shot for instantaneous firing or the amount of explosives per delay for delay firing shall not be great enough to damage nearby structures, rock formations, or other property. Where commercial building stone formations are located in the effective vicinity, adequate seismograph readings shall be obtained, with no additional payment, as evidence that blasting operations have not altered existing commercial building stone formations outside the right-of-way limits of the project.

Permission may be granted to use machine methods to establish the finished slopes in those cuts where machine methods are used to remove roadway excavation, provided final machine finished slopes are equal or superior to that which would be obtained by pre-splitting methods.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work or in consequence of the non-execution thereof, such property shall be restored, with no additional payment, to a condition similar or equal to that existing before such damage or injury was done by repairing, rebuilding, or otherwise restoring as directed, or such damage or injury shall be made good in an acceptable manner.

No direct payment will be made for pre-splitting, but the cost thereof shall be included in the pay item of rock excavation or unclassified excavation.

203.16 Peat Deposit Treatment

If construction is specified at a location where a peat deposit is to be treated, the deposit shall be treated ahead of paving operations to obtain maximum settlement. If settlement has not been obtained when paving operations are at the limits of any peat deposit treatment, a gap in the pavement shall be left as directed. Gaps not constructed as part of the project will become an exception to the contract.

Treatment shall be by the following methods:

(a) Treatment of Existing Fills

If the required alignment is on an existing fill over a peat deposit, treatment may be required by any one or any combination of the following methods:

1. removal of the existing fill with or without the removal of the underlying peat and of the material at the sides of the existing fill;

2. blasting the peat under the fill;

3. loading the existing fill with additional fill material, and, if directed, blasting the peat underneath;

4. leaving the existing fill in place and treating the material at the sides either by removing the peat at the sides and backfilling or by displacement or both.

Determination of the method or methods to be used will be made based on conclusions from test holes which may be required to be drilled at designated locations.

(b) Treatment by Removal

This method consists of completely removing the objectionable material either as peat excavation or by machine operation and backfilling to the full toe-width of the proposed embankment or to such other widths, if so directed depending on the condition and depth of the material to be removed.

If water is not present, the space previously occupied by the removed material shall be backfilled with common excavation, borrow, or both, and placed in accordance with 203.

If water is present, the backfill shall be with material in accordance with 211.02. Placement of this material shall follow as closely behind the removal of the peat as possible. It shall be carried across the area from one end to the other by end-dumping and finally left at the established grade. This grade shall be such that keeps end-dumping to a minimum, which nominally shall be approximately 2 ft (0.6 m) above free water level. That portion between free water level and this established grade shall be thoroughly watersoaked to secure maximum compaction.

If additional fill is needed to bring the embankment to its final required grade, it may be common excavation or borrow. Further placing of the granular material above the end-dumped material may be authorized. This additional fill shall be placed and compacted in accordance with 203 but shall not be placed for at least 14 days after the end-dumped material is placed and compacted. This period may be shortened or lengthened with written approval, depending on the settlement that has been obtained.

(c) Treatment by Displacement

When this method is used, the peat at each end of the deposit shall be removed completely by excavation to the full width shown on the plans, or to such other width as may be directed, until a point is reached where the depth of the peat being removed is greater than 10 ft (3 m), or to a greater or lesser depth, as directed.

If conditions permit, the upper portions of the remaining peat shall be excavated across the remainder of the deposit in the same manner as set out above for the ends. Removal of this upper portion shall begin at one end and proceed to the other end at a sufficient distance ahead of backfilling operations so displacement of the remaining peat will not be retarded. If excavation to the required depth is not maintained for the full width ahead of the backfill or surcharge, additional units shall be used or backfill operations stopped until the two operation are in balance. If conditions permit, draglines

shall be operated from mats in front of the advancing excavation. If blasting is required to aid displacement, it shall be completed as extra work in accordance with 104.03.

Backfilling shall be in accordance with 203.16(b) for end-dumped material except, when required, a temporary surcharge shall be maintained at the head of the backfilling. The top of the surcharge shall be constructed and maintained to a width equal to the full shoulder width of the proposed embankment, or as approved or directed. The height of the surcharge shall be the same as the depth of the peat being treated, unless otherwise directed. The original ground shall be the reference elevation for measuring peat depths and surcharge heights. The top of the surcharge shall be approximately level and the length on top shall be at least two times the depth of the peat being treated. The surcharge shall be kept built up and pushed forward with a bulldozer or other approved equipment as the displacement progresses. Machine methods shall be used to relieve pressure at the advancing toe and sides of the surcharge. Sufficient hauling units shall be used to maintain the surcharge at the required height, width, and length. The machine operation to augment displacement shall be coordinated with the rate of placing temporary surcharge.

After the granular backfill has been completed across the deposit, any remaining fill necessary to bring the embankment up to the required final grade shall be in accordance with 203.16(b) for that portion above the end-dumped material.

203.17 Cased Test Holes

As displacement progresses, cased test holes shall be placed at locations as directed to determine the extent of peat displacement and for use in conjunction with final measurement. These holes shall extend to the bottom of the deposit. The boring shall be conduced in such a manner that accurate information may be obtained as to the nature of the materials through which the test holes are placed. If these test holes indicate that full displacement has not been obtained, the remaining peat shall be blasted or additional treatment shall be performed as required.

Unless otherwise permitted in writing, cased test holes shall be placed by hydraulic boring. The external casing shall be a minimum of 2 in. (50 mm) in diameter and of such additional size as to perform the operation satisfactorily. A continuous supply of fresh water shall be jetted through an internal pipe so that the wash water and loosened material is carried to the surface between the jet rod and the external casing. Pumps and other miscellaneous tools and equipment shall be used as required to perform a satisfactory operation.

203.18 Embankment Construction

Embankment construction shall consist of constructing roadway embankments, including preparation of the areas upon which they are to be placed; the construction of dikes within or outside the right-of-way; the placing and compacting of approved material within roadway areas where unsuitable material has been removed; and the placing and compacting of embankment material in holes, pits, and other depressions within the roadway area. Only approved materials shall be used in the construction of embankment backfill. Rocks, broken concrete, or other solid materials shall not be placed in embankment areas where piling is to be placed or driven.

203.19 Embankment Over and Around Structures

Fill shall not be placed against any new masonry abutment, wingwall, retaining wall, or culvert, nor over any culvert, bridge, or arch until approved. Applicable provisions of 702.23 shall be met.

Filling around culverts, bents, and piers, and fill below the natural ground surface at abutments, wings, and retaining walls shall be deposited on both sides to approximately the same elevation at the same time. Piers or bents shall not be displaced and shall be checked for proper location as the work progresses. Corrective measures shall be made if necessary. Filling at arch structures shall be carried up in horizontal layers, symmetrically from haunch to crown, and simultaneously over and against all piers, abutments, and arch rings.

Wedging action of filling material against structures shall be prevented. If directed, back slopes of excavation shall be destroyed by stepping or serrating.

The embankments around the end bents shall be constructed to approximate subgrade elevation for a distance of no less than 75 ft (23 m). This work shall be done before piling in the end bents are driven, and before the end bent or abutment is constructed. Compaction shall be in accordance with 203.23. After the embankments are completed, the embankments shall be excavated to construct the end bents and berms. Before driving piles, holes to receive the piling shall be cored through the embankment in accordance with 701.09(a). After the piles have been driven, the space between the pile and the cored hole shall be backfilled with granular material as directed. If the embankment in the area of the end bents is to consist of sand, gravel, or other permeable material in which a cored hole would not remain open, the piling shall be driven before the embankment is constructed. No direct payment will be made for excavation of the embankment at the end bents or abutments, or for coring, backfilling holes, or excavating fill, the cost to be included in the cost of other pay items.

203.20 Rock and Shale Embankment

Utilization of these materials in embankment construction shall be in accordance with the following.

(a) Rock Embankment

Where rock is used for embankment, no large stones shall be allowed to nest but shall be distributed over the area to avoid pockets. Voids shall be filled carefully with small stones. The final 2 ft (0.6 m) of the embankment just below the subgrade elevation shall be composed of suitable material placed in layers not exceeding 8 in. (200 mm) loose measurement and compacted to the required density. Shale or shale-like materials will not be permitted in the upper 2 ft (0.6 m) of the embankment.

Where the depth of an embankment exceeds 5 ft (1.5 m) and is to consist entirely of rock, the rock shall be deposited in lifts not to exceed the top size of the material being placed, but in no event exceeding 4 ft (1.2 m). The rock for any particular lift shall be deposited on and pushed over the end of the lift being constructed by means of bulldozers or other approved equipment. Depositing of rock over the end of any lift from hauling equipment will not be permitted. If the voids of the last lift are not closed sufficiently,

they shall be choked with small broken stone or other suitable material and compacted as directed.

Where the depth of embankment is 5 ft (1.5 m) or less, or where the material being placed does not consist entirely of rock, the material shall be placed in lifts not to exceed the top size of the rock being placed but not exceeding 2 ft (0.6 m). Each layer shall be choked thoroughly with broken stone or other suitable material and be compacted to the required density or as directed.

Where a rock fill is to be placed over a structure, the structure shall first be covered with 2 to 4 ft (0.6 to 1.2 m) of earth or other approved material, and properly compacted before the rock is placed. This covering shall be placed in accordance with 203.19.

Shale shall not be incorporated as rock embankment unless written permission is obtained.

(b) Shale, Shale and Soft Rock Mixtures, or Soft Rock

When these materials are encountered and are to be used for embankment construction, the compaction shall be accomplished with an approved vibratory tamping-foot roller in conjunction with a static tamping-foot roller. The minimum weight for the static tamping-foot roller shall be 30 t (27 Mg). The minimum total compactive effort for the vibratory tamping-foot roller shall be 27.5 t (244 kN). Total compactive effort is defined as that portion of the static weight acting upon the unsprung compaction drum added to the centrifugal force provided by that drum. If the manufacturer's charts do not list the static weight acting on the compaction drum, the roller shall be satisfactorily weighed, the weight shall be added to the centrifugal force, and the roller rated in accordance with the Construction Industry Manufacturers Association, CIMA. Each tamping foot on the static roller shall project from the drum a minimum of 6 in. (150 mm). Each tamping-foot on the vibratory tamping-foot roller shall project from the drum a minimum of 4 in. (100 mm). The surface area of the end of each foot on both tamping-foot rollers shall be no less than 5 1/2 sq in. (3550 mm^2).

Shale, shale and soft rock mixtures, or soft rock shall be placed in 8 in. (200 mm) maximum loose lifts, and shall be compacted to at least 95% of maximum dry density. The moisture content shall be controlled within -2 and +1 percentage points of optimum moisture content. The density will be measured with a calibrated nuclear gauge using the direct transmission mode. Excavation and blasting procedures shall accommodate the selective placement of these materials and avoid intermixing rock. Rock shall be placed in accordance with 203.20(a).

Water shall be applied to the shale in the cut to accelerate the slaking action and again prior to disking and compaction to facilitate the compaction. The water shall be distributed by an approved method which provides uniform application of the required quantity of water. The water shall be uniformly incorporated throughout the entire lift by a multiple gang disk with a minimum disk wheel diameter of 24 in. (600 mm).

Unless otherwise approved in writing, each embankment lift shall receive a minimum of three passes with the static roller and a minimum of two passes with the

vibratory roller. The material shall be bladed before using the vibratory tamping-foot roller. A pass shall be in accordance with 402.15. The rollers shall not exceed 3 mph (5 km/h) during these passes. The number of passes will be adjusted upward if necessary to obtain 95% of maximum dry density, in accordance with AASHTO T 99. No additional compensation will be allowed for additional passes as specified herein, the cost of which shall be included in the cost of the pay items.

Water required to facilitate the slaking and compaction of the shale or soft rock will be measured in accordance with 203.27(h) and paid for in accordance with 203.28. No payment will be allowed for any water required for compaction of material furnished as borrow.

(c) Shale and Thinly Layered Limestone

In Dearborn, Decatur, Fayette, Franklin, Jefferson, Ohio, Ripley, Rush, Switzerland, Union, and Wayne Counties specifically, or in other areas where relatively thin layered shale and rock are encountered, their use will be permitted in the construction of embankment, if the following provisions, in addition to those stated in 203.20(b), are observed.

1. The slopes shall be encased with a minimum of 10 ft (3 m) of relatively impervious, non-shale, non-erodable material.

2. The maximum size of limestone which will be permitted in the mixture shall be 6 in. (150 mm) in thickness and 1.5 ft (0.5 m) in any other dimension.

3. The minimum number of passes with static roller and the vibratory tamping-foot roller shall be six static and two vibratory.

If the material is found to be too intermixed with limestone fragments to permit field density tests as required in this section, this requirement may be waived by written permission.

203.21 Embankment on Hillsides or Slopes

Before an embankment is placed on natural soil slopes or existing fill slopes of 4:1 or flatter, the existing ground surfaces shall be plowed or deeply scarified or, if the nature of the ground indicates greater precautions should be taken for integrating the proposed fill materials with the existing slopes, benches shall be cut into the existing slopes before fill placement is started. All such precautionary work shall be done as directed. No direct payment will be made for plowing or scarifying, the cost thereof to be included in the various pay items of the contract. Before an embankment is placed on natural soil slopes or existing fill slopes steeper than 4:1, benches a minimum of 10 ft (3 m) wide, unless otherwise specified, shall be cut into the slopes prior to the placement of embankment fill. If benches are cut, the excavation involved will be paid for at the contract unit price per cubic yard (cubic meter) for the class or classes of excavation encountered.

203.22 Embankment Over Existing Roadbeds

If embankment for new pavement is to be placed over an area where a rigid pavement or any pavement having a concrete base is in place, or in other cases when required, the upper surface of which is 1 ft (0.3 m) or less below the subgrade elevation of the proposed new pavement, the existing old pavement, including any concrete base, shall be removed. The method of removal, disposal, and basis of payment shall be in accordance with 202.05 and 202.14.

If embankment for new pavement is to be placed over an area where an existing rigid pavement is in place, the upper surface of which is more than 1 ft (0.3 m) but less than 3 ft (0.9 m) below the subgrade elevation of the proposed new pavement, or in other cases when required, the existing pavement shall be broken. Pavement shall be broken so the area of any individual unbroken slab does not exceed 1 sq yd (1 m^2).

If embankment for new pavement is to be placed over an area where an asphalt filled brick-type or an asphalt-type surface on a concrete base is in place, and such existing surface is more than 1 ft (0.3 m) but less than 3 ft (0.9 m) below the subgrade elevation of the proposed new pavement, or in other cases when required, the brick and cushion material, or the asphalt courses, shall be removed and the concrete base broken. Removal of the surfacing material, breaking the base, disposal of removed material, and basis of payment shall be in accordance with 202.05 and 202.14.

If embankment for new pavement is to be placed over an area where a flexible-type pavement is in place, the top of which is at the approximate elevation of, or is 1 ft (0.3 m) or less below the required subgrade elevation of the proposed new pavement, the existing pavement shall be loosened to the depth directed, but no less than 1 ft (0.3 m). This loosened material shall be spread uniformly over the full width of the subgrade plus 1 ft (0.3 m) on each side and compacted. No direct payment will be made for this loosening, spreading, and compacting, the cost thereof to be included in the various pay items of the contract.

If embankment for new pavement is to be placed over an existing macadam, the surface of which is more than 1 ft (0.3 m) but less than 3 ft (0.9 m) below the subgrade elevation of the proposed new pavement, the existing macadam shall be loosened to a depth sufficient to prevent possible trapping of water above the existing surface. No direct payment will be made for this loosening, the cost thereof to be included in the various pay items of the contract.

Where the existing roadbed is too narrow, except as otherwise herein provided, new pavement shall not be placed partly on old and partly on new embankment. If the fill supporting an existing roadbed is 1 ft (0.3 m) or more in depth, and is too narrow to carry the entire width of the proposed new pavement, the existing width of roadbed shall be taken down to include the new roadbed width and rebuilt from the lowest elevation of the disturbed old roadbed to the required new width. This rebuilding shall be in accordance with these specifications for constructing embankment and as directed. For the necessary tearing down of the existing embankment, payment will be made at the contract unit price per cubic yard (cubic meter) for the class or classes of excavation encountered.

If an embankment is to be widened, due precautions shall be taken to ensure a firm foundation. After all sod and other perishable material has been removed, the existing shoulders shall be plowed down 2 ft (0.6 m) out from the existing pavement. This material shall be used for widening. Benches, a minimum of 4 ft (1.2 m) wide, shall be cut into the slope of the old embankment, unless otherwise directed. The materials from plowing down the shoulders and benching the slopes shall be deposited, spread, and compacted as set out herein for embankment, after which any remaining required embankment shall be finished with additional material, deposited and compacted in like manner. No direct payment will be made for benching, plowing, spreading, and compacting, the cost thereof to be included in the various pay items of the contract.

203.23 Embankment Other Than Rock and Shale, With Density Control

Unless otherwise specified, all embankments shall be compacted to at least 95% of their maximum dry density. The moisture content shall be controlled within -2 and +1 percentage points of optimum moisture content. Maximum density and optimum moisture content shall be determined in accordance with AASHTO T 99 using method A for soil and method C for granular materials.

When silts or loessial type soils are encountered and used in embankment construction, the moisture content shall be controlled within -3 percentage points of optimum moisture content and optimum moisture content. In no case shall these soils be placed at moisture content in excess of optimum moisture content.

The moisture content for sand soil or a sand and gravel soil, having at least 80% sand and gravel size particles, shall be such that the soils may be compacted to the specified density at a moisture content which is normally several percentage points below optimum or as directed.

If the embankment material is too wet or too dry, either the material shall be aerated to remove excess moisture or watered and disked to increase the moisture content, until in either case the moisture content is within the specified range. Sufficient moisture tests will be made to ensure that this range is maintained throughout the embankment.

The embankment material shall be placed in uniform level layers, left properly shaped as set out above, and compacted with approved compacting equipment. Compacting equipment shall include at least one three-wheel roller or other approved compacting equipment capable of providing a smooth and even surface on the embankment as directed.

Each lift shall be disked or treated by some other mechanical means which shall ensure the breaking up of any existing lumps and clods.

The loose depth of each lift shall be such that the required compaction can be obtained, but in no case shall it exceed 8 in. (200 mm). Where a tamping roller is used, the loose depth of lift shall not exceed the length of the tamper feet. The surface area of the end of each foot of the tamping roller shall be no less than 5 1/2 sq in. (3550 mm^2).

203.24 Method of Making Density Tests

The percent of compaction shall be based on maximum dry densities unless otherwise specified or directed. Field compaction tests will be run on each lift and the required compaction obtained on each lift before the next is placed.

(a) Laboratory

The procedure for determining maximum densities for compaction control shall be in accordance with AASHTO T 99.

(b) Field

The field density determination shall be made in accordance with AASHTO T 191, T 310, or T 272 except as follows:

1. If T 191 is used, the sand used for the test shall be Silica Sand in accordance with the gradation as follows:

   Passing the No. 20 sieve (850 µm) - 98 to 100%
   Passing the No. 40 sieve (425 µm) - 0 to 35%
   Passing the No. 70 sieve (212 µm) - 0 to 2%

   Sand such as Wedron Silica Sand No. 4075 or Ottawa 2.8 Blasting Sand has been found to be acceptable.

2. If particles larger than those that can pass through a No. 4 (4.75 mm) sieve for soil and a 3/4 in. (19.0 mm) sieve for granular material are encountered, corrections shall be made so that the density obtained is for the minus No. 4 (4.75 mm) or 3/4 in. (19.0 mm) only. After the densities are determined, the degree of compaction shall be computed by the following formula:

$$\text{Degree of Compaction} = \frac{\text{In Place Density pcf (kg/m}^3\text{)}}{\text{Maximum Density pcf (kg/m}^3\text{)}} \times 100$$

3. Other approved types of field density tests may be used for control purposes after density values corresponding to those obtained by either of the methods set out above have been established.

4. All references to soils in these methods of tests shall be interpreted to mean either or both soil and granular materials.

203.25 Embankment Without Density Control

When aggregate is used for embankment construction and has such a large top size as to make it impractical to perform density tests, and if approved, such material may be compacted with crawler-tread equipment or with approved vibratory equipment, or both. The materials shall be placed in lifts not to exceed 6 in. (150 mm), loose measurements, and each lift compacted thoroughly by successive trips back and forth with the tread areas overlapping enough on each trip so that all portions will be compacted uniformly.

At locations inaccessible to the above compacting equipment, the required compaction shall be obtained with approved mechanical tamps or vibrators, in which case the depth of lifts, loose measurement, shall not exceed 4 in. (100 mm).

203.26 Proofrolling

When proofrolling is specified, the work shall be performed with a pneumatic tire roller in accordance with 409.03(d)3. Other approved equipment such as a fully legally loaded tri-axle dump truck may be substituted for the pneumatic tire roller. There shall be one or two complete coverages as directed. Roller marks, irregularities, or failures shall be corrected.

203.27 Method of Measurement

(a) Contract Quantity

The quantities of excavation for which payment will be made will be those shown in the Schedule of Pay Items for the pay items, provided the project is constructed to the lines and grades shown on the plans or revised contract quantities as adjusted by authorized change.

Unless otherwise specified, the project limits will be considered as one balance. If earthwork balances are shown on the plans, they are for information only.

When the plans have been altered or when disagreement exists as to the accuracy of the plan quantities in any balance, or the contract quantity, either party shall have the right to request and cause the quantities involved to be measured in accordance with measured quantities. When the quantities are measured for payment, the original plan cross sections plotted on the plans shall be used as original field cross sections. Additional original cross sections may be interpolated at points where necessary to determine the quantities more accurately. If the Contractor has acceptable engineered data that indicates an excavation quantity that is in error by more than 2%, then additional measurements will be preformed on the areas in question and payment will be made for actual quantities.

(b) Measured Quantities

When payment is specified on a volume basis, all accepted excavation and borrow will 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, and authorized excavation of rock, shale, peat, or other unsuitable material. Volumes will be computed from cross section measurements by the average end area method.

Measurement for payment will not include material excavated beyond authorized cross sections. Where material is excavated beyond authorized cross sections and wasted without authority, the material so wasted will be measured and deducted from the excavation quantities. Unless otherwise authorized, the amount of waste to be deducted, when common excavation, rock excavation, unclassified excavation, borrow, or other excavation has been wasted along embankments or elsewhere without authority shall be that portion of the embankment or fill which is outside a 1/4 to 1 slope in excess of that

shown on the plans, and all portions outside a line from the shoulder point to a point 4 ft (1.2 m), measured horizontally, outside the theoretical toe of the slope. In determining waste, no tolerance in widths of shoulders will be allowed unless additional widths are authorized in writing before shoulders are finally constructed.

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

Where it is impracticable 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 to measure the material in its original position.

The cubic yards (cubic meters) of peat excavated will be determined by cross sections, as described above, with the final cross sections taken after complete excavation and before placing granular backfill, if peat is removed by excavation. When removal by displacement is necessary, final cross sections will be derived from cased test holes through the completed granular treatment in accordance with 203.17. Such test holes shall be located at intervals which clearly define the bottom of the treatment between lateral limits. Pay quantities of peat excavation will be limited to the volume of peat lying between vertical lines as shown on the plans for lateral limits.

Cased test holes and exploratory drilling will be measured by the linear foot (meter); B borrow by the cubic yard (cubic meter), in accordance with 211.09. However, measurement to neat lines will not apply unless specifically designated. Breaking pavement will be measured by the square yard (square meter) in place before breaking.

(c) Measurement on a Linear Basis

When either or both the plans and contract provide for a pay item for linear grading, the measurement for payment will be based on the length of roadway actually constructed to the lines, grades, and typical cross sections specified. All classes of excavation involved, including required borrow, will not be measured for payment, but will be considered as included in the pay item for linear grading per mile (kilometer).

(d) Measurement of Excavation Items on a Weight Basis

A pay item for excavation may be specified to be measured and paid for on a weight basis. When a weight basis is specified, the material will be weighed in accordance with 109.01(b).

(e) Measurement of Embankments

When specified, embankments constructed will be measured in accordance with the terms set forth.

When embankment is specified as a separate pay item, the volume so constructed will be measured in place in accordance with 203.27(b). However, no measurement will be made for excavation or borrow, except as noted herein. The volume shall be computed in cubic yards (cubic meters) from the dimensions of the embankment cross sections and to the depth below completed grade to which this method of construction applies. No shrinkage factor shall be used in computing the embankment volume. Measurements will be made for unsuitable materials actually excavated and removed to obtain proper

compaction in cut sections and in foundations of fill sections in accordance with 203.27(b). B borrow from off the right-of-way placed within embankment areas will be measured in accordance with 211.09.

If the Contractor chooses the option of coarse aggregate No. 53 as subgrade treatment in accordance with 207.04, the embankment material including the aggregate will be measured in accordance with 203.27(b). The aggregate will also be measured as subgrade treatment in accordance with 207.05.

(f) Measurement of Borrow

Borrow will be measured by the cubic yard (cubic meter). Except as otherwise provided herein, borrow will be cross sectioned in its original position before excavation is started, again after it is completed, and the volume computed by the average end area method. No material shall be excavated as borrow until unsuitable material, vegetation, and other perishable matter have been removed and cross sections taken over the cleared area. None of this removed unacceptable material shall be move back into the pit before final sections are taken.

If borrow is obtained from a source where it is impracticable to measure the material in its original position, such material will be measured after being placed in embankment with no allowance made for a compaction factor. The borrow may be measured in truck beds in accordance with 211.09 for contracts having a proposal quantity less than 500 cu yd (382 m^3). If such source is contemplated, approval shall be obtained in writing before this part of the work is started. For quantities less than 5,000 cu yd (3820 m^3), the material may be weighed in accordance with 109.01(b) and converted from pounds (kilograms) shown on the weigh tickets to cubic yards (cubic meters) using a factor of 3,000 lb/yd^3 (1780 kg/m^3).

If borrow is specified outside the limits of B borrow and if the requirements of the work do not otherwise prohibit, material in accordance with these specifications for B borrow, may be furnished and placed at the contract unit price for borrow, in which case measurement will be in accordance with 211.09. Measurement of borrow in accordance with 211.09 will be limited to nominal quantities outside the limits of structure backfill. The quantity of borrow measured for payment will not exceed the theoretical quantity of B borrow furnished.

If the Contractor chooses the option of coarse aggregate No. 53 as subgrade treatment in accordance with 207.04, the borrow material including the aggregate will be measured in accordance with 203.27(b). The aggregate will also be measured as subgrade treatment in accordance with 207.05.

(g) Measurement of Embankment Foundation Soils Treatment

Mechanical treatment of embankment foundation soils will be measured by the square yard (square meter). Chemical treatment of embankment foundation soils will be measured in accordance with 215.10.

(h) Measurement of Water for Shale, Shale and Soft Rock Mixtures, or Soft Rock

When payment for water for shale is specified in the contract, the water for shale used will be measured by the 1,000 gal. (kiloliter) by means of calibrated tanks or distributors, or by means of accurate water meters. When water for shale is not specified as a pay item in the contract, the water for shale that is used will not be measured directly. Such measurement will be included in that required for other pay items.

(i) Lump Sum

If the pay unit for a pay item for excavation is lump sum, no measurement will be made.

(j) Measurement of Exploratory Cores

Exploratory cores will be measured by the linear foot (meter) of rock core.

203.28 Basis of Payment

The accepted quantities of excavation and embankment will be paid for at the contract price per unit of measurement for each of the pay items listed below which is included in the Schedule of Pay Items. Common excavation and unclassified excavation will be paid for on the unit basis of contract quantities in accordance with 203.27(a), without any quantity limit, unless otherwise shown in the Schedule of Pay Items. Combined quantities of borrow, common and unclassified excavation not exceeding 15,000 cys (12 000 m^3) will be paid for on the basis of contract quantities in accordance with 203.27(a) with no adjustment to plan shrinkage factor. Except as noted above, borrow, as well as all other excavation, will be paid for on the basis of measured quantities in accordance with 203.27(b), unless otherwise shown in the Schedule of Pay Items.

If the class of excavation is linear grading, additional borrow and the excavation of and disposal of unsuitable material not included as pay items will be paid for as follows:

If the total quantity exceeds 5,000 cu yd (3800 m^3) at a given location, it will be paid for at $8.00 per cu yd ($10.46 per m^3). If the total quantity exceeds 1,000 cu yd (765 m^3), but does not exceed 5,000 cu yd (3800 m^3) at a given location, it will be paid for at $12.00 per cu yd ($15.69 per m^3). If the total quantity does not exceed 1,000 cu yd (765 m^3) at a given location, it will be paid for at $15.00 per cu yd ($19.61 per m^3).

Linear grading includes only such grading within the construction limits. All grading the Contractor is directed to perform outside the construction limits, except for the Contractor's convenience, will be paid for in accordance with 104.03 or 109.03 unless such grading is shown on the plans or in the Contract Information book.

Existing concrete building foundations, concrete walls, concrete columns, or concrete steps not visible and not shown on the plans within the limits of the planned excavation will be paid for at ten times the contract unit price per cubic yard (cubic meter) for common or unclassified excavation, whichever is set out as a pay item. Unless a waste area is established within the contract limits, the minimum pay for this work will be $80.00 per cu yd ($104.60 per m^3).

Excavation and disposal of unsuitable material will be paid for at the contract unit price for the class of excavation involved. If no such pay item is included in the contract and embankment is included as a pay item, the excavation and disposal will be paid for at the contract unit price for embankment, unless otherwise directed.

If there is no pay item for rock excavation and such is encountered, it will be paid for at ten times the contract unit price per cubic yard (cubic meter) for common excavation or $100.00 per cu yd ($130.80 per m^3) for quantities less than 100 cu yd (76 m^3) or $80.00 per cu yd ($104.60 per m^3) for quantities greater than 100 cu yd (76 m^3) but less than 200 cu yd (159 m^3), whichever is greater.

If there is no pay item for common excavation and if such is encountered, it will be paid for at the contract unit price per cubic yard (cubic meter) for borrow.

If the contract includes a pay item for waterway excavation, and if class Y excavation is encountered and there is no pay item for such, the class Y excavation will be paid for at ten times the contract unit price per cubic yard (cubic meter) for waterway excavation, or $100.00 per cu yd ($130.80 per m^3), whichever is greater.

If the contract does not include a pay item for waterway excavation and such is encountered, pay will be determined in accordance with 104.03.

If excavation is necessary to investigate or to seal sinkholes, or to explore underground drainage, the accepted quantity involved at each location will be paid for as follows. The first 10 cu yd (8 m^3) or fraction thereof will be paid for at ten times the contract unit price for the class of excavation encountered. The next 40 cu yd (30 m^3) or fraction thereof will be paid for at seven times the contract unit price for the class of excavation involved. Additional quantities will be paid for at three times the contract unit price per cubic yard (cubic meter) for the class of excavation involved.

Material overlying the peat deposits which is excavated and used in embankment will be considered as common excavation and will be paid for as such. Excavation for standard side ditches or other side ditches which are constructed through peat areas at locations shown on the plans, or where directed, will be paid for at the contract unit price per cubic yard (cubic meter) for common excavation.

Mechanical treatment of embankment foundation soils will be paid for by the square yard (square meter) as embankment foundation soils treatment.

Cased test holes and exploratory drilling will be paid for at the contract unit price per linear foot (meter).

If there is no pay item for borrow, the costs of identifying the borrow areas, the archeological investigation, all required permits, and the opening and closing of the borrow area will be included in a change order developed in accordance with 109.05 and paid for as borrow area.

If the contract documents do not identify excess excavation nor require removal of any items from the site, the cost of identifying a disposal area, archeological investigation, all required permits, and the opening and closing of the disposal area will be included in a change order developed in accordance with 109.05 and paid for as disposal area.

If a type of excavation for which no pay item exists is required and the new type of excavation requires the Contractor to use equipment not otherwise being used on the contract, all cost involved in determining the type of equipment necessary to complete the work and making this equipment available for the project will be included in a change order developed in accordance with 109.05 and paid for as additional mobilization and demobilization.

If a type of excavation for which no pay item exists is required and the new type of excavation requires additional traffic control not shown on the plans or results in traffic control being required for an additional period of time, all cost involved in providing the additional traffic control will be included in a change order developed in accordance with 109.05 and paid for as additional maintaining of traffic.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Borrow	CYS (m3)
Breaking Pavement	SYS (m2)
Cased Test Holes	LFT (m)
Embankment	CYS (m3)
Embankment Foundation Soils Treatment	SYS (m2)
Excavation, Common	CYS (m3)
Excavation, Peat	CYS (m3)
Excavation, Rock	CYS (m3)
Excavation, Unclassified	CYS (m3)
Excavation, Waterway	CYS (m3)
Excavation, Y	CYS (m3)
Exploratory Cores	LFT (m)
Exploratory Drilling	LFT (m)
Linear Grading	STA
Water for Shale	kGAL. (kL)

If embankment is specified as a pay item, borrow and common excavation, unless otherwise specified, will not be paid for directly. The costs thereof shall be included in the cost of embankment. Such price shall be full compensation for preparation of the natural ground on which the embankment is to be placed and excavating, hauling, placing, spreading, and compaction of materials in accordance with 203.23. The costs of labor, equipment, tools, and necessary incidentals shall be included in the cost of embankment. The cubic yardage (cubic meterage) of suitable material used in the embankment excavated from the right-of-way and paid for under a specific pay item will not be deducted from the embankment quantities. The quantity of material to be paid for

as B borrow and placed within the embankment area as specified will be deducted from the quantity of embankment.

The costs of excavating, backfilling, disposal of surplus material, labor, equipment, tools, and necessary incidentals necessary shall be included in the cost of excavation required to seal sinkholes or explore underground damage.

The costs of all excavated or displaced peat, regardless of depth, peat disposal, temporary surcharge, machine operation, and machine availability shall be included in the cost of peat excavation. However, the Department may provide temporary right-of-way for peat disposal when so specified.

Cost for providing additional lighting for grading operations shall be included in the cost of other pay items in this section.

No payment will be made for the construction or restoration of borrow or disposal sites.

No payment will be made for the inspection of disposal and borrow areas for wetland identification, obtaining of permits, the development and construction of all mitigation measures, or the fulfillment of permit requirements.

The cost of boring the holes, casings and fittings, labor, equipment, tools, and all necessary incidentals shall be included in the cost of cased test holes or exploratory drilling.

The cost of reshaping scoured or eroded areas shall be included in the cost of other pay items.

The cost of surface roughening shall be included in the cost of other pay items.

The cost of identification of borrow pits, archeological investigations, and changes to construction operations caused by the identification of an archeological site shall be included in the cost of borrow, unless otherwise agreed to in writing.

SECTION 204 – GEOTECHNICAL INSTRUMENTATION

204.01 Description

This work shall consist of providing, installing and maintaining of geotechnical instrumentation including settlement plates, settlement stakes, lateral stakes and standpipe piezometers as directed and in accordance with 105.03.

MATERIALS

204.02 Materials

Materials shall be in accordance with the following.

B Borrow.....211.02
Coarse Aggregate, Class D or Higher, Size No. 53. 904

Ottawa Sand* ..... AASHTO T 252
Structure Backfill, Size No. 30 904
* Ottawa Sand shall have a minimum permeability of 25.0 ft/day (8.3 m/day).

Bentonite chips shall consist of commercially processed angular fragments of pure bentonite, without additives.

Bentonite-cement grout shall consist of a mixture with the ratio of 25 lb (11.36 kg) of bentonite with 94 lb (42.64 kg) of Portland Cement, type I in accordance with 901.01(b) and a 30 gal. (113.4 L) of water.

CONSTRUCTION REQUIREMENTS

204.03 Settlement Plates

Settlement plates consist of 0.5 in. by 3 ft by 3 ft (13 mm by 1.0 m by 1.0 m) steel plate~~s~~ equipped with sections of 3/4 in. (19 mm) pipe and 2 in. (50 mm) galvanized threaded pipe and couplings to act as a cover or guard.

(a) Installation Requirements

Each settlement plate shall be placed on a horizontal plane consisting of a compacted leveling layer of B borrow, whose surface is not less than 1.0 ft (0.3 m) below the elevation of the adjacent area. The first section of pipe shall then be installed by welding to the settlement plate. The bottom elevation of the settlement plate will be recorded. The area is backfilled with B borrow and thoroughly compacted. The couplings shall be tack welded and the top elevation of the first pipe section will be recorded before starting the first lift of grading operations.

The pipe sections for the settlement plates shall be 3/4 in. (19 mm) steel pipe, 4.0 ft (1.2 m) long and threaded on both ends with proper fittings so that such pipe sections can be extended vertically from the center of the plates up through the new embankment as it increases in height during grading operations. A cover pipe 2 in. (50 mm) shall be slipped over and centered on the standpipe, and not welded to plates. The 3/4 in. (19 mm) steel and cover pipes shall extend a minimum of 2.0 ft (0.6 m) or more above the grade of the new embankments at all times during grading operations and monitoring period.

Settlement stakes and lateral stakes, if required, shall be installed as shown on the plans or as directed by the Engineer. The stakes shall be 3/4 in. (19 mm) by 4.0 ft (1.2 m) steel rods and shall be driven at least 12 in. (300 mm) into the ground. These stakes shall be set firmly in a vertical position and initial readings will be taken.

B borrow shall be used as compaction material around the settlement plates and pipes and shall be placed in accordance with the applicable requirements of 211.

(b) Instrument Readings and Settlement Period

During the construction of the embankment, elevation readings will be taken on all settlement plate extension pipes and settlement stakes at the end of each seven-day period, or more frequently if required. After the embankment is constructed to subgrade elevation, additional readings will be taken every seven days until the settlement rate per

week is 1/4 in. (6 mm) or less for four consecutive weeks. The monitoring period may be reduced as directed by the Department's Geotechnical Section.

If the results of any readings indicate that the new embankment has settlement greater than 1/4 in. (6 mm), the monitoring period will be extended until the settlement requirements are met.

Settlement stakes will be used to measure the vertical movement, in conjunction with settlement plates if specified. Settlement stakes and settlement plates will be monitored at the same time and interval. Measurements will be made to the nearest 1/4 in. (6mm). Settlement data will be sent electronically to the Department's Geotechnical Section within one day of the readings for approval.

Lateral stakes will be used to monitor horizontal movement of the ground or new fill. If lateral movement is noticed during the construction of the fill, the work will be suspended and corrective measures taken as directed. Measurements will be made to the nearest 1/4 in. (6 mm).

Settlement plates, extension pipes, cover pipes, and stakes shall be protected during construction operations and during the monitoring period.

204.04 Standpipe Piezometers

The standpipe piezometers shall be installed by a Department approved Geotechnical Consultant prior to placing the first lift of embankment. Piezometer consists of a 1/2 in. (13 mm) leak proof, flush-coupled Schedule 80 PVC pipe or ABS standpipe extending to the surface of the embankment with an attached polyethylene tip in accordance with AASHTO T 252.

(a) Installation Requirements

A separate water-monitoring borehole shall be installed outside the influence of the fill as shown on the plans. This shall be a minimum 2 in. (50 mm) diameter borehole, cased with slotted pipes, drilled to a recommended depth and location or as directed by the Engineer, to establish ground water elevation prior to piezometer installation.

The installation of the standpipe piezometer shall precede placement of any embankment by at least two weeks to allow time for testing of the installation. The piezometer shall be maintained and protected during the embankment construction. The hollow stem auger shall be advanced to an approximate depth of 6 in. (150 mm) below the recommended piezometer tip elevation. Augers shall be cleaned and washed inside for their full length, until the wash water runs clear.

The auger shall be withdrawn 6 in. (150 mm) by means of jacking or other steady pull operations. The hole shall be filled to the bottom with saturated Ottawa sand and tamped with an annular tamping hammer. The elevation shall be measured and provided to the Engineer.

The tip shall be attached to the standpipe and tested for free flow of water. The bottom end of the tip shall be plugged and soaked in water if a porous stone tip is used. The tip and standpipe shall be filled with clean water. The tip shall be lowered into the

auger until it rests on the top of the sand placed and the elevation of the tip should be documented. Excess head shall be maintained in the standpipe during lowering to ensure that a small amount of water flows out of the tip.

The auger shall then be pulled or jacked a distance equal to the length of the tip in increments of 6 in. (150 mm). The hole shall be filled with water saturated Ottowa sand at each increment. This layer of sand shall not be tamped in order to avoid damage to the tip.

The auger shall be raised 12 in. (300 mm) and the hole filled with saturated Ottowa sand in 6 in. (150 mm) increments until the backfilling reaches a minimum of 6 in. (150 mm) below the elevation of the strata change or as directed by the Engineer. In locations where there is no strata change, the Ottowa sand shall be placed a minimum of 12 in. (300 mm) above the top of the tip.

The augers shall then be raised and the hole sealed with bentonite chips in accordance with AASHTO T 252 which shall be placed in 6 in. (150 mm) lifts. The top of the seal shall be a minimum of 6 in. (150 mm) above the strata break. A weighted line shall be used to ensure the bentonite seal is in place. The remainder of the hole shall then be backfilled with cement-bentonite grout as the augers are withdrawn. The riser pipe shall be kept in tension and shall be centered in the auger while backfilling. Depths for various stages shall be recorded on the Engineers' logs.

If the piezometer location is not in an area of proposed fill, a protective metal cover, about 3 ft (1 m) long shall be installed at the top with about 2 ft (0.6 m) below the surface and 12 in. (300 mm) above the surface. A 6 in. (150 mm) circular pad of course aggregate; 6 in. (150 mm) thick shall be filled around the cover. A lockable cap shall be securely attached onto the protective metal cover.

If the piezometer location is in an area of proposed fill, a PVC casing shall be used around the piezometer standpipe in order to protect the pipes during embankment construction. B borrow shall be placed and compacted around the casing without disturbing the casing.

The casing and standpipe shall be extended as the fill is placed, by adding extra lengths not to exceed 5.0 ft (1.5 m). The top of the standpipe shall be at least 12 in. (300 mm) above the grade of the new fill. Each time the casing and standpipe are extended, the casing shall be filled with structure backfill. The last extension of pipe shall be of such length that it extends 12 in. (300 mm) above grade. It shall be filled with structure backfill to within 9 in. (225 mm) of the top of the casing. A 6 in. (150 mm) circular pad of coarse aggregate, 6 in. (150 mm) thick shall be filled around the pipes. A lockable cap shall be securely attached onto the protective cover.

When the standpipe is completed it shall be checked for obstructions by dropping a weighted line through the pipe. The standpipe shall then be filled with water and periodic readings made of the water level until the ground water level is stabilized. Hydrostatic time lag required for equalization will be provided by the Geotechnical report. If required, the standpipe shall be flushed and retested at the direction of the Engineer. Ground water readings shall be provided to the Engineer.

Standpipe piezometers, and cover pipes shall be protected during construction operations and during the monitoring of the fill. In the event of damage, fill construction shall be suspended in this area until the piezometer is restored.

(b) Readings and Maintenance of Piezometer

The Engineer will conduct and record all observations and measurements required to determine natural ground water elevations and pore pressures induced by embankment construction. Monitoring intervals will be once every day for the first seven days, once every other day for the next eight, and then, once every three days through the end of construction of the fill. The elevation of the natural ground water existing at the time of installation, prior to placement of any fill, will be used as a reference to determine baseline pore pressures. Ground water and pore pressure test results will be made available to the Contractor.

The pore pressure measurement in conjunction with settlement data will be sent electronically to the Department's Geotechnical Section within one day of the readings for approval. If it is determined that pore-water pressures have not sufficiently dissipated, fill placement shall be suspended, and the monitoring period extended as directed.

If monitoring is to be continued after paving in a traffic accessible area, then the pipe shall be cut off 6 in. (150 mm) below the finished grade and a handhole in accordance with 807.09, shall be installed for monitoring access. When the evaluation is completed, the water monitoring borehole and piezometers shall be backfilled with bentonite-cement grout.

204.05 Method of Measurement

Settlement plates, settlement stakes, lateral stakes, standpipe piezometers, and water monitoring boreholes will be measured by the number of units installed.

204.06 Basis of Payment

Settlement plates, settlement stakes, lateral stakes, standpipe piezometers, and water monitoring boreholes will be paid for at the contract unit price per each.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Settlement Plate	EACH
Stake, Lateral	EACH
Stake, Settlement	EACH
Standpipe Piezometer	EACH
Water Monitoring Borehole	EACH

The cost of furnishing, installing, and maintaining settlement plates, extension pipes, cover pipes, B borrow, structure backfill, coarse aggregate and all necessary incidentals shall be included in the cost of settlement plates.

The cost of backfilling water monitoring boreholes will be included in cost of water monitoring boreholes.

The cost of handholes, protective covers, bentonite, Ottowa sand, tips, casing, drilling, tubing or PVC pipe, backfilling and measurements will be included in the cost of standpipe piezometers.

No additional compensation will be made for any costs incurred related to the repair of settlement plates, pipes, settlement stakes, lateral stakes or standpipe piezometers as the result of damage by the Contractor.

SECTION 205 – TEMPORARY EROSION AND SEDIMENT CONTROL

205.01 Description

This work shall consist of furnishing, installing, maintaining, and removing temporary erosion and sediment control measures in accordance with 105.03.

MATERIALS

205.02 Materials

Materials shall be in accordance with the following:

Coarse Aggregate, Class F or Higher.....904
Geotextile for Silt Fence 918.04
Geotextile Under Riprap 918.02
Metal End Sections 908.06
Pipe Drains.....715.02(d)
Revetment Riprap.....904
Stakes .....914.09(b)

Straw bales shall be a minimum of 14 in. by 18 in. by 36 in. (350 mm by 450 mm by 900 mm) and shall not weigh less than 35 lb (16 kg). Bales shall be bound with wire or nylon twine.

CONSTRUCTION REQUIREMENTS

205.03 Control Measures

The installation of temporary erosion and sediment control measures shall include those necessary or required by permits at off-site locations such as borrow and disposal areas, field office sites, batch plants, locations where Contractor's vehicles enter and leave public roads, and other locations where erosion or sediment control becomes an issue during the contract. The Contractor's designated individual in accordance with 108.04 shall be responsible for the installation, inspection, and maintenance of these measures.

Adjustments of the erosion and sediment control measures shall be made where appropriate to meet field conditions. These measures shall be constructed as soon as practical and shall be maintained in accordance with the following.

(a) Silt Fence

The manufacturer's recommendations shall be followed with regard to shipping, handling, storage, installation, and protection from direct sunlight. The geotextile will be rejected if it has defects, tears, punctures, flaws, deterioration, or damage incurred during manufacture, transportation, storage, or installation. Each roll shall be labeled or tagged to provide product identification.

The post spacing shall be as recommended by the manufacturer. The spacing of the posts shall be adjusted such that the posts are located at the low points along the fence line. Joints in fabric shall be avoided at low points along the fence line. At joints, the overlap shall be nailed or similarly fastened to the nearest post with a lath.

The original copies of all necessary current manufacturer's installation manuals shall be provided prior to installation.

(b) Temporary Mulching

Mulching shall be in accordance with 621.05(c) except that the rate of application shall be 2.5 ton/acre (5.5 Mg/ha).

(c) Check Dams

Check dams shall be constructed with revetment riprap or straw bales as shown on the plans.

1. Revetment Riprap

Revetment riprap shall be in accordance with 616 unless otherwise specified.

2. Straw Bales

Straw bales shall be embedded and staked as shown on the plans. Adjacent bales shall be chinked to eliminate gaps between the bales. Bales shall be placed such that the bindings are parallel to and not in contact with the ground.

(d) Interceptor Ditches

Interceptor ditches shall be constructed and graded to drain.

(e) Sediment Traps

Revetment riprap in accordance with 616 shall be used in construction of sediment traps, unless otherwise specified.

(f) Sediment Basins

Embankment construction shall be in accordance with 203. Revetment riprap used for overflow protection shall be in accordance with 616, unless otherwise specified. A manufactured perforated riser may be used when called for on the plans, or as directed.

(g) Ditch Inlet Protection

Ditch inlet protection shall be constructed as shown on the plans.

(h) Slope Drains

Slope drain pipes shall be lengthened as required by the construction of the embankment.

(i) Temporary Seeding

Temporary seeding shall be in accordance with 621.06.

(j) Vegetative Filter Strips

Designated vegetative filter strips shall not be disturbed.

(k) Splashpads

Splashpads shall be constructed with revetment riprap in accordance with 616.

(l) Deck and Curb Inlet Protection

All deck and curb drains shall have sediment control measures when the structure or road is to be used for hauling operations.

(m) Detention Ponds

Excavation shall be in accordance with 203.

(n) Retention Ponds

Excavation shall be in accordance with 203. The soil used in the liner shall be in accordance with AASHTO M 145, classification A-6 or A-7.

The sides and bottom of the retention pond shall be lined with a soil liner of 2 ft (600 mm) minimum thickness. The soil in the liner shall be compacted to 95% of the maximum dry density in accordance with 203.23. The Contractor may use an alternate lining system. Details of the proposed pond lining system shall be submitted to the Department's Geotechnical Section for approval. These details shall include all necessary information such as liner thickness, smooth surface versus textured surface, thickness and type of proposed soil cover, joint construction, material used in the liner, and manufacturer of the liner.

205.04 Maintenance

Temporary erosion and sediment control measures shall be inspected by the Contractor once every seven days and after rain activities. Inspections shall be documented and records shall be maintained by the Contractor, to be made available for review upon request. Records shall include, at a minimum, the date, the inspector's name, the maintenance and corrections needed based on this inspection, and the status of previously identified deficiencies. The temporary protection measures shall be returned to good working conditions within 48 hours after inspection or as directed. Sediment shall be removed as approved and disposed of in accordance with 201.03 and 203.08.

205.05 Removal

Temporary erosion and sediment control measures shall remain in place until directed to be removed. The Contractor shall remove and dispose of all excess silt accumulations, dress the area, and vegetate all bare areas in accordance with the contract requirements. Use or disposal of riprap and straw bales shall be as directed.

205.06 Method of Measurement

Silt fence and straw bale check dams will be measured by the linear foot (meter). Sediment basins will be measured by the units installed complete in place. Revetment

riprap check dams, sediment traps, and splashpads will be measured by the ton (megagram). Measurement of sediment traps will include the riprap and the No. 8 filter stone. Temporary mulching will be measured by the ton (megagram). Temporary seeding will be measured in accordance with 621.13. Removal of sediment will be measured by the cubic yard (cubic meter). Revetment riprap will be measured in accordance with 616.12. Slope drains will be measured in accordance with 715.13. Ditch inlet protection will be measured per each unit installed.

Interceptor ditches, curb inlet protection, deck inlet protection, and the off-site locations designated in 205.03 will not be measured for payment.

Excavation for detention and retention ponds will be measured as common excavation in accordance with 203.27. Retention pond liners will not be measured for payment.

205.07 Basis of Payment

The accepted quantities of silt fence will be paid for at the contract unit price per linear foot (meter), complete in place. Temporary mulching will be paid for by the ton (megagram). Temporary seeding will be paid for in accordance with 621.14. Sediment basins will be paid for at the contract unit price per each unit installed. Check dams, revetment riprap; sediment traps; and splashpads will be paid for by the ton (megagram). Check dams, straw bales will be paid for by the linear foot (meter). Revetment riprap will be paid for in accordance with 616.13. Slope drains will be paid for in accordance with 715.14. Removal of sediment will be paid for at the contract unit price per cubic yard (cubic meter). Ditch inlet protection will be paid for at the contract unit price per each unit installed.

The accepted quantities of excavation for detention or retention ponds will be paid for as common excavation in accordance with 203.28. Retention pond liners will be paid for as a lump sum.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Liner for Retention Pond	LS
Sediment, Remove	CYS (m3)
Splashpad, Riprap	TON (Mg)
Temporary Check Dam, Revetment Riprap	TON (Mg)
Temporary Check Dam, Straw Bales	LFT (m)
Temporary Ditch Inlet Protection	EACH
Temporary Mulching	TON (Mg)
Temporary Sediment Basin	EACH
Temporary Sediment Trap	TON (Mg)
Temporary Silt Fence	LFT (m)
Temporary Slope Drain	LFT (m)

The cost of geotextile fabric shall be included in the cost of the sediment trap.

The cost of geotextile fabric, trenching, backfilling, posts, fencing, and all necessary incidentals shall be included in the cost of silt fence.

The cost for stakes, trenching, backfilling, posts, and all necessary incidentals shall be included in the cost of temporary check dams, straw bales.

The cost of deck and curb inlet protection and interceptor ditches shall be included in the cost of other pay items in this section.

Payment for slope drain will include the standard metal end section, anchors, and all incidentals necessary to perform the work.

The cost of the materials, installation, inspection, maintenance, and removal of the temporary erosion and sediment control measures at off-site locations designated in 205.03 will not be paid for.

SECTION 206 – STRUCTURE EXCAVATION

206.01 Description

This work shall consist of the excavation and backfill or disposal of all materials required for the construction of foundations for substructures of bridges, culverts, and retaining walls; and for the furnishing and subsequent removal of all necessary materials and equipment for and the construction of cribs, cofferdams, caissons, and similar items, together with their dewatering. The work shall be in accordance with 105.03.

All excavation for structures below the designed slope or subgrade line as shown on the plans shall be included under this item.

Unless otherwise specified, structure excavation shall include all pumping, bailing, draining, sheeting, bracing, and incidentals required for proper execution of the work.

206.02 Class X Excavation

(a) General Excavation

If one or more of the following materials is encountered within the limits of foundation excavating, such shall be defined as class X excavation.

1. solid rock, hard ledge rock, slate, hard shale, or conglomerate, any of which is actually removed by blasting or use of pneumatic or equivalent tools and which could not reasonably be removed by any other method;

2. loose stones or boulders more than 1/2 cu yd (0.4 m^3) in volume;

3. concrete, masonry, or other similar materials which are parts of an old structure not shown on the plans;

4. timber grillages, old foundation piling, buried logs, stumps, or similar materials which extend beyond the limits of excavation so that they must be cut off. Such obstructions shall be removed back to cofferdam limits and the portions so removed within cofferdam limits will be considered as class X.

Material commonly known as hardpan will not be considered as class X. If material is encountered during excavation which seems to be in accordance with that defined herein as class X, notification shall be made in writing, and ample time shall be allowed to make necessary investigations and measurements to determine the class and volume of the material in question.

(b) Excavation for Foundation of Traffic Support Structures

If class X material as defined in 206.02(a) is encountered within the limits of foundation excavation for traffic support structures, overhead sign structure foundations, strain pole, or high mast lighting foundations, the foundation shall be located as directed.

If class X material in accordance with 206.02(a)1 is encountered, the material shall be excavated to allow the foundation to be embedded a distance that is equal to 1/2 of the remaining depth of the foundation before the material was encountered, except for overhead sign structures, strain poles, and high mast lighting foundations.

Overhead sign structure foundations, strain poles, and high mast lighting foundations shall be excavated to allow the foundation to be embedded as shown on the plans or as directed.

If class X material in accordance with 206.02(a)2, 206.02(a)3, or 206.02(a)4 is encountered, the material shall be removed to the total depth of the foundation as shown on the plans.

206.03 Wet Excavation

Wet excavation shall be defined as that portion of foundation excavation, except class X, which is below a horizontal plane designated on the plans as the upper limit of wet excavation and above the bottom of the footing as shown on the plans. If wet excavation is a pay quantity and the elevation of the upper limit of wet excavation is not shown on the plans, an elevation of 1 ft (0.3 m) above the elevation of low water level as shown on the plans shall be used as such limit.

206.04 Dry Excavation

Dry excavation shall be defined as that portion of foundation excavation, except class X, which is above the upper limit of wet excavation.

206.05 Foundation Excavation, Unclassified

If the Schedule of Pay Items provides a pay quantity of foundation excavation, unclassified, and none for wet excavation or dry excavation, then foundation excavation, unclassified shall include all work described as wet excavation and dry excavation, regardless of whether or not water is encountered, but shall not include class X. Even though designated herein as foundation excavation, unclassified, it shall be regarded in these specifications as a class of excavation.

If no upper limit of foundation excavation, unclassified is shown on the plans, it shall be at the original ground except where waterway excavation, common excavation, or other classified excavation overlaps the area of foundation excavation and is a pay item. The upper limit of foundation excavation, unclassified shall be the lower limit of the overlapping classified material.

CONSTRUCTION REQUIREMENTS

206.06 General Requirements

The drainage requirements of 203.14 shall apply to excavation for structures and, in addition, adequate outlets shall be provided as shown on the plans or as directed, if within the limits of the excavation.

All excavation shall be adequately shored to avoid damage to the structure, its approaches, adjacent roadway, embankments, tracks, buildings, or other property.

Footing excavation shall, in general, conform with the outlines of footings as shown on the plans, or as revised, and shall be of sufficient size to permit construction of the footings to their full required dimensions. If an existing structure is being extended, the old footings shall be adequately protected. Boulders, logs, or other unforeseen obstacles encountered shall be removed.

The elevations of bottoms of footings as shown on the plans shall be considered approximate. The final elevations shall depend on conditions encountered during excavation, at which time other elevations may be ordered in writing if necessary to secure satisfactory foundations.

Where existing foundation material would not support the contemplated load safely, the plans may require, or it may be directed that foundation piles be driven in the footing area. This piling shall be furnished, driven, and paid for in accordance with 701.

206.07 Disposal of Excavated Material

Except as otherwise herein provided, material excavated for a structure or its approaches, including any material excavated beyond the pay limits of foundation excavation or its specified or approved extensions, shall, if suitable, be used for filling around the new structure, for spandrel filling, approach embankment, regular embankment, or for any combination of these, all as specified or directed.

If excavated material is in accordance with 211.02 and if material of this nature is required at the structure or in its approaches, then this material shall be used as special fill and placed in accordance with applicable provisions of 211.

Surplus or unsuitable material shall not be disposed of in any manner that would obstruct or pollute the stream or otherwise impair the efficiency or appearance of the structure. If there are piers in the water, permission may be granted to waste excavated material adjacent to these piers provided such waste does not obstruct the waterway. If usable excavated material is wasted without authority, the quantity so wasted will be

deducted from the quantities of common excavation, borrow, or B borrow, depending on the nature of the waste and its use.

Disposal of surplus or unsuitable material, including class X excavation, outside the right-of-way shall be in accordance with 201.03 and 203.08.

206.08 Preparation of Foundation Surfaces

All rock or other hard material, if to be left in place as a foundation surface, shall be freed of loose material, cleaned, and cut to a firm surface. The final surface shall be level, stepped, or serrated as directed. Seams shall be cleaned and filled with concrete, cement mortar, or grout. These conditions shall prevail when the foundation masonry is placed.

Where the masonry is to rest on a foundation surface other than those described above, the approximate bottom of the excavation shall not be disturbed. The final removal of material to the required grade shall be done carefully just prior to placing the foundation masonry. The final surface shall be left smooth and, unless otherwise designated, be level.

Notification shall be given after final excavation of each foundation is completed. No masonry shall be placed until the depth of the excavation and the character of the foundation material have been approved.

Before foundations that do not require piling are poured, sufficient test borings shall be made to determine the character of the underlying material for a depth of at least 5 ft (1.5 m) below the bottom of the footing. Also, before pilings are driven in foundations requiring piling, sufficient soundings shall be made to determine the character of the underlying material for a depth of 10 ft (3 m) below the bottom of the footing.

Rock at the bottom of spread footings shall be proof tested. Exploratory holes of 2 in. (50 mm) diameter shall be drilled into the foundation base. Holes shall be drilled into sound rock to a depth of 5 ft (1.5 m) or as directed. Three holes shall be drilled into each foundation base. Observations shall be made at each hole as follows:

1. speed of drilling
2. drill pressure
3. dropping or clogging of drill bit
4. loss of drill water, if used
5. probing of the sides of the holes with a right angled chisel point. The chisel shall be formed from a rod of 3/8 or 1/2 in. (10 or 13 mm) diameter.
6. continuity of bearing material

A professional engineer shall supervise the proof testing work. A report for each hole shall be prepared and submitted for review and approval.

206.09 Cofferdams and Temporary Construction Dikes

Cofferdam drawings shall be submitted in accordance with 105.02. They shall show the proposed method of cofferdam construction and other details left open to choice or not fully shown on the plans. Cofferdam construction shall not start before these submitted drawings are approved. Such approval shall be only for insuring the Department against inadequate and insufficient cofferdams and shall not release the Contractor from any risk or responsibility in connection with this part of the work.

Drawings of dikes to be used in lieu of cofferdams or to be used for access to the work shall be submitted, if such dikes are to be constructed within the waterway. Approval of such drawings will not relieve responsibilities as set out elsewhere in the contract documents and will only be given if the probability of stream pollution and stream flow restriction is minimal.

Cofferdams shall be constructed for all abutments and piers where water or unstable soil is encountered or where the soil may become unstable; excessive stream pollution or stream flow restriction might occur with other construction procedures; or if necessary to support the sides of excavated areas, embankment, adjacent buildings, tracks, or other premises. In general, they shall be carried down well below bottoms of footings, shall be well braced, and as nearly watertight as practicable. The interior dimensions shall be sufficient to provide ample clearance to permit pile driving, the construction of forms, and clearance for pumping equipment outside the forms. Cofferdams shall be constructed to protect plastic concrete against damage from a sudden rising of the stream and to prevent damage to the foundation by erosion.

No timber or bracing that would extend into substructure masonry shall be left in cofferdams except with written permission.

Cofferdams which become tilted or moved laterally during the process of sinking shall be righted or enlarged to provide ample clearance. Any necessary correction shall be made with no additional payment.

Except as otherwise provided herein, cofferdams shall be dewatered and sediment controlled in accordance with 108.04. Pumping will not be permitted for 24 h after concrete placement, unless otherwise approved.

When conditions are encountered under which it is established that no reasonable pumping will dewater the cofferdam when every practicable effort has been made to reduce the inflow of water, or other conditions are such that a foundation seal is necessary, the construction of a concrete foundation seal may be required of such dimensions as necessary. This seal shall be constructed in accordance with 702.20(f).

Unless otherwise permitted, all cofferdam bracing shall be removed and all sheeting removed or cut off at least 2 ft (0.6 m) below the finished ground line, except within the low-water channel it may either be removed or cut off even with the stream bed. Removal shall be such that the finished masonry will not be marred or disturbed.

206.10 Method of Measurement

Structure excavation, except wet excavation, will be measured in cubic yards (cubic meters) in its original position below the limits of roadway excavation. Wet excavation will be the theoretical quantity in accordance with 206.11(b). When structures are to be placed in embankment sections, the natural ground line, as cross sectioned, will be the uppermost level of computation unless otherwise specified or shown on the plans.

Class X material encountered and removed during the excavation of foundations for traffic support structures will be measured to the foundation neat lines as shown on the plans below the surface of class X material.

If the pay unit for any item of excavation in the Schedule of Pay Items is lump sum, no measurement will be made.

Extended excavation for footings will be measured to include the entire depth needed for the deeper footing and the entire width needed to comply with OSHA or IOSHA requirements.

Additional excavation required for a culvert when the culvert is placed at an elevation that is a least 1 ft (0.3 m) below the elevation shown on the plans shall be measured to include the entire width needed to comply with OSHA or IOSHA requirements.

206.11 Basis of Payment

The accepted quantities of structure excavation will be paid for at the contract unit price per cubic yard (cubic meter) or lump sum.

Unless otherwise provided, excavation for bridges will be paid for at the contract unit price or prices per cubic yard (cubic meter) for the respective class or classes involved.

If cofferdams are specified as a pay item, they will be paid for at the contract lump sum price for cofferdams.

If a foundation seal is constructed, it will be paid for in accordance with 702.28.

The quantity of class X excavation to be paid for will be the cubic yardage (cubic meterage) of such material actually removed from within vertical planes defining the neat lines of the footings, except where material classified as class X excavation overlays other material which shall be excavated to cofferdam limits. Such overlying strata will be paid for to the limits of the material excavated beneath it. Unless otherwise provided, no additional payment will be made for such excavation made outside these limits.

If class X excavation is encountered at locations other than sign foundations, traffic signal foundations, and highway illumination foundations, and there is no contract unit price for class X excavation, payment will be made at a unit price per cubic yard (cubic meter) as follows:

1. $1000.00 per cu yd ($1300.00 per m^3) if the quantity of class X excavation is less than or equal to 1 cubic yard (1 cubic meter) per foundation.

2. When the quantity of class X excavation is greater than 1 cubic yard (1 cubic meter) per foundation, payment will be made at the lesser of four times the contract unit price for wet excavation or ten times the contract unit price for dry excavation.

If class X excavation is encountered at locations for sign foundations, traffic signal foundations, and highway illumination foundations and there is no contract unit price for class X excavation, payment will be made as follows:

1. $500.00 if the quantity of class X excavation is less than or equal to 1 cubic yard ($660.00 if the quantity of class excavation is less than or equal to 1 cubic meter) per foundation.

2. $500.00 per cu yd ($660.00 per m^3) for all quantities over 1 cubic yard (1 cubic meter).

In addition to the payment for class X excavation at sign foundations, traffic signal foundations, and highway illumination foundations when there is no contract unit price for class X excavation, a mobilization and demobilization payment for class X excavation will be paid in the amount of $1500.00 per occurrence. Multiple mobilization and demobilization payments will be paid if all project foundation locations are not made available in a reasonable time frame while the equipment is on the project. The cost of this work will be included in a change order developed in accordance with 109.05 and paid as class X excavation and a mobilization and demobilization for class X excavation.

If class X excavation is encountered in foundation excavation unclassified and there is no pay item shown in the Schedule of Pay Items, payment will be made at eight times the contract unit price per cubic yard (cubic meter) for foundation excavation unclassified.

Except as otherwise provided, the quantity of dry excavation to be paid for will be the amount of such excavation actually removed from its original position within vertical planes which are 18 in. (0.5 m) outside the neat lines of the footings and parallel thereto. Regardless of the quantity actually removed, the quantity of wet excavation to be paid for will be the theoretical volume bounded by the bottom of the footings, the upper limit of wet excavation, and vertical planes which are 18 in. (0.5 m) outside the neat lines of footings and parallel thereto. Additional payment will not be made for such excavation outside these limits.

Where it is necessary to carry a footing or a portion of a footing deeper than its elevation shown on the plans, such additional excavation, except a portion thereof classified as class X which is carried down to a plane which is 4 ft (1.2 m) below the bottom of footing as shown on the plans, will be paid for as extended dry excavation, extended wet excavation, or extended foundation excavation unclassified, at a price to be

determined by multiplying the contract unit price for dry excavation, wet excavation, or foundation excavation, unclassified, respectively by the factors shown below.

1. For footings or portions thereof lowered not more than 1 ft (0.3 m), the factor will be 2.0.

2. For footings or portions thereof lowered more than 1 ft (0.3 m) and not more than 2 ft (0.6 m), the factor will be 2.5.

3. For footings or portions thereof lowered more than 2 ft (0.6 m) and not more than 3 ft (0.9 m), the factor will be 3.5.

4. For footings or portions thereof lowered more than 3 ft (0.9 m) and not more than 4 ft (1.2 m), the factor will be 5.0.

For a footing lowered more than 4 ft (1.2 m) below its elevation shown on the plans, all such extended excavation below the bottom of footing elevation shown on the plans to the revised bottom of footing shall be done as extra work in accordance with 104.03. Payment will be made in accordance with 109.05.

All backfill material or sub-footing material required whose source is other than structure excavation will be paid for at the contract unit price for the material being used or as extra work if no unit price has been established. A change order will be prepared in accordance with 109.05.

The cost of furnishing all materials and labor associated with proof testing of rock shall be included in the cost of other pay items.

If a borrow area is required and borrow is not specified as a pay item, payment will be made in accordance with 203.28.

If a waste area is required and the contract documents do not identify excess excavation nor require removal of any items, payment will be made in accordance with 203.28.

Except for sign foundations, traffic signal foundations, and highway illumination foundations, if a type of excavation for which no pay item exists is required and the new type of excavation requires the Contractor to use equipment not otherwise being used on the contract, payment will be in accordance with 203.28.

If a type of excavation for which no pay item exists is required and the new type of excavation requires additional traffic control not shown on the plans or results in traffic control being required for an additional period of time, payment will be made in accordance with 203.28.

Payment will be made under:

Pay Item	Pay Unit Symbol
Cofferdam	LS
Excavation, Dry	CYS (m3)
Excavation, Foundation, Unclassified	CYS (m3)
Excavation, Wet	CYS (m3)
Excavation, X	CYS (m3)

The cost of placing and compacting of all backfill when the materials used are obtained from excavation, clearing and grubbing required and not paid for under another pay item, formation of embankments made with material from structure excavation, and disposal of all surplus or unsuitable excavation, unless otherwise specified shall be included in the cost of the pay items.

The cost for disposing of surplus or unsuitable excavated materials outside the right-of-way shall be included in the various pay items in this section.

(a) Culverts and Retaining Walls

This requirement will not include pipe culverts. Except as otherwise provided herein, excavation for culverts and retaining walls will not be paid for directly. The cost thereof shall be included in the cost of the class of concrete used therein. The cost of all necessary removal and satisfactory disposal of all or part of the existing old structure unless its removal is otherwise provided for, cleaning out an old channel or constructing a new channel within the right-of-way limits and widening it to the grade of the existing or proposed new stream bed as shown on the plans or as directed, construction of all necessary curbs and cofferdams and their subsequent removal, subsoil borings or soundings below bottom of footings, dewatering, disposal of excavated materials, and all labor, equipment, tools, and necessary incidentals shall be included in the cost of this work.

If a culvert is lowered, relocated, or material of such nature is encountered that additional excavation is necessary over and above that required at the originally planned location, the additional excavation will not be paid for if it is 10 cu yd (8 m^3) or less. Additional excavation in excess of 10 cu yd (8 m^3) will be paid for at three times the contract unit price for the class of excavation involved. However, if the culvert is placed at a depth that is equal to or greater than 1 ft (0.3 m) deeper than the elevation shown on the plans, the additional excavation in excess of 10 cu yd (8 m^3) will be paid at five times the contract unit price for the class of excavation involved.

(b) Bridges

The cost of clearing right-of-way within the project limits; constructing, dewatering, and removal of cofferdams, if not a pay item; subsoil borings or soundings below bottoms of footings; final preparation of foundation surfaces; disposal of excavated material; and all labor, equipment, tools, and incidentals necessary to the satisfactory completion of the excavation shall be included in the cost of this work.

The cost of all required shop plans; furnishing, hauling, and placing necessary materials; construction; maintenance; dewatering; removal of bracing; removal of or

cutting off the sheeting; and labor, equipment, tools, and necessary incidentals shall be included in the cost of cofferdams.

If cofferdams are not specified as a pay item, and if cofferdams are necessary, their cost shall be included in the cost of excavation or the concrete requiring their use.

If there is no pay item for dry excavation, the cost of this part of the work shall be included in the cost of the foundation concrete or for other concrete requiring such excavation. However, where waterway excavation, common excavation, or other classified excavation overlaps the area of dry foundation excavation, no deduction will be made in the pay volume of such overlapping classified material. This exception will apply only if dry excavation is not a pay item.

Except as otherwise provided in 206.05, the cost of foundation excavation unclassified shall include all work and elements of volume, and excavation described above for wet excavation and dry excavation, regardless of whether or not water is encountered. The cost of foundation excavation unclassified shall not include the cost of class X excavation.

The classifications for necessary excavation for a cantilevered wing outside the limits of foundation excavation shall be the same as those governing the excavation inside such limits. The quantity to be paid for will be that actually removed from its original position within vertical planes 18 in. (0.5 m) outside the neat lines shown on the plans and parallel thereto and above a plane 1 ft (0.3 m) below and parallel to the bottom surface of the wing.

The classifications for necessary excavation for arch superstructures outside the limits of foundation excavation or waterway excavation shall be those governing the excavation inside the limits of foundation excavation or waterway excavation, depending on the location of the excavation for the arch superstructure. Such excavation shall be bounded by vertical planes which are 1 ft (0.3 m) outside the outside faces of the arch ring and parallel thereto, by a vertical plane passing through the intersection of the intrados of the arch ring and the original ground line and parallel to the face of the abutment, and the vertical plane bounding the foundation excavation on the side adjacent to the arch ring. The lower limit shall be a sloping plane which is 1 ft (0.3 m) below a plane connecting the intersection of the intrados of the arch ring and the original ground, and the intersection of the intrados of the arch ring with the vertical plane bounding the foundation excavation.

For U-abutments, the limits of dry excavation to be paid for will be extended to include all material removed from between the limits of the wing excavation and above the elevation of the bottom of the lowest tie beam. If the bottom of the lowest tie beam is below the upper limits of wet excavation, the limits of wet excavation and dry excavation to be paid for will be extended to include material actually and necessarily removed from between the limits of the wing excavation.

Where it is necessary to excavate outside the foundation excavation limits for superstructure or extensions other than those described above, the pay limits will be extended to include all such excavation, as determined necessary.

If a suitable sump is constructed outside the pay limits as described above, such limits will be extended to include the actual lines of the sump. The additional pay limits added for the sump will not exceed 4% of the area of the footing involved.

(c) Traffic Structure Supports

The cost of excavation for traffic structure supports, except for class X material in accordance with 206.02(a)1, shall be included in the cost of the foundation material.

SECTON 207 – SUBGRADE

207.01 Description

This work shall consist of the construction of the subgrade in accordance with 105.03.

MATERIALS

207.02 Materials

Materials shall be in accordance with the following.

Chemical Modifiers
- Fly Ash 901.02
- Lime ..... 913.04(b)
- Portland Cement, Type I ..... 901.01(b)

Coarse Aggregate, Class D or Higher, Size No. 11, 12, 53, or 73 904

Geogrid, Type I ..... 918.05(a)

Water 913.01

Recycled concrete pavement meeting the requirements of coarse aggregate size No. 53 may be used when crushed stone size No. 53 is specified.

CONSTRUCTION REQUIREMENTS

207.03 General Requirements

The subgrade shall be constructed uniformly transversely across the width of the pavement including 2 ft (0.6 m) outside the edge of shoulders or curbs unless shown otherwise on the plans, by one of the following methods.

(a) chemical modification in accordance with 215;

(b) aggregate No. 53 in accordance with 301;

(c) geogrid in accordance with 214 placed under aggregate No. 53 in accordance with 301, or

(d) soil compaction to 100% of maximum dry density.

Longitudinally, the treatment may vary depending on the method of construction.

Soils containing greater than 3% by dry weight calcium, magnesium carbonate or organic material, or with a maximum dry density of less than 100 pcf (1600 kg/m^3), or with liquid limit of greater than 50, will not be permitted within the specified thickness of the subgrade. Density shall be determined in accordance with AASHTO T 99 and loss of ignition shall be determined in accordance with AASHTO T 267. Liquid limits shall be determined in accordance with AASHTO T 89.

Coal within the specified thickness of the subgrade shall be excavated if directed, and disposed of in accordance with 202.05. Coal or coal blossoms that are allowed to remain shall be mixed thoroughly with subgrade soils and compacted in accordance with 207.04.

All rock greater than 6 in. (150 mm) shall be removed or broken off at least 6 in. (150 mm) below the subgrade surface. Holes or depressions resulting from the removal of unsuitable material shall be filled with an acceptable material and compacted to conform with the surrounding subgrade.

During subgrade preparation, adequate drainage shall be provided at all times to prevent water from standing on the subgrade.

Even though the subgrade has been previously accepted, the condition of the subgrade at the time paving material is placed shall be in accordance with 105.03 and 207.04. Just prior to placing the base course on the subgrade, proofrolling in accordance with 203.26 shall be completed. Undue distortion of the subgrade shall be avoided. If limits of the work make mechanical preparation of the subgrade impractical, appropriate hand methods may be used.

The grade and cross section of the subgrade shall be finished within a tolerance of 1/2 in. (13 mm) from the true subgrade. It is permissible to finish within this tolerance by blading or other mechanical means without the use of side forms. If these methods do not finish within this tolerance, side forms shall be used.

207.04 Subgrade Treatments

The subgrade treatment type shall be as specified on the contract plans.

Within each of the following subgrade treatment types, the Contractor shall choose from the listed options for each type.

Type I. 16 in. (400 mm) chemical soil modification, 12 in. (300 mm) of the subgrade excavated and replaced with coarse aggregate No. 53, or by 24 in. (600 mm) of soil compacted to density and moisture requirements.

Type IA. 16 in. (400 mm) chemical soil modification or 12 in. (300 mm) of the subgrade excavated and replaced with coarse aggregate No. 53.

Type II. 8 in. (200 mm) chemical soil modification, 6 in. (150 mm) of the subgrade excavated and replaced with coarse aggregate No. 53,or 12 in. (300 mm) of soil compacted to density and moisture requirements.

Type IIA. 8 in. (200 mm) chemical soil modification or 6 in. (150 mm) of the subgrade excavated and replaced with coarse aggregate No. 53.

Type III. 6 in. (150 mm) of soil compacted to the density and moisture requirements, or 6 in. (150 mm) of subgrade excavated and replaced with coarse aggregate No. 53.

Type IIIA. 6 in. (150 mm) of subgrade excavated and replaced with coarse aggregate No. 53.

Type IV. 9 in. (225 mm) of the subgrade excavated and replaced with coarse aggregate No. 53 on geogrid.

Where the density and moisture control option is used, compaction of embankment areas shall be in accordance with 203.23. In cut and transition areas, the top lifts shall be removed, and the bottom 6 in. (150 mm) compacted in-place to comply with the specified density and moisture requirements. The excavated material shall then be replaced and compacted in 6 in. (150 mm) lifts to comply with the specified density and moisture requirements. Removal of the upper lifts may be waived and only the upper 6 in. (150 mm) treated in accordance with 207.03 when it is determined, through testing in accordance with 203.24, that the lower lifts comply with the specified density and moisture requirements.

In sections where shale or shale and rock mixtures are encountered, these materials shall be undercut 12 in. (300 mm) below the subgrade elevation and replaced with coarse aggregate No. 53 or No. 73 and compacted in accordance with 301.06. All irregularities and holes shall be graded to provide positive drainage. Where necessary, finishing to subgrade elevation shall be accomplished using No. 11 or No. 12 crushed stone.

When conditions are encountered below the specified subgrade treatment depth that prevent achieving the specified subgrade compaction, such conditions shall be treated as directed.

207.05 Method of Measurement

Subgrade treatment will be measured in both cut and fill areas by the square yard (square meter) per type. Chemicals for modification, excavation, aggregates, and geogrid materials will not be measured.

The undercutting of rock, where encountered, will be measured in accordance with 203.27(b).

207.06 Basis of Payment

The accepted quantities of subgrade treatment will be paid for at the contract unit price per square yard (square meter) per type, complete in place.

The undercutting of rock, where encountered, will be measured in accordance with 203.27.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Subgrade Treatment, Type _____	SYS (m2)

The cost of subgrade treatments including testing, sampling, aggregates for cut or at-grade areas, chemicals for modification, geogrid, water, and the excavation required for the methods chosen by the Contractor shall be included in the cost of the pay item for subgrade treatment, type.

Compacted aggregate used for subgrade treatment in fill areas will also be measured and paid for as either embankment or as borrow, as appropriate, in accordance with 203.27 and 203.28.

Where conditions exist below the specified subgrade compaction depth that prevent achieving the specified compaction, payment for correcting such conditions will be made based on the directed method of treatment.

SECTION 208 – FINISHING SHOULDERS, DITCHES, AND SLOPES

208.01 Description

This work shall consist of the final shaping and dressing of shoulders, ditches, and slopes by hand or machine methods, or both, to the required smoothness in accordance with these specifications and in reasonably close conformance with the elevations and cross sections shown on the plans or as directed.

Where divided pavement is constructed, each roadway with its shoulders, ditches, and slopes will be considered a separate roadway.

CONSTRUCTION REQUIREMENTS

208.02 Finishing Shoulders

Unless otherwise provided, shoulders shall be constructed of earth or other approved material which contains no sod, weeds, sticks, roots, or other perishable matter. The inside edges shall be built up slightly above the finished surface of the adjoining pavement and compacted thoroughly with a roller weighing no less than 5 t (4.5 Mg) and with the roller wheel slightly overlapping the pavement. Rolling shall continue until there is no break between the pavement and shoulders, and until the required cross section is obtained.

If rolling is not practicable on shoulders for approach pavement or other miscellaneous areas, compaction shall be obtained with mechanical tamps, vibrators, or other satisfactory means.

Except where permission has been granted to widen shoulders to dispose of surplus excavation, the outside edges shall be parallel to the pavement edges.

Where cuts are widened beyond the typical cross sections shown on the plans in order to obtain additional material for constructing shoulder widths required or where fills are widened to dispose of excess excavated material, the shoulders shall be finished to the widths as finally constructed.

It may be necessary to finish shoulders after the pavement is opened to traffic. As a matter of safety to traffic, the pavement shall be kept as free as possible from shoulder material and equipment. The adjacent pavement over which traffic is being routed shall be cleaned at the close of each work day.

208.03 Finishing Ditches

Ditches shall be finished to the lines and grades shown on the plans or as otherwise laid out. The edges shall be parallel to the pavement unless it is necessary to have the gradients different from that of the pavement in order to obtain proper drainage, in which case the edges shall be as determined.

208.04 Finishing Slopes

All cut and fill slopes shall be constructed to the cross sections shown on the plans or to revised sections where cuts are widened to obtain additional material or fills widened to utilize excess. Cut and fill slopes shall be finished to the degree ordinarily obtained by a blade grader, scraper, or hand shovel.

208.05 Blank

208.06 Finishing at Contract Drainage Structures

If the contract work is for bridges or culverts or for extensions thereof, the requirements of this specification shall apply to the right-of-way within the contract structure limits, unless otherwise specified.

208.07 Method of Measurement

Finishing will not be measured for payment unless otherwise provided.

208.08 Basis of Payment

Finishing shoulders, ditches, and slopes will not be paid for directly. The cost thereof shall be included in the cost of other pay items.

SECTION 209 – FINISHING EARTH GRADED ROADS

209.01 Description

This work shall consist of leveling, shaping, and otherwise completing an earth graded road ready for acceptance when the contract is for grading or for grading and structures, but not when the contract includes paving or surfacing.

209.02 Construction Requirements

After all grading is substantially complete and structures, if any, are finished, the roadbed and cut and fill slopes shall be shaped properly and, where necessary, compacted.

Shaping and compacting shall be with approved equipment supplemented with hand methods if necessary. Reasonably smooth surfaces shall be obtained and finished at least to within ± 0.1 ft (30 mm) of the required profile and cross sections shown on the plans or as directed.

All rock greater than 6 in. (150 mm) encountered shall be removed or broken off at least 6 in. (150 mm) below the subgrade surface. Holes or depressions resulting from the removal of unsuitable material shall be filled with an acceptable material and compacted to conform with the surrounding subgrade.

Final trimming and cleaning shall be in accordance with 210.

209.03 Method of Measurement

Finishing earth graded roads will not be measured for payment unless otherwise provided.

209.04 Basis of Payment

Finishing earth graded roads will not be paid for directly. The cost thereof shall be included in the cost of other pay items.

SECTION 210 – FINAL TRIMMING AND CLEANING

210.01 Description

This work shall consist of trimming and cleaning the otherwise completed highway between right-of-way lines for its entire contract length.

210.02 Construction Requirements

At the time of acceptance, the following conditions shall prevail for the entire contract length and also for the full right-of-way width except as hereinafter provided.

Debris and rubbish shall be removed and disposed of in accordance with 201.03.

Remaining loose stones and broken masonry meeting the aggregate requirements for hand laid or grouted riprap shall be stored in neat piles on the right-of-way as directed.

Weeds, brush, and stumps shall be cut close to the ground. Disposal shall be in accordance with 201.03 and 203.08.

Cut and fill slopes made or disturbed shall be left reasonably smooth and uniform. Loose and overhanging rock shall be removed.

Floors, roadways, railings, bottom chords, shoes, and seats of bridges shall be cleaned of rubbish, sand, stone, gravel, and dirt. Waterways shall be left unobstructed. Culverts and other drainage structures shall be left clean for their entire length.

If the contract is for construction of a new pavement or for grading and structures only on a right-of-way acquired for divided highway construction, one roadway of which has been constructed and on which the Department has assumed normal maintenance, the provisions of this specification shall not apply to the maintained portion except to those areas of such which are disturbed by the operations.

If the contract is for construction of a portion of a divided highway on a right-of-way on which no previous construction has been done or on a divided highway right-of-way on which a previous grading-only contract has been completed, then the provisions of this specification shall apply to the entire right-of-way for the full contract length.

Unless otherwise set out in the special provisions for a contract which includes work for patching, widening, resurfacing, surface treating, undersealing, or for a combination of these, or for a contract through which traffic is being maintained during construction, these requirements will apply only to that portion of the right-of-way disturbed by the operations.

210.03 Method of Measurement

Final trimming and cleaning will not be measured for payment unless otherwise provided.

210.04 Basis of Payment

Final trimming and cleaning will not be paid for directly. The cost thereof shall be included in the cost of other pay items.

SECTION 211 – B BORROW FILL AND BACKFILL

211.01 Description

This work shall consist of backfilling excavated or displaced peat deposits; filling up to designated elevations of spaces excavated for structures and not occupied by permanent work; constructing bridge approach embankment; and filling over structures and over arches between spandrel walls, all with special material.

MATERIALS

211.02 Materials

Materials shall be in accordance with the following.

B Borrow ..... As Defined*
Geotextile 918.02
Structure Backfill 904

* The material used for special filling shall be of acceptable quality, free from large or frozen lumps, wood, or other extraneous matter and shall be known as B borrow. It shall consist of suitable sand, gravel, crushed stone, ACBF, GBF, or other approved material. The material shall contain no more than 10% passing the No. 200 (75 µm) sieve and shall be otherwise suitably graded. The use of an essentially one-size material will not be permitted unless approved.

The Contractor has the option of either providing B borrow or structure backfill from an established CAPP source, or supplying the material from another source. The Contractor has the following options for supplying B borrow or structure backfill from a local site:

(a) the establishment of a CAPP Producer Yard at the local site in accordance with 917; or

(b) use a CAPP Certified Aggregate Technician or a consultant on the Department's list of approved Geotechnical Consultants For Gradation Control Testing.

For material excavated within the project limits, gradation control testing will be performed by the Department if the Contractor is directed to use the material as B borrow or as structure backfill.

The frequency of gradation control testing shall be one test per 2000 t (2000 Mg) based on production samples into a stockpile or by over the scales measurement, with a minimum of two tests per contract (one in the beginning and one near the mid-point). The sampling and testing of these materials shall be in accordance with applicable requirements of 904 for fine and coarse aggregates. The Contractor shall advise, in writing, the Engineer and the District Materials and Testing Engineer of the plan to measure the material.

When structure backfill is specified, the Contractor may substitute flowable backfill in accordance with 213. However, flowable backfill shall not be placed into or through standing water, unless approved in writing.

CONSTRUCTION REQUIREMENTS

211.03 General Requirements

If B borrow or structure backfill is obtained from borrow areas, the items of obtaining the areas, their locations, depths, drainage, and final finish shall be in accordance with 203.

Unless otherwise specified, if excavated material complies with 211.02 and if B borrow or structure backfill is required for special filling, the excavated material shall be used as such. If there is a surplus of this material, such surplus shall be used in embankment. The provisions of 203.19 shall apply to placing this material at structures.

All surplus in excess of the directed or specified use on the right-of-way shall be disposed of in accordance with 201.03.

If fill or backfill as described in this specification is within embankment limits, and if it is not required that the entire fill or backfill be of B borrow and placed as such, then that portion above the free-water level shall be placed in accordance with applicable provisions of 203 and compacted to the required density.

If borrow is required outside the specified limits of B borrow, material in accordance with the specifications for B borrow may be furnished at the contract unit price for borrow; however, the quantity of borrow measured for payment outside the limits of structure backfill will not exceed the theoretical quantity of B borrow furnished.

Unless otherwise specified, all spaces excavated for and not occupied by bridge abutments and piers, if within embankment limits, shall be backfilled to the original ground line with B borrow, and placed in accordance with 211.04.

Where B borrow or structure backfill is required as backfill at culverts, retaining walls, sewers, manholes, catch basins, and other miscellaneous structures, it shall be compacted in accordance with 211.04.

211.04 Mechanical Compaction

Where B borrow or structure backfill is to be compacted by mechanical compaction, it shall, unless otherwise specified, be placed in accordance with the applicable provisions of 203.23 except, if mechanical tamps or vibrators are used, the material shall be deposited in approximately 6 in. (150 mm) lifts, loose measurements, and each lift compacted to density requirements.

211.05 Embankment for Bridges

When special filling is required, the embankment for bridges shall be constructed using B borrow within the specified limits shown on the plans. All embankment construction details specifically set out in this specification for embankment for bridges shall be considered in accordance with the applicable requirements of 203.

At the time B borrow is being placed for approach embankment, a well compacted watertight dam shall be constructed in level lifts, the details of which are shown on the plans. Except as hereinafter specified for material to be used in constructing the enclosing dam, and for growing vegetation, and unless otherwise provided, the material for constructing bridge approach embankment shall be B borrow compacted by mechanical methods. If approach embankment or shoulders are constructed of material not suitable for growing seed or sod, and if one or both of these is required, then such areas shall, unless otherwise specified, be covered with a layer of clay, loam, or other approved material. This layer shall be approximately 1 ft (0.3 m) thick after being compacted into place.

211.06 B Borrow Around Bents

When specified, B borrow shall be placed around all bents falling within the limits of the approach grade as shown on the plans. Before placing, the surface of the ground on which it is to be placed shall be scarified or plowed as directed. The

embankment slope shall be 2:1 on the sides and beneath the structure, and shall be 6:1 from the end of the bridge down to the average ground line, or it may be required to complete the approaches back to the existing grade. An enclosing dam and provisions for growing vegetation shall be constructed in accordance with 211.05.

211.07 Aggregate For End Bent Backfill

When specified, coarse aggregate shall be placed behind end bents as shown on the plans. The material shall be deposited in lifts not to exceed 12 in. (300 mm) loose measurement, and each lift shall be mechanically compacted using a hand held vibratory plate compactor having a plate width of 17 in. (425 mm) or larger that delivers 3000 to 9000 lb (13.3 to 40 kN) per blow. Each lift shall be compacted with two passes of the compactor.

Prior to placing the aggregate, a geotextile shall be installed in accordance with 616.11.

211.08 Spandrel Filling

Unless otherwise specified, spandrel fills for arch structures shall be composed of B borrow. The fill shall be carried up symmetrically in lifts from haunch to crown and simultaneously over all piers, abutments, and arch rings. Compaction shall be in accordance with 211.04.

211.09 Method of Measurement

B borrow, structure backfill, and aggregate for end bent backfill will be measured by the cubic yard (cubic meter) as computed from the neat line limits shown on the plans, or as adjusted. If cubic yards (cubic meters) are set out as the pay item for B borrow or structure backfill in the Schedule of Pay Items and if neat line limits are not specified for measurement of volume for the material, measurement will be made by the cubic yard (cubic meter) at the loading point in truck beds which have been measured, stenciled, and approved. The B borrow may be weighed and converted to cubic yards (cubic meters) by assuming the weight per cubic foot (mass per cubic meter) to be 90% of the maximum wet density in accordance with AASHTO T 99. The material may be cross sectioned in its original position and again after excavation is complete, and the volume computed by the average end area method. If B borrow is used for backfill in areas where unsuitable material is present or peat excavation has been performed, unless otherwise directed, the B borrow will be cross sectioned, and the volume will be computed by the average end area method.

If the material is to be paid for by the ton (megagram), it will be weighed in accordance with 109.01(b).

If the material comes from a wet source such as below water or a washing plant, and weighing is involved in the method of measurement, there shall be a 12 h drainage period prior to the weighing.

Geotextile will be measured in accordance with 616.12.

211.10 Basis of Payment

The accepted quantities of B borrow will be paid for at the contract unit price per cubic yard (cubic meter) or per ton (megagram) as specified, complete in place.

Structure backfill will be paid for at the contract unit price per cubic yard (cubic meter), based on the neat line limits shown on the plans or as adjusted for authorized changes, provided the material comes from outside the permanent right-of-way. If the Schedule of Pay Items does not contain a pay item for structure backfill and it is required to backfill pipes or culverts within the project limits, a change order will be generated to establish a unit price.

B borrow material placed outside the neat lines will be paid for as borrow when such B borrow eliminates required borrow material. Otherwise, no payment will be made for backfill material placed outside the neat lines.

Aggregate for end bent backfill will be paid for at the contract unit price per cubic yard (cubic meter), based on the neat line limits shown on the plans or as adjusted by authorized changes.

Geotextile will be paid for in accordance with 616.13.

Flowable backfill which is substituted for structure backfill will be paid for as structure backfill.

If topsoil, loam, or other suitable material in accordance with 211.05 is used for expediting the growth of seed or sod, it will be paid for at the contract unit price per cubic yard (cubic meter) for borrow, unless otherwise provided.

Payment will be made under the following:

Pay Item	**Pay Unit Symbol**
Aggregate For End Bent Backfill	CYS (m3)
B Borrow	CYS (m3) TON (Mg)
Structure Backfill	CYS (m3)

No payment will be made under this section for material obtained within the excavation limits of the project if the Contractor is directed to use the material as B borrow or structure backfill in a pipe trench, culvert, construction of an embankment or fill, or if the Contractor uses the material for its own convenience. Material obtained from within the excavation limits of the project and which the Contractor is directed to use as B borrow or structure backfill for other purposes including replacement of undercut areas, support for a MSE wall, and end bent fill will be paid for at the contract unit price of $5.00 per cubic yard ($6.50 per cubic meter) for B borrow/structure backfill handling.

The cost of disposal of excavated material shall be included in the cost of the pay items in this section.

SECTION 212 – STOCKPILED SELECTED MATERIALS

212.01 Description

This work shall consist of excavation selected road material from within the construction limits and stockpiling it on the right-of-way at designated locations. It also includes any subsequent removal of the material from the stockpile, if to be used in the work.

212.02 Materials

Any material to be excavated and stockpiled will be specifically named and described in the special provisions and may include rock, top soil, material in accordance with 211.02, or any other material selected, any of which may be excavated as common excavation.

After the selected material is stockpiled it shall be known as stockpiled selected material and if any of this material is required to be removed from the stockpile and used in the work, its removal and its incorporation into the work shall be known as salvaged stockpiled selected material.

212.03 Construction Requirements

Selected material shall be excavated from specified areas and stockpiled on the right-of-way at designated locations. The depth of excavation shall be as directed.

If the material is required to be taken from the stockpile and utilized in the work, the material so utilized shall be placed in accordance with these specifications as they apply to the nature of the material and the use to which it is put.

212.04 Method of Measurement

Stockpiled selected material will be measured in the stockpiles by means of cross sections by the cubic yard (cubic meter), computed by the average end area method. The volume measured as salvaged stockpiled selected material will be the difference in cubic yards (cubic meters) between that of the existing stockpile and that remaining after the material has been removed from the stockpile and used. Both stockpiles will be measured by means of cross sections. The volume will be computed by the average end area method.

If stockpiled selected material is obtained from within the excavation pay limits of new construction, the volume of the material will be deducted from the pay quantities for excavation as shown on the original cross sections.

212.05 Basis of Payment

The accepted quantities of stockpiled selected material and salvaged stockpiled selected material will be paid for at the contract unit price per cubic yard (cubic meter), complete in place.

Payment will be made under:

Pay Item	Pay Unit Symbol
Stockpiled Selected Material	CYS (m3)
Stockpiled Selected Material, Salvaged	CYS (m3)

The cost of excavation, hauling, removing material from the stockpile, placing materials, and necessary incidentals shall be included in the cost of the pay items.

SECTION 213 – FLOWABLE BACKFILL

213.01 Description

This work shall consist of placing flowable backfill in trenches for pipe structures, culverts, utility cuts and other work extending under pavement locations, to fill cavities beneath slopewalls and other locations in accordance with 105.03.

MATERIALS

213.02 Materials

Materials shall be in accordance with the following:

Concrete Admixtures	912.03
Fine Aggregate*	904
Fly Ash	901.02
Portland Cement	901.01(b)
Water	913.01

*Except that steel furnace slag shall not be used

If fly ash is used as a filler and not as a pozzolan, the fly ash shall be in accordance with 904.

The supplier may elect to use gradations in accordance with 904 or may propose the use of alternate gradations. The alternate gradation and proposed tolerances of material passing each sieve shall be included in the flowable backfill mix design.

213.03 Flowable Backfill Mix Design

The Contractor shall submit a flowable backfill mix design, FBMD, to the Engineer and arrange a trial batch. The FBMD will be approved based on compliance with 213.04. The FBMD shall be submitted in a format acceptable to the Engineer and shall include the following:

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

FBMD's which were used on contracts in the current or previous calendar year, may be submitted to the District Materials and Tests Engineer for approval. Effective January 1, 2004, all FBMD's shall meet the requirements of 213.05.

After the completion of the trial batch and all test results have been reviewed for compliance with the specifications, a mixture number will be assigned by the Engineer.

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

213.04 Flowable Backfill Mix Criteria

The FBMD shall produce a workable mixture with the following properties:

Minimum Unconfined Compressive Strength
at 28-days ..... 50 psi (350 kPa)
Maximum Unconfined Compressive Strength
at 28-days ..... 150 psi (1050 kPa)
Minimum Fill Spread Diameter .....8 in. (200 mm)

213.05 Flowable Backfill Trial Batch

A trial batch shall be produced by the Contractor and tested by the District Materials and Tests Engineer to verify that the FBMD meets the flowable backfill mix criteria. The flowable backfill shall be batched within the proportioning tolerances of 508.02(b). The Engineer will determine and provide the Contractor with test results for the unconfined compressive strength test and the flowable backfill spread diameter. The trial batch shall be of sufficient quantity to allow the Contractor and the Engineer to perform all required tests from the same batch. Trial batch flowable backfill shall not be used for more than one test.

Compressive strength testing shall be conducted in accordance with ITM 588. Flow testing shall be conducted in accordance with ASTM D 6103.

The Contractor shall determine the penetration resistance of the flowable backfill produced during the trial batch in accordance with ITM 213 at one, three, seven, and fourteen days. The results shall be submitted to the Engineer.

FBMD's which were used on contracts in the current or previous calendar year, may be submitted to the District Materials and Tests Engineer for approval.

213.06 Mixing Equipment

The mixing equipment shall be in accordance with the applicable requirements of 702 or 722, except that in lieu of the calibration requirements of 722.11, the mixer operator shall make delivery in a properly calibrated continuous mixer.

CONSTRUCTION REQUIREMENTS

213.07 Placement

The flowable backfill shall not be placed on frozen ground. Flowable backfill shall be protected from freezing until the material has set.

The diameter of the flowable backfill spread shall be at least 8 in. (200 mm) at time of placement.

The flowable backfill shall be brought up uniformly to the fill line as shown on the plans or as directed.

The flowable backfill shall not be subject to load nor disturbed by construction activities until penetration resistance testing in accordance with ITM 213 has been completed. The minimum penetration resistance shall be as follows:

For PCCP ..... 70 psi (500 kPa)
For all Other Applications..... 1200 psi (8000 kPa)

213.08 Method of Measurement

Flowable backfill will be measured by the cubic yard (cubic meter) as computed from the neat line limits shown on the plans, or as adjusted. If neat line limits are not shown on the plans, the volume in cubic yards (cubic meters) of flowable backfill furnished and placed will be computed from the nominal volume of each batch and a count of the batches. Unused and wasted flowable backfill will be estimated and deducted. Drilled holes will be measured by the number of holes drilled.

213.09 Basis of Payment

The accepted quantities of flowable backfill will be paid for at the contract unit price per cubic yard (cubic meter) furnished and placed. Holes drilled in the pavement will be paid for at the contract unit price per each.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Drilled Hole for Flowable Backfill	EACH
Flowable Backfill	CYS (m3)

The cost of material placed outside the neat line limits, material placed outside the adjusted limits, and unused or wasted flowable backfill shall be included in the cost of this work.

SECTION 214 – GEOGRID

214.01 Description

This work shall consist of furnishing and installing geogrid as shown on the plans and in accordance with 105.03.

MATERIALS

214.02 Materials

Materials shall be in accordance with 918.05.

CONSTRUCTION REQUIREMENTS

214.03 Foundation Preparation

The embankment foundation shall be cleared and grubbed in accordance with 201 and excavated using lightweight equipment to minimize disturbance of the embankment foundation soils. Construction activities using equipment which cause pumping and rutting of the embankment foundation soils shall be prevented where possible or otherwise minimized. Fine grading may be waived where impractical. However, when very soft soil is encountered, the embankment foundation shall be cleared of all trash and rubbish materials without disturbing the vegetation cover. The embankment foundation shall be subject to approval prior to placement of geogrid. Proofrolling of the embankment foundation will not be required.

214.04 Geogrid Placement

The geogrid shall be installed in accordance with the manufacturer's recommendations with excess geogrid being removed. The Contractor may turn the excess portion of the geogrid into the fill layer as an alternative to removal, provided an acceptable installation is obtained. The geogrid shall be kept taut during placement of the initial lift of backfill. Installation may require the use of stakes to hold the geogrid in place.

The geogrid material supplier shall provide a qualified manufacturer's representative on the contract site at the start of the work to assist the Contractor. The representative shall also be available during the construction when required by the Engineer or Contractor. A copy of the manual for the installation shall be furnished to the Engineer.

Geogrid shall be overlapped a minimum of 2.0 ft (0.6 m) side to side and end to end for type I and only end-to-end for type II. The geogrids shall be overlapped 3.0 ft (1 m) in areas where foundation conditions cannot support foot traffic or where 2.0 ft (0.6 m) is found to be inadequate during fill placement. Overlaps shall be oriented, or shingled, to prevent advancing fill from lifting the geogrid. Overlaps shall be further secured to prevent separation during fill placement. Damaged geogrid shall be patched. Patching shall include placement of a minimum of 3.0 ft (1 m) of overlapped geogrid beyond the damaged area. If the damaged portion extends for more than 50% of the roll in the width direction, the entire width shall be replaced.

Geogrid shall be covered with fill within three calendar days after placement. Only that amount of geogrid required for pending work shall be placed to minimize exposure of the geogrid.

214.05 Fill Placement

Construction vehicles shall not be permitted on the geogrid. The placement of the fill shall proceed forward along the roadway centerline and outward to the embankment

edges and compacted in accordance with 203.23. The Engineer may waive density requirements for the first lift if the fill is determined to be too soft to support compaction equipment.

214.06 Method of Measurement

Geogrid will be measured by the square yard (square meter), for the type specified. The quantity will be computed based on the total area of geogrid shown on the plans, exclusive of the area of overlaps. The portion of geogrid cut off or turned up into the backfill layer will not be measured for payment.

214.07 Basis of Payment

The accepted quantities of geogrid will be paid for at the contract unit price per square yard (square meter) per type of geogrid.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Geogrid, _____ type	SYS (m2)

The cost of furnishing the materials, manufacturer's representative, all labor and equipment required for furnishing and placing the geogrid, all work necessary to establish grades, geogrid splices, overlaps, stakes or pins, supplemental product test data, and patching or replacement of damaged geogrid shall be included in the cost of this work.

SECTION 215 – CHEMICAL MODIFICATION OF SOILS

215.01 Description

This work shall consist of the modification of soils by uniformly mixing dry portland cement, fly ash, lime, or a combination of the materials with soil to aid in achieving the workability of soils having an excessive moisture content.

MATERIALS

215.02 Materials

Materials shall be in accordance with the following:

Fly Ash	901.02
Lime	913.04(b)
Portland Cement, Type I	901.01(b)
Water	913.01

CONSTRUCTION REQUIREMENTS

215.03 Testing and Mix Design

The Contractor shall be responsible for all tests required to determine the chemical modifier type and optimum chemical modifier content for modification of the soils. The modifier selection, laboratory testing, and mix design shall be performed by an

approved geotechnical consultant in accordance with the Department's Design Procedures for Soil Modification or Stabilization.

The quantities for hydrated lime, quicklime, or portland cement shall be based on 4.0 ± 0.5% by dry unit weight (mass) of the soils. The quantities for lime by-products shall be based on 5.0 ± 1.0% by dry unit weight (mass) of the soils. The quantities for fly ash class C shall be based on 12.0 ± 2.0% by dry unit weight (mass) of the soils. Class F fly ash shall not be used except in combination with lime or cement.

If hydrated lime, quick lime, or cement are used, test results, recommendations, and a type A certification for the chemical modifiers, except for cement, shall be submitted to the Engineer prior to use. If fly ash, lime, lime by-products, or any combination of chemical modifiers are used, test results, recommendations, and type A certifications for the chemical modifiers shall be submitted to the Engineer and to the Materials and Tests Division for approval at least five business days prior to use. Cement, if used, shall be from the Department's list of approved Cement Sources.

The quantity of chemical modifier may be adjusted for different soil types. However, the source or type of chemical modifier shall not be changed during the progress of the work without approval. A change in source or type shall require a new mix design.

215.04 Storage and Handling

The chemical modifier shall be stored and handled in accordance with the manufacturer's recommendations.

215.05 Weather Limitations

The chemical soil modification shall be performed when the soil has a minimum temperature of 45°F (7°C), measured 4 in. (100 mm) below the surface, and with the air temperature rising. The chemical modifier shall not be mixed with frozen soils or with soil containing frost.

215.06 Preparation of Soils

The soils shall be prepared in accordance with 207.03. All aggregates which are larger than approximately 3 in. (75 mm) encountered before or after mixing the soils and chemical modifiers shall be removed.

215.07 Spreading of Chemical Modifiers

Where type A-6 or A-7 soils are used or encountered, the surface shall be scarified or disked to the specified depth prior to distribution of the chemical modifier. If a combination of modifiers are used, it shall be mixed mechanically prior to being incorporated. The chemical modifier shall be distributed uniformly by a cyclone, screw-type, or pressure manifold type distributor. The chemical modifier shall not be applied when wind conditions create problems in adjacent areas or create a hazard to traffic on any adjacent roadway. The spreading of the chemical modifier shall be limited to an amount which can be incorporated into the soil within the same work day. If weather causes stoppage of work or exposes the chemical modifier to washing or blowing, additional chemical modifier may be spread when the work resumes.

215.08 Mixing

The chemical modifier, soil, and water when necessary, shall be thoroughly mixed by rotary speed mixers or a disc harrow. The mixing shall continue until a homogenous layer of the required thickness has been obtained. One hundred percent of the material, exclusive of rock particles, shall pass a 1 in. (25 mm) sieve and at least 60% shall pass a No. 4 (4.75 mm) sieve. The mixing depth shall be 16 in. (400 mm).

215.09 Compaction

Compaction of the mixture shall begin as soon as practicable after mixing. Compaction after mixing shall be as follows:

(a) For cement modified soils, mixing shall be completed within 30 min of cement placement and compaction shall be completed within 3 h after mixing.

(b) Fly ash modified soils shall be compacted within 4 h.

(c) Lime modified soils shall be compacted within 24 h.

Compactive efforts shall be in accordance with 203 or 207.03 as applicable.

Maximum dry densities will be determined in accordance with AASHTO T 272 at the same time and location as each in-place density test is performed when in-place densities do not meet AASHTO T 99. The field in-place dry density shall be in accordance with AASHTO T 191 or AASHTO T 310.

The moisture content of the mixture shall be between the optimum moisture and the optimum moisture plus 2.0%. Aeration or drying by further mixing, or the addition of water and further mixing, may be required to obtain the optimum moisture content.

Construction traffic or equipment shall not be on the treated soils within 72 h after compaction.

215.10 Method of Measurement

The accepted quantity of chemically modified soils will be measured by the square yard (square meter), complete in place. All excavation required to modify the soils below the specified depth will be measured in accordance with 203.27(b).

215.11 Basis of Payment

The accepted quantity of chemically modified soils will be paid for by the square yard (square meter), complete in place. All excavation required to modify the soils below the specified depth will be paid for in accordance with 203.28.

Adjustment of materials for chemical modification that exceeds the limits of 215.03 will be included in a change order for materials only and paid for as chemical modifier adjustments. If mix design test results show that hydrated lime, quicklime, lime by-products, or fly ash are not appropriate and moisture density compaction can not be achieved, a price adjustment will be made for the use of cement. The price adjustment will be calculated at a cost equal to the difference in the invoice cost of the cement and

the invoice cost of the hydrated lime. This adjustment will be included in a change order and will be paid for as chemical modifier adjustments. Payment for chemical modifier adjustments will be made for direct material costs incurred by the Contractor and shall not include any other markups.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Chemical Modification, Soils	SYS (m2)

The cost of performing the laboratory tests, providing an approved geotechnical consultant, scarification of the subgrade, spreading and mixing of the chemical modifier and soil, compaction of the resultant mixture, shaping the subgrade, work required due to adjustments of modifier proportioning, additional modification required due to weather conditions, correction of deficient areas, water required for the modification process, modified subgrade trimming, and all operations needed to meet the requirements of this specification shall be included in the cost of the pay items of this section.

SECTION 216 – CELLULAR CONCRETE, CCF

216.01 Description

This work shall consist of furnishing and placing a light weight, low absorbability cellular concrete fill in accordance with 105.03.

MATERIALS

216.02 Materials

Materials shall be in accordance with the following:

Cement	901.01(b)
Fly Ash	901.02
Water	913.01

An admixture in accordance with 912.03 may be used as recommended by the CCF manufacturer.

A foam liquid concentrate in accordance with ASTM C 796 shall be used to produce the CCF properties in accordance with 216.04. The concentrate shall be chosen from those shown on the Department's list of approved CCF Manufacturers/Installers.

CONSTRUCTION REQUIREMENTS

216.03 Mix Design

A mix design prepared in accordance with the geotechnical report shall be submitted to the Materials and Tests Division for approval at least five work days before the CCF operations begin. A cellular concrete manufacturer shall be chosen from those shown on the Department's list of approved CCF Manufacturers/Installers.

216.04 Properties and Tests

The CCF shall be in accordance with the manufacturer's recommendations and the minimum physical properties as follows:

PROPERTIES	CLASS II	CLASS III	CLASS IV
Cast Density Mix	810 lb/cyd (480 kg/m^3)	972 lb/cyd (580 kg/m^3)	1134 lb/cyd (670 kg/m^3)
Minimum Compressive Strength, ASTM C 495*	40 psi (375 kPa)	80 psi (550 kPa)	120 psi (825 kPa)
Freeze-thaw resistance minimum at relative E = 70%, ASTM C 666 Modified		80 cycles	300 cycles
Water Absorption Maximum**	20%	16%	14%
Shear Modulus, G ASTM D 4015	25,000 psi (172 000 kPa)	34,000 psi (231 000 kPa)	
Young Modulus, E, ASTM D 4015	67,000 psi (469 000 kPa)	102,000 psi (772 000 kPa)	

* Specimens shall not be oven dried for the compressive strength test.

** Percentage after 120 days. Long term total immersion as a percent of cast density in accordance with ASTM C 796.

(a) CCF Cast Density

The density shall be monitored at the point of placement at hourly intervals during placement. Adjustments shall be made as necessary to maintain the specified cast density, ± 10%. If two consecutive test results are failing, operations shall cease and corrective action taken before placement of the CCF resumes.

(b) Foam Density

Foam density shall be tested twice during each 24 h period for each mixer. The foam density shall be within 10% of the target provided in the approved mix design.

216.05 Storage and Handling

Protection of the material during and after placement shall be in accordance with the manufacturer's recommendations.

216.06 Weather Limitations

CCF shall be placed when the ambient temperature is 32°F (0°C) or above. CCF shall not be placed on frozen subsoil. The installation procedure shall not begin if a temperature of less than 32°F (0°C) is expected within a 10 h period from the completion of the CCF placement, unless recommended by the manufacturer.

216.07 Preparation of Subgrade

The subgrade shall be prepared in accordance with 207. All standing water shall be removed prior to placement of CCF.

216.08 Installation

CCF shall be proportioned, mixed, and placed in lifts as recommended by the manufacturer. Transit mixers will not be acceptable for mixing the CCF. The CCF shall not be subjected to load nor disturbed by construction activities until a minimum compressive strength of 25 psi (175 kPa) has been achieved.

The final surface finish shall be within ± 0.1 ft (30 mm) of the plan elevation.

216.09 Lots

Lots will be defined as 300 cyd (250 m^3) of CCF placed. A partial lot equal to or less than 60 cyd (50 m^3) shall be included in the previous lot. A partial lot greater than 60 cyd (50 m^3) but less than 300 cyd (250 m^3), will be considered a full lot.

216.10 Testing

Acceptance of the work will be based on successful test results for compressive strength. The Contractor shall cast four specimens for each lot. Testing of the specimens will be in accordance with ASTM C 495, except test specimens shall be covered immediately after casting. The specimens shall be moist cured for 26 days and then air cured for two days prior to the compressive strength testing. The specimens shall not be oven dried. Test specimens will become the property of the Department after curing and will be tested at 28 days.

216.11 Method of Measurement

CCF will be measured by the cubic yard (cubic meter) for each class as computed from the neat lines shown on the plans, or as adjusted.

216.12 Basis of Payment

CCF will be paid for at the contract unit price per cubic yard (cubic meter) of the class specified.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Cellular Concrete Fill, _____ class	CYS (m3)

Water, curing, molds, equipment, materials, and other incidentals necessary for finishing CCF specimens shall be included in the cost of CCF.

No payment will be made for replacement of damaged CCF.