

PART 1 - GENERAL

1.01 SUMMARY:

- A. Section Includes: The work covered by this section consists of site clearing, grading, general and building excavation, disposal of debris and spoils, dewatering, preparation of subgrade, foundations, borrow, embankment, structural and general backfill, restoration, and cleanup necessary to construct the project, all as shown on the drawings and as specified herein.
- B. Related Sections: Drawings and General Provisions of the contract, including the General Covenants and Provisions, Supplementary Covenants and Provisions and General Requirements.
- C. Method of measurement: The quantity of fill material acceptably placed in the embankment will be measured and computed in cubic yards by the average end area method, to the nearest cubic yard.
 - 1. The soil preparation not otherwise included elsewhere will be inclusive.
- D. Basis for payment:
 - 1. Unit Price: If the work of this section is so designated to be paid, the Contractor will be paid the Contract Unit Price for the calculated quantity of material provided as shown on the Drawings and as specified herein.
 - a. Additional payments for increased quantities, labor or equipment usage will only be allowed if a change order is warranted due to a change in project scope or for unforeseen conditions, as determined by the Project Engineer, in accordance with the provisions of the General Conditions of the Contract.

1.02 QUALITY ASSURANCE:

- A. Codes and Standards: Perform all excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Safety: All excavation work and methods of construction shall conform to the State of Iowa Bureau of Labor and all OSHA Standards.

1.03 JOB CONDITIONS:

- A. Site information shown on the Drawings regarding existing conditions is of a general nature. Visit the site and be familiar with existing conditions.
- B. Observe weather conditions. Attempt no work in frozen conditions without the approval of the DNR Construction Inspector.

1.04 PROTECTION OF PERSONS AND PROPERTY:

- A. Protect from damage existing buildings, walks, paving, fencing, sod, and other items noted to remain. Maintain bench marks, monuments, property stakes, and other reference points.
- B. Protect existing underground utilities to remain. Notify the DNR Construction Inspector of underground utilities or structures encountered but not indicated on drawings.
 - 1. Contractor responsibilities: Correcting damage caused to existing construction, utilities, surfacing, and other items noted to remain at no additional expense to the Owner.
- C. Barricade open excavations occurring as part of this work and provide warning lights.

1.05 EXPLOSIVES:

- A. The use of explosives is not permitted.

PART 2 - PRODUCTS

2.01 GENERAL FILL AND EMBANKMENT MATERIAL:

- A. Materials to be incorporated in the top 12 inches of earth embankment or general fill shall be earthy materials, free from stones larger than 2 inches, broken concrete, roots, or other materials that would significantly affect scarifying, compacting and finishing the subgrade. It is anticipated that the majority of excavation material from the required excavation will be acceptable for this use. Obtain approval of fill material prior to any placement from the DNR Construction Inspector.

2.02 STRUCTURAL BACKFILL MATERIAL:

- A. Structural backfill material shall consist of a natural sand or a mixture of sand with gravel, crushed stone, or other broken fine material to fill all voids in coarser material. The maximum size of any gravel, stone, or broken or fragmented material shall be of such size that 100 percent passes a 6-inch sieve. The liquid limit of the material shall not be greater than 25 and the plasticity index shall not be more than 6. The portion of the material which passes a No. 4 sieve shall conform to the following requirements:

<u>Sieve Size</u>	<u>Percentage By Weight Passing</u>
No. 4	100
No. 40	Not more than 75
No. 100	Not more than 15
No. 200	Not more than 8

- B. The material shall be capable of being compacted to 95 percent maximum density without undue weaving and heaving as defined by ASTM D698, Method D.
- C. Obtain approval of fill material prior to any placement from the DNR Construction Inspector.

2.03 GRANULAR DRAINAGE FILL MATERIAL:

- A. Granular drainage fill for use under concrete slabs and walks where shown on the Drawings shall consist of granular, free--draining material, consisting of clean bank run gravel or crushed stone of full range of sizes. Maximum size of aggregate shall be 3/4 inch. 15 to 50% of that portion of weight of fill shall pass the No. 4 sieve.

2.04 TOPSOIL:

- A. Topsoil: Friable clay loam surface soil reasonably free of subsoil, clay lumps, stones and other objects over two inches in diameter, and without weeds, roots and other objectionable materials.

PART 3 - EXECUTION

3.01 SITE CLEARING:

- A. General: Remove vegetation, improvements, or obstructions interfering with installation of new construction. Removal includes digging out of stumps, roots, boulders and any other necessary items, the removal of which is not covered in the work of another section.
- B. Clearing and Grubbing: Clear site of trees, shrubs, and other vegetation, except those indicated or directed to be left standing.
 - 1. Completely remove stumps, roots, boulders and other debris protruding through the ground. Use only hand methods for grubbing inside drip line of trees indicated to be left standing.
 - 2. Depressions: Fill depressions caused by clearing and grubbing operations with satisfactory soil materials, unless further excavation work is required or indicated.
 - 3. Material for clearing and grubbing may be burned in accordance with IAC 567-23.2 and additional local ordinances. Unburned materials may be buried at locations designated by the Engineer.
 - 4. Material from clearing and grubbing may be processed by such means as chipping of logs, down timber or brush, for mulching material, or salvage of logs and down timber for firewood. Other vegetation may be disked into the existing ground surface. Field fence shall be removed from the project.

3.02 LAYING OUT WORK:

- A. Unless otherwise noted, DNR surveyor will locate new construction, set slope and grade stakes, and otherwise fully lay out work. Contractor will provide intermediate staking to maintain proper grades and control, check existing grades at site against grades or contours indicated on Drawings, and report any differences to Project Engineer before beginning of grading.
- B. Preserve stakes and markers. Replace at no cost to the Owner stakes or markers carelessly or willfully damaged by operations. Assume responsibility for accuracy of lines, grades, and dimensions.

3.03 STRIPPING AND SALVAGING OF TOPSOIL:

- A. Preparation: Mow or otherwise remove weeds, grass and other vegetation on entire area expected to be disturbed by the work of this section.
- B. Sod: Shred sod by shallow plowing, blading or disking throughout the entire area.
- C. Excavation of topsoil: Not required for this project.

3.04 DEWATERING:

- A. Dewatering System: Provide, maintain and operate sufficient well points, headers, pumps, trenches, and sumps to keep all excavations for structures free from water at all times. Submit proposal to the DNR Construction Inspector for review prior to construction.
- B. Surface Runoff: Grading shall be controlled around the excavation to prevent surface water from running into the excavations for the structure.
- C. Saturated Foundations: Prior to placing any concrete for foundations, remove soils in footing excavation that have become saturated with surface water.

3.05 EXCAVATION - GENERAL:

- A. General: General excavation consists of removal of materials of whatever nature, including boulders smaller than 1 cubic yard in volume, required for the construction of structures, roads, and walks. The method of excavating shall be at the Contractor's option, exercising great care to leave the final grade in an undisturbed condition. If final grade is disturbed, it shall be restored to requirements and to the satisfaction of the DNR Construction Inspector. Prior to placing any concrete for footings and foundation work, the Contractor shall notify the DNR Construction Inspector to inspect the excavation and shall obtain approval to proceed with the pour.
- B. Frozen Ground: Provide frost protection for all structural excavation work. Do not place concrete for foundation work on frozen ground.
- C. Protection of Existing Work: Protect existing work, including underground utilities and piping, from damage caused by excavation work. Repair any damage to existing work, utilities, or piping at Contractor's expense.
- D. Storage of Fill Materials: Store excavated fill material away from excavations to avoid slides. Deposit excess earth on site, where directed by DNR Construction Inspector.
- E. Removal of Unsuitable Materials: Cross-sectional dimensions and depths shown on Drawings shall be subject to such changes as may be found necessary by the DNR Construction Inspector to secure foundations free from soft, weathered, shattered and loose or other objectionable materials. Remove unsuitable material encountered and replace with granular materials from established pits satisfactory to the DNR Construction Inspector. Compact granular materials to at least 95 percent of maximum density.
 - 1. When the excavation of unsuitable materials and replacement with granular fill material directed by the DNR Construction Inspector is found to be above normal expectations, it

will be paid for at the unit prices listed in the Contractor's submitted cost breakdown. What constitutes normal expectations will be determined by the Project Engineer. The Project Engineer's decision will be final.

- F. Disposal of Excavated Materials: Materials free from sticks, roots, and other objectionable material may be used on site as directed by the DNR Construction Inspector.
 - 1. Remove excavated materials not suitable for fill as approved by Construction Inspector.

3.06 PLACEMENT OF EMBANKMENT MATERIAL:

- A. Deposit loose material in horizontal layers of not more than eight (8) inches in depth. Provide surface drainage of installed embankment material at all times during construction. Do not place embankment material on frozen ground nor use any frozen embankment material during construction.
- B. Smooth out deposited material to a uniform depth using suitable motor patrol, bulldozer, or self-propelled, tamping-type roller with blade attachment. Continue the initial smoothing and leveling during compaction to provide a surface free of ruts and other irregularities.
- C. Compaction: The desired compaction is to be obtained by the operation of an approved tamping type roller. Compaction will be considered in compliance with a minimum of one roller pass per inch depth of each lift, and continuing until the roller is supported on its tamping feet, as determined by the DNR Construction Inspector.
- D. Should a moisture problem be encountered in compaction of the material, the manipulation necessary to incorporate water or to dry the material shall be considered incidental to embankment construction.

3.07 STRUCTURAL EXCAVATION:

- A. Excavate to elevations and dimensions indicated on the Drawings; allow additional space as required for construction operations and inspection.
- B. Remove all existing construction encountered within the excavation to a depth of 6 inches below the indicated elevation of footings and subgrades to receive floor slabs, walks, and paving.
- C. If suitable bearing is not encountered at depth indicated on the Drawings for foundations, immediately notify the DNR Construction Inspector and do not proceed until instructions are given and necessary measurements made for the purpose of establishing additional volume of excavation.
- D. Excavate last 4 inches by hand, if machines are used for excavation.
- E. Fill with concrete, at Contractor's expense, unauthorized excavation carried below bottom of foundation levels shown.
- F. The DNR Construction Inspector will inspect and approve the bottoms of all excavations prior to concrete placement.

3.08 STRUCTURAL BACKFILL:

- A. Start backfill around foundations not less than 24 hours nor more than seven (7) days after application of waterproofing. Backfill walls and piers to approximately the same elevation on each side to equalize pressure.
- B. Compact structural backfill to same requirements as construction of embankments, Section 3.06.

3.09 PLACING BACKFILL ADJACENT TO WALLS AND FOOTINGS:

- A. Deposit fill on each side of piers, walls and free standing structures simultaneously to approximately the same elevation. Protect below grade waterproofing, dampproofing and insulation with a single thickness of 1/2" fiberboard, 1/8" asphalt impregnated board or other approved means. Place fill in workable condition, free of clods, frost, or debris, in 8" lifts, and thoroughly compact each lift with mechanical tamper.
- B. Do not operate heavy equipment for spreading and compacting backfill closer to any wall than a distance equal to the height of the backfill above the top of the footings. Backfill adjacent to walls shall be compacted to the same density as the adjacent fill with a small vibratory or hand tamping compactor.

3.10 PREPARATION OF EARTH SUBGRADE FOR CONCRETE:

- A. When excavating for footings or bottom mat slabs to be cast on native soil, excavate to final grade in a manner so as to not disturb the existing soil. If the soil is disturbed, compact it to the satisfaction of the DNR Construction Inspector. If the soil is not capable of compaction to the satisfaction of the DNR Construction Inspector, remove the disturbed material, and replace it with thoroughly compacted structural backfill material. Do not place concrete on surfaces that are muddy, frozen or contain frost. If during the course of construction, bottom surfaces become muddy or saturated with water, remove the undesirable material and replace with compacted structural backfill as indicated above.

3.11 PLACING PIPE IN FILL:

- A. When it is necessary to place pipe culverts, drain piping, or other appurtenances in general or structural backfill, bring the fill up to at least one foot above the top of the pipe or appurtenances. Do not leave areas of backfill depressed to allow for trenches. After the compacted fill is complete, excavate for the pipe or appurtenances. Backfill materials and compaction are to conform to the fill in which it is placed.

3.12 TRIMMING AND CLEAN UP:

- A. Final trimming and cleaning up shall consist of work as follows:
 - 1. Smooth out all irregularities, fill all washouts, make slopes uniform, slightly rounded at top and bottom, and compact the entire area of the fill to the required lines, grades and cross sections, within one-tenth foot (0.1) above or below the established grade.
 - 2. Where additional material is required, provide similar fill as the one used. Obtain such material from source approved by the DNR Construction Inspector.

3. When work is completed, remove and dispose of surplus material including stumps, trees and brush, and leave premises in a condition acceptable to the DNR Construction Inspector.

3.13 FINISH GRADING:

- A. After completion of rough grading, scarify areas to be seeded fertilized and mulched to a minimum depth of 4", as approved by the DNR Construction Inspector. Grade surfaces to eliminate water pockets or irregularities. Eliminate soil lumps and round off abrupt changes in slope. Spread excess earth on site as directed by DNR Construction Inspector. Topsoil removal, stockpiling, and deposit will not be required for this project.

3.14 SITE RESTORATION:

- A. All disturbed areas within the boundaries of this project (including borrow areas) not specifically receiving a finished surface are to be seeded in accordance with Section 02930.

END OF SECTION 02200

PART 1 - GENERAL

1.01 SUMMARY:

- A. Section Includes: The work covered by this Section consists of furnishing all material, labor and equipment necessary or required to do the trenching, backfilling and compacting needed for the proper and complete installation of underground utilities as shown on the Drawings.
- B. Related Sections: Drawings and General Provisions of the contract, including the General Covenants and Provisions, Supplementary Covenants and Provisions and General Requirements.

Section 02200 - Earthwork

1.02 QUALITY ASSURANCE:

- A. Qualifications: Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts, and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.
- C. Codes and Standards: Perform all work of this Section in compliance with applicable requirements of governing authorities having jurisdiction.
 - 1. In addition to complying with the pertinent codes and regulations of other governing agencies, comply with applicable requirements of Iowa Department of Natural Resources Authorized Technical Specifications for Water and Sewer Projects, latest edition.
- D. Safety: All trenching, excavating and methods of construction shall conform to the state of Iowa Bureau of Labor and all OSHA standards.
- E. Where conflicts arise between Contract Documents and Referenced Codes and Standards, the latter shall prevail, unless Contract Documents are more stringent.
 - 1. Bring all conflicts to the attention of the DNR Construction Inspector.

1.03 PROJECT/SITE CONDITIONS:

- A. Environmental Requirements:
 - 1. Protect existing trees and other vegetation indicated or as directed by DNR Construction Inspector to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling

construction materials or excavated materials within drip line, excess foot traffic or vehicular traffic, or parking of vehicles within drip line.

2. Provide temporary guards to protect trees and vegetation to be left standing.
3. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to the DNR Construction Inspector.

B. Existing Conditions:

1. Site information indicated on the Drawings regarding existing conditions, is of a general nature.
 - a. Visit the site and become familiar with existing conditions.
2. Observe weather conditions.
 - a. Attempt no work in frozen conditions without the approval of the DNR Construction Inspector.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Fill and Backfill Materials:

1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15 percent of the rocks or lumps larger than 2-3/8" in their greatest dimension.
2. Fill material is subject to the approval of the DNR Construction Inspector, and is that material removed from excavations or imported from off-site borrow areas, predominantly granular, nonexpansive soil free from roots and other deleterious matter.
3. Do not permit rocks having a dimension greater than 1" in the upper 12" of fill.
4. Cohesionless Material Used for Backfill: Provide sand free from organic material and other foreign matter, and approved by the DNR Construction Inspector.

- B. Provide other materials, not specifically described but required for a complete and proper installation, selected by the Contractor subject to the approval of the Project Engineer.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Protection of Persons and Property:

1. Barricade open holes and depressions occurring as part of the work, and post warning lights on property adjacent to or with public access.

2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.

B. Protection of Utilities:

1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to trenching.
 - a. If damaged, repair or replace at no additional cost to the Owner.
2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Project Engineer and secure instructions.
5. Do not proceed with permanent relocation of utilities until written instructions are received from the Project Engineer.

C. Dewatering:

1. Remove all water, including rain water, encountered during trench and sub-structure work to an approved location by pumps, drains, and other approved methods.
2. Keep trenches and site construction area free from water.

D. Dust Control: Use means necessary to prevent dust becoming a nuisance to the public, at neighbors, and to other work being performed on or near the site.

E. Maintain access to adjacent areas at all times.

3.02 TRENCHING:

- A. Provide sheeting and shoring necessary for protection of the work and for the safety of personnel.
1. Prior to backfilling, remove all sheeting.
 2. Do not permit sheeting to remain in the trenches except when, in the opinion of the DNR Construction Inspector, field conditions or the type of sheeting or methods of construction such as use of concrete bedding are such as to make removal of sheeting impracticable.

- a. In such cases, the Project Engineer, upon recommendation from the DNR Construction Inspector, may permit portions of sheeting to be cut off and remain in the trench.

B. Open Cut:

1. Excavate for utilities by open cut.
2. If conditions at the site prevent such open cut, and if approved by the Project Engineer, trenching may be used.
3. Short sections of a trench may be tunneled if, in the opinion of the Project Engineer, the conductor can be installed safely and backfill can be compacted properly into such tunnel.
4. Where it becomes necessary to excavate beyond the limits of normal excavation lines in order to remove boulders or other interfering objects, backfill the voids remaining after removal of the objects as directed by the DNR Construction Inspector.
5. When the void is below the subgrade for the utility bedding, use suitable earth materials and compact to the relative density directed by the DNR Construction Inspector, but in no case less than 90 percent.
6. When the void is in the side of the utility trench or open cut, use suitable earth or sand compacted or consolidated as approved by the DNR Construction Inspector, but in no case to a relative density less than 80 percent.
7. Remove boulders and other interfering objects, and backfill voids left by such removals, at no additional cost to the Owner.
8. Excavating for appurtenances:
 - a. Excavate for manholes and similar structures to a distance sufficient to leave at least 12" clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.
 - b. Overdepth excavation below such appurtenances, unless directed, will be considered unauthorized.
 - c. Fill unauthorized overdepth excavation with sand, gravel, or lean concrete as directed by the DNR Construction Inspector, and at no additional cost to the Owner.

C. Trench to the minimum width allowed for proper installation of the utility, with sides as nearly vertical as possible.

1. Accurately grade the bottom to provide uniform bearing for the utility.

D. Depressions:

1. Dig bell holes and depressions for joints after the trench has been graded.

- a. Provide uniform bearing for the pipe on prepared bottom of the trench.
 2. Except where rock is encountered, do not excavate below the depth indicated or specified.
 3. Where rock is encountered, excavate rock to a minimum overdepth of 4" below the trench depth indicated.
- E. Where utility runs traverse public property or are subject to governmental or utility company jurisdiction, provide depth, bedding, cover, and other requirements as set forth by legally constituted authority having jurisdiction, but in no case less than the depth shown in the Contract Documents.
- F. Where trenching occurs in existing lawns, remove turf in sections, keep damp and replace turf upon completion of the backfilling.
- G. Cover:
1. Provide minimum trench depth indicated below to maintain a minimum cover over the top of the installed item below the finish grade or subgrade:
 - a. Areas subject to vehicular traffic:
 - (1) Sanitary sewers: 48"
 - (2) Storm drains: 36"
 - b. Areas not subject to vehicular traffic:
 - (1) Sanitary sewers: 30"
 - (2) Storm drains: 18"
 - c. All areas:
 - (1) Water lines: 60"
 - (2) Natural gas lines: 24"
 - (3) Electrical cables: 42"
 - (4) Electrical ducts: 36"
 2. Where utilities are under a concrete structure slab or pavement, the minimum depth need only be sufficient to completely encase the conduit or pipe sleeve, and electrical long-radius rigid metal conduit riser, provided it will not interfere with the structural integrity of the slab or pavement.
 3. Where the minimum cover is not provided, encase the pipes in concrete as indicated.
 - a. Provide concrete with a minimum 28-day compressive strength of 3,000 psi.

3.03 BEDDING:

A. Provide bedding as indicated on the Drawings and as specified herein.

3.04 BACKFILLING:

A. General:

1. Do not completely backfill trenches until required pressure and leakage tests have been performed, and until the utilities systems as installed conform to the requirements specified in the pertinent Section of these Specifications.
2. Except as otherwise specified, or directed for special conditions, backfill trenches to the ground surface with selected material approved by the DNR Construction Inspector.
3. Re-open trenches which have been improperly backfilled, to a depth as required for proper compaction.
4. Refill and compact as specified, or otherwise correct to the approval of the DNR Construction Inspector.
5. Do not allow or cause any of the work performed or installed to be covered up or enclosed by work of this Section prior to required inspections, test, and approvals.
6. Should any of the work be so enclosed or covered up before it has been approved, uncover all such work and, after approvals have been made, refill and compact as specified, all at no additional cost to the Owner.

B. Lower Portion of Trench:

1. Deposit approved backfill and bedding material in layers of 6" maximum thickness, and compact with suitable tampers of the density of the adjacent soil, or grade as specified herein, until there is a cover of not less than 14" over sewers and 12" over other utility lines.
2. Take special care in backfilling and bedding operations not to damage pipe and pipe coatings.

C. Remainder of Trench:

1. Except for special materials for pavements, backfill the remainder of the trench with material free from stones larger than 6" or 1/2 the layered thickness, whichever is smaller, in any dimension.
2. Deposit backfill material in layers not exceeding the thickness specified, and compact each layer to the minimum density directed by the DNR Construction Inspector.

D. Adjacent to Buildings: Mechanically compact backfill within ten feet of buildings.

E. Consolidation of backfill by jetting with water may be permitted, when specifically approved by the DNR Construction Inspector, in areas other than building and pavement areas.

3.05 PIPE JACKING:

- A. Unless so or otherwise required, the Contractor may, at his option, install steel pipe casings, tongue-and-groove reinforced concrete pipes, and steel pipes under existing roads or pavements by jacking into place using procedures approved by the governmental agencies having jurisdiction and approved by the DNR Construction Inspector.

3.06 TUNNELING OPERATIONS:

- A. Unless so or otherwise required, the Contractor is allowed the option to tunnel pipes into position using procedures approved by the Project Engineer/DNR Construction Inspector and the governmental agencies having jurisdiction.

3.07 FIELD QUALITY CONTROL:

- A. Tests: Test for displacement of sewer and storm drains.
 - 1. Check sewers and storm drains to determine whether displacement has occurred after the trench has been backfilled to above the pipe and has been compacted as specified.
 - 2. Flash a light between manholes or, if the manholes have not yet been constructed, between the locations of the manholes, by means of a flashlight or by reflecting sunlight with a mirror.
 - 3. If the illuminated interior of the pipeline shows poor alignment, displaced pipes, or other defects, correct the defects to the specified conditions and at no additional cost to the Owner.
- B. Inspection: The DNR Construction Inspector will inspect and approve open cuts and trenches before installation of utilities, and the following:
 - 1. Assure that trenches are not backfilled until all tests have been completed.
 - 2. Check backfilling for proper layer thickness and compaction.
 - 3. Verify that test results conform to the specified requirements, and that sufficient tests are performed.
 - 4. Assure that defective work is removed and properly replaced.

END OF SECTION 02220

CLASS "D" AND "E" SLOPE PROTECTION AND EROSION CONTROL

PART 1 - GENERAL1.01 SUMMARY:

- A. Section includes: All material, labor and equipment necessary for the placement of riprap required for the protection of and to prevent soil erosion on designated slopes where shown on the drawings and as specified herein. Also included are material, labor and equipment necessary for soil and slope preparation as shown on the drawings not included elsewhere.
- B. Related Sections:
 - 1. Drawings and General Provisions of the contract, including the General Covenants and Provisions, Supplementary Covenants and Provisions and General Requirements.
- C. Method of measurement: All slope protection and erosion control will be delivered in tons. Weigh on accurate scales designed for weighing loaded trucks. Load vehicles to insure against loss of material between the scales and the point of delivery. No deduction will be made for the weight of moisture naturally occurring in the material. Material will not be deposited nor spread until the scale ticket is delivered to the DNR Construction Inspector and the weight of the material verified.
 - 1. The soil preparation not otherwise included elsewhere will be inclusive.
- D. Basis for payment:
 - 1. Unit Price: If the work of this section is so designated to be paid, the Contractor will be paid the Contract Unit Price for the calculated number of tons for each class of material provided as shown on the Drawings and as specified herein.
 - a. Additional payments for increased quantities, labor or equipment usage will only be allowed if a change order is warranted due to a change in project scope or for unforeseen conditions, as determined by the Project Engineer, in accordance with the provisions of the General Conditions of the Contract.

1.02 REFERENCES:

- A. Standards of materials and construction shall conform with the Standard Specifications for Highway and Bridge Construction, 2009 Series of the Iowa Department of Transportation.
 - 1. Section 4130 - Revetment Stone
- B. Where conflicts arise between the Drawings and Code Requirements, the latter shall prevail, unless Drawings are more stringent. Bring all conflicts to the attention of the Project Engineer and the DNR Construction Inspector.

1.03 SUBMITTALS:

- A. Samples: Submit, for verification purposes, samples of each type of material to be used in the work of this section, as requested by the DNR Construction Inspector.
- B. Weight tickets: Provide weight tickets for each truckload.
 - 1. Include the Contractor's name, date of delivery designation of mixture, load identification number, net weight of load and any other data which would aid in the identification of the load.
 - 2. Only weight tickets issued by a state licensed scale will be accepted.

1.04 QUALITY ASSURANCE:

- A. Qualification of Workers: Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the requirements and the methods needed for proper performance of the work of this section.

1.05 MATERIAL HANDLING:

- A. Class "D" Revetment Stone: Use a loading method which assures reasonable compliance with specified requirements and is acceptable to the DNR Construction Inspector. The DNR Construction Inspector will visually inspect material prior to loading and may reject material too fine or too coarse and require Contractor to load from another area.
- B. Class "E" Revetment Stone: Class "E" material shall be processed to the extent that most of the material 3 in. and less shall be removed.

1.06 PROJECT/SITE CONDITIONS:

- A. Existing Conditions: Survey job conditions prior to commencing work. Bring any discrepancies between existing conditions and the Drawings and Specifications to the attention of the Project Engineer/DNR Construction Inspector.
 - 1. Interface with existing conditions in accordance with the obvious intent of Drawings and Specifications. Claims for extra payments as a result of failure to examine existing conditions at the site will not be allowed.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Revetment Stone: Provide Revetment Stone (Riprap), where indicated on the drawings, meeting the requirements of IDOT Standard Specification Section 4130 for gradation shown and which when subjected to the freezing and thawing test of the IDOT Laboratory, Method 211, Method C, shall not lose more than 10% for stones crushed to 1-1/2" to 3/4"(nominal) for Class "D" revetment. Class "E" revetment shall not exceed 10% Method A. In addition the percentage of abrasion loss when tested in accordance to AASHTO T96 shall not exceed 50. Do not use material which split in layers less than 4-inches thick, when exposed to natural weathering regardless of the above tests results.

1. Class "D" and Class "E" revetment stone shall be taken from blasted rock or broken concrete. Class "D" material shall not require additional processing. After visual inspection and prior to loading, the engineer may designate material as too fine or too coarse and may require material to be loaded from another area. Class "E" material shall be processed to the extent that most of the material 3 in. and less shall be removed.

Revetment shall be well-graded material with a nominal top size of 250 lb.* and meeting the following additional size limitations.

<u>Stone Weight</u>	<u>Minimum % Larger Than Stone Weight</u>
90 lb	50
5 lb	90

*Note: The Engineer may approve using riprap containing material larger than 250 lb.

- B. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Project Engineer.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION:

- A. Surface Preparation: Begin with trench excavations to the elevations shown on the Drawings. Shape and dress the slope to be protected so that the revetment surface will be in compliance with the lines and grades shown on the Drawings.
 1. To control placement provide a grid system designating those areas shown on the Drawings to receive stone protection.
 2. The DNR Inspector will inspect the prepared base directly prior to placement of revetment.

3.03 APPLICATION:

- A. Special Techniques: Spot loads and distribute over the surface marked in grid. Do not place any material until prepared base has been accepted by the DNR Construction Inspector.
- B. Place stone riprap to produce a reasonably well-graded mass of stone with the minimum practicable percentage of voids and in full course thickness in one operation.
 1. Distribute the largest stones so that the entire mass conforms approximately to the gradation specified.

2. Where necessary, allow some roughness in surface to break up wave action and decrease the velocity of the mass while keeping the mass fairly compact with all sizes of material in proper proportions.
 3. Hand place or rearrange individual stones with mechanical equipment as necessary to secure results as specified.
- C. Tolerances: Control distribution based on the assumed density of 100 lbs per cubic foot and the actual weights delivered.

END OF SECTION 02270

PART 1 - GENERAL

1.01 SUMMARY:

- A. Section Includes: The work covered by this section consists of furnishing all materials, labor, and equipment necessary or required to install engineering fabric as shown on the Drawings and as specified herein.
- B. Related Sections: Drawings and General Provisions of the contract, including the General Covenants and Provisions, Supplementary Covenants and Provisions and General Requirements as well as, but not necessarily limited to, the following:
 - Section 02200 - Earthwork
 - Section 02270 - Slope Protection and Erosion Control
- C. Measurement: Measure the quantity of material installed, to the nearest square yard.
- D. Method of Payment:
 - 1. Contract Unit Price: When payment for the work of this section is so designated, the contractor will be paid the Contract Unit price per square yard.
 - a. In the event that the estimated quantity is larger than the quantity provided, pay the Owner a deduct for the difference in cost for both quantity and labor.
 - b. Additional payments for increased quantities or labor will only be allowed if a change order is warranted due to a change in project scope or for unforeseen conditions, as determined by the Project Engineer, in accordance with the provisions of the General Conditions of the Contract.
 - 3. The Owner will make no additional payments for additional material or labor to correct deficiencies, shortages, or mistakes by the Contractor.

1.02 REFERENCES:

- A. Standards of materials and construction shall conform with the Standard Specifications for Highway and Bridge Construction, Series of 2009, of the Iowa Department of Transportation.

1.03 CONTROL OF MATERIALS:

- A. General: Use materials as specified in this section, tested and approved for use by the DNR Construction Inspector in accordance with the applicable portions of 2009 Series, IDOT Section 4196.
- B. Field Testing: Testing of materials and workmanship will continue throughout the project as conducted by the DNR Construction Inspector. Cooperate in these tests in any way needed to obtain the required data and samples.

- C. Unacceptable materials: Unacceptable materials will be rejected in accordance with 2009 Series, IDOT Section 1106.04.

1.05 JOB CONDITIONS:

- A. Review job conditions prior to commencing work. Bring any discrepancies between existing work and the Drawings and Specifications to the attention of the Project Engineer/ DNR Construction Inspector.
- B. Observe weather conditions. Attempt no work in frozen conditions without written approval from the DNR Construction Inspector.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Provide material in accordance with 2009 Series, IDOT Standard Specifications Section 4196.
- B. Engineering Fabric: Provide engineering fabric of a nonwoven synthetic material formed into a stable network such that the filaments or yarns retain their relative position to each other. The material shall be mildew, rot, insect, and rodent resistant and shall be inert to commonly encountered chemicals found in soil. During all periods of shipment and storage, the fabric shall be maintained, wrapped in a heavy-duty protective covering to protect the fabric from direct sunlight, ultraviolet rays, mud, dirt, dust, and debris. The material shall be free of defects or flaws which significantly affect it's physical properties. A competent laboratory must be maintained by the producer of the fabric at the point of manufacture to ensure quality control. Each roll of fabric in the shipment is to be labeled with a number or symbol to identify that particular production run.

- 1. Fabric for use under riprap will be capable of withstanding normal installation stresses and have the following minimum properties:

<u>Property</u>	<u>Value</u>	<u>Test Method</u>
A. Grab strength, dry; lb.	150	ASTM D-4632
B. Elongation, dry; %	20	ASTM D-4632
C. Water permeability, K;0.02 - 0.30	ASTM D-4491
D. Apparent opening size	40	ASTM D-4751

PART 3- EXECUTION

3.01 GENERAL:

- A. Accomplish the work of this section in accordance with the applicable portions of the 2009 Series, IDOT Standard Specifications for Highway and Bridge Construction.

3.02 PREPARATION OF SUBGRADE:

- A. Shape subgrade prior to starting the work of this section, as directed by the DNR Construction Inspector, and as recommended by the fabric manufacturer.
- B. Install fabric according to the details in the Drawings and according to the manufacturers recommendations.

3.03 CLEAN UP:

- A. Upon completion of construction, remove all excess materials and construction debris, and restore any damage done to existing buildings or landscape.

END OF SECTION 02272

PART 1 - GENERAL

1.01 SUMMARY:

- A. Section Includes: The work covered by this section consists of furnishing all materials, labor, and equipment necessary or required to install silt fence as shown on the Drawings and as specified herein.
- B. Related Sections: Drawings and General Provisions of the contract, including the General Covenants and Provisions, Supplementary Covenants and Provisions and General Requirements as well as, but not necessarily limited to, the following:

Section 02200 - Earthwork
Section 02270 - Slope Protection and Erosion Control

- C. Measurement: Measure the quantity of material installed, to the nearest lineal foot.
- D. Method of Payment:
 - 1. Contract Unit Price: When payment for the work of this section will be so designated, the contractor will be paid the Contract Unit price per lineal foot.
 - a. Additional payments for increased quantities or labor will only be allowed if a change order is warranted due to a change in project scope or for unforeseen conditions, as determined by the Project Engineer, in accordance with the provisions of the General Conditions of the Contract.
 - 2. The Owner will make no additional payments for additional material or labor to correct deficiencies, shortages, or mistakes by the Contractor.

1.02 REFERENCES:

- A. Standards of materials and construction will conform to the Standard Specifications for Highway and Bridge Construction, Series of 2009, of the Iowa Department of Transportation.

1.03 CONTROL OF MATERIALS:

- A. General: Use materials as specified in this section, tested and approved for use by the DNR Construction Inspector in accordance with the applicable portions of 2009 Series, IDOT Section 4196.
- B. Samples and Tests: Submit samples of materials to the DNR Construction Inspector in advance of the anticipated use to avoid construction delays.
 - 1. Submit samples and tests in accordance with Section 01300 of these Specifications.

- C. Field Testing: Testing of materials and workmanship will continue throughout the project as conducted by the DNR Construction Inspector.
 - 1. Cooperate in these tests in any way needed to obtain the required data and samples.
- D. Unacceptable materials: Unacceptable materials will be rejected in accordance with 2009 Series, IDOT Section 1106.04.

1.05 JOB CONDITIONS:

- A. Review job conditions prior to commencing work. Bring any discrepancies between existing work and the Drawings and Specifications to the attention of the Project Engineer/DNR Construction Inspector.
- B. Observe weather conditions. Attempt no work in frozen conditions without written approval from the DNR Construction Inspector.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Silt Fence Fabric: Provide silt fence fabric of a woven synthetic material formed into a stable network such that the filaments or yarns retain their relative position to each other. The material shall be mildew, rot, insect, and rodent resistant and shall be inert to commonly encountered chemicals found in soil. During all periods of shipment and storage, the fabric shall be maintained, wrapped in a heavy-duty protective covering to protect the fabric from direct sunlight, ultraviolet rays, mud, dirt, dust, and debris. The material shall be free of defects or flaws which significantly affect it's physical properties. A competent laboratory must be maintained by the producer of the fabric at the point of manufacture to ensure quality control. Each roll of fabric in the shipment will be labeled with a number or symbol to identify that production run.

- 1. Fabric for use as silt fence will be capable of withstanding normal installation stresses and have the following properties:

<u>Property</u>	<u>Value</u>	<u>Test Method</u>
a. Grab strength, wet; lb.	100 Min.	ASTM D 1682
b. Grab strength, ; lb.	100 Min.	ASTM D 1682
c. Grab strength,lb., after 500 hr. in a Q-U-V Weatherometer with a cycle of 16 hrs. ultraviolet @ 55C and 8 hrs. condensation @ 45C:	35 Min.	ASTM D 1682
d. Filtering Efficiency, % :	50 Min.	Iowa 909
e. Flow time, minutes :	15 Max.	Iowa 909

PART 3- EXECUTION

3.01 GENERAL:

- A. Accomplish the work of this section in accordance with these Specifications and IDOT Standard Road Plan RC-16, as directed by the DNR Construction Inspector.

3.02 INSTALLATION OF SILT FABRIC:

- A. Temporary siltation control measures are to be placed at locations shown on the Drawings or as directed by the Inspector; at locations where conditions develop during construction that were unforeseen during design; or where needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.
 - 1. It is intended that siltation control features be maintained in appropriate functional condition from initial construction through project completion. Where siltation control features have been reduced in capacity by 50% or more, Contractor will restore such features to their original condition with a minimum of delay and as approved by the Engineer.
 - 2. Such restoration of silt fence erosion control features will not be paid for separately, but will be considered incidental to the Contract Unit Price for Silt Fence.

3.03 CLEAN UP:

- A. Upon completion of construction, remove all excess materials and construction debris, and restore any damage done to existing buildings or landscape.

END OF SECTION 02273

PART 1 - GENERAL

1.01 SUMMARY:

- A. Section Includes: The work covered by this section consists of furnishing all materials, labor, and equipment necessary or required to do the grading, placing and compacting of granular base materials as shown on the Drawings and as specified herein.
- B. Related Sections: Drawings and General Provisions of the contract, including the General Covenants and Provisions, Supplementary Covenants and Provisions and General Requirements as well as, but not necessarily limited to, the following:

Section 02200A - Earthwork With M & D Compaction

- C. Measurement: Measure the quantity of material delivered in tons.
 - 1. Weigh on accurate scales designed for weighing loaded trucks.
 - 2. Load vehicles to insure against loss of material between the scales and the point of delivery.
 - 3. No deductions will be made for the weight of moisture naturally occurring in the material.
 - 4. Material will not be deposited and spread until the scale weight ticket is delivered to the DNR Construction Inspector and the weight of material verified.
 - a. Include the Contractor's name, date of delivery, designation of mixture, load identification number, gross, tare, and net weights of load and any other data which would aid in the identification of the load.
 - b. Only weight tickets issued by a state licensed scale will be accepted.
- D. Method of Payments:
 - 1. Contract Unit Price: When payment for the work of this section is so designated, the Contractor will be paid the Contract Unit price per ton.
 - a. Material will not be deposited and spread until the scale weight ticket is delivered to the inspector and the weight of material verified.

- b. In the event that the estimated quantity is larger than the quantity provided, pay the Owner a deduct for the difference in cost for both quantity and labor.
 - c. Additional payments for increased quantities or labor will only be allowed if a change order is warranted due to a change in project scope or for unforeseen conditions, as determined by the Project Engineer, in accordance with the provision of the General Conditions of the Contract.
 2. Lump Sum Payment: If this method of payment is so designated, the Contract Documents provide for payment of a lump sum bid amount for the entire project, part of which is the work of this contract, or a lump sum payment for the work of this section as indicated.
 - a. The quantity of material provided will be verified by scale tickets and compared to the estimated quantity provided as part of the Contractor's Price Breakdown.
 - b. In the event that the estimated quantity is larger than the quantity provided, the Contractor shall pay the Owner a deduct for the difference in cost for both quantity and labor.
 - c. Additional payments for increased quantities or labor will only be allowed if a change order is warranted due to a change in project scope or for unforeseen situations, as determined by the Project Engineer, warranting additional material and labor to accomplish the original work of this section.
 3. The Owner will make no additional payments for additional material or labor to correct deficiencies, shortages or mistakes by the Contractor.

1.02 REFERENCES:

- A. Standards of materials and construction shall conform with the Standard Specifications for Highway and Bridge Construction, Series of 2009 of the Iowa Department of Transportation:

Section 1106 - Control of Material
Section 2111 - Granular Subbase
Section 4109 - Aggregate Gradation
Section 4121 - Granular Subbase Material

1.03 CONTROL OF MATERIALS:

- A. General: Use only materials as specified for this section and tested and approved for use by the DNR Construction Inspector in accordance with the applicable portions of 2009 Series, I.D.O.T. Section 1106.
- B. Samples and Tests: Submit samples of materials to be used to the DNR Construction Inspector in advance of anticipated use to avoid construction delays.
 - 1. Test and inspect and obtain approval of the DNR for each consignment of material before it is incorporated in the work.
 - 2. Unless otherwise designated elsewhere provide samples, and tests, and apply a basis for acceptance in accordance with the current AASHTO "Standard Specifications for Transportation, Material and Methods of Sampling and Testing" including published interim standards.
- C. Field Testing: Testing of materials and workmanship will continue throughout the project as conducted by the DNR Construction Inspector.
 - 1. Cooperate in these tests in any way needed to obtain the required data and samples.
- D. Unacceptable Materials: Unacceptable materials will be rejected as follows:
 - 1. The DNR field inspector will consider unacceptable and reject any material not conforming to the specified requirements.
 - 2. The DNR Inspector will also reject previously accepted material, delivered to the site, which have become damaged before actual incorporation into the work.
 - 3. Promptly remove from the site all rejected material.
 - 4. Unless otherwise authorized by the Project Engineer, do not incorporate corrected rejected material into the work.

1.05 JOB CONDITIONS:

- A. Survey job conditions prior to commencing work.
 - 1. Bring any discrepancies between existing work and the Drawings and Specifications to the attention of the Project Engineer/DNR Construction Inspector.
- B. Observe weather conditions.

1. Attempt no work in frozen conditions without written approval from the DNR Construction Inspector.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Provide material in accordance with 2009 Series, IDOT Standard Specifications Section 4121.
- B. Class A Crushed Stone: Provide Class A crushed stone consisting of a uniform mixture of coarse and fine particles produced by crushing ledge rock, predominantly limestone, dolomite, or quartzite.
 1. Provide material meeting the requirement of IDOT Standard Specifications Section 4121 for gradation number 11 with a maximum of 4 percent mud balls and a minimum of 4 percent passing No. 200 sieve.
 2. The percentage of wear when tested in accordance with AASHTO T96, grading B, shall not exceed 45.
 3. Gradation: Provide material, which when tested, will meet the requirements of IDOT gradation No. 11 as follows:

<u>% Passing</u>	<u>Sieve Size</u>
100	1 inch
97-100	3/4 inch
30-75	No. 4
15-45	No. 8
6-16	No. 200

PART 3 - EXECUTION

3.1 GENERAL:

- A. Accomplish the work of this section in accordance with the applicable portions of the 2009 Series, IDOT Standard Specification for Highway and Bridge Construction.

3.02 PREPARATION OF SUBGRADE:

- A. Preparation and correction of Subgrade: Conform to 2009 Series, I.D.O.T. Section 2111.

1. Blade loose granular material present on the roadbed into windrow and store on the shoulder area, then correct the subgrade to required profile and cross section.
 - a. Wet and consolidate material moved in this operation so that the subgrade on which the next course is placed is smooth, firm, compacted earth.
2. Profile and Cross section requirements:
 - a. Check the cross section with an accurate template extending at least halfway across the width of the subgrade and correct deviations of more than one (1) inch from the template.
 - b. Remove dips or humps from profile to provide a good riding surface.

3.03 PLACING OF CRUSHED STONE COURSE:

- A. Construct base course using crushed rock top course material as defined by IDOT 2009 Series. Place the course in accordance with applicable sections of the IDOT Standard Specifications for Granular Surfacing, Standard Compaction as defined by the IDOT Standard Specifications.

3.05 CLEAN UP:

- A. Upon completion of construction, remove all excess materials and construction debris, and restore any damage done to existing buildings or landscape.

END OF SECTION 02505

PART 1 - GENERAL

1.01 SUMMARY:

- A. Section Includes: The work covered by this section consists of furnishing all materials, labor, and equipment necessary or required to install pipe culverts as shown on the Drawings and as specified herein.
- B. Related Sections: Drawings and General Provisions of the contract, including the General Covenants and Provisions, Supplementary Covenants and Provisions and General Requirements.
- C. Measurement: Measure the quantity of material installed, to the nearest lineal foot for pipe culverts, and per each unit for pipe aprons.
- D. Method of Payment:
 - 1. Contract Unit Price: When payment for the work of this section is so designated, the contractor will be paid the Contract Unit price per lineal foot for culvert pipe, and per each for pipe aprons.
 - a. Additional payments for increased quantities or labor will only be allowed if a change order is warranted due to a change in project scope or for unforeseen conditions, as determined by the Project Engineer, in accordance with the provisions of the General Conditions of the Contract.
 - b. No extra payment will be made for required strutting incidental to price bid for CMP structure.
 - c. No additional payment will be made for items of work required by the DNR Construction Inspector to accomplish the intent of the contract and normally expected to accomplish a complete and proper project.
 - 2. The Owner will make no additional payments for additional material or labor to correct deficiencies, shortages, or mistakes by the Contractor.

1.02 REFERENCES:

- A. Standards of materials and construction will conform to the Standard Specifications for Highway and Bridge Construction, Series of 2009, of the Iowa Department of Transportation.

1.03 SUBMITTALS:

- A. Samples and Tests: Submit samples of materials to the DNR Construction Inspector in advance of the anticipated use to avoid construction delays.
 - 1. Submit samples and tests in accordance with Section 01300 of these Specifications if applicable.

1.04 QUALITY ASSURANCE:

- A. General: Use materials as specified in this section, tested and approved for use by the DNR Construction Inspector in accordance with the applicable portions of 2009 Series, IDOT Section 4153.05.
- B. Field Testing: Testing of materials and workmanship will continue throughout the project as conducted by the DNR Construction Inspector.
 - 1. Cooperate in these tests in any way needed to obtain the required data and samples.
- D. Unacceptable materials: Unacceptable materials will be rejected in accordance with 2009 Series, IDOT Section 1106.04.

1.05 JOB/SITE CONDITIONS:

- A. Review conditions prior to commencing work.
 - 1. Bring any discrepancies between existing work and the Drawings and Specifications to the attention of the Project Engineer/DNR Construction Inspector.
- B. Observe weather conditions.
 - 1. Attempt no work in frozen conditions without written approval from the DNR Construction Inspector.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Welded Seam Circular Steel Culvert Pipe: Unless otherwise specified, standard weight black pipe meeting requirements of ASTM A 53, Grade B to be furnished for this project.

PART 3- EXECUTION

3.01 EXAMINATION:

- A. Examine the areas and conditions under which work of this section will be performed.
- B. Correct conditions detrimental to timely and proper completion of the work.
- C. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION OF PIPE CULVERTS BY JACKING:

- A. Pipe installation:

1. Begin pipe placement from lowest point in proposed pipe line where possible.
2. Pipe with bell and spigot ends will be placed with bell end of pipe pointing upgrade where possible.
3. Pipe is to be placed uniformly to line and grade so finished culvert will present uniform bore.
4. Pipe jacking is to be accomplished in accordance with the applicable portions of 2009 Series, IDOT Section 2418, and as directed by the Inspector.

3.03 COMPACTION OF PIPE CULVERTS:

- A. Compaction around pipe culverts is to be accomplished as specified in Section 02200 of these Specifications.
- B. In addition to compaction requirements, provide for timber strutting of CMP structures for those structures above 48" diameter to prevent damage or distortion of the structure, at no extra cost to the owner.
 1. Timber strutting of structures to be as approved by the IDNR Construction Inspector.

3.03 CLEAN UP:

- A. Upon completion of construction, remove all excess materials and construction debris, and restore any damage done to existing buildings or landscape.

END OF SECTION 02721

PART 1 - GENERAL

1.01 SUMMARY:

- A. Section Includes: The work covered by this section consists of furnishing all materials, labor, and equipment necessary or required to install stream gages as shown on the Drawings and as specified herein.
- B. Related Sections: Drawings and General Provisions of the contract, including the General Covenants and Provisions, Supplementary Covenants and Provisions and General Requirements.
- C. Method of Payment:
 - 1. Staff style stream gages will not be paid for separately, but will be considered incidental to the price bid for the structure in which they are placed.
 - a. No additional payment will be made for items of work required by the DNR Construction Inspector to accomplish the intent of the contract and normally expected to accomplish a complete and proper project.
 - 2. The Owner will make no additional payments for additional material or labor to correct deficiencies, shortages, or mistakes by the Contractor.

1.02 REFERENCES:

- A. Standards of materials and construction will conform to the Standard Specifications for Highway and Bridge Construction, Series of 2009, of the Iowa Department of Transportation.

1.03 SUBMITTALS:

- A. Samples and Tests: Submit samples of materials to the DNR Construction Inspector in advance of the anticipated use to avoid construction delays.
 - 1. Submit samples and tests in accordance with Section 01300 of these Specifications, if applicable.

1.04 QUALITY ASSURANCE:

- A. General: Use materials as specified in this section, tested and approved for use by the DNR Construction Inspector in accordance with the applicable portions of 2009 Series, IDOT Standard Specifications.

1.05 JOB/SITE CONDITIONS:

- A. Review conditions prior to commencing work.
 - 1. Bring any discrepancies between existing work and the Drawings and Specifications to the attention of the Project Engineer/DNR Construction Inspector.
- B. Observe weather conditions.
 - 1. Attempt no work in frozen conditions without written approval from the DNR Construction Inspector.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Staff Type Stream Gages: Gages shall be as manufactured by Steven's Water Resources Products, P.O. Box 688, Beaverton, Oregon 97075; telephone 503/646-9171, or approved equal.
 - 1. Style "C" gages shall be assembled from two 3 1/2 foot length sections of M.S.L. elevation numbered scale as required by the Plans. Fasten gage sections to 3" x 3/8" steel mounting base plates that have been tack-welded to the riser section of the Control Structure.
 - a. The base plates shall be hot-dip galvanized or otherwise protected from corrosion by an approved method. Gage fasteners shall be round head self-tapping corrosion-resistant screws.

PART 3- EXECUTION

3.01 EXAMINATION:

- A. Examine the areas and conditions under which work of this section will be performed.
- B. Correct conditions detrimental to timely and proper completion of the work.
- C. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION OF STAFF TYPE STREAM GAGES:

- A. Gage installation:
 - 1. Placement of stream gages to be as shown on the Plans or as modified when necessary by the DNR Construction Inspector.

3.03 CLEAN UP:

- A. Upon completion of construction, remove all excess materials and construction debris, and restore any damage done to existing buildings or landscape.

END OF SECTION 02722

PART 1 - GENERAL

1.01 SUMMARY:

- A. Section Includes: Seedbed preparation and application of seed mixtures and fertilizer to all areas designated on the Drawings or all areas within the boundaries of this project having been disturbed by works of this project and not receiving finished surfacing, as determined by the DNR Construction Inspector and as specified herein.
- B. Related Sections: Drawings and General Provisions of the Contract, including the General Covenants and Provisions, Supplementary Covenants and Provisions and General Requirements as well as, but not necessarily limited to, the following:

Section 02200 - Earthwork

1.02 REFERENCES:

- A. Standards of materials and construction shall conform to the Standard Specifications for Highway and Bridge Construction, 2009 Series of the Iowa Department of Transportation.

1.03 QUALITY ASSURANCE:

- A. Codes and Standards: Perform all work of this section in accordance with the requirements of the "Standard Specifications" 2009 I.D.O.T. Section 2601.

1.04 PROJECT/SITE CONDITIONS:

- A. Environmental Requirement:
 - 1. Weather conditions shall be observed. Seeding shall be performed only during normal application periods, optimum temperature, moisture and climatic condition to promote germination and plan growth. Normal application periods are between March 1 and May 31 and between August 10 and September 30.
- B. Existing Conditions: Survey job conditions prior to commencing work. Bring any discrepancies between existing work and the Drawings and Specifications to the attention of the Project Engineer/DNR Construction Inspector.

1.05 SEQUENCING AND SCHEDULING:

- A. Properly coordinate the work of this section with all other trades.
- B. Do not start the work of this section until the work of all other trades has been completed unless otherwise approved by the DNR Construction Inspector.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. All topsoil used for seedbed shall be in accordance with Section 02200.
- B. All seeds shall be "redtag" quality or better supplied from the latest available crop, free of noxious weed seed and supplied in the following varieties and percentages of weight.
- C. Provide mixture of types and quantities as specified herein for seeding of areas designated by the Project Engineer, the DNR Construction Inspector as indicated on the Drawings, and as specified herein.

- 1. Class "A" Mixture: For areas to remain in semi-natural state where mowing is required only as a temporary control measure.

Fescue, Kentucky 31 25 lbs. per acre
Switchgrass (Blackwell) 8 lbs. per acre
Alfalfa (Northern Grown) 5 lbs. per acre
Birdfoot Trefoil (Empire) 4 lbs. per acre
Alsike Clover 4 lbs. per acre

- 2. Class "B" Mixture: For same situation as where Class "A" mixture is used but where a lighter mix is preferable.

Fescue, Kentucky 31 20 lbs. per acre
Switchgrass (Blackwell) 3 lbs. per acre
Alfalfa (Northern Grown) 4 lbs. per acre
Birdfoot Trefoil (Empire) 4 lbs. per acre
Alsike Clover 4 lbs. per acre

- 3. Class "C" Mixture: For area designated as fine seeded, lawns or other mowed grass areas.

Bluegrass, Kentucky 70%
Ryegrass, Perennial, Fineleaf 10%
Fescue Creeping Red 20%

- 4. Class "D" Mixture: For all areas, unless otherwise specified, where a prairie grass in natural state is required.

- Big Bluestem 30 lbs. per acre
- Switchgrass (Blackwell) 5 lbs. per acre
- Sideoats Grama 5 lbs. per acre
- Little Bluestem 5 lbs. per acre

- D. Seed is to be delivered on site in separate packaging for each individual type of seed within each mixture and mixed in the presence of the DNR Construction Inspector if required. Commercial mixture in the quantities as specified will be acceptable at the discretion of the DNR Construction Inspector, if these quantities are verifiable.

E. Seed mixture for this project to be Class "A" mixture.

2.02 FUNGICIDE:

- A. All seeds for permanent seeding shall be treated with a non-mercurial fungicide (75% concentration or equivalent) at the rate of 5-1/2 ounces per 100 pounds of seed.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.02 SEEDBED PREPARATION:

- A. The area to be seeded shall be raked or graded to fill washes or gullies. Pick up and dispose of all debris, including stones, boulders, logs, stumps, or other foreign material that will interfere with the seeding operation.

3.03 FERTILIZER APPLICATION:

- A. Spread fertilizer over the area at the rate of 750 pounds per acre of 15-15-15 (or equivalent).
- B. Unless otherwise indicated, spread all fertilizer with a mechanical spreader, which will secure a uniform rate of application.
- C. Spread fertilizer after the preliminary preparation of seedbed and prior to the sowing of any seeds.

- D. Disk the fertilizer and roll the area prior to seeding.
- E. On area inaccessible to field machinery, spread fertilizer after preparation of the seedbed and thoroughly rake into the soil.
- F. Application of fertilizer in combination with seeding by hydraulic seeder as specified in I.D.O.T. Section 2601.04H will be acceptable at the discretion of the DNR Construction Inspector.

3.04 SEED APPLICATION:

- A. Preparation: Mix all seeds specified for this project thoroughly at the project site prior to placing in spreading equipment.
- B. On all areas accessible to field machinery, all grass seeds may be sown with a gravity, cyclone or hydraulic seeder as specified herein. On areas inaccessible to field machinery, the use of hand-cyclone seeder will be permitted.
- C. Apply seed mixture at a rate of four pounds per 1,000 square feet, unless otherwise indicated, during fair, calm weather. One half of the seed mixture shall be sown in one direction and the remainder at right angles to the first sowing.

3.05 SEED APPLICATION IN MAINTAINED LAWNS:

- A. For maintained lawns to be seeded as part of this project, apply fertilizer prior to preparation of the seedbed.
- B. A rotary tiller will be required for preparation of the seedbed. The seedbed after tilling will be raked firm, smooth and free of clods, rocks and other debris.
- C. Roll the seedbed shall both before and after the application of seeds. Apply seeds over damp soil by broadcast seeding.
- D. Roll, seed, and fertilize by hand or with hand operated equipment in areas inaccessible to field equipment.

3.06 SPRING OVERSEEDING:

- A. Seedbed preparation will not be required provided the overseeding is applied when the ground is free from frost action after March 1 and before April 1 or as directed by the DNR Construction Inspector.

3.07 MOWING:

- A. When requested by the DNR Construction Inspector, mowing may be required prior to permanent seeding or anytime during the growing season.

3.08 MULCHING:

- A. All seeded areas are to be mulched unless otherwise designated in the contract documents.
- B. All areas requiring mulch are to be mulched as soon as seed is sown and final rolling is completed.
- C. Mulch is to be evenly and uniformly distributed and anchored into the soil. The application rate for reasonably dry material shall be approximately 1-1/2 tons of dry cereal straw, 2 tons of wood excelsior, or 2 tons of prairie hay per acre, or other approved material, depending on the type of material furnished.
 - 1. All accessible mulched areas are to have mulch consolidated into the soil with a mulch stabilizer, and slope areas are to be tacked on the contour.
 - 2. Crawler type or dual wheel tractors are to be used for the mulching operation. Equipment is to be operated in a manner to minimize displacement of the soil and disturbances of the design cross section.

END OF SECTION 02930