

TECHNICAL SPECIFICATIONS
 FOR
CORNELL DITCH, ZAKUTANSKY ARM
DRAIN TILE RECONSTRUCTION

PORTER CO. DEPARTMENT OF DEVELOPMENT & STORMWATER MANAGEMENT
 NOVEMBER 19, 2018

The following Technical Specifications shall apply to and govern the project designated as **Cornell Ditch, Zakutansky Arm – Drain Tile Reconstruction**. Such Technical Specifications supplement the specifications contained in the documents listed in the table below and, in case of conflict with any part or parts of said specifications, the Engineer shall determine which specifications shall take precedence and govern.

Specification	Issuing Agency	Adopted/Dated
General Specifications to the Construction & Maintenance Services Agreements	Porter Co. Department of Development & Storm Water Management	August 1, 2018
Construction Plans for Cornell Ditch, Zakutansky Arm – Drain Tile Reconstruction	Porter Co. Department of Development & Storm Water Management	November 19, 2018

**DIVISION 200
SITE PREPARATION AND EARTHWORK**

STRIP TOPSOIL

DESCRIPTION

This work shall consist of the stripping of topsoil from the existing surface of trenches and other cut areas and the existing surface of embankments and other fill areas and the transportation of materials generated during such stripping work to stockpile areas located on the project site.

CONSTRUCTION REQUIREMENTS

Topsoil shall be stripped from the existing surface of trenches and other cut areas and the existing surface of embankments and other fill areas, as shown on the construction plans. Topsoil shall be stripped to a depth of 6 IN, or as directed by the Engineer, and stockpiled on the project site near the areas where it is to be spread.

MEASUREMENT

This work shall be considered as incidental to the work and the various other items of work involved and will not be measured for payment.

PAYMENT

This work will not be paid for directly but shall be considered as included in the various other items of work involved and shall be included in the unit prices for such items and no additional compensation will be allowed.

EXCAVATION**DESCRIPTION**

This work shall consist of the excavation of materials from trenches and other cut areas and the transportation of materials generated during such excavation work to fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site.

CONSTRUCTION REQUIREMENTS**(a) Preparation**

Prior to starting the excavation work, necessary clearing and tree removal, mowing, hand removal, and/or topsoil stripping work shall be conducted within the work area and within any fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site, in accordance with these technical specifications.

(b) Excavation

All excavation work shall be conducted in accordance with the lines, grades, and elevations shown on the construction plans; there shall be no deviation from such lines, grades, and elevations, without the written consent of the Engineer.

All suitable materials generated during the excavation work, including, but not limited to, earth, gravel, rock, stone, boulders, and broken concrete not containing exposed rebar, shall be re-used in the work, as described below, provided that such materials meet all applicable materials specifications. Materials generated during the excavation work that are not suitable for re-use in the work shall be removed and disposed of off-site in a responsible and lawful manner.

Suitable earth, gravel, rock, stone, and boulders generated during the excavation work may be placed in fill areas, embankment locations, spoil disposal areas, or stockpile areas, provided that such materials are placed and compacted in accordance with the contract documents. Suitable broken concrete not containing exposed rebar generated during the channel excavation work may also be used in fill areas, embankment locations, spoil disposal areas, or stockpile areas, provided that such materials are placed and compacted to the satisfaction of the Engineer, buried under a minimum of two feet of earth, and do not create an unsightly appearance or conflict with the natural topography of the area. Suitable gravel, rock, and broken concrete not containing exposed rebar generated during the excavation work may also be used as coarse aggregate, provided that such materials meet all applicable materials specifications. Suitable rock, stone, boulders, and broken concrete not containing exposed rebar generated during the excavation work may also be used as rip rap, provided that such materials meet all applicable materials specifications.

Materials generated during the excavation work that are not suitable for re-use in the work shall be removed and disposed of off-site in a licensed landfill, recycled, reused, or otherwise disposed of in accordance with local, state, and federal laws and regulations. Should the Contractor choose to dispose of such materials at a clean construction and demolition debris (CCDD) facility or at an uncontaminated soil fill operation, it shall be the Contractor's responsibility to have the pH of the material tested to ensure the value is between 6.25 and 9.0, inclusive. A copy of the pH test results shall be provided to the Engineer.

When the Contractor removes and disposes of materials generated during the excavation work that are not suitable for re-use in the work, the Contractor shall obtain written approval from the owner of such off-site location and present such written approval to the Engineer prior to using such location. The approval of the proposed off-site disposal site shall be according to Article 107.17.

(c) Classification

All excavation work will be classified by the Engineer. All excavation work will be classified as EXCAVATION, except that excavation work conducted in rock shall be classified as ROCK EXCAVATION.

ROCK EXCAVATION shall consist of the excavation of boulders 1/2 CY in volume or greater and all rock in ledges, bedded deposits, and conglomerate deposits exhibiting the physical characteristics and difficulty of rock removal, as determined by the Engineer.

MEASUREMENT

This work shall not be measured for payment, but shall be considered complete following inspection and acceptance of the work by the Department.

This work shall be paid for at the contract quantity for EXCAVATION AND/OR ROCK EXCAVATION shown on the basis of quote or basis of bid form. The entire volume designated for EXCAVATION AND/OR ROCK EXCAVATION on the construction plans shall have been used in computing such quantity.

PAYMENT

This work shall be paid for at the contract unit price(s) per cubic yard for EXCAVATION AND/OR ROCK EXCAVATION.

Such unit price(s) shall include all preparation necessary to complete the work, as well as the furnishing, transporting, and/or placing of all labor, tools, equipment, and other incidental items necessary to complete the work. The transportation of materials generated during such excavation work to fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site shall also be considered as incidental to this work.

The removal and disposal, including transportation, of materials generated during the excavation work that are not suitable for re-use in the work will be paid for at the contract unit price per cubic yard for REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL, provided the completion of such work is provided for in the contract documents. If the completion of such work is not provided for in the contract documents, REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL will be paid for according to Article 109.05.

GRADING DITCHES & SWALES**DESCRIPTION**

This work shall consist of the creation of new swales, ditches, and other small channels and/or the deepening, widening, or straightening of existing swales, ditches, and other small channels and the transportation of materials generated during such grading work to fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site.

CONSTRUCTION REQUIREMENTS**(a) Preparation**

Prior to starting the grading work, necessary clearing and tree removal, mowing, hand removal, and/or topsoil stripping work shall be conducted within the work area and within any fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site, in accordance with these technical specifications.

(b) Grading

All grading work on swales, ditches, and other small channels shall be conducted in accordance with the lines, grades, and elevations shown on the construction plans; there shall be no deviation from such lines, grades, and elevations, without the written consent of the Engineer.

All suitable materials generated during the grading work, including, but not limited to, earth, gravel, rock, stone, boulders, and broken concrete not containing exposed rebar, shall be re-used in the work, as described below, provided that such materials meet all applicable materials specifications. Materials generated during the grading work that are not suitable for re-use in the work shall be removed and disposed of off-site in a responsible and lawful manner.

Suitable earth, gravel, rock, stone, and boulders generated during the grading work may be placed in fill areas, embankment locations, spoil disposal areas, or stockpile areas, provided that such materials are placed and compacted in accordance with the contract documents. Suitable broken concrete not containing exposed rebar generated during the grading work may also be used in fill areas, embankment locations, spoil disposal areas, or stockpile areas, provided that such materials are placed and compacted to the satisfaction of the Engineer, buried under a minimum of two feet of earth, and do not create an unsightly appearance or conflict with the natural topography of the area. Suitable gravel, rock, and broken concrete not containing exposed rebar generated during the grading work may also be used as coarse aggregate, provided that such materials meet all applicable materials specifications. Suitable rock, stone, boulders, and broken concrete not containing exposed rebar generated during the grading work may also be used as rip rap, provided that such materials meet all applicable materials specifications.

Materials generated during the grading work that are not suitable for re-use in the work shall be removed and disposed of off-site in a licensed landfill, recycled, reused, or otherwise disposed of in accordance with local, state, and federal laws and regulations. Should the Contractor choose to dispose of such materials at a clean construction and demolition debris (CCDD) facility or at an uncontaminated soil fill operation, it shall be the Contractor's responsibility to have the pH of the material tested to ensure the value is between 6.25 and 9.0, inclusive. A copy of the pH test results shall be provided to the Engineer.

When the Contractor removes and disposes of materials generated during the grading work that are not suitable for re-use in the work, the Contractor shall obtain written approval from the owner of such off-site location and present such written approval to the Engineer prior to using such location. The approval of the proposed off-site disposal site shall be according to Article 107.17.

(c) Finishing

Within swales, ditches, and other small channels designated for this work, all irregularities shall be smoothed out, depressions shall be filled in, and the swale, ditch, or other small channel shall be shaped, trimmed, and finished uniformly to the lines, grades, and elevations shown on the construction plans and blended into the existing adjacent grade.

Finished surfaces shall be cleaned up for final acceptance. All unsuitable material, debris, and rubbish, resulting from construction operations, or otherwise occurring within the finished surface, and all stones more than 6 IN in

the largest dimension, shall be removed from the finished surface and disposed of in accordance with these technical specifications. The degree of finish required shall be that which can be obtained by use of suitable mechanical equipment, with only such hand labor as special conditions may require. Following finishing, the finished surface shall have a smooth appearance and shall be relatively free of dirt clods, stones, woody debris, rubbish, and other irregularities.

MEASUREMENT

This work shall not be measured for payment, but shall be considered complete following inspection and acceptance of the work by the Department.

This work shall be paid for at the contract quantity for GRADING DITCHES & SWALES shown on the basis of quote or basis of bid form. The entire length along the centerline of ditches, swales, and other small channels designated for GRADING DITCHES & SWALES on the construction plans shall have been used in computing such quantity.

PAYMENT

This work shall be paid for at the contract unit price(s) per linear foot for GRADING DITCHES & SWALES.

Such unit price(s) shall include all preparation necessary to complete the work, as well as the furnishing, transporting, and/or placing of all labor, tools, equipment, and other incidental items necessary to complete the work. The transportation of materials generated during such grading work to fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site shall also be considered as incidental to this work.

The removal and disposal, including transportation, of materials generated during the grading work that are not suitable for re-use in the work will be paid for at the contract unit price per cubic yard for REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL, provided the completion of such work is provided for in the contract documents. If the completion of such work is not provided for in the contract documents, REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL will be paid for according to Article 109.05.

FILL**DESCRIPTION**

This work shall consist of the construction of embankments and other fill areas on the project site by transporting, spreading, and tamping or compacting suitable material above the surface of the existing grade.

CONSTRUCTION REQUIREMENTS**(a) Preparation**

Prior to starting the construction of an embankment or other fill area, necessary clearing and tree removal, mowing, hand removal, and/or topsoil stripping work shall be conducted within the work area in accordance with these technical specifications.

The existing ground surface within the embankment or other fill area shall then be scarified or tilled to a minimum of 3 IN deep to prepare the ground surface for the placement of fill. Fill shall not be placed on frozen earth.

When embankments and other fill areas are located on existing slopes, or if existing slopes are included in embankments or other fill areas, the existing slopes shall be scarified or tilled to a minimum of 3 IN deep to prepare the ground surface for the placement of fill. If additional precautions for binding the fill to the ground surface are justified, steps shall be cut into the existing slopes before the construction of the embankment or other fill area begins.

(b) Fill

Embankments and other fill areas shall be constructed of suitable materials that will compact and develop stability. No sod, frozen material, or any material which, by decay or otherwise, might cause settlement shall be placed or allowed to remain in embankments or other fill areas. Embankments and other fill areas shall be constructed to the height and width deemed necessary to provide for shrinkage during compaction. Upon completion, the embankments and other fill areas shall be according to the lines, grades, and cross sections shown on the construction plans.

When embankments and other fill areas are constructed of materials generated during excavation work, such materials shall be well distributed, and sufficient earth or other fine material shall be incorporated within them when they are deposited to fill interstices and provide solid embankments and surfaces. No rock, stones or broken concrete more than 4 IN in largest dimension shall be permitted within a vertical distance of 12 IN from the surface of the finished grade.

Pieces of concrete, not exceeding 2 SF for any area of surface, and large rocks and boulders may be placed in embankments and other fill areas without being broken up, provided they are well embedded, and the interstices filled with smaller pieces or smaller material in a manner to give a density satisfactory to the Engineer. The lifts of the smaller pieces or smaller material shall not exceed 8 IN in depth.

So far as practicable, each lift of material shall extend the entire length and width of the embankment or other fill area. The material shall be leveled by means of bulldozers, graders, or other equipment approved by the Engineer. Each lift shall be not more than 8 IN thick when in loose condition, uniform in cross section, and thoroughly compacted before the next lift is started. Each lift of material shall be disked sufficiently to break down oversized clods, mix the different materials, secure a uniform moisture content, and ensure uniform density and compaction. Disking may be omitted if the fill material consists of sand or gravel.

The use of drag line excavators or similar equipment which excavate and deposit material in large unit masses will not be permitted, unless all materials excavated in this manner are spread as provided herein and compacted in accordance with these technical specifications, or as directed by the Engineer.

(c) Compaction

If the height of the embankment or other fill area is less than 1-1/2 FT, all lifts shall be compacted to not less than 95 percent of the standard laboratory density. If the height of the embankment or other fill area is between 1-1/2 FT and 3 FT, the first lift shall be compacted to not less than 90 percent, and the balance to a minimum of 95 percent of the standard laboratory density. If the height of the embankment or other fill area exceeds 3 FT in height, the lower 1/3 of the embankment or surface, but not to exceed the lower 2 FT, shall be compacted in a

manner that will yield a minimum of 90 percent of standard laboratory density to the uppermost lift of that portion of the embankment or other fill area. The next 1 FT of the embankment or other fill area shall be compacted to not less than 93 percent, and the balance of the embankment or other fill area shall be compacted to not less than 95 percent of the standard laboratory density.

The top 2 FT of all embankments and other fill areas shall not contain more than 120 percent of the optimum moisture determined according to AASHTO T 99 (Method C). The Contractor will be permitted the use of an approved additive to effect a quicker drying time.

The standard laboratory density shall be the maximum dry density determined according to AASHTO T 99 (Method C). A coarse particle correction according to AASHTO T 224 shall be used.

The dry density of the compacted embankment or other fill area will be determined by the Engineer at regular intervals according to AASHTO T 191, AASHTO T 310, or by other methods approved by the Engineer.

The embankment or other fill area shall be sprinkled with water when it is necessary to increase the moisture content of the soil to permit the fill area or embankment location to be constructed to the densities indicated above.

Compacting equipment and compacting operations shall be coordinated with the rate of placing fill material so that the required density is obtained.

Special care shall be exercised in compacting embankments and other fill areas adjacent to structures and in sharp depressions. Where such areas are inaccessible to the compacting equipment being used, the material shall be placed in 8 IN lifts and uniformly compacted with suitable mechanical equipment. Embankment and other fill areas placed adjacent to a structure shall not contain more than 110 percent of the optimum moisture determined according to AASHTO T 99 (Method C).

MEASUREMENT

This work shall be considered as incidental to the work and the various other items of work involved and will not be measured for payment.

PAYMENT

This work will not be paid for directly but shall be considered as included in the various other items of work involved and shall be included in the unit prices for such items and no additional compensation will be allowed.

BEDDING & INITIAL BACKFILL

DESCRIPTION

This work shall consist of furnishing, transporting, and placing coarse aggregate for the bedding and initial backfill to be installed at the bottom of all trenches excavated during the performance of the work for the purpose of installing drain tiles and storm sewers.

This work also includes the transportation of suitable surplus excavated material from trenches, such suitable surplus excavated material having been replaced by bedding and initial backfill, to fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site. Surplus excavated material not suitable for use in fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site shall be removed and disposed of off-site in a licensed landfill, recycled, reused, or otherwise disposed of in accordance with local, state, and federal laws and regulations.

MATERIALS

Materials shall be in accordance with the following materials specifications, which are presented elsewhere in these technical specifications.

MATERIALS

(1) Bedding & Initial Backfill

CONSTRUCTION REQUIREMENTS

The installation of bedding and initial backfill shall be completed in accordance with these technical specifications.

MEASUREMENT

This work shall not be measured for payment, but shall be considered complete following inspection and acceptance of the work by the Department.

This work shall be paid for at the contract quantity for BEDDING & INITIAL BACKFILL shown on the basis of quote or basis of bid form. The entire volume of BEDDING & INITIAL BACKFILL necessary to complete the work shown on the construction plans shall have been used in computing such quantity.

PAYMENT

This work shall be paid for at the contract unit price per cubic yard for BEDDING & INITIAL BACKFILL.

Such unit price shall include all preparation necessary to complete the work, as well as the furnishing, transporting, and placing of all material, labor, tools, equipment, and other incidental items necessary to complete the work. The transportation of suitable surplus excavated material from trenches, such suitable surplus excavated material having been replaced by bedding and initial backfill, to fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site shall also be considered as incidental to this work.

The removal and disposal, including transportation, of surplus excavated materials that are not suitable for re-use in the work will be paid for at the contract unit price per cubic yard for REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL, provided the completion of such work is provided for in the contract documents. If the completion of such work is not provided for in the contract documents, REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL will be paid for according to Article 109.05.

STRUCTURE BEDDING

DESCRIPTION

This work shall consist of furnishing, transporting, and placing fine aggregate for the bedding to be installed at the bottom of all excavations made during the performance of the work for the purpose of installing storm sewer structures.

This work also includes the transportation of suitable surplus excavated material from such excavations, such suitable surplus excavated material having been replaced by structure bedding, to fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site. Surplus excavated material not suitable for use in fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site shall be removed and disposed of off-site in a licensed landfill, recycled, reused, or otherwise disposed of in accordance with local, state, and federal laws and regulations.

MATERIALS

Materials shall be in accordance with the following materials specifications, which are presented elsewhere in these technical specifications.

MATERIALS

- (1) Structure Bedding

CONSTRUCTION REQUIREMENTS

The installation of structure bedding shall be completed in accordance with these technical specifications.

MEASUREMENT

This work shall not be measured for payment, but shall be considered complete following inspection and acceptance of the work by the Department.

This work shall be paid for at the contract quantity for STRUCTURE BEDDING shown on the basis of quote or basis of quote form. The entire volume of STRUCTURE BEDDING necessary to complete the work shown on the construction plans shall have been used in computing such quantity.

PAYMENT

This work shall be paid for at the contract unit price per cubic yard for STRUCTURE BEDDING.

Such unit price shall include all preparation necessary to complete the work, as well as the furnishing, transporting, and/or placing of all material, labor, tools, equipment, and other incidental items necessary to complete the work. The transportation of suitable surplus excavated material from trenches, such suitable surplus excavated material having been replaced by sand bedding, to fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site shall also be considered as incidental to this work.

The removal and disposal, including transportation, of surplus excavated materials that are not suitable for re-use in the work will be paid for at the contract unit price per cubic yard for REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL, provided the completion of such work is provided for in the contract documents. If the completion of such work is not provided for in the contract documents, REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL will be paid for according to Article 109.05.

FINAL BACKFILL**DESCRIPTION**

This work shall consist of furnishing, transporting, and placing suitable excavated material for the final backfilling of all trenches not located in or near the subgrade of a proposed or existing pavement. It shall also consist of furnishing, transporting, and placing coarse aggregate for the final backfilling of all trenches located in the subgrade of a proposed or existing pavement, curb, gutter, curb and gutter, stabilized shoulder, or sidewalk, and all trenches located where the inner edge of the trench is within 2 FT of the edge of a proposed or existing pavement, curb, gutter, curb and gutter, stabilized shoulder, or sidewalk.

This work also includes the transportation of suitable surplus excavated material from trenches, such suitable surplus excavated material having been replaced by final backfill, to fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site. Surplus excavated material not suitable for use in fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site shall be removed and disposed of off-site in a licensed landfill, recycled, reused, or otherwise disposed of in accordance with local, state, and federal laws and regulations.

MATERIALS

Materials shall be in accordance with the following materials specifications, which are presented elsewhere in these technical specifications.

MATERIALS

- (1) Suitable Excavated Material
- (2) Trench Backfill

CONSTRUCTION REQUIREMENTS

The installation of final backfill shall be completed in accordance with these technical specifications.

MEASUREMENT

This work shall not be measured for payment, but shall be considered complete following inspection and acceptance of the work by the Department.

This work shall be paid for at the contract quantity for FINAL BACKFILL shown on the basis of quote form. The entire volume of FINAL BACKFILL necessary to complete the work shown on the construction plans shall have been used in computing such quantity.

PAYMENT

This work shall be paid for at the contract unit price per cubic yard for FINAL BACKFILL.

Such unit price shall include all preparation necessary to complete the work, as well as the furnishing, transporting, and/or placing of all material, labor, tools, equipment, and other incidental items necessary to complete the work. The transportation of suitable surplus excavated material from trenches, such suitable surplus excavated material having been replaced by trench backfill, to fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site shall also be considered as incidental to this work.

The removal and disposal, including transportation, of surplus excavated materials that are not suitable for re-use in the work will be paid for at the contract unit price per cubic yard for REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL, provided the completion of such work is provided for in the contract documents. If the completion of such work is not provided for in the contract documents, REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL will be paid for according to Article 109.05.

STRUCTURE BACKFILL**DESCRIPTION**

This work shall consist of furnishing, transporting, and placing suitable excavated material for backfilling the entire space between the sides of all excavations made during the performance of the work for the purpose of installing storm sewer structures and the outside of such structures when such structures are not located within or near the subgrade of a proposed or existing pavement. It shall also consist of furnishing, transporting, and placing fine aggregate for backfilling the entire space between the sides of all excavations made during the performance of the work for the purpose of installing storm sewer structures and the outside of such structures when such structures are located within the subgrade of a proposed or existing pavement, curb, gutter, curb and gutter, stabilized shoulder, or sidewalk, of if any point of the excavation created to allow for the installation such structure is located within 2 FT of the edge of a proposed or existing pavement, curb, gutter, curb and gutter, stabilized shoulder, or sidewalk.

This work also includes the transportation of suitable surplus excavated material from such excavations, such suitable surplus excavated material having been replaced by structure backfill, to fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site. Surplus excavated material not suitable for use in fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site shall be removed and disposed of off-site in a licensed landfill, recycled, reused, or otherwise disposed of in accordance with local, state, and federal laws and regulations.

MATERIALS

Materials shall be in accordance with the following materials specifications, which are presented elsewhere in these technical specifications.

MATERIALS

- (1) Suitable Excavated Material
- (2) Structure Backfill

CONSTRUCTION REQUIREMENTS

The installation of structure backfill shall be completed in accordance with these technical specifications.

MEASUREMENT

This work shall not be measured for payment, but shall be considered complete following inspection and acceptance of the work by the Department.

This work shall be paid for at the contract quantity for STRUCTURE BACKFILL shown on the basis of quote or basis of quote form. The entire volume of STRUCTURE BACKFILL necessary to complete the work shown on the construction plans shall have been used in computing such quantity.

PAYMENT

This work shall be paid for at the contract unit price per cubic yard for STRUCTURE BACKFILL.

Such unit price shall include all preparation necessary to complete the work, as well as the furnishing, transporting, and/or placing of all material, labor, tools, equipment, and other incidental items necessary to complete the work. The transportation of suitable surplus excavated material from trenches, such suitable surplus excavated material having been replaced by sand bedding, to fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site shall also be considered as incidental to this work.

The removal and disposal, including transportation, of surplus excavated materials that are not suitable for re-use in the work will be paid for at the contract unit price per cubic yard for REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL, provided the completion of such work is provided for in the contract documents. If the completion of such work is not provided for in the contract documents, REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL will be paid for according to Article 109.05.

SPREAD TOPSOIL

DESCRIPTION

This work shall consist of the transportation of materials from topsoil stockpile areas located on the project site to disturbed areas located on the project site, such as trenches and other cut areas and embankments and other fill areas, and the spreading of such materials over such disturbed areas.

CONSTRUCTION REQUIREMENTS

Topsoil shall be spread over disturbed areas located on the project site, such as trenches and other cut areas and embankments and other fill areas, as shown on the construction plans. Topsoil shall be spread over such disturbed areas to a depth of 6 IN, or as directed by the Engineer, and firmly tamped or compacted.

So far as practicable, each lift of topsoil shall extend the entire length and width of the disturbed area. The material shall be spread by means of bulldozers, graders, or other equipment approved by the Engineer. Each lift shall be not more than 8 IN thick when in loose condition, uniform in cross section, and firmly tamped or compacted before the next lift is started. Each lift of material shall be disked sufficiently to break down oversized clods, mix the different materials, secure a uniform moisture content, and ensure uniform density and compaction.

All spreading work shall be conducted in accordance with the lines, grades, and elevations shown on the construction plans; there shall be no deviation from such lines, grades, and elevations, without the written consent of the Engineer.

MEASUREMENT

This work shall be considered as incidental to the work and the various other items of work involved and will not be measured for payment.

PAYMENT

This work will not be paid for directly but shall be considered as included in the various other items of work involved and shall be included in the unit prices for such items and no additional compensation will be allowed.

SHAPING, TRIMMING & FINISHING

DESCRIPTION

This work shall consist of the shaping, trimming, and finishing of disturbed areas located on the project site, the cleaning up of disturbed areas located on the project site, and completing the work for acceptance.

CONSTRUCTION REQUIREMENTS

(a) Grading

Within disturbed areas located on the project site, all irregularities shall be smoothed out, depressions shall be filled in, and the entire disturbed area shall be shaped, trimmed, and finished uniformly to the lines, grades, and elevations shown on the construction plans and blended into the existing adjacent grade.

(b) Finishing

Finished surfaces shall be cleaned up for final acceptance. All unsuitable material, debris, and rubbish, resulting from construction operations, or otherwise occurring within the finished surface, and all stones more than 6 IN in the largest dimension, shall be removed from the finished surface and disposed of in accordance with these technical specifications. The degree of finish required shall be that which can be obtained by use of suitable mechanical equipment, with only such hand labor as special conditions may require. Following finishing, the finished surface shall have a smooth appearance and shall be relatively free of dirt clods, stones, woody debris, rubbish, and other irregularities.

MEASUREMENT

This work shall be considered as incidental to the work and the various other items of work involved and will not be measured for payment.

PAYMENT

This work will not be paid for directly but shall be considered as included in the various other items of work involved and shall be included in the unit prices for such items and no additional compensation will be allowed.

**DIVISION 300
DRAINAGE AND STORMWATER MANAGEMENT**

DRAIN TILE

DESCRIPTION

This work shall consist of constructing drain tiles, via open trench construction, as shown on the construction plans.

MATERIALS

Materials shall be in accordance with the following materials specifications, which are presented elsewhere in these technical specifications.

MATERIALS

- (1) Flexible Pipe
 - a. High Density Polyethylene (HDPE) Pipe, Type DWS (Dual Wall, Solid)
- (2) Bedding & Initial Backfill
- (3) Final Backfill

CONSTRUCTION REQUIREMENTS

This work shall be completed in accordance with the Porter County Supplemental Design and Construction Standards/Specifications and these technical specifications. In case of conflict between these technical specifications and any part or parts of said Porter County Supplemental Design and Construction Standards/Specifications, the Engineer shall determine which specifications shall take precedence and govern.

(a) Excavation

Drain tiles shall be constructed in trenches free of water, excavated either in embankments or natural ground. Trenches shall be dewatered through the use of diversion channels or other methods approved by the Engineer before proceeding with the construction.

Trenches shall be excavated to the depths and widths described in the table below.

Inside Diameter or Equivalent Diameter of Drain Tile, d (IN)	Required Trench Width on Each Side of the Drain Tile (IN)	Required Trench Depth Below the Drain Tile (IN)
$d < 24$ IN	9 IN	3 IN
24 IN $< d < 60$ IN	12 IN	4 IN
$d > 60$ IN	18 IN	6 IN

If the width of the trench exceeds the maximum horizontal dimension specified above as a result of careless or faulty construction methods, that portion of the trench shall be corrected by backfilling in 8 IN lifts and again excavating the trench to the required width.

Trenches shall be excavated so that vertical faces are maintained at least to an elevation 12 IN above the top of drain tile. If the trench has been made deeper than necessary, the foundation shall be brought to the proper grade by the addition of well compacted bedding material. For trench depths greater than 5 FT, trench protection shall be utilized according to the applicable standards for work place safety. At the request of the Engineer, the Contractor shall provide to the Department, in writing, his/her procedures for fulfilling the safety requirements for trench protection.

Where pipe having bells or hubs is used, cross trenches not more than 2 IN wider than the bell or hub shall be excavated to provide uniform bearing along the length of the pipe.

Where a firm foundation is not encountered at the bottom of the trench due to the presence of unsuitable material, such as soft or spongy soil, unstable soil, or rock in either ledge or boulder formation is encountered at locations along the line of the drain tile and at the grade established for the drain tile, the material or rock shall be removed and replaced before proceeding with the construction.

The unsuitable material shall be removed to a depth determined by the Engineer for the width of the trench, and replaced with well compacted bedding material. Rock shall be removed to an elevation 1 FT lower than the bottom of the pipe or to a depth equal to 1/2 IN/FT of ultimate fill height over the top of the pipe, whichever is the greater depth, for the width of the trench, and replaced with well compacted bedding material. Bedding material shall be placed in 8 IN lifts and compacted by mechanical means to the satisfaction of the Engineer.

When all or a portion of a pipe will be in fill, the embankment, or a portion thereof, shall be constructed prior to excavating the trench. The embankment shall be constructed to a height which will provide approximately 1 FT of cover over the pipe, except that in no case shall the height of the embankment constructed result in a finished trench depth exceeding 5 FT. The width of the top of the embankment shall be a minimum of 2 FT on each side of the pipe, measured at right angles to its centerline, and the longitudinal slopes shall be 6:1 (H:V) or flatter. The embankment shall be constructed according to the requirements of these technical specifications, except the material shall be suitable excavated material meeting the approval of the Engineer.

All excavated material not suitable for re-use on the work shall be disposed of in accordance with these technical specifications.

(b) Foundation

Well compacted bedding material, in accordance with the table below, shall be placed along the entire width of the trench for the entire length of the pipe, except when the drain tile outlets from an embankment or existing slope, the last 3 FT of the pipe shall be bedded in compacted impervious material. The bedding material and/or impervious material shall be compacted by mechanical means to the satisfaction of the Engineer.

Inside Diameter or Equivalent Diameter of Drain Tile, d (IN)	Required Depth of Bedding Material (IN)
$d \leq 24$ IN	3 IN
24 IN $< d \leq 60$ IN	4 IN
$d > 60$ IN	6 IN

(c) Laying Drain Tile Pipe

No drain tile pipe shall be placed until the trench and the prepared foundation have been approved by the Engineer.

The trench shall be kept free from water while the pipe is being placed and until the joints have been sealed. Trenches shall be dewatered through the use of diversion channels or other methods approved by the Engineer before proceeding with the construction.

The laying of pipes shall be started at the outlet end with the spigot ends pointing in the direction of flow, and shall proceed toward the inlet end with pipes abutting and true to line and grade. The ends of pipes shall be carefully cleaned before the pipes are lowered into the trenches, and the pipes shall be lowered so as to avoid unnecessary handling in the trench.

As each length of pipe is laid, the mouth of the pipe shall be properly protected to prevent the entrance of earth or the bedding material. The pipes shall be fitted and matched so that when laid in the work they will form a drain tile with a smooth, uniform invert. If reinforced concrete pipe is used, the word "top" or "bottom" may be stenciled on the inside of the pipe sections. All concrete pipe so marked shall be placed as indicated by these marks. Each section of pipe shall be pushed or pulled to the section in place to ensure tight joints. Pipe having a diameter greater than 42 IN shall be set or "brought home" with a winch, come-a-long, or other positive means.

All joints in concrete pipe shall be sealed with rubber gaskets, preformed flexible joint sealants, mastic joint sealer, or external sealing bands. When mastic joint sealer is used, it shall be applied according to the manufacturer's recommendations and the material shall completely fill the joint after the pipes have been brought together. After each joint is sealed, it shall be wiped clean on the inside. Handling holes in concrete pipe shall be filled with a precast concrete plug and sealed with mastic or mortar; or filled with a polyethylene plug. The plug shall not project beyond the inside surface after installation.

HDPE pipe shall be joined according to the manufacturer's specifications. PVC pipe shall be joined according to the manufacturer's specifications.

(d) Backfilling

As soon as the condition of the drain tile will permit, the entire width of the trench shall be backfilled with trench backfill material to a height of at least the top of the pipe, except when the drain tile outlets from an embankment or existing slope, the initial backfill material around and above the last 3 FT of the pipe shall be impervious material. All initial backfill material shall be deposited in such a manner as not to damage the pipe. The initial backfill material shall be placed longitudinally along the pipe and the filling of the trench shall be carried on simultaneously on both sides of the pipe. Upon finishing placement of the initial backfill material, the elevation of the initial backfill material on each side of the pipe shall be the same and the space under the pipe shall be completely filled. The initial backfill material shall be placed in 8 IN lifts and compacted by mechanical means to the satisfaction of the Engineer.

The installed pipe and its embedment (i.e., bedding and initial backfill) shall not be disturbed when using movable trench boxes and shields, sheet pile, or other trench protection.

The remainder of the trench shall be backfilled to the existing adjacent grade or finished surface as rapidly as the condition of the drain tile will permit. The final backfill material shall consist of suitable excavated material from the trench or trench backfill, as specified in the contract documents or as follows:

- (1) Trench Backfill. For trenches made in the subgrade of a proposed or existing pavement, curb, gutter, curb and gutter, stabilized shoulder, or sidewalk, and trenches where the inner edge of the trench is within 2 FT of the edge of a proposed or existing pavement, curb, gutter, curb and gutter, stabilized shoulder, or sidewalk, the remainder of the trench shall be backfilled with trench backfill material meeting the requirements of these technical specifications. The material shall be placed in lifts not exceeding 8 IN in depth and compacted to a minimum of 85 percent of standard lab density by mechanical means.
- (2) Suitable Excavated Material. For all other trenches, the remainder of the trench shall be backfilled with suitable excavated material. The material shall be from excavation or borrow, free from large or frozen lumps, clods, or rock, and meeting the approval of the Engineer. The material shall be placed in lifts not exceeding 8 IN in depth, and compacted to 95 percent of standard lab density by mechanical means.

Before compaction, each lift shall be wetted or dried to bring the moisture content within 80 to 110 percent of optimum as determined according to AASHTO T 99 (Method C).

When sheeting and bracing have been used, sufficient bracing shall be left across the trench as the backfilling progresses to hold the sides firmly in place without caving or settlement. This bracing shall be removed as soon as practicable. Any depressions which may develop within the area involved in the construction operation due to settlement of the backfill material shall be filled in a manner meeting the approval of the Engineer.

When the Contractor constructs the trench with sloped or benched sides, backfilling for the full width of the excavation shall be as herein specified, except that no additional compensation will be allowed for backfill material required outside the vertical limits of the specified trench width.

(e) Shaping, Trimming & Finishing

After backfilling has been completed, the top of the trench shall be shaped, trimmed, and finished to the lines, grades, and elevations shown on the construction plans, in accordance with these technical specifications.

(f) Television Inspection

All drain tiles shall be inspected via closed circuit television not less than 30 days after the pipe has been installed and the backfilling has been completed. Such inspection shall be performed in the presence of the Engineer.

(g) Deflection Testing

All HDPE drain tiles shall be tested for deflection not less than 30 days after the pipe has been installed and the backfilling has been completed. Such testing shall be performed in the presence of the Engineer.

For HDPE pipe with a diameter of 24 IN or smaller, a mandrel drag shall be used for deflection testing. For HDPE pipe with a diameter of greater than 24 IN, deflection measurements other than by a mandrel shall be used.

Where the mandrel is used, the mandrel shall be furnished by the Contractor and pulled by hand through the pipeline with a suitable rope or cable connected to each end. Winching or other means of forcing the deflection gauge through the pipeline will not be allowed.

The mandrel shall be of a shape similar to that of a true circle enabling the gauge to pass through a satisfactory pipeline with little or no resistance. The mandrel shall be of a design to prevent it from tipping from side to side and to prevent debris buildup from occurring between the channels of the adjacent fins or legs during operation.

Each end of the core of the mandrel shall have fasteners to which the pulling cables can be attached. The mandrel shall have nine, various sized fins or legs of appropriate dimension for various diameter pipes. Each fin or leg shall have a permanent marking that states its designated pipe size and percent of deflection allowable.

The outside diameter of the mandrel shall be 95 percent of the base inside diameter. For all PVC pipe, the base inside diameter shall be defined using ASTM D 3034 methodology. For all HDPE pipe, the base inside diameter shall be defined as the average inside diameter based on the minimum and maximum tolerances specified in the corresponding ASTM or AASHTO material specifications.

If the pipe is found to have a deflection greater than that specified, that pipe section shall be removed, replaced, and retested.

(h) Plugging Drain Tile Pipe

Drain tiles to be plugged, as shown in the construction plans or as designated by the Engineer, shall be plugged with Class SI concrete, brick and mortar, or other methods approved by the Engineer. This work will not be paid for directly but shall be considered as included in the other drain tile work involved and shall be included in the unit prices for such items and no additional compensation will be allowed. If other drain tile work is not provided for in the contract documents, plugging drain tile pipe will be paid for according to Article 109.05.

MEASUREMENT

DRAIN TILE shall not be measured for payment, but shall be considered complete following inspection and acceptance of the work by the Department.

This work shall be paid for at the contract quantity and/or quantities shown on the basis of quote or basis of bid form for DRAIN TILE of the diameter, material, and class and/or type specified in the contract documents. The entire length of DRAIN TILE necessary to complete the work shown in the construction plans shall have been used in computing such quantity. When a drain tile enters a storm sewer structure, calculation of the contract quantity and/or quantities for storm sewer shall have ended at the inside wall of such storm sewer structure.

EXCAVATION FOR DRAIN TILE will be measured for payment in accordance with these technical specifications.

DEWATERING FOR DRAIN TILE will be measured for payment in accordance with these technical specifications.

BEDDING & INITIAL BACKFILL FOR DRAIN TILE will be measured for payment in accordance with these technical specifications.

FINAL BACKFILL FOR DRAIN TILE will be measured for payment in accordance with these technical specifications.

PAYMENT

DRAIN TILE shall be paid for at the contract unit price(s) per foot for DRAIN TILE of the diameter, material, and class and/or type specified in the contract documents.

Such unit price shall include all preparation necessary to complete the work, as well as the furnishing, transporting, and/or placing of all material, labor, tools, equipment, and other incidental items necessary to complete the work.

EXCAVATION FOR DRAIN TILE shall be paid for in accordance with these technical specifications.

DEWATERING FOR DRAIN TILE shall be paid for in accordance with these technical specifications.

BEDDING & INITIAL BACKFILL FOR DRAIN TILE shall be paid for in accordance with these technical specifications.

FINAL BACKFILL FOR DRAIN TILE shall be paid for in accordance with these technical specifications.

DRAIN TILE, TRENCHLESS CONSTRUCTION**DESCRIPTION**

This work shall consist of constructing drain tiles, via trenchless construction, as shown on the construction plans.

MATERIALS

Materials shall be in accordance with the following materials specifications, which are presented elsewhere in these technical specifications.

MATERIALS

(1) Flexible Pipe

- a. High Density Polyethylene (HDPE) Pipe, Type DWS (Dual Wall, Solid)

CONSTRUCTION REQUIREMENTS

This work shall be completed in accordance with the Porter County Supplemental Design and Construction Standards/Specifications and these technical specifications. In case of conflict between these technical specifications and any part or parts of said Porter County Supplemental Design and Construction Standards/Specifications, the Engineer shall determine which specifications shall take precedence and govern.

(a) Laying Drain Tile Pipe

Suitable labor and equipment, such as a tile plow, shall be used to install the drain tile pipe, via trenchless construction, in accordance with the construction plans.

HDPE pipe shall be joined according to the manufacturer's specifications.

(b) Shaping, Trimming & Finishing

After installation of the drain tile has been completed, the area disturbed by the installation of the drain tile shall be shaped, trimmed, and finished to the lines, grades, and elevations shown on the construction plans, in accordance with these technical specifications.

(c) Television Inspection

All drain tiles shall be inspected via closed circuit television not less than 30 days after the pipe has been installed and the backfilling has been completed. Such inspection shall be performed in the presence of the Engineer.

(d) Deflection Testing

All PVC and HDPE storm sewers shall be tested for deflection not less than 30 days after the pipe has been installed and the backfilling has been completed. Such testing shall be performed in the presence of the Engineer.

For PVC and HDPE pipe with a diameter of 24 IN or smaller, a mandrel drag shall be used for deflection testing. For PVC and HDPE pipe with a diameter of greater than 24 IN, deflection measurements other than by a mandrel shall be used.

Where the mandrel is used, the mandrel shall be furnished by the Contractor and pulled by hand through the pipe with a suitable rope or cable connected to each end. Winching or other means of forcing the deflection gauge through the pipe will not be allowed.

The mandrel shall be of a shape similar to that of a true circle enabling the gauge to pass through a satisfactory pipeline with little or no resistance. The mandrel shall be of a design to prevent it from tipping from side to side and to prevent debris buildup from occurring between the channels of the adjacent fins or legs during operation.

Each end of the core of the mandrel shall have fasteners to which the pulling cables can be attached. The mandrel shall have nine, various sized fins or legs of appropriate dimension for various diameter pipes. Each fin or leg shall have a permanent marking that states its designated pipe size and percent of deflection allowable.

The outside diameter of the mandrel shall be 95 percent of the base inside diameter. For all PVC pipe, the base inside diameter shall be defined using ASTM D 3034 methodology. For all HDPE pipe, the base inside diameter

shall be defined as the average inside diameter based on the minimum and maximum tolerances specified in the corresponding ASTM or AASHTO material specifications.

If the pipe is found to have a deflection greater than that specified, that pipe section shall be removed, replaced, and retested.

MEASUREMENT

DRAIN TILE, TRENCHLESS CONSTRUCTION shall not be measured for payment, but shall be considered complete following inspection and acceptance of the work by the Department.

This work shall be paid for at the contract quantity and/or quantities shown on the basis of quote or basis of bid form for DRAIN TILE, TRENCHLESS CONSTRUCTION of the diameter, material, and class and/or type specified in the contract documents. The entire length of DRAIN TILE, TRENCHLESS CONSTRUCTION necessary to complete the work shown on the construction plans shall have been used in computing such quantity. When a drain tile enters a storm sewer structure, calculation of the contract quantity and/or quantities for drain tile shall have ended at the inside wall of such storm sewer structure.

PAYMENT

DRAIN TILE, TRENCHLESS CONSTRUCTION shall paid for at the contract unit price(s) per foot for DRAIN TILE, TRENCHLESS CONSTRUCTION of the diameter, material, and class and/or type specified in the contract documents.

Such unit price shall include all preparation necessary to complete the work, as well as the furnishing, transporting, and/or placing of all material, labor, tools, equipment, and other incidental items necessary to complete the work.

PERFORATED DRAIN TILE, TRENCHLESS CONSTRUCTION**DESCRIPTION**

This work shall consist of constructing perforated drain tiles, via trenchless construction, as shown on the construction plans.

MATERIALS

Materials shall be in accordance with the following materials specifications, which are presented elsewhere in these technical specifications.

MATERIALS

(1) Flexible Pipe

- a. High Density Polyethylene (HDPE) Pipe, Type SWP (Single Wall, Perforated)

CONSTRUCTION REQUIREMENTS

This work shall be completed in accordance with the Porter County Supplemental Design and Construction Standards/Specifications and these technical specifications. In case of conflict between these technical specifications and any part or parts of said Porter County Supplemental Design and Construction Standards/Specifications, the Engineer shall determine which specifications shall take precedence and govern.

(a) Laying Drain Tile Pipe

Suitable labor and equipment, such as a tile plow, shall be used to install the perforated drain tile pipe, via trenchless construction, in accordance with the construction plans.

HDPE pipe shall be joined according to the manufacturer's specifications.

(b) Shaping, Trimming & Finishing

After installation of the perforated drain tile has been completed, the area disturbed by the installation of the perforated drain tile shall be shaped, trimmed, and finished to the lines, grades, and elevations shown on the construction plans, in accordance with these technical specifications.

MEASUREMENT

PERFORATED DRAIN TILE, TRENCHLESS CONSTRUCTION shall not be measured for payment, but shall be considered complete following inspection and acceptance of the work by the Department.

This work shall be paid for at the contract quantity and/or quantities shown on the basis of quote or basis of bid form for PERFORATED DRAIN TILE, TRENCHLESS CONSTRUCTION of the diameter, material, and class and/or type specified in the contract documents. The entire length of PERFORATED DRAIN TILE, TRENCHLESS CONSTRUCTION necessary to complete the work shown on the construction plans shall have been used in computing such quantity. When a drain tile enters a storm sewer structure, calculation of the contract quantity and/or quantities for drain tile shall have ended at the inside wall of such storm sewer structure.

PAYMENT

PERFORATED DRAIN TILE, TRENCHLESS CONSTRUCTION shall be paid for at the contract unit price(s) per foot for PERFORATED DRAIN TILE, TRENCHLESS CONSTRUCTION of the diameter, material, and class and/or type specified in the contract documents.

Such unit price shall include all preparation necessary to complete the work, as well as the furnishing, transporting, and/or placing of all material, labor, tools, equipment, and other incidental items necessary to complete the work.

STORM SEWER STRUCTURES

DESCRIPTION

This work shall consist of constructing, adjusting, or reconstructing storm sewer structures with castings, as shown on the construction plans.

MATERIALS

Materials shall be in accordance with the following materials specifications, which are presented elsewhere in these technical specifications.

MATERIALS

- (1) Precast Reinforced Concrete Storm Sewer Structures
- (2) Structure Bedding
- (3) Structure Backfill

CONSTRUCTION REQUIREMENTS

This work shall be completed in accordance with the Porter County Supplemental Design and Construction Standards/Specifications and these technical specifications. In case of conflict between these technical specifications and any part or parts of said Porter County Supplemental Design and Construction Standards/Specifications, the Engineer shall determine which specifications shall take precedence and govern.

(a) Classification

Classification as to the adjustment or reconstruction of existing storm sewer structures shall be made by the Engineer on the following basis:

- (1) Adjustment. Adjustment shall include all those existing storm sewer structures which are to be adjusted to grade where 2 FT or less of material will be either added, removed, or rebuilt to bring the specified structure to the finished grade specified on the construction plans.
- (2) Reconstruction. Reconstruction shall include all those existing storm sewer structures which are to be adjusted to grade where more than 2 FT of material will be either added, removed, or rebuilt to bring the specified structure to the finished grade specified on the construction plans.

(b) Excavation

Storm sewer structures shall be constructed in excavations free of water, excavated either in embankments or natural ground. Excavations shall be dewatered through the use of diversion channels or other methods approved by the Engineer before proceeding with the construction.

In order to provide for proper embedment of the structure, and in order to permit proper joining of sections of the structure, the excavation shall be made to 6 IN below the structure and a diameter of at least 6 IN greater than the diameter of the structure.

Where a firm foundation is not encountered at the bottom of the excavation due to the presence of unsuitable material, such as soft or spongy soil, unstable soil, or rock in either ledge or boulder formation is encountered at the bottom of the excavation, the material or rock shall be removed and replaced before proceeding with the construction.

The unsuitable material shall be removed to a depth determined by the Engineer for the diameter or length and width of the excavation, and replaced with well compacted bedding material. Rock shall be removed to an elevation 1 FT lower than the bottom of the structure or to a depth equal to 1/2 IN/FT of ultimate fill height over the top of the structure, whichever is the greater depth, for the diameter or length and width of the excavation, and replaced with well compacted bedding material. Bedding material shall be placed in 8 IN lifts and compacted by mechanical means to the satisfaction of the Engineer.

When all or a portion of a structure will be in fill, the embankment, or a portion thereof, shall be constructed prior to excavating. The embankment shall be constructed to a height which will provide approximately 1 FT of cover over the structure. The width of the top of the embankment shall be a minimum of 2 FT on each side of the

structure, measured from the side of the structure along centerlines passing through the center of the structure, and the longitudinal slopes shall be 6:1 (H:V) or flatter. The embankment shall be constructed according to the requirements of these technical specifications, except the material shall be suitable excavated material meeting the approval of the Engineer.

All excavated material not suitable for re-use on the work shall be disposed of in accordance with these technical specifications.

(c) Foundation

Well compacted structure bedding material shall be placed along the entire diameter or length or width of the excavation to a depth of 6 IN. The structure bedding material shall be compacted by mechanical means to the satisfaction of the Engineer.

(d) Setting Storm Sewer Structures

No structure shall be placed until the excavation and the prepared foundation have been approved by the Engineer.

The excavation shall be kept free from water while the structure is being placed and until the joints have been sealed. Excavations shall be dewatered through the use of diversion channels or other methods approved by the Engineer before proceeding with the construction.

Precast reinforced concrete sections shall be constructed in horizontal courses. The sections shall be laid in mortar or sealed with external sealing bands, preformed flexible joint sealant, or mastic joint sealer. When mastic joint sealer is used, the material shall completely fill the joint after the units have been brought together.

All precast reinforced concrete units shall be installed on a 6 IN thick cushion of structure bedding. Handling holes shall be filled with a precast concrete plug and sealed with mastic or mortar. The plug shall not project beyond the inside surface after installation. When metal lifting inserts are used, their sockets shall be filled with mastic or mortar.

(e) Connecting Pipe to Storm Sewer Structures

Connections of pipe to storm sewer structures shall utilize cast-in-place watertight connectors and shall be used in accordance with the manufacturer's recommendations.

(f) Placing Adjusting Rings and Castings

Placing adjusting rings and castings shall be as follows:

- (1) Furnishing. Adjusting rings and castings, including frames and grates, frames and lids, and trash racks, shall be furnished as specified in the contract documents.
- (2) Placing. Adjusting rings shall be constructed in horizontal courses. Adjusting rings shall be laid mortar or sealed with preformed flexible joint sealant or mastic joint sealer. When mastic joint sealer is used, the material shall completely fill the joint after the units have been brought together.

Casting frames shall be set in full mortar beds or sealed with preformed flexible joint sealant or mastic joint sealer. When mastic joint sealer is used, the material shall completely fill the joint after the units have been brought together.

Adjusting rings and castings shall be set to the natural line or finished surface so that no subsequent adjustment will be necessary.

(g) Backfilling

If the structure is located within the subgrade of a proposed or existing pavement, curb, gutter, curb and gutter, stabilized shoulder, or sidewalk, or if any point of the excavation created to allow for the installation of the structure is located within 2 FT of the edge of a proposed or existing pavement, curb, gutter, curb and gutter, stabilized shoulder, or sidewalk, as soon as the condition of the structure will permit, the entire space between the sides of the excavation and the outside of the structure shall be backfilled with structure backfill meeting the

requirements of these technical specifications to the top of the structure. The material shall be placed in lifts not exceeding 8 IN in depth and compacted to a minimum of 85 percent of standard lab density by mechanical means.

For all other structures, the entire space between the sides of the excavation and the outside of the structure shall be backfilled with suitable excavated material to the top of the structure. The material shall be from excavation or borrow, free from large or frozen lumps, clods, or rock, and meeting the approval of the Engineer. The material shall be placed in lifts not exceeding 8 IN in depth, and compacted to 95 percent of standard lab density by mechanical means.

Before compaction, each lift shall be wetted or dried to bring the moisture content within 80 to 110 percent of optimum as determined according to AASHTO T 99 (Method C).

Once adjusting rings and castings have been set, backfilling shall continue, as described herein, from the top of the structure to the existing adjacent grade or finished surface.

All backfill material shall be deposited and compacted in such a manner as not to damage the structure, adjusting rings, or casting.

(h) Shaping, Trimming & Finishing

After backfilling has been completed, the top of the excavation shall be shaped, trimmed, and finished to the lines, grades, and elevations shown on the construction plans, in accordance with these technical specifications.

(i) Cleaning

All storm sewer structures shall be cleaned of any accumulation of silt, debris, or foreign matter of any kind, and shall be free from such accumulations at the time of final inspection.

MEASUREMENT

This work shall not be measured for payment, but shall be considered complete following inspection and acceptance of the work by the Department.

When this work includes construction of storm sewer structures, this work shall be paid for at the contract quantity and/or quantities shown on the basis of quote or basis of bid form for STORM SEWER STRUCTURES of the diameter, depth, material, and class and/or type specified in the contract documents, and with the type of casting, including frame and grate, frame and lid, or trash rack, specified in the contract documents. The entire quantity of STORM SEWER STRUCTURES necessary to complete the work shown on the construction plans shall have been used in computing such quantity.

When this work includes adjustment or reconstruction of storm sewer structures, and existing castings are to be used, this work shall be paid for at the contract quantity and/or quantities shown on the basis of quote or basis of bid form for ADJUSTMENT OF STORM SEWER STRUCTURES or RECONSTRUCTION OF STORM SEWER STRUCTURES of the diameter, depth, material, and class and/or type specified in the contract documents.

When this work includes adjustment or reconstruction of storm sewer structures, and new castings are to be used, this work shall be paid for at the contract quantity and/or quantities shown on the basis of quote or basis of quote form for ADJUSTMENT OF STORM SEWER STRUCTURES WITH NEW CASTINGS or RECONSTRUCTION OF STORM SEWER STRUCTURES WITH NEW CASTINGS of the diameter, depth, material, and class and/or type specified in the contract documents, and with the type of casting, including frame and grate, frame and lid, or trash rack, specified in the contract documents.

EXCAVATION FOR STORM SEWER STRUCTURES will be measured for payment in accordance with these technical specifications.

DEWATERING FOR STORM SEWER STRUCTURES will be measured for payment in accordance with these technical specifications.

STRUCTURE BEDDING FOR STORM SEWER STRUCTURES will be measured for payment in accordance with these technical specifications.

STRUCTURE BACKFILL FOR STORM SEWER STRUCTURES will be measured for payment in accordance with these technical specifications.

PAYMENT

Construction of STORM SEWER STRUCTURES shall be paid for at the contract unit price(s) per each for STORM SEWER STRUCTURES of the diameter, depth, material, and class and/or type specified in the contract documents, and with the type of casting, including frame and grate, frame and lid, or trash rack, specified in the contract documents.

Adjustment or reconstruction of STORM SEWER STRUCTURES, using existing castings, shall be paid for at the contract unit price(s) per each for ADJUSTMENT OF STORM SEWER STRUCTURES or RECONSTRUCTION OF STORM SEWER STRUCTURES of the diameter, depth, material, and class and/or type specified in the contract documents.

Adjustment or reconstruction of STORM SEWER STRUCTURES, using new castings, shall be paid for at the contract unit price(s) per each for ADJUSTMENT OF STORM SEWER STRUCTURES WITH NEW CASTINGS or RECONSTRUCTION OF STORM SEWER STRUCTURES WITH NEW CASTINGS of the diameter, depth, material, and class and/or type specified in the contract documents, and with the type of casting, including frame and grate, frame and lid, or trash rack, specified in the contract documents.

Such unit prices shall include all preparation necessary to complete the work, as well as the furnishing, transporting, and/or placing of all material, labor, tools, equipment, and other incidental items necessary to complete the work.

EXCAVATION FOR STORM SEWER STRUCTURES shall be paid for in accordance with these technical specifications.

DEWATERING FOR STORM SEWER STRUCTURES shall be paid for in accordance with these technical specifications.

STRUCTURE BEDDING FOR STORM SEWER STRUCTURES shall be paid for in accordance with these technical specifications.

STRUCTURE BACKFILL FOR STORM SEWER STRUCTURES shall be paid for in accordance with these technical specifications.

DRAIN TILE INVESTIGATION

DESCRIPTION

This work shall consist of locating existing drain tiles within the project site.

CONSTRUCTION REQUIREMENTS

Existing drain tiles in those areas where they are suspected to exist, as shown on the construction plans, and in other locations identified by the Engineer, shall be located by excavating an exploratory trench, in accordance with these technical specifications.

The exploratory trench shall be not less than 54 IN in depth, as measured from the existing adjacent grade. The width of the exploratory trench shall be sufficient to allow for proper investigation of the entire trench.

When an existing drain tile is encountered, additional exploratory trenches shall be excavated as needed to establish the alignment, size, and depth of the existing drain tile.

When an existing drain tile is encountered, the trench shall be inspected by the Engineer to determine what treatment, if any shall be applied to the existing drain tile. Broken drain tile shall be repaired as directed by the Engineer and no surface runoff or sediment shall be allowed to enter any existing drain tile.

After the trench has been inspected by the Engineer, and any necessary treatment has been applied to any existing drain tile, the excavated material shall be used to backfill the trench. Any excess excavated material shall be disposed of in accordance with these technical specifications and, following the completion of backfilling activities, the area shall be shaped, trimmed, and finished in accordance with these technical specifications.

MEASUREMENT

This work shall not be measured for payment, but shall be considered complete following inspection and acceptance of the work by the Department.

This work shall be paid for at the contract quantity for DRAIN TILE INVESTIGATION shown on the basis of quote or basis of bid form. The entire quantity of DRAIN TILE INVESTIGATION shown on the construction plans shall have been used in computing such quantity.

PAYMENT

This work shall be paid for at the contract unit price(s) per each for DRAIN TILE INVESTIGATION.

Such unit price(s) shall include all preparation necessary to complete the work, as well as the furnishing, transporting, and/or placing of all labor, tools, equipment, and other incidental items necessary to complete the work. The transportation of materials generated during such investigation work to fill areas, embankment locations, spoil disposal areas, or stockpile areas located on the project site shall also be considered as incidental to this work.

Other means of locating existing drain tiles, if approved by the Engineer, will be paid for according to Article 109.05.

**DIVISION 500
EROSION AND SEDIMENT CONTROL**

TEMPORARY CONSTRUCTION ENTRANCE

DESCRIPTION

This work shall consist of the creation of temporary construction entrances at the locations shown on the construction plans or where otherwise required to complete the work in accordance with the contract documents. This work shall also include maintaining temporary construction entrances throughout the performance of the work and restoring areas disturbed as a result of the installation and maintenance of such temporary construction entrances.

CONSTRUCTION REQUIREMENTS

Temporary construction entrances shall be confined to those locations indicated on the construction plans or as approved by the Engineer and shall avoid wetland areas. Where equipment or vehicles related to the performance of the work are operated on any portion of any public or private roadway adjacent to such temporary construction entrances, the Contractor shall maintain such roadway free from all dirt and debris at all times. If dirt or debris are carried on to such roadway by equipment or vehicles related to the performance of the work, the Contractor shall immediately clean the pavement of all dirt and debris.

MEASUREMENT

This work shall not be measured for payment, but shall be considered complete following inspection and acceptance of the work by the Department.

This work shall be paid for at the contract quantity for TEMPORARY CONSTRUCTION ENTRANCE shown on the basis of quote or basis of bid form. The entire quantity of TEMPORARY CONSTRUCTION ENTRANCE shown on the construction plans shall have been used in computing such quantity.

PAYMENT

This work shall be paid for at the contract unit price(s) per each for TEMPORARY CONSTRUCTION ENTRANCE.

Such unit price(s) shall include all preparation necessary to complete the work, as well as the furnishing, transporting, and/or placing of all labor, tools, equipment, and other incidental items necessary to complete the work.

DIVISION 600 LANDSCAPING

RESTORE DISTURBED AREA

DESCRIPTION

This work shall consist of preparation and furnishing, transporting, and placing topsoil and/or plant seed and, where required by the contract documents, erosion control blanket, over areas disturbed during the performance of the work, including, but not limited to, temporary construction entrances, construction access routes, swales, grassed waterways, and constructed wetlands. It shall include the restoration of those areas shown in the construction plans and, as directed by the Engineer, other areas disturbed during the performance of the work.

MATERIALS

Materials for the restoration of disturbed areas shall be in accordance with the following materials specifications, which are presented elsewhere in these Technical Specifications.

MATERIALS

- (1) Topsoil
- (2) Cover Crop
- (3) Grass Seed Mix
- (4) Grassed Waterway Seed Mix
- (5) Constructed Wetland Seed Mix
- (6) Erosion Control Blanket

CONSTRUCTION REQUIREMENTS

Restoration of the disturbed area shall begin by raking, scarifying, tilling, or blading the soil surface to a minimum of 3 in. deep to prepare the disturbed area for the placement of topsoil and/or plant seed. The soil surface shall be shaped, trimmed, and finished uniformly and blended into the existing adjacent grade. Topsoil may be placed over the disturbed area as needed to smooth out the soil surface, fill in ruts, wheel tracks, and depressions, and blend the disturbed area into the existing adjacent grade. Following preparation of the disturbed area, the soil surface shall have a relatively smooth appearance and shall be relatively free of dirt clods, rocks, sticks, and other irregularities.

Once the surface of the disturbed area has been prepared, the appropriate plant seed, as outlined below, shall be installed in the disturbed area.

PLANT SEED

- (1) Cover Crop Seed Mix. Cover crop seed mix shall be installed in areas disturbed during the performance of the work, as shown in the construction plans, including temporary construction entrances, construction access routes, and, as directed by the Engineer, other areas disturbed during the performance of the work.
- (2) Grass Seed Mix. Grass seed mix shall be installed in turf grass areas disturbed during the performance of the work, as shown on the construction plans.
- (3) Grassed Waterway Seed Mix. Grassed waterway seed mix shall be installed in grassed waterway areas disturbed during the performance of the work, as shown on the construction plans.
- (4) Constructed Wetland Seed Mix. Constructed wetland seed mix shall be installed in constructed wetland areas disturbed during the performance of the work, as shown on the construction plans.

The appropriate plant seed shall be installed in the disturbed area using seeding equipment or methods approved by the Engineer. If requested by the Contractor, the Engineer will consider the use of broadcast seeding or hydraulic seeding. Regardless of the seeding method used, the Contractor shall ensure that the disturbed area receives the appropriate plant seed at the seeding rates specified in these Technical Specifications.

Installation of plant seed in disturbed areas shall occur at appropriate times of the year under appropriate weather conditions. Plant seed shall only be installed between March 1 and June 30 or between September 1 and November 30, unless otherwise approved by the Engineer. Under no circumstances shall plant seed be installed when the ground surface is frozen or saturated.

After the appropriate plant seed has been installed in the disturbed area, the appropriate erosion control blanket, as outlined below, shall be installed over the disturbed area.

EROSION CONTROL BLANKET

- (1) NAG SC75BN Erosion Control Blanket. North American Green (NAG) SC75BN erosion control blanket, or equivalent, as approved by the Engineer, shall be installed over all disturbed areas located within the bottom of the swale (i.e., toe of slope to toe of slope), the bottom of the grassed waterway (i.e., toe of slope to toe of slope), and all other disturbed areas to be restored and located on slopes of 3:1 (H:V) or steeper.

In order to prevent erosion of the underlying soil surface and washout of the underlying plant seed, the erosion control blanket shall be installed within 24 hours of the installation of the plant seed.

The erosion control blanket shall be installed in accordance with the manufacturer's instructions. It shall be layed out flat, evenly, and smoothly over the disturbed area, without stretching the blanket. If the height of the slope of the disturbed area is greater than 4 ft., the erosion control blanket shall be installed vertically up the slope, perpendicular to the streambank. If the height of the slope of the disturbed area is 4 ft. or less, the erosion control blanket shall be installed horizontally along the slope, parallel to the streambank. If the disturbed area is located within a swale, gully, or stream channel, the erosion control blanket shall be installed parallel to the centerline of the swale, gully, or stream channel, so that there are no perpendicular seams within the swale, gully, or stream channel or longitudinal seams within 2 ft. of the bottom (i.e., invert) of the swale, gully, or stream channel.

Erosion control blanket of insufficient width or length to fully cover the disturbed area shall be lapped or sewn. Overlaps in the erosion control blanket, whether such overlaps will be lapped or sewn, shall be placed so that any upslope section of erosion control blanket will overlap the downslope section. The minimum overlap for lapped sections is 12 in. and the minimum overlap for sewn sections is 4 in. When sewn, overlapped sections of erosion control blanket shall be stitched together at a minimum rate of one stitch per 1.5 in. with the same thread used to manufacture the erosion control blanket, as described in these Technical Specifications.

The erosion control blanket shall be placed in firm contact with the underlying soil surface and then fastened to the underlying soil surface with minimum 6 in. long staples, in accordance with the manufacturer's recommended staple pattern. Each end of the erosion control blanket shall then be anchored to the underlying soil surface in a minimum 12 in. deep by minimum 6 in. wide trench, as shown on the construction plans.

MEASUREMENT

The restoration of all areas disturbed during performance of the work and the various items of work involved, including, but not limited to, temporary construction entrances, construction access routes, swales, grassed waterways, constructed wetlands, and other areas disturbed during the performance of the work shall be considered as incidental to the work and the various items of work involved and will not be measured for payment.

PAYMENT

The restoration of all areas disturbed during performance of the work and the various items of work involved will not be paid for directly but shall be considered as included in the various other items of work involved and shall be included in the unit prices for such items and no additional compensation will be allowed.

**DIVISION 700
INCIDENTAL CONSTRUCTION**

ROAD CUT & REPAIR

DESCRIPTION

This work shall consist of cutting existing pavement to allow for the excavation of trenches in the subgrade of an existing pavement, curb, gutter, curb and gutter, stabilized shoulder, driveway, or sidewalk for the purpose of installing drain tiles. This work also includes furnishing, transporting, and placing trench backfill the final backfilling of all trenches located in the subgrade of an existing pavement, curb, gutter, curb and gutter, stabilized shoulder, driveway, or sidewalk. It also includes restoration of the existing pavement, curb, gutter, curb and gutter, stabilized shoulder, driveway, or sidewalk.

CONSTRUCTION REQUIREMENTS

This work shall be completed in accordance with the Porter County Supplemental Design and Construction Standards/Specifications and these technical specifications. In case of conflict between these technical specifications and any part or parts of said Porter County Supplemental Design and Construction Standards/Specifications, the Engineer shall determine which specifications shall take precedence and govern.

Road cuts shall be made no wider than the width of the trench required to install the drain tile, in accordance with these technical specifications. Road cuts shall be made by sawing the existing pavement with a concrete saw.

Once the road cut has been made, drain tile installation may proceed in accordance with these technical specifications.

After initial backfilling has been completed, the remainder of the trench shall be backfilled to within 4 IN of the existing adjacent grade or finished surface as rapidly as the condition of the drain tile will permit. The backfill material shall consist of trench backfill meeting the requirements of these technical specifications.

The existing pavement, curb, gutter, curb and gutter, stabilized shoulder, driveway, or sidewalk shall then be restored in accordance with the Porter County Supplemental Design and Construction Standards/Specifications.

MEASUREMENT

This work shall not be measured for payment, but shall be considered complete following inspection and acceptance of the work by the Department.

This work shall be paid for at the contract quantity for ROAD CUT & REPAIR shown on the basis of quote or basis of bid form. The entire area designated for ROAD CUT & REPAIR on the construction plans shall have been used in computing such quantity.

PAYMENT

This work shall be paid for at the contract unit price per square yard for ROAD CUT & REPAIR.

Such unit price shall include all preparation necessary to complete the work, as well as the furnishing, transporting, and/or placing of all labor, tools, equipment, and other incidental items necessary to complete the work.

DEWATERING**DESCRIPTION**

This work shall consist of implementation of an approved dewatering plan, which shall have been prepared by the Contractor, submitted to the Engineer for approval, and approved by the Engineer prior to the start of the work.

In accordance with the approved dewatering plan, this work shall include preparation, earthwork, and furnishing, transporting, and placing materials to construct dewatering structures (e.g., dewatering sump, dewatering bag) and furnishing, transporting, placing, and operating dewatering equipment (e.g., bypass pump, evacuation pump) in order to complete the work in accordance with the construction plans. This work shall also include maintaining dewatering structures and equipment during the performance of the work, removing dewatering structures and equipment prior to completion of the work, and restoring areas disturbed as a result of the installation and removal of dewatering structures and equipment.

MATERIALS

Materials shall be in accordance with the approved dewatering plan.

SUBMITTALS

Prior to the start of the work, the Contractor shall develop a dewatering plan and shall submit such dewatering plan to the Engineer for approval. Approval of the dewatering plan is required prior to the start of the work. The Contractor shall coordinate with the Engineer as needed to develop such dewatering plan.

In accordance with these technical specifications, drain tiles and storm sewer structures shall be constructed in excavations free of water. Excavations shall be dewatered through the use of diversion channels or other methods approved by the Engineer before proceeding with the construction.

In order to create the dry conditions necessary to construct drain tiles and storm sewer structures surface and groundwater flows moving through a work area may be temporarily reduced by isolating and pumping around the work area using check dams and bypass pump(s) installed in a dewatering sump, or other methods approved by the Engineer. Following isolation, work areas may be dewatered using an evacuation pump(s) or other methods approved by the Engineer.

If dewatering will be used to create the dry conditions necessary to construct drain tiles and storm sewer structures, work areas shall be isolated using non-erodible materials, such as rock, sandbags, or pre-fabricated rigid cofferdams, and such dewatering shall be performed in a manner that maintains flow downstream of the work area. If dewatering will be used, dewatering pump discharge locations shall be adequately protected from erosion. Discharges shall be routed through an appropriate sediment control measure (e.g., dewatering bag, rock apron), approved by the Engineer, and, if necessary, treated with an appropriate anionic polymer treatment system (e.g., floc log, coir fiber roll), before being routed downstream.

CONSTRUCTION REQUIREMENTS

Construction shall be in accordance with the approved dewatering plan.

MEASUREMENT

This work shall not be measured for payment, but shall be considered complete following inspection and acceptance of the work by the Department.

This work shall be paid for at the contract quantity for DEWATERING shown on the basis of quote or basis of bid form.

PAYMENT

This work will be paid for at the contract unit price per lump sum for DEWATERING.

Such unit price shall include all preparation and earthwork necessary to complete the work, as well as the furnishing, transporting, and placing of all materials and the furnishing, transporting, placing, and operation of all equipment necessary to complete the work. The preparation of a dewatering plan, maintenance of dewatering structures and equipment during performance of the work, the removal of dewatering structures and equipment

prior to completion of the work, and the transportation and disposal of items resulting from the removal of dewatering structures and equipment shall also be considered as incidental to this work. The restoration of areas disturbed as a result of the installation and removal of dewatering structures and equipment shall also be considered as incidental to this work.

**DIVISION 1000
MATERIALS****STRUCTURE BEDDING**

Structure bedding shall be natural sand or crushed stone, dolomite, or gravel, INDOT No. 23 or No. 24 fine aggregate.

BEDDING & INITIAL BACKFILL

Bedding and initial backfill shall be crushed stone, dolomite, or gravel, INDOT No. 5, No. 8, No. 9, No. 53, or No. 73 coarse aggregate.

TRENCH BACKFILL

Trench backfill shall be crushed stone, dolomite, or gravel, INDOT No. 53, or No. 73 coarse aggregate.

STRUCTURE BACKFILL

Structure backfill shall be natural sand or crushed stone, dolomite, or gravel, INDOT No. 23 or No. 24 fine aggregate.

DRAIN TILE**(1) Flexible Pipe****a. High Density Polyethylene (HDPE) Pipe, Type DWS (Dual Wall, Solid)**

High Density Polyethylene (HDPE) Pipe, Type DWS (Dual Wall, Solid), shall be water tight reinforced integral bell and gasketed spigot pipe in accordance with ASTM F2306/AASHTO M294. Pipe joints shall be in accordance with ASTM F2306/AASHTO M294 and shall be water tight in accordance with ASTM D3212. Pipe fittings shall be in accordance with ASTM F2306/AASHTO M294. Installation shall be in accordance with ASTM D2321 and the manufacturer's specifications.

PERFORATED DRAIN TILE**(1) Flexible Pipe****a. High Density Polyethylene (HDPE) Pipe, Type SWP (Single Wall, Perforated)**

High Density Polyethylene (HDPE) Pipe, Type SWP (Single Wall, Perforated), shall be soil tight pipe in accordance with ASTM F667. Pipe joints shall be made with split or snap couplings in accordance with ASTM F667. Pipe fittings shall be in accordance with ASTM D3350. Installation shall be in accordance with ASTM D2321 and the manufacturer's specifications.

PRECAST REINFORCED CONCRETE STORM SEWER STRUCTURES

Precast reinforced concrete storm sewer structures shall be in accordance with ASTM C478/AASHTO M199.

COVER CROP SEED MIX

Cover crop seed shall be in accordance with the following.

DESCRIPTION

Cover crop seed shall be healthy, with an origin as close as possible to the project site.

QUALITY

All cover crop seed shall be handled and packed in a manner appropriate for the particular plant species included in the seed mix, with regard for the soil and climate conditions present at the time and place of packing, the soil and climate conditions present at the project site, the time that the plant seed will be in transit to the project site, and for the time that the plant seed will be in storage at the project site. All precautions customary to good trade practices shall be taken to ensure that the cover crop seed is delivered to the site in good and healthy condition. Inspection shall occur at the time of delivery for disease and insect infestation, in accordance with all applicable state and federal laws.

Seeding shall occur promptly following delivery of the cover crop seed. If seeding will be significantly delayed following delivery, precautions shall be taken to protect the cover crop seed and maintain its healthy condition. Seed shall be stored in a shaded area when ambient temperatures exceed 72°F.

SPECIES

COVER CROP SEED MIX

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>LB/AC</u>
COVER CROP (MARCH 1 – JUNE 30)		
<i>Avena sativa</i>	Seed oats	32.0
<i>Lolium multiflorum</i>	Annual rye	<u>32.0</u>
		64.0
COVER CROP (SEPTEMBER 1 – NOVEMBER 30)		
<i>Triticum aestivum</i>	Winter wheat	32.0
<i>Lolium multiflorum</i>	Annual rye	<u>32.0</u>
		64.0

GRASS SEED MIX

Grass seed shall be INDOT Seed Mixture R, plus cover crop, in accordance with the following.

DESCRIPTION

Grass seed shall be healthy, with an origin as close as possible to the project site.

QUALITY

All grass seed shall be handled and packed in a manner appropriate for the particular plant species included in the seed mix, with regard for the soil and climate conditions present at the time and place of packing, the soil and climate conditions present at the project site, the time that the plant seed will be in transit to the project site, and for the time that the plant seed will be in storage at the project site. All precautions customary to good trade practices shall be taken to ensure that the grass seed is delivered to the site in good and healthy condition. Inspection shall occur at the time of delivery for disease and insect infestation, in accordance with all applicable state and federal laws.

Seeding shall occur promptly following delivery of the grass seed. If seeding will be significantly delayed following delivery, precautions shall be taken to protect the grass seed and maintain its healthy condition. Seed shall be stored in a shaded area when ambient temperatures exceed 72°F.

SPECIES

GRASS SEED MIX

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>LB/AC</u>
<i>Festuca arundinacea</i> “Kentucky 31”	Kentucky 31 tall fescue	95.0
<i>Lolium perenne</i>	Perennial ryegrass	65.0
<i>Festuca rubra</i> “Jasper II”	Jasper II red fescue	<u>10.0</u>
		170.0
COVER CROP (MARCH 1 – JUNE 30)		
<i>Avena sativa</i>	Seed oats	32.0
<i>Lolium multiflorum</i>	Annual rye	<u>32.0</u>
		64.0
COVER CROP (SEPTEMBER 1 – NOVEMBER 30)		
<i>Triticum aestivum</i>	Winter wheat	32.0
<i>Lolium multiflorum</i>	Annual rye	<u>32.0</u>

GRASSED WATERWAY SEED MIX

Grassed waterway seed shall be in accordance with the following.

DESCRIPTION

Grassed waterway seed shall be healthy, with an origin as close as possible to the project site.

QUALITY

All grassed waterway seed shall be handled and packed in a manner appropriate for the particular plant species included in the seed mix, with regard for the soil and climate conditions present at the time and place of packing, the soil and climate conditions present at the project site, the time that the plant seed will be in transit to the project site, and for the time that the plant seed will be in storage at the project site. All precautions customary to good trade practices shall be taken to ensure that the grassed waterway seed is delivered to the site in good and healthy condition. Inspection shall occur at the time of delivery for disease and insect infestation, in accordance with all applicable state and federal laws.

Seeding shall occur promptly following delivery of the grassed waterway seed. If seeding will be significantly delayed following delivery, precautions shall be taken to protect the grassed waterway seed and maintain its healthy condition. Seed shall be stored in a shaded area when ambient temperatures exceed 72°F.

SPECIES

GRASSED WATERWAY SEED MIX

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>LB/AC</u>
<i>Festuca arundinacea</i> "Kentucky 31"	Kentucky 31 tall fescue	35.0
<i>Lolium multiflorum</i>	Annual rye	8.0
<i>Avena sativa</i>	Seed oats	<u>32.0</u>
		75.0
 COVER CROP (MARCH 1 – JUNE 30)		
<i>Avena sativa</i>	Seed oats	32.0
<i>Lolium multiflorum</i>	Annual rye	<u>32.0</u>
		64.0
 COVER CROP (SEPTEMBER 1 – NOVEMBER 30)		
<i>Triticum aestivum</i>	Winter wheat	32.0
<i>Lolium multiflorum</i>	Annual rye	<u>32.0</u>
		64.0

CONSTRUCTED WETLAND SEED MIX

Constructed wetland seed shall be in accordance with the following.

DESCRIPTION

Constructed wetland seed shall be healthy, with an origin as close as possible to the project site.

QUALITY

All constructed wetland seed shall be handled and packed in a manner appropriate for the particular plant species included in the seed mix, with regard for the soil and climate conditions present at the time and place of packing, the soil and climate conditions present at the project site, the time that the plant seed will be in transit to the project site, and for the time that the plant seed will be in storage at the project site. All precautions customary to good trade practices shall be taken to ensure that the constructed wetland seed is delivered to the site in good and healthy condition. Inspection shall occur at the time of delivery for disease and insect infestation, in accordance with all applicable state and federal laws.

Seeding shall occur promptly following delivery of the constructed wetland seed. If seeding will be significantly delayed following delivery, precautions shall be taken to protect the constructed wetland seed and maintain its healthy condition. Seed shall be stored in a shaded area when ambient temperatures exceed 72°F.

SPECIES

CONSTRUCTED WETLAND SEED MIX

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>LB/AC</u>
<i>Elymus virginicus</i>	Virginia wildrye	2.0
<i>Sorghastrum nutans</i>	Indiangrass	1.0
<i>Andropogon gerardi</i>	Big bluestem	1.0
<i>Desmodium canadense</i>	Showy tick trefoil	1.0
<i>Liatris spicata</i>	Marsh blazing star	1.0
<i>Helianthus grosseserratus</i>	Sawtooth sunflower	1.0
<i>Enchinacea purpurea</i>	Purple coneflower	1.0
<i>Rudbeckia hirta</i>	Black-eyed susan	1.0
<i>Senna hebecarpa</i>	Wild senna	<u>0.3</u>
		9.3

COVER CROP (MARCH 1 – JUNE 30)

<i>Avena sativa</i>	Seed oats	32.0
<i>Lolium multiflorum</i>	Annual rye	<u>32.0</u>
		64.0

COVER CROP (SEPTEMBER 1 – NOVEMBER 30)

<i>Triticum aestivum</i>	Winter wheat	32.0
<i>Lolium multiflorum</i>	Annual rye	<u>32.0</u>
		64.0

TOPSOIL

Topsoil shall be loamy soil from the “A horizon” of the soil profile and shall be relatively free from large plant material, roots, sticks, rocks, and other materials larger than 0.5 in. in diameter and other litter or waste. 90 percent of the topsoil shall pass a No. 10 sieve (i.e., 0.0787 in.). It shall have an organic content of between one and ten percent, its pH shall be between 5.5 and 8.0, and it shall be capable of germinating native plant material.

To the maximum extent practicable, all topsoil to be used on the project site shall be obtained from the project site. If additional topsoil is required to complete the work in accordance with the contract documents, the Contractor shall furnish and transport the required additional topsoil from locations other than the project site. Should topsoil from locations other than the project site be required in order to complete the work in accordance with the contract documents, the Contractor shall notify the Engineer of such need and shall name the source of such topsoil prior to the delivery of such topsoil to the project site.

EROSION CONTROL BLANKET

Erosion control blanket shall be in accordance with the following.

NAG SC75BN EROSION CONTROL BLANKET

Erosion control blanket shall be North American Green (NAG) SC75BN erosion control blanket, or equivalent, as approved by the Engineer.

The blanket shall be a machine-produced, 100% biodegradable blanket consisting of a 100% agricultural straw fiber matrix with a functional longevity of approximately 12 months. The blanket shall have a consistent thickness, with the straw fiber evenly distributed over the entire surface of the blanket.

The blanket shall be covered on the top only with a 100% biodegradable woven natural organic fiber (e.g., jute fiber) netting. The netting shall consist of machine-produced directional strands formed from two intertwined yarns. Cross directional strands shall be interwoven through the intertwined yards of one another, commonly referred to as a leno weave, to form a mesh measuring approximately 0.5 inch by 1.0 inch. Within the bottom netting, cross directional strands shall be woven into one another, commonly known as a simple weave, to form a mesh measuring approximately 0.5 inch by 1.0 inch. The blanket shall be sown together with biodegradable thread on 1.5 inch centers.

The blanket shall have the following properties.

- (1) Matrix. The content of the matrix shall be 100% agricultural straw fiber, with a density of 0.50 pounds per square yard (0.50 lb./sq. yd.).
- (2) Top Netting. The netting shall be located on the top side of the blanket only. The netting shall consist of a leno woven 100% biodegradable organic fiber (e.g., jute fiber) with a mesh size of 0.5 inch by 1.0 inch and an approximate weight of 9.3 pounds per 1,000 square feet (9.3 lb./msf).
- (3) Thread. Biodegradable.
- (4) Stitch Spacing. 1.5 inches on center (1.5 in./O.C.).

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