

APPENDIX A: INFRASTRUCTURE SPECIFICATIONS AND STANDARDS

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EXCAVATION AND BACKFILL FOR UNDERGROUND CONDUITS

§ 1-1 DESCRIPTION.

(A) For the purpose of this section, underground conduits shall be considered sewer pipe, water main, culverts, or any other pipe conduits indicated on the plans. Wherever the term "pipe" or "pipe line" is used, it shall mean underground conduit.

(B) Excavation and backfill shall include all excavation

backfilling, compacting, disposal of surplus material, restoration of

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all disturbed surface, and all other work incidental to the construction of trenches, including any additional excavation which may be required for manholes or other structures forming a part of the pipe line.

§ 1-2 CONSTRUCTION DETAILS.

1-2.01 Surface Removal:

Along the proposed pipe lines as indicated on the plans, the contractor shall remove the surface materials only to such widths as will permit a trench to be excavated which will afford sufficient room for proper efficiency and proper construction. Where sidewalks, driveways, pavements and curb and gutter are encountered, care shall be taken to protect against fracture or disturbance beyond reasonable working limits. In areas specified on the plans, the top 12 inches shall be piled separately and preserved so that it may be restored after the remainder of the backfill is replaced.

1-2.02 Excavation by Hand or Machine:

When working space will permit, trenches may be excavated by machine, provided that by so doing, public and private improvements will not be subjected to an unreasonable amount of damage. If, however, excavation by machine methods cannot be made without material damage being done to public and private improvements, hand excavation shall be employed.

1-2.03 Width of Excavation:

(A) The bottom of the trench at and below the top of the pipe and inside the sheeting and bracing, if used, shall not exceed the following widths:

<i>Pipe Size</i>	<i>Width</i>	<i>Pipe Size</i>	<i>Width</i>	<i>Pipe Size</i>	<i>Width</i>
6"	2'6"	27"	4'3"	66"	9'1"
8"	2'6"	30"	4'7"	72"	9'8"
10"	2'6"	33"	5'4"	78"	10'3"
12"	2'8"	36"	5'8"	84"	10'10"
15"	2'10"	42"	6'3"	90"	11'5"

18"	3'2"	48"	6'10"	96"	12'0"
21"	3'8"	54"	7'11"	102"	12'7"
24"	4'0"	60"	8'6"	108"	13'2"

Note: The strength or class of pipe shall be as indicated on the plans or special provisions.

(B) Trench sheeting and bracing or a trench shield shall be used as required by the rules and regulation of O.S.H.A. The bottom of the trench excavation shall conform to the details shown on the plan.

1-2.04 Excavation Below Grade:

In cases where the excavation is carried beyond or below the lines and grades given by the Engineer, the Contractor shall refill all such excavated space with suitable granular material.

1-2.05 Rock Excavation:

Whenever "rock" is used as the name of an excavated material, it shall mean boulders or pieces of rock, concrete, or masonry measuring one-half ($\frac{1}{2}$) cubic yard or more, hard shale or solid ledge rock and masonry which, in the opinion of the Engineer, requires for its removal the continuous use of pneumatic tools or drilling or blasting.

1-2.06 Braced and Sheeted Trenches:

(A) Open-cut trenches shall be sheeted and braced or otherwise protected as required by any governing federal, state or county laws and municipal ordinances, and as may be necessary to protect life, property, or the work. In any event, the minimum protection shall conform to the recommendations in O.S.H.A. Safety and Health Standards for Construction. A sand box or trench shield may be used in lieu of sheeting as permitted by O.S.H.A. and approved by the Engineer. When close-sheeting is used, it shall be so driven as to prevent adjacent soil from entering the trench either below or through such sheeting.

(B) Where sheeting and bracing are used, the trench width shall be increased accordingly. The Engineer may order the sheeting driven to the full depth of the trench or to such additional depth as may be required for the protection of the work. Where soil in the lower limits of the trench has the necessary stability to meet the O.S.H.A. Standards, the Engineer, at his discretion, may permit the contractor to stop the driving of sheeting at such designated elevation above the trench bottom. The granting of permission by the Engineer, however, shall not relieve the Contractor in any degree from his full responsibility under the contract. Sheeting and bracing which have been ordered left in place shall be cut off at the elevation ordered by the Engineer. Trench bracing, except that ordered left in place, may be removed when the backfilling has reached the respective levels of such bracing. Sheeting, except that ordered left in place, may be removed after the backfilling has been completed or has been brought to such an elevation as to permit its safe removal.

1-2.07 Trenches With Sloping Sides, Limited:

The Contractor may, at his option, where working conditions and right-of-way permit (as determined by the Engineer), excavate pipeline trenches with sloping sides, but with the following

limitations:

(A) In general, only braced and vertical trenches will be permitted in traveled streets, alleys or narrow easements.

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(B) Where trenches with sloping sides are permitted, the slopes shall not extend below the top of the sewer, and trench excavations below this point shall be made with vertical sides with widths not exceeding those specified herein for the various sizes of pipe.

1-2.08 Short Tunnels:

In some instances, trees, fire hydrants, sidewalks and other obstructions may be encountered, the proximity of which may be a hindrance to open cut excavation. In such cases, the Contractor shall excavate by means of short tunnels in order to protect such obstructions against damage.

1-2.09 Piling Excavated Material:

All excavated material shall be piled in a manner that will not endanger the work and that will avoid obstructing streets, alleys, sidewalks and driveways. Fire hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clear or other satisfactory provisions made for street drainage. Natural watercourses shall not be obstructed.

1-2.10 Removal of Water:

The Contractor shall, at all times during construction, provide and maintain ample means and devices with which to promptly remove and properly dispose of all water entering the excavations or other parts of the work until all work to be performed therein has been completed. No sanitary sewer shall be used for disposal of trench water.

1-2.11 Safety:

(A) Barricades, Guards and Safety Provisions. To protect persons from injury and to avoid property damage, adequate barricades, construction signs, torches, red lanterns and guards, as required, shall be placed and maintained by the Contractor at his expense during the progress of the construction work and until it is safe for traffic to use the roads and streets. All material piles, equipment and pipe which may serve as obstructions to traffic shall be protected by proper lights when the visibility is poor. The rules and regulations of O.S.H.A. and appropriate authorities respecting safety provisions shall be observed.

(B) Structure Protection. Temporary support, adequate protection and maintenance of all underground and surface structures, water mains, drains, sewers and other obstructions encountered in the progress of the work shall be furnished by the Contractor under the direction of the Engineer. The structures which may have been

disturbed shall be restored upon completion of the work.

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(C) Protection of Property and Surface Structures. Trees, shrubbery, fences, poles and all other property and surface structures shall be protected during construction operations unless their removal for purposes of construction is authorized by the Engineer. Any fences, poles, or other man made surface improvements which are moved or disturbed by the Contractor shall be restored to the original conditions after construction is completed. Any trees, shrubbery, or other vegetation, which are approved for removal or ordered for removal by the Engineer in order to facilitate construction operations, shall be removed completely, including stumps and roots, by the Contractor. Responsibility for any damage or claims for damage caused by construction operations to shrubbery or other landscape improvements which were not authorized for removal by the Engineer shall be assumed by the Contractor.

1-2.12 Deviations Occasioned by Other Structures or Utilities:

Whenever obstructions are encountered during the progress of the work and interfere to such an extent that an alteration in the plan is required, the Engineer shall have the authority to approve the plans and order a deviation from the line and grade or arrange with the owners of the structures for the removal, relocation or reconstruction of the obstructions. Where gas, water, telephone, electrical, hot water, steam, or other existing utilities are an impediment to the vertical or horizontal alignment of the proposed pipe line, the engineer shall require a change in grade or alignment or shall direct the Contractor to arrange with the owners of the utilities for their removal.

1-2.13 Interruption to Utilities:

(A) The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures may be determined. Prior to proceeding with trench excavation, the Contractor shall contact all utility companies in the area to aid in locating their underground services.

(B) The Contractor shall take all reasonable precautions against damage to existing utilities. However, in the event of a break in an existing water main, gas main, sewer or underground cable, he shall immediately notify the responsible official of the organization operating the utility interrupted. The Contractor shall lend all possible assistance in restoring services and shall assume all cost, charges, or claims connected with the interruption and repair of such services if the location of the utility was marked by the owner thereof prior to excavation.

1-2.14 Maintenance of Traffic and Closing of Streets:

The Contractor shall carry on the work in a manner which will cause a minimum of interruption to traffic, and may not close a street to

through travel without the express approval of the Director of Operations. Where traffic must cross open trenches, the Contractor shall provide suitable bridges at street intersections and driveways. The

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Contractor shall post, where directed by the Engineer, suitable signs indicating that a street is closed and necessary detour signs for the proper maintenance of traffic. Prior to closing any driving lanes of a street, the Contractor shall notify responsible municipal authorities; including the Director of Operations, Police, Fire and School.

1-2.15 Construction in Easements:

In easements across private property, the Contractor shall be responsible and liable for all damage outside of the easement area. Trees, fences, shrubbery or other types of surface improvements located in the easements will require protection during construction. The provisions of § 1-2.11(C) above shall apply to all easement areas as well as to public rights-of-way. Precautions shall be taken by adequate sheeting or other approved methods to prevent any cave-in or subsidence beyond the easement limits or damage to improvements within the easement. In general, the easement area is intended to provide reasonable access and working area for efficient operation by the Contractor. Where easement space for the efficient operation is not provided, the Contractor shall be responsible for organizing his operations to perform within the restrictions indicated.

1-2.16 Underground Conduit Constructed in Tunnel:

(A) Where required by the Engineer, pipe lines shall be constructed in tunnel. This work will be conducted in accordance with requirements of any permits obtained by the owner from railroads or state or county highway departments for tunnel work or in accordance with the following requirements:

(1) Materials. Pipe materials shall be shown on the plans or as described in the special provisions.

(2) Excavation and Laying. Requirements for excavation, laying, and joints shall be those applicable for the type of pipe line involved, unless otherwise specified.

(3) Methods of Construction.

(a) The tunnel shall be only of sufficient width and height to provide free working space. The sides and roof of the tunnel shall be braced sufficiently to support the external loads and to prevent caving, bulging, and settling of the earth.

(b) The Contractor shall backfill all tunnels with well-compacted sand, fine gravel or stone screenings as rapidly as the conditions permit.

(c) The backfill material shall be deposited in the tunnel in such a manner as not to injure or disturb the pipe. The

filling of the tunnel shall be carried on simultaneously on both sides of the pipe in such a manner that injurious side pressures do not occur. Special care shall be taken to compact the backfill under the haunches

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of the pipe. The remainder of the tunnel, or such portion of the remainder as may be possible, shall then be backfilled by one of the following methods, at the option of the Contractor, if in the opinion of the Engineer the method is practicable.

1. The material shall be deposited in uniform layers not to exceed 12 inches thick (loose measure) and such layer either inundated or deposited in water; or

2. The tunnel shall be backfilled with loose material or only partly backfilled at a time, if necessary, and settlement secured in either case by introducing water through holes jetted into the material to a point approximately two feet above the top of the pipe.

(d) If neither of the above methods is practicable or can be used for only a portion of the backfill, the remainder of the tunnel shall be completely backfilled with material carefully deposited in layers and each layer compacted by ramming or tamping with tools approved by the Engineer.

(e) When sheeting and bracing have been used, sufficient bracing shall be left across the trench as the backfilling progresses to hold the sides and top firmly in place without caving or settlement before the backfilling has been placed. This bracing may be removed as soon as practicable.

(f) Any depressions which may develop within the area involved in the construction operations due to settlement of the backfilling material shall be filled in a manner meeting the approval of the Engineer.

(4) Use of Casing Pipe. The Contractor may, subject to the approval of the Engineer, use metal casing pipe as a tunnel liner in place of timber shoring for tunnel sections. The diameter, gauge and type of such pipe, method of placing and method of installing pipe within it shall be subject to the approval of the Engineer. The entire void space between tunnel liners and pipe shall be filled with compacted sand or other approved material if such method of construction is used.

(5) Jacking or Boring of Pipe. The Contractor may, subject to the approval of the Engineer, use special cast iron or specially designed reinforced concrete pipe jacked and/or bored into position with or without tunnel liners, for tunneled sections of pipe. In such cases, all conditions of performance of the work shall be subject to the approval of the Engineer.

(A) The trench shall be excavated to an elevation of four inches below the bottom of the pipe and so that the flow line of the finished sewer will be at the depth and grade specified or established by the Engineer.

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(B) Well compacted moist fine aggregate bedding material, at least four inches in depth below the pipe, shall be placed the entire width of the trench and for the length of the pipe. The fine aggregate shall meet the approval of the Engineer and shall be compacted to his satisfaction by ramming or tamping with tools approved by the Engineer.

(C) When pipe having bells or hubs is used, cross trenches, not more than two inches wider than the bell or hub, shall be excavated to provide uniform bearing along the length of the pipe.

(D) If the excavation has been made deeper than necessary, the foundation shall be brought to the proper grade by the addition of well compacted bedding material.

(E) Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unsuitable soil, all such unsuitable soil under the pipe and for the width of the trench shall be removed and replaced with well compacted bedding material.

(F) Where rock, in either ledge or boulder formation, is encountered, it shall be removed below grade and replaced with a cushion of well compacted bedding material having a thickness under the pipe of not less than eight inches.

(G) Concrete Cradle. Where sub-grade conditions, in the opinion of the Engineer, warrant extra precautions for the bedding of pipe, the Engineer may require the construction of a concrete cradle to be installed in conformance with the size and dimensions indicated on the plans. All concrete used in concrete cradle shall have a minimum compressive strength of 2,500 psi at 28 days.

1-2.18 Backfill:

(A) As soon as the condition of the pipe will permit, the entire width of the trench shall be backfilled, with moist fine aggregate to a height of at least the elevation of the center of the pipe. The fine aggregate shall be placed longitudinally along the pipe. The elevation of the backfill material on each side of the pipe shall be the same. Special care shall be taken to completely fill the space under the pipe. The fine aggregate backfill material shall be placed in four inch layers, loose measurement, and compacted to the satisfaction of the Engineer by ramming or tamping with tools approved by the Engineer. The fine aggregate used for backfilling shall meet the approval of the Engineer.

(B) The remainder of the trench and excavation shall be backfilled to the natural line or finished surface as rapidly as the condition of the sewer will permit. The backfill material shall consist of the excavated material or trench backfill as herein

specified. All backfill material shall be deposited in the trench or excavation in such a manner as not to damage the sewer. The filling of the trench shall be carried on simultaneously on both sides of the pipe in such a manner that injurious side pressures do not occur. The backfill for trenches and

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excavation made in the sub-grade of the proposed improvement, and for all trenches outside of the sub-grade where the inner edge of the trench is within two feet of the edge of the proposed pavement, curb, gutter, curb and gutter, stabilized shoulder or sidewalk, shall be made with trench backfill material unless the excavated material meets the requirements of § 211 of the Indiana State Highway Standard Specifications.

(C) All backfill material up to a height of 12 inches above the pipe shall be carefully deposited in uniform layers not exceeding four inches thick (loose measure). The material in each layer shall be firmly compacted by ramming or tamping with tools approved by the Engineer, in such a manner as not to disturb or injure the pipe. The backfilling above this height shall be done by Method 1, 2 or 3 below.

(D) When required, trench backfill material or excavated material meeting the requirements of § 211 of the Indiana State Highway Specifications above the first 12 inches above the pipe shall be compacted by either Method 2 or Method 3 specified below, or in accordance with Method 1 except that the compacted lifts shall not exceed four inches in thickness.

Method 1: The material shall be deposited in uniform layers not exceeding twelve 12 inches thick (loose measure) and each layer shall be compacted by ramming or tamping with tools approved by the Engineer.

Method 2: The material shall be deposited in uniform layers not exceeding 12 inches thick (loose measure), and each layer shall be either inundated or deposited in water.

Method 3: The trench shall be backfilled with loose material and settlement secured by introducing water through holes jetted into the backfill to a point approximately two feet above the top of the pipe. The holes shall be spaced as directed by the Engineer, but shall not be any further than six feet apart.

(E) The water shall be injected at a pressure just sufficient to sink the holes at a moderate rate of speed. The pressure shall be such that the water will not cut cavities in the backfill material nor overflow the surface. If water does overflow the surface, it shall be drained into the jetted holes by means of shallow trenches. Water shall be injected as long as it will be absorbed by the backfill material and until samples taken from test holes in the trench show a satisfactory moisture content. The Contractor shall bore the test holes not more than 50 feet apart and at such other locations in the trench designated by the Engineer. As soon as the water soaking has been completed, all holes shall be filled with soil

and compacted by ramming with a tool approved by the Engineer.

(F) Backfill material which has been water soaked shall be allowed to settle and dry for at least ten days before any surface course or pavement is constructed on it. The length of time may be altered if deemed desirable by the Engineer.

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(G) Where the inner edge of the trench is within two feet of the edge of the proposed pavement, curb, gutter, or curb and gutter, the provisions of this paragraph shall also apply.

(H) At the end of the settling and, drying period, the crusted top of the backfill material shall be scarified and, if necessary, sufficient backfill material added, as specified in Method 1, to complete the backfilling operations.

(I) The method used for backfilling and compacting the backfilling material will be the choice of the Contractor. However, if the method used does not produce results satisfactory to the Engineer, the Contractor will be required to alter or change the method being used so that the resultant backfill will be satisfactory to the Engineer.

RESTORATION OF SURFACES

§ 2-1 General.

Restoration of surfaces shall include the removal of the existing surface, the disposal of surplus material, and the construction of new surfaces as indicated on the plans or special provisions. The type of surface restoration required shall be shown on the plans or described in the special provisions.

§ 2-2 Construction Details.

2-2.01 Temporary Surface Over Trench:

Wherever conduits are constructed under traveled roadways, driveways, sidewalks, or other traveled surfaces, a temporary surface shall be placed over the top of the trench as soon as possible after compaction, as specified above, has been satisfactorily completed. The temporary surface shall consist of a minimum of six inches of coarse aggregate conforming to the current specifications of the Indiana State Highway Specifications for Grade No. 53. The top of the temporary surface shall be smooth and meet the grade of the adjacent undisturbed surface. The temporary surface shall be maintained at the Contractor's expense until final restoration of the street surface is completed as specified. No permanent restoration of street surface shall be initiated until authorized by the Engineer.

2-2.02 Removal of Pavement, Sidewalk, Driveway and Curb:

Wherever the pipe is located along or across an improved surface, the width of the trench shall be held as nearly as possible to the maximum width specified in § 1-2.03. Where brick or concrete pavement, sidewalk, driveway or curbing is cut, the width of the cut shall exceed the actual width of the top of the trench by 12 inches

on each side or a total of two feet. Exposed surfaces of portland cement or asphaltic concrete shall be cut with a pavement saw before breaking. Care shall be taken in cutting to insure that a straight joint is sawed.

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2-2.03 Replacement of Permanent Type Pavement, Sidewalks, Driveways, Curbs, Gutters and Structures:

(A) General. The Contractor shall restore (unless otherwise specified or ordered by the Engineer) all permanent type pavements, sidewalks, driveways, curbs, gutters, shrubbery, fences, poles and other property and surface structures removed or disturbed during or as a result of construction operations to a condition which is equal in appearance and quality to the condition that existed before the work began.

(B) Portland Cement Concrete Pavement Surface. Where the existing pavement surface is portland cement concrete, the pavement replacement shall consist of ten inch portland cement concrete pavement reinforced the same as adjacent pavement. Portland cement concrete shall conform to the applicable provisions of those specifications and shall have a compressive strength of 3,500 pounds per square inch at 28 days. Construction methods for portland cement concrete pavement shall conform to § 501 of the current requirements of the Indiana State Highway specifications for portland cement concrete pavement. Pavement joints in the replacement surface shall conform to and match the joints in the adjacent pavement area.

(C) Bituminous Concrete Pavement Surface-Rigid Base. Where the existing pavement surface is bituminous concrete and the base consists of a rigid material such as brick, portland cement concrete, soil cement, natural cement or a combination of these materials, the base replacement shall consist of eight-inch portland cement concrete base course reinforced as indicated by the Engineer. Portland cement concrete shall conform to applicable provisions of these specifications and shall have a compressive strength of 3,500 pounds per square inch at 28 days. Construction methods for portland cement concrete base course shall conform to § 501 of the current requirements of the Indiana State Highway Specifications for portland cement concrete base course. The surface replacement shall consist of a bituminous prime coat and three inch minimum thickness bituminous concrete surface course conforming to § 403 of the Indiana State Highway specifications for bituminous concrete surface course.

(D) Bituminous Plant Mix Pavement or Bituminous Treated Surface Flexible Base. Where the existing pavement is bituminous plant mix material or bituminous surface treatment and the base consists of a flexible material such as gravel or crushed stone, the base replacement shall consist of an eight-inch compacted thickness of material conforming to aggregate materials as described in the Indiana State Highway Specifications.

(E) Placing and compacting of the base course material shall conform to the methods described in the above-referenced specifications for aggregate base course. The surface replacement

shall consist of a bituminous prime coat and a bituminous surface plant mix three inches in thickness conforming to the Indiana State Highway Specifications for bituminous surface plant mix.

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(F) Concrete Sidewalks, Driveways, Curb, and Gutter. When it is necessary to remove and replace concrete sidewalk, driveways, curb and curb and gutter, replacements shall be made as follows:

(1) Concrete sidewalks, driveways, curbs and curbs and gutter shall be replaced with concrete meeting the applicable provisions of these specifications and having a compressive strength of not less than 3,500 psi at 28 days. Minimum thickness shall be five inches for sidewalks and seven inches for driveways.

(2) Curb or curb and gutter dimensions and cross-sections shall conform, as nearly as practicable, with the existing installations. Sidewalks shall be finished to match existing adjacent sidewalk surfaces unless otherwise specified or directed by the Engineer.

(G) Brick Sidewalks and Driveways. Brick sidewalks or driveways shall be replaced with brick, using salvage materials where in good condition. Where shown on the plans, or directed by the Engineer, brick sidewalks or driveways shall be replaced with concrete in accordance with division (F) above.

2-2.04 Replacing Existing Temporary Street and Alley Surfaces:

(A) General. For the purpose of this specification, all existing street and alley surfaces shall be considered temporary except:

(1) Concrete or brick pavements; and

(2) An asphaltic concrete or a bituminous treated surface over a soil cement, concrete, crushed stone or selected gravel base. Specifically included as temporary street surfaces shall be compacted earth, cinders, shale, mixtures of gravel and earth or crushed stone and earth, whether or not these respective materials are further stabilized by road oil or bituminous surface treatment.

(B) Where, in the opinion of the Engineer, the conduit is located in the traveled portion of the temporary street or alley traveled surface, a new temporary surface shall be constructed over the trench, as specified in § 2-2.01. After this surface has been placed, it shall be maintained by the Contractor until final restoration is authorized. Just prior to final restoration, the entire width of the street to be restored shall be scarified. For final surface restoration, the Contractor shall apply a bituminous treatment to the entire width of the traveled surface, as ordered by the Engineer. The bituminous treatment shall consist of the application of a bituminous prime coat and a bituminous surface treatment corresponding to the materials and construction methods described in the Indiana State Highway Specifications for bituminous

surface treatment.

(C) The Engineer reserves the right to order the omission of bituminous surface treatment in any locations where such omission may be, in his opinion, in the public interest.

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2-2.05 Seeding and Sodding:

(A) General. At locations indicated on the plans or special provisions or where designated by the Engineer, the Contractor shall prepare seed beds, furnish and spread fertilizers and furnish and plant the seed specified herein on disturbed areas.

(B) Material.

(1) Fertilizer shall be standard commercial 10-8-6 or 10-4-6 grade, uniform in composition, free flowing and suitable for application with approved equipment, delivered to the site in bags or other convenient containers each fully labeled, conforming to applicable state laws.

(2) Lime shall be ground limestone containing all of the finer particles obtained in the grinding process and ground sufficiently fine so that not less than 80% will pass through a No. 8 sieve. The calcium carbonate equivalent by the percent of material passing through the No. 8 sieve will be equal to or in excess of 0.72. The moisture content at the time of shipment must not exceed eight percent.

(3) The classes of seeding mixture shall be designated on the plans and shall consist of one or more of the classes listed below. Seeding mixtures from the specified class shall be designated by the Engineer, based on the season of the year when seeding operations are performed. Spring seeding shall begin January 1 and terminate June 30 and Fall seeding shall begin July 1 and terminate December 31.

SEEDING MIXTURES

Seeds	Lbs./Acre	Season to Use
<u>Class I</u>		
Kentucky Bluegrass	50	Spring
Perennial Ryegrass	20	
Redtop or Creeping Red Fescue	10	
Ladino or White Dutch Clover	5	
Kentucky Bluegrass	50	Fall
Perennial Ryegrass	20	
Redtop or Creeping Red Fescue	10	
Oats, Spring	48	
Kentucky Bluegrass	70	Spring
Redtop or Creeping Red Fescue	20	or Fall

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Seeds	Lbs./Acre	Season to Use
<u>Class II</u>		
Kentucky 31 or Alto Fescue	50	Spring
Perennial Ryegrass	20	
Redtop or Creeping Red Fescue	10	
Ladino or White Dutch Clover	5	
Kentucky 31 or Alto Fescue	50	
Perennial Ryegrass	10	
Redtop or Creeping Red Fescue	10	
Oats, Spring	48	
<u>Class III</u>		
Crown Vetch	20	
Perennial Ryegrass	10	
Lespedeza, Ladino, Alfalfa or White Dutch Clover*	5	
Crown Vetch	20	Fall
Winter Vetch	40	

* Lespedeza shall not be sown north of U.S. 136.

(C) The percent purity, germination and weed content shall meet the requirements as set forth in the Indiana State Highway Specifications.

(D) Preparation of Seed Bed.

(1) After the areas to be seeded have been brought to the proper grades and cleared of all stones, boulders and debris, the areas shall be thoroughly tilled to a depth of at least three inches by discing, harrowing or other approved methods acceptable to the Engineer. The incorporation of fertilizer may be a part of the tillage operation specified above.

(2) Fertilizer shall be distributed uniformly at the rate of 400 pounds per acre, over the area indicated to be fertilized, and shall be incorporated into the soil to a depth of at least three inches by discing, harrowing, or other approved methods acceptable to the Engineer. The incorporation of fertilizer may be a part of the tillage operation specified above.

(3) Lime shall be distributed uniformly on all areas to be fertilized at the rate of one ton to one acre, and shall be incorporated in the soil to a depth of at least three inches by discing, harrowing, or by other methods acceptable to the Engineer, immediately following or simultaneously with the incorporation of the fertilizing.

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(E) Seeding Methods.

(1) No seed shall be sown during high winds or when the ground is not in a proper condition for seeding, nor shall any seed be sown until the purity test has been completed for the seed to be used, and shows that the seed meets the noxious weed seed requirements. Equipment shall be operated in a manner to insure complete coverage of the entire area to be seeded. When seed or fertilizer is applied with a hydraulic seeder, the rate of application shall be not less than 1,000 gallons of slurry per acre. This slurry shall contain the proper quantity of seed or fertilizer specified per acre. When using a hydraulic seeder, the fertilizer nutrients and seed shall be applied in two separate operations.

(2) Within 12 hours, all seed areas shall be rolled at right angles to the run-off with an approved type roller or cultipacker to compact the seedbed and place the seed in contact with the soil. On areas seeded with a hydraulic seeder, rolling shall not be required.

(3) The optimum depth for seeding shall be $\frac{1}{4}$ inch.

(4) All legumes (clover, vetch, lespedeza, and alfalfa) shall be inoculated with the proper bacteria in the amounts and manner recommended by the manufacturer of the inoculant before sowing or being mixed with other seeds for sowing. The inoculation shall be furnished by the Contractor and shall be approved by the Engineer. The seed shall be sown, as soon as possible, after inoculation and seed that has been standing more than five hours after inoculation shall be reinoculated before sowing. If legumes are applied by hydro seeder, three times the normal amount of inoculation shall be used. The Contractor shall furnish the inoculant and the cost of furnishing it shall be included in the contract unit price per acre for seeding of the class specified.

(F) Replacement of Sodded Areas. At locations specified, shown on the plans, or designated by the Engineer, the Contractor shall remove and carefully store the sod. Upon compaction of the trench in a manner satisfactory to the Engineer, the sod shall be replaced in a neat, workmanlike manner, over a minimum of two inches of topsoil. Any deficiency in sod, necessary to restore the surface to a condition equal or better to that, which existed before construction operations began, will require new sodding to be performed by the Contractor. The Contractor shall maintain sodded areas until certification of completion by the Engineer.

2-2.06 Disposal of Surplus Excavated Material:

Surplus excavated soil, not needed for backfill shall be promptly removed from the site and transported to the Munster Landfill.

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2-2.07 Cleaning Up:

(A) All surplus materials and all tools and temporary structures shall be removed from the site by the Contractor. The construction site shall be left clean and acceptable to the Engineers at the earliest possible date.

(B) Before acceptance of underground conduit construction, all pipes, manholes, catch basins, fire hydrants, and other appurtenances shall be cleaned of all debris and foreign material.

(C) After all backfill has been completed, the ground surface shall be shaped to conform to the contour of adjacent surfaces. General clean up of the entire construction area shall otherwise conform to applicable requirements specified.

2-2.08 Streets:

All debris, sand and earth, resulting from evacuation, restoration or equipment transportation shall be promptly and thoroughly cleaned from streets, easements, alleys, curbs, driveways, gutters, and sidewalks to the satisfaction of the Engineer, within 20 hours after notice. If such cleaning is not satisfactorily performed in a timely fashion, the town shall clean the debris, and charge the Contractor accordingly.

(Ord. 767, passed 4-25-00)

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