

901 - PIPE SEWERS COMPLETE IN PLACE

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901.01 Description. This work shall consist of the construction of pipe sewers complete in place. The work shall be in accordance with these specifications and in conformity with the lines and grades shown on the plans, or as established by the Engineer. This work shall include: Excavating for pipes and bedding for same, including clearing and grubbing. Fill or embankment, and the removal of all materials necessary for placing the pipe except removals listed separately; furnishing and placing concrete or granular bedding, concrete backing or encasement, and compact backfill, granular backfill as required, compacted granular backfill or concrete backfill as required, trench dams; construction and subsequently removing all necessary cofferdams, cribs and sheeting; constructing and placing all necessary bulkheads; removal of water; all pipe joints, furnishing, installing and testing all necessary pipe of the types specified or shown on the plans; joining to existing and proposed sewers and appurtenances as required; restoration of disturbed facilities and surfaces; maintenance of traffic, drainage and existing facilities all as shown on the drawings and as specified, unless otherwise provided for by separate pay items. Manholes shall be as specified and paid for under 604.

901.02 Materials and Material Handling. Pipe shall be of the size and type specified in the proposal and shown on the plans and shall meet the requirements of the pertinent sections of 706 or 802. When the kind of pipe is not specifically itemized in the proposal or shown on the plans, any of the following kinds may be used,

Specific materials shall be as follows:

(a)	Concrete for cradle, backing and backfill Class C	499, 905
(b)	Concrete for blocking Class C	499
(c)	Stone or gravel bedding No. 8 or 67	703
	Compacted granular material	912.02
(d)	Cement for Mortar	701
(e)	Sand for Mortar	703.03
(f)	Lime for Mortar	712.04
(g)	Gaskets for Concrete Pipe Joints	901.15
(h)	Gaskets for Vitrified Clay Pipe Joints	901.15
(i)	Gaskets for Ductile Iron Pipe Joints	901.15
(j)	Non-Reinforced Concrete Pipe	706.01
(k)	Reinforced Concrete Pipe	706.02, 706.03
(l)	Reinforced Elliptical Concrete Pipe	706.04
(m)	Vitrified Clay Pipe, Extra Strength	706.08
(n)	Ductile Iron Pipe Class 52	802.03

The Contractor shall exercise due care in material handling to prevent field and installation damage which could impair the function and durability of the installation.

901.03 Excavation. The Contractor shall excavate all material of whatever nature encountered, including rock in place unless a separate item is provided for rock excavation, necessary for the construction of work as shown on the plans and as specified. All excavation, except as otherwise required, permitted or ordered in writing by the Engineer shall be in open trench,

901.04 Limits as to Width of Trench. The width of trench below the elevation of the outside top of the barrel of the sewer shall not exceed the specified width when shown on the construction drawings unless permitted or ordered in writing by the Engineer. Sufficient sheeting, bracing, timbering, etc., shall be provided, installed and used by the Contractor to maintain the sides of the trench in a substantially vertical position in such a manner so as to protect and preserve life, property or the use of such property and no separate payment will be made for such sheeting, bracing, timbering, etc., necessitated by the Contractor's operations to accomplish and carry out this responsibility.

Where a sewer is to be placed within an embankment or the top of the sewer is above existing ground, the embankment, compacted to Section 203.07 requirements, shall be constructed at least to 30 inches above the outside top of the sewer pipe before trenching. The trench shall be then excavated to the minimum width necessary for the proper placing and backfilling of the sewer as described in 901.17.

901.05 Unauthorized Excavation. All excavation outside or below the limiting lines for excavation as shown on the standard drawings shall be classified as unauthorized and shall be filled by the Contractor at his own cost and expense in a manner and with material approved by the Engineer.

901.06 Subgrade. It is expected that satisfactory material will be found at the subgrade of the trench if adequate water removal facilities are provided. If soft, spongy, unsuitable or similarly unacceptable material is encountered at the subgrade upon which the bedding material is to be placed, this unsuitable material shall be removed or dewatered as directed by the Engineer in writing. The following will govern the prosecution of the work involved.

- a. If the unsuitable material is removed by written order of the Engineer, it shall be replaced by stone foundation as specified in 906 and paid for as indicated therein.
- b. If the dewatering of the subgrade materials, by whatever means is used by the Contractor, produces a subgrade acceptable to the Engineer for placing the bedding material, no additional payment will be made for the work and the payment for this work will be included in this item.

901.07 Excavation Material. All excavated material in excess of that required for backfilling shall be disposed of by the Contractor. Public or private property shall not be used for this purpose without the written permission of the owner. Excavated material required for backfill, except as hereinafter provided for under Surface Soil as per 901.18, may be stored on the bank of the trench immediately adjacent to the work under construction where space is available in the right-of-way acquired for the work, provided, however, that such storage shall not interfere with access to and maintenance of traffic, drainage and utilities as herein specified.

Ingress and egress to all properties along the line of the work shall be maintained, except as permitted, in writing, by the Engineer.

901.08 Removal of Obstructions. The removal of any obstructions including abandoned sewer, which may be encountered or is necessary for the construction of the work, shall be done by the Contractor at his own expense under the direction of the Engineer. All trees encountered within the excavation limits shall be considered obstructions and the Contractor is responsible for removal of those trees.

Where a portion of an existing concrete, brick or clay sewer is to be abandoned under this contract, the Contractor will be required to construct brick or concrete bulkheads in the undisturbed section of the abandoned sewer as directed. The locations of bulkheads may be, but are not necessarily, shown on the drawings. Where the existing sewer to be abandoned is of a material other than clay, brick or concrete, the undisturbed section shall be capped or plugged as directed. The cost of this work is to be included in the several items of the contract and no separate payment will be made therefore.

901.09 Maintaining Drainage. The flow of all sewers, drains, streets, gutters, field tiles and water courses encountered shall be provided for by and at the Contractor's own expense and wherever such water courses and drains are disturbed or destroyed during the prosecution of the work, they shall be restored by and at the Contractor's own cost and expense to a condition satisfactory to the Engineer.

901.10 Maintaining Service in Existing Structures. All existing overhead, surface or subsurface structures, together with all appurtenances and service connections, except those otherwise provided for herein, encountered or affected in any way during the construction of any of the work under this contract, shall be maintained in service by the Contractor at all times unless other arrangements, satisfactory to the authority responsible for their operation, are made with such authority.

Where connections are to be made to existing sewers, the Contractor shall make suitable provision for maintaining the flow in the existing sewer until the completion of the connection.

The cost of this work shall be included in the prices bid for all the various items of this contract.

901.11 Bedding and Embedment.

Type I

- a. Sanitary and storm sewers fifteen (15) inches in diameter and smaller shall have a bedding of No. 67 stone or compacted granular material 912.02 extending from a point four (4) inches below the bottom of the pipe to a point twelve (12) inches above the outside top of pipe as shown on standard drawing S-1.
- b. Sanitary and storm sewers eighteen (18) inches in diameter to and including twenty-seven (27) inches in diameter shall have a bedding of No. 67 stone or compacted granular material 912.02 extended from a point four (4) inches below the bottom of the pipe to a point six (6) inches above the outside top of the pipe as shown on standard drawing S-1.
- c. Sanitary and storm sewers thirty (30) inches in diameter to and including ninety (90) inches in diameter shall have a bedding of No. 67 stone or compacted granular material 912.02 extending from a point six (6) inches below the bottom of the pipe to the spring line of the pipe as shown on standard drawing S-3.
- d. Sanitary and storm sewers ninety-six (96) inches in diameter and larger and shall have a bedding of No. 67 stone or compacted granular material 912.02 extending from a point eight (8) inches below the bottom of the pipe to the spring line of the pipe as shown on standard drawing S-3.

When Type I bedding is used, the cost of all bedding as described above shall be included in the price bid for the various pipe items. When compacted granular material fails to meet the compaction required under 912.03, under pipe haunches and around the pipe, the Engineer will order stone bedding No. 67 or No. 8 in lieu of compacted granular material at no additional cost.

Type II

Sanitary and storm sewers shall be set to line and grade on Class "C" CONCRETE BLOCKS meeting the following minimum requirements:

- (a) the concrete blocking must have a horizontal bearing area in contact with the subgrade such that the bearing load does not exceed 3,000 pounds per square foot and
- (b) the concrete blocking shall support the pipe at least six (6) inches above the subgrade

Class "C" CONCRETE CRADLE shall fill all the space around the concrete blocking and below the pipe as shown on standard drawing S-4 and all concrete placed outside the limiting lines for trench width and elevation will be deemed unauthorized and will not be included for payment.

Backing shall be accomplished with stone bedding or compacted granular material unless Class "C" Concrete is specified, or shown on the drawings.

When Type II bedding is used, the cost of all bedding as described above shall be included in the price bid for the various pipe items.

All the space within the width of the trench excavation, inside or outside the authorized limits, shall be filled, between the elevation limits and with the same material, as specified on the applicable standard drawing.

Unless otherwise directed by the Engineer, the Contractor shall place cutoff trench dams at 150 foot intervals to retard and resist the movement of groundwater through the trench granular bedding or backfill material.

Trench dams shall be constructed of Item 613 Low Strength Mortar. Trench dams shall be a minimum of two (2) feet in thickness, as measured along the sewer centerline. No pipe joints shall be covered by the trench dam. For clay pipe, the trench dam shall run the full length of one pipe segment, from joint to joint. Trench dams shall extend twelve (12) inches beyond the trench walls and six (6) inches below the trench bottom into undisturbed soil. The height of the trench dam above the top of the sewer shall be either thirty (30) inches, or a height such that the top of the trench dam is five (5) feet below finished grade, whichever is greater. Backfilling of the trench dam may not occur until the material has cured sufficiently to prevent intermixing of the backfill and the trench dam material.

901.12 Laying Pipe. The laying of pipes in finished trenches shall be commenced at the lowest point so that the spigot ends point in the direction of flow. All pipes shall be laid with ends abutting and true to line and grade.

Where necessary with bell end pipe, suitable bell-holes shall be excavated in the bedding material for the bell of each pipe so that the weight of the pipe will not be supported by the bells only. The pipes shall be fitted and matched so that when laid in

the work, they will form a conduit with a smooth and uniform invert. All possible care shall be used when shoving the pipe together so that the joints will not be unnecessarily large and pipe ends shall be carefully cleaned before pipes are laid. Gaskets shall be installed in accordance with the manufacturer's recommendations.

Class C concrete encasement, according to dimensional standard drawing shall be required within the limits of existing or proposed paved areas inside of right-of-way where minimum cover during construction or proposed cover over the outside top of the pipe is 30 inches or less for pipe size 6 to 27 inches in diameter inclusive.

All existing structures shall be cleaned prior to making any new connections to them. All connections with existing structures shall be made in a thorough, first class, neat and workmanlike manner acceptable to the Engineer. All debris resulting from making the connection shall be removed and disposed of by the Contractor. The cost of this work shall be included in the price bid for the various pipe items.

901.13 Bulkheads. The Contractor shall construct a bulkhead at the start of construction of Sanitary Sewers, remove same bulkhead after all pipes and manholes are placed, all water removed and the sewer has been tested and approved.

All concrete, brick or clay pipe stubs shown on the plans shall have the outer end sealed with a brick masonry bulkhead. Bulkheads shall be twelve (12) inches in thickness. Plaster all bulkheads with a ½ inch coat of mortar. Cost of this work shall be included in the price bid for various pipe items.

901.14 Sanitary Sewers. Roof drains, foundation drains and other clean water connections to sanitary sewers are prohibited.

901.15 Pipe Joints.

Sanitary Sewers

Concrete – pipe joints shall conform to the requirements of ASTM C 361 as it pertains to the use of a confined gasket. All joints shall consist of confined rubber gaskets placed in grooves in the spigots of the pipe such that the gaskets will be enclosed on all four sides when the pipe is laid and the joints are completed. All rubber gaskets used in sanitary sewers shall conform to the requirements of ASTM C 361 except when encased in tunnel.

Concrete – Encased in Tunnel – joint shall meet ASTM C 443 for tongue and groove joints up to and including 42" in diameter, and ASTM C 361 for pipe larger than 42" diameter. Any pipe outside of tunnel and not encased shall meet ASTM C 361 joint requirement.

Elliptical Reinforced Concrete Pipe – pipe joints shall be preformed butyl rubber 706.14 with ASTM C 877 External Sealing Band. The sealing band shall not be less than 12 inches in width and secured to the pipe with two stainless steel band clamps placed one on each side of the joint.

Vitrified Clay – pipe joints shall conform to the requirements of ASTM C 425 Compression Joints for Vitrified Clay Bell and Spigot Pipe.

Ductile Iron – pipe joints shall be mechanical or push-on conforming to AWWA C 111.

Storm Sewers

Concrete – pipe joints shall conform to one of the following:

Type A Rubber Gasket – meeting the requirements of ASTM 443.

Type B Mortar – on sewers thirty (30) inches in diameter and larger the groove end of the pipe, laid to line and grade, shall be carefully washed with a wet brush and the bottom half of the groove buttered with 1 to 2 Portland Cement mortar shall be applied to the top half of it. The tongue end of the second pipe shall then be fitted into the groove end of the first pipe until the mortar is squeezed out onto the inner and outer surfaces. The inner surface of the pipe at the joint shall then be pointed up smooth with a long handled brush, and the outside pointed up with a bead of mortar. If the joint opening on the bottom half of the pipe exceeds one-half ($\frac{1}{2}$) inch, it shall be filled with 1 to 2 Portland Cement mortar.

Type C Bituminous pipe joint filler – meeting the requirements of 706.10 ODOT CMS.

Vitrified Clay – pipe joints shall conform to one of the following:

Type A Compression – meeting the requirements for vitrified clay pipe joints used in sanitary sewers as specified herein.

Type C Bituminous filler – meeting the requirements of 706.10, State of Ohio, Department of Transportation, Construction and Material Specifications.

Type D Preformed butyl rubber material meeting the requirements 706.14. For concrete pipe 78 inch diameter and larger, the annular mating surface shall be primed.

All elliptical reinforced concrete pipe for storm sewers shall have Type B – mortar, Type C Bituminous pipe joint filler, or Type D preformed butyl rubber material. If butyl rubber is used, all elliptical pipe equivalent to 78 inch diameter or larger shall have the annular mating surface primed before joint material is applied. Where conditions dictate the use of other types of joints, such will be noted on the plans.

901.16 Removal of Water. The Contractor shall, at all times, during construction, provide proper and satisfactory means and devices for the removal of all water entering the excavations and shall not interfere with the prosecution of the work or the proper placing of masonry or other work.

901.17 Backfilling.

All trenches and excavations shall, in general, be backfilled from 12 inches above the top of the pipe, as hereinafter specified, as soon after the sewers or other structures built therein are completed and as the particular type of construction and the circumstances will, in the opinion of the Engineer, permit.

For pipe sizes 18 inches to and including 36 inches in diameter, a carefully selected and placed backfill, using finely divided job excavated earth that is free from debris, organic or frozen material and stone larger than 2 inches in their greater dimension, shall be placed from the top of the granular bedding or concrete backing, as shown on the standard drawing, to a level not lower than 12 inches above the outside top of the pipe. The 12 inch selected backfill shall be placed in two 6 inch thick lifts, each carefully tamped, in order to produce a cushion over the pipe to prevent its breakage during that placing of the remaining trench backfill material. The selected backfill layer may be composed entirely of granular bedding material if the Contractor so elects, but without extra compensation therefore. When compacted granular backfill is specified in the plans, then the material for the selected backfill layer shall be per 912.02.

Earth backfilling of open trench excavations shall be done with the best of excavated earth, which shall be free from rubbish, or excessive frozen material, provided, however, that occasional boulders or stones not larger than one cubic foot may be deposited at least two (2) feet above the top of the sewer and subject to the approval of the Engineer.

Where concrete cradle or backing, or both, are required, at least 2 hours shall elapse before granular backing, pipe protection or backfill is placed. The method employed in depositing the backfill shall be as to prevent damage to the sewer or other structures. Concrete structures built in place shall not be backfilled until permitted by the Engineer.

Except when other requirements as noted on the plans, or provided for in the specifications or are ordered by the Engineer, all open trench backfill above the elevation of the bedding material of the sewer shall be done with materials that, subject to other provisions of the specifications for compaction or special fill have the same as or better soil characteristics than the adjacent undisturbed soil or materials and shall be performed in a manner satisfactory to the Engineer. All backfilling operations and placement of the backfill material shall be conducted by such means as to eliminate damage to the sewer, its appurtenant structures and other adjacent structures.

Where settlement of the backfill is to be done by flushing or ponding, it shall be so shown by notes on the plans or as otherwise may be approved in writing by the Engineer.

All trenches, that cross existing or proposed pavements or where the front face of trenches, paralleling the pavement, is within 48" of the face of the curb or edge of pavement within public right-of-way shall be backfilled with compacted granular material as per Item 912. The material shall extend 48" beyond that face of the curb or edge of pavement. Other areas outside above requirement but inside right-of-way shall be compacted per Item 911.

The above backfill requirements within public rights-of-way shall be considered minimum requirements. City standard drawings promulgating more stringent requirements will prevail where applicable.

Where sewer construction is in existing lawn areas, outside proposed or existing right-of-way, the backfill shall be compacted to a minimum 90 percent maximum dry density.

Any settlement in the open trench backfill taking place within the guarantee period shall be refilled with satisfactory materials and the affected surface properly repaired to the satisfaction of the Engineer by the Contractor all at the Contractor's own cost and expense and no extra payment will be made therefore.

901.18 Surface Soil and Restoration of Surfaces. Except where otherwise specifically exempted or provided, the Contractor shall, before starting trench excavation, remove the surface soil to a depth of not less than that of the topsoil material to a maximum of 12 inches below the original surface of the ground within the limits to be excavated and then segregate and store it separately from the remaining stored excavated material. In cultivated areas the entire work area, including storage for backfill, shall be stripped up to 12 inches deep and stored for reuse. If necessary, he shall acquire additional area to provide for such separate storage of surface soil. After completion of sewer construction and basic trench backfill, the Contractor shall replace and redistribute surface soil in the affected areas to a depth of up to 12 inches and shall make due allowance where embankment is required and shall re-execute the basic trench backfill where necessary to allow for the surface soil fill. When directed by the Engineer, the Contractor shall perform restoration of all surfaces as the work progresses and will be directed to cease excavation and pipe laying until such restoration work is accomplished. Where surface soil is replaced, any settlement below the original ground surface occurring within the guarantee period shall be refilled with surface soil equivalent to the original material. The cost of all work and other expenses connected with the surface soil operation shall be included in the price bid for the various sewer items and no extra payment will be made therefore.

All surfaces, including grass, or lawn pavement, sidewalk, curbing or other surfaces disturbed or destroyed during and as a result of the construction work, shall be replaced by the Contractor as hereinafter specified under the respective items therefore, providing such items as herein included.

The Contractor will be required under this provision to sod all lawn areas and seed all other areas disturbed. The seeding and sodding operations shall be done in conformity with the requirements set forth under 659 and 660 of these specifications and shall be performed within 30 days weather permitting.

Suitable surface soil shall be obtained and applied over excavated area to a depth not less than that of the original topsoil up to 12 inches to allow for proper leveling and for preparation of adequate bed to support growth.

All fences damaged or removed in connection with the construction of the sewer shall be repaired or replaced by the Contractor to the satisfaction of the Engineer. If necessary, temporary fencing shall be provided by the Contractor.

The Contractor shall include in the prices bid for the sewer items, the cost of all such restoration in all areas involved above and adjacent to the work and no separate or additional payment shall be made therefore unless specifically provided for under other items.

901.19 Trees.

All branches or growth from trees that are to be saved and which are interfering with the free construction of the pipe sewer may be removed by the use of pruning tools. All pruning tools used and methods employed shall meet with the approval of the Engineer. The branches shall be removed with a good clean cut made flush with the parent trunk or if having a good healthy lateral branch the cut shall be a good clean slanting cut close to and beyond the healthy branch. All pruning cuts shall be painted with an accepted pruning preservative. All branches removed shall be at the direction of the Engineer. The cost of all work and expenses connected with the removal of branches shall be included in the price bid for the various sewer items and no extra payment shall be made therefore.

901.20 Leakage Tests.

Leakage through the joints of all sewer pipe, sanitary and storm shall not exceed the following allowable limits:

Sanitary Sewers: 100 gallons per inch of tributary pipe diameter per 24 hours per mile of length or the computed equivalent for shorter lengths and shorter periods of time. All sanitary sewers shall be tested.

Storm Sewers: 1,000 gallons per inch of tributary pipe diameter per 24 hours per mile of length or the computed equivalent for shorter lengths and shorter periods of time. Tests on storm sewers will be performed unless otherwise indicated on the plans.

The following leakage tests shall be performed after all installed pipe and manholes have been cleaned and obstructions removed:

(a) Infiltration Test: This test is to be conducted when the height of ground water table is two feet or more above the elevation of the inside crown of pipe at the upstream limit of the section being tested.

The infiltration test shall be made by installing a weir or other measuring device approved by the Engineer in the lower end of the sewer section to be tested. The quantity of ground water infiltration into the sewer shall be measured and shall not exceed the allowable leakage.

(b) Exfiltration Test: This test is to be conducted when the height of the ground water table is less than two feet above elevation of the inside crown of pipe at the upstream limit of the section being tested.

The entire sanitary sewer system installed shall be tested. Unless otherwise directed by the Engineer or indicated on the plans, testing shall be done section by section where a section consists of the distance between successive manholes. The inlet end of the upstream and downstream manholes shall be closed with a watertight bulkhead and the sewer, along with the upstream manhole, shall be filled with water until the elevation of the water in the upstream manhole is two feet higher than the inside crown of the pipe in the section being tested, or two feet above the existing ground water in the trench, whichever is the higher elevation. The length of section to be tested may be filled and maintained full of water for a period of approximately 24 hours prior to the start of the test. If the water level in the upper manhole has dropped during this 24 hour period the level shall be raised to the test elevation mark prior to the measurement of

leakage. If the Contractor elects to test at any time during the 24 hour period, the water shall be set at the test elevation mark and the test made.

The exfiltration will be determined by measuring the volume of water that is required to be added to return the surface of the water in the upstream manhole to the test elevation mark. The test period shall be a minimum of one hour duration from the start of the test.

The Engineer, because of adjacent trench material consideration, may order that after the completion of the exfiltration test the test section of line shall be drained and the infiltration, under existing ground conditions, shall be measured within three hours by means of a weir located in the downstream manhole.

The allowable leakage is based on a maximum difference in elevation of eight feet between the level of water in the upper manhole and the invert of the bulk headed pipe at the downstream manhole. If the difference in elevation exceeds eight feet, the allowable leakage shall be increased five percent for each foot in excess of eight feet.

(c) Air Test. In lieu of exfiltration tests required for pipe sizes 8" thru 24" under 901.20 (b) and subject to approval of the Engineer on a job to job basis, the Contractor may request an air test for checking tightness of sanitary sewer pipe construction. All sections of pipe between manholes shall be tested. Air testing of pipe will be accomplished only by use of equipment that has been approved by the Engineer and in accordance with the following steps:

- 1.) Plug all pipe outlets with suitable test plugs. Brace each plug securely.
- 2.) Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 5.0 psig.
- 3.) After an internal pressure of 5.0 psig is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.
- 4.) When pressure equalizes to 5.0 psig, start stopwatch. Minimum permissible pressure holding times for runs of single pipe diameter and for systems of 4", 6" or 8" laterals is five (5) minutes with a maximum loss of 0.5 psig. Holding times for larger sewers shall be as published in tables by the National Clay Pipe Institute for vitrified clay pipe.

(d) Manhole Test. Manholes shall be tested by plugging connecting pipes and filling with water to 2 feet above the crown of the highest entering pipe. After the filled manhole has been allowed to stand for 24 hours, no loss of water will be permitted in a four hour period. As an alternative to this test procedure, the Contractor may perform a vacuum test in accordance with the procedures set forth in ASTM C 1244, with the following two alterations: 1) the test must be performed no sooner than 30 days after completion of backfilling operations, and 2) the test must be performed with the manhole frame sealed to the structure.

In the event the allowable leakage limits are not met, the Contractor shall determine the location where excess water is entering or leaving the sewer. The sewer and/or

manholes shall be repaired in a manner satisfactory to the Engineer and retested until the leakage is within the allowable limits.

The Contractor shall include, in the price bid per linear foot of sewer, the cost of all bulkheads, plugs, pipe stopper, pumps, compressors, water weirs, labor, delay, and any other items of cost necessary for the performance and completion of the required leakage test and for the cost of any repairs or adjustments which may be necessary to make the project conform to the required allowable leakage limits.

All leakage tests shall be conducted no sooner than 30 days after completion of backfilling operations and under the supervision of the Engineer or his representative.

901.21 Method of Measurement. The length of pipe to be paid for will be the actual number of linear feet accepted, as measured along the centerline of the sewer, complete in place, including lengths through manholes and inlets and to the center of manholes and inlets in the case of sewer size change thereat. In case of an extended stub or branch stub at a manhole, the length of pipe to be paid will be measured from the center of the manhole to the end of the stub, unless the payment for such stub is otherwise provided for. No length deduction will be made at manholes or tunnel shafts since the basis of bids for manholes or tunnel shafts is to be the difference between the prices of the affected length of sewer not affected by a manhole or tunnel shaft.

901.22 Basis of Payment. The accepted quantities of sewer of the sizes and types specified will be paid for at the contract unit prices per linear foot, complete in place.

Payment will be made under:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
901	Linear Foot	_____ Pipe, with Type _____ bedding

902 - INCREASED OR DECREASED EARTH EXCAVATION

902.01	Description
902.02	Excavation and Backfilling
902.03	Method of Measurement
902.04	Basis of Payment

902.01 Description. This work shall consist of performance or non-performance of excavation, and backfilling with suitable material, for sewers or other appurtenant structures, where ordered by the Engineer, due to deviation from the line and grades shown on the plans.

902.02 Excavation and Backfilling. The applicable section of Sections 901.03 and 901.17 will govern this work unless otherwise specified or directed in writing.

902.03 Method of Measurement. The number of cubic yards (cubic meters) of increased or decreased earth excavation will be measured vertically below or above the structure subgrade and will be limited by vertical planes 12 inches (305 mm) outside of the structure surfaces. The number of cubic yards (cubic meters) of increased earth excavation due to deviation from the line and grade shown on the plans will be measured by multiplying the total length of trench involved by the product of the trench width as shown in the plans and the average depth of increase or decrease involved.

902.04 Basis of Payment. The accepted quantities of increased or decreased earth excavation ordered in writing by the Engineer will be paid for or deducted from moneys due the Contractor at the contract unit price per cubic yard (cubic meters).

Payment will be made or deducted under:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
902	Cubic Yard (Cubic Meters)	Increased or Decreased Earth Excavation

906 - STONE FOUNDATION

906.01	Description
906.02	Materials
906.03	Method of Measurement
906.04	Basis of Payment

906.01 Description. This work shall consist of the excavation for and the placing of specified stone material and the disposal of the surplus excavated material as shown on the plans and where placed as ordered in writing by the Engineer. The purpose of this work is to provide a suitable subgrade for the pipe and appurtenant structures. Stone or gravel used as foundation material shall be compacted or consolidated in such a manner and to such an extent that adequate support will be provided for the overlaying structure or material.

Stone foundation placed by the Contractor to provide for the water free trench as specified by 901.16 will not be paid for under this item and any material so placed will be provided by the contractor at his sole cost and expense,

906.02 Materials. Materials shall be as follows:

- a. Stone for foundations, No. 1.....703
- b. Stone for foundations, No. 2.....703
- c. Stone for foundations, No. 467.....703

906.03 Method of Measurement. Stone foundation will be measured by the number of cubic yards placed, calculated within the authorized excavation limits, as shown on the plans or as ordered in writing by the Engineer.

906.04 Basis of Payment. The accepted number of cubic yards or stone foundation measured for payment will be paid for at the contract unit price per cubic yard. No payment will be made for excavation or material outside the authorized limits.

Payment will be made under:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
906	Cubic Yard	Stone Foundation

910 - CONCRETE ENCASEMENT FOR SEWERS

910.01	Description
910.02	Materials
910.03	Excavating and Backfilling
910.04	Pipe
910.05	Method of Measurement
910.06	Basis of Payment

910.01 Description. This work shall consist of furnishing and installing reinforced or plain concrete encasement of sewer pipes as shown on the plans and as specified herein.

910.02 Materials. Materials shall be as follows:

- (a) Concrete, Class F.....455, 511
- (b) Reinforcing steel.....709

910.03 Excavating and Backfilling. Excavating and backfilling shall be as specified under Section 901.03 and 901.17 and will be paid for under Item 901.

910.04 Pipe. Pipe to be encased shall be as specified under all the applicable parts of Item 901 pertaining to the furnishing and installing of pipe, and will be paid for there under. When encasing flexible pipe, concrete encasement shall extend from structure to structure along the entire length of the pipe.

910.05 Method of Measurement. The length of encasement of sewer to be paid for will be the actual number of linear feet accepted, as measured along the centerline of the sewer complete in place,

910.06 Basis of Payment. The accepted number of linear feet of reinforced or non-reinforced encasement work of the sizes specified will be paid for at the contract unit price per linear foot complete in place.

Payment will be made under:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
910	Linear Foot	Plain Concrete Encasement of _____ Inch Diameter Pipe
910	Linear Foot	Reinforced Concrete Encasement Of Inch Diameter Pipe

911 - COMPACTED BACKFILL

911.01	Description
911.02	Materials
911.03	General
911.04	Method of Measurement
911.05	Basis of Payment

911.01 Description. This work shall consist of compacting native or excavated material as trench backfill where shown on the plans or ordered by the Engineer and as specified.

911.02 Materials. Materials shall be suitable native material or a granular material meeting the requirements of 912.02 and must be approved by the Engineer.

911.03 General. Where excavated material available for compacting proves to be unsuitable or the Contractor finds it impracticable to use the excavated material to meet the requirements of this item, the Contractor shall, at no extra compensation, procure suitable backfill material elsewhere and dispose of the unsuitable material.

Backfilling shall conform in every respect with the provisions of 901.17 and shall be governed by the results of such tests as may be ordered by the Engineer to determine that the compaction requirements of 912.03 have been met.

911.04 Method of Measurement. The number of cubic yards of compacted backfill to be paid for will be computed on the following basis:

Volume in cubic yards equals W times L times D divided by twenty-seven (27) where W is the specified trench width in feet, L is the length of trench in feet as specified or ordered to be compacted and D is the distance in feet from (1) the top of the bedding or encasement on 6 through 27 inch pipe or (2) the top of the outside barrel of the pipe or encasement on 30-inch and larger pipe to a point one foot below the existing ground elevation. These definitions for the D measurement may be varied as indicated or as specified or ordered by the Engineer. The length of trench will be measured along the centerline of the sewer in place without deduction for manholes or structures built in the open trench. No extra payment will be made for compacted backfill in the extra excavation widths necessary at manholes and other structures along the centerline of the work. At existing manholes and other structures, where the work connects, the measurement for this item will be made from the centerline of the existing manhole or structure. At terminal manholes or structures, being constructed as part of the work, the measurement for this item will be through the manhole or structure to a point one (1) foot beyond the manhole or structure base. Where manholes or structures are built over existing sewers, as part of the work, compacted backfill will be measured along the centerline of the sewer between two points one (1) foot beyond and on either side of the manhole or structure being constructed as part of the work, a length equal to the

specified width of trench for the lesser diameter pipe shall be deducted from the above measurement of the length of the intersection.

The Contractor will receive no compensation because of the following:

- a. For substitution of granular or any other material for backfill material.
- b. For being required to procure suitable backfill material elsewhere.
- c. Work necessitated or material placed outside of the payments limits described above, which is necessary to secure the required compaction within the length of trench specified or ordered, due to unauthorized excavation.
- d. Where the plans indicate that this work shall be included in the unit price bid for item 901.

911.05 Basis of Payment. The computed number of cubic yards of compacted backfill measured for payment will be paid for at the contract unit price per cubic yard.

Payment will be made under:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
911	Cubic Yard	Compacted Backfill

912 - COMPACTED GRANULAR MATERIAL

912.01	Description
912.02	Materials
912.03	Compaction Requirements
912.04	Method of Measurement
912.05	Basis of Payment

912.01 Description. The work shall consist of furnishing, placing and compacting granular material for bedding, backfill or other use where shown on the plans, specified or ordered by the Engineer, including the disposal of excess material.

912.02 Materials. Materials shall be as follows:

Granular material shall consist of limestone 304 aggregate as described in Section 703.17, State of Ohio, Department of Transportation, Construction and Material Specifications. ODOT Item 613 Low Strength Mortar Backfill, Type 1 or 2, may be used as an alternate to compacted granular material.

912.03 Compaction Requirements. The following compaction requirements shall apply to granular materials and to native backfill materials when such materials are to be compacted (911).

<u>Max. Lab. Dry Wt.</u> <u>---- lbs./cu.ft .-----</u>	<u>Min. Comp. Requirements</u> <u>----- % Lab. Max. -----</u>
90 - 104.9	102%
105 - 119.9	100%
120 and More	98%

Materials having a maximum laboratory dry weight of less than 90 lbs./cu.ft. shall be considered unsuitable for compaction.

The Contractor shall cooperate to the fullest extent to accommodate compaction tests and no extra payment will be allowed for delay or time lost due to verification of compaction required.

912.04 Method of Measurement. The number of cubic yards of compacted granular material will be computed on the following basis:

The number of cubic yards is equal to W times L times D divided by twenty-seven (27) where W is the specified trench width in feet, L is the length of trench in feet specified or ordered to be backfilled with compacted granular material and D is the distance in feet from (1) the top of the bedding or encasement on 6 through 27 inch pipe or (2) the outside top of the barrel of the pipe or encasement on 30 inch and larger pipe to a point one foot below the existing ground surface. These definitions for the D measurement may be varied as indicated on the plans or as specified or ordered by the Engineer. The length of trench will be measured along the centerline of the sewer in place without

deduction for manholes or other structures built in the open trench. No extra payment will be made for compacted backfill in the extra excavation widths necessary at manholes and other structures along the centerline of the work. At existing manholes or structures, where the work connects, the measurement for this item will be made from the centerline of the existing manhole or structure. At terminal manholes or structures, being constructed as part of the work, the measurement for this item will be through the manhole or structure to a point one (1) foot beyond the manhole or structure base. Where manholes or structures are built over existing sewers, as part of the work, compacted backfill will be measured along the centerline of the sewer between two points one (1) foot beyond and on either side of the manholes or structure base. Where sewer trenches intersect, at different elevations or at a manhole or structure being constructed as part of the work, a length equal to the specified width of trench for the lesser diameter pipe shall be deducted from the above measurement for the length of the intersection.

The Contractor will receive no compensation for:

- a. Work necessitated or material placed outside of the payment limits defined above, within the length of trench specified or ordered, due to unauthorized excavation.
- b. Compacted granular material for bedding, backing or other use which is paid for under 901 as a part of the price per foot of pipe.

912.05 Basis of Payment. The computed number of cubic yards of granular backfill measured for payment will be paid for at the contract unit price per cubic yard.

Payment will be made under:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
912	Cubic Yards	Compacted Granular Material

915 - WYE OR TEE FITTINGS AND CLEAN-OUTS

915.01	Description
915.02	Materials
915.03	General
915.04	Method of Measurement
915.05	Basis of Payment

915.01 Description. This work shall consist of furnishing and installing plugged Wye or Tee fittings in the sewer where shown on the plans or directed by the Engineer and as specified herein. The Wye or Tee fittings shall be of the same type of material as the lateral sewer, or as directed by the Engineer.

Clean-outs shall be constructed according to the applicable standard drawing and shall be of the same type of material as the lateral sewer, or as directed by the Engineer.

Risers, 914, shall be installed when the depth exceeds 10 feet from the lateral sewer fitting to a point 9 feet plus or minus 1 foot from existing or proposed surface elevation, whichever is higher.

915.02 Materials. All materials furnished and installed in accordance with the plans or as directed shall conform in all respects to the applicable provisions of 901.

915.03 General. The insertion of fitting connectors into all pipe sewers shall be done by the Contractor in a manner satisfactory to the Engineer.

All connections of sewer laterals to sanitary sewer mains of less than fifteen inch (15") diameter shall be done in the following manner: the complete joint where the connection is to be made shall be removed and replaced with a "Y" for such connections. In pipes fifteen inches (15") and over, an opening may be core drilled into the pipe with a rubber compression boot inserted in the hole and a short hub installed in this opening. This hub shall be protected with either cement mortar or concrete of proper mixture.

The end of each fitting shall be securely sealed with a stopper or cap which shall be installed so that the closure is water tight and so that the stopper or cap can be later removed without damage to the gaskets.

Above each sewer fitting the Contractor shall set a two (2) inch by two (2) inch CCA treated lumber pole extending to a point above the partial backfilling. The pole shall be braced in such a manner as to hold it firmly in position during complete backfilling. After the Engineer has located the poles, the Contractor shall, at his own expense, cut off the pole to a point slightly below the original ground surface.

When a sewer tap is to be made into an existing PVC pipe sewer, it shall be made by installing a prefabricated solid PVC Wye fitting pipe section.

915.04 Method of Measurement. The number of Wye or Tee fittings or clean-outs of each kind shall be those installed and accepted.

915.05 Basis of Payment. The number of each kind of fitting accepted will be paid for at the Contract unit price for each.

Payment will be made under:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
915	Each	_____” x 6” diameter Wye Fitting
915	Each	_____” x 6” diameter Tee Fitting
915	Each	Clean-out

918 - SANITARY HOUSE CONNECTION SERVICE

918.01	Description
918.02	Materials
918.03	Excavation
918.04	Bedding
918.05	Laying Pipe
918.06	Pipe Joints
918.07	Backfilling
918.08	Surface Soil and Restoration of Surfaces
918.09	Method of Measurement
918.10	Basis of Payment

918.01 Description. This work shall consist of the construction of the sanitary house connection service from the wye fitting on the main line lateral sanitary sewer to the building drain adapter complete in place. This work shall include: excavation for the pipe and the bedding for same, including clearing and grubbing fill or embankment, and the removal of all materials necessary for placing the removals listed separately: furnishing and placing the removals listed separately; furnishing and placing the bedding, concrete backing or encasement, and granular or concrete backfill as required; constructing and subsequently removing all necessary cofferdams, cribs and sheeting; removal of water; all pipe joints; furnishing and installing all necessary pipe of the types specified or shown on the plans; joining to existing and proposed sewers and plumbing appurtenances as required; furnishing and placing of Y-Poles; restoration of disturbed facilities and surfaces; maintenance of traffic, drainage and existing structures; all as shown on the drawings as specified.

918.02 Materials. Pipe shall be of the size and type specified in the proposal and shown on the plans and shall meet the requirements of the pertinent specifications listed below. When the kind of pipe is not specifically itemized on the proposal or shown on the plans, any of the following types of pipe may be used.

Sanitary house connection services which are to be installed from an existing main line lateral sewer shall be connected to the existing sewer or appurtenance with the same material fitting or with a flexible adapter approved by the Engineer. The connection shall produce as tight a joint between the existing and proposed work as that specified for the sanitary house connection service pipe joint.

Specific materials shall be as follows:

- | | | |
|-----|--|------------------|
| (a) | Stone or Gravel bedding – No. 67 or 8 Stone | 703 |
| | Or Compacted Granular Material | 912.02 |
| (b) | Concrete for backing and backfill – Class C | 499 |
| (c) | Extra Strength Vitrified Clay Pipe | 706.08 |
| (d) | Cast Iron Soil Pipe | ASTM A74 |
| (e) | Type PSM Poly (Vinyl Chloride) (PVC)
Sewer Pipe | ASTM D3034 SDR35 |

918.03 Excavation. The work shall be done according to 901.03.

918.04 Bedding. Pipe shall have a bed of granular material extending from a point four (4) inches below the bottom of the pipe to the outside top of the pipe as shown on standard drawing S-1.

The Contractor shall place a bedding cut off trench dam of native clay or impervious soil across and along the trench at a point 20 to 30 feet upstream from the main line sewer wye, tee or saddle to retard and resist the movement of groundwater through the trench granular bedding or backfill material. The trench dams shall be carefully compacted and shall be 3 feet in thickness, as measured along the service centerline and shall be constructed against the undisturbed trench sides from the subgrade or bottom of the Stone Foundation, whichever is lower to the top of granular bedding or backfill to a limit of 12 inches over the top.

918.05 Laying Pipe. The work shall be done according to 901.12.

The end of the sanitary house connection service, installed for future use, shall be plugged with an approved stopper so as to prevent ground water infiltration.

At the end of the service shall be set a Y-Pole made of timber not less than 2 inch x 4 inch section with the timber being treated, in good condition, straight, sound and free from large or loose knots. The Y-Pole shall extend to a point above the backfill. After the Engineer has located the Y-Poles, the Contractor shall cut off the Y-Pole to a point slightly below the original ground surface. The Y-Pole shall be braced in such a manner as to hold it firmly in position during backfilling. If the Y-Pole is pulled out or bent over, the Contractor shall dig down to its end and replace or straighten the Y-Pole. The Y-Pole shall be adjacent to the end of the service, but not on it.

918.06 Pipe Joints. The joints for sanitary house connection service lines shall be as follows:

	<u>Material</u>	<u>Joint Specifications</u>
(a)	Vitrified Clay Pipe	901.15
(b)	Cast Iron Pipe	ANSI A 21.11
(c)	PVC Plastic Pipe	901.15

918.07 Backfilling. The work shall be done according to 901.17.

918.08 Surface Soil and Restoration of Surfaces. The work shall be done according to 901.18.

918.09 Method of Measurement. The length of sanitary house connection service shall be measured on the centerline of the pipe as constructed from the wye fitting to the end of the sanitary house connection service, including curves and bends but excluding the wye fitting.

918.10 Basis of Payment. Payment for accepted quantities of sanitary house connection service, including the furnishing and placing of the Y-Pole, will be paid for at the contract unit prices per linear foot, complete in place.

<u>Item</u>	<u>Unit</u>	<u>Description</u>
918	Linear Foot	_____ Inch Diameter Pipe, Sanitary House Connection

919 - WATERCOURSE EROSION PROTECTION

919.01	Description
919.02	Materials
919.03	Excavation and Backfill
919.04	Protection Material
919.05	Method of Measurement
919.06	Basis of Payment

919.01 Description. This work shall consist of compacting backfill and placing the protection material on the banks and bottom of swales, ditches, channels or streams where shown on the plans, or as ordered by the Engineer, over the full width of the excavated trench to undisturbed earth.

919.02 Materials. Material shall be as follows:

- (a) Dumped rock fill, Type B.....601.08

919.03 Excavation and Backfill. Excavation shall be as specified under Section 901.03 and Backfill shall meet the requirements of Item 911 and both will be paid for under Item 901.

919.04 Protection Material. The Contractor shall distribute the rock to a mat thickness of 18 inches. Reasonable care shall be exercised in placing the protection to assure that the finished surface of the protected trench shall conform with the existing bank and bottom contours.

919.05 Method of Measurement. The number of square yards of watercourse erosion protection to be paid for will be computed on the following basis:

Square yards equals W times L divided by 9: Where W is the surface width of the rock mat and L is the surface length of the rock mat as measured along the slope of the mat parallel to the centerline of the sewer, both width and length being in feet, complete in place.

919.06 Basis of Payment. Payment will be made at contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
919	Square Yard	Watercourse Erosion Protection

930 - TEMPORARY BYPASS PUMPING AND MAINTENANCE OF FLOW

930.01	General
930.02	Pumping and Bypassing
930.03	Flow Control Precautions
930.04	Discharge
930.05	Maintenance of Flow
930.06	Method of Measurement
930.07	Basis of Payment

930.01 General. This work shall consist of furnishing, operating, maintaining and removal of all devices required to maintain sewage flows during construction and during nights and weekends. Service to the homes must be maintained at all times. The point of construction must also be maintained as free of sewage which may contaminate or erode the base material as possible. A temporary connection must be made each night and weekends to maintain the normal flow.

930.02 Pumping and Bypassing. When pumping and bypassing is required, the Contractor shall supply the pumps, conduits, plugs, and other equipment to divert the flow of sewage around the manhole section in which work is to be performed. A sewer line plug shall be inserted into the line at the upstream end of the section to be replaced. The bypass system shall be of sufficient capacity to handle existing flow plus additional flow that may occur during a rainstorm. The Contractor will be responsible for furnishing the necessary labor and supervision to set up and operate the pumping and bypassing system. If pumping is required on a 24-hour basis, engines shall be equipped in a manner to keep noise to a minimum. When replacing a manhole, the Contractor shall provide such pump and ponding facilities to prevent any sewage from entering the construction until the base has been set and cured and the first manhole section is set. All precautions shall be taken to prevent flooding or contamination of the base material.

930.03 Flow Control Precautions. When flow in a sewer line is plugged, blocked, or bypassed, sufficient precautions must be taken to protect the sewer line from damage that might result from sewer surcharging. Further, precautions must be taken to insure that sewer flow control operations do not cause flooding or damage to public or private property being served by the sewers involved.

930.04 Discharge. The discharge of any pumping and bypassing operation shall be to an approved outlet. At no time shall any discharge of sanitary sewage be allowed to flow into a storm sewer, onto the street, into a swale or drainage way, or into any stream, river or creek or roadside ditch.

930.05 Maintenance of Flow.

The Contractor shall furnish, install, and remove a temporary section of sewer to maintain flow during the night, on weekends, and holidays. The temporary pipe section may be fabricated out of PVC rigid pipe and shall be of such diameter that the upstream end will fit around the existing pipe and the downstream end will fit into the new pipe. The work shall be suspended at night, on weekends, and holidays at a point that is between house service wyes.

930.06 Method of Measurement.

The work required to maintain flows and to bypass pump sewage around work areas, including all materials, equipment, labor, fuel, and protection, shall be paid for as a lump sum price for the entire project.

930.07 Basis of Payment.

Payment shall be made at contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
930	Lump	Temporary Bypass Pumping and Maintenance of Flow

931 - MANHOLE CHIMNEY SEALS

931.01	Description
931.02	Materials
931.03	Construction Methods
931.04	Method of Measurement
931.05	Basis of Payment

931.01 Description. The work shall consist of the installation of internal manhole chimney seals within each manhole shown on the drawings. Such seals will be placed to prevent inflow under the manhole frame.

931.02 Materials. Materials shall be:

Rubber Sleeve and Extension

The sleeves shall be made of a rubber material and shall conform to the physical requirements of ASTM C922. Each sleeve shall be double pleated, have a minimum vertical height of 8 inches, and have a minimum thickness of 3/16 inch. The sleeves shall be capable of a 2-inch minimum vertical expansion when installed. The bottom section of the sleeve shall contain an integral expansion band recess as well as multiple sealing fins.

The rubber extension shall also conform to the physical requirements of ASTM C923 and have a minimum thickness of 3/16 inch. The top section of the extension shall be shaped to fit into the bottom band recess of the rubber sleeve. The bottom section of the extension shall also contain an integrally formed expansion band recess and shall also contain multiple sealing fins matching that of the rubber sleeve.

Continuous Wedge Strips

A continuous wedge strip, if needed, shall be used to adapt the rubber sleeve to sloped surfaces. Each strip shall have a sloped differential to provide a vertical recess surface. It shall also be shaped to fit into the band recess, and have an integral band restraint. The strip, when cut, shall be long enough to cover the entire side circumference of the band recess requiring slope adjustment.

Expansion Bands

The expansion bands used to compress the sleeve against the manhole frame shall be 16 gauge stainless steel conforming to ASTM A-240, Type 304, with a minimum width of 1 3/4 inches.

The expansion mechanism shall provide enough pressure to secure a watertight seal and shall have a minimum adjustment of two inches in diameter. Studs and nuts used for this mechanism shall be stainless steel conforming to ASTM F-593 and 594, Type 304.

931.03 Construction Methods. The contractor shall field measure the inside diameter of each manhole frame base and manhole chimney cone to determine the amount of taper, if any, along the inside surface of the manhole frame. This information shall be used to determine the band sizes, the sizes and shapes of the seal, as well as the required slope for a wedge insert, should one be needed.

The surfaces against which the sleeve is to be compressed shall be circular, clean, reasonably smooth, and free of any loose material and/or excessive voids. If the masonry surface is rough or irregular, it shall be smoothed with an approved low-shrink mortar. A bead of butyl rubber caulk conforming to AASHTO M-198, Type B, may be applied to the lower sealing surface of the sleeve to fill any minor irregularities on the masonry surface. Any flaws along the manhole frame, such as cracks, pits, or protrusions, shall be filled with mortar or smoothed by grinding.

After the rubber sleeve has been placed in the proper position, the stainless steel expansion bands shall be installed in the top and bottom band recesses and individually tightened as required to provide a watertight seal.

If a wedge insert is required to adapt the rubber sleeve to a sloped surface, it shall be placed in the appropriate band recess before the expansion bands are installed. The expansion shall then be installed in the wedge insert/band recess and expanded as required to provide a watertight seal.

931.04 Method of Measurement. The complete and accepted rubber sleeves, extensions, wedge strips, and expansion bands will be measured by the unit for each seal and class of work itemized complete and in place.

931.05 Basis of Payment. The work included in this item shall be paid for at the contract price per each unit paid in place.

<u>Item</u>	<u>Unit</u>	<u>Description</u>
931	Each	Manhole Chimney Seal