

**CITY
OF
FAIRLAWN**

**CONSTRUCTION & MATERIALS
SPECIFICATIONS**

December, 2020

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PART I – GENERAL CLAUSES AND COVENANTS

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ITEM 1 - DEFINITIONS AND TERMS

1.01 ABBREVIATIONS

Wherever the following abbreviations are used in these specifications or on the plans or other contract documents, they are to be construed the same as the respective expressions represented:

AASHTO	- American Association of State Highway and Transportation Officials
ABS	- Acrylonitrile Butadiene Styrene
ANSI	- American National Standards Institute
APHA	- American Public Health Association
ASTM	- ASTM International (formerly American Society for Testing and Materials)
AWG	- American Wire Gauge
AWWA	- American Water Works Association
BMP	- Best Management Practice
CMS	- Construction and Material Specifications
DVD	- Digital Video Disc
HDD	- Horizontal Directional Drilling
MSDS	- Material Safety Data Sheet
NPDES	- National Pollutant Discharge Elimination System
ODOT	- Ohio Department of Transportation
OEPA	- Ohio Environmental Protection Agency
ORC	- Ohio Revised Code
OSHA	- Occupational Safety Health Administration
PE	- Professional Engineer
PS	- Professional Surveyor
psf	- Pounds Per Square Foot
psi	- Pounds Per Square Inch
PVC	- Polyvinyl Chloride
SCTE	- Society of Cable Telecommunications Engineers
SWPPP	- Storm Water Pollution Prevention Plan

1.02 ADVERTISEMENT (LEGAL NOTICE)

The public announcement as required by law, inviting bids for WORK to be performed or materials to be furnished.

1.03 AVERAGE DAILY FLOW

The total quantity of liquid tributary to a point, divided by the number of days over which the flow was measured.

PART I – GENERAL CLAUSES AND COVENANTS

1.04 BACKFILL

The earth or other material used to fill a trench or excavation from the top of the “bedding” to subgrade elevation.

1.05 BACKFILL MATERIAL

The earth or other specified material used for backfill.

1.06 BASEMENT

That portion of a building that is below the first floor and is partially or wholly underground.

1.07 BEDDING

The earth or other specified material on which a pipe or conduit is supported.

1.08 BIDDER

The individual, firm or corporation submitting a bid to the City of Fairlawn for the performance of the WORK.

1.09 BUILDING SEWER

The pipe, which carries wastewater from a building, to a common sewer, beginning five feet (5') outside the inner face of the building wall.

1.10 BUILDING STORM DRAIN

The pipe carrying clean water (footer drains and downspouts) from a building to a common storm sewer or building storm drainage system, beginning five feet (5') outside the inner face of the building wall.

1.11 CERTIFIED TEST DATA

A test report from a manufacturer's laboratory or independent laboratory listing test data covering the specified requirements for the samples tested and a statement by a person having legal authority to act for the manufacturer and/or supplier of the material for the material tested for incorporation into, or use on, the project. The certifications shall include the laboratory report number and the project name to which the material is delivered. Only laboratory reports signed by a Registered Professional Engineer will be accepted for this purpose.

PART I – GENERAL CLAUSES AND COVENANTS

1.12 CITY

The term "CITY" wherever used in these specifications shall mean the City of Fairlawn, Summit County, Ohio, acting through its Service Director or his properly authorized agents, such agents acting severally within the scope of the particular duties entrusted to them.

1.13 COLLECTOR SEWER

A sewer that receives flow from two (2) or more building sewers and conveys that wastewater to other collector sewers or an interceptor sewer.

1.14 COMBINED SEWER

A sewer intended to receive and is presently receiving both clean water and waste water.

1.15 CONSTITUENTS

The combination of particles or conditions, that exists, in industrial wastes.

1.16 CONTRACT

The Advertisement for Bids, Special Information for Bidders, Bid Book, General Instructions, Special Provisions, Plan Specifications, Addenda, Project Plans, the City of Fairlawn Construction and Materials Specification Book and the several instruments therein referred to all comprise the contract between the City of Fairlawn and the Contractor setting forth the obligations of the parties thereunder including, but not limited to, the performance of the WORK, the furnishing of labor and materials, the required bonds and the basis of payment.

1.17 CONTRACT ITEM (PAY ITEM)

A specifically described unit of WORK for which a price is bid and paid for as provided in the contract.

1.18 CONTRACTOR

The individual, firm or corporation (known as the party of the second part) contracting with the City of Fairlawn for performance of prescribed WORK acting directly or through a duly authorized representative.

1.19 CROSS CONNECTION

A physical connection through which a supply of potable water could be contaminated or polluted.

A connection between a supervised potable water supply and one unknown potable source.

1.20 DAYS

PART I – GENERAL CLAUSES AND COVENANTS

The word "DAYS" when used in this contract shall be held to mean CALENDAR DAYS (every day shown on the calendar) unless otherwise specified.

1.21 DEPUTY DIRECTOR

The term "DEPUTY DIRECTOR" where used shall mean the Deputy Director of Public Service retained by the City of Fairlawn, Summit County, Ohio or his authorized assistant.

1.22 DETAILED PLANS

See "Plans".

1.23 DROP MANHOLE

A manhole installed in a sewer where the elevation of the incoming sewer considerably exceeds that of the outgoing sewer; a vertical waterway outside the manhole is provided to divert the wastewater from the upper to the lower level so it does not fall freely into the manhole except at peak rate flow.

1.24 ENERGY GRADIENT

The elevation of the hydraulic grade line plus the velocity head of the flowing wastewater.

1.25 ENGINEER

The term "ENGINEER" where used shall mean the Engineer retained by the City of Fairlawn, Summit County, Ohio or his authorized assistant.

1.26 EQUIPMENT

All machines, tools and apparatus, together with the necessary supplies for upkeep and maintenance, required for the proper construction and acceptable completion of the WORK.

1.27 EXTRA WORK

An item of WORK not provided for in the contract as awarded, but found essential to the satisfactory completion of the contract within its intended scope.

1.28 EXFILTRATION

The quantity of wastewater which leaks into the surrounding ground, through unintentional openings in a sewer. Also the process whereby this leaking occurs.

1.29 GARBAGE

Solid waste, debris and other materials discarded or not used in connection with the project.

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1.30 HYDRAULIC GRADE LINE

The surface of the flowing wastewater

1.31 INCOMPATIBLE POLLUTANTS

Any pollutant that is not included as a compatible pollutant.

1.32 INDUSTRIAL WASTES

Shall mean the liquid wastes from industrial manufacturing processes, trade, or business as distinct from sanitary sewerage.

1.33 INFILTRATION ALLOWANCES

The amount of infiltration anticipated in sewer systems; considered inevitable under sewer construction and sewer service conditions, and authorized and provided for in a sewer system capacity design and in sewer construction practice.

1.34 INFILTRATION / INFLOW (I & I)

The combination of infiltration and inflow water in sewer lines, with no way to distinguish either of the two basic sources.

1.35 INFILTRATION

The discharge of ground waters into sewers, through defects in pipe lines, joints, manholes, or other sewer structures.

1.36 INFLOW

The discharge of any kinds of water into sewer lines not including “Infiltration”.

1.37 INSPECTOR/PROJECT INSPECTOR

The "INSPECTOR" or PROJECT INSPECTOR is the authorized representative of the City assigned to make a detailed inspection of any or all portions of the WORK, or materials thereof.

1.38 INTERCEPTOR SEWER

A sewer that receives the flow from the collector sewers and conveys the wastewaters to treatment facilities.

1.39 INTERPRETATIONS

PART I – GENERAL CLAUSES AND COVENANTS

In order to avoid cumbersome and confusing repetition of expressions in these specifications, it is provided that whenever anything is, or is to be, done if, as, or, when or where "acceptable, accepted, approval, approved, authorized, condemned, considered necessary, contemplated, deemed necessary, designated, determined, directed, disapproved, established, given, indicated, insufficient, ordered, permitted, rejected, required, reserved, satisfactory, specified, sufficient, suitable, suspended or unacceptable" it shall be understood as if the expression were followed by the words "by the Service Director" or "to the Service Director."

1.40 JOINTS

The means of connecting sectional lengths of sewer pipe into a continuous sewer line, using various types of jointing materials with various types of pipe formations that make possible the jointing of the sections of pipe into a continuous collecting sewer line. The number of joints depends on the lengths of the pipe sections used in the specific sewer construction job.

1.41 MAIN SEWER

In larger systems, the principal sewer to which collector sewers and sub-mains are tributary, also called trunk sewer. In small systems, a sewer to which one or more collector sewers are tributary.

1.42 MAJOR CONTRIBUTING INDUSTRY

A major contributing industry is one that:

- A) Has a flow of 50,000 gallons or more per average workday.
- B) Has a flow of greater than five percent (5%) of the flow carried by the municipal system receiving the waste.
- C) Is found by the permit issuance authority, in connection with the issuance of NPDES permit to the publicly owned treatment works receiving the waste, to have a significant impact, either singly or in combination with other contributing industries, on that treatment works or upon the quality of effluent from that treatment works.

1.43 MANHOLE

An opening in a sewer provided for the purpose of permitting a man access to the sewerage system for maintaining and/or inspection.

1.44 MATERIALS OR PRODUCTS

Any substance or substances, or the parts, goods, stock, or the like specified or contemplated for use in the construction of the project and its appurtenances.

1.45 NON-FILTERABLE RESIDUE OR SUSPENDED SOLIDS

Solids that either float on the surface, or are in suspension in water, sewage, or other liquids

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which are removable by laboratory filtering.

1.46 NPDES PERMIT

The National Pollutant Discharge Elimination System Permit means a permit issued by the State of Ohio under the direction of the United States Environmental Protection Agency for a discharge which is either in compliance with authorized discharge levels or which includes a schedule which will bring the point source into compliance with authorized discharge levels.

1.47 OHIO ENVIRONMENTAL PROTECTION AGENCY

Ohio Environmental Protection Agency is the State agency with all the administrative, regulatory and/or quasi-judicial powers provided to it by applicable law.

1.48 PEAK

The maximum quantity that occurs over a relatively short period of time. Also called peak demand or peak load.

1.49 PERFORMANCE, PAYMENT AND MAINTENANCE BONDS

The "PERFORMANCE, PAYMENT AND MAINTENANCE BOND" or bonds are the approved form of security furnished by the Contractor and its Surety or Sureties as a guaranty that it will complete the WORK in accordance with the terms of the Contract, and all Supplemental Agreements pertaining thereto, which security shall comply with and be subject to the approval of the City.

1.50 PERSON, ENTERPRISE, ESTABLISHMENT, OR OWNER

Shall be any individual, firm, company, association, society, corporation or group using the sewage works and sewerage system. The owner shall be the legal owner of record.

PART I – GENERAL CLAUSES AND COVENANTS

1.51 PLANS

The "PLANS" are the official Plans, profiles, typical cross sections, general cross sections, working drawings and supplemental drawings, or exact reproductions thereof, approved by the Director that show the location, character, dimensions and details of the WORK to be done, and which are to be considered as a part of the Contract supplementary to these specifications.

1.52 PROJECT

The specific location together with all appurtenances and construction to be performed thereon under the contract.

1.53 PROJECT PLANS

See "PLANS".

1.54 PROPOSAL

The "PROPOSAL" is the offer of the Bidder for the WORK when executed and submitted on the prescribed Proposal Form, properly signed and guaranteed, to perform the WORK and to furnish the labor and materials at the price quoted.

1.55 PROPOSAL GUARANTEE

The security furnished with a bid as a guarantee that the bidder will enter into the contract if its bid is accepted.

1.56 PUBLIC SEWER

Shall mean a sewer in which all owners of abutting properties have equal rights, and is controlled by public authority.

1.57 REGISTERED ENGINEER

An engineer registered with the Ohio State Board of Registration for Professional Engineers and Surveyors to practice professional engineering in the State of Ohio.

1.58 REGISTERED SURVEYOR

A surveyor registered with the Ohio State Board of Registration for Professional Engineers and Surveyors to practice professional surveying in the State of Ohio.

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1.59 RIGHT-OF-WAY

A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to street, highway or utility purposes.

1.60 SANITARY SEWAGE

See Sanitary Wastewater

1.61 SANITARY WASTEWATER

- A) Domestic wastewater with storm and surface water excluded.
- B) Wastewater discharging from the sanitary conveniences of dwellings (including apartment houses and hotels), office buildings, industrial plants, or institutions.
- C) The water supply of a community after it has been used and discharged into a sewer.

1.62 SERVICE CONNECTION

Are the individual utility lines from five feet (5') outside the inner wall of the building to the main lines in the public right-of-way or easements.

1.63 SERVICE DIRECTOR

The term "SERVICE DIRECTOR" or "Director" where used shall mean the Director of Public Service retained by the City of Fairlawn, Summit County, Ohio or his designee or, in the absence of a Director of Public Service, the Deputy Director of Public Service or his authorized assistant.

1.64 SEWAGE

Wastes from residences, business buildings, institutions, and industrial establishments.

1.65 SEWER

Shall mean a pipe or conduit for carrying sewage or storm water.

1.66 SEWER TAP

The installation of a wye on an existing sanitary sewer.

1.67 SEWERAGE WORKS, WASTEWATER TREATMENT WORKS, OR SEWERAGE SYSTEM

Shall mean all facilities for collecting, transportation, pumping, treating and disposing of sewage.

1.68 SLUDGE

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Shall mean any discharge of sewage, or industrial waste which in concentration of any given constituent or in quantity of flow exceeds for any period of duration longer than fifteen (15) minutes more than five (5) times the average twenty-four (24) hour concentration of flows during normal operation.

1.69 SPECIAL PROVISIONS

Additions and/or revisions to the standard and supplemental specifications covering conditions or procedures peculiar to an individual project.

1.70 SPECIFICATIONS

The Specifications are the directions, provisions and requirements contained herein as supplemented by such supplemental specifications and Special Provisions as may be necessary, pertaining to the method and manner of performing the WORK or to the quantities and qualities of materials to be furnished under the Contract.

1.71 STREET COMMISSIONER

The term "STREET COMMISSIONER" where used shall mean the Street Commissioner of the City of Fairlawn.

1.72 STRUCTURES

Bridges, culverts, catch basins, inlets, retaining walls, manholes, endwalls, buildings, sewers, service pipes, underdrains, foundation drains, and other features which may be encountered in the WORK and not otherwise classed herein.

1.73 SUBCONTRACTOR

An individual, firm or corporation who assumes any part of the Contractor's undertaking to carry on and complete the WORK under agreement with the Contractor. This does not include those who merely furnish materials.

1.74 SUBSTRUCTURE

All that part of the structure below the bearing seats of simple spans, truss, through girder and continuous spans, skewbacks of arches and tops of footings or rigid frames together with backwall, wingwalls and slope protection.

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1.75 SUPERINTENDENT

The Contractor's authorized representative present on the project and responsible for supervising the WORK.

1.76 SUPERSTRUCTURE

The entire structure except the substructure.

1.77 SUPPLEMENTAL AGREEMENT

Supplemental Agreement is a written agreement executed by the Contractor and by the authorized representative of the City of Fairlawn covering necessary alterations to an existing contract.

1.78 SUPPLEMENTAL SPECIFICATIONS

Detailed specifications supplemental to or superseding these specifications.

1.79 SURETY

The corporation, firm or individual, other than the Contractor, executing a bond furnished by the Contractor.

1.80 SUSPENDED SOLIDS

Shall mean solids that either float on the surface of, or are in suspension in water, sewage, or other liquids, and which are removable by laboratory filtering.

1.81 UTILITY COMMISSIONER

The term "UTILITY COMMISSIONER" where used shall mean the Utility Commissioner retained by the City of Fairlawn, Summit County, Ohio or his authorized assistant.

1.82 WATERS OF THE STATE

Shall mean all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or partly within, or border upon, this State, or are within its jurisdiction, except those private waters which do not combine or effect a junction with natural surface or underground waters. (Ohio Revised Code 6111.01-H)

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1.83 WORK

The WORK consists of all elements of the Project as described by the Bid Book, Contract, Supplemental Agreements and as indicated on the Project Plans and Specifications, including all labor, services, materials, equipment, and other incidentals necessary or convenient for the successful completion of the Project and the performance of all duties and obligations imposed by the Contract.

1.84 WORKING DRAWINGS

All plans or drawings issued for construction on the project which can include but are not limited to stress sheets, shop drawings, erection plans, false work plans, framework plans, cofferdam plans, bending diagrams for reinforcing steel, traffic detour plans, or any other supplementary plans or similar data which the Contractor is required to submit for approval.

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ITEM 2 - PROPOSAL REQUIREMENTS AND CONDITIONS

2.01 CONFLICTING PROVISIONS

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2.10 PUBLIC OPENING OF PROPOSALS

2.11 IRREGULAR PROPOSALS

2.12 COLLUSION

2.13 DISQUALIFICATION OF BIDDERS

2.01 CONFLICTING PROVISIONS

If any provision(s) contained in the City of Fairlawn Construction and Materials Specifications is/are in conflict with any provision(s) in a City of Fairlawn Public Project Bid Book, the provision(s) contained in the City of Fairlawn Public Project Bid Book shall prevail.

2.02 CONTENTS OF PROPOSAL FORM

Upon request, and payment in the amount specified in the advertisement, copies of the Proposal Form, Contract Documents, Specifications and Plans may be obtained from Spagnuolo & Associates, LLC, 3057 W. Market St, Fairlawn, Ohio, between the hours of 8:00 A.M. and 4:00 P.M., Monday through Friday except holidays, unless otherwise specified in the advertisement. This form will state the location and description of the contemplated quantities and kinds of WORK to be performed and/or materials upon which bids shall be solicited. The proposal will state the time allowed for completion of the project, the amount of the proposal guarantee, and the date, time and place of the opening of proposals. The form will also include any special provisions or requirements that vary from or are not contained in the plans and specifications.

2.03 INTERPRETATION OF QUANTITIES IN PROPOSAL

The quantities in the proposal are approximate only and are prepared for the comparison of bids. Payment to the Contractor will be made only for the actual quantities of WORK performed and accepted or materials furnished and accepted in accordance with the contract except for lump sum contracts, and except for lump sum items in unit price contracts. The scheduled quantities of WORK to be done and materials to be furnished may each be increased, decreased or deleted as hereinafter provided.

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2.04 EXAMINATION OF PLANS, SPECIFICATIONS, SPECIAL PROVISIONS AND SITE OF WORK

The bidder is expected to examine carefully the site of the proposed WORK, the proposal, plans and specifications, supplemental specifications, special provisions, and contract forms before submitting a proposal. The submission of a bid shall be considered evidence that the bidder has made such examinations and is satisfied as to the conditions to be encountered in performing the WORK and as to the requirements of the plans, specifications, supplemental specifications, special provisions, contract and other related documents. When a prospective bidder is in doubt as to the true meaning of any item contained in the plans, specifications or other contract documents, he may submit to the Engineer a written request for interpretation of it. Any such interpretation will be made an Addendum and a copy shall be transmitted, or otherwise furnished, to each person who obtains one or more sets of Bidding and Contract Documents. The City will not be responsible for any other interpretation of any item in question.

2.05 PREPARATION OF PROPOSAL

The Bidder shall submit his proposal upon the forms furnished by the City. A unit price for labor and material for each item shall be given in the column provided. The products of the respective unit prices and quantities shall be given in the column provided for that purpose and the total amount of the proposal obtained by adding the amounts of the several items. All the figures shall be in ink or typed. Any erasures, corrections or alterations shall be initialed and dated by the Bidder.

When an item in the proposal contains a choice to be designated by the Bidder, the Bidder shall indicate his choice in accordance with the specifications for that particular item, and thereafter no further choice will be permitted.

The proposal shall include a properly executed Non-Collusion Affidavit.

The Bidder's proposal must be signed in ink by an authorized representative on behalf of the entity submitting the bid. If the proposal is made by an individual, the name and business address of the individual must be clearly evident on the bid. If the proposal is submitted by a partnership, the names and business address of all partners must be clearly evident on the bid. If the proposal is submitted by a joint venture, the names and business addresses of the firms represented by the joint venture as well as the name and address of an individual authorized to sign on behalf of the joint venture must be clearly evident on the bid. If the proposal is made by a corporation, the name and title of the officer having authority to sign the contract, as well as the name and address of the corporation must be clearly evident on the bid.

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2.06 DELIVERY OF PROPOSALS

The proposals for each project shall be placed, together with the proposal guarantee, in a separate sealed envelope marked so as to indicate the identity of the project and the name and address of the bidder. Proposals will be received at the location specified in the proposal until the time and date set for the opening thereof. Proposals received after the time for opening of bids will be returned to the bidder unopened. If City offices are closed on the scheduled bid opening date due to unforeseen conditions, bids will be received and opened the next regular business day at the location and time noted on the Proposal.

2.07 WITHDRAWAL OF PROPOSALS

A bidder may not withdraw his proposal after it has been submitted.

2.08 COMBINATION OR CONDITIONAL PROPOSALS

If the Engineer so elects, proposals may be requested for projects in combination and/or separately, so that bids may be submitted either on the combination or on separate units of the combination. The City reserves the right to make awards on combination bids or separate bids to the best advantage of the City. No combination bids, other than those specifically designated by the Engineer, will be considered. Separate contracts may be awarded for each individual project included in the combination.

2.09 COMBINED OR SEPARATE PROPOSALS

If the Engineer so elects, bids for a project may be requested in a single proposal containing all the items of WORK, or separate bids may be requested for each group of related items of WORK on a single project.

2.10 PUBLIC OPENING OF PROPOSALS

Proposals will be open and read publicly at the time and place designated by the Engineer. The bid opening is open to the public and anyone may attend.

2.11 IRREGULAR PROPOSALS

Irregular Proposals - Proposals will be considered irregular and may be rejected for the following reasons:

If the proposal is on a form other than that furnished by the City; or if the form is altered or if any part thereof is detached. Computer generated facsimiles of the City's format are acceptable.

If there are unauthorized additions, conditional or alternate bids, or irregularities of any kind which may tend to make the proposal incomplete, indefinite, or ambiguous as to its meaning.

If the proposal does not contain a unit price for each pay item listed, except in the case of

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authorized alternate pay items or lump sum items.

If the City determines that any of the unit bid prices are significantly unbalanced to the potential detriment of the City.

If the Bidder adds any provisions reserving the right to accept or reject an award.

If the proposal is not typed or in ink.

If the Bidder fails to submit to submit a complete bid.

If the proposal is not signed by the Bidder and does not contain an executed Non-Collusion Affidavit.

If there is evidence of collusion.

2.12 COLLUSION

Collusion is an agreement between two or more Bidders to defraud the City and/or to gain an unfair advantage over competitors bidding on the same project. Evidence of collusion among Bidders will render the bids of such Bidders void. Bidders who participate in collusion will not be permitted to bid on any future WORK advertised by the City for a period of three (3) years.

2.13 DISQUALIFICATION OF BIDDERS

Any of the following reasons may be considered as being sufficient for the disqualification of a Bidder and the rejection of its proposal or proposals:

More than one proposal for the same WORK from an individual, firm or corporation under the same or different name, or corporations with one or more of the same persons as officers or directors of such corporations.

Evidence of collusion among bidders. Participants in such collusion will not be permitted to bid on any future WORK advertised by the City for a period of three (3) years.

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Bid prices which obviously are mathematically unbalanced. Mathematically unbalanced bid prices are those that do not reasonably reflect the cost of the item bid inclusive of labor, profit, overhead and material costs. Some examples of a mathematically unbalanced bid are ‘front-end loading’ and ‘covering’ (moving money from one item to another). Bidders must bid at least the cost of the materials for every item bid. Rejection of a bid may result if the City determines that the bid prices submitted are ‘materially unbalanced’. A bid is materially unbalanced if there is a reasonable doubt that the award to the Bidder submitting the mathematically unbalanced bid will result in the lowest ultimate cost to the City.

Lack of experience, competency and/or adequate machinery, equipment, plant, and other resources.

Uncompleted WORK on other projects, whether or not with the City, which, in the judgment of the City, might hinder or prevent the prompt completion of the WORK if awarded.

Failure to comply with any pre-qualification requirements.

Failure to perform previous contracts adequately or a breach of prior contracts, whether or not the breach was waived by the City at a prior time.

Or for any other reasonable cause.

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ITEM 3 - AWARD AND EXECUTION OF THE CONTRACT

3.01 CONSIDERATION OF BIDS

3.02 AWARD OF CONTRACT

3.03 EXECUTION OF CONTRACT

3.04 FAILURE TO EXECUTE CONTRACT

3.05 RESPONSIBILITY FOR DAMAGE CLAIMS AND LIABILITY INSURANCE

3.06 REPORTING, INVESTIGATING, AND RESOLVING MOTORIST DAMAGE CLAIMS

3.01 CONSIDERATION OF BIDS

All proposals timely received will be publicly opened and read by the City. Those sections of a proposal containing pricing information will be tabulated and made available to the public.

Until the final award of the Contract, however, the right will be reserved to reject any or all proposals and to waive technical errors as may be deemed to be for the best interests of the City.

The proposals will be compared on the basis of the Engineer's Estimate of quantity of WORK to be done and materials to be furnished. They are approximates only and the City expressly reserves the right to increase or decrease them or to omit any item that the Director may deem advisable. The maintenance period for all improvements under this contract shall be the same as the guarantee and retainer period (Section 9.12). The right to award the contract to the bidder who is not handicapped with other WORK of such magnitude as to interfere with the execution of the WORK under this contract is especially reserved by the City.

The lowest bid will be determined by comparing the total amount of the proposals, excluding alternates, as specified in Section 2.05. Proposals will be compared on the basis of the summation of the products of the estimated quantities shown in the proposal and the unit bid prices. In case of a discrepancy in computing the amount of the bid, unit prices quoted will govern.

The right is reserved to reject any or all proposals, to waive technicalities or to advertise for new proposals, if it is in the best interest of the City.

3.02 AWARD OF CONTRACT

The award of the contract, if it be awarded, will be made as soon as it is reasonably possible after the opening of proposals, to the lowest responsive and responsible bidder whose proposal complies with all the requirements prescribed. In no case will an award be made until all necessary investigations are made as to the responsibility of the bidder to whom it is proposed to award the contract. The successful bidder will be notified, by letter mailed to the address shown on the proposal, telephone call, or e-mail that its bid has been accepted and the bidder has been awarded the contract.

Where the bids exceed the Engineer's Estimate by more than 15 percent, a public hearing may be

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necessary, in which case the award of the contract, if it is to be awarded, will be withheld and not awarded until after such hearing occurs.

If a contract is not awarded within ninety (90) calendar days after the opening of bids, the Bidder may withdraw its bid without prejudice. The City reserves the right to ask a Bidder to extend its bid for an amount of time greater than ninety (90) calendar days and for such time as the City and Bidder may agree. All bids received by the City shall remain valid for ninety (90) days.

Where bids are taken in the form of separate proposals on portions of one project, the WORK will ordinarily be awarded to the Contractor, otherwise qualified, whose combined bid is the lowest, responsive and responsible bid. No Contractor bidding on all such proposals shall be required to enter into a contract covering less than the entire project without its consent.

When a proposal is accepted, and within ten (10) days thereafter, the bidder whose proposal is so accepted will be required to enter into a contract in the form hereto attached and GIVE BOND IN THE SUM EQUAL TO ONE HUNDRED PERCENT (100%) OF THE PROPOSAL to insure the faithful performance of all requirements of said contract to the satisfaction of the City, and in the form hereto attached.

3.03 EXECUTION OF CONTRACT

The successful bidder shall, after receipt of notice of the award and delivery of the contract form by the City, sign the contract and return it, together with the Contract Performance Bond, the Certificate of Compliance from the Industrial Commission, the Power of Attorney of the individual signing the Performance Bond and all other required contract documents. No proposal shall be considered binding upon the City of Fairlawn until the execution of the contract by the duly authorized officials of the City of Fairlawn. Unless exigent circumstances exist, no authorization to perform any WORK shall be given until all documentation has been submitted to and approved by the City.

3.04 FAILURE TO EXECUTE CONTRACT

Failure to execute the contract and file acceptable bond and required documents within 10 calendar days may be just cause for the cancellation of the award and the forfeiture of the proposal guarantee which shall become the property of the City, not as a penalty, but in liquidation of damages sustained. Award may then be made to the next lowest responsive and responsible bidder, or the WORK may be re-advertised and constructed under contract, or otherwise, as the City may decide.

3.05 RESPONSIBILITY FOR DAMAGE CLAIMS AND LIABILITY INSURANCE

The Contractor shall indemnify and save harmless the City, its officers, employees, agents and any fee owner from whom a temporary Right-of-Way was acquired for the Project from all suits, actions, claims, damages, or costs of any character brought on account of any injuries or damages sustained by any person or property on account of any negligent act or omission by the Contractor or its subcontractors or agents in the prosecution or safeguarding of the WORK.

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The Contractor shall procure and maintain insurance for liability for damages imposed by law and assumed under this Contract, including the kinds and in the amounts hereinafter provided from insurance companies authorized to do business in the State of Ohio.

Before the execution of the Contract by the City, the Contractor shall:

Furnish to the Director a certificate or certificates of insurance in the form satisfactory to the City demonstrating compliance with this subsection.

Provide an insurance certificate or certificates that show the Contractor's liability and auto policies coverage are not reduced, restricted, or canceled until 30 days written notice has been given to the City by the insurer.

Mail all certificates and notices to: City of Fairlawn, 3487 S. Smith Road, Fairlawn, Ohio 44333. Upon request, the Contractor shall furnish the City with a certified copy of each policy, including the provisions establishing premiums.

The types and minimum limits of insurance are as follows:

Worker's Compensation Insurance. The Contractor shall provide and maintain, during the life of this Contract, adequate Worker's Compensation Insurance for all employees employed at the site of the project and, in case any WORK is sublet, the Contractor shall require the subcontractor similarly to provide Worker's Compensation Insurance for the subcontractor's employees, unless such employees are covered by the protection afforded the Contractor.

Contractor's Insurance. The Contractor shall provide and maintain, during the life of this Contract, such Public Liability (Bodily Injury and Property Damage) Insurance as shall protect the Contractor and any subcontractor performing WORK covered by the Contract from claims for damages for personal injury, including accidental death, as well as from claims for property damage which may arise from operations under the contract, whether such operation shall be performed by the Contractor or by any subcontractor or by anyone directly or indirectly employed by either of them. Such insurance policy shall include the City as an additionally named insured. The Contractor shall maintain coverage of the types and in the amounts as specified below.

The amounts of such insurance shall be as follows:

General Liability Insurance Certificate naming the City and other parties named above, as Additional Insured (Bodily Injury and property damage combined single limit at \$1,000,000 each occurrence and \$2,000,000 aggregate)

Auto Liability Insurance Certificate naming the City and other parties named above, as Additional Insured (Bodily injury and property damage combined single limit at \$1,000,000 each occurrence)

Umbrella liability coverage of at least \$5,000,000.

The insurance should be written by a Company licensed to do business in Ohio with an A.M.

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Best Rating of A- or better.

Fire and Builders Risk Insurance. The Contractor shall maintain insurance to protect the Contractor and the City from loss by fire, lightning, extended coverage and vandalism in the full amount of the contract.

Such Insurance shall remain in full force and effect during the life of the Contract.

Insurance may not be changed or cancelled unless the insured and the City are notified in writing not less than thirty (30) days prior to such change or cancellation. In the event of cancellation the Contractor shall cease all operations until proper insurance has been restored. If any part of the contract is sublet, the Contractor is responsible for the part being sublet being adequately covered by insurance herein-above described.

Explosion, Collapse, and Underground (XCU) coverage at the same limits as the commercial general liability insurance policy. In addition, if blasting is to be performed, obtain XCU coverage providing a minimum Aggregate Limit of \$5,000,000 and Each Occurrence Limit of \$1,000,000. Submit proof of insurance, endorsements, and attachments to the Director prior to starting the WORK.

Insurance coverage in the minimum amounts set forth above neither relieves the Contractor from liability in excess of such coverage, nor precludes the City from taking such other actions as are available to it under any other provisions of this Contract or otherwise in law.

If requested by the City, the Contractor shall provide evidence of all policy exclusions and deductibles listed with each and every policy of insurance required by this contract. The Contractor is responsible for any and all exclusions consistent with the risks it assumes under this Contract and as imposed by law. The Contractor is also responsible for any and all deductible limits listed with all policies of insurance required herein.

If the Contractor provides evidence of insurance in the form of certificates of insurance, valid for a period of time less than the period during which the Contractor is required by terms of this Contract, then the City will accept the certificates, but the Contractor is obligated to renew its insurance policies as necessary and shall provide new certificates of insurance from time to time, so that the City is continuously in possession of evidence that the Contractor's insurance is according to the foregoing provisions.

If the Contractor fails or refuses to renew its insurance policies or the policies are canceled or terminated, or if aggregate limits have been impaired by claims so that the amount available is under the minimum aggregate required, or modified so that the insurance does not meet the requirements of this section, the City may refuse to make payment of any further monies due under this Contract or refuse to make payment of monies due or coming due under other contracts between the Contractor and the City. The City in its sole discretion may use monies retained pursuant to this subsection to renew or increase the Contractor's insurance as necessary for the periods and amounts referred to above. Should the Contractor fail to comply with these requirements, the City may default the Contractor and call upon the Contractor's Surety to

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remedy any deficiencies. During any period when the required insurance is not in effect, the Director may suspend performance of the Contract. If the Contract is so suspended, the Contractor is not entitled to additional compensation or an extension of time on account thereof.

Nothing in the Contract Documents and insurance requirements is intended to create in the public or any member thereof a third party beneficiary hereunder, nor is any term and condition or other provision of the Contract intended to establish a standard of care owed to the public or any member thereof.

3.06 REPORTING, INVESTIGATING, AND RESOLVING MOTORIST DAMAGE CLAIMS

The Contractor and the City are required to report, investigate, and resolve motorist damage claims accordingly.

When a motorist reports damage to its vehicle either verbally or in writing to the Contractor, the Contractor shall within 3 days make and file a written report to the Director. The Director will then contact the Contractor's insurance company and request that the insurance company investigate and resolve the claim. In the event that the City directly receives the motorist's claim, the City will send the claim report to the Contractor's insurance company and a copy of the claim report to the Contractor. If the Contractor's insurance company does not resolve the claim in a timely manner, the City will advise the motorist of the option of pursuing the claim in Court.

In the event of a lawsuit filed against the City by the motorist, the City, as co-insured party, may request the Contractor's insurance company to defend this lawsuit and hold the City harmless.

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ITEM 4 - SCOPE OF WORK

4.01 INTENT OF PLANS AND SPECIFICATIONS

4.02 SUB-SURFACE WORK

4.03 INCREASE OR DECREASED QUANTITIES

4.04 EXTRA WORK

4.05 MAINTENANCE OF LOCAL TRAFFIC

4.06 REMOVAL AND DISPOSAL OF STRUCTURES AND OBSTRUCTIONS

4.07 RIGHTS IN AND USE OF MATERIALS FOUND ON THE WORK

4.08 FINAL CLEANING UP

4.09 RESTORATION OF DISTURBED SURFACES

4.01 INTENT OF PLANS AND SPECIFICATIONS

The Advertisement for Bids, Special Information for Bidders, Bid Book, General Instructions, Special Provisions, Plan Specifications, Addenda, Project Plans, this Document the City of Fairlawn Construction and Materials Specification Book and the several instruments therein referred to shall constitute the contract documents and shall be construed together to determine the agreement of the parties. Should any misunderstanding arise as to the intent or meaning of said Advertisement for Bids, Special Information for Bidders, Bid Book, General Instructions, Special Provisions, Plan Specifications, Addenda, Project Plans, the City of Fairlawn Construction and Materials Specification Book and the several instruments therein referred to or any discrepancy appear in any, the decision of the City in such case shall be final and conclusive.

The contractor shall perform all items of WORK and perform altered and extra WORK, all in accordance with the lines, grades, typical cross sections, and dimensions shown on the plans; and shall furnish, unless otherwise provided in the special provisions or in the contract, all materials, implements, machinery, equipment, tools, supplies, transportation and labor necessary to the prosecution of the WORK.

Wherever in the specifications or upon the plans, the words "designated, directed, ordered, permitted, prescribed, required" or words of like import are used, it shall be understood as, at the direction of the City Engineer. Similarly the word "acceptable, approved, satisfactory", or words of like import, shall mean approved by, or acceptable or satisfactory to, the City Engineer, unless otherwise expressly stated.

4.02 SUB-SURFACE WORK

The City reserves the right to lay or relay, or allow to be laid or re-laid, any sewers, drains, gas pipes, water pipes, conduits or any other structures or necessary appurtenances thereto, which, in the opinion of the Engineer, are necessary or expedient.

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IN GENERAL, it is the intention of the City to require all property owners to have water, sewer and gas connections made to all lots before placing any pavement.

The Contractor is expected to have on hand such necessary replacement material i.e.: water service boxes, corporation valves, main water valve boxes, various castings, etc.

If the Contractor finds that old trenches are not properly backfilled, he shall so notify the Engineer in writing, allowing ample time to have the defects remedied before laying the base materials.

If any opening is made subsequent to the completion of the improvement, all the WORK of restoring the pavement will be done directly by the City, and the Contractor will be relieved of any maintenance requirements on the portion of the pavement so disturbed.

4.03 INCREASE OR DECREASED QUANTITIES

The Director, may by written instructions to the Contractor, make alterations in plans involving increases or decreases in the quantity of WORK as may be necessary or desirable. Such alterations shall not be considered as a waiver to any of the conditions of the contract, nor invalidate any of the provisions thereof.

A CHANGE ORDER is an amendment or alteration to any of the contract documents, the work to be performed, price to be paid or schedule of performance. Furthermore, no WORK shall be performed or paid for on non-bid items of any contract prior to a written agreement between the Contractor and Director, and in no case shall the value of such items be in excess of \$1,000.00 without approval by the Board of Audit and Review. Increases in quantities or costs of items that are made within the above limits shall be considered as covered by the original contract.

4.04 EXTRA WORK

The Contractor shall perform unforeseen WORK, when ordered, for which no price is included in the contract, whenever it is deemed necessary or desirable in order to complete fully the WORK as contemplated. Such WORK shall be performed in accordance with the specifications and as directed, and will be paid for as provided under Section 9.05 extra WORK.

4.05 MAINTENANCE OF LOCAL TRAFFIC

It is the purpose of the City to subject the residents on the street to be improved to as little inconvenience, discomfort, injury to business and loss of enjoyment as possible. PUBLIC SERVICE COMPANIES will be kept informed of the WORK being done, and destruction of public or private property will not be acceptable. The Contractor will be charged with the cost of all repairs to public or private property occasioned by the unnecessary disarrangement or destruction of it.

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There shall be provided and maintained in passable condition such detours, by-passes or temporary structures, including snow and ice removal, as may be necessary to provide ingress and egress for the residents adjacent to the improvement, emergency vehicles including but not limited to ambulance and fire department vehicles, school buses and the United States Postal Service vehicles. Temporary approaches and crossings of intersecting streets shall be provided and maintained in a safe condition. Such of the above accommodations for traffic as are in the street shall be constructed and maintained by the Contractor until the permanent improvement is completed and open to local traffic.

If, in the opinion of the Service Director, the Contractor is not providing proper maintenance, the City may take the necessary steps to place it in proper condition and the cost of such services will be deducted from any money that may be due or become due to the Contractor.

The cost of maintaining local traffic including lights, signs, barricades, watchman, and constructing, maintaining and removing temporary roads and structures required for this purpose shall be included in the LUMP SUM BID FOR ITEM 53 "MAINTAINING TRAFFIC". Aggregate, Calcium Chloride and/or Road Oil, authorized by the Engineer and used for maintaining local traffic, will be paid for at the unit prices bid for the items.

4.06 REMOVAL AND DISPOSAL OF STRUCTURES AND OBSTRUCTIONS

All obstructions of any character including but not limited to buildings, fences, landscaping, structures, etc., obstructing the construction of the roadway or other improvement and falling within the limits of the right of way or easement shall be removed by the Contractor and disposed of accordingly.

Old paving material, curbing, manhole and inlet castings, sewer pipe, water main, culverts, driveway pipe, or other appurtenances, on or in the street or intersections, or as the Service Director may designate, shall remain the property of the City and shall be carefully removed by the Contractor and neatly piled at such points along the street as the Service Director may direct.

Corrugated pipe or other driveway culvert material in good condition shall be carefully removed without damage, cleaned of debris and stored adjacent to the place of removal until the Service Director has determined whether it is to be reinstalled or to be removed from the site by the Contractor.

Such material, in the judgment of the Service Director, which is suitable and required to be relayed under the items of the contract, shall be thoroughly cleaned, redressed and relayed where directed. The City may remove the remainder, but in case the City shall not have removed such material before the final cleaning up of the street or streets, the Contractor shall remove the same without additional compensation.

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4.07 RIGHTS IN AND USE OF MATERIALS FOUND ON THE WORK

The Contractor, with the approval of the Service Director, may use on the project such stone, gravel, sand or other material determined suitable by the Service Director as may be found in the proposed excavation. The contractor shall not excavate or remove any material within the project limits which is not within the grading limits, as indicated by the slope and grade lines, without the written authorization from the Service Director. No charge for the materials so used will be made against the Contractor. The Contractor shall replace at its own expense with other acceptable material all of that portion of the excavation material so removed and so used, to the satisfaction of the Service Director.

Old paving material, curbing, manhole and inlet castings, etc., on or in the street or intersections, or so much of it as the Service Director may designate, shall remain the property of the City and shall be removed by the Contractor and neatly piled at such points within the project limits as the Service Director may direct. The City may remove these materials, but in case the City shall have not removed such material before the final cleaning up of the street or streets, the Contractor shall remove and dispose of the same without additional compensation.

4.08 FINAL CLEANING UP

Before final acceptance, the Project, including stream channels and banks within the right-of-way at drainage structures, and all borrow and waste areas, storage sites, temporary plant sites, all roads and other ground occupied by the Contractor in connection with the WORK shall be cleaned of all rubbish, excess materials, temporary structures, and equipment. These areas shall have vegetative cover established by seeding and mulching in accordance with Item 34 at no additional cost to the City, and all parts of the WORK shall be left in an acceptable condition. Furthermore, the sewers, manholes, inlets, etc. shall be cleared of all scaffolding, centering, rubbish, dirt, dams or other obstructions.

Upon completion of the WORK, the Contractor shall be responsible for a final cleaning of all WORK areas. Cleaning shall include, but not be limited to, the removal of grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces as resulting from WORK on the project to the satisfaction of the Service Director. Cleaning materials and methods used shall not create hazards to health or property and shall not damage surfaces.

4.09 RESTORATION OF DISTURBED SURFACES

All areas affected by the contractor's operations shall be completely restored at such time as may be designated by the Service Director.

On brick, block, or asphalt paved streets, the area over trenches shall be restored with materials of same kind as existing, over an 8 inch concrete, class "C" base. The concrete base shall extend at least 12 inches beyond the edge of the undisturbed soil. On brick and block surface streets, all pieces of brick or block at the sides of the trench shall be removed and the repaving shall be neatly toothed into the existing brick or block pavement.

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On concrete paved streets, the area over trenches shall be restored with concrete, class "C"; same thickness as existing but no less than 8 inches, and extending a minimum of 12 inches beyond the edge of the undisturbed soil. Where an existing pavement joint is less than one half slab away from the restored area, the pavement will be removed and restored to the existing joint. In no case shall the replacement consist of less than one half of an existing pavement slab.

Where the roadway surface cracks, settles, or gets damaged otherwise beyond the restoration limits stated above due to the Contractor's operations, such additional areas shall be restored in the same manner as areas over the trench. The Contractor will be required to remove all surplus excavation, open all gutters and existing drains, and shape or blade the existing roadways to the same condition as found prior to the start of construction, and in a manner satisfactory to the Service Director.

All curbs, sidewalks, and driveways affected by the WORK of this contract shall be restored completely and in accordance with these specifications for constructing curbs, sidewalks and driveways. Restoration of curbs, sidewalks and driveways shall be done in full blocks. Patching or piecing of blocks will not be permitted.

The cost of all restoration, unless otherwise provided on the plans or in the specifications, shall be included and paid for in the price bid for the WORK.

Should any settlement in the street surface occur after the pavement restoration has been made which is the result of trench settlements, poor workmanship, defective materials, etc., the Contractor or his surety will be required within the guarantee period and in accordance with provisions thereof to remedy the defects in the trenches and to restore the street surface to its proper condition.

Failure of the Contractor to follow the order of the Service Director pursuant to this section, shall give the City the unqualified right to supply the materials and perform the labor or cause it to be performed and any and all expense chargeable thereto, directly or indirectly, shall be deducted from monies due the Contractor or billed to the Contractor.

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ITEM 5 - CONTROL OF WORK

5.01 AUTHORITY OF DIRECTOR OF PUBLIC SERVICE

5.02 PLANS

5.03 CONFORMITY WITH PLANS AND SPECIFICATIONS

5.04 COORDINATION OF PLANS, SPECIFICATIONS AND SPECIAL PROVISION

5.05 COOPERATION OF CONTRACTOR

5.06 COOPERATION WITH UTILITIES

5.07 COOPERATION BETWEEN CONTRACTORS

5.08 AUTHORITY AND DUTIES OF PROJECT INSPECTOR

5.09 AUTHORITY AND DUTIES OF INSPECTORS

5.10 INSPECTION

5.11 CONSTRUCTION STAKES

5.12 MAINTENANCE DURING CONSTRUCTION

5.13 REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK

5.14 PROTECTION FROM CONSTRUCTION EQUIPMENT

5.15 CONDUCT OF WORK

5.01 AUTHORITY OF DIRECTOR OF PUBLIC SERVICE

The Director of Public Service shall decide any and all questions which may arise as to the quality or acceptability of materials furnished and WORK performed and as to the manner of performance and rate of progress of the WORK and shall decide all questions which may arise as to the interpretation of the Plans and Specifications and all questions as to the acceptable fulfillment of the Contract on the part of the Contractor, and as to compensation.

The Service Director will have the authority to suspend the WORK wholly or in part due to the failure of the Contractor to correct conditions deemed unsafe for the workers or the general public, for failure to carry out provisions of the contract and to carry out orders. The Service Director may suspend the WORK for such periods as deemed necessary due to adverse weather conditions, for conditions considered adverse to the prosecution of the WORK or for any other condition or reason deemed to be in the public interest.

5.02 PLANS

Unless otherwise stated, all plans will show location and design details of all structures, lines, grades and typical cross-sections of roadways, conduits and other items appearing on the proposal. The Contractor shall keep one set of plans available on the WORK site at all times.

The approved Plans will be supplemented by such standard and working drawings as are necessary to adequately control the WORK. It is mutually agreed that all authorized alterations affecting the requirements and information given on the approved plans shall be in writing.

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The Contractor shall be responsible for the furnishing of copies of Plans, Specifications and Special Provisions, or the necessary portions thereof, to subcontractors and parties furnishing materials, labor and equipment for a project.

5.03 CONFORMITY WITH PLANS AND SPECIFICATIONS

All WORK performed and all materials furnished shall be in conformity with the lines, grades, cross sections, dimensions and material requirements shown on the plans or indicated in the specifications.

In the event the Service Director finds the materials or the finished product in which the materials are used not in conformity with the plans and specifications but that reasonably acceptable WORK has been produced, he shall then make a determination if the WORK shall be accepted and remain in place. In this event, the Service Director will document the basis of acceptance by contract modification which will provide for any appropriate adjustment in the contract price for such WORK or materials as he deems necessary to conform to his determination based on his Engineer's judgment.

Failure of the Contractor to follow the order of the Service Director, pursuant to this section, shall give the City the unqualified right to supply the materials for the finished product and perform the labor or cause it to be performed and any and all expenses chargeable thereto, directly or indirectly, shall be deducted or billed to the Contractor at the option of the Service Director.

5.04 COORDINATION OF PLANS, SPECIFICATIONS AND SPECIAL PROVISIONS

These specifications, the supplemental specifications, the plans, special provisions, and all supplementary documents are essential parts of the Contract, and requirements appearing in one are as binding as though appearing in all. They are intended to be cooperative, to describe and provide for a complete WORK.

In case of a discrepancy, figured dimensions shall govern over scaled dimensions; plans shall govern over specifications; special provisions shall govern over both specifications and plans.

The Contractor shall take no advantage of any apparent error or omission in the plans or specifications. In the event the Contractor discovers such an error or omission, he shall immediately notify the Engineer. The Engineer will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the plans and specifications.

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5.05 COOPERATION BY CONTRACTOR

The Contractor will be supplied with plans, specifications and any special provisions. The Contractor shall have available on the WORK at all times, one copy each of said plans and special provisions and specifications. He shall give the WORK constant attention necessary to facilitate the progress thereof, and shall cooperate with the Service Director, Engineer, Inspector and with other Contractors in every way possible. The Contractor shall at all times have a competent superintendent, capable of reading and thoroughly understanding the plans and specifications as his agent on the WORK, who shall receive instructions from the Service Director, Engineer and Inspector or their authorized representatives.

The Superintendent shall have full authority to execute and shall execute the orders or directions of the Service Director, Engineer and Inspector without delay and to promptly supply such materials, tools, plant equipment and labor as may be required. Such Superintendent shall be furnished by the Contractor, irrespective of the amount of WORK sublet.

The address given in the bid or proposal upon which this contract is founded is hereby designated as the place where all notices, letters and other communications to the Contractor shall be mailed or delivered.

Delivery to the above named place or depositing in the mail, directed to the above place, in any mail box regularly maintained by the United States Postal Service; or delivery of any other notice, letter or other communication to the Contractor to the above place shall be deemed sufficient service thereof upon the Contractor and the date of said service shall be the date of such delivery or mailing. Fax or email delivery is also an acceptable means of delivery if the fax or email is acknowledged as received by the recipient by either a reply indicating so or a “read receipt” acknowledged by the recipient.

Such address may be changed at any time by an instrument in writing executed and acknowledged by the Contractor and delivered to the Service Director. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter or other communication upon the Contractor personally.

The Contractor agrees to confine the WORK under this contract to the strict dimensions of easements, rights-of-way, or other WORK area authorized in writing by the City or shown on the plans. Any failure of the Contractor, its agents, servants and employees to restrict the WORK to the defined area shall be at its sole liability and responsibility and the Contractor further agrees to save the City and its agents harmless from any activity of his agents, servants, employees and Subcontractors where such activity concerning WORK under this contract extends beyond the defined WORK area.

Within 60 days of completion of the WORK the contractor will submit a set of as-built drawings and a copy of any notes pertaining to the WORK to the Inspector or Engineer. This set of drawings will show the as-built construction lines and grades, will incorporate addenda, change orders, field orders, WORK directive changes and all other changes to the original drawings to reflect the actual in-place installation of the WORK. The as-built drawings shall include but not

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be limited to, the location and elevation of all new WORK. All existing underground utilities and structures both noted and not noted on the original drawings shall be shown on the appropriate drawing plans, elevations and details and shall include the location, elevation, dimensions and material types. Costs to furnish the as-built drawings including all labor, material and equipment to perform the requirements described herein will be included in the price bid for the various items of WORK to be completed under the contract.

5.06 COOPERATION WITH UTILITIES

The Contractor will notify all utility companies, all line owners or other parties affected and will endeavor to have all necessary adjustments of the public or private utility fixtures, pipe line and other appurtenances within or adjacent to the limits of construction made as soon as possible so as not to interfere with the progress of the WORK.

Existing surface or overhead structures or utility lines are not necessarily shown on the drawings and those shown are only approximately correct. The Contractor shall make such investigations as are necessary to determine the extent to which existing surface or overhead structures may interfere with the prosecution of the WORK contemplated under this contract.

Existing subsurface structures or utility lines (including sewer service connections but excluding all other subsurface connections) which may be encountered during the construction of the WORK or are located in such close proximity to the WORK to be done under this contract so as to require special precautions and methods for their protection, such as sewers, drains, sewage force mains, water mains, gas mains, telephone and electric conduits, together with appurtenances, are shown on the plans or drawings, insofar as there is not public record of their existence.

The sizes, locations and depths shown are, however, only approximately correct and the Contractor shall make such investigations or explorations as may be necessary to verify their accuracy. The Contractor shall, if so ordered, uncover and locate these structures in advance of the excavation for the WORK required by these specifications.

In order to avoid damages to private subsurface utility lines and services as a result of excavating operations, the Contractor shall give advance notice of each line or service crossing to the particular company concerned.

Water lines, gas lines, wire lines, service connections, water and gas meter boxes, water and gas valve boxes, light standards, cable ways, signals and all other utility appurtenances within the limits of the proposed construction which are to be relocated or adjusted are to be moved by the owners at their expense, except as otherwise provided for in the special provisions or as noted on the plans or other contract documents.

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It is understood and agreed that the Contractor has considered in his bid all of the known permanent and temporary utility appurtenances in their present or relocated positions and that no additional compensation will be allowed for any delays, inconvenience or damage sustained by him due to any interference from the known said utility appurtenance or the operation of moving them.

It is the complete responsibility of the Contractor to determine the exact location of each, every and all substructures and utility lines including but not limited to water, sewer, gas, electricity and pipes or conduits whether or not located on private property, public property, public or private rights-of-way, or public or private easements and of all surface or overhead structures, including but not limited to utility lines, telephone or electrical poles, sidewalks, driveways and growing things such as trees, shrubbery, etc.

If the WORK of the Contractor is delayed because of any acts or omissions of any other Contractor of the Owner, the Contractor shall, on that account, have no claim against the Owner other than for an equitable adjustment in the time required for performance of the WORK.

5.07 COOPERATION BETWEEN CONTRACTORS

At any time, the City may contract for other WORK on or near the Project.

Separate contractors working within the limits of the Project shall conduct their WORK without interfering with or hindering the progress or completion of WORK being performed by other contractors and shall cooperate with each other as directed by the Service Director.

5.08 AUTHORITY AND DUTIES OF PROJECT INSPECTOR

The Project Inspector is the inspector assigned and authorized to administer the contract. He shall give instructions to the Contractor on all matters concerning the WORK and the Contractor shall refer all questions concerning the WORK to the Project Inspector. The Project Inspector shall suspend items of WORK which do not meet the requirements of the proposal, plans and specifications until contract requirements are met.

5.09 AUTHORITY AND DUTIES OF INSPECTORS

Inspectors employed by the City shall be authorized to inspect all WORK done and all material furnished. Such inspection may extend to all or any part of the WORK and to the preparation, fabrication or manufacture of the materials to be used. The Inspector shall not be authorized to revoke, alter or waive any requirements of the specification or plans.

He shall be authorized to call the attention of the Contractor to any failure of the WORK or materials to conform to the specifications or contract. He shall have the authority to reject materials that do not meet specification requirements or suspend the portion of the WORK involved until any question at issue can be referred to and decided by the Service Director.

5.10 INSPECTION

PART I – GENERAL CLAUSES AND COVENANTS

The Contractor shall furnish the inspector with every reasonable facility for ascertaining whether or not the WORK performed and materials used are in accordance with the requirements and intent of specifications and contract.

If the Service Director requests it, the Contractor shall at any time before final acceptance of the WORK, remove or uncover such portions of the finished WORK as may be directed. After examination, the Contractor shall restore said portions of the WORK to the standard required by the specifications. Should the WORK thus exposed and examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed, shall be paid for as extra WORK; but, should the WORK so exposed or examined prove unacceptable, the uncovering or removing and the replacing of the covering or making good of the parts removed, shall be at the Contractors' expense. No WORK shall be done nor materials used without suitable supervision or inspection. Failure to reject any defective WORK or material shall not in any way prevent later rejection when such defects be discovered; or obligate the City to final acceptance.

Holes resulting from the removal of test cores shall be filled by the Contractor with the material similar to that of the cores and compacted and finished to conform to the surrounding construction at no additional cost to the City.

5.11 CONSTRUCTION STAKES

Unless otherwise specified in the contract documents, the Engineer will furnish the Contractor, well in advance of the actual construction, with all line, profile and grade stakes necessary to the proper prosecution of the WORK contracted for under these specifications.

The contractor shall construct the WORK in accordance with the Engineer's stakes and marks, making use of them before they are disturbed, and shall be charged with the full responsibility for conformity and agreement of the WORK with such stakes and marks. The Contractor shall be held responsible for the preservation of all stakes and marks and, if in the opinion of the Service Director, any of the survey stakes or marks has been carelessly or willfully destroyed or disturbed by the Contractor, the cost of replacing them shall be charged against and shall be deducted from the payment for the WORK.

5.12 MAINTENANCE DURING CONSTRUCTION

The Contractor shall maintain the WORK during construction and until the project is accepted. This maintenance shall constitute continuous and effective WORK prosecuted day by day, with adequate equipment and forces to the end so that the roadway, conduits or structures are kept in satisfactory condition at all times.

PART I – GENERAL CLAUSES AND COVENANTS

Contractor shall repair, restore and clean streets and other public facilities outside the WORK limits that are affected by his operations, including hauling and delivery of materials.

5.13 REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK

All WORK that has been rejected shall be remedied, or removed and replaced in an acceptable manner by the Contractor at his own expense, and no compensation shall be allowed to him for such removal or replacement. Any WORK done beyond the lines and grades shown on the plans, or as given, except as herein provided, or any extra WORK done without authority, will be considered as unauthorized and at the expense of the Contractor and will not be measured nor paid for. WORK so done may be ordered removed at the Contractor's expense. Upon failure on the part of the Contractor to comply forthwith with any order of the Service Director made under the provisions of this article, the Service Director shall have authority to cause defective WORK to be remedied, or removed and replaced, and unauthorized WORK to be removed and to deduct the costs from any monies due or to be become due to the Contractor.

5.14 PROTECTION FROM CONSTRUCTION EQUIPMENT

The Contractor shall be responsible for any damage caused by his equipment or operations. Loads which are in excess of the legal limit or construction equipment mounted on crawler tracks and weighing more than 16 tons including load shall not be permitted on a new or existing bridge, pavement or base which is to remain in place, except as specifically authorized by the Service Director. No loads shall be permitted on a pavement or base before the expiration of the curing period. Crawler tracks are not permitted to “crawl” from job site to job site using existing paved areas or streets.

5.15 CONDUCT OF WORK

The WORK shall be commenced at such points as the Service Director may direct. If the WORK under this contract conflicts with other WORK to be done in the same territory for or by the City, the Service Director will determine when and how the WORK shall proceed.

It must be distinctly understood that if more than one contract is awarded to the same Contractor, he may be required to prosecute WORK on all of them at the same time at the option of the Service Director; and he will not be allowed to transfer men, implements or machinery from one job to another, but shall at all times have a competent foreman and sufficient number of men, implements, and machinery upon each job and at the same time as in the opinion of the Service Director shall be sufficient for the proper execution of the WORK. If deemed desirable by the Service Director, the WORK shall be executed simultaneously and continuously in two or more sections, at such points as the Service Director may determine.

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No WORK shall be done at night or during freezing weather except by special direction and under special requirements of the Service Director to be agreed upon in writing and without extra compensation there for. All unfinished concrete WORK shall be suitably protected during freezing weather to prevent damage. The Service Director on account of public necessity, adverse weather conditions, or other reasons, may order all WORK suspended and thereupon the Contractor must pile up all material neatly, fill depressions, provide temporary board walks, crossings and take such other means as are necessary to protect the public and the WORK and facilitate traffic. The time allowed for the completion of the WORK shall be extended in an amount equal to that lost by the Contractor in this manner.

The Contractor is required to execute WORK done under this contract during the hours of daylight; and no WORK will be permitted at night or on Sundays except to save property or life or in case of emergency as authorized and directed by the Service Director.

In the event a life safety issue arises for which the Contractor does not have time to obtain approval of the Service Director to act, then the Contractor shall proceed in accordance with its best judgement and shall notify the Service Director of doing so as soon as possible.

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ITEM 6 - CONTROL OF MATERIAL

6.01 SOURCE OF SUPPLY AND QUALITY OF MATERIALS

6.02 SAMPLES AND TESTS

6.03 DEFECTIVE MATERIALS

6.04 SECURITY OF THE WORKSITE

6.05 STORAGE OF MATERIALS

6.06 UNACCEPTABLE MATERIALS

6.01 SOURCE OF SUPPLY AND QUALITY OF MATERIALS

At the option of the Service Director the source of supply of each of the materials shall be approved before the delivery is started. Only materials conforming to the requirements of these specifications and approved shall be used in the WORK. All proposed materials to be used might be inspected or tested at any time during their preparation and use. If, after inspection or testing, it is found that sources of supply that have been approved do not furnish a uniform product, or if the product from any source does not meet specifications at any time, the Contractor shall be required to furnish approved material from their approved sources. No material that, after approval, has in any way become unfit for use shall be used in the WORK.

6.02 SAMPLES AND TESTS

In order to assure the use of suitable materials the Service Director may require any or all materials to be subject to test by means of samples or otherwise as he may determine. The Contractor shall afford such facilities as the Service Director may require for collecting and forwarding samples and shall not make use of nor incorporate in the WORK any material represented by the samples until the tests have been made and the materials found acceptable and in accordance with the requirements of the specifications. The Contractor, in all cases, shall furnish the required samples without charge.

Unless otherwise indicated in these specifications or in the Special Provisions and Proposal, all sampling and testing and laboratory methods required or involved under this contract shall be in accordance with the "Standard Specifications for Highway Materials and Methods of Sampling and Testing" of the AASHO. With respect to the test of quality of aggregates (stone, slag, or gravel), modified tests for abrasion in lieu of the abrasion test (percent of wear) for broken stone, and of the abrasion test (percent of wear) for gravel, have been provided and shall govern in certain cases as hereinafter provided in the MATERIAL DETAILS - MINIMUM REQUIREMENTS FOR SAMPLING MATERIALS, under ITEM 700 - ODOT Construction and Material Specifications, Latest Edition.

Whenever ASTM standard specifications and serial designations are stipulated the reference shall be construed to be the specifications and serial designation of the ASTM as amended as of the date of the advertisement for bids.

PART I – GENERAL CLAUSES AND COVENANTS

For the verification of weights or proportions and character of materials and determinations of temperatures used in the preparation of the materials and mixtures, the inspector shall have access at all times to all parts of any paving or other plants connected with the WORK. The Contractor shall facilitate and assist the verification of all scales, measures and other devices that he operates.

On any project where it is deemed necessary by the Service Director, the Contractor shall provide a suitable shelter for Laboratory Plant Representative or Inspector on duty at the plant, to protect him from the weather while conducting the necessary tests of materials used. The room shall be heated to a temperature of at least 60 degrees Fahrenheit, if the WORK is in progress in cold weather. All sieves shall conform to the requirements of the Specification for Sieves for Testing Purposes, ASTM Designation E-11.

Detailed specification for the materials to be used in the WORK will be found in "Detailed Specifications" of this volume for the respective type of WORK involved.

The kind or grade of material specifically mentioned in the proposal or in the plans for any part of the WORK shall be used. When no such designation is made, the use of any of the materials permitted by these specifications for that distinctive part of the WORK would be optional with the Contractor.

The Contractor shall guarantee that materials used, and all the WORK done under this Contract, will fully comply with the requirements of the plans and specifications.

6.03 DEFECTIVE MATERIALS

All materials not conforming to the requirements of these specifications shall be considered as defective and all such materials, whether in place or not shall be rejected and shall be removed immediately from the site of the WORK, unless otherwise permitted by the Service Director. No rejected material, the defects of which have been subsequently corrected, shall be used until approval has been given. Upon failure on the part of the Contractor to comply forthwith with any order of the Service Director made under the provisions of this article, the Service Director shall have authority to remove and replace defective materials and to deduct the cost of removal and replacement from any monies due or to become due to the Contractor.

6.04 SECURITY OF THE WORKSITE

The Contractor shall be responsible for the safety and security of the WORK site including all materials used and stored at the WORK site. Any acts of vandalism resulting from improper security or storage of materials shall be the responsibility of the Contractor under ITEM 7.10 "RESPONSIBILITY FOR DAMAGE CLAIMS, ETC."

PART I – GENERAL CLAUSES AND COVENANTS

6.05 STORAGE OF MATERIAL

Materials shall be so stored as to assure the preservation of their quality and fitness for the WORK. Stored materials, even though approved before storage, may again be inspected prior to their use in the WORK. Stored materials shall be located so as to facilitate their prompt inspection. Approved portions of the right-of-way may be used for storage purposes and for the placing of the Contractor's plant and equipment, but any additional space required must be provided by the Contractor at his expense. Private property shall not be used for storage purposes without written permission of the owner or lessee, and if requested by the Service Director, copies of such written permission shall be furnished to him. Such permission shall not relieve the Contractor of his responsibilities under ITEM 7.02 “PERMITS AND LICENSES” and ITEM 7.10 “RESPONSIBILITY FOR DAMAGE CLAIMS, ETC.”. All storage sites shall be restored to their original condition by the Contractor at his expense. This shall not apply to the stripping and storing of topsoil, or to other materials salvaged from the WORK.

6.06 UNACCEPTABLE MATERIALS

All materials not complying to the requirements of the specifications at the time they are intended to be used shall be considered unacceptable and shall be removed immediately from the site of the WORK unless otherwise instructed by the Service Director. No materials for which defects have been corrected, shall be used until approval has been given. Upon failure on the part of the Contractor to comply immediately with any order of the Service Director made under the provisions of this ITEM, the Service Director shall have authority to remove and replace defective materials and to deduct the cost of removal and replacement from any monies due or to become due to the Contractor.

PART I – GENERAL CLAUSES AND COVENANTS

ITEM 7 - LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

7.01 LAWS TO BE OBSERVED

7.02 PERMITS AND LICENSES

7.03 PATENTED DEVICES, MATERIALS AND PROCESSES

7.04 RESTORATION OF SURFACES OPENED BY PERMIT

7.05 SANITARY PROVISIONS

7.06 PUBLIC CONVENIENCE AND SAFETY

7.07 BARRICADES, DANGER AND WARNING SIGNS

7.08 USE OF EXPLOSIVES

7.09 PRESERVATION AND RESTORATION OF PROPERTY

7.10 RESPONSIBILITY FOR DAMAGE CLAIMS, ETC.

7.11 DAMAGE AND DETENTION CLAIMS BY THE CONTRACTOR

7.12 NO WAIVER OF LEGAL RIGHTS

7.13 CONTRACTOR'S RESPONSIBILITY FOR THE WORK

7.14 PERSONAL LIABILITY OF PUBLIC OFFICIALS

7.15 ASSIGNMENT OF RIGHTS BY CONTRACTOR

7.01 LAWS TO BE OBSERVED

The Contractor shall keep fully informed of all federal, state and local laws, ordinances, and regulations and all orders and decrees of authorities having any jurisdiction or authority, which in any manner affect those engaged or employed on the WORK or which in any way affects the conduct of the WORK; and it shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the City and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by itself, its employees, agents, representatives, subcontractors, suppliers, assigns or others working under the direction, control or supervision of Contractor.

The Contractor agrees that in the hiring of employees for the performance of WORK under this Contract or any other subcontract hereunder, no Contractor or Subcontractor, nor any person acting on behalf of such Contractor or Subcontractor, shall, by reason of race, color, religion, sex, national origin, disability, age, genetics, citizenship or military status discriminate in the employment of labor or workers, who are qualified or available to perform The WORK to which the employment relates.

No Contractor, Subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of WORK under the Contract based upon race, color, religion, sex, national origin, disability, age, genetics, citizenship or military status.

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7.02 PERMITS AND LICENSES

The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of WORK, excepting that WORK which will be under City Contract. When the WORK is under City Contract the deposit required by and paid to the City of Fairlawn as enumerated in the City of Fairlawn code will be waived, but this will in no way relieve the Contractor of his responsibility for the preservation and restoration of both public and private property in the area of the WORK (See ITEM 7.09, 9.07, etc).

A permit for drawing water from fire hydrants must be secured from the City of Akron, Department of Public Service, Public Utilities Bureau, 146 South High Street, P.O. Box 3665, Akron, Ohio 44309-3665.

7.03 PATENTED DEVICES, MATERIALS AND PROCESSES

It is mutually understood and agreed that without exception the bid prices are to include all royalties and costs arising from patents, trademarks, and copyrights in any way involved in the WORK.

Whenever the Contractor is required or desires to use any design, device, material, or process covered by letters, patent or copyright, the right for such use shall be provided for by suitable agreement with the patentee, owner or assignee and a copy of this agreement shall be filed with the Service Director. However, whether or not such agreement is made or filed as herein provided, the Bidder and the Surety in all cases shall indemnify and save harmless the City from any and all claims for infringement by reason of the use of any such patented design, device, material or process, to be performed under the Contract; and shall indemnify the City for any costs, expenses, and damages arising or accruing in favor of the holder of such patent, trademark or copyright by reason of any such infringement at anytime after the award of the Contract in all proposals and projects where patented devices, materials and processes, patented pavements and details are specified or involved.

It is intended that the Bidder in addition thereto, bid on one or more patented or unpatented devices, materials and processes as alternates as provided in the proposal which may be bid upon and furnished by the Bidder in lieu of the patented devices, materials and processes specified in the proposal.

In the case of patented pavements and wearing courses, where royalties, licensing and proprietary services charges exacted or to be exacted by the patentees are published and certified agreements are filed with the City, guaranteeing to prospective Bidders free unrestricted use of all such proprietary rights and trade-marked goods upon payment of such published charges, such patented pavements may be specifically designated in the proposal and competition secured upon the item exclusive of the patent or proprietary charges, provided, however, that an unpatented alternate set up as comparable in the proposal will afford the Bidder opportunity for basing his bid thereon.

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7.04 RESTORATION OF SURFACES OPENED BY PERMIT

The right to construct or reconstruct any utility service in the highway or street or to grant permits for same, at any time, is hereby expressly reserved by the City, and the Contractor shall not be entitled to any damages either for the digging up of the street or any delay occasioned thereby.

Any individual, firm, public agency or corporation wishing to make an opening in the street must obtain a permit. The Contractor shall allow parties bearing such permits, and only those parties, to make openings in the highway or street. When ordered by the Service Director, the Contractor shall make in an acceptable manner all necessary repairs due to such openings, and such necessary WORK will be paid for as extra WORK, or as provided for in the specifications, and will be subject to the same conditions as original WORK performed.

7.05 SANITARY PROVISIONS

The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his employees and the City Representatives as may be necessary to comply with the requirements and regulations of the State Department of Health or of other authorities having jurisdiction, and shall commit no public nuisance.

7.06 PUBLIC CONVENIENCE AND SAFETY

The Contractor shall not close the streets to the public unless such action shall have first been determined to be necessary by the Service Director. The Contractor shall not close to traffic any portion of a street until "Road Closed" signs and "Temporary Route" markers have been placed.

The Contractor shall notify the Service Director in writing at least TWO DAYS IN ADVANCE of the date he proposes to close any portion of a street.

Materials stored upon the street shall be placed and the WORK at all times shall be so conducted, as to cause the minimum obstruction to the traveling public.

Any waste (unwanted construction material) must be removed daily from the project site. This includes all rubbish. The Contractor shall be responsible for the safety and security of the WORK site including all materials used and stored at the WORK site. Any acts of vandalism resulting from improper security or storage of materials shall be the responsibility of the Contractor.

The City will enter upon projects, where the Contractor is responsible for maintaining traffic through part or along the entire project, to remove snow and ice and place abrasive or surfacing material at its own expense as may be considered necessary or advisable. The Contractor shall be responsible for the removal of said abrasive or surfacing material placed. For this, no claim for additional compensation will be allowed, nor shall the Contractor be relieved in any way, of his obligation for the maintenance of traffic.

PART I – GENERAL CLAUSES AND COVENANTS

The presence of barricades, lights or other traffic control devices, provided and maintained by any party other than the Contractor, shall not relieve the Contractor of this responsibility.

All traffic control devices are to be per the Ohio Manual of Uniform Traffic Control Devices, Latest Edition, and/or as required under Section 4511.09, Ohio Revised Code.

7.07 BARRICADES, DANGER AND WARNING SIGNS

During the progress of the WORK, the Contractor shall in a reasonable manner accommodate both the vehicular and foot traffic. Street intersections may be blocked only one-half at a time, and the Contractor shall lay and maintain temporary board walks, driveways, bridges and crossings such as in the opinion of the Service Director are necessary to reasonably accommodate the public. Whenever the Contractor is compelled to suspend WORK on this contract on account of weather, he shall provide and maintain such temporary walks and drives as are necessary to accommodate the public and the residents on the street until the resumption of WORK. The roadway may also be aggregate surfaced to such a depth and width as the Engineer may designate. When a street is closed to traffic, the Contractor shall provide, erect and maintain barricades as per standard drawings, equipped with suitable and sufficient colored flasher lights and danger signals at the limits of the project, where side streets intersect the project, and/or at such other points as shown on the plans or as directed by the Service Director. When the street under construction is being used by the traveling public, including periods of suspension of the WORK, the Contractor shall maintain by the use of labor, equipment and materials, that portion of the streets being so used, so that it is smooth, free from holes, ruts, ridges, bumps and dust, and sloped and provided with the necessary outlets to drain freely.

Pipe trenches or other openings left in hard surface pavements shall be maintained with material of comparable quality (See ITEM 9.07 - "RESTORATION OF STREETS"). The Contractor shall maintain all structures on such portion of the street in a condition for safe and convenient use. The Contractor shall also maintain adequate guard rails, temporary guide markers, lights, signs and such other traffic control devices, and watchmen and flagmen as may be necessary to maintain safe traffic conditions.

The Contractor will be required to provide and set up lights and maintain the necessary barricades, pedestals and other devices of detouring traffic around sections of the improvement that the Engineer orders closed during construction. He shall change the location of detour devices as often as necessary. THE CONTRACTOR WILL PROVIDE THE METAL SIGNS, AND ALL WATCHMEN OR POLICE TO DIRECT TRAFFIC IF NECESSARY.

If, in the opinion of the Service Director, proper maintenance is not being provided by the Contractor, the City may take the necessary steps to place the street in proper condition, and the cost of such services will be deducted from any monies which may be due or become due the Contractor.

The Contractor shall furnish, erect and maintain such additional signs and safety devices as he may deem essential and which have been approved by the Service Director.

PART I – GENERAL CLAUSES AND COVENANTS

All watchmen and flagmen furnished for the protection of the public and direction of traffic shall perform their duties in a courteous manner with a view to insuring the safety and convenience of the traveling public within the limits of the guarded area. The Contractor shall immediately correct any deficiency in equipment or procedure of watchmen or flagmen, brought to his attention by the Service Director.

Each watchman or flagman shall be supplied, for use in daylight, with a red flag not less than 16 inches by 16 inches on a staff. To stop traffic in daylight, the flagman shall stand at the edge of the traffic lane, and facing the approaching traffic, with his arm and hand extended into the traffic lane, and holding the red flag across the traffic lane. The red flag shall be held without waving so that the full area of the flag is below the staff and visible to the approaching traffic. In daylight, traffic shall be signaled to proceed by lowering the red flag and waving the arm (not the flag) in a forward direction.

At locations where men and equipment are at WORK adjacent to the part of the street in use by the traveling public, a portable 30 inch by 30 inch "MEN WORKING" sign shall be placed on each approach to such locations approximately 200 feet from the WORK site. As the WORK site advances, the rear sign shall be moved so that the distance between the sign and actual WORK site does not exceed 600 feet. At the close of the workday the signs shall be set aside so as not to be readable by approaching drivers or covered until WORK is resumed.

Where the vertical distance between the top edge of the pavement and the adjoining berm is 4 inches or more, the Contractor shall, at the discretion of the Engineer, either correct the condition by placing suitable material against the edge of the pavement, or with the approval of the Service Director, he may erect and maintain temporary guide markers as herein described.

Whenever one-way traffic is put into effect for a distance not to exceed 200 feet, at least one flagman shall be used during daylight hours and at least 2 flagmen shall be used between sunset and sunrise. Whenever the length of one-way traffic exceeds 200 feet, a minimum of 2 flagmen or traffic signals shall be used.

Equipment and material stored on the street shall at all times be marked. From the hour of sunset to sunrise any such material or equipment stored between the side ditches or between lines 5 feet behind any raised curbs, shall be clearly outlined with reflective barricades, or other equally dependable devices approved by the Service Director. In addition, when the restricted portion of the street includes sidewalks, the Contractor shall provide any other lights, barricades, etc. that may be needed for the protection of pedestrian traffic.

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All barricades, signs and obstructions to be used at night shall have reflective material or other equally dependable devices approved by the Service Director. During the hours between sunset to sunrise the Contractor shall provide and maintain two colored flasher lights (one above the other) at each barricade, and such other points as are necessary to protect the traveling public.

7.08 USE OF EXPLOSIVES

When the use of explosives is necessary for the execution of the WORK, the Contractor shall use the highest degree of care so as not to endanger life or property. The Contractor shall be responsible for any and all damage resulting from use of explosives.

The Contractor agrees and warrants that he will observe all state laws and regulations relative to the use and storing of such explosives as may be kept on the job and all such storage places shall be clearly marked "DANGEROUS - EXPLOSIVES".

As a general rule, the City does not permit blasting in connection with underground construction in order to protect existing utilities. The Engineer may grant permission for blasting where the condition may warrant, in which case the Contractor shall OBTAIN A PERMIT FROM THE STATE FIRE MARSHALL AND FURNISH EVIDENCE OF INSURANCE TO COMPLETELY COVER AND PROTECT THE CITY OF FAIRLAWN AND ALL PERSONS OR PROPERTY ADJOINING THE BLAST AREA.

Where blasting is necessary, men EXPERIENCED IN SUCH WORK shall do it.

All blasts shall be well covered and provisions made to protect pipes, conduits, sewers, structures, and persons and property adjacent to the site of the WORK.

Prior to blasts, all persons in the vicinity shall be given ample warning.

BLASTING WILL NOT BE PERMITTED within 25 feet of completed WORK.

Dynamite and other explosives shall be stored and handled in accordance with the provisions of the laws relating thereto and the instructions of the Service Director.

Exploders shall be stored apart from explosives. Provisions shall be made to protect all explosives from freezing; thawing of explosives when frozen is prohibited without special permission.

The amount of explosives to be used in a single charge shall be governed by existing ordinances if such exists, or may be limited by the Service Director, but any such regulation by the Service Director shall in no way operate to relieve the Contractor from his responsibility or liability for damages arising from all blasting operations.

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7.09 PRESERVATION AND RESTORATION OF PROPERTY

The Contractor shall be responsible for all damage or injury to property of any character, during the prosecution of the WORK resulting from any act, omission, neglect, or misconduct in his manner or method of executing the WORK. Dust, mud, noise or other nuisance originating from any planned operations either inside or outside of the right-of-way shall be controlled by the Contractor in accordance with local ordinances and regulations at the sole expense of the Contractor. Prior to the start of construction, the Contractor shall review the need for dust, mud, noise and other nuisance control. The Contractor shall create a plan to control said nuisances and submit it to the Service Director for his approval.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the WORK, or in consequence of the non-execution thereof by the Contractor, he shall restore, at his own expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, rebuilding or otherwise restoring as directed by the Service Director, or he shall make good such damage or injury in an acceptable manner.

The Contractor shall not remove, injure, cut or destroy any tree or shrub, even though listed as a removal, until the Service Director specifically marks it in the field.

The Contractor shall cooperate with the Service Director and shall exercise special care to protect and preserve all survey monuments such as cornerstones, monuments, lot corners and bench marks as required by ORC Section 5519.05. Whenever the nature of the WORK necessitates the removal of any type of survey monument, the Contractor shall notify the Service Director before disturbing said monument. The Contractor shall not start grading or resurfacing operations until the Service Director has referenced all known cornerstones, monuments and land markers in the area to be improved. Monuments, cornerstones and land markers unexpectedly encountered shall be protected, referenced and preserved in the same manner. In the event that the Contractor damages, destroys or removes any monuments, stone, lot corner, iron pipe or other survey point without permission of the Service Director, the Contractor shall engage a registered surveyor to replace all such survey points or markers at no cost to the City.

The Contractor shall cooperate with the owners of any underground or overhead utility lines in their removal and rearrangement operations so that these operations may progress in a reasonable manner, and that duplication or rearrangement WORK may be reduced to a minimum, and that services rendered by these parties will not be unnecessarily interrupted. All necessary precautions shall be used in order that these lines will not be damaged either in their present or their proposed locations.

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When mailboxes and supports interfere with construction, the Contractor shall remove and erect them in a temporary location during construction in a manner satisfactory to and as directed by the Service Director. After completion of the construction and before final acceptance of the project, the Contractor shall erect the mailboxes and supports in a permanent location directed by the Service Director. Payment for this WORK shall be included in the unit price bid for ITEM 41 - "ROADWAY EXCAVATION AND EMBANKMENT".

The Contractor shall protect the natural vegetation and surroundings; shall adequately and suitably box, fence or otherwise protect all trees and other woody plants which are to remain in place; shall repair injuries to bark, trunk, limbs and roots or remaining plants by properly dressing, cutting and painting, according to approved methods, using only approved tools and materials. He shall replace to its original condition by approved seeding and sodding methods and materials all grass areas beyond the limits of construction or which normally would be preserved within the limits of construction which have been disturbed or destroyed by construction operations.

7.10 RESPONSIBILITY FOR DAMAGE CLAIMS, ETC.

The Contractor and his Surety shall save harmless the City and all of its representatives from all suits, actions, or claims of any character brought on account of any injuries or damages sustained by any person or property in consequence of any neglect in safeguarding the WORK, improper storage of materials or through the use of unacceptable materials in the construction of the improvement or on account of any act or omission, by the Contractor or his agents.

7.11 DAMAGE AND DETENTION CLAIMS BY THE CONTRACTOR

If the Contractor shall claim compensation for any delay or damage caused in whole or in part by actions or failure to act of the City, or for any reason upon which the City may be liable, it shall, within five (5) days after the commencement of the event causing such damages, provide written notice of its claim for additional compensation or an extension of time to complete the project. Such written communication shall be provided to the Service Director. On or before the fifteenth day of the month succeeding that in which any such damage shall have been sustained, the Contractor shall file with the Service Director an itemized statement of the details and amount of such damage, and unless such statement shall be made as thus required, his claim for compensation may be forfeited and invalidated, and he shall not be entitled to payment on account of any such damage.

Notwithstanding the preceding paragraph, claims of the Contractor for damages by reason of any temporary stoppage or suspension of the WORK by the City will not be allowed, provided that the City has good cause for the stoppage or suspension (such as an emergency situation or unforeseen condition). Any such stoppage or suspension shall entitle the Contractor to a corresponding extension of time for the completion of the WORK.

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7.12 NO WAIVER OF LEGAL RIGHTS

Neither the inspection by the Service Director, nor by any of his duly authorized agents, nor any order, measurements, or certificate by the Service Director, or said agents, nor any order by the Service Director for the payments of money, nor any payment for, nor acceptance of any WORK by the Service Director, nor any extensions of time, nor any possession taken by the City or its duly authorized agents, shall operate as a waiver by the City of any right to damages provided in any breach of this Contract be held to be a waiver of any subsequent breach.

7.13 CONTRACTOR'S RESPONSIBILITY FOR THE WORK

Until substantial acceptance of the WORK by the Service Director, the Contractor shall have the charge and care of the WORK thereof and shall take every precaution against injury or damage to any part thereof by the action of the elements, from vandalism or from any other cause, whether arising from the execution or from the non-execution of the WORK. The Contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the WORK occasioned by any of the above causes before sub-final acceptance and shall bear the expense thereof except damage to the WORK due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God, of the public enemy or governmental authorities.

The Contractor shall not suspend the WORK unless approved by the Service Director and in such case or under the provisions of 105.09 of the ODOT Construction and Materials Specifications, take such precautions as may be necessary to prevent damage to the project, provide for adequate drainage and shall erect any necessary temporary signs, structures, or other facilities at his expense. During such period of suspension or WORK, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established plantings, seeding and sodding furnished under this contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

7.14 PERSONAL LIABILITY OF PUBLIC OFFICIALS

In carrying out any of the above provisions or in exercising any power of authority granted to him by this Contract there shall be no liability upon said Service Director or his authorized agents, either personally or as an official of the City, it being understood that in such matters he acts as the agent and representative of the City.

7.15 ASSIGNMENT OF RIGHTS BY CONTRACTOR

Contractor shall assign to the City any and all of Contractor's state and federal antitrust claims and causes of action that relate to all goods and services provided by the Contractor under its contract with the City.

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ITEM 8 - PROSECUTION AND PROGRESS

8.01 RATE OF PROGRESS AND DATE OF COMPLETION

8.02 UNSATISFACTORY PROGRESS AND ANNULMENT OF CONTRACT

8.03 FAILURE TO COMPLETE THE WORK ON TIME

8.04 SUSPENSION OF WORK

8.05 SUBLETTING OR ASSIGNING

8.06 LIMITATIONS OF OPERATIONS

8.07 CHARACTER OF WORKMEN AND EQUIPMENT

8.01 RATE OF PROGRESS AND DATE OF COMPLETION

The Contractor shall have completed the WORK on or before the date specified in the proposal, or on or before a later date determined as specified herein, otherwise the City shall proceed as provided below.

If the Contract is revised in any material respect and it is determined that said revision will cause delay in the completion of the WORK, the Board of Audit and Review may postpone the completion date by a determined number of calendar days.

When a delay occurs due to unforeseen causes beyond the, and without the fault or negligence of the Contractor, including but not restricted to: acts of God, acts of the public enemy, acts of Government, acts of the City or any political subdivision thereof, fires, floods, epidemics, strikes, (except those caused by improper acts or omissions of the Contractor), extraordinary delays in delivery of materials caused by strikes, lock-outs, wrecks, freight embargoes (acts of Government) or acts of God, the time of completion shall be extended in whatever amount is determined by the City to be equitable.

An Act of God is construed to mean an earthquake, flood, cloudburst, cyclone, or other cataclysmic phenomenon of nature beyond the power of the Contractor to foresee or to make preparation in defense of. A rain, windstorm or other natural phenomenon of normal intensity, based on U.S. Weather Bureau Reports, for the particular locality and for the particular season of the year in which the WORK is being prosecuted shall not be construed as an "Act of God" and no extension of time will be granted for the delays resulting there from.

No extensions of time will be granted for any delay or suspension of the WORK due to the fault of the Contractor. No extensions of time on account of a delay due to unforeseen causes will be granted if application therefore is not filed within 15 days of the date of termination of the delay or prior to the completion date of the Contract, whichever shall be sooner.

Postponement of the completion date shall be immediately recorded by appropriate entry into the records of the City and the Contractor formally advised.

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If the City should suspend the WORK in whole or in part as provided in Sections 5.15, 8.04 and 8.06, the date for completion shall be postponed the number of days that the suspension directly or indirectly delays the completion of the WORK.

Failure at any time to maintain a rate of progress which in the opinion of the Service Director is sufficient to assure the completion of the stipulated WORK within the specified time shall be sufficient cause for suspending payments on progress estimates until such rate of progress is restored and being maintained.

8.02 UNSATISFACTORY PROGRESS AND ANNULMENT OF CONTRACT

If the Contractor has not commenced his WORK within reasonable time, or does not carry the same forward with reasonable progress, or is improperly performing his WORK, or has abandoned, or fails, or refuses to complete the WORK, the Engineer shall make a finding to that effect and notify the Service Director in writing. The Service Director shall have the power to notify the Contractor, by a written notice, to discontinue all WORK under this contract, and it is hereby agreed that the Contractor, upon receipt of this notification, shall immediately cease to control and supervise the WORK.

The Service Director shall thereupon have the power in the manner prescribed by law, to complete the WORK herein described, furnishing the necessary material and labor therefore, or to contract for the completion thereof, and to use such materials and tools, machinery and appliances as he may find upon the site of said WORK, all of which the Contractor agrees may be used by the City, or to procure other material, tools, machinery and appliances necessary to complete the WORK and to charge the expense of said labor, materials, tools, machinery and appliances or of the new contract to the Contractor, and the expense so charged shall be deducted and paid out of such monies as may then be due, or thereafter at any time become due to the Contractor; and in such case of his default his sureties shall pay the amount of such excess, on notice from the Service Director to the Finance Director of the City of Fairlawn. A copy of the Service Director's notice to the Contractor shall also be served upon said Contractor's surety or bondsmen.

8.03 FAILURE TO COMPLETE THE WORK ON TIME

For each calendar day that any WORK shall remain uncompleted after the contract completion date, the sum of six hundred dollars (\$600.00) per day will be deducted from any money due the Contractor, not as a penalty, but as liquidated damages provided, however, that due account shall be taken of any adjustment of the completion date granted under the provision herein. The liquidated damages shall cease when the project is substantially complete as determined by the Service Director.

Permitting the Contractor to continue and finish the WORK or any part of it after the date fixed for its completion, or after the date to which completion may have been extended, will in no way operate as a waiver on the part of the City of any of its rights under the contract.

The project will be considered substantially complete when all WORK required by the contract

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documents has been satisfactorily completed.

8.04 SUSPENSION OF WORK

The Service Director, by certified mail, fax or email, as long as such fax or email is acknowledged to have been received by the Contractor, then the Service Director may instruct the Contractor to delay the start of its operations or suspend the Contractor's operations, in whole or in part, for the length of time the Service Director may deem necessary because of conditions which the Service Director considers to be unfavorable for the suitable prosecution of the WORK; or when detoured traffic would cause excessive damage to the public streets over which traffic is to be detoured. In such an event, the Contractor shall start or resume his operation when he is notified to do so by the Service Director.

8.05 SUBLETTING OR ASSIGNING

The Contractor shall give his personal attention constantly to the faithful prosecution of the WORK, shall keep the same under his personal control, and shall not assign by power of attorney or otherwise, nor sublet the WORK or any part thereof, as provided herein, without the previous consent of the Service Director, and shall not, either legally or equitably, assign any of the monies payable under this agreement or a claim thereto, unless by and with the consent of said Service Director.

Assigning or subletting the whole or any portion of this Contract shall not operate to release the Contractor or his Surety hereunder from any of the contract obligations.

Should the Contractor, at any time or in any manner, assign, transfer, mortgage, sublet, pledge, or in any way encumber this agreement without the written consent of the Service Director, the same may work as a forfeiture of this contract on the part of the Contractor, at the option of the Service Director.

Subletting of the contract:

The Contractor shall perform the WORK amounting to not less than 55 percent of the Contract Price with its own organization. The phrase "its own organization" includes only workers employed and paid directly, inclusive of employees who are employed by a lease agreement acceptable to the City, and equipment owned or rented with or without operators by the Contractor. The phrase, "its own organization", does not include employees or equipment of a subcontractor, assignee, or agent of the Contractor.

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The Contractor's percentage of the total Contract Price includes the cost of materials and manufactured products purchased by the Contractor, but not the cost of materials and manufactured products purchased by subcontractors.

The Service Director will calculate the Contractor's percentage based on the quantities shown in the Proposal and the unit prices of the contract items to be performed by the Contractor's organization. If the Contractor performs only a portion of a contract item, then the Service Director will determine the proportional value administratively on the same basis. The Service Director will follow this procedure even when the part not subcontracted consists only of the procurement of materials. However, if a subcontractor both sells the materials to the Contractor and performs the WORK of incorporating the materials into the Project, then the City will consider these two phases in combination and as a single subcontract. The Contractor's profit on a subcontractor's contract is included in the subcontractor's percentage. If an affiliate of the subcontractor either sells the materials or performs the WORK, the City may refuse approval. An affiliate is one who has some common ownership or other close relation to said subcontractor.

8.06 LIMITATIONS OF OPERATIONS

At least 48 hours before breaking ground, the Contractor shall notify all public service corporations whose wires, pipes, conduits or other structures may be affected by his operations. He shall likewise notify the Chief of the City of Fairlawn and Copley Township Fire Departments, Chief of the City of Fairlawn Police Department, City of Fairlawn Streets Commissioner, City of Fairlawn Dispatch and if the WORK falls within the school year, the Copley-Fairlawn School District, of the temporary blocking or closing of any street. The contractor shall also contact the Ohio Utilities Protection Service (800-362-2764) before beginning the WORK. The Contractor when contacting the Ohio Utilities Protection Service shall give location and nature of the WORK and the approximate time when WORK will be performed.

The Contractor shall at all times conduct the WORK in such a manner and in such sequence as will insure the least practicable interference with traffic and he shall have due regard to convenient detours. He shall not open up WORK to the detriment of WORK already started and the Service Director may require the Contractor to finish a section on which WORK is in progress before WORK is started on any additional section.

The Contractor hereby agrees to arrange his WORK and his material so as not to interfere with the operations of other Contractors engaged upon adjacent WORK, and to join his WORK to that of others in a proper manner, and in accordance with the intent of the plans and specifications, and to perform his WORK in the proper sequence in relation to that of other Contractors, all as may be directed by the Service Director.

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The Contractor shall note that additional WORK that may be required by public and private utilities that is not shown on the plans or covered in the specifications shall be done by the said utilities at their own expense.

The Contractor shall co-operate with the said private and public utilities in order that the WORK may progress in the best possible manner.

Special care shall be taken in the construction, adjustment or rebuilding of manholes, inlets and valve boxes to see that debris does not fall into the structure which could cause a stoppage. If necessary, the Service Director may direct precautions to be taken to eliminate this possibility; all manholes, inlets and valve boxes shall be cleaned of any and all debris after such adjustments have been made and again after the final paving operation is complete.

It shall be the responsibility of the Contractor to check the condition of all manholes, inlets and valve boxes within the limits of the WORK before construction begins and report in writing to the Service Director any condition of the above items that in his opinion warrants cleaning, repair or replacement. This report is subject to the approval of the Service Director who will check the conditions and the City will make the proper adjustment or repairs necessary. Failure to make this report will not relieve the Contractor of the responsibility of correcting these conditions at his own expense.

The Contractor at his own expense shall replace any manhole castings or water valve boxes that are damaged by the Contractor by negligence during the course of construction.

Any existing manhole castings or water valve boxes that are found to be defective shall be removed and replaced under the direction of the Service Director; and the Contractor shall be paid an extra for manhole castings and/or water valve boxes so furnished and installed on written order of the Service Director only.

Each Contractor shall be held responsible for any damage done by him or his agents to the WORK performed by another Contractor. Each Contractor shall so conduct his operations and maintain the WORK in such condition that adequate drainage shall be in effect at all times.

Earth or other berm material shall not be dumped or stockpiled on the new or existing pavement. Such material shall be kept clear of the pavement area at all times.

Existing structures that may be encountered in the WORK shall be removed and replaced, or maintained by the Contractor or at his instance and expense by the parties interested, and in such manner as to secure the safety of the public and the structure. Excepted from the foregoing are the public service poles which will be removed by the corporation owning the same at no expense to the Contractor.

The use of the pipes, conduits, etc., shall not be interrupted without the consent of the parties owning or controlling the same. Sub-surface structures encountered in the prosecution of the WORK shall be protected and maintained in complete operation, unless permission for their

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removal or relocation is given.

Existing sub-surface structures, including old sewers, abandoned drains, etc., which may appear within the limits of the excavation, shall be removed if required by the City, but such removals will not be paid for separately, being included in the price paid for the excavation or other items including such excavation.

In case the uncovering of sub-surface structures necessitates a change in the alignment or grade of the proposed WORK, the Contractor shall give written notice of such obstruction, and shall cease WORK at such points until ordered to proceed.

In case any change of grade or alignment shall serve to delay the WORK, the time allowed for completion of the contract will be extended to the extent to which the delay shall have operated; the decision of the City upon this point being final.

8.07 CHARACTER OF WORKMEN AND EQUIPMENT

All workmen must have sufficient skill and experience to properly perform the WORK assigned them. All workmen engaged on special WORK or skilled WORK, such as bituminous courses or mixtures, concrete bases, pavements or structures, roadside improvements with special regard to planting operations, or in any trade, shall have sufficient experience in such WORK to properly and satisfactorily perform it and operate the equipment involved, and shall make due and proper effort to execute the WORK in the manner prescribed in these specifications.

Any foreman or workman employed by the Contractor or by any Subcontractor who, in the opinion of the Service Director or his authorized representative, does not perform his WORK in a proper and skillful manner or is disrespectful, intemperate or disorderly shall at the written request of the Service Director be forthwith removed from the project by the Contractor or Subcontractor employing such foreman or workman, and shall not be employed again on any portion of the WORK without the written consent of the Service Director. Should the Contractor fail to remove such person or persons or fail to furnish suitable and sufficient machinery, equipment, or personnel for the proper prosecution of the WORK, the Service Director may withhold all estimates that are or may become due or may suspend the WORK until such orders are complied with.

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ITEM 9 - ACCEPTANCE, MEASUREMENT AND PAYMENT

9.01 MEASUREMENT OF QUANTITIES

9.02 SCOPE OF PAYMENT

9.03 PARTIAL PAYMENTS

9.04 PAYMENT AND COMPENSATION FOR ALTERED QUANTITIES

9.05 EXTRA WORK

9.06 OMITTED ITEMS

9.07 RESTORATION OF STREETS

9.08 ACCEPTANCE

9.09 FINAL INSPECTION

9.10 ACCEPTANCE AND FINAL PAYMENT

9.11 RIGHTS NOT ESTOPPED

9.12 GUARANTEE

9.13 RETAINER AND TERMINATION OF CONTRACTOR'S RESPONSIBILITY

9.14 RELEASE OF LIABILITY

9.01 MEASUREMENT OF QUANTITIES

For all other than lump sum contracts after an item of the WORK is completed and before final payment is made therefore, the Service Director will determine the quantities of various items of WORK performed as the basis for final settlement. The Contractor, in case of unit price items, will be paid for the actual amount of WORK performed in accordance with these specifications as provided under the various items.

All WORK completed under the contract shall be measured by the Service Director according to the United States Standard Measures. All longitudinal measurements for area will be made horizontally, and no deductions will be made for individual fixtures in the roadway having an area of 5 square feet or less. For all transverse measurements for area of base courses and pavements, the dimensions to be used in calculating the pay area shall be the neat dimensions shown on plans or ordered in writing by the Service Director. All materials that are specified for measurement by the cubic yard "loose measurements" or "measured in vehicle" shall be hauled in approved vehicles and measured therein at the point of delivery on the road. Approved vehicles for this purpose may be any type or size satisfactory to the Service Director provided that the body is of such type that the actual contents may be readily and accurately determined. Unless all approved vehicles on a job are of uniform capacity, each approved vehicle must bear a plainly legible identification mark indicating the specific approved capacity. The inspector may reject all loads not hauled in such approved vehicles.

When the computations of areas or volumes by exact geometric methods is unduly laborious or refined, the planimeter will be held as an instrument of precision and will be used in the determination of quantities upon which payments are based.

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Where items are to be paid for on the basis of weight units converted from weights, or where manufacturers' certifications are required, delivery tickets must be supplied to the project inspector upon the delivery of the material.

The City's measurements of the amount of WORK completed will be final and conclusive.

9.02 SCOPE OF PAYMENT

The Contractor shall accept the compensation, as herein provided, as full payment for furnishing all materials, labor, tools and equipment unless otherwise provided necessary to the completed WORK and for performing all WORK contemplated and embraced under the contract; also, for loss or damage arising from the nature of the WORK, or from the action of the elements, except as herein provided, or from any unforeseen difficulties which may be encountered during the prosecution of the WORK until the final acceptance by the Service Director and for all risks of every description connected with the prosecution of the WORK; also, for all expenses incurred in consequence of the suspension or discontinuance of the WORK as herein specified and for any loss or liability sustained by the Contractor resulting from any infringement of patent, trademark, or copyright, and for completing the WORK according to the plans and specifications. Neither the payment of any estimate or of any retained percentage shall relieve the Contractor of any obligation to make good any defective WORK or material.

9.03 PARTIAL PAYMENTS

The Service Director shall review all requests for payment and make in writing an estimate such as in his opinion shall be just and fair, of the amount and value of the WORK done and materials incorporated in the WORK by the Contractor in the performance of this contract. On the basis of this estimate, the City shall pay the Contractor an amount equivalent to 90 percent of the value at contract prices of WORK so completed. Such payments shall not be an acceptance of WORK done, and no WORK shall be accepted until the WORK contracted for is fully completed, or as provided otherwise in these specifications. Estimates may at any time be withheld if in the opinion of the Service Director, the WORK is not proceeding in accordance with the provisions of this contract.

Should any defective WORK or material or acceptable WORK that has been damaged by the Contractor's operations be discovered previous to the final acceptance; or should a reasonable doubt arise previous to the final acceptance as to the integrity of any part of the completed WORK, the estimate and payment for such defective or questioned WORK shall not be allowed until the defect has been remedied and cause for doubt removed.

9.04 PAYMENT AND COMPENSATION FOR ALTERED QUANTITIES

When alteration in plans or quantities of WORK not requiring in Supplemental Agreements as herein provided are ordered and performed, the Contractor shall accept payment in full at the contract unit prices for the actual quantities of WORK done and no allowance will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor resulting either directly from such alterations, or indirectly from

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unbalanced allocation among the contract times of overhead expense on the part of the bidder and subsequent loss of expected reimbursement therefore, or for any other cause. The City has the right to renegotiate the unit price of any item if additional WORK is greater than 15 percent of the contract quantity. Increased WORK involving Supplemental Agreements shall be paid for as stipulated in such agreements. The Contractor shall furnish substantiating data required in the preparation of these agreements.

9.05 EXTRA WORK

Extra WORK, when ordered, shall be paid for under a written order in accordance with the terms therein provided.

1. LABOR AND MATERIALS

(a) For all labor and supervision in direct charge of the specified operations, the Contractor shall receive the current local rate or wage to be agreed upon in writing before starting such WORK, for the time that said labor and supervision is actually engaged in such WORK, to which may be added an amount equal to 25 percent of the sum thereof.

The wages of any foreman or timekeeper who is employed partly on extra WORK and partly in other WORK shall be pro-rated between the two classes of WORK according to the number of men employed on each class of WORK as shown by the payrolls.

(b) For all materials entering permanently into the WORK the Contractor shall receive the actual cost of such material delivered to the WORK, including freight and hauling charges as shown by original receipted bills; to such cost may be added a sum equal to 15 percent thereof.

(c) For any machinery or special equipment other than small tools, and including fuel and lubricants which it may be deemed necessary or desirable to use, the Contractor shall be allowed a reasonable rental price to be agreed upon in writing before such WORK is begun, for the time that such equipment is in use on the road. No profit or overhead shall be added to any charges in connection with the use of owned equipment, however, 15 percent of the total cost of rented equipment as shown by original receipted bills may be added for profit and overhead.

THE COMPENSATION as above provided in (a), (b) and (c) shall be received by the Contractor as payment in full for extra WORK done including administration, overhead, use of tools and equipment for which no rental is allowed, profit, taxes, premiums on bonds and insurance, unemployment contributions and any other expense incidental to performing the extra WORK. The Contractor and Service Director, or their authorized representatives, shall compare records of payrolls for labor furnished extra WORK basis at the end of each day; claim for extra WORK done shall be submitted to the Service Director by the Contractor or upon certified triplicate statements to which shall be attached original receipted bills and invoices covering the costs of the freight and haulage charges on all materials permanently entering into such WORK.

2. LUMP SUM

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Where total cost will be less than two-thousand dollars (\$2000.00) a "LUMP SUM" agreement may be entered into subject to approval of the Board of Audit and Review, which sum shall include full compensation for all supervision, labor, material, tools and equipment used to complete the item.

9.06 OMITTED ITEMS

The City shall have the right to cancel the portions of the contract relating to the construction of any item herein by the payment to the Contractor of the reasonable cost of all items of cost incurred prior to the date of cancellation or suspension of the WORK by order of the Director. If no cost has been incurred by the Contractor, then the Contractor shall not be entitled to receive any payment for omitted work.

9.07 RESTORATION OF STREETS

The Contractor shall be responsible for the restoration of all streets on which WORK is done under the contract. No additional payment shall be made as a separate item and the cost thereof shall be included in other bid items of the contract. After the backfill has been completed as required under Section 10.12 - BACKFILLING, the Contractor shall remove all waste excavation from the roadway and berm.

If the project has been installed in, or extended into the roadway of an unpaved street, the Contractor shall re-shape the roadway with a power blading machine and apply a surface of 4 inches of aggregate in accordance with Item 43 - TRAFFIC COMPACTED SURFACE COURSE.

If the WORK extends into a paved street the granular backfill shall be brought to within 2 inches of the existing pavement surface. The remaining depth, plus 1/2 inch, shall be filled with "cold patch" bituminous material, shaped and compacted. After remaining in place for not less than 2 months, this temporary patch and granular fill shall be removed to a depth of 8 inches and if the existing wearing course is of bituminous construction a permanent pavement of Item 46 - BITUMINOUS AGGREGATE BASE COURSE, hot mixed-hot laid asphaltic concrete shall be placed and thoroughly compacted in layers not to exceed 3 inches in depth; the top 3 inches of the existing pavement shall be painted with asphalt cement before placing of the final course of Item 49 - ASPHALTIC CONCRETE SURFACE COURSES. Care shall be exercised to insure a smooth riding, neat appearing final surface finish.

Where the existing pavement surface is Portland Cement Concrete, the replacement at the end of 2 months shall be of ODOT Construction and Material Specifications, latest revision Class "C" Portland Cement Concrete with air entraining admixture of a thickness equal to that of the existing pavement. This patch shall be cured and protected for at least 5 days. All repairs or replacement slabs must be full slabs. No partial slab repairs or replacements are allowed.

If the WORK is installed in the berm strip, then the Contractor shall restore the berm to its original condition; and if this construction has damaged the roadway, then the Contractor shall replace aggregate in accordance with the above, and oiled at the specified rate.

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The Contractor shall restore the roadway to the original condition beyond and adjacent to the limits of his construction if the same has been damaged during construction.

All gutter ditches shall be cleaned or graded to provide complete drainage for the entire limits of the improvement and all driveway culverts required to be adjusted by reason of this grading shall be removed, cleaned and re-laid to the proper grade.

All berms, including lawn strips, house walks, street signs, poles, etcetera; and all driveways and driveway culverts that have been damaged during construction shall be restored to their original condition by the Contractor. Unless otherwise noted or specified there shall be no extra compensation for restoration of streets, it being included in the price bid per lineal foot of pavement, storm sewer, complete of the various sizes.

9.08 ACCEPTANCE

(A) Acceptance and Opening to Traffic - Part of Project:

When all items on a portion of a project covered by contract are substantially completed, the Service Director may make a partial acceptance and that portion opened to traffic when such opening will benefit the public interest. When all items on a portion of the street are completed, upon written authorization by the Service Director, the Contractor may cease to maintain barriers and lights covering the accepted portion.

The Contractor shall not be required to maintain portions of the street or structures that have been completed and accepted, but he is required to repair any damage caused by his operations, defective WORK, or non-compliance with the plans, specifications and contract until the Service Director or the Engineer has approved the final estimate.

(B) Acceptance and Opening to Traffic when Progress is Unsatisfactory or WORK is Suspended:

When a portion of a project is completed and the progress schedule of WORK has not been met or the Contractor suspends WORK for over 14 days during the normal construction season, the Service Director on written notice to the Contractor may order the road or structure to be opened for travel and the Contractor shall place the project or portions thereof in such condition for travel as the Service Director may order and shall remove all barriers and obstructions at no cost to the City.

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9.09 FINAL INSPECTION

Immediately after completion of the improvement and after the cleaning of the street and catch basins, inlets, manholes, sewers and valve boxes, as specified, the WORK shall be inspected by the Service Director. Any cleanup operation found unsatisfactory shall be immediately remedied by the Contractor and all soft and inferior material found in either pavement, curb or other structures shall be replaced with good and satisfactory material by or at the expense of the Contractor; all settlements and defects in workmanship shall be repaired and made good; any inlets, catch basins, manholes and valve boxes found defective by reason of this construction shall be repaired or rebuilt by the Contractor as the Service Director may direct.

9.10 ACCEPTANCE AND FINAL PAYMENT

Before the final estimate is allowed the Service Director may require the Contractor to submit an affidavit from each and every subcontractor showing that all claims and obligations arising in connection with the performance of his portion of the contract have been satisfactorily settled. The improvement shall be inspected by the Service Director, and if he finds the WORK is completed according to the contract, shall, within 60 days after the completion of this contract, prepare a statement of total cost of the WORK done hereunder, after deducting there from all previous payments and all amounts to be kept and all amounts to be retained, under the provisions of the contract.

All prior partial estimates and payments shall be subject to correction in the certificate of "TOTAL COST". No payments shall be made for the unauthorized WORK. The date of approval of the final estimate by the Service Director shall be the date of acceptance for that project.

9.11 RIGHTS NOT ESTOPPED

The City shall not be precluded or estopped by any payment made, approval issued, return or certificate made or given by it, from showing at any time either before or after the final completion and acceptance of the WORK and payment therefore pursuant to any such return or certificate, the true and correct amount and character of the WORK done and materials furnished by the Contractor or any other person under this agreement; or from showing at any time that any such particular, or that the WORK and materials, or any part thereof do not in fact conform to the specifications; and the City shall not be precluded or estopped, notwithstanding any such payment, approval, return or certificate and payment in accordance therewith from demanding and recovering from the Contractor such damages as it may sustain by reason of Contractor's failure to comply with the specifications.

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9.12 GUARANTEE

The contractor for the WORK herein specified, and in consideration of the price and received, therefore guarantees that the workmanship, and materials furnished under these specifications, and used in the said improvements are in all respects in accordance with these specifications and of such kind and quality that the improvement will remain in good and sound condition for and during the entire guarantee period of 3 years.

When any WORK is accepted by the City, there shall be a guarantee period extending for three (3) years from the date of acceptance of the WORK. The length of the guarantee period will be specified in the contract documents, as well as the requirement for posting of a maintenance bond.

At any time during the maintenance period, the City may notify the Contractor and his Surety that certain repairs are necessary. Within fourteen (14) days after being so notified, the Contractor shall make such repairs as are declared necessary to restore the WORK to a good and serviceable condition. In the event that the Contractor fails to comply with the order to repair as provided, said repairs may be made by the City and it is hereby agreed by the Contractor that reimbursement shall be made to the City for said expense so incurred within ten (10) days following the receipt of a statement rendered to the Contractor by the City for said expense. Specifications for the WORK performed under this Contract shall govern in the making of repairs under this section.

Upon notice from the Service Director served at any time during the period of said guarantee, the Contractor shall at his own expense take out and remove all inferior or defective materials found in either the pavement, topsoil, seeding, curb and gutter, sidewalks, driveway approaches, catch basins, storm sewers, sanitary sewers and any other item furnished under the contract and good and acceptable material shall be substituted therefore, including any pavement or material that has become injured or has settled out of place by reason of its being in close proximity to any and all inferior or defective material. The Contractor shall take up and replace all pavement, sidewalk, curb and gutter or driveway approaches that have settled out of place or become uneven, and shall repair all catch basins, sanitary sewer or storm sewer built by him if found defective during the term of said guarantee. The Contractor shall also fill all cracks in the pavement with asphaltic filler and keep them filled during the term of said guarantee.

The above guarantee shall not apply to any repairs incidental to, or made necessary by reason of the construction, repair, maintenance or operation of any sewer, water or gas pipe or conduit or other improvement made after the completion of the WORK.

All repair WORK shall conform to and be done in accordance with the original plans and specifications.

If said Contractor, within 14 days after receiving notice from the Service Director to do so, shall fail or neglect to make repairs to the improvement or any part thereof, so herein provided, then said Service Director may, without further notice proceed to make such repairs or cause the same to be made either by contract or otherwise at his option, and shall pay the cost of such repairs and

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the cost of any inspection that he may deem necessary in connection therewith.

The retainer held to fulfill the herein stated guarantee shall be calculated from the Service Director's certification of "TOTAL COST" and shall be held for the total guarantee period for the improvement regardless of the guarantee period of the other improvements under this contract.

RETAINER AND TERMINATION OF CONTRACTOR'S RESPONSIBILITY

The City will require a maintenance bond of 10 percent of the entire cost of the WORK done by the Contractor for the above guarantee period of years from the date of the approval by the Service Director of the Service Director's Certificate of "TOTAL COST".

The maintenance bond is required to be given to the City prior to final payment of the Contract amount being released to the Contractor by the City. The Contractor shall have complied with all the requirements of the contract in keeping said street in good and proper repair, then at the end of his guarantee period upon order of the Service Director, the Contractor shall receive a release of the maintenance bond; but if the Contractor shall fail to make all necessary repairs as indicated by said Service Director at any time during the above period, then the Service Director shall have the power to expend all or such part of the amounts so retained as the said Service Director may see fit, and apply the same to making the necessary repairs.

Should the maintenance bond not be sufficient to make the required repairs, the Contractor shall at once make good the deficiency. At the time of expiration of the guarantee period as above specified, whatever remains to the credit of the Contractor, provided all repairs shall have been made satisfactory to the Service Director, shall be released to the Contractor as full settlement of any balance due on said contract as herein provided whereupon and not until then, shall the Contractor be released from the obligation assumed in this contract and his bondsmen discharged. The final acceptance of the WORK shall be the date when the guarantee is released.

RELEASE OF LIABILITY

Except as provided in O.R.C. 4113.61, receipt and acceptance by the Contractor of final payment from the City for the Contractor's work performed under the terms of the Contract shall be and is a full and complete release of any and all claims, demands, suits, actions, recoveries, judgments and expenses of every kind and description whether direct, indirect, consequential or inconsequential that the Contractor has, had or may have against the City and any and all of its officials, officers, directors, employees, agents, representatives and assigns arising out of or resulting from any act or omission of the City in connection with any aspect of the work performed by any party.

PART II – STORM SEWER

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ITEM 10 - STORM SEWER

10.01 DESCRIPTION

10.02 EXCAVATION

10.03 TRENCH OPENINGS

10.04 COLD WEATHER CONSTRUCTION

10.05 SHEETING

10.06 EXISTING SEWERS, DRAINS, STRUCTURES OR UTILITIES ENCOUNTERED

10.07 EXCAVATION - ROCK

10.08 MATERIALS

10.09 LAYING

10.10 BEDDING

10.11 PIPE JOINTS

10.12 BACKFILLING

10.13 METHOD OF MEASUREMENT

10.14 BASIS OF PAYMENT

10.01 DESCRIPTION

This WORK shall consist of storm sewers constructed of the kind, size and length as called for on the Plans, in the Special Provisions or Proposal, conforming to these Specifications at such places as are designated on the Plans, in the Special Provisions or Proposal and in conformity with the lines and grades given. The respective items bid shall include all excavation, the furnishing and placing of granular bedding, backfilling and its compaction, and the costs of sealing or banding of all joints and the connections to the existing pipes, drains, catch basins, inlets, headwalls, etc. The respective items bid shall also include the removal and disposal of all surplus excavation and discarded material that will be required to complete the respective item.

10.02 EXCAVATION

Excavation shall include the removal, loading, transporting and disposal of any and all material of any nature (excepting rock). Excavation shall also include the removal of any and all brush, trees or stumps (unless otherwise paid for as a separate item) incidental to the construction and completion of the respective items.

Unless otherwise specifically noted on the drawing or in the specifications, the ownership of all surplus excavated materials shall be in accordance with Section 4.07 - RIGHTS IN AND USE OF MATERIALS FOUND ON THE WORK. Materials recovered and satisfying the specifications may, with the approval of the Service Director, be used in the WORK.

Excepted from the foregoing are excavated or other materials recovered from private property or rights of way. Materials recovered from these areas, unless otherwise noted on the drawings or

PART II – STORM SEWER

specifications, shall remain the property of the private property owner or grantor of the right of way. If the private property owner or grantor of the right of way does not want the surplus material then the ownership of the surplus excavated materials shall be in accordance with Section 4.07 - RIGHTS IN AND USE OF MATERIALS FOUND ON THE WORK.

Excavation limits shall be as specified in the ODOT Construction and Materials Specifications, latest revision.

Should the contractor excavate outside the specified limits, he shall refill the additional area with material specified under Section 10.12 – BACKFILLING, as directed by the Service Director and at his own expense.

10.03 TRENCH OPENINGS

The trench openings shall be considered the same as Section 611.05 – EXCAVATION, as specified in the ODOT Construction and Materials Specifications, latest revision.

10.04 COLD WEATHER CONSTRUCTION

Sewers and all related structures shall not be constructed on frozen ground. No backfill of any nature shall be made of material containing frozen lumps. Adequate precautions shall be taken to prevent concrete and/or mortar from freezing. Brick, concrete block, etc. having a temperature of 40 degrees Fahrenheit or less shall not be set with mortar until heated for a period of time sufficient to insure a temperature of 50 degrees to 80 degrees Fahrenheit throughout the entire mass of material. Brick and/or masonry units constructed shall be protected by earth, straw or other suitable protective covering for a period of 5 days at a minimum temperature of 50 degrees Fahrenheit and a maximum of 90 degrees Fahrenheit.

10.05 SHEETING

The Contractor shall furnish, place, and maintain such sheeting and bracing as may be required to properly support the sides and ends of the excavations to prevent injury to persons, property, and the new and existing structures. At any time the City so orders, the Contractor shall install such additional sheeting and bracing as may be required. In compliance with such orders or failure on the part of the City to exercise its right to give such orders shall in no way release the Contractor from liability for damage caused by weak or insufficient sheeting, or from his responsibility to protect the WORK and adjacent property. Voids appearing outside the sheeting shall be immediately and completely filled with suitable material.

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10.06 EXISTING SEWERS, DRAINS, STRUCTURES OR UTILITIES ENCOUNTERED

The Contractor must contact the Ohio Utilities Protection Service (OUPS) 1-800-362-2764 at least 48 hours (2 working days) prior to beginning any WORK to have existing underground utilities marked. All non-members of OUPS must be called directly.

If an existing sewer, drain, water main, water service or other utility, whether public or private, is encountered or damaged during construction, the Contractor shall, at the direction of the Service Director, remove any damaged portion and rebuild the same in place.

The Bidder understands that the City cannot guarantee the exact location of the aforementioned underground utilities other than by prevailing records and that the bidder shall use the necessary caution to protect the same. In the event the Contractor damages underground utilities that are not shown by records or marked by OUPS, the Engineer and the Contractor shall mutually agree on a price to be paid to the Contractor in accordance with Section 9.05 - EXTRA WORK, of the City of Fairlawn Construction and Materials Specifications. If the Contractor is negligent in the execution of his WORK, then he shall complete the repairs at no cost to the City. This does not relieve the Contractor from responsibility in regard to underground utilities as outlined in the General Clauses and Covenants of the City of Fairlawn Construction and Materials Specifications.

10.07 EXCAVATION - ROCK

When solid ledge rock is encountered in the trench excavations, payment shall be made under ITEM 11 - ROCK EXCAVATION.

10.08 MATERIALS

The pipe, bedding, joints and other materials stipulated shall be the type and quality specified in the Proposal or on the Plans and shall conform to Section 611.02 – MATERIALS, as specified in the ODOT Construction and Materials Specifications, latest edition.

10.09 LAYING

All pipes shall be laid in conformity to the lines and grades given by the Service Director and shall conform to Section 611.07 - LAYING CONDUIT, as specified in the ODOT Construction and Materials Specifications, latest edition.

10.10 BEDDING

All pipe bedding shall conform to Section 611.06 – BEDDING AND BACKFILL, as specified in the ODOT Construction and Materials Specifications, latest edition.

10.11 PIPE JOINTS

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All pipe joints shall conform to Section 611.08 - JOINING CONDUIT, as specified in the ODOT Construction and Materials Specifications, latest edition.

10.12 BACKFILLING

When the WORK is performed within the right of way, all backfill material shall conform to Section 703.17 (Item 304) and the methods shall conform to Section 611.06 – BEDDING AND BACKFILL, as specified in the ODOT Construction and Materials Specifications, latest edition.

When the WORK is performed outside of the right of way, all backfill material and methods shall conform to Section 611.06 – BEDDING AND BACKFILL, as specified in the ODOT Construction and Materials Specifications, latest edition.

In trench areas, other than those described above, hand backfill shall be performed to a depth of 12 inches above the top of the pipe. The backfill shall be placed in layers not exceeding 8 inches in thickness with each layer being thoroughly compacted, with special care exercised to insure thorough compaction under and around the sides of the pipe. The remainder of the backfill may be placed mechanically, but shall be done in lifts not to exceed 8 inches and compacted until maximum density is obtained. Compaction of each lift using mechanical devices, hoe rams, jumping jacks, hand devices, vibrating plates, or other equipment, shall meet the restrictions in Section 611.08. Compaction shall be to 98%.

Field density tests shall be performed during trench backfill according to ASTM D 2922 nuclear method and compared to laboratory tests. The degree of compaction of the backfill above the pipe bedding will be accepted if the test shows the lift was compacted to 98% of maximum dry density. At least one field test shall be done every 100 feet of trench and every lift. The compaction and field testing operation will be subject to quality control inspection by the third party inspection service. A failed density test indicates that the backfill has not met specifications and is not acceptable. Additional fill shall not be placed until compaction procedures have been modified, the failed lift has been re-installed and the lift has been re-tested and has passed its field density test.

Backfill for underdrains shall be per Item 13 - UNDERDRAINS.

10.13 METHOD OF MEASUREMENT

The footage to be paid for shall be the horizontal centerline measurement from center-to-center of structures under 6 linear feet across or between open ends of the size and type of conduit in place, completed, and accepted. The internal diameter of manholes or special structures constructed that are 6 linear feet or more across will be deducted from the gross length of the conduit. Conduits with beveled or skewed ends will be measured along the invert.

PART II – STORM SEWER

10.14 BASIS OF PAYMENT

The footage, measured as provided above, shall be paid at the contract unit price per linear foot bid for each size and type of Item 10 – STORM SEWER. The price includes the installation of all wye branches called for on the Plans, granular bed, backfill and its compaction, water used for compaction, all excavation excepting rock excavation, removal and disposal of all surplus excavation and discarded materials; the furnishing and construction of all joints and connections to lateral sewers, drains, manholes, catch basins, etcetera; and for all labor, equipment, tools and incidentals necessary to complete this item including cementing, sealing and banding joints.

PART II – STORM SEWER

ITEM 11 - ROCK EXCAVATION

11.01 DESCRIPTION

11.02 METHOD OF MEASUREMENT

11.03 BASIS OF PAYMENT

11.01 DESCRIPTION

This WORK shall consist of the removal of solid ledge rock encountered in trench excavations.

11.02 METHOD OF MEASUREMENT

When solid ledge rock is encountered in trench excavations, payment shall be made under ITEM 11 - ROCK EXCAVATION. If no unit price has been established for this item, The Service Director and the Contractor shall establish the unit price in writing before continuing with the excavation.

The volume of rock to be paid for shall be the space within the lines of excavation from which the solid ledge rock was removed. The "lines of excavation" shall have a clear width of 24 inches greater than the external diameter of the pipe. The depth of excavation shall be from the average upper surface of the rock to a plane 5 inches below the outside surface of the pipe up to 27 inches in diameter, and 8 inches for all pipe over 27 inches in diameter. A sand cushion between the pipe and the rock excavation shall be carefully constructed to insure that no direct contact occurs between the two. Payment for the sand cushion shall be included in the price paid under this section. No allowance shall be made for excavation outside of the "lines of excavation".

The Service Director shall be the sole and final judge as to whether any material shall be classified as solid ledge rock, and his determination of the quantity of rock to be paid for shall be final and binding upon all parties.

11.03 BASIS OF PAYMENT

The volume, measured as provided above, shall be paid for at the contract unit price bid per cubic yard of Item 11- ROCK EXCAVATION. Price shall include all removal and disposal of rock excavation; providing and installing sand cushion; and for all labor, equipment, tools and incidentals necessary to complete this WORK.

PART II – STORM SEWER

ITEM 12 - PIPE FOR DRIVEWAYS

12.01 DESCRIPTION

12.02 EXCAVATION

12.03 MATERIAL

12.04 BACKFILL

12.05 METHOD OF MEASUREMENT

12.06 BASIS OF PAYMENT

12.01 DESCRIPTION

This WORK shall consist of the furnishing and placing of conduit as specified below in accordance with Section 10.01- DESCRIPTION, of these Specifications.

12.02 EXCAVATION

Excavation shall be in accordance with Section 10.02 - EXCAVATION.

12.03 MATERIAL

The pipe shall be Type "D" Conduits as specified in Section 611.02 – MATERIALS, as specified in the ODOT Construction and Materials Specifications, latest edition.

12.04 BACKFILL

Backfill shall be in accordance with Section 10.12 - BACKFILLING.

12.05 METHOD OF MEASUREMENT

The footage to be paid for shall be the horizontal centerline measurement between open ends of the size and type of pipe in place, completed, and accepted.

12.06 BASIS OF PAYMENT

The footage, measured as provided above, shall be paid for at the contract unit price per linear foot bid for ITEM 12 - PIPE FOR DRIVEWAYS, installed in place, completed, and accepted for each size and type of conduit as shown in the proposal. The price includes the granular bed, backfill and its compaction, water used for compaction, all excavation excepting rock excavation, removal and disposal of all surplus excavation and discarded materials, all labor, equipment, tools and incidentals necessary to complete this WORK including cementing, sealing and banding joints.

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ITEM 13 - UNDERDRAINS

13.01 DESCRIPTION

13.02 EXCAVATION

13.03 MATERIAL

13.04 CONSTRUCTION METHODS

13.05 BACKFILLING

13.06 METHOD OF MEASUREMENT

13.07 BASIS OF PAYMENT

13.01 DESCRIPTION

This WORK shall consist of furnishing and placing such underdrains of the size and type as specified on the Plans and Proposal in accordance with Section 605 - UNDERDRAINS as specified in the ODOT Construction and Materials Specifications, latest edition.

13.02 EXCAVATION

Excavation shall be in accordance with Section 10.02 EXCAVATION.

13.03 MATERIAL

Materials shall be in accordance with Section 605 - UNDERDRAINS as specified in the ODOT Construction and Materials Specifications, latest edition, with the following changes:

Only the following types of pipe, perforated per Section 707.41 as specified in the ODOT Construction and Materials Specifications, latest edition, may be used:

Polyvinyl chloride corrugated smooth interior pipe in accordance with Section 707.42 as specified in the ODOT Construction and Materials Specifications, latest edition.

Polyvinyl chloride solid wall pipe in accordance with Section 707.45 as specified in the ODOT Construction and Materials Specifications, latest edition.

13.04 CONSTRUCTION METHOD

Construction methods shall be in accordance with Section 605 - UNDERDRAINS as specified in the ODOT Construction and Materials Specifications, latest edition, with the following changes:

When the length of underdrain installed between structures is 200 feet or greater, a cleanout shall be installed at the mid-point as measured along the underdrain.

If not specified on the Plans and Proposal the bottom of the underdrain pipe shall be constructed to be even with the subgrade.

13.05 BACKFILLING

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Backfill for underdrains shall consist of a granular filter material. The granular filter material shall consist of durable No. 57 washed limestone. It shall be placed for the full width of the trench and shall extend to the bottom of the pavement or subbase as shown on the plans. When underdrains are placed outside of the pavement or subbase area, the granular filter material shall extend to within 4 inches of the finished grade. The top 4 inches of the trench shall be backfilled with Item 32 – TOP SOIL FURNISHED AND PLACED.

13.06 METHOD OF MEASUREMENT

The footage to be paid for shall be the horizontal centerline measurement of the size and type of pipe in place, completed, and accepted. The internal diameter of manholes or special structures constructed (that are 6 linear feet or more across) will be deducted from the gross length of the sewer.

13.07 BASIS OF PAYMENT

The footage, measured as provided above, shall be paid for at the contract unit price bid per lineal foot for the size and type of Item 13- UNDERDRAINS which price shall constitute full compensation for furnishing, hauling and placing all material, including pipe, porous covering material, incidental concrete, excavation, backfill and its compaction, water used for compaction; the removal of all surplus excavation and discarded material; the furnishing and construction of all branches, wyes, tees, transitions, and bends; the furnishing and construction of such joints and connections to pipes, catch basins, manholes, inlets, etcetera, and all labor, tools, and incidentals necessary to complete this WORK.

PART II – STORM SEWER

ITEM 14 - MANHOLES, CATCH BASINS, INLETS AND JUNCTION CHAMBERS

14.01 DESCRIPTION

14.02 MATERIALS

14.03 CONSTRUCTION METHODS

14.04 METHOD OF MEASUREMENT

14.05 BASIS OF PAYMENT

14.01 DESCRIPTION

This WORK shall consist of furnishing all materials for manholes, catch basins, inlets and junction chambers, conforming to these specifications, Standard Drawings, Proposals, and as shown on the plans and constructing the same in accordance with these Specifications at the locations and to the lines and grades shown on the Plans.

14.02 MATERIALS

All materials shall conform to Section 611.02 – MATERIALS as specified in the ODOT Construction and Materials Specifications, latest revision.

14.03 CONSTRUCTION METHODS

All construction methods shall conform to Section 611.10 – DRAINAGE STRUCTURE CONSTRUCTION, as specified in the ODOT Construction and Materials Specifications, latest revision.

14.04 METHOD OF MEASUREMENT

The manholes, catch basins, inlets and junction chambers to be paid for will be the actual number of each in place, completed, and accepted.

14.05 BASIS OF PAYMENT

Each Section shall be paid for at the contract unit price for each Item 14 – MANHOLES, Item 14 – CATCH BASINS, Item 14 – INLETS, and Item 14 – JUNCTION CHAMBERS in place, completed and accepted. Payment shall constitute full compensation for all excavation and backfill; sheeting, bracing, pumping; furnishing, hauling and placing all castings, reinforcing steel, brick and concrete masonry, pipe, specials, inverts, stubs, steps, pipe drops, chimney seals, connections and other material; and for all labor, equipment, tools and incidentals necessary to complete this WORK, except that the price and payment shall NOT include pipe listed for payment under ITEM 10 – STORM SEWER, and ITEM 13 – UNDERDRAIN of these Specifications.

PART II – STORM SEWER

ITEM 15 - MANHOLES, CATCH BASINS, INLETS, JUNCTION CHAMBERS, MONUMENT BOXES, OR VALVE BOXES ADJUSTED TO GRADE

15.01 DESCRIPTION

15.02 CONSTRUCTION METHODS

15.03 METHOD OF MEASUREMENT

15.04 BASIS OF PAYMENT

15.01 DESCRIPTION

This WORK shall consist of the removal and reconstruction of such portions of existing manholes, catch basins, inlets, and junction chambers as may be required to adjust the elevation of the structure 12 inches or less below or above its existing position as required by the plans or as directed by the Service Director. This item shall also cover the raising or lowering of any monument boxes, water valve boxes and gas valve boxes.

15.02 CONSTRUCTION METHODS

The removal of iron frame, top, and cover castings shall be carefully performed to avoid damage to the castings or the existing brickwork. All covers are to be separated from frames, match-marked and the bearing surfaces are to be cleaned of all rust and dirt to obtain a firm bearing. Any cover that cannot be fitted to a firm bearing shall be called to the attention of the inspector before final adjustment is made.

Adjust the height of the existing masonry to such lines and grades as may be indicated by the Service Director to conform to Section 611.10 – DRAINAGE STRUCTURE CONSTRUCTION, as specified in the ODOT Construction and Materials Specifications, latest revision. In general, the final adjustment of the casting shall be accomplished after all base and leveling courses are completed and just preceding the placing of the pavement surface course. Any device used to adjust the height of the casting must be approved by the Service Director. Reset the iron frames, tops, and cover castings in a bed of concrete mortar or structure concrete to the new grade.

Any backfill shall be in accordance with Section 10.12 - BACKFILLING of these specifications.

The contractor shall prevent earth or debris resulting from construction operations from entering the manhole, catch basin, inlet, or junction chamber. After completion of the reconstruction, the Contractor shall thoroughly clean the bottom of each manhole, catch basin, inlet, or junction chamber making sure that there are no obstructions to the flow of the sewer.

All valve boxes adjusted under this item shall be plumb and centered over the valve and cleaned free of all foreign material and debris so that a valve opener may operate freely. The decision of the Service Director shall be final in placing responsibility for damage to valve boxes.

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Before excavation on the roadway begins or during the time the excavation is in progress, the Contractor shall at his option examine the valve boxes located in the roadway to determine their condition and shall report to the Service Director or his representative in writing the location of all valve boxes where in his opinion the valve box is damaged to the extent that it cannot be incorporated into the proposed pavement. This report shall be subject to approval of the Service Director. Failure to do this will not relieve the Contractor of the responsibility of replacing at his own expense all street-water valve boxes that are found damaged and not suitable for use during the operation of his contract.

15.03 METHOD OF MEASUREMENT

The manholes, catch basins, inlets, junction chambers, monument boxes, or valve boxes adjusted to grade to be paid for will be the actual number of each item in place, completed, and accepted.

15.04 BASIS OF PAYMENT

Each item shall be paid for at the contract unit price for each Item 15 – MANHOLES ADJUSTED TO GRADE, Item 15 - CATCH BASINS ADJUSTED TO GRADE, Item 15 – INLETS ADJUSTED TO GRADE, Item 15 – JUNCTION CHAMBERS ADJUSTED TO GRADE, Item 15 – MONUMENT BOXES ADJUSTED TO GRADE, or Item 15 - VALVE BOXES ADJUSTED TO GRADE, in place, completed, and accepted. Payment shall constitute full compensation for all excavation and backfill; pavement removal of all types and its disposal; and for the setting for, furnishing, and placing of all brickwork; the setting (but not furnishing) of all castings; and for all labor, equipment, tools and incidentals necessary to complete this WORK.

In the event, after examination of the above mentioned valve boxes located in the roadway, said boxes were found to have been damaged prior to the award of the contract, the City of Akron shall furnish the necessary replacement valve box to the Contractor for installation at the time designated by the Contractor. This valve box shall be installed and adjusted by the Contractor and paid for at the price quoted in the Proposal for Item 15 - VALVE BOXES ADJUSTED TO GRADE.

PART II – STORM SEWER

ITEM 16 – MANHOLES, CATCH BASINS, INLETS, AND JUNCTION CHAMBERS REBUILT

16.01 DESCRIPTION

16.02 CONSTRUCTION METHODS

16.03 METHOD OF MEASUREMENT

16.04 BASIS OF PAYMENT

16.01 DESCRIPTION

This WORK shall consist of the removal and reconstruction of such portions of existing manholes, catch basins, inlets, and junction chambers as may be required to adjust the elevation of the structure more than 12 inches below or above its existing position as required by the plans or as directed by the Engineer.

16.02 CONSTRUCTION METHODS

The removal of iron frame, top, and cover castings shall be carefully performed to avoid damage to the castings or the existing brickwork. All covers are to be separated from frames, match-marked and the bearing surfaces are to be cleaned of all rust and dirt to obtain a firm bearing. Any cover that cannot be fitted to a firm bearing shall be called to the attention of the inspector before final adjustment is made.

The existing masonry shall be carefully removed to such lines and grades as may be indicated by the Service Director and the structure rebuilt to conform to Section 611.10 – DRAINAGE STRUCTURE CONSTRUCTION as specified in the ODOT Construction and Materials Specifications, latest revision. In general, the final adjustment of the casting shall be accomplished after all base and leveling courses are completed and just preceding the placing of the pavement surface course. Any device used to adjust the height of the casting must be approved by the Service Director. Reset the iron frames, tops, and cover castings in a bed of concrete mortar or structure concrete to the new grade.

Any backfill shall be in accordance with Section 10.12 - BACKFILLING of these specifications.

The contractor shall prevent earth or debris resulting from construction operations from entering the manhole, catch basin, inlet, or junction chamber. After completion of the reconstruction, the Contractor shall thoroughly clean the bottom of each manhole, catch basin, inlet, or junction chamber making sure that there are no obstructions to the flow of the sewer.

16.03 METHOD OF MEASUREMENT

The footage to be paid for under this item shall be the average vertical height of the new masonry constructed in place, completed, and accepted for each manhole, catch basin, inlet, or junction chamber rebuilt.

16.04 BASIS OF PAYMENT

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The footage, measured as provided above, shall be paid for at the contract unit price per lineal foot bid for Item 16 – MANHOLES REBUILT, Item 16 – CATCH BASINS REBUILT, Item 16 – INLETS REBUILT, or Item 16 – JUNCTION CHAMBER REBUILT in place, completed, and accepted. Payment shall constitute full compensation for all excavation and backfill; pavement removal of all types and its disposal; and for the setting for, furnishing, and placing of all brickwork or other device used to adjust the height of the casting; the setting (but not furnishing) of all castings; and for all labor, equipment, tools and incidentals necessary to complete this WORK.

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ITEM 17 - MANHOLES, CATCH BASINS, INLETS OR JUNCTION CHAMBERS ABANDONED

17.01 DESCRIPTION

17.02 MATERIALS

17.03 CONSTRUCTION METHODS

17.04 METHOD OF MEASUREMENT

17.05 BASIS OF PAYMENT

17.01 DESCRIPTION

This WORK shall consist of the removal of castings, the connecting of pipes through the manholes, catch basins, inlets, junction chambers, or the sealing of the outlet and inlet pipe, the removal of walls to a minimum depth of 3 feet below the finished subgrade or surface, the backfilling of the structure, the storage of castings outside the pavement area and the removal and disposal of all surplus and discarded material which may be required to complete this item.

17.02 MATERIALS

Pipe, when required for connections through manholes, catch basins, inlets, or junction chambers, shall be a type of pipe which is the same as the existing pipe being connected to and shall be the same diameter. In case the inlet and outlet pipes are of different diameters, the connecting pipe shall have a diameter equal to the diameter of the larger pipe. Materials shall be in accordance with Section 10.08 – MATERIALS, of these specifications.

17.03 CONSTRUCTION METHODS

Castings on manholes, catch basins or inlets to be abandoned shall be carefully removed in a manner to prevent damage to the castings and shall be placed outside the pavement area. All castings are the property of the City. The Service Director shall be contacted to check if any of the castings will be retained by the City. Any castings not retained by the City will become the property of the contractor.

When the manhole, catch basin or inlet walls extend to within 3 feet of the finished subgrade or surface if outside the roadway, they shall be torn down to a minimum depth of 3 feet below the finished subgrade or surface in a manner that no damage results to pipes which are to remain.

When directed, existing pipes shall be connected through manholes, catch basins, or inlets with pipe placed in accordance with the requirements of the pertinent item of the specification for the existing pipes being connected.

When directed, seal the existing inlet and outlet pipes with precast vitrified or concrete stoppers or with masonry of a type and thickness to fill the inlet or outlet pipe.

After connecting or sealing the existing pipes and removing walls to the required depth, the manhole, catch basin or inlet shall be backfilled with suitable soil if outside the right of way or

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granular material per Section 10.12 – BACKFILLING if within the right of way. When connecting pipes are used, the backfill shall be tamped solidly under and around the pipe by the use of proper tools. When the backfilled area is under an area to be paved, the backfill will be placed to the elevation of the subbase. When the backfilled area is outside of the pavement or subbase area, the granular filter material shall extend to within 4 inches of the finished grade. The top 4 inches of the trench shall be backfilled with Item 32 – TOP SOIL FURNISHED AND PLACED.

17.04 METHOD OF MEASUREMENT

The manholes, catch basins, inlets, or junction chambers abandoned to be paid for will be the actual number of each item in place, completed, and accepted.

17.05 BASIS OF PAYMENT

The WORK included in this item shall be paid for at the contract unit price bid for each Item 17 - MANHOLES ABANDONED, Item 17 - CATCH BASINS ABANDONED, Item 17 - INLETS ABANDONED, or Item 17 – JUNCTION CHAMBERS ABANDONED, which price and payment will constitute full compensation for removing and storing castings, excavation, removal of portions of walls, furnishing and placing pipe, backfilling, disposal of removed masonry and for furnishing and placing all the necessary materials; and for all labor, equipment, tools and other incidentals necessary to complete this WORK.

PART II – STORM SEWER

ITEM 18 - FURNISH CASTINGS FOR MANHOLES, CATCH BASINS OR INLETS

18.01 DESCRIPTION

18.02 METHOD OF PAYMENT

18.03 BASIS OF PAYMENT

18.01 DESCRIPTION

This WORK shall consist of the furnishing and painting of manhole, catch basin or inlet castings as per the Standard Construction Drawings for the type and size specified on the Plans or at the direction of the Service Director. The bearing surfaces of both frame and cover shall be machined so that they fit together without rocking.

18.02 METHOD OF PAYMENT

The castings for manholes, catch basins or inlets to be paid for will be the actual number of each type completed, delivered, painted and accepted.

18.03 BASIS OF PAYMENT

Payment for this item shall be at the contract unit price bid for each type and size complete, delivered, painted, and accepted. Payment shall constitute full compensation for all cast iron and ductile iron frames, covers, grates, backs, hoods and all other required appurtenances. Payment for setting or adjusting the furnished casting for the manhole, catch basin, or inlet, will be under Item 15 - MANHOLES, CATCH BASINS, INLETS, JUNCTION CHAMBERS, MONUMENT BOXES, OR VALVE BOXES ADJUSTED TO GRADE or Item 16 - MANHOLES, CATCH BASINS, INLETS AND JUNCTION CHAMBERS REBUILT, whichever may apply.

ITEM 19 - RESERVED

PART II – STORM SEWER

ITEM 20 - SLOPE AND CHANNEL PROTECTION

20.01 DESCRIPTION

20.02 MATERIALS

20.03 RIPRAP

20.04 CRUSHED AGGREGATE SLOPE PROTECTION

20.05 DUMPED ROCK FILL

20.06 ROCK CHANNEL PROTECTION

20.07 METHOD OF MEASUREMENT

20.08 BASIS OF PAYMENT

20.01 DESCRIPTION

This WORK shall consist of the excavation for and the construction of a protective layer of stone of the type called for and at the location shown on the Plans, in the Proposal or as directed by the Engineer. Construction and materials shall be in accordance with these Specifications and in conformity with the dimensions and other pertinent details shown on the Plans.

20.02 MATERIALS

All materials shall be sound and durable. Concrete shall be Class "QC 1" and shall conform to Item 499 - CONCRETE - GENERAL, as specified in the ODOT Construction and Materials Specifications, latest revision.

Provide steel filter fabric securing pins with washers for securing filter fabric. Use steel washers having an outside diameter not less than 1 ½ inches and a securing pin at least 18 inches in length and 3/16 inch in diameter with a point at one end and a head able to secure the washer.

20.03 RIPRAP

This shall consist of flat stones, pre-cast concrete blocks or broken concrete roughly rectangular in cross section, not less than 1/3 cubic foot in volume nor less than 3 inches thick. The individual pieces shall be placed by hand, one upon the other so that they will break joints with the piece in the course below. Unless otherwise shown on the Plans they shall be placed with their flat surfaces roughly perpendicular to the slope and forming contact with the courses immediately below and above. The space between the larger pieces shall be filled with spalls rammed into place to present an even and tight surface, pleasing in appearance. The surface of the finished riprap slope shall not vary more than 3 inches from that shown on the Plans.

When required by the Plans, fill the riprap with grout. Use grout consisting of one part of cement and two parts of sand by volume, corrected for moisture. The grout shall be thoroughly mixed by a mechanical mixer. The riprap shall be thoroughly wet immediately before the grout is applied. As soon as the grout is applied it shall be broomed so as to thoroughly fill the joints. Grouted riprap shall be cured with wet burlap or cotton mats for a period of 48 hours. The backing shall be compacted as the construction of the riprap progresses, in layers of not more than 6 inches thick.

PART II – STORM SEWER

Unless otherwise specified on the Plans, the thickness of the riprap, measured perpendicular to the slope, shall not be less than 12 inches and shall average not less than 18 inches.

20.04 CRUSHED AGGREGATE SLOPE PROTECTION

Material shall conform to Section 703.19 – ROCK AND AGGREGATE MATERIALS, as specified in the ODOT Construction and Materials Specifications, latest revision. Place the material on filter fabric so that the surface is flush with the embankment slopes. Use a thickness of 12 inches unless a different thickness is specified. Extend the aggregate from the face of the abutments down to the toe of the slope or to normal water elevation, and a minimum of 3 feet beyond the outer edges of the superstructures or as shown on the plans.

20.05 DUMPED ROCK FILL

Dumped rock fill shall consist of sound and durable rock placed as a rock fill for the protection of the slopes. The rock shall be carefully dumped in place with the larger rock at the outer face and the smaller rock and spalls near the face of the slope. Care should be exercised in dumping the rock to insure a reasonably smooth and continuous surface, and to conform to the slope lines indicated on the Plans. This item shall be of two types defined below:

Type A shall consist of sizes such that at least 85 percent of the total material by weight shall be larger than an 18 inch square opening. The material smaller than an 18 inch square opening shall consist predominantly of rock spalls and rock fines and shall be free of soil. Material shall conform to Section 703.19 – ROCK AND AGGREGATE MATERIALS, as specified in the ODOT Construction and Materials Specifications, latest revision.

Type B shall consist of sizes such that at least 85 percent of the total material by weight shall be larger than a 9 inch square opening. The material smaller than a 9 inch square opening shall consist predominantly of rock spalls and rock fines and shall be free of soil. Material shall conform to Section 703.19 – ROCK AND AGGREGATE MATERIALS, as specified in the ODOT Construction and Materials Specifications, latest revision.

20.06 ROCK CHANNEL PROTECTION

Rock for channel protection shall be sound and durable and shall meet the requirements of Type A or Type B dumped rock fill material as defined in Section 20.05. Reasonable care shall be exercised in placing the rock to assure the finished surface of the protected channel will conform to the channel cross-section as required by the Plan. Where directed by the Service Director, filter fabric shall be placed under all rock channel protection.

PART II – STORM SEWER

20.07 METHOD OF MEASUREMENT

The yardage of riprap or crushed aggregate slope protection to be paid for shall be the number of square yards, in place, completed and accepted, measured in a plane parallel with the slope. The yardage of dumped rock fill or dumped rock channel protection to be paid for shall be the cubic yards measured in place completed and accepted in accordance with the dimensions shown on the Plans, or if it is not practical to determine the amount by measurement, the yardage may be established by a job conversion weight from tonnage or acceptable material delivered.

20.08 BASIS OF PAYMENT

The yardage of riprap or crushed aggregate slope protection, measured as provided above, shall be paid for at the contract unit price per square yard bid for Item 20 - RIPRAP or Item 20 - CRUSHED AGGREGATE SLOPE PROTECTION which price and payment shall constitute full compensation for furnishing and placing all materials to the lines shown on the Plans, all necessary excavation; and all labor, equipment, tools, and incidentals necessary to complete this item. The yardage of dumped rock, measured as provided above, shall be paid for at the contract unit price per cubic yard bid for Item 20 - DUMPED ROCK FILL, TYPE (A or B) or Item 20 - ROCK CHANNEL PROTECTION, TYPE (A or B) which price and payment shall constitute full compensation for furnishing and placing all materials, including excavation and disposal of earthwork and including any quarrying and all labor, equipment, tools and incidentals necessary to complete this WORK.

PART II – STORM SEWER

ITEM 21 - SHEETING LEFT IN PLACE

21.01 DESCRIPTION

21.02 METHOD OF MEASUREMENT

21.03 BASIS OF PAYMENT

21.01 DESCRIPTION

This WORK shall consist of placing and leaving in place any or all sheeting and bracing of trenches or other excavations as may be indicated on the Plans or as directed by the Service Director. All such sheeting and bracing shall be cut off at least 2 feet below the surface of the street or ground level.

21.02 METHOD OF MEASUREMENT

The number of square feet to be paid for shall be the actual quantities left in place. Any sheeting and bracing left in open excavation by the Contractor at his own option and any sheeting and timbering left in any tunneling shall not be included in this item.

21.03 BASIS OF PAYMENT

The number of square feet, measured as provided above, shall be paid for at the contract unit price per square feet for Item 21 - SHEETING LEFT IN PLACE. This price shall include the furnishing and placing of all sheeting and bracing and the cutting off of same as required, including all labor, tools and equipment required to complete this WORK.

PART II – STORM SEWER

ITEM 22 - CHANNEL EXCAVATION

22.01 DESCRIPTION

22.02 METHOD OF MEASUREMENT

22.03 BASIS OF PAYMENT

22.01 DESCRIPTION

This WORK shall consist of excavating for a new channel or increasing the width, increasing the depth, or straightening an existing channel, and the removal and disposal of all materials encountered, of whatever nature, all in accordance with the Plans and Proposal, or as directed by the Service Director.

This item does not include the normal ditching necessary to insure proper drainage along roadways, which is included in the price bid for the excavation and embankment portion of a roadway project, or normal ditching required as part of a storm sewer improvement project, which is included in the price bid per lineal foot of storm sewer pipe.

22.02 METHOD OF MEASUREMENT

The number of cubic yards of material in the original position, acceptably excavated as herein described, measured by the method of average end areas. Excavation outside plan lines shall not be included in the measurement for payment. The quantities may be based on cross sections prior to the WORK being completed and checked during construction to insure that the plan quantities have been excavated.

22.03 BASIS OF PAYMENT

The cubic yards, measured as provided above, shall be paid for at the contract unit price bid per cubic yard for Item 22 - CHANNEL EXCAVATION. This price and payment shall constitute full compensation for performing all of the requirements of this WORK, including furnishing all materials, labor, tools, equipment, supplies and incidentals.

PART II – STORM SEWER

ITEM 23 - GRANULAR BACKFILL

23.01 DESCRIPTION

23.02 MATERIALS

23.03 CONSTRUCTION METHODS

23.04 METHOD OF MEASUREMENT

23.05 BASIS OF PAYMENT

23.01 DESCRIPTION

This WORK shall consist of furnishing granular backfill material and its compaction where required or at such locations as called for on the Plans and Proposal, or as directed by the Service Director. This granular backfill item is to be used for utility trenches and other locations not covered by other items in these Specifications.

23.02 MATERIALS

When the WORK is performed within the right of way, all granular backfill material shall conform to Section 703.17 (Item 304), as specified in the ODOT Construction and Materials Specifications, latest edition.

When the WORK is performed outside of the right of way, all granular backfill material shall conform to Section 611.06 – BEDDING AND BACKFILLING, as specified in the ODOT Construction and Materials Specifications, latest edition.

23.03 CONSTRUCTION METHODS

All backfill WORK shall conform to Section 611.06 – BEDDING AND BACKFILLING, as specified in the ODOT Construction and Materials Specifications, latest edition.

In utility trenches, backfilling shall be performed per the items requirements to a depth of 12 inches above the top of the item. All backfill above the 12 inches will be placed in layers not exceeding 8 inches in thickness with each layer being thoroughly compacted. The backfill may be placed mechanically, but shall be done in lifts not to exceed 8 inches and compacted until maximum density is obtained. Compaction of each lift using mechanical devices, hoe rams, jumping jacks, hand devices, vibrating plates, or other equipment, shall meet the restrictions in Section 611.06 in the ODOT Construction and Materials Specifications, latest edition. Compaction shall be to 98%. Compacted backfill must be placed for the full width of the trench and shall extend to the bottom of the subbase when the backfill is occurring under pavement. When the backfill is placed outside of the pavement or subbase area, the granular backfill shall extend to within 4 inches of the finished grade. The top 4 inches of the trench shall be backfilled with Item 32 – TOP SOIL FURNISHED AND PLACED.

PART II – STORM SEWER

Field density tests shall be performed during trench backfill according to ASTM D 2922 nuclear method and compared to laboratory tests. The degree of compaction of the backfill above the bedding will be accepted if the test shows the lift was compacted to 98% of maximum dry density. At least one field test shall be done every 100 feet of trench and every lift. The compaction and field testing operation will be subject to quality control inspection by the third party inspection service. A failed density test indicates that the backfill has not met specifications and is not acceptable. Additional fill shall not be placed until compaction procedures have been modified, the failed lift has been re-installed and the lift has been re-tested and has passed its field density test.

23.04 METHOD OF MEASUREMENT

The volume of granular backfill to be paid for shall be that volume of the trench approved by the Service Director, minus the volume of the pipe, excepting that the trench length, width, and depth used in determining the volume shall be subject to the following limiting conditions:

Width	The trench width shall be considered the same as in Section 611.05 – EXCAVATION, as specified in the ODOT Construction and Materials Specifications, latest revision.
Length	The trench length shall be the horizontal distance for which the granular backfill is used.
Depth	The trench depth shall be from the bottom of the pipe to the bottom of the subbase when the backfill is occurring under pavement or when the backfill is placed outside of the pavement or subbase area, to within 4 inches of the finished grade.

23.05 BASIS OF PAYMENT

The volume of granular backfill, measured as provided above, shall be paid for at the contract unit price bid per cubic yard. This price shall constitute full compensation for furnishing granular backfill and its compaction, water used for compaction; and for all labor, equipment, tools, and incidentals necessary to complete this WORK.

PART II – STORM SEWER

ITEM 24 - YARD DRAIN

24.01 DESCRIPTION

24.02 MATERIAL

24.03 CONSTRUCTION METHODS

24.04 METHOD OF MEASUREMENT

24.05 BASIS OF PAYMENT

24.01 DESCRIPTION

This WORK shall consist of furnishing and constructing a yard drain as called for on the Plans and Proposal, or as directed by the Service Director.

24.02 MATERIAL

The pipe, bedding, joints and other materials shall be the type and quality specified on the Plans and Proposal or as directed by the Engineer and shall conform to Section 611.02 - MATERIALS, as specified in the ODOT Construction and Materials Specifications, latest edition.

Concrete shall be Class "QC 1" and shall conform to Item 499 - CONCRETE - GENERAL, as specified in the ODOT Construction and Materials Specifications, latest revision.

24.03 CONSTRUCTION METHODS

A 10-inch by 6-inch tee shall be used for the yard drain. Concrete will be used to fill around the base of the drain. The casting for the top shall be a 10-inch East Jordan Casting Number 2790-10 or equal.

24.04 METHOD OF MEASUREMENT

The quantity to be paid for shall be the actual number of yard drains furnished and constructed in place, completed, and accepted.

24.05 BASIS OF PAYMENT

The quantity of yard drains, measured as provided above, shall be paid for at the contract unit price bid per each Item 24 - YARD DRAIN. This price shall constitute full compensation for furnishing, constructing, and using all labor, material, equipment, tools and incidentals necessary to complete this WORK.

PART III – INCIDENTAL ITEMS

PART III - INCIDENTAL ITEMS

ITEM 25 - CONCRETE SIDEWALK AND MULTI USE TRAIL

25.01 DESCRIPTION

25.02 MATERIALS

25.03 CONSTRUCTION METHODS

25.04 PROTECTION AND CURING

25.05 METHOD OF MEASUREMENT

25.06 BASIS OF PAYMENT

25.01 DESCRIPTION

This WORK shall consist of constructing concrete sidewalk or multi use trail in accordance with the Plans, Standard Drawings and Proposal to the grade and alignment established by the Engineer. It shall include all WORK necessary to construct new concrete sidewalk, multi use trail or reconstruct existing sidewalk or multi use trail, including the removal of existing sidewalk or multi use trail unless paid for under Item 29 – REMOVAL AND DISPOSAL OF EXISTING SIDEWALK OR REMOVAL OF EXISTING MULTI USE TRAIL.

When any sidewalk is removed and is to be reconstructed, the entire (full) slab must be removed and replaced. A full slab of sidewalk is considered a piece of sidewalk from a transverse joint to the next adjacent transverse joint.

25.02 MATERIALS

All materials shall meet the following ODOT Construction and Material Specifications, latest revision.

Portland Cement Concrete (Class QC 1)	499 and 511
Waterproof Curing Membrane	705.07
Preformed Expansion Joint Filler	705.03
Aggregate Base	304
Asphaltic Concrete Intermediate Course	441

PART III – INCIDENTAL ITEMS

25.03 CONSTRUCTION METHODS

The earth shall be excavated to a uniform depth of 4 inches below the finished surface of the sidewalk, excepting at drive approaches, business areas and commercial areas, where it shall be excavated to a depth of 6 inches below the finished surface. The sidewalk width for residential areas shall be 4 feet in width and in business and commercial areas the sidewalks width shall be a minimum of 6 feet in width or as designated by the Service Director. The minimum width of a multi use trail is to be 8 feet. In areas where embankment is required to raise the finished surface to grade, the material used shall be granular and shall be thoroughly compacted to 98 percent of its maximum laboratory dry weight. Unless otherwise specified in the Plans and Proposal the cost of such excavation or embankment shall be included in the price bid per square foot of concrete sidewalk.

Use either fixed sidewalk forms or slip-form methods. For fixed-form construction, use clean metal forms that are in good condition. The forms shall be firmly staked, extend the full depth of the concrete, and shall not spring under the concrete pressure. Limited use of wood forms for forming special WORK may be permitted if approved by the Service Director. For slip-form construction, perform the WORK according to Section 609.04.C of the ODOT Construction and Material Specifications, latest revision.

The subgrade shall be thoroughly moistened just before the concrete is placed. The concrete shall be deposited and compacted in a single layer. It shall be struck off with a template and smoothed with a float to produce a sandy texture. Do not plaster the concrete. The finished surface shall be free from depressions or inequalities. Any irregularity in excess of 1/4-inch per section shall be sufficient cause for rejection, removal, and replacement, of that section. All outside edges and joints shall be rounded to 1/4-inch radius. The sidewalk will be laid in sections not exceeding 5 feet in length. Saw or form transverse joints to a depth of not less than one-fourth the thickness of the slab and to a width of approximately 1/8 inch (3 mm). Install 1/2 inch thick expansion joint filler between the walk and any fixed structure that extends the full depth of the walk. Install 1 inch thick expansion joint filler between the walk and the back of curb and at expansion joints which extend through the full depth of the sidewalk and shall be constructed at intervals of not more than 50 feet or as directed by the Engineer.

Unless otherwise directed, the surface of sidewalks shall have a transverse slope of 1/4 inch per foot with the low side being adjacent to the roadway.

For Multi Use Trails, the WORK consists of furnishing, placing, and compacting one or more courses of aggregate base and asphalt surface, including furnishing and incorporating all water required for compaction.

This WORK shall be considered to be the same as Item 304 - AGGREGATE BASE and 441 – ASPHALT CONCRETE INTERMEDIATE COURSE, as specified in the ODOT Construction and Materials Specifications, latest revision, with the following exceptions:

Section 304.08 as specified in the ODOT Construction and Materials Specifications, latest revision - Basis of payment to include furnishing and applying water.

PART III – INCIDENTAL ITEMS

Preparation of subgrade will be per Section 41.12.

The asphalt concrete intermediate course will be Type 1 with the asphaltic binder being PG 64-28.

25.04 PROTECTION AND CURING

No concrete shall be placed when the temperature of the air on the site of the WORK is below 40 degrees Fahrenheit, except upon special permission of the Service Director who may require the heating of any or all of the materials therein. Protect the concrete from freezing. The use of common salt or calcium chloride to protect the concrete from freezing is prohibited. In no case shall concrete be deposited upon frozen subgrade.

A waterproof membrane shall be applied immediately after the final finishing and after the free water has disappeared. All exposed surfaces of the concrete shall be sealed by spraying thereon, as a fine mist, a uniform application of curing material in such a manner as to provide a continuous, uniform water-impermeable film without marring the surface of the concrete. The material shall be applied in one or more separate coats with an approved mechanical spray. An adequate shield shall provide wind protection for the spray fog. A minimum of one gallon of material shall be used for each one hundred fifty square feet of surface treated.

As soon as the forms have been removed, immediately correct all honey-comb areas and coat the edges of the pavement with the curing material. Respray all areas of curing material film damaged during the sawing of joints. Apply curing as soon as possible and without marring the concrete surface. Keep the entire surface of the top and sides of the newly placed concrete covered and protected for seven days. The above requirements for curing are minimum requirements only. Repair or replace all concrete showing injury or damage due to noncompliance to curing requirements at no additional cost to the City.

25.05 METHOD OF MEASUREMENT

The footage of sidewalk or multi use trail to be paid for shall be the actual number of square feet of sidewalk or multi use trail, in place, completed, and accepted.

25.06 BASIS OF PAYMENT

The footage of sidewalk or multi use trail, measured as provided above, shall be paid for at the contract unit price bid per square foot for Item 25 - CONCRETE SIDEWALK OR MULTI USE TRAIL, which price and payment shall constitute full compensation for the necessary excavation and/or embankment, the removal and disposal of all surplus excavation including existing sidewalk unless otherwise noted on the Plans and Proposal; sufficient grading or approaches so as to prevent accidents to pedestrians; furnishing, preparing, and placing all materials, including expansion joints; curing and protecting for 7 days; and for all labor, equipment, tools and incidentals necessary to complete this WORK.

PART III – INCIDENTAL ITEMS

ITEM 26 - CONCRETE DRIVEWAY APPROACHES

26.01 DESCRIPTION

26.02 MATERIALS

26.03 CONSTRUCTION METHODS

26.04 PROTECTION AND CURING

26.05 METHOD OF MEASUREMENT

26.06 BASIS OF PAYMENT

26.01 DESCRIPTION

This WORK shall consist of the construction of concrete driveway approaches where called for on the Plans and proposal or as directed by the Service Director in accordance with these Specifications.

When any portion of an existing drive approach, including asphalt, brick, paver, gravel, concrete, or any other material used as a driveway approach, is removed for any reason and is to be reconstructed, the entire driveway approach must be removed and replaced with a concrete driveway approach. A driveway approach is that portion of the driveway which is located within the road right of way.

26.02 MATERIALS

All materials shall meet the following ODOT Construction and Material Specifications, latest revision.

Portland Cement Concrete (Class QC 1)	499 and 511
Portland Cement Concrete (Class QC MS)	499 and 511
Waterproof Curing Membrane	705.07
Prefomed Expansion Joint Filler	705.03

Concrete shall be Portland Cement Concrete (Class QC 1) if installing a new drive or (Class QC MS) if replacing an existing drive.

26.03 CONSTRUCTION METHODS

The earth shall be excavated to a uniform depth of 6 inches below the finished surface of the driveway approach. In areas where embankment is required to raise the finished surface to grade, the material used shall be granular and shall be thoroughly compacted to 98 percent of its maximum laboratory dry weight. Unless otherwise specified in the Plans and Proposal the cost of such excavation or embankment shall be included in the price bid per square yard of concrete driveway approach.

PART III – INCIDENTAL ITEMS

Use fixed forms construction. Use clean metal forms that are in good condition. The forms shall be firmly staked, extend the full depth of the concrete, and shall not spring under the concrete pressure. Limited use of wood forms for forming special WORK may be permitted if approved by the Service Director.

The subgrade shall be thoroughly moistened just before the concrete is placed. The concrete shall be deposited and compacted in a single layer. It shall be struck off with a template and smoothed with a float to produce a sandy texture. Do not plaster the concrete. The finished surface shall be free from depressions or inequalities. Any irregularity in excess of 1/4-inch per section shall be sufficient cause for rejection, removal, and replacement, of that section. All outside edges and joints shall be rounded to 1/4-inch radius. Saw or form transverse joints to a depth of not less than one-fourth the thickness of the slab and to a width of approximately 1/8 inch. Special care shall be used in the placing of the 1/2 inch expansion joint material to ensure that a complete separation of the concrete driveway approach and adjacent concrete curb and sidewalk is achieved.

26.04 PROTECTION AND CURING

No concrete shall be placed when the temperature of the air on the site of the WORK is below 40 degrees Fahrenheit, except upon special permission of the Service Director who may require the heating of any or all of the materials therein. Protect the concrete from freezing. The use of common salt or calcium chloride to protect the concrete from freezing is prohibited. In no case shall concrete be deposited upon frozen subgrade.

A waterproof membrane shall be applied immediately after the final finishing and after the free water has disappeared. All exposed surfaces of the concrete shall be sealed by spraying thereon, as a fine mist, a uniform application of curing material in such a manner as to provide a continuous, uniform water-impermeable film without marring the surface of the concrete. The material shall be applied in one or more separate coats with an approved mechanical spray. An adequate shield shall provide wind protection for the spray fog. A minimum of one gallon of material shall be used for each one hundred fifty square feet of surface treated.

As soon as the forms have been removed, immediately correct all honey-comb areas and coat the edges of the pavement with the curing material. Respray all areas of curing material film damaged during the sawing of joints. Apply curing as soon as possible and without marring the concrete surface. Keep the entire surface of the top and sides of the newly placed Portland Cement Concrete (Class QC 1) covered and protected for seven days. Keep the entire surface of the top and sides of the newly placed Portland Cement Concrete (Class QC MS) covered and protected for three days or as directed by the Engineer. The above requirements for curing are minimum requirements only. Repair or replace all concrete showing injury or damage due to noncompliance to curing requirements at no additional cost to the City.

PART III – INCIDENTAL ITEMS

26.05 METHOD OF MEASUREMENT

The yardage to be paid for shall be the number of square yards of concrete driveway approach as specified in place, completed, and accepted.

26.06 BASIS OF PAYMENT

The yardage, measured as provided above, shall be paid at the contract unit price per square yard bid for Item 26 - CONCRETE DRIVEWAY APPROACHES, which price and payment shall constitute full compensation for all excavation, embankment, and preparation of subgrade; all materials including joint material, the placing, finishing and curing; and all labor, equipment, tools and incidentals necessary to complete the WORK.

PART III – INCIDENTAL ITEMS

**ITEM 27 - CONCRETE CURB, COMBINATION CURB AND GUTTER AND
HEADER CURB**

27.01 DESCRIPTION

27.02 MATERIALS

27.03 CONSTRUCTION METHODS

27.04 METHOD OF MEASUREMENT

27.05 BASIS OF PAYMENT

27.01 DESCRIPTION

This WORK shall consist of the furnishing and construction of concrete curb, combination curb and gutter, and header curb, to the dimensions, lines, and grades, at the locations shown on the Plans and Proposal or as directed by the Service Director, in accordance with Item 609 – CURBING as specified in the ODOT Construction and Materials Specifications, latest edition.

27.02 MATERIALS

All materials shall meet the following ODOT Construction and Material Specifications, latest revision.

Portland Cement Concrete (Class QC 1)	499 and 511
Portland Cement Concrete (Class QC MS)	499 and 511
Waterproof Curing Membrane	705.07
Preformed Expansion Joint Filler	705.03
Tie bar steel, epoxy coated	709.00, 709.01, 709.03, 709.05
Coated dowel bars	709.13

Concrete shall be Portland Cement Concrete (Class QC MS) only when directed by the Service Director.

27.03 CONSTRUCTION METHODS

Concrete curb, combination curb and gutter, and header curb shall be placed using slip-form construction, in accordance with Section 609.04.C of the ODOT Construction and Material Specifications, latest revision.

Fixed forms construction may only be used when directed by the Service Director. Use clean metal forms that are in good condition. The forms shall be firmly staked, extend the full depth of the concrete, and shall not spring under the concrete pressure. Limited use of wood forms for forming special WORK may be permitted if approved by the Service Director.

Where existing and proposed drive approaches are shown on the Plans and Proposal or as directed by the Service Director, the curb lowered to create a dropped curb as shown on the City of Fairlawn Standard Construction Drawings.

PART III – INCIDENTAL ITEMS

Saw or form transverse joints to a depth of not less than 1 inch and to a width of approximately 1/4 inch. At all locations where concrete abuts asphalt and all joints shall be sealed using a mechanical applicator wand capable of continuously feeding the sealant through nozzles shaped to penetrate the joint. Sealant shall be Hot-Applied Road Saver 515 as manufactured by Crafcoc or approved equal. Sealant must be applied prior to opening the curb to traffic and shall be applied to a level slightly below the road surface to prevent tracking. Joints to be constructed approximately every 10 feet, as measured along the face of the curb.

27.04 METHOD OF MEASUREMENT

The footage to be paid for shall be the actual number of lineal feet of concrete curb, combination curb and gutter, and header curb, measured along the face of the curb for concrete curb and combination curb and gutter and along the centerline for concrete header curb as specified in place, completed, and accepted.

27.05 BASIS OF PAYMENT

The quantity, measured as provided above, shall be paid for at the contract unit price per lineal foot bid for Item 27 - CONCRETE CURB, Item 27 – COMBINATION CURB AND GUTTER, and Item 27 - HEADER CURB, which price and payment shall constitute full compensation for preparation of subgrade as per Section 41.12 - PREPARATION OF SUBGRADE of these specifications; for furnishing, hauling, preparing and placing all material; furnishing and compaction of excavation, embankment, backfill; removal and disposal of all surplus excavation and discarded material; construction of all joints; furnishing and installing all joint materials and sealants; and for all labor, equipment, tools and incidentals necessary to complete this WORK.

ITEM 28 - RESERVED

PART III – INCIDENTAL ITEMS

ITEM 29 - REMOVAL OF PAVEMENT, BASE, WEARING COURSE, SIDEWALK, MULTI USE TRAIL, DRIVES OR CURB

29.01 DESCRIPTION

29.02 GENERAL

29.03 REMOVAL METHODS

29.04 METHOD OF MEASUREMENT

29.05 BASIS OF PAYMENT

29.01 DESCRIPTION

This WORK shall consist of full depth removal of pavement, base, sidewalk, multi use trail, drives, curb, or full or partial depth removal of wearing course, to the dimensions, lines, and grades, as shown on the Plans and Proposal or as directed by the Service Director, and the disposal of all waste materials, in accordance with these Specifications.

29.02 GENERAL

Removal methods shall be such that materials which are to be salvaged and pavement, base, curb, and other installations that are to remain in place will not be damaged. Pavement, base, curb, and other installations which are to remain in place and which have been damaged by the Contractor's operations shall be repaired at no additional cost to the City.

The disposal of all removed material shall be the responsibility of the Contractor.

29.03 REMOVAL METHODS

A - Full depth removal of pavement, base, sidewalk, multi use trail, drives, curb

The Contractor shall use such suitable equipment, tools, and methods for cutting and trimming to remove the pavement, base, sidewalk, multi use trail, drive or curb to the neat line set by the Engineer and will not disturb or damage, in any manner, the sections of pavement, base, sidewalk, or curb, which are to remain in place. Unless otherwise specified in the contract documents, the removal of concrete pavement and/or sidewalk shall be in full slab increments. Power chisels shall be used whenever the type and density of material requires. If the amount of pavement, base, sidewalk, multi use trail, drive or curb, removed is of sufficient size to warrant the use of graders, power shovels or similar equipment, they shall operate only in such areas and in such a manner as will not violate the above provision.

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At locations where the base is to remain and the condition and elevation are satisfactory, special care shall be taken in the removal operation in order to avoid disturbing the base. If the base is unsatisfactory as determined by the Service Director, it shall be removed and replaced or additional material shall be added as directed by the Service Director to the lines and grades as determined in the Plans and Proposal in accordance with Item 45 – AGGREGATE BASE COURSE. Any additional aggregate base material required shall be paid for under Item 45 – Aggregate Base Course.

Where the subgrade condition and elevation are satisfactory, special care shall be taken in the removal operation in order to avoid disturbing the subgrade. If mud, soft clay, spongy or otherwise unsatisfactory material is found to be present through no fault or neglect of the Contractor, it shall be removed and replaced with suitable material in accordance with the provisions of Item 41 - ROADWAY EXCAVATION AND EMBANKMENT. The removal and replacement of unsatisfactory subbase shall be paid for under Item 41- ROADWAY EXCAVATION AND EMBANKMENT of these Specifications.

B - Removal of wearing course

The full or partial depth removal of the wearing course of whatever type shall include the cleaning and preparation of the base course for the specified new construction. The Service Director shall mark the area where the wearing course is to be removed. The removal of the wearing course shall be in accordance with Item 254 – PAVEMENT PLANNING of the ODOT Construction and Material Specifications, latest revision

Patch areas of the planed surface that the Service Director designates that have spalling or dislodged unsound pavement. Before patching, clean areas of loose material, coat with Item 48 – TACK COAT, and fill voids with Item 49 – ASPHALT CONCRETE. Level and compact the new material flush to the adjacent planed pavement. When the surface of the exposed material is in such condition that a bituminous tack coat is required, the Contractor shall apply the tack coat of the grade and amount as determined by the Service Director. The tack coat shall be paid for under Item 48 – TACK COAT.

29.04 METHOD OF MEASUREMENT

The pay quantities for this item shall be determined after all of the requirements of this item have been performed. The unit of measurement shall be the square foot, square yard or the lineal foot. The number of square yards to be paid for shall be the area of the pavement, base or wearing course, including curb, curb and gutter, and header curb which are integral with the pavement or base, which have been removed in accordance with the requirements of this item. The number of square feet to be paid for shall be the area of sidewalk or multi use trail which has been removed in accordance with requirements of this item. The number of lineal feet to be paid for shall be the length of curb, curb and gutter, or header curb which are not integral with the pavement or base and which has been removed in accordance with the requirements of this item.

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29.05 BASIS OF PAYMENT

The square feet, square yards or lineal feet measured as provided above, shall be paid for at the contract unit price bid:

Per square yard for Item 29 - REMOVAL OF EXISTING PAVEMENT

Per square yard for Item 29 - REMOVAL OF EXISTING BASE

Per square yard for Item 29 - REMOVAL OF EXISTING WEARING COURSE

Per square foot for Item 29 - REMOVAL OF EXISTING SIDEWALK

Per square foot for Item 29 – REMOVAL OF EXISTING MULTI USE TRAIL

Per square foot for Item 29 - REMOVAL OF EXISTING DRIVES

Per lineal foot for Item 29 - REMOVAL OF EXISTING CURB, CURB AND GUTTER, OR
HEADER CURB

These prices and payments shall constitute full compensation for performing all the requirements of this WORK including the disposal of all removed material, furnishing all necessary materials, labor, tools, equipment, supplies and incidentals.

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ITEM 30 - REMOVAL OF TREES AND STUMPS

30.01 DESCRIPTION

30.02 REMOVAL AND DISPOSAL

30.03 METHOD OF MEASUREMENT

30.04 BASIS OF PAYMENT

30.01 DESCRIPTION

This WORK shall consist of the removal of trees and stumps as shown on the Plan and Proposal or as directed by the Service Director. A tree is considered to be a tree, stump, and roots. A stump is considered a stump and roots. Suitable precautions shall be taken in the removal of trees and stumps to protect utility poles, utility wires, sidewalks, pavement, and any other public or private property, from damage.

Holes caused by such removal within the limits of the right of way shall be backfilled and compacted in accordance with Section 10.12 - BACKFILLING. If outside the limits of proposed pavement or right of way, the top 4 inches of the trench shall be backfilled with Item 32 – TOP SOIL FURNISHED AND PLACED.

30.02 REMOVAL AND DISPOSAL

Before the Contractor removes any tree or stump, the Service Director shall review the Plan and Proposal and appropriately mark each tree or stump to be removed.

Only such trees and stumps so marked by the Service Director shall be removed.

The disposal of trees and stumps shall be the responsibility of the Contractor.

30.03 METHOD OF MEASUREMENT

The pay quantities for this item shall be determined after all of the requirements of this item have been performed. The unit of measurement shall be one tree, or one stump. The trees and stumps to be paid for shall be each removed in accordance with the requirements of this item.

Measurements for determining diameter shall be made at a point 2 feet above the normal ground level at the base of the tree, measuring the circumference and dividing by 3.14.

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30.04 BASIS OF PAYMENT

The trees and stumps, measured as provided above, shall be paid for at the contract unit price bid under the following classes:

Trees and stumps 6 inches, and under: EXCAVATION AND EMBANKMENT	Price to be included in Item 41 - ROADWAY
Trees over 6 inch to 12 inch: TO 12 INCH	each for Item 30 - REMOVAL OF TREES 6 INCH
Trees over 12 inch to 18 inch: INCH TO 18 INCH	each for Item 30 - REMOVAL OF TREES 12
Trees over 18 inches: INCH AND LARGER	each for Item 30 - REMOVAL OF TREES 18
Stumps over 6 inch to 12 inch: INCH TO 12 INCH	each for Item 30 - REMOVAL OF STUMPS 6
Stumps over 12 inch to 18 inch: INCH TO 18 INCH	each for Item 30 - REMOVAL OF STUMPS 12
Stumps over 18 inches: INCH AND LARGER	each for Item 30 - REMOVAL OF STUMPS 18

These prices and payments shall constitute full compensation for performing all of the requirements of the WORK including backfill and compaction of all backfill; the disposal of all trees and stumps; and the furnishing of all necessary materials, labor, tools and equipment necessary to complete the WORK.

PART III – INCIDENTAL ITEMS

ITEM 31 - CONNECT EXISTING DOWNSPOUTS

31.01 DESCRIPTION

31.02 MATERIAL

31.03 CONSTRUCTION METHODS

31.04 METHOD OF MEASUREMENT

31.05 BASIS OF PAYMENT

31.01 DESCRIPTION

This WORK shall consist of furnishing and installing downspout drain pipe under the sidewalk, and between the property line and curb as shown on the Plan and Proposal or as directed by the Service Director.

31.02 MATERIAL

The materials shall be the type and quality conforming to Section 707.46 of the ODOT Construction and Materials Specifications, latest edition.

31.03 CONSTRUCTION METHODS

Connections with existing downspout pipe shall be as directed by the Service Director. The end of the pipe at the curb shall be securely connected to the curb underdrain, when possible, or to an existing storm sewer using a wye connection. If a connection to the underdrain or storm sewer is not possible, the downspout shall be inserted into a hole in the curb and tightly sealed with bituminous mastic compound meeting ODOT Construction and Material Specifications, latest revision. When the pipe extends from the property line to the curbing, it shall be laid just under the sidewalk and on a straight grade from property line to the underdrain. When the pipe extends from existing pipe to the curbing, it shall be laid on a straight grade between these two points.

The Contractor shall confine his WORK under this item to the area within the street right of way; except with signed WORK Right Agreements the Service Director may determine the limits necessary to make a suitable connection to the existing downspout pipe.

31.04 METHOD OF MEASUREMENT

The quantity to be paid for shall be the actual number of lineal feet of pipe in place, completed and accepted.

31.05 BASIS OF PAYMENT

The quantity, measured as provided above, shall be paid for at the contract unit price bid per lineal foot for Item 31 - CONNECT EXISTING DOWNSPOUTS, which price shall constitute full compensation for furnishing and installing the pipe; and for all materials, labor, equipment, tools and incidentals necessary to complete this WORK.

PART III – INCIDENTAL ITEMS

ITEM 32 - TOPSOIL FURNISHED AND PLACED

32.01 DESCRIPTION

32.02 MATERIAL

32.03 CONSTRUCTION METHODS

32.04 METHOD OF MEASUREMENT

32.05 BASIS OF PAYMENT

32.01 DESCRIPTION

This WORK shall include the furnishing, spreading and shaping of a minimum of 4 inches of approved topsoil on all berms and slope areas disturbed during subsequent construction WORK or as directed by the Service Director. It shall also include the adjustment of all valve boxes located outside the right of way to the newly graded elevation. Any adjustment of valve boxes located within the right of way shall be in paid accordance with Item 15 - MANHOLES, CATCH BASINS, INLETS, JUNCTION CHAMBERS, MONUMENT BOXES, OR VALVE BOXES ADJUSTED TO GRADE, of these specifications.

32.02 MATERIAL

All material shall conform to Section 653 - TOPSOIL FURNISHED AND PLACED, as specified in the ODOT Construction and Materials Specifications, latest revision.

32.03 CONSTRUCTION METHODS

Topsoil shall not be placed until the area to be covered has been shaped and all construction WORK in the area has been completed. These areas shall be free of rock or other foreign material of any kind. The topsoil shall be furnished, spread, and shaped, over the areas as directed by the Engineer to a depth sufficiently greater than 4 inches so that settlement and rolling will produce a 4 inch minimum depth of topsoil with a finished surface conforming to the lines, grades and elevations shown on the plans. All topsoil placed behind the curb must be placed, shaped, and compacted so its final grade is to the top of curb.

After the berm grading has been completed and topsoil placed, and before fine grading and seeding is undertaken, the valve boxes shall be adjusted to the final berm grade in accordance with Item 15 - MANHOLES, CATCH BASINS, INLETS, JUNCTION CHAMBERS, MONUMENT BOXES, OR VALVE BOXES ADJUSTED TO GRADE, of these specifications. This WORK includes the adjustment of all valve boxes located outside the right of way to the new elevation. Any adjustment of valve boxes located within the right of way shall be in paid accordance with Item 15 - MANHOLES, CATCH BASINS, INLETS, JUNCTION CHAMBERS, MONUMENT BOXES, OR VALVE BOXES ADJUSTED TO GRADE, of these specifications.

It shall be the responsibility of the Contractor to make arrangements with any utility company when needed to make the valve box adjustments to meet the proposed grade as outlined above.

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32.04 METHOD OF MEASUREMENT

The yardage of Topsoil Furnished and Placed to be paid for shall be the number of square yards measured, completed in place, conforming to the lines, grades and dimensions shown on the Plans, or as directed by the Service Director and accepted.

32.05 BASIS OF PAYMENT

The square yardage of Topsoil Furnished and Placed, measured as provided above, shall be paid for at the contract unit price per cubic yard bid for Item 32 - TOPSOIL FURNISHED AND PLACED, which price and payment shall constitute full compensation for furnishing, hauling, depositing, placing, shaping, spreading, compacting, and finishing of approved topsoil; the proper preparation of the subgrade; adjustment of all valve boxes located outside of the right of way; and furnishing of all labor, equipment, tools and incidentals necessary to complete this WORK.

PART III – INCIDENTAL ITEMS

ITEM 33 - SODDING

33.01 DESCRIPTION

33.02 MATERIAL AND CONSTRUCTION METHODS

33.03 METHOD OF MEASUREMENT

33.04 BASIS OF PAYMENT

33.01 DESCRIPTION

This WORK shall consist of furnishing and placing sod on areas designated by the Plans and Proposals or as directed by the Service Director.

33.02 MATERIAL AND CONSTRUCTION METHODS

All material and construction methods shall conform to Section 660 – SODDING, as specified in the ODOT Construction and Material Specifications, latest revision.

33.03 METHOD OF MEASUREMENT

The quantity to be paid for shall be the number of square yards of sod in place, completed and accepted. The number of square yards will be determined from the Engineer's measurements of the sod in place.

33.04 BASIS OF PAYMENT

The quantity measured as provided above shall be paid for at the contract unit price per square yard bid for Item 33 - SODDING, which price shall constitute full compensation for furnishing, placing, preparing the bed, tamping, and watering the sod and for all material, labor, equipment, tools and incidentals necessary to complete this WORK as specified.

PART III – INCIDENTAL ITEMS

ITEM 34 - SEEDING

34.01 DESCRIPTION

34.02 CONSTRUCTION METHODS

34.03 METHOD OF MEASUREMENT

34.04 BASIS OF PAYMENT

34.01 DESCRIPTION

This WORK shall consist of furnishing, hauling, and applying of all seed, fertilizer, tracer, mulch, and tackifier, by the hydroseeding method, in accordance with these Specifications.

34.02 CONSTRUCTION METHODS

HYDROSEEDING

Prepare the topsoil as provided under Item 32 - TOPSOIL FURNISHED AND PLACED.

Apply seed, fertilizer, mulch and tackifier as follows:

Use hydraulic equipment that continuously mixes and agitates the slurry and applies the mixture uniformly through a pressure-spray system providing a continuous, non-fluctuating delivery. Place seed, fertilizer, mulch and tackifier in the hydroseeder tank no more than 30 minutes prior to application.

Perform hydroseeding in a one-step or two-step process. The two-step process is preferred.

Two-Step Process

Step one:

Apply the following mixture known as Fairlawn Sunny Mix or equal:

30.80 percent Kentucky Bluegrass VNS

14.75 percent Fortitude Creeping Red Fescue

9.85 percent Brooklawn Kentucky Bluegrass

9.85 percent Protégé GLR Perennial Ryegrass

9.85 percent Amazing GS Perennial Ryegrass

9.85 percent Homerun Perennial Ryegrass

9.85 percent Fiesta 4 Perennial Ryegrass

0.40 percent crop, 0.01 percent weed, 4.79 percent inert, a commercial fertilizer of 22-10-5, and tracer.

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Evenly spread the seed over the area at a rate of 6 pounds per 1000 square feet, fertilizer at a rate of 10 pounds per 1000 square feet and tracer as needed.

Step two:

Apply mulch and tackifier.

One-Step Process

Apply the following mixture know as Fairlawn Sunny Mix or equal:

30.80 percent Kentucky Bluegrass VNS
14.75 percent Fortitude Creeping Red Fescue
9.85 percent Brooklawn Kentucky Bluegrass
9.85 percent Protégé GLR Perennial Ryegrass
9.85 percent Amazing GS Perennial Ryegrass
9.85 percent Homerun Perennial Ryegrass
9.85 percent Fiesta 4 Perennial Ryegrass
0.40 percent crop, 0.01 percent weed, 4.79 percent inert, a commercial fertilizer of 22-10-5, and tackifier in one-step.

Evenly spread the seed over the area at a rate of 12 pounds per 1000 square feet, fertilizer at a rate of 10 pounds per 1000 square feet. When using the one-step process, the amount of seed is doubled to compensate for the seed suspended above the soil by the mulch.

34.03 METHOD OF MEASUREMENT

The quantity of SEEDING to be paid for shall be the number of square yards measured in place, completed and accepted.

34.04 BASIS OF PAYMENT

The quantity measured as provided above shall be paid for at the contract unit price per square yard bid for Item 34 – SEEDING, which price shall constitute full compensation for furnishing, hauling, and applying of all seed, fertilizer, tracer, mulch, and tackifier, by the hydroseeding method and for all material, labor, equipment, tools and incidentals necessary to complete this WORK as specified.

PART III – INCIDENTAL ITEMS

ITEM 35 - REINFORCING STEEL

35.01 DESCRIPTION

35.02 MATERIALS

35.03 CARE OF MATERIAL

35.04 METHOD OF MEASUREMENT

35.05 BASIS OF PAYMENT

35.01 DESCRIPTION

This WORK shall consist of furnishing and placing in concrete, reinforcing steel of the quality, type, size, and quantity, as designated on the Plans and Proposal or as directed by the Service Director, in accordance with these Specifications.

35.02 MATERIALS

The materials shall be the quality, type, and size, conforming to Item 709 - REINFORCING STEEL, of the ODOT Construction and Materials Specifications, latest edition.

35.03 CARE OF MATERIAL

All reinforcing steel when received on the WORK, prior to its use, shall be stacked off the ground and shall be kept free of dirt, oil, grease, and avoidable rust. When placed in the concrete, it shall be clean and free from all scale and injurious rust.

35.04 METHOD OF MEASUREMENT

The number of pounds of reinforcing steel to be paid for shall be the actual number of pounds of the various sizes incorporated in the concrete masonry as shown on the Plans, completed and accepted. The number of pounds shall be determined from the number, length and net sections of the bars as shown on the steel list of the Plans. The weight of reinforcing steel shall be considered as 490 pounds per cubic foot.

35.05 BASIS OF PAYMENT

The quantity, as provided above, shall be paid for at the contract unit price per pound bid for Item 35 - REINFORCING STEEL, which price and payment shall constitute full compensation for furnishing, preparing and placing all materials; and for all labor, equipment, tools and incidentals necessary to complete this WORK.

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ITEM 36 - CONCRETE ENCASEMENT OF PIPE

36.01 DESCRIPTION

36.02 METHOD OF MEASUREMENT

36.03 BASIS OF PAYMENT

36.01 DESCRIPTION

This WORK shall consist of such excavation for, and concrete encasement of, pipe as may be required by the Plans and Proposal or as directed by the Service Director. Concrete shall conform to Section 25.02 of these Specifications.

36.02 METHOD OF MEASUREMENT

The number of cubic yards to be paid for shall be the actual number of cubic yards delivered, in place, completed and accepted.

36.03 BASIS OF PAYMENT

The quantity, as provided above, shall be paid for at the contract unit price bid for Item 36 - CONCRETE ENCASEMENT OF PIPE, which price and payment shall constitute full compensation for all excavation; and the furnishing, placing, shaping and compacting of concrete around the pipe; and all labor, equipment, tools and incidentals necessary to complete this WORK.

PART III – INCIDENTAL ITEMS

ITEM 37 - MONUMENT BOX ASSEMBLY

37.01 DESCRIPTION

37.02 METHOD OF MEASUREMENT

37.03 BASIS OF PAYMENT

37.01 DESCRIPTION

This WORK shall consist of furnishing all materials for monument box assemblies conforming to these Specifications and the City of Fairlawn Standard Construction Drawings. A Registered Surveyor must determine the placement of all monument boxes and pins within the monument boxes.

37.02 METHOD OF MEASUREMENT

The number of monument box assemblies to be paid for shall be the actual number of monument box assemblies, in place, completed and accepted.

37.03 BASIS OF PAYMENT

The quantity of monument box assemblies, measured as provided above, shall be paid for at the contract unit price bid per each Item 37 – MONUMENT BOX ASSEMBLY. This price shall constitute full compensation for all excavation and backfill; for furnishing, hauling and setting of castings; all paving reconstruction; and using all labor, material, equipment, tools and incidentals necessary to complete this WORK.

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ITEM 38 - NUMBER 1 & 2 AGGREGATE

38.01 DESCRIPTION

38.02 MATERIAL AND CONSTRUCTION METHODS

38.03 METHOD OF MEASUREMENT

38.04 BASIS OF PAYMENT

38.01 DESCRIPTION

This WORK shall consist of placing a combination of Number 1 and Number 2 aggregate to be used as base material. This material is to be used in areas of poor subgrade or as directed by the Service Director.

38.02 MATERIAL AND CONSTRUCTION METHODS

The Number 1 and Number 2 aggregate shall form a resultant mixture of approximately 50-percent of each and the aggregate shall conform to Item 703 of the ODOT Construction and Materials Specifications, latest revision. The stone shall be rolled or compacted to form a firm base. Item 45 - AGGREGATE BASE COURSE will normally be placed on top of this stone.

38.03 METHOD OF MEASUREMENT

The number of cubic yards to be paid for shall be the actual number of cubic yards delivered, in place, completed and accepted.

38.04 BASIS OF PAYMENT

The quantity, as provided above, shall be paid for at the contract unit price bid for Item 38 – NUMBER 1 & 2 AGGREGATE, which price and payment shall constitute full compensation for furnishing, placing, shaping and compaction; and all labor, equipment, tools and incidentals necessary to complete this WORK.

ITEM 39 - RESERVED

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ITEM 40 - MANHOLE REHABILITATION

40.01 DESCRIPTION

40.02 INTERNAL CHIMNEY SEALS

40.03 LID GASKETS

40.04 LID PLUGS

40.05 INFLOW DISHES

40.06 EXTERIOR JOINT COLLAR

40.07 ADJUSTING MANHOLE TO GRADE

40.08 SEAL MANHOLE WALLS

40.09 FLOW INTERRUPTION

40.10 METHOD OF MEASUREMENT

40.11 BASIS OF PAYMENT

40.01 DESCRIPTION

The WORK under this item shall include all materials, equipment, and labor necessary to clean, patch, repair, waterproof, seal, reestablish the structural integrity of the sanitary sewer manholes, and perform specified and necessary WORK required to stop the inflow and infiltration of clean water into existing sanitary sewer manholes. WORK includes necessary repairs, surface preparation to install internal chimney seal and extensions, lid gaskets, dishes, lid plugs, invert-bench repairs, precast joint seals, and any other WORK in accordance with these specifications, in existing manholes as shown on the Plans, Proposals, or as required by the Service Director.

40.02 INTERNAL CHIMNEY SEALS

Chimney seals shall be designed to provide an interior watertight, flexible seal between the manhole frames and adjusting rings, bricks, or cone sections. The seal shall consist of a rubber seal, stainless steel expansion bands, preformed extensions, bands, and hardware.

Rubber sleeve shall be extruded from a high grade rubber compound meeting applicable requirements of ASTM C923. The sleeve shall be double pleated with a minimum unexpanded vertical height of 8-inches, shall have a minimum thickness of 3/16-inch, and shall expand not less than 2-inches vertically when installed. Top and bottom shall contain an integrally formed expansion band recess and multiple. Any splices shall be hot vulcanized and shall withstand a 180 degree bend with no visible separation.

Expansion bands for compressing the sleeve against the manhole surfaces shall be 16 gauge, minimum 1-3/4 inches wide, and stainless steel meeting the requirements of ASTM A240, Type 304. The expansion mechanism shall have the capacity to develop the pressure necessary to make a watertight seal and shall have an adjustment of up to not less than two diameter inches. Hardware shall be of stainless steel meeting the requirements, as applicable, of ASTM F593 and 594, Type 304.

Chimney seals and extensions shall be installed in strict accordance with the manufacturer's specifications and recommendations, including use of butyl caulk on the lower portion of the seal

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when installed in brick manholes. The installation of the chimney seal and extension shall include the preparation of the wall surfaces in the chimney area and the adjustment of the frame as required by the manufacturer's specifications and recommendations. Measurements shall be the responsibility of the Contractor.

Precast manholes, shall be sealed from the bottom 2 inches of the steel casting to the top 2 inches of the precast manhole cone and include all grade rings.

Brick manholes, manholes, shall be sealed from the bottom 2 inches of the steel casting to the second level of brick courses of the manhole chimney.

Chimney seals shall be as manufactured by Cretex Specialty Products, or equal, and shall be installed in strict accordance with the manufacturer's instructions. The installation of the chimney seal shall include the preparation of the wall surfaces in the chimney area and the adjustment of the frame as required by the manufacturer's installation instructions.

40.03 LID GASKETS

Lid gaskets shall be manufactured with an outside rib and have a minimum thickness of 3/32" inch and any splice used in fabrication shall have the strength to withstand a 180 degree bend without visible separation. Lid Gaskets shall be Cretex or approved equal.

40.04 LID PLUGS

Vent hole plugs shall be Cretex Style #3 and furnished in the size needed to insure water tightness.

40.05 INFLOW DISHES

Plastic inflow dishes shall be made of ultra high density, polyethylene copolymer, with material that meets ASTM specifications designation D1248, Class A, Category 5, Type 3 with a minimum impact brittleness temperature of 180 degrees F., Environmental Stress Crack Rating (ESCR) of 800, Flexural Modulus of 175,000, and the thickness shall be uniform 1/8-inch or greater. This material is corrosion proof from all gasses associated with waste water collection systems.

The lift strap is made of woven polypropylene web and is attached to the bowl of the dish by a wide head stainless steel rivet and a stainless steel 3/4-inch backup washer. All edges are seared to insure against raveling.

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Ventilation is provided by a vent hole and/or a valve located on the side of the bowl. The hole or valve allows a maximum release of 5 gallons of water per 24 hours and is not affected by debris that might collect in the bottom of the dish. Sewer gas is vented at one psi or less.

The gasket is made of closed cell neoprene and is attached by pressure sensitive adhesive to the weight bearing surface of the dish.

The manhole frame shall be cleaned of all dirt and debris before placing the manhole insert on the rim.

The manhole insert shall be fully seated around the manhole frame rim to prevent water from infiltrating between the cover and the manhole frame rim.

Dishes shall be "NoFlow InFlow" as distributed by Municipal & Contractor Sealing Products, Inc., Cincinnati, OH, or approved equal and shall have a 5-year minimum warranty against cracking.

40.06 EXTERIOR JOINT COLLAR

Exterior joint collars shall consist of a band 9 inches wide meeting the standards of ASTM C 877-94, Type 11. The band shall have an outer layer of polyethylene with an under layer of rubberized mastic that is reinforced with a woven polypropylene fabric. There shall be a peelable protective paper against the mastic that is removed when the collar is applied to the joint. Within the collar, two steel straps 5/8 inch wide shall be located 3/4 inches from each edge of the band. The straps shall be in tubes that isolate them from the mastic and allow them to slip freely when tightened around the pipe. The collar shall be designed so that when it is applied around the joint the ends shall overlap at least 12 inches and when the straps are secure, completely cover the straps protecting them from moisture and rust. Exterior joint collars shall be Mac Wrap as manufactured by Mar-Mac Industries and distributed by Municipal & Contractor Sealing Products, Inc., Cincinnati, OH or approved equal.

40.07 ADJUSTING MANHOLE TO GRADE

This WORK shall include the removal and resetting of the existing manhole frame to the proper alignment and elevation. New frames shall be used if deemed necessary to satisfactorily seal the manhole. No additional payment shall be made for using a new frame. Existing frames and covers shall be reset where required to accommodate the installation of the chimney seals and as otherwise determined during WORK on the Project. Any additional manholes determined to need adjustment but not listed as part of the WORK, must be approved by the Service Director, before any WORK is done on the additional manholes.

Resetting shall include all necessary materials and construction to adjust the frame and cover to grade as determined by the Service Director.

Excavation in pavement shall be such as to provide no less than a 12 inch wide band of new pavement around the frame and cover after it has been reset, and shall extend to a depth below

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the frame base flange as necessary to permit all required wall repairs. The existing pavement shall be removed to neat, straight lines or circles around the frame and cover by sawing or otherwise cutting the existing pavement for its full depth. The frame shall be completely removed and the frame and supporting surface cleaned. The frames shall be raised using sewer bricks or pre-cast rings that shall be plastered on the outside with mortar to a minimum thickness of 1/2 inch. This mortar shall overlap the existing mortar by not less than 6 inches. The frames shall be reset in a full leveling of 1-1/2 inches of new bituminous seal or as otherwise approved by the Service Director.

After resetting, the excavated area shall be backfilled and restored to a condition equal to that existing prior to the WORK. In pavement areas, only suitable material that was excavated shall be used as backfill. If additional backfill is needed, material and compaction shall be per ITEM 23. Replacement of the pavement shall be the same type as removed. Replacement pavement shall conform to the specifications as set forth for new construction and contained herein. Cost of replacement pavement is to be included at no additional cost.

40.08 SEAL MANHOLE WALLS

WORK under this item shall include all materials, equipment and labor necessary to patch the joints on brick manholes and seal all walls as specified in the existing manholes as designated.

If the temperature is expected to be below those required by the manufacturer for their products, the Contractor shall take measures to keep applied materials warm and provide the required heat in the manhole before repair WORK is started and the 24-hour period following application.

Prior to any other WORK inside of the manhole, all interior wall, invert, and bench surfaces shall be cleaned using a minimum 3,000 psi water blast to remove all foreign matter and loose material. Water blast equipment shall be capable of providing up to 5,000 psi. Then a solution of muriatic acid (hydrochloric acid) at a ratio of ten parts water will be applied by spraying from above the manhole. After the acid solution is used, it shall be washed completely off and the manhole allowed to dry. The mixing, application and removal of the acid solution shall be done in strict accordance with the manufacturer's specifications and recommendations. All safety procedures applicable to the handling of these acids shall be strictly adhered to. No separate payment will be made for cleaning.

Patching shall include the repair of all steps, benches and inverts.

Manhole step repair shall include replacing missing steps and others requiring replacement as determined by the Service Director. The Contractor will supply all steps. The Contractor shall remove the existing step where required, drill the necessary holes, and perform all other WORK to install the replacement steps. Steps shall be replaced as directed at no additional cost.

Bottom repair shall include the patching of the invert and bench areas in the manholes using "Octocrete" by IPA Systems, Inc. or approved equal. The flow channel shall be checked for leaks, cracks, spalls, or other discrepancies by plugging the upstream side and visually inspecting the channel. If additional bench or invert repairs are identified and deemed necessary, repairs

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shall be made so as to make the surface smooth and provide smooth flow through the manhole. The invert shall have a minimum depth through the manhole equal to one half the diameter of the sewer pipe, with the bench sloping upward toward the manhole walls at a rate of one inch (1") per foot. All loose and deteriorated material shall be removed from the WORK site and properly disposed of by the Contractor. Patching material shall be "Octocrete" by IPA Systems, Inc. or approved equal. Payment for bottom repairs will be included in cost of sealing manhole walls.

Wall repair shall include the sealing of all visible leaks in the manhole. Wherever heavy infiltration is present due to high ground water and cannot be reasonably stopped, four 5/8" diameter holes will be drilled at intervals around the base of the manhole wall to relieve outside pressure. All pressure leaks shall be sealed with a rapid setting material that bonds both mechanically and chemically to saturated surfaces. This compound shall be capable of setting in approximately 45 to 90 seconds. The material shall be Ipanex-R (IPA Systems, Inc.), Preco Plug (Preco Industries, Ltd.), Speed plug (Tamms Industries) or equal. Once the walls have been rehabilitated, the drilled holes shall be plugged with Ipanex-R, Preco Plug, Speed Plug and Portland cement as set forth in the manufacturer's directions or approved equal. Wall repair, as determined by the Contractor and appropriate for the conditions, may be performed by Chemical Grouting in accordance with NASSCO Specifications and as approved by the Service Director. Payment for wall repair will be included in the cost of sealing the manhole walls.

Once all infiltration of water has been stopped on concrete manholes and there is evidence of deteriorating concrete, two (2) coats of "Duripal," as manufactured by IPA Systems, Inc., shall be applied to the entire manhole surface to stabilize the substrate. The "Duripal," shall be applied to a clean, dry, sound surface and in accordance with manufacturer's directions.

Patching of manhole walls shall be required in areas where large voids exist including missing bricks, cracks, spalls in manhole walls, around steps, frames, pipes and mortar joints. All cracked or disintegrated material shall be removed from the area to be patched exposing a clean, sound substrate. The chimney area of manholes shall be patched so that the top four inches (4") will accept a Cretex chimney seal. Under no circumstances shall water plug type materials be used for general patching. Patching material shall be "Octocrete," a fast setting polymer mortar, as manufactured by IPA Systems, Inc. or equal.

Brush applied waterproofing of manhole walls shall be a two (2) coat application of "Drycon" inorganic waterproofing at a thickness of 1/16" (inch) per coat and a total of 1/8 inch for the two (2) coats. The first coat shall be gray in color; the second coat shall be white. If manholes are more than 15 feet in depth, a third 1/16 inch coating of the white colored Drycon inorganic waterproofing shall be applied to surfaces below the 15 foot depth. The waterproofing system shall be applied from the invert to manhole frame to a dampened substrate.

Spray application shall be a single coating of "Drycon SMF" inorganic waterproofing at a thickness between 3/8" (Inch) and 2" (inches) as required. Mechanically mix "Drycon SMF" per manufacturer's instructions, starting with 4 quarts of water per bag. Gradually increase water until the desired consistency is achieved, but using no more than 4 quarts of water per 50-pound bag of material. "Drycon SMF" may be spray applied (using a peristaltic pump). After spray application, immediately return with a hand trowel and WORK "Drycon SMF" into cracks, joints, and areas where brickwork has been stepped to assure that proper coverage and bonding is

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achieved. Use a masons brush to make the "Drycon SMF" coating uniform over the entire surface.

Once all manholes have been sealed and the proper curing time for the sealant materials has elapsed, the manholes will be given a field inspection. The Contractor, The Service Director and/or his agents shall conduct this inspection. The inspection shall be performed during the warranty period following a rainfall event sufficient enough to raise the ground water table above the problem areas. All leakage problems determined by this inspection shall be corrected by the Contractor within an agreed upon time by the Service Director at no additional cost.

The Contractor shall guarantee the sealed manholes and/or inverts for a minimum of three years after acceptance by the City to the extent that he will repair any leaks that may appear in them during this period because of faulty workmanship or materials.

The materials shall comprise a system specifically recommended by the manufacturer for sanitary sewer manhole rehabilitation.

All WORK shall be in strict accordance with the manufacturer's instructions and shall be complete with recommended bonding agents and surface stabilizers. When there is frost in the area, the Contractor shall provide, operate and maintain necessary equipment to provide the required heat in the manhole before repair WORK can be done.

Where necessary to complete the WORK, the Contractor shall be responsible for the bypassing and/or blocking of flow in the manholes as approved by the Service Director.

40.09 FLOW INTERRUPTION

Bypassing and/or blocking of the flow in the manholes shall only be done with prior approval of the Service Director.

40.10 METHOD OF MEASUREMENT

The manholes rehabilitated to be paid for will be the actual number of manholes rehabilitated in accordance with all items shown under Item 40 – MANHOLE REHABILITATION, in place, completed, and accepted.

When listed separately the internal chimney seals, lid gaskets, lid plugs, inflow dishes, and exterior joint collar to be paid for will be the actual number of each, in place, completed and accepted.

40.11 BASIS OF PAYMENT

The WORK included in this item shall be paid for at the contract unit price bid for each Item 40 – MANHOLE REHABILITATION, and when listed separately, Item 40 - INTERNAL CHIMNEY SEAL, Item 40 – LID GASKET, Item 40 – LID PLUGS, or Item 40 - INFLOW DISHES, which price and payment will constitute full compensation for removing and storing

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castings, excavation, removal of portions of walls, furnishing and placing pipe, backfilling, disposal of removed masonry and for furnishing and placing all the necessary materials; and for all labor, equipment, tools, and other incidentals necessary to complete these items.

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ITEM 41 - ROADWAY EXCAVATION AND EMBANKMENT

41.01 DESCRIPTION

41.02 DEFINITIONS

41.03 CLEARING AND GRUBBING

41.04 PREPARATION OF FOUNDATION FOR EMBANKMENT

41.05 ROADWAY EXCAVATION

41.06 DISPOSAL OF EXCAVATED MATERIAL

41.07 ROLLERS

41.08 EMBANKMENT

41.09 EMBANKMENT COMPACTION

41.10 MOISTURE CONTROL

41.11 AREAS INACCESSIBLE TO A ROLLER

41.12 PREPARATION OF SUBGRADE

41.13 TOLERANCES

41.14 METHOD OF MEASUREMENT

41.15 BASIS OF PAYMENT

41.01 DESCRIPTION

This WORK shall consist of performing the following operations in accordance with the Plans, Special Provisions, Proposal and the requirements hereinafter set forth:

Clearing and grubbing; preparing the embankment foundation; excavating for the roadway, slopes, ditches, approaches of driveways and intersecting streets; constructing embankment with the excavated material and material from other sources necessary to complete the planned embankment; disposing of unsuitable and surplus material; preparing the subgrade; finishing berm slopes. It shall include the removal of all materials encountered of whatever nature, except removals which are covered in the contract under Item 29 - REMOVAL OF PAVEMENT, BASE, WEARING COURSE, SIDEWALK OR CURB, and Item 30 - REMOVAL OF TREES AND STUMPS.

Payment for Item 41 - ROADWAY EMBANKMENT, shall include payment for placing suitable excavated material in embankment, with no separate payment. No excavated material shall be wasted without permission, and all suitable material from excavation, or an equivalent volume of suitable material from other sources, shall be used for planned embankments to the extent of project requirements.

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41.02 DEFINITIONS

The following terms referred to in this item are defined herewith:

EMBANKMENT: Embankment shall be considered as a structure consisting of soil and granular material, constructed in layers to a predetermined elevation and cross section.

GRANULAR MATERIAL: Granular material shall consist of natural or synthetic mineral aggregate such as broken or crushed rock, gravel, slag, sand or cinders which can be readily incorporated in an 8 inch layer, and in which at least 65 percent by weight of the grains or particles are retained on a #200 sieve.

OPTIMUM MOISTURE: Optimum moisture shall be considered as the water content at which the maximum density is produced in a soil by a given compactive effort (AASHTO Designation: T99).

RANDOM MATERIAL: Random material shall consist of a mixture of previously defined materials suitable for use in embankment that can be readily incorporated in an 8-inch layer.

ROADWAY: Roadway shall be considered as the portion of the street within the limits of construction.

ROCK: Rock shall be considered as sandstone, limestone, glacial boulders, brick and old concrete which cannot readily be incorporated in an 8 inch layer.

SHALE: Shale shall be considered as laminated material, formed by the consolidation in nature of soil, with a finely stratified structure.

SOIL: Soil shall be considered to include all earth materials, organic or inorganic, which have resulted from natural processes such as weathering, decay, and chemical action in which more than 35 percent by weight of the grains or particles will pass a #200 sieve.

SUBBASE: Subbase shall be considered as selected material of planned thickness, placed on the subgrade as a foundation for a base or surface course. Subbase is a part of the pavement structure.

SUBGRADE: Subgrade shall be considered as the material, in cut or in fill, immediately under the pavement structure (pavement, base and subbase) to such a depth as may affect the structural design of the pavement.

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41.03 CLEARING AND GRUBBING

The Contractor shall remove all trees marked for removal, brush, sod, roots, hedges, fences, boulders, loose rock on slopes, rubbish and any other objectionable material within the limits of the right of way or overhanging the roadway.

Within the area where excavation, borrow or embankment will be made, the Contractor shall remove all trees, stumps, roots, and other objectionable and unsuitable materials from the surface of the ground before excavation or embankment is started, except that within the areas where embankment is to be placed; all stumps and roots which are to be buried 3 feet or more below the surface of the subgrade may be allowed to remain provided they are cut flush with the existing ground.

No tree shall be removed even though listed for removal until specifically marked by the Service Director. Trees marked for removal shall be felled in such a manner as not to injure other trees that are to remain either on the right of way or on private property. Trees and shrubs within the right of way or private property or adjacent thereto, which are to remain in place and which may be in danger of injury by construction operations or equipment, shall be suitably boxed, fenced or otherwise protected. Boxing and fencing shall remain in place until the Engineer orders removal.

The Contractor shall repair all injuries to bark, trunk, limbs and roots of remaining trees and shrubs by properly dressing, cutting and painting, according to approved methods, using only approved tools and materials.

Tree branches overhanging the roadway that are less than 20 feet above the grade line shall be cut off close to the trunk in a manner acceptable to the Service Director.

Payment for the removal of all trees and stumps not separately specified for removal shall be included in the unit price bid for Item 41 - ROADWAY EXCAVATION, or Item 41 – ROADWAY EMBANKMENT.

The removal and disposal of driveway pavement, sidewalk, curb, curb and gutter, rails, ties, pole stubs, headwalls, pipes, garage floors or other masonry lying within the right of way and not specifically paid for under a separate item shall be classified and paid for as roadway excavation and embankment. If the item is below or outside the plan limits for excavation, additional excavation necessary to perform the above operations shall be measured and paid for at the contract unit price bid per cubic yard for Item 41 - ROADWAY EXCAVATION, or Item 41 - ROADWAY EMBANKMENT.

All stumps, roots, brush, waste logs, limbs, tops, or other debris resulting from the clearing and grubbing operation or occurring within the right of way shall be disposed of in such a manner as not to injure or endanger public or private property.

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41.04 PREPARATION OF FOUNDATION FOR EMBANKMENT

All unpaved areas over which embankment is to be placed, except as noted hereinafter, shall be cleared and grubbed as provided under Section 41.03. The upper 12 inches of foundation, including horizontal surfaces in benched areas, shall be compacted to 100 percent of Laboratory maximum dry weight. Soil in the upper 12 inches of the foundation that is unsuitable under the requirements of Section 41.08 shall be removed, measured, and paid for at the contract unit price bid per cubic yard for Item 41 - ROADWAY EMBANKMENT, and disposed of.

41.05 ROADWAY EXCAVATION

The Contractor shall excavate for the roadway so that the excavation conforms to the cross sections and shall satisfy himself as to the nature and distribution of the materials to be excavated.

The unit price bid for Item 41 - ROADWAY EXCAVATION shall apply to all materials of whatever nature to be excavated.

The WORK done under Item 41 - ROADWAY EXCAVATION shall start at some definite place, or places, on the project and will be carried forward in an approximately completed manner. The roadway shall be graded to the full cross section width before placing pavement of any type, except that partial width construction will be permitted where necessary for the maintenance of traffic.

The roadway shall be maintained in such condition that it will be well drained at all times.

41.06 DISPOSAL OF EXCAVATED MATERIAL

All suitable materials removed shall be used in the formation of embankments and other uses as indicated on the Plans and as directed by the Service Director or shall be disposed of by the Contractor at his own responsibility and expense outside the limits of the right of way.

The Contractor shall note that property owners abutting the improvement shall be entitled upon request to any waste excavation from this improvement. It is called to the attention of the bidder that the Service Director desires that where fill material is needed by adjacent property owners the Contractor will cooperate in taking care of such requests.

41.07 ROLLERS

The rollers used in WORK performed under this item shall be capable of consistently obtaining specified compaction.

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41.08 EMBANKMENT

Embankments shall be formed of suitable soil, granular material, shale, rock or random material. All materials used in embankment shall be free from objectionable material such as leaves, grass, or roots. Frozen material shall not be placed in the embankment, nor shall embankment be placed on frozen material.

Soil, granular material, shale and random material shall be spread in successive level layers of a depth to allow compaction to the specified density and of not more than 8 inches in thickness (loose depth), unless otherwise specified, and unless otherwise authorized in writing by the Service Director. The layers shall be spread for the full width of the cross sections or the full width between rock slopes, except that partial width construction will be permitted where necessary for the maintenance of traffic. The layers thus placed shall be compacted as specified in this section. Compaction of the outer 5 feet of each layer measured horizontally from the face of the slopes shall be obtained by a tamping roller or pneumatic-tired roller. The balance of the fill shall be compacted by a roller approved by the Service Director.

The Contractor shall replace all sections of embankment which have been damaged or displaced due to carelessness or neglect on the part of the Contractor, or due to natural causes such as storms, and not attributable to the unavoidable movement of the natural causes such as storms, and not attributable to the unavoidable movement of the natural ground upon which the embankment is made.

(a) SOIL: For soil, each layer shall be rolled until its density is not less than the density prescribed in Section 41.09, Soils having maximum dry weights of less than 102.0 pounds per cubic foot shall not be used in the top 12 inches of embankment subgrade.

Silt from excavation or borrow identified as Ohio Classification A-4b shall be placed at least 3 feet below the surface of the subgrade when used in embankment.

Soil, in addition to the above requirements, shall have a liquid limit not to exceed 65, and the minimum plasticity index number of soil with liquid limits between 40 and 65 shall not be less than that determined by the formula Liquid Limit minus 30.

Between the dates of May 1 and November 1, soil in areas to be excavated for which the moisture content exceeds optimum moisture for that soil by 8 percent or more, shall be considered unsuitable for use in embankment, except that such wet soil, if suitable when drier, may be dried and used in embankment if the Contractor elects.

(b) GRANULAR MATERIAL: Granular material shall be compacted to the density established as satisfactory by the Service Director based on field density tests. The moisture content shall be as determined by the Service Director to obtain the desired compaction.

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41.09 EMBANKMENT COMPACTION

Embankment compaction shall meet the requirements of Item 203 - ROADWAY EXCAVATION AND EMBANKMENT, as specified in the ODOT Construction and Material Specifications, latest revision.

41.10 MOISTURE CONTROL

Embankment material that does not contain sufficient moisture to be compacted in accordance with the requirements of this section shall be sprinkled with water as directed by the Service Director. Watering of embankment shall be performed and paid for as a part of this item.

Embankment material containing excess moisture shall be required to dry prior to or during compaction to a moisture content not greater than 3 percent above optimum, except that for material which displays pronounced elasticity or deformation under the action of loaded rubber-tired construction equipment, the moisture content shall be reduced to optimum if necessary to secure stability. Drying of wet soil shall be expedited by the use of plows, scarifiers, discs, harrows, power driven rotary type mixing machines, or by other approved methods when so ordered by the Service Director.

41.11 AREAS INACCESSIBLE TO A ROLLER

Embankment in areas inaccessible to a roller shall be composed of embankment material which can readily be incorporated into a 4-inch layer, loose depth, placed and compacted in accordance with the following provisions: Embankment material, other than granular material, shall be deposited in level layers not exceeding 4 inches in thickness, loose depth, and compacted by mechanical devices to the density required in this section.

41.12 PREPARATION OF SUBGRADE

The Contractor shall prepare the subgrade for new pavement, pavement widening, paved and stabilized shoulders, curb and gutter and driveways in accordance with the provisions of this section.

The entire subgrade shall be brought to a uniform condition of stability.

Not less than 200 lineal feet of completed subgrade will be maintained ahead of the paving operations at all times. Failure to comply with this provision will be deemed sufficient cause to stop the paving operations until this provision is met.

Subgrade for all new pavement and curb and gutter shall be compacted to 100 percent of the laboratory maximum dry weight of the soil for a depth of 12 inches below the surface of the subgrade and to a width of 18 inches beyond the edge of the surface of the pavement or back of curb. The moisture content of all subgrade materials at the time of compacting shall not be greater than 2 percent over the optimum. The moisture content at the time of compaction and also at the time of placing pavement or subbase for any approved subgrade material that displays

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pronounced elasticity or deformation under construction equipment shall not exceed optimum.

The surface of the subgrade shall be maintained in a smooth condition to prevent ponding of water, and ditches shall be constructed and maintained to insure the thorough drainage of the subgrade surface at all times.

Subgrade compaction shall be obtained as outlined above by making a minimum of eight passes using a three-wheeled general purpose roller, weighing not less than 10 tons, rubber tired roller, vibratory compacting roller, or other method approved by the Service Director.

Payment for the preparation of subgrade as specified above shall be included in the unit price bid per square yard of the base, subbase, or pavement and curb and gutter specified as a part of this proposal.

Where soft subgrade is encountered due to no fault or neglect of the Contractor, in which satisfactory stability cannot be obtained by moisture control and compaction, the unstable material shall be excavated to the depth required by the Service Director. The excavation thus required shall be measured and paid for at the contract unit price bid for Item 41 - ROADWAY EXCAVATION. Material thus excavated shall be disposed of in accordance with Section 41.06.

The excavation thus made shall be filled with suitable material placed in accordance with the compaction and moisture requirements of this item and shall be paid for at the contract unit price for Item 41 - ROADWAY EMBANKMENT.

Where soft subgrade is due to the failure of the Contractor to maintain adequate surface drainage as required in Section 41.05, or is due to any other fault or neglect of the Contractor, the unstable condition shall be corrected as outlined above at no expense to the City.

After the surface of the subgrade has been properly shaped, and before any pavement, curb and gutter, base or subbase material is placed thereon, the subgrade shall be compacted with a roller as specified in Section 41.09. When the rolling is completed the surface of the subgrade shall conform to the grade and cross section of the overlying course within the tolerance set for in Section 41.13 and shall be so maintained until the overlying course is in place.

41.13 TOLERANCES

The Contractor shall check the WORK under this item with templates, slope boards or other devices satisfactory to the Service Director. The completed WORK shall conform to the Plans within the following tolerances:

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For sub-grade for pavement types other than traffic compacted surface course the surface shall at no place vary more than 1/2 inch from a 10-foot straight edge applied to the surface parallel to the centerline of the pavement, nor more than 1/2 inch from a template conforming with the cross section shown on the Plans, and the edge grade of subgrade shall not deviate from the Plan grade for subgrade by more than 1/2 inch from plan dimensions.

The WORK when completed shall not contain objectionable bulges or depressions.

For excavation and embankment beyond plan lines, payment will be made only to plan lines.

41.14 METHOD OF MEASUREMENT

The quantities to be paid for shall be the number of cubic yards of material in the original position, acceptably excavated as herein described, measured by the method of average end areas. Excavation outside plan lines shall not be included in measurement for payment. The quantities may be based on cross sections prior to the WORK being done, checked during construction to insure that the plan quantities have been excavated.

41.15 BASIS OF PAYMENT

The quantities measured, as provided above, shall be paid for at the contract unit price bid per cubic yard for Item 41 - ROADWAY EXCAVATION, Item 41 - ROADWAY EMBANKMENT, and Item 41 – ROADWAY EXCAVATION AND EMBANKMENT. This price and payment shall constitute full compensation for performing all of the requirements of this item, including the compacting of sub-grade, placing suitable excavated material in embankment, and including furnishing all necessary materials, labor, tools, equipment, supplies and incidentals.

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ITEM 42 - BORROW

42.01 DESCRIPTION

42.02 MATERIAL

42.03 MISCELLANEOUS REQUIREMENTS

42.04 METHOD OF MEASUREMENT

42.05 BASIS OF PAYMENT

42.01 DESCRIPTION

This WORK shall consist of the following operations performed in accordance with the Plans, Special Provisions, Proposal, and the requirements hereinafter set forth; furnishing all borrow areas; clearing and scalping the borrow areas and the area upon which borrow material is to be placed; excavating material from the borrow areas; using the material from borrow areas or other sources for constructing embankment and backfill; constructing the embankment and backfill; preparing the subgrade; cleaning the borrow areas.

42.02 MATERIAL

Material furnished under this item shall meet the requirements for suitable embankment material as defined in Item 41 – ROADWAY EXCAVATION AND EMBANKMENT.

42.03 MISCELLANEOUS REQUIREMENTS

Borrow shall be resorted to only when sufficient quantities of suitable materials are not available from other items of the Contract.

Borrow areas shall be cleared and scalped before initial cross sections or any weight measurements are taken and before any borrow is excavated. After clearing and scalping have been completed the contractor shall notify the Service Director sufficiently in advance of the opening of any borrow areas so that cross sections and measurements of the surface may be taken.

42.04 METHOD OF MEASUREMENT

The pay quantities for this item shall be determined after all of the requirements of this item have been performed. The unit of measurement shall be the cubic yard. The number of cubic yards to be paid for shall be the volume of acceptable material incorporated into the embankment to the extent of plan requirements, and measured as follows.

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Borrow materials in a natural formation shall be measured by the method of average end areas or by weight. Where measurement by the method of average end areas is used the borrow area shall be cross-sectioned after the surface has been cleared and scalped and again after the excavating in the borrow area has been completed.

The cubic yards to be paid for shall be determined from these cross sections. Where measurement by weight is used, the density of the material in its original position shall be determined by a series of representative field measurements made after clearing and scalping have been performed, and as the material in the borrow area becomes exposed by excavating operations. Acceptable material excavated from the borrow area for incorporation into the embankment shall be weighed and load slips furnished. The cubic yards to be paid for shall be determined by dividing the average weight per cubic yard of the undisturbed material as determined by the density tests into the total weight of borrow material as determined by the load weight slips.

42.05 BASIS OF PAYMENT

The number of cubic yards, measured as provided above, shall be paid for at the contract unit price bid per cubic yard for Item 42 - BORROW. This price and payment shall constitute full compensation for performing all of the requirements of this item including furnishing all necessary materials, labor, tools, equipment, supplies and incidentals.

ITEM 43 - TRAFFIC COMPACTED SURFACE COURSE

43.01 DESCRIPTION

This WORK consists of furnishing and placing an aggregate wearing course on the completed and accepted subgrade or temporary road.

This WORK shall be considered to be the same as Item 410 - TRAFFIC COMPACTED SURFACE, as specified in the ODOT Construction and Materials Specifications, latest revision.

ITEM 44 - STABILIZED CRUSHED AGGREGATE BASE COURSE

44.01 DESCRIPTION

This WORK consists of placing a compacted course or courses of crushed aggregate.

This WORK shall be considered to be the same as Item 411 - STABILIZED CRUSHED AGGREGATE, as specified in the ODOT Construction and Materials Specifications, latest revision.

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ITEM 45 - AGGREGATE BASE COURSE

45.01 DESCRIPTION

This WORK consists of furnishing, placing, and compacting one or more courses of aggregate on a prepared surface, including furnishing and incorporating all water required for compaction.

This WORK shall be considered to be the same as Item 304 - AGGREGATE BASE, as specified in the ODOT Construction and Materials Specifications, latest revision, with the following exceptions:

Section 304.08 as specified in the ODOT Construction and Materials Specifications, latest revision - Basis of payment to include furnishing and applying water.

Preparation of subgrade will be per Section 41.12.

ITEM 46 – ASPHALT CONCRETE BASE

46.01 DESCRIPTION

This WORK consists of constructing a base course of aggregate and asphalt binder, mixed in a central plant and spread and compacted on a prepared surface.

This WORK shall be considered to be the same as Item 301 - ASPHALT CONCRETE BASE, as specified in the ODOT Construction and Materials Specifications, latest revision.

ITEM 47 - RESERVED

ITEM 48 - TACK COAT

48.01 DESCRIPTION

This WORK consists of preparing and treating a paved surface with asphalt material, and cover aggregate if required.

This WORK shall be considered to be the same as Item 407 - TACK COAT, as specified in the ODOT Construction and Materials Specifications, latest revision, with the following exception:

Section 407.08 as specified in the ODOT Construction and Materials Specifications, latest revision - The use of a cover aggregate shall not be mandatory but as directed by the Service Director.

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ITEM 49 - ASPHALT CONCRETE

49.01 DESCRIPTION

This WORK consists of constructing a surface course or an intermediate course of aggregate and asphalt binder mixed in a central plant and spread and compacted on a prepared surface.

This WORK shall be considered to be the same as Item 441 - ASPHALT CONCRETE, as specified in the ODOT Construction and Materials Specifications, latest revision. The asphalt concrete surface course will be Type 1 with the asphalt binder being PG 70-22. The asphalt concrete intermediate course will be Type 1 with the asphaltic binder being PG 64-28.

49.02 BASIS OF PAYMENT

The number of cubic yards measured as provided above shall be paid for at the contract unit price bid per cubic yard for Item 49 - ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG 70-22 or Item 49 - ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 1, PG 64-28. This price and payment shall constitute full compensation for performing all of the requirements of this item including furnishing all necessary materials, labor, tools, equipment, supplies and incidentals.

ITEM 50 - PORTLAND CEMENT CONCRETE BASE

50.01 DESCRIPTION

This WORK consists of constructing a Portland Cement Concrete base on a prepared surface.

This WORK shall be considered to be the same as Item 305 - PORTLAND CEMENT CONCRETE BASE, as specified in the ODOT Construction and Materials Specifications, latest revision, with the following exception:

Section 305.03 as specified in the ODOT Construction and Materials Specifications, latest revision - Basis of Payment shall also include integral curb if specified on the Plans and Proposal.

Measurements shall be from back of curb to back of curb for area computations.

Preparation of subgrade will be per Section 41.12.

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ITEM 51 - NON-REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT

51.01 DESCRIPTION

This WORK consists of constructing a non-reinforced Portland Cement Pavement on a prepared surface.

This WORK shall be considered to be the same as ITEM 452 – NON-REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT, as specified in the ODOT Construction and Materials Specifications, latest revision, with the following exceptions:

Section 452.04 – BASIS OF PAYMENT, as specified in the ODOT Construction and Materials Specifications, latest revision - Basis of payment shall also include integral curb if specified on the Plans and Proposal.

Measurements shall be from back of curb to back of curb for area computations.

Preparation of subgrade will be per Section 41.12.

A paver shall be used for concrete placement.

All concrete shall be tested for compressive strength by an approved testing company in accordance Section 511.04 - CONCRETE TEST CYLINDERS as specified in the ODOT Construction and Materials Specifications, latest revision.

All streets shall have a minimum of six inches of subgrade removed. Geotextile fabric and an amount of Item 45 - AGGREGATE BASE COURSE equal to the amount of subgrade removed must be installed over subgrade after a successful proof roll and a successful compaction test showing 98% compaction.

All saw cuts made in proposed pavement shall be 3/8 inch wide and 2-1/2 inch deep.

Class QC MS cement shall be used when noted on the plans, proposal or as directed by the Service Director. This class is a moderate-setting Portland Cement Concrete for accelerated strength development. Use a minimum cement content of 800 pounds per cubic yard and a maximum water-cement ratio of 0.43. The Contractor may open the rigid replacement to traffic 24 hours after concrete is placed provided that test beams have attained a modulus of rupture of 400 pounds per square inch.

PART IV – PAVING

ITEM 52 - REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT

52.01 GENERAL

This WORK consists of constructing a pavement composed of reinforced Portland Cement Concrete on a prepared surface.

This item shall be considered to be the same as Item 451 - REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT, as specified in the ODOT Construction and Materials Specifications, latest revision, with the following exceptions:

Section 451.21 – BASIS OF PAYMENT, as specified in the ODOT Construction and Materials Specifications, latest revision - Basis of payment shall also include integral curb if specified on the Plans and Proposal.

Measurements shall be from back of curb to back of curb for area computations.

Preparation of subgrade will be per Section 41.12.

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ITEM 53 - MAINTAINING TRAFFIC

53.01 DESCRIPTION

53.02 GENERAL REQUIREMENTS

53.03 BASIS OF PAYMENT

53.01 DESCRIPTION

This WORK shall consist of maintaining and protecting vehicular traffic, pedestrian traffic, and the WORK, while the contract is in force, as shown on the Plans, Proposals, or as required by the Service Director.

53.02 GENERAL REQUIREMENTS

The Contractor shall be governed by the general provisions for maintaining and protecting vehicular traffic, pedestrian traffic, and the WORK, as described in Item 614 - MAINTAINING TRAFFIC, as specified in the ODOT Construction and Materials Specifications, latest revision.

53.03 BASIS OF PAYMENT

The cost of supplying signs, supports, warning lights, drums, cones, gates, barricades, impact attenuators, vertical panels, flashing arrow panels, portable changeable message signs, WORK zone traffic signals, poles, controllers, lighting for WORK zone signals, WORK Zone Impact Attenuator, flaggers with their equipment, law enforcement officers, law enforcement officers with patrol car, watchmen, furnishing, installing, maintaining, and removing the detour signs and their necessary supports, for constructing, maintaining and removing temporary roads, removal or coverage of pavement markings when required for this purpose shall be paid for at the lump sum price bid for Item 53 – MAINTAINING TRAFFIC, as called for on the Plans, Proposals, or as required by the Service Director, which price shall constitute full compensation for performing this WORK.

PART IV – PAVING

ITEM 54 - DRIVE AND PAVEMENT SAW CUTS

54.01 DESCRIPTION

54.02 MATERIAL AND CONSTRUCTION METHODS

54.03 METHOD OF MEASUREMENT

54.04 BASIS OF PAYMENT

54.01 DESCRIPTION

This WORK shall consist of providing saw cuts in existing pavement as shown on the Plans, Proposals, or as required by the Service Director.

54.02 MATERIAL AND CONSTRUCTION METHODS

All pavement to be removed must be saw cut prior to removal. Saw cut the existing pavement to the full depth at the limits of the area designated by the Service Director using a standard motorized model of saw with a diamond saw blade that can provide a clean cut. All concrete slurry must be washed away immediately after cutting to prevent vehicular tracking.

54.03 METHOD OF MEASUREMENT

The quantity to be paid for shall be the actual number of lineal feet of saw cuts made in place, completed and accepted.

54.04 BASIS OF PAYMENT

The quantity measured as above provided shall be paid for at the contract unit price per lineal foot for Item 54 - DRIVE AND PAVEMENT SAW CUTS, which price shall constitute full compensation for furnishing and using saw machine and for all labor, material, equipment, tools and incidentals necessary to complete this WORK as specified.

PART IV – PAVING

ITEM 55 - INTERLOCKING PAVERS

55.01 DESCRIPTION

55.02 MATERIALS

55.03 CONSTRUCTION METHODS

55.04 GENERAL

55.05 METHOD OF MEASUREMENT

55.06 BASIS OF PAYMENT

55.01 DESCRIPTION

This WORK shall consist of the furnishing and installation of interlocking decorative paving stones for use on City Streets. All pavers and installations shall conform to the requirements shown on Plans, Proposals, or as required by the Service Director.

55.02 MATERIALS

The pavers shall be manufactured of pre-cast Portland Cement Concrete or fired clay. All units shall be sound and free of defects. The manufacturer must provide evidence that the units to be provided have a proven field performance that exhibits no objectionable deterioration.

Concrete pavers must meet the test requirements of ASTM C-936. The pavers shall have a minimum thickness of 3 inches. They shall have a minimum compressive strength of 8000 psi and have a maximum absorption of 5 percent. Shape, color, and pattern shall be per the approved detail drawings for the project.

Fired Clay pavers must meet the test requirements of ASTM C-902, Class SX, Traffic Type I. The pavers shall have a minimum thickness of 3 inches. They shall have a minimum compressive strength of 10,500 psi and have a maximum absorption of 8 percent. Shape, color, and pattern shall be per the approved detail drawings for the project.

55.03 CONSTRUCTION METHODS

Subgrade

Any fill below the paver sections must meet City of Fairlawn Standard Item 41 – ROADWAY EMBANKMENT. The subgrade shall be compacted fully per Section 203.07 - COMPACTION AND MOISTURE REQUIREMENTS, as specified in the ODOT Construction and Materials Specifications, latest revision.

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Base

The pavers shall have an 8 inch reinforced concrete base. This base shall be cast integrally with a minimum 6 inch wide edge restraint. The edge restraint shall have a minimum depth of 12 inches. The base surface shall be flat to within + or - ¼ inch over a 10 foot span. Base material shall meet Item 52 - REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT requirements. The concrete base shall have a broom finish.

Setting Bed

Pavers shall be placed on a ¾ inch bituminous setting bed. The concrete slab must be sound, clean, and free of debris prior to the installation of the setting bed. The bituminous base shall be composed of Asphalt cement conforming to ASTM D-3381, grade A.C. 10 or A.C. 20, and fine aggregate composed of clean hard sand passing a No. 4 sieve. The dried aggregate shall be combined with the hot asphalt cement and heated to approximately 300 F. The mix shall have a minimum of 7 percent (by weight) of asphalt cement. The remainder is to be the fine sand. The setting bed must be placed on a TACK COAT conforming to Item 48 - TACK COAT.

Neoprene Modified Asphalt Adhesive

Pavers must be installed on a neoprene modified asphalt adhesive that is placed over the bituminous setting bed. The adhesive shall meet the following requirements:

Mastic:Solids	75 + 1%
Lbs / gal	8 - 8.5 lb
Solvent	Varsol
Base:	(2% neoprene, 10% fibers, 88% asphalt)
Melting Point	200 F min per ASTM D - 36
Penetration / 77 F	100 - gram load
5 second (0.1 mm)	23 - 27
Ductility per	ASTM D113 - 44 at 25 C
5 cm per minute	125 cm / minute

The adhesive shall be installed with a trowel or a squeegee over the top surface of the bituminous setting bed to a maximum depth of 1/16 inch.

PART IV – PAVING

55.04 GENERAL

No WORK shall be performed on the bituminous setting bed when the base slab is covered by rain, snow, or ice, or when the ambient temperature is below 40 F. The setting bed must be flat to within + or - ¼ inch over a 10 foot span. The setting bed shall be rolled with a power roller to a nominal depth of ¾ inch.

The pavers shall be placed in the required pattern taking care to insure that they are the proper position both horizontally and vertically. Apply clean dry sand passing a No. 16 sieve to the joints. Sweep the sand back and forth until the joints are completely full of sand. Surplus sand shall be left on the pavers until the completion of the project for protection. At the conclusion of the project, the contractor shall clean up all WORK areas by removing surplus sand, debris, and equipment from site.

55.05 METHOD OF MEASUREMENT

The quantity to be paid for shall be the actual number of square yards of paver stone and edge restraint in place, completed and accepted by the Service Director.

55.06 BASIS OF PAYMENT

The quantity as measured above shall be paid for at the contract unit price bid for Item 55-INTERLOCKING PAVERS as called for in the proposal, which price shall constitute full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete this WORK as specified.

PART IV – PAVING

ITEM 56 - FIBER REINFORCED BITUMINOUS MEMBRANE SURFACE TREATMENT

56.01 DESCRIPTION

56.02 SPECIFICATIONS AND MATERIALS

56.03 EQUIPMENT

56.04 PRE-PAVING ON SITE MEETING

56.05 WEATHER LIMITATIONS

56.06 CONSTRUCTION

56.07 APPLICATION OF FIBER REINFORCED BITUMINOUS BINDER

56.08 QUALITY CONTROL

56.09 DOCUMENTATION

56.10 ACCEPTANCE

56.11 PLACEMENT OF ASPHALT OVERLAY

56.12 METHOD OF MEASUREMENT

56.13 BASIS OF PAYMENT

56.01 DESCRIPTION

This WORK shall consist of furnishing all materials, equipment, labor and preparation necessary for the application of a Fiber Reinforced Bituminous Membrane Surface Treatment used as a standalone finished surface (Type A) or as a Stress Absorbing Membrane Interlayer (Type B). The applied material shall completely seal the entire pavement surface and provide a uniform textured surface, suitable for placement of hot mixed asphalt, micro-surfacing or as a finished surface.

This is accomplished by using a specific applicator, which can be mounted on an asphalt distributor modified for applying the surface treatment of bituminous binder reinforced with glass fibers. The applicator comprises of an open bottomed spray bar housing fan or blower for producing a down draft in the housing, and at least one spray bar mounted on the housing and adapted to extend transversely in the direction of movement of the asphalt distributor on which the unit can be mounted.

A number of nozzles spaced longitudinally along the spray bar for spraying bituminous material, means of controlling the nozzles, and a number of sources for dispensing the cut glass fibers through the open bottomed housing to the surface of the bituminous material previously sprayed shall also be included.

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56.02 MATERIALS

POLYMER MODIFIED BITUMINOUS BINDER

EMULSION PROPERTY METHOD	MIN.	MAX.	TEST
S.F. Viscosity, 50 C (sec)	100	250	ASTM D 244
Percent Solids (%)*	65	---	ASTM D 244
Storage Stability, 24 hrs. (%)	---	1.0	ASTM D 244
Sieve Test, #20 mesh (%)	---	0.1	ASTM D 244
RESIDUE PROPERTY METHOD	MIN.	MAX.	TEST
Penetration, 100g, 5 sec, 25 C (dmm)	100	200	ASTM D 5
Elastic Recovery, 10 C, 10 cm (%) **	50	---	ASTM D 113

* By distillation or evaporation

** The specimen is extended 20 cm. The extended area is severed in the middle using a pair of shears. After 1 hour, at the test temperature the severed ends are returned to contact and the ductilometer reading is made again. The sample must recover at least 50 percent of the original 20 cm distance.

The polymer modifier shall be a Styrene-Butadiene-Styrene or a Styrene-Butadiene-Rubber type polymer. The minimum amount of solid or dry polymer modifier shall be 3%, based upon the asphalt weight. The polymer materials shall be milled or blended into the asphalt or blended through the emulsion mill as the emulsion is being produced.

Course Aggregate

The course aggregate shall be 100% crushed material from quarried stone, natural gravel or other high quality aggregate and meet the following requirements:

PHYSICAL REQUIREMENTS

TEST SPECIFICATION	DESCRIPTION	
AASHTO T96	L.A. Abrasion Test	40% max.
S1029*	Deleterious Material	1.0 max.
S1021*	Crushed Pieces	100%
AASHTO T104	Sodium Sulfate Soundness Test, 5 Cycle	15

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GRADING REQUIREMENTS – ASTM C-117

SIEVE SIZE	TYPE A	TYPE B
1 inch (25mm)	100	100
¾ inch (19mm)	100	100
½ inch (12.5mm)	95-100	95 -100
No. 4 (4.75mm)	5-25	5 - 25
No. 8 (2.36mm)	0-10	0-10
No. 200 (75um)	2	2

Fiber

The glass fiber is E Class from an approved source. The glass fiber spools are supplied internally wound, in coils or cheeses. The spools are cut in-place into 60 mm, (2.38”) lengths which are distributed uniformly across and between the two parallel applications of modified asphalt emulsion. Glass fiber spread rates are up to 120 g/m², (4oz.), with additional asphalt emulsion rates of spread, depending upon the site requirements.

56.03 EQUIPMENT

All equipment required for performance of the WORK shall be approved before construction is to begin, and shall be maintained in satisfactory operating condition. The Contractor shall furnish an accurate thermometer, hand brooms and other small tools and equipment essential for the completion of the WORK.

Pressure Distributor/Fiber Applicator

The pressure distributor shall have a computerized rate control that automatically adjusts the distributor’s pump to the ground speed. The pressure distributor shall be capable of heating and re-circulating the bituminous binder to the specified temperature. The proper nozzles shall be used for the material and rate specified. There shall be two separate spray bars, one in front of the fiber applicator housing and one following it. The fiber cutter and distributor shall be an integrated unit. The integrated applicator shall be comprised of an open bottomed spray bar housing, a fan or blower producing a down draft in the housing, and at least one spray bar mounted on the housing and adapted to extend transversely in the direction of movement of the vehicle on which the applicator is mounted. A number of sources for dispensing cut glass fiber through the open bottomed housing to the surface of the binder material previously sprayed shall also be included.

The integrated applicator shall have been calibrated within the previous 12 months for transverse and longitudinal distribution application rates according to ASTM D2995, Practice for Determining Application Rate of Bituminous Applicator or other suitable method. The bituminous fiber applicator shall be equipped, maintained, and operated so that the bituminous materials can be applied at controlled rates from 0.1 l/m² (0.022 gal/SY) to 2.7 l/m² (0.56 gal/SY). The fiber is applied at controlled rates from nominally 30 to 120 g/m² (approx. 1-4 oz/SY). These applications shall be such that a uniform first layer of asphalt emulsion is applied

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followed by uniform layer of glass fibers that is chopped in-place and covered with a uniform layer of asphalt emulsion.

Aggregate Spreader

The aggregate spreader shall be self-propelled and shall be equipped with hoppers, revolving cylinders and adjustments necessary to produce a uniform distribution of material at the specified rate.

Pneumatic Tire Roller

The pneumatic tire rollers shall conform to CMS 401.12 type P-2.

56.04 PRE-PAVING ON SITE MEETING

A meeting between the Contractor and Service Director and others under the direction of the Service Director will be held at the project site prior to beginning WORK. The agenda for this meeting will include:

- Review of Contractors detailed WORK schedule
- Review of the traffic control plan
- Inspection of equipment
- Calibration and adjustment to equipment

56.05 WEATHER LIMITATIONS

The fiber reinforced bituminous membrane surface treatment shall be placed when the pavement and atmospheric temperature is 50° F or above. Placement is not permitted if it is raining, when the pavement surface is wet, or when temperatures are forecasted to be below 32° F within 24 hours of placement.

56.06 CONSTRUCTION

The Contractor shall follow the construction methods as described.

The Contractor shall establish stations, at 1,000 foot intervals on the entire project, prior to placing the treatment. The stations shall be maintained until the project is completed.

Preparation of the surface shall be in accordance with CMS 407.04. The surface shall be cleaned by the Contractor and shall be dry when the bituminous binder is applied. Material cleaned from the surface shall be disposed of in accordance with CMS 203.01.

The specified aggregate shall be spread uniformly onto the bituminous binder/fiber within 30 seconds of the bituminous spray and shall be placed in accordance with CMS 409.09, except that three-wheel rollers will not be required.

Projects greater than 12,000 sy² shall use a minimum of two rollers. Rollers shall proceed at maximum speed of 5 mph. The entire surface shall receive a minimum of two roller passes. The first roller pass shall be performed within one minute of aggregate spreading.

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Brooming of the completed surface shall be accomplished prior to unrestricted use by traffic. The entire surface shall be clean of all loose material within 24 hours and prior to placement of surface course material.

The Contractor shall protect all utility castings using tarpaper or other approved material. All covers shall be properly fitted to the casting and removed prior to sweeping.

56.07 APPLICATION OF THE FIBER REINFORCED BITUMINOUS MEMBRANE SURFACE TREATMENT

Fibers and bituminous materials shall be applied by means of a pressure distributor in a uniform, continuous spread over the section to be treated and within the temperature range, sandwiching the in-place chopped fibers between the two layers of asphalt emulsion. The distributor shall be moving forward at the proper application speed at the time the spray bar and fiber chopper bars are opened. If any skipped areas or deficiencies occur, the operation shall be immediately stopped. Junctions of spreads shall be carefully made to assure a smooth riding surface and the deficient areas corrected in a manner approved by the Service Director.

Bituminous Binder

The bituminous binder shall be applied at a temperature of 150 F to 180 F, and at the rate specified.

Course Aggregate

Stockpiling and loading methods shall permit ready identification of material and to minimize segregation and contamination of the aggregate.

The moisture content of the course aggregate shall be below 4% and maintained throughout the project.

Course aggregate shall be spread uniformly without ridges or gaps at the specified rates.

Spreading of the aggregate shall be adjusted to produce a minimum of excess loose particles and shall provide complete coverage after rolling.

The spreading operation shall be accomplished in such a manner that the tires of trucks or the spreader at no time comes into contact with the newly applied bituminous material.

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Material Application Rates

BINDER/FIBER APPLICATION RATE

Gallons per Square Yard

APPLICATION TYPE	EMULSION	TOLERANCE	FIBER
Type A	0.40 – 0.55	± 0.02	1 – 4 oz.
Type B	0.40 – 0.60	± 0.02	1 – 4 oz.

Aggregate application rate shall be as determined by the supplier of the Fiber Reinforced Bituminous Membrane Surface Treatment binder and shall produce a completed surface with no exposed binder. The supplier of the Fiber Reinforced Bituminous Membrane Surface Treatment binder shall determine the application rate for emulsion and aggregate, based on the existing pavement condition and aggregate size. This information shall be reported to the Service Director prior to beginning WORK and shall include an aggregate gradation on the job specific materials.

56.08 QUALITY CONTROL

The Contractor to measure compliance shall use the methods described in this section.

Aggregate gradation

Aggregate Moisture Content

Yield Check on Bituminous Binder

Yield Check on Fiber

Temperature Check on Bituminous Binder

If the Contractor's test results exceed any of the identified quality control tolerances, the Service Director shall be immediately notified. The Service Director will review the explanation and the corrective action taken by the Contractor. Another test will be taken and if the results still exceed the quality control tolerance, placement shall stop. The Contractor shall immediately notify the Service Director, and identify the cause of the excessive deviation and detail corrective action necessary to bring the deficiency into compliance. The Service Director will give approval prior to resuming WORK.

Bituminous Binder

The application rate shall not exceed a tolerance of 0.02 gallons per square yard from the specified rate, and within the temperature range as specified in 56.07.

Course Aggregate

The aggregate shall be clean and uniform, and shall be within the gradation range as specified in 56.02. Moisture content shall not exceed the tolerance as specified in 56.07.

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56.09 DOCUMENTATION

The Contractor shall provide the Service Director a daily report with the following information:

Control Section/Project Number/County/Route
Date/Air Temperature/Pavement Temperature
Bituminous Binder Temperature (3 per day)
Station Location per Test
Beginning and Ending Stations
Yield Check on Bituminous Binder (3 per day)
Yield Check on Fiber (3 per day)
Aggregate Gradation & Moisture (1 per day)
Length/Width/Total Area

Other required documentation shall include:

Bill of lading on aggregate, fiber and bituminous binder, to be provided as requested or at project completion.

56.10 ACCEPTANCE

The Contractor shall inspect the completed Treatments during the application process for any deficiencies. The deficiencies will be limited to flushing, surface patterns and loss of stone retention.

Workmanship shall be inspected for the following:

Untreated areas (missed)
No overlap on longitudinal joints
No overlap on construction joints

All corrective WORK shall be accomplished prior to resurfacing with bituminous materials, or within 24 hours. The Contractor shall furnish materials, equipment and labor to make corrections at no additional cost to the Contract. The Service Director shall give final approval on inspection and corrective WORK.

56.11 PLACEMENT OF ASPHALT OVERLAY

If the Fiber Reinforced Bituminous Membrane Surface Treatment application is used as an intermediate layer for an asphalt overlay, a minimum period of 24 hours shall be observed prior to the placement of the asphalt surface course after placement of the Fiber Reinforced Bituminous Membrane Surface Treatment material. This time limit may be increased or decreased by the Service Director dependent on ambient temperatures and conditions.

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56.12 METHOD OF MEASUREMENT

Fiber Reinforced Bituminous Membrane Surface Treatment will be measured by the square yard as provided for in the Contract Documents. The accepted quantities, measured as provided for above, will be paid for at the contract unit price for Fiber Reinforced Bituminous Membrane Surface Treatment.

56.13 BASIS OF PAYMENT

Fiber Reinforced Bituminous Membrane Surface Treatment shall be paid for per square yard for furnishing all preparation, materials, equipment, labor, clean up, and incidentals necessary to complete the WORK as specified.

Item	Description	Unit
56	Fiber Reinforced Bituminous Membrane Surface Treatment, Type A	Square Yard
56	Fiber Reinforced Bituminous Membrane Surface Treatment, Type B	Square Yard

PART IV – PAVING

ITEM 57 - SLABJACKING RIGID PAVEMENTS

57.01 DESCRIPTION

57.02 PRODUCTS

57.03 EXECUTION

57.04 METHOD OF MEASUREMENT

57.05 BASIS OF PAYMENT

57.01 DESCRIPTION

A. Equipment

Furnish all equipment, tools, and other apparatus necessary for the proper construction and acceptable completion of the WORK specified under this contract. The equipment shall be approved by the Service Director prior to starting the WORK, and maintained in good working condition by the Contractor during the progress of the WORK.

B. Grout Plant

NOTE: When the use of limestone dust grouts is approved, a paddle type mixer may be substituted for the high speed colloidal mixer.

Provide a grout plant consisting of a positive displacement grout injection pump capable of applying up to 250 psi pressure, a high speed colloidal mixing machine, and a grout return system. Produce the colloidal grout by mixing in a colloidal mill connected to the cone-shaped bottom of cylindrical drum. Operate the colloidal mill between 800 and 2,000 RPM, creating a high shearing action and subsequent pressure release to make a homogeneous mixture. Provide an injection system capable of continuously pumping grout at rates as low as 1-1/2 gallons per minute and equipped with pressure monitoring devices and a quick action valving system that can be closed instantly and provide for the grout to be recirculated through the system.

C. Water Tanker

If water tanks and metered pumps are not an integral part of the plant, supply a water truck equipped with a metered pump for delivery to the grout plant.

D. Drilling

Provide an air compressor and rock drill or other device capable of drilling the grout injection holes through the pavement and base material. Keep the equipment in good condition. The holes shall be vertical and round. Down-feed pressure, whether by hand or mechanical means, not exceeding 200 psi. Drill holes to prevent breakout at the bottom of the pavement.

E. Flow Cone

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Provide a flow cone, with necessary components and conforming to the dimensions and other measurements of ASTM C 939, so that the consistency of the mixture can be determined.

F. Miscellaneous

Provide all necessary hoses; valving, valve manifolds, and positive cut-off and bypass provisions to control pressure and volume; pressure gauges with gauge protectors; expanding packers for positive seal grout injection; wood plugs; hole washing tools; and drill steel and bits.

Quality Assurance

A. Bench Marks

Elevations of bench marks used by the Contractor for grade control at the site of the WORK will be determined, established, and maintained by the Contractor.

Environmental Requirements

Do not perform pavement slabjacking when the ambient temperature at the bottom of the pavement slab is less than 40 degrees F, or when the subgrade or subbase is frozen.

57.02 - PRODUCTS

Grout Mixture

Provide Portland Cement grout mixture, used for slabjacking, consisting of Portland Cement, pozzolan or fly ash, limestone dust, sand, and water. The use of accelerators, high range water reducers and fluidifiers are subject to the approval of the Service Director.

Mineral Aggregate

Aggregate to be used for slabjacking may consist of natural sand, manufactured sand, or a combination of natural and manufactured sand and limestone dust. If the aggregate is a combination of separately processed sizes from the same or different sources, or a blend of different materials, batch the different components separately or blended under approved conditions prior to delivery to the batching plant.

A. Particle Shape

Particles of the aggregate shall be generally spherical or cubical in shape. Aggregates containing flat platelet grains or rhombohedral grains will not be approved.

B. Grading

The aggregate, as delivered to the mixer, shall conform to the following gradation when tested in accordance with ASTM C 136.

Sieve Designation US Percent By Standard Square Mesh Weight Passing

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No. 8 100
No. 16 80-95
No. 50 50-70
No. 200 25-45

C. Deleterious Materials

Deleterious materials in the aggregate shall not exceed the following limits when tested in accordance with ASTM C 142.

Percentage of Material by Weight

Clay lumps 2.0%

Coal and lignite 1.0%

Pozzolans and Fly Ash

Provide pozzolans and fly ash meeting the requirements of ASTM C 618.

Portland Cement

Furnish Portland Cement meeting the requirements of ASTM C 150/C 150M. Do not use cement salvaged by cleaning bags mechanically or otherwise, or from discarded bags of cement. Use cement that has been stored at the site for 60 days or more before using cement of lesser age. The temperature of the cement as delivered to the mixer shall not exceed 150 degrees F.

Water

Furnish water for mixing of grout that is clean, fresh, and free from injurious amounts of oil, acid, salt, alkali, organic matter, or other deleterious substances. Water approved by Public Health authorities for domestic consumption may be accepted for use without being tested. Test the water, at the Contractor's expense, in accordance with Corp of Engineers COE CRD-C 400 specifications if, in the opinion of the Service Director, the water is of questionable quality.

Chemical Admixtures

Provide chemical admixtures that are proposed to be used to assist in pumping grouts, or to compensate for climatic conditions, conforming to ASTM C 494/C 494M and ASTM C 937.

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Proportioning of Materials

Proportion the grout mixture to be used for slabjacking as follows:

- a. One part (by volume) Portland Cement.
- b. Three parts (by volume) aggregates or a mixture of aggregates and pozzolans or fly ash.
- c. Water to achieve fluidity.
- d. Additives (when approved), high range water reducers, water reducers, fluidifiers.

57.03 - EXECUTION

Pavement Inspection

Prior to jacking any pavement, closely examine the slabs for any existing cracks. Perform this investigation with the Service Director or his designee; both parties shall agree regarding the existing condition of the pavement; and existing cracks shall be noted or marked.

Drilling Holes for Grout Injection

Drill grout injection holes in a pattern as needed. Holes shall not be larger than 2 inches in diameter, drilled vertically to a depth sufficient to penetrate through any chemically stabilized base, but not more than 3 inches into the subgrade. Drill holes so that breakout does not occur at the bottom of the slab.

Wash Holes

Subject to the Service Director's approval, holes may be washed or air blown to create a small cavity to allow the initial spread of grout.

Jacking

Prior to jacking operations erect string lines that will be blocked up from the pavement high points to monitor movement. Lower into the holes an expanding rubber packer or other approved device providing a positive seal and connected to the discharge hose on the grout plant. Do not extend the discharge end of the packer or hose below the lower surface of the concrete pavement. Pump in a pattern and in the amount required to raise the pavement to within 1/8 inch from a string line grade. Grade tolerances shown in this section shall be applicable to transverse grades as well as longitudinal grades. Continuous pressures to 200 psi will be permitted. Pressures to 300 psi will be allowed only for short periods. In the event the pavement is bonded to the subbase, brief pressure rises (10 seconds or less) to 600 psi will be allowed.

Loss of grout through cracks, joints, other injection holes, or from back pressure in the hose or in the shoulder area will not be tolerated. Grout held in the mixer or in the injection pump or hose for more than 1 hour after mixing shall not be used for jacking.

Raising of Slabs

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Do not raise the slabs more than 1/4 inch when pumping in any one hole at any time. No part of the slab shall lead any other part of the slab or any adjacent slab more than 1/4 inch at any time. Keep the entire slab and all adjacent slabs on the same plane at all times, within the 1/4 inch tolerance. Make observations to ensure that when pumping from one hole, the grout flows to adjacent holes filling all voids. The Contractor may cut a slab at a joint to prevent breakage when it is bound against an adjoining slab. If the temperature is 80 degrees F, or higher during the jacking operation, moisten the slabs sufficiently to prevent expansion of the slabs.

Sealing of Injection Holes

After jacking has been completed at any one hole, immediately remove the packer and plug the hole temporarily with a tapered wooden plug. The temporary wooden plugs shall not be removed until the grout has set sufficiently so that back pressure will not force it through the hole. Permanently seal each hole flush with the pavement surface with a fast setting sand/cement or other patch material approved by the Service Director. The patch material shall have a minimum thickness of 3 inches.

Grade Requirements

During the raising of the slabs, furnish and utilize qualified personnel and equipment for determining the proper elevations required to conform to the elevations. Upon completion of jacking operations, slabs within the WORK area shall present an even grade at each joint and shall not vary from the elevations by more than 1/8 inch. If slabs are found that are lower than the specified tolerance from the plan grade, these slabs shall be further jacked until the tolerance is met. If slabs are found that are higher than the specified tolerance, raise the grade of the surrounding pavement, as determined by the Service Director, to a newly established grade or Individual sections of pavement that are raised above the specified tolerances shall be brought to grade by grinding. The Service Director will determine the corrective measure to be used. Should the overjacking be greater than 1/4 inch the City of Fairlawn has the option to require removal and replacement of the pavement. These repairs shall be accomplished at no additional cost to the City.

Replacing and Repair of Damaged Pavement

Replace any slabs broken due to jacking as determined by the Service Director. Cracks emanating radially from the grout injection holes will be presumed to be caused by improper injection techniques by the Contractor. For each 2 feet of such crack measured, the Contractor's pay quantity will be reduced by 5 square feet of Special-Slabjacking Rigid Pavement. In the event that transverse cracks develop between adjacent grout injection holes, the Contractor will be required to repair these cracks by an epoxy injection method to the satisfaction of the Service Director. The Service Director may require the removal and replacement of the entire slab or a portion of the slab damaged by radial or transverse cracks, at no cost to the City. Replace the pavement in accordance with Fairlawn Construction and Materials Specifications.

Protection of Pavement

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Do not permit traffic on the pavement slab until the grout has obtained a minimum set. The minimum set time shall be included in the mixture proportion approval, and shall be adjusted daily to account for variations in temperature.

Acceptance of WORK

Prior to acceptance, remove loose concrete, joint filler, or grout spilled on the surface. Remove waste construction material and leave the surrounding areas in a neat, orderly condition prior to opening to traffic or final acceptance.

57.04 – METHOD OF MEASUREMENT

Each square foot of concrete sidewalk or pavement which is adjusted by slabjacking method.

57.05 – BASIS OF PAYMENT

The quantity of concrete sidewalk or pavement, measured as specified, will be paid for at the contract unit price for slabjacking. The unit price for slabjacking will include full compensation for furnishing labor, grout materials, and tools and equipment; for furnishing, loading and unloading, storing, hauling and handling grout ingredients; for mixing and pumping grout; and for furnishing of manufacturer's test report for each lot of cement. All of the above will be considered in the unit price for each square foot of sidewalk or pavement which is slabjacked.

Broken Slabs

Replacement of concrete slabs broken due to slabjacking shall not be measured for payment. Furnish all labor, equipment, tools, and materials necessary to remove and replace the broken concrete pavement at no cost to the City.

ITEM 58 – RESERVED

ITEM 59 - RESERVED

PART V – SANITARY SEWER

PART V – SANITARY SEWER

ITEM 60 - SANITARY SEWER

ITEM 60.01 – DESCRIPTION

ITEM 60.02 – GENERAL NOTES

ITEM 60.03 – MATERIALS

ITEM 60.04 – STORING PIPE

ITEM 60.05 – LAYING SANITARY SEWER PIPE

ITEM 60.06 – EXCAVATION

ITEM 60.07 – SEWER BEDDING

ITEM 60.08 – BACKFILLING

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ITEM 60.10 – REMOVAL OF EXISTING SEWERS

ITEM 60.11 – BULKHEADS

**ITEM 60.12 – REPLACING, MOVING AND/OR REPAIRING EXISTING
STRUCTURES**

ITEM 60.13 – PROTECTION OF STRUCTURES

ITEM 60.14 – METHOD OF MEASUREMENT

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60.01 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 and established by the Service Director. 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, and granular or concrete backfill as required; constructing and subsequently removing all necessary cofferdams, cribs and sheeting; removal of water; all pipe joints; furnishing, installation 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 structures all as shown on the drawings and as specified.

60.02 GENERAL NOTES

PERMISSION TO CONSTRUCT SANITARY SEWERS SHALL BE GRANTED BY THE OHIO EPA, AND THE CITY OF FAIRLAWN. THE CITY OF FAIRLAWN IS AUTHORIZED TO STOP ANY CONSTRUCTION NOT IN COMPLIANCE WITH THE CURRENT REGULATIONS STANDARDS.

1. The City of Fairlawn standard drawings have been basically derived from the TEN STATE STANDARDS. If no applicable standard is attached, TEN STATE STANDARDS will be understood. However, the City of Fairlawn will be considered final in unusual cases.

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2. All WORK shall be done under the direction of a competent engineer.
3. All construction must be inspected by the City of Fairlawn. The cost of such inspection shall be borne by the Project.
4. No construction shall begin until the plans and specifications are approved by the City of Fairlawn, and the Ohio Environmental Protection Agency as applicable.
5. All changes to approved drawings must be re-approved by the City of Fairlawn's Engineer prior to construction.
6. All sanitary sewers 6" through 12" diameter shall be tested by the low-pressure air test method as outlined in these Fairlawn Specifications.

Sanitary sewers 15" diameter and larger shall be tested by the most practical method. Methods accepted are:

- a. Low Pressure air test
- b. Infiltration test
- c. Exfiltration test

The test method to be used must be approved by the Service Director. His approval will be based on the existing ground water table and other facts pertinent to the particular project.

7. All local and trunk sewers 8" and larger shall be color filmed according to the standards attached. This requirement will be performed by the Contractor, Developer or as directed by the Service Director. Cost for such filming will be back charged to the Project if performed by the City of Fairlawn or its designate. See Item 64 - TESTING OF SANITARY SEWERS, LATERALS AND MANHOLES.
8. All local and trunk sewers shall be tested for a maximum deflection of 5 percent not less than 30 days after the final backfill has been placed, in accordance with the methods outlined in these City of Fairlawn Construction and Material Specifications.

Footer drains, down spouts, sump pumps, or other clean water sources shall not be connected to the sanitary sewers.

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10. The Contractor must maintain a 10.0-foot horizontal clearance and 1.5-foot vertical clearance from the edge of all water main pipe to the edge of all sanitary sewer or force main pipes.

60.03 MATERIALS

All piping materials, manholes and appurtenances furnished for public sanitary sewers shall comply with the latest applicable national standards, such as the American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), American Water Works Association (AWWA), or other representative standards organizations. Some products are specified with more than one applicable reference standard for items as testing, installation, or supplementary material specifications.

The minimum nominal size of all sanitary sewers, excluding lateral connection, shall be eight inches (8") in diameter.

- A) Circular Reinforced Concrete Piping: ASTM C-76
Joints conform to ASTM C-443
Bedding Classification ASTM D-2321

All concrete piping shall be limited to fifteen inches (15") in diameter and above. Pipe shall have a spigot and socket pattern and have standard pipe lengths at a minimum of eight feet (8').

Joints shall be rubber gaskets with the gasket confined in a groove.

Branches on fittings in the main line for connections shall be of the same material and incorporate joints as specified for the type of pipe to be connected. Branches shall be cast with the concrete pipe by the pipe manufacturer and shall not be done in the field

Exterior coating, where shown on the plans, shall be a coal tar epoxy applied in accordance with the manufacturer's published recommendations.

Low infiltration reinforced concrete pipe "Super Pipe" ASTM C-76 with C-361 joints and "C" wall thickness, can be used for sewers for sizes up to forty-two inches (42").

- B) Elliptical Reinforced Concrete Piping: ASTM C-507
Joints conform to ASTM C-443
Bedding Classification ASTM D-2321

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All concrete piping shall be limited to fifteen inches (15") in diameter and above and have standard pipe lengths of a minimum of eight feet (8').

Joints shall be rubber gaskets with the gasket confined in a groove.

Branches on fittings in the main line for connections shall be of the same material and incorporate joints as specified for the type of pipe to be connected. Branches shall be cast with the concrete pipe by the pipe manufacturer and shall not be done in the field

Exterior coating, where shown on the plans, shall be a coal tar epoxy applied in accordance with the manufacturer's published recommendations.

- C) Ductile Iron Pipe: ANSI A21.51, A21.10, A21.11
Joints conform to ANSI A2.11, AWWA C-111
Bedding Classification ASTM D-2321

All ductile iron pipes shall be standard American National Standards Institute (ANSI) Class Thickness No. 2.

Pipe joints shall be premium compression joints meeting all applicable requirements of ANSI A2.11 (or AWWA C111) with a solid cross section, rubber rings, and shall securely lock in place to prevent displacement. All fittings and accessories shall have bell and/or spigot configurations identical to that of the pipe.

- D) Polyvinyl Chloride Pipe (PVC): ASTM D-3034, D-2680
Joints conform to ASTM D-3212
Bedding Classification ASTM D-2321 CL. I

Polyvinyl Chloride Pipe (PVC) shall have an SDR (Standard Diameter Ratio) of not more than 35. The bell shall consist of an integral wall.

- E) Truss Pipe-ABS & PVC: ASTM D-2680, D-2751
Joints conform to ASTM D-3212, D-2680
Bedding Classification ASTM D-2321

Acrylonitrile Butadiene Styrene (ABS) composite sewer pipe and fittings shall conform to ASTM D-2680. Pipe stiffness shall be a minimum of 200 PSI. All pipe spigots shall have a "home" mark to facilitate joint closure. All premium joints shall be welded chemically, per ASTM D-2680, using a standard ABS coupling on the exterior of the pipe joint and welded using only MEK (Methyl Ethyl Ketone) joint primer and MEK-ABS welding cement as supplied by the pipe manufacturer. All fittings and adapters shall have joints of proper design to facilitate joining to the pipe and shall be formed with standard dimensions as set forth in ASTM D-2680. The cost of fittings and/or adapters or other special accessories shall be included in the contractor's unit price for pipe.

For depths greater than 13 feet, when thermoplastic piping or PVC composite sewer pipe is used,

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it is recommended that minimum pipe stiffness of 115 psi or SDR-26 be utilized. All plastic pipe for sanitary sewers and fittings shall have a minimum pipe stiffness of 46 psi. In addition to the above for plastic pipes, the 5 percent diametric, in place deflection limits on the average inside diameter shall be adhered to. All sewer pipe within a manhole to manhole increment shall be of one type and class. In the case of lateral connections, proper watertight transition connections of differing materials may be permitted. Lateral connections to building sites shall be a minimum of six (6) inches in diameter. Only wye branch fittings will be accepted for service connections for sewers up to and including 21" diameter. For sewers 24 inches and larger, tee connections are permitted.

60.04 STORING PIPE

Pipe shall be stored at the job site in such a manner as to protect the pipe from damage. Plastic pipe must be stored to prevent bowing. Pipes having deviations from straight greater than 1/16-inch per foot of length shall not be used. Pipe, fittings and specials with visible breakage or other defects shall not be used, or repaired and used, unless specifically approved by the Engineer in writing. Pipe shall be kept clean at all times.

60.05 LAYING SANITARY SEWER PIPE

Pipe shall be laid accurately to the line and grade designated on the plans. Pipe shall be carefully centered so that when laid it will form a sewer with close fitting joints and a uniform invert. Pipe in finished trenches shall be commenced at the lowest points so that the spigot ends point in the direction of flow.

All pipes shall begin and end with pipe ends as normally fabricated by the manufacturers. If field cutting of pipe is required, cutting shall be performed by the use of tools or equipment that will provide a neat perpendicular cut without structural damage to the pipe wall or damage to coatings or fillers.

All sewers shall be laid and maintained to the required lines and grade with wye branches and manholes set at the required locations. Unless otherwise approved by the Engineer, manholes shall be set as laying pipe and openings shall not be left for manholes.

Reinforced concrete pipe with elliptical reinforcement and reinforced concrete horizontal elliptical pipe with single cage reinforcement shall be handled and placed with the reinforcement markings along a vertical plane. Reinforced concrete pipe with auxiliary supports shall be handled and placed with the centerline of the auxiliary support system in vertical plane.

Where bracing plates or a trench box is used for the installation of flexible pipe, all voids caused by the withdrawal of the bracing plates or the trench box shall be completely filled with backfill material as outlined in these specifications.

The contractor shall furnish all material and labor to set grade bars every fifty feet (50'). Every pipe shall be laid at each end by line and grade indicated by a line drawn between working line and pipe in trench. A plumb bob shall be used to check the line of the pipe. If the grades are flat

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and the Service Director so orders, the contractor shall place intermediate bars between those set at stakes of Service Director to avoid sag in the working line. Such additional bars shall be placed at the contractor's expense. In lieu of the line and batter board method, a laser beam alignment system approved by the Service Director may be used.

Where laser beam alignment is proposed and possible, grade and line shall be provided at each manhole, at twenty-five feet (25') upstream and at every one hundred feet (100') thereafter. The Contractor shall provide horizontal and vertical bars, levels and other materials and equipment necessary to visually check at each station. Use of field levels or transits for check of grade shall not be acceptable for inspector's check of grade unless approved by the Service Director.

60.06 EXCAVATION

Pipe, except that which is to be jacked in place, shall be installed in dry trench excavations. The Contractor shall provide suitable dewatering equipment until the pipe is laid, inspected, and sufficient backfill is placed. The method of dewatering shall be at the Contractor's option, but shall receive prior approval of the Service Director.

Trenches shall be excavated to lines and grades shown on the contract plans and as staked. Trenches shall be of sufficient width to permit proper making of joints and, where necessary, placing of sheeting and bracing, but within these limits, shall be as narrow as possible. Sheeting and bracing shall be used where necessary to prevent caving in of trenches. As the trenches are backfilled, all sheeting and bracing shall be removed unless ordered by the Service Director to be left in place. Sheeting left in place shall be cut off eighteen inches (18") below finished grade. All necessary precautions shall be taken to prevent the entrance of mud, sand or other obstructing matter into the pipe.

The contractor shall excavate all material of whatever nature encountered, excluding rock in place if a separate item is provided for rock excavation, necessary for the WORK as shown on the Plans and as specified. All excavation, except as otherwise required, permitted or ordered in writing by the Service Director shall be in open trench.

60.07 SEWER BEDDING

Sanitary sewer pipe shall be laid so that the barrel of the pipe is supported over its entire length on a firm layer of bedding material properly compacted. (Bell holes under bells or couplings shall have at least one inch of clearance under the bottom of the bells or couplings).

Bedding for all sewers shall not be less than Type 2 as specified in section 611.06 of the ODOT Construction and Material Specifications. Where Type 1, 3 or 4 bedding or other special bedding requirements are necessary, the Design Engineer shall recommend to the Service Director for approval, the particular bedding conditions proposed.

Materials for Type 2 bedding shall be numbers 6, 67, or 68 gravel, limestone, or slag placed in accordance with section 611.06 of the ODOT Specification with the following modifications:

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1. Acrylonitrile Butadiene Styrene Composite Pipe (ABS) - The bedding material shall be placed around the pipe and to a point at least six inches (6") above the top of the pipe and extend to the side walls of the trench.
2. Polyvinyl Chloride Pipe (PVC) - In addition to Class B bedding, the trench shall be filled with compacted limestone to a minimum of six inches (6") above the top of the pipe.

60.08 BACKFILLING

The specific area called "Backfill" varies depending upon the type of pipe being used, while the backfill material depends on the sewer location. The following used in conjunction with "Sewer Bedding", should cover all normal installations. Unusual situations must be presented to the City of Fairlawn for resolution prior to construction.

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 by the contractor all at his cost and expense and no extra payment shall be made therefore.

For Vitrified Clay Pipe and Reinforced Concrete Pipe, backfill shall be hand placed to a depth of no less than twelve inches (12") above the top of the pipe. The material shall be of sound earth or gravel, free of large stones or lumps.

ABS Composite Pipe requires the same backfill as Vitrified Clay Pipe except that the bedding material shall be carried to a minimum of six inches (6") above the top of the pipe.

Backfilling in paved or proposed paved areas shall be accomplished with compacted limestone screenings to pavement base, unless otherwise specified by the City of Fairlawn.

60.09 DRAINAGE OF TRENCHES

The sewer trench must in all cases be kept relatively free from storm, surface and subsoil water or sewage so that all masonry and joints may have ample time to set and harden. No joints shall be made under water.

60.10 REMOVAL OF EXISTING SEWERS

When preparing and clearing a new construction site, or when shown on the plans, existing sewers and manholes shall be removed by the contractor. All abandoned sewers shall be bulkheaded with brick masonry bulkheads at all points where they are cut. Any materials removed in the progress of the WORK which are deemed to be salvageable by the Engineer, shall be removed to storage points designated by the Service Director and shall remain the property of the City of Fairlawn.

60.11 BULKHEADS

The contractor shall construct masonry bulkheads in any existing sanitary sewers which are cut

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and abandoned, in all stub sewers in new construction, and at all location where directed by the Engineer.

60.12 REPLACING, MOVING AND/OR REPAIRING EXISTING STRUCTURES

The contractor shall replace, move or repair and maintain all sewers, drains, catch basins, manholes and culverts encountered in the performance of said WORK, together with all house services whether or not they are shown on the plans. The contractor shall replace, move or repair and maintain all pipes for water, sewer or gas and all wire conduits, and all other structures encountered in the WORK. The contractor shall replace, move or repair all damage done to any of the said structures through his acts or neglect and shall keep them in repair during the life of said contract. The contractor shall in all cases leave said structures in as good condition as they were previous to the commencement of the WORK and to the full satisfaction of the Service Director.

60.13 PROTECTION OF STRUCTURES

The presence of the Service Director, Engineer, Project Inspector or others does not relieve the contractor of his duty to protect any structures either above, below, or at the surface of the ground, and should any damage arise due to the negligence of the contractor, it shall be the contractor's duty to repair any such damage within a period of ninety-six hours (96); upon failure of the contractor to complete the necessary repair WORK, the Service Director may direct such damage to be repaired or the damaged property replaced either by contract, with some capable person, without advertising, or by such other arrangements as may be most convenient, and shall bill the entire cost of the repair or restoration WORK done to the contractor who shall be liable for and shall pay the same at once.

60.14 METHOD OF MEASUREMENT

The footage to be paid for shall be the horizontal centerline measurement of the size and type of pipe in place, completed and accepted. The internal diameter of manholes or special structures constructed (that are 6 linear feet or more across) will be deducted from the gross length of the sewer.

60.15 BASIS OF PAYMENT

The footage, measured as provided above, shall be paid at the contract unit price per linear foot bid for each size and type of pipe. The price includes the installation of all wye branches called for on the Plans, all excavation excepting Item 11 - ROCK EXCAVATION, and includes all, dewatering, granular bedding, backfill and its compaction, water used for compaction, removal and disposal of all surplus excavation and discarded materials; the furnishing and construction of all joints and connections to lateral sewers or drains, manholes, catch basins, etc.; and for all labor, equipment tools and incidentals necessary to complete this item including cementing, sealing and banding joints.

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ITEM 61 – SANITARY SEWER MANHOLES AND DROP MANHOLES

61.01 SANITARY SEWER MANHOLES

61.02 DROP MANHOLES

61.03 METHOD OF MEASUREMENT

61.04 BASIS OF PAYMENT

61.01 SANITARY SEWER MANHOLES

Manholes shall be pre-cast concrete and shall conform to ODOT Construction and Materials Specifications ITEM 611 and Section 706.13 with the following exceptions and additions:

- A) Manholes shall have “O” ring type joints meeting the requirements of ASTM specification C-443.
- B) Manholes shall have a premium connection (Reseal, Lock Joint, Dura-Seal or an approved equal).
- C) Manhole castings shall be Neenah Foundry R-1782 with solid lid, or East Jordan Iron Works Frame No. 1710 with type “A” cover. Lids shall bear the word “Sanitary”.

The distance between manholes shall not exceed four hundred feet (400'). Construction shall not begin on any section of sewer unless the next manhole to be installed is on the job site.

Provisions shall be made so that the pre-cast concrete rings shall not exceed twelve inches (12") between the uppermost pre-cast section and the bottom of the casting. The ring and cover shall be set in mortar upon the top of each manhole. Manholes shall also have a reinforced concrete base with a bench and invert.

Where the pipe passes through the outside face of manhole's walls, there shall be a four-foot (4') section of pipe such that slight flexing or motion can take place without shearing the sewer pipe.

Manhole steps shall be built into each manhole and shall be continued downward along the interior face of the manhole to a level two feet (2') above the bottom of the manhole. Such steps shall be built into the manhole walls at the factory and shall be spaced twelve inches (12") apart or sixteen inches (16") apart and shall not be at a joint. All steps in any one manhole shall have the same spacing. Manhole steps shall be placed so that a man ascending from the manhole will be facing the street or the largest portion of the sanitary easement, unless an inlet or outlet pipe interferes with the placement; then steps should be placed in the best location to facilitate entrance to or exit from the manhole. The manhole steps shall be polypropylene (ASTM 2146, Type 2, Class 16906) and (No. 3 deformed steel rod) ASTM A615, Grade 60.

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61.02 DROP MANHOLES

Drop manholes shall be installed where there is a difference in invert elevations greater than two and one-half feet (2-1/2'). Drop manholes shall be constructed in accordance with the construction standards and Item 61 - SANITARY SEWER MANHOLES AND DROP MANHOLES, section of these specifications. Drop manhole pipe sizes shall be determined as follows:

DROP MANHOLE PIPE SIZES

Main Line Sewer	Drop Pipe (Minimum)
6"	6"
8"	6"
10"	6"
12"	8"
15"	8"
18"	10"
21"	10"
24"	12"
27"	15"
30"	18"

61.03 METHOD OF MEASUREMENT

The manholes to be paid for will be the actual number of each, listed separately, completed and accepted.

61.04 BASIS OF PAYMENT

The WORK included in this item shall be paid for at the contract unit price for each type of manhole in place completed and accepted. Payment shall constitute full compensation for all excavation excepting Item 11 - ROCK EXCAVATION and includes all backfill; sheeting, bracing, pumping, dewatering, furnishing, hauling and placing all castings, reinforcing steel, brick and concrete masonry, pipe, specials, inverts, connections and other material; and for all labor, equipment, tools and incidentals necessary to complete the item, except that the price and payment shall NOT include pipe listed for payment under Item 60 - SANITARY SEWER, Item 62 - FORCE MAINS, and Item 63 - SANITARY SERVICE CONNECTION LATERALS of these Specifications.

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ITEM 62 – FORCE MAIN

62.01 GENERAL

62.02 MATERIAL

62.03 FITTINGS

62.04 THRUST BLOCKS

62.05 METHOD OF MEASUREMENT

62.06 BASIS OF PAYMENT

62.01 GENERAL

All materials for the force main shall comply with the latest applicable national organizations standards such as American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), American Water Works Association (AWWA), or other representative standards organizations. Some products are specified with more than one applicable reference standard for items as testing, installation, or supplementary material specifications. Minimal cover of four (4) feet shall be used on force mains. All force mains crossing a stream shall have 6 inches of concrete (3000 psi) encasement.

62.02 MATERIAL

The force main material shall be polyvinyl chloride (PVC) pipe SDR-26 ASTM D 2241, Push-on-Joints ASTM D-3139; SDR-21 ASTM D-2241, Push-on-joints ASTM D-3139; AWWA C-900 series; Class 150 meeting requirements of DR-18 with rubber gaskets or O-rings conforming to the requirements of ASTM D-3139; Push-on-joints or Mechanical Joints Ductile Iron Pipe ANSI A 21.6, (AWWA C-106). Other materials which are rated as pressure piping by national standards organizations such as ASTM, AWWA or ANSI are acceptable.

62.03 FITTINGS

For force mains 4” or larger, only ductile iron fittings are allowed. ANSI A21.53 / AWWA C-153 fittings shall be cast from ductile iron grade 70-50-05 with minimal tensile strength of 25,000 PSI in accordance with ANSI A21.10 / AWWA C-110. Fittings and accessories shall be mechanical joints in accordance with ANSI A21.10 / AWWA C-110 and ANSI A21.11 / AWWA C-111, with the exception of the manufacturer’s proprietary design dimensions and weights. The wall thickness of ductile iron fittings shall be the equivalent of ductile iron class 54. The working pressure rating shall be 350 PSI for the ductile iron fittings. Fittings shall have a bituminous material in accordance with ANSI A21.4 / AWWA C-104.

62.04 THRUST BLOCKS

All thrust blocks can be either 4,000 psi concrete or of the pipe restrain type such as the ones manufactured by Uni-flange, such as melalugs, or retaining glands. The concrete blocking must have its face bearing against undisturbed soil. Blocking design shall be based on combined working pressure plus water hammer of 240 psi minimum and bearing capacity values of 1,000 psf for sand and gravel, 3,000 psf for shale and 5,000 psf for rock. No welding of bends will be

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permitted on the force main. Pipe bedding and trench detail shall conform to the standard drawings.

62.05 METHOD OF MEASUREMENT

The quantity to be paid for shall be the actual number of lineal feet of force main in place, completed and accepted.

62.06 BASIS OF PAYMENT

The quantity measured as provided above shall be paid for at the contract unit price bid per lineal foot for Item 62 - FORCE MAIN which price shall constitute full compensation for furnishing and installing the pipe, fittings or thrust blocking; and for all materials, labor, equipment, tools and incidentals necessary to complete this item.

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ITEM 63 – SANITARY SERVICE CONNECTION LATERALS

63.01 SANITARY SEWER LATERALS

63.02 JACKED OR BORED LATERAL CONNECTIONS

63.03 RISERS

63.04 CLEANOUTS

63.05 OIL/GREASE INTERCEPTORS

63.06 METHOD OF MEASUREMENT

63.07 BASIS OF PAYMENT

63.01 SANITARY SERVICE CONNECTION LATERALS

House sanitary sewer service connections shall be a minimum six inch (6") PVC pipe installed at a minimum grade of 1.00% and carried to a point ten feet (10') beyond the property line, or as shown on the approved plans.

Building sanitary sewer service connections shall be a minimum six inch (6") PVC pipe installed at a minimum grade of 1.00% and carried to a point ten feet (10') beyond the property line, or as shown on the approved plans. A cleanout shall be placed five feet (5') from the inner wall of the building.

Polyvinyl chloride pipe (PVC) sanitary house connections shall conform to the latest ASTM designation ASTM D-3034 with a ring tight joint or equal as per ASTM D-3212.

63.02 JACKED OR BORED LATERAL CONNECTIONS

At the locations shown on the plans, the sewer pipe shall be jacked into a bored hole as herein specified. A sufficiently large boring pit shall be excavated to allow for proper alignment of the drilling equipment and to allow the pipe to be pushed through the drilled hole. The alignment of pipe will not be allowed to vary more than two feet (2') at the upstream end of the house connection from a line drawn at right angles from the sanitary sewer at the wye or riser.

The house connection shall be laid on a grade of not less than one percent (1%) but not more than three percent (3%). The invert of the upstream end of the pipe shall not be less than nine feet (9') below the elevation of the centerline of the street for residential areas and seven feet (7') for commercial and industrial areas, providing the depth of the sewer main is sufficient. In cases where the Engineer prohibits the cutting of the pavement, and the sub-surface consists of rock or other hard material that does not lend itself to boring, the sewer shall, upon the order of the Engineer, be installed by tunneling under the pavement.

63.03 RISERS / STACKS

Risers / stacks shall be constructed where they are called for on the construction plan or wherever it is deemed necessary during construction by the Engineer. Risers / Stacks shall be built in accordance with the City of Fairlawn Standard Construction Drawings.

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63.04 CLEANOUTS

Cleanouts shall be installed on service connection laterals five feet (5') from the inner wall of the structure to be served, and at all change in alignment locations. The cleanout shall be the same size and material as the service connection lateral.

The cleanout cover shall be Neenah Foundry R-4055 or East Jordan Iron Works 6300 and be placed six inches (6") below finished grade elevation. Covers other than those specified will be considered provided they can be located with a metal detector after installation. Cleanouts will not normally be located within the road right-of-way.

63.05 OIL/GREASE INTERCEPTORS

Oil/Grease interceptors shall be constructed in accordance with the latest specifications of the Summit County Department of Sanitary Sewer Services and/or the Summit County Department of Building Standards.

63.06 METHOD OF MEASUREMENT

The quantity to be paid for shall be the actual number of lineal feet of pipe, the actual number of risers or cleanouts in place, completed and accepted.

63.07 BASIS OF PAYMENT

The quantity measured as provided above shall be paid for at the contract unit price bid per lineal foot for ITEM 63 - SANITARY SEWER LATERAL, ITEM 63 - JACKED OR BORED LATERAL CONNECTION, ITEM 63 - RISERS/STACKS, Item 63 – OIL/GREASE INTERCEPTORS or Item 63 – CLEANOUTS, which price shall constitute full compensation for furnishing and installing the pipe, risers or cleanouts; and for all materials, labor, equipment, tools and incidentals necessary to complete this item.

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ITEM 64 – TESTING OF SANITARY SEWERS, LATERALS AND MANHOLES

64.01 INTERNAL INSPECTION

64.02 INFILTRATION / EXFILTRATION TEST PROCEDURE

64.03 LOW PRESSURE AIR TEST PROCEDURE

64.04 DEFLECTION TEST

64.01 INTERNAL INSPECTION

A. GENERAL

All gravity sanitary sewer extensions, eight inches (8") or larger in diameter, must be internally inspected after construction is complete. This internal inspection shall utilize video tapes or films that shall be submitted with a report of such to the City of Fairlawn for viewing and kept for permanent record. The submittal to the City of Fairlawn shall be directly from the internal inspection firm. Films or tapes submitted by Developers, Engineers or Contractors shall not be accepted.

Acceptance of a sewer system shall be contingent upon results of the internal inspection as well as other tests required by the City of Fairlawn.

It is suggested that the entire new system be thoroughly cleaned by jetting or other applicable methods prior to filming. If the internal inspection shows a significant amount of mud, water, debris, foreign material, or other obstruction to the sewer or to the viewing of the sewer, identifiable or otherwise, the system must be re-flushed and re-inspected. The City of Fairlawn shall make the determination whether a second or repetitive inspection will be required.

Under normal circumstances a City of Fairlawn representative need not be present for flushing or internal inspection WORK, the City of Fairlawn, however, shall be notified of the intent to WORK prior to 9:00 AM on the day proceeding when the WORK is to commence.

All lines, strings, ropes, plugs, or other paraphernalia necessary to the internal inspection of the sewer system shall be removed from the sewer after the WORK is performed. All damage to the existing sewer system, the new sewer, or other incidental damages resulting from the internal inspection or remaining inspection paraphernalia will be the responsibility of the contractor.

All costs involved in internal inspection, re-inspection, repairing, cleaning, etc. will be paid by the contractor prior to sewer system acceptance by the City of Fairlawn. This includes any damage to existing sewer system, the new sewer, or other incidental damages resulting from the internal inspection or remaining inspection paraphernalia.

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All internal inspection shall be done by persons and/or firms qualified and approved by the Service Director. Inferior WORK performed by any person/firm will be rejected. Repeated inferior WORK will result in suspension from internal inspection WORK being accepted by the Service Director until evidence is presented showing how the deficiencies have been corrected.

B. VIDEO RECORDING

All video recordings shall be done in color on Digital Video Disc (DVD) showing continuous coverage of the sanitary sewer from manhole to manhole. The color shall be a good rendition of the sewer installed in the opinion of the Service Director.

The recording shall be in good focus and have adequate but not excessive lighting. The light intensity shall be adjusted to assure a quality viewing when the pipe changes color due to pipe material used or mud on the pipe. This section does not condone or represent approval of the use of different color pipe.

The recording shall be free of video “noise” in the form of snow, streaks, migrating color or focus patterns or other electronic interference, which would hinder observation of the sanitary sewer.

The video recording shall be supplied on DVD media. The recording of any run of sewer shall be continuous with no breaks in the recording operation.

The recording shall show the actual footage of the sewer run located at the top center of the screen. Any recording with footage counters or other notation at the bottom center obstructing the view of the pipe invert shall be summarily rejected.

The camera dragline shall not obstruct the view of the flow line of the pipe.

The view shall be clear and unobstructed from dirt or water condensation on the lens or water vapor in the sewer line.

The recording shall be augmented with audio voice recording calling out the nomenclature of the sewer system, pipe, manholes, wyes, debris, mud, water, bad joints, cracked damaged or deformed pipe, joints or fittings or any other information that would be of use to internal inspection of sewers. The voice shall be clear, concise, and loud enough to overcome any background noise from machinery or equipment. The audio annotation shall start by identifying the pipe footage from the downstream manhole of the run and then go on to identify the “event”. The camera shall stop at each “event” if it is something out of the ordinary. It is left to the discretion of the recording firm as to whether the event is of such severity (or unidentifiable) to warrant reversing the camera one or more times to catch a better view.

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The camera view shall be looking upstream so that the butt-ends of the pipe spigot will show clearly.

The camera travel direction shall be upstream.

The video inspection sequence shall be from the lowest manhole to the farthest upstream “terminal” manhole. Each subsequent branch shall be recorded from a manhole already recorded to the terminal manhole of the branch.

At each manhole, video and audio annotation shall be presented identifying in a uniform manner the following information:

1. Manhole Number (Matching approved construction drawings)
2. Manhole to which the camera is about to travel
3. Project name
4. Street name
5. Date of recording
6. Size and material of pipe

Each project or phase shall be recorded separately and supplied to the City of Fairlawn on separate digital video discs.

Each DVD shall be marked with the following information:

1. Project name and phase
2. Developer’s Name
3. Contractor’s Name
4. Video Inspection Company’s name
5. Date of Submittal
6. Cassette number, if more than one

Each DVD submittal shall be accompanied with a report describing the tape and its contents.

C. REPORT

Each DVD of a project requiring internal inspection shall be submitted to the City of Fairlawn with an accompanying report on 8-1/2 by 11-inch paper with a cover sheet.

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The report cover sheet for the DVD submittal shall include the following minimum information:

1. Project name and phase
2. Project number
3. Developer's Name
4. Contractor's Name
5. Internal Inspection Company's Name, mailing address, and telephone number
6. Date of Submittal

The report shall contain a map of the subdivision and/or streets or easements showing the general layout of the improvement. The minimum information on the map shall include:

1. Project name and phase
2. Developer
3. Street names, right-of-way identifications matching the names on the approved construction drawings.
4. North arrow
5. Scale
6. Manhole numbers or names matching the approved construction drawings
7. Intended flow directional arrows

The report shall include a separate sheet for each run of sewer (manhole to manhole) containing detailed information of each sewer run. The minimum general information on each sheet shall include:

1. Internal Inspection Company's name
2. Project name and phase number
3. Internal Inspection Media
4. Date the internal inspection was made
5. Size and material of pipe
6. Beginning and ending construction station numbers
7. Beginning and ending manhole number (matching the map and the construction drawings)
8. Total footage of pipe in sewer run

The specific information to be included for each run of sewer shall be in tabular form containing a column indicating the distance from the previous manhole and a column for a description of what has been observed. These columns shall be filled out whenever these following "events" are encountered, at a minimum:

1. Starting manhole including manhole cover
2. Service connection (give direction as either left/right or by "o'clock" not by east/west or north/south)
3. Abnormal pipe joints such as open or partially open, cracked, excessive glue, gasket exposure, leaking, defects, etc.
4. Abnormal pipe such as cracked, leaking, damaged, deflected, etc.
5. Obstructions such as mud, stones, leaves, paper, tools, etc.

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6. Standing water starting point
7. Standing water ending point
8. Submergence of camera
9. Blocked pipe partially or wholly preventing camera travel
10. Changed pipe material or color
11. Water vapor
12. Other events either ordinary or extra-ordinary
13. End manhole including number

D. INTENT

It is the intent of this specification to assure uniformity of each submittal so that video internal inspection will be complete and the review of the same can be accomplished quickly and without conflict.

The ultimate goal of internal inspection as well as other tests such as air tests, hydrostatic pressure tests, and mandrel tests is to assure that each contractor produces a quality product that will serve the customer base in an economical manner by minimizing maintenance calls and reducing sewer repair probabilities.

64.02 INFILTRATION / EXFILTRATION TEST PROCEDURE

A. GENERAL

The contractor shall conduct tests to determine the water tightness of the gravity sewer when completed. The Engineer shall observe the tests, but the contractor shall furnish all labor, equipment and materials required in connection therewith.

It is agreed that the sewer shall be tested in sections, each section extending between two adjacent manholes or from the end of the sewer to the nearest manhole. The contractor may elect to use either an infiltration test, an exfiltration test, or the low-pressure air test, with the approval of the City of Fairlawn.

B. INFILTRATION TEST

Each section under test shall be covered with not less than two (2) feet of water above the top of the pipe at the highest point. The infiltration will be measured by means of a weir located in the downstream manhole. The above head of two (2) feet shall be maintained for a period of not less than twenty-four (24) hours before the weir measurements are made.

C. EXFILTRATION TEST

The sewer at the upstream side of the lower manhole and the upstream side of the upper manhole in each section shall be closed with a watertight bulkhead and the sewer filled with water until

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the water elevation in the upstream manhole is not less than two (2) feet above the top of the sewer pipe or two (2) feet above ground water elevation in the trench, whichever is higher. The exfiltration will be determined by measuring the amount of water required to maintain the above stated water elevation for a period of one (1) hour from the start of the test. The entire length of the section to be tested shall be filled and maintained full of water for a period of approximately twenty-four (24) hours prior to the start of the test.

D. ALLOWABLE INFILTRATION OR EXFILTRATION

The amount of infiltration or exfiltration shall not exceed 100 gallons per inch of pipe diameter per twenty-four (24) hours per mile of sewer in each and every section tested in accordance with above.

E. TESTING REQUIREMENTS

In the event the allowable leakage rates are not met, the contractor shall determine the location(s) where excess water is entering the sewer or leaving the sewer. The sewer and/or the manholes shall be repaired in a manner satisfactory to the Service Director and retested until the leakage in the sewer is within the allowable limits.

The contractor shall include in the price bid per lineal foot of sewer, the cost of all bulkheads, plugs, pipe stoppers, pumps, water, weirs, accessories, labor delay and any other items of cost necessary for the performance and the completion of the required leakage tests and for the cost of any repairs or adjustments which may be necessary to make the sewer conform to the required allowable leakage rates (for public projects only).

All leakage tests shall be conducted under the supervision of the Service Director.

It is understood that each section, as above described, must be tested under the supervision of the Service Director for conformity to these requirements before such section or sections are included in any current or final estimate for payment to the contractor (for public projects only). It is further understood that, if the leakage does not come within the limits specified, the contractor will be required to do such WORK as may be necessary in order to insure conformance even to the extent of reconstructing the defective section or sections.

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64.03 LOW PRESSURE AIR TEST PROCEDURE

A. GENERAL

In lieu of performing an infiltration or exfiltration test to determine the water tightness of the sewer, the contractor may elect to perform a low-pressure air test by the Ramseier procedure, as recommended by the National Clay Pipe Institute (NCPI). Air leakage testing shall be per ASTM C-1244.

Ramseier's method of conducting acceptance tests may be separated into two parts, one having to do with field procedure and the other having to do with the determination of pressure holding time.

B. FIELD PROCEDURES

1. Clean pipe to be tested by propelling snug fitting inflated rubber ball through the pipe with water, by jetting or by other method approved by the City of Fairlawn.
2. Plug all pipe outlets with suitable test plugs. Brace each plug securely.
3. If the pipe to be tested is submerged in ground water, insert a pipe probe, by boring or jetting, into the backfill material adjacent to the center of the pipe, and determine the pressure in the probe when air passes slowly through it. This is the backpressure due to ground water submergence over the end of the probe. All gage pressures in the test should be increased by this amount.
4. Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 4.0 psig.
5. Check exposed pipe and plugs for abnormal leakage by coating with a soap solution. If any failures are observed, bleed off air and make necessary repairs.
6. After an internal pressure of 4.0 psig is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.
7. After the two-minute period, disconnect air supply.
8. When pressure decreases to 3.5 psig, start stopwatch. Determine the time in seconds that is required for the internal air pressure to reach 2.5 psig. This time interval should then be compared with the time required by the specification as computed below.

C. PRESSURE HOLDING TIME

For convenience, the minimum permissible pressure holding time for commonly tested runs of single pipe diameter and for systems consisting of two diameters of pipe that is 4", 6" and 8" laterals in combination with 6" through 24" trunk sewers, have been computed according to Ramseier's recommended procedure and listed in tabular form as shown in the appendix on pages A-1 through A-12.

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If a system contains pipe of more than two diameters, it will be necessary to compute the minimum holding time using the procedure described herein and the nomograph shown in the appendix on page A-13.

D. COMPUTATION OF HOLDING TIME

For computing permissible pressure drop time, Ramseier recommends the following procedure.

1. List size and length of all portions of pipe under test in table.
2. By use of nomograph, obtain K and C. Place straight edge from listed footage L (column 1) to pipe size d (column 4) and read C (Column 2) and K (Column 3). Enter in table as illustrated.
3. Add all values of K and all values of C for pipe under test.
4. If the total of all C values is less than one, enter the total of all K values into the space for "Time required by specification"
5. If the total of all C values is greater than one, divide the total of all K values, by the total of all C values, to get t_q (time required by specification). To make this division with the nomograph, use scales C and K, and read t_q .

E. SAFETY

All air tests shall be conducted with the utmost safety precautions, including, but not limited to:

1. Bracing all plugs securely
2. A pressure-relief system operative at 10 psi
3. Not allowing anyone in manholes during testing.

F. TESTING REQUIREMENTS

All air tests as described above must be conducted in the presence of and approved by the City of Fairlawn. The contractor shall furnish all labor, equipment, and materials necessary to perform the tests and include all costs for such testing, retesting, delays, etc., in the price bid per lineal foot of sewer (on public projects).

In the event that the minimum air pressure holding time cannot be achieved, the contractor shall locate and repair the leaks in sewer in a manner satisfactory to the Engineer and retest until the minimum holding time is equaled or exceeded.

Each section of sewer as above described must be tested for conformity to these requirements before such section(s) may be included in any current or final estimate for payment to the contractor (on public projects).

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64.04 DEFLECTION TEST

A. REQUIREMENTS

Test 8 inch diameter and larger PVC plastic pipe and ABS and PVC composite pipe for a maximum deflection of 5 percent not less than 30 days after final full backfill has been placed, as determined by Engineer. Pipe with a pipe stiffness of 200 psi or greater at 5 percent deflection, as determined in accordance with ASTM D-2412, need not be tested for deflection if all pipe between two manholes is less than 12 feet below final grade.

Conduct deflection tests with a representative of the Service Director present.

Repair or replace pipes exceeding a deflection of 5 percent and then retest until satisfactory test results are obtained.

Conduct tests by pulling an approved deflection probe, having a diameter not less than 95 percent of the base inside diameter or average inside diameter of the pipe depending on which is specified in the ASTM Specifications, including the appendix, to which the pipe is manufactured, through the sewer line without mechanical pulling devices. Have a proving ring with an inside diameter equal to the outside diameter of the probe available at the time the probe is used to verify that the probe has the proper diameter by inserting the probe into the ring. The pipe shall be measured in accordance with ASTM D-2122.

Deflection Probe: By Wortco, Inc., Burke Concrete Accessories, Inc., or as approved; designed specifically for testing the deflection of the type and size of pipe subject to test; and complying with the following:

Odd number (no less than 9) of 1/2" x 3/16" bar stock runners equally spaced on edge around and welded to the circumference of a minimum of two 1/4 inch thick circular steel plates.

Distance between plates, out-to-out, of not less than 2 inches smaller than the nominal diameter of the pipe to be tested, with runners extending approximately 1-1/2 inches beyond each plate, being bent inward for this distance at approximately 30 degrees.

Continuous 3/4 inch threaded rod through the center of the plates, having a hex nut drawn tight against the inside face of each plate, and extending past each side as required for providing a 3/4 inch ferrule loop insert or similar piece for attaching the pulling medium.

B. TESTING REQUIREMENTS

All deflection tests as described above must be conducted in the presence of and approved by the Service Director. The contractor shall furnish all labor, equipment, and materials necessary to perform the tests and include all costs for such testing, retesting, delays, etc., in the price bid per lineal foot of sewer (on public projects).

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In the event that a passing deflection test cannot be achieved, the contractor shall locate and repair the sewer in a manner satisfactory to the Service Director and retest until the deflection probe can pass through the sewer.

Each section of sewer as above described must be tested for conformity to these requirements before such section(s) may be included in any current or final estimate for payment to the contractor (on public projects).

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ITEM 67 – RESERVED

ITEM 68 – RESERVED

ITEM 69 - RESERVED

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ITEM 70 - FIBER OPTIC CONDUIT & PULL BOX

70.01 DESCRIPTION

70.02 MATERIALS

70.03 JUNCTION AND SERVICE BOXES

70.04 DETECTABLE WARNING TAPE

70.05 CONDUIT INSTALLATION

70.06 CONDUITS WITHOUT CONCRETE ENCASEMENT

70.07 MARKERS

70.08 BEDDING AND BACKFILL FOR CONDUITS

70.09 RESTORATION

70.10 METHOD OF MEASUREMENT

70.11 BASIS OF PAYMENT

70.01 DESCRIPTION

This WORK shall consist of underground conduits installed in accordance with this specification and shall include furnishing and installing of all underground individual and multiple underground conduits. It shall also include all turf trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement shown in plans, mandrelling, pulling lines, detectable tape, conduit markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables in accordance electrical specifications. This item shall also include furnishing and installing junction boxes, service boxes, conduits and all incidentals thereto. Verification of existing conduits is incidental to the pay items provided in this specification.

70.02 MATERIALS

Plastic conduit and fittings shall conform to the requirements of Underwriters Laboratories Standards UL-651 and Article 347 of the current National Electrical Code. Conduit shall be one of the following, or as shown on the plans:

- a.) Type I–Schedule 40 PVC suitable for underground use either direct-buried or encased in concrete.
- b.) Type II–Schedule 40 PVC suitable for above or underground use.

The type of adhesive shall be as recommended by the conduit/fitting manufacturer. Conduits shall be not less than 3-inches inside diameter or shall comply with the National Electrical Code based on cable to be installed, whichever is larger.

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70.03 JUNCTION AND SERVICE BOXES.

Junction and Service Boxes will be constructed of, unless otherwise specified on plans, Fiberglass Polymer Concrete structures meeting AMERICAN NATIONAL STANDARD ANSI/SCTE 77 2013.

Junction Boxes minimum interior dimensions W 17” X L 30” X H 24” including fastening lid, with stainless steel bolts, and “CITY OF FAIRLAWN FIBER OPTIC” in raised lettering. Service Boxes minimum interior dimensions W 12” X L 12” X H 24” including fastening lid, with stainless steel bolts, and “CITY OF FAIRLAWN FIBER OPTIC” in raised lettering.

70.04 DETECTABLE WARNING TAPE

Plastic, detectable, color as noted magnetic tape shall be polyethylene film with a metalized foil core and shall be 4-inches to 6-inches wide. The tape shall be as manufactured by Reef Industries, Inc., or approved equal. Detectable tape is incidental to the respective bid item. Tape shall say “Caution Electric Line” or similar.

70.05 CONDUIT INSTALLATION

All conduit lines shall be laid so as to grade toward access points and conduit ends for drainage. On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. No underground conduit shall be less than 24-inches below finished grade. Where under pavement or walk, the top of the conduit shall not be less than 24-inches below the subgrade. The Contractor shall mandrel each individual conduit. A flexible mandrel, not more than 1/4-inch smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits, junction, and service boxes, etc. interiors IMMEDIATELY prior to pulling cable. Once cleaned and swabbed the junction boxes, and service boxes and all accessible points of entry to the conduit system shall be kept closed except when installing cables. Cleaning of ducts, junction/service boxes, etc. is incidental to the WORK. All conduit systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor’s expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing conduits proposed for use in this project as clear and open. The Contractor shall notify the Service Director of the schedule for testing so that the Service Director may witness the test. For pulling the permanent wiring, each individual conduit, shall be provided with a 200 pound test polypropylene pull rope. Pull ropes shall be installed in all conduits, whether cables will be installed or not during this project. The ends shall be secured and sufficient length shall be left in access points to prevent it from slipping back into the conduit. Where spare conduits are installed, the open ends shall be plugged with removable tapered plugs, designed for this purpose. All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminate from entering the conduits. Any conduit section having a defective joint shall not be installed. Trenches for conduits and duct

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banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of graders shall not be used to excavate the trench. When rock is encountered, the rock shall be removed to a depth of at least 3-inches below the required conduit depth and it shall be replaced with bedding material of sand containing no mineral aggregate particles that would be retained on a 1/4-inch sieve. Flowable backfill may alternatively be used. The Contractor shall ascertain the type of soil or rock to be excavated before bidding.

Underground warning (caution) tape shall be installed in the trench at 12 inches above all underground conduits. Contractor shall submit a sample of the proposed warning tape for approval by the Service Director.

Joints in plastic conduit shall be prepared in accordance with the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2-feet. Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the Service Director, the unsuitable material shall be removed and replaced in accordance with Section 70.08, Bedding and Backfill for Conduits. Alternatively, additional duct bank supports that are adequate and stable shall be installed, as approved by the Service Director.

All excavation shall be unclassified and shall be considered incidental to the respective pay item of which it is a component part. Dewatering necessary for duct installation, erosion and turbidity control, in accordance with Federal, State, and Local requirements is incidental to its respective pay item as a part of Underground Conduit. The cost of all excavation regardless of type of material encountered, shall be included in the unit price bid for the respective pay item as a part of Underground Conduit. Any excess excavation shall be removed and replaced in accordance with Section 70.08, Bedding and Backfill for Conduits. It is the Contractor's responsibility to locate existing utilities within the WORK area prior to excavation. Where existing active cable(s) cross proposed installations, the Contractor shall insure that these cable(s) are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

- a.) Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred.
- b.) Trenching, etc., in cable areas shall then proceed with approval of the Service Director, with care taken to minimize possible damage or disruption of existing utility, including careful backfilling in area of cable.

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In the event that any previously identified utility is damaged during the course of construction, the Contractor shall be responsible for the complete repair.

70.06 CONDUITS WITHOUT CONCRETE ENCASEMENT.

Trenches for single-conduit lines shall be not less than 6-inches nor more than 12-inches wide, and the trench for two or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length. Unless otherwise shown on the plans, existing soils shall be removed and replaced in accordance with Section 70.08, Bedding and Backfill for Conduits. The bedding material shall consist of natural sand, and it shall contain no particles that would be retained on a 1/4-inch sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively be used. Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits are at least 24-inches below the finished grade.

When two or more individual conduits intended to carry conductors of equivalent insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 2-inches apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6-inches apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3-inches apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6-inches apart in a vertical direction. Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6-inches to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the Service Director for review prior to use.

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70.07 MARKERS

The location of each end and of each change of direction of conduits shall be marked by a concrete slab marker 2-foot square and 4-inches to 6-inches thick extending approximately 1-inch above the surface. The markers shall also be located directly above the ends of all conduits, except where they terminate in a junction/access structure or building. The Contractor shall impress the word “FIBER CONDUIT” on each marker slab. The Contractor shall also impress on the slab the number and size of conduits beneath the marker along with all other necessary information as determined by the Service Director. The letters shall be 4-inches high and 3-inches wide with width of stroke 1/2-inch and 1/4-inch deep or as large as the available space permits. Furnishing and installation of conduit markers is incidental to the respective conduit pay item.

70.08 BEDDING AND BACKFILL FOR CONDUITS

For conduits, 8-inches of sand (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted in accordance with ODOT Section 611.06 BACKFILLING except that material used for backfill shall be per ODOT Item 304 Limestone. Flowable backfill may alternatively be used. Trenches shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that, where topsoil is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the topsoil to be used, with proper allowance for settlement. Any excess excavated material shall be removed and disposed of in accordance with instructions issued by the Service Director.

70.09 RESTORATION

Where soil and topsoil has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by WORK shall be restored to its original condition. The restoration shall include topsoil and hydroseeding as shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective pay item contained herein.

70.10 METHOD OF MEASUREMENT

Underground conduits shall be measured by the linear feet of conduits installed, locator tape, trenching and backfill with designated resolution, all measured in place, completed, and accepted, and placed on an as built set of drawings.

Separate measurement shall be made for the various types and sizes of Junction and Service Boxes per each.

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70.11 BASIS OF PAYMENT

Payment will be made at the contract unit price per linear foot or each, for type and size of conduit, service box, and junction box completed and accepted, including trench and backfill with the designated material.

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ITEM 71 – HORIZONTAL DIRECTIONAL DRILLING

71.01 DESCRIPTION

71.02 MATERIALS

71.03 CONSTRUCTION

71.04 TESTING

71.05 METHOD OF MEASUREMENT

71.06 BASIS OF PAYMENT

71.01 DESCRIPTION

Furnish and install underground utility/facility/product/pipe/conduit (referred to as product pipe in the rest of this section) by use of Horizontal Directional Drilling (HDD). The installation is according to the sizes and limits shown on the plans, and specified by these technical specifications herein. The WORK includes all services, equipment, materials, tools, and labor for a complete and proper installation and testing.

HDD is a trenchless method for installing a product pipe. It is a multi-stage process consisting of site preparation, equipment setup, pilot bore, product pipe pulling through the drilled bore, and site restoration. Alignment of the bore is accomplished by proper orientation of the drill bit head as it is pushed through the ground by the drill rig. Orientation and tracking of the drill bit is determined by using an acceptable tracking system from a transmitter located within the drill bit head. When necessary, enlarge the pilot borehole (back reaming) to accommodate a product pipe larger than the pilot borehole size. Back ream ahead of or at the same time pulling the product pipe through the pilot borehole.

In order to minimize friction and prevent collapse of the bore hole, introduce a soil stabilizing agent (drilling fluid) into the annular bore space from the front end of the drill bit. The rotation of the bit in the soil wetted by the drilling fluid creates slurry. The slurry stabilizes the surrounding soil, prevents the bore hole from collapsing, and provides lubrication. Select or design the drilling fluids for the site's specific soil and ground water conditions. Confine free flowing (escaping) slurry or drilling fluids at the ground surface during pull back or drilling.

71.02 MATERIALS

Select the product pipe material according to the type of product indicated on the plans. The product pipe must comply with all applicable City of Fairlawn specification sections and ASTM standards depending on the purpose and material of the product pipe. Join the pipe sections so that the joined pipe sections are installable using HDD. Ensure that the joined product pipes have adequate strength and flexibility to withstand the installation stresses, overburden pressures, and operating pressures without compromising the structural stability of the pipe wall. Ensure that the product pipe meets the bend radius required for the proposed installation. Join the pipe sections so that the inner surfaces are flush and even.

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The following material standards are the minimum in place standards.

Material Standards for HDD Installation		
Material Type	Non-Pressure	Pressure
Polyethylene (PE)	ASTM D 2447	ASTM 2513 ASTM D 2447
High Density Polyethylene (HOPE)	ASTM D 2447 AS1MD 3350 ASTM F714	ASTM D 2447 ASTM D 3350 ASTM F714 ASTM 2513
Polyvinyl-Chloride (PVC)	ASTM F 789	ASTM D1 785 ASTM 02241
Steel	ASTM A139 Grade B (1)	AWWA C200 API 2B (2)

- (1) No hydrostatic test required
- (2) Dimensional tolerances only

Electronic detection material for non-conductive piping products. Select tracer wire designed for HDD to conductively locate underground utility lines according to ASTM D- 1248. Use either a continuous green sheathed solid conductor copper wire line (minimum #12 AWG for external placement) or a coated conductive tape. Select a minimum 12-gauge copper clad steel wire and able to withstand the installation tension along the entire length of the line.

71.03 CONSTRUCTION

SUBMITTALS

Prior to beginning the WORK, submit to the Service Director a WORK Plan detailing the procedure and schedule to execute the project. The WORK Plan will be comprehensive, realistic, and based on actual working conditions for this particular project. The WORK Plan documents the planning required to successfully complete the project. The WORK Plan includes complete descriptions of proposed plans, procedures, equipment, personnel, and if applicable, supporting material, for the following:

- Drilling operations: describe the pilot hole drilling procedure, the reaming operation, the pullback procedure, and illustrate the plan
- Profile of the bore plotted at a scale appropriate for the crossing and acceptable to the Engineer.
- HDD site layout including entry and exit points.
- Directional drilling equipment list includes: drilling rig, drill bit, back-reamer, mud mixing and pumping systems, down-hole tools, guidance system, and rig safety system. Provide calibration records for guidance equipment.
- Drilling fluid management plan: drilling fluid types and specifications, cleaning and recycling equipment, estimated flow rates, procedures for minimizing drilling fluid escape, and the method/location for final disposal of waste drilling fluids. Provide the MSDS for all drilling fluid additives that will be used.
- Pipe storage and handling details.

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- Pipeline assembly and installation procedures.
- MSDS of any potentially hazardous substances to be used.
- Contingency plans for possible problems.

Submit supporting calculations, certifications, or material demonstrating the strength of the product pipes for acceptance before the beginning of the installation. Submit for the Service Director's acceptance prior to construction, other product pipe material than those listed on the plans.

Demonstrate that the proposed material satisfies the purpose of the utility and withstands the design and construction stresses and pressures.

If site conditions change and require modification to the WORK Plan, resubmit revised drilling plans to achieve successful installation. Explain, in the revised submittal, the anticipated and encountered conditions that mandated the change in plans.

RECORD DRAWINGS

At the completion of the HDD product pipe installation, the general contractor will provide the Engineer marked up plans noting all deviations from the plans that result in change of location, material, and guidance system log. Post, on the drawing, the x, y, and z coordinates of the starting and ending points of the line at minimum. Include in the marked up plans, the station number or reference to a permanent structure within the project right-of-way, name of person collecting data, including title, position and company name, detection method used, and elevations and offset dimensions. Certify the accuracy of the drawing to the capability of the tracking system.

INSTALLATION

Walk the area prior to the commencement of the HDD project and visually inspect the site for potential problems.

Contact the Ohio Utilities Protection Service at 1-800-362-2764 or 8- 1-1 and contact the Oil & Gas Producers Underground Protection Service by dialing 1-800-825-0988 or 8-1-1 at least 48 hours, but no more than 10 working days (excluding weekends and legal holidays) before beginning WORK. Explore and locate existing underground utilities in the areas of WORK. Verify the exact physical location and depth of existing utilities by exposing as needed. If utilities are to remain in place, provide adequate means of protecting the utility during excavation operations. Should uncharted or incorrectly charted piping or other utilities be encountered during the utility exploration, contact the owner of the utilities. Contractor is responsible for repairing damaged utilities to the satisfaction of the utility owner in accordance to the Ohio Revised Code 153.64 Protecting underground utility facilities during construction of public improvement and 3781.25 One-call utility protection service definitions. If the utility was accurately marked by the utility locator or on the drawing, repair it at no additional cost. If the damaged utility was not accurately marked by the utility locator or on the drawing, owner adjusts the contract value and/or time accordingly.

Have a representative who is thoroughly knowledgeable of the equipment, boring and the owner

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procedures, present at the job site during the entire installation and available to address immediate concerns and emergency operations.

Notify the Service Director 48 hours in advance of starting WORK. Do not begin installation until the Service Director is present at the job site and agrees that proper preparations have been made.

EQUIPMENT REQUIREMENTS

Match the HDD drill rig and its auxiliary pieces of equipment to the diameter and length of product pipe being installed and ensure that the drill rod can meet the bend radius required for the proposed installation. The directional drilling machine consist of a power system to rotate, push and pull back hollow drill pipe into the ground at variable angles while delivering a pressurized fluid mixture to a guidable drill head (bit). Select/design the power system to provide sufficient pressure to power the drilling operations through a leak-free hydraulic system. Anchor the directional drilling machine to the ground to withstand the pulling, pushing, and rotating pressure required to complete the HDD installation.

Select a drilling fluid mixing system that is self-contained and closed with sufficient size to mix and deliver drilling fluid to the drill bit. The mixing system will continually agitate the drilling fluid during drilling operations. Select fluids delivery system capable of pumping drilling fluid with sufficient volume and pressure from the mixing tank through the drill rods to the drill head (bit).

Minimize potential damage from soil displacement/settlement/heave by limiting the borehole diameter compared to the product pipe. Select the back-reamer size so it creates a large enough borehole to allow cuttings to transfer from the face of excavation to the surface with a minimum soil displacement.

GUIDANCE SYSTEM

Unless it is specified on the plan, select an acceptable guidance system to locate and track continuously and accurately the drill head during the pilot bore. The guidance system must be capable of tracking the drill bit in the expected underground environment and at the depth shown on the plans. The acceptable methods include: walkover, wire line, Magnetic Guidance System probe, or any other system as accepted by the Service Director. Select the guidance system and the drill rig to deliver the required horizontal and vertical accuracy required for the product pipe. Use a locating and tracking system capable of ensuring that the proposed installation is executed as intended. If signal interference is encountered that significantly affects the ability to accurately track the drill bit, the Service Director may specify the use of a suitable tracking system. If the City informs the Contractor about signal interference or it is reasonable to expect interference at the site, select a suitable tracking system without extra cost to the City. Select the locating and tracking system to provide information on: (a) Clock and pitch information (b) depth (c) transmitter temperature (d) battery status (e) position (x,y) (f) azimuth, where direct overhead readings (walkover) are not possible (i.e. subaqueous or limited access transportation facility). Ensure proper calibration of all equipment before commencing directional drilling operation.

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Take necessary measures to ensure accurate record drawing. Install all facilities such that their location can be readily determined by electronic designation after installation.

DRILLING FLUIDS

Use a drilling fluids mixture composed of potable water and stabilizing agent - usually bentonite and/or polymer and/or appropriate additives continuously pumped to the drill bit. Use water with pH between 7.5 and 10 and free of chlorine with calcium < 100ppm, sodium chloride < 500ppm, and chlorine < 50ppm. Hard water may be treated with soda ash to reach the required pH. Design the quantity and the mixture of drilling fluids to perform the operation in the expected soil. Vary the fluid viscosity to best fit the encountered soil conditions. Do not use any other chemicals or polymer surfactants in the drilling fluid without written consent from the Service Director. Certify to the Service Director in writing that any added chemicals are environmentally safe and not harmful or corrosive to the product pipe and the environment. Approvals and permits are required for obtaining water from such sources as streams, rivers, ponds or fire hydrants. Any water source used other than potable water requires a pH test.

DRILLING OPERATIONS

Prior to the start of the boring operation, survey the WORK site with x, y, z coordinates at control point at 100/LF intervals at minimum along the planned bore path. Provide stakes at offset distances (left or right) from the centerline at these control points and at all known existing utility crossings. Submit this information to the Service Director at least 24 hours before the start of pilot bore operations.

Drill the pilot hole along the path shown on the plans and profile drawings within the allowable tolerance of the type of utility. Provide and maintain instrumentation necessary to accurately locate the pilot hole (both horizontal and vertical placements). Ensure adequate removal of soil cuttings and stability of the bore hole by monitoring the drilling fluids parameters such as the pumping rate, pressures, viscosity and density during the pilot bore, back reaming, and product pipe installation. Relief holes can be used as necessary to relieve excess pressure down hole. Obtain the Service Director's approval of the location and all conditions necessary to construct relief holes. Maintain proper disposition of drilling fluids and minimize inconvenience to other facility users.

To minimize heaving during pull back, determine the pullback rate in order to maximize the removal of soil cuttings without building excess down hole pressure. Contain excess drilling fluids at entry and exit points until the recycle, vacuum, or removal from the site during drilling operations. Ensure that entry and exit containments are of sufficient size to contain the expected return of drilling fluids and soil cuttings. Carry out excavation and backfill for entry, exit, recovery pits, connection pits, slurry sump pits, or any other excavation as specified in Item 23. Ensure that all drilling fluids are disposed of or recycled in a manner acceptable to the appropriate local, state, or federal regulatory agencies. When drilling in contaminated ground, test the drilling fluid for contamination and appropriately dispose of it. The Engineer will adjust the contract value and/or time if the contractor was not notified about the contamination during the bidding phase. Remove any excess material upon completion of the bore. Contact the

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Engineer immediately if it becomes evident that the soil is contaminated in the drilling process. Do not continue drilling without the Service Director's consent.

Install all facilities such that their location can be readily determined by electronic designation after installation. For non-conductive installations, attach a continuous conductive tracking (tracer wire) material, either externally, internally or integral with the product. Tracking conductors must extend two feet beyond bore termini. Test conductors for continuity. Within 48 hours of completing the installation, clean the WORK site of all excess slurry or spoils, de-mobilize equipment, and ensure that the site is safe and secured.

Take all necessary measures to eliminate the discharge of water, drilling mud, and cuttings to nearby waterways during the HDD WORK. If applicable, provide equipment and procedures to maximize the recirculation or reuse of drilling mud to minimize waste. Follow section 107.19 Environmental Protection of the Ohio Department of Transportation Construction and Material Specifications, latest edition, for environmental protection requirements.

Take responsibility for restoration of any damage caused by heaving, settlement, separation of pavement, escaping drilling fluid, or from the directional drilling operation. If the negligence of the contractor causes damage to any facility, restore the facility to its original conditions or better at no additional cost to the City. Follow ODOT sections 104.04 and 107.10 of the Construction and Material Specifications, latest edition, for other requirements regarding clean up and restoration. When remediation plans are required by the Service Director, provide detailed plans to the Service Director for acceptance showing how the damage will be remedied before any WORK proceeds.

71.04 TESTING

Upon completion of the directional bore, test tracer wire continuity for each bore before acceptance.

71.05 METHOD OF MEASUREMENT

The Service Director will measure installed product by lineal feet in place from center-to-center of appurtenant small structures, connection points, or between open ends inclusive of lengths of pipe bends and branches.

APPENDIX

NCPI AIR TEST TABLE

MINIMUM TIME IN SECTIONS SHOWN REQUIRED FOR PRESSURE TO DROP FROM 3.5 TO 2.5 PSIG
(Where no time is shown, the required time is the largest value for a given diameter)

	4"	6"	8"	10"	12"	15"	18"	21"	24"	27"	30"	33"	36"	39"
25	4	10	18	28	40	62	89	121	158	200	248	299	356	418
50	9	20	35	55	79	124	178	243	317	401	495	599	713	837
75	13	30	53	83	119	186	267	364	475	601	743	898	1020	1105
100	18	40	70	110	158	248	356	485	634	765	851	935		
125	22	50	88	138	198	309	446	595	680					
150	26	59	106	165	238	371	510							
175	31	69	123	193	277	425								
200	35	79	141	220	317									
225	40	89	158	248	340									
250	44	99	176	275										
275	48	109	194	283										
300	53	119	211											
350	62	139	227											
400	70	158												
450	79	170												
500	88													
550	97													
600	106													
650	113													

NOTE: TO BE USED WHEN TESTING ONE DIAMETER ONLY.
THIS TABLE NOT TO BE USED WHERE LATERALS EXIST ON SECTION TO BE TESTED.

NCPI AIR TEST TABLE

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3.5 TO 2.5 PSIG

		LENGTH OF MAIN LINE IN FEET										6" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (4" DIAMETER)	25	14	24	34	44	54	64	74	84	94	103	113	123
	50	19	29	39	48	58	68	78	88	98	108	118	128
	75	23	33	43	53	63	73	83	92	102	112	122	132
	100	28	37	47	57	67	77	87	97	107	117	127	136
	125	32	42	52	62	72	81	91	101	111	121	131	141
	150	36	46	56	66	76	86	96	106	116	125	135	145
	175	41	51	61	70	80	90	100	110	120	130	140	150
	200	45	55	65	75	85	95	105	114	124	134	144	153
	225	50	59	69	79	89	99	109	119	129	139	149	151
	250	54	64	74	84	94	103	113	123	133	143	149	150
	275	58	68	78	88	98	108	118	128	138	146	147	149
	300	63	73	83	92	102	112	122	132	142	145	146	147
	350	72	81	91	101	111	121	131	140	141	143	144	145
	400	80	90	100	110	120	130	136	138	139	141	142	143
	450	89	99	109	119	129	132	134	136	138	139	141	142
	500	98	108	118	126	129	131	133	135	136	138	139	140

		LENGTH OF MAIN LINE IN FEET										8" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (4" DIAMETER)	25	22	40	57	75	92	110	128	145	163	180	198	216
	50	26	44	62	79	97	114	132	150	167	185	202	218
	75	31	48	66	84	101	119	136	154	172	189	207	214
	100	35	53	70	88	106	123	141	158	176	194	209	211
	125	40	57	75	92	110	128	145	163	180	198	206	207
	150	44	62	79	97	114	132	150	167	185	201	202	204
	175	48	66	84	101	119	136	154	172	189	197	199	201
	200	53	70	88	106	123	141	158	176	192	194	197	199
	225	57	75	92	110	128	145	163	180	189	192	194	196
	250	62	79	97	114	132	150	167	183	186	189	191	193
	275	66	84	101	119	136	154	172	181	184	187	189	191
	300	70	88	106	123	141	158	174	178	181	184	187	189
	350	79	97	114	132	150	166	170	174	177	180	183	185
	400	88	106	123	141	157	162	166	170	174	176	179	181
	450	97	114	132	148	154	159	163	167	170	173	176	178
	500	106	123	140	146	151	156	160	164	167	170	173	175

NCPI AIR TEST TABLE

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3.5 TO 2.5 PSIG

		LENGTH OF MAIN LINE IN FEET											
		8" DIAMETER											
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (6" DIAMETER)	25	28	45	63	80	98	116	133	151	168	186	204	221
	50	37	55	73	90	108	126	143	161	178	196	214	220
	75	47	65	83	100	118	135	153	171	188	206	217	217
	100	57	75	93	110	128	145	163	181	198	214	214	215
	125	67	85	102	120	138	155	173	190	208	211	212	213
	150	77	95	112	130	148	165	182	200	207	209	210	211
	175	87	105	122	140	157	175	192	204	206	207	208	209
	200	97	114	132	150	167	185	201	202	204	205	206	207
	225	107	124	142	160	177	195	199	201	203	204	205	206
	250	117	134	152	169	187	195	198	199	201	202	203	204
	275	127	144	162	179	192	194	196	198	200	201	202	204
	300	136	154	172	187	190	192	195	196	198	200	201	202
	350	156	174	181	185	187	190	193	194	196	198	199	200
	400	173	178	181	184	186	189	191	192	194	196	197	198
	450	173	177	180	183	185	187	189	190	192	194	195	196
	500	173	177	180	182	184	186	188	189	191	192	193	194

		LENGTH OF MAIN LINE IN FEET											
		10" DIAMETER											
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (4" DIAMETER)	25	32	59	87	114	142	169	197	224	252	277	277	278
	50	36	64	91	119	146	174	201	229	256	271	272	273
	75	41	68	96	123	151	178	206	233	261	265	267	268
	100	45	73	100	128	155	183	210	238	258	260	262	264
	125	50	77	105	132	160	187	214	242	253	255	257	259
	150	54	81	109	136	164	191	219	244	248	251	253	255
	175	58	86	113	141	168	196	223	239	243	246	249	251
	200	63	90	118	145	173	200	228	235	239	242	245	248
	225	67	95	122	150	177	205	226	231	235	239	242	244
	250	72	99	127	154	182	209	222	227	231	235	238	241
	275	76	103	131	158	186	211	218	223	228	231	235	238
	300	80	108	135	163	190	208	214	220	224	228	232	235
	350	89	117	144	172	194	201	208	213	218	222	226	229
	400	98	125	153	179	188	196	202	208	213	217	221	224
	450	107	134	162	174	183	191	197	203	208	212	216	220
	500	116	143	160	170	179	186	193	198	203	208	212	215

NCPI AIR TEST TABLE

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3.5 TO 2.5 PSIG

		LENGTH OF MAIN LINE IN FEET										10" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (6" DIAMETER)	25	37	65	92	120	147	175	202	230	257	277	278	278
	50	47	75	102	130	157	185	212	240	267	271	272	273
	75	57	85	112	140	167	195	222	250	265	266	267	269
	100	67	95	122	150	177	205	232	257	260	262	263	265
	125	77	105	132	160	187	215	242	253	255	257	259	261
	150	87	114	142	169	197	224	245	248	251	254	256	257
	175	97	124	152	179	207	234	241	245	248	250	252	254
	200	107	134	162	189	217	233	237	241	244	247	249	251
	225	117	144	172	199	225	230	234	238	241	244	246	248
	250	127	154	182	209	222	227	231	235	238	241	243	246
	275	136	164	191	213	219	224	229	232	236	238	241	243
	300	146	174	201	211	217	222	226	230	233	236	239	241
	350	166	192	200	207	212	217	222	226	229	232	235	237
	400	181	190	197	203	209	214	218	222	225	228	231	233
	450	180	188	195	201	206	211	215	218	222	225	227	230
	500	179	186	193	198	203	208	212	215	219	222	224	227

		LENGTH OF MAIN LINE IN FEET										10" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (8" DIAMETER)	25	45	73	100	128	155	183	210	238	265	279	280	280
	50	63	90	118	145	173	200	228	255	275	275	276	277
	75	80	108	135	163	190	218	245	270	272	272	273	274
	100	98	125	153	180	208	235	263	267	268	269	270	271
	125	116	143	171	198	226	253	263	265	266	267	268	269
	150	133	161	188	216	243	258	260	262	264	265	266	267
	175	151	178	206	233	254	256	258	260	262	263	264	265
	200	168	196	223	249	252	254	256	258	260	261	262	263
	225	186	213	241	247	250	253	255	257	258	259	261	262
	250	204	231	242	246	249	251	253	255	256	258	259	260
	275	221	237	241	244	247	250	250	254	255	256	258	259
	300	232	237	240	243	246	249	251	253	254	255	256	258
	350	232	235	239	242	244	247	249	251	252	253	254	256
	400	231	234	238	240	243	245	247	249	250	251	253	254
	450	230	234	237	239	241	243	245	247	248	250	251	252
	500	230	233	236	238	240	242	244	246	247	249	250	251

NCPI AIR TEST TABLE

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3.5 TO 2.5 PSIG

		LENGTH OF MAIN LINE IN FEET										12" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (4" DIAMETER)	25	44	84	123	163	202	242	282	321	332	333	334	334
	50	48	88	128	167	207	246	286	323	324	326	327	328
	75	53	92	132	172	211	251	290	316	317	319	321	323
	100	57	97	136	176	216	255	295	308	311	313	316	317
	125	62	101	141	180	220	260	297	301	304	308	310	312
	150	66	106	145	185	224	264	290	295	299	302	305	308
	175	70	110	150	189	229	268	283	289	293	297	300	303
	200	75	114	154	194	233	271	277	283	288	292	296	299
	225	79	119	158	198	238	265	272	278	283	288	291	295
	250	84	123	163	202	242	259	267	273	278	283	287	291
	275	88	128	167	207	244	254	262	269	274	279	283	287
	300	92	132	172	211	239	249	257	264	270	275	279	283
	350	101	141	180	218	231	241	249	256	262	268	272	276
	400	110	150	189	210	223	233	242	249	255	261	266	270
	450	119	158	189	204	216	227	235	243	249	255	260	264
	500	128	166	184	198	210	221	229	237	243	249	254	259

		LENGTH OF MAIN LINE IN FEET										12" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (6" DIAMETER)	25	50	89	129	168	208	248	287	327	331	332	333	333
	50	59	99	139	178	218	257	297	321	323	325	326	327
	75	69	109	149	188	228	267	307	314	316	318	320	321
	100	79	119	158	198	238	277	302	306	309	312	314	316
	125	89	129	168	208	248	287	295	300	303	306	309	311
	150	99	139	178	218	257	284	289	294	298	301	304	306
	175	109	149	188	228	267	278	284	289	293	296	299	302
	200	119	158	198	238	265	272	278	284	288	292	295	298
	225	129	168	208	248	260	268	274	279	284	288	291	294
	250	139	178	218	246	255	263	269	275	280	284	287	290
	275	149	188	228	242	251	259	266	271	276	280	284	287
	300	158	198	227	238	248	255	262	268	272	277	281	284
	350	178	208	221	232	241	249	255	261	266	271	274	278
	400	189	204	217	227	236	243	250	256	261	265	269	273
	450	187	201	213	223	231	239	245	251	256	260	264	268
	500	186	199	210	219	227	234	240	246	251	256	260	263

NCPI AIR TEST TABLE

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3.5 TO 2.5 PSIG

		LENGTH OF MAIN LINE IN FEET										12" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (8" DIAMETER)	25	57	97	136	176	216	255	295	331	332	333	334	334
	50	75	114	154	194	233	273	312	324	325	327	328	329
	75	92	132	172	211	251	290	315	317	319	321	323	324
	100	110	150	189	229	268	306	309	312	314	316	318	319
	125	128	167	207	246	286	300	303	306	309	311	314	315
	150	145	185	224	264	290	295	299	302	305	307	310	311
	175	163	202	242	279	285	290	294	298	301	304	306	308
	200	180	220	260	275	281	287	291	294	297	300	303	305
	225	198	238	265	272	278	283	287	291	294	297	300	302
	250	216	253	262	269	275	280	284	288	291	294	297	299
	275	233	251	260	266	272	277	282	285	289	292	294	297
	300	240	249	258	264	270	275	279	283	286	289	292	294
	350	238	247	254	260	266	271	275	279	282	285	288	290
	400	237	245	252	257	263	267	271	275	278	281	284	286
	450	236	243	249	255	260	264	268	272	275	278	281	283
	500	235	242	248	253	257	262	265	269	272	275	278	280

		LENGTH OF MAIN LINE IN FEET										15" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (4" DIAMETER)	25	66	128	190	252	314	376	414	415	416	417	418	418
	50	71	133	194	256	318	380	403	406	408	409	411	412
	75	75	137	199	261	323	385	393	397	400	402	404	406
	100	80	141	203	265	327	318	384	388	392	395	397	400
	125	84	146	208	270	331	369	375	380	385	388	391	394
	150	88	150	212	274	336	360	367	373	378	382	385	388
	175	93	155	216	278	340	351	359	366	371	376	380	383
	200	97	159	221	283	332	343	352	359	365	370	374	378
	225	102	163	225	287	324	336	345	353	359	365	369	373
	250	106	168	230	292	317	329	339	347	353	359	364	368
	275	110	172	234	293	310	323	333	341	348	354	359	364
	300	115	177	238	287	303	316	327	336	343	349	354	359
	350	124	185	247	275	292	305	316	325	333	340	346	351
	400	132	194	242	264	281	295	306	316	324	332	338	343
	450	141	203	233	255	272	286	298	308	316	324	330	336
	500	150	199	225	247	264	278	290	300	309	316	323	329

NCPI AIR TEST TABLE

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3.5 TO 2.5 PSIG

		LENGTH OF MAIN LINE IN FEET										15" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (6" DIAMETER)	25	72	134	196	257	319	381	411	413	414	416	416	417
	50	82	144	205	267	329	391	399	402	404	406	408	409
	75	92	154	215	277	339	383	388	392	395	398	400	402
	100	102	163	225	287	349	372	378	383	387	390	393	395
	125	111	173	235	297	352	362	369	374	379	383	386	389
	150	121	183	245	307	342	352	360	367	372	376	380	383
	175	131	193	255	317	334	344	353	360	365	370	374	377
	200	141	203	265	312	326	337	346	353	359	364	368	372
	225	151	213	275	304	319	330	339	346	353	358	363	367
	250	161	223	279	298	312	323	333	341	347	353	358	362
	275	171	233	273	292	306	317	327	335	342	348	353	357
	300	181	243	268	286	300	312	322	330	337	343	349	353
	350	201	237	259	277	291	302	312	321	328	334	339	344
	400	204	231	252	268	282	294	304	312	320	326	332	337
	450	201	226	245	261	275	286	296	305	312	319	325	330
	500	199	221	240	255	269	280	290	298	306	312	318	324

		LENGTH OF MAIN LINE IN FEET										15" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (8" DIAMETER)	25	80	141	203	265	327	389	411	413	414	418	416	417
	50	97	159	221	283	366	395	399	402	404	408	407	409
	75	115	177	238	300	362	383	388	392	395	400	400	402
	100	132	194	256	318	366	373	378	383	387	392	393	395
	125	150	212	274	336	356	364	370	375	379	385	386	389
	150	168	229	291	337	348	356	362	368	373	379	380	383
	175	185	247	309	329	340	349	355	362	366	373	374	378
	200	203	265	309	323	334	342	349	356	361	367	369	373
	225	220	282	303	317	328	337	344	350	356	362	364	368
	250	238	281	298	311	322	331	339	345	351	357	360	364
	275	256	277	293	307	318	327	334	341	346	353	356	359
	300	254	274	290	303	313	322	330	336	342	349	352	356
	350	250	269	283	296	306	315	322	329	335	341	344	349
	400	248	264	278	290	300	308	316	322	328	335	338	342
	450	246	261	274	285	294	303	310	316	322	329	332	337
	500	244	258	270	281	290	298	305	311	317	323	327	331

NCPI AIR TEST TABLE

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3.5 TO 2.5 PSIG

		LENGTH OF MAIN LINE IN FEET										18" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (4" DIAMETER)	25	94	183	272	361	450	496	498	499	501	502	502	503
	50	98	187	276	365	454	483	487	489	492	493	495	496
	75	102	191	281	370	459	470	476	480	483	485	488	489
	100	107	196	285	374	450	459	465	470	475	478	481	483
	125	111	200	289	378	438	448	456	462	467	470	474	477
	150	116	205	294	383	427	438	446	453	459	463	467	471
	175	120	209	298	387	416	428	438	445	452	457	461	465
	200	124	213	303	388	406	419	430	438	445	450	455	459
	225	129	218	307	378	397	410	422	431	438	444	449	453
	250	133	222	311	369	388	402	414	424	431	438	443	448
	275	138	227	316	360	380	395	407	417	425	432	438	443
	300	142	231	320	352	372	387	400	411	419	426	433	438
	350	151	340	308	337	358	374	388	399	408	416	422	428
	400	160	249	295	323	345	362	376	388	397	406	413	419
	450	168	246	283	312	333	351	365	378	388	396	404	411
	500	177	237	273	301	323	341	355	368	379	388	396	403

		LENGTH OF MAIN LINE IN FEET										18" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (6" DIAMETER)	25	99	188	277	366	455	492	495	497	498	499	500	501
	50	109	198	287	376	465	476	481	484	487	489	491	493
	75	119	208	297	386	453	462	468	473	477	480	482	484
	100	129	218	307	396	439	449	456	462	467	470	474	476
	125	139	228	317	406	425	437	445	452	457	462	466	469
	150	149	238	327	397	413	426	435	443	449	454	458	462
	175	158	248	337	385	402	415	426	434	441	446	451	455
	200	168	257	347	375	392	406	417	426	433	439	444	449
	225	178	267	340	365	383	397	409	418	426	432	438	443
	250	188	277	331	356	374	389	401	411	419	426	431	437
	275	198	287	323	348	376	382	394	404	412	419	426	431
	300	208	284	316	341	359	375	387	397	406	414	420	426
	350	228	272	303	328	346	362	375	385	395	403	409	415
	400	224	263	293	316	335	351	364	375	384	392	400	406
	450	219	255	284	307	325	341	354	365	375	383	391	397
	500	215	246	276	298	316	332	345	356	366	375	382	389

NCPI AIR TEST TABLE

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3.5 TO 2.5 PSIG

		LENGTH OF MAIN LINE IN FEET											
		18" DIAMETER											
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (8" DIAMETER)	25	107	196	285	374	463	490	493	495	497	498	499	500
	50	124	213	303	392	468	473	478	482	485	487	489	491
	75	142	231	320	409	451	458	465	469	474	477	479	482
	100	160	249	338	423	436	445	452	458	463	467	470	473
	125	177	266	355	409	423	433	442	448	454	458	462	466
	150	195	284	373	397	411	422	432	439	445	450	454	458
	175	212	301	366	386	401	413	422	430	437	442	447	451
	200	230	319	356	377	391	404	414	422	429	435	440	445
	225	248	321	348	368	384	396	406	415	422	429	434	439
	250	265	315	341	361	376	389	399	408	416	423	428	433
	275	275	309	334	354	369	382	393	402	410	417	422	428
	300	271	304	328	348	363	376	387	396	404	411	417	422
	350	266	296	319	337	352	365	376	386	394	401	407	413
	400	262	289	311	329	343	356	367	376	384	392	398	404
	450	258	284	304	321	335	348	359	368	376	384	390	396
	500	255	279	298	315	328	340	351	361	369	376	383	389

		LENGTH OF MAIN LINE IN FEET											
		21" DIAMETER											
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (4" DIAMETER)	25	126	247	368	490	577	581	582	585	585	586	587	588
	50	130	251	373	494	561	567	570	573	576	578	579	581
	75	135	256	377	498	545	553	559	563	567	569	571	574
	100	139	260	381	503	531	541	548	553	558	561	564	567
	125	143	265	386	503	518	529	537	544	549	553	557	560
	150	148	269	390	488	505	518	527	535	541	546	550	553
	175	152	273	395	475	493	507	518	526	533	538	543	547
	200	157	278	399	462	482	497	509	518	526	531	536	541
	225	161	282	403	450	472	488	500	510	518	524	530	535
	250	165	287	408	439	462	479	492	502	511	518	524	529
	275	170	291	397	429	452	470	484	495	504	511	518	523
	300	174	295	387	420	443	462	476	488	498	505	512	518
	350	183	304	368	402	427	446	462	474	485	493	501	507
	400	192	304	352	386	412	432	448	462	473	482	490	497
	450	201	291	338	372	398	419	436	450	462	472	480	488
	500	209	279	325	360	386	407	425	439	452	462	471	479

NCPI AIR TEST TABLE

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3.5 TO 2.5 PSIG

		LENGTH OF MAIN LINE IN FEET										21" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (6" DIAMETER)	25	131	253	374	495	572	576	579	581	582	584	585	586
	50	141	262	384	505	552	559	563	567	570	573	574	576
	75	151	272	394	515	533	543	549	554	559	562	565	567
	100	161	282	403	501	516	528	536	542	548	552	555	559
	125	171	292	413	483	501	514	524	531	537	542	547	550
	150	181	302	423	468	487	501	512	521	528	533	538	543
	175	191	312	425	454	474	490	501	511	518	525	530	535
	200	201	322	412	441	462	479	491	501	510	517	522	528
	225	210	332	399	429	451	468	482	492	501	509	515	521
	250	220	342	388	418	441	459	473	484	493	501	508	514
	275	230	336	378	409	432	450	464	476	486	494	501	508
	300	240	327	369	399	423	441	456	468	479	487	495	501
	350	255	312	353	383	407	426	441	454	465	474	482	490
	400	246	300	339	369	393	412	428	441	453	462	471	479
	450	239	290	317	357	380	400	416	429	441	451	460	468
	500	234	281	327	346	369	389	405	419	431	441	450	459

		LENGTH OF MAIN LINE IN FEET										21" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (8" DIAMETER)	25	139	260	381	503	569	573	576	578	580	582	583	584
	50	157	278	399	520	546	554	559	563	566	569	571	573
	75	174	295	417	513	526	536	543	549	554	557	560	563
	100	192	313	434	493	508	520	529	536	542	546	550	554
	125	209	331	452	476	493	506	516	524	531	536	540	545
	150	227	348	436	461	479	493	504	513	520	526	531	536
	175	245	366	422	447	466	481	493	502	511	517	523	528
	200	262	375	409	435	455	470	483	493	502	509	515	520
	225	280	364	398	424	444	461	473	484	493	501	507	513
	250	297	355	389	415	435	451	465	476	485	493	500	506
	275	298	347	380	406	426	443	456	468	478	486	493	499
	300	293	340	372	398	418	435	449	460	470	479	486	493
	350	285	328	359	384	404	421	435	447	458	466	474	481
	400	279	319	348	372	392	409	423	435	446	455	463	471
	450	274	311	338	362	381	398	413	425	435	445	453	461
	500	270	304	330	353	372	389	403	415	426	436	444	452

NCPI AIR TEST TABLE

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3.5 TO 2.5 PSIG

		LENGTH OF MAIN LINE IN FEET											
		24" DIAMETER											
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (4" DIAMETER)	25	163	321	480	638	662	665	667	669	670	671	672	673
	50	167	326	484	637	645	650	654	658	660	662	664	665
	75	172	330	488	617	629	636	642	647	650	653	656	658
	100	176	334	493	599	613	623	631	637	641	645	648	650
	125	180	339	497	582	599	611	620	627	632	637	640	643
	150	185	343	502	567	585	599	609	617	623	629	633	636
	175	189	348	506	552	573	588	599	608	615	621	626	630
	200	194	358	506	538	560	577	589	599	607	613	619	623
	225	198	356	492	525	549	566	580	591	599	606	612	617
	250	202	361	478	513	538	556	571	582	591	599	605	611
	275	207	365	465	501	528	547	562	574	584	592	599	605
	300	211	370	454	491	518	538	554	567	577	585	593	599
	350	220	375	432	471	499	521	538	552	563	573	581	588
	400	229	356	413	453	482	505	523	538	550	560	569	577
	450	238	340	397	436	467	491	509	525	538	549	558	566
	500	244	326	382	422	453	477	497	513	526	538	548	556

		LENGTH OF MAIN LINE IN FEET											
		24" DIAMETER											
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (6" DIAMETER)	25	168	327	485	644	656	660	663	665	667	668	669	670
	50	178	337	495	624	634	641	646	651	654	656	658	660
	75	188	347	505	600	614	624	631	637	641	645	648	650
	100	198	356	515	579	596	608	617	624	630	634	638	641
	125	208	366	525	559	579	593	603	612	618	624	629	632
	150	218	376	511	542	563	579	591	600	608	614	619	624
	175	228	386	493	526	548	566	579	589	598	605	611	616
	200	238	396	477	511	535	553	567	579	588	596	602	608
	225	248	406	462	497	522	542	557	569	579	587	594	600
	250	257	397	449	485	511	531	547	559	570	579	586	593
	275	267	385	437	473	500	521	537	550	561	571	579	586
	300	277	374	426	462	490	511	528	542	553	563	571	579
	350	283	356	406	443	471	493	511	526	538	549	558	566
	400	272	340	389	426	454	477	495	511	524	535	545	553
	450	263	327	375	411	439	462	481	497	511	523	533	542
	500	255	316	362	398	426	449	468	485	499	511	521	531

NCPI AIR TEST TABLE

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3.5 TO 2.5 PSIG

		LENGTH OF MAIN LINE IN FEET										24" DIAMETER	
		25	50	75	100	125	150	175	200	225	250	275	300
LENGTH OF LATERAL IN FEET (8" DIAMETER)	25	176	334	493	645	652	656	659	662	664	666	667	668
	50	194	352	510	615	627	635	641	645	649	652	654	656
	75	211	370	528	589	604	615	623	630	635	639	642	645
	100	229	387	541	566	584	597	607	615	622	627	631	635
	125	246	405	519	546	566	581	592	602	609	615	620	625
	150	264	422	499	528	550	566	579	589	597	604	610	615
	175	282	436	482	512	535	553	566	577	586	594	600	606
	200	299	421	467	498	522	540	554	566	576	584	591	597
	225	317	408	453	485	509	528	543	556	566	575	583	589
	250	331	396	441	473	498	517	533	546	557	566	574	581
	275	324	386	430	462	487	507	523	537	548	558	566	573
	300	317	377	421	452	478	498	514	528	540	550	559	566
	350	307	362	404	435	460	481	498	513	525	535	544	553
	400	298	350	390	420	445	466	483	498	511	522	532	540
	450	292	340	378	407	432	453	470	485	498	510	520	529
	500	286	331	367	396	421	441	459	474	487	498	509	519

EXAMPLE:

The following lines are to be tested simultaneously;

325'-10" pipe

75'-6" pipe

395'-4" pipe

Pipe under Test		Values from Nomograph	
Dia. d (in.)	Length L (ft.)	K	C
10"	325'	360	1.26
6"	$75' \times 10^{\frac{3}{4}} = 750'$	$\frac{300}{10^{\frac{3}{4}}} = 30$	$\frac{1.77}{10^{\frac{3}{4}}} = 0.18$
4"	395'	70	0.62
TOTALS		460	2.06
Time required (seconds) t_q		$\frac{460}{2.06}$	223

When length of line tested falls off the chart a multiple of ten may be used, with answers obtained being adjusted accordingly.



