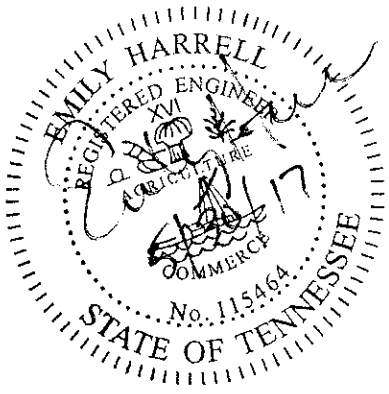
PROJECT MANUAL

FOR

WINDWARD SLOPES PARK IMPROVEMENTS



City of Lakeland
June 2017

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STANDARD
ADVERTISEMENT FOR BIDS
FOR
WINDWARD SLOPES PARK IMPROVEMENTS
FOR
CITY OF LAKELAND
LAKELAND, TENNESSEE

Notice is hereby given, pursuant to Tennessee Statute Section 16-19-104, the City of Lakeland, Tennessee, will receive sealed bids until 2:00 p.m., Local Time, June 6, 2017, for the following:
WINDWARD SLOPES PARK IMPROVEMENTS

Bids must be in one sealed envelope with statement thereon "BID ENCLOSED, WINDWARD SLOPES PARK IMPROVEMENTS" and be submitted to the receptionist at the City of Lakeland, Tennessee 10001 U.S. Highway 70, at or before the above stated time. Bids will be opened publicly, read aloud, and tabulated by the City Manager, or his or her Designee, at the above stated time and place, unless an alternative site is designated in writing prior to the time of Bid Opening. No bid may be withdrawn for a period of thirty (30) days after the date set for opening thereof. The City of Lakeland, Tennessee reserves the right to reject any or all bids and to waive any informalities or technicalities in the bidding; provided, however, that any bid received after the time specified or without accompanying Bid Guaranty, as stated below, will not be considered.

Bidding Documents, including specifications, are currently available from the City of Lakeland Tennessee, 10001 U.S. Highway No. 70, Lakeland Tennessee or www.lakelandtn.gov.

A Bid Guaranty in the form of a properly executed Bid Bond payable to the City in the amount of not less than 5% of the total base bid amount must accompany each bid. Pursuant to T.S. 12-4-201, in lieu of a Bid Bond, the following securities or cash may be substituted at the percentage rate required for such bond: United States treasury bond or general obligation bond or certificates of deposit irrevocably pledged from a state or national bank having its principle office in Tennessee or a state or federal saving and loan association having its principal office in Tennessee, or any state or national banks or state or federal savings and loans associations that has its principal office located outside of Tennessee and that maintains a branch in this state, or a letter of credit or cash. The successful Bidder will be required to execute an Agreement with the City, in the form supplied in the bidding documents, within thirty (30) days after Notice of Award is issued. The Notice of Award shall serve as notice that the Agreement is ready for execution. The Bid Guaranty shall be forfeited as liquidated damages if the Bidder fails to execute the Agreement within thirty (30) days after such Notice is issued, or fails to provide proper Bond or other form of Guaranty, as approved. The Bid Guaranty, if a Bid Bond, shall be executed by a surety or guarantee company authorized to do business in Tennessee. The Attorney-in-Fact who executes the Bond on behalf of the surety shall affix a certified and current copy of its Power of Attorney from the surety. No other type of Bid

Guaranty will be accepted. The City may proceed against a Bid Guaranty unless either: a) the Agreement has been executed by Contractor and Performance, and Labor and Material Payment Bonds have been furnished, as required; or, b) the specified time has elapsed so that Bids may be withdrawn; or, c) the Bid has been rejected.

Notice is hereby given that preference will be granted to Tennessee contractors, subcontractors, laborers, and materials, supplies, equipment, machinery, and provisions produced, manufactured, supplied, or grown in Tennessee, as required by Tennessee Statute Section 12-4-121 et seq.

A Pre-Bid Conference will be held at 1:00 p.m., Local Time, May 31, 2017, at Lakeland City Hall. A site tour may be held to review the Project following this conference. Contact for this Project is Emily Harrell, P.E. at (901) 867-2718.

Attendance in the Pre-Bid Conference is not mandatory for Contractors who wish to be considered qualified and/or responsible.

_____
Jim Atkinson
City Manager

Publish: May 24, 2017
May 31, 2017

STANDARD
INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS.

1.1 Terms used in these Instructions to Bidders have the meanings assigned to them in the Standard General Conditions, as modified by the Supplementary Conditions unless otherwise stated herein.

1.2 Certain additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof.

A. Bidder: One who submits a bid directly to the City.

B. Successful Bidder and/or Contractor: This term means the qualified, responsible, and responsive Bidder, as determined by the City, who has submitted the lowest bid, and to whom the City has awarded the Contract.

C. Bid Documents: Prior to award of the contract, all documents in the Bid Package are considered "Bid Documents." This includes the Advertisement for Bid, Instructions to Bidders, Bid Forms, Bond Forms, Sample Agreement, Standard General Conditions, Supplementary Conditions, Technical Specifications, drawings, etc. Bid Documents also include any addenda issued prior to the opening of the bids.

D. Contract Documents: Following the award of the contract, contract documents shall include those documents listed above in "C." -- with the exception of the Advertisement for Bid, Bid Bond and the Instructions to Bidders; the executed performance and payment bonds; change orders; and, all written agreements and/or written documents executed between the City and Contractor.

2. COPIES OF BIDDING DOCUMENTS.

2.1 Complete sets of Bidding Documents, which include the Advertisement for Bids, these Instructions to Bidders, Bid Form, Bid Bond, Contract Documents, and Addenda, may be obtained from the City of Lakeland, Engineering Office, 10001, U.S. Highway 70, Lakeland, Tennessee 38002.

2.2 Complete sets of Bidding Documents must be used in preparing Bids; the City assumes no responsibility to Bidders for errors or misinterpretations, including those resulting from the use of incomplete sets of Bidding Documents.

2.3 The City, and/or its agent, in making copies of Bidding Documents available on the above terms, does so only for the purpose of obtaining Bids on the Work and does not confer a license or grant for any other use.

3. QUALIFICATIONS OF BIDDERS.

3.1 Pre-qualification Requirements: Attendance at the Pre-Bid Conference may be considered by the City in determining a Bidder's qualifications. Consult Section 5 below.

3.2 Post Bid Qualifications: To demonstrate qualifications to perform the Work, each Bidder must be prepared to submit within five (5) days of Owner's request written evidence demonstrating Bidder's responsibility, including, but not limited to, matters such as financial data and previous experience. Each Bid will be considered a warrant of Bidder's qualification to do business in this state. Proof of such qualifications may be required upon five (5) days notice.

3.3 Bidding Preferences: Pursuant to T.S. 12-4-802 whenever the lowest responsible and responsive bidder on a public construction project in this state is a resident of another state which is contiguous to Tennessee and which allows a preference to a resident contractor of that state, a like reciprocal preference is allowed to the lowest responsible and responsive bidder on such project who is either a resident of this state or is a resident of another state which does not allow for a preference to a resident contractor of that state.

3.4 Responsible and Responsive Bidders: Pursuant to TS 12-4-801, a responsible bidder means a person who has the capacity in all respects to perform fully the contract requirements, and the integrity and reliability which will assure good faith performance and; and Responsive Bidder means a person who has submitted a bid which confirms in all material respects to all document, whether attached or incorporate by reference, utilized for soliciting bids.

4. PRE-BID CONFERENCE.

A Pre-bid Conference will be held at the time and place stated in the "Advertisement for Bid." Attendance at the Pre-bid Conference is not mandatory.

The purpose of the Conference is to review project requirements and provide bidders an opportunity to visit the project site to make their own determination of existing conditions.

Minutes will be taken of the Pre-bid Conference, and thereafter consulted as a bidding document.

5. EXAMINATION OF CONTRACT DOCUMENTS AND SITE.

5.1 Before submitting a Bid, each Bidder must do at least the following:

A. Examine the Bidding Documents thoroughly;

B. Visit the site to become familiar with local conditions that may in any manner affect cost progress, or performance of the Work;

C. Become familiar with federal, state, and local laws, ordinances, rules, and regulations that may in any manner affect cost, progress, or performance of the work; and

D. Study and carefully correlate Bidder's observations with the Bidding Documents.

5.2 Reference is made to the Supplementary Conditions, for the identification of those reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress, or performance of the work which has/have been relied upon by Engineer in preparing the Drawings and Specifications. The City will provide copies of such reports for review to any Bidder requesting them (if applicable). These reports are not guaranteed as to accuracy or completeness. Before submitting a Bid each Bidder will, at its own expense, make such additional investigations and tests as the Bidder may deem necessary to determine the time, price, and other terms and conditions of the Contract Documents.

5.3 On request the City will provide each Bidder access to the site to conduct such investigations and tests as each Bidder deems necessary for submission of his Bid. The City may require any Bidder desiring access to execute an appropriate release form.

5.4 The lands upon which the work is to be performed, right-of-way for access thereto and other lands designated for use by Contractor in performing the work are identified in the Supplementary Conditions, Special Provisions, and/or Drawings.

5.5 The submission of a Bid will constitute an incontrovertible representation by the Bidder that: Bidder has read and understands the Bidding Documents and the Bid is made in accordance therewith; Bidder has visited the site and become familiar with the local conditions under which the work is to be performed; Bidder assumes responsibility for estimating properly the difficulties and costs of successfully performing the work; Bidder has complied with every requirement of these instructions; and that the Bidding Documents are sufficient in scope and detail to indicate and convey an understanding of all terms and conditions for performance of the Work.

6. AVAILABILITY OF LANDS.

6.1 Access to private property required by Contractor for staging areas, temporary facilities or other uses in addition to those identified in the Bidding or Contract Documents shall be obtained and paid for by Contractor. Such costs are to be considered incidental to the Contract and merged with Bid Items described and are to be provided without additional compensation to Contractor.

7. INTERPRETATIONS.

All questions about the meaning or intent of the Bidding Documents shall be submitted to Engineer in writing. Replies will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than ten (10) days prior to the date for opening the Bids will not be answered. Only questions answered by formal written Addenda will be binding. Oral interpretations, clarifications, or comments are not binding upon the City, and do not serve to amend, modify, or in any way change the basic Bidding Documents, and shall be relied upon by Bidder at his own risk.

8. BID GUARANTY.

8.1 A Bid Guaranty in the form of a properly executed Bid Bond payable to the City in the amount of not less than 5% of the total base bid amount must accompany each bid. Pursuant to T.S. 12-4-201, in lieu of a Bid Bond, the following securities or cash may be substituted at the percentage rate required for such bond: United States treasury bond or general obligation bond or certificates of deposit irrevocably pledged from a state or national bank having its principle office in Tennessee or a state or federal saving and loan association having its principal office in Tennessee, or any state or national banks or state or federal savings and loans associations that has its principal office located outside of Tennessee and that maintains a branch in this state, or a letter of credit or cash. The successful Bidder will be required to execute an Agreement with the City, in the form supplied in the bidding documents, within thirty (30) days after Notice of Award is issued. The Notice of Award shall serve as notice that the Agreement is ready for execution. The Bid Guaranty shall be forfeited as liquidated damages if the Bidder fails to execute the Agreement within thirty (30) days after such Notice is issued, or fails to provide proper Bond or other form of Guaranty, as approved. The Bid Guaranty, if a Bid Bond, shall be executed by a surety or guarantee company authorized to do business in Tennessee. The Attorney-in-Fact who executes the Bond on behalf of the surety shall affix a certified and current copy of its Power of Attorney from the surety. No other type of Bid Guaranty will be accepted. The City may proceed against a Bid Guaranty unless either: a) the Agreement has been executed by Contractor and Performance, and Labor and Material Payment Bonds have been furnished, as required; or, b) the specified time has elapsed so that Bids may be withdrawn; or, c) the Bid has been rejected. .

8.2 The Bid Guaranty of the Successful Bidder will not be released unless and until such Bidder has executed the Agreement and furnished the required contract Bond(s). If the successful Bidder fails to execute and deliver the Agreement and furnish the required Contract Bonds within thirty (30) days of the Notice of Award, or fails to proceed with the performance of the Contract, the City may annul the Notice of Award and the Bid Guaranty of that Bidder will be forfeited as liquidated damages, it being agreed that exact damages are difficult or impossible to calculate, and the Bid Guaranty amount is the best estimate.

9. CONTRACT TIME.

The number of days within which, or the date by which, the Work is to be completed (the Contract Time) is set forth in the Bid Form and will be included in the Agreement.

10. LIQUIDATED DAMAGES.

Provisions for liquidated damages are to be set forth in the Agreement.

11. MATERIAL AND EQUIPMENT.

11.1 The materials, products, and equipment described in the Bidding Documents establish a standard or required function, dimension, appearance, and quality to be met by any proposed substitution.

11.2 Materials containing asbestos will not be accepted.

11.3 No substitution will be considered unless written request for approval has been submitted by the Bidder on an appropriate form, and has been received by the Engineer or the City's designated agent at least TEN (10) DAYS prior to the date for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, cuts, performance and test data, and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment, or work that incorporation of the substitute would require, shall be included. The burden of proof of the merit and adequacy of a proposed substitute is upon the Bidder. The decision of approval or disapproval of a proposed substitution by the Engineer or the City's designated agent will be final.

If any proposed substitution is approved, such approval will be described in an addendum. Bidders shall not rely upon approvals made in any other manner.

11.4 When generic parameters for performance and/or appearance are specified, those materials which comply with specifics as delineated do not require a written request for approval. They must be capable of withstanding specification comparison, however, at the time of product data and shop drawing submittal.

12.5 Pursuant to T.S. 12-4-121, "Preference is hereby given to materials, supplies, equipment, machinery, and provisions produced, manufactured, supplied or grown in Tennessee, quality being equal to articles offered by the competitors outside of the State."

12. SUBCONTRACTORS, ETC.

12.1 If required by the City, the identity of certain Subcontractors and other persons and organizations shall be submitted to the City in advance of the Notice of Award. The apparent Successful Bidder, and any other Bidder so requested by the City, will within seven (7) days after the day of the Bid opening, submit to the City a list of names and addresses of all Subcontractors and

other persons and organizations whom Bidder proposes will furnish material and/or equipment for the Work. Such list shall be accompanied by an experience statement with pertinent information as to similar projects and other evidence of qualification for each Subcontractor, person, and organization if requested by the City. If the City or Engineer after due investigation has reasonable objection to any proposed Subcontractor, or other person, or organization, the City may, before giving the Notice of Award, request the apparent Successful Bidder to submit an acceptable substitute without an increase in Bid price. If the apparent Successful Bidder declines to make any such substitution and the Agreement is not awarded to such Bidder for that reason, the Bidder's refusal will not constitute grounds for forfeiting the Bid Guaranty. Any Subcontractor, other person, or organization so listed and to whom the City or Engineer does not make written objections prior to giving of the Notice of Award will be deemed acceptable to the Owner and Engineer.

13. BID FORM

13.1 The Bid Form is included with the Bidding Documents. Bidders shall bid all schedules and alternates (if any) as set forth in the Bid Form.

13.2 Bid Forms must be completed in ink or by typewriter. Corrections must be initialed by the Bidder. The Bid price of each item on the form must be stated in words and numerals; in case of a conflict, words will take precedence.

13.3 Bids by corporations or limited liability companies must be executed in the business entity's name by the president or a vice-president (or other officer or member accompanied by evidence of authority to sign), and the signature attested to by an authorized officer or member. The business entity's address and state of incorporation shall be shown below the signature.

13.4 Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature. The official address of the partnership must be shown below the signature.

13.5 All names must be typed or printed below the signature.

13.6 The bid shall contain an acknowledgment of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form). Failure to acknowledge receipt of Addenda shall not constitute an adjustment of the Contract Price provided on the Bid Form.

13.7 The address to which communications regarding the Bid are to be directed must be shown.

13.8 All items which are not specifically referred to in the Bid Form but are included in the plans or specifications are to be considered incidental to the performance of the major work described and shall be constructed as indicated on the plans or called for in the specifications without additional remuneration.

14. SUBMISSION OF BIDS.

14.1 Bids shall be submitted not later than the time and at the place indicated in the Advertisement for Bids and shall be included in an opaque sealed envelope, marked with the Project title and name and address of the Bidder and accompanied by the Bid Guaranty and other required documents. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face thereof. All bidding information shall be included in the sealed envelope.

14.2 Contractors' Licenses, Bids Contractors and electrical, plumbing, and HVAC subcontractors who do jobs costing $25,000 or more must be licensed by the state (T.C.A. § 62-6-102, T.C.A. § 62-6-111). Officials issuing a permit or work order to an unlicensed contractor are guilty of a Class A misdemeanor (T.C.A. § 62-6-120). The name, license number, license expiration date, and classification of contractors applying to bid on jobs must appear on the bid envelope when the bid is more than $25,000. If the bid is less than $25,000, only the name of the contractor must appear on the outside of the envelope. Upon opening the envelope, if the bid exceeds $25,000, the bid is automatically disqualified (T.C.A. § 62-6-119(b)). The name of a prime contractor who does electrical, plumbing, heating, ventilation, and air conditioning must appear on the outside of the envelope. Failure of a bidder to comply voids the bid, and it may not be opened. It is a ClassA misdemeanor for any person to disregard the above requirements. Municipalities may not impose additional licensing requirements on state-licensed contractors (T.C.A. § 62-6-111(i)(2)(c)). T.C.A. § 62-6-137, however, allows municipalities to require a permit bond for contractors to ensure that the contractor complies with applicable laws and ordinances. Approving the permit bond program requires a two-thirds vote of the governing body.

15. MODIFICATION AND WITHDRAWAL OF BIDS.

15.1 Bids may be modified or withdrawn by an appropriate document duly executed (in the same manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

15.2 If, within twenty-four (24) hours after Bids are opened, any bidder files a duly signed written notice with the City and promptly thereafter demonstrates to the satisfaction of the City that there was a material and substantial mistake in the preparation of his Bid, that Bidder may withdraw its Bid and the Bid Guaranty will be returned. Thereafter, that Bidder will be disqualified from further bidding on the Work.

16. OPENING OF BIDS.

Bids will be opened publicly and read aloud. An abstract of the bid schedule will be made available after the opening of Bids.

17. BIDS TO REMAIN EFFECTIVE.

All Bids not modified or withdrawn as provided in Section 16, shall remain effective for thirty (30) days after the day of the Bid opening, but the Owner may, in its sole discretion, release any Bid and return the Bid Guaranty prior to that date.

18. AWARD OF CONTRACT.

18.1 The City reserves the right to reject any and all Bids; to waive any and all irregularities or informalities; to negotiate specific contract terms not inconsistent with the Advertisement for Bids, with the Successful Bidder; and to disregard all nonconforming, nonresponsive, unbalanced, or conditional Bids. Discrepancies between words and numerals will be resolved in favor of words. Discrepancies between the indicated sum of any column of numerals and the correct sum thereof will be resolved in favor of the correct sum.

18.2 A Bidder shall bid all schedules and alternates (if any) as set forth in the Bid Form. The City reserves the right in awarding the Agreement to consider the competency, responsibility, and suitability of the Bidder, as well as the amounts of the various bids. The Work, therefore, may not necessarily be awarded to the low bidder.

18.3 In evaluating Bids, the Owner reserves the right to limit the scope of the project to the monies available for the project.

18.4 The Owner may consider, among other things, the qualifications and experience of Subcontractors and other persons and organizations who are proposed to furnish material or equipment for the Work; operating costs; maintenance considerations; performance data; and guarantees of materials and equipment.

18.5 The Owner may conduct such investigations as it deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualification, and financial ability of the Bidders, proposed Subcontractors, and other persons and organizations proposed to do the Work in accordance with the Bidding Documents.

18.6 If the Agreement is to be awarded, it will be to the lowest Bidder who is determined qualified and responsible in the sole discretion and best interest of the City. The low bid shall be determined based upon an evaluation of the Total Base Bid. The City reserves the right to accept or reject alternates in any order or combination; and to accept or reject any schedule or all schedules.

If the low bid is to be awarded in any other manner, applicable laws must be consulted and the above paragraphs must be modified.

18.7 If the Agreement is to be awarded, the Owner will give the Successful Bidder a Notice of Award within thirty (30) Days after the day of the Bid opening.

19. PERFORMANCE AND PAYMENT BONDS AND INSURANCE CERTIFICATES.

The General and Supplementary Conditions set forth the City's requirements as to Performance and Payment Bonds and Insurance Certificate(s). When the Successful Bidder delivers the executed Agreement to the Owner, it shall be accompanied by the required Bonds and Insurance Certificate(s).

19.1 Pursuant to T.S. 12-4-201, no contract shall be let for any public work in this state, by any city, county or state authority, until the contractor shall have first executed a good and solvent bond to the effect that the contractor will pay for all the labors and materials used by the contractor, or any immediate or remote subcontractor under the contractor, in such contract, in lawful money of the United States. The bond to be so given shall be for twenty-five (25%) of the contract price on all contracts in excess of one hundred thousand dollars ($100,000). Where advertisement is made, the condition of the bond shall be stated in advertisement; provided that T.S. 12-4-201 shall not apply to contracts of one hundred thousand dollars ($100,000) or less.

20. SIGNING OF AGREEMENT.

When the City gives a Notice of Award to the Successful Bidder, it will be accompanied by one (1) unsigned counterpart of the Agreement and the Performance and Payment Bonds. Within thirty (30) days thereafter, Contractor shall comply with the conditions precedent in the Notice of Award. Within ten (10) days thereafter, the City will deliver one (1) fully signed counterpart to Contractor. The City will deliver one signed copy of the Agreement within the project manual.

Notes:

Revised 10.11.09 paragraph 14.1 and 14.2

EXHIBIT "A"
STANDARD
BID FORM

PROJECT IDENTIFICATION: City of Lakeland, Tennessee
Project Description: Windward Slopes Park Improvements

THIS BID SUBMITTED TO: City of Lakeland, Tennessee
10001 U.S. Highway 70
Lakeland, Tennessee 38002

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with the City in the form included in the Bidding Documents and to complete all Work as specified or indicated in the Bidding Documents for the Contract Price by August 25, 2017, and completed and ready for final payment not later than September 1, 2017, in accordance with the Bidding Documents.

2. Bidder accepts all of the terms and conditions of the Advertisement for Bids and Instructions to Bidders, including without limitation those dealing with the disposition of Bid Guaranty. This Bid will remain effective for thirty (30) days after the day of Bid opening. Bidder will sign the Agreement and submit the Bonds and other documents required by the Bidding Documents within thirty (30) days after the date of the City's Notice of Award.

3. Notice that preferences will be granted pursuant to Tennessee Statutes is hereby acknowledged.

4. In submitting this Bid, Bidder represents, as more fully set forth in the Bidding Documents, that:

   A. Bidder has examined copies of all the Bidding Documents and of the following addenda (receipt of all which is hereby acknowledged):

      Addendum No. _____ Dated _____
      Addendum No. _____ Dated _____

   B. Bidder has examined the site and locality where the work is to be performed, the federal, state, and local Laws and Regulations, and the conditions affecting cost, progress, or performance of the work and has made such independent investigations as Bidder deems necessary;

C. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, corporation, or other business entity. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid. Bidder has not solicited or induced any person, firm, or a corporation to refrain from bidding. Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or against the City.

D. Each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not on the list created pursuant to Tennessee Statute 12-12-106

5. Bidder is bidding all schedules, alternates, if any, and will complete the Work for unit price(s) stated on the attached bid schedule based on materials actually furnished and installed and services actually provided. The Bid is summarized below on the basis of estimated quantities:

TOTAL BASE BID, IN NUMERALS: $_____

TOTAL BASE BID, IN WORDS: _____
_____ DOLLARS.

7. Bidder agrees that the work for the City will be as provided above.

8. Bidder accepts the provisions of the Bidding Documents as to liquidated damages in the event of failure to complete the work on time, unless otherwise stated as provided below. Bidder agrees that such liquidated damages are not a penalty and that the amount provided is as close an estimate as possible to actual damages. Any exceptions or objections to this provision are stated in writing and attached hereto by Bidder.

9. The following documents are attached to and made a condition of this Bid:

A. Required Bid Guaranty in the form of a Bid Bond. (Unless otherwise provided by the City.)

B. Itemized Bid Schedule.

10. Communications concerning this Bid shall be addressed to:

Address of Bidder: _____
_____
_____

11. The terms used in this Bid are defined in and have the meanings assigned to them in the General Conditions, except as provided in the Supplementary Conditions and Bidding Documents.

Submitted on _____, 2017.

Bidder is bidding as a _____ (Insert Resident or Non-Resident)

IF BIDDER IS:

AN INDIVIDUAL

By: _____ (seal)
(Individual's Name)

doing business as: _____

Business Address: _____
_____
_____

Phone Number: _____

A PARTNERSHIP

By: _____ (seal)
(Firm's Name)

_____
(General Partner)

Business Address: _____
_____
_____

Phone Number: _____

A CORPORATION OR LIMITED LIABILITY COMPANY

By: _____ (seal)
(Corporation's or Limited Liability Company's Name)

_____
(State of Incorporation or Organization)

By: _____ (seal)

(Title)

(Seal)

Attest: _____

Business Address: _____
_____
_____

Phone Number: _____

A JOINT VENTURE

By: _____ (seal)
(Name)

_____
(Address)

By: _____ (seal)
(Name)

_____
(Address)

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Bid Schedule
Windward Slopes Park Improvements

BID DATE:_____
COMPANY NAME: _____
ADDRESS: _____

Contractor shall furnish and install items as shown on the Drawings or called for in the Specifications. All costs not included in the schedule that are necessary to provide a complete, functional project as depicted in the Drawings and Specifications are to be considered incidental and merged with costs of other related bid items.

LS = Lump Sum R&R = Remove and Replace LF = Linear Feet F&I = Furnish and Install SYI = Square Yard Inch
SY = Square Yard FA = Force Account CY = Cubic Yard EA = Each Ton = Ton

Schedule A –

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
1	Earthwork	LS	1		
2	F&I 12" PVC Drain Pipe	LF	322		
3	F&I PVC Drain Inlet	EA	5		
4	F&I Type E Headwall	EA	1		
5	F&I Tiffway 419 Bermuda Sod	SY	3,400		
6	F&I Silt Fence	LF	300		
7	F&I Construction Fence	LF	400		
8	F&I Inlet Protection	EA	5		
9	R&R Sanitary Sewer Cleanout	EA	1		
10	R&R Asphalt Pavement	SF	120		
11	F&I Class B Rip Rap	CY	8		
			Total Bid Schedule A		

Total Base Bid :_____

_____Dollars ($_____).

STANDARD
BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____ as Principal, and _____ as Surety, are hereby held and firmly bound, unto the City of Lakeland, Tennessee a Municipal Corporation as OWNER, in the penal sum of _____Dollar(s) ($ _____) for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns, which represents five percent (5%) of the Principal's Total Base Bid.

The Condition of the above obligation is such that whereas the Principal has submitted to the City of Lakeland, Tennessee a certain BID, whereby it has offered to enter into an Agreement in writing with OWNER, for Windward Slopes Park Improvements

NOW, THEREFORE,

A. If said BID shall be rejected; or,

B. If said BID shall be accepted and the Principal shall execute and deliver the Agreement to OWNER within thirty (30) days after Notice of Award (which shall constitute presentation of the Agreement to the Principal for the purpose of execution) and shall furnish Guarantors as provided in the Bidding Documents for this Project for Principal's faithful performance of said Agreement and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall otherwise proceed with the performance of said Agreement, then this obligation shall be void, otherwise the same shall remain in full force and effect and OWNER may proceed against the BOND. It is expressly understood and agreed, however, that the liability of Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by an extension of the time within which the OWNER may accept such BID, to a maximum of ninety (90) days after its submission to OWNER; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, this ____ day of _____, 2017.

Attest:

Principal (Corporation, Partnership, Individual)

_____
Secretary or Authorized Witness

By
(Authorized Representative)

(Seal)

_____
(Print or Type Name)

_____
Address

_____

State of _____)
)ss.
County of _____)

The foregoing Bid Bond was executed before me by _____, on behalf of _____, this ____ day of _____, 2017.

_____
Notary Public

My Commission Expires: _____

_____
Surety

BY: _____
Attorney-in-Fact for Surety

_____
Address

_____

State of _____)
) ss.
County of _____)

The foregoing Bid Bond was executed before me by _____, who represented that he/she was the Attorney-in-Fact for the above named Surety, this _____ day of _____, 2017.

_____
Notary Public

My Commission Expires: _____

STANDARD FORM OF
AGREEMENT BETWEEN OWNER AND CONTRACTOR

THIS AGREEMENT is made between the City of Lakeland, hereinafter referred to as the "Owner," and _____, hereinafter referred to as the "Contractor."

WHEREAS, the City of Lakeland is desirous of park improvements in Windward Slopes Park; and,

WHEREAS, _____, is able and willing to provide those services to the City of Lakeland, Tennessee.

NOW, THEREFORE, it is hereby agreed as follows:

ARTICLE 1. WORK.

Contractor shall perform all the work required by the Contract documents for Windward Slopes Park Improvements, Lakeland, Tennessee.

ARTICLE 2. ENGINEER.

The Project has been designed by the City of Lakeland Engineering Office, 10001 U.S. Highway 70, Lakeland, Tennessee, who is hereinafter referred to as the "Engineer" and who is to act as Owner's representative, assume all duties and responsibilities and have the rights and authority assigned to Engineer in the Contract documents in connection with completion of the Work in accordance with the Contract documents.

ARTICLE 3. CONTRACT TIME.

3.1 The Work will be substantially completed by August 25, 2017, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions by September 1, 2017.

3.2 Liquidated Damages. Owner and Contractor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not substantially completed by the time specified in Paragraph 3.1 above, plus any extension thereof allowed in accordance with Article 15 of the General Conditions. They also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not substantially completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay Owner one Hundred Dollars ($100.00) for each day that expires after the time specified in Paragraph 3.1 for substantial completion. After Substantial Completion, if the Contractor shall neglect, refuse, or fail to complete the remaining work within the time specified in paragraph 3.1 for completion and readiness for final payment or any proper extension thereof granted by Owner,

Contractor shall pay Owner One Hundred Dollars ($100.00) for each day that expires after the time specified in paragraph 3.1 for completion and readiness for final payment. It is further agreed that such liquidated damages are not a penalty, but represent the parties' best estimate of actual damages.

ARTICLE 4. CONTRACT PRICE.

In Consideration of the performance of the work in accordance with the Contract documents for this Unit Price Contract, Owner shall pay Contractor in current funds a not-to-exceed total contract price of _____ Dollars ($_____), subject to additions and deductions by Change Order approved by the Owner. The contract fee shall be based on materials actually furnished and installed and services actually provided based on the unit prices contained in the Bid Form and Itemized Bid Schedule, included as Exhibit "A" (pages BF-1 -- BS-1) and by this reference made a part of this Agreement.

ARTICLE 5. PAYMENT PROCEDURES.

Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed through the Engineer as provided in the General Conditions.

5.1 Progress Payments. Owner shall make progress payments on the basis of Contractor's Applications for Payment as recommended by Engineer, on or about the 25th day of each month during construction as provided below. All progress payments will be on the basis of the progress of the Work measured by the Schedule of Values provided for in Paragraph 15 of the General Conditions, subject to the cutoff and submittal dates provided in the General Provisions.

5.1.1 During the course of the Contract progress payments will be made in an amount equal to 95% of the Work completed, less in each case the aggregate of payments previously made.

5.1.2 In the event the Contractor makes only one application for payment upon substantially completing the Work, progress payment will be made in an amount equal to 95% of the Work completed. Owner shall withhold five percent (5%) of the work completed as retainage, said retainage to be paid in accordance with the provisions of Paragraph 5.2, Final Payment.

5.2 Final Payment. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Engineer shall recommend payment and present Contractor's Final Application for Payment to the City in accordance with Tennessee Statutes 54-5-122. Before final acceptance of the project as having been finally completed, the contractor shall furnish evidence of payment in full for materials and labor to the City in accordance with Tennessee 54-5-122. When this is done, full settlement may be made with the contractor, but not until thirty (30) day's notice is some newspaper published in the county where the work is done, if there is a newspaper there, and if not, in a newspaper in an adjoining county that settlement is about to be

made and notifying all claimants to file notice of their claims with the officials and the period for filing shall not be less than thirty (30) days after the last published notice. In the event claims are filed, the officials shall withhold a sufficient sum to pay the claims in the same way and manner as is provided for claimants making claims against contractors dealing with the Department of Transportation in accordance with Statutes 54-5-123, and claimants may bring suits against contractors in the way and manner provided in 54-5-124, as suits are brought against contractors dealing with the department. Where claims are allowed by the Courts, Statutes 54-5-125 and 54-5-127 shall be applicable.

ARTICLE 6. WITHHELD FUNDS.

Pursuant to Tennessee Statutes Section 66-11-104 et seq., withheld percentages for Contracts exceeding $500,000.00 will be retained in an account in the name of the Contractor (except when specifically waived in writing by Contractor) which has been assigned to the Owner until the Contract is completely, satisfactorily, and finally accepted by the Owner. Unless a depository is designated by the Contractor in a written attachment hereto, the Contractor's signature hereon shall act as authority for the Owner to designate a retainage depository on behalf of the Contractor, for the purposes specified in Tennessee Statutes Section 66-11-104. The Contractor's signature hereon shall act as an assignment of the depository account to the Owner, as provided by Tennessee Statutes Section 66-11-104 et seq., whether the depository is designated by the Contractor or by the Owner.

ARTICLE 7. CONTRACTOR'S REPRESENTATIONS.

In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

7.1 Contractor has familiarized himself with the nature and extent of the Contract documents, Work, locality, and with all local conditions and federal, state, and local Laws and Regulations that in any manner may affect cost, progress, or performance of the Work.

7.2 Contractor has studied carefully all reports of investigations and test of subsurface and latent physical conditions at the site or otherwise affecting cost, progress, or performance of the Work which were relied upon by Engineer in the preparation of the Drawings and Specifications and which have been identified in the Supplementary Conditions.

7.3 Contractor has made or caused to be made examinations, investigations, and test and studies as he deems necessary for the performance of the Work at the Contract price, within the Contract Time, and in accordance with the other terms and conditions of the Contract documents; and no additional examinations, investigations, tests, reports, or similar data are or will be required by Contractor for such purposes.

7.4 Contractor has correlated the results of all such observations, examinations, investigations, tests, reports, and data with the terms and conditions of the Contract documents.

7.5 Contractor has given Engineer written notice of all conflicts, errors, or discrepancies that he has discovered in the Contract documents and the written resolution thereof by Engineer is acceptable to Contractor.

ARTICLE 8. CONTRACT DOCUMENTS.

The Contract documents which comprise the entire agreement between Owner and Contractor are attached to this Agreement, made a part hereof and consist of the following:

8.1 This Agreement (Pages SFA-1 to SFA-5, inclusive).

8.2 Joint Account Agreement or Letter of Forfeiture waiving same (if applicable)

8.3 Exhibit "A" - Bid Form and Bid Schedule.

8.4 Affidavit of Drug Free Work Program

8.5 Addendum __

8.6 Performance Bond

8.7 Certificates of Insurance, of Workers' Compensation Coverage, and of Unemployment Insurance Coverage.

8.8 2013 Standard General Conditions of the Construction Contract (Pages i to 62, inclusive).

8.8 Standard Supplementary Conditions (Pages SSC-1 to SSC-16, inclusive).

8.9 General Requirements, consisting of seven (7) sections

8.10 Special Provisions (Section 01810)

8.11 Technical Specifications consisting of seven (7) sections

8.12 Notice of Award.

8.13 Notice to Proceed.

8.14 Minutes of the Pre-Bid Conference, if any.

8.15 Shop Drawings and other Submittals furnished by Contractor during performance of the Work and accepted by the Owner.

8.16 Any modifications, amendments, and supplements, including Change Orders, issued pursuant to Article 11 of the General Conditions, on or after the effective date of this Agreement.

8.17 Notice of Substantial Completion.

ARTICLE 9. MISCELLANEOUS PROVISIONS.

9.1 The CONTRACTOR hereby agrees, warrants, and assures compliance with the provisions of Title VI and VII of the Civil Rights Act of 1964 and all other federal statutory laws which provide in whole or in part that no person shall be excluded from participation or be denied benefits of or be otherwise subjected to discrimination in the performance of this Contract or in the employment practices of the CONTRACTOR on the grounds of handicap and/or disability, age, race, color, religion, sex, national origin, or any other classification protected by federal, Tennessee State Constitutional or statutory law. The CONTRACTOR shall upon request show proof of such non-discrimination and shall post in conspicuous places available to all employees and applicants notices of non-discrimination.

Terms used in this Agreement, which are defined in the General Conditions, shall have the meanings designated in those conditions.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed in one (1) original copy on the day and year first above written.

APPROVED AS TO FORM:

_____

(PROJECT:_____)

DATED this _____ day of _____, 2017

ATTEST:

CONTRACTOR:

_____

_____

_____

By: _____

Title: _____

By: _____

Title: _____

ATTEST:

By: _____
Jessica Millspaugh
Title: City Recorder

OWNER:
CITY OF LAKELAND, TENNESSEE
A Municipal Corporation

By: _____
Wyatt Bunker
Title: Mayor

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

PERFORMANCE BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:
City of Lakeland
10001 Highway 70
Lakeland, TN 38002

CONSTRUCTION CONTRACT
Effective Date of the Agreement:
Amount: $
Description *(name and location)*: Windward Slopes Park Improvements

BOND
Bond Number:
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:
Amount:
Modifications to this Bond Form: ☐ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

_____ *(seal)*
Contractor's Name and Corporate Seal

By: _____
Signature

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

SURETY

_____ *(seal)*
Surety's Name and Corporate Seal

By: _____
Signature *(attach power of attorney)*

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

DRUG-FREE WORKPLACE AFFIDAVIT

STATE OF _____

COUNTY OF _____

The undersigned, principal officer of _____, an employer of five (5) or more employees contracting with _____County government to provide construction services, hereby states under oath as follows:

1. The undersigned is a principal officer of _____(hereinafter referred to as the "Company"), and is duly authorized to execute this Affidavit on behalf of the Company.

2. The Company submits this Affidavit pursuant to T.C.A. § 50-9-113, which requires each employer with no less than five (5) employees receiving pay who contracts with the state or any local government to provide construction services to submit an affidavit stating that such employer has a drug-free workplace program that complies with Title 50, Chapter 9, of the *Tennessee Code Annotated.*

3. The Company is in compliance with T.C.A. § 50-9-113.

Further affiant saith not.

_____
Principal Officer

STATE OF _____

COUNTY OF _____

Before me personally appeared _____, with whom I am personally acquainted (or proved to me on the basis of satisfactory evidence), and who acknowledged that such person executed the foregoing affidavit for the purposes therein contained.

Witness my hand and seal at office this _____day of _____, 20_____.

_____
Notary Public

My commission expires: _____

SECTION 01010

SUMMARY OF WORK

A. Project Identification:

Windward Slopes Park Improvements

B. Project Summary:

This project consists of constructing an athletic field in Windward Slopes Park. Work includes grading, installation of storm drain structures, soil amendments and sod.

The contractor is responsible for all utility locates in the area of work and for those that may be affected by the construction. Coordination with utility company will be required. The location and depth of all utilities shown on the Construction Plans is estimated. Contractor should use caution when excavating in these areas.

Temporary traffic control measures shall be used during all phases of construction. Access to the park shall be provided throughout the project.

All construction material shall be removed and properly disposed of in accordance with State and local regulations within the time limits of the project. Removal and hauling away of all construction debris including unsuitable soils shall be the responsibility of the Contractor.

A general description of the work includes the following; however this is not an exhaustive list:

- Construction area shall be fenced with temporary construction fencing to restrict access.
- Grading shall be restricted to the areas as shown in the plans.
- Furnish and install PVC drain pipe and inlets as specified in the plans (or approved equal). Headwall shall be concrete Type E with wingwalls per City of Lakeland specifications.
- Existing sewer cleanout shall be capped and relocated outside of the athletic field.
- Erosion control measures shall be installed and approved prior to commencing construction. Silt fence shall be used along all down slopes.
- Remove and replace asphalt walking trail damaged during construction. Asphalt shall be TDOT 411.E.
- Prior to placing sod, soil shall be amended on the athletic field as specified in the plans. Sod shall be Tiffway 419 Bemuda or approved equal.
- All other disturbed areas shall be graded and stabilized with sod upon completion of construction. These areas shall be returned to a condition equal to that prior to construction.

C. Particular project requirements.

1. Apply for, obtain, and pay for permits when required to perform the work.

2. Field-verify dimensions indicated on drawings (when applicable) before fabricating or ordering materials. Do not scale drawings.

3. Notify Owner of existing conditions differing from those indicated on the drawings. Verify the existence and location of underground utilities along the route of proposed work. Omission from, or inclusion of, locations on the drawings, is not to be considered as the nonexistence of, or the definite location of, existing underground utilities. Do not remove or alter existing utilities without prior written approval.

6. The Contract Documents are intended to provide the basis for proper completion of the work suitable for the intended use of the Owner. Anything not expressly set forth but which is reasonably implied or necessary for proper performance of the project shall be included.

7. The Provisions are written in the imperative mode. Except where specifically intended otherwise, the subject of all imperative statements is the Contractor. For example, "furnish..." means "Contractor shall furnish..."

END OF SECTION

SECTION 01100

GENERAL CONSTRUCTION REQUIREMENTS

PART 1 - Description.

To establish uniform requirements for construction of water distribution facilities, sanitary sewerage collection facilities, storm sewer collection systems, streets, and associated appurtenances which will enable the construction to be performed in accordance with Local, State, and Federal laws.

1.01 Definitions.

A. For the purposes of these specifications, the words and phrases set out in the following articles shall have the meanings as follows:

1. "City" means the governing body of the city of Lakeland, TN.

2. "Contractor" means the individual, partnership, firm, or corporation contracting with the developer or the City which will be performing the work, or which will be performing the construction activities.

3. "Developer" means partnership, firm, or corporation developing property where construction will be performed.

4. "Engineer" means the consultant or City Engineer.

5. "Owner" means the individual, partnership, firm or corporation being the owner of record of property where construction will be performed.

6. "Underground facility" means any item of personal or public property buried or placed below ground for use in connection with the storage or conveyance of electronic, water, sewage, telephonic or telegraphic communications, cable television, electric energy, oil, gas, hazardous liquids, or other substances and including, but not limited to pipes, sewers, water, storm water, conduits, cables, valves, lines, wires, manholes, and attachments.

B. The following abbreviations shall have the designated meanings:

1. "APWA" means the American Public Works Association.

2. "ASTM" means the American Society for Testing and Materials.

3. "AWWA" means the American Water Works Association.

4. "AASHTO" means the American Association of State Highway & Transportation Officials.

C. Reference to a specific specification, i.e., AWWA C900, means the latest Edition of that specification.

PART 3 Execution

3.01 Scheduling and Construction Progress.

A. Prior to the start of any work, the Contractor shall submit in writing to the Engineer for review, a progress schedule that shall be followed as closely as possible. Progress scheduling using critical path method is approved and encouraged. Once work has started on a street, it must be pursued continuously until all work on that street is finished.

1. The Contractor shall schedule a preconstruction conference prior to the start of work. Persons attending shall include representatives of the Contractor, subcontractors, owner, developer, Engineer, and affected utilities.

B. Each successive phase of work will follow the preceding phase as closely as possible so that the time any one street is under construction is kept to a minimum.

C. In the event that the work is not being accomplished expeditiously or in accordance with the time period set forth in the progress schedule, or if the work on an excavation has ceased or is abandoned without due cause, the Engineer may give written notice to the Contractor and/or the surety company for the project.

3.02 Notification of Landowners, Residents, and Businesses

A. At least one (1) week prior to beginning construction operations Contractor shall notify in writing, all those directly affected by the Work, including the Fire, Ambulance, Police Departments, and the Engineer's Office. The notification shall include the following as a minimum:

1. Name, address, telephone number, and contact person for Developer, Developer's Contractor, Owner, and Engineer.

2. A brief description of the proposed Work.

3. Name and telephone number of Contractor's person to contact in emergency.

4. A map showing the Work area, the traffic control plan, and the planned access to be provided to the affected properties. The map should also show the property or business owners' access during construction, and access in case of an emergency for fire, ambulance, police, or other emergency service agency vehicles.

5. A schedule for start up and completion of the Work. Schedules shall be updated as needed as the work progresses.

6. Contractor shall notify property owner and occupant 24 hours in advance of any disruption of service or access.

3.03 Available Maintenance Personnel

The Contractor shall have personnel available to maintain the Work as required, 24 hours per day every day. Accordingly, the Contractor shall furnish the City, the Owner, the Engineer, and the Shelby County Sheriff's Office with the names, addresses, and telephone numbers of local employees or representatives who will be available to maintain the Contractor's work during non-working periods, evenings, nights, weekends, and holidays.

3.04 Utility Locates

A. It is the responsibility of the Contractor to obtain locates for buried facilities within the project area prior to the start of work as necessary and as required by law. The Contractor is responsible for any damage to buried utilities or damage or injury to persons or property resulting from Contractor's work in the vicinity of the utilities.

B. It is the responsibility of the Contractor to provide advance notice to all utility notification centers serving that area. The Contractor shall request the notification center to provide the nature, location, and elevation of the utility at each location and at whatever interval is necessary for the work. If the utility company cannot or will not provide the information, the Contractor shall obtain the information by whatever means are necessary. For each location that the utility is exposed, the Contractor shall locate the utility by tying it both horizontally and vertically by coordinates, to the datum established by the City.

C. At all utility crossings the Contractor shall locate the utility at a minimum of one point directly over the proposed line or appurtenance. When existing utilities that parallel the proposed line or appurtenance are exposed by excavation, the Contractor shall locate the utility by tying it both horizontally and vertically to the datum and include the information on the record drawings. At a minimum, the utility shall be tied horizontally and vertically at 300-foot (90 m) intervals.

D. If during the field location of the utilities, additional unforeseen utilities are discovered, the Contractor shall immediately notify the Engineer and proceed in accordance with approval of the Engineer. The utility must be located by the Contractor as specified above and include the information on the record drawings.

E. The Contractor must protect all existing utilities and improvements, public or private, located on the right-of-way, and other work areas, during the entire period of his work. Special care must be taken in backfilling and compacting under and around

such improvements. Any breakage or damage to underground facilities caused by trenching, backfilling, resurfacing, or any other activity associated with the work shall be the responsibility of the Contractor.

F. Whenever utility mains or services are crossed, the utility owner shall be notified and the crossing shall be constructed in accordance with the utility owner's requirements.

G. Before the Contractor begins his grading operations, he shall confer with the owners of any underground or overhead utilities which may be in or in close proximity to the grading areas, and shall arrange for the necessary disconnection of these utilities in accordance with the regulations of the utility companies concerned. The Contractor shall take such measures as the Engineer may direct in protecting these utilities properly throughout the period his grading operations are in progress. The party or parties owning or operating overhead or underground utilities shall perform the actual work of moving, repairing, reconditioning, or revising the utilities, except as otherwise specified in this Section. Whenever and wherever such operations are undertaken by the owners of utilities, the Contractor shall cooperate to the extent that ample protection of their work will be provided so that the entire work as contemplated may be expedited to the best interests of all concerned, as judged by the Engineer.

H. Protect and safeguard existing service lines and utilities structures, the locations of which have been made known to the Contractor by the owners of the utilities or by others, prior to excavation or construction of fills or embankments, from damage during grading operations. Any damage to such lines or structures shall be repaired at the Contractor's expense. The above provisions are applicable to all service lines or utilities structures, all or any portion of which protrude above the original ground or street surfaces, or lie beneath such surfaces in any grading area or any other area upon which the Contractor has encroached.

3.05 Protection of Existing Buildings and Structures

For collapse of adjacent buildings, sidewalks, structures, and underground or above ground utilities, the Contractor shall repair damage done to the owner's property or any other property, on or off the premises, by reason of his operations. The Contractor shall adequately brace walls during backfilling and compacting operations.

3.06 Construction Stakes – Alignment and Grades

A. All work shall be constructed in accordance with lines and grades shown on the drawings and as designated by the Engineer. These lines and grades may be modified by the Engineer as provided in the General Conditions.

B. The Contractor shall provide experienced personnel, materials, and equipment necessary to complete all survey, layout, and measurement work. The Contractor shall keep the Engineer informed a reasonable time in advance, of the times and places he wishes to do work so that initial control points may be designated.

3.07 Restoration of Street Surface, Street Signs, Curbs, Driveways, Sidewalks, Irrigation and Landscaping

A. Wherever existing improvements are removed, damaged or otherwise disturbed by Contractor's activities, Contractor shall replace or repair the improvements to conditions equal to or better than the condition prior to the start of work. Any crushed rock, sod, or natural vegetation disturbed by the Contractor shall be replaced, rebuilt or restored to conditions equal to or better than the condition prior to the start of work.

3.08 Temporary Utilities, Public Access and Safety

A. Contractor shall provide temporary water and sewer service to properties when permanent facilities will be out of service for eight (8) hours or longer, or when other circumstances make it necessary. Where service cannot be interrupted, such as sewer mains, Contractor shall provide plant and equipment to pump around the sections which are out of service.

B. Where the Engineer deems necessary, the Contractor shall provide access wherever possible to public and private property to prevent serious inconvenience to pedestrian and vehicular traffic. This shall not be construed to require the Contractor to provide such access at the times and locations where it will interfere with his construction progress. The Contractor shall furnish, place, and maintain sufficient flags, flares, barricades, signs, etc., along the location of his work in accordance with the Federal Highway Administration, "Manual on Uniform Traffic Control Devices." Flag persons shall be utilized if necessary to maintain safe traffic flow.

3.09 Erosion and Sediment Control

A. Erosion and sediment control shall be performed in accordance with rules and regulations adopted by the City of Lakeland and the Tennessee Department of Environment and Conservation.

3.10 City Permits

A. All necessary permits shall be obtained prior to the beginning of any construction project. Those permits may include: City of Lakeland/TDEC Permit to Construct, Street Cut Permits, Traffic Control Permits, Bonds, and Erosion and Sediment Control Permit, as well as any other appropriate permits required for the project by the City.

3.11 Punchlist and Final Closeout

A. Initial City Punchlist

1. The Contractor, Owner, Engineer, and City personnel will conduct an initial walkthrough and develop a list of deficiencies that will be presented to the Contractor by the Engineer.

2. The Contractor, Owner, and Engineer will conduct a walkthrough identifying items to be corrected. A final punch list will be developed by the Contractor and Engineer. The punch list will contain dates for completion of the various identified items.

3. All items on the list will be completed to the satisfaction of the City prior to acceptance of the project and start of the one-year warranty period.

3.12 Submittals

The Contractor shall submit for approval by the Engineer a minimum of five (5) copies of data required by specific sections of this specification.

3.13 Workmanship and Cleanup

A. All debris and rubbish caused by the operations of the Contractor shall be removed, and the areas occupied during his operations shall be left in a neat and presentable condition satisfactory to the Engineer. Construction cleanup and all backfill operations shall immediately follow installation of underground facilities. Cleanup shall be completed to allow local traffic on the street and access to driveways, parking lots, etc. During construction, all existing gutters, storm drains, runoff channels, etc. shall be kept clean of dirt, rubble, or debris which would impede the flow of storm sewer.

B. Excess, unsuitable, and waste materials from the project (including that from trench excavation, pavement removal, curbwalk removal, and grading operations), shall be suitably disposed of, offsite, by Contractor.

C. Excess material resulting from parkway and shoulder finishing and other final operations shall not be permitted to accumulate on the pavement surface and shall be removed concurrently with the finishing operations. Care shall be taken to prevent the entrance of this material into drainage structures or other waterways during the construction period. It shall be the responsibility of the Contractor to properly dispose of all excess material.

3.14 Design Mixes, Testing and Quality Assurance

A. The testing requirements and cost responsibilities of design mixes, testing requirements, and quality assurance testing are listed in each specific section of these specifications.

B. Unless specified by the contract documents, or addressed specifically within these

Standard Specifications, the Owner will be responsible for moisture/density/compaction testing only. If the initial moisture/density/compaction test fails to meet the minimum standards as established by these specifications, the Contractor shall pay for any and all additional tests until a moisture/density/compaction test meeting the minimum standards is obtained.

END OF SECTION

SECTION 01200

PROJECT COORDINATION

PART 1 – Description

1.01 SUMMARY

A. Contractor shall schedule a preconstruction conference (if required) to be held within twenty (20) days of the Notice of Award. Contractor's assigned supervisory personnel and subcontractors shall attend this conference. Contractor shall provide a work schedule at or prior to this meeting for review by all parties. A corrected schedule shall be provided within seven (7) days following the meetings.

B. Conduct all construction activities between the hours of 7:00 a.m. and 6:00 p.m., Monday through Friday, except in cases of emergencies. No work will be allowed on Saturdays without the Owner's permission, and no work, except for emergencies, will be allowed on Sundays or City of Lakeland Holidays. All pavement subgrade excavation shall be observed by the Owner Representative. The Owner's Representative shall determine the depth of the subgrade excavation prior to backfill.

C. Contractor shall obtain water for use during construction at his expense. If Contractor elects to obtain water from the public water utility, he will make all the arrangements, comply with their regulations, and pay all fees and charges.

1.02 COORDINATION WITH PUBLIC AND PRIVATE AGENCIES

A. If utility companies elect to repair or replace their lines in the project area, their crews will be permitted access to the area to accomplish their work.

B. Contractor is responsible for locating and protecting existing underground improvements. Contact all utility companies for location of their facilities. To contact all utility companies call the local underground number at least 48 hours prior to excavation for field locates.

C. Contractor shall have personnel available to maintain his work as required 24 hours per day every day. Contractor is responsible for housekeeping, dust and erosion control, and shall provide all equipment and personnel necessary to meet the requirements of this responsibility. Contractor shall provide Engineer with the name(s) and telephone number(s) of the person(s) designated to be available for after-hours contact. If this person cannot be contacted, Owner may use its equipment to correct problems. In this case, Contractor shall pay all costs incurred by Owner.

D. Do not utilize private property for any purpose without written permission from the property owner.

1.03 COORDINATION WITH OWNER AND ENGINEER

A. Construct all work in accordance with the lines and grades shown on the Drawings, and as designated by Engineer (when applicable). Engineer may modify these lines and grades as provided in the General Conditions. Where the Contract Documents specify survey work to be provided by Engineer, give Engineer a minimum of 24 hours notice.

B. Owner shall employ and pay for the services for an independent testing agency to perform tests as required by the Contract Documents. Notify Engineer a minimum of 24 hours in advance to request testing. Contractor shall be responsible for cost of re-tests required if the results of the original tests do not meet the minimum requirements.

C. Coordinate on-site staging areas, access and temporary facilities with Owner.

D. For additional information, contact Emily Harrell, PE, Lakeland City Engineer at 867-5418.

1.04 COORDINATION OF CONSTRUCTION

A. Contractor is responsible for coordinating work of all trades by preparation of schedules and progress reports, coordination of drawings and other work as necessary.

B. Schedule work to produce orderly, continuous progress and avoid delays due to lack of materials, subcontractor schedule, lack of available manpower, etc.

F. Contractor is responsible for ensuring that installed and/or completed work is complete and satisfactory prior to enclosing or covering. Call for required inspections in a timely manner and do not cover work that requires inspection.

END OF SECTION

SECTION 01340

SUBMITTALS

PART 1 - Description

1.01 Summary

A. Comply with Submittal format requirements as specified in the Contract Documents.

B. Provide, in a timely manner, the number of copies and types of submittals listed in individual sections of the Contract Documents. If not specified elsewhere, provide the following as a minimum:

1. Mix designs and certifications of compliance for Portland Cement Concrete, Cement Treated Base, Aggregate Base Course, Asphaltic paving material, and any other material or product used as part of this project as required in the Standard Specifications.

2. Closeout submittals.

C. Provide required resubmittals in the appropriate quantities if original submittals are not approved.

D. Samples and shop drawings shall be prepared specifically for this project. Shop drawings shall include dimensions and details, including adjacent construction and related work. Note any special coordination required. Note any deviations from requirements of the Contract Documents. Submittal data shall be properly labeled indicating specific service for which material or equipment is to be used, section and article number of specifications, project name, Contractor, etc. Data of a general nature will not be accepted.

E. Failure of Contractor to submit shop drawings in ample time for checking shall not entitle him to an extension of contract time.

END OF SECTION

SECTION 01505

TEMPORARY FACILITIES

PART 1 - Description

1.01 Summary

A. Provide temporary services and utilities, including utility costs:

1. Potable and non-potable water.
2. Lighting and power.
3. Toilet facilities.
4. Materials storage.
5. Heating.

B. Provide construction facilities, including utility costs;

1. Construction equipment.
2. Dewatering and pumping.

C. Provide security and protection requirements:

1. Fire extinguishers.
2. Site enclosure fence, barricades, warning signs, and lights.
3. Snow and ice removal, if applicable.

D. Provide personnel support facilities:

1. Sanitary facilities.
2. Drinking water.
3. Cleaning and trash removal.
4. First aid and Emergency Medical Services.
5. Trash removal.

END OF SECTION

SECTION 01650

MEASUREMENT AND PAYMENT PROCEDURES

PART 1 – Description.

All work completed under this Contract will be measured by the Engineering according to the bid items and to the construction drawings. Units of measurement and dimensions will be shown in these specifications.

1.01 Payment

A. Progress payments will be processed in accordance with the following schedule.

Cut-Off Date	Date of Submittal
June 23, 2017	June 30, 2017
July 21, 2017	July 28, 2017
August 18, 2017	August 25, 2017
September 22, 2017	September 29, 2017

Submit pay requests to the City by the dates of submittal listed above.

B. Owner will make progress payments as defined in Article 5 of the Agreement, on the forms provided by the Engineer.

C. If the Contractor elects to enter into a joint account agreement, two (2) pay requests and vouchers must be submitted. One pay request and voucher for the appropriate progress payment amount, the other for the retained amount.

1.02 Measurement of Quantities

Quantities shown on the bid schedule are estimated and are to be considered approximate. Actual constructed quantities will vary. The Contractor will be compensated only for those items and materials actually installed and approved as part of the project. No additional pay will be granted for items or materials not installed.

A. Payment will be made for the work completed and stored materials less retained amounts in accordance with provisions of the contract documents.

B. Payment amounts will be based on the scheduled values and mutually agreed upon percentage of completion for each item.

1.03 Bid Item Descriptions

The cost of all material and labor required to complete this project as specified and shown on the drawings, but not specifically included as a pay item, shall be included in the bid price of its related bid item. No extra pay shall be granted for items that are reasonably foreseen as necessary for the proper installation of an item.

PART 3 Execution

3.01 Measurement and Payment of Bid Items

A. Earthwork

1. Measurement of this item shall be paid by lump sum (LS) for earthwork. This item shall include completing earthwork and grading as outlined in Plans and Specifications. Payment shall be made by the contract unit price per Lump Sum (LS).

B. Furnish and Install 12" PVC Drain Pipe

1. Measurement of this item shall be paid by lineal foot (LF) of 12" PVC Drain Pipe furnished and installed in place and approved. This item shall include pipe, excavation, backfill, compaction, bedding material, materials used in making joints and connections to other structures, and all other incidentals necessary to complete the work. Payment shall be made by the contract unit price per Lineal Foot (LF) in place.

C. Furnish and Install PVC Drain Inlet

1. Measurement of this item shall be made for each (EA) PVC drain inlet furnished, installed in place and approved. This item shall include grate, catch basin, excavation, preparation of base, setting of new structure, castings, backfilling, compacting, grading, and diversion of water. Payment shall be by the contract unit price per Each (EA) in place.

D. Furnish and Install Type E Headwall

1. Measurement of this item shall be made for each (EA) Type E Headwall furnished, installed in place and approved. This item shall include pre-cast concrete headwall, excavation, preparation of base, installation, foundation, backfilling, compacting, grading, and diversion of water. Payment shall be by the contract unit price per Each (EA) in place.

E. Furnish and Install Tiffway 419 Bermuda Sod

1. Measurement of this item shall be paid by square yard (SY) of Tiffway 419 Bermuda sod furnished and installed in place and approved. This item shall include soil amendments, tilling, fine grading, furnishing and placing sod, fertilizer and watering. Payment shall be made by the contract unit price per Square Yard (SY) in place.

F. Furnish and Install Silt Fencing

1. Measurement of this item shall be paid by lineal foot (LF) of silt fencing furnished and installed in place and approved. This item shall include silt fence, stakes and installation. Payment shall be made by the contract unit price per Lineal Foot (LF) in place.

G. Furnish and Install Construction Fencing

1. Measurement of this item shall be paid by lineal foot (LF) of construction fencing furnished and installed in place and approved. This item shall include tree protection fence, stakes and installation. Payment shall be made by the contract unit price per Lineal Foot (LF) in place.

H. Furnish and Install Inlet Protection

1. Measurement of this item shall be paid by each (EA) inlet protection furnished and installed in place and approved. This item shall include clearing, excavation, furnishing and placement of geotextile and granular material, and maintenance. Payment shall be made by the contract unit price per Each (EA) in place.

I. Remove and Replace Sanitary Sewer Cleanout

1. Measurement of this item shall be paid by each (EA) sanitary sewer cleanout removed and replaced and approved. This item shall include excavation, removal of existing cleanout, installation of new cleanout, water diversion, backfill, and compaction. Payment shall be made by the contract unit price per Each (EA) in place.

J. Remove and Replace Asphalt Pavement

1. Measurement of this item shall be by the number of square feet (SF) of hot-mix asphalt pavement furnished and installed in place and approved. Measurements shall be made from the lines formed by the junction of new asphalt and old asphalt. This item shall include furnishing and application of tack coat, furnishing and placement of new 411-E hot mix asphalt, and compaction. New asphalt pavement shall have a compacted thickness of no less than two inches (2") after compaction. Payment shall be by the contract unit price per Square Feet (SF) in place.

K. Furnish and Install Class B Rip Rap

1. Measurement of this item shall be by the number of cubic yards (CY) of Class B Rip Rap furnished and installed in place and approved. Quantities shall be verified and paid by haul ticket. This item includes excavation, disposal of existing material, geotextile, furnishing and installing granular material, and compaction. Payment shall be by the contract unit price per Cubic Yard (CY) in place.

END OF SECTION

SECTION 01750

CONTRACT CLOSEOUT

PART I Description

1.01 **Summary**

A. Provide prerequisites to substantial completion.

1. Punch list.
2. Supporting documentation.
3. Warranties.
4. Certifications.

B. Provide prerequisites to final acceptance.

1. Final payment request with supporting affidavits.
2. Completed punch list.
3. Submit record documents: One set of drawings and project manual with all changes noted in red and Project Manual changes flagged with page tabs.
4. Final clean-up.
5. Removal of temporary facilities.

END OF SECTION

SECTION 01810

SPECIAL PROVISIONS

PART 1 Description

1.01 SUMMARY

A. These "Special Provisions" supplement, clarify, or modify provisions of Specifications as they apply to this project.

B. Requirements of Special Provisions, General and Supplemental Conditions apply to work performed under all sections of this project.

C. Work of this contract shall include all work required to construct the entire Project as shown on the drawings and defined by the Specifications and other contract documents, unless specific exceptions are stated therein.

D. DISCREPANCY BETWEEN SPECIAL PROVISIONS, SPECIFICATIONS, AND PLANS. In the event of discrepancy between Special Provisions and other sections of the Specifications, the Special Provisions will take precedence over the Specifications, the General Conditions, and the Supplemental Conditions. The Specifications will take precedence over the Plans.

1.02 LABOR PRACTICES

A. EIGHT-HOUR WORK DAY

The Contractor's attention is directed to, Limitation on work hours; overtime; exceptions. a) No person shall require laborers, workmen, or mechanics to work more than eight hours in any one calendar day or forty hours in any one week upon any public works of the state, or any of its political subdivisions, except as hereafter authorized. An employee may agree to work more than eight hours per day or more than forty hours in any week provided the employee shall be paid at the rate of one and one-half times the regularly established hourly rate for all work in excess of forty hours in any one week.

1.03 BACKFILL OBSERVATION

No work shall be covered before the Project Representative or Engineer has approved the work. If any piping or appurtenance is covered without the approval of the Engineer or Project Representative, at the discretion of the Engineer, the Contractor will be required to

re-excavate to expose the covered materials. The cost of exposing those materials and then backfilling and compaction will be at the Contractor's expense, regardless of the condition of the pipe and/or the materials under question.

1.04 CONSTRUCTION WATER

The Contractor is responsible for supplying water for construction purposes. If the Contractor wishes to use existing fire hydrants for water, he shall make the proper arrangements with the owner of the hydrant. The Contractor will be responsible for compliance with that owner's requirements as well as the payment of any fees for its use. Construction water is considered incidental to this project and no separate payment will be made to the Contractor for this item. If the Contractor wishes to use water from a resident, he shall obtain written permission from that resident to do so.

1.05 SAFETY

In accordance with generally accepted construction practices, the Contractor will be solely and completely responsible for safety conditions at and adjacent to the job site, including the safety of all persons and property during the performance of the work. The Contractor shall comply with all federal, state, and local safety laws and regulations. This requirement shall apply continuously, and shall not be limited to normal working operations. The Engineer's construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures, in, on, or near the construction site. This paragraph shall be applicable to the Contractor and all of the Contractor's subcontractors.

In addition, the Contractor shall provide barriers, fences, signs, lights, etc. as necessary to control access to the site.

Contractor shall provide Owner a written copy of their confined spaced program, proof of record-keeping protocol and inventory of appropriate equipment such as monitors for atmospheric hazards and rescue equipment. These documents shall be submitted at the preconstruction conference.

1.07 DUST CONTROL

The Contractor shall be responsible for dust and erosion control, and for minimizing dust and erosion to the Owner's satisfaction. Dust and erosion control shall be deemed to be incidental and shall not be a pay item.

1.08 DISPOSAL OF WASTE MATERIALS

Excess, unsuitable, and waste materials from this project (including that from trench

excavation, pavement removal, piping removal, and grading operations), shall be disposed of, offsite, by Contractor. Such disposal shall be considered incidental, and shall not be a pay item.

1.09 CODES AND STANDARDS

All materials and the completed installation shall comply with applicable standards promulgated pursuant to the State of Tennessee and City of Lakeland.

1.10 OPEN EXCAVATIONS

The Contractor shall completely backfill all excavations before stopping work for the day. No excavation (fenced or unfenced) shall be left open overnight, over a weekend, nor any period in which no work at that location is underway. The cost of reopening or re-excavation due to this provision will be borne by the Contractor.

1.11 CONSTRUCTION SURVEYING AND STAKING

In this project, lines and grades of replaced appurtenances shall match those existing. When new appurtenances such as drain lines, catch basins, curb, sidewalks, and new roadway crowns are to be installed, the Contractor will provide construction surveying and staking, unless otherwise noted.

1.12 CLEANING AND FINISHING

After completion of all work all debris and foreign material will be removed by the contractor. The project area, including staging areas, shall be clean and functional. This will include the restoration of any disturbed landscaping in the work area.

1.13 TRAFFIC CONTROL

A traffic control plan is required for repairs in areas affecting traffic. The Contractor is responsible for furnishing a traffic control plan to the City Engineer at least one week prior to the start of construction. Excavations which traverse a street shall be limited to one-half the width of the street at any one time, unless an emergency situation exists which requires the entire width of the street be excavated. The City Engineer's approval is required prior to traversing an entire street. The closure should not exceed forty-eight (48) hours and proper signage shall be installed detouring traffic and warning of construction.

END OF SECTION

SECTION 01551

TEMPORARY TRAFFIC CONTROLS

PART 1. Description

To establish uniform requirements for detours, signs and barricades, and traffic control plans associated with construction activities performed on or affecting City of Lakeland streets. The work in this article shall consist of furnishing, erecting, maintaining, relocating, and removing temporary traffic control devices at the locations specified on the drawings and as directed by the Engineer. All traffic control devices shall conform to the provision for construction signing as set forth in the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) latest edition.

PART 2 MATERIALS

2.01 Traffic Control Products

A. Sign Panels

1. Sign panels will be constructed of ¾" plywood conforming to plywood sign panels and barricades of the standard specification for road and bridge construction; or 6061-T6 or 5052-H38 aluminum alloy sheeting conforming to ASTM B209.

2. Wood sign panels will be backed with metal backing angles; except that backing is not required for those sign panels 48" x 60" or smaller.

3. Aluminum sign panels will be 0.125" thick and backed with metal backing angles; except that those sign panels 48" x 60" or smaller may be:

   i. 0.080" thick and backed with metal backing angles or 2 x 4 lumber; or,

   ii. Unbacked, 0.125" thick.

4. Special signs which are unique to the project, i.e., signs not shown on the plans or included in part VI of the MUTCD, and signs shown on the plans which contain a message that is unique to the project, will be furnished by the contractor, as specified on the plans, and erected by the Contractor. Posts and hardware for fixed special sign installations, and all equipment for portable special sign installations will be furnished by the contractor. Post lengths will be specified by the Engineer. Upon removal, the special sign panels, posts, hardware, and portable installation equipment will remain the property of the Contractor.

i. Special signs will be erected on fixed mountings unless portable mountings are authorized by the Engineer.

B. Barrels will be plastic conforming to the MUTCD, with 6" wide reflective stripes.

C. Temporary markings

1. Temporary reflective pavement markings will be paint, preformed tape, or raised pavement markers, and will be suitable for use on either Portland cement concrete or asphalt pavements. Minimum acceptable standards are as follows:

   i. Paint used for temporary markings will be commercially manufactured highway striping paint. The paint will be applied without dilution.

   ii. All painted stripes will be 4" wide, and will be reflectorized by dropping or spraying glass beads onto the wet paint.

   iii. The reflective beads will conform to AASHTO Specification M247, Type 1.

2. Temporary reflective pavement striping tape will be 4" wide, pressure-sensitive tape manufactured for use as pavement striping.

   i. Striping tape applied to finished pavement surfaces which will be returned to normal traffic use will be a removable type.

   ii. Striping tape applied to temporary pavement surfaces which will be obliterated may be a non-removable type.

   iii. Striping tape applied to the surface of intermediate lifts of asphalt pavement may be non-removable type, and may be let in place. If a removable type is used, it will be removed before placing the next lift.

3. Temporary retro-reflective raised pavement markers manufactured by Astro Optics of Schaumburg, Illinois, Model No. TPM, or Stimsonite Products of Niles, Illinois, Model No. 66, or an approved equal will be acceptable.

4. Temporary retro-reflective motorist guidance markers manufactured by Davidson Plastic Company of Ken, Washington, Model NO. TRPM, or TOM, or an approved equal will be acceptable.

PART 3 EXECUTION

3.01 Traffic Control Plans

A. A complete traffic control plan shall be submitted to the Engineer and the Lakeland City Engineering office at least one week prior to the start of construction.

1. Traffic will be permitted to use the street at all times, unless a detour is specifically permitted on the drawings or by the Engineer. Access to all abutting residences and properties shall be maintained to the maximum extent possible.
2. The Contractor shall construct and maintain temporary crossings, complete with flagmen, whenever necessary to expedite the work or to maintain traffic. The Contractor shall furnish not less than two flagmen at each location where loading or depositing of material requires the turning of the trucks on any highway or street and where the operation of construction equipment endangers traffic. Temporary crossings shall be of ample size to safely carry the load which comes upon them.
    i. The Contractor shall maintain the streets in a passable condition. The work shall be conducted so as to create a minimum of inconvenience to traffic.
    ii. Excavations which traverse a street shall be limited to one-half the width of the street at any one time, unless an emergency situation exists which requires that the entire width of the street be excavated. City Engineer's office approval is required prior to excavation traversing an entire street.
3. The Contractor shall furnish sufficient signs and barricades to facilitate the directing of traffic. Unless directed otherwise by the Engineer, all signs and barricades shall conform to:
    i. Within the "Manual on Uniform Traffic Control Devices (MUTCD), " latest edition.
4. The Contractor shall have a sufficient number of barricades and signs on hand prior to the start of the construction
    i. Each detour sign shall be reflectorized and shall be illuminated with two battery-powered blinkers with six-inch (6") amber lenses.
    ii. All barricades shall have blinker lights on each end.
    iii. It shall be the Contractor's responsibility to make necessary checks and inspections of all lights and barricades every day, including Sundays and holidays.
5. Temporary suspension of work does not relieve the Contractor of the responsibility outlined in the above requirements.

3.02 Permits

A. The Contractor shall obtain all necessary permits from the City Engineer's office for any closure of any street or portion thereof, as provided in the Lakeland Municipal Code. Along with the permit application, the Contractor shall provide a sketch showing traffic routing and traffic control devices to be used. The construction traffic control sketch shall be approved by the City Engineer's office before the permit is issued.

3.03 Street Closure

A. The City Engineer may permit the closing of streets to all traffic for a period of time prescribed by the office if, in the City Engineer's Opinion, it is necessary.

END OF SECTION

SECTION 02115

EROSION AND SEDIMENT CONTROL

PART 1 - Description

This work shall consist of providing erosion and sediment control during and upon completion of construction as specified herein and as shown on the Construction Drawings.

1.01 General

A. The Contractor shall provide the Engineer a copy of the Storm Water Pollution Prevention Plan (SWPPP) as submitted to the Tennessee Department of Environment and Conservation.

B. All erosion and sediment control plans shall be developed as per regulations outlined by the Tennessee Department of Environment and Conservation.

C. All erosion and sediment control plans as outlined in the SWPPP shall be installed prior to any grading and land disturbance.

D. All control measures shall be checked, and repaired as necessary, twice weekly in dry periods and within 24 hours after any rainfall of 0.5 inches (minimum). During prolonged rainfall daily checking and repairing is necessary. Maintain records of checks and repairs.

E. A specific individual who is certified by a TDEC Certification Program or its equivalent shall be designated to be responsible for erosion and sediment control.

1.02 Related Sections

Section 02230 Clearing and Grubbing

Section 02315 Excavation, Embankment and Fill

Section 02335 Roadway Earthwork

Section 02340 Geotextiles

Section 02370 Storm Drain Outfall Protection

Section 02835 Topsoil, Seeding and Lawn Restoration

PART 2 – Materials

A. The Contractor shall submit the following to the Engineer for inspection and acceptance all materials used for this Section.

B. Silt Fence Materials shall be as follows:

1. Silt Fence-See Section 02340 Geotextiles.

2. Fence Post (for fabricated units): Steel posts will be a standard "T" and "U" sections weighting not less than 1.33 pounds per lineal foot with a minimum length 42 inches.

3. Wire Fence (for fabricated units): Wire fencing shall be minimum 14-1/4 gage welded wire fabric with a maximum six inch mesh opening or as approved by the Owner.

C. Stabilized Construction Entrance Materials shall be as follows:

1. Aggregate shall be in accordance with Tennessee Department of Transportation (TDOT) #1 or #2 stone specifications (1.5 to 3.5 inch stone), washed and well graded. Refer to Tennessee Department of Environment and Conservation (TDEC) specification Riprap for aggregate size tables.

2. Geotextile fabric shall meet the requirements of Section 02340 Geotextiles.

PART 3 - Execution

3.01 Silt Fencing

A. Silt fence shall be constructed by securely fastening silt fence fabric and wire reinforcement to steel posts using wire ties. The silt fence fabric panels shall be installed loosely with adjacent panels overlapped a minimum of 12 inches. The top edge of the fabric shall be reinforced or shall have a one inch tuck.

B. Accumulated silt and debris shall be removed by the Contractor behind the face of the silt fence when the silt deposits reach approximately one half the height of the fence. Clogged or damaged silt fence fabric or wire reinforcement shall be immediately replaced at no additional expense to the Owner.

C. Refer to Silt Fence details on the construction drawing for additional details and general notes.

3.02 Erosion Control During Construction

A. The Contractor shall take sufficient precautions during construction to minimize the run-off of polluting substances such as silt, clay, wastes, fuels, oils, bitumens, and calcium chloride into the water supplies and surface waters of the State. Special precautions shall be taken in the use of construction equipment to prevent operations which promote erosion.

B. Disposal of drainage shall be in an area approved by the Owner. The Contractor shall prevent the flow or seepage of drainage back into the drainage areas. Drainage shall not be disposed of until silt and other sedimentary materials have been removed. Particular care shall be taken to prevent the discharge of unsuitable drainage to a water supply or surface water body.

C. As a minimum, the following shall apply:

1. Approved silt fencing shall be provided as points where drainage from the worksite leaves the site, to reduce the sediment content of the water.

2. Drainage leaving the site shall flow to water courses in such a manner to prevent erosion.

D. Measures for control of erosion must be adequate to assure that turbidity in receiving water will not be increased more than 10 standard turbidity units (s.t.u.) or as otherwise required by the State or other controlling body, in waters used for public water supply or fish unless limits have been established for the particular water. In surface water used for other purposes, the turbidity increases must not exceed 25 s.t.u. unless otherwise permitted.

3.03 Stabilized Construction Entrance

A. Contractor shall install stabilized construction entrances in at least one main entry point to the construction site. Additional entrances shall be stabilized depending on the project size and use of entry points to the construction sites. Construct stabilized construction entrance as per dimensions shown on the construction.

B. Geotextile Engineering fabric shall be installed prior to placement of aggregate. Fabric shall not be required for work on single family residential lot.

C. Maintenance of stabilized construction entrance shall include periodic top dressing of entrance with additional stones as conditions demand to prevent tracking or flow of sediment onto public rights of way.

END OF SECTION

SECTION 02530

SANITARY SEWERAGE COLLECTION FACILITIES

PART 1 – Description

1.01 Summary

A. This Section covers the furnishing and installation of all materials, labor, tools, and equipment to construct complete, in-place sanitary sewer mains, sewer service lines, and all appurtenances in accordance with the requirements of the Contract Documents, and as specified herein.

B. The Contractor shall also do the excavating of all kinds of materials encountered, furnish or compact foundations where required, furnish and install all timbering, sheeting and bracing necessary or proper to safely support all work, remove all water, protect, repair, relocate, maintain, and restore all subsurface, surface, and overhead structures directly or indirectly disturbed, injured, or affected by his operations, and furnish all other appurtenant items and services necessary or specified.

PART 2 - Materials

2.01 Submittals

Before the fabrication of the pipe and manholes is started, the contractor shall submit for review, drawings showing the pipe lengths, complete laying schedule, joint details, special sections, and other additional details, such as fittings. All pipe and manholes furnished shall be fabricated in accordance with the reviewed drawings. Manufacturer's certificates of compliance and installation recommendations shall be provided to the City prior to construction

2.02 Materials

A. The materials used in this work shall all be new and conform to the requirements for class, kind, size, and material as specified herein.

1. A copy of the manufacturer's installation recommendations for each kind of pipe used must be provided to each foreman and inspector prior to construction and must be followed during construction unless otherwise instructed.

2. When required by the Engineer, the Contractor shall furnish certification by the manufacturer of the pipe to be furnished on this project, certifying that the pipe and fittings comply with the applicable specifications.

3. All pipe shall be clearly marked with type, class, and/or thickness as applicable. Lettering shall be legible and permanent under normal conditions of handling and storage.

4. Except in locations where the soils are contaminated by hydrocarbons and other locations designated by the City, all sewer main piping shall be polyvinyl chloride pipe (PVC).

B. Polyvinyl Chloride Pipe (PVC) and Fittings

1. PVC pipe and fittings shall conform to ASTM D-3034, SDR 26 (4-inch through 15-inch) (100mm – 375 mm) Type PSM or ASTM F679, Type I, SDR 35 (18-inch through 36-inch) (450mm – 914mm).

2. Each joint of pipe shall be marked with the size, SDR, "Sewer Pipe", and code number. The pipe and fittings shall have bell and spigot joints with approved gaskets conforming to ASTM F-477. The spigot end shall be marked so that the installer and the inspector can determine when the pipe is properly installed.

3. All PVC pipe and fittings shall be manufactured from virgin, National Sanitation Foundation (NSF) approved resin conforming to ASTM D-1784.

4. All PVC pipe joints will be gasketed bell and spigot push-on type conforming to ASTM D 3212, unless directed otherwise in these specifications. Gaskets will be part of a complete pipe section and purchased as such. Lubricant will be as recommended by the pipe manufacturer.

C. Ductile Iron Pipe (DIP)

1. Ductile iron pipe shall conform to the requirements of AWWA C151, laying condition type 5. The minimum design thickness shall be pressure Class 350. All pipe shall be clearly marked with manufacturer's name, DI or ductile, weight, class or nominal thickness, and casting period. Unless otherwise specified, joints will be push-on gasket type conforming to the requirements of ANSI A 21.11 and AWWA C111.

2. The interior of the pipe shall be epoxy lined or polyurethane lined to a nominal thickness of 40 mils in general conformance to AWWA C-210, C-213, or C-550. The bell gasket area and the spigot ends shall have a nominal interior thickness of 6 mils in order to alleviate assembly problems. The pipe exterior shall be a tar or bituminous seal coating at least one mil thick. The coating shall adhere to the pipe and spotty or thin coating, or poor adhesion, shall be cause for rejection of the pipe.

3. Fittings will conform to the requirements of ANSI A21.10.

4. When specified, Mechanical Joints will conform to the requirements of ANSI A 21.11. Flanged joints will conform to the requirements of ANSI A21.15. Flexible joint ductile iron pipe for stream crossings applications will conform to ASTM A 536 and will be Grade 70-50-05. Steel retainer rings will conform to ASTM A 148 for Grade 90-60.

D. Corrugated PVC Pipe with Smooth Interior 12 to 36 inch

1. Pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. Pipe shall be manufactured to 46 psi stiffness when tested in accordance with ASTM Test Method D2412. There shall be no evidence of splitting, cracking or breaking when the pipe is tested per ASTM Test Method D2412. The pipe shall be made of PVC compound having a minimum cell classification of 12454B as defined in ASTM Specification D1784.

2. Pipe shall be A-2000 as manufactured by Contech Construction Products or approved equal.

All other manufactures of Corrugated PVC pipe shall be pre-qualified at least 10 days prior to bid opening to be considered as approved material suppliers. Pre-qualified submittals shall demonstrate a minimum of 5 years experience of manufacturing proposed pipe material, pipe performance history including a project installation list with at least ten successful sanitary sewer installations in excess of 20,000 LF per project, product literature and installations recommendations. For pricing and product information contact Paul Gavin of Contech Construction Products at 901-299-4847.

3. All fittings for PVC corrugated sewer pipe with a smooth interior shall conform to ASTM F949, Section 5.2.3. To insure compatibility, the pipe manufacturer shall provide all fittings.

4. All joints shall be made with integrally-formed bell and spigot gasketed connections. The manufacturer shall provide documentation showing no leakage when gasketed pipe joints are tested in accordance with ASTM Test Method D3212. Elastomeric seals (gaskets) shall meet the requirements of ASTM Designation F477.

E. Corrugated PVC Pipe with Smooth Interior 8 to 10 inch

1. Pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. Pipe shall be manufactured to 115 psi stiffness when tested in accordance with ASTM Test Method D2412. There shall be no evidence of splitting, cracking or breaking when the pipe is tested per ASTM Test Method D2412. The pipe shall be made of PVC compound having a minimum cell classification of 12454B as defined in ASTM Specification D1784.

2. Pipe shall be A-2026 as manufactured by Contech Construction Products or approved Equal. All other manufactures of Corrugated PVC pipe shall be pre-qualified at least 10 days prior to bid opening to be considered as approved material suppliers. Pre-qualified submittals shall demonstrate a minimum of 5 years experience of manufacturing proposed pipe material, pipe performance history including a project installation list with at least ten successful sanitary sewer installations in excess of 20,000 LF per project, product literature and installations recommendations. For pricing and product information contact Paul Gavin of Contech Construction Products at 901-299-4847.

3. All fittings for PVC corrugated sewer pipe with a smooth interior shall conform to ASTM F949, Section 5.2.3. To insure compatibility, the pipe manufacturer shall provide all fittings.

4. All joints shall be made with integrally-formed bell and spigot gasketed connections. The manufacturer shall provide documentation showing no leakage when gasketed pipe joints are tested in accordance with ASTM Test Method D3212. Elastomeric seals (gaskets) shall meet the requirements of ASTM Designation F477.

F. Sewer Service Pipe Within the Public Right-of-Way

1. Service pipe materials shall be extra heavy cast iron pipe, PVC sewer pipe (ASTM D2665 Schedule 40 or ASTM D3034, SDR ~~35~~ 26) or ABS sewer pipe (ASTM D2661).

2. An approved watertight commercial adapter joint shall be used to connect the service pipe to the sewer main wye.

G. Reducing Wyes

1. Service connections to the main line shall be made with monolithic reducing wyes installed in the main line.

2. The reducing wye fittings shall meet ASTM D3034, SDR 26 (4-inch through 15-inch) (100mm – 375 mm) or ASTM F679, Type I, SDR 26 (18-inch through 27-inch) (450mm – 675mm).

H. Manholes

1. All manholes and other precast items shall be manufactured in a plant that is certified by the National Precast Concrete Association. Manufacturer's certificates of compliance and installation recommendations shall be provided to the Engineer and City prior to construction.

2. All manholes shall be constructed with concentric precast concrete sections without steps unless otherwise approved. Precast concrete manhole sections shall be manufactured to standards at least equal to or greater than the requirements of the Standard Specifications for Precast Reinforced Concrete Manhole Sections, ASTM Designation C478. The minimum internal diameter for sanitary manholes shall be forty-eight inches (48") (1.2m) unless shown otherwise. Manholes shall conform to all requirements as shown on the detail drawings. Precast manhole joints shall be made water-tight with Ram-Nek material or an approved gasket at each joint. The Ram-Nek and primer must be used in accordance with the manufacturer's instructions.

3. Rubber gaskets used for precast manhole joints shall be designed in accordance with ASTM C361, C478, C443, and AASHTO M 315-94. All lifting holes must be grouted in after placement. All concrete for manholes and drop manhole encasement shall be Class AS. Portland Cement used in manufacturing reinforced manholes shall be Type II, ASTM C 150.

4. The concrete base shall be cast-in-place or precast concrete of the size and depth shown on the drawings. Concrete used for bases shall have a twenty-eight (28) day compressive strength of at least four thousand pounds per square inch (4,000psi) (27,600 kPa). Approved precast concrete bases will be allowed if provided with an integral groove for barrel placement. Precast concrete bases shall conform to ASTM C478. Manholes with the base monolithically poured with the bottom barrel are also acceptable and preferred.

5. For sewer manholes four (4) to six (6) feet in diameter and less than twenty (20) feet deep, precast reinforced manhole base sections shall be a minimum of 8 inches thick. For sewer manholes greater than six (6) feet in diameter or more than twenty (20) feet deep, precast reinforced concrete manhole base sections shall be a minimum of 12 inches thick. All precast manhole base sections shall be reinforced with #4 steel reinforcement bars placed 6 inches on center each way and at mid depth of the slab, unless shown otherwise on the plans.

6. All manholes (proposed or existing) with force mains (proposed or existing) discharging into them shall be coated according to this specification. Manholes for automatic air (or

air/vacuum) release valves on sewer force mains shall also be coated according as per this section.

a. For existing manholes, Quadex QM-1s Restore cementitious coating as distributed by Quadex, Inc., North Little Rock, Arkansas, U.S.A. is specified as the standard of quality. Other coating material of equal or better quality, as determined by the Engineer, may be used instead. The material shall be a high strength, cement based polypropylene fiber reinforced shrinkage compensated mortar enhanced with NSG (nepheline synite granite). The material shall have high early and ultimate compressive, flexural, and bond strengths. The material shall have proven resistance to a broad range of corrosive chemicals, including sulfuric acid created by hydrogen sulfide gas as well as other chemicals typically found in sanitary sewers. The material shall also have a low permeability.

b. For new manholes, the protective coating shall be Sauereisen SewerGard polymer lining as distributed by Sauereisen, Pittsburgh, Pennsylvania, U.S.A. as the standard of quality. Other polymer coating systems of equal or better quality, as determined by the Engineer and approved by the Owner, may be used instead. The material shall be an impermeable, high strength, corrosion-resistant, fiber-filled or aggregate-filled epoxy material specifically designed to protect concrete surfaces of municipal wastewater treatment structures and collection systems from chemical attack and physical abuse. The material shall prohibit water infiltration and shall have proven resistance to a broad range of corrosive chemicals, including sulfuric acid created by hydrogen sulfide gas as well as other chemicals typically found in sanitary sewers. The material shall be suitable for application over damp or dry concrete surfaces without the use of a primer. The material shall have a non-sagging consistency to permit application on vertical and overhead surfaces.

c. Manufacturer & Installer - Coating materials shall be as manufactured by Quadex, Inc., Sauereisen, or approved equal. Installation shall be performed by an installer approved by the material's manufacturer using workers experienced in the application of the coating to be used.

7. Precast manhole inverts shall be constructed using a secondary invert forming system designed to provide a finished invert that aligns precisely with the incoming pipelines, incorporating a finished flow depth of 0.75 diameter of the largest pipe. The completed precast invert shall include an alignment bench for each pipe, and provide for uniform horizontal and vertical transition through the manhole in accordance with drawings. Provide 0.1' (30mm) minimum fall between inlet and outlet. After the installation of the pipelines into the manhole, the interior annular space around the outside of the pipe shall be sealed with grout. Manhole couplings or other acceptable water stops (i.e. PVC pipe gasket stretched over outside of pipe, Ram-Nek, etc.) must be used when connecting PVC pipe to manholes. The acceptable tolerances for manhole inverts are one-quarter inch (1/4") (6.25mm) in any dimension and within 2 degrees for alignment. The invert forming system shall be "A-Lok Tru Contour", or approved equal.

8. Manhole frames and covers shall be Neenah R 1643 or approved equal. Cover and frame seat shall be machine finished to prevent any rocking of cover in its associated frame. Cover shall have the word "SEWER" clearly cast on its surface. Manhole cover shall be minimum

of 7.5 inches in height, have a minimum inside clearance of 24 inches in diameter and shall be considered heavy duty with 1.5 inch thick cover.

a. When required, self-sealing, waterproof frames and covers meeting Neenah R-1916-F or D&L Supply E-1926 or approved equal shall be used.

9. For manholes with depths of six feet (6') (1.8m) or less, all of the precast manhole sections shall be of the specified diameter and shall have a flat, precast concrete top.

10. Manholes located in the 100 year floodplain and more than three feet (3') above final grade shall have a flat, precast top and self-sealing waterproof frame and cover.

I. Force Mains

1. Ductile Iron Pipe (DIP)
   a. See specifications for ductile iron pipe in Section 2.02 Materials C.

2. High Density Polyethylene (HDPE) Pressure Pipe and Fittings

   a. High Density Polyethylene Pipe (HDPE) shall be manufactured from virgin extra high molecular weight, high density PE3408 polyethylene pipe grade resin to a minimum cell classification of PE345434C as determined by ASTM D3350. No post consumer recycled polyethylene materials shall be allowed. The minimum material classification shall conform to III C5 P34 as determined by ASTM D1248.

   b. All HDPE pipe and fittings shall conform to ASTM F714 and ASTM D3261, respectively, and have a Standard Dimension Ratio (SDR) of 17.

   c. Successive joints of HDPE pipe shall be joined by heat fusion at a fusion pressure of 75 psi and temperature of 400° F. All such connections shall be performed in strict accordance with the manufacturers instructions

3. Polyvinyl Chloride (PVC) Pressure Pipe and Fittings

   a. Polyvinyl chloride (PVC) pressure pipe shall be SDR-21 Class 200 and conform to the ASTM D2241 standard, be UL listed and approved by the National Sanitation Foundation, and shall be white in color. The outside diameter shall be identical to steel pipe. PVC pipe pressure class shall be equal to or greater than twice the maximum calculated pressure of the force main.

   b. PVC Pressure Pipe shall be designed and tested in accordance with ASTM D1598, D1599, and D2152.

   c. Fittings for PVC pressure pipe shall be ductile-iron, and shall conform to AWWA C153, unless otherwise specified. Fitting joints shall be mechanical joints. Bolts and nuts for mechanical joints, or flanged ends will be of a high strength corrosion resistant low-alloy steel and shall conform to AWWA C111. Flange bolts and nuts for above ground installation shall conform to Appendix A of AWWA C115. Flange bolts and nuts for below ground installation shall be 316 stainless steel. All fittings

shall be epoxy coated and lined unless stainless steel is used. Polyethylene wrap or encasement of metal fittings shall conform to AWWA C105. Joint tape shall be self sticking PVC or 10-mil-thick polyethylene.

d. Joints: PVC water pipe shall be furnished with an elastomeric gasket at each joint and an integral thickened bell as part of each joint. Pipe and fittings must be assembled with a non-toxic lubricant. Provisions must be made at each joint for expansion and contraction. Refer to ASTM F477, D3139 and D3212. Where joints are to be restrained, use mega-lug type fitting.

4. Air-Vacuum Release Valve

a. Air Vacuum Release Valves shall be manufactured and tested in accordance with American Water Works Association (AWWA) Standard C512. Manufacturer shall have a quality management system that is certified to ISO 9001:2000 by an accredited, certifying body. The valve body, cover, and baffle shall be constructed of ASTM A126 Class B cast iron. The float, guide shafts, and bushings shall be constructed of Type 316 stainless steel. Non-metallic guides and bushings are not acceptable. Resilient seats shall be Buna-N.

b. Valve sizes 3 in.(75 mm) and smaller shall have full size NPT inlets and outlets equal to the nominal valve size with a 2 in. (50 mm) inlet on 1 in. (25 mm) valve. The body inlet connection shall be hexagonal for a wrench connection. The valve body shall have 2 in. NPT cleanout and 1in. NPT drain connections on the side of the casting.

c. Valve sizes 4 in. (100 mm) and larger shall have bolted flange inlets with NPT outlets. Flanges shall be in accordance with ANSI B16.1 for Class 125 iron flanges.

d. The valve shall have three additional NPT connections for the addition of backwash accessories.

5. Air-Vacuum Release Valve Vault

a. Air Vacuum Release Vault shall be precast or cast in place. Concrete shall meet the requirements as specified in Section 03050. The vault shall be placed on Foundation Material as specified herein or as per the detail.

b. Vault frames and covers shall be Neenah R 1578 or approved equal. Cover and frame seat shall be machine finished to prevent any rocking of cover in its associated frame. Cover shall have the word "SEWER" clearly cast on its surface. Manhole cover shall be a minimum of 6 inches in height, have a minimum inside clearance of 36 inches in diameter and shall be considered heavy duty with 1.5 inch thick cover.

6. Eccentric Plug Valve

a. Eccentric plug valves and actuators shall meet or exceed the latest revisions of AWWA C517 and other applicable standards. Flanged ends shall be per ANSI B16.1 and mechanical joint ends per AWWA C111. Eccentric plug valves and actuators shall be model PEF as manufactured by DeZURIK, Inc. or pre-approved equal.

b. Plugs shall be solid one piece, cast of ASTM A536 ductile iron. The plug shall have a cylindrical seating surface eccentrically offset from the center of the shaft. Plug shall not contact the seat prior to 90% closed. Plug facing shall be Chloroprene (CR), or other resilient facing suitable for wastewater, mixed liquor or sludge service.

c. Bodies shall be of ASTM A126 Class B cast iron. Port area shall be 100% of standard class pipe area. Bearings shall be sleeve type and made of sintered, oil-impregnated permanently lubricated type 316 stainless steel per ASTM A743 Grade CF8M.

d. Seats shall be 1/8" thick welded overlay of not less than 95% pure nickel. Seat shall be at least 1/2" wide and raised. The raised surface shall be completely covered with nickel to insure that the resilient plug face contacts only the nickel seat.

e. Adjustable Packing shall be of the multiple V-ring type, with a packing gland follower. Shaft seals shall permit inspection, adjustment or complete replacement of packing without disturbing any part of the valve or actuator assembly except the packing gland follower.

f. Grit Excluders made of PTFE shall be provided to prevent the entry of grit and solids into the bearing areas.

g. Valves shall provide drip-tight shutoff in either direction up to the valves operating pressure. Pressure ratings shall be bi-directional and 175 psi (1,207 kPa) on sizes 3"-12" (80-300mm) and 150 psi (1,034 kPa) for 14"-36" (350-900mm). Every valve shall be given a certified hydrostatic and seat test, with test reports being available upon request.

h. Each valve shall be furnished with an actuator. Means of actuation shall be by hand lever, chain lever, worm gear operator, pneumatic cylinder, hydraulic cylinder, electric motor or air motor as indicated on the Plans. Operator accessories such as hand wheels, chain wheels and chains, 2" operating nuts, extension stems, floor stands, and bonnet extensions shall be provided as indicated on the Plans.

i. Worm gear actuators shall be provided on all valves six inches and larger and on all buried valves. Actuators shall be enclosed in cast iron housing, with outboard seals to protect the bearings and other internal components. The actuator shaft and gear quadrant shall be supported on permanently lubricated bronze bearings.

j. Buried actuators shall be 90% grease filled. Input shaft and fasteners shall be stainless steel. Actuator mounting brackets shall be totally enclosed.

k. All plug valves shall be thoroughly cleaned of all dirt, dust oil, grease and other foreign matter. This work shall be done with care to avoid damage to inside coating.

l. All plug valves shall be tested for pressure and leakage in accordance with AWWA C600.

m. An epoxy coating shall be applied to the interior and exterior ferrous surfaces of the valve except for finished or seating surfaces.

n. All valves shall have the name or monogram of the manufacturer, the year the valve casting was made, the size of the valve, and the operating pressure cast onto the body of the valve.

7. Valve Boxes

a. Cast iron valve boxes shall be installed for all valves installed underground. Casting shall be manufactured of clean, even grain grey cast iron conforming to ASTM A48, Class 20B, Gray Iron Castings; and shall be smooth, true to pattern, free from blowholes, sand holes, projections and other harmful defects.

b. The valve box shall be coated with a single thin coat of coal tar pitch varnish before machining so that machined seating surfaces will be free of any coating.

c. Valve boxes shall have a minimum 5¼ inch shaft, a weight of at least 60 pounds and a wall thickness of at least ¼". Valve boxes shall be of a two-piece design including bottom section and top section with lid and shall be adjustable to fit the depth of earth cover over the valve. Three-piece valve boxes will be allowed for excessively deep valves.

d. Valve boxes shall be accurately centered over valve operating nuts and backfill shall be thoroughly tamped around them. They shall be set vertically plumb and properly adjusted so that the tops of boxes will be at grade in any paving, walk, road or ground surface.

e. Valve boxes shall be designed so as to prevent the transmission of surface loads directly to the valve or piping. Valve boxes inside paving, walks, or road surfaces shall not be set on the valves but shall be supported on crushed stone fill.

f. The seating surface of both the lid cover and the top section of the valve box shall be cast so the cover will not rock after it has been seated and will fit tightly with little or no play in the fit. Valve boxes shall have the word "SEWER" cast into the covers.

g. Wherever valve boxes fall outside of the roadway, the top of the box shall be set in a concrete slab 18"x18"x6" thick (or 18" diameter x 6" thick) with the top of the slab and box flush with the top of the ground. This provision shall apply to all new and all existing valve boxes which fall within the limits of the contract, unless otherwise stated on the plans or ordered by the Engineer.

h. Valve boxes shall have extension stems, where necessary, when operating nut is raised to be within 4 feet of the existing grade. Extensions must be securely attached to the operating nut so the shaft will not pull off of the operator.

J. Granular Materials

1. Granular materials furnished for foundation, bedding, encasement, or other purposes as may be specified, shall consist of any material or synthetic mineral aggregate such as sand, gravel, crushed rock, crushed stone or slag, that shall be so graded as to meet the gradation requirements specified herein for each particular use.

2. Granular Material Gradation Classifications

   a. Granular materials furnished for use in Foundation, Bedding, or Encasement installations shall be:

MATERIAL USE DESIGNATION
Percent Passing

SIEVE SIZE	FOUNDATION	BEDDING & ENCASEMENT
1 INCH (25MM)	100	100
3/4 INCH (20MM)	85-100	90-100
3/8 INCH (9.5MM)	30-60	20-55
NO. 4 (4.75MM)	0-10	0-10
NO. 8 (0.075MM)	0-5	
NO. 200 (0.075 MM)		0-15

   b. Other gradations may be used if written approval is obtained from the City Engineer.

   c. Other approved material for bedding and encasement shall consist of sand, sandy gravel, or fine gravel having a maximum size of three-quarter inch (3/4") (20mm), uniformly graded and a maximum plasticity of 6 as determined by AASHO T-89 and T-90.

   d. Certified copies of all sieve analysis and plasticity analysis for the above materials shall be submitted to the City Engineer and approved before construction starts. Other sieve or plasticity analysis may be required during construction as directed by the City Engineer.

3. Granular Material Use Designations

   a. Granular materials provided for Foundation, Bedding, or Encasement use as required by the Contract, either as part of the pipe item work unit or as a separate Contract Item, shall be classified as to use in accordance with the following:

Material Use Designation	Zone Designation
Granular Foundation	Placed below and to the midpoint of the pipe as replacement for unsuitable or unstable soils, to achieve better foundation support.
Granular Bedding	Placed from four inches (4") (100mm) below the pipe to the pipe midpoint to facilitate proper shaping and achieve uniform pipe support. When foundation material is required, the granular bedding shall be of foundation material gradation.

Granular Encasement	Placed below an elevation one foot (1') (300mm) above the top of pipe, after pipe installation, for protection of the pipe and to assure proper filling of voids or thorough consolidation of backfill

K. Select Backfill

1. Job excavated and imported select backfill material shall be free from debris, organic material, and stones larger than three inches (3") (75mm) in diameter. Contractor shall be responsible, at his expense, for separating debris, organic material and stones larger than three inches (3") (75mm) in diameter.

2. Select material that the Engineer directs to be used shall be the same gradation as bedding and encasement material.

3. No asphalt chunks or concrete may be used as select backfill.

L. Ground Water Barriers

1. Low permeability ground water barriers shall be used where directed. Barrier material shall meet soil classification GC, SC, or CL per the Unified Soil Classification System and shall have a liquid limit less than 50.

2. The barrier material shall be compacted to 95 percent of maximum density.

3. Job excavated material meeting one of the above soil classifications and free from stones, organic matter, and debris may be used.

M. Steel Casing Pipe

1. Casing pipe will conform to ASTM A 139. Minimum yield strength will be 35000 psi. Wall thickness will meet the requirement of the latest revision of the American Railway Engineering Association manual of Recommended Practices unless otherwise specified. Wall thickness will be:

Nominal Thickness (inches)	Nominal Diameter (inches)
0.188	Less than 14
0.219	14 and 16
0.250	18 inches
0.281	20
0.312	22
0.244	24
0.375	26
0.406	28 and 30
0.438	32
0.469	34 and 36
0.500	38, 40, and 42

2. When casing is installed without a protective coating and is not cathodically protected, the wall thickness shown above will be increased to the nearest standard size that is the minimum of 0.063 inches greater than the thickness shown. This requirement does not apply to casing diameters less than 12 ¾ inches.

PART 3 Execution

3.01 Excavation and Preparation of Trench

A. When cutting into existing roads, streets, alleys, or other public rights-of-way, the Contractor, shall obtain the proper licenses, cut permits, etc. from the appropriate authority when applicable.

B. When trench excavation requires the removal of curb and gutter, concrete sidewalks, or asphaltic or concrete pavement, the pavement or concrete shall be cut in a straight line parallel to the edge of the excavation by use of a spadebitted air hammer, concrete saw, or similar approved equipment to obtain a straight, square, clean break. Cuts shall be located at standard joint locations when possible.

C. When crossing existing or prospective cultivated areas, gravel streets or other developed surfaces the Contractor shall strip the cover material to full depth of the existing surfacing. This surfacing shall be stockpiled and placed back over the trench after backfilling to the extent that it is acceptable and usable for that purpose. New material shall be provided as necessary. Topsoil shall be removed to full depth of the topsoil, or to a maximum depth of twelve inches (12") (300mm), whichever is less.

D. The disturbed area from construction shall be confined within the construction limits.

1. The trench shall be dug only as far in advance of the pipeline as work can be reasonably completed that day. The sides of the trench shall be sloped and/or braced in accordance with the current OSHA Rules and Regulations and the trench drained so that workers can work safely and efficiently. All work must be done in a dry trench and no water will be permitted to discharge down the pipe previously laid. A sewer plug shall be installed at the connection to existing sewer system. Discharge of pumps shall be to approved natural drainage channels or storm sewers.

E. Pipe crossings under sidewalks or curbs may be made by tunneling only if approved by the Engineer. If the Contractor elects to remove a portion of the sidewalk or curb, he must use a concrete saw for making neat joints corresponding to existing joints, compact the backfill as specified, and pour a new concrete sidewalk or curb section in accordance with the applicable sections of these specifications.

F. During excavation, materials suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated materials shall be stored and retained at least two feet (2') (600mm) or more from the edge of the trench in accordance with Tennessee Occupational Health and Safety Rules and Regulations for Construction. Excavated material must not be piled over nearby existing parallel trench lines unless adequate precautions are taken by the Contractor to prevent sidewall failure. Ready access to existing fire alarm boxes, fire hydrants, valves, manholes, and other appurtenances must be maintained.

1. When making excavations, the various materials excavated shall be piled separately. All concrete and bituminous materials, any soils, which cannot be properly compacted, and all other deleterious materials shall be immediately removed from the construction site and properly disposed of in accordance with applicable laws.

G. Surface drainage of adjoining areas shall be unobstructed. Grading shall be done as may be necessary to prevent surface water from flowing into excavations, and any other water accumulating therein shall be promptly removed. Under no circumstances shall water be permitted to rise in open trenches until after the pipe has been placed, tested, and covered with backfill. Any pipe having its alignment or grade changed as a result of a flooded trench shall be reinstalled. Gutters shall be kept clear or other satisfactory provisions made for street drainage at all times.

H. The bottom of the trenches shall be accurately graded to the line and grade shown on the drawings. Bedding material shall be added four inches (4") (100mm) minimum to provide uniform bearing and support for each section of pipe at every point along its barrel length with bell holes dug for bells. Care must be taken to avoid over excavation. Unauthorized over-depths shall be backfilled with approved bedding material at the Contractor's expense. All bedding material added shall be moistened and compacted to a minimum of 95% density as determined by ASTM D698. The finished trench bedding beneath the pipe shall be prepared accurately by means of hand tools.

1. The bottom of all excavations shall be neat and clean, and graded accurately to the line and grade shown on the drawings. Suitable methods shall be used to produce an excavated surface without disturbance to the underlying material by compacting soil material to at least 95% Standard Proctor, ASTM D698.

2. If in its natural state the material at the bottom of the trench is soft and, in the opinion of the Engineer, cannot support the pipe, a further depth and/or width shall be excavated as directed by the Engineer and refilled with foundation material to the midpoint of the pipe. Other approved methods may be used to assure a firm foundation.

3. Foundation material used to dewater the trench or to replace a wet material shall be considered incidental to construction.

I. Ledge rock, boulders, and large stones shall be removed to provide a clearance of at least six inches (6") (150mm) below the outside barrel of pipe and allow a clear width of six inches (6") (150mm) on each side of the pipe. The space between the bottom of the trench in bedrock or rocky areas and the bottom of the pipe shall be backfilled with suitable granular material in three-inch (3") (75mm) uncompacted layers and thoroughly tamped before pipe is installed.

J. All excavated material shall be piled within the construction limits or in a location obtained by the Contractor and accepted by the Engineer in a manner that will not endanger the work and that will avoid obstructing sidewalks, driveways, and fire hydrants.

K. The width of the trench shall be such to provide adequate working room for workers to install the pipe in the specified manner. The trench in the pipe zone and to one foot (1') (300mm) above the pipe zone shall be adequate in width to allow for proper compaction but shall in no case be

wider than the pipe diameter plus three feet (3') (900mm).

L. Where the trench is not located near existing utilities, buildings or other structures, and where water and other conditions permit, the Contractor may omit sheeting and bracing of the excavation. In this event, sides of the trench if in unstable or soft material or five feet (5') (1.5m) or more in depth, shall be sloped to protect the workers working within them in accordance with current Occupational Safety and Health Rules and Regulations for Construction.

M. The Contractor shall provide safety boxes or sheeting and bracing necessary to confine his work within the construction limits, to provide safe working conditions, to prevent damage and delay to the work, and to prevent the disturbing or settlement of adjacent road surfaces, foundations, structures, utility lines or railroad tracks. The Contractor shall be responsible for the strength and sufficiency of all sheeting and bracing.

N. Any damage to the work under this contract or to adjacent structures or property caused by settlement, water or earth pressures, slides, cave-ins, or other reasons due to failure or lack of sheeting and bracing, or improper bracing, or through negligence or fault of the Contractor in any manner, shall be repaired by the Contractor without delay and at his expense. Bracing shall be so arranged as to provide ample working space, so as not to interfere with the work, and so as not to place any strain on the structures being constructed, until such structures are of sufficient strength to withstand such strain. No sheeting and bracing shall be removed until the construction has proceeded far enough to provide ample strength for its safe removal.

1. Sheeting or bracing may be left in place in the trench at the discretion of the Engineer. Any sheeting or bracing left in place shall be cut off approximately three feet (3') (900mm) above the top of the pipe or two feet (2') (600m) below finish grade, whichever is lower, and the cut-off portion removed. All sheeting or bracing left in place shall be accurately located and shown on the "Record Drawing" (See Division 600 Section 601.12 of these specifications.)

O. The Contractor shall be responsible for enforcing safety and maintaining safe working conditions in all trenching, and shoring operations to conform to OSHA regulations.

P. The Contractor, if required by site conditions, shall provide a dewatering operation. The Contractor shall provide and maintain adequate dewatering equipment to remove and dispose of all surface water and groundwater entering the excavations, trenches, or other parts of the work.

1. All trench excavations which extend down to or below groundwater shall be dewatered by lowering and keeping the groundwater level beneath such excavations twelve inches (12")(300mm) or more below the bottom of the excavation.

2. Surface water shall be diverted or otherwise prevented from entering excavated areas or trenches to the greatest extent practicable without causing damage to adjacent property.

3. The Contractor shall be responsible for the conditions of any pipe or conduit which he may use for drainage purposes, and all such pipes or conduits shall be left clean and free of sediment.

4. In areas where dewatering is required, the Contractor will comply with the following requirements:

a. All discharges from dewatering systems, including well points, dewatering wells, pumps in the bottoms of the trenches, etc. will require a permit from the Tennessee Department of Environment and Conservation (TDEC). Before starting any construction, the Contractor shall submit an application to discharge to the TDEC along with a proposed dewatering plan for review. The application shall be submitted on "National Pollutant Discharge Elimination System, Application to Discharge from a Construction Project, Short Form E". If the dewatering plan is revised during construction, the Contractor shall immediately send a revised plan to the DEQ.

b. One copy of the initial application, dewatering plan, and of the permit authorizing the discharge must be provided to the City Engineer with the application for an excavation permit. Copies of any revisions to the dewatering plan shall be immediately provided to the City Engineer.

Q. Trenching and tunneling standards near trees.

1. Trenches should be routed outside the tree protection zone or critical root zone (CRZ). For trees less than 6" diameter at breast height (DBH), defined as 4.5' about average ground level, that are to be retained, no trenching should occur within the dripline or tree protection/critical root zone as defined by the City of Lakeland Tree Management Ordinance. For trees 6" DBH and less than 20" DBH no trenching should occur within an area equal to 1' radius for every inch of DBH or within the tree protection/critical root zone as defined by the City of Lakeland Tree Management Ordinance. For trees 20" DBH and greater, no trenching should occur within an area equal to 1.5' of radius for every inch of DBH or within the tree protection/critical root zone as defined by the City of Lakeland Tree Management Ordinance.

2. Soil removed from the trenches should be placed on the side away from the trees and replaced as soon as possible. The width of the trench should be minimized. The use of trench walls should be considered rather than sloping sides when working around trees.

3. If placement of utilities or other infrastructure is unavoidable within the tree protection zone or critical root zone then specific measures should be applied to minimize root damage. Tunneling is recommended as soon as roots 1 inch diameter and greater are encountered. Minimum tunnel depth should be 24 inches. Launch and recovery pits should be located outside of tree protection zones and critical root zones. If tunneling is impossible due to specific soil restrictions, the trenching should be done by hand within the tree protection zone or critical root zone. If this required trenching will sever more than 25% of the tree protection/critical root zone then the trench should be re-directed at the center of the tree with the final section dug under the base of the tree. Trenches should be backfilled with native soil or a prepared soil mixture when inside of a tree protection zone or critical root zone. Gravel, slurry, stone, and concrete are not appropriate fill material within a tree protection zone.

4. Changes to the approved construction plans or methods for trenching and tunneling must be submitted to and receive approval by the City's Representative before proceeding.

P. Procedures For Boring And Jacking

1. Casing pipe larger than 36 inches shall be bored or tunneled. Casing pipe smaller than 36 inches may be jacked or bored.

2. Boring:
   a. Extend casing through entire distance bored.
   b. Check grade and alignment after each casing section is installed.
   c. Coordinate operations to provide continuous support to surrounding earth materials.
   d. If the annular space between the casing pipe and the earthen bore exceeds 4 inches, the contractor shall fill the space with dry blown sand. Dry sand shall be blown in from both sides of the casing pipe.

3. Jacking:
   a. Progressively push carrier pipe through completed casing. A minimum clearance of at least 2 inches between the inner wall of the casing pipe and the maximum outside diameter of the cased pipe and joints shall be provided.
   b. Strap 2 wooden saddle blocks or plastic fins to each pipe length to provide support at regular intervals.
   b. Center carrier pipe in casing at all times.
   c. Fill annular space between casing and carrier pipe with dry blown in sand.
   d. Seal each end of the casing after the sand has been deposited.
   e. A minimum of 1 foot of grout shall be placed in the void between the inner wall of the casing pipe and the cased pipe at the ends of the casing pipe after placement of sand.

4. Field Tolerances for Boring and Jacking Casing Pipe
   a. Boring
      i. Maximum departure from established grade = 6 inches / 100 feet.
      ii. Maximum departure from established line = 2 inches / 100 feet.
      iii. Maximum departure from established line and grade = 6 inches / 100 feet.
   b. Tunneling
      i. Maximum departure from established grade = 2 inches / 100 feet.
      ii. Maximum departure from established line = 2 inches / 100 feet.
      iii.Maximum departure from established line and grade = 3 inches / 100 feet.

3.02 Laying of Pipe

Contractor shall provide all plant, equipment, labor, and material necessary for the safe and convenient prosecution of the work. Pipe manufacturer's installation instructions shall be followed and supplemented by these specifications.

A. The sewer pipe shall be carefully lowered into trench piece by piece by means of a derrick, ropes, or other suitable tools or equipment in such a manner as to prevent damage to the protective coatings and linings. The use of chains is not allowed. Under no circumstances shall sewer main materials be dumped into the trench. Any damage to pipe coatings shall be repaired with the same materials used for the original coating before laying the pipe.

B. Before lowering and while suspended, the pipe and fittings shall be inspected for defects and to detect any cracks. Any defective, damaged, or unsound material shall be rejected.

C. All foreign matter or dirt shall be removed from the inside of the pipe before it is lowered into its position in the trench, and it shall be kept clean by approved means during and after laying. All openings along the line of the sewer shall be securely closed as directed and, in the suspension of work at any time, suitable watertight stoppers shall be placed to prevent earth, water or other substances from entering the main.

D. Sewer piping shall be laid to the lines and grades indicated in the Contract Documents. Methods of maintaining alignment and grade, such as use of laser beam equipment or surveying instruments, shall be used.

E. Fine grading of the trench bedding beneath the pipe shall proceed ahead of the pipe laying. Unauthorized over-excavation shall be backfilled with bedding material at the Contractor's expense. All bedding material added shall be moistened and compacted to 95% of maximum density (Standard Proctor).

F. Bell holes shall be dug for the pipe bells or couplings and the materials placed along the preceding pipe laid. The pipe shall be supported for the bottom 60 degrees and throughout its length (except for the minimum distance necessary at the bell holes). Bell holes shall be adequate to make the joint, but no larger than necessary, so that maximum support on the prepared bedding beneath the pipe will be provided. The remainder of the pipe shall be surrounded to at least its midpoint by granular bedding material shovel-placed and hand-held machine tamped in maximum six-inch (6") (150mm) layers to completely fill all spaces under and adjacent to the pipe.

G. No pipe shall be laid in water, on frozen ground, or when the trench conditions are unsuitable for such work.

H. Pipe laying should proceed upgrade with the spigot ends pointed in the direction of the flow. The Contractor shall make all connections of pipe to the manholes that have previously been constructed.

I. When connecting to existing sewers, the Contractor shall take every precaution necessary to prevent dirt or debris from entering the existing lines. The Contractor shall use an approved water-tight plug to securely plug the new sewer at the connection to the existing sewer immediately after the connection has been made. The plug shall be braced as necessary and tied to the manhole by a rope or chain. This plug shall remain until the new sewer mains have been accepted by the City or until otherwise directed by the City.

3.03 Installation of Manholes

A. Excavation shall be to a depth and size to provide for construction of the manhole. Concrete bases shall be poured on undisturbed ground. Precast concrete bases shall be carefully lowered onto one of the following:

1. Six-inches (6") (150mm) minimum layer of well compacted granular material accurately laid to a smooth level surface using a straight edge and hand level.

2. Three inches (3") (75mm) of concrete poured on undisturbed soil.

B. Walls shall be of precast concrete as shown in the standard drawings and shall be constructed to form a complete watertight structure.

C. The Contractor shall provide a minimum of two inches (2") (50mm) and a maximum of twelve inches (12") (300mm) in two-inch (2") (50mm) layers of precast reinforced concrete adjusting rings between the cast iron frame and the manhole top section. Each ring shall be set on a full bed of mortar and shall be made watertight. Wood will not be allowed as spacers. Adjusting rings shall conform to the size and shape of the casting frame. Frames and covers shall be set to the designated elevation in a full mortar bed.

1. The minimum two-inch (2") (50mm) concrete ring for grade is not needed if grade can be met with a six-inch (6") (150mm) flange on top of the cone section of the manhole.

2. If the number of adjusting rings exceeds the maximum twelve inches (12") (300mm), the manhole shall be reexcavated and a manhole barrel section installed.

D. Manholes shall be set as shown on the detail drawings. All lifting holes must be grouted in after placement.

E. Riser rings, if approved by the engineer, shall be a minimum of two inches (2") (50mm) or greater in height. No aluminum risers shall be used. In gravel or unpaved roads, the manhole ring shall be kept one to two inches (1"-2") (25mm-50mm) below the road surface.

F. In asphalt paving areas, where patching material is required around the manhole covers, asphaltic material shall be required in the top two inches (2") (50mm) of the street.

G. The invert of all manholes shall be smoothly shaped so as to allow a free, uninterrupted flow of sanitary sewage. The invert forming system shall be "A-Lok Tru Contour", or approved equal.

1. Floor troughs shall be furnished for all sewers entering manholes. Inverts shall be U-shaped to the 1.0 diameter point before sloping at a 1 to 12 slope to the manhole walls.

2. Unless approved by the Engineer, the sanitary sewer pipe should be laid continuously through the manholes and cut out when the manhole invert is finished. Manhole couplings or other acceptable water stops (i.e. PVC pipe gasket stretched over outside of pipe, Ram-Nek, etc.) must be used when connecting PVC pipe to manholes. After the installation of the pipelines into the manhole, the interior annular space around the outside of the pipe shall be sealed with grout.

H. Fittings for drop manholes shall consist of a wye and a ninety-degree bend. (see Detail Drawings unless otherwise shown in the Contract Documents or approved by the Engineer). Clean out pipe on drop manholes will penetrate the inside of the manhole twelve inches (12") (300mm) to fourteen inches (14") (350mm) with the top half of the pipe cut out. The entire drop inlet piping arrangement shall be encased in mass concrete having a twenty-eight (28) day compressive strength of at least four thousand pounds per square inch (4,000psi) (27,600 kPa).

3.04 Installation of Air Release Valve Vault

A. The vault for the air release valve of a force main shall be installed in accordance with

Paragraph 3.03 Installation of Manholes.

3.05 Backfilling and Grading

A. All excavation in trenches shall be backfilled to the original ground surface or to such grades as specified or as shown on the drawings. The backfill shall begin as soon as practical after the pipe has been placed and shall thereafter be carried on as rapidly as the protection of the balance of the work shall permit.

1. No pipe shall be covered before the Project Representative or the Engineer has observed and approved the pipe. If any piping or appurtenance is covered without the approval of the Engineer or Resident Project Representative, at the discretion of the Engineer, the Contractor shall be required to re-excavate to expose the covered materials. The cost of exposing those materials and then backfilling and recompacting will be at the Contractor's expense regardless of the condition of the pipe and/or the materials under question.

2. The Contractor shall completely backfill all excavations before stopping work at the end of each day. Open excavations (fenced or unfenced) will not be allowed overnight, on weekends, or after work at any site after work has stopped for the day, unless approved by the City.

B. Complete cleanup shall proceed directly behind the backfilling operation to accommodate the return to normal conditions. Should the Contractor, in the City's opinion, fail to pursue diligently the backfilling and cleanup, the amount of work on which complete cleanup has not been accomplished shall be limited to one thousand lineal feet (1,000') (300m) for the entire job. The Contractor shall have sufficient equipment on the job to assure timely backfill and cleanup at all times.

C. Backfilling and compacting shall be done to meet minimum densities as required. Depositing of the backfill shall be done so the impact of falling material will not injure the pipe or structures. Grading over and around all parts of the work shall be done as directed by the Engineer.

1. Where excavations occur in unpaved surfaces, such as alleys but not previously turfed areas, the area shall be restored by placing a minimum of two inches (2") (50mm) of stabilized gravel on the surface of the excavation. Stabilized gravel shall be equal to material meeting coarse aggregate for minimum three-fourths inch (3/4") (20mm) as specified in other Divisions and Sections related to Street Construction.

D. Class C granular bedding shall be deposited in the trench simultaneously on both sides of the pipe for the full width of the trench to a height at least to the mid-point of the pipe. The bedding material shall be shovel placed and hand-held machine tamped in maximum six-inch (6") (150mm) layers to completely fill all spaces under and adjacent to the haunches of the pipe. Encasement material will then be placed around and over the pipe to a height of at least twelve inches (12") (300mm) above the top of the pipe, but need not be hand-placed. Granular encasement material, as specified, must be used for all pipe.

E. Succeeding layers of backfill above the twelve-inch (12") (300mm) level may contain coarse materials not exceeding three-inches (3") (75mm) in the largest dimension, but shall be free from large pieces of rock, frozen material, concrete, roots, stumps, tin cans, rubbish, and other similar articles whose presence in the backfill would, in the opinion of the Engineer, cause settlement of the trench or damage to the pipe. If suitable trench excavation is not available, Contractor shall

import pit run material for trench backfill. Pit Run material shall meet the approval of the Engineer. Whenever select material, encountered in the upper two feet of the finished grade of paved or graveled streets or roadways, is removed by the trench excavation, the Contractor shall replace said material (or material of equal quality) as backfill. Where select material does not exist in place as described above, the Contractor shall provide and place sufficient select backfill to stabilize the finished grade as directed by the Engineer.

F. Backfilling shall be done in lifts of uniform layers which will produce the required compaction. Each lift shall be completely compacted over the full width of the excavated area. Compacting shall continue until the specified relative compaction has been attained or until no more settlement occurs. Water jetting of backfill shall not be permitted.

G. Groundwater barriers may be directed by the City Engineer to be placed at maximum three hundred feet (300') (90m) intervals. These shall be provided to interrupt the passage of water through the foundation, bedding, encasement, and select backfill material. The barriers shall be compacted to 95% of maximum density (Standard Proctor) the full depth of the granular material, the full trench width and a minimum of three-feet (3') (900mm) long.

H. Special attention shall be given to the compaction operation performed around all manholes, valve boxes, curb boxes, other structures, and utilities by the use of pneumatic tampers, plate tampers, or plate vibrators to obtain the required compaction requirement.

1. Structure backfilling shall cover manholes, valve boxes, curb boxes, and any other structure encountered during the course of the work. Fill around structures shall consist of trench backfill meeting the requirements of bedding and encasement material or select backfill material. Fill material shall be spread and compacted to provide continuous and uniform support around the structure.

2. Do not place fill when the surface to be filled is snow covered or frozen. Do not place frozen fill.

3. Fill around concrete structures shall commence only after concrete has attained 80% of the ultimate compressive strength specified. Remove all form materials, concrete spills, and trash from around the structures before placing fill. Where backfilling on both sides or around the perimeter of a structure is required, place the backfill and compact simultaneously at the same elevation on opposite sides or around the perimeter in lifts.

4. Place fill material in eight-inch (8") maximum lifts and compact to at least 95% density for cohesive soils and 70% relative density for non-cohesive soils. The moisture content shall be plus or minus 2% of optimum.

I. Sewer service trenches shall be compacted in the same manner as the sewer main trenches. In streets open to traffic, service trenches must not be left open overnight. In areas where curb and gutter exist, sufficient curbing shall be removed to allow this compaction over the entire disturbed area.

J. All deficiencies in the quantity of material for backfilling the trenches or for filling depressions caused by settlement shall be supplied by the Contractor. Any excess material shall be hauled away and disposed of in a legal manner at no additional compensation.

K. No waste material or debris shall be deposited on any public or private property without the written permission of the Engineer. Waste material and debris shall include, but not be limited to

trees, stumps, pieces of pipe, pieces of concrete, pieces of asphaltic concrete, tin cans, or other waste material from the construction operations. Disposal of this material shall be the responsibility of the Contractor.

L. The in-place density of the compacted soil shall be determined by the Engineer using either ASTM standard test method D1556-82 (sandcone), AASHTO T 238-97, or ASTM standard test method D2722-81 (nuclear). The maximum density of the soil shall be determined by ASTM standard test method D698 (standard proctor). The in-place density must not be less than the following percentages of the maximum density in paved areas, areas to be paved, and graveled areas:

1. 95% compaction from twenty-four inches (24") (600mm) above top of pipe to the finished surface, except that in no case shall this 95% compaction zone be less than forty-eight inches (48") (1.2m) deep..
2. The compaction required outside paved areas, outside areas to be paved or outside graveled areas shall be 90%.
3. The compacted backfill shall have a moisture content of ± 2% of optimum moisture.

M. The Engineer shall determine the frequency and number of tests to be conducted to measure the gradation, density, and moisture of the backfill. Minimum testing frequency is as follows:

1. Gradation Tests

   a. Foundation Material. One initial gradation test for each type of material plus one additional test for each 1,000 cubic yards (1,000 yd^3) (750 m^3) or portion thereof placed of each material.

   b. Bedding and Encasement Material. One initial gradation test for each type of material plus one additional test for each 10,000 cubic yards (10,000 yd^3) (7,500 m^3) or portion thereof placed of each material.

   c. Select Backfill Material. One initial gradation test for each type of material plus one additional test for each 10,000 cubic yards (10,000 yd3) (7,500 m3) or portion thereof placed of each material.

   d. All gradation tests shall be the responsibility of the Contractor using a certified approved soils testing laboratory acceptable to the Owner and Engineer. The Contractor shall be responsible for all costs associated with gradation testing.

2. Density and Moisture Test

   a. Pipe Encasement Material. One test for each one thousand cubic yards (1,000 yds^3) (750 m^3) or portion thereof placed of each material.

   b. Foundation Material. One test for each one thousand cubic yards (1,000 yds^3) (750 m^3) or portion thereof placed of each material.

   c. Bedding and Encasement Material. One test for each one thousand cubic yards (1,000 yds^3) (750 m^3) or portion thereof placed of each material.

d. Select Backfill Material. One test for each one thousand cubic yards (1,000 yds^3) (750 m^3) or portion thereof placed of each material.

e. Job Excavated Select Backfill Material. Tests shall be taken as arranged by the Engineer.

f. Unless otherwise indicated in the Contract Documents, density and moisture tests shall be the responsibility of the Engineer. The Contractor shall cooperate with the Engineer or the soils testing agency in taking density and moisture tests.

N. When the trench excavation for the sewer main and appurtenances is within the rights-of-way of state or county highways, the backfilling of the trench, compaction of materials, subgrade preparation and surfacing shall be done in strict accordance with the requirements and specifications of the authority having jurisdiction or as required by these specifications, whichever is more stringent.

O. In all cases, the Contractor shall blade and compact the roadway after the trench has been backfilled, so that it shall be passable to traffic at all times. The Contractor shall maintain the roadway in a condition acceptable to the City at all times until final acceptance of the entire work by the City.

P. The Contractor shall also blade and maintain all detours and bypasses. All maintenance work shall be done at no additional compensation. In addition to the blading and maintenance requirements specified, the Contractor shall provide at least one tank truck with pressurized spray bars for spraying water on the streets to control the dust. Dust control shall be required as necessary on all streets after compaction and grading and on all detours and bypasses.

Q. The Contractor is responsible for the complete maintenance of his work at all times. If he fails to provide proper maintenance, and safety or nuisance conditions arise, it is expressly understood that City crews may be directed by the City to provide essential maintenance, and that such work will be done at the expense of the Contractor.

R. The Contractor shall remedy at his own expense any defects that appear in the backfill following completion and during the warranty period.

3.06 Service Connections

A. It shall be the duty of the Contractor to keep an accurate record of service connections as to the location, elevation of the service at the property line, type of connection provided, and other pertinent data and to include this information on the record drawings. Locations shall be made in respect to the survey line stationing and house corners or lot corners. The Engineer, prior to any backfill, shall approve all service installations.

B. The Contractor shall construct services for building connections and shall extend such services to the back of the utility easement. Service connections shall have a wye or tee installed at the main

line. The sewer lateral will be aligned at a 90 degree angle with the main line. Service connections shall not enter at an angle greater than 45 degrees from the horizontal. Contractor shall leak test all new service lines in conjunction with new sewer mains being leak tested.

C. Sewer service riser pipes shall not be installed directly into the main line. The bottom section of the sewer service line (installed at an angle not greater than 45 degrees from the horizontal) shall be a minimum length of eighteen inches (18") (450 mm) between the main line and the riser pipe installed at a grade not greater than 1/2 – inch per foot. The trench bottom below the bottom sections and the riser of the sewer service line shall be compacted to support the sewer service riser pipe. Riser pipes shall be laid against the trench wall to help prevent drag down loading from soil settlement. An engineer will design all sewer service riser pipes where the depth of the main line is twelve feet (12') (3.6m) or greater.

D. Sewer services shall be installed ten feet (10') (3m) from the lot centerline on the downhill side of the sewer main. Services may be installed at a greater distance from the centerline if required by the sewer elevation. Services shall be installed perpendicular to the sewer main between the main and the property line.

E. Sewer service lines shall be kept as deep as required to serve the property and shall extend on a straight-line grade to the property line unless otherwise directed by the Engineer. Where possible, all sewer service connections shall end above the groundwater table.

1. All sewer service connections shall be capped with stoppers which shall effectively prevent water from entering the sewer until the connection is placed in service. The cap shall be as recommended by the pipe manufacturer, sealed firmly in place, or by other methods accepted by the Engineer. The service connection end shall be clearly marked by a rebar extending from the pipe end to at least three feet (3') (1m) above the ground. The service line location shall also be marked in the concrete curbwalk by an arrow with the letter "S".

F. In some areas, the sewer services may be laid at the minimum grade allowed by the plumbing code in effect due to a shallow sewer line or low abutting property. Services shall be at right angles to the main sewer unless otherwise directed by the Engineer.

G. Where it is necessary to tap sewer services into existing mains, the City shall make the taps for the Contractor using saddle adapters. The Contractor shall be responsible for installing the service line from the installed tap to the property. The Contractor shall be responsible for obtaining a street cut permit, laying out and excavating the trench, protecting all mains and service pipes and backfilling the excavation in an approved manner. Contractor shall adhere to OSHA trenching and shoring rules and regulations.

H. All abandoned or unused sewer service lines must be plugged at the property line and capped with a watertight stopper.

3.07 Leak Testing

A. Upon completion of all utility construction and before any sewer service line is connected into, leak testing will be required of all sanitary sewer pipe lines. The Contractor has the option of performing either an air test or a water exfiltration test. Testing shall be performed after complete compaction and backfill and completion manholes, but may be performed before the

final surfacing.

1. Leak testing, using low-pressure air shall be performed with suitable equipment specifically designed for air testing sewers.

   a. The air test shall be made when the sewer is clean. Sections of sewer pipe to be tested may be wetted before the air test. The pipeline shall be plugged at each manhole with pneumatic balls. Low-pressure air shall be introduced into the plugged line until the internal pressure reaches four-pounds per square inch (4.0 psig) (28 kPa) greater than the average back pressure of any groundwater pressure that may submerge the pipe. At least two (2) minutes shall be allowed for the air temperature to stabilize before readings are taken and the time started.

   b. The portion of the sewer line being tested shall pass if it does not lose air at a rate to cause the pressure to drop one-half pound per square inch (0.5 psig) (greater than the average back pressure of any groundwater that may submerge the pipe) in less time than listed below.

Pipe Diameter in. (mm)	Minimum Time (min:sec)	Specified Time for L (min:sec)							
		100' (30m)	150' (45m)	200' (60m)	250' (75m)	300' (90m)	350' (105m)	400' (120m)	450' (135m)
4 (100)	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6 (150)	2:50	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8 (200)	3:47	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10 (250)	4:43	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12 (300)	5:40	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15 (375)	7:05	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18 (450)	8:30	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21 (525)	9:55	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24 (600)	11:20	1:24	17:57	22:48	28:30	34:11	39:53	45:35	46:54
27 (675)	12:45	14:25	21:38	28:51	36:04	43:16	50:30	57:42	51:17
30 (750)	14:10	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33 (825)	15:35	21:33	32:19	43:06	53:52	64:38	75:25	86:11	96:58
36 (900)	17:00	25:39	38:39	51:17	64:06	76:56	89:45	102:34	115:24

   c. If the pipeline section fails this test, the testing equipment may be used to determine the location of the pipe leak.

   d. All service plugs shall be secured in place to prevent displacement during testing operations.

2. In lieu of the standard sanitary sewer air test, the Contractor may perform leakage testing on sewers using water and measuring the exfiltration.

   a. The test section shall be bulkheaded at both ends and the pipe subjected to a hydrostatic pressure produced by a head of water at a depth of three feet (3') (1m) above the top of the sewer at the upper manhole under this test. In areas where ground water exists, this head of water shall be three feet (3') (1m) above the existing water table.

b. For purposes of the test, the line between adjoining manholes will be considered a section and will be tested as such

i The head of water shall be obtained by means of an open ended stand-pipe projecting from a test plug on the upper manhole. Placing water in the upper manhole is not permissible as a means of obtaining the necessary pressure head of water.

ii This head of water shall be maintained for a period of one (1) hour during which it is presumed that full absorption of the pipe body has taken place, and thereafter for a further period of one (1) hour for the actual test of leakage. During this one (1) hour test period, the measured maximum allowable rate of exfiltration for any section of sewer, including service stubs, shall be listed below:

MAIN SEWER DIAMETER	MAXIMUM ALLOWABLE EXFILTRATION
inches(mm)	Gallons Per Hour Per 100 feet(*l*/hr/30m)
4 (100)	0.6 (2.2)
6 (150)	0.9 (3.4)
8 (200)	1.2 (4.5)
10 (250)	1.5 (5.5)
12 (300)	1.9 (7)
15 (375)	2.3 (9)
18 (450)	2.8 (10.5)
21 (525)	3.3 (12.5)
24 (600) & larger	38 (14)

iii In case measurements indicate an exfiltration greater than the maximum allowable leakage, additional measurements shall be taken and continued until all leaks are located and the necessary repairs and corrective work have reduced the leakage in the section being tested below the maximum allowable by the specifications.

3. The Contractor shall furnish the plugs, standpipe, and other material and labor for placing the plugs and standpipe in the sewer.

4. The introduction of any substance into the water used for testing with the intent of sealing such leaks as may be indicated will not be permitted.

5. If results of either of these leakage tests are not satisfactory, repairs or pipe replacement will be required until the Engineer is satisfied that the leakage requirements are being met. All repair methods and materials used shall be approved by the Engineer.

B. Manholes will be tested for leakage separately from the pipe by one of the following methods:

1. Vacuum Testing

a. All manholes shall be vacuum tested for leaks upon the completion of the backfill and compaction operation. The vacuum test method shall be in accordance with ASTM

C1244-05a, except as specified otherwise herein. The vacuum test shall be performed by the Contractor and witnessed by the Engineer or representative of the Engineering Department. Twenty-four hours (24hr) advance notice shall be provided before testing begins.

b. The Contractor shall furnish all equipment and labor required, including necessary piping/hoses, pneumatic plugs, test vacuum equipment (vacuum pump and vacuum plate/head), vacuum gauge and second timer. The vacuum gauge shall have a maximum range of 0-30 inches of mercury (Hg) and the vacuum gauge figure intervals shall be in ½ inch increments.

c. After cleaning the interior surface of the manhole, the Contractor shall place and inflate pneumatic plugs in all the connecting pipes with the exception of sewer services to isolate the manhole. Complete sewer services entering the manhole shall be part of manhole vacuum test.

d. The vacuum plate/head shall be placed on the top of the manhole lid frame. The vacuum pump shall be connected to the outlet port with the valve open. When a vacuum of ten (10) inches of mercury has been attained, the outlet valve shall be closed and the test period is started. The minimum test period is determined from the following table:

DEPTH OF MANHOLE (ft)	DIAMETER OF MANHOLE (ft)	
	4	6
	TIME (sec)	
<14	60	60
16	60	67
18	60	73
20	60	81
22	60	89
24	60	97
26	64	105
28	69	113
30	74	121

e. All pneumatic plugs shall be removed from the manhole after the test.

f. Any manhole that fails the initial vacuum test must be repaired with a non-shrink grout material. The Contractor shall apply non-shrink grout on the interior of the manhole. Upon completion of the repairs, the manhole shall be retested as described in the above test procedures. The cost of the manhole repair and backfill is incidental to the cost of the project.

g. Any manhole that fails the three vacuum tests must be removed and replaced with a new manhole. The new manhole shall be backfilled to grade and tested as described in the above test procedures. The cost of the new manhole and backfill is incidental to the cost of the project.

h. The manhole shall have passed the vacuum test if the manhole vacuum does not drop below nine (9) inches of mercury during the minimum specified test period.

2. Manholes shall be filled with water to a depth of five feet (5') (1.5m) above the invert or five feet (5') (1.5m) above the groundwater table whichever is higher. If the groundwater level is more than five feet (5') (1.5m) above the invert, inflow to the manhole shall be measured. Allowable leakage into or out of or both shall be one gallon per hour (1g/h) (3.75*l*/h) per manhole measured over a minimum four (4) hours. At least 20% of all manholes shall be tested. Based on these tests, and visual inspection of all manholes, additional tests may be required for other manholes. Any manhole whose test is unsatisfactory shall be repaired and retested until satisfactory results are obtained.

3.08 PVC Deflection Test

A. All PVC pipe shall be subject to a deflection test by use of cage type approved mandrel.

1. In paved areas or areas to be paved, the Contractor has the option of:

   a. Testing PVC sewer lines with a 4% deflection mandrel after completed backfill and compaction of trench but before paving, or

   b. Testing PVC sewer lines with a 5% deflection mandrel after paving is complete.

2. In non-paved areas Contractor has the option of:

   a. Testing PVC sewer lines with a 4% deflection mandrel after complete backfill and compaction of trench but before placing and spreading topsoil, or

   b. Testing PVC sewer lines with a 5% deflection mandrel after placing and spreading topsoil (but before seeding).

B. All mandrels shall be precisely made to the diameters specified below (which include allowances for pipe manufacturer's outside diameter tolerance, excess wall thickness tolerance, and out-of-roundness tolerance).

NOMINAL PIPE DIAMETER	MANDREL MINIMUM OD FOR 4% DEFLECTION	MANDREL MINIMUM OD FOR 5% DEFLECTION
8"(200mm)	7.358" (187mm)	7.282" (185mm)
10" (250mm)	9.180" (233mm)	9.085" (231mm)
12" (300mm)	10.907" (277mm)	10.793" (274mm)
15" (375mm)	13.342" (339mm)	13.203" (335mm)
18" (450mm)	16.297" (414mm)	16.127" (410mm)
21" (525mm)	19.204" (488mm)	19.004" (483mm)
24" (600mm)	21.581" (548mm)	21.356" (542mm)
27" (675mm)	24.314" (618mm)	24.061" (611mm)

* OD – Outside Diameter

3.09 Separation of Water Mains and Sewers.

A. Minimum horizontal separation shall be ten feet (10') (3m) where the invert (bottom) of the water main is less than eighteen inches (18") (450mm) above the crown (top) of the sewer line. Minimum vertical separation shall be eighteen inches (18") (450mm) at crossings. Joints in sewers at crossings shall be located at least ten feet (10') (3m) from water mains. The upper line of a crossing shall be specially supported. Where vertical and/or horizontal clearances cannot be maintained, the sewer or water piping shall be placed in a separate conduit pipe.

3.10 Inspection and Acceptance

A. Prior to acceptance of each section of sanitary sewer line, the Contractor shall flush a ball the full diameter of the pipe through all pipelines up to eighteen inches (18") (450mm) in diameter. Larger pipelines shall be cleaned by other appropriate methods. All dirt and debris shall be prevented from entering the existing sewer system by suitable methods.

B. Preliminary Acceptance

1. Prior to preliminary acceptance of a sanitary sewer collection system, regardless of ownership, the following inspection tests shall be made and certified for each section of sewer line.

    a. Gradation tests. Copies of the test results shall be enclosed as an attachment to the "Certificate of Completion".

    b. Density and moisture tests. Copies of the test results shall be enclosed as an attachment to the "Certificate of Completion".

    c. Air tests or exfiltration tests. Copies of the test results shall be enclosed as an attachment to the "Certificate of Completion".

    d. Deflection test (PVC). Copies of the test results shall be enclosed as an attachment to the "Certificate of Completion".

    e. Cleaning and flushing of the lines and manholes.

2. Each manhole shall be inspected for:

    a. Proper construction. The invert of the manholes shall be smooth, clean, and free of obstructions.

    b. Leakage

    c. Cover accessible and at proper grade.

3. Items 1.c. and 1.d. above shall be performed only after complete backfill and compaction; items 1.e. and items 2.a., 2.b., and 2.c. shall be performed after an all-weather roadway is completed and complete easement restoration is accomplished.

4. The "Certificate of Completion" and "Record Drawings" shall be submitted to the City prior to preliminary acceptance.

C. Final acceptance

1. Final acceptance will not take place until preliminary acceptance is obtained and all paving and curbwalk is completed.

2. Before final acceptance of any sanitary sewer, the following inspections shall be made:

   a. All lines clean and flushed.

   b. Manholes up to proper grade in a proper condition.

3. All punch list items must be completed prior to final acceptance.

4. The warranty period shall not start until final acceptance is obtained and a complete set of "Record Drawings" is submitted to the City.

3.11 Record Drawings

A. "Record Drawings" shall be submitted to the City prior to preliminary acceptance of the construction project. "Record Drawings" shall include, in addition to construction drawings and details, "as built" information where it differs from construction drawings and locate information including horizontal and vertical coordinates in the datum established by the City for the Geographical Information System.

END OF SECTION

SECTION 02741

ASPHALTIC CONCRETE PAVEMENT

PART 1 – Description

This work shall consist of an asphaltic concrete pavement constructed in one or more layers for surface course(s) and binder course(s). The binder course may also be used as a leveling or bushing course. Binder course shall consist of a hot mixture of aggregate and asphalt prepared in a hot bituminous mixing plant. The binder course shall be constructed on a prepared subgrade, subbase, or base conforming to the lines, grades, thicknesses, and cross-sections shown on the Plans or as directed by the Engineer. The surface course shall consist of an asphaltic concrete pavement composed of a mixture of coarse aggregate, fine aggregate, mineral filler, and asphalt cement, constructed on a prepared roadbed in conformity with the lines, grades, thicknesses, and cross-sections shown on the Plans or directed by the Owner.

PART 2 – Materials And Equipment

2.01 MATERIALS

A. Asphalt Cement. Asphalt cement shall conform to the requirements of ASSHTO M 226, Table 2, for the grade specified. Unless otherwise directed, asphalt shall be Viscosity Grade AC-20, PG64-22, or PG 64-28. The type and grade of bituminous material may be changed one step by the Engineer during construction, at now change in unit price.

B. Course Aggregate. Course aggregate (aggregate retained on the No. 4 sieve) shall be crushed stone meeting the quality requirements of ASTM D 692 with the following exceptions:

1. Crushed limestone shall have a sodium sulfate soundness loss not exceeding 9 percent.
2. For Mix No. 1, material retained on the No. 4 sieve shall have a maximum of 20 percent elongated pieces (length greater than five times the average thicknesses).
3. For Mix No. 2, the aggregate shall contain no more than 5 percent soft or nondurable particles.
4. For Mix No. 3, the aggregate shall contain no more than 5 percent soft or nondurable particles.

C. Fine Aggregate. The fine aggregate shall consist of natural sand consisting of hard, clean, tough grains which will have a maximum loss of 12 percent when subjected to the sodium sulfate soundness test.

D. Composition of Mixtures

1. Asphaltic Concrete Surface, Mix No. 1, shall be laid in one course to the thickness shown on the Plans.

2. Asphaltic Concrete Binder, Mix No. 2, shall be laid in one or more courses to the thicknesses shown on the Plans. Mix No. 2 may also be used as a leveling course or bushing course.

3. Asphaltic Concrete Binder, Mix No. 3 shall be laid in one or more courses to the thickness shown on the plans.

4. The composition of the mixes shall be as follows:

	Total Percent Passing by Weight		
Sieve Size	Mix No. 1	Mix No. 2	Mix No. 3
2"	100	100	100
1-1/2"	100	100	90 - 100
3/4"	100	100	65 - 90
3/8"	76 – 96	65 - 95	----------
No. 4	51 - 76	45 - 70	30 - 55
No. 8	36 - 60	25 - 50	20 - 45
No. 30	16 - 40	12 - 30	8 - 25
No. 100	3 – 12	2 – 12	2 - 12
No. 200	2 - 8	1 - 6	1 - 6

5. The proportions of the total mixture, in percent by weight, shall be as follows:

Courses	Combined Mineral Aggregate	Asphalt Cement
Mix No. 1, Surface(Limestone)	92.0 – 96.0	4.0 – 8.0
Mix No. 2, Binder	93.0 – 97.5	2.5 – 7.0
Mix No. 3, Binder	93.0 – 97.5	2.5 – 7.0

6. It is the intent of this Section of the Specifications that the above described mixes shall conform to the following mixtures specified in the Tennessee Department of Transportation Standard Specifications for Road and Bridge construction.

Mix No. 1 – Section 411, Asphaltic Concrete Surface (Hot Mix), Aggregate Grading E.
Mix No. 2 – Section 307, Bituminous Plant Mix Base (Hot Mix), Aggregate Grading C.

Mix No. 3 – Section 307, Bituminous Plant Mix Base (Hot Mix), Aggregate Grading B.

7. For multiple layer construction, succeeding layers shall not be laid until the previous layer has cooled sufficiently to support the construction equipment

8. When Mix No. 1 is to be used as a surface for traffic lanes, the mineral aggregate shall be composed of not less than 50 percent nor more than 80 percent crushed limestone and not more than 50 percent nor less than 20 percent natural sand. When Mix No. 1 is used for surfacing of shoulders or other non-traffic lane construction, the mineral aggregate may be composed entirely of limestone, including screening and manufactured sand, but in no case shall the mineral aggregate for this construction consist of less than 50 percent limestone. The natural sand shall be so graded that not more than 5 percent will be retained on the No. 4 sieve.

2.02 EQUIPMENT

A. All equipment necessary for the satisfactory performance of this construction shall be on the Project and approved of before work will be permitted to begin. The equipment shall meet the requirements of Specification Section 02710.

PART 3 – Execution

3.01 General

A. The general construction requirements for surface and binder courses shall be as prescribed in the applicable portions of Specification Section 02710

3.02 Preparation of Base or Existing Surface

A. The designated surface upon which asphalt concrete courses are to be placed shall meet the applicable requirements of Specification 02710 and be thoroughly cleaned of all dirt and other foreign or loose matter prior to the application of the Tack Coat or Prime Coat, as specified in TDOT Specification Sections 402 and 403.

3.03 Thickness And Surface Requirements

A. Thickness shall be controlled during the spreading operations by frequent measurements taken of freshly spread mixture to establish a relationship between the un-compacted and compacted material. This thickness shall remain in conformity with that specified on the Plans. The surface of all courses shall meet the requirements specified under Specification Section 02710 and when tested in

accordance with the provisions of Specification Section 02710 the deviation of the surfaces from the testing edge of the straightedge shall not exceed 1/4 inch for Mix No. 1 or 3/8 inch for Mix No. 2 and Mix No. 3.

3.04 Manhole Adjustments

A. Drainage and sanitary sewer manholes owned by the City shall be adjusted and set at final grade by the Contractor as necessary for compliance with the Plans. Adjustments of City owned manholes shall be as specified in Section 02530 or 02632 of these Specifications. Manholes, valve boxes, and other utility structures not owned by the City but within the right-of-way of the project shall be adjusted as necessary by the owner of such facilities. The Contractor shall be responsible for notifying other owners of any required adjustments and for the accomplishment of that work by the owner of such facilities according to the project schedule.

3.05 Traffic And Maintenance

A. The Owner will determine when the surface course has sufficient compaction and has cured sufficiently to allow construction equipment, slow moving local traffic, or normal traffic to use the completed surface.

END OF SECTION

SECTION 02835

SEEDING AND LAWN RESTORATION

PART 1 - DESCRIPTION

1.01 General

The work covered in this article includes the furnishing of all materials, labor, tools and equipment for seeding and lawn restoration as described in the specifications.

PART 2 - MATERIALS

2.01 Materials

A. Type A – Native Seed

1. Priority should be given to native species in any mixture due to the level of damage that non-native species are currently exhibiting within the City as noted by the Natural Resources Inventory. Suggested native seed mixes are shown below but can be modified to include a variety of native warm season grasses and native forbs. Suggested native warm season grasses include:
    (a) Big bluestem (*Andropogon gerardii*)
    (b) Little bluestem (*Schizachyrium scoparium*)
    (c) Indiangrass (*Sorghastrum nutans*)
    (d) Broomsedge bluestem (*Andropogon virginicus*)
    (e) Sideoats grama (*Bouteloua curtipendula*)
    (f) Switchgrass (*Panicum virgatum*)
    (g) Eastern gamagrass (*Tripsacum dactyloides*)

2. Any native warm season grass mixture should contain no more than 30% of one species. Native forbs may be included in the seed mixture including but not limited to:
    (a) partridge pea (*Chamaecrista fasciculata*)
    (b) Illinois bundleflower (*Desmanthus illinoensis*)
    (c) roundhead lespedeza (*Lespedeza capitata*)
    (d) perennial sunflowers *(Helianthus salicifolius)*
    (e) purple prairieclover *(Dalea purpurea var. purpurea)*
    (f) purple coneflower *(Echinacea purpurea)*
    (g) Tennessee Coneflower *(Echinacea tennesseensis)*
    (h) black-eyed susan *(Rudbeckia hirta)*
    (i) blazing star *(Liatris spicata / Liatris squarrulosa)*
    (j) lance-leaved coreopsis *(Coreopsis lanceolata)*
    (k) joe pyeweed *(Eupatorium purpureum var. purpureum)*
    (l) evening primrose *(Oenothera biennis)*

(m)New England aster *(Symphyotrichum novae-angliae)*
(n) Indian blanket *(Gaillardia pulchella var. pulchella)*

Suggested Type A Seed Mixes With Planting Dates

Native Grass Mixture	Little Bluestem Indian Grass Side Oats Grama Big Bluestem Switchgrass (native) (*Panicum virgatum*)	April 1 – June 30
Southeast Native Mixture	Indiangrass Little Bluestem Switchgrass Big Bluestem Lovegrass (Native only)	March 1 – June 15
Songbird Native Grass /Wildflower Mixture (Useful near conservation easements or natural areas for establishment of wildlife habitat)	Side Oats Grama Little Bluestem Indian Blanket Lance-leaved Coreopsis Purple Coneflower Goldenrod Joe Pyeweed Evening Primrose New England Aster Black-Eyed Susan	April 1 – June 15 August 15 – October 15
Wetland Mixture	Red Top (Native only) Virginia Wild Rye Fox Sedge Woolgrass Soft Rush Lurid Sedge Joe Pyeweed	March 15 – June 15 August 15 – October 15
Native Rough Mixture (Fescue mix may not be appropriate in all locations due to invasive nature)	Hard Fescue Little Bluestem Chewings Fescue Blue Fescue	March 15 - June 1 August 15 – Octobe

3. Some of the above mixtures may not be appropriate near natural areas due to the inclusion of non-natives and plants that are invasive by nature. Mowing should only be done in late October and late February to early March. Other forms of maintenance (that closely resemble natural disturbance) may be needed to exclude undesirables and to further promote the growth and spread of the native grasses.

4. Type A seed mix should be sown at approximate rates of 4-8 pounds pure live seed (PLS) per acre. Seed purity should be no less than 50% PLS.

B. Type B – Lawn Seed

1. Bermuda, Zoysia, and Fescue shall be used in areas where frequent mowing occurs. An established mowing schedule shall be in place in order to prevent species from becoming invasive.

C. Grass seed mixtures under brand names may be acceptable if they approach the above specifications and if accepted by the City Engineer. All seed types shall meet the requirements of the Tennessee Department of Agriculture and no Below Standard seed will be accepted. Grass seed furnished under these specifications shall be packed in new bags or bags that are sound and not mended. The vendor shall furnish the Engineer a certified laboratory report from an accredited commercial seed laboratory or from a State seed laboratory showing the analysis of the seed to be furnished.

D. Tackifiers

1. Tackifiers shall be a synthetic polyacrylamide tackifier. The tackifier shall water soluble and anionic in nature. Cationic tackifiers shall not be permitted. Organic tackifiers such as starch based compounds may be substituted upon approval of the engineer.

E. Mulch

1. Hay or straw mulch materials shall be air dried and reasonable free of noxious weeds and weed seeds or other materials detrimental to plant growth. Hay shall be stalks of approved grasses, sedges or legumes seasoned before bailing or loading. Straw shall be stalks of rye, oats, wheat, or other approved grain crops. Both hay and straw shall be suitable for spreading with standard mulch blower equipment.

2. Wood fiber mulch shall be in accordance with Section 02925.

PART 3 - EXECUTION

3.01 Restoration of Lawn and Grassed Areas.

A. Any sod which is disturbed during the project or its appurtenances shall be replaced with similar sod including necessary topsoil, by the Contractor.

1. Top soil shall be replaced to a thickness equal to that removed up to a maximum of six inches (6") (150mm). No sod or seed shall be laid on less than four inches (4") (100mm) of topsoil. Topsoil shall be light friable loam containing a liberal amount of humus and shall be free from heavy clay, coarse sand, stones, plants, roots, sticks, and other foreign materials.

2. Sod shall be rolled within 24 hours after its placement with a roller that leaves the sod smooth and the joints properly closed. The new sod shall be trimmed neatly to match old sod, curbs, and walks. In all sod areas, the Contractor shall be responsible for ensuring adequate moisture until the new sod has properly established itself.

B. In other areas, the Contractor shall reseed as specified in the City's Standard Specifications.

1. In general, Type A seeding shall be used in undeveloped areas having a "native" grass vegetation. After the disturbed area has been backfilled as specified, the Contractor shall place four inches (4") inches (100mm) of topsoil over the disturbed area, prior to Type A, seeding. The area to be seeded shall be made smooth and uniform and shall conform with the finished grade. Type B seeding shall be used in developed areas where the disturbed vegetation would not be classified as sod. For temporary seeding of disturbed areas, Type A seed shall be used.

2. The seedbed, if not loose, shall be loosened to a depth of from 1 to 2 inches (25-50mm) below finished grade. Seeds and fertilizers can be sown with standard agricultural drills, or other approved methods. Grass seeds may be sown broadcast or with a special seeder attachment on agricultural drills, but shall not be covered with more than ½-inch (12mm) of soil, whether drilled or raked in. If not covered by the drill, all uncovered seed shall, immediately after sowing, be slightly raked or harrowed to cover the seed. No seed shall be broadcast during high wind.

3. Seeding shall be done in accordance with the manufacturers recommendation and approved of by the City Engineer. During other periods, the time of sowing shall be determined by the Engineer, whose decisions will be based on the moisture content of the soil and weather conditions.

3.02 Fertilization, Mulching and Tackifier

A. Fertilizer shall be applied in accordance to the soils analysis recommendation. Cellulose hydromulch shall be applied according to manufacturer's recommendation.

3.03 Warranty

A. Weed control in planted areas shall be the responsibility of the Contractor. Watering schedules of City-owned property shall be the responsibility of the Contractor during the warranty period.

END OF SECTION