One City Plaza, Suite B
P.O. BOX 1287
CABOT, ARKANSAS 72023
501-843-4654

INVITATION TO BID (ITB)

Date: September 15, 2025

Cabot WaterWorks (CWW) is accepting Sealed Bids for the following Services.

Furnish & Install; 6" & 12" Diameter, Sewer Road Bores

Sealed, written responses to this invitation must be received at Cabot WaterWorks Administrative Office, at the address above no later than 11:30 a.m. September 25th, 2017 for consideration. THE SEALED ENVELOPE, INCLUDING EXPRESS ENVELOPES, MUST BE LABELED AS A SEALED BID AND SHOW ITEM OR BID NUMBER.

Questions and Site Visits should be directed to Tim Joyner, General Manager.

Cabot Waterworks encourages the participation of small, minority, and woman owned business enterprises in the procurement of goods and services. Bidders must be prepared, if requested by Cabot Waterworks, to provide additional information within 10 business days so that Cabot Waterworks can determine Bidder's ability to meet requirements of this ITB. **Cabot Waterworks reserves the right to reject any or all bids** and to waive any formalities or minor exceptions.

Bids will be opened and the dollar amount read at the stated time and is open to the public. Bidders are welcome at the bid opening but their presence is not required. Bid tabulations and the bids will be available for public viewing and inspection after Cabot Waterworks has prepared such tabulation after the bid opening. A decision will not be made at the bid opening as to bid award. Cabot Waterworks staff will take bids under consideration. After evaluation, CWW staff will prepare a recommendation to present to the Cabot Water and Wastewater Commission for their consideration at an upcoming Commission meeting. Once the Commission approves the bid, Cabot Waterworks will issue a Notice of Award. Cabot Waterworks will not formally notify unsuccessful bidders.

This invitation does not constitute an order for the service/product named.

ACKNOWLEDGEMENT

ACKNOWLEDGEMENT OF THIS "INVITATION TO BID" (ITB) / REQUEST FOR PROPOSALS" (RFP) MUST BE RECEIVED BY CABOT WATERWORKS IN ORDER FOR YOU TO RECEIVE ADDENDUMS.

PLEASE COMPLETE BELOW AND RETURN TO CABOT WATERWORKS <u>IMMEDIATELY UPON RECEIPT</u> OF THIS PACKET.

Services requested in Invitation to Bid:

Furnish & Install; 6" & 12" Diameter, Sewer Road Bores

DATE RECEIVED: _____

RECIPIENT: _____(NAME)

_____(ADDRESS)

_____

_____(Phone)

_____(Fax)

_____(Email)

_____ _____

Printed Name Signature

TERMS AND CONDITIONS OF BIDDING

1.0 DEFINITIONS

Cabot Waterworks (CWW) hereinafter means Cabot Water & Wastewater Commission DBA “Cabot WaterWorks”

2.0 BID SUBMISSION REQUIREMENTS

Bids shall be valid for a period of sixty (60) days after the bid opening date of this ITB. Bidder must submit the following properly executed forms listed below.

- Bid Form
- Bidder shall furnish a Bid Bond or Certified Check for 5% of total Bid amount

3.0 PRICING

Prices must be submitted on a firm, fixed price basis not subject to escalation. Unit prices are to be extended and a total price shown on all bids. If unit prices and extensions thereof do not coincide, Cabot Waterworks will assume the price most favorable to Cabot Waterworks to be the correct price. Bids not prepared properly may not be considered for evaluation.

- Bidder shall include impact to pricing for quantity additions/deletions.

4.0 TERMS OF PAYMENT

Cabot Waterworks’ terms of payment are Net 30 days upon receipt of an invoice for completed bores.

5.0 BID AWARD

Cabot Waterworks will award a bid based on the lowest responsive, responsible bid considering any other pertinent factors that might affect overall cost to CWW.

Cabot Waterworks will issue a Notice of Award to the successful bidder. The successful bidder will have 10 calendar days upon receipt of the Notice of Award to return the executed Agreement with Performance and Payment Bonds in penal sums equal to the contract price, conditioned upon the performance by the contractor and upon prompt payment by the contractor to all persons supplying labor and materials on the project.

If the Bidder fails to execute the Agreement and submit required bonds, the Bidder may be considered in default, in which case the Bid Bond accompanying the bid will become property of CWW.

6.0 CANCELLATION

In accordance with the Agreement, Cabot Waterworks shall have the option to cancel the Agreement for convenience, in whole or in part, without cost or liability by giving written notice of such cancellation to Bidder.

7.0 CABOT WATERWORKS'S RIGHTS

Cabot Waterworks reserves the right to award the bid by item or groups of items or in total, and/or to award the bid in the manner most advantageous to the public. Cabot Waterworks reserves the right to, at its discretion, purchase additional units, within a reasonable time, at the bid price, upon concurrence of the bidder.

8.0 TAX INFORMATION

Bidder to show sales taxes (if applicable and not included in price) on bid form as part of bid.

9.0 INSPECTION

Cabot Waterworks will inspect all work for compliance with Cabot WaterWorks Standard Construction Specifications. Acceptance will not be recognized until Cabot Waterworks is satisfied that the work meets Cabot WaterWorks Standard Construction Specifications.

10.0 QUESTIONS AND CLARIFICATIONS

Any questions or requests for clarification concerning the bid or bid specifications may be made in person, by phone or in writing to Cabot Waterworks, Administrative Off prior to 5 working days before the bid opening. Should the question(s) pose substantial issues, Cabot Waterworks may ask that they be submitted in writing. Any such inquiry that results in a change in the bid or the specifications, such change will be put in writing, time permitting, and provided to all those who have received the bid request. This procedure shall be followed in order to ensure competitive fairness by providing all prospective bidders with the same information. Bidders should rely on written information (as opposed to verbal information).

11.0 IDENTICAL BIDS

In the event of two or more identical low bids, the ITB may be re-bid or awarded arbitrarily or for any reason to any of such bidders or split in any proportion between the bidders at the discretion of Cabot Waterworks.

12.0 AMBIGUITY IN BID

Any ambiguity in any bid as the result of omission, error, lack of clarity or noncompliance by the bidder with specifications, instructions and all conditions of bidding shall be construed in the most favorable to Cabot Waterworks. An error in the extension of unit prices (unit price x quantity) may be corrected by Cabot Waterworks.

13.0 BID SPECIFICATIONS

The specifications listed are to be interpreted as meaning the minimum acceptable by Cabot Waterworks.

When used, except as might be noted, the use of any manufacturers or Bidders names, trade names, brand names, catalog numbers or other identifying references or descriptions are for the purpose of describing and establishing general quality levels. Such references are not intended to be restrictive.

14.0 BIDDER INDEBTEDNESS

Acceptance by the successful bidder of an award from this bid request indicates that the successful bidder is in no way currently indebted to Cabot Waterworks or the City of Cabot or the State of Arkansas and is in compliance with any and all applicable laws and ordinances thereof. Indebtedness to any of the above may be basis for no award and/or cancellation of any award. The successful bidder may be required to obtain a City of Cabot business license.

15.0 PROTEST PROCEDURE

Protest of bidding procedures, specifications or bid/contract awards shall be made in accordance with the following procedures. Such protests may only be initiated by an authorized representative of a person, firm or corporation who has a direct economic interest in the particular procurement in question. Any protest must be filed with the General Manager at the address specified in the bid specifications. The protest must be in writing and describe in full detail the basis for the protest and the particular bid or quote in controversy within five (5) business days of Cabot WaterWorks' award decision. A protest may be delivered in person, by U.S. mail, facsimile or electronic means; provided, however that a facsimile or electronic filing shall be followed with documents bearing original signatures as soon as practical thereafter.

23.0 OTHER TERMS

Other terms or conditions prepared by bidder may or may not be considered by Cabot Waterworks in awarding the bid. Cabot Waterworks reserves the right to accept or reject any bidder's proposed terms and conditions or any part thereof. Cabot Waterworks further reserves the right to waive any minor irregularities in bids submitted.

AGREEMENT

THIS AGREEMENT entered into this ____day of *2025,* by and between Cabot Waterworks, hereinafter referred to as "CWW" *and*_____, hereinafter referred to as "Contractor".

NOW, THEREFORE, THIS AGREEMENT WITNESSETH:

1 Contractor agrees to furnish all material, labor, machinery, equipment, expert superintendence, and means to *Furnish & Install; 6" & 12" Diameter, Sewer Road Bores, Cabot, Arkansas* in accordance with drawings, sketches, "General Specifications" and "Cabot WaterWorks Standard Construction Specifications Water & Wastewater Facilities", as prepared by CWW which is attached hereto and made a part hereof.

2 CWW agrees to pay Contractor for work performed hereunder at the rates and prices set forth on the attached Bid Form.

3 Contractor agrees that all work related to this project shall be substantially completed within **60** calendar days from the date of this agreement indicated above.

a) Cabot Waterworks' terms of payment is Net 30 days upon receipt of CWW approved invoice. Payments for each completed bore shall be in accordance with the unit or lump sum prices shown on the Bid Form and verified by CWW.

b) No separate payment will be made for those materials or work required to make a complete installation as shown on the Plans or indicated in these specifications, except as shown on the Bid Form. Materials and work not itemized on the Bid Form, but nonetheless required for a complete installation shall be considered subsidiary to the principle item of work and the cost thereof included in the bid price for the principle items.

c) Casing pipe – (No Rock encountered, boring through soil, chert or shale) The unit price per linear foot shall be considered as full payment for installing the casing pipe utilizing tunneling & boring and shall be based upon the unit price per linear foot as set forth in the Bid Sheet for the various sizes of casing pipe required and installed. The unit price for installation shall include transporting all materials to the job site, excavation and backfill, and all other items as required to provide a complete installation which are not paid for under a separate bid item.

d) Casing Pipe through Rock Boring – The unit price per linear foot shall for boring through solid rock formations as set forth in the Bid Sheet for the various sizes of casing pipe required and installed. The unit price for installation shall include transporting all materials to the job site, excavation and backfill, and all other items as required to provide a complete installation which are not paid for under a separate bid item.

4 Cabot Waterworks shall have the option to cancel this Agreement for convenience, in whole or in part, without cost or liability by giving written notice of such cancellation to Contractor. Final payments shall be based on that portion of the work satisfactorily performed to the date of cancellation.

5 Contractor agrees that he is an independent contractor and is not an agent of CWW and as such is solely responsible for the acts of his employees in the performance of the work hereunder.

6 Contractor agrees that all work performed for CWW shall comply with the following.

a) All Federal, State, and Municipal Laws and ordinances in effect at the date work is performed.
b) All Federal, State, and Municipal Safety Laws.
c) State Fire Marshall
d) National Electric Code (NEC)
e) Underwriters Laboratories (UL)
f) National Electric Safety Code (NESC)
g) National Electrical Manufacturer's Association (NEMA)
h) Institute of Electrical and Electronics Engineers (IEEE)
i) American National Standards Institute (ANSI)
j) American Society of Testing and Materials (ASTM)
k) American Waterworks Association (AWWA)
l) Occupational Safety and Health Act (OSHA), Specifically incorporated into this Agreement by reference;

i. **Excavation and Trench Safety, 29 CFR 1926.650 Subpart P**
ii. **Hazard Communication, 29 CFR 1910.1200**
iii. **Confined Spaces, 29 CFR 1910.146**
iv. **Control of Hazardous Energy, 29 CFR 1910.147**
v. **Fall Protection, 29 CFR 1926.500 Subpart M**

7 Contractor agrees to take necessary precautions for the safety of his/her employees and any sub-contractor performing work for CWW. Contractor agrees to furnish his/her employees with all required personal protective safety equipment. The Contractor shall inform, train and evaluate its employees as applicable to individual

assignments as described below:

a) The applicable provisions of the site's Emergency Response Plan.
b) The Contractor shall advise CWW Representative of any unique hazards presented by the Contractor's work, or of any hazards found by the Contractor during his work.
c) It is the responsibility of the Contractor, where appropriate, to ensure its employees are suitably trained and qualified to enter **confined spaces**. Confined spaces include but are not limited to trenches, excavations and vaults that are large enough for an employee to enter but have limited means of entry and exit and potentially have a hazardous atmosphere due to toxic gases or lack of oxygen.
d) The Contractor shall instruct Contractor's employees, where appropriate, in the OSHA requirements for **Lockout/Tagout Procedures**. Lockout/Tagout is the controlling of hazardous energy by locking-out energy sources and releasing any potential energy stored in equipment, machinery and pressurized vessels **(i.e. pressurized water, hydraulic and pneumatic piping)**. The Contractor shall adhere to the OSHA procedures at all times. Prior to the commencement of the Lockout/Tagout work, the Contractor must notify and receive approval from CWW Representative. A copy of CWW Lockout/Tag-out procedures will be provided upon request.
e) The Contractor is responsible for providing their employees with the appropriat**e Personal Protective Equipment (PPE)** and the proper training in the use and maintenance of such equipment in accordance with OSHA regulations. Personal Protective Equipment shall include but not limited to; hand and foot protection, eye protection, hearing protection, hard hats, protective clothing.
f) Contractor is required to inform CWW Representative of any hazardous chemical that is brought on-site. The Contractor **shall provide Material Safety Data Sheets (MSDS)** and is responsible for reviewing with their employees the hazards associated with those chemicals.
g) **Labels** are required on all products and secondary containers so that those handling the contents will be able to understand the hazards of its use. Contractors shall advise its employees that a variety of labels may be found on the chemicals used in the facility. Examples of labels found on the products are National Fire Protection (NFPA) Labels, Department of Transportation (DOT) Labels and the Chemical Abstract Service (CAS) Number.
h) Contractors shall not attempt to clean up spills involving toxic or corrosive chemicals until CWW Representative has been notified of the incident and has authorized the Contractor to proceed with the clean-up and/or mitigation activities.
i) Contractor employees shall report any injuries to their Supervisor and CWW Representative immediately.
j) Contractors shall protect open manholes, catch basins, and open excavations with adequate barricades and warning signs.
k) Smoking and the use of tobacco in any form are not permitted at any time in any of CWW' enclosed buildings.
l) **OSHA regulations require use of Fall Protection devices when Contractor's personnel are working at heights greater than 6 feet.** Fall protection is also required when working at the top of an open excavation greater than 6 feet in depth.
m) All straight or extension ladders used on the site must be routinely inspected and maintained in safe working order and have feet on bottom rails.
n) **Scaffolding** shall conform to OSHA regulations.
o) **OSHA regulations 29CFR 1926.652:** Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with paragraph (b) or (c) of this 29 CFR 1926.652 except when:
    - Excavations are made entirely in stable rock; or
    - Excavations are less than 5 feet (1.52 m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.
p) Work is to be as neat and clean at the end of the day as reasonably possible.

8 Contractor agrees to submit to CWW a copy of Contractor's OSHA 300 log upon execution of this Agreement.
9 Contractor agrees that he/she is an independent contractor and is not an agent of CWW and as such is solely responsible for the acts of his/her employees in the performance of the work hereunder.
10 Contractor shall guarantee all work performed under this contract for a period of one year from the date of completion and acceptance by CWW.
   a) Any defective portions of such work which is under the Contractor's jurisdiction, whether materials or workmanship, shall be replaced by Contractor at no cost to CWW during the term of the guarantee
11 This Agreement shall be binding and valid between the parties hereto.

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement on the day and date first shown

above.

Cabot WaterWorks

_____ BY: _____

ATTEST: ITS: General Manager

CONTRACTOR

Signature: _____ Date: _____

Company: _____ Tax ID: _____

Title: _____ Arkansas Contractor License: _____

Address: _____

Phone (Business Office and Cell): _____

Business Email _____

GENERAL SPECIFICATIONS

1. Qualifications of Contractors

1.1. Contractor shall furnish a list of projects and the names and addresses for who work was performed to show that he has satisfactory experience installing steel encased road-bores from 12” to 24" diameter.

1.2. Contractor shall list available equipment and supervisory personnel for proper prosecution of the proposed work.

1.3. Contractor shall furnish the names and qualifications of the general superintendent that is responsible to oversee all work performed by contractor for CWW.

1.4. CWW reserves the right to reject any and all bids when such rejection is in the interest of CWW; to reject the bid of a bidder who has previously failed to perform properly or complete on time contracts of a similar nature; and to reject the bid of a bidder who is not, in the opinion of Cabot WaterWorks, in a position to perform this contract.

1.5. Any bid which fails to include any of the information required under "Qualification of Contractors", Paragraph 1.1 to 1.4 inclusive will be rejected.

2. Bid Award and Agreement

2.1. Cabot Waterworks will award a bid based on the lowest responsive, responsible bid considering any other pertinent factors that might affect overall cost to CWW.

2.2. Cabot Waterworks will issue a Notice of Award to the successful bidder. The successful bidder will have 10 calendar days upon receipt of the Notice of Award to return the executed Agreement with Performance and Payment Bonds in penal sums equal to the contract price, conditioned upon the performance by the contractor and upon prompt payment by the contractor to all persons supplying labor and materials on the project.

2.2.1. **Performance and payment bonds** each in an amount equal to the Contract Price. These bonds shall remain in effect until one year after final accepted completion by CWW of this project.

2.2.2. Performance and Payment Bonds shall be from an ‘A’ rated, Corporate Surety Company duly authorized to do business in the State of Arkansas.

2.3. If the Bidder fails to execute the Agreement and submit required bonds, the Bidder may be considered in default, in which case the Bid Bond accompanying the bid will become property of CWW.

3. Insurance

3.1. The Contractor shall purchase and maintain such insurance as will protect the Contractor and CWW from claims which may arise out of or result from the Contractor's operations under this Contract, or by anyone for whose acts any of the may be liable. Such insurance shall be written for not less than the coverage and any limits of liability specified below, or as required by law, whichever is greater. By requiring insurance specified herein, CWW does not represent that such coverage and limits will necessarily be adequate to protect the Contractor and such coverage and limits shall not be deemed as a limitation on Contractor's liability under the indemnities or warranties granted to CWW in this Contract/Agreement.

3.2. Certificates of Insurance acceptable to CWW shall state that they are Primary Insurance and shall be filed with CWW prior to the commencement of the Work. These Certificates shall contain a provision that coverage afforded under the policies will not be canceled until at least sixty (60) days prior written notice has been given to CWW, except ten (10) days notice for non-payment of premium. CWW shall be named as an additional insured on all policies except workers' compensation.

3.3. The Contractor shall furnish CWW with notice of all claims it receives and shall keep CWW informed as to the status of each claim.

3.4. The Contractor shall agree to indemnify, hold harmless and defend CWW from and against any and all liability for loss, damage or expense which CWW may suffer or for which CWW may be held liable by reason of injury (including death) to any person or damage to any property arising out of or in any manner connected with the work under this contract whether or not due in whole or in part to any act, omission or negligence of CWW or any of its representatives or employees together with any and all attorneys' fees incurred by CWW on account thereof.

Type of Coverage	**Limits**
Worker's Compensation	Statutory
Employer's Liability	$500,000 per occurrence
Comprehensive General and/or Property Damage Liability, Injury per occurrence subject to a $1,000,000 aggregate	$1,000,000 Combined Personal
Umbrella Liability	$5,000,000
Automobile liability for:	
bodily injury	$1,000,000 per person, $1,000,000 per occurrence
property damage	$1,000,000 per occurrence

4. Definitions of terms

4.1. Whenever used in these specifications or the contract document the following terms shall have meanings as follows:

4.1.1. CWW: Cabot WaterWorks

4.1.2. Engineer: CWW' authorized Engineer, either acting directly or through field engineers or inspectors, such field engineers or inspectors acting within the scope of the particular duties assigned to them.

4.1.3. Contractor: Person, Firm or corporation executing the contract with CWW for the performance of the work hereunder.

4.1.4. Superintendent or Foreman: Representative of Contractor, authorized to receive and fulfill instructions from Engineer.

4.1.5. Contract: The contract consists of the instructions to Contractors, the proposal, the contract agreement, the specifications, plans, supplemental specifications and other supplemental agreements all as required for the full execution and satisfactory completion of the work.

4.1.6. Plans: The approved maps, standard drawings, supplemental drawings and sketches which show the location, character, dimensions and details of the work to be done. Contractor will be supplied with copies of the plans and specifications. Any alterations affecting the requirements and information given in the plans and specifications shall be authorized in writing.

4.1.7. Specifications: The directions, provisions and requirements contained herein and referred to here in pertaining to the work.

4.1.8. Supplemental Specifications: Specific instructions setting forth conditions or requirements peculiar to the project under consideration not completely covered by the specifications.

4.1.9. Supplemental Agreements: The written agreements executed by Contractor and CWW covering alterations in the contract, unforeseen work and materials incident and necessary to the project.

4.1.10. The Work: All work specified herein and as indicated on the various plans as may be furnished to

Contractor from time to time.

4.1.11. Title: The title to all work completed and in the course of construction at the site and of all materials furnished by CWW, irrespective of the location thereof as between CWW and Contractor or subcontractors, shall be CWW.

4.1.12. Authority of Engineer: The Engineer shall decide any and all questions which may arise as to the quality and acceptability of work performed and the rate of progress of the work and shall decide all questions that may arise as to the interpretation of the plans and specifications and all questions as to the acceptable fulfillment of the terms of the contract.

4.1.13. Assistants: The Engineer may appoint such assistants as he desires. They shall have the authority to give instructions pertaining to the work, to approve or reject work, to make measurements of quantities, to keep records of cost, and otherwise represent the Engineer. The assistants shall not be authorized to revoke, alter, enlarge, relax or release any requirement of the contract agreement, plans and specifications nor shall they act as foreman for the Contractor.

4.1.14. Undeveloped Areas: New subdivisions and private or public rights-of-way where other utilities facilities are not present and where traffic maintenance is not major concern.

4.1.15. Developed Areas: Old subdivisions and other developed areas along private or public rights-of-way where other utilities' facilities are present and cross the path of CWW' proposed pipeline route and where traffic maintenance is of major concern.

4.1.16. Test Hole: Excavation made at Engineer's request prior to start of project for the purpose of determining location of existing facilities to aid in choice of alignment and grade for pipelines. To include excavation and tamped backfilling of hole approximately 4 feet wide x 4 feet long x 6 feet deep and reseeding or sodding surface. Replacement of paving is not to be included in contractors cost.

5. General:

5.1. Contractor agrees to enter into contract with CWW to perform work hereunder within 3 days after notification of acceptance of bid by CWW. Copy of form of agreement is attached hereto for Contractor's reference.

5.2. The intent of the plans and specifications is to describe a complete project which contractor shall undertake to do in full compliance with the contract agreement, plans and specifications. The plans and specifications are intended to be complementary to each other in that anything shown on the plans and not described in the specifications, or vice versa, shall be considered as if shown on the plans and described in the specifications.

5.3. Contractor is an "Independent Contractor" and has full power and authority to select the means, methods, and manner of performing the work, subject to strict compliance with requirements of local authorities, being responsible to CWW for all materials delivered and for the results herein contracted for, and, upon completion of the contract, the work shall be delivered complete and undamaged in accordance with the specifications and plans.

5.4. Contractor shall not be permitted to sublet, sell or assign this contract or sublet any of the work to be performed hereunder without the written consent of CWW and any such assignment or subletting of any such work without said consent shall be null and void and without force and effect. CWW shall have the right to assign in whole or in part its rights hereunder.

5.5. Contractor shall prosecute the construction of said work with due diligence and at such a rate and in such

manner as in the opinion of the Engineer is necessary for completion within a reasonable time, provided that, after commencement of said construction work by Contractor, said Contractor is delayed CWW, the completion date of said project shall be extended to the extent that the Contractor is delayed in carrying on said work by reason of such failure on the part of CWW. Contractor shall not open up work to the prejudice of work already started and shall arrange its work and dispose of materials so as to insure the least possible interference and inconvenience to the land owners on or beside whose property the work is being constructed or to the public where the work lies in or near a public thoroughfare. Contractor shall employ such number of construction crews as are reasonably necessary to construct said works within the allotted time, provided CWW may require the employment of an additional crew or crews, if in its judgment it is necessary, in order to complete said work within the time required.

5.6. Contractor shall furnish the Engineer with every reasonable facility for ascertaining whether the work performed is in accordance with the requirements and intent of the contract agreement, plans, and specifications. If the Engineer requests it, Contractor at any time before acceptance of the work by CWW, shall remove or uncover such portions of the finished work as may be directed. After examination, Contractor shall restore said portions of the work to the standards required by the Specifications. Should the work thus exposed or examined prove to be in accordance with the Specifications, the uncovering or removing, and the replacing of the covering or making good of the parts removed shall be paid for by CWW, but should the work so exposed or examined prove to be not in accordance with the Specifications, the uncovering or removing and the replacing of the covering or the making good of the parts removed, shall be at Contractor's expense. Should any work be performed without giving notice of plan of work and opportunity of inspection by the Engineer or his representative, the Engineer may require Contractor to uncover such work at his own expense for examination by the Engineer. Cost of uncovering such work shall be borne by the Contractor, whether or not the work is found acceptable. The work shall also be subject to inspection by other appropriate governmental inspectors at all times.

5.7. Contractor at all times shall have a Superintendent as its agent of the work. Such Superintendent shall have full authority to execute the orders, or directions, of the Engineer without delay; shall apply promptly such materials, tools, equipment and labor as may be required; same shall be furnished irrespective of the amount of work sublet; and shall not be removed from the work, or replaced, without written permission by the Engineer.

5.8. Except in instances where common labor may be utilized, Contractor shall employ only competent, experienced, and skilled workman to do the work, and all work shall be performed and completed in good, careful, and workmanlike manner and to the satisfaction of CWW. CWW shall have the right at all times to require the removal of any superintendent, foreman or workman for performing inferior work.

5.9. The methods, equipment and appliances shall produce a satisfactory quality of work and shall be adequate to maintain the schedule of progress as submitted under provisions herein above. Contractor shall maintain all equipment in good repair to insure efficient performance of the work required. The Engineer shall have the right to require the removal and/or replacement of any equipment which he deems incapable of satisfactory performance.

5.10. Invoices for work performed will be submitted to CWW only after satisfactory completion and acceptance of the work by Engineer.

5.11. Contractor shall be responsible for any damage to CWW' equipment and facilities resulting from

Contractor's negligence.

5.12. Contractor shall be responsible for any damage to any public and/or privately owned facilities resulting from work being performed under this agreement, this includes city and state roads, sidewalks, driveways, fences, lawns and private property vegetation.

5.13. Contractor shall be responsible for determining <u>exact</u> locations of all other utilities.

5.14. CWW reserves the right to reject any and all bids when such rejection is in the interest of CWW; to reject the bid of a Contractor who has previously failed to perform properly or complete on time contracts of a similar nature; and to reject the bid of a Contractor who is not, in the opinion of CWW, in a position to perform this contract.

6. Performance of Work

6.1. Work will not be performed on Saturdays, Sundays or legal holidays, except by written permission of an official of CWW.

6.2. <u>All work performed at the FORD Dealership must be performed after normal business hours 8pm-7:30am. Equipment, Materials and excavation spoil must be removed prior to normal business hours. Emergency Access must be maintained at all times to the Ford Dealership property.</u>

6.3. The Contractor may perform multiple bores simultaneously upon prior approval by CWW.

6.4. Contractor shall furnish all supervision, labor, tools, equipment, materials, water, power and temporary construction necessary for performance of the work.

6.5. All materials and appurtenances shall conform to and are to be installed and tested in accordance with <u>"Cabot WaterWorks Standard Construction Specification for Water and Wastewater Facilities"</u> unless specifically provided otherwise by the Engineer in writing.

6.6. All materials are subject to approval by the Engineer as to quality and suitability for the construction to be performed.

6.7. Contractor, at his expense, shall provide suitable storage for all materials as required by the manufacturer.

6.8. Contractor shall clean and prepare materials for installation in accordance with CWW Specifications and in accordance with Manufacturer's requirements.

6.9. All work is to be performed with diligence in a workmanlike manner according to best practices so as to produce a completed job of a quality commensurate with prevailing standards of the waterworks industry and CWW particularly.

6.10. CWW shall secure and provide rights-of-way, highway permits and such other permits and licenses within its jurisdiction and pertaining to occupancy and use of the facilities to be constructed.

6.11. Contractor shall secure and provide, at his expense, any special permits, and bonds, construction access and rights-of-way; material storage permits; waste material disposal sites; and all other permits and licenses necessary for construction of the facilities within the scope of this project.

6.12. CWW shall be responsible for cost of inspectors required by or in conjunction with permits and licenses acquired by it as indicated in Paragraph 6.9 above, as shall be reasonably required.

6.13. Contractor shall be responsible for cost of inspectors and inspection fees as stated in Paragraph 6.9 for such time, as work shall be delayed unreasonably by act of negligence of the contractor.

7. Governmental Requirements

7.1. CWW shall apply for and obtain all rights-of-way and franchise as required at its expense.

7.2. Contractor shall obtain at his expense all safety permits necessary for construction purposes as required by appropriate State and County laws and Township and Municipal ordinances where applicable.

7.3. Contractor shall be responsible, at his expense, for compliance with all applicable Federal, State and/or local codes, regulations, requirements pertaining to construction of the proposed facilities, including those for safety, sanitary purposes, pollution prevention, maintenance of traffic, removal and disposal of excavated material unsuitable for backfill and replacement with suitable backfill material, disposal of excess earth, paving, trash, rubbish and debris.

8. Guarantee

8.1. Contractor shall guarantee all work performed under this contract for a period of one year from the date of completion and acceptance by CWW.

8.2. **Any defective portions of such work which is under the Contractor's jurisdiction, whether materials or workmanship, shall be replaced by Contractor at no cost to CWW during the term of the guarantee.**

9. RESTORATION AND CLEAN-UP

9.1. Restoration and clean-up of all work performed in roadways, either within or outside paved areas, shall be performed in strict accordance with specifications of the regulating local authorities and governmental agencies.

9.2. Guarantee as set forth in these specifications shall apply hereunder also.

9.3. Contractor shall provide all equipment, materials and labor to restore areas disturbed by construction to their original condition or better, as nearby as is possible in accordance with good engineering and construction practices.

9.4. Promptly upon completion of work and at his expense, Contractor shall remove from the site, tools, equipment, and surplus materials. All waste and debris shall be disposed in accordance with Federal, State and local regulatory agencies having jurisdiction of same.

9.5. No work will be accepted as complete until RESTORATION AND CLEAN-UP is completed as required.

10. INFORMATION FOR CONTRACTORS

10.1. Contractor acknowledges that contractor has reviewed the plans, drawings, sketches and specifications for the proposed work; has viewed the construction site in the field; has discussed the proposed work with CWW and is, therefore, familiar with the desires and requirements of CWW, Local Authorities and Governmental Agencies.

10.2. Contractor acknowledges that quoted price for the work as shown below includes all costs of successful conclusion of the work, including labor, materials, permits, bonds, insurance overheads and other incidental expenses, except those costs of which CWW has herein stated specific responsibility. Such contractor costs are to include excavating, installation, proper backfill and compaction as required, pavement restoration, site restorations, seeding and all other pertinent and incidental cost.

Specifications for Road-Bores

1. Steel Pipe Encasement Structures (Directional Boring)

1.1 Encasement pipe is required for all water and wastewater lines (including services) crossing Arkansas State Highways, Major, Minor, and Collector; City and County Roads and shall conform to the following requirements:

a). Encasements shall be designed to support the load of the roads and superimposed loads thereon and, as a minimum, shall equal the structural requirements for highway drainage facilities. Encasements shall be composed of materials of satisfactory durability under conditions to which they may be subjected.

b). Encasements shall have a minimum cover of forty-eight (48) inches measured vertically from the flow line of parallel ditches or sixty (60) inches measured vertically from the highway surface; whichever provides the greater cover.

c). Encasements should extend from right of way line to right of way line. As a minimum, encasements shall extend six (6) feet beyond the toe of the slope in any embankment section, the flow line of any parallel ditches, or back of any curb as applicable for the highway section.

1.2 The CONTRACTOR shall inspect the location where encasement structures are to be installed and become familiar with the conditions under which the work will be performed and with all necessary details as to the orderly prosecution of the work. The omission of any details in the Plans and Specifications for the satisfactory installation of the work in its entirety, which may not appear herein, shall not relieve the CONTRACTOR of full responsibility.

1.3 The CONTRACTOR shall satisfy himself of soil conditions by means he deems necessary; i.e., exploratory boring or exploratory pit excavations at tunnel ends. All such exploratory work shall be done in such a manner as to not jeopardize highway or railroad fill, and shall be satisfactorily back filled and the site restored.

1.4 **Submittals:** Contractor is required to submit their proposed steering (e.g. articulated steering head, offset jets incorporated into a direction sensing and steering head, etc.) and tracking equipment (e.g. transmitter & receiver, electromagnetic down-hole navigational system, water level line, laser & survey tools, etc.), procedures, and proposed locations requiring surface or subsurface access.

1.5 The size structure as shown on the Plans is considered as the "minimum acceptable size". If the CONTRACTOR deems that it would be to his advantage to install a larger structure, he may do so subject to the approval of the ENGINEER. If the CONTRACTOR elects to use large structures, the unit bid price as stated in the Bid for the size structure specified will be considered the unit bid price for the larger structure. In no case will CWW be liable for extra payment for structures larger than the size specified.

1.6 Steel casing pipe shall have minimum yield strength of 35,000-psi and a wall thickness indicated in the Casing Pipe Sizing Table below. The pipe shall conform to ASTM A-53 or ASTM A-135, Type E (electric resistance welded, Grade B) or Type S (seamless, Grade B). A letter of compliance from the Bidder or mill tickets shall be supplied to CWW for the delivered pipe.

1.7 PVC and HDPE carrier pipe, shall conform to the PVC SDR 26 ASTM 3034, HDPE pipe shall be DR-21.

1.8 Encasement with carrier pipe shall be installed at the grades and alignment shown on the Plans. Variations shall be approved by the ENGINEER.

1.9 Where open cut is not practical or permitted, the encasement structure shall be installed by Directional Boring.

i. Directional Boring requirements:

a). All bores shall be encased with smooth wall steel encasement pipe and shall be connected by full penetration butt welding continuously around the circumference of the casing. Welded joints of encasement pipe shall be aligned with no offsets or bends from joint to joint. Steel Encasement pipe shall meet the minimum diameter and wall thickness indicated in the table below.

b). **All joints of encasement pipe shall be watertight.** The inside surface of encasement pipe shall be free from welding material and other obstructions that restrict sliding carrier pipe into the casing.

(1). Cabot Waterworks inspects the interior casing by remote video camera CCTV.

(2). Installed Encasement Pipe shall pass a low pressure air test in accordance with procedures specified for low pressure testing for sewer pipelines, later in these specifications.

c). An auger pilot hole shall first be attempted to determine if rock will prevent the installation of the casing. If the pilot hole is successfully made, the casing shall be installed.

d). Bore machine shall be set to attain the specified grade, slope and alignment of the casing. bores shall be conducted in a manner consistent with industry accepted practices that minimize annular voids and over-breaks and protect the integrity of ground cover, surfaces and structures. In no case, shall overbore exceed 5 percent of the pipe diameter.

e). Water pressure to jet a hole ahead of the auger shall not exceed 10 pounds per square inch (psi). Over-reamed bore holes are not permitted. Any annular space between the casing and bore hole shall be filled by pressure grouting.

f). The leading section of casing shall be equipped with a bore head securely anchored thereto to prevent any wobble or variation in alignment.

g). Excavation shall be performed entirely within the cutter head and no excavation in advance of the casing pipe shall be permitted.

h). Excavated material shall be removed from the casing as excavation progresses, and no accumulation of such material within the casing will be permitted.

i). The boring operations shall be done simultaneously with correct line and grade carefully maintained for the casing. Holes for casing shall be bored with an auger mounted to casing pipe with the auger extending a short distance beyond the lead end of the pipe to preclude caving.

1.10 Pits and trenches shall be protected in accordance with Occupational Safety and Health Administration's (OSHA) Excavation and Trenching Safety standard, Title 29 of the Code of Federal Regulations (CFR), Part 1926.650.

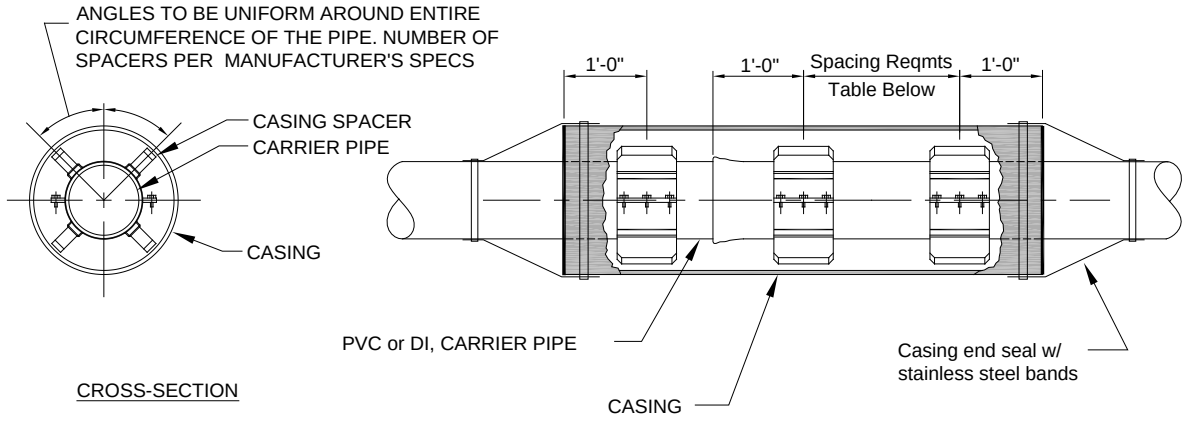
1.11 Excavation for bore pits shall not intrude into drainage ditches or the slope of embankments.

1.12 The excavation and backfill for Open Cut installation of encasement pipe shall be in accordance with CWW Specifications for PIPE BEDDING & BACKFILL for water and sewer pipelines.

1.13 Carrier pipe installed in casing shall have casing spacers installed at intervals indicated in the table below, with the exception for welded PE or HDPE carrier pipe will not require casing spacers upon approval of CWW. Casing spacers shall be constructed of a Stainless Steel or Polyethylene with runners designed to support the weight of the filled pipe. Acceptable manufacturers of casing spacers are Advance Products and Systems, Inc., of Lafayette, Louisiana. If, after installation of the pipe, adequate stability has not been provided, in the opinion of the ENGINEER, the pipe shall be removed or the annular spaces between the pipe and encasement structure be filled with grout or sand, as required by the ENGINEER. Carrier pipe shall not be bear on bell joints in casing.

1.14 Carrier pipe shall be installed in a manner to assure that the joints are not over deflected or pulled apart during the process. The pipe shall be jointed and pulled or jacked through the encasement structure with a cable capable of pulling the total number of pipe lengths and shall be threaded through the casing. The pipe shall be pulled into the casing one joint at a time by means of a slow steady pull on the cable and guided by hand to prevent damage to the pipe, and to prevent the pipe and casing spacers from rotating out of alignment. The cable shall be attached to a wood block (of sufficient size to take the strain) placed across the end of the pipe. After each joint of pipe is pulled into the casing, the cable shall be taken loose and threaded through the next joint of pipe to be added to the line. This process shall be repeated until the pipeline section is completely installed in the casing.

1.15 Ends of Encasement shall be sealed using a non-shrink grout or neoprene molded rubber end seal with stainless steel banding around casing and carrier pipe. Casing End seals shall be manufactured by Advance Products & Systems Model AC or Model AM or equal. End seals shall be approved by the Engineer.



Casing Pipe sizing table

Nominal Pipe Diameter (in.)	Casing Size Inside Dia. (in.)	Steel Casing Wall Thickness (in.)	Casing Spacer Maximum Spacing (ft.)
8”	12”	0.25”	10.0’ & each side of bell joint

2. PROTECTION OF VEGETATION

The CONTRACTOR shall not remove or disturb any vegetation except that required for execution of the work.

Unless otherwise directed in these specifications or Plans, the CONTRACTOR shall replace all sod, shrubbery, trees, and flowers disturbed or removed, that are located upon public and private property. The CONTRACTOR shall replace vegetation with healthy vegetation of the same kind or type and re-landscape or cause such to be performed throughout the work area as soon as possible after the pipelines and appurtenances have been installed. All vegetation shall be replanted in the original location. The CONTRACTOR shall maintain all replanted vegetation by the application of water, fertilizers and top soil. The vegetation shall be cultivated to prohibit the growth of foreign vegetation until a well developed root system has been established and transplanted vegetation has overcome the "shock" resulting from transplanting. All vegetation which dies or becomes unhealthy shall be replaced by the CONTRACTOR. The contour of the ground shall be left as near the original contour as possible.

The CONTRACTOR shall restore the topography of the work site to facilitate proper drainage of all adjacent lands.

The CONTRACTOR shall stabilize all areas where ground surface has been disturbed and erosion is likely to occur in accordance with the approved Storm Water Pollution Prevention Plan (SWPPP). The method of stabilization shall be approved by CWW.

In developed and undeveloped areas, vegetation shall be re-established in all disturbed areas by seeding and mulching, or by sodding as directed by the ENGINEER.

2.1.1.1. Prior to seeding or sodding, noxious weeds and Johnson grass shall be grubbed, and raked. The collected material shall be removed from the site. The surface shall be cleared of stumps, loose surface rocks larger than ¾”, roots, trash and debris that might hinder grass mowing.

2.1.1.2. The CONTRACTOR shall provide high quality topsoil with no rocks or noxious weeds. The topsoil shall be approved by the ENGINEER prior to application.

2.1.1.3. Thickness of topsoil shall be a minimum three (3").

2.1.1.4. The CONTRACTOR shall prepare a loose surface seed bed 2” in depth in the area of replacement.

2.1.1.5. Areas to be seeded and mulched shall be accomplished by seeding with permanent lawn grasses. Seed shall comply with the current rules and regulations of the Arkansas State Plant Board and the germination test shall be valid on the date the seed is used. It shall have a minimum of 98% pure seed and 85% germination by weight, and shall contain no more than 1% weed seeds. Do not use FESCUE or WHEAT seed. Seed shall be placed on a loose surface seedbed. Fertilizer (equivalent analysis 10-20-10) shall be applied to these areas at the rate of 250 lbs. per acre. Grass mixture shall be as approved by CWW. SEEDING AND MULCH SHALL BE OF THE HYDRO-SEEDING METHOD. Mulch shall be

finely chopped. Mulch cover shall consist of; straw from threshed rice, oats, wheat, barley, or rye; wood excelsior; hay obtained from various legumes or grasses, such as lespedeza, clover, vetch, soybeans, bermuda, carpet sedge, bahia, fescue, or other legumes or grasses; or a combination thereof. Mulch shall be· dry and reasonably free from Johnson grass or other noxious weeds, and shall not be excessively brittle or in an advanced state of decomposition. Mulch shall be applied at the rate of 3000 lbs. per acre. Tackifiers used in mulch anchoring shall be of such quality that the mulch cover will be bound together to form a cover mat that will stay intact.

2.1.1.6. The Contractor shall replace seed and mulch that has eroded or failed to germinate until the ground has "established" vegetation.

2.1.1.7. Property with existing sod shall be re-sodded. New sod shall be of the same species as existing turf.

Ornamental trees and shrubs having a diameter of two inches (2") or less (measured 6-inches from the ground) shall be removed and replaced. The CONTRACTOR shall hand dig around the tree or shrub to be replaced. The entire root system shall be removed (minimum 2-foot diameter root ball), wrapped in burlap, moistened and protected.

2.1.1.8. The CONTRACTOR shall replant/replace any tree or shrub removed within 48-hours of removal.

2.1.1.9. A hole shall be excavated sufficient to accommodate the entire root system. The hole shall be filled with rich topsoil. This material shall be compacted below and around the root system.

2.1.1.10. Trees or shrubs shall be guaranteed to live for one year after being replanted or replaced. Dead or dying trees or shrubs shall be replaced within thirty (30) days of written notification at the CONTRACTOR'S expense.

2.1.1.11. The CONTRACTOR shall thoroughly water all planted and sodded areas and maintain them by application of additional water and additional fertilizer until an average of 80% of the ground has "established" vegetation.

2.1.1.12. Restoration of permanent summer lawn grass will be considered complete when the grass has a well-developed root system showing vigorous runners in all directions and blending with the undisturbed grass adjacent to the area being re-established.

2.1.1.13. CWW will furnish metered water necessary for the establishment of vegetation.

2.1.1.14. Backflow Preventers shall be furnished and installed by CWW between the water source and the hose to be used. Removal or relocation of the Backflow Preventer(s) is prohibited.

2.1.1.15. All lawns and maintained grass areas, pastures and meadows, and wooded areas disturbed by construction shall be restored to a condition equal to or better than that existing prior to construction. In general, all surfaces shall be graded smooth and shall be free of rock larger than ¾", clumps, sticks, trash and debris. Wooded areas cleared and grubbed of trees shall be only seeded and mulch unless otherwise directed by the ENGINEER.

2.1.1.16. Sodding and seeding work shall commence within one month of the installation of pipelines segment. Transplantation of vegetation shall be immediate after installation of pipe.

2.1.1.17. Failure to begin vegetation restoration in a timely manner or failure to complete vegetation restoration to the satisfaction of the property owner and ENGINEER shall result in CWW securing a licensed landscaping service to perform the work. The cost of the landscaping work will be deducted from monies due the CONTRACTOR.

2.1.1.18. The CONTRACTOR shall use suitable equipment for fine grading and landscape work. Heavy equipment normally associated with utility work is not deemed satisfactory. Equipment of the size and nature normally associated with landscape work shall be used.

2.1.1.19. All other work associated with the restoration of vegetation shall be subsidiary to the various pay items and will not be paid for separately.

3. GENERAL PIPE INSTALLATION – Water & Wastewater

3.1 The Contractor shall notify the Engineer or his representative 24hours prior to trenching to schedule inspection of all pipe installed. Pipe bedding shall be inspected by CWW' representative prior to backfilling.

3.2 Proper implements, tools and equipment shall be provided and used by the CONTRACTOR for the safe and convenient prosecution of the work. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

3.3 **All foreign matter or dirt shall be removed from the inside of the pipe and appurtenances before lowering into the trench and the pipe interior shall be kept clean during and after installation. A swab shall be kept in the pipelines as long as the pipe is being laid.**

3.4 **When pipe installation is not in progress, the open ends of the pipe shall be sealed by installing a plug or cap of sufficient design to prevent storm water, foreign matter, and dirt from entering the pipeline.**

3.5 Cutting of the pipe for inserting into valves, fittings or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or pipe lining. Torch cutting is not permitted. Pipe inserted into valves, fittings or closure pieces shall be **cut at an angle of 90° to the pipe centerline.** Cutting at other angles to provide greater deflections at the joints shall not be permitted. Field welding or welding except by the pipe manufacturer shall not be permitted.

3.6 Pipe shall be laid with bell ends facing the direction of installation; and for lines on an appreciable slope, bells shall face upgrade.

3.7 No pipe shall be laid in water, or when the trench condition or the weather is unsuitable for such work, except by permission of the ENGINEER. Contractor shall dewater open trenches as required prior for pipe installation.

3.8 **Tracer Wire:** A continuous 12-gauge copper wire (insulation color blue for water and green for sewer), shall be installed with all pipe including service lines. The wire shall be installed directly on TOP of the pipe after initial backfill. The wire shall be looped up to the top of valve boxes, and around valves and other appurtenances in such manner that there is no interference with the operation of the valve or appurtenance.

a). Cast Iron Valve boxes or Cast Iron tracer wire access boxes shall be used to provide a connection point to tracer wires on long pipe runs every 1000'.

b). Splices to tracer wire shall be joined by twisting together then installing a silicon filled twist on connector manufactured by DRYCONN "DBSR" or equal.

c). Contractor shall perform a continuity test on all tracer wire in the presence of Cabot Waterworks' representative. If the tracer wire is found to be discontinuous or damaged, Contractor shall repair or replace the failed segment of the wire at his cost.

3.9 **Marking Tape:** All water and wastewater service lines and main line pipe shall have a detectable metallic marking tape, "Terra Tape" or equal installed 18" above the top of pipe or service line and labeled "Caution – Buried Water Line Below" for water lines and "Caution – Buried Sewer Line Below" for sewer lines. At the end of each service location, the Marking Tape shall be extended into meter boxes or up to finish grade for sewer services. The tape shall be in addition to the tracer wire.

4. LOCATION, ALIGNMENT and GRADE

4.1 All work shall be constructed in accordance with the lines and grades shown on the Drawings. Elevations of existing ground, structures, and appurtenances, and existing utilities are believed to be reasonably correct as shown but are not guaranteed to be absolute and therefore are presented only as an approximation. Any error or apparent discrepancy in the data shown or omissions of data required for accurately locating the work shall be referred immediately to the Owner for interpretation or correction.

4.2 The Contractor is responsible for all construction layout and both horizontal and vertical control of construction operations at all construction sites. The Engineer will provide surveys to establish reference points and benchmarks which are in the Engineer's judgment necessary to enable the Contractor to proceed with the Work. The contractor will report to the Engineer when any reference point is lost or destroyed.

4.3 The contractor will be responsible for all street, drainage, and pipeline grade control. Contractor will set all grade stakes, "blue tops", slope stakes, etc. as necessary for the proper control of construction effort; all in such manner as to complete the structures and facilities to such line and grade as established on the Drawings or as directed by the Engineer. It shall be the responsibility of the CONTRACTOR to make necessary measurements from control points in order to maintain the proper alignment and grade of the pipelines and appurtenances.

4.4 The Contractor shall be responsible for resetting all property pins disturbed by construction activities.

4.5 The Contractor shall carefully preserve bench marks, reference points and stakes. The Contractor shall pay all associated costs to reset bench marks and reference points.

4.6 Pipe, fittings, valves and hydrants shall be located and maintained to conform closely to the location, lines and grades specified hereunder or as shown on the Plans, whichever is more stringent.

4.7 Water and wastewater pipe alignment shall be located:

a). Within utility easements where provided. Where no easements mains shall be installed within the outer 4' of street or highway right-of-way.

b). Water and wastewater mains shall typically be installed on opposite sides of streets.

c). A minimum horizontal distance of three feet (3') shall be maintained between water & wastewater lines and other underground utilities (gas, electric, communication, etc.), except utilities crossing the Facilities at right angles in which case a minimum vertical distance of six inches (6") shall be maintained between the utilities. Cabot Waterworks will require Developers and Contractors to relocate at their expense, any buried utility installed parallel over the top of water and sewer facilities.

d). CWW shall approve alignment and grade of water and wastewater mains prior to construction.

e). **Water Mains shall be installed with 3' minimum and 4' maximum cover below final grade.**

f). Main line resilient seated gate valves of the same diameter as the pipe shall be installed on both sides of connections to lateral water mains and every 1200' along water mains, typically at locations where fire hydrants are installed. Gate valves shall be installed on all lateral water mains within 10 feet of connection to mains.

g). Fire Hydrants shall be installed at a maximum spacing of every 600' along water mains and at intersections to side streets.

h). Valves and hydrants shall be set with operating stem and nut plumb. There shall be no sharp and sudden breaks, requiring extra fittings and no joint shall be located underneath a sub-structure without the consent of the ENGINEER.

i). **Sanitary hazards:** Water mains and sanitary sewers shall be constructed as far apart as practicable, and shall be separated by undisturbed and compacted earth. A minimum horizontal distance of ten feet should be maintained between water lines and sewer lines or other sources of contamination. Water lines and sewers shall not be laid in the same trench except on the written approval of the Arkansas Department of Health. Water mains necessarily in close proximity to sewers must be placed so that the bottom of the water line will be at least 18 inches above the top of the sewer line at its highest point. If this distance must unavoidably be reduced, the water line or the sewer line must be encased in watertight pipe with sealed watertight ends extending at least ten feet either side of the crossing. Any joint in the encasement pipe is to be mechanically restrained. The encasement pipe shall be vented to the surface if carrying water or sewer under pressure. Where a water line must unavoidably pass beneath the sewer line, at least 18 inches of separation must be maintained between the outside of the two pipes in addition to the preceding encasement requirement. Exceptions to this must be approved in writing by the Arkansas Department of Health.

5. PIPE TRENCH CONSTRUCTION Water & Wastewater

5.1 All water and wastewater pipes, (Ductile Iron and PVC) shall be bedded in accordance with Specifications for PIPE BEDDING & BACKFILL.

5.2 Unless bound herein or shown on the Plans, information related to soil conditions is not furnished by CWW. Any information furnished by CWW related to soil conditions is not guaranteed to represent actual conditions which the CONTRACTOR will encounter and is to be used at the CONTRACTOR'S risk; therefore, the CONTRACTOR shall take whatever action he feels necessary to satisfy himself as to the actual subsurface soil conditions.

5.3 The trench shall be excavated to the alignment and grade specified and only so far in advance of pipe installation as the ENGINEER shall permit. Trenches along public streets or roads shall be limited to 300 feet or less, or as permitted by the governmental authority having jurisdiction. This limit may be reduced by the ENGINEER in congested areas.

a). The use of trench-digging machinery will be permitted except in places where operations of same will cause damage to trees, buildings, or other existing facilities above or below the ground; in which case hand methods shall be employed.

b). CONTRACTOR shall remove the minimum amount of street, driveway, sidewalk, parking lot, or other pavement required to permit installation of the pipelines or appurtenances. All pavement surfaces shall be

saw-cut in straight lines with suitable equipment before removal. Concrete surfaces shall be scored with a suitable concrete saw unless all material is removed between existing construction joints.

5.4 Blasting for excavation will be permitted only after the CONTRACTOR secures the approval of the ENGINEER and only when proper precautions are taken for the protection of persons and property. The hours of blasting will be fixed by the ENGINEER. Any damage caused by blasting shall be repaired by the CONTRACTOR at his expense. The method of transporting, handling, and storage of explosives and blasting procedure shall conform to Federal Regulations, local and state laws and municipal ordinances.

5.5 Excavation Safety

a). Whenever necessary to prevent caving; excavations in sand, gravel, sandy soil, or other unstable material shall be adequately sloped, shored and/or braced in accordance with OSHA 29 CFR 1926.650 SUBPART-P.

b). **29CFR 1926.652** - Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with 29 CFR 1926.650 except when:

- Excavations are made entirely in stable rock; or
- Excavations are less than 5 feet (1.52 m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

5.6 Where shoring and bracing is used, the trench width may be increased accordingly. Trench shoring shall remain in place until the pipe has been installed and jointed. Where slides or cave-ins occur, the CONTRACTOR shall, at his expense, provide proper bedding and support for the pipe.

5.7 The trench width may vary and depend upon the depth and the nature of the excavated material encountered. The trench shall be of ample width to permit the pipe to be laid and joined properly and the backfill to be placed and compacted properly.

5.8 The minimum width of trench shall be:

a). **12” plus the nominal pipe diameter for pipe up to 24-inches in diameter;**

b). 18” plus the nominal pipe diameter for pipe over 24-inches in diameter.

5.9 The trench shall be excavated to a depth that accommodates a minimum **3’ (feet) of cover** measured from top of pipe to finished grade plus undercut as required where the following conditions exist:

a). When ledge rock, boulders, large stones, and other rock formations are encountered, all rock shall be removed to provide a clearance of at least 6” (inches) below and sides of pipe, valves, and fittings.
b). 9" inches when Type 5 Bedding is required.
c). 9" inches for pipelines and appurtenances larger than 24-inches in diameter.
d). Where the bottom of the trench at sub-grade is found to be unstable or to include ashes, cinders, refuse, vegetable or other organic material, or large pieces of inorganic material, that, in the judgment of the ENGINEER, should be removed, the CONTRACTOR shall remove all such material to the extent required by the ENGINEER.

5.10 All excavated material shall be stockpiled in a manner that will not endanger the work and that will not obstruct streets, sidewalks and driveways. Excavated material that is acceptable for backfill shall be separated from the general excavation material. Excess or unsuitable material and debris shall be removed promptly. Gutters and ditches shall be kept clear or other satisfactory provisions shall be made for drainage.

6. PIPE BEDDING & BACKFILL Water & Wastewater

6.1 CONTRACTOR shall bed all pipe in accordance with Type 4 or Type 5 bedding details below.

a). Type 4 Bedding is required on all water and sewer pipelines.

b). Type 5 Bedding shall be required at any street, road, or ally crossing.

c). State Highway crossings shall be performed in accordance with Section: Encasement Structures.

6.2 **All pipe bedding shall be inspected by CWW’ representative before backfilling.**

6.3 All bedding shall provide a uniform and continuous support for the pipe barrel. A shallow depression shall be made in the bedding to accommodate bell ends.

6.4 If the pipe trench passes over previous excavations, the trench bottom shall be compacted to provide the same bearing capacity as adjoining undisturbed native soil.

6.5 All trenches shall be backfilled as soon as possible after installation of pipe and appurtenances. In areas with concrete blocking, it may be necessary to backfill only a portion of the trench in order to allow placement and curing of concrete. Fittings or appurtenances designated by the ENGINEER shall not be backfilled until the hydrostatic pressure and leakage tests have been completed.

6.6 Compressible silts, clays and Dona-fill shall not be used for pipe bedding and backfill.

6.7 **Select Granular Bedding Material –**shall conform to ASTM D2321 with the following grading by weight:

ASTM D2321, Class IA (Angular crushed stone or gravel)

SIEVE SIZE	PERCENT PASSING
1.5"	100%
#4	< or = 10%
#200	< 5%

6.8 **TYPE 4 BEDDING**

a). Select Granular Bedding Material shall be placed to provide a 6” bedding layer under the pipe and carefully tamped and rammed around the pipe until the aggregate has been brought to 6” above the top of the pipe.

b). The remaining trench may be backfilled with native material, except rocks larger than six (6) inches will not be permitted. Upon reaching the top of the trench with backfill, the trench shall be rolled by passing the wheel or track of heavy equipment along the trench line to attain consolidation.

c). In areas where sod, trees, shrubs, flowers or other vegetation has been removed and is to be replanted, the top six (6) inches of backfill shall be of suitable top soil.

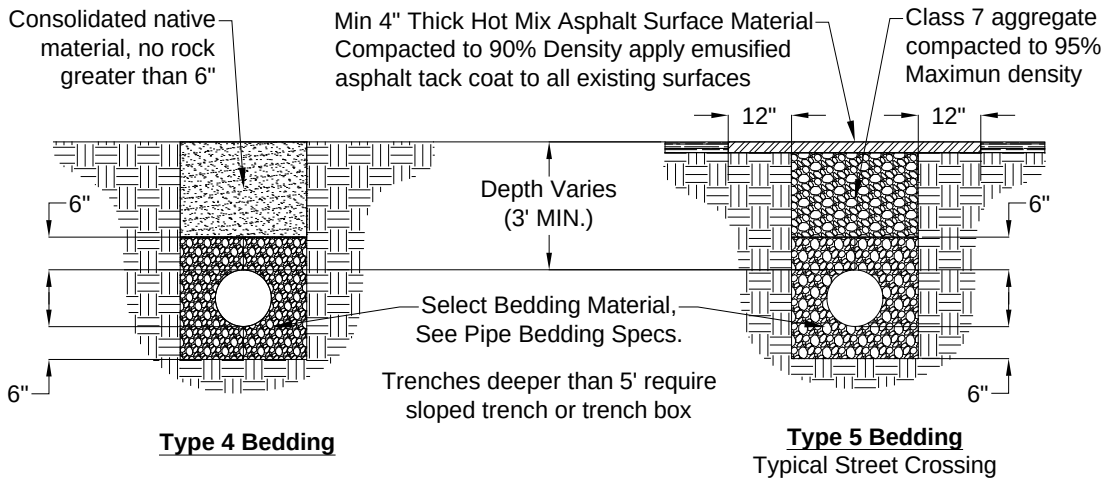
6.9 **TYPE 5 BEDDING**

a). Select Granular Bedding Material shall be deposited to provide a 6” layer under the pipe and carefully tamped and rammed around the pipe until the aggregate has been brought to 6” above the top of the pipe. Where the soil in the bottom of the trench is wet or soft enough to intrude into the voids of granular material, coarse sand shall be used for bedding.

b). After aggregate has been brought to 6” above the top of the pipe, compaction shall continue until 90% of maximum density as determined by the Modified Proctor Compaction Test has been achieved.

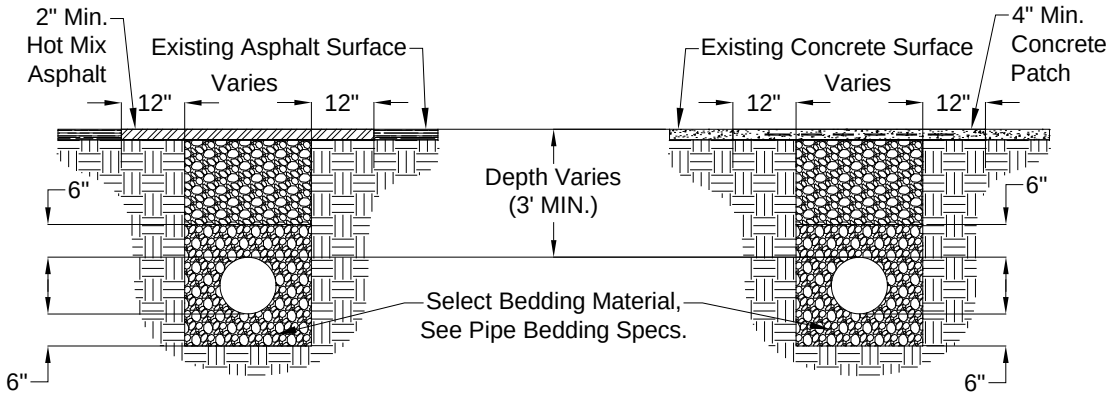
c). When pipe trenches cross or roads, streets, alleys, sidewalks, driveways, parking lots, or other areas specified, the backfill shall be continued using the Select Granular Bedding Material, and shall be compacted to 95% of maximum density as determined by the Modified Proctor Compaction Test to a point 6" below the bottom of the improved surface.

6.10 The CONTRACTOR shall fill trenches with suitable material where settlement has occurred throughout the warranty period after completion of the project.



Type 4 Bedding

Type 5 Bedding
Typical Street Crossing



Asphalt Driveway Pavement Repair
Typical Driveway Crossing

Concrete Driveway Pavement Repair
Typical Driveway Crossing

6.11 JOINTING PUSH-ON (BELL) JOINT PIPE & FITTINGS

a). Prior to joining the pipe and/or fittings, the plain ends of the pipe and the bells of the pipe and fittings shall be thoroughly cleaned, removing all foreign materials from the bells, especially the gasket seats. Any burrs or imperfections in that part of the plain end or bell which will be in contact with the gasket shall be removed.

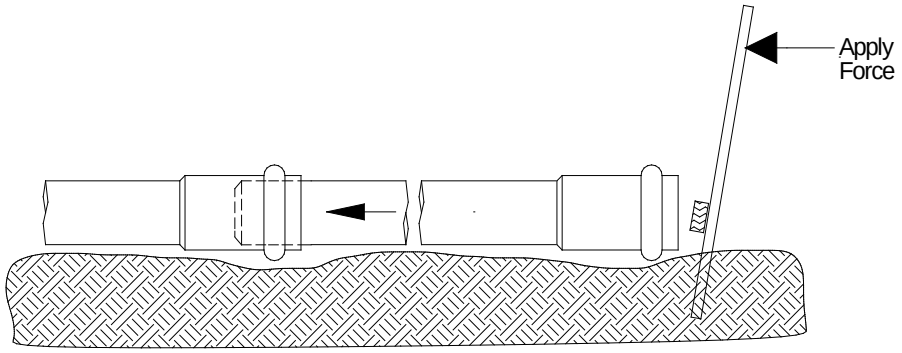
b). The clean rubber gasket shall be inserted in the bell and a thin film of lubricant shall be applied to the inside surface of the gasket.

c). Gasket lubricants shall be supplied as per the pipe manufacturer recommendations. Contractor shall provide documentation that gasket lubricants are approved by the manufacturer and the Arkansas Department of Health for the pipe and gaskets used on the project. Lubricants shall be applied as per pipe manufacturer's recommendation.

d). The cleaned plain end shall initially be entered in the bell in straight alignment.

e). If pipe is cut, the plain ends must be beveled similar to the original manufacturer's bevel on new pipe. After beveling, stop marks must be applied to the ends. Use the plain end of another piece of pipe or fitting to determine the location of the stop mark and mark the piece of pipe that has been cut. The pipe shall be pushed into bell or coupling either by hand or with the use of lever and block. Care shall be exercised to assure that the pipe is not damaged by the application of levers. Suitable wood blocks shall be used between levers and the pipe as shown below.

f). The beveled end shall be forced inside the gasket and bell until it strikes the end of the interior of the bell, after which the end of the pipe shall be moved sideways or up eight (8") inches to move it slightly away from home to allow for expansion and to provide flexibility to the completed line. The pipe may then be deflected as prescribed in the preceding table.



6.12 During the pipe laying operation, deflections at joints shall not exceed the amounts indicated in the following tables for the various types of joints and pipe.

6.13 PVC pressure pipe joint deflection may be achieved by following the procedure and limits, as defined:

a). Keeping pipe length in straight alignment with the previously laid length, insert spigot end into the bell gasket until the reference mark is flush with the leading edge of the bell lip.
b). If additional deflection is required, proceed from sequence 1, on next pipe length.

6.14 Pipe shall not be over inserted into bell.

7. ASPHALT PAVEMENT REPAIR

7.1 Where asphalt streets, driveways, or parking areas are disturbed or damaged during construction, the surface shall be replaced as soon as practical after completion and restored to the original condition.

7.2 Replacement of paved surfaces within the right-of-way of public streets or roads must conform to requirements of, and be approved by, the state, county or City authority having jurisdiction. Contractor shall be responsible to secure permits and inspections, post necessary bonds, and pay necessary fees.

7.3 Asphalt pavement repairs shall be in accordance with this Section and details for Pipe Bedding & Backfill.

7.4 Driveways shall be maintained to allow access during all weather conditions.

7.5 Temporary repairs to paved surfaces shall be made with Class 7 crushed stone and maintained until permanent repairs are made.

7.6 Detours shall have crushed stone, or asphalt surface. Dust shall be controlled by applying water or asphalt.

7.7 ASPHALT PAVING MATERIALS:

a). Base Coarse; Crushed stone conforming to ARDOT Standard Specifications for Highway Construction Section 303, Class 7.
b). Prime Coat: Medium curing cut-back asphalt; MC-30 or MC-70; AASHTO M82; heated and applied within the temperature range 80-150 degrees F.
c). Hot-mix surfacing material shall meet the following requirements: Asphaltic Cement Hot Mix Surface Course in accordance with Section 407 of the ARDOT Standard Specifications for Highway Construction.

7.8 EXECUTION

a). Asphalt surfaces for pavements, streets, roads, driveways, parking lots and walks shall be repaired with hot mix asphalt. The finished surface shall match and shall be level with surrounding pavement.
b). Before replacing paved surfacing, the existing pavement shall be cut, sawed, or trimmed along straight and vertical lines along each side of the trench.
c). Remove all saw cut debris, organic silty and clayey topsoil and other unsuitable material removed and replaced with approved material. Fill and tamp traces of utility trenches. Replace soft spots as needed.
d). Spread base course the same day the material Is hauled. It shall be thoroughly mixed, either by repeated handling with a blade grader or by harrowing to secure a uniform mixture or coarse and fine particles.
e). Base course shall be compacted in 8-inch lifts to achieve 95 Percent Standard Proctor Minimum density (ASTM D698).
f). The base coarse shall be finished smooth and rolled with a steel wheel or pneumatic tired roller, or other compaction equipment to compact the uppermost portion of the repair area.

g). Paved areas adjacent to the repair shall be cleaned by broom sweeping. The prime coat shall be applied at a rate of 0.40 gallons per square yard. The vertical edges of existing pavement shall be primed.

h). Compact base course by systematically rolling and watering as required to obtain a firm, uniform, smooth surface as specified in Division 300 of ARDOT Standard Specifications for Highway Construction.

7.9 HOT-MIX SURFACING FOR ASPHALTIC PAVING

a). Plant Mixing and Transporting: Mixing, transportation, and temperature limitations for hotmix surface course materials shall be in accordance with the requirements of Division 400, Asphalt Pavements of the ARDOT Standard Specifications for Highway Construction.

b). Placing, compacting, and acceptance shall be in accordance with Division 400, Asphalt Pavements of the ARDOT Standard Specifications for Highway Construction.

c). Hot mix asphalt shall not be placed on a surface having excess moisture or when general weather conditions are not suitable.

d). Bituminous asphalt shall be transported to the work site in vehicles with a cover over the cargo compartment to retard heat loss. The mixture shall be delivered at a temperature of 275°F to 325°F. The mixture shall be spread by hand or suitable machine immediately after delivery to the work site to a depth which will match adjacent pavement surfaces after rolling. The mixture shall be thoroughly compacted by passing a steel wheel roller over the surface course immediately after being spread. The mixture shall be continuously rolled until all roller marks are eliminated and no further compaction is possible. The final surface shall match adjacent pavement surfaces and shall not have any depressions or raised surfaces across the repaired area.

7.10 All preparatory work must be inspected by the ENGINEER before placement of asphaltic concrete.

8. SANITARY SEWER MANHOLES

8.1 Brick, masonry, and vitrified clay block manholes will not be accepted.

8.2 Pre-cast manholes shall conform to ASTM C478, “Standard Specification for Precast Reinforced Manholes”. The minimum compressive strength of precast products covered by this specification shall be 4000 psi.

8.3 Horizontal joints on precast manholes shall be sealed using a butyl mastic sealant conforming to ASTM C990. Acceptable Manufacturers: “NPC BIDCO C-56” butyl mastic sealant. The interior annular space at horizontal joints shall be grouted after installation with a non-shrink grout.

8.4 Concrete used in the construction of cast-in-place and pre-cast manholes shall have a 28-day compressive strength of at least 4,000 psi conforming to ASTM C94, “Standard Specification for Ready-Mixed Concrete” or ASTM C387, “Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete”.

8.5 Hydraulic-Cement Grout (non-shrink) used for connecting pipe in manholes shall conform to ASTM C1107. Non-shrink grout shall be specially formulated to stop infiltration. Grout that has not been used within 30 minutes after water has been added shall not be used.

8.6 Manhole Rings and Lids shall be a minimum of 250 pounds combined weight with a 23 ½” diameter lid. Manhole lids shall have 2 inch tall, raised letters reading “SANITARY SEWER” cast into the lid. Lids shall have a pick bar and pick slot cast in the lid. Manhole lids with city names or any other lettering cast into the lid will not be accepted.

8.7 Stub-outs shall be constructed at the locations shown on the Plans. The stub-out shall be constructed in the direction and shall be the size and pipe material as shown on the Plans. The stub-out shall be bedded and backfilled as specified for sewer pipe used. After the stub-out installation is complete, watertight caps shall be installed on the end of the pipe. All stub-outs shall be pressure tested as specified for gravity sewers in these Specifications.

8.8 Pipe Connections to Manholes shall be made with a manhole adapter gasket conforming to ASTM C923 and designed to connect PVC sewer pipe to a concrete manhole wall. Manhole Adapter Gaskets shall be equal to Romac Style LCT or FERNCO Inc. and grouted or cast into manhole openings. Connections to Pre-cast manholes may optionally be made with Kor-N-Seal Pipe-to-Manhole Connectors or equal. All manhole connectors shall be installed in accordance with manufacturer’s recommendations. All interior annular space between pipe and manhole opening shall be filled with non-shrink grout conforming ASTM C1107.

EXECUTION:

8.9 Excavation for Manholes shall be limited to the area required for the manhole base. No extra payment shall be made for manhole excavation.

8.10 The concrete base shall have a minimum thickness of 6 inches measured from bottom of slab to bottom of all pipe connecting to the manhole and shall be poured on undisturbed earth. The base shall be poured so that the top of the concrete base outside the barrel is one-half of the pipe diameter of all pipes entering the manhole. The base shall extend 1 foot outside of the finished manhole barrel. Prior to pouring the base, any water in the excavation shall be removed, and the base poured in the dry. Reinforcement steel consisting of #4 rebar (1/4" inch diameter) shall be placed at mid depth in the base at 12inch centers in two directions.

8.11 Contractor shall support all pipe extending from the manhole barrel to undisturbed soil by filling under the pipe with Select Granular Bedding Material. All pipes entering a manhole shall extend to the interior surface of the manhole barrel.

8.12 The invert of the manhole shall be benched and hand shaped with concrete as specified. The base and barrel of the manhole shall be cleaned thoroughly prior to placement of the benched invert. Benches shall be shaped and sloped ½ inch/foot from the manhole barrel wall down to ½ of the inside pipe diameter. The entire diameter of each pipe entering the manhole barrel shall be cut smooth with the inside surface of the manhole barrel and the invert shaped smooth from all inlet pipes to the outlet pipe. The flow channels in the invert shall be contoured to the inside diameter of all pipes entering and exiting the manhole. Flow channels shall have the same slope between inlet and outlet as the connected pipe.

8.13 Manhole Barrels. The minimum thickness of manhole barrels shall be 6 inches. The barrel may be poured monolithically with the base, or the barrel forms may be set as soon as the concrete base has cured enough to support the forms. Barrel forms shall be set plumb and properly braced prior to pouring concrete. Vibration equipment shall be used while pouring the barrel walls to eliminate voids in the concrete barrel wall.

8.14 All manholes shall be 4 feet inside diameter, except where larger diameter manholes are called for on the Plans.

8.15 Prior to setting the manhole barrel forms in place, any water that may have accumulated in the excavated area shall be pumped out and the concrete base thoroughly cleaned of dirt and debris. All concrete shall be poured in the dry.

8.16 Construction joints shall be provided with a keyway as shown on the detail and shall have a 2 inch layer of grout applied to the previous pour immediately before the next wall lift is poured.

8.17 The cast-in-place forms may be removed after the initial set of the concrete so that holes may be cut in the manhole barrel for the installation of pipes which are to enter the manhole at points other than adjacent to the manhole base. After these pipes have been put in place, the barrel shall be repaired using a non-shrink grout mixture conforming to ASTM C1107.

8.18 After removal of the forms all honeycombing, imperfections and depressions found in the barrel wall shall be immediately filled with mortar and rubbed with a wooden float or steel trowel to give a uniform appearance. Spurs shall be removed from the concrete surface.

a). Barrels exposed above grade shall be hand rubbed as required. Wet and fill all voids using mortar with the same sand-cement ratio as original concrete. Blend cement to match concrete color. Strike off all excess mortar flush with the surface using a burlap or canvas cloth with a circular motion. Remove all rough spots and rub with cloth to leave a surface of uniform texture and appearance. Finish shall result in a coating of mortar that will fill all voids and air holes, leaving a smooth surface.

8.19 Manhole steps are required for manholes over 4 feet deep. Steps shall be resistant to corrosion from hydrogen sulfide and sulfuric acid.

8.20 Top of manholes shall be constructed 1 foot above finished grade; 1 foot above flood elevation and/or 1 foot above peak storm flow elevation when located adjacent to open storm drainage channels. Exception: Top of manholes located at high elevations that will not collect storm water runoff, may be constructed 2" above finished grade.

a). Cabot Waterworks may consider bolted water tight manhole lids as an option.

b). Finish grade shall slope away from manholes, (including any paved surface)

c). Top of manholes located in paved surfaces shall be set at the final grade of the paved surface.

8.21 Manholes shall be installed at the end of each line and spaced at distances no greater than 600 feet.

8.22 Drop manholes, unless otherwise shown on the Plans, shall be constructed at all manholes where the difference in invert elevation between incoming and outgoing sewer is 2 feet or more. Drop manholes shall be constructed of the same material and dimensions as are standard manholes, the only difference being in the inlet arrangements as shown on the standard detail.

8.23 Curing compounds or covers may be used at the option of the Contractor. However, it will be the responsibility of the Contractor to protect the concrete to prevent cracking during the curing process and to protect the manhole during freezing temperatures. The Engineer shall, at his discretion, prohibit pouring concrete during periods of extreme cold or inclement weather.

8.24 Manholes shall be backfilled only after 48 hours of concrete curing time. Extra care shall be taken to compact all backfill evenly around the perimeter of the manhole to the top of the highest pipe entering the manhole. Backfill material shall conform to pipe bedding as specified elsewhere in these Specifications.

8.25 All manholes constructed shall be watertight and show no visible evidence of infiltration.

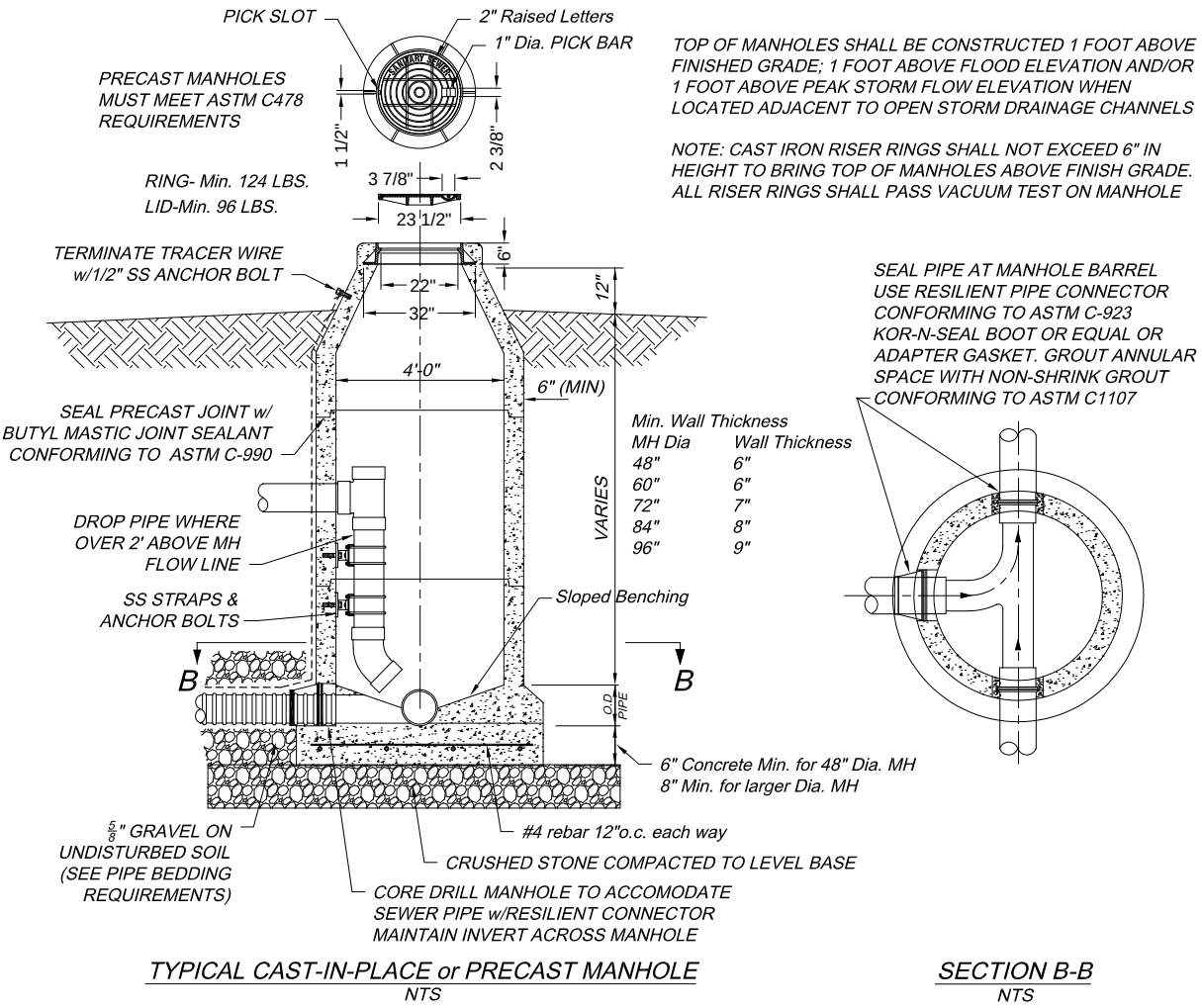
8.26 Manholes shall pass a vacuum test in accordance with ASTM Designation C1244

a). Vacuum Test. All incoming and outgoing sewer mains shall be plugged for vacuum test. Service line stub-outs shall be capped outside manhole and open inside manhole for vacuum testing. The Contractor shall furnish a suitable manhole vacuum testing apparatus, such as manufactured by P. A. Glazier, Inc., made for such purpose. The test shall be performed by drawing a vacuum of 10" of mercury (Hg) (equivalent to 5 PSI vacuum) and measuring the time for a drop to no less than 9" Hg, (½ PSI vacuum drop). The time measured shall not be less than indicated in the table below for a 1.0" Hg, (½ PSI) drop in vacuum.

Depth of MH	Time in seconds for 1.0" Hg (1/2 PSI) loss of vacuum		
(feet)	48" Diameter	72" Diameter	96" Diameter
4'	10	16	23
6'	15	25	34
8'	20	33	45
10'	25	41	56
12'	30	49	67
14'	35	57	78
16'	40	67	89
18'	45	73	100
20'	50	81	111

b). For all manholes with leaks in excess of the above, the CONTRACTOR shall, at his own expense, perform whatever work and/or replace whatever material that is required in order to remedy the defect and stop the leaks. All corrective work shall be approved by CWW.

c). Manholes which fail the test shall be retested after remedial measures are completed.



TYPICAL CAST-IN-PLACE or PRECAST MANHOLE
NTS

SECTION B-B
NTS

9. SANITARY SEWER GRAVITY PIPELINES

9.1 All requirements for **Pipe Bedding & Backfill,** including Tracer Wire and marking tape, in these specifications shall apply to Sanitary Sewer Pipelines.

9.2 Contractor shall support all pipes from manholes to undisturbed soil by filling under the pipe with Select Granular Bedding. Backfill shall be placed as specified in these Specifications.

9.3 All joints shall be of the bell and spigot type and conform to ASTM D3212 and/or Uni-Bell UNI-B-1. Gaskets shall be in accordance with ASTM F477. All bells shall be formed integrally with the pipe and shall contain a factory installed elastomeric gasket which is positively retained. Wall thickness of this bell at any point shall not be less than the required minimum for the pipe barrel. No solvent cement joints will be permitted except as specifically authorized by the Engineer.

9.4 Gasket lubricants shall be supplied as per the pipe manufacturer recommendations. Contractor shall provide documentation that gasket lubricants are approved by the manufacturer for the pipe and gaskets used on the project. Lubricants shall be applied as per pipe manufacturer's recommendation.

9.5 Construction Sequence. Construction of sewers shall begin at the low point of the line and continue in orderly succession throughout the project. Any deviation from this procedure shall be made only with the specific approval of the Engineer. Pipe shall be laid with bell ends facing the direction of laying upgrade.

a). Sewer pipe shall be installed on a uniform slope between manholes at the grade indicated on plans using a pipe laser specifically designed for installing pipelines on grade.

9.6 Connections to new manholes shall conform to requirements for "Sewer Manholes" in these specifications.

9.7 Existing Manholes. Connections to existing manholes or inlets, where pipe stubs exist, shall be made by cutting a hole in the wall of the existing manhole, inserting the PVC pipe with a manhole adapter around the pipe into the hole, filling the annular space around the pipe with non-shrink grout, and troweling the inside

and outside surface to a smooth finish. The bottom of the manhole shall be shaped to fit the invert of the sewer pipe.

9.8 Mandrel Testing. Gravity PVC sewer mains shall be tested for deflection in accordance with ASTM D2321.

a). Mandrel test shall not be performed for at least 30 days after reaching final trench backfill grade, provided, in the opinion of the Engineer, that sufficient ground settlement has occurred throughout the entire trench depth. If this has not been achieved prior to the project completion date, then the Mandrel size shall be increased to measure one-third less of a deflection allowance.

b). The Mandrel shall be a rigid device sized to pass 5 percent or less deflection (or deformation) of the pipe and shall be cylindrical in shape with a minimum of 9 evenly spaced arms or prongs. Mandrels with fewer arms will be rejected as not sufficiently accurate. The contact length of the Mandrel's arms shall equal or exceed the nominal diameter of the sewer to be inspected. Critical Mandrel dimensions shall carry a tolerance of plus or minus 0.01 inch.

c). Inside pipe dimensions specified in the applicable ASTM pipe standards, shall be used to compute the Mandrel dimensions.

d). The Mandrel shall be hand-pulled by the Contractor through all sewer lines. Any sections of sewer not passing the Mandrel shall be uncovered and the Contractor shall re-bed, re-round or replace the sewer pipe to the satisfaction of the Engineer. These repaired sections shall be retested.

e). Drawings of the Mandrel with complete dimensioning shall be furnished by the Contractor to the Engineer for his approval for each diameter and specification of pipe.

9.9 Low Pressure Air Testing for Sewer Lines.

a). After ALL underground utilities have been installed, (Electric, gas, phone, cable, etc.), Contractor shall perform low pressure air test on all gravity sewer lines in accordance with ASTM F1417.

b). The equipment required for the test shall include a regulator to avoid over-pressurizing and possibly damaging an otherwise acceptable line. The equipment used shall be Air-Loc system as manufactured by Cherne Industrial, Inc., Hopkins, Minnesota, or equal.

c). The low pressure air test shall be conducted by plugging each opening in the reach of pipe to be tested. All plugs shall be braced against slippage due to internal pressure, and no one shall be allowed in the manhole during the testing procedure. One of the plugs provided must have an inlet tap or other provision for connecting an air hose.

d). Service lines connected to the pipe to be tested shall be capped with an air tight cap that will withstand air pressure to be applied.

e). After connecting the air control equipment to the air hose, monitor the air pressure so that the internal pressure does not exceed 5.0 psig. After reaching 4.0 psig, the air supply shall be throttled to maintain between 4.0 and 3.5 psig for at least 5-10 minutes in order to allow the air temperature to equalize inside pipe walls. The time required for the air temperature to equalize will depend on differential air temperature from the compressor to inside the pipe If plugs are found to leak, the Contractor shall bleed off the air, tighten the plugs, and again begin supplying air. After the temperature has stabilized, the pressure is allowed to decrease to 3.5 psig. At 3.5 psig, the Contractor shall begin timing to determine the time required for the pressure to drop to 3.0 psig. The pipe shall be presumed free of defects if the time, in seconds, for the air pressure to decrease from 3.5 psig to 3.0 psig is greater than that shown in the table shown on the following page.

f). Any test section less than 100 feet in length shall be tested for the time set out for 100 feet.

g). If by use of the above procedure, defective section(s) of pipeline are found, the pipeline segment shall be tested at 20 foot intervals to determine the exact location of the defect(s). Repairs shall be made in defective section(s) and the entire line segment shall then be retested.

SPECIFICATION TIME REQUIRED FOR 0.5 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015

Pipe Dia. (in.)	Min. Time (min:sec)	Length for Min. Time (ft)	Time for Longer Length (sec)	Specification Time for Length (L) Shown (hr:min:sec)										
				100	150 ft.	200 ft.	250 ft.	300 ft.	350 ft.	400 ft.	450 ft.	500 ft.	550 ft.	600 ft.
8	3:47	298	.760L	0:03:47	0:03:47	0:03:47	0:03:47	0:03:48	0:04:26	0:05:04	0:05:42	0:06:20	0:06:58	0:07:36
10	4:43	239	1.187L	0:04:43	0:04:43	0:04:43	0:04:57	0:05:56	0:06:55	0:07:55	0:08:54	0:09:54	0:10:53	0:11:52
12	5:40	199	1.709L	0:05:40	0:05:40	0:05:42	0:07:07	0:08:33	0:09:58	0:11:24	0:12:49	0:14:15	0:15:40	0:17:05
15	7:05	159	2.671L	0:07:05	0:07:05	0:08:54	0:11:08	0:13:21	0:15:35	0:17:48	0:20:02	0:22:15	0:24:29	0:26:43
18	8:30	133	3.846L	0:08:30	0:09:37	0:12:49	0:16:01	0:19:14	0:22:26	0:25:38	0:28:51	0:32:03	0:35:15	0:38:28
21	9:55	114	5.235L	0:09:55	0:13:05	0:17:27	0:21:49	0:26:11	0:30:32	0:34:54	0:39:16	0:43:37	0:47:59	0:52:21

9.10 ACCEPTANCE INSPECTION BY CCTV: Before acceptance of gravity sewer pipelines by CWW, gravity sewer line segments shall be inspected for final acceptance by CCTV.

a). CCTV inspection shall be performed at Contractors expense after all underground utilities have been installed, (Electric, gas, phone, cable, etc.),

b). A Cabot Waterworks representative shall be present during the CCTV inspection.

c). Sewer Mains shall be flushed and all debris removed prior to CCTV inspection.

d). After Sewer Mains are flushed, the pipe shall be flooded with adequate water to fill low spots to verify pipe is on grade.

e). All sections of sewer pipe that fail to drain after flushing or have trapped or standing water in excess of ¼" in depth will be considered defective work and shall be corrected by the Contractor prior to acceptance. The Contractor shall repair any misalignment, displaced pipe, or other conditions which deviate from those specified.

f). The television camera used for the inspection should be designed and constructed specifically for such inspection, producing a highly legible picture. The camera shall be operative in conditions 100% humidity and/or under water. The lighting and camera quality shall be suitable to allow a clear, in focus picture of a minimum of 6 linear feet of the entire inside periphery of the sewer pipe.

g). Picture quality and definition shall be to the satisfaction of Cabot Waterworks.

h). The section of gravity sewer line being inspected shall be isolated from the remainder of the sewer line as necessary. The Contractor shall make all provisions for pumping or bypassing the flow around the manhole section as required and the cost shall be incidental to the CCTV inspection.

i). The camera shall be moved through the sewer line in either direction at a uniform slow rate not to exceed 60 feet per minute. Under no circumstances shall the camera be tethered to a hydraulically propelled or high velocity jet cleaning device while the cleaning device is on.

j). The camera shall stop at each service connection and provide a view up the service line.

k). Contractor shall not be allowed to float the camera.

l). The Contractor shall furnish video recordings of the lines televised to CWW for review and comments. The DVD recordings shall log the following information:

Project Job Number (or Subdivision Name)
Name of Contractor
Date Televised and Continuous Distance Log (measured in feet)
Street or Other Location
Upstream Manhole Designation
Downstream Manhole Designation
Pipe Material and Diameter
Direction of Televising (Downstream or Upstream)

m). The Video recordings shall become the property of CWW and will be retained by the CWW.

n). If the video recordings are of such poor quality that CWW is unable to evaluate the condition of the sewer line or to locate service connections, the Contractor shall be required to re-televise and provide a good quality video recording of the sewer line at no additional cost to CWW.

o). All sections of sewer lines considered unacceptable shall be repaired using new materials. The cost of such repairs shall be the responsibility of the Contractor.

p). Cabot Waterworks shall make no payments for repair of unsatisfactory or defective work.

10. RESTORATION AND CLEAN-UP OF JOB SITE

10.1 Restoration and clean-up of all work performed in roadways, either within or outside paved areas, shall be performed in strict accordance with specifications of the regulating local authorities and governmental agencies.

10.2 Contractor shall provide all equipment, materials and labor to restore areas disturbed by construction to their original condition or better, as nearby as is possible in accordance with good engineering and construction practices.

10.3 Promptly upon completion of work and at his expense, Contractor shall remove from the site, tools, equipment, temporary structures, barricades and surplus materials. All waste and debris shall be disposed in accordance with Federal, State and local regulatory agencies having jurisdiction of same.

10.4 The CONTRACTOR shall remove all vegetation that has been cut or has died as a result of the work. There shall be no burning on the job site unless approved, in advance, by the ENGINEER and other agencies involved.

10.5 The CONTRACTOR shall restore the topography of the work site to facilitate proper drainage of all adjacent lands.

10.6 No work will be accepted as complete until RESTORATION AND CLEAN-UP are completed as required.

10.7 Guarantee as set forth in these specifications shall apply hereunder also.

11. GUARANTEE

11.1 Contractor shall guarantee all work performed under this contract for a period of one year from the date of completion and acceptance by CWW.

11.2 Any defective portions of such work which is under the Contractor's jurisdiction, whether materials or workmanship, shall be replaced by Contractor at no cost to CWW during the term of the guarantee.

WaterWorks
CABOT

Bid Form

Road Bores				
BORE #	Units	**Description and Specification**	Steel Casing Wall Thickness	**Lump Sum Cost**
1	LS	**Furnish all Materials, Equipment and Labor to Install 109' Road Bore w/ 12" Steel Encasement, 393' of 8" DR26 Sewer Pipe and New Sewer Manholes, (in accordance with CWW Specifications)**	1/4"	
2	LS	**Furnish all Materials, Equipment and Labor to Install 375' Road Bore and install 6" DR26 HDPE Sewer Pipe**	N/A	
			Bid Total	

Provide Proposed Start and Completion Dates

Business Name:

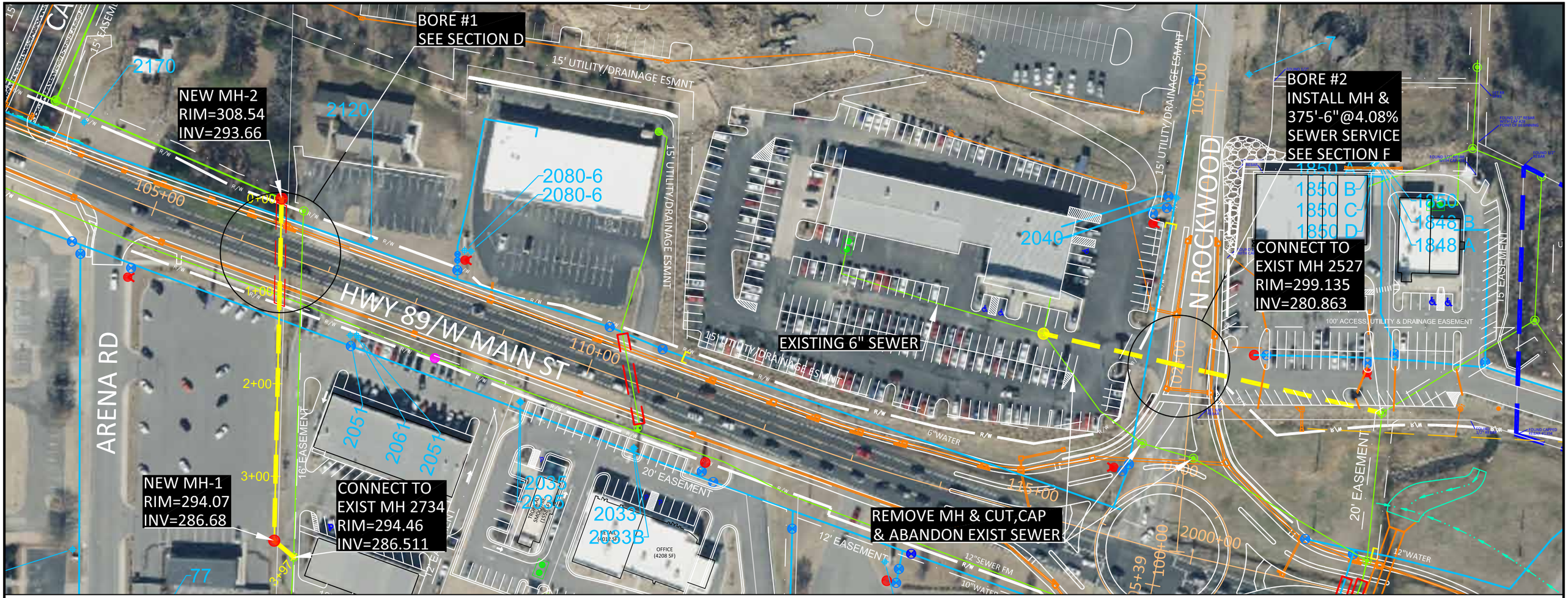
Business Address:

Signature:

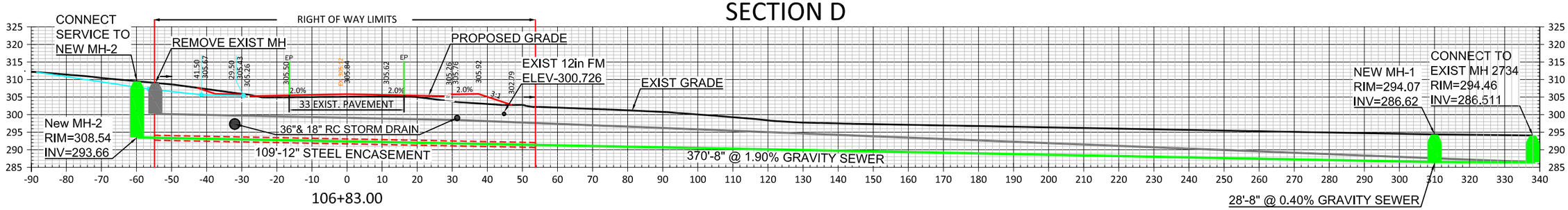
Printed:

Phone (Business Office and Cell):

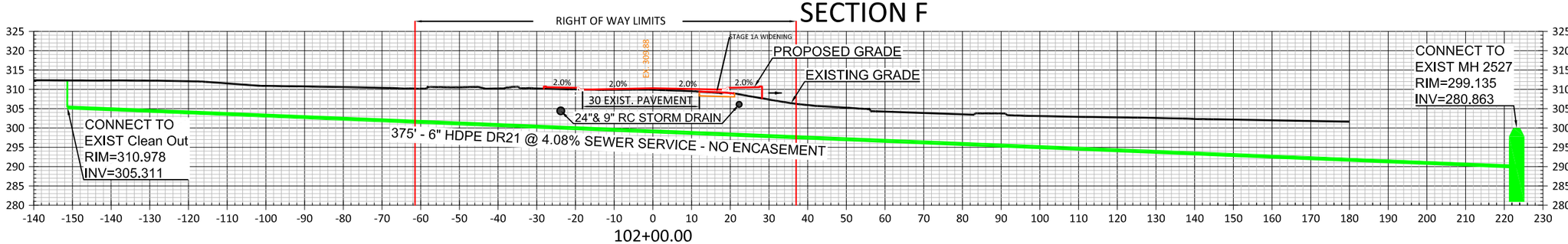
Email:



SECTION D



SECTION F



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W E
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WaterWorks
CABOT

Wastewater Bores
ARDot Widening
Scale 1"=100'