LUMBERTON MUNICIPAL UTILITY DISTRICT

STANDARDS FOR WATER & SEWER CONSTRUCTION

UPDATED THROUGH 4/21/2008
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INTRODUCTION

The enclosed LUMBERTON MUNICIPAL UTILITY DISTRICT STANDARDS FOR WATER/SEWER LINE CONSTRUCTION represents the minimum standards acceptable by the District. These specifications were written to cover normal situations found in construction of subdivisions. Situations that are unusual or not covered by these specifications will be handled on a case by case basis.

The District requires that all prospective subdivision or multi-use developers bring two copies of a preliminary sketch of the proposed subdivision or multi-use by the District office before starting the design phase. A review of the sketch will allow us to indicate the availability of service, location of lines, and any special requirements before actual design by the developer's engineer.

The Lumberton Municipal Utility District Board of Directors will, in their regularly scheduled meeting, approve or disapprove any proposals based on information made available to them by District engineering and District staff.
LUMBERTON MUNICIPAL UTILITY DISTRICT
APPLICATION FOR MULTI-USE WATER/SEWER CONSTRUCTION

1. Date: _____________________ Phone No. of Applicant: ______________________________
2. Name of Owner or Developer _______________________________________________________ 
3. Address ___________________________________________________________________________ 
4. Person Making Application if Different from Owner ___________________________________  
5. Address ___________________________________________________________________________ 
6. Name of Design Engineer to be Used __________________________________________________ 
7. Subdivision or Multi-use Street Name ________________________________________________ 
8. Location of Subdivision/ Extension ___________________________________________________ 
9. No. of Lots or Length of Extension ___________________________________________________ 
10. Subdivision Dedicated and Accepted by County? ___________ City? ______________ 
11. If Not Yet Accepted, Approximate Date of Presentation to County? ___________ to City? ___________ 
12. When Do You Plan to Start Construction? _____________________________________________ 
13. Provided Preliminary Drawing Showing Water/Sewer Lines? _____________________________ 
14. Provided Complete Set of Plans Prepared by Engineer? _________________________________ 
15. Are All Necessary Easements Secured? ________________________________________________ 
16. Application Fee Included With This Application? ___$100.00 __________________ 

GENERAL INFORMATION

1. All subdivisions, mobile home parks, extensions for 2 or more units, large apartments, or large commercial enterprises I.E. Strip centers require Board approval. Plans and drawing of proposed extension must be given to Manager for review and final Board approval. Small commercial applications with minimal system impact may be approved by the District Manager on a case by case basis and ratified by the Board at a later date. All work must meet Dist. Ordinances, specifications, extension policy and International Plumbing Code. (See Dist. specs for service line info. water/sewer line extensions and pro rata reimbursement, min. standards for new subdivisions, "State Design Criteria for Water/Sewer Systems, and District Ord. on new subdivision.) 

2. State law requires all projects over $3,000 or new subdivisions must have plans prepared by a Registered Professional Engineer. Construction must also be under direct supervision of the Engineer. 

3. State law requires the District to obtain approval from the Texas Commission on Environmental Quality for all additions to our system. Applicant's Engineer will secure approval from the State agencies. Applicant must consider the additional time delay for these approvals (approx. 6 to 8 weeks). 

4. FEES - An Engineering Study must be prepared by District Engineers. An application processing fee, inspection fee, tap fees and water and sewer tie-in fees are also required on all subdivisions. I HEREBY AGREE TO REIMBURSE THE DISTRICT FOR THE ABOVE STUDY AND FEES BEFORE CONSTRUCTION CAN BEGIN. 

Signature: _______________________________ Date: ____________________________
The following procedures are established by the Lumberton Municipal Utility District (the "District") for the development of subdivisions within the District. The following procedures are in addition to and not in lieu of requirements that may be made by either the City of Lumberton, Texas (the "City") or Hardin County, Texas (the "County") for the platting and approval of subdivisions as required by those governmental entities or as otherwise may be required by law. The District provides water and sanitary sewer services within the boundaries of the District, and the following guidelines are applicable to the development of facilities by a developer for those purposes. Any and all other requirements and approvals including drainage facilities must be approved by such other governmental entities as may have jurisdiction.

Definition - Multi-use Water/Sewer Facility

1. Subdivided lot for the purpose of sale or rental (2 lots or more).
2. Contiguous tract developed for the purpose of rental spaces (in trailer parks, apartments, duplexes, strip centers, etc.).

A. Procedures to Obtain Utility Service Capacity.

1. Developer shall provide two preliminary sets of plats to the District. One copy is kept on file at the District offices, and the other copy shall be provided by the District to its engineers to determine if utility capacity exists to handle the proposed development. A ONE HUNDRED DOLLAR APPLICATION FEE IS REQUIRED.

2. When the preliminary plats are delivered to the District, the developer shall complete the subdivision application and shall agree to pay the cost of any engineering study required by the District to be performed by its engineers to review the preliminary plats and the capacity of the District to provide the utility service requested. THE DEVELOPER WILL BE BILLED FOR THE COST OF SUCH STUDY AS CHARGED BY THE ENGINEER.

3. The acceptance of an application, payment of the application fee or payment for an engineering study does not guarantee capacity for a development, said payment of fees are not refundable and the District may approve, deny or modify a request for utility service depending upon the District's utility system capacity limitations or may require a developer to construct improvements to the utility system at its sole expense.

4. After completion of the engineering study and a determination that water and sewage capacity exists, the District Manager may place approval of the subdivision for utility service on the Board's agenda provided the developer has shown evidence of having submitted his preliminary plats with either the City or the County for approval under their subdivision rules.
B. **Procedures Prior to Construction of Utilities Within a Development**

1. After the Board has given preliminary approval that adequate utility service capacity exists, the developer must provide completed plans. Construction plans must be a minimum of 24”x 36” and an engineer's estimate, for the construction of the utility system improvements which have been designed by a professional engineer who has sealed the plans and specifications and complied with all Texas Commission on Environmental Quality regulations. Two (2) copies of such plans and specifications shall be provided at no cost to the District and shall be reviewed by the District or its engineers. **COSTS TO REVIEW THE PROPOSED PLANS AND SPECIFICATIONS SHALL BE $100 PER SHEET.**

2. After the District has reviewed the plans and specifications and made any recommended changes which have been agreed to by the developer, the proposed development together with its construction plans may be placed upon the agenda for the Board of Directors for approval PROVIDED THAT THE DEVELOPER CAN SHOW THAT FINAL PLAT APPROVAL HAS BEEN RECEIVED FROM EITHER THE CITY OR THE COUNTY AND THE PLAT RECORDED WITH HARDIN COUNTY, TEXAS. NO CONSIDERATION OF A DEVELOPMENT FOR CONSTRUCTION WILL BE CONSIDERED UNTIL FINAL CITY OR COUNTY PLAT APPROVAL AND DUE RECORDING OF THE PLAT WITH HARDIN COUNTY, TEXAS.

C. **Procedures for Acceptance of Utility System Improvements Within a Development**.

1. Prior to final acceptance, all construction costs for required upgrades to be paid for by the developer and all required District fees must be paid prior to final acceptance being given by the Board of Directors of the District.

2. Developers shall present documentation, in the form of the engineer's costs estimate, referenced above, or in an acceptable engineer's costing of "as built" drawings for the total cost of water/sewer improvements, and shall include two sets of "as built" drawings and one electronic (CAD) copy with such documentation.

3. Prior to final acceptance the developer shall provide a maintenance bond, letter of credit, or cash deposit, in the amount of 20% of the total water and sewer system improvements, based upon the values established by the engineer's cost estimate and agreed upon by the District. Such security will be made payable to the District for a period of one year from the date of acceptance by the District.
4. Prior to final acceptance, all water and sewer service easements as well as deeds to real property as may be required for utility system upgrades shall have been executed and recorded in the Real Property Records of Hardin County, Texas. Volume and page numbers in the Hardin County Real Property Records shall be required for the District's Secretary to prepare a Bill of Sale to convey utility system improvements from the developer to the District.

5. After all construction plans have been approved, utility facilities have been inspected and payment of fees, the District Manager may place upon the agenda of the Board of Directors of the District a request for final approval and acceptance of the facilities as constructed and inspected.

   All roads, drainage, storm sewer and any other improvements which require excavations or passage of heavy equipment shall be in place prior to testing and final acceptance.

   Plumbing permits may be issued by approval prior to final acceptance by the District after testing of the lines is complete, but no permanent or residential service may be connected until such conditions for acceptance are met, and the subdivision is formally accepted by the Board of Directors.

6. Where a proposed subdivision abuts an existing street and both water and sewer lines are in place, then in that event the developer may obtain water and sewer services in order to build on those lots which face such existing utilities. Nothing herein shall be so construed as to allow water and sewer services for improvement on those lots not facing existing streets or utilities until the subdivision has been completed and approved by the district.
1. All new multi-use water/sewer construction requires Board approval. **PLANS AND DRAWING OF THE PROPOSED EXTENSION MUST BE PRESENTED TO THE MANAGER FOR REVIEW AND THEN TO THE BOARD FOR FINAL APPROVAL.** All work must meet District ordinances, the technical specifications as set forth in this standard, and the International Plumbing Code. (See District specifications for (a) service line information, (b) rules for water and sewer line extensions and pro rata reimbursement and State Design Criteria for Water & Sewer Systems). Inspection must be made of construction daily by the District Inspector. No services are to be connected to District lines until final inspection and approval other than for test purposes. Final approval and issuance of a permit is required prior to start of construction.

2. All new subdivisions within the District shall be required to tie onto District water and sewer service.

3. The developer is required to obtain District Board approval and meet all District specifications and requirements, along with the Texas Commission on Environmental Quality's approval. Services must be designed and have the construction supervised by a Registered Professional Engineer and in accordance with the State rules and regulations for public water systems and the design criteria for sanitary sewer systems. All systems will be deeded to the District upon completion.

4. The developer will be required to place both water and sewer taps for each lot up to the lot line during initial construction. The water tap will be complete with curb stop and meter box meeting District specifications. The sewer tap will include a clean out with a cover box. A deposit, water and sewer tie-in fees will be required prior to installation of the meter.

5. The developer will be required to pay for all construction costs for water and sewer lines, lift stations and other facilities within the subdivision boundary to the point designated by the District to supply water service or to the point designated to receive sewer. All costs involved upgrading the initial receiving lift station, collection system, treatment facilities, and water lines; to accommodate the increased flow will also be paid by the developer. The developer will guarantee all work, equipment, and materials for one year against failures. A guaranty bond or approved surety will be required.
6. All new subdivisions are required to be permitted and inspected daily during construction. A special fee schedule will apply for this type of permit and inspection.

7. Fire protection must be installed within all subdivisions.

8. Requests for new subdivisions require an application and a set of preliminary plans for initial processing. A processing fee will be charged for the preliminary study and a fee will be charged for processing the final drawings based on the number of pages. (See District fee schedule.) The preliminary drawing will contain the following:

1. Scaled drawing of subdivision showing streets, lots and easements.
2. Size and location of proposed water lines with valves, fire hydrants, etc. within the easement.
3. Size and location of proposed sewer lines, manholes, and lift stations if required.
4. Location and size of proposed easements designating all other utilities to avoid conflict with proposed District utilities. (See enclosed detail)
5. Vicinity map.
6. Bench marks. (United States Geological Survey Elevation only)
7. Consecutively numbered manholes

9. The final plans must be submitted to the District for final approval along with a set of written specifications for the project. The plans will have an approval block for the District to sign. The written specifications will contain a cover sheet that indicates the Lumberton Municipal Utility District as the ultimate owner.

10. State law requires Texas Commission on Environmental Quality approval of the plans for any new subdivisions within the District. The applicant’s engineer will secure necessary approval from the State and should consider a time delay for this approval.

11. All required lift stations will be designed in accordance with the “Texas Commission on Environmental Quality. The pumps and controls will be the same brand as used by the District to enable standardization of replacement units and parts.

12. All lines to be connected to the existing water distribution and sewer collection systems shall be sized and meet the design specifications set by the management of the District and/or its’ Engineer and constructed to their standards. The developer shall be responsible for all locates and repairs to piping and related appurtenances under construction until final approval is given by the Board.

13. All lines that are installed within the existing County, State or District right-of-ways and easements shall be deemed as the property of the District.
14. Water and sewer taps to District lines must be under District’ supervisor. Costs for master meter or individual meter settings will be paid for by the owner.

15. Once the water or sewer lines have been installed, approved and accepted by the District, then the water/sewer lines shall be deemed to be existing lines for the purposes of future extensions and the persons making such future extensions shall not bear the cost of any reimbursement other than for such future extensions of the water or sewer lines.

16. Completed water and sewer lines within any subdivision shall be deeded to the District after completion and acceptance. Multi-user applications (MH Parks-Apts.) shall remain the property of the owner and be maintained by the owner.

17. Any easements required will be a minimum of 15’ wide and a minimum of 20’ if both water and sewer service lines are in the same easements. Both water and sewer lines will be installed in the street right-of-way or easement. No services will be accepted in an alley or to the rear of a structure. Size of sanitary sewer lift station easements will be determined by the District. See L/S specs. (Technical Specifications 4000)

18. Water main lines will be connected to the District lines in two separate locations so as to form a loop to avoid dirty water and to maintain pressure. Any exceptions must be approved by the District.

19. Cost of the water meter tie-in fee and the sewer tie-in fee must be paid by the home owner, or plumber, at the time the plumbing permit is issued.

20. All water lines and hydrants must be designed and constructed to meet the general requirement of the Texas Commission of Environmental Quality. Spacing of hydrants shall not be greater than required under (Technical Specifications 2550)

21. The District will require three copies of the plans and specifications after approval by the Texas Commission on Environmental Quality. We require two 24” X 36” copies and one electronic (CAD) file of the “as” built’ plans prior to final acceptance.

22. Board approvals for developments will be good for one year. Construction must start within one year of the commitment.

23. A drainage plan for the subdivision must be submitted along with plans when making the original application. These plans will show all elevations of all drainage ditches, culverts and sizes, and all major drainage ditches that will accept the water from the subdivision.
24. All subdivision and commercial account gravity sewer main lines that tie into District main lines must be tied in through a manhole.

25. On subdivisions requiring lift stations, the point at which the District will accept the discharge will be determined by the District’s engineers, after application is made.

26. The District will control the operation of any valves and connections to District facilities during construction continuing through completion of the project.

27. If storm sewer drains are installed, these also must be completed prior to testing and acceptance.

28. Before final acceptance by the Board of Directors, the Developer, in a format acceptable to the District, shall provide documentation of the cost summary of all water, sewer, and related materials, along with their easements, right-of-ways, and locations of all other utilities, giving a total dollar amount for installation.
TECHNICAL SPECIFICATIONS
1000 - CLEARING AND GRUBBING

1000.01 – DESCRIPTION

Clearing and grubbing shall consist of the removal and disposal of trees, stumps, brush, roots, vegetation, logs, rubbish, and other objectionable matter.

1000.02 – CONSTRUCTION METHODS

The entire area as shown on the plans shall be cleared and grubbed of all trees, stumps, brush, logs, and rubbish.

All cleared and grubbed material shall become the property of the Contractor and shall be removed from the site of the work. The site shall then be graded, filling all stump holes to provide drainage from site. The Contractor shall comply with all Local, County, State, and Federal requirements in disposing of those materials removed from the site.
1050 – EXISTING UTILITIES

1050.01 – DESCRIPTION

In general, the CONTRACTOR shall be responsible for locating and protecting all utility lines during the construction and for support and maintenance in position of all ducts and conduits, except for those specifically shown to be relocated or removed by others. CONTRACTOR shall be responsible for any damage to existing utilities and shall IMMEDIATELY repair same, or make arrangements for such repair with the Owner of the utility involved.

1050.02 – CONSTRUCTION METHOD

In all cases the CONTRACTOR shall co-ordinate his work with the Owners of the various utilities and shall notify their proper representative not less than forty-eight (48) hours in advance of any work which might damage, interfere with, or require adjustments to utilities along or adjacent to the work.

All utility adjustments other than those shown on the plans to be done by the CONTRACTOR, shall be the responsibility of the Owners of the utilities. The CONTRACTOR will be responsible for locating all utilities and if in the opinion of the District adjustment is required, the CONTRACTOR will be responsible for notifying the respective owner.
2000 - LINE CONSTRUCTION PROCEDURES

2000.01 - DESCRIPTION

All construction will follow good construction standards as followed in the industry and set forth by the "American Water Works Association". Contractors will follow the following specific guidelines:

(a) Workmen do not use the ditch as a latrine.
(b) Materials and tools are kept clean.
(c) Ditch is kept dry while working in it.
(d) All pipe is swabbed (if large enough to permit) before placing in ditch.
(e) Ditch water is not permitted to enter the pipe.
(f) Laid pipe is never left with an open end when leaving the job. (Close with a watertight plug).
(g) Sewer lines will be covered daily to protect grade damage from rain.
(h) All lines must be inspected daily prior to backfilling.
(i) All tie-ins to District facilities shall be inspected by the District.
2100 - UNDERGROUND PIPING CONSTRUCTION

2100.01 – DESCRIPTION

This item shall govern the construction of water mains, sanitary sewer, and under drains, complete in place. This item provides for all clearing and grubbing, excavation, tunneling, sheeting, bracing, embedment, connecting to new or old work, laying, jointing, excluding water, backfilling, tamping, and removal and replacement of street surfaces; and the furnishing of all materials, equipment, tools, labor, and incidentals for complete line construction.

Point repairs to existing water or sewer lines are excluded from work under this item, except insofar as the items providing for point repairs may refer to this item.

2100.02 – MATERIALS

All piping and fittings shall conform to the items outlined in this document.

2100.03 – SEQUENCE OF WORK

The Contractor shall make adequate planning and preparation before excavation starts. Contractor shall coordinate a pre-construction meeting with the district 48 hours in advance of any excavation or construction. District permits must also be secured prior to start of construction. All gravity sewer lines shall be laid beginning at the downstream connection to existing facilities. When construction involves a main trunk having lateral or tributary lines, the latter shall not be started until the main trunk has been built to the point of their junction unless otherwise approved by the District. All appurtenances shall be constructed as soon as the pipeline they serve is constructed to their location, rather than constructing them in advance or postponing construction. However, if construction reaches a point requiring installation of an appurtenance for which the materials are not immediately available, upon approval of the District, the Contractor shall provide sufficient space for installation at a later time. The open ends of pipe shall be properly sealed and backfilled at the end of every workday.

The Contractor shall excavate the trench to finish grade fifty feet (50’) to one hundred feet (100’) ahead of the end of the completed pipeline. No excavation shall be performed farther than three hundred feet (300’) beyond the completed pipeline, except for isolated excavations which may be required to locate existing utilities.
2100.04 – SITE OF WORK

The OWNER will furnish the site, easements, or any right of way considered necessary by the District. IF CONTRACTOR needs more work area, he shall make his own arrangements and indemnify the OWNER from any damages or claims.

2100.05 – PUBLIC CONVENIENCE AND SAFETY

Materials stored about the work shall be so placed, and the work shall at all times be so conducted as to cause no greater obstruction to the traveling public than is considered necessary by the District. Sidewalks must not be obstructed except by special permission of the District.

The materials excavated and the construction materials used in the construction of the work shall be placed so as not to endanger the work, or prevent free access to all fire hydrants; water and gas valves; manholes for telephone, telegraph, signal, or electric conduits; sanitary or storm sewers; and fire alarm or police call boxes in the vicinity.

The Contractor shall make provisions by bridges or otherwise at all cross streets, highways, sidewalks, and private driveways for the free passage of pedestrians and vehicles. Where bridging is impractical or unnecessary in the opinion of the District, the Contractor may make arrangements satisfactory to the District for the diversion of traffic and shall, at his own expense, provide all material and perform all work necessary for the construction and maintenance or roadways and bridges for the diversion of traffic. At no time shall more than two (2) blocks be closed to traffic. Where practical, the Contractor shall leave at least two (2) access routes open to any residential or commercial area. The Contractor shall make all attempts to keep drainage areas open during construction.

If pipe line construction or construction traffic creates a need for dust control, as along dirt streets, the Contractor shall at his own expense perform all necessary sprinkling as directed by the District.

All foreign material shall be removed, as necessary, from all public streets.

The District reserves the right to remedy any neglect on the part of the Contractor regarding public convenience and safety which may come to its attention, after twenty-four (24) hours notice in writing to the Contractor. In cases of emergency, the District shall have the right to remedy any neglect without notice. In either case, the cost of such work done by the District shall be billed to the Contractor.

The Contractor shall notify the District and the local City or County offices forty-eight (48) hours in advance (excluding Saturdays, Sundays, and holidays) of the closing or obstruction of any street. Where the Contractor is required to construct temporary bridges or make other arrangements for crossing over ditches of streams, his responsibility for accidents shall include the roadway approaches as well as the structures of such crossings.
2100.06 – BARRICADES, LIGHTS, AND WATCHMEN

Where the work is being performed in or adjacent to any street, alley, or public place, the Contractor shall, at his own cost and expense, furnish and erect such barricades, fences, lights, and danger signals; shall provide such watchmen; and shall take such other precautionary measures for the protection of persons or property and of the work as are necessary. Barricades shall be recently painted in a color that will be visible at night. From sunset to sunrise the Contractor shall furnish and maintain adequate lights at each barricade. A sufficient number of barricades shall be erected to keep vehicles from being driven on or into any work under construction. (See Figure 1).

The Contractor shall furnish watchmen in sufficient numbers to protect the work at all times from vandalism or related instances. The Contractor shall be held responsible for all damage to the work due to failure of barricades, signs, lights, and watchmen to protect it.

Whenever evidence is found of such damage, the District may order the damaged portion immediately removed and replaced by the Contractor at the Contractor’s cost and expense. The Contractor’s responsibility for the maintenance of barricades, signs, and lights and for providing watchmen, shall not cease until the project has been accepted by the District.

2100.07– PROTECTION AND RESTORATION OF PROPERTY

The Contractor shall not enter upon private property for any purpose without previously obtaining permission from the property owner. The Contractor shall notify the proper representative of any public utility, corporation, company, or individual not less than forty-eight (48) hours in advance of any work which might damage or interfere with the operation of their facilities along or adjacent to the work.

The Contractor shall be responsible for the preservation of all public and private property along or adjacent to the work, including but not limited to, trees, shrubbery, plants, lawns, fences, culverts, bridges, pavement, driveways, sidewalks, etc.; drainage facilities; and all underground or above ground utilities. Any pavement or sidewalks which must be removed shall be replaced according to this Item of the Specifications.

The Contractor shall be responsible for all direct or indirect damage to property of any character resulting from any act, omission, or negligence in execution of the work; from non-execution of the work; or from defective work or materials. When any such damage occurs, the Contractor shall restore the affected property to a condition at least equal to its condition prior to the damage, or shall fully compensate the property owner. Such restoration shall be at the Contractor’s expense, except for any items specifically designated in the plans and specifications.
The District may, upon forty-eight (48) hours written notice (or without notice when a nuisance or hazardous condition occurs), proceed to restore any property damage which the District deems necessary. The cost of such restoration will be billed to the Contractor.

IF the Contractor discovers that existing utilities present obstructions to construction of lines or appurtenances, he shall immediately notify the District. The District will determine without delay whether existing improvements should be relocated, or whether the grade and/or alignment of the line should be changed.

When necessary to move services, poles, guy wires, pipelines, or other obstructions, the Contractor will make necessary arrangements with the owner-operator of utilities.

2100.08 – PREPARATION OF THE SITE AND THE ROUTE

The Contractor shall make all preparation necessary before excavation starts.

The construction site and/or the route which the pipe will be laid in shall be cleared and grubbed before pipe laying. All trees, stumps, brush, roots, logs, rubbish and other objectionable material shall be removed and disposed in a manner approved by the District. Burning and/or hauling of the material shall be executed in compliance with ordinances of Hardin County or any other governmental body. If work is proceeding through a utility easement, care shall be taken to clear all the proposed easement as specified above.

The Contractor shall prepare the site furthermore by establishing drainage along the route if necessary, filling up holes, and generally leveling the site and/or the route. The purpose is to keep the surface water away from the trench for pipe. It will also benefit the Contractor since soil conditions will improve and therefore the progress of the pipe laying.

2100.09 – TEMPORARY SEWER AND DRAIN CONNECTIONS

When existing sewers or drains have to be replaced or removed, the Contractor shall take care of all sewage or drainage from these facilities. For this purpose the Contractor shall provide and maintain, at his own expense, all necessary temporary connections, outlets, diversions, and pumping facilities. The Contractor shall dispose of all drainage and sewage from these facilities until the permanent connections are built and put into use, unless otherwise provided for in these specifications or as directed by the District. All water or sewage shall be disposed of in a satisfactory manner so that no nuisance is created and so that the work under construction will be adequately protected.
2100.10 – CONTROL OF GRADE AND ALIGNMENT

The Contractor will be responsible for placing centerline stakes and cut stakes on the job. It is the responsibility of the Contractor to protect such stakes and control the alignment and grade. The Contractor may use any device such as level, transit or laser beam instrument to control the pipe laying. If the pipe is not laid in the proper alignment and grade, it shall be taken out.

2100.11 – TRENCH EXCAVATION

1. GENERAL – Bell holes shall be excavated in advance of pipe laying.

2. SEWERS – The ground shall be excavated by the open trench method to the required depth, line, and grade as given by the District. Excavated material shall not be removed from the site of work until backfilling is completed, except by permission of the District.

   The sides of the trench shall be vertical to a point not less than twelve inches (12”) above the top of the sewer pipe. The sides of the trench shall be between six (6”) and eight (8”) inches outside the pipe for pipe sizes ten inches (10”) or less; and between eight inches (8”) and twelve inches (12”) outside the pipe for sizes larger than ten inches (10”).

   In case the trench is excavated below the proper grade, it shall be refilled to grade with selected material and thoroughly compacted.

3. WATER MAINS – Trench requirements for water mains shall be the same as for sewer lines, except that the trench shall be excavated six inches (6”) below the outside bottom of the pipe to provide for bedding.

4. OTHER TRENCH DESIGNS – If the specifications for the type of pipe being used contain special trench requirements, those requirements shall be followed in lieu of Sub-item 2 or 3 above.

5. UNSTABLE SOILS – If unstable material is encountered at the bottom of the trench, the Contractor shall undercut and stabilize the trench with suitable materials such as CLASS 1 embedment, or cement stabilized sand (one (1) sack cement per ton) in accordance with Item 2200 and at the direction of the District.
6. **LOCATING INTERSECTING PIPES** – Before laying a segment of line, the Contractor shall attempt to locate all utilities which might interfere with the proposed alignment and grade. He shall locate and excavate in advance all water lines, sewer lines, service lines, and appurtenances to which the proposed line will be connected, so that the District can make any necessary adjustments in alignment or grade. The owners of all utilities crossing or closely paralleling the proposed alignment shall be notified in advance of construction.

7. **DEWATERING** – Under no circumstances shall the surface water be allowed to flow in the trench. When ground water exists in the trench, the Contractor shall make attempts to drain it away from the pipe laying area or pump it out of the trench.

   Where necessary in the opinion of the District, the Contractor shall dewater the trench by the well point method. The Contractor may also use well pointing at his option in other locations.

   If quicksand or water sand conditions appear in the trench bottom, the Contractor shall undercut the trench and replace it with Class I embedment as follows:

   Angular, one-fourth (¼) to one and a half inch (1½”) graded or crushed stone.

2100.12 – **SHEETING AND BRACING**

   The Contractor shall provide all sheeting and bracing necessary, for the protection of the work, the employees, or any existing utilities or structures. No such sheeting shall be removed from below the springline of the pipe after the pipe has been backfilled to this level.

   In the event the soil conditions are such that the Contractor should desire to leave such sheeting above the springline in place, he shall secure the permission of the District to do so.
2100.13 – LAYING PIPE

The Contractor shall unload and store all water pipe according to the manufacturer’s specifications. Care shall be taken not to damage the pipe by impaction or point loading. Flexible pipe shall be kept in the shipping bundle until the day of installation. All pipe and fittings shall be stored so as to prevent contamination.

All pipe lines must be laid in a straight line unless otherwise shown on the drawings, and with the flow line of the pipe accurately placed to the grade and alignment fixed by the District. Variations in the flow line of force mains will normally be permitted as long as minimum depth is maintained, adequate clearance from existing and proposed utilities is maintained and unnecessary high points are not created. A joint shall be located within two (2) pipe diameters (thirty (30”) inches maximum) outside the walls of each proposed manhole or junction box, both upstream and downstream. Joints shall also be placed near other rigid connections, or near the ends of pipe casings, when recommended by the manufacturer or by the appropriate ASTM specification.

No variation from true and even alignment (including grade and invert for gravity lines) will be permitted except to avoid existing underground main service lines of utilities, and then only upon the written permission of the District, should such deviation be desirable and not detrimental to the pipeline.

All pipe shall be laid with the spigot-end or tongue end downstream entering the bell or groove to full depth. Care shall be taken in placing pipe to prevent any earth being dragged into or left in the annular space for sealing of the joints.

Each piece of pipe shall be examined for defects and cut to the correct lengths. The interior surface and the bell and spigot shall be thoroughly cleaned of all foreign material prior to placing same in the trench in an approved manner. The pipe, valves, fittings, etc., shall be adjusted so as to be at their proper locations and then each spigot properly fitted into position. Each length of pipe shall rest on the bottom of the trench throughout its entire length.

Joints shall conform to Item 2200. Instructions for jointing pipes with special couplings shall be in strict conformity with the Manufacturer’s printed instructions.

Cleanouts, where required, shall be installed according to detail. (See Technical Specifications 3200)

Water lines shall be installed in accordance with “Rules and Regulations for Public Water Systems”, adopted by the TCEQ.
If a defective piece of pipe furnished and placed by the Contractor in a water or sewer line should collapse, the Contractor shall furnish at his expense all labor and materials required for removing and replacing the defective pipe and restoring the street or other surface to its condition just prior to the failure of the pipe.

All pressure piping shall have thrust blocks installed as designated by the District. Thrust blocks or mechanical joint restraints will be shown on the plans.

2100.14 – PLUGGING ENDS

Before leaving the work for the night, or at any time, any openings in the pipeline shall be securely closed with a tight fitting plug at the entire cost and expense of the Contractor. The plugging requirement shall also apply to dead ends of stub-outs.

2100.15 - PROTECTIVE COATINGS

All metal, bolts, and nuts shall receive a protective coating with an asphalt compound acceptable to the District before backfilling. Surface preparation shall be in accordance with the coating manufacturer’s recommendations.

2100.16 – TIME OF BACKFILLING

Backfilling shall begin as soon as the joints have been completed and all protective coating applied and cured. All open trenches shall be completely backfilled before the workday ends, unless otherwise directed by the District.

2100.17 – BACKFILLING OF TRENCH

1. LOWER PORTION OF TRENCH

   a. Sewer Lines – After the pipe has been placed, the backfill around and to a point twelve inches (12”) above the top of the pipe shall be made in accordance with the installation specifications for the pipe material being installed as outlined in Item 250.
b. **Water Lines** – In the absence of proper soil approved by the District, six inches (6”) of sand bedding shall be provided in the bottom of the trench (trench having been cut six inches (6”) below grade), prior to laying the pipe and making up the joints. Subsequent to completion of joints being made up and inspected, sand backfill shall be placed around the pipe, extending the full width of the trench and to a minimum compacted depth of six inches (6”) over the top of the pipe to provide a compacted encasement surrounding the pipe. Care shall be taken to see that no dirt clods or trench sides are allowed to fall and/or to rest against the pipe prior to completion of the sand encasement.

Sand for bedding and backfill shall be a select sand or other District approved granular material free from clay lumps, organic materials, or other deleterious substances and having a plasticity index of not greater than seven (7) and with not more than forty (40) percent passing a number two hundred (200) sieve. Selected native material from trench excavation may be used for bedding with District approval.

2. **UPPER PORTION OF TRENCH** – From the six (6”) or twelve (12”) inches above the top of the pipe upward, the type of backfill for various locations shall be as follows:

a. **Concrete or Asphalt Pavement** – The trench shall be filled to two inches (2”) below the bottom of the flexible base (or concrete pavement) with a mixture of clean sand and one and a half (1 ½) sacks of cement per cubic yard. This material shall be placed in layers not more than six inches (6”) thick and thoroughly tamped by mechanical or hand tamping, as directed by the District.

No further backfill is required for concrete pavement. Flexible base shall be replaced to the bottom of the pavement with a compacted base material consisting of crushed stone.

This requirement shall apply to all trenches running underneath surfaced streets, whether crossing the pavement or running along the street.

b. **Unsurfaced Streets** – The trench shall be backfilled with selected loose, fine excavated material by means of water tamping of power tamping. The District may require power tamping for heavily traveled streets.
In using water tamping, the trench shall be filled to ten inches (10”) below the surface with the loose fine material in even layers not exceeding eighteen (18”) in thickness of loose material and immediately flooded to complete saturation and left undisturbed for three (3) days. The trench shall then be refilled and flooded again using poles to insure penetration of water to full depth of the trench. This flooding shall continue until there is no further settlement.

Power tamping will be permitted only where the trench and backfill material is dry enough to permit satisfactory compaction. Backfill shall be placed in the trench in layers not exceeding twelve inches (12”) in thickness.

The top ten inches (10”) of the trench shall be backfilled with crushed stone. On completion of the tamping, all of the excavated material shall be substantially replaced in the trench deducting the space occupied by the pipe, bedding, and crushed stone. Compaction in all levels from six inches (6”) or twelve inches (12”) above the top of pipe to ten inches (10”) below grade shall be not less than ninety percent (90%) of the maximum density value as determined by the “Standard Laboratory Method for Compaction and Density of Soil, AASHTO designation T-99.”

The above procedure for unsurfaced streets shall apply in trenches running in and parallel to and running across the normally maintained portion of the road or street right-of-way.

c. **Trench Within Right-of-Way, But Outside Pavement** – Trenches within the right-of-way of a surfaced street shall be backfilled according to the procedure for an unsurfaced street, except that the crushed stone in the top ten inches (10”) of the trench shall be placed only in driveway crossings, roadway shoulders, and other areas where there will be light traffic. The ground shall be restored to its original condition by the replacement of grass or any other improvement which existed before the construction or which are shown on the plans to be constructed.

c. **Trenches Away from Streets** – Whenever the trench is not in a street but in an easement or plant area which is not traveled, the backfill procedure shall be the same as for an unsurfaced street, except that the top ten inches (10”) of crushed stone shall be omitted.
e. **Oil Top Streets** - Backfill shall be same as for unsurfaced streets, except that the crushed stone in the top portion of the trench need cover only the top six inches (6”) of the trench. This base material shall be covered with an asphalt prime coat to the limits of the original oil top surface. Asphalt shall consist of MC-30 (Texas Highway Department 1982 Standard Specs Item 300), applied at the rate of 0.35 gallon/square yard and covered with enough sandy materials to absorb excess asphalt.

f. **The Above Specifications are Minimum.** County and/or City requirements may exceed these specifications.

### 2100.18 - REMOVAL AND REPLACEMENT OF STREET OR DRIVEWAY SURFACES OR SIDEWALKS AND INSTALLATION OF NEW SIDEWALKS

When any portion of a street, driveway, or parking lot surface must be removed for the installation of lines or appurtenances, the Contractor shall remove and replace the pavement as specified below.

1. **CONCRETE PAVEMENT (WITH OR WITHOUT ASPHALT OVERLAY)** – The pavement shall be removed to a distance not less than six inches (6”) back from a firm bank of the trench excavation. The Contractor shall not use equipment to cut trenches in existing pavements which will strike a heavier blow than is usual with a hand pavement breaker operated from an air compressor. The edges of the cut shall be trimmed so as to leave a vertical face of sound, unfractured pavement. If concrete pavement without overlay is encountered, the top three inches (3”) shall be saw cut. Replacement of concrete pavement shall be according to the details in the plans. Unless otherwise specified, concrete pavement shall be replaced to its original depth plus two inches. All replaced pavement shall be finished in a neat and workmanlike manner and protected and cured as its nature may require.

   Any asphalt overlay shall be replaced with asphaltic concrete so as to make a smooth joint with adjacent pavement.

2. **FLEXIBLE BASE ASPHALT PAVEMENT** – The pavement and flexible base shall be removed to a distance not less than twelve inches (12”) back from a firm bank of the trench excavation. The edges of the cut shall be smooth and vertical. The base shall be replaced to its original depth plus two inches (2”), as specified in Item 200.19. The surface shall be replaced with asphaltic concrete so as to make a smooth joint with adjacent pavement.
3. **CURB AND GUTTER** – If the Contractor removes any curb and gutter in order to install lines or appurtenances, he shall replace it at his own expense. The replacement curb and gutter shall be similar to that removed, and shall be at least equal in quality.

4. **CONCRETE SIDEWALKS** – The Contractor shall replace at his own expense any concrete sidewalk removed or damaged during line construction. The replacement sidewalk shall be of the same width and thickness as that removed, and shall be at least equal in quality.

    New sidewalks shall be of the same width, thickness and quality as adjacent sections of replacement sidewalks.

5. **TIME OF REPLACEMENT** - The Contractor may replace concrete or asphaltic pavement immediately after completion of trench backfillings, or he may wait until the line has passed an exfiltration test. If pavement replacement is not made within seventy-two (72) hours after backfilling, the Contractor shall restore and maintain the roadway at his own expense until the time of replacement. For this purpose he shall provide enough temporary base material and/or surfacing to bring the roadway up to grade.

    Curbs, gutters, and sidewalks shall be replaced without undue delay.

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**2100.19 - SPECIAL CROSSINGS**

1. **HIGHWAY AND RAILROAD CROSSINGS**

   (a) **General** – Crossings of state highways, designated major streets, and railroads shall be made according to the requirements of the owner of the facility being crossed. Unless otherwise specified, these crossings shall be made by boring under the facility and placing the line inside a liner as specified by the District.

   The Contractor shall notify the designated highway or railroad official at least two (2) days prior to beginning construction of crossings (including access pits). The Contractor shall maintain all necessary barricades, signs, flares, and flagmen for traffic protection, and shall restore the site to its original condition. For railroad crossings, the Contractor shall pay all costs of foremen and/or crews furnished by the railroad for supervising or assisting in construction of the crossings.
(b) **Highway Crossings** – Crossings of highways shall be done according to the requirements set forth by the Texas Highway Department as spelled out in the permit. Contractor shall secure all permits. It is the responsibility of the Contractor to familiarize himself with the requirements. The District will also require joint restraints and pipe spacers as manufactured by, Ford Meter Box Company, Model 1390 series, or approved equal.

(c) **Railroad Crossings** – Crossings of the railroads shall be done according to the requirements set by the Railroad Company as spelled out in the permit. Contractor shall secure all permits. It is the responsibility of the Contractor to familiarize himself with the requirements. The District will also require joint restraints and pipe spacers as manufactured by, Ford Meter Box Company, Model 1390 series, or approved equal.

(d) **Construction Methods** – The Contractor shall submit to the District his plans for installing the pipeline under the facility to be crossed. The bedding and backfill shall be designed to support the pipe throughout its design life without detrimental settlement or pipe failure.

(e) **Casings in Highway Bores** - Steel pipe casings shall have a minimum wall thickness of one-quarter inch (¼”). Used pipe will be acceptable if in good condition and thoroughly cleaned. The size shall be at least six inches (6”) larger than the outside diameter of the bell of the pipe.

2. **STREAM BEDS** - Where shown on the plans and approved by the District, the Contractor shall encase the line in a steel casing or in quick-set concrete (three thousand (3,000) psi, two inches (2”) max. aggregate size). The encasement shall extend a minimum of six inches (6”) outside the pipe in all directions. The trench shall be dewatered if necessary, and the trench bottom shall be firm enough to prevent settlement of the concrete.

3. **STREAMS AND DITCHES** – Water and sewer lines which cross streams or ditches above the flow line shall be constructed according to the plans, or as directed by the District.
4. **CROSSINGS (OR PARALLEL CONSTRUCTION) OF WATER AND SEWER LINES** - All crossings or parallel construction of water and sewer lines shall conform to Design Criteria for Sewerage Systems, adopted jointly by Texas Commission on Environmental Quality. These requirements shall apply whether the water line, the sewer line, or both are new construction.

**2100.20 – EXCESS EXCAVATION**

Excess excavation shall be hauled to and placed on properties designated by the Owner. Once each week the Contractor shall spread the deposited excavation at the site as directed by the Owner.

IF no site is designated by the Owner, then it shall be the responsibility of the Contractor to dispose of this material in a safe and legal manner.

**2100.21 CLEAN-UP**

The Contractor shall remove from the work site all temporary structures, rubbish, and waste material including all excess excavated materials. The completed clean-up shall not be greater than one thousand feet (1,000’) behind the pipe laying operation. Pipe laying operations will be suspended temporarily if completed clean-up is further behind than one thousand feet (1,000’).

Clean-up requirements shall also apply to any public or private property used by the Contractor for constructing the project, such as temporary storage or field office sites.
2200 - PIPING MATERIALS AND FITTINGS

2200.01 – GENERAL

This item shall govern all piping and fitting materials required for sewer and water lines. This item also governs all materials, equipment, tools, labor, and incidentals required for jointing of sewer and water lines and for embedment of sewer lines.

2200.02 – PIPE BEDDING MATERIAL

Sand for bedding and backfill shall be a select sand soil or other granular material being free from clay lumps, organic materials or other deleterious substances and having a plasticity index of not greater than seven (7) and with not more than forty percent (40%) passing a number two hundred (200) sieve.

2200.03 – INSPECTION AND TESTING

The Contractor shall furnish the Owner with a certified copy of test results showing that pipe supplier’s material meets the requirements of this specification and those set forth in ASTM D-3034 and/or D-1784 for standard or reinforced PVC pipe.

The finished gravity sewer line shall pass infiltration testing in accordance with procedures outlined in Item 3800. Flexible sewer lines shall also pass deflection testing according to Item 3800.

Should any section of line fail to pass the above test(s), the Contractor shall, at his own expense, locate and repair all defects and retest until line passes the prescribed test.
2400 - WATER SERVICE CONSTRUCTION DETAILS

2400.01 – GENERAL

This Item will govern specific details in the construction of water lines.

2400.02 – SPECIFIC WATER LINE DETAILS

1. VALVES AT TIE-IN TO DISTRICT – A gate valve and box will be installed at the tap on our line and included in the tap fee.

2. DEPTH – Water lines will be forty eight inches (48”) below ground or ditch bottom whichever is lowest.

3. FLUSH VALVES – A flush valve will be required at the end of all dead-end lines. (See Fig. 6)

4. STREET CROSSINGS – All street crossing will be made on center of lot lines so as to serve one (1) lot with one crossing. A minimum of one inch (1”) service line will be used for all crossings. (See District specifications for water and sewer service lines).

5. Water, for irrigation systems will be supplied by a separate individual tap.

2400.03 – DUCTILE IRON PIPE AND CAST IRON PIPE

This specification covers ductile iron pipe and cast iron pipe to be used as a pipe line for domestic wastes or potable water. Ductile iron and cast iron pipe will only be used in special situations such as above stream crossing and other exposed areas.

1. PIPE AND FITTINGS - Pipe shall conform to AWWA Class 150, with fittings conforming to ASA A21.10 and ASA B16.1.

3. COATING – The inside of the pipe shall be coated by one or more of the following methods, as noted on the plans:
(a) **Coal tar epoxy, twenty (20) mil thickness.**

(b) **Cement lining (AWWA C-104).**

3. **INSTALLATION**

(a) **Underground (Not in bore or tunnel).** Pipe shall be installed according to Item 400.09/401.09 except that bedding for short lengths (as in water/sewer crossing) shall be same as adjacent pipe material. Pipe shall be “poly” wrapped according to AWWA C-105-77.

(b) **Bores, Tunnels, and Above Ground.** Installation shall be according to the plans, or as directed by the District.

4. **JOINTS** - Joints shall be one of the following types, as noted on the plans:

(a) **Bell and spigot with confined elastomeric gasket.**

(b) **Mechanical Joint (AWWA C-aaa).**

(c) **Flanged joint.**
2400.04 - PVC POTABLE WATER PIPE

This specification covers PVC (Polyvinyl Chloride) pipe to be used as a water main for potable water.

1. **PIPE** – Pipe four inches (4”) and larger shall consist of AWWA C900 Class 150 PVC, pipe and couplings shall be made from Class 12454-B virgin compounds as defined in ASTM D1784 and conforming with the outside dimensions of iron pipe. Two inch (2”) pipe shall be ASTM 2241 200 PSI PVC pipe with gasketed joints and shall be NSF approved.

2. **INSTALLATION** – PVC water pipe shall be installed in accordance with ASTM D-2774, with sand embedment material as required.

4. **JOINTS** – Joints shall be of the bell and spigot type with confined elastomeric gasket.

4. **FITTINGS** - Fittings for four inch (4”) and larger pipe shall be cement lined according to AWWA C-104 cast or ductile iron, conforming to AWWA C-110 and shall be mechanical joint.

5. **INSPECTION AND TESTING** - Completed water mains shall pass a hydrostatic test equal to twenty-five percent (25%) more than maximum operating pressure of pipe (See Item 350)
2450 COMBINATION AIR VALVE

90° BEND (TYP)

REDUCING BUSHING & NIPPLE, AS REQ'D

BACKFLUSHING ATTACHMENTS W/ QUICK DISCONNECT

DISCHARGE INTO WET WELL USING 316 SS PIPE AND FITTINGS, SEE PLAN & ELEVATION SHEETS

2" COMBINATION AIR VALVE

BLOW-OFF VALVE

2" BALL VALVE

DI BLIND FLANGE WITH 2" TAP

2" 316 SS NPT PIPE N

FLG DI TEE

TYPICAL COMBINATION AIR VALVE

NTS
2500 - METER DETAILS

2500.01 – GENERAL

This item will govern specific details for placement of meter boxes and connections.

2500.02 – SPECIFIC METER DETAILS

1. **MATERIALS** - The subdivision owner will be responsible for providing the District approved meter box and a three-quarter inch by one inch (3/4”X 1”) curbstop with lock ring that is approved by the District at each lot. Meters will be set at finish grade and tied to house service line by the District at each location after payment of a meter setting fee. Meters will be locked until required deposits are paid.

2. **LOCATION** - The meter hook-up will be installed on the center line of the lot adjacent to the street.

3. **DEPTH OF METER** - The center line of the meter connection on the curbstop will be a maximum of eight inches (8”) below finish ground level.

4. **CURBSTOPS** - Those furnished by the developer shall be of a design that has the meter connection made onto the curbstop and approved by the District.

5. **ROAD CROSSINGS** – All water taps will be spaced a minimum of eighteen inches apart, and any taps closer than four feet together shall be rotated forty five degrees away from one another.
TYPICAL WATER SERVICE CONNECTION
L.M.U.D.
2550 - HYDRANTS

2550.01 - DESCRIPTION

Fire hydrants shall conform to requirements and tests of AWWA Specifications C502-73 "AWWA Standard for Fire Hydrants for Ordinary Water Works Service" or the latest revision thereto as to the design, component materials, construction and manufacture of all fire hydrants furnished under these specifications except as otherwise modified or supplemented below:

(a) Diameter of valve opening shall not be less than five and one-fourth inches (5\(\frac{1}{4}\"\)).

(b) Valve stem shall operate to OPEN COUNTERCLOCKWISE.

(c) Bury Depth, variable, depending on depth of main. Run-out pipe is to be horizontal and ground line flange 3 inches above ground.

(d) Hydrants shall be equipped with two (2), two and one-half inch (2 ½") hose nozzles and one pumper nozzle, size and threads of both hose and pumper nozzles to conform to standard now in use by the Lumberton Municipal Utility District. All nozzles shall be provided with nozzle caps securely attached to barrel with chains not less than one-eighth inch (1/8") diameter and with cap gaskets of rubber composition. Obtain spec. from Fire Department.

(e) Hydrants shall be of the compression type shut-off valve, closing with the pressure, of dry-top and collision safety construction, designed for 150 psi working pressure. The main valve seat ring shall be of bronze and screw into an all bronze drain ring.

(f) Inlet shoe shall be an elbow with AWWA standard bell designed for normal six-inch (6") flanged, mechanical joint, or swivel joint assembly as specified.

(g) Hydrant barrel shall be provided with non-tapped drain openings, completely of bronze or bronze lined, that will drain barrel when hydrant valve is in the fully closed position and without leakage when in the open position.
This barrel joint shall be designed so that the hydrant shut-off valve will remain closed and reasonably tight against leakage in the event of an impact accident resulting in damage or breaking of the hydrant above or near ground level. The joint shall be provided with a breakable bolt flange or breakable coupling that will include a minimum of eight (8) bolts.

(h) Valve stem shall be provided with breakable stem couplings opposite the above barrel breakaway feature.

Valve stem shall be provided with bronze sleeve, "O" ring seals, travel stop, and operating threads that will not be exposed to water. Operating threads shall be fully lubricated when opening and closing of shut-off valve with lubricating reservoir sealed top and bottom. Valve stem shall be equipped with thrust bearing or lubricated thrust collar to minimize operation torque.

(i) Each hydrant shall be tested at not less than three hundred pounds (300 lbs.) hydrostatic pressure and designed for 150 lbs. water working pressure.

(j) Operating nut on hydrants and nozzle cap nuts shall conform to existing hydrants in the District.

(k) All necessary bolts, glands, and gaskets for complete installation of each hydrant shall be supplied with each hydrant and shall conform to AWWA Standard Specification C-111-72. They shall be shipped and stored in such a manner as to prevent rusting or other damage before installation.

Hydrants shall be Darling B-84-B, or District approved equal.

(l) Working parts shall be replaceable from the top. Nozzles shall be replaceable in the field.

(m) All hydrants are required to have STORZ nozzle on pumping connection. (Detail in this section)
2550.02 - INSTALLATION

Installation of fire hydrants will be in accordance with the drawings in this section. Tyler Swivel Tee 5-125 or approved equal will be used to come off main line for hydrant.

2550.03 - FIRE HYDRANT SPACING

Fire hydrants to be located:

1. Single family dwelling sites.
   
   (a) Fire hydrants shall be located along the curb or edge line of a street, public road or private drive where each dwelling is within 350' feet of a fire hydrant. (This will result in a normal spacing of fire hydrants 700 feet or less measured along the curb or edge line of a street, public road or private drive.)

2. Multi-family or Commercial sites:
   
   (Apartments, townhomes, cluster housing, condominiums, hotels, motels, high-rise apartments or any multi-family dwellings.)

   (a) Fire hydrants shall be located along the curb or edge line of a street, public road or private drive where each building is within 250 feet of a fire hydrant. (This will result in a normal spacing of fire hydrants 500 feet or less measured along the curb or edge line of a street, public road or private drive.)

3. Industrial sites:
   
   (a) Fire hydrants shall be located along the curb or edge line of a street, public road, private drive or parking lots, where each building or every portion of a building is within 175 feet of a fire hydrant. (This will result in a normal spacing of fire hydrants 350 feet or less measured along the curb or edge line of a street, public road, private drive or parking lot.

1. Approval:

The complete layout of fire hydrants, and water lines shall be submitted to the District Manager for approval before installation.
TYPICAL FIRE HYDRANT INSTALLATION
2600 - RESILIENT SEAT GATE VALVES

2600.01 - GENERAL DESCRIPTION

All two-inch (2") and larger valves used shall be gate valves which conform strictly to the requirements of American Water Works Association Standard Specifications for Resilient Seat Gate Valves for Ordinary Water Works Service C509-80, including changes and additions specifically stated in these specifications.

Gate valves shall be of the single-disc design, in which the disc is lowered into the valve body and seats against the body through a resilient seat. The seat may be attached to the disc or to the body, and shall be firmly bonded or mechanically attached. The disc shall be fitted at the top with a heavy bronze or corrosion resisting stem nut, threaded to accept the valve stem.

All gate valves will be "American - 80 CRS Gate Valves" or District pre-approved equal.

2600.02 - VALVE CONSTRUCTION

1. Valves shall open counterclockwise with stationary non-rising stem, and shall be designed for opening with a standard square head portable wrench. The valve shall not contain a hand wheel unless on above ground piping.

2. Operating nut shall be two inches (2") square, with required operating torque of not over 200 ft. - lb. for 3" and 4" valves, or 300 ft. - lb. for 6" through 12" valves.

3. All valves shall be manufactured with mechanical joints.
2600.03 FLUSH VALVES

MAINGUARD NO. 77 BLOW-OFF HYDRANT

Post Hydrants shall be non-freezing, self draining type with a ___’ bury. These hydrants will be furnished with a 2” FIP inlet, a non-turning operating rod, and shall open to the left. All of the working parts shall be of bronze-to-bronze design, and be servicable from above grade with no digging. The outlet shall also be bronze and be 2–1/2” NST. Hydrants shall be lockable to prevent unauthorized use as manufactured by Kupferle Foundry Co., St. Louis, MO, or approved equal.

FLUSH HYDRANT

Lumberton Municipal Utility District Specifications for Construction 2008
2800 - TESTING AND STERILIZATION OF WATER LINES

2800.01 – GENERAL

This specification provides for pressure testing and sterilization of completed water lines prior to placing them in service.

2800.02 – PROCEDURE

The flushing, checking, chlorinating, sampling, and testing of the completed line shall be done in the following sequence;

1. Flush line properly through valve or other opening at dead end. Area of opening should be no less than one-fourth (¼) area of pipe being flushed. Observe line under District water pressure. Repair any apparent failures at this time.

2. Chlorinate line. Pressure drop and flow should be away from point of chlorination and should be toward dead end (open) of line, not toward District connection. Chlorination shall be in accordance with AWWA Specification C601-68.

3. Make specified pressure test using District water through a direct connection to pump suction.

4. Make bacteriological test after pressure test.

5. Installation, disinfection, and testing shall meet the requirements of the “Rules and Regulations for Public Water Systems” adopted by the TCEQ.

In case of line failure where a joint or portion of a joint of pipe has to be replaced, that section of line should be isolated by closing adjacent line valves, open line kept free of foreign matter, repairs made and HTH used liberally, then flushed out at the nearest hydrant.

In extreme cases of failure, the Contractor may be required to repeat the entire chlorination procedure.

District personnel only may open and close existing valves.
2800.03 – PRESSURE TEST PROCEDURE

The Contractor shall, after backfilling or partial backfilling all newly laid pipe, slowly fill the lines with water expelling all air. The Contractor shall use all available outlets to accomplish this, such as hydrants, air relief valves, and taps when specified. Should additional taps be needed to vent the air from high points in the line, they shall be installed by the Contractor at his own expense.

The Contractor shall install certified gauges on the line being tested at spacing not to exceed two thousand feet (2,000’) and at the end of the test section.

During this period, the bulkheads, valves, manholes, and connections shall be examined for leaks and any found shall be sealed.

A test pressure of not less than one hundred and twenty percent (120%) of pressure class of pipe shall be applied to valved or bulkhead sections by means of a hand pump or small power pump.

The Contractor shall furnish, install, and operate at his own expense the necessary connection, pumps, meters, and gauges in filling the line and making the test. The water necessary to maintain the test pressure shall be measured through a meter or other means satisfactory to the District.

2800.04 – PERMISSIBLE LEAKAGE

No pipe installation will be accepted until or unless the leakage in the foregoing test is less than the following values:

1. Cast Iron or Ductile Iron Pipe: Twenty-four (24) gallons per twenty-four (24) hours per mile of pipe per inch of nominal diameter for eighteen foot (18’) length joints of pipe at a minimum of 150 PSI.

2. “PVC Pipe: 24 N P/7400, where N – number of joints in test section and P = test pressure in psig.”

(NOTE: In Gallons per day per inch diameter of pipe.)
The leakage shall be considered the amount of water entering the pipe line during the test, less the measured leakage through valves or bulkheads.

2800.05 – STERILIZATION

When repairs are made to existing mains or when new main extensions are provided, they must be disinfected by the Contractor by using enough chlorine or chlorine compounds to fill the repaired or new mains and appurtenances with water containing fifty (50) ppm chlorine. After the water containing this amount of chlorine (which is greater than that normally present in drinking water) has been in contact with the pipe and appurtenances at least twenty-four (24) hours, the water shall be replaced with water to be transported normally. Samples of normal water from the new or repaired main shall be submitted to laboratories for bacteriological examination to be assured that the disinfection procedure was effective. Contractor will provide a lab report on samples indication “No Coliform Organism Found” prior to putting the line in final service.
3200 - SEWER LINE DETAILS

3200.01 – GENERAL

This item will govern specific details in the construction of sewer lines.

3200.02 – SPECIFIC SEWER LINE DETAILS

1. **MANHOLES** – A manhole is required at the tap to the District line. A manhole is required for each change in direction, every three hundred (300') to three hundred-fifty (350) feet and for any major change in elevation or change in pipe diameter. A major change in elevation may require a drop manhole.

2. **SLOPE** – The minimum slope acceptable will be twelve inch (12”) fall per hundred feet (100’), for four inch (4”) pipe; six inch (6”) fall per hundred feet (100’) 50%, for six inch (6”) pipe; and four inch (4”) 33% fall per hundred feet (100’) for eight inch (8”) pipe.

3. **PIPE SIZE** – No sewers other than house laterals and force mains shall be less than six inches (6”) in diameter. Individual house taps will be a minimum of four inches (4”) in diameter.

4. **CLEAN-OUTS** – A clean-out is required at the dead end of each sewer line and fitted with a water tight cap or plug. (See Drawing in this section)

5. **DEPTH** - The minimum depth for sewer lines will be eighteen inches (18”) below grade or ditch bottom, for service taps, and thirty-six inches (36”) for main sewer lines.

6. **STREET CROSSINGS** - All street crossings will be made on joint lot lines so as to serve two lots with one crossing where possible. (See Drawing in this section)

3200.03 – PVC FORCE MAIN SEWER PIPE AND FITTINGS

This specification covers PVC (Poly Vinyl Chloride) pipe to be used as a force main for domestic wastes or as a water main for potable water.
1. **PIPE** - Pipe shall consist of AWWA C900 Class 100 PVC, pipe and couplings shall be made from Class 12454-B virgin compounds as defined in ASTM D-1784 and conforming with the outside dimensions of iron pipe. ASTM 2241 200 PSI PVC pipe with NSF approval is also acceptable for force mains. C900 Used for force main shall be white in color.

2. **INSTALLATION** - PVC force main sewer pipe shall be installed in accordance with ASTM D-2774 with sand embedment material as required.

3. **JOINTS** - Joints shall be of the bell and spigot type with confined elastomeric gasket.

4. **INSPECTION AND TESTING** - Completed sewer force mains with free discharge shall pass a hydrostatic test equal to twenty-five percent (25%) more than maximum operating pressure of pump. (See Item 350)
3200.04 – PVC GRAVITY SEWER PIPE AND FITTINGS

This specification covers PVC (Polyvinyl Chloride) pipe to be used as a gravity sewer line for domestic wastes.

1. **PIPE AND FITTINGS** – Pipe and fittings shall be manufactured to the dimensions and minimum design criteria as set forth in “Type PSM (Poly-vinyl Chloride (PVC) Sewer Pipe and Fittings”, ASTM D-3034. Pipe shall have a minimum SDR of twenty-six (26). (Green in color) Below 8 foot depth, SDR 35 permissible to 0’ to 8’ with District approval.

2. **INSTALLATION** – PVC sewer pipe shall be installed in accordance with ASTM D-2321 with sand embedment material.

3. **JOINTS** – Joints shall be of the bell and spigot confined elastomeric gasket type with installation in accordance with the manufacturer’s recommendations.

4. **TESTING** - PVC sewer pipe will be tested in accordance with Item 3800.

3200.05 – PRESSURE TESTING

After the pipe has been laid and backfilled as specified, all newly laid pipe shall be subjected to a hydrostatic pressure equal to one hundred and twenty percent (120%) of the class of the pipe unless otherwise noted on specification of pipe material. Water for testing shall be furnished by the District at the nearest convenient connection approved by the Inspector of the District. The duration of each pressure test shall be four (4) hours.
MINIMUM TIME – AIR TEST

FOR 0.5 PSI PRESSURE DROP

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<tr>
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<th>TIME (MINUTES)</th>
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3200.06– IN FILTRATION – EX FILTRATION METHOD OF TESTING

Testing of the completed sewer line shall be made between manholes. Infiltration-exfiltration test is allowed only if water table is six feet (6’) above the invert of the pipe. If this method is to be used the District will provide special instructions.

3200.07 – DEFLECTION TESTING

Deflection test shall be performed on all flexible and semi-rigid pipe. The test shall be conducted after the final backfill has been in place at least thirty (30) days. No pipe shall exceed a deflection of seven and one-half percent (7 ½%). If the deflection test is to be run using a rigid ball or mandrel, it shall have a diameter equal to ninety-two and one-half percent (92 ½%) of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices. (See Fig. 2). All locations with excessive deflection shall be excavated and repaired by rebedding or replacement of the pipe.
NOTE:
2 SACK/CY CEMENT STABILIZED SAND BACKFILL UNDER PAVEMENT TO SEWER MAIN

CONCRETE METER BOX W/CAST IRON LID

REMOVABLE WATER TIGHT PLUG

PROPERTY LINE

SERVICE LINE TO HOUSE

4" PVC GASKETED

4" WYE

WYE'S ARE REQUIRED SADDLES NOT ACCEPTED

NOTE:
1. ALL FITTINGS TO BE GASKETED
2. PIPE JOINT CAN BE PUSH ON
3. CLEANOUT SHALL BE THE SAME DIAMETER AND MATERIALS AS THE SEWER PIPE

DETAIL OF SANITARY SEWER CLEAN OUT L.M.U.D.

NTS
NOTE:

1. TWO LOTS PER SERVICE TAP

2. PIPE AND FITTINGS ABOVE 8’ DEEP SHALL BE SDR 35

3. PIPE AND FITTINGS BELOW 8’ DEEP SHALL BE SDR 26

TYPICAL L.M.U.D. SEWER SERVICE TAP

NTS
NOTES: TRENCH WIDTH AS NECESSARY FOR TRENCH PROTECTION (REQUIRED FOR TRENCH DEPTHS GREATER THAN 5' DEEP).

NATIVE MATERIALS COMPACTED TO THE DENSITY OF THE SURROUNDING SOIL (6" MIN.)

EXISTING DIRT OR GRASS DRIVEWAY

2 SACK PER TON CEMENT STABILIZED SAND PLACED IN 12" LIFTS AND COMPACTED TO THE DENSITY OF THE SURROUNDING SOIL

SELECT NATIVE MATERIALS COMPACTED IN 6" LIFTS TO THE DENSITY OF THE SURROUNDING SOIL

PROPOSED WATER MAIN

2'-6" (MIN.)

6" (MIN.)

PIPE O.D.

6" (MIN.)

TYPICAL TRENCH BACK FILL IN DIRT OR GRASS DRIVEWAY

NTS
TYPICAL TRENCH BACK FILL IN ROCK DRIVEWAY

NOTES: TRENCH WIDTH AS NECESSARY FOR TRENCH PROTECTION (REQUIRED FOR TRENCH DEPTHS GREATER THAN 5' DEEP).

REPLACEMENT SECTION OF LIMESTONE BASE (8" MIN.)

EXISTING ROCK DRIVEWAY

2 SACK PER TON CEMENT STABILIZED SAND PLACED IN 12" LIFTS AND COMPACTED TO THE DENSITY OF THE SURROUNDING SOIL

SELECT NATIVE MATERIALS COMPACTED IN 6" LIFTS TO THE DENSITY OF THE SURROUNDING SOIL

PROPOSED WATER MAIN

2'-6" (MIN.)

6" (MIN.)

PIPE O.D.

6" (MIN.)
MOUND BACKFILL MAX 3” TO PROVIDE FOR SETTLEMENT

SELECT NATIVE MATERIALS COMPACTED IN 6” LIFTS TO THE DENSITY OF THE SURROUNDING SOIL

PROPOSED WATER MAIN

NOTES: TRENCH WIDTH AS NECESSARY FOR TRENCH PROTECTION (REQUIRED FOR TRENCH DEPTHS GREATER THAN 5’ DEEP).

TYPICAL TRENCH BACK FILL OUTSIDE OF PAVEMENT

NTS
NOTES:

1. ACTUAL FIELD CONDITIONS WILL DICATE LENGTHS OF NIPPLES BETWEEN TEES AND VALVES.

2. ALL FITTINGS AND VALVES ARE TO BE SUPPORTED WITH CONCRETE BLOCKS PLACED ON SOLID UNDISTURBED SOIL.

3. FITTINGS AND VALVES ARE TO BE TOTALLY ENCASED IN POLYWAP.

4. ALL NUTS AND BOLTS USED UNDERGROUND SHALL BE STAINLESS STEEL.

5. WHEN BACKFILLING THE TRENCH WITH STABILIZED SAND SUFFICIENT SPACE ON THE BACK SIDE OF THE TEES SHALL BE LEFT TO PROVIDE THE BEARING AREA ON THE UNDISTURBED EARTH AS DETERMINED BY THE THrust BLOCKING DETAIL.

3300 - MANHOLES

3300.01 - GENERAL

All manholes shall be constructed in accordance with our details and shall consist of all excavation, castings, backfilling and furnishing all materials or other items necessary for installation thereof. Manholes will be constructed of fiberglass reinforced plastic mortar or pre-cast concrete with cast in place.

3300.02 - CONSTRUCTION OF MANHOLES

Excavation for manholes shall be to the required depth and size as necessary for the type manhole to be constructed.

Manholes shall be constructed around main line sewer pipes after laying. Sewer pipes other than the main line are to be built in and trimmed flush with the inside wall. A concrete or grout invert will be formed in the bottom of manholes to facilitate flow and shall extend from pipe to wall with a minimum of one and a half (1.5) to one (1) slope. Manhole bottom shall be minimum 12” cast in place, reinforced concrete. The top of manholes shall consist of a cast iron ring and cover and be finished to the grade designated by the District. All manholes with ABS, ROM, or PVC sewer lines shall have manhole coupling, adaptors and all manholes shall have short joints on each side of manhole.

Manholes shall be clean with smooth finishing and free from any leakage or seepage prior to acceptance.

Manholes shall be constructed in accordance with Figures 10, 11, and 12.

3300.03 - FIBERGLASS REINFORCED PLASTIC MORTAR MANHOLE

Manhole walls and cone shall be of fiberglass reinforced plastic mortar Series M-1 as manufactured by Owens/Corning or approved equal.

Manhole shall consist of a cast in place reinforced concrete bottom min. 12” below and invert, a fiberglass reinforced plastic manhole of a single unit construction extending to within not less than eighteen inches (18”) of final grade, grade adaptor rings of concrete or brick and a District Standard cast iron ring and cover. The completed manhole shall be designed to withstand a wheel load of forty thousand pounds (40,000 lbs.) and be water-tight and able to pass a zero-gallons exfiltration test.
3300.04 - STANDARD MANHOLE FRAME AND COVER 30” – 36”

The frame and cover shall conform to the size and type currently used by the Lumberton Municipal Utility District. The frame will be securely grouted inside and outside the manhole.

3300.05 - EXCAVATION AND BACKFILL

The Contractor shall excavate to the required depth and size for each manhole. The District may require the Contractor to undercut for a maximum of twelve inches (12") below the manhole base and backfill with cement stabilized material where necessary. Backfill from the base to a point not less than twelve inches (12") below ground level shall be as follows:

1. **FIBERGLASS MANHOLES** - Backfill shall consist of select soil or sand, according to Fig. 10.

3300.06 - FIBERGLASS MANHOLES OVER FIVE FEET DEEP

Fiberglass manholes over five (5) feet deep shall be backfilled with stabilized sand (1 ½ sacks cement per c.y. sand) to within five feet (5') of the top. The top five feet shall be backfilled as previously specified. (See Fig. 10)

3300.07 - SNORKEL VENTS

Snorkel vents shall be installed on all manhole covers in low areas and ditch lines as designated by the District. Design and materials shall conform to SV 1-1045 by Mabry Foundry, Beaumont, Texas, or prior approved equal.

The snorkel vent shall be designed so as to thread into the one inch (1") hole in the cover, extend up approximately three and one-half inches, (3 ½"), and curve back downward. The open end of the snorkel shall be equipped with a caged float ball which will seal off the end of the snorkel when pounding occurs at the manhole, but will allow free ventilation at all other times.

The snorkel vent shall be non-corrosive, chemical resistant, and shear resistant. The float ball shall be chemical resistant and nonbiodegradable, with permanent flotation quality. All exposed edges shall be well rounded.
3300.08 - WATERSTOP GASKETS

Water stop gaskets shall comply with ASTM F-477, having a cross-section of a minimum of three inches (3") in nominal width, and shall be secured in place with a stainless steel strap clamp. Water stop gaskets shall be placed around all sewer lines at manhole joints. The securing clamp shall be made tight with gasket and clamp completely enclosed in place, using an expansive grout at a thickness of six inches (6") all around. Grout shall be metallic base non-shrink equal to Sika Chemical's "Kemox", Gifford-Hill's "Gilco", or Master Builders' "Embecco", or prior approved equal. (See Fig. aa and 12)

3300.09 - EXFILTRATION TEST PROCEDURES (MANHOLES)

The Contractor shall test each new manhole by an exfiltration test, as follows:

1. Plug all incoming and outgoing lines securely.
2. Fill manhole with water up to the corbel section.
3. Measure the drop in water level after five (5) minutes. If the water loss exceeds the maximum allowable as shown below, the manhole shall have failed the test.

   Depth of Manhole
   (Corbel to Invert........... Maximum Allowable Water Loss

   0 - 8 feet .................... 1 inch

   Over 8 feet .................. 1 inch per vertical foot

4. Repair and retest any manholes which fail the test.

3300.10 - PIPE ENTRY INTO MANHOLES

All pipe into manholes other than main collector shall be by entry saddle as per specification on Figure I.
TYPICAL DROP MANHOLE

NTS
TYPICAL PRECAST CONCRETE MANHOLE
OUTSIDE OF PAVEMENT

NTS
WS SERIES WATERSTOP GROUTING RINGS

SEALS FOR RIGID JOINTS BETWEEN PIPE & CONCRETE STRUCTURES

Ideal for:
- Mortared Connections to Precast Structures
- Field-Poured Concrete Structures
- Field-Poured Collars
- Casting Pipe Hubs in any Concrete Structure

Get these WaterSTOP Advantages:

Prevents fluid infiltration and exfiltration
Excellent in-field connection to existing structures
Installs quickly and easily with just a ratchet
Available for most pipe types 1.5" to 144"

Three Profiles for All Your Rigid Joint Sealing Requirements . . .

WS – 20
(1.5 – 3" Pipe)

WS – 25
(4-6" Pipe*)

WS-30
(8-144" Pipe)

*WS-25 can be used on larger pipe than 6", but the WS-30 is recommended on 8" pipe and larger

Press-Seal Gasket Corporation
6932 Gettysburg Pike, Fort Wayne, Indiana 46804
Phone: (260)436-0521 (800)348-7325 Fax: (260)436-1908 E-mail: sales@press-seal.com Web: www.press-seal.com
WATER STOP GASKET
LUMBERTON MUD MANHOLE COVER

1 1/4" LETTERING
RECESSED FLUSH

(4) 1.00 [25mm] DIA HOLE
THRU ON 25 1/2" [648mm] DIA
HOLE CIRCLE.

(2) OPEN PICKHOLES

2 1/2" [64mm]

1 1/4" [32mm] LETTERS

31 7/8" DIA
[810mm]

2 1/2" [58mm]

23" DIA
[584mm]

2 1/4"[57mm]

COVER SECTION

BOTTOM VIEW
3800 - TESTING OF SEWER LINES

3800.01 – GENERAL

This specification shall provide for inspection and testing of all completed sanitary sewer lines by a low pressure air test or infiltration – exfiltration if required by the District.

3800.02 – GROUND WATER LEVEL

Before conducting an air, exfiltration, or infiltration test on one or more adjacent line segments (the test section), the Contractor shall determine the ground water level at four hundred foot (400’) intervals within the test section. Each interval shall have a two inch (2”) vertical pipe set in the ground for this purpose. Some existing manholes may have this device or another device previously installed for this purpose.

Before testing the sewer lines, the Contractor shall insert a small rod into each two inch (2”) pipe along the test section to determine the level of ground water in the pipe. If an existing manhole along the test section contains a nipple or other device for this purpose, the Contractor shall determine the ground water level by means of this device if practical.

All ground water measurements shall be converted to depth of ground water above the pipe invert of the test section. The ground water depth for the test section shall be taken as the greatest depth so calculated. If no reliable measurement can be made, the ground water depth shall be taken as the greatest line depth along the test section.

3800.03 – AIR TEST

A low pressure air test shall be conducted on the sewer line between adjacent manholes.

AIR TEST PROCEDURES:

1. Test is conducted between two (2) consecutive manholes, as directed by the District.

2. The test section of the sewer line is plugged at each end. One of the plugs used at the manhole must be tapped and equipped for the air inlet connection for filling the line from the air compressor.
3. All plugs shall be properly braced against the internal pressure to prevent air leakage by slippage and blowouts.

4. Connect air hose to tapped plug selected for the air inlet. Then connect the other end of the air hose to the portable air control equipment which consists of valves and pressure gauges used to control:

(a) The air entry rate to the sewer test section, and

(b) To monitor the air pressure in the pipe line.

More specifically, the air control equipment includes a shut-off valve, pressure regulating valve, pressure reduction valve and a monitoring pressure gauge having a pressure range from 0 to 15 psi. The gauge shall have minimum divisions of 0.10 psi and an accuracy of +0.04 psi.

5. Connect another air hose between the air compressor and the air control equipment.

6. Supply air to the test section slowly, filling the pipe line until a constant pressure of 3.5 psig plus 0.433 psi for each foot of ground water level above the invert of the pipe. The air pressure must be regulated to prevent the pressure inside the pipe from exceeding 15.0 psig.

7. When constant pressure of 3.5 psig above ground water pressure adjustment is reached, throttle the air supply to maintain the internal pressure above 3.0 psig plus ground water pressure adjustment for at least five minutes. If leakage is detected at any cap or plug, release the pressure in the line and tighten all leaky caps and plugs. Then start the test operation again by supplying air. When it is necessary to bleed off the air to tighten or repair a faulty plug, a new five-minute interval must be allowed after the pipe line has been refilled.

8. After the stabilization period, adjust the air pressure to 3.5 psig above ground water pressure adjustment and shut off or disconnect the air supply. Observe the gauge until the air pressure reaches 3.0 psig above ground water pressure adjustment. At 3.0 psig above ground water pressure adjustment commence timing with a stop watch which is allowed to run until the line pressure drops to 2.5 psig above ground water pressure adjustment at which time the stop watch is stopped. The time required, as shown on the stop watch, for a pressure loss of 0.5 psig is used to compute the air loss.
9. If the time, in minutes and seconds, for the air pressure to drop 0.5 psig is greater than that shown in the table below for the designated pipe size, the section undergoing test shall have passed.

10. If the time, in minutes and seconds, for the 0.5 psig drop is less than that shown in the table below for the designated pipe size, the section of pipe shall not have passed the test; therefore, adequate repairs must be made and the line retested.

3800.04 - INФILTRATION AND/OR EXФILTRATION AND TESTING

Infiltration and/or exfiltration in gravity sanitary sewer lines shall not exceed two hundred (200) gallons per inch of diameter per day per mile of pipe. Sewer lines shall be tested for exfiltration according to Item 400 of these specifications.

Water lines shall be sterilized and tested in accordance with applicable specifications. (Technical Specifications 3800)

3800.05 – PRESSURE TESTING

After the pipe has been laid and backfilled as specified, all newly laid pipe shall be subjected to a hydrostatic pressure equal to one hundred and twenty percent (120%) of the class of the pipe unless otherwise noted on specification of pipe material. Water for testing shall be furnished by the District at the nearest convenient connection approved by the Inspector of the District. The duration of each pressure test shall be four (4) hours.

MINIMUM TIME – AIR TEST

FOR 0.5 PSI PRESSURE DROP

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3800.06 – INFILTRATION – EXFILTRATION METHOD OF TESTING

Testing of the completed sewer line shall be made between manholes. Infiltration-exfiltration test is allowed only if water table is six feet (6\') above the invert of the pipe. If this method is to be used the District will provide special instructions.

3800.07 – DEFLECTION TESTING

Deflection test shall be performed on all flexible and semi-rigid pipe. The test shall be conducted after the final backfill has been in place at least thirty (30) days. No pipe shall exceed a deflection of seven and one-half percent (7 ½\%). If the deflection test is to be run using a rigid ball or mandrel, it shall have a diameter equal to ninety-two and one-half percent (92 ½\%) of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices. (See Fig. 2). All locations with excessive deflection shall be excavated and repaired by rebedding or replacement of the pipe.
TYPICAL
TEXAS DEPARTMENT OF TRANSPORTATION ROAD CROSSING

[Diagram of typical road bore in TXDOT R.O.W.]
COMBINATION AIR VALVE

90° BEND (TYP)

REDUCING BUSHING & NIPPLE, AS REQ'D

BACKFLUSHING ATTACH W/ QUICK DISCONNECT

DISCHARGE INTO WET WELL USING 316 SS PIPE AND FITTINGS, SEE PLAN & ELEVATION SHEETS

2" COMBINATION AIR W/ BLOW-OFF VALVE

2" BALL VALVE

DI BLIND FLANGE WITH 2" TAP

2" 316 SS NPT PIPE

FLG DI TEE

TYPICAL COMBINATION AIR VALVE

NTS

Back of easement
TYPICAL TRENCH BACK FILL IN DIRT OR GRASS DRIVEWAY

NOTES:

- TRENCH WIDTH AS NECESSARY FOR TRENCH PROTECTION (REQUIRED FOR TRENCH DEPTHS GREATER THAN 6' DEEP).

- NATIVE MATERIALS COMPACTED TO THE DENSITY OF THE SURROUNDING SOIL (6" MIN.)

- 2 SACK PER TON CEMENT STABILIZED SAND PLACED IN 12" LIFTS AND COMPACTED TO THE DENSITY OF THE SURROUNDING SOIL

- SELECT NATIVE MATERIALS COMPACTED IN 6" LIFTS TO THE DENSITY OF THE SURROUNDING SOIL

- PROPOSED WATER MAIN

- EXISTING DIRT OR GRASS DRIVEWAY

- 6" (MIN.)

- 2'-6" (MIN.)

- PIPE O.D.

- 6" (MIN.)

- 5" (MIN.)
TYPICAL TRENCH BACK FILL IN ROCK DRIVEWAY
MOUND BACKFILL MAX 3” TO PROVIDE FOR SETTLEMENT

SELECT NATIVE MATERIALS COMPACTED IN 6” LIFTS TO THE DENSITY OF THE SURROUNDING SOIL

NOTES: TRENCH WIDTH AS NECESSARY FOR TRENCH PROTECTION (REQUIRED FOR TRENCH DEPTHS GREATER THAN 5’ DEEP).

TYPICAL TRENCH BACK FILL OUTSIDE OF PAVEMENT

NTS
TYPICAL TRENCH BACK FILL IN PAVEMENT

NOTES: TRENCH WIDTH AS NECESSARY FOR TRENCH PROTECTION (REQUIRED FOR TRENCH DEPTHS GREATER THAN 5' DEEP).

- SAW CUT ASPHALT PRIOR TO REMOVAL
- REPLACEMENT SECTION OF LIMESTONE BASE
- REPLACEMENT SECTION OF HMAC
- EXISTING BASE MATERIAL
- EXISTING HMAC
- 2 SACK PER TON CEMENT STABILIZED SAND PLACED IN 12" LIFTS AND COMPACTED TO THE DENSITY OF THE SURROUNDING SOIL
- SAND COMPACTED TO THE DENSITY OF THE SURROUNDING SOIL
- PROPOSED WATER MAIN
- 2'-6" (MIN.)
- 6" (MIN.)
- PIPE O.D.
- 6" (MIN.)

NTS
4000 Lift Stations

4001 Purpose

The manual provides guidance for the design criteria for developing site specific drawings for new lift stations to provide facilities that are consistent in quality, arrangement and equipment throughout the LMUD service area.

4002 General

Furnish and install a completely assembled fully operable lift station. The package shall consist of basin, cover with aluminum hatch for level I, Concrete for level II, minimum of two (2) pumps, stainless steel rails, discharge piping including valves and check valves outside of the station, electrical service and controls, minimum 6” vent for level II, 3” minimum for level I. All weather drive way and associated slab around station. The pumps, rails and controls shall be the same brand as currently used by the district. Basin design, pump type and model, electrical controls must be pre-approved by the District to assure standardization of equipment. The contract engineer will have to determine, with the Districts approval, what level of lift station (Level I or Level II). ALL MATERIALS INSIDE THE WETWELL MUST BE A CORROSION RESISTANT MATERIAL.

All pump station construction plans shall include drawings that provide the following.

1. Site Layout
2. Plan and profile of pump station and associated piping
3. Profile view of pump operational and control levels and settings
4. Hydraulic system curves must be provided for both normal and peak operating conditions
5. Cycle time calculations showing necessary vertical difference from all pumps off to first pump on.
6. Electrical wiring and control system schematics
7. Structural details.
4005 Coordination with other Documents

In addition to this manual, the Design Engineer should be very familiar with the Texas Administrative Code design criteria for Lift Stations Chapter 217.

4040 Type of Lift Station

The District has two levels of lift stations, which require approval from the District.

Level I: Less than or equal to 5 HP and with a 2” pump discharge or less.

Level II: Greater than 5HP or larger than 2” pump discharge.

4050 Site Plan

Lift stations are required to be on private Lumberton MUD easement outside of City, County, or state right-of-ways that abuts to a public right-of-way.

Level I requires a minimum 20’ X 20’ easement.
Level II requires a minimum 40’ X 40’ easement.

If a culvert is required the culvert shall extend completely crossing the entire easement. All site plans need to be submitted to the District for approval.
TYPICAL LEVEL II SITE LAYOUT

This section is all concrete
4100 Basin Design

Basin design considerations: The Wall thickness shall be sufficient to withstand a water-saturated soil load of 120 lb. per cubic foot with a safety factor of two at all depths. A properly sized flexible pipe fitting or plastic pipe adapter for inlet shall be furnished with a location as determined by the District from top of the basin to the inlet centerline. The Flexible pipe fitting or pipe adapter and gasket material shall be shipped loose for field installation for level 1 type stations. A ballast support flange shall be provided as an integral part of the basin assembly. The flange shall extend a minimum of three inches (3") on the radius of the basin.

The Level 1 basin cover shall be of aluminum diamond plate construction with a minimum thickness of three-eighths inch (3/8”), and shall have a minimum diameter four inches (4”) greater than the basin. A hinged door shall be an integral part of the cover, and shall have locking provisions. The cover shall be securely mounted to the basin with a minimum of six (6) stainless steel bolts threaded into stainless steel inserts in the top collar of the basin. All hardware shall be stainless steel. The vent shall have 16” thread per inch screened bug free vent that is corrosion resistant.

Basin design considerations shall be pre-approved by the District. Finished elevation of the lift station top shall be at least one foot above the 100-year flood plane (minimum). Provide a minimum clearance of 6 inches from the inside wet well wall to all flanges to enable removal of all bolts. All basins shall be sized to provide a 10-minute minimum cycle time for submersible pumps and 14 minute for self-primers.

All Level I basins can be made of fiberglass and of circular design with a minimum diameter of 60” and appropriate depth all hardware inside the wet well shall be corrosion resistant. All fastening devices shall be stainless steel. All piping 4” and greater may be ductile iron and all less than 4” shall be stainless steel. All Level II stations shall have a minimum of 6 feet between lowest flow line and finished floor elevation. All Level I shall have a minimum of 4 feet from lowest inlet pipe entering wet well and finished floor elevation. All level II Basins shall be constructed of concrete and be square or rectangular, minimum size shall be 8 feet by 8 feet and appropriate depth.
4300 Mechanical

4301 Valves and Piping

Isolation valves and check valves are required for each pump discharge located outside the wet well in a valve vault or on top of a slab. Approved Gate Vales are American Flow Control. Approved check valves are AVK with lever and weight, for 4 inch discharges or larger. Smaller check valves approved for 3 inches or less are Danfoss Model 508. All pipe supports shall be poured in place concrete conforming to the bottom of pipe of fitting to be supported but should not interfere with the removal of bolts or fittings. All header manifolds where pumping discharges come together shall be flanged ductile iron fittings. No tapping of pipe will be allowed, a ductile iron tee shall be installed and the blind flange tapped for a combination air valve and pressure gauge installations. All reducing fittings shall be eccentric with the flat side up. All stations shall be equipped with an appropriately sized bypass pumping capabilities. There shall be a separate valve installed at the property line to allow work to be performed on the header piping. All piping shall be painted in accordance to the painting specifications.

4302 Station Venting

A corrosion resistant down blast fan is required for all level II stations that shall offer a continuous air change rate of 12 air changes per hour “minimum”. The down blast fan should enter the wet well through a pipe ran from the station to the opposite corner of the site than the passive vent. Below ground materials for vents may be C 900 PVC and above ground ductile iron primed and painted. The passive vent shall be a minimum of 6 inches and constructed with a tee on top and extend 8 feet higher than finish top elevation of the station. The tee shall be screened on both sides with 16 threads per inch stainless steel screen and positioned where one opening points north and the other point’s south. All level I stations shall have a passive vent 3” minimum. All vents shall be through the side of the tank and not mounted on top of the lid.
4303 Coatings & Painting

4304 - GENERAL

1. This specification covers preparation of surfaces, performance, and completion of painting and finishing of all exterior and interior surfaces as required by the drawings and as specified herein.

2. All materials delivered to the job site shall be in original sealed and labeled containers of the paint manufacturer.

3. Coatings shall be applied during good painting weather. Air and surface temperatures shall be within limits prescribed by the manufacturer for the coating being applied, and work areas shall be reasonably free of airborne dust at the time of application and while the coating is drying.

4305 - MATERIALS

1. All materials provided for herein shall be manufactured for sanitary sewer service and shall be as manufactured by one or more of the following:

   Tnemec Co., Inc., Sherman Williams

2. Equivalent materials of other manufacturers may be submitted for pre-approval of the District. Requests for substitution shall include manufacturers literature for each product giving the name, generic type, descriptive information, solids by volume, and recommended dry film thickness. No request for substitution shall be considered that would decrease film thickness and/or number of coats or offers a change in the general type of coating specified for sanitary sewer service.

3. Colors, where not specified, shall be selected by the District.

4. All coats of paint for any particular surface shall be from the same manufacturer.
4306 - SURFACE PREPARATION

1. All surfaces to be painted shall have all contaminants removed, that will interfere with the full development of adhesion of the coating system.

2. The method of surface preparation shall be as indicated below, depending upon the type and concentration of contaminants and the specific requirements of the coating system being used.

a. Ferrous Metal

   (1) Submerged Surfaces

      (a) Shop cleaning: SP-8 pickling (acid etch)

      (b) Field cleaning: SP-l0 Near-White Blast Clean

   (2) Non-submerged Shop and/or field cleaning: SP-6 Commercial Blast & SP-2 Solvent and Hand Tool Clean.

b. Non-ferrous and galvanized Metal. Shop and/or field cleaning: SP-l Solvent Cleaning.

c. Masonry Surfaces

   (1) Submerged SP-6 Commercial Blast Clean.

   (2) Non-submerged. SP-6 Commercial Blast Clean, SP-l Solvent Clean, and/or SP-2 Hand Tool Clean.

   (3) Mitigate Exposures. SP-7 Brush Blast Clean, SP-l Solvent Clean, and/or SP-2 .
4307 - APPLICATION

1. Materials shall be mixed, thinned, and applied according to the manufacturer’s printed instructions.

2. Each coat shall be allowed to dry thoroughly before applying the next coat.

3. All work shall be cut in neatly, and finish coats shall be uniform in color and texture without streaks, laps, heavy build-ups, runs, sags, or missed areas.

4308 - SHOP PAINTING

1. It is the intent of this item of the specifications that all metal work be properly painted whether or not specific mention is made of each individual part of the work.

2. All structural steel, except stainless, miscellaneous iron, ornamental iron, equipment, hollow metal doors, louvers, etc., shall receive one (1) shop coat of a primer compatible with the field coat specified.

4309 FIELD PAINTING

1. All painting at the site of the work is hereby defined as field painting and shall be under the direction of the Engineer to the extent that he shall determine where and when painting may be done. All surfaces to be painted shall have their readiness for painting approved by the District before work is started.

Surfaces of exposed members inaccessible after erection shall be cleaned and painted before erection.

2. Before final acceptance of the project, any damaged painted surfaces shall be touched up or repainted, as directed by the Engineer.

- DRY FILM THICKNESS

1. The Contractor shall apply all coatings to the dry mill thicknesses indicated in Item 4310 below.

2. The Contractor shall provide and make available to the Engineer a “Dry Thickness Gauge,” or other gauge, to prove the dry mill thickness of the paint applied.
4310 - PAINTING SCHEDULE

1. Structural, Tanks, Pipes, and Ect.
   a. Exterior or Non-Immersion

   Epoxy-Polyamide:
   1st Coat Inorganic Zinc Primer
   : White Epoxy Primer
   3rd_Coat: Color Coat

   Dry. MilS
   2.0 - 3.5 First Coat
   1.5-2.5 Second Coat
   1.5 - 2.5 Third Coat
   5.0 - 8.5 Fourth Coat

4350 Area Lighting

LIGHTING FIXTURES

A. Outdoor, recessed, incandescent fixtures shall be 120 volt, 75 watt lamp, ceiling mount, 5” aluminum housing, approved for wet location, U.L. listed; Lithonia Series L5 with wet location trim or equal.

B. Outdoor, wall-mount, floodlight fixtures shall be 240 volt, 150 watt, metal halide type, die-cast aluminum housing, glass lens, enclosed and gasketed, standard bronze finish, U.L. listed; Lithonia #TWH 150S TB or equal.

C. Outdoor area pole-mounted floodlighting fixtures shall be 240 volt, 250 watt, metal halide type, die cast aluminum construction, natural aluminum finish, U.L. listed for wet areas, impact resistant glass lens, 7 x 7 distribution pattern; Lithonia #TFA 250S TA TB IS DNA or equal.
D. Outdoor, task lighting, stanchion and pendant mount fixtures shall be 120 volt, 150 watt, metal halide type, die cast aluminum construction, U.L. listed, impact resistant glass globe, aluminum guard, fiberglass-reinforced polyester reflector; Crouse-I-Hinds Type NVMV. Refer to Drawings for specific Crouse Hinds model number.

4375 Cover for Electrical Enclosures for Level II Stations

CLOSE GABLE ENDS WITH 2B GA. GALVANIZED STEEL SIDING

ELECTRICAL MOTOR STARTER & CONTROL ENCLOSURES

SECTION A-A
GENERAL SHELTER NOTES:

1. USE 1100 UNISTRUT PURLINS SPACED AT 18" ON CENTER.

2. ALL STRUCTURAL STEEL, AS DEFINED IN THE API CODE OF STANDARD PRACTICE FOR STEEL PLATING AND
   BRIDGES, SHALL CONFORM TO THE FOLLOWING ASTM
   DESIGNATIONS:
   - ANCHORS: ASTM A-4 & A-36
   - CHANNELS: ASTM A-4 & A-36
   - SQUARE TUBING: ASTM A-4 & A-36
   - ALL STRUCTURAL STEEL SHALL BE GALVANIZED AND SHALL
     CONFORM TO ASTM A-123.

3. ALL MIG WELDS ON PURLINS SHALL CONFORM TO THE
   STRUCTURAL WELDING CODE OF THE AMERICAN WELDING
   SOCIETY.

4. ALL BOLTS, NUTS, PLAIN WASHERS AND O-RING WASHERS
   SHALL BE NOT SPLIT GALVANIZED IN ACCORDANCE WITH

5. SPACER PLATE BOLTED CONNECTIONS SHALL BE MADE WITH
   3/4" INDIVIDUAL BOLTS IN ACCORDANCE WITH ASTM A-325
   AND ALL WASHER BOLTS SHALL BE 3/4" AND IN

6. ROOF PANELS SHALL BE 2 1/2"X1/2" GALVANIZED STEEL
   (ASTM A-14, GRADE A). PANEL THICKNESS SHALL BE
   28 GA. PANELS SHALL BE APPLIED IN SINGLE LENGTHS
   WITHOUT SPLICING TO THE DIMENSIONS SHOWN ON THE
   DRAWINGS.

7. PANEL FASTENERS SHALL BE SS WITH NEOPRENE
   WASHERS. NUTS AND SPACING SHALL BE IN
   ACCORDANCE WITH MANUFACTURER SPECIFICATIONS.

8. SHELTER FABRICATION SHALL PROVIDE ALL NECESSARY
   AND REQUIRED BOLTS, NUTS, WASHERS, SCREWS, SEALING
   TAPE, AND/OR OTHER FASTENERS.

9. ERECTED SHELTER STRUCTURE TO SUSTAIN A ROOF LIVE
   LOAD OF 12 PSF AND A WIND LOAD OF 120 MPH.

10. ALTERNATE PRE-ENGINEERED MANUFACTURED SHELTERS
    SHALL REQUIRE SHOP DRAWINGS AND DESIGN
    CALCULATIONS SIGNED AND SEALED BY A REGISTERED
    PROFESSIONAL ENGINEER IN THE STATE OF TEXAS.
**4400 PUMPS**

**4401 GENERAL**

All Level 1 will require 120/240v 3 phase pumps with motor winding temperature, and seal fail detection sensors.

All Level II will require 277/480 volt 3 phase pumps. All pumps are required to have seal detection and over temp sensors inside the motor housing.

All pumps to be used shall be the same brand as currently used by the District, and are to be pre-approved by the District.

**4404 Pump Rails**

Pumps must be pre approved by the district. Pumps shall be securely supported per manufacturer specifications so as to prevent movement or vibration during operation. All pumps shall have a rail type pump support system that allows pump removal and installation without requiring de-watering of or entry into the wet well. Rails and all fastening devices shall be constructed of series 309 stainless steel. Pump discharge shall not allow any leakage at any flow condition.
4500 ELECTRICAL, CONTROLS, & INSTRUMENTATION

4501 BASIC REQUIREMENTS

The Contractor shall furnish equipment, material, labor, & tools necessary for assembly, installation, and testing of the complete electrical & control system as shown on the drawings and stipulated in this specification. The District has developed certain control schemes and programs that will be downloaded on to certain critical components that are mandatory they are used. All equipment shall be new. Equipment with mechanical or corrosion damage in the opinion of the District, such equipment will be rejected and replaced at the sole cost of the contractor.

Prior to assembling a drawing package the following site specific data must be established.

- Number of Pumps and size (GPM, & HP)
- Level I or Level II
- Available Power single or three phase
- Full load calculations

The equipment that follows is required to fit in with the District’s control scheme and standardization of controls.

- Siemens LUC 500 Ultrasonic level controller
- Siemens Micromaster Variable Frequency Drives
- The District will perform all commissioning of the Wall mount
- Siemens LOGO programmable relays (one per pump)
4502 ELECTRIC POWER REQUIREMENTS

All power shall be underground service and the following electrical power sources are the most economical and practical for serving Lift stations.

1. For level I stations a 120/240 volt 3 phase service is required. If three phase power is not available then the contractor must enlarge the required variable frequency drive to generate three phase power. Contractor must get approval from the district on the size and the model of the drive to ensure proper operation.

2. For level II stations a 277/480 three phase service is required. If the power source is not economically feasible the District will consider other alternatives on smaller stations.

3. All phase conversions will be established by using the Micromaster VFD’s to convert single phase to three phase.
4503 METER SERVICE RACK DETAIL

The electrical meter and service disconnect shall be mounted on an additional rack mounted outside the site against the fence within the easement.
4" LIQUID FILLED STAINLESS STEEL PRESSURE GAUGE (0–40 psi RANGE IN 1psi INCREMENTS), BRASS BALL VALVE, AND SS NIPPLE MOUNTED ON TAPPED BLIND FLANGE.

MARSH DIAPHRAGM SEAL MODEL 25–01 TO 102 OR EQUAL

DI BLIND FLANGE WITH 1" TAP

PROPOSED TEE

PRESSURE GAUGE
4504 INSTALLATION REQUIREMENTS

A. Conduit installed underground shall be schedule 40 PVC unless noted otherwise in the drawings. Aboveground conduit shall be aluminum unless noted otherwise in the drawings. Aluminum conduit fittings are to be Crouse-Hinds Mark 9 copper-free aluminum or equal.

Underground stub-ups into equipment or enclosures shall be aluminum. Underground bends shall have long radii (typically 36').

B. The top of underground conduits shall be at a depth of 24". The depth shall be increased to 36" under roadways and parking areas and for utility service feeders. Underground conduits outside the concrete area shall be encased within a 2-inch thick envelope of red concrete.

C. A minimum separation of 12" shall be maintained between AC power circuits (480, 240, 120 VAC) and signaling and communication circuits (data, control, and phone).

D. Exposed conduit shall be run parallel or perpendicular to walls, ceilings, main structural members, or vessels. Conduits shall not interfere with the use of passageways, doorways, or maintenance areas around equipment, nor present a safety hazard.

E. Conduits shall be installed such that they are mechanically secure, neat in appearance according to the District, and continuous.

F. All enclosures shall be furnished with threaded hubs or require watertight type hubs. Outdoor enclosures shall have bottom or side conduit entry.

G. Motors and field instruments shall be connected with liquid tight flexible metal.
ITEM 4600

ELECTRICAL/CONTROLS GENERAL PROVISIONS

4600.01 BASIC REQUIREMENTS

A. The Contractor shall furnish equipment, material, labor, and tools necessary for assembly, installation, and testing of the complete electrical and control systems.

B. The Contractor shall warranty his work free from defects in material and workmanship for a period of at least one year from the date of acceptance by the owner.

C. The contractor may be required to install a covered shed as shown at the District’s discretion.

D. Electrical equipment, materials, and installation shall be in accordance with the 2005 edition of the National Electrical Code. Electrical equipment and materials shall be new and listed by Underwriters Laboratories, Inc.

4600.02 SCOPE OF WORK

A. The work shall include furnishing, installing, and testing all electrical and control equipment and materials as detailed in the following Specification Items and as specified on the drawings. The work also includes all utility company coordination, equipment, material, and labor necessary for providing the required electrical power service.

4600.03 EQUIPMENT IDENTIFICATION

A. A phenolic nameplate shall be permanently affixed to each item of electrical and control equipment. The nameplate shall be inscribed with the equipment name as designated on the Drawings. Nameplates shall show white lettering on a black background and be approximately 1 x 3”. Nameplates shall be adhesively affixed to enclosures.

B. All control conductors and signal pairs shall be tagged with heat shrink type wire markers inscribed as indicated on the Drawings. All wire tag inscriptions shall be typed.

C. Distribution panel schedules shall be typed with the circuit service descriptions indicated on the Drawings.
4600.04 INSTALLATION REQUIREMENTS

1. All power (480, 240, and 120 VAC) conductors shall be rated 600 volt. Control conductors installed in the MCC or in enclosures with 480 volt power cables shall be rated 600 volt. Other control and signal cables shall be rated 300 volt. Individual conductors for both power and control applications shall be THWN stranded copper. Cables to motors operated by Variable Frequency Drives (VFD’s) shall be shielded to minimize the potential for electrical noise disturbance of sensitive circuits (Belden or equal). Power, ground, control, and signal conductor sizes shall be as specified in the Conduit Schedule attached to this Specification. Internal Control Cabinet single conductors shall be Type MTW and sized as specified on the Drawings. Power and grounding conductors shall be color coded as noted below by insulation or electrical tape.

Phase A     Black
Phase B     Black
Phase C     Black
Neutral     White
Ground     Green

2. All steel and aluminum equipment and structures with the potential to contact electrical circuits shall be permanently connected to the grounding system by means of a grounding conductor including (but not limited to) motor frames, junction boxes, control cabinets, 120/240/480 VAC powered devices, panel support racks, and equipment shown to be grounded in the Drawings. Minimum ground rod will be three quarter inch copper by ten feet long installed to Entergy’s specification.
All level controls must be pre approved by the district. The following electrical and control instrumentation must be used for all lift stations located within the Lumberton MUD service area. The District has standardized the lift station control equipment as well as developed control schemes and programs so it is mandatory that these items be used. All equipment shall be in accordance with the current approved edition of the National Electric code and listed by the Underwriters laboratories. The equipment shall bear the appropriate U.L. Marking.

- Control circuits must be separated to provide a robust redundant system. There should be a minimum of four (4) control circuits for each pump.
- A separate redundant control circuit for alarms.
- The enclosure shall be a NEMA 4X stainless steel free standing enclosure with back plate, with quick release latches and pad lock provisions mounted on an eighteen inches tall by appropriate width and depth for the specific controller.
- All Level I stations shall be equipped with an ultra-sonic Siemens LUC 500 for level control.
- All Level II stations shall have a redundant level controller and the primary level controller shall be an ultra-sonic Siemens LUC500 standard wall mount controller.
- All lift stations shall use a Siemens Logo programmable relay for each pump to control lockouts, and one for alarm control scheme.
4675 CONCRETE SLAB SPECIFICATIONS

4675.01 DESCRIPTION

Provide concrete slab for work area around lift station size to be determined by the District according to the site and size of lift station. Concrete mix design and reinforcement shall be sufficient to support related equipment used for servicing station i.e. backhoe, crane, etc. Construction joints shall be made as follows.

NOTE; the drawing is a generalization of a typical slab it may not work for every application. Engineer must submit a construction joint plan.
TYPICAL COMBINATION AIR VALVE
NOTE: VERIFY DIMENSIONS WITH ELECTRICAL PANEL APPROX. DIMENSION OF ELECTRICAL CABINET/PANEL IS 11’ x 2’ 6”.

CURB @ ELECTRICAL PANEL(S)
VENT PIPING

nts
HATCH OPENING WITH ULTRASONIC TRANSDUCER

nts
CLOSE GABLE ENDS WITH 28 GA. GALVANIZED STEEL SIDING

ELECTRICAL MOTOR STARTER & CONTROL ENCLOSURES

SECTION A–A
GENERAL SHELTER NOTES:

1. USE P100 UNISTRUT PURLINS SPACED AT 18” ON CENTER.

2. ALL STRUCTURAL STEEL AS DEFINED IN THE AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDING AND BRIDGES SHALL CONFORM TO THE FOLLOWING ASTM DESIGNATIONS:
   - ANGLES: ASTM A-36
   - CHANNELS: ASTM A-36 & A36
   - SQUARE TUBING: ASTM A-6 & A242
   ALL STRUCTURAL STEEL SHALL BE GALVANIZED AND SHALL CONFORM TO ASTM A-123.

3. ALL ARC WELDING ELECTRODES SHALL CONFORM TO THE STRUCTURAL WELDING CODE OF THE AMERICAN WELDING SOCIETY.


6. ROOF PANELS SHALL BE 2 1/2”X1/2” GALVANIZED STEEL (ASTM A-446, GRADE A), PANEL THICKNESS SHALL BE 28 GA. PANELS SHALL BE APPLIED IN SINGLE LENGTHS WITHOUT SPLICES TO THE DIMENSIONS SHOWN ON THE DRAWINGS.

7. PANEL FASTENERS SHALL BE SS WITH NEOPRENE WASHERS, NUMBER AND SPACING SHALL BE IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.

8. SHELTER FABRICATOR SHALL PROVIDE ALL NECESSARY AND REQUIRED BOLTS, NUTS, WASHERS, SCREWS, SEALING TAPE, AND/OR OTHER FASTENERS.

9. ERECTED SHELTER STRUCTURE TO SUSTAIN A ROOF LIVE LOAD OF 12 PSF AND A WIND LOAD OF 120 MPH.

10. ALTERNATE PRE-ENGINEERED MANUFACTURED SHELTERS SHALL REQUIRE SHOP DRAWINGS AND DESIGN CALCULATIONS SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF TEXAS.
GENERAL FOUNDATION NOTES:

1. FOUNDATIONS TO BE CONSTRUCTED OF F' C 4000 psi (AT 28 days) CONCRETE.

2. MAXIMUM SIZE AGGREGATE SHALL BE 1".

3. REINFORCING STEEL SHALL CONFORM TO ASTM A-615, A-616, OR A-617, GRADE 60.

4. FOUNDATIONS TO BE CAST IN UNDISTURBED SOIL OR COMPACTED SELECT FILL. SELECT FILL SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH THE SPECIFICATIONS.
ITEM 4700  FENCE DETAILS

4710 CHAIN LINK FENCE

4710.01 DESCRIPTION
Provide chain link fences and gates as completed units controlled by a single source including necessary erection accessories, fittings, and fastenings. Extent of chain link fences and gates is indicated drawings and is to match existing fencing.
Manufacturer Subject to compliance with requirements, provide products of one of the following:
Galvanized Steel Fencing and Fabric:
Allied Tube and Conduit Corp.
American Fence Corp.
Anchor Fence Co.
Cyclone Fence, United States Steel
Submit manufacturer’s technical product data and installation instructions for metal fencing, fabric, gates, and accessories.

4710.02 MATERIAL
Dimensions indicated for pipe, roll-formed, and H-sections are outside dimensions, exclusive of coatings.

A. Fabric: No. 9 ga. (0.148”) finished size steel wires, 2” mesh, with top selvages knuckled for fabric 60” high and under, and both top and bottom selvages twisted and barbed for fabric over 60” high.

Furnish one-piece fabric widths for fencing up to 12’ high.

Fabric Finish, galvanized, ASTM A 392, Class I, with not less than 2.0 oz. zinc per sq. ft. of surface.

B. Framework: Galvanized steel, ASTM A 120 or ASTM A 123, with not less than 1.8 oz. zinc per sq. ft. of surface

C. Fittings and Accessories: Galvanized, ASTM A 153, with zinc weights per Table I.

D. Framing and Accessories:

1. End Corner and Pull Posts: Minimum sizes and weights as follows:
   - Up to 6’ fabric height, 2.375” OD steel pipe, 3.65 lbs. per un. ft., or 3.5” x 3.5” rolled-formed sections, 4.85 lbs. per un. ft.
   - Over 6’ fabric height, 2.875” OD steel pipe, 5.79 lbs. per un. ft., or 3.5” x 3.5” rolled-formed sections, 4.85 lbs. per un. ft.

2. Line Posts: Space 10’ o.c. maximum, unless otherwise indicated, of following minimum sizes and weights.

3. Steel Fabric: Up to 6’ fabric height, 1.90” OD steel pipe, 2.70 lbs. per un. ft. or 1.875” x 1.625” C-sections, 2.28 lbs. per un. ft.
   - 6’ to 8’ fabric height, 2.375” OD steel pipe, 3.65 lbs. per lin. ft. or 2.25” x 1.875” H-section, 2.64 lbs. per un. ft.
   - Over 8’ fabric height, 2.875” OD steel pipe, 5.79 lbs. per un. ft. or 2.25” x 1.875” H-section, 3.26 lbs. per lin. ft.
4. Gate Posts: Furnish posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:

<table>
<thead>
<tr>
<th>Leaf Width</th>
<th>Gate Post</th>
<th>lbs./lin. ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 6’</td>
<td>3.5” x 3.5” roll-formed section or 2.875” OD pipe</td>
<td>4.85</td>
</tr>
<tr>
<td></td>
<td>4.000” OD pipe</td>
<td>9.11</td>
</tr>
<tr>
<td>Over 6’ to 13’</td>
<td>6.625” OD pipe</td>
<td>18.97</td>
</tr>
<tr>
<td>Over 13’ to 18’</td>
<td>8.625” OD pipe</td>
<td>28.55</td>
</tr>
</tbody>
</table>

5. Top Rail: Manufacturer’s longest lengths, with expansion type couplings, approximately 6” long, for each joint. Provide means for attaching top rail securely to each gate corner, pull and end post.

1.66” OD pipe, 2.27 lbs. per ft. or 1.625” x 1.25” roll-formed sections, 1.35 lbs. per ft.


7. Post Brace Assembly: Manufacturer’s standard adjustable brace at end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same material as top rail for brace, and truss to line posts with 0.375” diameter rod and adjustable tightener.

8. Post Tops: Provide weatherproof closure cap with loop to receive tension wire or top rail; one cap for each post.

9. Stretcher Bars: One-piece lengths equal to full height of fabric, with minimum cross-section of 3/16” x 3/4”. Provide one stretcher bar for each gate end post, and 2 for each corner and pull post, except where fabric is integrally woven into post.

10. Stretcher Bar Bands: Space not over 15” o.c., to secure stretcher bars to end, corner, pull, and
gate posts.

11. Barbed Wire Supporting Arms: Manufacturer’s standard barbed wire supporting arms, metal and finish to match framework, with provision for anchorage to posts and attaching 3 rows of barbed wire to each arm. Supporting arms may be either attached to posts or integral with post. Top weather cap and must be capable of withstanding 250 lbs. downward pull at outermost end. Provide follow type:

   Single 45 degree arm; for 3 strands barbed wire, one for each post.

12. Barbed Wire: 2 strand, 12-1/2 ga. wire with 14 ga. 4-point barbs spaced not more than 5” o.c.; metal and finish to match fabric.

13. Gates: Fabricate perimeter frame of gates from metal and finish to match metal framework. Assemble gate frames by welding or with special fittings and rivets for rigid connections, providing security against removal or breakage connections. Provide horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware and accessories. Space frame members maximum of 8’ apart unless otherwise indicated.

   Provide same fabric as for fence, unless otherwise indicated. Install fabric with stretcher bars at vertical edges and at top and bottom edges. Attach stretcher bars to gate frame at not more than 15” o.c.

   Install diagonal cross-bracing consisting of 3/8” diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.

   Where barbed wire is indicated above gates, extend end members of gate frames 1’ - 0” above top member and prepare. Provide necessary clips to receive and secure 3 stands of wire. Swing Gates: Fabricate perimeter frames of minimum 1.90” OD pipe.

14. Gate Hardware: Provide hardware and accessories for each gate, galvanized per ASTM A 153, and in accordance with the following:

   Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.

   Include locking device and padlock eyes as integral part of latch.

15. Sliding Gates: Provide manufacturer’s standard heavy-duty inverted channel track, ball-bearing hanger sheaves, overhead framing and supports, guides, stays, bracing, hardware, and
accessories as required.

16. Wire ties: For tying fabric to line posts, use wire ties spaced 12” o.c. For tying fabric to rails and braces, use wire ties spaced 24” o.c. For tying fabric to tension wire, use hog rings spaced 24” o.c. Manufacturer’s standard procedure will be accepted if of equal strength and durability.

17. Concrete: Provide concrete consisting of Portland cement, ASTM C 150, aggregates ASTM C 33, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 2500 psi using at least 4 sacks of cement per cu. yd., 1” maximum size aggregate, maximum 3” slump, and 2% to 4% entrained air.

18. Excavation: If not shown on drawings, excavate holes to minimum depth and diameter as recommended by fence manufacturer.

E. Installation: Install in accordance with ASTM F 567 and written installation instructions of fencing manufacturer to provide secure, aligned installation.
CORNOR AND GATE POLES

LINE POLES

FENCE DETAILS

NTS