

**GENERAL CONDITIONS AND  
TECHNICAL SPECIFICATIONS**

for

Construction of

**NATURAL GAS LINE ADDITIONS**

for the

**CITY OF GALLATIN**

in

**SUMNER COUNTY, TENNESSEE**

**JULY 2000**

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SECTION 2

GAS LINES

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## DIVISION 2

### TECHNICAL SPECIFICATIONS GAS LINES

#### 2.01 SCOPE

The work required under this Section of the Specifications consists of furnishing and installing natural gas piping and related items. The contractor shall provide all necessary labor, materials, tools, equipment, and services for an installation complete in every detail and ready for use as required by the Contract Documents. The project shall consist generally of the following items:

- a. The construction of steel natural gas piping,
- b. The furnishing and installing of ALL other pipeline appurtenances,
- d. Excavation and backfill,
- e. Unencased road and driveway crossings,
- f. Stream crossings and directional bores,
- g. Connections to existing gas lines,

#### 2.02 GENERAL

All pipe, coatings, valves, meters, and appurtenances shall be manufactured in the United States of America.

Instructions, techniques, and recommendations of the manufacturers shall be complied with in the use of their products except as modified by these specifications, or otherwise by the written direction of the Engineer.

#### 2.03 OPERATING PRESSURES

The MAOP on the steel gas line to be installed will be determined by Gallatin Public Utilities. As such, the piping must be constructed to operate continuously at these pressures. Gas line and appurtenances shall be manufactured and installed to function properly and safely under Code of Federal Regulations, Title 49, Part 192, Transportation of Natural and Other Gas by Pipeline Minimum Federal Safety Standards. In addition, all requirements of the Tennessee Regulatory Authority must be met.

#### 2.04 STEEL PIPE

Gas main shall be new steel pipe meeting American Petroleum Institute Standard Specifications, as follows:

2" through 8" diameter to be longitudinally electrically resistance welded (ERW) at the mill, 2" with 0.154" wall thickness, 4" through 6" with

0.188" wall thickness, and 8" with 0.250 wall thickness, API 5L, X42 .

Manufacturer's notarized affidavit of conformance to the applicable specifications herein shall be provided to the Owner. If requested by the Owner, the manufacturer shall furnish check records indicating the results of physical and chemical tests as required by the applicable specifications cited above. The Owner shall be permitted to inspect pipe to be delivered to the project at the mill, railhead, coating mill, or project site at his convenience.

2.05 COATINGS FOR STEEL PIPE

The steel main-line gas piping shall be furnished with factory applied coating. The coating shall be as follows:

A. Epoxy Coating for Pipe

Steel gas piping shall have a 12 mil fusion bonded epoxy coating. The coating is to be a one-part, heat curable, thermosetting powdered epoxy coating designed to provide corrosion protection of the pipe.

Pipe coating shall meet or exceed the following standards:

(1)	Impact	ASTM G 14
(2)	Abrasion Resistance	ASTM D 1044
(3)	Shear	ASTM D 1002
(4)	Tensile Strength	ASTM D 2370

Pipe and coating shall be subject to inspection by the Engineer at the storage yard or the site. Should the Engineer allow damaged pipe to be repaired by the Contractor, the repairs shall be to the Engineer's satisfaction without charge under this contract.

Coating for the steel gas pipe shall be Scotchkote 206 N fusion bonded epoxy or equal.

B. Coating for State Highway Unencased Bores & Stream Crossings

Ceramgard or Powercrete coating shall be applied in accordance to manufacturer's recommendation and thickness shall be 30 mi. Hardness shall be a minimum reading on the Shore Hardness Scale of 70.

C. Field Coatings for Pipe, Joints, Fittings

The contractor shall furnish and install all field coating and wrapping materials. Compensation will be included in the price of installing pipe, and NO separate payment will be made.

Field joint coating sleeves shall be a one piece, heat shrinkable, wrap-around of 80 MILS (total sleeve thickness) with a one-piece welded clear closure seal attached to the backing, the width shall be 12 inches. Field joint coating sleeves shall be for below ground applications, and designed for 135 degrees F maximum operating temperature of the pipeline. Sleeve shall be the Canusa one-piece WindoWeld™ Wrapid Sleeve™ with a clear, weldable closure strip, product designation KTC-170-12" YE WW.

All buried materials shall be coated. The field coating or repair shall be at least equal to the mill-applied coating in thickness, bond, and electrical resistance.

All field coating and wrapping shall be done in the manner recommended by the manufacturer of the coating and wrapping materials, and as accepted by the Engineer. One copy of the approved instruction for coating and wrapping the pipe shall be at the job site at all times.

Before applying field coating and wrapping, remove from the surfaces to be coated and wrapped ALL dirt, mud, moisture, loose rust, scale, welding shag, oil, grease, and other foreign matter which may adversely affect the coating and wrapping. Use scraping, wire brushing, or power buffing to remove encrusted or adhered foreign matter. Remove oil, grease, or other soluble materials by wiping or brushing with coal tar solvent or Xylol. Clean out corners, crevices, depressions, wrinkles, or other places which harbor foreign matter.

Prime the cleaned surfaces and apply tape in accordance with manufacturer's instructions. Overlap the field applied coating at least 3 inches over the mill applied coating.

Recoat or repair remaining flaws after holiday testing or damage incurred in the trench.

## 2.06 VALVES (BELOW GROUND)

Valve shall be Kerotest, Cooper Cameron, or approved equal ball valve. The valve shall have weld-ends, which are produced from ASTM A106 grade B, seamless carbon steel. Valves shall be ANSI 300.

End Preparation: Butt Weld ends shall conform to the requirements of ANSI B16.25 (1979 Edition) and B31.8 (1989 Edition).

Welding: Valve shall require no special welding precautions. It is recommended that valve be fully closed when welding it in-line.

Testing: All valves shall be 100% seat leak tested and tested at no less than 150% of maximum rated pressure.

## 2.07. VALVE BOXES

Valve boxes shall be concrete boxes of sufficient size having a cast iron frame cover marked "GAS". Box shall be traffic rated Bouchard or equal.

## 2.08 STOPPER FITTINGS

Hot tap connections shall be performed using Mueller stopper fittings. Fittings shall meet or exceed DOT Title 49 Part 192 specifications. Fittings shall have completion plug with equalizing valve and shall be rated for ANSI 300.

## 2.09 FITTINGS (STEEL PIPE)

All welded fittings for steel piping shall be Tube Turn, Midwest or approved equal,

forged steel welding neck for steel butt welding, standard strength (Schedule 40 fittings, conforming to ANSI/ASME 16.25, ASA B16.9 and MSS-SP-25. All welded steel pipe fittings such as elbows, tees, reducers, etc., shall be of the long radius type.

## 2.10 INSULATING FLANGES AND COUPLINGS

Proposed gas main piping shall be electrically insulated from the existing system near the point of connection. All main line valves shall have insulating kits installed at their flanges. Insulating gaskets shall be neoprene faced, micarta, or equal suitable for natural gas duty at 300 psi working pressure. Electrical conductivity shall be established and maintained throughout the pipeline, and across each insulated valve and flange by the installation of jumper cable to transmit impressed current from the existing system throughout the length of this project.

Flange insulating kits shall be Central Plastics, or F. H. Maloney Company of Houston, Texas or approved equal, with gaskets of phenolic or other approved material, and plastic insulating sleeves for flange bolts and double plastic washers for flange nuts.

Insulated weld fittings shall be Kerotest No. WE17 as manufactured by Kerotest Manufacturing Corporation, or approved equal.

Insulated couplings shall be compression type, Dresser or approved equal.

## 2.11 CONNECTION TO EXISTING GAS SYSTEM

After the distribution system represented by this project has been cleaned and satisfactorily tested, and approved by the Engineer for gas service, the contractor will proceed to tie this project into the existing gas system at the location(s) indicated on the drawings. The connection to the existing system will not be a pay item according to the Contract Documents, and will include all preparations, costs, materials, labor, tools, and equipment to complete and finish a satisfactory tie-in. No additional payment will be made in connection with the tie in.

Before performing connection, contractor shall provide written proof to Gallatin Public Utilities that the individual(s) performing this work have experience making taps under similar conditions. Gallatin Public Utilities shall be contacted by the contractor and notified of the scheduled tap work at least two days in advance of this work.

Verify with the Gallatin Public Utilities the operating gas pressure in the existing system prior to starting tie-in. Follow all safety precautions including those of the Gallatin Public Utilities. Take fire prevention measures and notify the Gallatin Fire Department of the scheduled tie-in. Pay all costs related to safety or emergency responses.

Maintain gas service to customers on the existing system. When pipework tie-in is complete, pressurize the pipe section in which the new joints are located and test for leaks in the presence of the Engineer. Notify the utility company when the tie-in is complete.

## 2.12 UNENCASED PIPE BORES

At all paved or concrete streets and driveways, it shall be mandatory for gas piping to be installed by boring under the affected surface without a cover pipe. Such installation shall be defined

as an "unencased pipe bore." It shall also be mandatory to perform unencased pipe bores when outside authorities having jurisdiction require it.

Further, on this project, it shall be required to bore under county roads, city streets, concrete or asphalt driveways, and parking lots. The balance of gravel surfaces encountered shall be open-cut and the surface restored.

## 2.13 CLEARING AND GRUBBING

Gas pipeline is to be installed on private properties as well as upon the rights-of-way of highways, railways, and other utilities. The contractor shall familiarize himself with all special requirements of the respective right-of-way holders before commencing work. No clearing shall be done until the Owner has secured proper authorization or permission from the holders of rights-of-way.

In addition, the contractor shall acquaint himself with all federal, state, and/or local regulations for preventing forest fires, and these regulations shall govern in all cases. Brush and undergrowth shall be piled and burned only at locations specified by the Engineer. Fire spreading beyond clearance limits causing property damage shall be the contractor's liability. Burning, to the extent that it will not conflict with such regulations, shall directly follow clearing work and shall be completed to the Owner's satisfaction before line materials are distributed along the pipe route.

Stumps in the way of the pipe trench ditch shall be grubbed or otherwise removed and the course of the line shall generally be grubbed and graded to allow passage of equipment and to allow the ditch to be excavated to the line and grade established by the Engineer.

## 2.14 GRADING

Slopes within highway rights-of-way that are cut down or notched to facilitate operation of construction equipment shall be rebuilt to original height and slope to the satisfaction of the Owner and the State Highway Division Maintenance Engineer. Spoil banks from grading operations shall not be placed where surface drainage will be affected.

## 2.15 EXCAVATION FOR PIPELINE TRENCHES

Excavation for gas mains shall be open trenches except where the drawings or specifications call for (or the Engineer requires) the contractor to underbore structures, improved surfaces, roads, or highways.

Excavate trenches to the lines and depth indicated and to provide uniform and continuous bearing and support for the installed pipe. Trenching shall include all excavation necessary to prepare the trench for the pipe to be installed regardless of what means or methods are necessary to produce such trench.

Excavation shall be unclassified. The term "unclassified" shall include ALL clearing, grubbing, and disposal of material (including all weeds, briars, trees, and stumps encountered, and the removal of earth, solid rock, roots, hardpan, boulders, street or road surfacing, clay, rubbish, unforeseen obstacles, underground conduits, pipe, drain tile, and other obstacles encountered).

Any blasting required for excavation operations shall be conducted in accordance with the requirements indicated in Section 1.

Trench depths shall be as required to provide the specified MINIMUM cover over the tops of the pipes; as required to permit pipes to pass under culverts, roads, driveways, existing pipelines, and other obstructions; and as required to accommodate valves and boxes.

MINIMUM cover over tops of pipes shall be:

- A. 36 inches.
- B. As herein specified for pipes under railroads, highways, creeks, and other special conditions.
- C. As required to maintain minimum cover under future excavation for highways or roadways when these circumstances are known or anticipated.

Trench widths shall be as required for the proper laying and joining of piping and the proper placing and compacting of backfill, but in NO case shall a trench be more than 24 inches wider than the inside diameter of the pipe to be laid therein. Wherever necessary to make joints in the trench, provide ample joint holes in the trench to facilitate this.

Machine or hand-cut trenches, except that in all cases prepare the final subgrade accurately with hand tools, and in special cases where required, cut the trenches entirely by hand. Where excavation is carried below proper subgrade, before laying pipe, bring the trench bottom up to proper subgrade by backfilling with approved material placed in 3-inch maximum thickness loose layers and thoroughly compact each layer as required to provide uniform and continuous bearing and support for the pipe.

Where the trench bottom at required subgrade is found to be unstable or to include ashes, cinders, or any type of refuse, vegetable or other organic material, or large pieces of fragments of inorganic material which in the Engineer's opinion should be removed, excavate and remove such unsuitable materials when ordered by the Engineer. Before laying pipe, bring the trench bottom up to proper subgrade by backfilling with approved backfill material placed in 3-inch maximum thickness loose layers, and thoroughly compact each layer as required to provide uniform and continuous bearing and support for the pipe. Backfill material shall be as specified under "Special Pipe Bedding."

Where rock is encountered in pipe trenches, remove all rock from sides of trench to provide at least six inches horizontal clearance from the pipe on each side, and remove all rock from the trench. Pipe bedding in rock shall be as specified under "Pipe Bedding."

Shore and brace trenches and excavations as required to protect personnel, adjacent structures, and adjacent property. Where required by the conditions encountered, brace trenches and excavations with suitable close sheathing or sheet piling. Do all necessary cribbing up required for the proper operation of trenching machines.

The contractor shall determine, as far as possible in advance and in accordance with the General Conditions, the location of all existing sewer, culvert, drain, water, electric, telephone conduits, and gas pipes, and other subsurface structures and avoid disturbing same in opening his trenches. The contractor shall furnish and keep a metal detector on the project for this purpose. In case of sewer, water, and gas services and other facilities easily damaged by machine trenching, same shall be uncovered without damage ahead of the trenching machine and left intact or removed without permanent

damage ahead of trenching and restored immediately after the trenching machine has passed without extra cost to the Owner. The contractor shall protect such existing facilities, including power and telephone poles and guy wires, against danger or damage while pipeline is being constructed and backfilled, or from damage due to settlement of his backfill. It shall be the responsibility of the contractor to inform the customers of utilities of disruption of any utility service as soon as it is known that it has been or will be cut off.

Construction equipment will not be approved for use where treads are injurious to paving encountered. Curbs, sidewalks, and other structures shall be protected by the contractor from damage by his construction equipment.

In case of damage to any existing structures, repair and restoration shall be made at once and backfill shall not be replaced until this is done. In all cases, restoration and repair shall be such that the damaged structure will be in as good condition and serve its purpose as completely as before, and such restoration and repair shall be done without extra charge. Where there is the possibility of damage to existing utility lines by trenching machine, the contractor shall make hand search excavation ahead of machine trenching to uncover same.

All trenches must be dug neatly to lines and grades. Hand trenching shall be required at no extra payment where undue damage would be caused to existing structures and facilities by machine trenching.

Where trenching is cut through paving which does not crumble on edges, trench edge shall be cut to at least two inches deep to straight and neat edges before excavation is started, and care taken to preserve the edge to facilitate neat repaving.

The contractor shall not open more trench in advance of pipe laying than is necessary to expedite the work. The contractor shall not open more than 500 feet of trench ahead of pipe laying and shall not leave more than 500 feet of open ditch behind pipe laying before backfilling, except upon written consent of the Owner or the Engineer. No trench shall be left open or work stopped on it for a considerable length of time. In case of objectionable delay, the trench shall be refilled according to backfill specifications. Trench openings that may be of particular danger to children shall be covered or filled in prior to periods when such openings are left unattended.

Dewatering of trenches shall be considered a part of trenching at no extra cost to the Owner. Dewatering of trenches shall include ground water and storm or sanitary sewage. Suitable pumping and other dewatering equipment is to be provided by the contractor to insure the installation of the pipeline structure in a dewatered trench and under the proper conditions. Dewatering shall include all practical means available for prevention of surface runoff into trenches and scouring against newly laid pipe. Precautions shall be taken to prevent flotation of the pipe should water enter the trench prior to putting the pipeline into operation.

Piles of excavated materials shall be trenched or temporarily piped to prevent, as far as practical, blockage of drainage ditches and gutters, and water carriage of excavated materials over street and highway surfaces.

## 2.16 PIPE BEDDING

All gas main pipe shall be supported on a bed of well compacted earth, dirt, or clay. Bedding material shall be acceptable to the Owner and free from rock, stones, bricks, concrete chunks,

organic matter, frozen or other objectionable material. In no case shall pipe be supported directly on rock. When rock is encountered in the trench, bottom bedding shall consist of lime dust or sand only installed to provide uniform and continuous bearing for the pipe.

## 2.17 SPECIAL PIPE BEDDING

In wet, yielding or mucky locations where pipe is in danger of sinking below grade or floating out of line or grade, or where backfill materials are of such a fluid nature that such movements of the pipe might take place during the placing of the backfill, the pipe must be weighted or secured permanently in place by such means as will prove effective. When ordered by the Engineer, yielding and mucky materials in subgrades shall be removed below ordinary trench depth in order to prepare a proper bed for the pipe.

When ordered by the Engineer, the pipe bed shall be prepared by using crushed rock (No. 9) topped with a minimum of one-foot depth of sand or lime dust. Such materials, when ordered, shall be paid for as "Special Pipe Bedding." Contractor shall furnish delivery tickets for materials at time of use. Gas piping shall not be in contact with crushed rock.

## 2.18 HANDLING, HAULING, AND STORAGE

The contractor shall receive the gas main piping and account for it as he takes it. He shall load, unload, haul, string along the route proposed for laying, and otherwise be responsible for the pipe after he receives it.

Care must be exercised in the handling and hauling of all materials and equipment, and the contractor will be held responsible for all breakage or damage to same caused by his workmen, agents, subcontractors, or equipment for handling and moving. Pipe or any other material shall in no case be thrown or dropped from cars, trucks, or wagons to the ground but same shall be lowered gently and not allowed to roll against or strike other objects violently. All materials shall be handled and placed so as not to interfere with public and private travel and so as not to be unnecessarily damaged. Pipe or other materials may be distributed at places that will not interfere with other construction operations as unloaded, or may be yarded and distributed as required as the contractor may elect. Valves, valve boxes, joining materials, meter box covers, castings, reinforcing steel and other similar materials shall be yarded or housed in some convenient location by the contractor and delivered on the ground as required. In all cases, materials shall be handled and stored in a manner which will facilitate inspection by the Engineer.

Pipe shall be placed on skids so that it is raised above the ground a sufficient height to properly accommodate welding. Pipe with welded seams shall be laid with seams staggered in adjacent joints not less than two inches apart. For coated pipe, the skids shall be padded as required to prevent damage to the pipe coating and special care in handling shall be practiced.

## 2.19 STRINGING, LOWERING, AND LAYING PIPE

Pipe shall not be lowered into the trench before the joint protective coating has hardened, and the coating has successfully passed the electrical holiday detection test. In case of accidental damage to the protective coating, the damaged coating shall be replaced and the covering left in equal condition to that of the undamaged portion, in the opinion of the Engineer.

If the use of powered equipment is required to lower the pipe, belt pipe slings or

appropriately sized padded calipers shall be used to lower the pipe into the trench. Otherwise, pipe shall be laid directly into an open trench with manpower. Do not under any circumstances drop or dump piping materials either from transportation vehicles or into trenches. Inspection of the trench shall be made by the contractor prior to lowering to see that no rocks or sharp objects are in the ditch which might damage the pipe or the pipe coating.

To permit thermal expansion and contraction of the pipe in the trench and to avoid unnecessary stress, the pipe shall be placed to "weave" from side to side in the trench, and weighted with select backfill material to maintain a pattern of "slack" in the pipeline.

Sections of coated pipe shall not be dragged or pulled into position without adequate protection for the protective coating and allowance made for pipeline slack in the ditch.

The pipe shall be lowered into the trench prior to repair of any broken tile or other damaged existing service lines. A minimum distance of 12 inches shall be provided between the gas mains or services and other service or utility lines; or other obstructions which might reduce the quality of construction or damage such obstructions. Such lines and obstructions shall be exposed for a sufficient length of time to allow the Engineer to make adequate investigations on which to base his decision. If controlling authorities require a greater clearance than 12 inches, this greater distance shall be provided by the contractor. The Engineer may order such further precautions as necessary to protect the pipe, including increasing clearances and the furnishing and installation of insulation.

Before an open pipe end is lowered into the trench, it shall be tightly capped with a line cap, a plastic end cap, a mental cone, or some similar form of protection. Where work is suspended at night or for any reason, the open ends of the pipeline shall be securely plugged or closed to prevent entrance of water and other foreign materials. All foreign materials shall be kept from entering the pipe at all times. If foreign material does enter the pipe, it shall be removed before the laying procedures continue.

Where a directional change is required in the pipeline, either vertical or horizontal, which does not require fabricated fittings, permission may be granted to bend the pipe. Pipe bends shall be made before the pipe is placed in the pipeline.

All bends in steel pipe shall be made by a smooth bending method. They shall be made with a bending shoe as approved by the Engineer.

Bends in steel pipe shall be free of wrinkles, buckles, cracks, or other evidence of damage or characteristics which will reduce the quality of the pipe or construction of the finished pipeline. Miter bends are NOT permitted. In no case shall a bend section contain a pipe joint. The longitudinal weld of steel pipe should be near the neutral axis of the bend. If the pipe coating is damaged during bending, it shall be repaired as outlined in Paragraph 2.05. The maximum allowable bend will be a 30 degree departure from the normal straight pipe.

## 2.20 JOINTS AND JOINING (STEEL PIPE)

### A. General

Principal joining methods for this project shall be:

⇒ Steel gas mains shall be welded.

⇒ Fittings shall be fabricated fittings manufactured for welding and joined by

welding.

⇒ Insulated compression couplings shall be used on service lines and as otherwise indicated.

Other types of joints shall be extraordinary and shall require the prior approval by the Engineer on a case by case basis.

#### B. Steel Pipe Joining

Any and all welding on the gas mains or appurtenances thereto, the testing and qualifications of welders, and destructive or non-destructive inspection, shall be in accordance with Part 192, Title 49 of the Code of Federal Regulations, latest revision, and the terms of API Standard 1104, "Standard for Welding Pipe Lines and Related Facilities," which are hereby incorporated by reference and made a part of these Specifications.

All welding, welds, and welded connections shall conform to ANSI/AWS D10.12, ANSI/AWS C5.6, ANSI/AWS D10./11, NFPA 51, NFPA 51B, API 1104, Section 11A of the ASME Boiler and Pressure Vessel Code and/or Section IX of the ASME Boiler and Pressure Vessel Code.

The contractor shall use only competent and skilled workmen on welding. Welders shall obtain their certification six months prior to the commencement of work on this project. Welding test certificate from an independent testing laboratory will be supplied to the OWNER by contractor before construction begins for any welder that will perform any work on the project. Each welding operator shall identify his welds with an approved stamp. Welders tested and certified by major gas operating companies may be approved upon application to the Engineer, provided they meet the above regulations. No welding shall be done on any piping, fittings, or other equipment until the welders have been fully qualified in accordance with the test requirements set forth herein. The expense of making all tests of welding operators shall be assumed by the contractor.

Steel gas mains shall be fusion welded by the electric weld process. Steel pipe and fittings shall be butt welded by the shielded metal-arc welding process using a manual welding technique, unless other welding methods are submitted to, and approved by, the Engineer. All welded joints shall be of the single "v" type tapered to 1/16 inch of inside pipe wall. Only direct current shall be used in field welding. No arc welding shall be permitted on pipe with less than two inch nominal diameter.

In instances where pipe other than seamless is used, the longitudinal seams of such pipe shall be staggered by not more than twenty degrees and welded sections or single joints shall be assembled and lowered into trench so that the longitudinal seams remain on the top half of pipe.

Welding shall not be performed when the quality of the completed weld may be impaired by prevailing weather conditions. The Engineer's decision shall govern whether conditions are suitable or unsuitable for welding.

The contractor shall protect filler metals and fluxes from deterioration and excessive moisture changes prior to use. Welding rods or other material that show signs of damage or deterioration shall not be used. During windy weather, suitable wind guards shall be provided to protect the work. The contractor shall temporarily suspend work whenever, in his own opinion or in the opinion of the Engineer, conditions are not conducive to doing good work.

Gas pipe shall be welded prior to lowering into the trench except where the Engineer

permits the pipe to be welded after placement. The adjoining ends of pipe to be welded shall be rigidly supported in true alignment with proper separation throughout the welding process.

All surfaces to be welded shall be bright, clean, and free of foreign material that may enter or be detrimental to the weld. The ends of pipe at all welded joints shall be properly beveled, and field bevels shall be made by the use of a pipe-beveling machine, or other method approved by the Engineer.

All welds on piping of two inch nominal diameter and larger shall be made with no less than three beads. The size of electrode for each pass on each size of pipe shall be as approved by the Engineer. Each bead shall be applied completely around the pipe, and shall be thoroughly cleaned of all scale, slag, or other foreign materials before the next bead is started. The filler bead and final bead shall be applied as soon as practical behind the stringer bead.

The completed weld shall project a minimum of 1/16 of an inch above the surface of the pipe at all points and shall have a width of not less than one-half inch or 1/16 of an inch over the shoulder of the pipe bevel. The welds shall be at least two and one-half times as wide as the pipe thickness, and shall be at least 125 percent as thick as the pipe being welded. Cooling of welds by using any other substance than air shall NOT be permitted.

Each completed weld shall be free of overlaps, undercuts, excessive convexity, scale, oxides, pin holes, non-metallic inclusions, air pockets, de-burred prior to applying joint wrap. All welds which are rough or sweat or leak shall be cut out and pipe ends cleaned and beveled and new welds made before lowering into trench.

Before placing in trench, all pipe, joints, fittings, and valves shall be field tested with an "electric holiday" detector in the presence of the Engineer. Use proper test voltage as recommended by the coating manufacturer for the type of coating involved. Joints made in the trench and other miscellaneous units which are impractical to test on the ditch bank, shall be tested for holidays in the trench.

Repair all "holidays" which may be found by the tests, and repeat the Tests as required for approval. Coating tests shall conform with ANSI/ASTM G62.

At the request of the Engineer, any weld designated by him may be subjected to radiogram inspection. Should the weld prove to be defective, the contractor will assume ALL costs for cutting out and replacing the weld.

When required by the Owner or Engineer, sample welds will be removed and sent to an independent testing laboratory to be destructively tested. If more than two welds, or ten percent, of such welds fail, the welder will not be allowed to weld on this job until sufficient proof that the welder has re-qualified along with a retest is submitted to the Owner and Engineer for their approval.

When re-welding the line where test welds have been cut out, one weld shall be used if it is practical to pull line back into position without damage to the pipe or coating. If it is not practical to pull the line into position, two welds shall be made by installing a nipple having a minimum length of 30 inches into the line.

Gas main fittings shall be of the butt-weld type. Use fittings at intersections and directional changes greater than 30 degrees. Welding specifications and techniques shall be the same as for welding main line pipe.

Threaded joints shall be used only above ground land upon approval by the Engineer. Where used, pipe shall be forged steel, 2000 psi W.O.G., with NPT threads. Threads shall be coated with thread compound or tape suitable for natural gas threaded connections.

## 2.21 BACKFILLING TRENCHES

The work required under this subsection includes the furnishing of all labor, materials, equipment, and services necessary for the backfilling of all trenching over the length of the pipeline.

Trenches shall be backfilled as soon as possible after approval of any leakage tests and electric holiday tests if applicable. Backfilling shall not commence until the Engineer or the Owner's Representative is satisfied that the pipe has proper depth and is firmly supported on approved bedding material. Where the trench crosses driveways, roads, streets, or other places used for the travel of vehicles or pedestrians, proper care should be taken so as NOT to impede the flow of traffic unnecessarily. In no case shall a street, road, or private driveway be left unusable overnight.

Backfill around and immediately over the top of the pipe with stable stone-free earth having a maximum particle size of 1/2 inch placed to a minimum level of six inches above the top of the pipe and compacted by "walking in." Wherever it is deemed necessary by the Engineer, hand labor shall be used in starting the backfill.

Machine backfilling, using excavated trench materials, may be permitted when all the following conditions are met:

- ⇒ In non-paved or non-improved areas only.
- ⇒ Only in the remainder of the trench after six inches of rock-free earth has been placed uniformly above the pipe, as specified above.
- ⇒ The amount of backfill dumped or dozed into the ditch must not be excessive or placed in such a manner as to displace or disturb the pipe.
- ⇒ Backfill shall be spread uniformly.
- ⇒ Hard objects must not exceed six inches in any dimension, and in no case be allowed to come in contact with the pipe.
- ⇒ Small rock in the backfill must be mixed with earth.
- ⇒ Truck or rubber tired equipment shall not be "walked" in the ditch until it is completely full of backfill material.

Backfill pipe under paved areas or vehicular traffic areas from the level of six inches above the pipe to the paving subgrade with No. 9 crushed stone. Machine tamp using compacting roller to obtain at least the density of the adjacent undisturbed soil.

Where grass plots or sod are destroyed on state highway rights-of-way, the surface shall be prepared and restored according to the requirements of the state highway department.

Waste materials and excavated materials from trenches, in excess of the quantity required for trench backfill, shall be disposed of by the contractor. It shall be the responsibility of the

contractor to obtain a location or permits for its disposal. Such materials shall be disposed of at an approved landfill or as otherwise directed by the Engineer. All rock, including crushed rock or gravel from construction, must be removed from lands and fields.

Should a period of time exist between the time of backfill and surfacing or property restoration, the contractor shall maintain the area so that a satisfactory condition exists. Before completion of the contract all backfills shall be reshaped, holes filled, and surplus materials hauled away and the restoration of permanent walks, streets, driveways, highway paving, and reseeding performed. If backfilling of the trench or surface restoration is not properly completed, a proportionate part of the price for pipe laying shall be retained from payment estimates.

The contractor shall refill and lightly grade all sunken areas as required or as requested by the Owner throughout the guarantee period and prior to expiration of the guarantee period correct all such unsatisfactory areas to the satisfaction of the Owner.

## 2.22 ASPHALT, HIGHWAY, AND STREET REPLACEMENT

Should the open-cut method be used to install the gas piping across asphalt highways, streets, or driveways in lieu of using unencased bores, the contractor shall do the work in accordance with the specifications hereinafter.

Prior to trenching the pavement shall be scored or cut to straight edges at least 12 inches outside each edge of the proposed trench to avoid unnecessary damage to the remainder of the paving. Edges of the existing pavement shall be recut and trimmed to square straight edges after the pipeline has been installed and prior to placing the new base and pavement.

The contractor shall replace those sections of existing highways, streets, and driveways required to be removed to install the pipeline. He shall construct same to the original lines and grades and in such manner as to leave all such surfaces in fully as good, or better, condition than that which existed prior to his operations.

Backfilling of the trench shall be in accordance with Paragraph 2.21 as described hereinbefore. Base course for the paving shall be flowable fill concrete dense furnished and placed in accordance with the current requirements of the Standard specifications for Road and Bridge Construction of the State Department of Transportation, to a depth of 24 inches in roads and streets and four inches in driveways.

The wearing surface of roads, streets, and driveways shall be plant mix bituminous concrete, furnished and placed in accordance with the current requirements of the Standard Specifications for Road and Bridge Construction of the State Department of Transportation to a depth of two inches in roads and streets and 1-1/2 inches in driveways.

## 2.23 UNPAVED DRIVEWAYS

Where unpaved driveways and parking areas are disturbed during the construction work, they shall be replaced in fully as good, or better condition than that which existed prior to the contractor's operations.

Backfilling of the pipeline trench shall be in accordance with the requirements of the specifications and shall be topped to grade with six inches compacted thickness #9

crushed stone surface course.

## 2.24 PROPERTY RESTORATION

The contractor shall be required to restore all areas disturbed by his operations to a condition equal to, or better than, the condition prevailing prior to construction.

Reasonable care shall be taken during construction to avoid damage to vegetation. Ornamental shrubbery and tree branches shall be temporarily tied back (where appropriate) to minimize damage. Trees which receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Tree trunks receiving damage from equipment shall be treated with a tree dressing.

All graded areas and pipeline trenches shall be left smooth and thickly sown with Kentucky #31 Fescue at a rate of not less than four pounds of seed per 1,000 square feet.

Areas to be seeded shall be rough graded to four inches below the finished grade. Topsoil shall then be spread and final grades established. Fine grade the entire area by discing or tilling to a depth of four inches. Then drag, or rake, the area with a plank float or by other means to develop a smooth even surface.

When the final grading has been completed, the entire area to be seeded shall be fertilized with ammonium nitrate at the rate of five pounds per 1,000 square feet and an approved commercial fertilizer at the rate of ten pounds per 1,000 square feet.

After the fertilizer has been distributed, the contractor shall disc or harrow the ground to thoroughly work the fertilizer into the soil. The seed shall then be broadcast either by hand or by approved sowing equipment at the rate specified. After the seed has been distributed, the contractor then shall lightly cover the seed by use of a drag or other approved device.

The seeded area then shall be covered with straw to a depth of approximately 1-1/2 inches. Any necessary reseeding or repairing shall be accomplished by the contractor prior to the final acceptance. If the construction work is brought to completion when the season is not favorable for the seeding of the grounds, then the contractor shall delay this time of work until the proper season for such seeding as directed by the Engineer.

## 2.25 JEEPING

After the pipeline has been welded and the joints coated, the complete pipeline shall be jeeped above ground. All holidays shall be repaired before lowering-in and backfilling. Only low-voltage jeeps shall be used and voltage shall be set to manufacturer's specifications but not higher than 125 volts per mil of coating thickness.

## 2.26 TESTING

Steel gas lines and appurtenances shall be tested at 1.5 times the MAOP of the line for 24 hours. The Contractor shall furnish to Owner a written outline of procedure to be used for testing.

All charts, graphs and records of testing shall be turned over to Owner. Hydrostatic testing of facilities is not permitted.

## 2.27 CLEANING AND PIGGING

Contractor shall ensure the inside of all mains have been thoroughly cleaned of all foreign materials, water and loose rust. Mains may be pigged or swabbed during construction and ends sealed to prevent reentry of foreign material; but, after testing and prior to purging and filling, all mains shall be pigged with a minimum of three runs. Contractor shall submit, in writing, to the Owner an outline of procedure to be followed for Cleaning and Pigging. Procedure shall include name, type and/or stock number of pigs to be used.

## 2.28 PURGING

When it is necessary to blow down a pipeline or fill a pipeline with natural gas that has contained air, the following procedures shall be followed and shall be applicable to all pipelines regardless of the operating pressures. (192.629)

- a. When a pipeline full of air is placed in service the air may be safely displaced with gas by introducing a moderately rapid rate of flow through the pipeline and out of a vent at the opposite end. The flow should be continued without interruption until the vented gas is free from air. The vent should then be closed. Whenever possible, a "squeegee" type pig or a slug of inert gas should be used to separate the gas and air to minimize the possibility of an explosive mixture.
- b. In cases where gas in a pipeline is to be displaced with air, a procedure similar to, but the reverse of, that described in (a) should not be used. If the rate of air that can be supplied is not sufficient to create a turbulent flow of air, then a "squeegee" pig or slug of inert gas must be used. If there is a reason to suspect the presence of volatile inflammable liquid precautions should be taken to minimize the possibility of striking static sparks within the pipeline.
- c. Before any cutting or welding is done on a pipeline that contains gas, it must be disconnected from all sources of gas and then purged with air, water or inert gas. If it is not possible to disconnect and purge the line per foregoing, the operation may be carried out in accordance with the following procedure after approval by the Engineer.
  - (1) Keep the pipeline full of gas and maintain a slight flow of gas toward the point where cutting or welding is being done.
  - (2) Control the gas pressure at the point of cutting and welding with a blow-off valve or other suitable means.

- (3) Close all slots or open ends - immediately after they are cut - with mud, tape, or other suitable material. If mud is used, it shall be replaced with tape or a tight fitting canvas bag immediately after the cut has been completed.
  - (4) Do not permit two openings to remain uncovered at the same time.
- d. No welding or cutting will be done on a pipeline that contains air and is connected to a source of gas, unless a suitable means has been provided to assure that an explosive mixture does not exist.

## 2.29 FIRE PREVENTION

Maintain suitable approved fire extinguishing equipment near the locations where work involving natural gas or other combustible material is in progress, and especially in the vicinity of "hot connection" and purging operations.

Use every possible safety precaution to prevent fire and explosions and comply with all applicable safety and fire prevention codes.

Portable fire extinguishing equipment shall conform to National Fire Protection Association's Standard Section 10.

The storage and use of flammable and explosive liquids, solids, and devices shall be in accordance with the applicable sections of the National Fire Protection Association's Codes, Standards, and Recommended Practices.

Section 1 of the NFPA standards shall be followed at all times.

## 2.30 PAINTING

All metallic piping, valves, hangers, supports, vents, control boxes, etc., exposed above ground shall be painted as follows:

Remove pipe coating material (except galvanizing), rust, dirt, grease, scale, slag, and foreign matter by sandblasting and/or wire brush cleaning. Preparation of the surface shall conform with SSPC-SP-1 and SSPC-SP-6. Surfaces to be painted shall be dry and free from moisture.

Apply one prime coat of Rust-O-Leum, Krylon, or De Rusto gray, white or red rust inhibitive primer. Allow proper drying between coats.

Apply two finish coats of Rust-O-Leum, Krylon, or De Rusto heavy duty paint. Allow proper drying time between coats.

Valves shall be bright red. Casing vents shall be white with bright red returns. Valve box tops shall be painted yellow. All guard posts shall be painted with yellow and black stripes to meet OSHA standards. All other exposed times shall be painted as specified by the Owner.

2.31

## CLEAN UP

The contractor shall not allow the site of the work to become littered with trash and waste material, but shall maintain the same in a neat and orderly condition throughout the construction period. The Engineer shall have the right to determine what is, or is not, waste material or rubbish and the place and manner of disposal.

On or before completion of the work, the contractor shall thoroughly clean all sites of the work or premises which he has entered upon. He shall tear down and remove all temporary structures built by him, remove rubbish of all kinds from any of the areas he has worked in or occupied, and leave them in a neat and clean condition.

END OF SECTION