
# TOWN OF MURPHY
# Standard Specifications
# And
# Details

5 Wofford Street
Murphy, NC 28906

CHEROKEE COUNTY, NORTH CAROLINA

Town of Murphy
Standard Specifications & Details

# TABLE OF CONTENTS

## STANDARD SPECIFICATIONS



## STANDARD DETAILS

STANDARD DETAILS - CONTINUED

| TITLE | | NO. OF PAGES |
|---|---|---|
| SANITARY SEWER DETAILS - CONTINUED | | |
| S.6 | RING AND COVER NON-TRAFFIC | 1 |
| S.7 | RING AND COVER - TRAFFIC BEARING | 1 |
| S.8 | RING AND COVER - WATERTIGHT | 1 |
| S.9 | MANHOLE STEPS | 1 |
| S.10 | SEWER LATERAL | 1 |
| S.11 | SEWER LATERAL NOTES | 1 |
| S.12 | SEWER LINE BEDDING | 1 |
| S.13 | AIR RELEASE VALVE | 2 |
| S.14 | MANHOLE VENT | 1 |
| S.15 | MANHOLE PENETRATION DETAIL | 1 |
| S.16 | FORCEMAIN GATE VALVE | 1 |
| S.17 | SEWER VALVE BOX | 1 |
| S.18 | CONCRETE PROTECTOR RING | 1 |
| WATER DISTRIBUTION DETAILS | | |
| W.1 | WATER UTILITY NOTES | 2 |
| W.2 | WATER SERVICE LATERAL | 1 |
| W.3 | DOUBLE WATER SERVICE LATERAL | 1 |
| W.4 | 2-INCH METER | 1 |
| W.5 | GATE VALVE | 1 |
| W.6 | VALVE BOX | 1 |
| W.7 | CONCRETE PROTECTOR RING | 1 |
| W.8 | MECHANICAL JOINT TAPPING VALVE | 1 |
| W.9 | DUCTILE IRON MECHANICAL JOINT TAPPING SLEEVE | 1 |
| W.10 | STAINLESS STEEL TAPPING SLEEVE | 1 |
| W.11 | FIRE HYDRANT | 1 |
| W.12 | 2-INCH BLOW OFF | 2 |
| W.13 | AIR RELEASE VALVE | 2 |
| W.14 | THRUST BLOCKING | 1 |
| W.15 | WATER LINE BEDDING | 1 |
| W.16 | METER VAULT | 2 |
| W.17 | 2-INCH BACKFLOW PREVENTOR | 2 |
| W.18 | BACKFLOW PREVENTOR GREATER THAN 2-INCH | 2 |

# SECTION 02050
# DEMOLITION

## PART 1: GENERAL

### 1.01 SCOPE OF WORK

A. GENERAL

The work of this section consists of removal and disposal of structures, old pavements, abandoned pipelines, and other obstructions as designated, including salvaging of materials and backfilling of resulting trenches, holes and pits. Also included is all work, which relates to explosives including receiving, handling, transporting, storing, distributing, priming, loading, firing, and disposal.
Raze, remove, and dispose of structures, and other obstructions indicated. Carefully remove designated salvable material; transport and store in approved locations. Fill cavities left by structure removal to level of the surrounding ground and thoroughly compact, as directed. Directions for execution of the work will be supplemented by The Town of Murphy as necessary.

## PART 2: NOT USED

## PART3: EXECUTION

### 3.01 DEMOLITION

A. BITUMINOUS PAVED AREAS

Scarify and completely remove offsite. Resultant material may be utilized in bottom portion of areas to receive fill. No pieces shall be left exposed in the fill slopes. If material is used in any portion of the new construction, layers shall be a maximum of 8" and separated by minimum 6" layers of earth. Water and compaction requirements are specified under other sections. No compaction is required for materials used for obliteration work outside the limits of new construction.

B. REMOVAL OF CONCRETE SURFACES AND STRUCTURES

Concrete designated for removal, break into pieces and use for rip-rap. Volume, minimum 0.5 cubic feet; 75% of pieces shall be between 1.5 and 2.0 cubic feet. Stockpile at designated locations.

C. PIPE REMOVAL

Remove pipe and dispose of in accordance with local, state, and federal regulations. Store pipe to be re-laid as directed.

### 3.02 DISPOSAL

Dispose of debris from demolition operations off-site in accordance with local, state, and federal regulations in an approved and satisfactory manner.

END OF SECTION

# SECTION 02210
# GRADING

## PART 1: GENERAL

### 1.01 DESCRIPTION

A. GENERAL

This portion of the project includes the excavation, undercut excavating, grading, earthwork and compaction required as shown on the plans and all other associated miscellaneous items of earthwork construction, as shown on the plans. The Contractor shall furnish all materials, labor, equipment and incidental items necessary to complete this portion of the work as detailed on the plans and as called for in these Specifications.

B. EXCAVATION CLASSIFICATION

All classified excavation shall be in accordance with Section 225 of the "Standard Specifications for Roads and Structures" latest edition, published by the North Carolina Department of Transportation, unless otherwise directed herein.

C. FINISH GRADES

Site grading shall conform to the grades indicated by the finish contours on the plans. Where topsoil, pavement, gravel or crushed stone surfacing and other items are shown, rough grade shall be finished to such depth below finish grade as necessary to accommodate these items. All areas where structures are to be built on fill shall be stripped to such depth as necessary to remove turf, roots, organic matter and other objectionable materials.

## PART 2: MATERIALS

A. TOPSOIL

Topsoil shall be considered to mean original surface soil, typical of the area, which is capable of supporting native plant growth, and shall be free of large stones, roots, brush, waste, construction debris and other undesirable material or contamination.

B. FILL

All fill used for site grading operations should consist of a clean (free of organics and debris) low plasticity soil (plasticity index less than 30).

## PART 3: EXECUTION

### 3.01 GENERAL REQUIREMENTS

A. CONSTRUCTION STAKE OUT

Construction stakeout will be provided by the Contractor. Exact locations and grade points are to be staked or fixed by the Contractor before construction. The Contractor shall not disturb any bench marks, reference stakes or property line monuments. In the event it becomes necessary to remove any bench mark, reference stake or property line monument in the performance of the work, the Contractor shall reference such points in preparation for replacement. If any such points are disturbed or damaged, they shall be replaced by a North Carolina Registered Land Surveyor at the expense of the Contractor.

B. EXISTING UTILITIES

Existing utility lines (either overhead or underground), sidewalks, fencing, pavement or other structures shown on the drawings, shown to the Contractor or mentioned in the plans and specifications shall be kept free of damage by the Contractor's operations. It shall be the responsibility of the Contractor to verify the existence and location of all underground utilities within the Project Site. The omission from or the inclusion of utility locations on the plans is not to be considered as the non-existence of or a definite location of existing underground utilities. Any existing construction damaged by the Contractor shall be restored to an equal condition as that existing at the time prior to damage, at the Contractor's expense. If any existing utility is inadvertently damaged during construction, the Contractor shall notify The Town of Murphy and the Project Engineer of said damaged utility at once so that emergency repairs may be made at the Contractor's expense and to the satisfaction of The Town of Murphy.

### 3.02 UNCLASSIFIED EXCAVATION

A. GENERAL

Excavation not classified includes all excavation to the required elevations. Excavation shall include earth excavation (includes borrow and waste materials as required), trench rock excavation, mass rock excavation, undercut excavation. There shall be no additional payment made for rock excavation. The Project Engineer and The Town of Murphy should be notified immediately if rock is encountered. All excavated materials which are not required or suitable for fills shall be considered as waste and shall be disposed of off the worksite at the Contractor's expense.

B. EARTH EXCAVATION

Earth excavation includes excavation of pavements and other obstructions visible on the surface, underground structures, utilities, and other items indicated to be demolished and removed in order to reach subgrade elevation; together with soils and other materials encountered that are not classified as trench rock excavation, mass rock excavation or undercut excavation.

C. TRENCH ROCK EXCAVATION

Trench rock excavation includes boulders exceeding one-half cubic yard in volume or solid ledge rock, which in the opinion of the Project Engineer, requires for its removal drilling and blasting, or wedging or sledging and barring.

In addition, classification as trench rock is only applicable when encountered, as described above, during the installation of storm drainage lines, water lines or services, sewer lines or services and associated structures as represented on the design drawings. Where trench rock excavation is necessary, the Contractor shall excavate the same as near the neat lines of the trench as practicable and the Contractor shall take all due precautions in the pursuance of the work. The Contractor will be held strictly responsible for all injury to life and to public and private property.

Trench rock shall be removed from the applicable excavation to the following limits:

a. Trenches - The diameter of the pipe plus 8 - inches on each side, extending 6 - inches below the pipe wall and bell.

b. Structures - 12 - inches beyond the vertical plane of the structure on all sides and on the bottom only to the depth necessary for proper installation:

Trench rock excavation includes removal and off-site disposal of rock material and obstructions encountered in trench excavations that cannot be removed without systematic drillings, blasting, or ripping; and backfilling with the specified compaction of the trench with suitable material.

D. MASS ROCK EXCAVATION

Mass rock excavation shall be considered any naturally occurring material, in the opinion of the Project Engineer, cannot be removed with a Caterpillar D-9 or equal, equipped with a properly fitted single tooth ripper, or removed by a Caterpillar 225 backhoe or equal, equipped with rock teeth. Mass rock in the bottom of roadway cuts shall be excavated to a depth of one foot below the roadbed and ditches. Mass rock in building pad areas shall be excavated to a depth of one foot below finished grade, or as directed by the Project Engineer. Where mass rock excavation is necessary, the Contractor shall excavate the same as near the neat limits of excavation as practicable and the Contractor shall take all due precautions in the pursuance of the work. The Contractor will be held strictly responsible for all injury to life and to public and private property.

Mass rock excavation includes removal and off-site disposal of rock material and obstructions encountered in excavations that cannot be removed without systematic drillings, blasting, or ripping; and backfilling with the specified compaction of the undercut rock with suitable material.

E. UNDERCUT EXCAVATION

Undercut excavation shall be any natural soil materials, not including topsoil, situated at or below the proposed subgrade elevation that is deemed unsuitable or undesirable in their

location or condition as determined by a qualified Geotechnical Engineer. The Geotechnical Engineer may require that the Contractor remove this undesirable material and backfill with approved material properly compacted. Moisture content shall not be an acceptable means for declaring a soil unsuitable. **It** is the responsibility of the contractor to properly condition the soil to an acceptable moisture content prior to use in grading operations.

Undercut excavation includes excavation and off-site disposal of undesirable material; any backfilling in the undercut area from an approved borrow source; and proper compaction of the borrow material. Topsoil, regardless of depth, shall not be classified as undercut excavation material and the replacement thereof shall be covered in the price for earth excavation as described above.

F. BORROW MATERIAL

Borrow material shall be suitable material from an approved off-site area that is required to: backfill undercut areas; bring the site to the proposed grades in the absence of sufficient material on-site; backfill trenches and other excavations as required. The borrow material shall be checked for suitability for compaction and approved by a qualified Geotechnical Engineer prior to placement on-site at the Contractor's expense. Borrow excavation shall be performed in accordance with Section 230 of the NCDOT Standard Specifications for Roads and Structures except where modified herein. All borrow material required shall be permitted, acquired and placed at the Contractor's sole expense. Borrow material required to bring the site to proposed grades in the absence of sufficient material on site shall be considered part of earth excavation and, therefore, no additional payment shall be made.

G. SHEETING AND SHORING

The Contractor shall provide all sheeting, shoring, underpinning and bracing required to hold the sides of any excavation and for the protection of all adjacent structures. The Contractor shall be held responsible for any damage to any part of the work by failure of excavated sides or bottoms.

## 3.03 DEWATERING

The Contractor shall control the grading in all areas so that the surface of the ground will be properly sloped, diked or ditched to prevent water from entering into excavated areas. The Contractor shall maintain sufficient personnel and equipment to promptly and continuously remove all water, from any source, entering or accumulating in the excavation or other parts of the work. All water pumped or drained from these areas shall be disposed of in a suitable manner without damaging adjacent property or other work under construction.

## 3.04 EMBANKMENTS, FILLS, AND BACKFILLS

A. PROOFROLLING EXISTING SUBGRADE

Upon completion of the stripping operations, the exposed subgrade in areas to receive fill should be proofrolled with a loaded dump truck or similar Pneumatic-tired vehicle with a minimum loaded weight of 20 tons, under the supervision of the geotechnical engineer. The proofrolling procedure should consist of four complete passes of the exposed areas with two of the passes being in a direction perpendicular to the preceding ones. Any areas which deflect, rut or pump excessively during the proofrolling or fail to "tighten up" after successive passes should be undercut to suitable soils and replaced with compacted fill.

B. PLACEMENT

Embankments and fills shall be constructed at the locations and to the lines and grades indicated on the drawings. Material shall be placed in horizontal layers not to exceed 8 inches in loose depth and thoroughly compacted prior to placing each following layer. All fill material shall be free from roots or other organic material, trash, and from all stones having any one dimension greater than 6 inches. Stones larger than 4 inches, maximum dimension, shall not be permitted in the upper 6 inches of fill or embankment. Fill areas shall be kept level with graders or other approved devices. Fill shall not be placed on surfaces that are muddy, frozen, or contain frost or Ice.

C. COMPACTION / MOISTURE

Embankment and fill compaction shall be accomplished by thoroughly compacting each layer with sheep foot rollers, pneumatic rollers, and mechanical tampers in places inaccessible to rollers, or other equipment. When material has too much moisture, grading operations shall be limited to drying soil by spreading and turning for drying by the sun and aeration. When material is dry, moisture shall be added by sprinkling by approved means.

D. EXISTING SLOPES RECEIVING FILL

Where natural slopes exceed 4: 1, horizontal benches shall be cut to receive fill material. Slopes of less than 4: 1 and other areas shall be scarified prior to placing fill material.

E. COMPACTION DENSITY REQUIREMENTS

All embankments and fills shall be compacted to the following percentages of the maximum dry density as determined by the Standard Proctor Density Test, ASTM D-698, Method C.

The following table shall be used throughout the project unless otherwise directed by the Project Engineer:

TABLE OF COMPACTION

| Type Fill or Embankment | Zone | Minimum Density % |
|---|---|---|
| Structures | Top 24" | 98 |
| | Below 24" | 95 |
| Paved Areas | Top 24" | 98 |
| | Below 24" | 95 |
| Yard or Field Areas | All Depths | 95 |

Embankment types are defined as follows:

Structure- beneath concrete slabs of buildings, floors, foundations, etc.

Paved Areas - beneath all roads, tracks, runways, pads, streets, truck operations, greenways, and automobile parking lots.

F. BACKFILL OF POURED-IN-PLACE DRAINAGE STRUCTURES

Where backfilling is required after the completion of drainage structures, all forms, trash, and construction debris shall be removed from excavation before backfilling begins. Backfill shall be placed in horizontal layers of 6 inches in loose depth. Compaction shall conform to requirements in the above table. Heavy rollers, crawler equipment, trucks or other heavy equipment shall not be used for compacting backfill within 5 feet of structure walls or other facilities which may be damaged by their weight or operation. No backfilling shall begin until concrete and masonry walls are properly cured.

G. The Contractor shall carry the top of embankments, fills, or backfills to the surrounding grade so that upon compaction and subsequent settlement, the grade will be at proper elevation. Should settlement occur during the guarantee period of the contract, the Contractor shall provide sufficient fill to bring area up to finished grade and shall reseed as required.

## 3.05 PROOFROLLING

A. GENERAL

Proofrolling under the observation of the Soils Engineer will be performed using a loaded dumptruck or similar pneumatic-tired vehicle with a minimum loaded weight of 20 tons as specified herein and as follows: The proofrolling procedure should consist of four complete passes of the exposed areas with two of the passes being in a direction perpendicular to the preceding ones. Any areas which deflect, rut or pump excessively during the proofrolling or fail to "tighten up" after successive passes should be undercut to suitable soils and replaced with compacted fill.

B. FILL AREAS

Immediately following stripping, all areas to receive fill shall be proofrolled as specified herein.

C. CUT AREAS

Immediately following the completion of excavation to proposed grades in cut areas, proofrolling shall be performed as specified herein.

D. STONE BASE AREAS

Immediately prior to stone base course placement in pavement areas and following final floor slab preparation, all subgrade areas will be proofrolled. Any local areas which deflect, rut or pump under the roller shall be undercut and replaced with compacted fill material as specified herein. Undercut will not be paid for in fill areas where proofroll does not pass.

## 3.06 AIR POLLUTION

A. COMPLIANCE WITH REGULATIONS

Comply with all pollution control rules, regulations, ordinances, and statutes which apply to any work performed under the Contract, including any air pollution control rules, regulations, ordinances and statutes, or any municipal regulations pertaining to air pollution.

B. DUST CONTROL

During the progress of the work, maintain the area of activity, including sweeping and sprinkling of streets as necessary, so as to minimize the creation and dispersion of dust. If The Town of Murphy decides that it is necessary to use calcium chloride or more effective dust control, furnish and spread the material, as directed, and without additional compensation.

## 3.07 SOIL INSPECTION AND TESTS

A. SOILS TESTING LABORATORY

All excavated and fill material shall be removed, selected, placed and compacted as applicable under supervision of a representative of a commercial soils testing laboratory which will be approved by The Town of Murphy. A commercial soils testing laboratory shall be any firm properly equipped to perform such compaction tests and who has in their employment a Professional Engineer experienced in testing and soil mechanics. The laboratory representative shall have the authority to approve or disapprove the condition of the subgrade on which fill is to be placed, filled material, placement methods, compaction methods, and shall make compaction density tests as necessary to determine that the specified density is obtained. The Contractor shall notify the laboratory at least three (3)days prior to starting fill operations in order that suitability of material for

compaction may be checked and no material shall be used that has not been previously checked and approved by the laboratory. The laboratory shall be notified before any cut is made or fill is placed in order that the laboratory representative may be present during all grading operations. The Contractor shall remove, replace, re-compact and retest all fills failing to meet the density requirements at no additional expense to The Town of Murphy.

B. PAYMENT TO SOILS TESTING LABORATORY

A soils testing laboratory shall be retained to supervise fill placement and compaction at no expense to The Town of Murphy.

C. FREQUENCY OF TESTS

Field density tests shall be performed by a TOWN OF MURPHY approved testing agency for each one foot of fill material placed at the following frequency:

1. A minimum of one field density test shall be made for each 2,000 square feet/vertical foot of fill placement in building areas.

2. A minimum of one field density test shall be made for each 5,000 square feet/vertical foot of fill placement in all other areas where pavement is to be placed.

D. REQUIRED CERTIFICATIONS

Prior to final acceptance, the Soils Engineer and Surveyor shall submit certification specifying that the project compaction criteria and subgrade elevations have been satisfactorily obtained. The Contractor is responsible for the certification statement from the Surveyor. This certification should be in the form of a letter accompanied by a stamped as-built drawing showing spot elevations.

## 3.08 BORROW AND WASTE MATERIALS

A. BORROW

In the event borrow material is required, the borrow material shall be checked for suitability for compaction and approved by the soils testing laboratory. The Contractor shall notify the laboratory at least three (3) days in advance of beginning borrow operations. Borrow excavation shall be performed in accordance with Section 230 of the NCDOT Standard Specifications for Roads and Structures except where modified herein. The Contractor shall be responsible for any erosion control, seeding and stabilization of any borrow area regardless of whether such area is located on or off the worksite.

B. WASTE

Excavated materials not suited for backfill and excavated material in excess of that needed to complete the work shall be hauled off the worksite at the Contractor's expense. The Contractor shall be responsible for any erosion control, seeding and stabilization at any waste site at no additional cost to The Town of Murphy. See section 02213 Waste Material Disposal.

## 3.09 RESIDUAL SOIL AREAS

If proofrolling indicates that on-site virgin soils supporting any roadway, parking, building or other structural areas are not adequate as determined by the Soils Engineer, then these unsuitable areas shall be classified as undercut and be repaired by the Contractor. The necessary repair procedure shall be determined by the Soils Engineer and may include scarifying, drying and re-compaction procedures or undercutting and replacement procedures.

## 3.10 FINAL GRADING

A. TOPSOIL

On completion of all grading, all graded areas (except building pads and pavement areas and all cut slopes steeper than 4:1 slope) shall be provided with 4 inches of topsoil and brought to the finished grades shown on the drawings. Areas disturbed by operations of the Contractor shall be properly returned to their original condition with a topsoil covering of 4 inches.

B. FINISHED SURFACE

After the entire graded area has been brought to the finished grades shown on drawings, all areas shall be left smooth and free from erosion, ridges, ditches and evidence of ponding. Final grades shall be free from all roots, debris, rock and soil lumps and left in readiness for seeding.

C. REQUIRED REPAIRS

Prior to acceptance of the entire project, the Contractor shall correct all embankments and graded areas of all damages due to washes, settlement, erosion, equipment ruts or any other cause at his expense.

D. CERTIFICATION

Prior to final acceptance, the Contractor shall provide certification that all grades are ± .1 foot of the finished grades shown on project drawings.

E. FINAL STABILIZATION

The Contractor shall stabilize all disturbed areas, unless otherwise directed, by seeding and mulching as specified elsewhere in these specifications or other means of stabilization called for by the contract drawings.

## 3.11 CLEAN-UP

Upon completion or termination of the work, and before final payment is made, the Contractor shall remove from site all equipment, waste materials and rubbish resulting from his operations. In the event of his failure to do so, the same may be done by The Town of Murphy at the expense of the Contractor.

**END OF SECTION**

# SECTION 02213
# WASTE MATERIAL DISPOSAL

## PART 1: GENERAL

### 1.01 SCOPE OF WORK

A. The work covered by this section consists of the disposal of waste and debris in accordance with the requirements of these specifications. Waste will be considered to be all excavated, grubbed or removed materials, which are not utilized in the construction of the project.

## PART 2: NOT USED

## PART 3: EXECUTION

### 3.01 GENERAL REQUIREMENTS

A. Waste shall be disposed of in a properly permitted offsite location provided by the Contractor, unless otherwise required by the plans or special provisions or unless disposal within the project area is permitted by the Town of Murphy.

B. The Contractor shall maintain the earth surfaces of all waste areas, both during the work and until the completion of all seeding and mulching or other erosion control measures specified, in a manner which will effectively control erosion and siltation.

C. The following requirements shall also be applicable to all waste or disposal areas other than active public waste or disposal areas:

1. Rock waste shall be shaped to contours which are comparable to and blend in with the adjacent topography where practical, and shall be covered with a minimum 6" thick layer of earth material either from the project waste or from borrow.

2. Earth waste shall be shaped to contours which are comparable to and blend in with the adjacent topography where practicable, but in no case will slopes steeper than 2: 1 be permitted.

3. Construction debris, grubbed debris and all broken pavement and masonry shall be covered with a minimum 6" thick layer of earth waste material from the project or borrow. The completed waste area shall be shaped as required above for disposal of earth waste.

4. Seeding and mulching shall be performed over all earth or earth covered waste areas. The work of seeding and mulching shall be performed in accordance with Section 02910.

5. Where the Town of Murphy has granted permission to dispose of waste and debris within the project, the Engineer will have the authority to establish whatever additional requirements may be necessary to insure the satisfactory appearance of the completed project.

6. Disposal of waste or debris in active public waste or disposal areas will not be permitted without prior approval by the Town of Murphy. Such disposal will not be permitted when, in the opinion of the Town of Murphy, it will result in excessive siltation or pollution.

END OF SECTION

# SECTION 02221
# TRENCHING, BACKFILLING AND COMPACTING FOR UTILITY SYSTEMS

## PART 1: GENERAL

### 1.01 SECTION INCLUDES

A. Excavating, preparation of pipe laying surface, pipe bedding, backfilling, compaction, and surface restoration for utility systems.

B. Excavation of Mechanical/Electrical Work: Excavation and backfill required in conjunction with underground mechanical and electrical utilities, and buried mechanical and electrical appurtenances is included as work of this section.

### 1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

| | | |
|---|---|---|
| 1. | ASTM D 422 | Particle – size Analysis of Soils |
| 2. | ASTM D 698 | Moisture – Density Relations of Soils and Soil – Aggregate mixtures using 5.5 lb. Rammer and 12 in. Drop. |
| 3. | ASTM D 1556 | Density of Soil in-place by the Sand – Cone Method. |
| 4. | ASTM D 2167 | Density and Unit Weight of Soil in-place by the Rubber Balloon Method. |
| 5. | ASTM D 2487 | Classification of Soils for Engineering Purposes. |
| 6. | ASTM D 2488 | Description of soils (Visual – Manual Procedure) |
| 7. | ASTM D 2922 | Density of Soil and Soil-Aggregate in-place by Nuclear Methods. |
| 8. | ASTM D 3017 | Moisture Content of Soil and Soil-Aggregate in place by Nuclear Methods. |
| 9. | ASTM D 4318 | Liquid Limit of Soils. |

B. American Water Works Association (AWWA)
   1. AWWA C600 - Installation of PVC Pressure Pipe.

### 1.03 JOB CONDITIONS

A. Existing Utilities:
   1. Locate existing underground utilities in areas of work.
   2. Provide adequate means of support and protection during earthwork operations.
   3. Utilities encountered during excavation, uncharted or incorrectly charted shall be kept in operation. Consult The Town of Murphy immediately for directions.
   4. Repair damaged utilities to satisfaction of The Town of Murphy at no cost to The Town of Murphy.
   5. Do not interrupt existing utilities serving facilities occupied and used by The Town of Murphy or others, during occupied hours, unless acceptable temporary utility services have been provided.

6. Provide a minimum of 48 – hour notice to The Town of Murphy and receive notice to proceed before interrupting any utility.

B. Protection of Persons and Property:
    1. Provide adequate barricades, construction signs, fencing, and lighting as required.
    2. Protection shall be placed and maintained by the Contractor at his expense during the progress of the construction.
    3. Obstructions to traffic, material piles, equipment and pipe, shall be enclosed by fences or barricades and shall be protected by proper lighting when visibility is poor.
    4. The rules and regulations of O.S.H.A. and appropriate authorities safety provisions shall be strictly observed.
    5. Shoring and Sheeting shall be used if the soil conditions are not substantial to:
        a. Prevent undermining of pavements and slabs.
        b. Prevent movement in banks or slopes.
        c. Prevent movement in vertical wall trenches.
    6. Protect satisfactory material from becoming spoil by water, debris, or organic material.
    7. A temporary surface shall be placed over the trench top as soon as possible after compaction in traveled areas. The temporary surface shall:
        a. Maintain a smooth surface.
        b. Meet grade of adjacent undisturbed surfaces.
        c. Maintained at Contractor's expense until final restoration.

## 1.04 DEFINITIONS

A. Absorption – The attachment of water molecules to the surfaces of soil particles.

B. Aggregate – Relatively inert granular mineral material such as sand, gravel, slag, crushed stone, etc.
    1. Fine Aggregate – Material that will pass a No. 4 screen.
    2. Course Aggregate – Material that will not pass a No. 4 screen.

C. Angular aggregate – aggregate which possesses well-defined edges formed at the intersection of roughly planar faces.

D. Base Course – A layer of specified or selected material of planned thickness constructed in the subgrade or subbase for the purpose of servicing one or more functions such as distributing load, providing drainage, minimizing frost action, etc.

E. Backfill – The area above the initial backfill to finish grade or grade specified.

F. Bedding – The Section from the top of the foundation to the bottom of the pipe.

G. Clay – Fine grained soil or the fine grained portion of soil that can be made to exhibit plasticity (putty like) within a range of water contents, and that exhibits considerable strength when air dried.

H. Cohesionless Soils – A soil that when unconfined has little or no strength when air dried and that has little or no cohesion when submerged.

I. Cohesive Soils – A soil that when unconfined has considerable strength when air dried and that has significant cohesion when submerged.

J. Compaction – The densification of a soil by means of mechanical manipulation.

K. Differential Settlement – Settlement that varies in rate or amount, or both, from place across a structure.

L. Displacement – A change in position of a material point.

M. Elasticity – Property of material that returns to its original form or condition after the applied force is removed.

N. Fineness – A measure of particle size.

O. Fines – Portion of soil that passes through a No. 200 US Standard sieve.

P. Foundation – Material below bedding that represents the bottom of trench.

Q. Water Table – Elevations at which the pressure of ground water is zero (0) with respect to the atmospheric pressure.

R. Ground Water Level – The level below which the rock and subsoil, to unknown depths, are saturated.

S. Hardpan – A hard impervious layer, composed chiefly of clay, cemented by relatively insoluble materials, that does not become plastic when mixed with water and definitely limits the downward movement of water and roots.

T. Haunching – Backfill from the bottom of the pipe to ¼ of the pipe outside diameter above the spring line (3/4 of pipe outside diameter above bottom of pipe).

U. Initial Backfill – Backfill from top of haunching section to the bottom of the final backfill.

V. Liquid Limit – The water content corresponding to the arbitrary limit between the liquid and plastic states of consistency of soil.

W. Moisture Content – The percentage by weight of water contained in the pore space of a rock or soil.

X. Muck – Stone, dirt, debris, or useless material or an organic soil of very soft consistency.

Y. Mud – A mixture of soil and water in a fluid or weakly solid state.

Z. Optimum Moisture Content – The water content at which a soil can be compacted to a maximum dry unit weight by a given compactive effort.

AA. Plasticity – The property of a soil or rock which allows it to be deformed beyond the point of recovery without cracking or appreciable volume change.

**PART 2: PRODUCTS**

## 2.01 SATISFACTORY MATERIALS

A. Satisfactory material shall consist of any material classified by the Unified soil Classification System (USCS) and ASTM D 2487, Table 1 as GW, GP, GM, SW, SP, SM, and SC.

## 2.02 UNSATISFACTORY MATERIALS

A. Unsatisfactory materials not to be used as trench backfill include but are not limited to those materials containing roots and other organic matter, trash, debris, frozen materials and stones larger than 3 inches and materials classified in USCS as PT, OH, OL, CH, GC, MH, CL, and ML.

B. Unsatisfactory materials also include man-made fills, refuse, or backfill from previous construction.

C. Satisfactory materials which are classified by ASTM D 2488 as wet or saturated shall be considered unsatisfactory material unless dried to optimum moisture content.

## 2.03 COHESIONLESS AND COHESIVE MATERIALS

A. Cohesionless materials shall include materials classified in USCS as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, GL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are non-plastic.

## 2.04 UNYIELDING MATERIAL

A. Unyielding material shall consist of rock and gravelly soils with stones greater than 3 inches in any dimension or as defined by the pipe manufacturer, whichever is smaller.

## 2.05 UNSTABLE MATERIAL

A. Unstable material shall consist of materials unable to properly support the utility pipe, conduit, or appurtenance structure.

## 2.06 DEGREE OF COMPACTION

A. Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 698.

## 2.07 EMBEDMENT MATERIALS

A. Embedment materials listed herein include a number of processed materials plus the soil classification listed under the Unified Soil Classification System (USCS) (Method D

2487 and Practice D 2488). These materials are grouped into four broad categories according to their suitability for this application.

1. Class I – Angular, ¼ to ½ inch, graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells.
2. Class II – Coarse sands and gravels with maximum particle size of 1 ½ inches, including variously graded sands and gravels containing a small percentage of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW, and SP are included in this class.
3. Class III – Fine sand and clay gravels, including fine sands, sand-clay mixtures, and gravel-day mixtures. Soil types GM, GC, SM and SC are included in this class.
4. Class IV – Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil types MH, ML, CH and CL are included in this class.

**PART 3: EXECUTION**

## 3.01 CONSTRUCTION METHODS

A. Construction on site and in easements:
   1. Confine all operations to the site or easement area.
   2. Take precautions to prevent any cave-in of disturbance beyond the site or easement limits or damage to improvements within the easement.
   3. Restore damage areas outside of the easement area to original condition.
   4. All debris shall be disposed of in approved means.
   5. Fences, shrubbery or other type of surface improvements located in easements will require protection during construction.
   6. Contractor is responsible for adherence to all local, state, and federal OSHA requirements for safety. It is the contractor's sole responsibility to perform work in accordance with latest OSHA requirements and shall indemnify The Town of Murphy of any responsibility.

## 3.02 EXCAVATION

A. Excavation shall be performed true to lines and grades indicated. No classification of excavation will be made.

B. Stockpile:
   1. Stockpile material satisfactory for backfilling at sufficient distance from the trench to avoid overloading and to prevent slides or cave-ins.
   2. If construction limits prevent the stockpiling of excavated material adjacent to the banks of the trench transport immediately excavated material to its ultimate destination (backfill or off-site).
   3. Provide adequate drainage for the stockpiles and surrounding areas, by means of ditches, dikes, or other approved methods.
   4. Grade to prevent surface water from flowing into the excavation.
   5. Remove accumulating water from trenches.
   6. Protect stockpiles from contamination with unsatisfactory excavated material or other material that may destroy the quality and fitness of the suitable stockpiled material.

7. Failure to protect stockpiles and any satisfactory material becomes contaminated as a result, remove and replace with satisfactory material from approve sources at no additional cost to The Town of Murphy.
8. Excavated material not required or unsatisfactory for backfill shall be completely removed from the site.
9. Avoid obstructing sidewalks and driveways.
10. Leave fire hydrants, valve pit covers, valve boxes, curb stop boxes, or other utility controls unobstructed and accessible.

C. Excavation for Appurtenances:
   1. Leave 12 inches clear between the outer structure surfaces and the face of the excavation or support members.
   2. Rock shall be cleaned of loose debris and cut to a firm surface either level, stepped, or serrated.
   3. Remove loose disintegrated rock and thin strata.
   4. Take care not to disturb the bottom (foundation) of the excavation when placing concrete or masonry.
   5. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

D. Trench Excavation:
   1. Excavate to the dimension and depth shown in the plans, or as required.
   2. Slope or brace trench walls, above the area designated as “initial backfill”, to meet OSHA requirements. Vertical side walls shall be maintained below the area designated as “initial backfill”.

E. Sheeting, Shoring and Bracing:
   1. Open-cut trenches shall be sheeted and braced or otherwise protected as required to protect life, property, or the work and as required by Federal, State, or municipal ordinances.
   2. The minimum protection shall conform to the recommendations in OSHA Safety and Health Standards for Construction.
   3. As Trench box or shield may be used in lieu of sheeting as permitted by OSHA.
   4. When close-sheeting is used, it shall be so driven as to prevent adjacent soil from entering the trench either below or through such sheeting.
   5. Where shoring and bracing are used, the trench with shall be increased accordingly.
   6. Sheeting and bracing which is ordered left in place shall be cut off 18 inches below grade
   7. Trench bracing, except that ordered left in place, may be removed after the backfilling has been completed or has been brought to such an elevation as to permit its safe removal.
   8. Sheeting, except that ordered left in place, may be removed after the backfilling has been completed or has been brought to such an elevation as to permit its safe removal.

F. Trenches With Sloping Sides, Limited:
   1. When working conditions and right-of-way permits allow, excavate pipe line trenches with sloping sides, but with the following exceptions:
      a. To save site improvements.
      b. Adjacent to a structure or building.

c. Violates easement or right-of-way permit.

G. Bottom Preparation:
   1. Accurately grade the bottom to provide uniform bearing and bottom quadrant support of each pipe section and to avoid differential settlement.
   2. When unstable material is encountered in the bottom of the trench, such material shall be removed to the depth as required to provide acceptable pipe foundation and replaced to the proper grade with Class I material.
   3. Over excavation of trench bottom – fill over excavation with an acceptable class of embedment material to at least 12 inches below pipe and compact to a minimum of 95% Standard Proctor Density, ASTM D 698.

## 3.03 DEWATERING

A. Trenches shall be kept dewatered at all times by bailing sump pumps at the lower end of the trench, by well-pointing or other approved means.

B. Surface water shall be prevented from flowing into trenches by diking, ditching or otherwise directing the flow of surface water.

C. Disposal of water shall be in accordance with local erosion and sediment control regulations. Silty or muddy water shall not be permitted to enter a water course, open ditch or storm drain until after flowing through a sediment trap or basin.

D. Running Water:
   1. Remove running water from trench before laying pipe.
   2. Select the method of water removal:
      a. Use Class I material for pipe bedding which will serve as a trench drain and/or underdrain from which the excess water will be pumped via trench side pumps.
      b. Well Points.
   3. Take necessary precautions to insure that the trench wall will not be removed as a result of the running water.

## 3.04 BACKFILL AND COMPACTION

A. Backfill shall be placed in layers not exceeding 6 inches loose thickness for hand operated machine compaction, and 8 inches loose thickness for other than hand operated machines, unless otherwise specified.
   1. Each layer shall be compacted to at least 98% maximum density for cohesionless soils and 95% maximum density for cohesive soils, unless otherwise specified.
   2. Compaction shall be tested by ASTM D 698.

B. Replacement of Unyielding Material: Unyielding material removed from the trench bottom shall be replaced with satisfactory material of class specified for that trench section (Haunching, Initial Backfill, etc.).

C. Replacement of Unstable Material: Unstable material removed from the bottom of the trench or excavated shall be replaced with the specified class of material for that trench section (Haunching, Initial Backfill, etc.).

D. Foundation: Take care to undercut only what is required for bedding and leave foundation undisturbed. In situations where unstable material is encountered below the bedding, it shall be removed to the depth required, replaced with Class I material in 6" layers and compacted to 98% of maximum density.

E. Bedding: shall consist of only Class I material.

F. Haunching: Place in layers of a maximum of 6" loose thickness. The haunching shall be brought up evenly on both sides of the pipe for the full length of the pipe. Compaction rates for materials used in haunching area are as follows:
    1. Class I: Requires hand tamped compaction.
        a. Care should be taken to ensure proper pipe support under pipe in haunching areas.
    2. Class II and III: 98% Maximum density.

G. Initial Backfill:
    1. Place in layers of a maximum of 6 inches loose thickness and compacted.
    2. When using ductile iron pipe use Class I, Class II, or Class III materials.
    3. Compaction Rates:
        a. Class I material: Hand Tamped
        b. Class II and III material: 98% maximum density
        c. Class IV material shall not be used in initial backfill area.

H. Final backfill: Class II, Class III, or Class IV material. Final backfill shall contain no unsuitable material which includes organic matter, trash, debris, frozen materials and stones larger than 3 inches.
    1. Sidewalks, Turfed or Sodded Areas and Miscellaneous Areas:
        a. Deposit in layers of a maximum of 12 inches loose thickness.
        b. Compact to 95% maximum density for cohesive soils and cohesionless soils.
        c. Water flooding or getting methods of compaction will be permitted for granular non-cohesive backfill material provided prior approval is granted from the Project Engineer.
        d. Water jetting shall not be allowed to penetrate the initial backfill.
    2. Backfill for Manholes, Catch Basins and other Appurtenances:
        a. Carefully place backfill so that the structure will not be damaged by the shock of falling earth.
        b. Deposit and compact as specified for initial backfill above.
        c. Place as to prevent eccentric loading and excess stress on the pipe or structure.
    3. Roadways and Parking Areas:
        a. Deposit on lifts not exceeding 6" loose thickness.
        b. Compact to 100% maximum density.

## 3.05 SPECIAL REQUIREMENTS

A. Water lines: Trenches shall be of a depth to provide a minimum cover of 3 feet from finish grade to top of pipe.

B. Storm and Sanitary Sewer Lines: Trenches shall be to indicated depth to provide proper slope for flow in pipe.

## 3.06 TESTING

A. A Town of Murphy approved soil testing and inspection services firm shall be used for quality control testing during earthwork operations.

B. Determination of Density:
   1. Tests shall be performed in sufficient numbers to ensure that the specified density is being obtained.
   2. A minimum of one laboratory moisture-density relation test and companion classification test shall be performed for each different type of material used for backfill.
   3. Under areas to be paved, one nuclear density test and companion classification test shall be performed for each alternative lift of backfill in trenches at increments of 100 feet or fraction thereof.
   4. In other areas, one nuclear density test and companion classification test shall be performed on each lift of backfill at interval spacing of 200 linear feet of trench, or fraction thereof.
   5. Laboratory tests for moisture-density relations shall be determined in accordance with ASTM D 698 or ASTM D 1557, as specified in these specifications.
   6. Characteristics of backfill material shall be determined in accordance with particle size analysis of soils in accordance with ASTM D 422.
   7. Field in-place density shall be determined in accordance with ASTM D 2167.
   8. Trenches improperly compacted shall be reopened to the necessary depth, then refilled and compacted to the density specified at no additional cost to The Town of Murphy.

## 3.07 RESTORATION OF EXISTING SURFACES

A. Paved and grassed areas disturbed by operations required under this section shall be restored as indicated on the Drawings or specified herein at no additional cost to The Town of Murphy.

**END OF SECTION**

**SECTION 02230**
**AGGREGATE BASE COURSE**

## PART 1: GENERAL

### 1.01 SCOPE OF WORK

A. The work covered by this section consists of the construction of a base composed of an approved aggregate material hauled to the site, placed on the site, compacted, and shaped to conform to the lines, grades, depths, and typical sections shown on the plans or established by the Town of Murphy.

## PART 2: PRODUCTS

### 2.01 MATERIALS

A. Aggregate base course materials shall consist of crushed stone or uncrushed gravel, or other similar material having hard, strong, durable particles free of adherent coatings.

B. The Contractor shall furnish aggregate base course material produced in accordance with the requirements indicated herein for Type A, aggregate unless otherwise specified in the special provisions.

C. All aggregates shall be from approved sources. Sources will not be approved unless the material has satisfactory soundness and satisfactory resistance to abrasion. Satisfactory soundness will be considered to be a weighted average loss of not greater than 15% when subjected to five (5) alternations of the sodium sulfate soundness test in accordance with AASHTO T104. Satisfactory resistance to abrasion will be considered to be a percentage of wear of not greater than 55% when tested in accordance with AASHTO T96.

D. Aggregates shall be handled in such a manner as to minimize segregation.

E. Sites for aggregate stockpiles shall be grubbed and cleaned prior to storing aggregates, and the ground surface shall be firm, smooth, and well drained. A cover of at least 3" of aggregate shall be maintained over the ground surface in order to avoid the inclusion of soil or foreign material. Stockpiles shall be built in such a manner as to minimize segregation. When it is necessary to operate trucks or other equipment on a stockpile in the process of building the stockpile, it shall be done in a manner approved by the Town of Murphy.

F. Stockpiles of different types or sizes of aggregates shall be spaced far enough apart, or else separated by suitable walls or partitions, to prevent the mixing of the aggregates.

G. Any method of stockpiling aggregates which allows the stockpile to become contaminated with foreign matter or causes excessive degradation of the aggregate will not be permitted. Excessive degradation will be determined by sieve tests of samples taken from any portion of the stockpile over which equipment has been operated, and failure of such samples to meet all grading requirements for the aggregate will be considered cause for discontinuance of such stockpiling procedure.

1. GRADATION
   All standard sizes of aggregates shall meet the gradation requirements when tested in accordance with AASHTO T27.

**PART 3: EXECUTION**

**3.01 CONSTRUCTION OF STONE BASE**

A. The aggregate material shall be spread on the subgrade to a uniform loose depth and without segregation.

B. Where the required compacted thickness of base is 8" or less the base material may be spread and compacted in one layer. Where the required compacted thickness of base is more than 8", the base material shall be spread and compacted in 2 or more approximately equal layers. The minimum compacted thickness of any one layer shall be approximately 4".

C. Each layer of material shall have been sampled, tested, compacted, and approved prior to placing succeeding layers of base material or pavement.

D. No base material shall be placed on frozen subgrade or base. Hauling equipment shall not be operated on subgrade or a previously completed layer of base material soft enough to rut or weave beneath the equipment.

E. The maximum speed of trucks hauling or traveling over any part of the subgrade or base shall be 5 miles per hour.

F. The Contractor shall utilize methods of handling, hauling, and placing which will minimize segregation and contamination. If segregation occurs, The Town of Murphy may require that changes be made in the Contractor's methods to minimize segregation, and may also require mixing on the road which may be necessary to correct any segregated material. No additional compensation will be allowed for the work of road mixing as may be required under this provision. Aggregate which is contaminated with foreign materials to the extent the base course will not adequately serve its intended use shall be removed and replaced by the Contractor at no additional cost to The Town of Murphy. The above requirements will be applicable regardless of the type of aggregate placed and regardless of prior acceptance.

G. The Engineer or a The Town of Murphy representative will have the right to require that any portion of the work done in his presence and if the work is covered up after such instruction, is shall be exposed by the contractor for observation at no additional cost to The Town of Murphy.

## 3.02 QUALITY CONTROL

A. TOLERANCES
   1. After final shaping and compacting the base, The Town of Murphy will check the surface of the base for conformance to grade and typical section and will determine the base thickness.
   2. The thickness of the base shall be within a tolerance of ± 1/2" of the base thickness required by the plans.

B. MAINTENANCE
   Where the base material is placed in a trench section, the Contractor shall provide adequate drainage through the shoulders to protect the subgrade and base until such time as shoulders are completed. The Contractor shall maintain the surface of the base by watering, machining, and rolling or dragging when necessary to prevent damage to the base by weather or traffic.

C. Testing
   1. There will be at least one base density test performed per 5,000 square feet by a geotechnical testing firm approved by The Town of Murphy.
   2. Compaction will be 100% of the maximum laboratory dry density as determined by ASTM D 1557 or AASHTO T 180.
   3. Depth measurements for compacted thickness shall be made by test holes through the base course. Where the base course is deficient, correct such areas by scarifying, adding base material and re-compacting as directed by The Town of Murphy. At staggered intervals not to exceed 250 feet.

**END OF SECTION**

**SECTION 02241**
**SUBGRADE**

## PART 1: GENERAL

### 1.01 SCOPE OF WORK

The work covered by this section consists of the preparation, shaping, and compaction of that portion of the project limits upon which base or pavement, including base and paving for shoulders, is to be placed.

## PART 2: NOT USED

## PART 3: EXECUTION

### 3.01 CONSTRUCTION

A. The subgrade shall be shaped to the lines, grades, and typical sections shown on the plans. All unsuitable material, boulders, and all vegetative matter shall be removed and replaced with suitable material. Suitable material, when not available from the subgrade work, shall be taken from roadway excavation or borrow pits.

B. Material excavated in preparing the subgrade shall be stored or stockpiled in such a manner as to not interfere with proper drainage or any of the subsequent operations of placing base or pavement.

C. The top 24" of subgrade in paved areas shall be compacted at a moisture content required to produce 98% of maximum density. All other areas subgrade will be compacted to 95% of maximum density at the optimum moisture content. The Contractor shall dry or add moisture to the subgrade when required to provide a uniformly compacted and acceptable subgrade.

### 3.02 QUALITY CONTROL

A. A tolerance of plus or minus 1/2" from the established grade will be permitted after the subgrade has been graded to a uniform surface.

B. Ditches and drains shall be provided and maintained when required to satisfactorily drain the subgrade. Where previously approved subgrade is damaged by natural causes, by hauling equipment, or by other traffic, the Contractor shall restore the sub grade to the required lines, grades, and typical sections and to the required density at no cost to The Town of Murphy.

**END OF SECTION**

**SECTION 02270**
**EROSION CONTROL**

## PART 1: GENERAL

### 1.O1 SECTION INCLUDES

A. Erosion and sedimentation control shall be provided for all areas of the site denoted or otherwise disturbed during construction. Installation of erosion and sediment control devices as well as removal of temporary erosion and sediment control devices required to protect all downstream properties, natural waterways, streams, lakes, ponds, catch basins, drainage ditches, roads, gutters, natural buffer zones, and man made structures shall be done as shown on the plans or as directed by The Town of Murphy.

B. Erosion and sediment control procedures and facilities shall conform to the "Erosion and Sediment Control Planning and Design Manual" latest edition as published by the North Carolina Sedimentation Control Commission, Sections 107 and 225 of the "Standard Specifications for Roads and Structures" Latest Revision, as published by the North Carolina Department of Transportation and to all applicable local codes or ordinances, whichever is more stringent.

C. For those projects which exceed the disturbed area limits of the controlling jurisdiction, the project engineer / contractor shall fully develop an "Erosion Control Plan" and obtain permits for the same as part of the project and at no cost to The Town of Murphy.

## PART 2: PRODUCTS

### 2.01 MATERIALS

A. Materials necessary for erosion control shall be in accordance with related sections herein and in accordance with "Standard Specifications for Roads and Structures" Latest Revision, as published by the North Carolina Department of Transportation.

## PART 3 EXECUTION

A. Erosion control requirements shown on plans or as directed by the Project Engineer or The Town of Murphy will be followed except that should circumstances dictate that extra precaution be taken to prohibit erosion and sedimentation on the project, preventative measures shall be implemented as needed.

B. Maintain all erosion and sediment control facilities to insure proper performance through out the construction phase and until such time all disturbed areas are permanently stabilized.

C. Upon completion of construction or successful permanent stabilization of all areas disturbed before or during construction operations or as indicated on the construction drawings, which ever occurs last, all temporary erosion and sediment control devices shall be removed from the project site.

D. Temporary or permanent ground cover shall be provided as called for by the Project Engineer or as shown on plans within seven (7) working days after disturbance of any areas on the site.

**END OF SECTION**

# SECTION 02601
# PRECAST MANHOLES

## PART 1: GENERAL

### 1.01 SCOPE

The Contractor shall furnish all labor, materials, equipment and supplies and shall perform all work necessary for the construction of all manholes, manhole drop connections, conflict manholes, tie-in manholes and appurtenance manholes complete and ready for use. Manholes and related appurtenances shall be constructed at the locations and grades shown or established by the Project Engineer and shall conform to the details shown on the plans.

### 1.02 REFERENCES

A. North Carolina Department of Transportation Standard Specifications for Roads and Structures, Latest Edition.

B. American Society for Testing and Materials (ASTM)

## PART 2: MATERIALS

### 2.01 GENERAL

A. Materials for manholes shall be new and shall be furnished by the contractor in accordance with the following specifications.

### 2.02 MANHOLES

A. Manholes shall be precast reinforced concrete sections conforming to ASTM C-478 and to the following

1. Tops shall be eccentric cone where cover permits unless shown otherwise on the drawings and flat slab tops otherwise. Bottoms shall be integrally cast unless the Contractor proposes to use specialty bases ("Dog-house") at points of connection to existing sewer mains. Any special bases or risers used must be detailed in shop drawings and submitted for approval. Manhole wall and base dimensions shall conform to ASTM C-478 or to the minimum dimensions shown on the drawings.
2. Manhole supplier shall design manhole sections to resist earth loads and to resist uplift resulting from buoyant forces calculated with the ground water table at the ground surface. Wall and or base dimensions shall be increased accordingly.
3. All pipe connections shall consist of an approved continuous boot of 3/8" minimum thickness neoprene as shown on the drawings conforming to ASTM C-923. Boots shall be either cast into the manhole wall or installed into a cored opening using internal compression rings. Installed boot shall result in a water-tight connection meeting the performance requirements of ASTM C-443.

4. For force main connections to manholes resulting in a concentration of Hydrogen Sulfide, the interior of the manhole shall receive a coating of an approved Sulfide Resistant product in accordance with the manufacturer's instructions.

## 2.03 FRAMES AND COVERS

A. Frames and covers shall be of domestic manufacture good quality cast iron of uniform grain, conforming to ASTM A48, Class 30 or better, constructed in accordance with details shown on the Plans and "Sanitary Sewer" cast into cover.

## 2.04 MANHOLE STEPS

A. Manhole steps shall be of composite plastic-steel construction. Steps shall consist of a ½" deformed steel reinforcing rod encapsulated in a co-polymer polypropylene plastic; reinforcing rods shall conform to ASTM A615, Grade 60; and polypropylene plastic shall conform to ASTM D2146, Type II, Grade 16906. Minimum design live load of steps shall be a single concentrated load of at least 300 pounds. Steps shall be nine inches in depth and at least twelve inches in width. Steps shall have non-skid top surfaces.

B. Steps shall be uniformly spaced not more than sixteen inches on center, including the spacing between the top step an the manhole cover. Steps shall be embedded in the wall a minimum distance of 4 inches in either cast or drilled holes. Steps shall not be driven or vibrated into fresh concrete and shall withstand a pullout resistance of 2000 pounds when tested in accordance with ASTM C 497. Each step shall project a minimum of 5 inches from the wall measured from the point of embedment.

## 2.05 CONCRETE (POURED IN PLACE)

A. Air entrained Portland Cement Concrete having minimum 28 day compressive strength of 4,000 psi.

B. For force main connections to manholes resulting in a concentration of Hydrogen Sulfide, the interior of the manhole shall receive a coating of an approved Sulfide Resistant product in accordance with the manufacturer's instructions.

## 2.06 JOINT SEALANT

Butyl Rubber based conforming to AASHTO M-198, type B – butyl rubber, suitable for application temperatures between 10 and 100 degrees F.

## 2.07 PRECAST GRADE RINGS

Precast grade rings shall be no less than 4" in height and conform to ASTM C478

## 2.08 WASHED STONE

Stone Material, crushed stone or gravel shall be strong, durable and conform to standard size No. 57 per NCDOT Section 1000.

**PART 3: EXECUTION**

## 3.01 CONSTRUCTION METHODS

A. Excavation for all sanitary manholes shall be carried to a depth such as to provide a minimum of 12 inches of washed stone bedding material below the bottom of structures and extend to a minimum width of 8 inches beyond each side of structures.

B. Should unstable soil, organic soil, or soil types classified as fine-grained soils (silts and clays) by ASTM D-2487 be encountered at the bottom of excavations, such soils shall be removed to a depth and width determined by the Engineer and properly disposed of. The resulting undercut shall be backfilled with washed stone. Placement and compaction shall conform to applicable earthwork specifications.

C. Manholes shall be constructed of precast reinforced concrete with cast iron frames and covers in accordance with details shown on the Plans.

D. Invert channels shall be smooth and accurately shaped to a semi-circular bottom conforming to the inside of the adjacent sewer sections. Inverts shall be formed of concrete, and no laying pipe through manholes will be permitted. Changes in size and grade shall be made gradually and evenly. The minimum bending radius of the trough centerline shall be 1.5 times the I.D. A minimum ½" radius shall be provided at the intersection of two or more channels.

E. Depressions, high spots, voids, chips or fractures over ¼" in diameter or depth shall be filled with sand cement and finished to a texture reasonably consistent with that of the formed surface.

F. Precast concrete bottom sections, risers, and top sections shall be fabricated such that when assembled, they provide a manhole conforming to the depth required. The Contractor shall be responsible for the furnishing and constructing manholes such that the completed assembly is flush (0.1 foot above) finished grade or at other elevations as may be shown on the drawings. No manhole assembly will be accepted or paid for that will allow surface water inflow to occur through the cover due to poor attention to construction grades.

G. Sections are to be assembled so as to provide a plum structure with uniform bearing at all joints and at the base slab. Joints shall be thoroughly cleaned to remove dirt and foreign material. The butyl rope sealant shall be unrolled directly against the base of the spigot. Leave the protective paper in place until the sealant is fully in place. Overlap rope from side to side, not top to bottom. Joints to be plastered smooth inside and outside of manhole with a cement grout. Joints shall be water-tight.

H. Pipes shall project into the manhole 2 inches and shall be mechanically sealed with a molded neoprene boot. The interior of each manhole shall be grouted to provide a smooth transition from pipe to manhole invert / trough.

I. Manhole frames and covers shall be set flush (0.1 foot above) with the finished grade or as otherwise shown on the drawings. Precast adjustment (grade) rings shall be used as required. No more than 8 vertical inches of grade ring will be allowed per

manhole. Seal frame to adjustment ring or cone section with butyl sealing rope and completely grout the ring to the top manhole section.

J. Drop connections shall be constructed in accordance with the Town of Murphy Standard Details.

K. Conflict manholes, tie-in manholes, appurtenance manholes and related items shall be constructed in accordance with details shown on the plans.

**END OF SECTION**

**SECTION 02667**
**WATER LINES: DISTRIBUTION SYSTEM**

## PART 1: GENERAL

### 1.01 GENERAL SPECIFICATIONS

A. Scope

The work includes furnishing all material and equipment and performing all labor necessary to construct, test and sterilize the water distribution system, complete with the necessary valves and other accessories, ready for operation.

B. Excavation and Backfilling

Excavation and backfilling shall conform to the requirements of Section 02221 – Trenching, Backfilling and Compacting for Utility Systems" of these specifications.

## PART 2: PRODUCTS

### 2.01 GENERAL MATERIAL SPECIFICATIONS

A. General:

1. All pipe and accessories shall be new and unused materials, conforming to the requirements specified hereinafter.
2. All materials/products that contact potable water must be third party certified as meeting the specifications of ANSI/NSF Standard 61, Drinking Water System Components – Health Effects.
3. Natural rubber or other material which will support microbiological growth may no be used for any gaskets, O-rings, and other products used for jointing pipes, setting meters or valves, or other appurtenances which will expose the material to the water.
4. The interior of the pipe and accessories shall be cleaned of all foreign matter before being placed into the trench, and shall be kept clean during laying operations by means of plugs or other approved methods.
5. Lubricants that will support microbiological growth shall not be used for slip-on joints. Vegetable shortening shall not be used to lubricate joints.
6. Shop drawings, catalog cuts and related data (4 copies minimum) for all pipe and appurtenances shall be submitted to The Town of Murphy for approval.

B. Buried Pipe

1. Ductile Iron Pipe:
    a. Ductile Iron Pipe shall be manufactured in accordance with AWWA C151. All Ductile Iron Pipe shall be Class 350 unless otherwise specified and shall be lined with cement mortar not less than 1/16 " thickness conforming to AWWA C104. Pipe wall thickness shall conform to "Thickness Design for Ductile Iron Pipe" AWWA C150. Exterior of Ductile Iron Pipe shall have a protective coating of bituminous seal coat conforming to AWWA C110 and C115.

b. Joints shall be AWWA C111 push-on or mechanical for general buried service. AWWA C115 Flanged for exposed service unless shown otherwise. Flange material shall match pipe material.
c. Restrained joint pipe where called for in the plans shall provide a flexible joint which locks in place so that the joint may withstand surges within the line. The pipe shall use "push-on" type joints in accordance with AWWA C111. Restrained joint pipe and fittings shall be U.S. Pipe TR Flex® or approved equivalent.

2. Polyvinyl Chloride Pipe (PVC):
   a. For Pressure rated PVC pipe with a nominal diameter of 4 inches and larger the pipe shall be manufactured in accordance with AWWA C900 and shall have a dimension ration (DR) of 14. For Pressure rated PVC pipe with a nominal diameter of 3 inches and less the pipe shall be manufactured in accordance with ASTM D-2241 and pressure rated 315 (SDR 13.5). All PVC pipe shall bear the National Sanitation Foundation (NSF) potable water logo and display the appropriate DR/SDR and size.
   b. Joints shall be AWWA C111 push-on

3. HDPE (High Density Polyethylene) Tubing:
   a. HDPE Tubing shall be manufactured in accordance with ASTM D2239 and ASTM D3035 and shall be rated for 250 psi (SDR 9) working pressure. Less than 2" diameter tubing shall be Copper Tube Size (CTS) and 2" diameter tubing shall be Iron Pipe Size (IPS).
   b. Joints shall be brass compression couplings or fusion welded suitable for working pressures of 250 psi.

C. Fittings and Specials

For 4 inches nominal diameter and larger pipe:

1. Fittings and specials shall be Mechanical Joint type Ductile Iron and shall conform to AWWA C110 or AWWA C153 Ductile Iron compact fittings.
2. All fittings shall be internally lined with cement mortar in accordance with AWWA C104 and externally lined with a bituminous seal coat.

For 3 inches nominal diameter and less PVC pipe:

1. Fittings and specials shall be push on gasketed pressure class 250 rated. No solvent welded PVC fittings shall be used.

D. Valves

1. Valves 2" through 12" shall be resilient-seated, cast iron body, non-rising stem Gate Valve conforming to AWWA C509, latest revision. Sealing mechanism shall provide zero leakage at the water working pressure against the line flow from either direction and be designed such that no exposed metal seams, edged, screws, etc. Are within the waterway in the closed position. The gate shall not be wedged into a pocket nor slide across the seating surface to obtain tight closure. All internal and external ferrous surfaces of the valve, including the interior of the gate, shall be coated with a protective coating conforming to AWWA C550, latest revision. Coating shall

be applied to castings prior to assembly to assure all exposed areas will be covered. Valves 3" through 12" shall be mechanical joint unless otherwise shown on plans. Valves less than 3" shall be N.P.T. threaded. All valves shall be rated at 250 psi working pressure. Unless otherwise noted, underground valves shall have an operating nut and exposed valves shall have a hand wheel operator.

2. Valves greater than 12" shall be Butterfly Valves conforming to AWWA C504, latest revision.

E. Valve Boxes

1. Each valve buried in the ground shall be provided with an approved type of valve box and cover. The boxes shall be adjustable slip-joint or screw type.
2. Valve Boxes shall be a cast iron in three pieces comprising the lower or base pieces which shall have a bell at the bottom to fit around the stuffing box gland and rest on the valve bonnet, the upper part of which shall be flared on the lower end to telescope on a socket to receive the cap or cover. Valve box covers shall have the word "Water" cast in the cast iron lid. All castings shall be coated with asphalt or coal-tar varnish.

F. Fire hydrants

1. Fire hydrants shall conform to AWWA standard C-502 – 94 and shall be of the three (3) way type. The hydrant valve opening shall not be less than five and one-quarter (5 ¼) inches. Each hydrant shall be equipped with two (2) two and one-half (2 ½) inch hose connections and one (1) steamer connection. The hydrants shall be fitted with bell ends to accommodate the spigot end of six (6) inch ductile iron or PVC pipe and have the standard one and one-half inch pentagon operating nut.
2. The barrel of the hydrant shall be of proper length to permit a three and one half (3 ½) bury. The valve shall be designed to close against the pressure of the distribution system and remain closed in the event of the upper part of the barrel being broken.
3. A flange shall be provided, above ground level, to permit adjusting the facing of the hydrant. The hydrant shall be so designed and constructed as to permit replacement of the upper portion of the barrel without digging.
4. Each nozzle shall have a cast iron cap, suitably attached to the hydrant by means of a chain. Nozzle caps shall be provided with leather gaskets.
5. Hose nipples shall be of the removable type and shall conform to the existing hose nipples in use. On a new system they shall have National Standard Threads on the hose connection side unless otherwise directed by the Engineer. The Contractor shall check existing nipples before ordering.
6. All fire hydrants furnished for this project shall be of the type known as "breakable" in order that the hydrant barrel may be broken without damaging the lower portion of the hydrant in case of an accident.
7. All fire hydrants furnished for this project shall be in accordance with The Town of Murphy standards.

G. Steel Encasing Pipe

1. Steel Encasing Pipe shall be smooth wall, meeting or exceeding ASTM A – 139 Grade B 35,000 psi minimum yield strength with minimum wall thickness as defined as follows:

| CARRIER PIPE | CASING PIPE | THICKNESS |
|---|---|---|
| 6" DUCTILE IRON | 12" | .250" |
| 8" DUCTILE IRON | 16" | .250" |
| 10" DUCTILE IRON | 24" | .250" |
| 12" DUCTILE IRON | 24" | .250" |

2. Carrier Pipe Supports Within Steel Casing: shall be steel plate, cold formed structural collar with flanges and a minimum of four support legs welded to the collar. Each support leg shall have a foot or skid welded on the end extending beyond the front and back edge of the collar. The front and rear of each foot shall be angled inwardly towards the collar to serve as a stable, effective skid during installation of the carrier pipe. The carrier support shall be securely fastened to the carrier pipe with heavy duty ½" grade 5 bolt and locking nut passing between the flanges, compressing the collar against the carrier pipe.

**PART 3: EXECUTION**

## 3.01 INSTALLATION OF PIPE AND ACCESSORIES

A. General

1. Pipe work shall be installed at the location shown on the plans and to the position, alignment and grade shown thereon, or in the event of grade conflict, as directed by the Engineer. All pipe work shall also be installed in accordance with the details shown on the drawings, unless otherwise hereinafter specified or required. All pipe shall have a minimum depth coverage of 36".
2. Handling pipe and Accessories: Pipe and accessories shall be handled in such a manner to insure delivery to the final location of installation in sound, undamaged condition and conforming in all respects to these specifications. All materials shall be maintained in a clean condition.
3. Placing Pipe in Trench: The interior of all pipe shall be thoroughly cleaned of all foreign matter before being lowered into the trench, and shall be kept clean and dry during laying operations by means of plugs or other approved methods. Trenches shall be kept free from water, and no trench water shall be allowed to enter the pipe or fittings. At all times when work is not in progress, all open ends of pipes and fittings shall be securely closed to the satisfaction of The Town of Murphy.
4. There shall be no connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water or other contamination materials may be discharged or drawn into the system.
5. Encasements:
    a. Encasements shall be installed by boring and jacking unless field conditions require otherwise. It shall be the Contractor's responsibility to notify The Town of Murphy immediately if conditions do not permit a jack and bore installation.

b. Installation of encasement pipe shall include all related work and services such as mobilization of equipment, constructing and maintaining working pits, right-of-way maintenance and restoration, traffic maintenance, mining, excavations, dewatering, sheeting, shoring and bracing for embankments, operating pits, and as elsewhere required shall be placed and maintained in order that work may proceed safely and expeditiously.
c. Installation of the casing pipe shall be carried out without disturbance of the embankment, pavement, tracks, or other railroad or highway facilities and without obstructing the passage of traffic at any time.
d. The alignment and grade shall be carefully maintained and the encasement pipe installed in a straight line.
e. The space outside the encasement and the ground shall be filled with grout, sand or pea gravel, as directed by The Town of Murphy. The Town of Murphy will direct that this space be filled if the space is large enough to cause any earth settling.
f. Before the pipe is installed in the casing, carrier pipe supports shall be rigidly fastened to the barrel of the pipe. After completion of the casing, the Contractor shall insert the pipeline in pre-jointed segments. No contact will be permitted between the casing and the carrier pipeline.

B. Inspection

1. Inspection of Pipe: Inspection shall be conducted before lowering into trench and while suspended for defects and any defective, damaged or unsound pipe which shall be rejected and removed from the project site.
2. Trench Bottom: Bottom shall be excavated such that the full length of each section of pipe shall rest solidly upon a firm pipe bed with recesses excavated to accommodate the bells and joints. Any pipe that has the grade or joint disturbed after laying shall be taken up and re-laid.
3. Alignment of Pipe: Where pipe lines or runs intended to be straight, shall be so laid. Deflections in straight line and grade, made necessary by vertical curves or horizontal curves or offsets, shall not exceed the maximum deflections recommended by the pipe manufacturer. If the specified or required alignment requires deflection in excess of those stipulated above, the Contractor shall either provide bends as approved by The Town of Murphy.
4. Laying Pipe: When laying a length of pipe in the trench, the spigot end shall be centered and the pipe pushed fully into position and brought into true and specified alignment.
5. Cutting Pipe: Pipe for closure pieces or for other reasons shall be done in a neat and workmanlike manner by a method which will not damage the pipe. Unless otherwise authorized by The Town of Murphy, all such cutting of pipe shall be done by means of mechanical cutters of an approved type, or types. Wheel cutters shall be used whenever practicable. The pipe ends shall be shaped as necessary to provide a good joint.

C. Thrust Blocking:

All fittings at bends in the pipe line shall be braced with concrete thrust blocks. Size of the thrust blocks will be based upon the bearing capacity of the soil at the bend. Concrete shall have a 28 day compressive strength of not less than 3000 psi. Thrust blocking shall bear directly against a firm undisturbed trench wall.

3,000 PSI Sacrete may be used for material as long as it is properly mixed in clean containers with potable water and so long as the appropriate water to cement ratio is used. If the soil is unsuitable for bearing or wet conditions exist, restrained joint fittings shall be used as directed by the Engineer or the Town of Murphy. Restrained joint glands shall be of the type Megalug or equal.

D. Existing Subsurface Conditions:
    1. Where existing sub-surface structures such as water pipe, gas lines, sewer pipe, conduit, etc., are found which are not shown on the plans or are found to be different in size or location from that indicated by the plans and specifications, the contractor shall notify The Town of Murphy, the structure shall be uncovered and supported by the Contractor, as directed by the Engineer, and at the Contractor's Expense. The Contractor shall not be entitled to any damages due to the presence of the structure, or the uncovering and supporting of the structure.
    2. Any changes in plans and specifications resulting from the presence of the structure shall be determined by the Engineer, and made by the Contractor as directed by the Engineer. Any additional charges for such work shall be as mutually agreed upon by The Town of Murphy and the Contractor – or if The Town of Murphy and the Contractor cannot agree upon a price for the work, payment shall be based on the direct cost of materials, labor (including insurance and Workman's Compensation), and equipment, plus a maximum of 15% overhead and profit for all other items of administration, profit, superintendence and other such costs and expenses.

E. Lateral Separation of Sewers and Water Mains
    1. Water mains shall be laid at least 10 feet laterally from existing or proposed sewers, unless local conditions or barriers prevent a 10 foot lateral separation – in which case:
        a. The water main is laid in a separate trench, with the elevation of the bottom of the water main at least 18 inches above the top of the sewer; or
        b. The water main is laid in the same trench as the sewer with the water main located at one side on a bench of undisturbed earth, and with the elevation of the bottom of the water main at least 18 inches above the top of the sewer.
    2. Crossing a Water Main Over a Sewer: Whenever it is necessary for a water main to cross over a sewer, the water main shall be laid at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer, unless local conditions or barriers prevent an 18 inch vertical separation – in which case both the water main and the sewer shall be constructed of ferrous materials and with joints that are equivalent to water main standards for a distance of 10 feet on each side of the point of crossing.
    3. Crossing a Water Main Under a Sewer: Whenever it is necessary for a water main to cross under a sewer, both the water main and the sewer shall be constructed of ferrous materials and with joints equivalent to water main standards for a distance of 10 feet on each side of the point of crossing. A section of water main pipe shall be centered at the point of crossing.

F. Installation of Valves:

1. Valves installed in trenches shall be placed where shown on the drawings unless otherwise directed by the Engineer.
2. Valves and valve boxes shall be set plumb, with valve boxes placed directly over the valves. After being correctly positioned, earth fill shall be carefully tamped around the valve box for a distance of 4 feet on all sides of the box.
3. Before installing any valve, care shall be taken to see that all foreign material is removed from the interior of the barrel.
4. After installation, each valve shall be opened and closed to insure that all parts are in proper working condition.
5. The valve box top shall be at finished grade elevation.
6. Each valve shall rest on stone bedding not less than 6 inches thick and 24 inches square.
7. Each valve box shall be provided with a standard concrete valve box protector as shown on the plans.

G. Installation of Fire Hydrants:

Fire hydrants shall be placed where shown in the Town of Murphy Standard Details or otherwise as directed by the Engineer. Hydrants shall be placed with the standpipe plumb. The base of the hydrant shall rest upon a slab of stone or concrete not less than 6 inches thick and 24 inches square. Beneath and around the base of the hydrant and to a point one foot above drip, at least a quarter of a yard of clean, crushed stone shall be placed, and the trench filled with earth. Hydrants shall receive 2 coats of red paint after installation. All other construction requirements shall be according to the Town of Murphy Standard Details.

H. Service Installation

a. Services shall be installed where shown on the drawings unless otherwise directed by the Engineer or the Town of Murphy. Service taps shall be made on the upper half of the water main at an angle of 45 degrees from the vertical.
b. Ductile iron body double strap tapping saddles shall be used for all service connections. HDPE fusion wells are allowed only if done by a current ASTM Certified Technician.
c. Installation shall conform to the Town of Murphy Standard Details.

I. Plugs or Caps:

Where pipe ends are left for future connections, they shall be valved, plugged or capped as indicated, or as directed by the Engineer or the Town of Murphy.

J. Connection to Existing Water Mains:

a. Where the Contractor is required to connect the proposed mains with certain existing mains, the approximate location of these existing mains and connections are noted on plans but it will be incumbent upon the Contractor to ascertain the exact locations of these mains if such exact locations are needed by the Contractor for the purpose of ordering pipe fittings or otherwise.
b. Such taps shall meet the standards of the system being tapped into and the Contractor shall coordinate with municipality or utility companies as necessary for the taps required.

## 3.02 HYDROSTATIC TESTS

A. Testing

1. After the pipe is laid and backfilled and the line is cleaned of dirt and foreign material, the pipe shall be subjected to a hydrostatic pressure of 1 ½ times of the working pressure.
2. The duration of each pressure test shall be at least two hours in the presence of a Town of Murphy representative.
3. Each valved section of pipe shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge. The test shall be applied by means of a test pump connected to the pipe in a manner satisfactory to the Engineer and The Town of Murphy.
4. The Contractor shall furnish the pump, pipe connection, measuring device, pressure gauges and all other necessary apparatus.
5. Before applying the test pressure, all air shall be expelled from the section of line to be tested. If permanent air vents or other appurtenances are not located at all high points, the Contractor shall install brass corporation stops at such points so the air can be expelled as the line is filled with water.
6. After all the air has been expelled, the corporation stops shall be closed and the test pressure applied. The corporation stops shall be left in the line after completion of the tests.
7. All costs of tapping the line and installing the corporation stops shall be incidental to construction and shall be borne by the Contractor.

B. Leakage Testing

1. A leakage test shall be conducted on each line, or section of line, in accordance with AWWA C600 - 82, latest revision. Leakage shall be defined as the quantity of water that must be applied into the newly laid pipe, or any valved section thereof, to maintain the specified test pressure after the air in the pipe line has been expelled and the pipe has been initially filled with water. All visible leaks must be repaired regardless of the amount of leakage.
2. No pipe installation will be accepted if the leakage is greater than that determined by the formula:

   $L = SD\sqrt{P} / 148{,}000$ in which L is the allowable leakage in gallons per hours;

   S is the length of line tested in feet

   P is the average test pressure during the test period in psi gauge; and

   D is the nominal pipe diameter in inches.
3. If any test of pipe laid discloses leakage greater than that specified above, the Contractor shall at his own expense locate and repair, or replace, the defective joint or pipe until the leakage is within the specified allowance.

## 3.03 STERILIZATION

A. General

1. Before being placed in service, all new mains and repaired portions of, or existing mains shall be thoroughly flushed then chlorinated according to AWWA Standard C651 Section 5.2, Continuous-Feed Method (latest revision). This method shall be followed as outlined below with the exception that the lines shall be disinfected by the addition and thorough distribution of a chlorine solution in concentration sufficient to produce a chlorine residual of

at least 50 milligrams per liter (or ppm) in accordance to Section .2003 of the "Rules Governing Public Water Supplies".

B. Preliminary Flushing

1. Before being chlorinated, the main shall be filled to eliminate air pockets and shall be flushed to remove particulates. The flushing velocity in the main shall not be less than 2.5 ft/s unless the Engineer or job superintendent determines that conditions do not permit the required flow to be discharged to waste. Table 1 shows the rates of flow required to produce a velocity of 2.5 ft/s in pipes of various sizes. Note that flushing is no substitute for preventive measures during construction. Certain contaminants, such as caked deposits, resist flushing at any feasible velocity.

*Table 1.*
*Required Flow and Openings to Flush Pipelines (40 psi Residual Pressure in Water Main)*

| Pipe Diameter (in) | Flow Required to Produce 2.5 ft/s (approx.) Velocity in Main (gpm) |
|---|---|
| 4 | 100 |
| 6 | 200 |
| 8 | 400 |
| 10 | 600 |
| 12 | 900 |
| 16 | 1600 |

C. Disinfection

1. Water from the existing distribution system or other approved source of supply shall be made to flow at a constant, measured rate into the newly laid water main. In the absence of a meter, the rate may be approximated by methods such as placing a pitot gauge in the discharge or measuring the time to fill a container of known volume.
2. At a point not more than 10 ft downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 50 mg/L chlorine residual. To assure that this concentration is provided, measure the chlorine concentration at regular intervals using appropriate chlorine test kits.
3. During the application of chlorine, valves shall be positioned so that the strong chlorine solution in the main being treated will not flow into water mains in active service. Chlorine application shall not cease until the entire main is filled with heavily chlorinated water. The chlorinated water shall be retained in the main for at least 24 hours during which time all valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances.
4. Direct-feed chlorinators, which operate solely from gas pressure in the chlorine cylinder, shall not be used for application of liquid chlorine. The preferred equipment for applying liquid chlorine is a solution-feed, vacuum-operated chlorinator and a booster pump. The vacuum-operated chlorinator mixes the chlorine gas in solution water; the booster pump injects the chlorine-gas solution into the main to be disinfected. Hypochlorite solutions may be applied to the water main with a gasoline or electrically powered

chemical-feed pump designed for feeding chlorine solutions. Feed lines shall be of such material and strength as to safely withstand the corrosion caused by the concentrated chlorine solutions and the maximum pressures that may be created by the pumps. All connections shall be checked for tightness before the solution is applied to the main.

5. Highly chlorinated water shall not be released into the distribution system nor shall be discharged into any sanitary sewer manhole or other sanitary sewer inlet. The chlorinated water shall remain in the line until the chlorine residual drops below 5 ppm or dissipated by other prior approved methods. After this period, the water will be wasted by pumping into the air to dissipate the remaining chlorine residual. Pumping shall be at a rate not to exceed 25 GPM. Pressure and nozzle size shall be such as to produce an 8 foot (vertical) spray. The system should then be flushed with potable water and the sampling program started. Sampling shall consist of taking at least one per line installation and one representative sample every 5000 feet and at each blow-off. The samples shall then be tested by a state approved laboratory for indication of bacteriologically satisfactory water. Two successive negative samples per line segment will be required for certification. Positive samples will require re-sterilization per specifications. Three (3) copies of this laboratory test shall be submitted to The Town of Murphy.
6. Contractor shall coordinate all filing, pressure testing, flushing, chlorination, and de-chlorination with the Town of Murphy and shall pay for water used in the process based on Engineer's calculations.

## 3.04 SAFETY

A. The Contractor shall comply with all applicable provisions of the Federal Occupation Safety and Health Act.
    1. Where work is to be done in state maintained right-of-ways, the Contractor shall contact the Department of Transportation (local and/or district office) to determine the peruse requirements for barricades, signs, etc.

## 3.05 FINAL CLEANUP

A. Immediately after the completion of the work for any substantial unit or portion of it, the Contractor shall remove all unused materials, refuse, etc., and shall leave the site of the work in a condition satisfactory to The Town of Murphy.

**END OF SECTION**

# SECTION 02675
# DISINFECTION OF WATER DISTRIBUTION SYSTEMS

## PART 1: GENERAL

### 1.01 SECTION INCLUDES

A. Disinfection of potable water distribution system

B. Testing and reporting results

### 1.02 REFERENCES

A. ANSI/AWWA B300 – Standard for Hypoclorites.

B. ANSI/AWWA B301 – Standard for Liquid Chlorine.

C. ANSI/AWWA C651 – Standard for Disinfecting Water Mains.

### 1.03 SUBMITTALS

A. Test Reports: Indicate results comparative to specified requirements.

B. Certification: Certify that the cleanness of the water distribution system meets or exceeds the North Carolina Department of Environmental Quality (NCDEQ) requirements.

### 1.04 PROJECT RECORD DOCUMENTS

A. Disinfection report; record:
   1. Type and form of disinfectant used.
   2. Date and time of disinfectant injection start and time of completion.
   3. Test locations.
   4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
   5. Date and time of flushing completion.
   6. Disinfectant residual after flushing in ppm for each outlet tested.

B. Bacteriological report; record:
   1. Date issued, project name, and testing laboratory name, address, and telephone number.
   2. Time and date of water sample collection.
   3. Name of person collecting samples.
   4. Test locations.
   5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
   6. Coliform bacteria test results for each outlet tested.
   7. Certification that water conforms, or fails to conform, to bacterial standards of the NCDEQ.
   8. Bacteriologist's signature and authority.

## 1.05 QUALIFICATIONS

A. Testing Firm: Company specializing in testing potable water systems, approved by the State of North Carolina.

## 1.06 REGULATORY REQUIREMENTS

A. Conform to the North Carolina Department of Environment Quality (NCDEQ).

# PART 2: PRODUCTS

## 2.01 DISINFECTION CHEMICALS

Chemicals: Hypochlorite, ANSI/AWWA B300; Liquid Chlorine, ANSI/AWWA B301.

# PART 3: EXECUTION

## 3.01 PREPARATION

A. Verify that piping system has been cleaned, inspected, and pressure tested.

B. Perform scheduling and disinfection activity with start-up, testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

## 3.02 DISINFECTION

A. Provide and attach required equipment to perform the work of this section.

B. Inject treatment disinfectant into piping system at a dosage of not less than 50 ppm.

C. Maintain disinfectant in system for at least 24 hours.

D. At end of retention period residual chlorine shall be no less than 10 ppm.

E. Flush, circulate and clean until residual chlorine is reduced to less than 1 ppm.

F. Open and close fire hydrants several times during flushing period.

G. Disposal of the chlorinated solution during flushing shall comply with all federal, state, and local regulations. In accordance with all applicable regulations, a neutralizing chemical shall be applied to minimize chlorine residual in the flushing water before discharging from the water main, unless an alternate plan is submitted and approved by The Town of Murphy. Disposal directly to surface waters without removal of chlorine is strictly prohibited.

## 3.03 BACTERIAL TESTING

A. Take samples of water from several locations in sterilized containers.

B. Test samples in accordance with ANSI/AWWA C651 and NCDENR.

C. There shall be two successive tests taken 48 hours apart having clear bacterial test results.

D. The system will not be accepted until satisfactory bacteriological results have been obtained.

**END OF SECTION**

# SECTION 02730
# GRAVITY SEWERS AND FORCE MAINS

## PART 1: GENERAL

### 1.01 GENERAL SPECIFICATIONS

A. Scope

The work includes furnishing all material and equipment and performing all labor necessary to construct sewers, complete with the necessary valves and other accessories, ready for operation. The Sewers shall be constructed to the lines and grades shown and shall be the size shown on the plans

B. Excavation and Backfilling

Excavation and backfilling shall conform to the requirements of Section 02221 – Trenching, Backfilling and Compacting for Utility Systems" of these specifications.

## PART 2: PRODUCTS

### 2.01 GENERAL MATERIAL SPECIFICATIONS

A. General:

1. All pipe and accessories shall be new and unused materials, conforming to the requirements specified hereinafter.
2. All gravity sewer mains shall conform the following material construction:

| Depth of Cover Class | Material |
|---|---|
| 3' up to 10' | SDR 35 PVC |
| 10' up to 14' | SDR 21 PVC |
| 14' up to 20' | Pressure Class 250 D.I.P. |
| 20' or greater | Pressure Class 350 D.I.P. |

3. All pressure sewer force mains shall be constructed of SDR 21 PVC for 3" diameter and smaller pipe, C900 DR 14 PVC for 4" diameter and larger pipe, DR 9 HDPE, or minimum class 350 Ductile Iron Pipe.
4. All materials/products that contact potable water must be third party certified as meeting the specifications of ANSI/NSF Standard 61, Drinking Water System Components – Health Effects.
5. Natural rubber or other material which will support microbiological growth may not be used for any gaskets, O-rings, and other products used for jointing pipes, setting meters or valves, or other appurtenances which will expose the material to the water.
6. The interior of the pipe and accessories shall be cleaned of all foreign matter before being placed into the trench, and shall be kept clean during laying operations by means of plugs or other approved methods.
7. Lubricants that will support microbiological growth shall not be used for slip-on joints. Vegetable shortening shall not be used to lubricate joints.
8. Shop drawings, catalog cuts and related data (1 copy minimum) for all pipe and appurtenances shall be submitted to The Town of Murphy for approval.

B. Buried Pipe

1. Gravity Sewer Ductile Iron Pipe:
    a. Ductile Iron Pipe shall be manufactured in accordance with AWWA C151. All Ductile Iron Pipe shall be Class 250 unless otherwise specified and shall be lined with cement mortar not less than 1/16 " thickness conforming to AWWA C104. Pipe wall thickness shall conform to "Thickness Design for Ductile Iron Pipe" AWWA C150. Exterior of Ductile Iron Pipe shall have a protective coating of bituminous seal coat conforming to AWWA C110 and C115.
    b. Joints shall be AWWA C111 push-on or mechanical for general buried service. AWWA C115 Flanged for exposed service unless shown otherwise. Flange material shall match pipe material.
    c. Restrained joint pipe where called for in the plans shall provide a flexible joint which locks in place so that the joint may withstand surges within the line. The pipe shall use "push-on" type joints in accordance with AWWA C111. Restrained joint pipe and fittings shall be U.S. Pipe TR Flex® or approved equivalent.
    d. D.I.P. used in forcemains shall have an approved sulfide resistant protective interior coating.

2. Gravity Sewer Polyvinyl Chloride Pipe (PVC):
    a. PVC pipe shall conform to ASTM D3034; "Type PSM PVC Sewer Pipe and Fittings." SDR 35 or SDR 21 with a minimum cell classification of 12454-B.
    b. Joints shall conform to ASTM D3212, Elastomeric gaskets conforming to ASTM F477.
    c. Fittings shall conform to ASTM D3034. Fittings in sizes through 8" shall be molded in one piece with elastomeric joints and minimum socket depths as specified in Sections 6.2 and 7.3.2. Fittings 10" and larger shall be molded or fabricated in accordance with Section 7.11 with manufacturer's standard pipe bells and gaskets

3. Pressure Sewer Ductile Iron Pipe:
    a. Ductile Iron Pipe shall be manufactured in accordance with AWWA C151. All Ductile Iron Pipe shall be Class 350 unless otherwise specified and shall be lined with cement mortar not less than 1/16 " thickness conforming to AWWA C104. Pipe wall thickness shall conform to "Thickness Design for Ductile Iron Pipe" AWWA C150. Exterior of Ductile Iron Pipe shall have a protective coating of bituminous seal coat conforming to AWWA C110 and C115.
    b. Joints shall be AWWA C111 push-on or mechanical for general buried service. AWWA C115 Flanged for exposed service unless shown otherwise. Flange material shall match pipe material.
    c. Restrained joint pipe where called for in the plans shall provide a flexible joint which locks in place so that the joint may withstand surges within the line. The pipe shall use "push-on" type joints in accordance with AWWA C111. Restrained joint pipe and fittings shall be U.S. Pipe TR Flex® or approved equivalent.

4. Pressure Sewer Polyvinyl Chloride Pipe (PVC):
    a. For Pressure rated PVC pipe with a nominal diameter of 3 inches and smaller, the pipe shall be manufactured in accordance with

ASTM D-2241 and pressure rated 200 psi (SDR 21). For Pressure rated PVC pipe with a nominal diameter of 4 inches and larger, the pipe shall be manufactured in accordance with AWWA C900 and pressure rated 200 psi (DR 14). All PVC pipe shall bear the National Sanitation Foundation (NSF) potable water logo and display the appropriate DR/SDR and size.

b. Joints shall be AWWA C111 push-on

5. Pressure Sewer HDPE (High Density Polyethylene) Tubing:
    a. HDPE Tubing shall be manufactured in accordance with ASTM D2239 and ASTM D3035 and shall be rated for 200 psi (SDR 9) working pressure.
    b. Joints shall be brass compression couplings or fusion welded suitable for working pressures of 200 psi.

C. Fittings and Specials
1. For 4 inches nominal diameter and larger pipe:
    a. Fittings and specials shall be Mechanical Joint type Ductile Iron and shall conform to AWWA C110 or AWWA C153 Ductile Iron compact fittings.
    b. All fittings shall be internally lined with cement mortar in accordance with AWWA C104 and externally lined with a bituminous seal coat.
2. For 3 inches nominal diameter and less PVC pipe:
    a. Fittings and specials shall be push on gasketed pressure class 200 rated.

D. Valves
1. Valves 2" through 12" shall be resilient-seated, cast iron body Gate Valves conforming to AWWA C509, latest revision. Sealing mechanism shall provide zero leakage at the water working pressure against the line flow from either direction and be designed such that no exposed metal seams, edged, screws, etc. Are within the waterway in the closed position. The gate shall not be wedged into a pocket nor slide across the seating surface to obtain tight closure. All internal and external ferrous surfaces of the valve, including the interior of the gate, shall be coated with a protective coating conforming to AWWA C550, latest revision. Coating shall be applied to castings prior to assembly to assure all exposed areas will be covered. Valves shall be rated at 200 psi working pressure. Unless otherwise noted, underground valves shall have an operating nut and exposed valves shall have a hand wheel operator.
2. Valves smaller than 2" shall be either bronze, or PVC pressure class 200 rated non-corrosive material. <u>All service (2" and smaller) valves and fittings shall be submitted to The Town of Murphy for approval prior to installation.</u>

E. Valve Boxes
1. Each valve buried in the ground shall be provided with an approved type of valve box and cover. The boxes shall be adjustable slip-joint or screw type.
2. Valve Boxes shall be a cast iron in three pieces comprising the lower or base pieces which shall have a bell at the bottom to fit around the stuffing box gland and rest on the valve bonnet, the upper part of which shall be flared on the lower end to telescope on a socket to receive the cap or cover. Valve box

covers shall have the word "SEWER" cast in the cast iron lid. All castings shall be coated with asphalt or coal-tar varnish.

F. Steel Encasing Pipe

1. Steel Encasing Pipe shall be smooth wall, meeting or exceeding ASTM A – 139 Grade B 35,000 psi minimum yield strength with minimum wall thickness as defined below:

| CARRIER PIPE | CASING PIPE | THICKNESS |
|---|---|---|
| 6" DUCTILE IRON | 12" | .250" |
| 8" DUCTILE IRON | 16" | .250" |
| 10" DUCTILE IRON | 24" | .250" |
| 12" DUCTILE IRON | 24" | .250" |

2. Carrier Pipe Supports Within Steel Casing: shall be steel plate, cold formed structural collar with flanges and a minimum of four support legs welded to the collar. Each support leg shall have a foot or skid welded on the end extending beyond the front and back edge of the collar. The front and rear of each foot shall be angled inwardly towards the collar to serve as a stable, effective skid during installation of the carrier pipe. The carrier support shall be securely fastened to the carrier pipe with heavy duty ½" grade 5 bolt and locking nut passing between the flanges, compressing the collar against the carrier pipe.

**PART 3: EXECUTION**

## 3.01 INSTALLATION OF PIPE AND ACCESSORIES

A. General

1. Pipe work shall be installed at the location shown on the plans and to the position, alignment and grade shown thereon, or in the event of grade conflict, as directed by the Project Engineer. All pipe work shall also be installed in accordance with the details shown on the drawings, unless otherwise hereinafter specified or required. All pipe shall have a minimum depth coverage of 36". Sewers shall be laid and jointed in accordance with manufacturer's recommendations and shall be laid proceeding upgrade.
2. Handling pipe and Accessories: Pipe and accessories shall be handled in such a manner to insure delivery to the final location of installation in sound, undamaged condition and conforming in all respects to these specifications. All materials shall be maintained in a clean condition.
3. Placing Pipe in Trench: The interior of all pipe shall be thoroughly cleaned of all foreign matter before being lowered into the trench, and shall be kept clean and dry during laying operations by means of plugs or other approved methods. Trenches shall be kept free from water, and no trench water shall be allowed to enter the pipe or fittings. At all times when work is not in progress, all open ends of pipes and fittings shall be securely closed to the satisfaction of The Town of Murphy.
4. All gravity sewer shall be bedded in accordance with manufacturer's recommendation for the proposed depth of sewer, and as detailed in the contract drawings.

5. Encasements:
    a. Encasements shall be installed by boring and jacking unless field conditions require otherwise.
    b. Installation of encasement pipe shall include all related work and services such as mobilization of equipment, constructing and maintaining working pits, right-of-way maintenance and restoration, traffic maintenance, mining, excavations, dewatering, sheeting, shoring and bracing for embankments, operating pits, and as elsewhere required shall be placed and maintained in order that work may proceed safely and expeditiously.
    c. Installation of the casing pipe shall be carried out without disturbance of the embankment, pavement, tracks, or other railroad or highway facilities and without obstructing the passage of traffic at any time.
    d. The alignment and grade shall be carefully maintained and the encasement pipe installed in a straight line.
    e. The space outside the encasement and the ground shall be filled with grout, sand or pea gravel, as directed by The Town of Murphy. The Town of Murphy may direct that this space be filled if the space is large enough to cause any earth settling.
    f. Before the pipe is installed in the casing, carrier pipe supports shall be rigidly fastened to the barrel of the pipe. No contact will be permitted between the casing and the carrier pipeline.

B. Inspection
1. Inspection of Pipe: Inspection shall be conducted before lowering into trench and while suspended for defects and any defective, damaged or unsound pipe which shall be rejected and removed from the project site.
2. Trench Bottom: Bottom shall be excavated such that the full length of each section of pipe shall rest solidly upon a firm pipe bed with recesses excavated to accommodate the bells and joints. Any pipe that has the grade or joint disturbed after laying shall be taken up and re-laid.
3. Alignment of Pipe: Where pipe lines or runs intended to be straight, shall be so laid.
4. Laying Pipe: When laying a length of pipe in the trench, the spigot end shall be centered and the pipe pushed fully into position and brought into true and specified alignment.
5. Cutting Pipe: Pipe for closure pieces or for other reasons shall be done in a neat and workmanlike manner by a method which will not damage the pipe. Unless otherwise authorized by The Town of Murphy or the Project Engineer, all such cutting of pipe shall be done by means of mechanical cutters of an approved type, or types. Wheel cutters shall be used whenever practicable. The pipe ends shall be shaped as necessary to provide a good joint.

C. Lateral Separation of Sanitary Sewers and Water Mains
1. Water mains shall be laid at least 10 feet laterally from existing or proposed sewers, unless local conditions or barriers prevent a 10 foot lateral separation – in which case:
    a. The water main is laid in a separate trench, with the elevation of the bottom of the water main at least 18 inches above the top of the sewer; or

b. The water main is laid in the same trench as the sewer with the water main located at one side on a bench of undisturbed earth, and with the elevation of the bottom of the water main at least 18 inches above the top of the sewer.

2. Crossing a Water Main Over a Sewer: Whenever it is necessary for a water main to cross over a sewer, the water main shall be laid at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer, unless local conditions or barriers prevent an 18 inch vertical separation – in which case both the water main and the sewer shall be constructed of ferrous materials and with joints that are equivalent to water main standards for a distance of 10 feet on each side of the point of crossing.
3. Crossing a Water Main Under a Sewer: Whenever it is necessary for a water main to cross under a sewer, both the water main and the sewer shall be constructed of ferrous materials and with joints equivalent to water main standards for a distance of 10 feet on each side of the point of crossing. A section of water main pipe shall be centered at the point of crossing.

D. Lateral Separation of Sanitary Sewers and Storm Sewers

1. Whenever it is necessary for a sanitary sewer to cross a storm sewer, the sanitary sewer line shall be laid at such an elevation that the vertical separation from outside diameters of both lines shall be a minimum of 24".

E. Installation of Valves (Force Mains):

1. Valves installed in trenches shall be placed where shown on the drawings unless otherwise directed by the Project Engineer or The Town of Murphy.
2. Valves and valve boxes shall be set plumb, with valve boxes placed directly over the valves. After being correctly positioned, earth fill shall be carefully tamped around the valve box for a distance of 4 feet on all sides of the box.
3. Before installing any valve, care shall be taken to see that all foreign material is removed from the interior of the barrel.
4. After installation, each valve shall be opened and closed to insure that all parts are in proper working condition.
5. The valve box top shall be at finished grade elevation.
6. Each valve shall rest on stone bedding not less than 6 inches thick and 24 inches square.
7. Each valve box shall be provided with a standard concrete valve box protector as shown attached to these specifications. Valve box lids shall have "SEWER" cast into the lid.

## 3.02 TESTS

A. General

1. All pipe installations shall be tested as specified herein. Tests shall be performed in the presence of a Town of Murphy representative. Testing shall not be performed until such time that all work which may affect the results of the testing has been completed. Where a test section fails to meet test requirements, corrections shall be made as specified herein and the section retested. The retest procedure shall continue until such time as test requirements are met.

B. Air testing (Gravity Sewer)

1. After the pipe is laid and backfilled and the line is cleaned of dirt and foreign material, the pipe shall be subjected to an air test. Tests shall be conducted in strict accordance with the testing equipment manufacturer's instructions, including all recommended safety precautions. No one will be allowed in the manholes during testing. Equipment used for air testing shall be equipment specifically designed for this type of test, and is subject to approval of The Town of Murphy.
2. The test shall be performed only on clean sewer mains after services are installed and the pipe is completely backfilled. Clean sewer mains by propelling a snug fitting inflated rubber ball through the pipe with water. After completely cleaned, plug all pipe outlets with suitable test plugs. Brace each plug securely.
3. For pipe within test sections above the ground water table, add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to the starting pressure of 4 psig. After the starting pressure is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure. When pressure decreases to 3.5 psig, start stopwatch. Determine the time that is required for the internal air pressure to reach 2.5 psig.
4. For pipe with test sections below the ground water table, determine the starting pressure for the test section, in psig, as follows:
    a. Determine the maximum depth of pipe within the test section in feet.
    b. Multiply this depth by 0.67 and add 9.3 feet.
    c. Multiply the result in part 2 by 0.43 and round to the nearest 0.5 psig. After this starting pressure is obtained, continue the test in accordance with the procedure in the paragraph above.

5. The test section shall be acceptable if the elapsed time for pressure drop of 1.0 psig is greater than the sum of the times shown in the table below for all pipe sizes within the test section.

| Length | Pipe Diameter (inches) | | | | |
|---|---|---|---|---|---|
| | 4 | 6 | 8 | 10 | 12 |
| 25 | 0:04 | 0:10 | 0:18 | 0:28 | 0:40 |
| 50 | 0:09 | 0:20 | 0:35 | 0:55 | 1:19 |
| 75 | 0:13 | 0:30 | 0:53 | 1:23 | 1:59 |
| 100 | 0:18 | 0:40 | 1:10 | 1:50 | 2:38 |
| 125 | 0:22 | 0:50 | 1:28 | 2:18 | 3:18 |
| 150 | 0:22 | 0:59 | 1:46 | 2:45 | 3:58 |
| 175 | 0:26 | 1:09 | 2:03 | 3:13 | 4:37 |
| 200 | 0:31 | 1:29 | 2:21 | 3:40 | 5:17 |
| 225 | 0:35 | 1:39 | 2:38 | 4:08 | 5:40 |
| 250 | 0:40 | 1:49 | 2:56 | 4:35 | " |
| 275 | 0:44 | 1:59 | 3:14 | 4:43 | " |
| 300 | 0:48 | 2:19 | 3:31 | " | " |
| 350 | 0:53 | 2:38 | 3:47 | " | " |
| 400 | 1:02 | 2:50 | " | " | 6:03 |
| | | | | | |
| | | | | | |

6. If elapsed time is less than the specified amount, the Contractor shall locate and repair leaks and repeat the test until elapsed time exceeds the specified amount.
7. All costs of tapping the line and installing the corporation stops shall be incidental to construction and shall be borne by the Contractor.

C. Force Main Testing
1. After the pipe is laid and backfilled and the line is cleaned of dirt and foreign material, the pipe shall be subjected to a minimum hydrostatic pressure of 150 psi, if not stated otherwise.
2. The duration of each pressure test shall be at least two hours.
3. Each valved section of pipe shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge. The test shall be applied by means of a test pump connected to the pipe in a manner satisfactory to The Town of Murphy.
4. The Contractor shall furnish the pump, pipe connection, measuring device, pressure gauges and all other necessary apparatus.
5. Before applying the test pressure, all air shall be expelled from the section of line to be tested. If permanent air vents or other appurtenances are not located at all high points, brass corporation stops shall be installed at such points so the air can be expelled as the line is filled with water.
6. After all the air has been expelled, the corporation stops shall be closed and the test pressure applied. The corporation stops shall be left in the line after completion of the tests.

D. Force Main Leakage Testing
1. A leakage test shall be conducted on each line, or section of line, in accordance with AWWA C600 - 82, latest revision. Leakage shall be defined as the quantity of water that must be applied into the newly laid pipe, or any valved section thereof, to maintain the specified test pressure after the air in the pipe line has been expelled and the pipe has been initially filled with water. All visible leaks must be repaired regardless of the amount of leakage.
2. No pipe installation will be accepted if the leakage is greater than that determined by the formula:
   L = SDvP / 133,200 in which L is the allowable leakage in gallons per hours;
   S is the length of line tested in feet
   P is the average test pressure during the test period in psi gauge; and
   D is the nominal pipe diameter in inches.
3. If any test of pipe laid discloses leakage greater than that specified above, the defective joint or pipe shall be located and repaired, or replaced, until the leakage is within the specified allowance.

E. Deflection Test (Gravity Sewer)
1. Tests shall be performed in the presence of a Town of Murphy representative no sooner than thirty days after completion of backfill. A nine arm mandrel and proving ring will be provided. The mandrel shall be manually pulled, from manhole to manhole, through the entire length of mainline pipe.

2. All pipe shall allow passage of the test mandrel. The mandrel and proving ring shall be sized at 5% less than the ASTM dimension for the pipe in accordance with the following table:

| Nom. Dia. | L | ASTM D3034 SDR35 D | ASTM D2680 D |
|---|---|---|---|
| 8" | 8" | 7.28" | 7.4" |
| 10" | 10" | 9.09" | 9.31" |
| 12" | 12" | 10.79" | 11.22" |
| | | | |

L = Mandrel Contact Length; D= I.D. of Proving Ring.

3. All pipe that fails the deflection test shall be removed, replaced and retested. Lines which fail to meet tests shall be repaired and retested as necessary, until test requirements are complied with.

## 3.03 FINAL CLEANUP

A. Immediately after the completion of the work for any substantial unit or portion of it, all unused materials, refuse, etc. shall be removed, and the site of the work shall be left in a condition satisfactory of The Town of Murphy.

**END OF SECTION**

# SECTION 02731
# SEWER SERVICE LATERALS

## PART 1: GENERAL

### 1.01 SCOPE

This section covers the installation of sewer service laterals as shown on the plans. Sewer laterals shall be installed at the locations shown on the plans or where directed by the Town of Murphy or Engineer.

### 1.02 REFERENCES

American Society for Testing and Materials (ASTM)

## PART 2: MATERIALS

### 2.01 WYES AND SADDLES

Wyes or Saddles shall be standard 45 degree pattern fittings or saddles as specified herein. For ductile iron use factory made wye fittings with O-ring joints on the run of the wye. For ABS composite sewers, PVC composite sewers, or SDR 35 PVC sewers use either field installed solvent cemented saddles or O-ring joints on as shown or directed for lateral pipe. Branch joint shall be as specified for lateral pipe or shall be fitted with an approved adapter at the bell of the branch.

### 2.02 PIPE 6" AND SMALLER

Use one of the following:

1. ABS plastic sewer pipe conforming to ASTM D2751, SDR 35, with solvent cement joints and all required markings.
2. PVC plastic sewer pipe conforming to ASTM D3034, SDR 35, with either solvent cement or elastomeric gasket joints and all required marking.

### 2.03 BENDS

Bends shall be either one (1) 1/8 bend (45 degree) or two (2) 1/16 bends (22 ½ degree) of the same material and joint as used for pipe. Use sweep (long radius) bends if available.

### 2.04 ADAPTERS

Adapters shall be approved type, submittal required. Adapters shall be rubber coupling with stainless steel clamps or shall utilize compressible donut designed for the purpose. Adapters shall be Fernco or approved equal.

## PART 3: EXECUTION

### 3.01 GENERAL

Service laterals shall be properly installed at the location designated or as required to best service the property. All wyes, bends, stacks or service pipe and other appurtenances shall be provided as required for each connection. Have the location of the lateral verified by the Engineer or The Town of Murphy. Use alignment, minimum slope and minimum cover criteria to install the laterals as shown in Plan detail.

**3.02 WYES**

Bends shall be either one (1) 1/8 bend (45 degree) or two (2) 1/16 bends (22 ½ degree) of the same material and joint as used for pipe. Use sweep (long radius) bends if available.

**3.03 BENDS**

Bends shall be placed in the wyes using care to obtain proper alignment. Bends shall be adequately supported.

**3.04 STACK PIPE**

Stack pipe shall be installed at wye connections, to the elevation determined above. Pipe shall be carefully aligned and adequately supported.

**3.05 SERVICE PIPE**

Service pipe shall be installed to the proper line and grade from the sewer line to each property line. Suitable plugs or caps shall be placed in the end of the service lines and suitable markers installed for location proposed. Care should be taken during installation to minimize disturbing the developed lots. Laterals should be located to minimize the amount of service line set and bends used.

**3.06 CONNECTION TO MANHOLES**

Connection to manholes shall be similar to sewer connections to existing manholes as shown on the detail drawings.

**3.07 RECORD DRAWINGS**

An accurate record of each service location shall be provided. Such information should be maintained during construction on a field set of bluelines and should also include all wyes, bends, length of service line, whether or not a stack was installed, and length and angle of stack.

**3.08 TESTS**

Sewer service laterals shall pass air test as specified for gravity sewers.

**END OF SECTION**

# SECTION 02850
# MISCELLANEOUS VALVES AND APPURTENANCES

## PART 1: GENERAL

### 1.01 GENERAL SPECIFICATIONS

A. Scope
   1. This section shall include miscellaneous valves and appurtenances not specified elsewhere. All Valves and appurtenances shall be subject to approval by The Town of Murphy and installed by the Contractor as designated on the plans in accordance with the installation specifications.

### 1.02 SUBMITTALS

A. Shop Drawings
   1. The Contractor shall submit 3 sets of shop drawings for review by The Town of Murphy. The shop drawings shall include installation drawings, materials of construction, and catalogue cut sheets for all materials being supplied.

B. Operation and maintenance manuals
   1. A minimum of 3 copies of operation and maintenance manuals shall be submitted to The Town of Murphy prior to start up.

### 1.03 DELIVERY, STORAGE AND HANDLING

No shipment shall be made until approved by The Town of Murphy. All materials shall be properly protected so that no damage or deterioration shall occur during shipment or storage. All storage and handling shall be in strict accordance with the manufacturer's recommendations.

### 1.04 WARRANTY

All valves and appurtenances shall be warranted to be free from defects in workmanship, design and materials for a period of one (1) year. If any part of the equipment shall fail during the warranty period, it shall be repaired or replaced at no cost to The Town of Murphy.

## PART 2: PRODUCTS

### 2.01 VALVES

A. Check Valves (sewage applications)
   1. Swing check valves smaller than 3" shall be single disc with renewable bronze seat rings, bronze discs or disc rings and bronze disc hinges and pins and shall be designed to give a full diameter passage.

2. Swing check valves 3" and larger shall be constructed with heavy cast-iron or cast-steel body with a bronze or stainless steel seat ring and a non-corrosive shaft for attachment of weight and lever. The valves shall absolutely prevent the return of water back through the valve when the inlet pressure decreases below the outlet pressure. The valve disc shall be of cast –iron or cast-steel sand shall be suspended from a non-corrosive shaft.

B. Plug Valves

1. Plug valves shall be of the ¼ turn, non-lubricated or permanently lubricated type. Plug valves shall have thru-port area equal to 100% of the line size. The valves shall be serviceable without moving the body from the pipeline and shall be capable of sealing rated pressure in either direction. The sealing arrangement shall be of the constant interference type with consistent opening torque and shall be non-binding in the closed position. The rubber thru-port seal shall be a full circle seat not penetrated by the valve shaft and shall be field replaceable on the existing vane. The hand lever operator shall have a position indicator that will hold the valve at 10 degree increments from open to close. The operator shall be capable of being locked at these positions. All valves shall be subjected to a 175 psi thru-port seal test and a 350 psi assembled valve hydrostatic test.

C. Air/Vacuum Release Valves

1. An Air/Vacuum valve shall be installed on the sewage force main at the locations shown on the plans. Generally an Air/Vacuum valve shall be installed at high points, increased down slopes, decreased upward slopes, long ascents, long descents and at long horizontal runs.
2. The Air/Vacuum valve shall be a combination valve designed to exhaust large amounts of air during filling of the force main, to release small amounts of accumulated air during operation, and to admit large amounts of air upon impending vacuum during draining.
3. The valve shall be float operated and both the air/vacuum and air release functions shall be housed in a single body. The valve body and cover shall be of cast iron conforming to ASTM Specifications A126, Class B. All leverage mechanisms, parts and the spherical float shall be stainless steel, Grade 304. The large and small orifice seats shall be Buna-N and shall be renewable.
4. The Air/vacuum valve shall be supplied with flushing attachments to allow periodic flushing of sediment, grease, and solids. Flushing attachments shall consist of an inlet isolating valve, bronze blow-off and flushing valves, and a minimum of five feet of rubber hose with quick disconnects to allow connection to a source of clean flushing water. The air/vacuum valve shall be Duo-Matic as manufactured by G.A. Industries,
    1. Inc., Mars, PA, or approved equal.
5. All Air/Vacuum valves shall be installed in a manhole, meeting the requirements of Section 2601 of the specifications. The manhole shall not have a base and shall have cut-outs for the sewage force main. The manhole shall be installed such that no load is applied to the pipe, and shall have 8-

inch minimum washed stone in the bottom with just the top of the sewage force main pipe showing.

**PART 3: EXECUTION**

**3.01 INSTALLATION**

All valves and appurtenances shall be installed as shown on the plans and in strict accordance with the manufacturer's recommendations.

**3.02 QUALITY CONTROL AND TESTING**

A. Quality control

The manufacturer shall provide the services of a fully qualified representative for at least one (1) day to inspect the installation and provide start-up, operator, and training services.

B. Field Testing

A representative of the manufacturer shall perform field tests to demonstrate that the performance of the equipment meets the specifications in the presence of a Town of Murphy representative.

**END OF SECTION**

# SECTION 02901
# SITE STABILIZATION

## PART 1: GENERAL

### 1.01 SCOPE OF WORK

This section covers the furnishing of all labor, equipment and materials necessary for the establishment of vegetation of all areas of the site disturbed by construction operations and all earth surfaces of embankments including rough and fine grading, topsoil if required, fertilizer, lime, seeding and mulching. The Contractor shall adapt his operations to variations in weather or soil conditions as necessary for the successful establishment and growth of the grasses and legumes.

## PART 2: PRODUCTS

### 2.01 MATERIALS

A. FERTILIZER

1. The quality of fertilizer and all operations in connection with the furnishing of this material shall comply with the requirements of the North Carolina Fertilizer Law and regulations adopted by the North Carolina Board of Agriculture.
2. Fertilizer shall be 10-10-10 grade or 5-10-10 or as noted in the plans. Upon written approval of The Town of Murphy a different grade of fertilizer may be used, provided the rate of application is adjusted to provide the same amounts of plant food.
3. During handling and storing, the fertilizer shall be cared for in such a manner that it will be protected against hardening, caking, or loss of plant food values. Any hardened or caked fertilizer shall be pulverized to its original conditions before being used.

B. LIME

1. The quality of lime and all operations in connection with the furnishing of this material shall comply with the requirements of the North Carolina Lime Law and regulations adopted by the North Carolina Board of Agriculture.
2. During the handling and storing, the lime shall be cared for in such a manner that it will be protected against hardening and caking. Any hardened or caked lime shall be pulverized to its original conditions before being used.
3. Lime shall be agriculture grade ground dolomitic limestone. It shall contain not less than 85% of the calcium and magnesium carbonates and shall be of such fineness that at least 90% will pass a No. 10 sieve and at least 50% will pass a No. 100 sieve.

C. SEED

1. The quality of seed and all operations in connection with the furnishing of this material shall comply with the requirements of the North Carolina Seed Law and regulations adopted by the North Carolina Board of Agriculture. Seed shall have been approved by the North Carolina Department of Agriculture or any agency approved by The Town of Murphy before being sown, and no seed will be accepted with a date of test more than 9 months prior to the date of sowing. Such testing however, will not relieve the Contractor from responsibility for furnishing and sowing seed that meets these specifications at the time of sowing. When a low percentage of germination causes the quality of the seed to fall below the minimum pure live seed specified, the Contractor may elect, subject to the approval of The Town of

Murphy, to increase the rate of seeding sufficiently to obtain the minimum pure live seed contents specified, provided that such an increase in seeding does not cause the quantity of noxious weed seed per square yard to exceed the quantity that would be allowable at the regular rate of seed.

2. During handling and storing, the seed shall be cared for in such a manner that it will be protected from damage by heat, moisture, rodents or other causes.
3. Seed shall be entirely free from bulblets or seed of Johnson Grass, Nutgrass, Sandbur, Wild Onion, Wild Garlic, and Bermuda Grass. The specifications for restricted noxious weed seed refers to the number per pound, singly or collectively, of Blessed Thistle, Wild Radish, Canada Thistle, Corncockle, Field Bindweed, Quackgrass, Dodders, Dock, Horsenettle, Bracted Plantain, Buckhorn or Wild Mustard; but in no case shall the number of Blessed Thistle or Wild Radish exceed 27 seeds of each per pound. No tolerance on weed seed will be allowed.

D. MULCH

Straw Mulch shall be threshed straw of oats, rye or wheat free from matured seed of obnoxious weeds or other species which would grow and be detrimental to the specified grass.

E. TACKIFIER

Emulsified asphalt or organic tackifier such as Reclamare R2400 shall be sprayed uniformly on mulch as it is ejected from blower or immediately thereafter. Tackifier shall be applied evenly over area creating uniform appearance. Rates of application will vary with conditions. Asphalt shall not be used in freezing weather.

**PART 3: EXECUTION**

**3.01 PREPARATION**

A. PROTECTION OF EXISTING TREES AND VEGETATION

1. Protect existing trees and other vegetation indicated to remain in place against cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide wood or metal stakes set on 8 to 10 foot centers and connected at a 4' -0" height by 2" minimum brightly colored flagging tape to protect trees and vegetation to remain. Set perimeter of protection at the drip line of trees to remain unless approved otherwise by The Town of Murphy.
2. Provide protection for roots over 1-1/2" diameter cut during construction operations. Cleanly cut off end of damaged root and coat cut faces with emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out and cover with earth as soon as possible.
3. The Contractor shall not remove or damage trees and shrubs which are outside the Clearing Limits established by the Owner or those within the Clearing Limits designated to remain.
4. Repair trees scheduled to remain and damaged by construction operations in a manner acceptable to The Town of Murphy. Repair damaged trees promptly to prevent progressive deterioration caused by damage.
5. Replace trees scheduled to remain and damaged beyond repair by construction operations, as determined by The Town of Murphy with trees of similar size and species. Repair and replacement of trees scheduled to remain and damaged by construction operations or lack of adequate protection during construction operations shall be at the Contractor's expense.

B. GRADING

1. Rough grading shall be done as soon as all excavation required in the area has been backfilled. The necessary earthwork shall be accomplished to bring the existing ground to the desired finish elevations as shown on the Contract Drawings or otherwise directed.
2. Fine grading shall consist of shaping the final contours for drainage and removing all large rock, clumps of earth, roots and waste construction material. It shall also include thorough loosening of the soil to a depth of 6" by plowing, discing, harrowing or other approved methods until the area is acceptable as suitable for subsequent landscaping operations. The work of establishing vegetation shall be performed on a section by section basis immediately upon completion of earthwork or pipeline installation.
3. Upon failure or neglect on the part of the Contractor to coordinate his grading with seeding and mulching operations and diligently pursue the control of erosion and siltation, The Town of Murphy may suspend the Contractor's grading operations until such time as the work is coordinated in a manner acceptable to The Town of Murphy.

C. SEEDBED PREPARATION

1. The Contractor shall cut and satisfactorily dispose of weeds or other unacceptable growth on the areas to be seeded. Uneven and rough areas outside the graded section, such as crop rows, farm contours, ditches and ditch spoil banks, fence line and hedgerow soil accumulations, and other minor irregularities which cannot be obliterated by normal seedbed preparation operations, shall be shaped and smoothed as directed by The Town of Murphy to provide for more effective seeding and for ease of subsequent mowing operations.
2. The soil shall then be scarified or otherwise loosened to a depth of not less than 6" except as otherwise provided below or otherwise directed by The Town of Murphy. Clods shall be broken and the top 2" to 3" of soil shall be worked into an acceptable seedbed by the use of soil pulverizers, drags, or harrows; or by other methods approved by The Town of Murphy.
3. On 2: 1 slopes a seedbed preparation will be required that is the same depth as that required on flatter areas, although the degree of smoothness may be reduced from that required on the flatter areas if so permitted by The Town of Murphy.
4. On cut slopes that are steeper than 2: 1, both the depth of preparation and the degree of smoothness of the seedbed may be reduced as permitted by the Project Engineer, but in all cases the slope surface shall be scarified, grooved, trenched, or punctured so as to provide pockets, ridges, or trenches in which the seeding materials can lodge.
5. On cut slopes that are either 2: 1 or steeper, the Project Engineer may permit the preparation of a partial or complete seedbed during the grading of the slope. If at the time of seeding and mulching operations such preparation is still in condition acceptable to The Town of Murphy, additional seedbed preparation may be reduced or eliminated.
6. The preparation of seedbeds shall not be done when the soil is frozen, extremely wet, or when The Town of Murphy determines that it is in an otherwise unfavorable working condition.

## 3.02 APPLICATION

A. Seed shall be applied by means of a hydro-seeder or other approved methods. The rates of application of seed, fertilizer and limestone shall be as stated in Table 1.

B. Equipment to be used for the application, covering or compaction of limestone, fertilizer, and seed shall have been approved by The Town of Murphy before being used on the project. Approval may be revoked at any time if equipment is not maintained in satisfactory working condition, or if the equipment operation damages the seed.

C. Limestone, fertilizer, and seed shall be applied within 24 hours after completion of seedbed preparation unless otherwise permitted by The Town of Murphy, but no limestone or fertilizer shall be distributed and no seed shall be sown when The Town of Murphy determines that weather and soil conditions are unfavorable for such operations.

D. Limestone may be applied as a part of the seedbed preparation, provided it is immediately worked into the soil. If not so applied, limestone and fertilizer shall be distributed uniformly over the prepared seedbed at the specified rate of application and then harrowed, raked, or otherwise thoroughly worked or mixed into the seedbed. Seed shall be distributed uniformly over the seedbed at the required rate of application, and immediately harrowed, dragged, raked, or otherwise worked so as to cover the seed with a layer of soil. The depth of covering shall be as directed by The Town of Murphy. If two kinds of seed are to be used which require different depths of covering, they shall be sown separately.

E. When a combination seed and fertilizer drill is used, fertilizer may be drilled in with the seed after limestone has been applied and worked into the soil. If two kinds of seed are being used which require different depths of covering, the seed requiring the lighter covering may be sown broadcast or with a special attachment to the drill, or drilled lightly following the initial drilling operation.

F. When a hydraulic seeder is used for application of seed and fertilizer, the seed shall not remain in water containing fertilizer for more than 30 minutes prior to application unless otherwise permitted by The Town of Murphy.

G. Immediately after seed has been properly covered the seedbed shall be compacted in the manner and degree approved by The Town of Murphy.

H. When adverse seeding conditions are encountered due to steepness of slope, height of slope, or soil conditions, The Town of Murphy may direct or permit that modifications be made in the above requirements which pertain to incorporating limestone into the seedbed; covering limestone, seed, and fertilizer; and compaction of the seedbed. Such modifications may include but not be limited to the following:
    1. The incorporation of limestone into the seedbed may be omitted on (a) cut slopes steeper than 2:1; (b) on 2:1 cut slopes when a seedbed has been prepared during the excavation of the cut and is still in an acceptable condition; or (c) on areas of slopes where the surface of the area is too rocky to permit the incorporation of the limestone.
    2. The rates of application of limestone, fertilizer, and seed on slopes 2: 1 or steeper or on rocky surfaces may be reduced or eliminated.
    3. Compaction after seeding may be reduced or eliminated on slopes 2: 1 or steeper, on rocky surfaces, or on other areas where soil conditions would make compaction undesirable.

I. MULCHING
    1. All seeded areas shall be mulched unless otherwise indicated in the special provisions or directed by the Project Engineer.
    2. It shall be spread uniformly at a rate of two tons per acre in a continuous blanket over the areas specified.
    3. Before mulch is applied on cut or fill slopes which are 3: 1 or flatter, and ditch slopes, the Contractor shall remove and dispose of all exposed stones in excess of 3" in diameter and all roots or other debris which will prevent proper contact of the mulch with the soil. Mulch shall be applied within 24 hours after the completion of seeding unless otherwise permitted by the Project Engineer. Care shall be

exercised to prevent displacement of soil or seed or other damage to the seeded area during the mulching operation.

4. Mulch shall be uniformly spread by hand or by approved mechanical spreaders or blowers which will provide an acceptable application. An acceptable application will be that which will allow some sunlight to penetrate and air to circulate but also partially shade the ground, reduce erosion, and conserve soil moisture.
5. Mulch shall be held in place by applying a sufficient amount of asphalt or other approved binding material to assure that the mulch is properly held in place. The rate and method of application of binding material shall meet the approval of The Town of Murphy. Where the binding material is not applied directly with the mulch it shall be applied immediately following the mulch application.
6. The Contractor shall take sufficient precautions to prevent mulch from entering drainage structures through displacement by wind, water, or other causes and shall promptly remove any blockage to drainage facilities which may occur.

## 3.03 MAINTENANCE

A. The Contractor shall keep all seeded areas in good condition, reseeding if and when necessary, until an acceptable stand of grass is established over the entire area seeded and shall maintain these areas in an approved condition until final acceptance of the Contract.

B. Grassed areas will be accepted when a 95% cover by permanent grasses is obtained and weeds are not dominant. On slopes, the Contractor shall provide against washouts by an approved method. Any washouts which occur shall be regraded and reseeded until a good sod is established.

C. Areas of damage or failure due to any cause shall be corrected by being repaired or by being completely redone as may be directed by The Town of Murphy. Areas of damage or failure resulting either from negligence on the part of the Contractor in performing subsequent construction operations or from not taking adequate precautions to control erosion and siltation as required throughout the various sections of the specifications, shall be repaired by the Contractor as directed by The Town of Murphy at no cost to The Town of Murphy.

### TABLE I - APPLICATION RATES

A. LIME AND FERTILIZER

In the absence of a soil test, the application of limestone and fertilizer shall be as noted within the "Seeding Schedule" located in the construction plans.

B. MULCH

In the absence of a soil test, the application of mulch shall be as noted within the "Seeding Schedule" located in the construction plans.

C. TEMPORARY SEED

The kinds of seed and the rates of Application shall be as contained in this table. All rates are in pounds per acre.

1. Winter/Early Spring (Normally Feb 15 to May 15)

   120 pounds of Rye (grain) and 50 pounds of Annual Lespedeza (Korean)

2. Summer (Normally May 15 to August 15)

   40 pounds of German millet

3. Fall (Normally August 15 to December 15)

   120 pounds of Rye (grain)

D. PERMANENT SEED

Reference the seeding schedule provided on the construction drawings for the appropriate seeding dates and mixtures for permanent seeding measures.

END OF SECTION

# SECTION 02905
# RESTORATION OF SURFACES

## PART 1: GENERAL

### 1.01 SCOPE OF WORK

A. This section covers the furnishing of all labor, equipment and materials necessary for the proper restoration of existing surfaces disturbed or damaged as a result of construction operations which are not specifically scheduled or specified for topsoil and seeding, paving, landscaping or other surfacing.

B. In general, the types of replacement included in this section are seeding along pipelines, concrete sidewalks, driveways, roadways, ditches, lawns and landscaped areas, curb and gutter.

C. Any damage to existing structures shall be repaired using materials and workmanship equal to those of original construction.

## PART 2: NOT USED

## PART 3: EXECUTION

### 3.01 RESTORATION OF SURFACES

A. SEEDING ALONG PIPELINES

1. All ground surfaces along pipelines, which are not classified as lawns, landscaped areas, or pavement areas, but would be classified as open fields, shall be raked smooth and seeded in accordance with section 02901 entitled Site Stabilization. Large rocks, clumps of earth and excessive spoil material shall be removed from the area prior to seeding.
2. Shoulders of all roads shall be restored as specific for lawns and landscaped areas.
3. Wooded areas, not classified as lawns shall be restored to as near their original condition as possible.

B. CONCRETE SIDEWALKS

1. Concrete walks removed in connection with, or damaged as a result of, construction operations under the Contract shall be replaced with new construction. Such walks shall be constructed of Class B concrete on a thoroughly compacted sub grade, shall have a vertical thickness of not less than 4" or the thickness of the replaced walk where greater than 4".

2. Walks shall be float finished, edged with an edging tool, and grooved at intermediate intervals not in excess of the width of the walk, uniform throughout the length of the walk in anyone direction.

C. DRIVEWAYS

1. Unpaved driveways shall be surfaced with not less than 3" of Crusher-run gravel, topped with 3" of stone, gravel, or other materials equal to that found in the original driveway. Driveways shall be left in a condition better than their original condition.
2. Concrete drives shall be replaced with Class B concrete and shall have equal thickness and reinforcing steel to that of the original drive. Prior to placing the concrete a 6" aggregate base course shall be placed in the drive area.
3. Bituminous or Asphaltic concrete drives shall be restored with a 6" aggregate base course and a 2" surface course, as defined in the section entitled Bituminous Pavement Repairs.

D. ROADWAY REPLACEMENT

1. Bituminous or Asphaltic pavements shall include all areas paved with blacktop; built-up pavements or oil and stone, tar and stone and similar pavements constructed with a bituminous or asphalt and stone materials.
2. Immediately upon completion of installation of underground piping and structures, the trench shall be backfilled and the roadway shall be repaired. **In** the excavated area, the repair shall consist of an 8" aggregate base course, 4" HB Binder Course and a 2" surface course as defined in the section entitled Bituminous Pavement Repairs. If, in the opinion of The Town of Murphy, the area adjacent to the excavation has not been damaged to the extent that the base course need to be replaced, restoration may consist of a surface course of sufficient thickness to meet the existing pavement.
3. Portland cement concrete roadways shall be replaced with Class B concrete and shall have equal thickness and reinforcing steel as the original roadway. An aggregate of 6" shall be placed prior to the placing of concrete.
4. Differential settlement of restored pavements shall be corrected immediately.
5. The Contractor shall repair and restripe any traffic markings that were damaged, removed or covered during construction. All work shall be done in accordance with NCDOT requirements and specifications.
6. All existing manhole and valve covers shall be raised as required by the Contractor prior to paving. The cost of this work shall be included in the unit bid prices for other related work and no additional payment shall be made.

E. DITCHES

1. Ditches shall be re-graded to the original grade and line. The surface of all ditches shall be returned to the same condition as found before commencing work.

F. LAWNS AND LANDSCAPED AREAS

1. Lawns and landscaped areas shall be re-graded and replaced as follows:

    a. Grading shall be to the grade existing before construction of the work under this Contract.

    b. Lawn replacement shall be in accordance with the section entitled Landscaping. Topsoiled areas shall be replaced with topsoil of equal quality and quantity.

2. Landscaped areas shall be replaced with shrubs, hedges, ornamental trees, flowers, or other items to original condition.

G. CURB AND GUTTER

1. Curb and gutter removed with, or damaged as a result of construction operations, injured or disturbed by the Contractor, his agents, or employees, shall be replaced with new construction to a condition similar and equal to that existing before damage was incurred. Class B Concrete shall be used in curb and gutter replacement.

H. DAMAGE TO STRUCTURES

1. Any damage to existing structures shall be repaired of materials and workmanship equal to those of original construction. Extensively damaged structures, where the structural stability has been affected or which cannot be repaired in a suitable fashion shall be replaced entirely. Replacement shall not commence until approval of the plan of replacement has been given by The Town of Murphy. Replacement costs shall be responsibility of the Contractor.

**END OF SECTION**

TOWN OF MURPHY

FATS, OIL, AND GREASE (FOG) CONTROL

Standard and Specification requirements based on the Town of Murphy Sewer Use Regulations Ordinance

## SECTION 1 – PURPOSE

1.1 This portion of the Town of Murphy Standards and Specifications provides guidelines and procedures to ensure compliance with the Town of Murphy's Sewer Use Regulations Ordinance. These guidelines are designed to prevent the introduction of pollutants into the publicly owned treatment works that will interfere with its operation and to aid in the prevention of sanitary sewer blockages and obstructions from contributions and accumulation of fats, oils, and greases discharged to the sanitary sewer system from industrial, commercial or other nonresidential establishments.

## SECTION 2 – POLICY

2.1 The Town of Murphy, like most water and sewer utilities, continues to experience sewer blockages caused by the accumulation of fats, oils and greases (FOG) in the wastewater collections system. Wastewaters containing FOG can be discharged into the system from several sources, but the major contributors are food service and vehicle maintenance operations. In order to reduce sewer blockages, customers in the Town of Murphy service area that discharge wastewater containing grease and oils are required to install, properly operate and maintain a grease trap/interceptor or oil-water separator.

2.2 Grease, oil-water interceptors/traps/separators shall be provided when, in the opinion of Town of Murphy, they are necessary for the proper handling of liquid wastes containing floatable oil, or other potentially harmful ingredients; except that such interceptors shall not normally be required for private living quarters or dwelling units. All grease, oil-water interceptors/traps/separators shall be approved by the Town of Murphy Administrator and the type and capacity shall be certified by a qualified professional, such as an engineer, as meeting the Town of Murphy's requirements. All units shall be easily accessible for cleaning, testing and inspection.

## SECTION 3 – DEFINITIONS

3.1 Cooking Establishments: Those establishments primarily engaged in activities of preparing, serving, or otherwise making available food for consumption and that use one or more of the following preparation activities: cooking by frying (all methods), baking (all methods) , grilling, sautéing, rotisserie cooking, broiling (all methods), boiling, blanching, roasting, toasting, or poaching. Also included are infrared heating, searing, barbecuing, and any other food preparation activity that produces a hot, non-drinkable food product in or on a receptacle that requires washing.

3.2 Fats, Oils, and Greases: Organic polar compounds derived from animal and/or plant sources that contain multiple carbon chain triglyceride molecules. These substances are detectable and measurable using analytical test procedures established in 40 CFR 136, as may be amended from time to time. All are sometimes referred to herein as "grease" or "greases".

3.3 Food Preparation or Serving Facility: Any commercial or industrial facility that prepares or serves food, including but not limited to a restaurant, café, cafeteria, snack bar, grill, deli, catering service, bakery, grocery store, butcher shop, or similar establishment.

3.4 Grease Interceptor: A device typically located outside of the facility served, typically underground and rated in gallons of capacity. This device is used for separating and retaining waterborne greases and grease complexes prior to the wastewater exiting the interceptor and entering the Town of Murphy sanitary sewer collection and treatment system. These devices also serve to collect settled solids, generated by and from food preparation activities, prior to the water exiting the interceptor and entering the sanitary sewer collection and treatment system.

3.5 Grease Traps: A device typically located inside a food service facility designed for separating and retaining waterborne greases and grease complexes prior to the wastewater exiting the trap and entering the Town of Murphy sanitary sewer collection and treatment system. These devices are typically rated at flow rates of no more than 100 gallons per minute (gpm). “Note: Use of all devices of this type requires a variance approval from the Town of Murphy Public Works Director”.

3.6 Minimum Design Capability: The design features of a grease interceptor and its ability or volume required to effectively intercept and retain greases from grease-laden wastewaters discharged to the public sanitary sewer.

3.7 Non-Cooking Establishments: Those establishments primarily engaged in the preparation of precooked foodstuffs that do not include any form of cooking. These include cold dairy and frozen foodstuffs preparation and serving establishments.

3.8 Oil-Water Separators: A device typically located outside the facility served and typically underground, rated in gallons of capacity. This device is used to separate oil, sand and other debris from vehicle maintenance facilities, car washes and trash dumpster pads.

3.9 Town of Murphy Public Works Director: The person or persons designated by the Town of Murphy Town Manager to administer the guidelines, procedures and practices set forth in this document.

3.10 User: Any person, including those located outside the jurisdictional limits of the Town of Murphy, who contribute, cause or permit the contribution or discharge of wastewater into the Town of Murphy sewer collections system, including persons who contribute such wastewater from mobile sources, such as those who discharge hauled wastewater.

3.11 Vehicle Maintenance Facility: Any commercial or industrial facility where automobiles, trucks or equipment are serviced or maintained, including garages, service stations, repair shops, oil and lubrication shops, car washes or similar establishments.

SECTION 4 – APPLICABILITY

4.1 The following types of facilities will be required to have grease interceptors/traps: restaurants, schools, hospitals, nursing homes, and any other facility that handles grease and which discharges wastewater containing grease into the Town of Murphy sewer collection system. All such establishments are required to have a properly sized and functioning

grease interceptor/trap which a qualified professional has certified to the Town of Murphy is designed to meet the Town of Murphy's Sewer Use Regulations Ordinance and grease and oil control requirements.

4.2 All Vehicle Maintenance Facilities will be required to have oil-water separators. All separators at such establishments shall be properly sized by a qualified professional and certified to the Town of Murphy that the design meets the Town of Murphy's Sewer Use Regulations Ordinance and Grease and Oil Control requirements.

4.3 Facilities other than those noted in Section 4.1 and 4.2 may require the installation of a grease interceptor/trap and/or an oil-water separator. The Town of Murphy Public Works Director shall determine the need and applicability of such device.

SECTION 5- DESIGN

5.1 The following documents shall be submitted to the Town of Murphy Public Works Director for review and approval prior to issuance of a permit for installation of an interceptor/trap/separator:

♦ Grease and Oil Control Fact Sheet.

♦ A site plan showing the location of the interceptor/trap/separator, lines, cleanout(s) and manholes. The submittal will also include a plan view of the kitchen area showing all fixtures and associated connections to the interceptor/trap/separator.

♦ A detail of the proposed interceptor/trap/separator demonstrating the unit complies with all requirements outlined herein.

♦ A Formula and Calculation Sheet used to determine the interceptor / trap capacity in total volume (gallons) or rate of flow (gallons/minute), signed by a Professional Engineer, Registered Architect or licensed Plumber. The applicant should select the form that is best suited for their particular application.

♦ Oil-Water separators shall be sized as stated in 5.11.

♦ Note: Once the applicant's design is approved, any changes to the approved plan must be approved, in advance and in writing, by the Town of Murphy Public Works Director prior to implementation of any change.

5.2 Drainage systems conveying sanitary waste (toilets, lavatories, etc.) shall not be connected to the influent side of the interceptor/trap/separator.

5.3 Dishwashers equipped with booster heaters and/or using water in excess of 140° F shall not pass through any grease interceptor/trap.

5.4 Food Waste Grinders: Waste from these units shall be discharged directly into the building's sewage plumbing system without passing through a grease interceptor/trap. All other fixtures and drains receiving kitchen or food preparation wastewater shall pass through a grease interceptor/trap.

5.5 Access Manholes for Grease Interceptors/Separators: Shall have a minimum diameter of 24" (inches) and shall be provided over each chamber. The access manholes shall extend at least to finished grade and be designed and

maintained to prevent water inflow or infiltration. The manholes shall be constructed in accordance with The Town of Murphy Standard Details.

5.6 Grease interceptors/traps/separators shall be vented in accordance with the North Carolina Plumbing Code.

5.7 Grease interceptor/separators shall be designed using standard engineering principles for sedimentation and floatation in gravity separators. Baffles and good inlet and outlet design are required to deflect the flow across the surface areas of the units and sufficient grease and solids storage capacity is required. Grease interceptors and oil water separators shall be rated for the design capacity in total gallons. Some oil water separators may be sized in gpm. This requirement will be handled on a case by case basis.

5.8 All interceptors and oil/water/sand separators of the pre-cast type shall have an inlet "T" (terminating a minimum of 18" above bottom of tank), a Baffle "T" (terminating a minimum of 12" above the bottom of tank) and an outlet "T" (terminating a minimum of 12" above bottom of tank). All "T's" shall extend above the water level line of the interceptor/trap/separator.

5.9 All interceptors shall be located outside of the building in such a manner that the Town of Murphy personnel are able to inspect the interceptor at any time.

5.10 Full size cleanouts shall be installed at both the inlet and outlet side of the interceptor.

5.11 Oil-Water separators shall be sized based on the following information:

♦ Car wash: Facilities containing two or fewer bays require a 1,000 gallon separator. Facilities containing three or four bays will require two 1,000 gallon separators. Facilities containing five or six bays will require three 1,000 gallon separators.

♦ Vehicle Maintenance shop: separator will be sized assuming that each floor drain in the maintenance shop shall have a flow rate of 50 gpm.

♦ Dumpster Pads: a 500 gallon separator is required per floor drain.

5.12 The use of Enzymes, grease solvents, thermal sources, emulsifiers, biological additives, etc. are not permitted.

5.13 Grease traps/interceptors/separators shall be installed by licensed plumbers or other firms with expertise and significant experience in grease trap/interceptor installation.

SECTION 6 – EXISTING ESTABLISHMENTS

6.1 Existing establishments subject to this Policy without a grease trap/interceptor/separator unit in place on the effective date of this Policy: If excessive grease buildup is noted in the collection system and/or excessive collection system maintenance is required in the collection system and/or sanitary sewer blockages occur in the sanitary sewer system below the facility without a grease trap/interceptor/separator unit the Town of Murphy reserves the right to require the establishment to install a grease trap/interceptor/separator unit.

6.2 Existing establishments that have an existing grease interception or oil-water separation system: If the system does not meet Town of Murphy's standards the owner may be required to upgrade the system in accordance with this Policy.

However, the Town of Murphy Public Works Director in some cases may allow the establishment to continue use of the present system subject to requirements such as the adoption of increased maintenance and cleaning frequencies.

6.3 The Town of Murphy shall be notified of any operational or process changes (food preparation methods, equipment, additional bays, floor drains, etc.) at any approved establishment. Establishments that modify their operations in a manner that will result in increased loadings of grease, fats or oils to their existing interceptor/trap/separator may be required to upgrade their interceptor/trap/ separator to meet current requirements and standards.

SECTION 7 – SERVICING, INSPECTIONS AND RECORDS

7.1 Regular servicing and maintenance are essential for the efficient operation of grease interceptors/traps/separators. All interceptors/traps/separators shall be maintained by the Owner(s) at the Owner(s) expense to ensure efficient, effective operation at all times. All interceptors/separators shall be serviced and emptied of accumulated waste as required in order to maintain minimum design capability or effective volume of the interceptor/separator. Servicing frequency is site-specific and is dependent on the amount of oil and grease and suspended solids generated at each operation and the size of the grease interceptor or oil-water separator. The frequency of cleaning shall be no more than every 60 days on interceptors/separators 1000 gallons and larger. The frequency of cleaning shall be no more than every 45 days for smaller capacity units (between 200 and 999 gallons). PDI rated trap units, and inside traps (under sinks, in floor, etc.), shall have a cleaning frequency of no more than every 7 days or as otherwise specified in the Town of Murphy's approval letter for the system.

7.2 Grease interceptors/separators (200 gallons or larger) shall be cleaned/pumped by a properly licensed cleaning and disposal agent (as per NCGS 130A-291). Cleaning shall include the complete removal of all contents within the interceptor/separator. Back flushing of the interceptor or its wastes is prohibited. The owner shall ensure no waste or wastewater from the interceptor/separator is introduced into the Town of Murphy's collection system, into the environment, or otherwise improperly disposed of during cleaning/maintenance operations. Records demonstrating that cleaning/pumping operations were performed by properly licensed agents shall be maintained by the Owner(s) and this information shall be made available to the Town of Murphy upon request.

7.3 Grease traps (PDI rated units) may be cleaned/pumped by Owner(s) if a septage permit issued by the State of North Carolina is obtained by that Owner (per NCGS 130A-290(32)). Owner(s) not holding a valid permit shall use a properly licensed cleaning and disposal agent.

7.4 All users, including food preparation/servicing facilities and vehicle maintenance facilities shall maintain a written record of maintenance performed on the interceptor for a minimum of three years. The record shall indicate the date and time of service and shall include the name of the agent that performed the maintenance/cleaning work. Upon request, all such records will be made available for inspection by the Town of Murphy.

7.5 Inspection of the interceptors/traps/separators will be performed periodically by Town of Murphy personnel. The owner/employees of the facility shall be responsible, upon request, for opening all plates, lids, covers, doors, etc. as necessary to allow inspections to be conducted. The Town of Murphy shall not be held liable for any and all damage that may occur as result of these inspections.

7.6 On any occasion where interceptor/traps/separators are found to be in need of cleaning, all required actions necessary to remedy the deficient condition(s) shall be completed within 14 calendar days of the date the deficiency was reported. All interceptors/traps/separators found to be in need of maintenance or repair shall have those conditions corrected within 30 calendar days of the date that the deficient condition(s) were reported.

SECTION 8 – VARIANCE/APPEAL

8.1 Under certain circumstances, users may require special exceptions to this standard. If an exception to this standard is requested, the user must demonstrate that any requested exceptions to the standard will not adversely affect the Town of Murphy's sanitary sewer collection or treatment works.

8.2 The Town of Murphy Public Works Director reserves the right to make determinations of grease interceptor/trap/separator adequacy and need, based on review of all relevant information regarding. This authority extends to requiring necessary repairs, modification and/or replacement of interceptors/traps/separators and their key components.

SECTION 9 – ENFORCEMENT

9.1 Failure to comply with the requirements of this standard or any other related provisions as outlined in the Town of Murphy Sewer Use Regulations Ordinance may result in the assessment of fines, civil penalties or a discontinuance of sewer service.

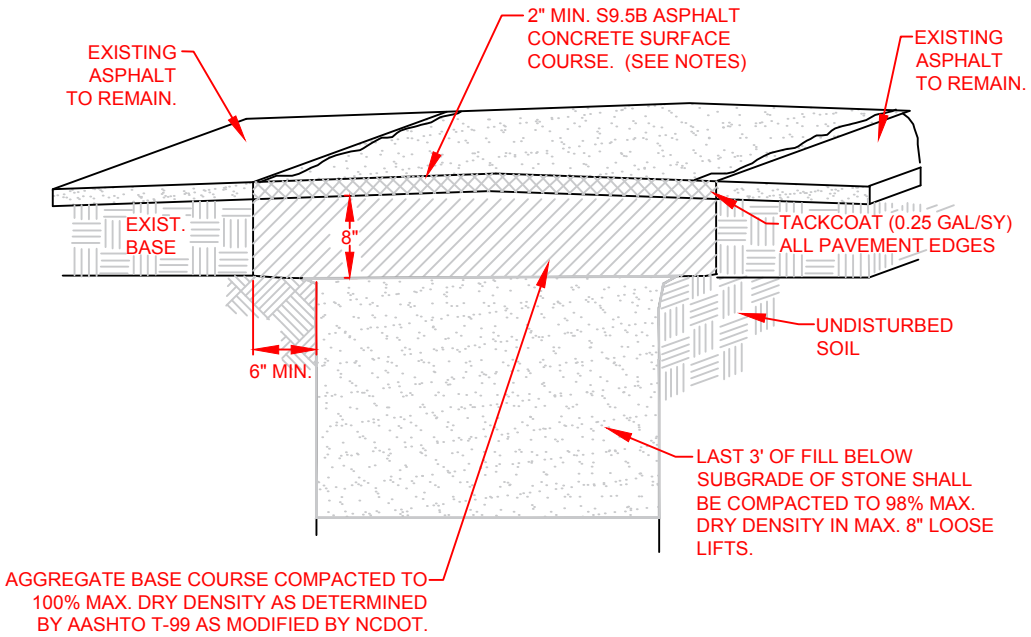
9.2 In accordance with the latest Town of Murphy Rates and Fees Schedule, all facilities subject to the Grease and Oil Control standards will be subject to an inspection fee and will be charged an additional fee when conditions dictate that a re-inspection of the installed system is necessary.

# TOWN OF MURPHY
# STANDARD DETAILS INDEX OF DRAWINGS



| INDEX OF DRAWINGS | | | TOWN OF MURPHY<br>5 WOFFORD STREET<br>MURPHY, NC , 28906<br>Know what's below. Call before you dig. | NO. | DATE | REVISION |
|---|---|---|---|---|---|---|
| SHEET NO. 1 OF 1 | DWG. NO. G.1 | DWG. BY: W.A.S. | | | | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | | | | |

G1-INDEX.dwg




NOTES:

1. CONTRACTOR SHALL PATCH PAVEMENT TO THE SAME PAVEMENT PROFILE AS EXISTED PRIOR TO REMOVING PAVEMENT.
2. WHERE PATCH OF ASPHALT CURBING OCCURS CONTRACTOR SHALL MATCH EXISTING CURB GRADES WITHIN 0.02 FEET. PATCHES THAT ARE ABOVE THE CURB GRADE LINE WILL NOT BE ACCEPTABLE AND SHALL BE REMOVED AND REPLACED. CURB PATCH SHALL BE THE SAME SHAPE/TEMPLATE AS THE EXISTING CURB.
3. CONTRACTOR SHALL BE REQUIRED TO PROVIDE TRAFFIC CONTROL AND DEVICES AS REQUIRED BY THE M.U.T.C.D. OR NC SUPPLEMENT. WORK CANNOT PROCEED UNTIL THE MEASURES ARE IN PLACE. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT NEW PAVEMENT FROM TRAFFIC AND OTHER SOURCES OF DAMAGE UNTIL ASPHALT HAS SUFFICIENTLY COOLED TO PREVENT DAMAGE.
4. CONTRACTOR SHALL SAWCUT EXISTING PAVEMENT STRAIGHT AND TRUE IMMEDIATELY PRIOR TO PAVING. THE FINAL PRODUCT SHALL BE SUBJECT TO TOWN OF MURPHY APPROVAL.
5. PATCH PAVING ON NCDOT MAINTAINED ROADS SHALL BE IN ACCORDANCE WITH THE APPROVED NCDOT ENCROACHMENT.
6. PROVIDE A MINIMUM OF 2" PAVEMENT (S9.5B), IF THE EXISTING PAVEMENT IS 2" OR LESS. MATCH EXISTING PAVEMENT THICKNESS IF OVER 2".
7. FOR PATCHES UP TO 4" THICK, PLACE S9.5B IN 2 LIFTS.
8. FOR PATCHES OVER 4" THICK, PLACE BINDER (I-19.0) TO 2" BELOW SURFACE. INSTALL BINDER IN 2" (MAX.) LIFTS. THE FINAL 2" SHALL BE SURFACE (S9.5B).
9. ALL PATCHES SHALL HAVE A MINIMUM OF 8" ABC UNDER ALL PAVEMENT, INCLUDING CURB AS REQUIRED.

# PERMANENT PAVEMENT PATCH

N.T.S.

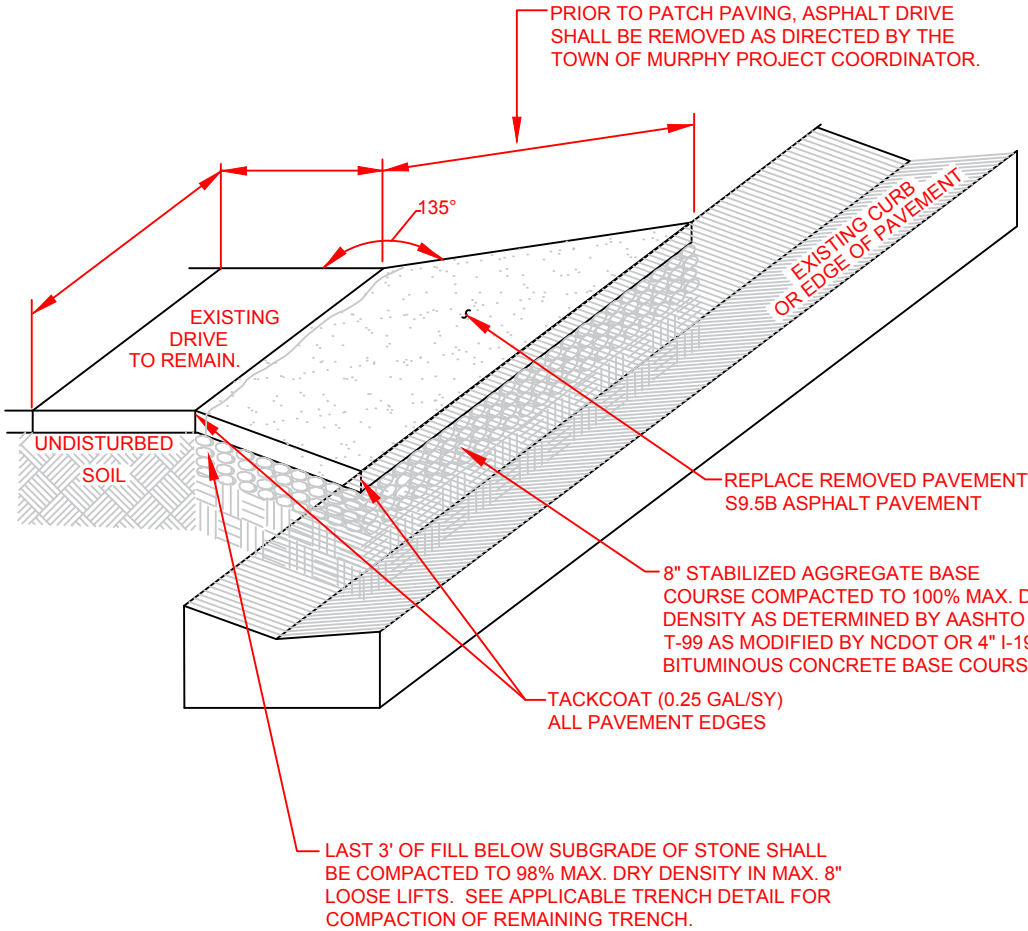
| SHEET NO. | DWG. NO. | DWG. BY: |
|---|---|---|
| 1 OF 1 | G.2 | W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

G2-PAV-PATCH.dwg




NOTES:

1. CONTRACTOR SHALL PATCH PAVEMENT TO THE SAME PAVEMENT PROFILE AND SHAPE AS EXISTED PRIOR TO REMOVING PAVEMENT.
2. CONTRACTOR SHALL BE REQUIRED TO PROVIDE TRAFFIC CONTROL AND DEVICES AS REQUIRED BY THE M.U.T.C.D. OR NC SUPPLEMENT. WORK CANNOT PROCEED UNTIL THE MEASURES ARE IN PLACE. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT NEW PAVEMENT FROM TRAFFIC AND OTHER SOURCES OF DAMAGE UNTIL ASPHALT HAS SUFFICIENTLY COOLED TO PREVENT DAMAGE.
3. CONTRACTOR SHALL SAWCUT EXISTING PAVEMENT STRAIGHT AND TRUE IMMEDIATELY PRIOR TO PAVING. THE FINAL PRODUCT SHALL BE SUBJECT TO THE OWNERS APPROVAL
4. UNDER NO CIRCUMSTANCES SHALL THE DISTURBED AREA EXTEND BEYOND THE RIGHT-OF-WAY AND/OR THE EASEMENT LIMITS.

# ASPHALT DRIVEWAY/ PARKING LOT PATCH

N.T.S

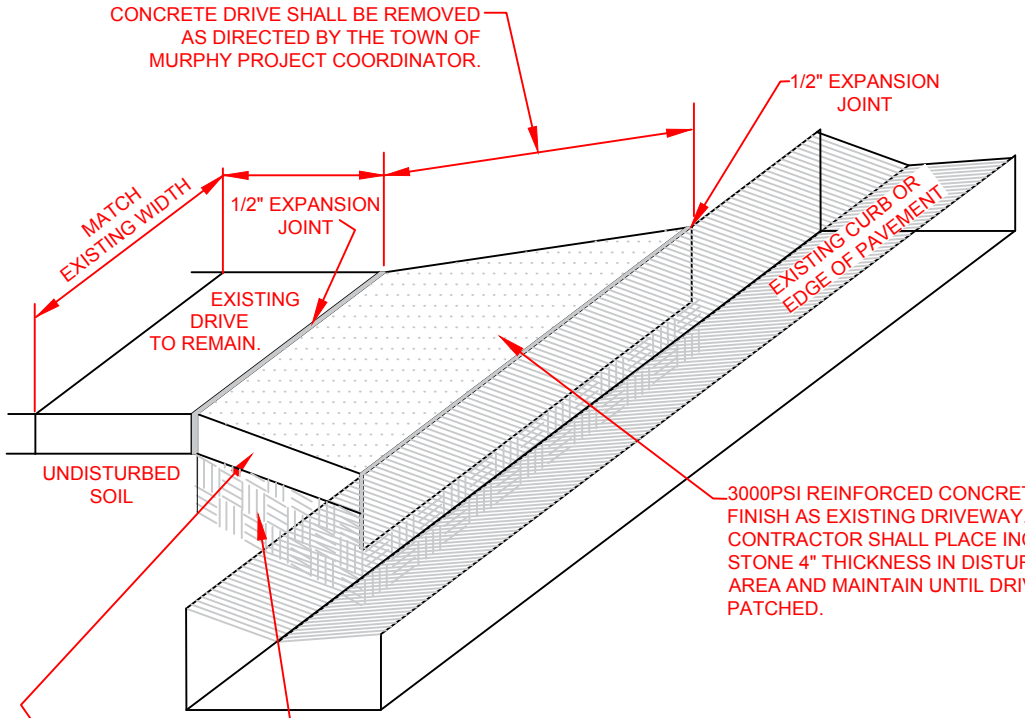
| | | | |
|---|---|---|---|
| SHEET NO. 1 OF 1 | DWG. NO. G.3 | DWG. BY: W.A.S. | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

G.3-ASPH-DRIVE-PATCH.dwg




NOTES:

1. CONTRACTOR SHALL REPLACE PAVEMENT TO THE SAME CROSS SECTION AS EXISTED PRIOR TO REMOVAL.
2. CONTRACTOR SHALL BE REQUIRED TO PROVIDE TRAFFIC CONTROL AND DEVICES AS REQUIRED BY THE M.U.T.C.D. OR NC SUPPLEMENT. WORK CANNOT PROCEED UNTIL THE MEASURES ARE IN PLACE. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT NEW PAVEMENT FROM TRAFFIC AND OTHER SOURCES OF DAMAGE.
3. UNDER NO CIRCUMSTANCES SHALL THE DISTURBED AREA EXTEND BEYOND THE RIGHT-OF-WAY AND/OR THE EASEMENT LIMITS. UNLESS OTHERWISE APPROVED BY THE TOWN OF MURPHY PROJECT COORDINATOR.
4. THE FINAL PRODUCT SHALL BE SUBJECT TO THE OWNER'S APPROVAL.
5. SAWCUT CONCRETE DRIVE STRAIGHT AND TRUE. JAGGED SAWCUTS SHALL NOT BE ACCEPTABLE. SAWCUTS SHALL BE STRAIGHT UNIFORM WIDTHS PERPENDICULAR TO THE DRIVEWAY.
6. MINIMUM RESIDENTIAL CONCRETE DRIVEWAY THICKNESS SHALL BE 5". MINIMUM COMMERCIAL CONCRETE DRIVEWAY THICKNESS SHALL BE 7".
7. NEW EXPANSION JOINTS SHALL BE PLACED 4 TO 10 FEET FROM EXISTING EXPANSION JOINTS, AS SPECIFIED BY THE TOWN OF MURPHY PROJECT COORDINATOR.

# CONCRETE DRIVEWAY PATCH

N.T.S.

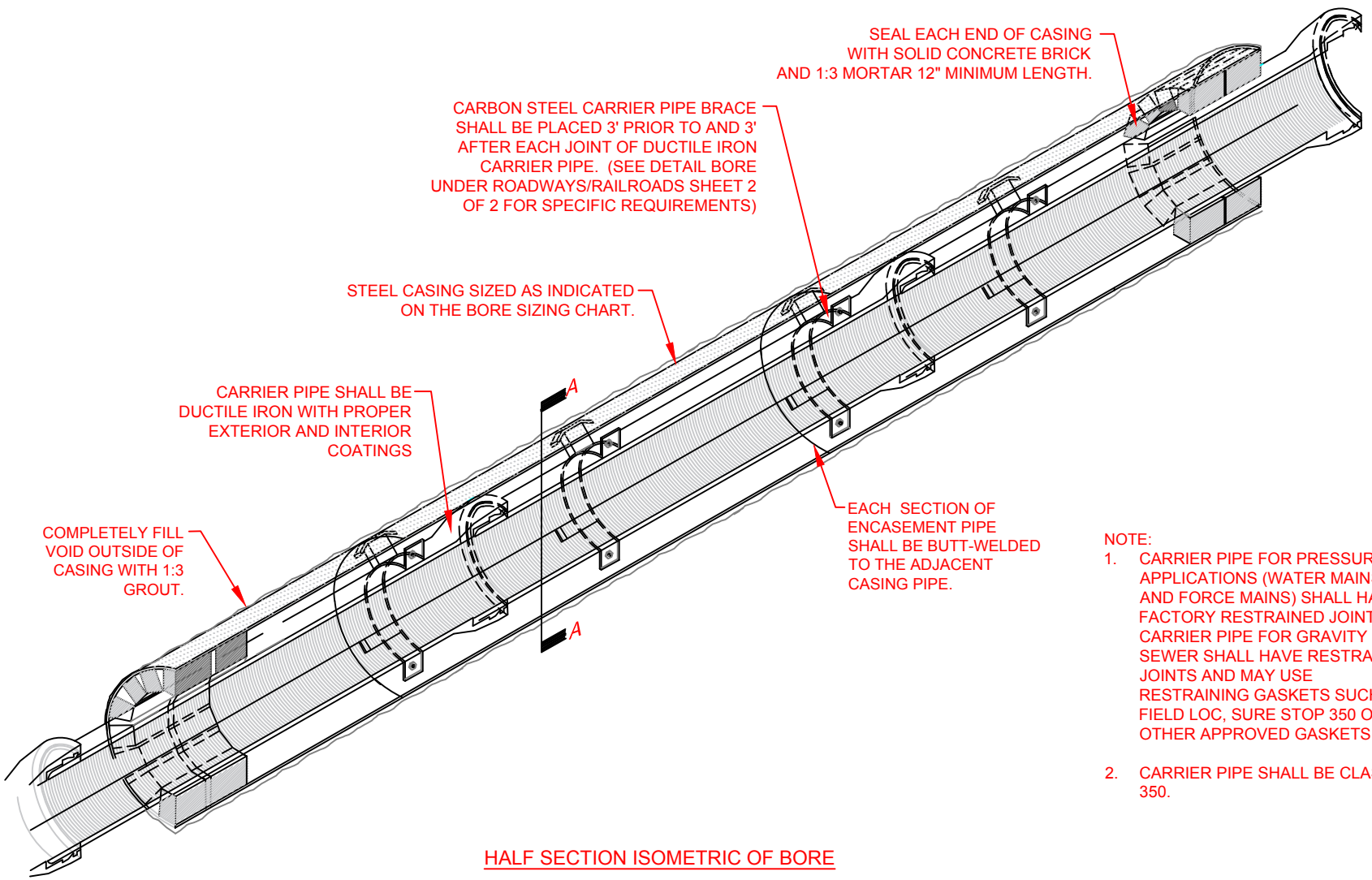
| | | |
|---|---|---|
| SHEET NO. 1 OF 1 | DWG. NO. G.4 | DWG. BY: W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

G.4-CONC-DRIVE-PATCH.dwg




NOTE:

1. CARRIER PIPE FOR PRESSURE APPLICATIONS (WATER MAINS AND FORCE MAINS) SHALL HAVE FACTORY RESTRAINED JOINTS. CARRIER PIPE FOR GRAVITY SEWER SHALL HAVE RESTRAINED JOINTS AND MAY USE RESTRAINING GASKETS SUCH AS FIELD LOC, SURE STOP 350 OR OTHER APPROVED GASKETS
2. CARRIER PIPE SHALL BE CLASS 350.

HALF SECTION ISOMETRIC OF BORE

| ROADWAYS/RAILROADS BORE N.T.S. | | |
|---|---|---|
| SHEET NO. 1 OF 2 | DWG. NO. G.5 | DWG. BY: W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

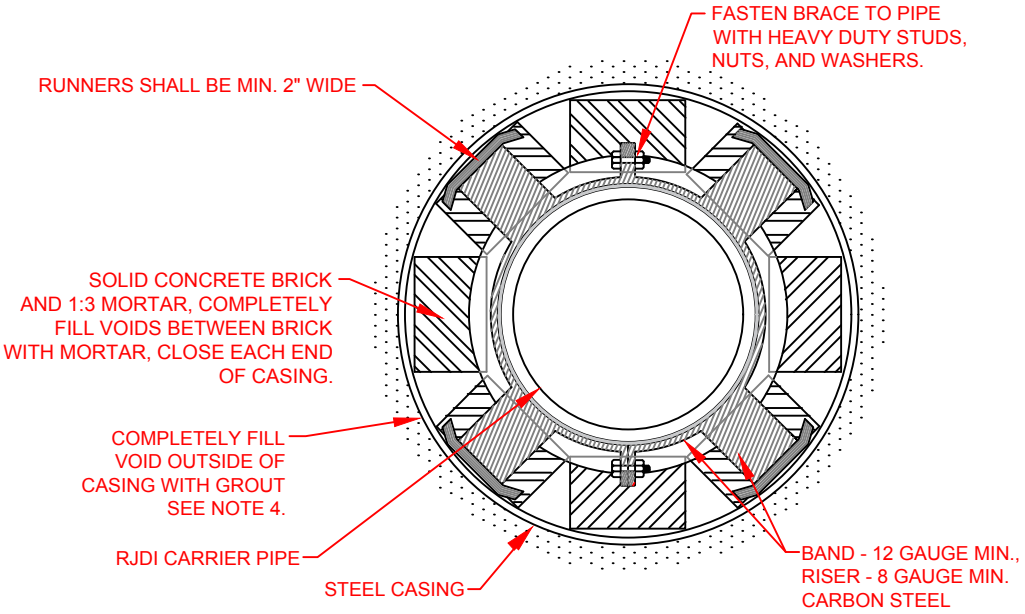
Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

G5-BORE-ROAD-RAIL.dwg

| BORE SIZING CHART* | | | |
|---|---|---|---|
| CARRIER PIPE SIZE | MIN. CASING SIZE | ROADWAYS MIN. WALL THICKNESS | RAILROADS MIN. WALL THICKNESS |
| 4" | 10" | 0.188" | 0.188" |
| 6" | 12" | 0.25" | 0.281" |
| 8" | 16" | 0.25" | 0.281" |
| 12" | 24" | 0.25" | 0.375" |
| 16" | 30" | 0.312" | 0.469" |
| 18" | 30" | 0.312" | 0.469" |
| 24" | 36" | 0.375" | 0.532" |
| 30" | 42" | 0.500" | 0.625" |
| 36" | 48" | 0.500" | 0.688" |

*CONTRACTOR MAY SUBSTITUTE A LARGER SIZE CASING PIPE HAVING THE MINIMUM WALL THICKNESS SHOWN FOR SEWER MAINS. ALL ADDITIONAL COSTS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR BORING AND JACKING.




SECTION "A-A" CARBON STEEL CARRIER PIPE BRACE

NOTES:

1. INSTALLATION SHALL BE DRY BORE AND JACKING OF SMOOTH WALL STEEL PIPE. JETTING OR WET BORING WITH WATER SHALL NOT BE ALLOWED.
2. SEE BORE SIZING CHART FOR CARRIER PIPE SIZE AND STEEL CASING SIZE, MINIMUM DIAMETER, AND WALL THICKNESS.
3. CASING PIPE SHALL BE IN ACCORDANCE WITH ASTM A-53, GRADE B WITH A MINIMUM YIELD STRENGTH OF 35,000PSI.
4. EACH END OF ENCASEMENT TO BE PLUGGED WITH BRICK. ALL VOIDS OUTSIDE THE CASING PIPE SHALL BE COMPLETELY FILLED WITH 1:3 PORTLAND CEMENT GROUT AT SUFFICIENT PRESSURE TO INSURE NO SETTLEMENT OF ROADWAY/RAILROAD. METHOD OF GROUTING SHALL BE AS APPROVED BY THE PERMITTING AGENCY.
5. IT IS RECOMMENDED THAT THE BORE BE ACCOMPLISHED BEFORE PIPE CONSTRUCTION BEGINS.
6. THE BORING SHALL BE PERFORMED FROM "UPSTREAM" TO "DOWNSTREAM" DIRECTION MAINTAINING THE CRITICAL DOWNSTREAM INVERT ELEVATION. SHOULD THE BORE NOT BE ON GRADE, A REVISED PLAN SHALL BE SUBMITTED TO THE TOWN OF MURPHY FOR APPROVAL.
7. THE BORING OPERATION SHALL BE CONDUCTED IN A MANNER THAT THE FLOW OF TRAFFIC IS NOT IMPEDED OR IN SUCH A MANNER SO AS NOT TO CREATE A HAZARD.
8. IF AN OBSTRUCTION IS ENCOUNTERED DURING THE BORING OPERATION, THE AUGER SHALL BE WITHDRAWN, THE EXCESS CASING PIPE CUT-OFF, CAPPED AND THE INTERIOR AND EXTERIOR VOIDS SHALL BE COMPLETELY FILLED WITH 1:3 PORTLAND CEMENT GROUT UNDER PRESSURE. NO SEPARATE PAYMENT FOR UNSUCCESSFUL BORES.
9. CONTRACTOR SHALL FIELD ADJUST AND INSTALL PROPER PIPE BRACES TO ACCOMPLISH GRADE AND INVERTS AS SHOWN ON THE DRAWINGS.
10. A MANUAL CONTROL STEERING HEAD OR OTHER GUIDANCE SYSTEM IS RECOMMENDED FOR BORES 30" DIAMETER AND/OR LARGER AND FOR BORES EXCEEDING 100' IN LENGTH OR AS SPECIFIED.
11. SUBCONTRACTORS SHALL ADHERE TO ALL PERMIT REQUIREMENTS AND SHALL PROVIDE APPROVED INSURANCE CERTIFICATES AS REQUIRED.
12. CONTRACTOR SHALL EXECUTE AND PERFORM ALL REQUIREMENTS AND CONDITIONS STIPULATED BY THE PERMITTING AGENCY.
13. CARRIER PIPE FOR PRESSURE APPLICATIONS (WATER MAINS AND FORCE MAINS) SHALL HAVE FACTORY RESTRAINED JOINTS. CARRIER PIPE FOR GRAVITY SEWER SHALL HAVE RESTRAINED JOINTS AND MAY USE RESTRAINING GASKETS SUCH AS FIELD LOK, SURE STOP 350 OR OTHER APPROVED GASKETS.

BORE UNDER ROADWAYS/RAILROADS
N.T.S.

SHEET NO. 2 OF 2

DWG. NO. G.5

DWG. BY: W.A.S.

DATE: 9/9/2019

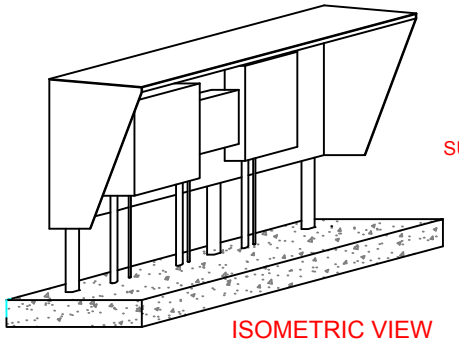
APPROVED BY: J.S.S.

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

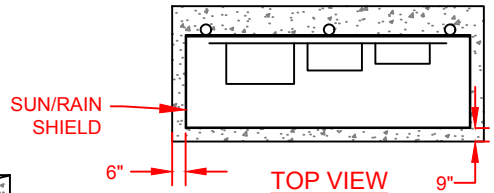
Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

G5-BORE-ROAD-RAIL.dwg



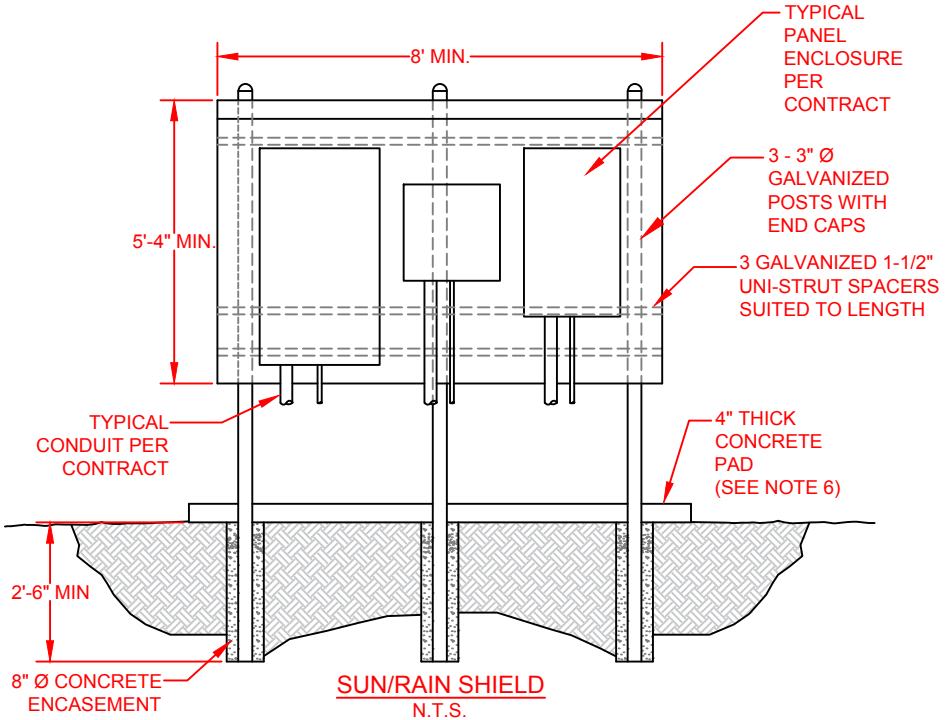
ISOMETRIC VIEW
N.T.S.




TOP VIEW
N.T.S.

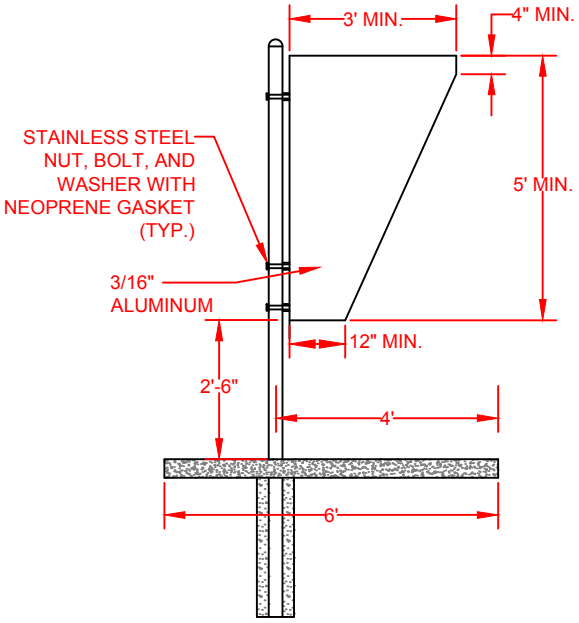
NOTES:

1. CONTRACTOR SHOULD VERIFY CONTROL PANEL SIZE BEFORE CONSTRUCTION OF SUN/RAIN SHIELD. SUN/RAIN SHIELD MAY NEED TO BE LARGER DEPENDING ON SIZE OF CONTROL PANEL.
2. WHEN SPECIFIED OR SHOWN, ALARM STROBE SHALL BE MOUNTED ON THE SUN/RAIN SHIELD. COORDINATE LOCATION WITH THE TOWN OF MURPHY.
3. WHERE SCHEDULED OR SHOWN ON THE PLANS PROVIDE WEATHERPROOF CORROSION RESISTANT LED FIXTURE MOUNTED UNDERNEATH SUN/RAIN SHIELD, LIGHT SWITCH, AND GFI RECEPTACLE.
4. WHERE SHOWN ON PLANS PROVIDE BACK-TO-BACK RACK EQUIPMENT MOUNTING AND SUN/RAIN SHIELD.
5. SUN/RAIN SHIELD TO BE CONSTRUCTED OF 3/16" ALUMINUM.
6. MINIMUM CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS SHALL BE 4,000PSI.




SUN/RAIN SHIELD
N.T.S.

SUN/RAIN SHIELD NOT SHOWN THIS VIEW. SEE SUN/RAIN SHIELD DETAIL AND ISOMETRIC VIEW.




SUN/RAIN SHIELD
N.T.S.

# ELECTRICAL EQUIPMENT RACK AND SUN/RAIN SHIELD
N.T.S.

| | | |
|---|---|---|
| SHEET NO. 1 OF 1 | DWG. NO. G.6 | DWG. BY: W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

G6-ELECTRICAL-EQUIP-RACK.dwg

1. CONTRACTOR SHALL REPAIR ALL WATER LATERALS AND MAINS DAMAGED DURING CONSTRUCTION. THE CONTRACTOR SHALL REPORT IMMEDIATELY ALL WATER MAIN AND LATERAL BREAKS TO THE TOWN OF MURPHY PROJECT COORDINATOR. THE CONTRACTOR SHALL INITIATE IMMEDIATE REPAIRS IN ACCORDANCE WITH TOWN OF MURPHY STANDARDS. CONTRACTOR SHALL NOT OPERATE TOWN OF MURPHY WATER MAIN VALVES WITHOUT TOWN OF MURPHY APPROVAL AND SHALL COORDINATE ALL VALVE CLOSINGS WITH THE TOWN OF MURPHY.
2. THE CONTRACTOR SHALL NOT USE HOUSE HOSE BIBBS OR ANY OTHER METHOD OF BLOW OFF WHICH ALLOWS DOMESTIC WATER CONTAINING SEDIMENTS OR HIGH LEVELS OF CHLORINE TO PASS THRU RESIDENT'S METERS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGES RESULTING FROM ALLOWING "DIRTY" WATER TO ENTER RESIDENT'S PLUMBING SYSTEM, SUCH AS WATER HEATERS, STAINED CLOTHING, CLOGGED SCREENS, ETC.
3. WATER MAINS AND LATERALS SHALL BE INSTALLED UTILIZING A TOWN OF MURPHY APPROVED CUT-SHEET INDICATING INSTALLATION DEPTH.
4. TRANSFER OF WATER SERVICES SHALL BE ACCOMPLISHED AS FOLLOWS:
   A. INSTALL, TEST AND STERILIZE NEW MAIN AND LATERALS. LATERALS SHALL BE INSTALLED 18" INSIDE RIGHT-OF-WAY UNLESS OTHERWISE DIRECTED BY THE TOWN OF MURPHY.
   B. TRANSFER EXISTING METER TO NEW METER BOX AND TIE NEW WATER LATERAL TO EXISTING DOMESTIC SERVICE UTILIZING BRASS FITTINGS. SAME METER NUMBER SHALL BE INSTALLED ON SAME ADDRESS AND/OR CUSTOMER. BLOW OFF SERVICE AT HOSE BIBB ON HOUSE ONLY AFTER METER HAS BEEN TRANSFERRED.
   C. AFTER ALL SERVICES ARE TRANSFERRED TO THE NEW SYSTEM, SHUT OFF VALVE ON EXISTING SYSTEM AND ABANDON EXISTING MAINS IN ACCORDANCE WITH TOWN OF MURPHY DETAILS.
   D. CONTRACTOR SHALL SUPPLY NEW METER BOXES AND DISPOSE OF EXISTING METER BOXES.
5. WHEN MAIN IS NOT TO BE ABANDONED, CONTRACTOR SHALL UNCOVER OLD CORPORATION AT MAIN, CLOSE AND PLUG CORPORATION TO ABANDON OLD SERVICE.
6. CONTRACTOR SHALL ABANDON ANY EXISTING WATER SERVICES THAT WILL NOT BE UTILIZED BY CUTTING THE SERVICE AT THE MAIN, PLUGGING THE CORPORATION, AND TURNING OFF THE CORPORATION. AT THE METER BOX, THE ABANDONED SERVICE IS TO BE CUT OR CRIMPED, AND BURIED A MINIMUM OF 3 FEET BELOW GRADE.
7. ALL EXISTING UTILITIES IMPACTED BY CONSTRUCTION SHALL BE ADJUSTED TO FINISHED GRADE, IN ACCORDANCE WITH TOWN OF MURPHY REQUIREMENTS.
8. ALL WORK ON TOWN OF MURPHY WATER UTILITIES (MAINS, LATERALS, ETC) SHALL BE PERFORMED BY A LICENSED UTILITY CONTRACTOR. THE TOWN OF MURPHY SHALL OBSERVE AND APPROVE ALL WORK ON TOWN OF MURPHY WATER UTILITIES. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH TOWN OF MURPHY REQUIREMENTS.
9. SEPARATION REQUIREMENTS:
   A. **LATERAL SEPARATION OF SEWERS AND WATER MAINS:** WATER MAINS SHALL BE LAID AT LEAST 10 FEET LATERALLY FROM EXISTING OR PROPOSED SEWER MAIN/LATERAL, UNLESS LOCAL CONDITIONS OR BARRIERS PREVENT A 10-FOOT LATERAL SEPARATION - IN WHICH CASE:
      i. THE WATER MAIN IS LAID IN A SEPARATE TRENCH, WITH THE ELEVATION OF THE BOTTOM OF THE WATER MAIN AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER MAIN/LATERAL; OR
      ii. THE WATER MAIN IS LAID IN THE SAME TRENCH AS THE SEWER MAIN/LATERAL WITH THE WATER MAIN LOCATED AT ONE SIDE ON A BENCH OF UNDISTURBED EARTH AND WITH THE ELEVATION OF THE BOTTOM OF THE WATER MAIN AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER MAIN/LATERAL.
   B. **CROSSING A WATER MAIN OVER A SEWER:** WHENEVER IT IS NECESSARY FOR A WATER MAIN TO CROSS OVER A SEWER MAIN/LATERAL, THE WATER MAIN SHALL BE LAID AT SUCH AN ELEVATION THAT THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER MAIN/LATERAL, UNLESS LOCAL CONDITIONS OR BARRIERS PREVENT AN 18 INCH VERTICAL SEPARATION - IN WHICH CASE BOTH THE WATER MAIN AND SEWER MAIN/LATERAL SHALL BE DUCTILE IRON IN ACCORDANCE WITH TOWN OF MURPHY REQUIREMENTS.
   C. **CROSSING WATER MAIN UNDER A SEWER:** WHENEVER IT IS NECESSARY FOR A WATER MAIN TO CROSS UNDER A SEWER MAIN/LATERAL, BOTH THE WATER MAIN AND THE SEWER MAIN/LATERAL SHALL BE DUCTILE IRON IN ACCORDANCE WITH TOWN OF MURPHY REQUIREMENTS. A FULL JOINT OF DUCTILE IRON PIPE SHALL BE INSTALLED ON THE WATER MAIN CENTERED AT THE POINT OF CROSSING.
   D. **CROSSING STORM DRAINAGE LINES:** A MINIMUM OF 12-INCHES OF VERTICAL CLEARANCE SHALL BE MAINTAINED BETWEEN A WATER LINE CROSSING OVER A STORM DRAINAGE LINE UNLESS DUCTILE IRON PIPE IS USED. IN ADDITION, THREE AND A HALF (3.5) FEET OF COVER MUST BE MAINTAINED OVER THE WATER MAIN OR IT SHALL BE DUCTILE IRON. IF DUCTILE IRON PIPE IS USED THEN TWO AN A HALF (2.5) FEET OF COVER MUST BE MAINTAINED OVER THE WATER MAIN AND A MINIMUM OF 4-INCHES OF VERTICAL CLEARANCE SHALL BE MAINTAINED BETWEEN THE WATER MAIN AND THE STORM DRAINAGE LINE. WHERE A WATER MAIN CROSSES UNDER A STORM DRAINAGE LINE THE MINIMUM OF TWELVE (12) INCHES OF VERTICAL SEPARATION SHALL BE MAINTAINED AND THE WATER MAIN SHALL BE DUCTILE IRON FOR A DISTANCE OF 10-FEET ON EACH SIDE OF THE CROSSING.

| WATER UTILITY NOTES | | |
|---|---|---|
| SHEET NO. 1 OF 2 | DWG. NO. W.1 | DWG. BY: W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W1-WATER-UTILITY-NOTES.dwg

10. **WATER OUTAGES:** THE CONTRACTOR SHALL SCHEDULE A COORDINATION MEETING WITH THE TOWN OF MURPHY PROJECT COORDINATOR AND PROJECT ENGINEER A MINIMUM OF THREE (3) WORKING DAYS PRIOR TO ANY PLANNED WATER OUTAGE. THE COORDINATION MEETING SHALL BE CONDUCTED PRIOR TO ANY NOTICES BEING ISSUED. ADDITIONALLY, THE CONTRACTOR SHALL LOCATE (VERTICALLY AND HORIZONTALLY) ANY UTILITIES WITHIN THE WORK AREA, IN ACCORDANCE WITH THESE CONTRACT DOCUMENTS. THE LOCATIONS OF ALL UTILITIES WITHIN THE WORK AREA SHALL BE DETERMINED PRIOR TO THE COORDINATION MEETING. ANY CONFLICTS WITH THE PENDING WORK AND THE EXISTING UTILITIES SHALL BE IDENTIFIED AND A PLAN FOR RESOLVING ANY CONFLICTS SHALL BE PRESENTED. THE PURPOSE OF THIS COORDINATION MEETING IS TO ENSURE THAT THE CONTRACTOR HAS A GOOD UNDERSTANDING OF THE REQUIREMENTS RELATED TO THE PENDING OUTAGE, VERIFY THAT THERE ARE NO UTILITY CONFLICTS THAT WILL PREVENT THE WORK FROM BEING COMPLETED, ALL EQUIPMENT IS IN GOOD WORKING ORDER, ALL EQUIPMENT IS FUNCTIONAL, ALL MATERIALS ARE ON SITE, ALL NECESSARY TOOLS ARE ON SITE, DISCUSS ANY NECESSARY CONTINGENCY PLANS, AND ANY OTHER ITEMS NECESSARY TO ENSURE THAT THE TOWN OF MURPHY HAS CONFIDENCE THAT THE WORK CAN BE ACCOMPLISHED WITHIN THE GIVEN TIME PERIOD. SHOULD, FOR ANY REASON, THE TOWN OF MURPHY DEEMS THAT THE CONTRACTOR IS NOT PREPARED FOR THE PROPOSED OUTAGE, THE OUTAGE NOTIFICATIONS WILL NOT BE DISTRIBUTED AND THE OUTAGE SHALL BE POSTPONED A MINIMUM OF TWO (2) WEEKS. THE TOWN OF MURPHY WILL PROVIDE WRITTEN NOTIFICATION TO THE CONTRACTOR OF THIS DECISION. NO ADDITIONAL CONTRACT TIME WILL BE GRANTED FOR THIS DELAY.

ONCE THE WATER OUTAGE NOTIFICATIONS HAVE BEEN ISSUED, A FOLLOW-UP COORDINATION MEETING WITH THE TOWN OF MURPHY PROJECT COORDINATOR AND PROJECT ENGINEER SHALL BE HELD A MINIMUM OF 24 HOURS PRIOR TO THE SCHEDULED OUTAGE. THE PURPOSE OF THIS MEETING IS TO VERIFY THAT THE CONTRACTOR IS PREPARED TO PROCEED WITH THE OUTAGE, AND THAT ALL EQUIPMENT, MATERIALS,TOOLS, AND ALL OTHER INCIDENTALS ARE ON THE PROJECT SITE AND FUNCTIONING. IF FOR ANY REASON THE TOWN OF MURPHY DEEMS THAT THE CONTRACTOR IS NOT PREPARED, THE OUTAGE SHALL BE POSTPONED AND ALL CUSTOMERS IMMEDIATELY NOTIFIED OF THE CANCELLATION. THE OUTAGE SHALL BE POSTPONED A MINIMUM OF TWO (2) WEEKS.

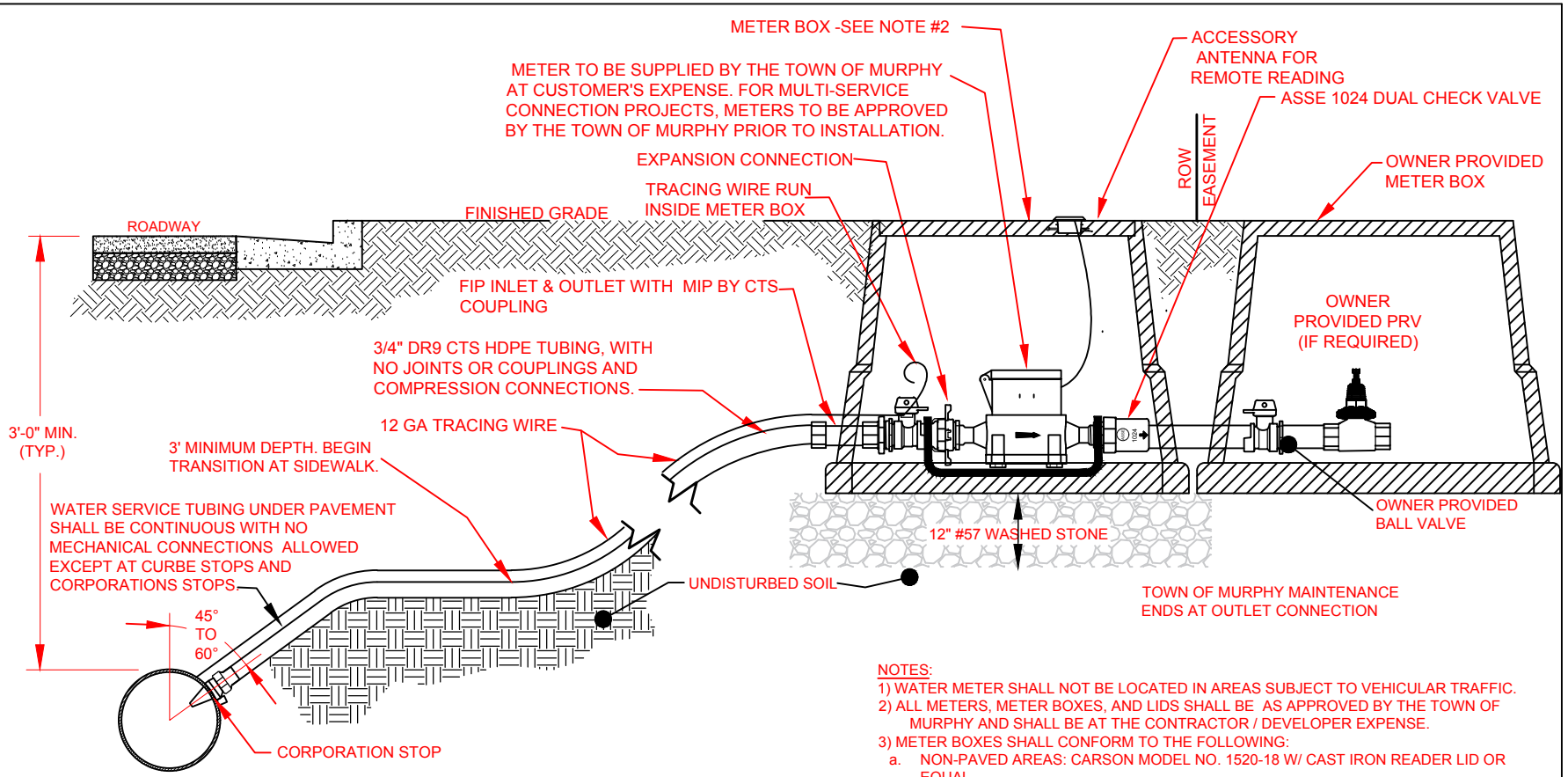
THE CONTRACTOR SHALL COMPLETE THE REQUIRED WORK AND RESTORE WATER SERVICE WITHIN THE GIVEN TIME PERIOD FOR THE OUTAGE. IF THE TOWN OF MURPHY PROJECT COORDINATOR DETERMINES THAT THE CONTRACTOR WILL NOT RESTORE WATER SERVICE WITHIN THE APPROVED TIMEFRAME, THE TOWN OF MURPHY PROJECT COORDINATOR WILL DIRECT THE CONTRACTOR ON HOW TO RESTORE WATER SERVICE. THE CONTRACTOR SHALL ADHERE TO ALL INSTRUCTIONS GIVEN BY THE TOWN OF MURPHY PROJECT COORDINATOR.

11. CONTRACTOR IS RESPONSIBLE FOR ADHERENCE TO ALL LOCAL, STATE, AND FEDERAL OSHA REQUIREMENTS FOR SAFETY. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO PERFORM WORK IN ACCORDANCE WITH LATEST OSHA REQUIREMENTS AND SHALL INDEMNIFY THE TOWN OF MURPHY OF ANY RESPONSIBILITY

12. TOWN OF MURPHY STAFF AND REPRESENTATIVES SHALL ONLY DIRECT CONTRACTOR AS REQUIRED IN THESE STANDARD DETAILS AND TOWN OF MURPHY SPECIFICATIONS. CONTRACTOR IS TO PROVIDE NECESSARY SUPERVISION TO PROPERLY PERFORM ALL WORK.

| | | | | | |
|---|---|---|---|---|---|
| WATER UTILITY NOTES | | | TOWN OF MURPHY<br>5 WOFFORD STREET<br>MURPHY, NC , 28906<br>811 Know what's below. Call before you dig. | NO. | DATE / REVISION |
| SHEET NO. 2 OF 2 | DWG. NO. W.1 | DWG. BY: W.A.S. | | | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | | | |

W1-WATER-UTILITY-NOTES.dwg




NOTES:

1) WATER METER SHALL NOT BE LOCATED IN AREAS SUBJECT TO VEHICULAR TRAFFIC.
2) ALL METERS, METER BOXES, AND LIDS SHALL BE AS APPROVED BY THE TOWN OF MURPHY AND SHALL BE AT THE CONTRACTOR / DEVELOPER EXPENSE.
3) METER BOXES SHALL CONFORM TO THE FOLLOWING:
   a. NON-PAVED AREAS: CARSON MODEL NO. 1520-18 W/ CAST IRON READER LID OR EQUAL
   b. PAVED AREAS: PRE-APPROVED H-20 TRAFFIC RATED METER BOX, MINIMUM 15"X20" INTERIOR DIMENSION.
4) ALL SERVICE LINES, VALVES AND FITTINGS SHALL COMPLY WITH AWWA C800.
5) FOR NON-RESIDENTIAL APPLICATIONS THAT REQUIRE AN ABOVE-GROUND BACKFLOW PREVENTER, THE DUAL CHECK ASSEMBLY MAY BE OMITTED.
6) ALL BRASS OF 85-5-5-5 RED BRASS, AWWA C800, ASTM B62.
7) ONE 2" OR 6" GRADE ADJUSTER MAY BE UTILIZED WHEN NEEDED TO MEET FINAL GRADE (NO GRADE ADJUSTERS MAY BE USED ON NEW CONSTRUCTION PROJECTS). GRADE ADJUSTER AND BOX SHALL BE BY THE SAME MANUFACTURER.
8) $\frac{3}{4}$" BALL VALVE (REQUIRED) AND PRESSURE REDUCING VALVE (IF REQUIRED) SHALL BE INSTALLED BETWEEN METER BOX AND STRUCTURE ENTRY POINT.

# 5/8"X3/4", 3/4", AND 1" WATER SERVICE LATERAL

N.T.S.

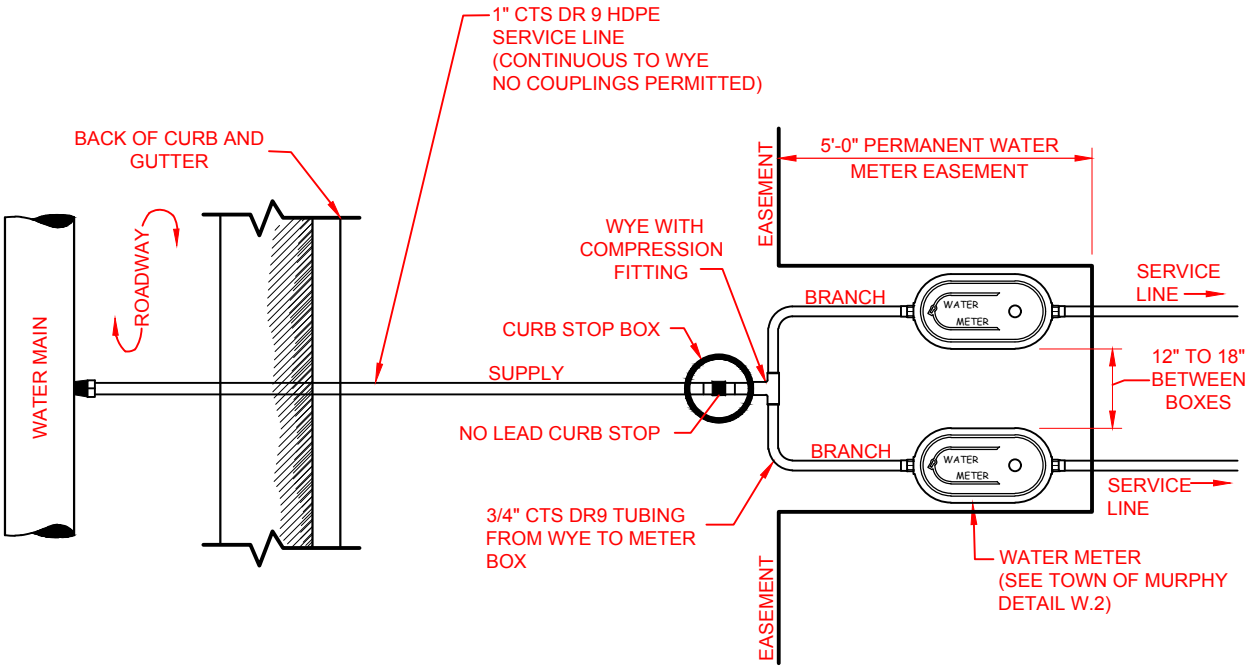
| SHEET NO. | DWG. NO. | DWG. BY: |
|---|---|---|
| 1 OF 1 | W.2 | W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |


TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906


Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W2-WLAT.dwg




NOTES:

1. ALL MATERIALS TO BE APPROVED BY THE TOWN OF MURPHY.
2. SERVICE LATERAL SIZE 1" CTS DR 9 POLYETHYLENE TO WYE AND $\frac{3}{4}$" CTS DR 9 FROM WYE TO METERS UNLESS OTHERWISE SPECIFIED.
3. SERVICE LATERAL INSTALLATION SHALL BE APPROVED BY THE TOWN OF MURPHY.
4. WHEN INSTALLED IN A PAVED AREA, METER BOX TO BE SET 1/4" ABOVE FINISHED PAVEMENT GRADES AND PAVEMENT FEATHERED TO TOP OF BOX TO PROVIDE DRAINAGE AWAY FROM BOX.
5. WHERE ASPHALT CURB OR STRIP PAVEMENT EXISTS, THE LOCATION OF THE METER BOX SHALL BE AS DIRECTED BY THE TOWN OF MURPHY REPRESENTATIVE.
6. RESIDENTIAL METER BOX SHALL BE SET 18" FROM RIGHT-OF-WAY TO CENTERLINE OF METER BOX PERPENDICULAR TO THE RIGHT-OF-WAY.
7. COMMERCIAL METER BOX LOCATION SHALL BE AS APPROVED. (NO METER TO BE INSTALLED LESS THAN 5' FROM BUILDING TO EDGE OF BOX).
8. LATERAL SHALL NOT BE BACK FILLED UNTIL INSPECTED BY THE TOWN OF MURPHY PROJECT COORDINATOR.
9. WATER MAIN AND LATERAL SHALL PASS HYDROSTATIC (200PSI) AND STERILIZATION TESTS.
10. SHOULD IT BE NECESSARY TO CRIMP THE WATER SERVICE LATERAL, A FULL CIRCLE REPAIR CLAMP SHALL BE PLACED ON THE CRIMPED AREA.

# 1" SPLIT WATER SERVICE LATERAL

N.T.S.

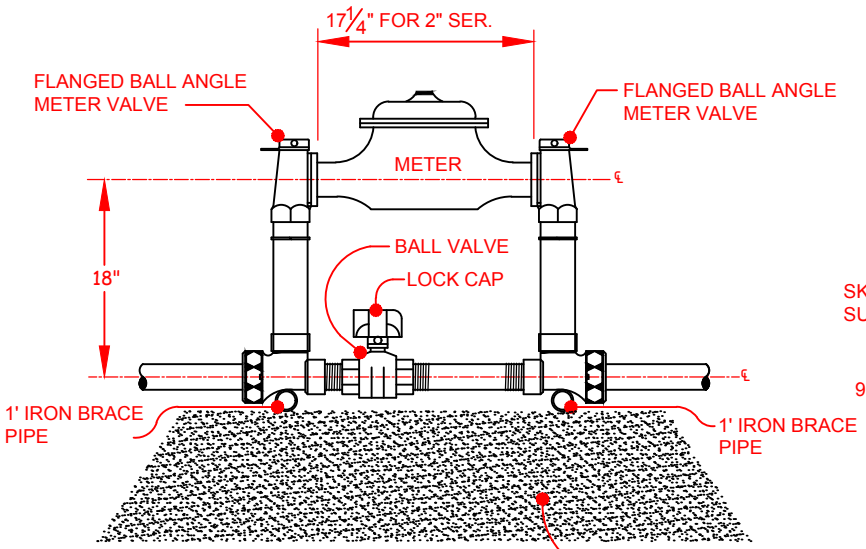
| SHEET NO. | DWG. NO. | DWG. BY: |
|---|---|---|
| 1 OF 1 | W.3 | W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

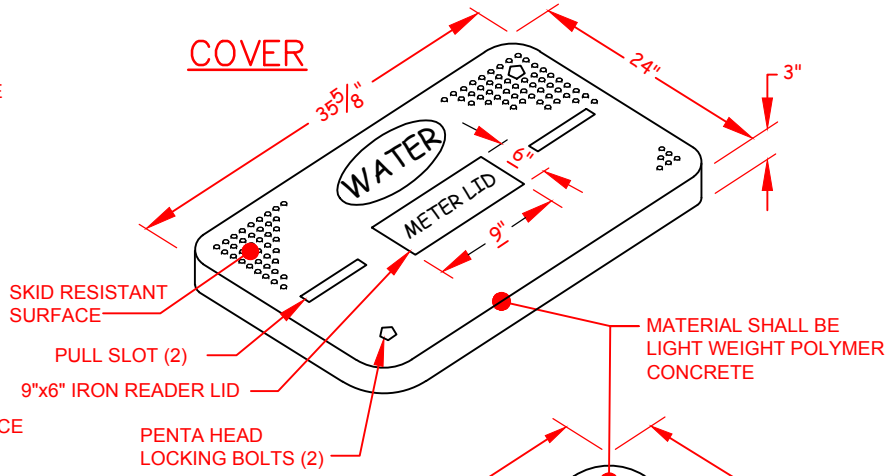
Know what's below. Call before you dig.

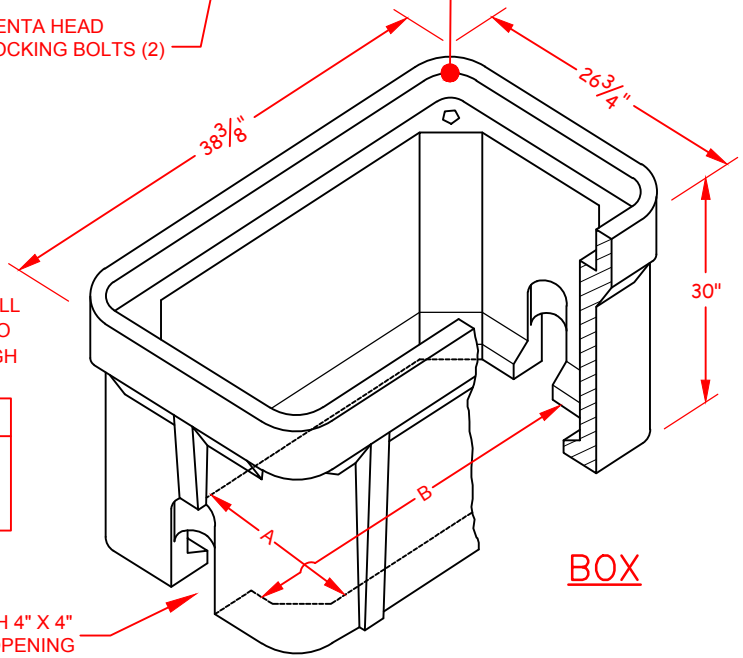
| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W3-SPLIT-WLAT.dwg




ELEVATION




BOX

NOTES:

1. PIPING TO BE BRASS AND COPPER TUBING. METER INLET AND OUTLET TO BE EQUIPPED WITH FLANGED BALL ANGLE METER VALVES.
2. CUSTOM SETTERS SHALL BE EQUIPPED WITH STANDARD LOW BYPASS WITH BALL VALVE AND PADLOCK WINGS.
3. SETTERS AND METERS SHALL BE AS APPROVED BY THE TOWN OF MURPHY
4. LOCATION OF BOX SHALL BE AS DETERMINED BY THE TOWN OF MURPHY PROJECT COORDINATOR. IN NO CASE SHALL BOX BE INSTALLED CLOSER THAN 5' TO BUILDING.
5. LATERAL SHALL BE INSPECTED AND APPROVED BY THE TOWN OF MURPHY PROJECT COORDINATOR PRIOR TO BACKFILL.
6. CONTRACTOR TO INSTALL TRACING WIRE INTO BOX. A MINIMUM 2' OF WIRE SHALL BE IN BOX.

NOTE:
TO ENSURE POSITIVE DRAINAGE, THE VAULT SHALL HAVE AN OPEN BOTTOM TO ALLOW DRAINAGE THROUGH STONE.

| DIMENSIONS (INCHES) | |
|---|---|
| A | B |
| 18¾" | 30⅜" |

# 2" METER

N.T.S.

SHEET NO. 1 OF 1

DWG. NO. W.4

DWG. BY: W.A.S.

DATE: 9/9/2019

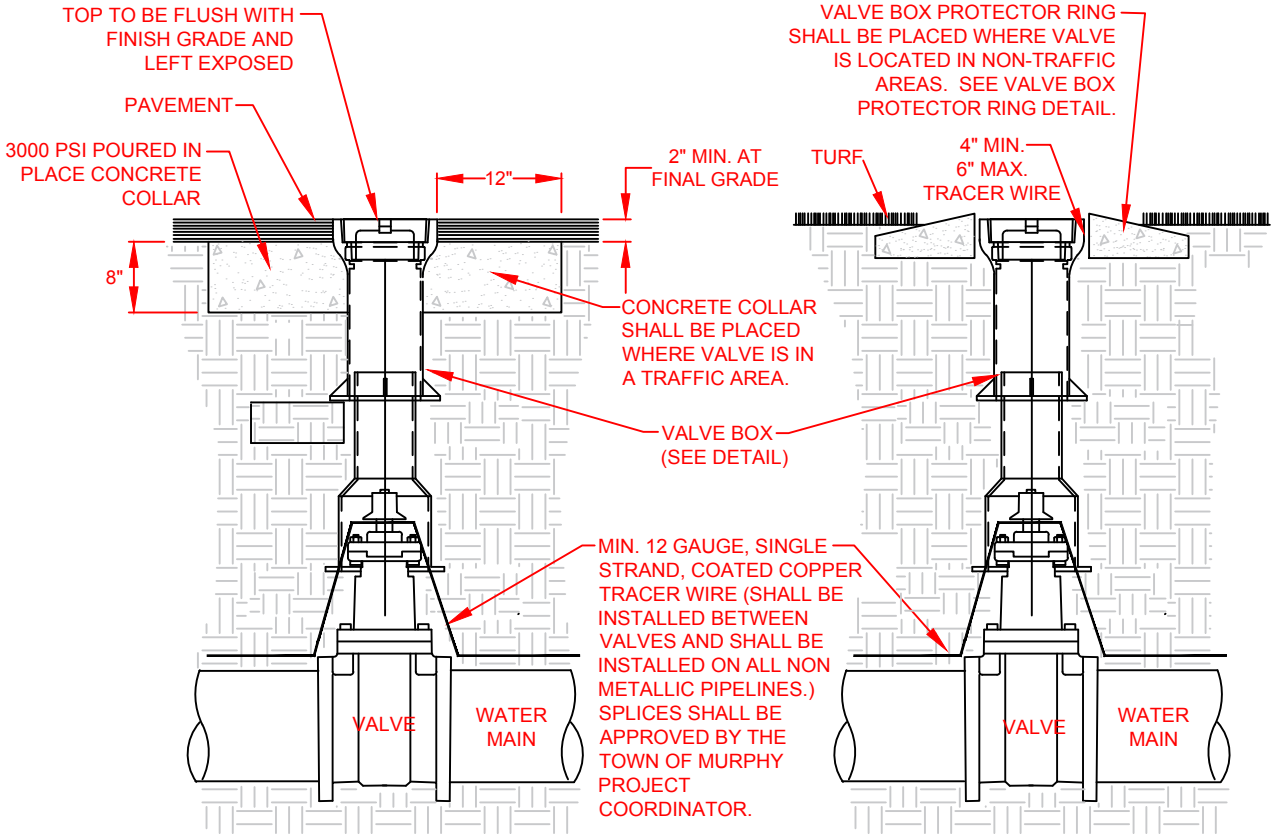
APPROVED BY: J.S.S.

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

811 Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W4-2IN-METER.dwg




VALVE IN TRAFFIC AREA

VALVE IN NON-TRAFFIC AREA

NOTES:

1. ALL MATERIALS SHALL BE IN ACCORDANCE WITH TOWN OF MURPHY STANDARDS.
2. RESILIENT WEDGE IRON BODY GATE VALVE SHALL BE AS MANUFACTURED BY MUELLER CORP., AMERICAN DARLING OR CLOW CORP.
3. ALL VALVES SHALL HAVE 2" SQUARE OPERATING NUT AND SHALL OPEN COUNTERCLOCKWISE.
4. VALVE BODY, BONNET, AND GATE SHALL BE IN ACCORDANCE WITH AWWA C-509/C-515 AND NSF61.
5. VALVE BODY AND BONNET SHALL BE COATED ON ALL INTERIOR AND EXTERIOR SURFACES WITH A FUSION BONDED EPOXY IN ACCORDANCE WITH AWWA C-550-90.
6. ALL VALVES 24" AND SMALLER SHALL HAVE A SAFE WORKING PRESSURE OF 250PSI.
7. SEE VALVE BOX DETAIL FOR ADDITIONAL INFORMATION.
8. SEE VALVE BOX PROTECTOR RING DETAIL FOR ADDITIONAL INFORMATION.
9. VALVE BOX SECTIONS ARE REQUIRED. THE USE OF PIPE IN LIEU OF VALVE BOX SECTIONS SHALL NOT BE PERMITTED.

# GATE VALVE

N.T.S.

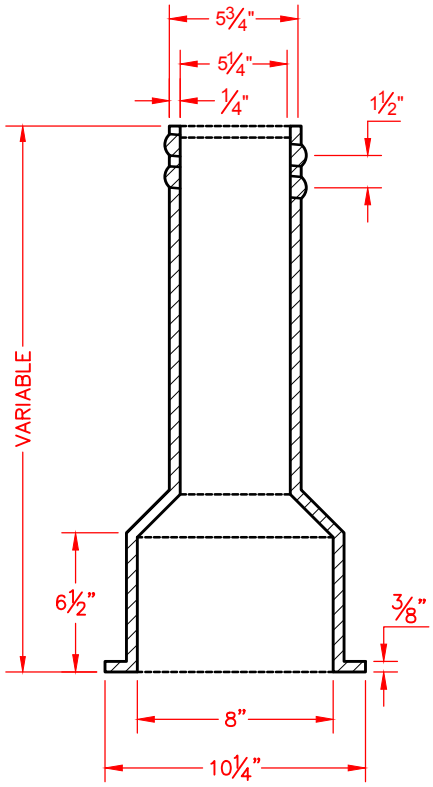
| | | | |
|---|---|---|---|
| SHEET NO. 1 OF 1 | DWG. NO. W.5 | DWG. BY: W.A.S. | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

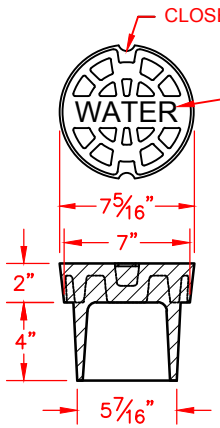
Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

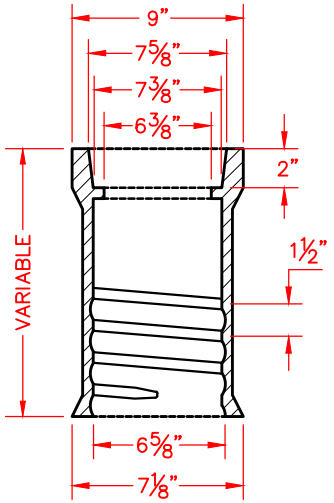
W5-GATEVALVE.dwg



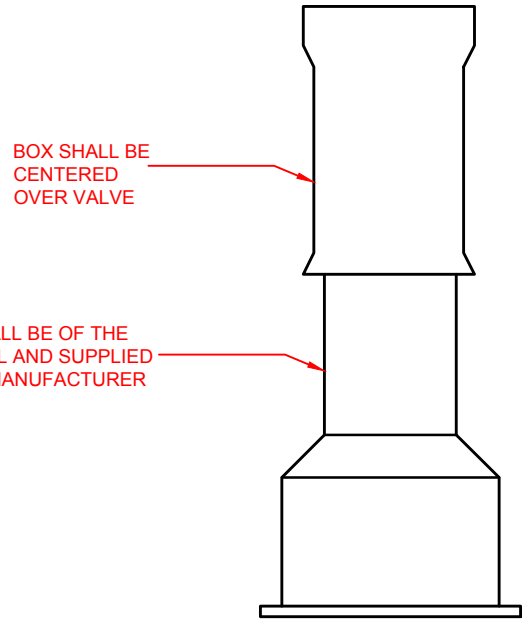

BOTTOM SECTION




LID




TOP SECTION




COMPLETE BOX

NOTES:

1. VALVE BOX SHALL HAVE RAISED LETTERS "WATER" CAST INTO COVER.
2. DIMENSIONS SHOWN VARY BASED UPON THE MANUFACTURER. ACTUAL DIMENSIONS SHALL BE APPROVED BY THE TOWN OF MURPHY.
3. VALVE BOX SECTIONS ARE REQUIRED. THE USE OF PIPE IN LIEU OF VALVE BOX SECTIONS SHALL NOT BE PERMITTED.
4. TRACING WIRE SHALL BE INSTALLED OUTSIDE OF BOX.
5. REFER TO TOWN OF MURPHY DETAIL W.5 FOR INSTALLATION REQUIREMENTS.

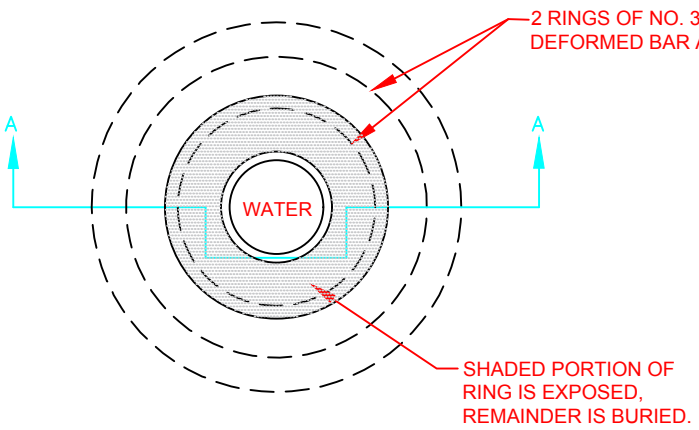
| | | | |
|---|---|---|---|
| VALVE BOX<br>N.T.S. | | | |
| SHEET NO.<br>1 OF 1 | DWG. NO. W.6 | DWG. BY: W.A.S. | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

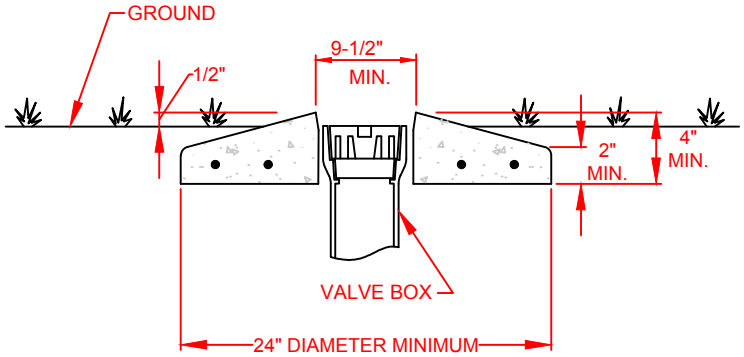
| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W6-VALVEBOX.dwg

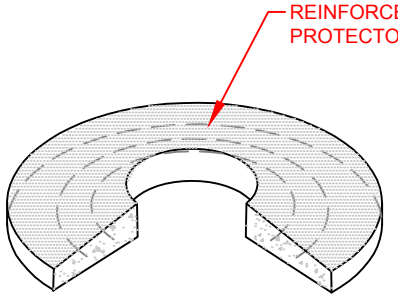



PLAN
N.T.S.

NOTES:
1. CONCRETE PROTECTOR RING SHALL BE 2500PSI PRECAST REINFORCED CONCRETE.
2. VALVE BOX SHALL BE AT GRADE WITH PROTECTOR RING EXTENDING 1/2" ABOVE GRADE.
3. SEE GATE VALVE AND BOX DETAIL.
4. VALVE BOX PROTECTOR RINGS SHALL BE INSTALLED AROUND VALVE BOX IN UNPAVED NON-TRAFFIC AREAS AND SHALL NOT CREATE A HINDRANCE TO MOWING OPERATIONS.




SECTION A-A
N.T.S.




CUT AWAY VIEW
N.T.S.

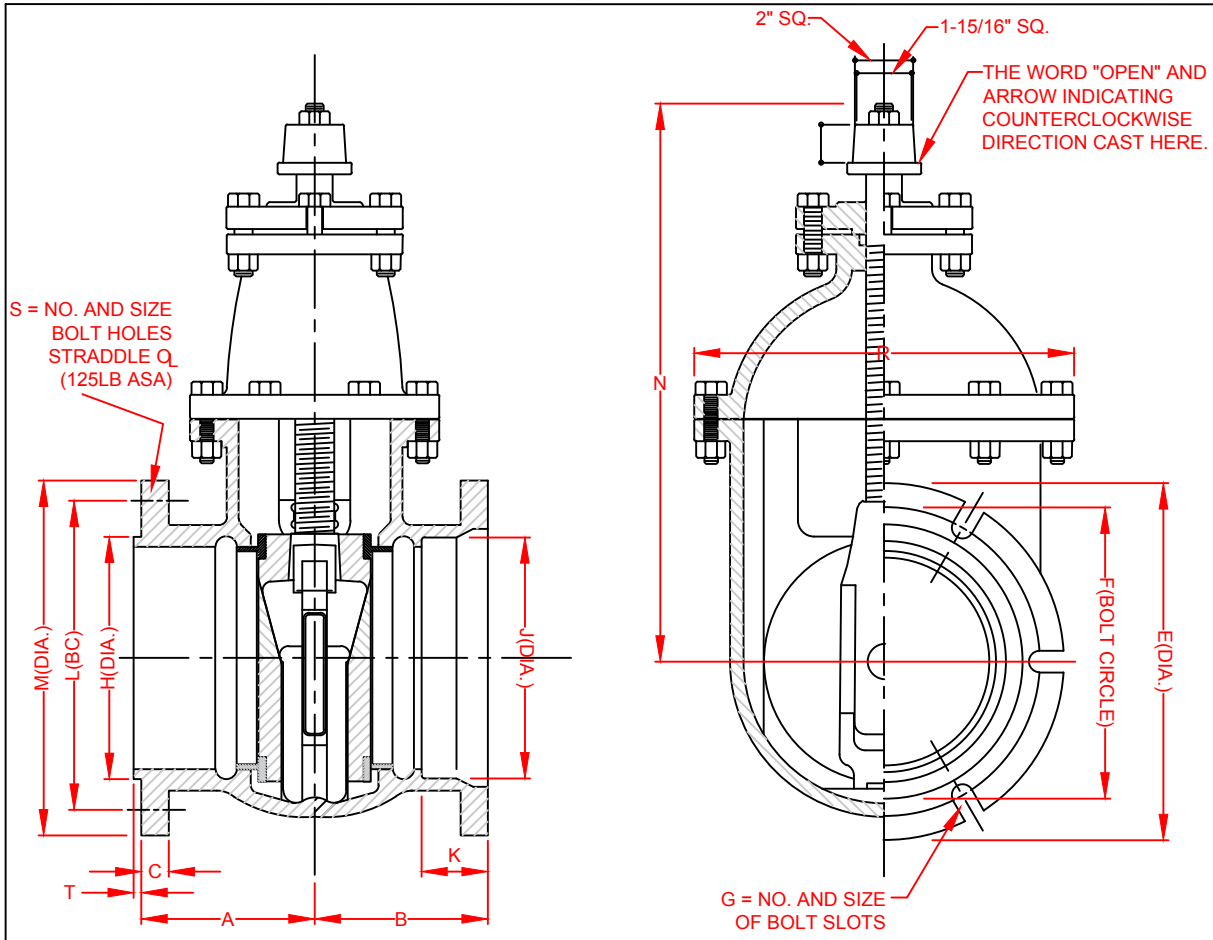
| VALVE BOX PROTECTOR RING<br>N.T.S. | | |
|---|---|---|
| SHEET NO.<br>1 OF 1 | DWG. NO. W.7 | DWG. BY: W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W7-CONC-PROTECTOR-RING.dwg




NOTES:

1. ALL MATERIALS SHALL BE IN ACCORDANCE WITH TOWN OF MURPHY STANDARDS.
2. RAISED MALE FACE SHALL BE REQUIRED TO PROVIDE FOR PROPER ALIGNMENT OF THE TAPPING SLEEVE.
3. ALL VALVES SHALL HAVE 2" SQUARE OPERATING NUT AND SHALL OPEN COUNTERCLOCKWISE.
4. RESILIENT WEDGE GATE VALVE SHALL BE AS MANUFACTURED BY MUELLER CORP., AMERICAN DARLING, CLOW CORP., OR APPROVED EQUAL.
5. VALVE BODY, BONNET, AND GATE SHALL BE IN ACCORDANCE WITH AWWA C-509/C-515 AND NSF61.
6. VALVE BODY AND BONNET SHALL BE COATED ON ALL INTERIOR AND EXTERIOR SURFACES WITH A FUSION BONDED EPOXY IN ACCORDANCE WITH AWWA C-550-90.
7. ALL VALVES 24" AND SMALLER SHALL HAVE A SAFE WORKING PRESSURE OF 250 PSI.
8. SEE TAPPING SLEEVE (DETAILS W.10 OR W.11) FOR ADDITIONAL INFORMATION.
9. DIMENSIONS SHOWN ARE FOR REFERENCE AND MAY VARY BASED UPON MANUFACTURER. VALVES SHALL BE SIMILAR IN NATURE TO THAT SHOWN AND SHALL NOT DEVIATE IN ESSENTIAL DETAILS.
10. ALL TAPPING SLEEVES SHALL BE HYDROSTATICALLY PRESSURE TESTED IN ACCORDANCE WITH TOWN OF MURPHY SPECIFICATIONS. TEST SHALL BE WITNESSED AND APPROVED BY THE TOWN OF MURPHY PROJECT COORDINATOR PRIOR TO BEGINNING TAPPING PROCESS.

| VALVE SIZE | A | B | C | D | E | F | G | H | J | K | L | M | N | R | S | T | TURNS TO OPEN | WEIGHT W/ACC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 4-3/8 | 5-7/8 | 15/16 | 1-1/2 | 9 | 7-1/2 | 4-7/8 | 4-63/64 | 4-29/32 | 2-1/2 | 7-1/2 | 9 | 14-1/8 | 9 | 8-3/4 | 1/4 | 14 | 118 |
| 6 | 6-7/8 | 6-1/4 | 1 | 1-5/8 | 11 | 9-1/2 | 6-7/8 | 6-63/64 | 7 | 2-1/2 | 9-1/2 | 11 | 17-5/8 | 11-3/4 | 8-7/8 | 1/4 | 21 | 175 |
| 8 | 6-1/2 | 7-1/4 | 1-1/8 | 1-3/4 | 13-1/4 | 11-3/4 | 6-7/8 | 8-63/64 | 9-5/32 | 2-1/2 | 11-3/4 | 13-1/2 | 21 | 14-1/4 | 8-7/8 | 1/4 | 28 | 274 |
| 12 | 7 | 8-1/4 | 1-1/4 | 1-3/4 | 17-7/8 | 16-1/4 | 8-7/8 | 12-63/64 | 13-5/16 | 2-1/2 | 17 | 19 | 28-1/4 | 19-1/8 | 12-1 | 1/4 | 39 | 570 |
| 16 | 8-1/2 | 9-1/8 | 1-7/16 | 2-1/16 | 23 | 21 | 12-7/8 | 16-15/16 | 17-35/64 | 3-1/2 | 21-1/4 | 23-1/2 | 38-5/8 | 26-1/8 | 16-1 1/8 | 1/4 | 55 | 1140 |
| 24 | 10-1/2 | 14-1/4 | 1-7/8 | 2-1/2 | 31-3/4 | 30 | 16-7/8 | 24-15/16 | 25-15/16 | 3-1/2 | 29-1/2 | 32 | 54-5/8 | 37-5/8 | 20-1 3/8 | 5/16 | 79 | 3225 |

# TAPPING VALVE

N.T.S.

SHEET NO. 1 OF 1

DWG. NO. W.8

DWG. BY: W.A.S.

DATE: 9/9/2019

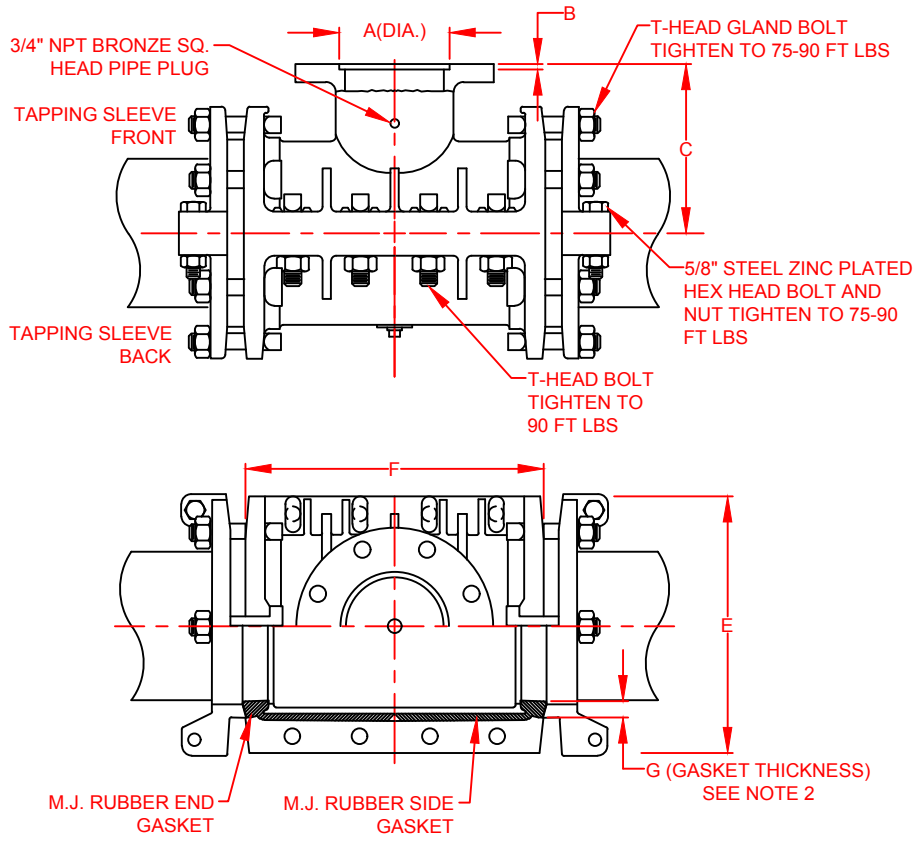
APPROVED BY: J.S.S.

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W8-M.J.-TAPPING-VALVE.dwg




NOTES:

1. ALL MATERIALS SHALL BE IN ACCORDANCE WITH TOWN OF MURPHY STANDARDS. SLEEVE BODY SHALL BE DUCTILE IRON ASTM A536.
2. MECHANICAL JOINT TAPPING SLEEVES SHALL BE AS MANUFACTURED BY CLOW, M & H, MUELLER, OR AMERICAN AND SHALL BE FURNISHED WITH SPLIT GLANDS, SPLIT END GASKET, BOLTS, ETC. THE OUTLET FLANGE SHALL BE CL 125 PER ANSI B16.1 COMPATIBLE WITH APPROVED TAPPING VALVES.
3. DIMENSIONS SHOWN ARE FOR REFERENCE AND MAY VARY BASED UPON MANUFACTURER. SLEEVES SHALL BE SIMILAR IN NATURE TO THAT SHOWN AND SHALL NOT DEVIATE IN ESSENTIAL DETAILS.
4. PIPE SURFACES SHALL BE CLEANED THOROUGHLY TO PERMIT FOR A GOOD SEAL PRIOR TO INSTALLATION.
5. EXTERIOR OF TAPPING SLEEVE SHALL BE COATED WITH 2 COATS ASPHALTIC VARNISH MIL-C450.
6. ALL TAPPING SLEEVES SHALL BE HYDROSTATICALLY PRESSURE TESTED IN ACCORDANCE WITH TOWN OF MURPHY SPECIFICATIONS. TEST SHALL BE WITNESSED AND APPROVED BY A TOWN OF MURPHY PROJECT COORDINATOR PRIOR TO BEGINNING TAPPING PROCESS.

SLEEVE FOR USE WITH CI OR DI PIPE

| SLEEVE SIZE PIPE X BRANCH | 6X6 | 8X6 | 8X8 | 12X6 | 12X8 | 12X12 | 16X6 | 16X8 | 16X12 | 24X6 | 24X8 | 24X12 | 24X16 | 24X24 | 30X6 | 30X8 | 30X12 | 30X16 | 30X24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A DIA +.031-.000 | 7.016 | 7.016 | 9.016 | 7.016 | 9.016 | 13.016 | 7.016 | 9.016 | 13.016 | 11.00 | 13.5 | 19.0 | 23.5 | 32.0 | 11.00 | 13.5 | 19.0 | 23.5 | 32.0 |
| B | .31 | .31 | .31 | .31 | .31 | .31 | .31 | .31 | .31 | .31 | .31 | .31 | .31 | .31 | .31 | .31 | .31 | .31 | .31 |
| C | 7-7/8 | 9-1/16 | 9 | 11-5/8 | 11-7/8 | 12-7/8 | 14-1/8 | 14-1/2 | 14-7/8 | 19.5 | 19.5 | 19.5 | 20.5 | 20.5 | 23.25 | 23.25 | 23.25 | 23.75 | 23.75 |
| E | 11-3/4 | 13-7/8 | 13-7/8 | 18-1/2 | 18-1/2 | 18-1/2 | 23-1/2 | 23-1/2 | 23-1/2 | 35.5 | 35.5 | 35.5 | 35.5 | 35.5 | 43.37 | 43.37 | 43.37 | 43.37 | 43.37 |
| F | 13-1/2 | 15 | 15 | 19-1/2 | 19-1/2 | 19-1/2 | 22-1/2 | 22-1/2 | 22-1/2 | 18.0 | 18.0 | 24.0 | 30.0 | 36.0 | 24.0 | 24.0 | 24.0 | 36.0 | 36.0 |
| | | | | | | | | | | | | | | | | | | | |

# DUCTILE IRON TAPPING SLEEVE

N.T.S.

SHEET NO. 1 OF 1

DWG. NO. W.9

DWG. BY: W.A.S.

DATE: 9/9/2019

APPROVED BY: J.S.S.

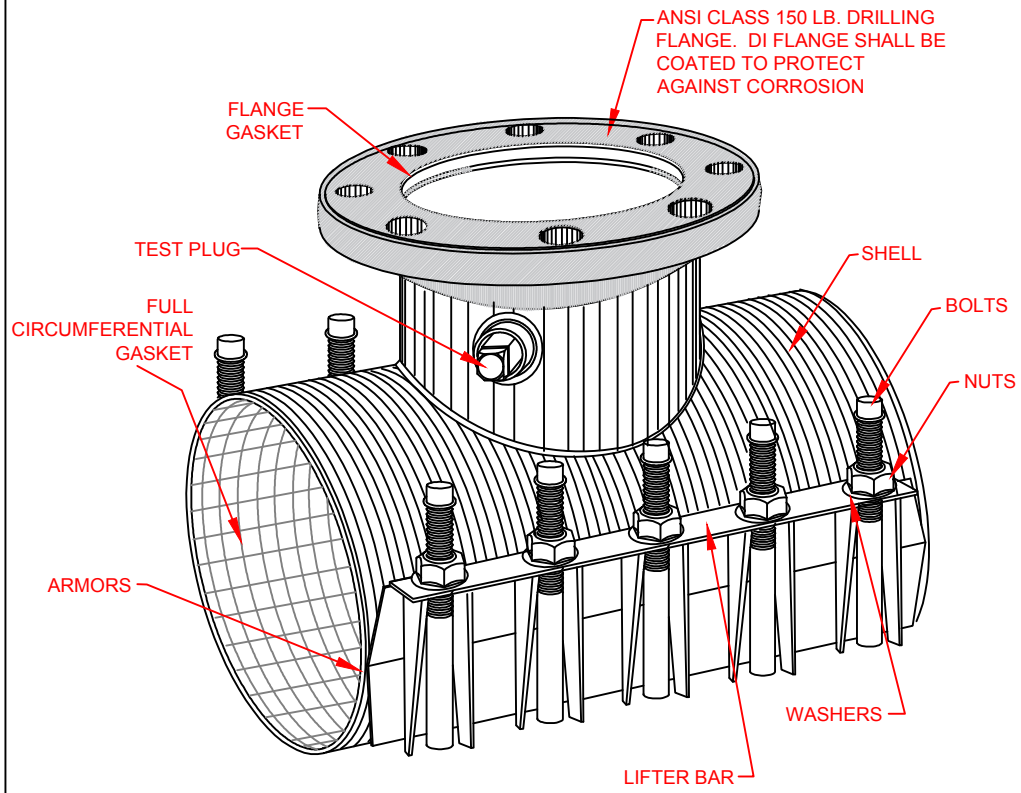
TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W9-M.J.-TAPPING-SLEEVE.dwg

| NOMINAL PIPE SIZE (INCH) | BRANCH SIZE | APPROX. WT. LBS. |
|---|---|---|
| 4" | 3",4" | 28,30 |
| 6" | 3",4",6" | 36,38,45 |
| 8" | 3",4",6",8" | 42,44,48,66 |
| 10" | 3",4",6",8",10" | 45,48,55,70,80, |
| 12" | 3",4",6",8",10",12" | 50,52,60,81,96,143 |
| 16" | 3",4",6",8",10",12" | 78,80,85,100,115,172 |
| 24" | 3",4",6",8",10",12" | 85,87,90,100,145,230 |




NOTES:

1. ALL MATERIALS SHALL BE IN ACCORDANCE WITH TOWN OF MURPHY STANDARDS.
2. TAPPING SLEEVES SHALL BE AS MANUFACTURED BY ROMAC, SMITH-BLAIR, OR APPROVED EQUAL.
3. STAINLESS STEEL TAPPING SLEEVE MAY BE UTILIZED FOR ALL TAPPING OF MAINS UP TO AND INCLUDING 24" DIAMETER WITH 12" OR LESS BRANCH. BRANCH GREATER THAN 12" SHALL REQUIRE FULL BODY D.I. M.J. TAPPING SLEEVE (SEE DETAIL W.10).
4. SHELL AND LUGS SHALL BE STAINLESS STEEL PER ASTM A 240, TYPE 304 AND 304L.
5. BOLTS SHALL BE 5/8" UNC ROLLED THREAD, STAINLESS STEEL PER ASTM A 193 TYPE 304 4" NOM. PIPE SIZE SHALL HAVE MINIMUM 1/2" BOLTS.
6. NUTS SHALL BE HEAVY HEX STAINLESS STEEL PER ASTM A-194, TYPE 304.
7. WASHERS SHALL BE STEEL AND PLASTIC LUBRICATING WASHER.
8. GASKETS SHALL BE VIRGIN SBR PER ASTM D 2000 MAA 610, COMPOUNDED FOR WATER AND SEWER SERVICE.
9. FLANGE SHALL BE DUCTILE IRON PER ASTM 536, GRADE 65-45-12, OR STAINLESS STEEL PER ASTM A-240, TYPE 304.
10. DIMENSIONS SHOWN ARE FOR REFERENCE AND MAY VARY BASED UPON MANUFACTURER. SLEEVES SHALL BE SIMILAR IN NATURE TO THAT SHOWN AND SHALL NOT DEVIATE IN ESSENTIAL DETAILS.
11. PIPE SURFACES SHALL BE CLEANED THOROUGHLY TO PERMIT A GOOD SEAL PRIOR TO INSTALLATION.
12. ALL TAPPING SLEEVES SHALL BE HYDROSTATICALLY PRESSURE TESTED IN ACCORDANCE WITH TOWN OF MURPHY SPECIFICATIONS. TEST SHALL BE WITNESSED AND APPROVED BY A TOWN OF MURPHY PROJECT COORDINATOR PRIOR TO BEGINNING TAPPING PROCESS.
13. THE NUMBER OF BOLTS, NUTS AND WASHERS SHOWN ARE FOR ILLUSTRATION ONLY, ACTUAL QUANTITY SHALL BE AS RECOMMENDED BY THE SLEEVE MANUFACTURER FOR THE REQUIRED SERVICE.

# STAINLESS STEEL TAPPING SLEEVE

N.T.S.

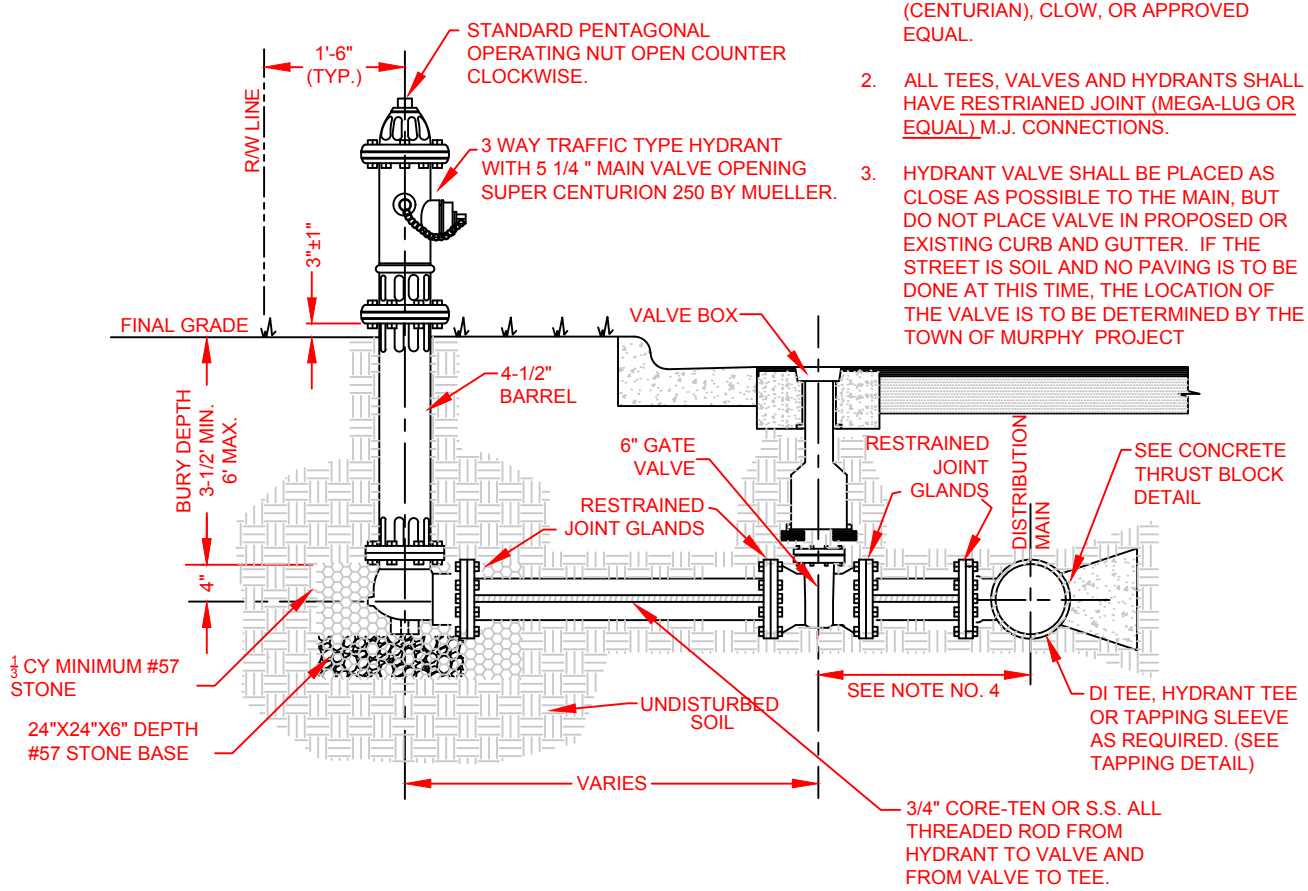
| SHEET NO. | DWG. NO. | DWG. BY: |
|---|---|---|
| 1 OF 1 | W.10 | W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |


TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906


811 Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W10-SS-TAPPING-SLEEVE.dwg




NOTES:

1. FIRE HYDRANT SHALL BE MODELS MANUFACTURED BY MUELLER CO. (CENTURIAN), CLOW, OR APPROVED EQUAL.
2. ALL TEES, VALVES AND HYDRANTS SHALL HAVE RESTRIANED JOINT (MEGA-LUG OR EQUAL) M.J. CONNECTIONS.
3. HYDRANT VALVE SHALL BE PLACED AS CLOSE AS POSSIBLE TO THE MAIN, BUT DO NOT PLACE VALVE IN PROPOSED OR EXISTING CURB AND GUTTER. IF THE STREET IS SOIL AND NO PAVING IS TO BE DONE AT THIS TIME, THE LOCATION OF THE VALVE IS TO BE DETERMINED BY THE TOWN OF MURPHY PROJECT COORDINATOR.
4. HYDRANT BRANCH SHALL NOT BE BACK FILLED UNTIL INSPECTED AND APPROVED BY A TOWN OF MURPHY PROJECT COORDINATOR.
5. GATE VALVE AND BOX SHALL BE IN ACCORDANCE WITH TOWN OF MURPHY DETAILS.
6. HYDRANT EXTENSIONS AND/OR OFFSETS SHALL BE APPROVED BY THE TOWN OF MURPHY PROJECT COORDINATOR.
7. FIRE HYDRANT CONNECTIONS TO EXISTING WATER MAINS SHALL BE MADE USING A TAPPING SLEEVE AND VALVE BY WET TAP CONNECTION. THE TAPPING SLEEVE AND VALVE SHALL BE HYDROSTATICALLY TESTED PRIOR TO STARTING THE TAP IN THE PRESENCE OF THE TOWN OF MURPHY PROJECT COORDINATOR.
8. THE PROPOSED LOCATION MAY BE RELOCATED BY THE TOWN OF MURPHY PROJECT COORDINATOR IF CONFLICTS EXIST (IE: GAS SERVICES, UGE, TELEPHONE, ETC.).
9. THE CONTRACTOR SHALL FIELD VERIFY THE EXISTING WATER MAIN MATERIAL, SIZE, AND DEPTH FOR EACH FIRE HYDRANT LOCATION PRIOR TO ORDERING MATERIALS. THE CONTRACTOR WILL BE REQUIRED TO SUPPLY VARIOUS LENGTHS OF BARRELS AND HYDRANT EXTENSIONS (NO MORE THAN ONE HYDRANT EXTENSION MAY BE USED PER HYDRANT). ADDITIONAL FITTINGS AND/OR HYDRANT EXTENSIONS OR OFFSET CONNECTORS MAY BE REQUIRED TO MAINTAIN PROPER COVER AS APPROVED BY THE TOWN OF MURPHY PROJECT COORDINATOR.
10. CONTRACTOR SHALL NOTIFY THE APPROPRIATE FIRE DEPARTMENT OF OUT OF SERVICE FIRE HYDRANTS PRIOR TO CONSTRUCTION.

# FIRE HYDRANT AND VALVE INSTALLATION

N.T.S.

| SHEET NO. | DWG. NO. | DWG. BY: |
|---|---|---|
| 1 OF 1 | W.11 | W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

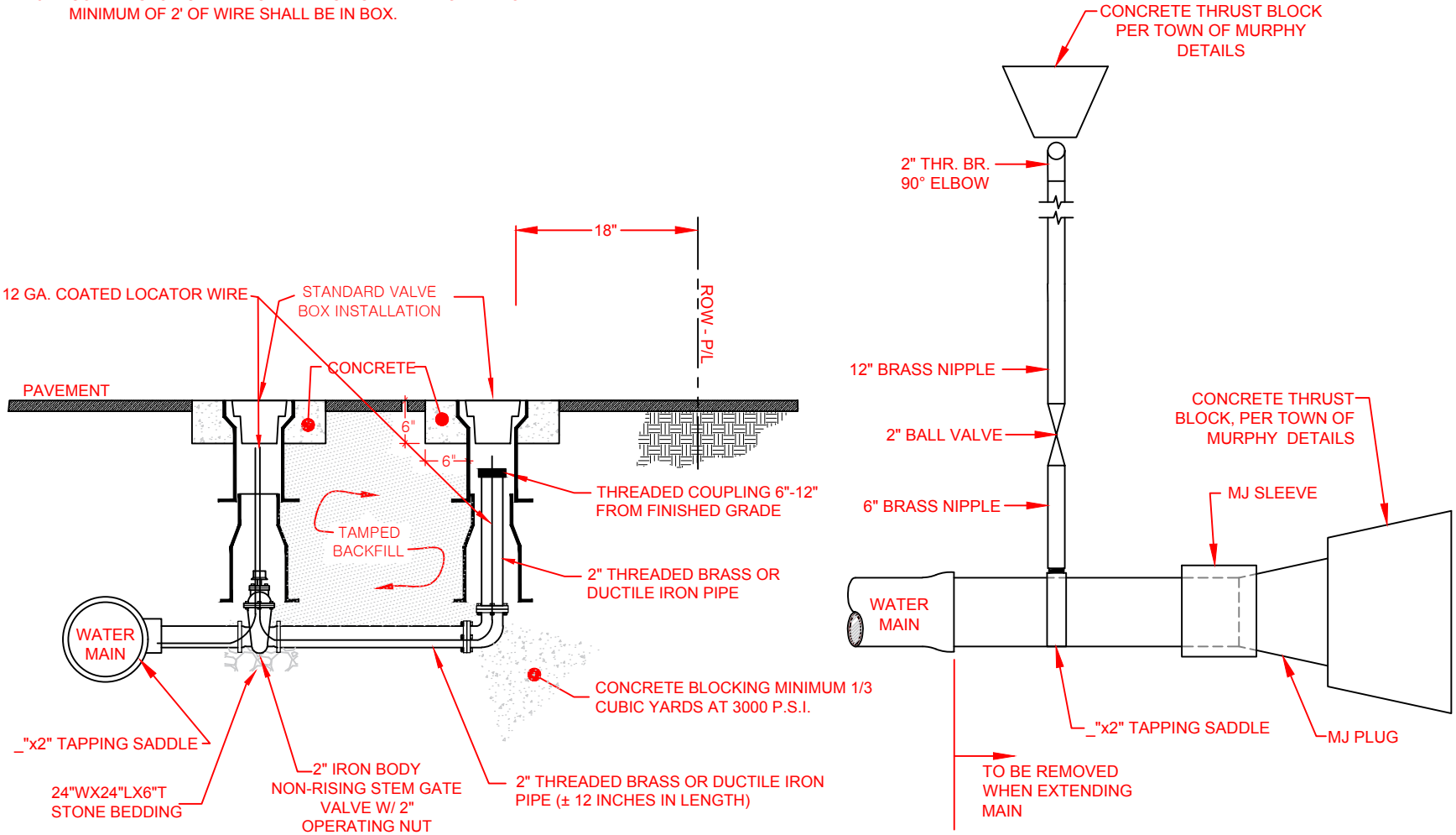
TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W11-FHCC.dwg

NOTES:
1. ALL MATERIAL SHALL BE APPROVED BY THE TOWN OF MURPHY.
2. INSTALLATION SHALL BE INSPECTED AND APPROVED BY A TOWN OF MURPHY PROJECT COORDINATOR PRIOR TO BACKFILL.
3. CONTRACTOR SHALL INSTALL RACING WIRE INTO THE BOX. A MINIMUM OF 2' OF WIRE SHALL BE IN BOX.




SIDE OF LINE 2" BLOW OFF
N.T.S.

| SHEET NO. 1 OF 2 | DWG. NO. W.12 | DWG. BY: W.A.S. |
|---|---|---|
| | DATE: 9/9/ 2019 | APPROVED BY: J.S.S. |

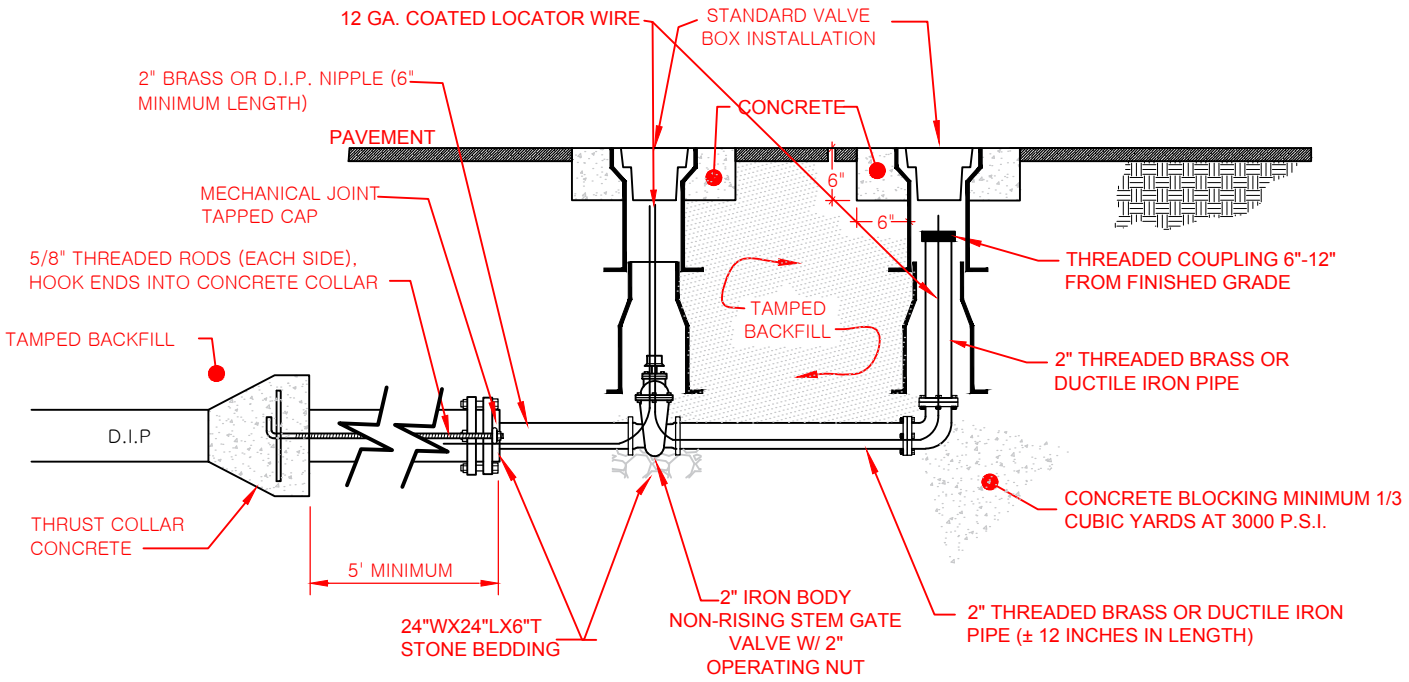

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906


Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

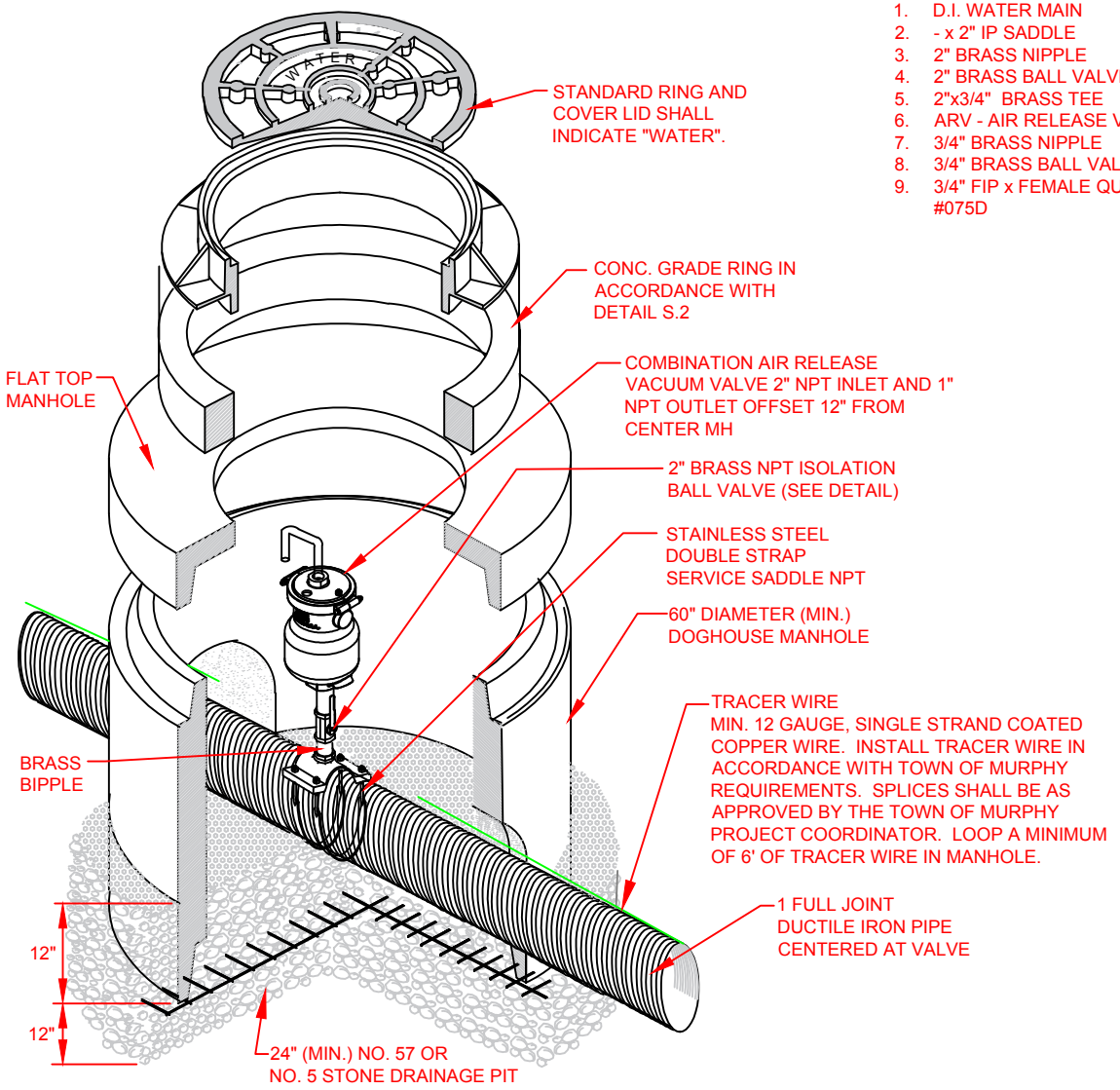
W12-2-BLOWOFF.dwg

NOTES:
1. ALL MATERIAL SHALL BE APPROVED BY THE TOWN OF MURPHY.
2. INSTALLATION SHALL BE INSPECTED AND APPROVED BY A TOWN OF MURPHY PROJECT COORDINATOR PRIOR TO BACKFILL.
3. CONTRACTOR SHALL INSTALL RACING WIRE INTO THE BOX. A MINIMUM OF 2' OF WIRE SHALL BE IN BOX.



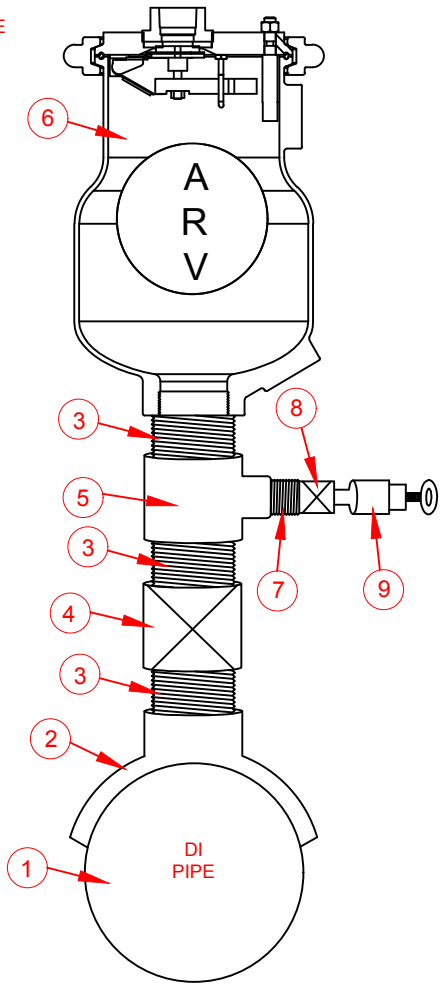

| END OF LINE 2" BLOW OFF<br>N.T.S. | | | TOWN OF MURPHY<br>5 WOFFORD STREET<br>MURPHY, NC , 28906<br>Know what's below. Call before you dig. | NO. | DATE | REVISION |
|---|---|---|---|---|---|---|
| SHEET NO.<br>2 OF 2 | DWG. NO. W.12 | DWG. BY: W.A.S. | | | | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | | | | |

W12-2-BLOWOFF.dwg




***DESCRIPTION***

1. D.I. WATER MAIN
2. - x 2" IP SADDLE
3. 2" BRASS NIPPLE
4. 2" BRASS BALL VALVE WITH HANDLE
5. 2"x3/4" BRASS TEE
6. ARV - AIR RELEASE VACUUM VALVE
7. 3/4" BRASS NIPPLE
8. 3/4" BRASS BALL VALVE
9. 3/4" FIP x FEMALE QUICK CONNECT #075D




# COMBINATION AIR RELEASE VACUUM VALVE (WATER SERVICE)

N.T.S.

| SHEET NO. 1 OF 2 | DWG. NO. W.13 | DWG. BY: W.A.S. |
|---|---|---|
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |


TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906


Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W13-AIR-RELEASE-VALVE.dwg

NOTES:

1. COMBINATION AIR RELEASE VALVES SHALL BE OF THE SINGLE HOUSING STYLE THAT COMBINES THE OPERATING FEATURES OF BOTH AN AIR VACUUM AND AIR RELEASE VALVE.
2. THE COMBINATION AIR RELEASE VALVE SHALL HAVE 2" NPT INLET AND 1" NPT OUTLET CONNECTIONS AND A 3/16 INCH DIAMETER ORIFICE (OR ORIFICE SHALL BE DETERMINED BY THE ENGINEER) FOR A MAXIMUM 200PSI WORKING PRESSURE.
3. ALL MATERIALS SHALL MEET THE STANDARDS AND SPECIFICATIONS OF THE TOWN OF MURPHY.
4. MANHOLE, FRAME, AND COVER SHALL BE IN ACCORDANCE WITH TOWN OF MURPHY DETAILS.
5. 2" TAPPING SADDLE SHALL BE DUCTILE IRON WITH STAINLESS STEEL STRAPS, BOLTS, NUTS, AND WASHERS.
6. SADDLES FOR PIPE SIZES 8" THRU 24" SHALL BE DOUBLE STRAP.
7. ALL INTERNAL PARTS SHALL BE 316 STAINLESS STEEL.
8. THE COMBINATION AIR RELEASE VALVE SHALL HAVE A SINGLE FLOAT DESIGN.
9. ALL COMBINATION AIR RELEASE VALVES SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
10. ALL COMBINATION AIR RELEASE VALVES SHALL BE CRISPIN MODEL UX20, ARI D-020, OR APPROVED EQUAL.
11. COMBINATION AIR RELEASE VALVE SHALL BE CENTERED IN MANHOLE. OFFSET THE RING AND COVER TO ALLOW ACCESS.
12. TOP OF WATER MAIN SHALL BE A MINIMUM 4' DEEP AT AIR RELEASE VALVE, UNLESS OTHERWISE REQUIRED DUE TO WATER MAIN AND/OR COMBINATION AIR RELEASE VALVE SIZE.
13. COMBINATION AIR RELEASE VALVE BODIES SHALL BE MADE OF STAINLESS STEEL OR REINFORCED NYLON

# COMBINATION AIR RELEASE VACUUM VALVE (WATER SERVICE)

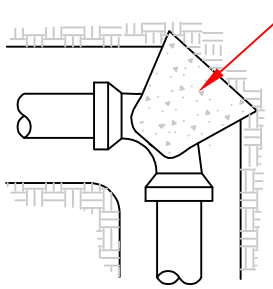
| | | |
|---|---|---|
| SHEET NO. 2 OF 2 | DWG. NO. W.13 | DWG. BY: W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

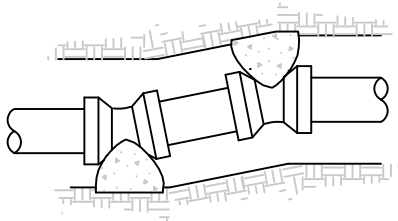
| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W13-AIR-RELEASE-VALVE.dwg

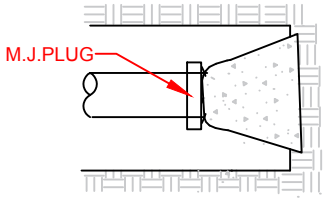



ELBOW

| MINIMUM BEARING AREA EACH DIRECTION OF THRUST IN SQUARE FEET (based on soil supporting value of 2,000psf @ 200 psig test pressure) | | | | |
|---|---|---|---|---|
| PIPE SIZE | TEES & DEADENDS | 90° ELBOWS | 45° ELBOW & CROSSES | 22-1/2° ELBOWS |
| 6" | 4 | 6 | 3 | 2 |
| 8" | 7 | 10 | 5 | 3 |
| 12" | 15 | 21 | 11 | 6 |

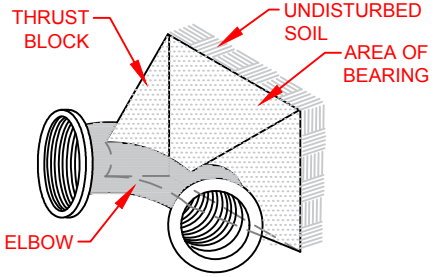


HORIZONTAL BEND

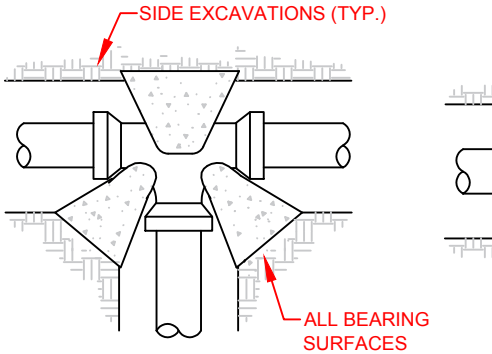



SEE BLOW-OFF DETAIL FOR CLARIFICATION OF CONSTRUCTION REQUIRED AT DEAD ENDS.

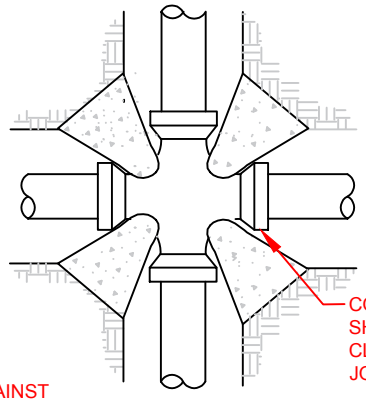
DEAD END



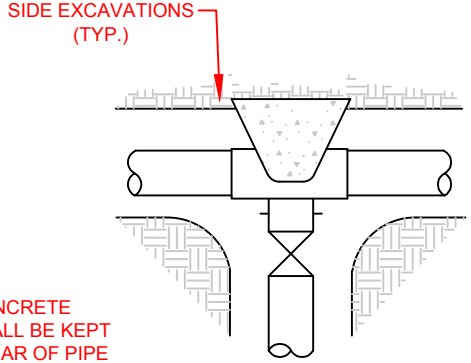

NOTES:
1. THRUST BLOCKS SHALL BE INSTALLED ON PVC WATER DISTRIBUTION LINES 6" THRU 12" DIAMETER IN THE MANNER SHOWN.
2. PIPE GREATER THAN 12 INCH DIAMETER SHALL REQUIRE RESTRAINT JOINT PIPE FOR THE PROPER LENGTH.
3. THRUST BLOCKS SHALL BE INSTALLED ON WATER MAIN IN THE MANNER SHOWN.
4. IF SAC-CRETE IS USED, MIXING MUST BE ON SITE UTILIZING A MECHANICAL MIXER.
5. NO CONCRETE SHALL BE PLACED ON BOLTS. WRAP JOINT FITTINGS WITH PLASTIC.
6. CONCRETE SHALL BE A MINIMUM 3,000PSI.
7. ALL BEARING SURFACES SHALL BE AGAINST UNDISTURBED SOIL AND SHALL BE APPROVED BY THE TOWN OF MURPHY PROJECT COORDINATOR PRIOR TO PLACEMENT OF CONCRETE.
8. USE OF RESTRAINED JOINT DUCTILE IRON WILL BE REQUIRED IF SOIL CONDITIONS DO NOT ALLOW THE USE OF THRUST BLOCKS.
9. ALL VERTICAL BENDS SHALL BE RESTRAINED USING RESTRAINED JOINT DUCTILE IRON PIPE.




TEE




CROSS




TAPPING SLEEVE AND VALVE

# CONCRETE THRUST BLOCK DETAIL

N.T.S.

| SHEET NO. 1 OF 1 | DWG. NO. W.14 | DWG. BY: W.A.S. |
|---|---|---|
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

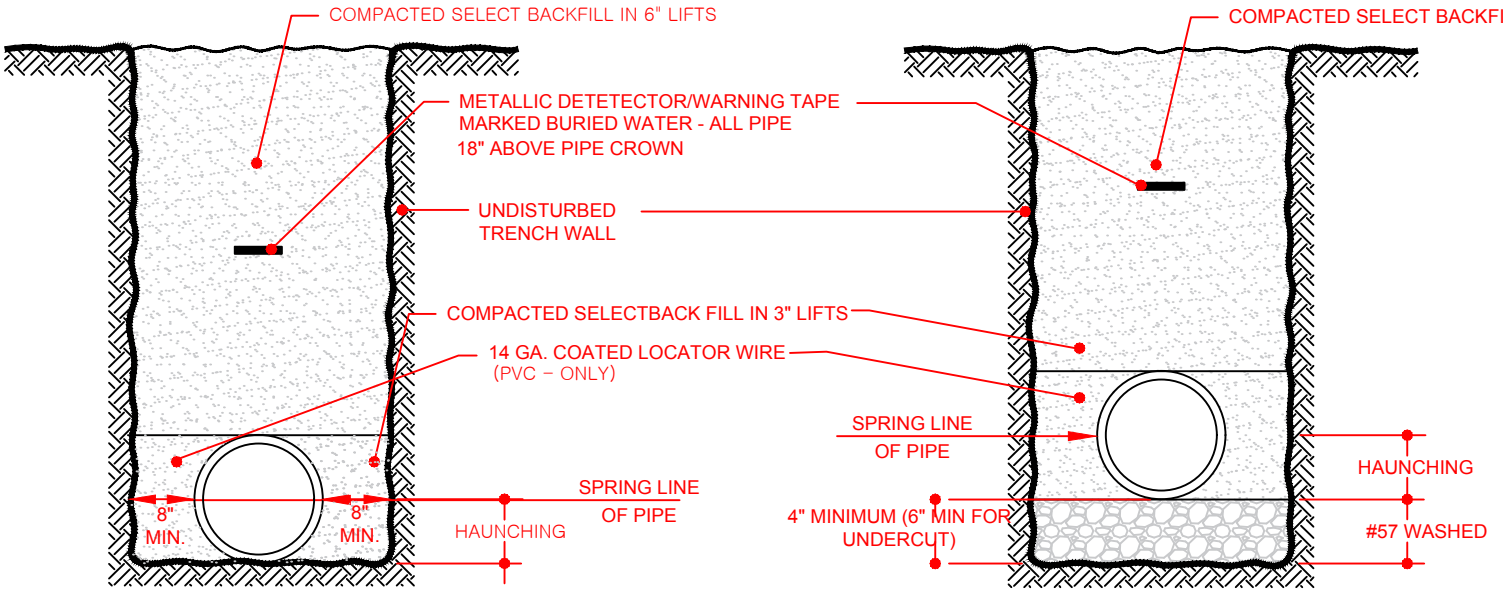
Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W14-THRUSTBLOCK.dwg

NOTES:

1. SUITABLE SOIL BEDDING IS DEFINED AS "NATIVE" SOIL EXCAVATED FROM THE TRENCH, FREE OF ROCKS, FOREIGN MATERIAL, AND FROZEN EARTH.
2. SUITABLE BEDDING MATERIAL SHALL EXTEND TO UNDISTURBED TRENCH WALLS.
3. UNDERCUT TRENCHING SHALL BE AS DIRECTED BY THE TOWN OF MURPHY PROJECT COORDINATOR OR ENGINEER.
4. MINIMUM DEPTH OF COVER SHALL BE 36" .



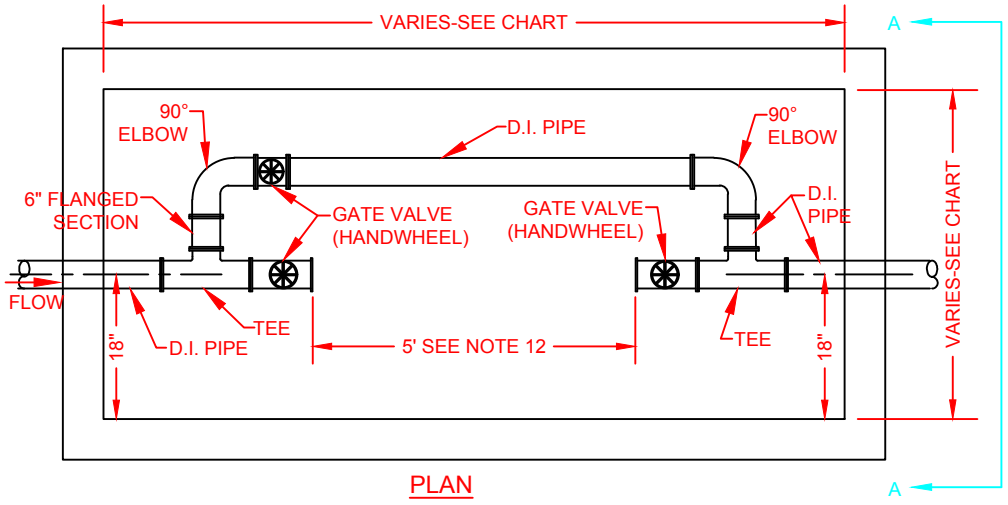

STANDARD BEDDING FOR WATER MAIN PIPE



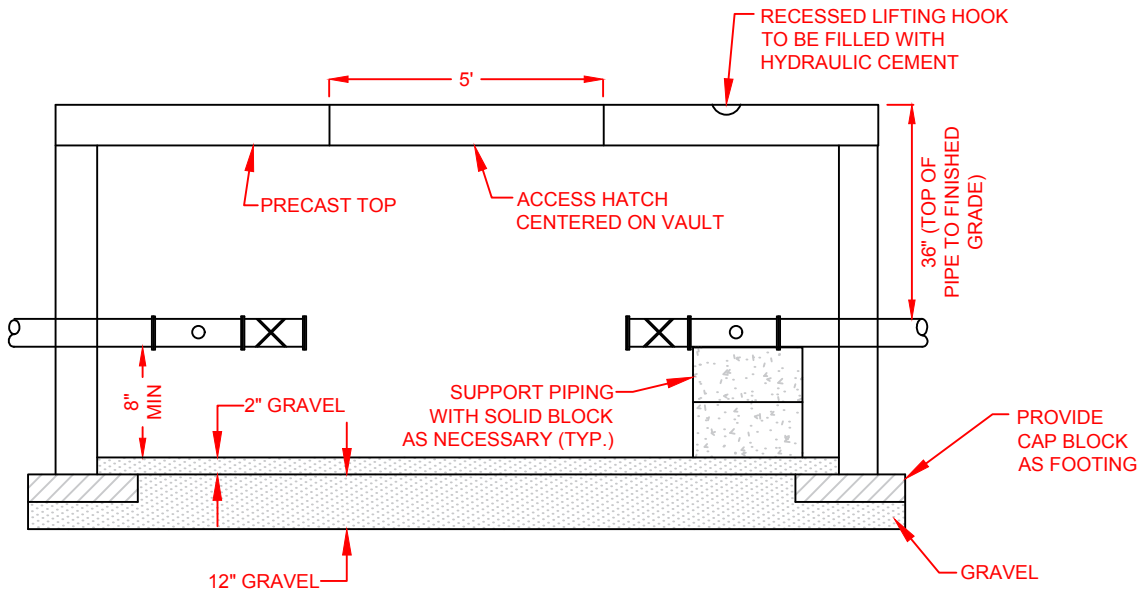

STANDARD BEDDING FOR WATER LINE PIPE UNDERCUT EXCAVATIONS

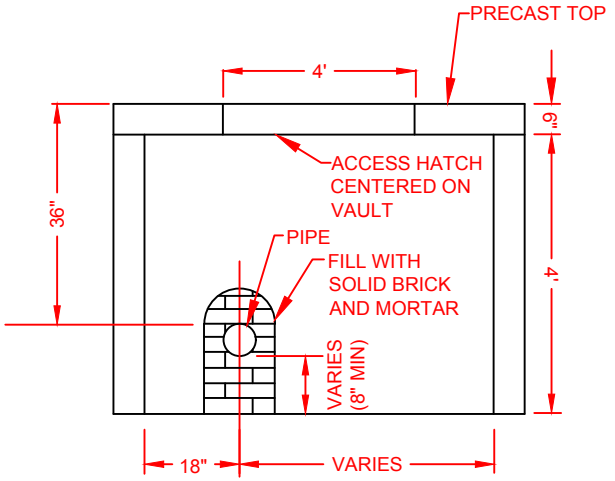
| WATER MAIN BEDDING DETAIL<br>N.T.S. | | | TOWN OF MURPHY<br>5 WOFFORD STREET<br>MURPHY, NC , 28906<br>Know what's below. Call before you dig. | NO. | DATE | REVISION |
|---|---|---|---|---|---|---|
| SHEET NO.<br>1 OF 1 | DWG. NO. W.15 | DWG. BY: W.A.S. | | | | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | | | | |

W15-WATER-BEDDING.dwg




PLAN




SECTION A-A

| | | | | | |
|---|---|---|---|---|---|
| METER VAULT<br>N.T.S. | | | TOWN OF MURPHY<br>5 WOFFORD STREET<br>MURPHY, NC , 28906<br>811 Know what's below. Call before you dig. | NO. | DATE / REVISION |
| SHEET NO.<br>1 OF 2 | DWG. NO. W.16 | DWG. BY: W.A.S. | | | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | | | |

W16-METER-VAULT.dwg

| METER SIZE | MIN PIPE DIA | SPACING BETWEEN GATE VALVES (SEE NOTE 20) | VAULT SIZE (INSIDE DIM.) |
|---|---|---|---|
| 3" | 4" | 5' | 5'x10' |
| 4" | 4" | 5' | 5'x10' |
| 6" | 6" | 5' | (SEE NOTE 19) 5'x10' |
| 8" | 8" | 5' | 6'x12' |

NOTES:

1. VAULTS SHALL BE PRECAST REINFORCED CONCRETE (4,000PSI). VAULT CONSTRUCTION SHALL BE CERTIFIED BY MANUFACTURER TO WITHSTAND LOADING DUE TO BACKFILLING, IN ACCORDANCE WITH ACI 318.
2. BRICK VAULTS SHALL NOT BE ACCEPTABLE.
3. NO RISERS SHALL BE ALLOWED.
4. VAULTS SHALL HAVE INSIDE DIMENSIONS AS INDICATED ON CHART.
5. VAULT SHALL BE LOCATED OUTSIDE OF PAVED TRAFFIC AREAS.
6. METER VAULT SHALL BE LOCATED WITHIN PUBLIC RIGHT-OF-WAY OR DEDICATED EASEMENT. IF IN EASEMENT, PROVIDE A MINIMUM 5' CLEARANCE AROUND VAULT.
7. CONTRACTOR SHALL PROVIDE ALL FITTINGS, PIPING, ETC. AS INDICATED.
8. THE VAULT SHALL BE LOCATED NO CLOSER THAN 5' FROM ANY STRUCTURE.
9. PIPING SHALL BE RESTRAINED JOINT DUCTILE IRON FROM TAP AT MAIN TO VAULT.
10. PIPE FITTINGS INSIDE VAULT SHALL BE FLANGED.
11. VAULT SHALL BE SET PLUMB AND LEVEL, MATCH FINISHED GRADE, AND SHALL HAVE POSITIVE DRAINAGE AWAY FROM IT.
12. ACCESS HATCH SHALL BE 5'x4' DOUBLE DOOR CENTERED ON VAULT, SO AS TO PROVIDE CLEAR ACCESS TO METER.
13. ACCESS HATCH SHALL BE ALUMINUM, MOUNTED FLUSH AND SHALL BE CAPABLE OF BEARING INCIDENTAL TRAFFIC LOADS. ALL OTHER HATCHES SHALL BE APPROVED BY THE TOWN OF MURPHY PRIOR TO CONSTRUCTION. BOLTS, HINGES AND HOLD OPEN ARM SHALL BE 316 STAINLESS STEEL.
14. ACCESS HATCH SHALL LATCH AUTOMATICALLY UPON CLOSURE (SLAMLOCK). HATCH SHALL BE LOCKABLE USING A KEYED LOCKING MECHANISM INTEGRAL TO THE HATCH. HATCH MANUFACTURER SHALL PROVIDE ONE OPERATING KEY TO THE TOWN OF MURPHY.
15. ALL LIFTING HOLES SHALL BE FILLED WITH HYDRAULIC CEMENT.
16. LATERAL AND VAULT INSTALLATION SHALL BE APPROVED BY THE TOWN OF MURPHY PROJECT COORDINATOR PRIOR TO BACKFILL.
17. LATERAL AND PIPING INSIDE OF VAULT SHALL PASS HYDROSTATIC AND STERILIZATION TESTS (200PSI).
18. IF USING 8" PIPING WITH A 6" METER, THE VAULT SHALL BE 6'x12'.
19. CONTRACTOR SHALL VERIFY VAULT DIMENSIONS, METER DIMENSIONS, AND PIPE LAYOUT WITH THE TOWN OF MURPHY PRIOR TO ORDERING MATERIALS.

# METER VAULT

SHEET NO. 2 OF 2

DWG. NO. W.16

DWG. BY: W.A.S.

DATE: 9/9/2019

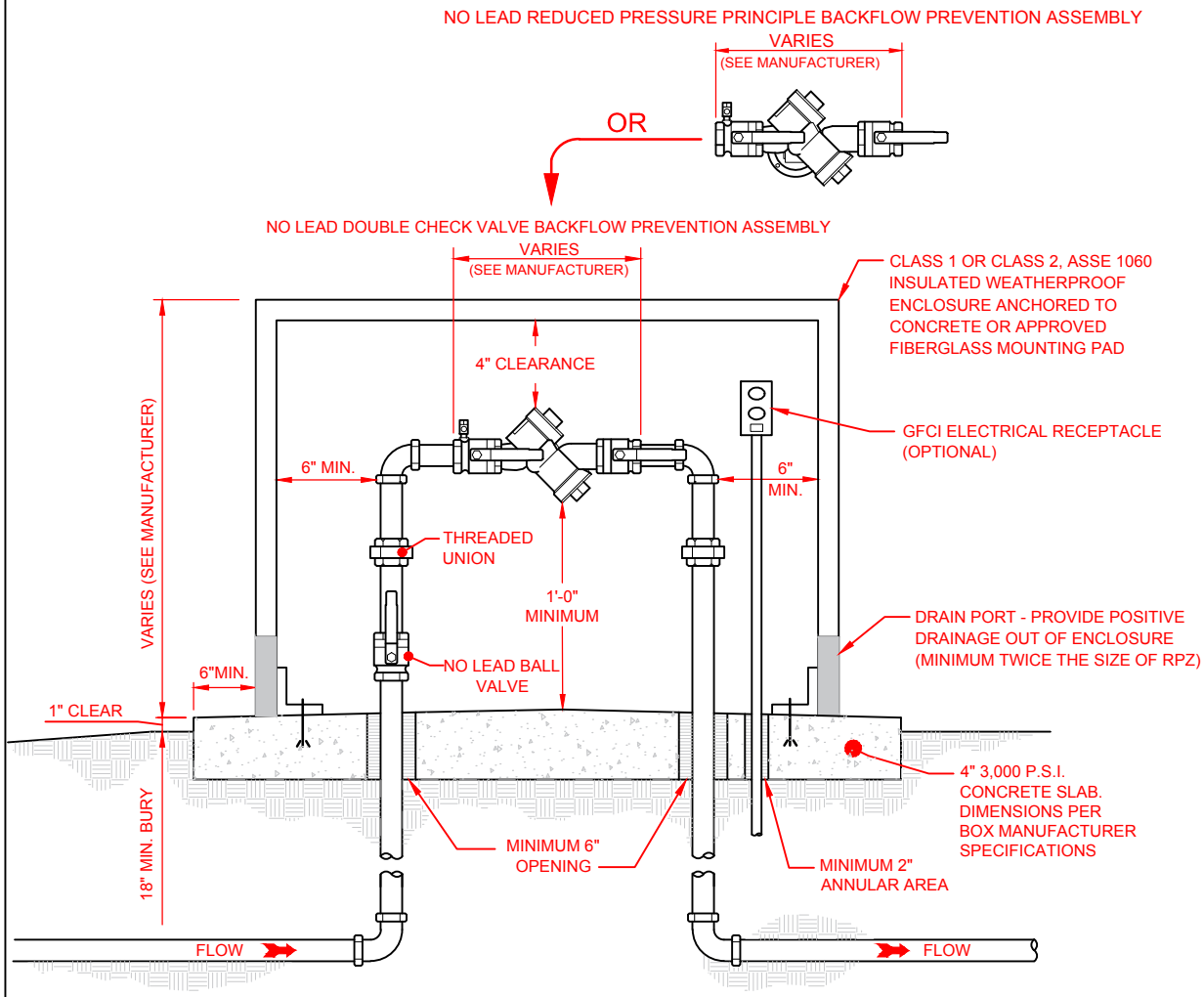
APPROVED BY: J.S.S.

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W16-METER-VAULT.dwg




NOTES:

1. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1013 & AWWA C511.
2. DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1015 & AWWA C510.
3. BACKFLOW PREVENTION ASSEMBLY SHALL BE INSTALLED WITHIN 5 FEET OF THE METER BOX.
4. BACKFLOW PREVENTION ASSEMBLY SHALL BE CENTERED ON CONCRETE OR APPROVED FIBERGLASS MOUNTING PAD AND CENTERED WITHIN ENCLOSURE.
5. MINIMUM INSULATED CLASS I OR CLASS II, ASSE 1060 WEATHERPROOF ENCLOSURE REQUIRED (HEATING OPTIONAL).
6. OPTIONAL 120V GFCI ELECTRICAL RECEPTACLE TO BE INSTALLED IN ACCORDANCE WITH THE N.C. ELECTRICAL CODE FOR OUTDOOR OPERATION.
7. PIPE MATERIAL SHALL BE PVC (SCH. 80 OR BETTER), COPPER (TYPE K), OR 'NO LEAD' BRASS (UNS C89833 PER ASTM B584).
8. INSTALLATION SHALL BE IN COMPLIANCE WITH ALL APPLICABLE TOWN ORDINANCES AND SPECIFICATIONS IN ADDITION TO THE N.C. PLUMBING CODE.
9. PROPERTY OWNER SHALL BE RESPONSIBLE FOR MAINTENANCE AND OPERATION OF BACKFLOW ASSEMBLY AND COMPLIANCE WITH REPORTING AND TESTING REQUIREMENTS.
10. ALL BRASS COMPONENTS SHALL BE 'NO LEAD' BRASS MEETING UNS C89833 AS PER ASTM B584.

# 2" OUTSIDE BACKFLOW PREVENTOR

N.T.S.

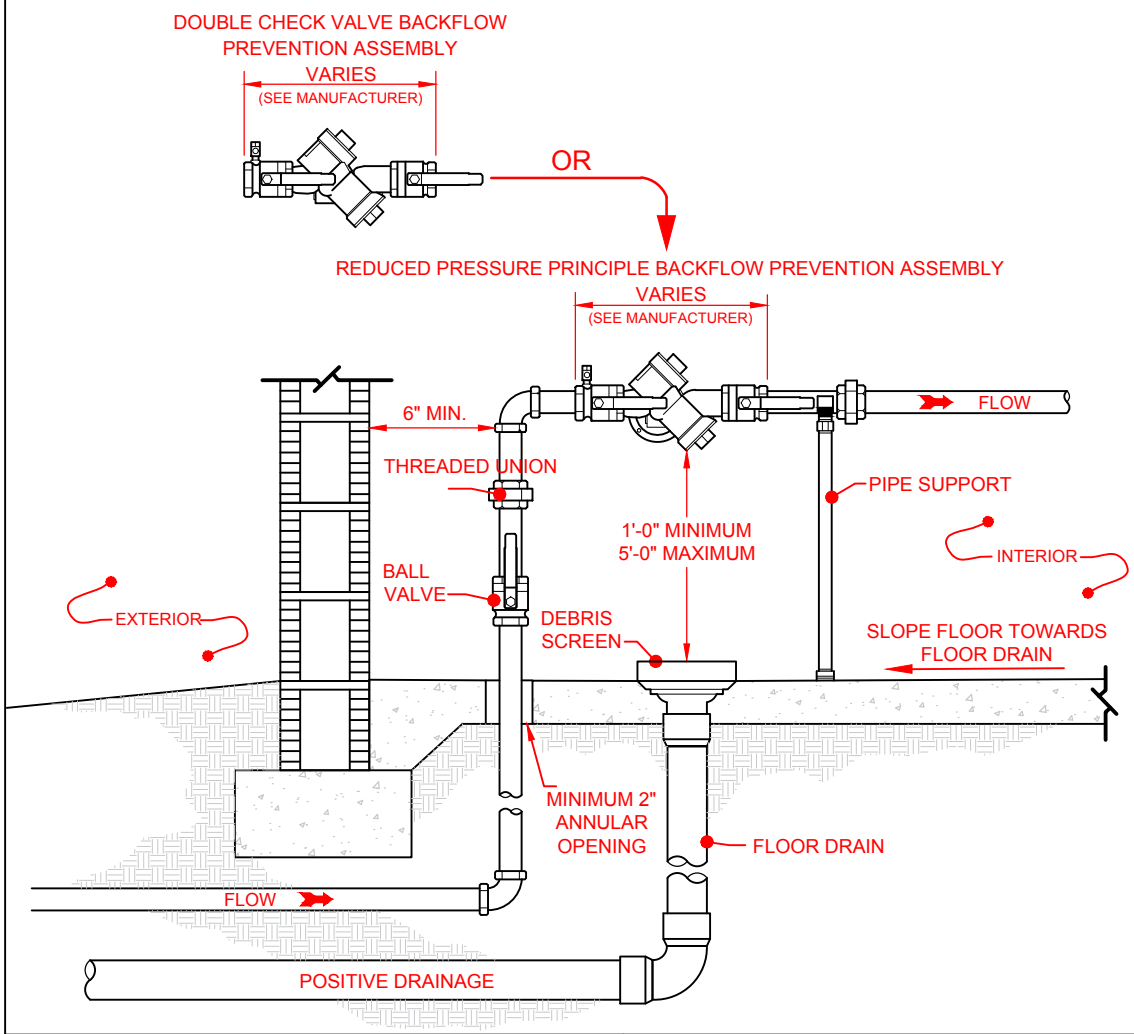
| | | | |
|---|---|---|---|
| SHEET NO. 1 OF 2 | DWG. NO. W.17 | DWG. BY: W.A.S. | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | |


TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906


811 Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W17-2IN BFP.dwg




NOTES:

1. ALL ASSEMBLIES SHALL CONSIST OF 'NO LEAD' BRASS MEETING UNS C89833 AS PER ASTM B584.
2. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1013 & AWWA C511.
3. DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1015 & AWWA C510.
4. BACKFLOW PREVENTION ASSEMBLY SHALL MAINTAIN MINIMUM CLEARANCES FROM WALLS AND FLOOR AS SPECIFIED.
5. BACKFLOW ASSEMBLY SHALL BE IN A SEPARATE ROOM WITH EXTERIOR DOOR. THIS MAY BE A MECHANICAL ROOM OR A FIRE SPRINKLER ROOM, BUT SHALL BE SEPARATE FROM THE MAIN STRUCTURE.
6. PIPE MATERIAL SHALL BE COPPER (TYPE K) OR BRASS (ASTM B43).
7. INSTALLATION SHALL BE IN COMPLIANCE WITH ALL APPLICABLE COUNTY ORDINANCES AND SPECIFICATIONS IN ADDITION TO THE N.C. PLUMBING CODE.
8. PROPERTY OWNER SHALL BE RESPONSIBLE FOR MAINTENANCE AND OPERATION OF BACKFLOW ASSEMBLY AND COMPLIANCE WITH REPORTING AND TESTING REQUIREMENTS.

# 2" INSIDE BACKFLOW PREVENTOR

N.T.S.

| | | | |
|---|---|---|---|
| SHEET NO. 2 OF 2 | DWG. NO. W.17 | DWG. BY: W.A.S. | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

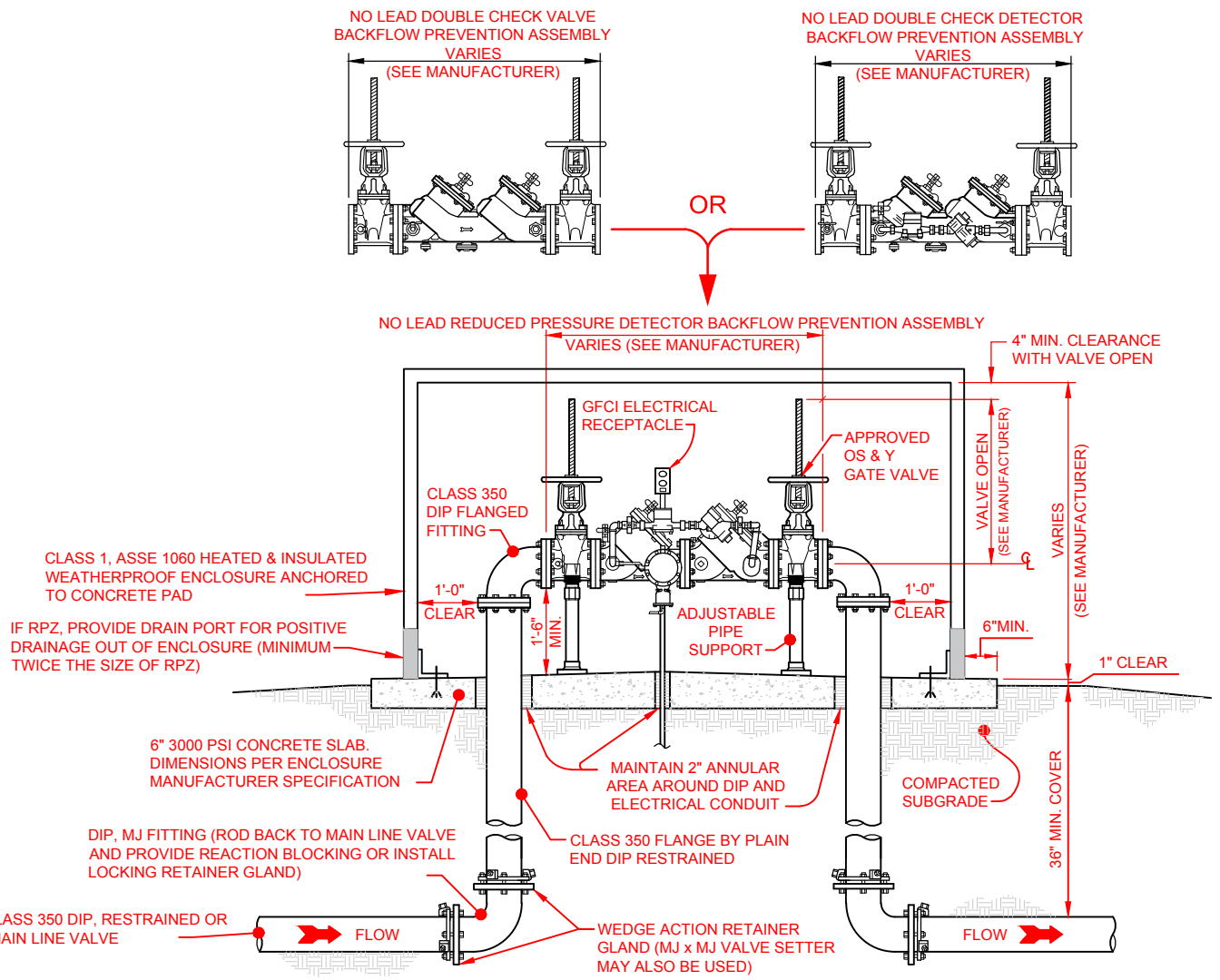
Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W17-2IN BFP.dwg

NOTES:

1. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1013 & AWWA C511.
2. REDUCED PRESSURE DETECTOR BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1047.
3. DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1015 & AWWA C510.
4. DOUBLE CHECK DETECTOR BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1048.
5. BACKFLOW ASSEMBLY SHALL BE CENTERED ON CONCRETE PAD AND CENTERED WITHIN ENCLOSURE.
6. CLASS I, ASSE 1060 HEATED AND INSULATED WEATHERPROOF ENCLOSURE REQUIRED.
7. STANDARD 120V GFCI ELECTRICAL RECEPTACLE TO BE INSTALLED IN ACCORDANCE WITH THE N.C. ELECTRICAL CODE FOR OUTDOOR OPERATION.
8. PIPE MATERIAL SHALL BE CLASS 350 DIP.
9. INSTALLATION SHALL BE IN COMPLIANCE WITH ALL APPLICABLE TOWN OF MURPHY SPECIFICATIONS IN ADDITION TO THE N.C. PLUMBING CODE.
10. PROPERTY OWNER SHALL BE RESPONSIBLE FOR MAINTENANCE AND OPERATION OF BACKFLOW ASSEMBLY AND COMPLIANCE WITH REPORTING AND TESTING REQUIREMENTS.
11. ALL 'NO LEAD' BRASS COMPONENTS SHALL MEET UNS C89833 AS PER ASTM B584.




# >2" OUTSIDE BACKFLOW PREVENTOR

N.T.S.

| | | | |
|---|---|---|---|
| SHEET NO. 1 OF 2 | DWG. NO. W.18 | DWG. BY: W.A.S. | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

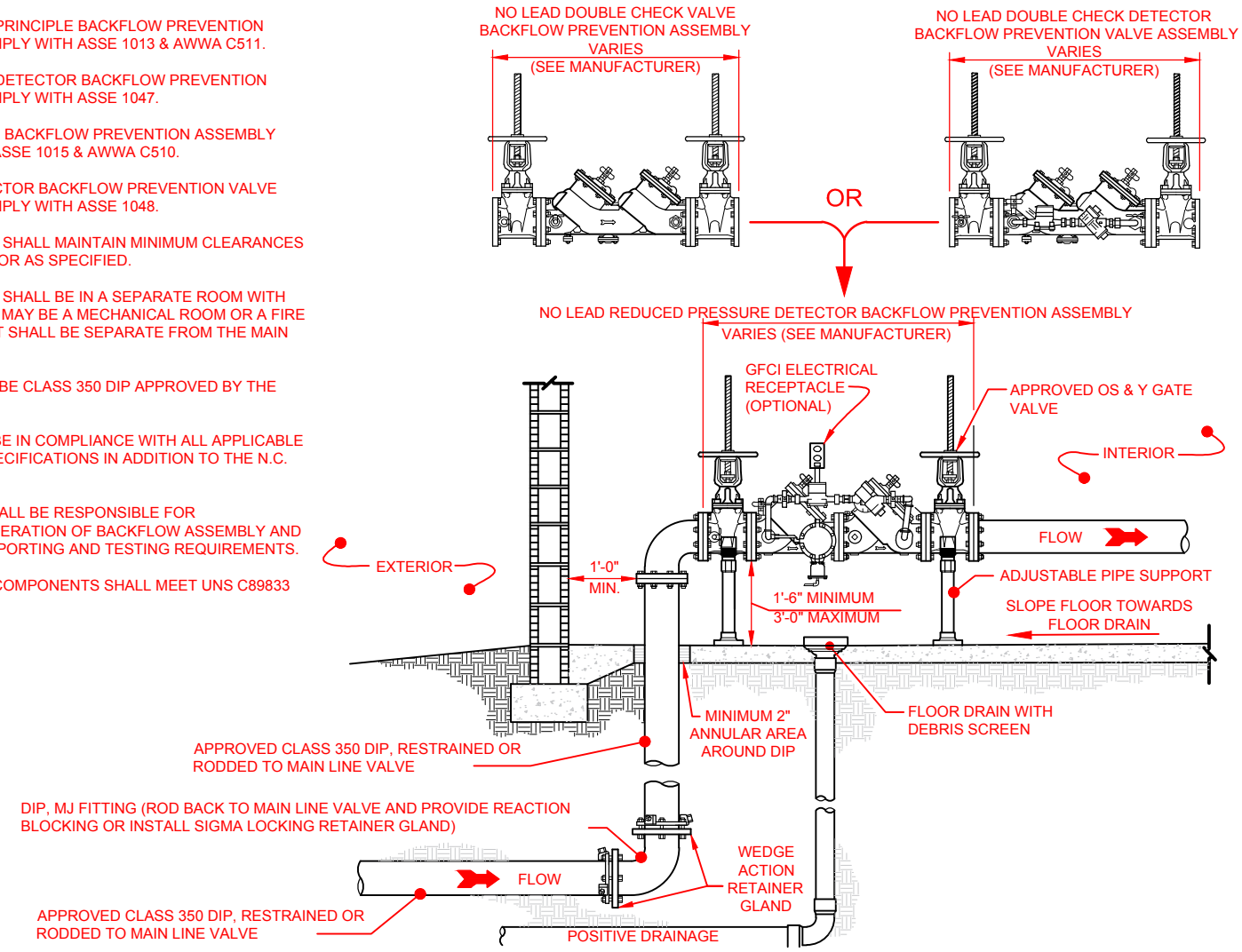
811 Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W18-LARGE-BFP.dwg

NOTES:

1. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1013 & AWWA C511.
2. REDUCED PRESSURE DETECTOR BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1047.
3. DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY SHALL COMPLY WITH ASSE 1015 & AWWA C510.
4. DOUBLE CHECK DETECTOR BACKFLOW PREVENTION VALVE ASSEMBLY SHALL COMPLY WITH ASSE 1048.
5. BACKFLOW ASSEMBLY SHALL MAINTAIN MINIMUM CLEARANCES FROM WALLS AND FLOOR AS SPECIFIED.
6. BACKFLOW ASSEMBLY SHALL BE IN A SEPARATE ROOM WITH EXTERIOR DOOR. THIS MAY BE A MECHANICAL ROOM OR A FIRE SPRINKLER ROOM, BUT SHALL BE SEPARATE FROM THE MAIN STRUCTURE.
7. PIPE MATERIAL SHALL BE CLASS 350 DIP APPROVED BY THE TOWN OF MURPHY.
8. INSTALLATION SHALL BE IN COMPLIANCE WITH ALL APPLICABLE TOWN OF MURPHY SPECIFICATIONS IN ADDITION TO THE N.C. PLUMBING CODE.
9. PROPERTY OWNER SHALL BE RESPONSIBLE FOR MAINTENANCE AND OPERATION OF BACKFLOW ASSEMBLY AND COMPLIANCE WITH REPORTING AND TESTING REQUIREMENTS.
10. ALL 'NO LEAD' BRASS COMPONENTS SHALL MEET UNS C89833 AS PER ASTM B584.




# >2" INSIDE BACKFLOW PREVENTOR

N.T.S.

| SHEET NO. | DWG. NO. | DWG. BY: |
|---|---|---|
| 2 OF 2 | W.18 | W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

W18-LARGE-BFP.dwg

1. CONTRACTOR SHALL REPAIR ALL SEWER LATERALS AND MAINS DAMAGED DURING CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY REPORT ALL SEWER MAIN AND LATERAL BREAKS TO THE TOWN OF MURPHY PROJECT COORDINATOR. THE CONTRACTOR SHALL INITIATE IMMEDIATE REPAIRS IN ACCORDANCE WITH TOWN OF MURPHY STANDARDS.

2. SEWER MAINS, LATERALS, AND MANHOLES SHALL BE INSTALLED UTILIZING A TOWN OF MURPHY APPROVED CUT-SHEET, RECORDING INSTALLATION DEPTH.

3. TRANSFER OF SEWER SERVICES SHALL BE ACCOMPLISHED AS FOLLOWS:
   A. INSTALL AND TEST NEW MAINS, MANHOLES, AND LATERALS. CLEANOUTS SHALL BE INSTALLED 18" INSIDE R/W UNLESS OTHERWISE DIRECTED BY THE TOWN OF MURPHY.
   B. CONNECT EXISTING PLUMBING TO NEW LATERAL UTILIZING THE NECESSARY FITTINGS AS DIRECTED BY THE TOWN OF MURPHY.
   C. AFTER ALL SERVICES HAVE BEEN TRANSFERRED TO THE NEW MAIN, THE EXISTING SEWER SYSTEM SHALL BE ABANDONED IN ACCORDANCE WITH THE TOWN OF MURPHY REQUIREMENTS.

4. WHEN THE EXISTING MAIN IS NOT TO BE ABANDONED, THE CONTRACTOR SHALL UNCOVER THE EXISTING LATERAL AT THE MAIN, CUT AND PLUG BOTH ENDS, REMOVE THE EXISTING CLEANOUT AND COMBINATION, AND PLUG THE LATERAL TO ABANDON THE OLD SERVICE.

5. CONTRACTOR SHALL ABANDON ANY EXISTING SEWER SERVICES THAT WILL NOT BE UTILIZED BY UNCOVERING THE EXISTING LATERAL AT THE MAIN, CUT AND PLUG AT BOTH ENDS, REMOVE THE EXISTING CLEANOUT AND COMBINATION, AND PLUG THE TAP OR TEE AT THE MAIN. FOR LATERALS THAT CONNECT TO A MANHOLE AND ARE TO BE ABANDONED, THE LATERAL SHALL BE REMOVED FROM THE MANHOLE AND THE REMAINING VOID IN THE MANHOLE SHALL BE FILLED WITH BLOCK AND MORTAR.

6. SEWER PLUGS SHALL BE INSTALLED TO ELIMINATE ANY DEBRIS OR OTHER MATERIAL FROM ENTERING THE ACTIVE SEWER SYSTEM. UPON ACCEPTANCE OF THE NEW SEWER SYSTEM, THE CONTRACTOR SHALL CLEAN THE NEW MAINS, REMOVE ALL DEBRIS, AND THEN REMOVE THE PLUG.

7. ALL EXISTING UTILITIES IMPACTED BY CONSTRUCTION SHALL BE ADJUSTED TO FINISHED GRADE, IN ACCORDANCE WITH THE TOWN OF MURPHY REQUIREMENTS.

8. ALL WORK ON THE TOWN OF MURPHY SEWER UTILITIES (MAINS, LATERALS, ETC) SHALL BE PERFORMED BY A LICENSED UTILITY CONTRACTOR. THE TOWN OF MURPHY SHALL OBSERVE AND APPROVE ALL WORK ON TOWN OF MURPHY SEWER UTILITIES. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE TOWN OF MURPHY REQUIREMENTS.

9. SEPARATION REQUIREMENTS:
   A. **LATERAL SEPARATION OF SEWERS AND WATER MAINS:** WATER MAINS SHALL BE LAID AT LEAST 10 FEET LATERALLY FROM EXISTING OR PROPOSED SEWER MAIN/LATERAL, UNLESS LOCAL CONDITIONS OR BARRIERS PREVENT A 10-FOOT LATERAL SEPARATION - IN WHICH CASE:

      i. THE WATER MAIN IS LAID IN A SEPARATE TRENCH, WITH THE ELEVATION OF THE BOTTOM OF THE WATER MAIN AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER MAIN/LATERAL; OR

      ii. THE WATER MAIN IS LAID IN THE SAME TRENCH AS THE SEWER MAIN/LATERAL WITH THE WATER MAIN LOCATED AT ONE SIDE ON A BENCH OF UNDISTURBED EARTH AND WITH THE ELEVATION OF THE BOTTOM OF THE WATER MAIN AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER MAIN/LATERAL

   B. **CROSSING A WATER MAIN OVER A SEWER:** WHENEVER IT IS NECESSARY FOR A WATER MAIN TO CROSS OVER A SEWER MAIN/LATERAL, THE WATER MAIN SHALL BE LAID AT SUCH AN ELEVATION THAT THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER MAIN/LATERAL, UNLESS LOCAL CONDITIONS OR BARRIERS PREVENT AN 18 INCH VERTICAL SEPARATION - IN WHICH CASE BOTH THE WATER MAIN AND SEWER MAIN/LATERAL SHALL BE CONSTRUCTED OF FERROUS MATERIAL AND WITH JOINTS THAT ARE EQUIVALENT TO WATER MAIN STANDARDS FOR A DISTANCE OF 10 FEET ON EACH SIDE OF THE POINT OF CROSSING.

   C. **CROSSING WATER MAIN UNDER A SEWER:** WHENEVER IT IS NECESSARY FOR A WATER MAIN TO CROSS UNDER A SEWER MAIN/LATERAL, BOTH THE WATER MAIN AND THE SEWER MAIN/LATERAL SHALL BE CONSTRUCTED OF DUCTILE IRON MATERIAL AND WITH JOINTS EQUIVALENT TO WATER MAIN STANDARDS FOR A DISTANCE OF 10 FEET ON EACH SIDE OF THE POINT OF CROSSING. A SECTION OF WATER MAIN PIPE SHALL BE CENTERED AT THE POINT OF CROSSING.

   D. **CROSSING STORM DRAINAGE LINES:** A MINIMUM OF 24-INCHES OF VERTICAL CLEARANCE SHALL BE MAINTAINED BETWEEN A SEWER MAIN/LATERAL CROSSING UNDER A STORM DRAINAGE LINE UNLESS DUCTILE IRON PIPE IS USED. IF DUCTILE IRON PIPE IS USED, A MINIMUM OF SIX(6) INCHES OF SEPARATION SHALL BE MAINTAINED, UNLESS OTHERWISE APPROVED BY THE TOWN OF MURPHY.

10. CONTRACTOR IS RESPONSIBLE FOR ADHERENCE TO ALL LOCAL, STATE, AND FEDERAL OSHA REQUIREMENTS FOR SAFETY. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO PERFORM WORK IN ACCORDANCE WITH LATEST OSHA REQUIREMENTS AND SHALL INDEMNIFY THE TOWN OF MURPHY OF ANY RESPONSIBILITY

11. TOWN OF MURPHY STAFF AND REPRESENTATIVES SHALL ONLY DIRECT CONTRACTOR AS REQUIRED IN THESE STANDARD DETAILS AND TOWN OF MURPHY SPECIFICATIONS. CONTRACTOR IS TO PROVIDE NECESSARY SUPERVISION TO PROPERLY PERFORM ALL WORK.

# GENERAL NOTES
# SANITARY SEWER UTILITY

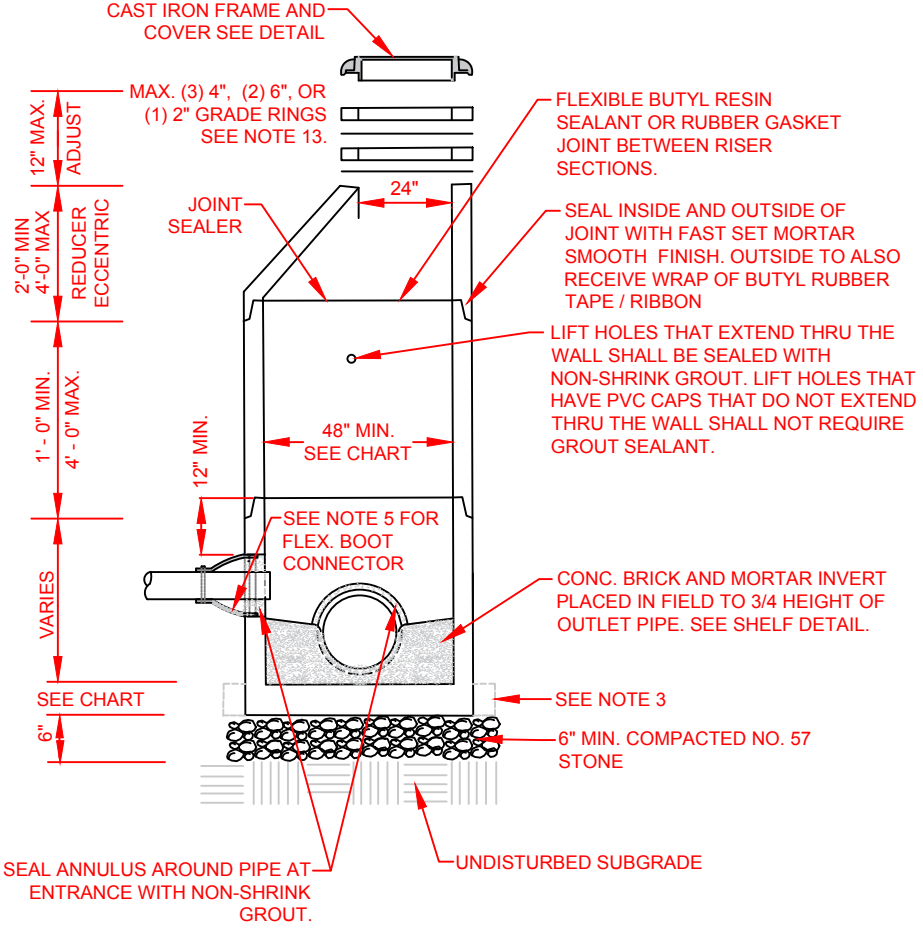
| SHEET NO. | DWG. NO. S.1 | DWG. BY: W.A.S. |
|---|---|---|
| 1 OF 1 | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

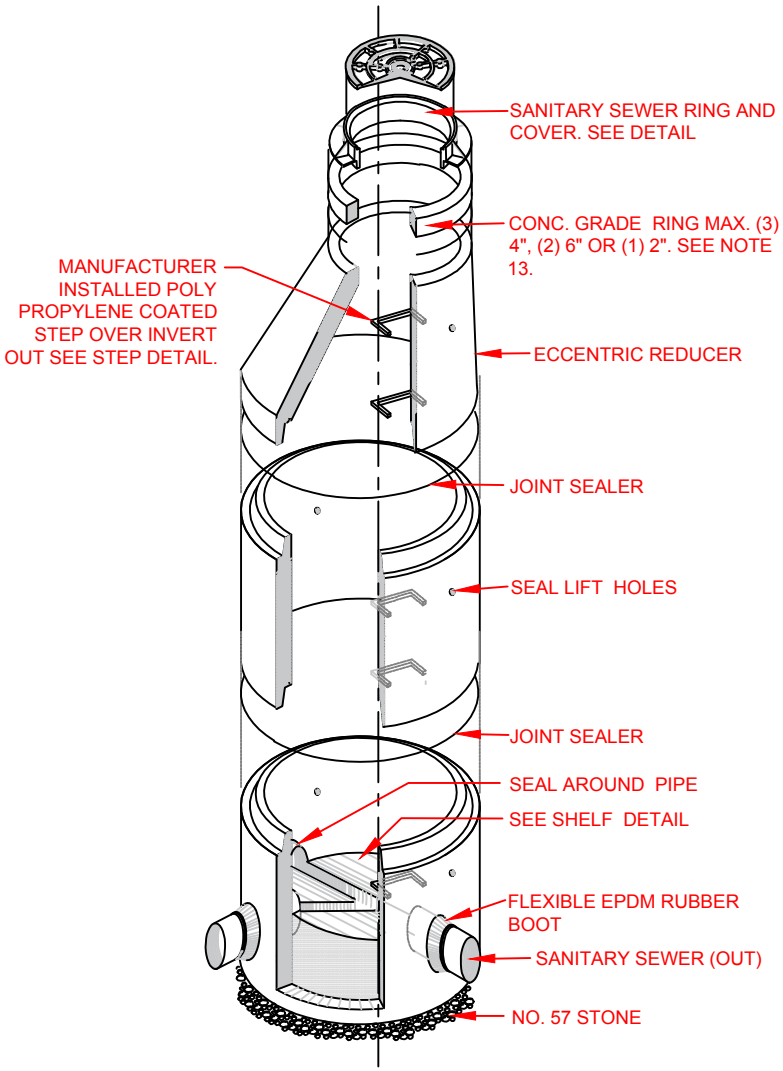
TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

S1-SEWER-NOTES.dwg




## STANDARD MANHOLE
N.T.S.

SHEET NO. 1 OF 2

DWG. NO. S.2

DWG. BY: W.A.S.

DATE: 9/9/2019

APPROVED BY: J.S.S.

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

S2-STANDARD-MANHOLE.dwg

NOTES:

1. PRECAST REINFORCED CONCRETE MANHOLES SHALL BE IN ACCORDANCE WITH ASTM C-478.

2. MINIMUM CONCRETE COMPRESSIVE STRENGTH SHALL BE 4,000PSI.

3. MANHOLES GREATER THAN 12' DEPTH SHALL HAVE MINIMUM 6" EXTENDED BASE.

4. FLEXIBLE BUTYL RESIN JOINT SEALANT SHALL BE IN ACCORDANCE WITH ASTM C990. RUBBER GASKET JOINTS SHALL BE IN ACCORDANCE WITH ASTM C-443.

5. FLEXIBLE EPDM RUBBER BOOT CONNECTORS SHALL BE IN ACCORDANCE WITH ASTM C923, INSTALLED BY MANUFACTURER WITH STAINLESS STEEL COMPRESSION RING AND TAKE-UP CLAMP. CONNECTION TO MAIN SHALL BE BY CONTRACTOR WITH STAINLESS STEEL PIPE CLAMP.

6. CONNECTIONS TO EXISTING MANHOLES SHALL BE BY CORING MANHOLE AND FIELD INSTALLING A FLEXIBLE EPDM RUBBER BOOT CONNECTOR. DO NOT ALLOW DEBRIS TO ENTER SYSTEM.

7. MORTAR SHALL BE QUICK SETTING, NON-SHRINK GROUT MIXED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

8. MANHOLE STEPS SHALL BE IN ACCORDANCE WITH ASTM C478 AND OSHA REGULATIONS. ALIGN STEPS WITH INVERT OUT.

9. VERTICAL DROPS BETWEEN THE INFLOW PIPES AND OUTFLOW PIPES SHALL REQUIRE THE FOLLOWING:
   A. GREATER THAN 2.5' SEE DROP STRUCTURE DETAIL (MIN. 5' DIAMETER MH REQUIRED).
   B. LESS THAN 2.5' SEE PIPE SLIDE DETAIL.

10. AN ECCENTRIC CONE SHALL BE UTILIZED ON ALL MANHOLES, UNLESS OTHERWISE APPROVED BY THE TOWN OF MURPHY.

11. INVERT ON PLANS IS TO MANHOLE CENTERLINE.

12. CONCRETE GRADE RINGS SHALL NOT BE USED FOR ABOVE GRADE ADJUSTMENTS (IE: OUTFALL AREAS). USE OF GRADE RINGS ARE ALLOWABLE IN YARD AREAS AND PAVEMENT, WHERE THE RING AND COVER ARE AT GROUND LEVEL.

14. THE MINIMUM SLOPE ACROSS THE INVERT OF THE MANHOLE SHALL BE 1%, UNLESS OTHERWISE APPROVED BY THE TOWN OF MURPHY. STANDING WATER IN INVERT OF MANHOLE IS NOT ACCEPTABLE.

15. THE EXTERIOR MANHOLE RISER JOINTS, INCLUDING THE JOINT AT THE CONE, SHALL BE SEALED ON THE OUTSIDE BY AN APPROVED JOINT WRAP. THE WRAP SHALL BE IN ACCORDANCE WITH THE TOWN OF MURPHY SPECIFICATIONS.

16. MANHOLE BOOT FOR 4-INCH LATERALS. SHOULD IT BE NECESSARY TO INSTALL A 4-INCH LATERAL INTO A MANHOLE, THE RUBBER BOOT THAT THE LATERAL IS INSERTED INTO SHALL BE SECURELY FASTENED TO THE CORE HOLE BY UTILIZING A STAINLESS STEEL BAND THAT IS TIGHTENED USING A JACK OR A TORQUE WRENCH (DIRECT DRIVE). BOTH STANDARD SIZE AND STEP DOWN BOOTS ARE ALLOWED. THE TORQUE WRENCH SHALL BE SUPPLIED BY THE MANUFACTURER. NO OTHER TYPE BANDS OR METHOD OF SECURING THE BOOT TO THE MANHOLE SHALL BE ACCEPTED.

    FOR FOUR (4) INCH SDR 35 LATERALS, THE PIPE OUTSIDE DIAMETER RANGE OF THE BOOT SHALL BE 3.5 INCHES TO 4.25 INCHES.

    FOR FOUR (4) INCH DUCTILE IRON LATERALS, THE PIPE OUTSIDE DIAMETER RANGE OF THE BOOT SHALL EITHER BE AS FOR PVC OR4.25 INCHES TO 4.81 INCHES.

    IN ALL CASES, THE BOOT SHALL BE TIGHTENED ON THE LATERAL BY MEANS OF A SINGLE STAINLESS STEEL STRAP.

    THE LATERAL INVERT SHALL BE AT THE TOP OF THE SHELF.

17. NO MORE THAN 4, FOUR INCH LATERALS OR 3, SIX INCH LATERALS SHALL ENTER A 4' DIAMETER TERMINAL MANHOLE. NO MORE THAN 2 LATERALS (REGARDLESS OF SIZE) SHALL ENTER ALL OTHER 4' DIAMETER MANHOLES. ALL LATERALS SHALL HAVE AN INDIVIDUAL TROUGH. 5' DIAMETER MANHOLES SHALL BE USED IF THE ABOVE CONDITIONS ARE NOT MET.

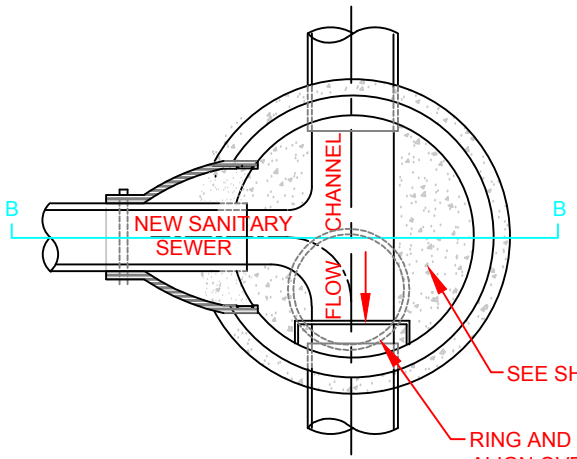
18. NO MORE THAN 5 LATERALS SHALL ENTER A 5' DIAMETER MANHOLE.

19. USE OF TEE-WYES ON LATERALS IS NOT ALLOWED.

20. ALL MANHOLES SHALL BE VACUUM TESTED IN ACCORDANCE WITH THE TOWN OF MURPHY STANDARDS.

| STANDARD MANHOLE | | | TOWN OF MURPHY<br>5 WOFFORD STREET<br>MURPHY, NC , 28906<br>811 Know what's below. Call before you dig. | NO. | DATE | REVISION |
|---|---|---|---|---|---|---|
| SHEET NO. 2 OF 2 | DWG. NO. S.2 | DWG. BY: W.A.S. | | | | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | | | | |

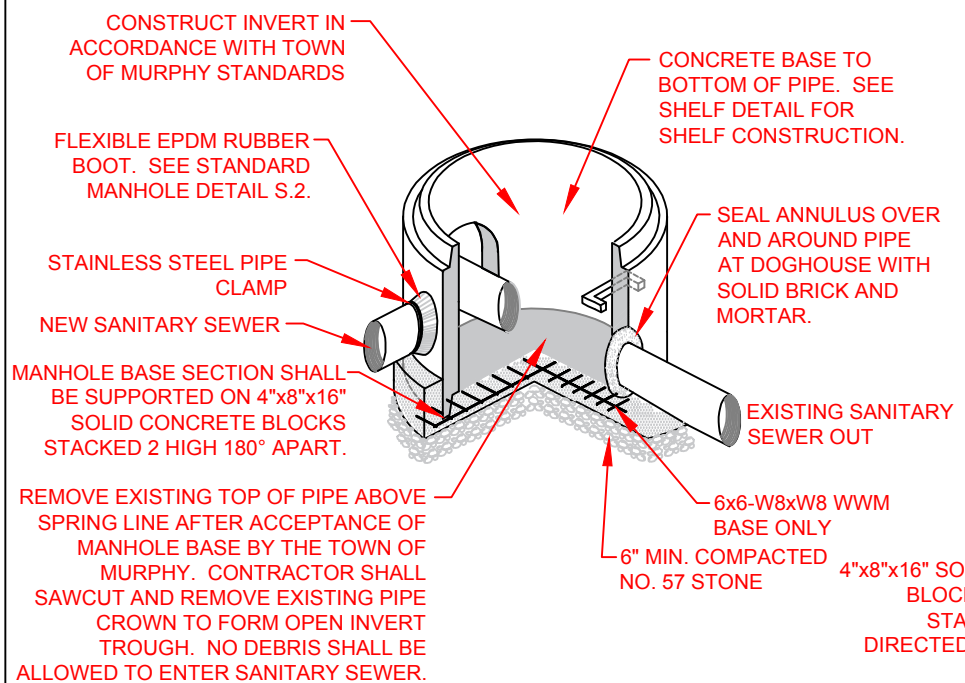
S2-STANDARD-MANHOLE.dwg

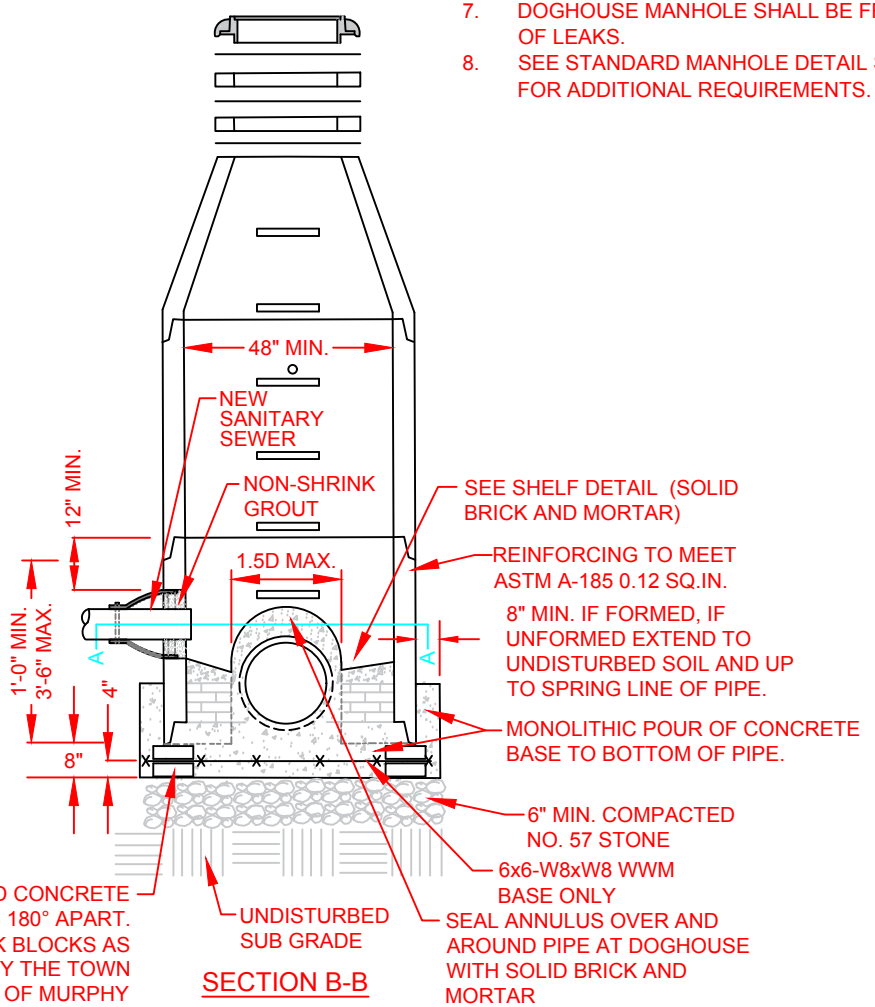



SECTION A-A

NOTES:

1. MANHOLE MEETS ALL REQUIREMENTS OF ASTM C478.
2. CONCRETE IS MINIMUM 4,000PSI COMPRESSIVE STRENGTH.
3. MATERIAL USED TO SEAL AROUND PIPE SHALL BE NON-SHRINK GROUT.
4. MANHOLE SHALL BE CONSTRUCTED OF PRECAST CONCRETE.
5. A DROP STRUCTURE SHALL BE PLACED WHERE PIPE VERTICAL SEPARATION BETWEEN INVERTS EXCEEDS 2.50'.
6. WITH THE EXCEPTION OF THE MANHOLE BASE SECTION. ALL OTHER MATERIALS, INSTALLATION AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE TOWN OF MURPHY STANDARD MANHOLE DETAILS.
7. DOGHOUSE MANHOLE SHALL BE FREE OF LEAKS.
8. SEE STANDARD MANHOLE DETAIL S.2 FOR ADDITIONAL REQUIREMENTS.




SECTION B-B

# DOGHOUSE MANHOLE (MAINS 15" OR LESS)

N.T.S.

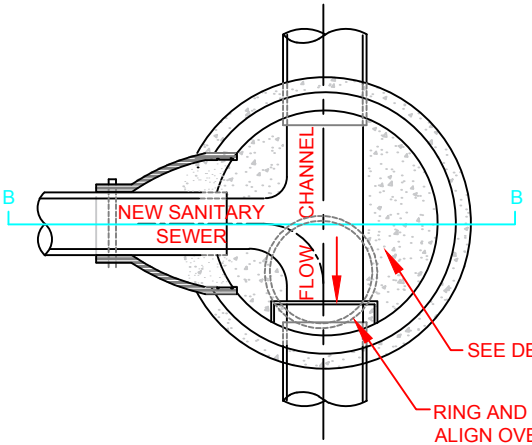
| | | | |
|---|---|---|---|
| SHEET NO. 1 OF 2 | DWG. NO. S.3 | DWG. BY: W.A.S. | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

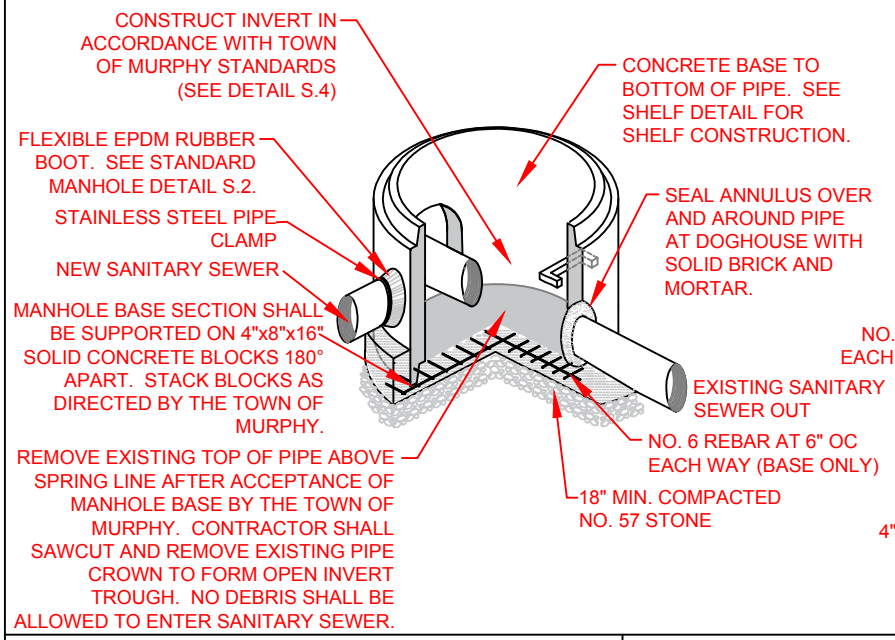
S3-DOGHOUSE-MH.dwg

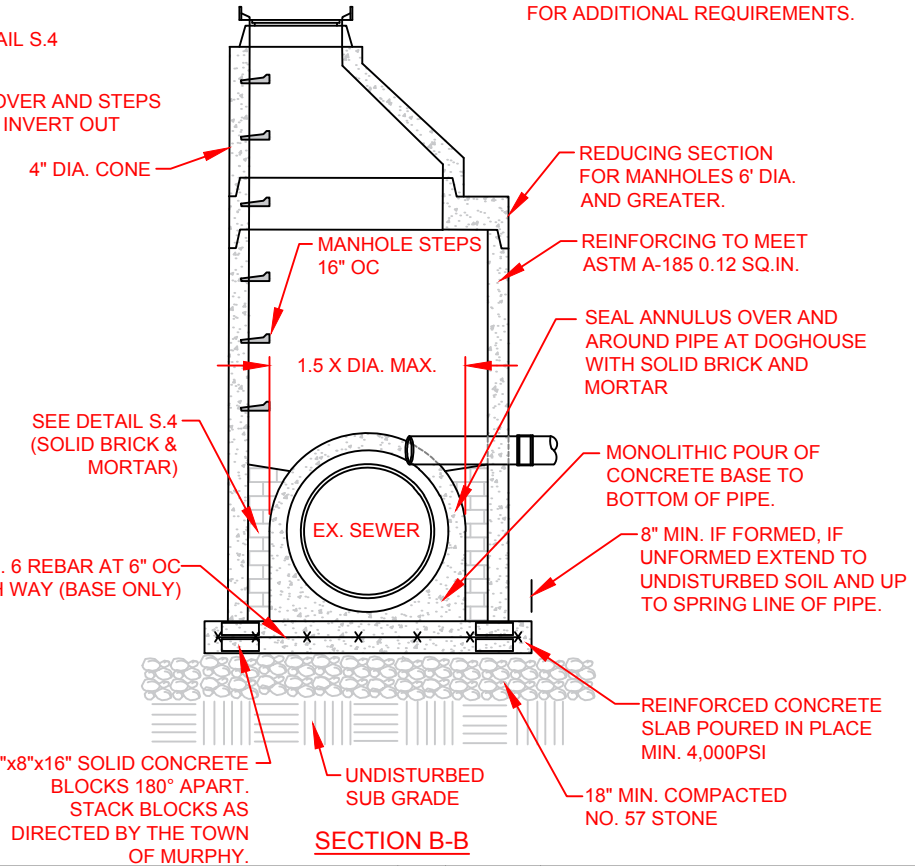



SECTION A-A

NOTES:

1. MANHOLE MEETS ALL REQUIREMENTS OF ASTM C478.
2. CONCRETE IS MINIMUM 4,000PSI COMPRESSIVE STRENGTH.
3. MATERIAL USED TO SEAL AROUND PIPE SHALL BE NON-SHRINK GROUT.
4. MANHOLE SHALL BE CONSTRUCTED OF PRECAST CONCRETE.
5. A DROP STRUCTURE SHALL BE PLACED WHERE PIPE VERTICAL SEPARATION BETWEEN INVERTS EXCEEDS 2.50'.
6. WITH THE EXCEPTION OF THE MANHOLE BASE SECTION, ALL OTHER MATERIALS, INSTALLATION AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE TOWN OF MURPHY STANDARD MANHOLE DETAILS.
7. DOGHOUSE MANHOLE SHALL BE FREE OF LEAKS.
8. SEE STANDARD MANHOLE DETAIL S.2 FOR ADDITIONAL REQUIREMENTS.




SECTION B-B

# DOGHOUSE MANHOLE (MAINS 16" OR LARGER)

N.T.S.

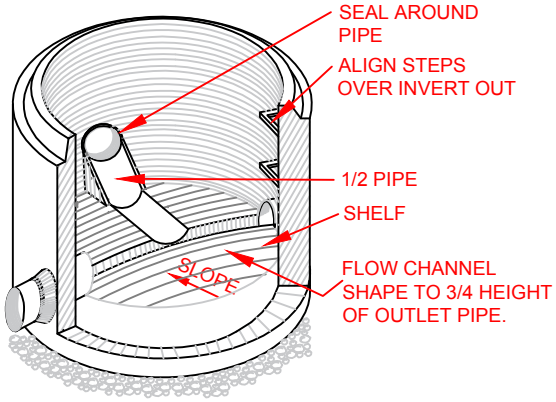
| | | | |
|---|---|---|---|
| SHEET NO. 2 OF 2 | DWG. NO. S.3 | DWG. BY: W.A.S. | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | |

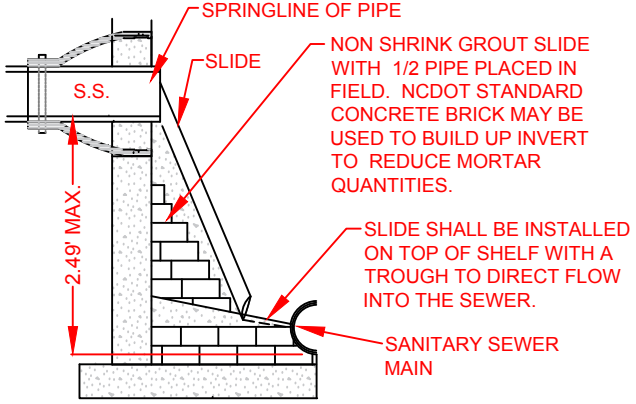
TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

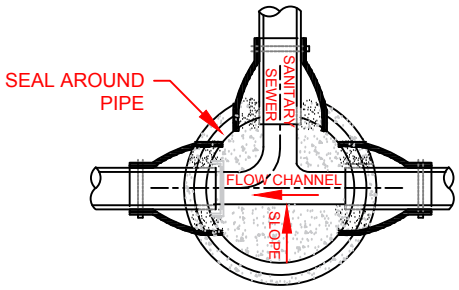
| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

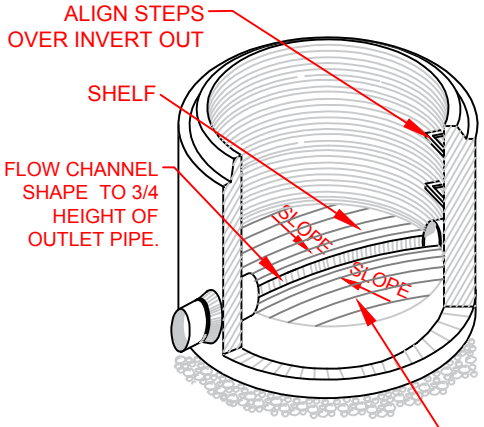
S3-DOGHOUSE-MH.dwg




PIPE SLIDE DETAIL
N.T.S.




SHELF DETAIL
N.T.S.

NOTES:

1. PIPE SLIDE REQUIRED WHERE VERTICAL SEPARATION BETWEEN PIPE INVERTS IS LESS THAN 2.5'. FOR LATERAL INVERTS AT OR WITHIN FOUR (4) INCHES OF THE SHELF, CONSTRUCT BENCH AND INVERT AS DIRECTED BY THE TOWN OF MURPHY PROJECT COORDINATOR.
2. INTERIOR DROP STRUCTURE REQUIRED WHERE VERTICAL SEPARATION BETWEEN INVERTS EQUALS OR EXCEEDS 2.50'. FOR INTERIOR DROP STRUCTURE SEE TOWN OF MURPHY STANDARD DETAIL S.5.
3. VERIFY SLIDE INSTALLATION WITH PROJECT COORDINATOR PRIOR TO CONSTRUCTION.
4. MANHOLE AND CONNECTIONS SHALL BE IN ACCORDANCE WITH THE TOWN OF MURPHY REQUIREMENTS.
5. BRICK USED FOR INVERT AND SHELF CONSTRUCTION SHALL BE NCDOT STANDARD CONCRETE BRICK.
6. MANHOLES GREATER THAN 12' IN DEPTH SHALL HAVE MINIMUM 6" EXTENDED BASE.
7. THE MINIMUM SLOPE ACROSS THE INVERT OF THE MANHOLE SHALL BE 1% UNLESS OTHERWISE APPROVED BY THE TOWN OF MURPHY.
8. DROP AND/OR SLIDE REQUIREMENTS SHALL APPLY TO ALL LATERALS ENTERING MANHOLES AS OUTLINED IN NOTES 1, 2, AND 3. NO MORE THAN 4, FOUR INCH LATERALS OR 3, SIX INCH LATERALS SHALL ENTER A 4' DIAMETER TERMINAL MANHOLE. NO MORE THAN 2 LATERALS (REGARDLESS OF SIZE) SHALL ENTER ALL OTHER 4' DIAMETER MANHOLES. ALL LATERALS SHALL HAVE AN INDIVIDUAL TROUGH. 5' DIAMETER MANHOLES SHALL BE USED IF THE ABOVE CONDITIONS ARE NOT MET. THE INVERT OF THE LATERAL SHALL BE A MINIMUM OF 1" ABOVE THE SHELF.
9. NO MORE THAN 5 LATERALS SHALL ENTER A 5' DIAMETER TERMINAL MANHOLE.
10. USE OF TEE-WYES ON LATERALS IS NOT ALLOWED.

# PIPE SLIDE AND SHELF DETAILS
N.T.S.

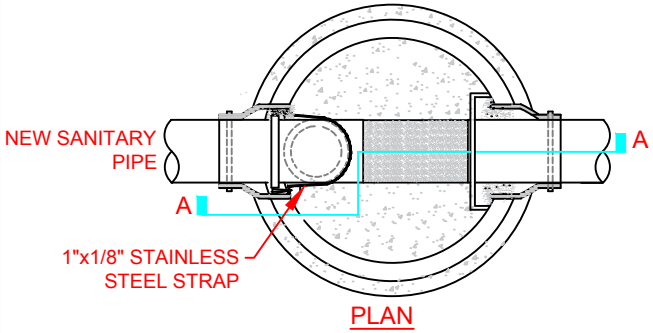
| SHEET NO. | DWG. NO. | DWG. BY: |
|---|---|---|
| 1 OF 1 | S.4 | W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

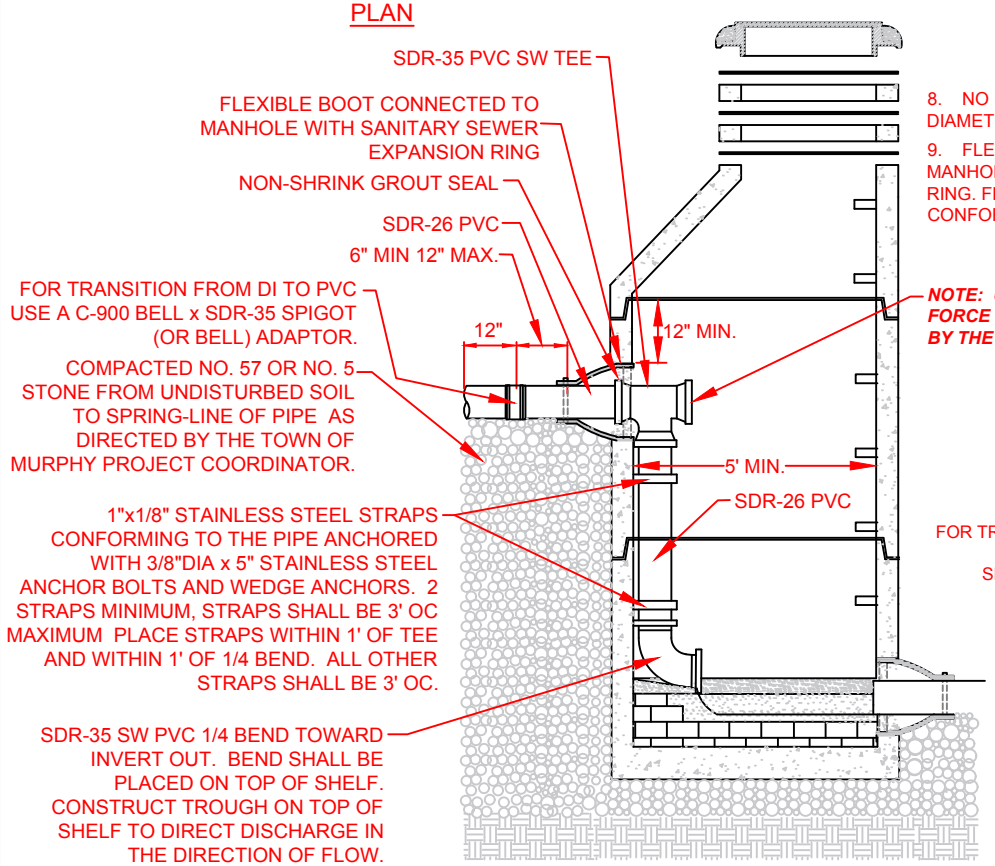
S4-PSLIDE.dwg



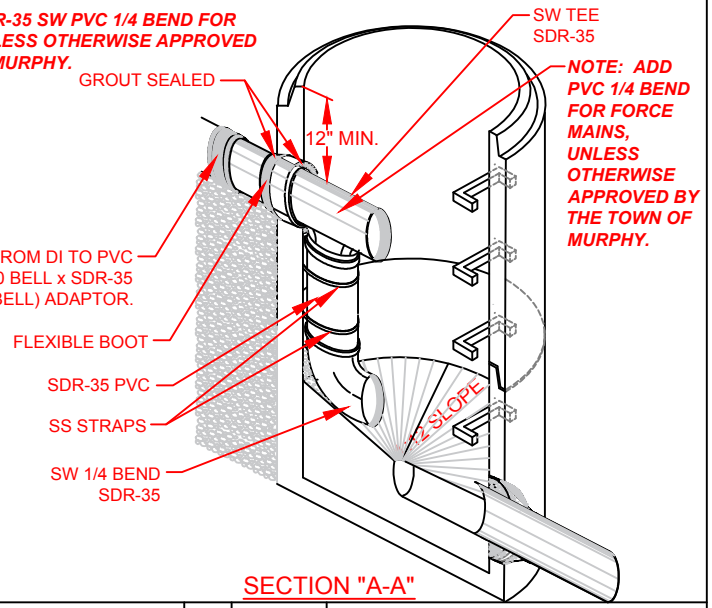

PLAN

NOTES:

1. MANHOLE SHALL BE IN ACCORDANCE WITH TOWN OF MURPHY STANDARDS, SEE MANHOLE DETAIL FOR ADDITIONAL INFORMATION.
2. ALL PVC FITTINGS FOR DROP STRUCTURE SHALL BE SDR-35 PVC WITH SOLVENT WELD JOINTS.
3. MANHOLES GREATER THAN 12' IN DEPTH SHALL HAVE MINIMUM 6" EXTENDED BASE.
4. DROP STRUCTURE SHALL BE PLACED WHERE SEWER MAIN OR LATERAL VERTICAL DROP BETWEEN INVERTS EQUALS OR EXCEEDS 2.50'. SEE PIPE SLIDE DETAILS FOR DROPS LESS THAN 2.50' VERTICAL SEPARATION.
5. DROP STRUCTURE MANHOLE SHALL BE A MINIMUM OF 5' DIAMETER. DROP STRUCTURE SHALL BE INSTALLED AGAINST WALL OF MANHOLE AS SHOWN. IF THE GRADE DOES NOT ALLOW, THEN INSTALL AS DIRECTED BY THE TOWN OF MURPHY.
6. 5' DIA. MANHOLES REQUIRED FOR ALL DROPS 6" AND GREATER IN DIAMETER, AND WHEN 3 OR MORE 4" LATERALS ENTER MANHOLES WITH 4" INTERIOR DROPS. NO MORE THAN FOUR 4" INTERIOR DROPS ARE ALLOWED IN A 5' MANHOLE.
7. NO MORE THAN 4, FOUR INCH LATERALS OR 3, SIX INCH LATERALS SHALL ENTER A 4' DIAMETER TERMINAL MANHOLE. NO MORE THAN 2 LATERALS (REGARDLESS OF SIZE) SHALL ENTER ALL OTHER 4' DIAMETER MANHOLES. ALL LATERALS SHALL HAVE AN INDIVIDUAL TROUGH. 5' DIAMETER MANHOLES SHALL BE USED IF THE ABOVE CONDITIONS ARE NOT MET. THE LATERAL INVERT SHALL BE AT THE TOP OF THE SHELF.
8. NO MORE THAN 5 LATERALS SHALL ENTER A 5' DIAMETER TERMINAL MANHOLE.
9. FLEXIBLE BOOT SHALL BE CONNECTED TO MANHOLE WITH STAINLESS STEEL EXPANSION RING. FLEXIBLE BOOT CONNECTORS SHALL CONFORM TO ASTM C-923 SPEC.
10. CONNECTIONS TO EXISTING MANHOLES SHALL HAVE CORE AND "BOOT" ONLY UNLESS APPROVED OTHERWISE BY THE TOWN OF MURPHY PROJECT COORDINATOR.
11. ALL MANHOLES SHALL BE VACUUM TESTED IN ACCORDANCE WITH THE TOWN OF MURPHY STANDARDS.




***NOTE: UTILIZE SDR-35 SW PVC 1/4 BEND FOR FORCE MAINS, UNLESS OTHERWISE APPROVED BY THE TOWN OF MURPHY.***




***NOTE: ADD PVC 1/4 BEND FOR FORCE MAINS, UNLESS OTHERWISE APPROVED BY THE TOWN OF MURPHY.***

SECTION "A-A"

# INTERIOR DROP STRUCTURE SEWER MAINS AND LATERALS

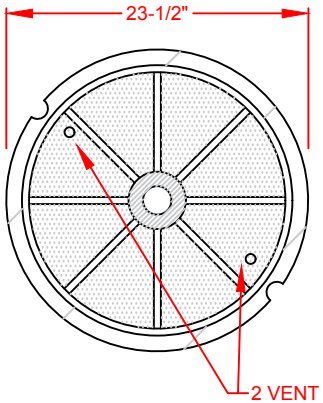
| SHEET NO. | DWG. NO. | DWG. BY: |
|---|---|---|
| 1 OF 1 | S.5 | W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

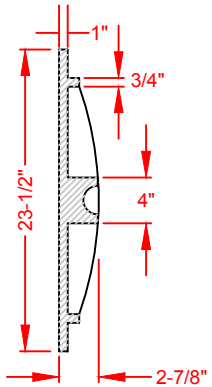
Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

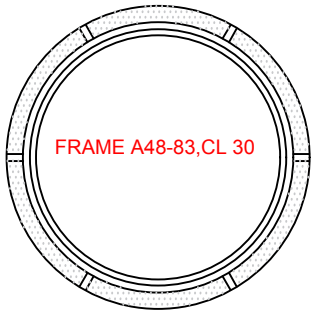
S5-DROP-MH.dwg




COVER BACK



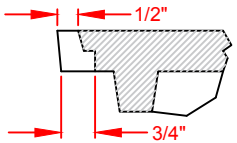

COVER SECTION



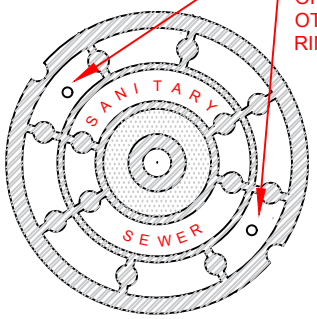

FRAME PLAN

NOTES:

1. DETAIL TO BE USED IN NON-PAVED AREAS ONLY.
2. MANHOLE FRAME AND COVER SHALL BE MADE OF GRAY CAST IRON CONFORMING TO ASTM SPEC. A48-83 CL 30/35 RESPECTIVELY, MANUFACTURED BY SAME MANUFACTURER. ALL CASTINGS SHALL CONFORM TO THE SHAPE AND DIMENSIONS SHOWN. THEY SHALL BE CLEAN AND PERFECT, WITHOUT BLOW OR SAND HOLES OR DEFECTS OF ANY KIND, TENDING TO IMPAIR THEIR STRENGTH. NO PLUGGING OR STOPPING OF DEFECTIVE HOLES WILL BE PERMITTED.
3. CASTINGS SHALL BE UNPAINTED AND SHALL HAVE THE LETTERS "SANITARY SEWER" CAST INTO COVER. LETTERS SHALL BE RAISED AND CLEARLY VISIBLE.
4. MANHOLE RING AND COVER SHALL WITHSTAND H-20 VEHICULAR TRAFFIC. ROCKING COVERS SHALL NOT BE ACCEPTABLE.
5. MINIMUM AVERAGE WEIGHT: PLUS OR MINUS 5% RING 175 LBS., COVER 135 LBS, UNIT 310 LBS.
6. PERFORATED COVERS WILL NOT BE ALLOWED.



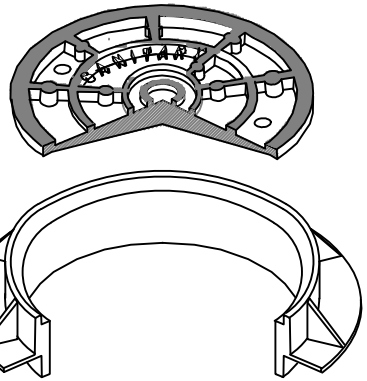

PICK SLOT DETAIL



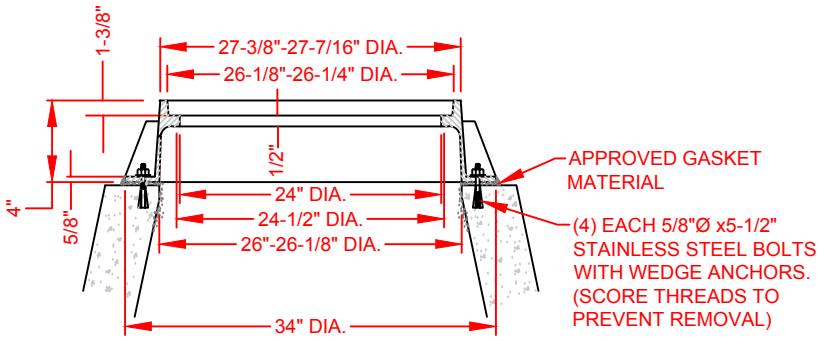

COVER A48-83,CL 35

COVER FACE

COVER



FRAME




FRAME SECTION
N.T.S.

# STANDARD NON- TRAFFIC AREA MANHOLE RING AND COVER

N.T.S.

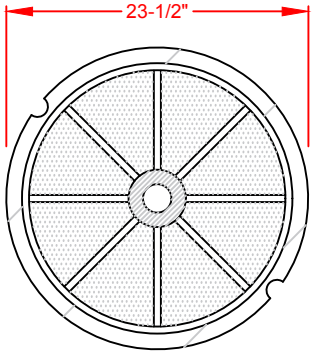
| | | | |
|---|---|---|---|
| SHEET NO. 1 OF 1 | DWG. NO. S.6 | DWG. BY: W.A.S. | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

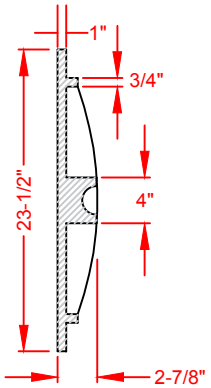
Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

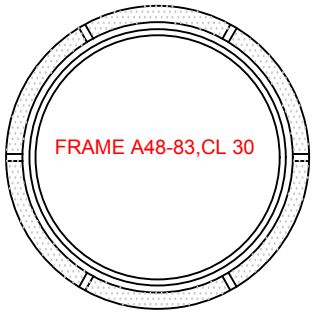
S6-RING-COVER-NON-TRAFFIC.dwg




COVER BACK




COVER SECTION




FRAME PLAN

NOTES:

1. DETAIL TO BE USED IN PAVED AREAS ONLY. ALL OTHER MANHOLES SHALL BE IN ACCORDANCE WITH DETAIL S.6, UNLESS OTHERWISE APPROVED.

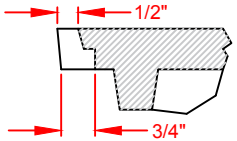
2. MANHOLE FRAME AND COVER SHALL BE MADE OF GRAY CAST IRON CONFORMING TO ASTM SPEC. A48-83 CL 30/35 RESPECTIVELY, MANUFACTURED BY SAME MANUFACTURER. ALL CASTINGS SHALL CONFORM TO THE SHAPE AND DIMENSIONS SHOWN. THEY SHALL BE CLEAN AND PERFECT, WITHOUT BLOW OR SAND HOLES OR DEFECTS OF ANY KIND, TENDING TO IMPAIR THEIR STRENGTH. NO PLUGGING OR STOPPING OF DEFECTIVE HOLES WILL BE PERMITTED.

3. CASTINGS SHALL BE UNPAINTED AND SHALL HAVE THE LETTERS "SANITARY SEWER" CAST INTO COVER. LETTERS SHALL BE RAISED AND CLEARLY VISIBLE.

4. MANHOLE RING AND COVER SHALL WITHSTAND H-20 VEHICULAR TRAFFIC. ROCKING COVERS SHALL NOT BE ACCEPTABLE.

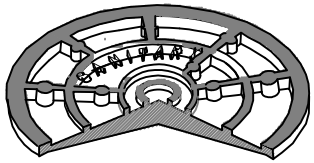
5. MINIMUM AVERAGE WEIGHT: PLUS OR MINUS 5% RING 175 LBS., COVER 135 LBS, UNIT 310 LBS.

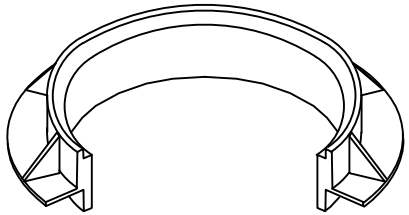
6. PERFORATED COVERS WILL NOT BE ALLOWED.



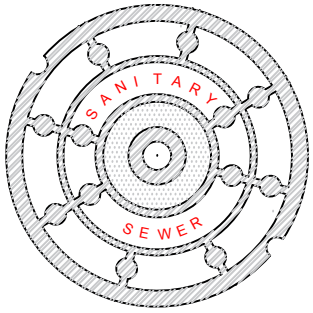

PICK SLOT DETAIL

COVER



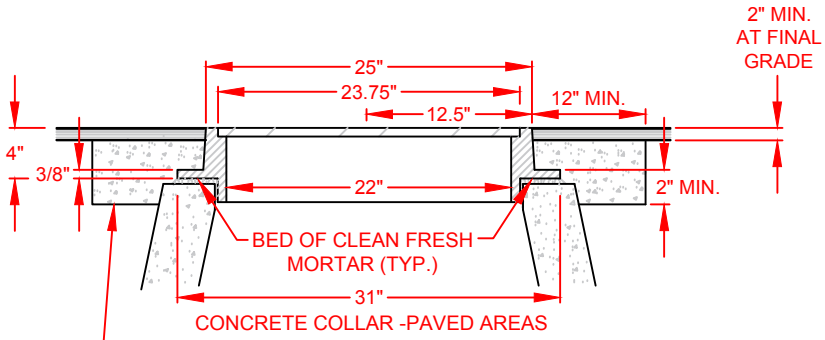


FRAME




COVER A48-83,CL 35

COVER FACE




CONCRETE COLLAR -PAVED AREAS

8" MIN. THICKNESS 3,000PSI CLASS "A" CONCRETE COLLAR 3-6% AIR ENTRAINMENT ALL AROUND FRAME. (WHEN UTILIZING CONCRETE GRADE RINGS THE CONCRETE COLLAR SHALL EXTEND TO 2" MIN. BELOW THE TOP OF CONE.)

# STANDARD TRAFFIC AREA MANHOLE RING AND COVER

N.T.S.

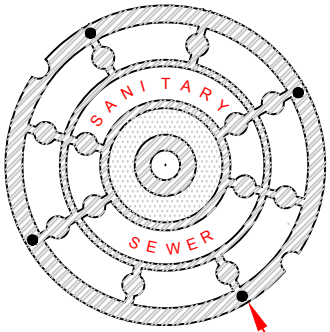
| | | | |
|---|---|---|---|
| SHEET NO. 1 OF 1 | DWG. NO. S.7 | DWG. BY: W.A.S. | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

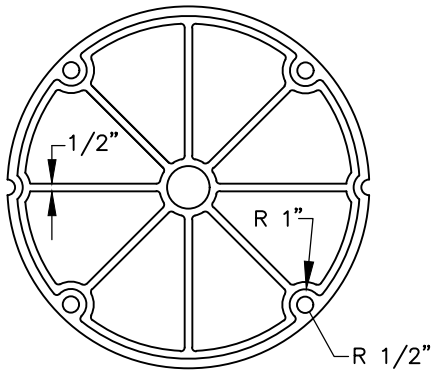
Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

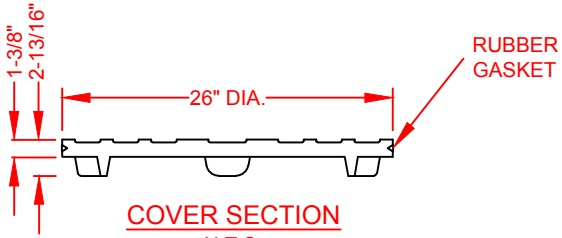
S7-RING-COVER-TRAFFIC.dwg



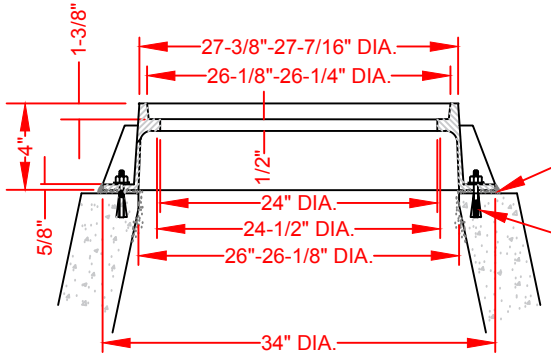

COVER A48-83,CL 35
COVER FACE



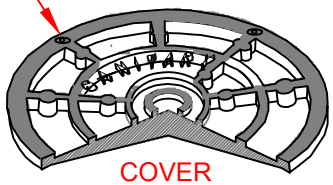

(4) 1/2" x 1 3/4" HEX HEAD, STAINLESS STEEL BOLTS AND WASHERS AT 180° COUNTERSUNK. BOLTS & WASHERS TO BE TYPE 316 STAINLESS STEEL.



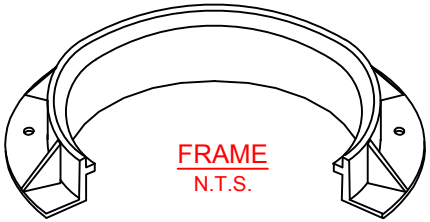

COVER SECTION
N.T.S.




FRAME SECTION
N.T.S.



COVER
N.T.S.



FRAME
N.T.S.

NOTES:
1. MANHOLE FRAME AND COVER TO BE MADE OF GRAY CAST IRON CONFORMING TO ASTM SPEC. A48-83, CLASS 35, MANUFACTURED BY SAME MANUFACTURER. ALL CASTINGS SHALL CONFORM TO THE SHAPE AND DIMENSIONS SHOWN. ALL CASTINGS SHALL BE CLEAN AND FREE FROM DEFECTS.
2. CASTINGS SHALL BE UNPAINTED AND SHALL HAVE THE LETTERS "SANITARY SEWER" CAST INTO COVER. LETTERS SHALL BE RAISED AND CLEARLY VISIBLE.
3. MANHOLE RING AND COVER SHALL WITHSTAND H-20 VEHICULAR TRAFFIC.
4. MINIMUM AVERAGE WEIGHT: PLUS OR MINUS 5% RING 155LBS., COVER 160LBS., UNIT 315LBS.
5. USE OF CONCRETE GRADE RINGS WITHIN PAVED AREAS ARE NOT ALLOWED, UNLESS APPROVED BY THE TOWN OF MURPHY PROJECT COORDINATOR.
6. FOR MANHOLES IN YARD OR LANDSCAPED AREAS, THE RING AND COVER SHALL BE SET TO FINISHED GRADE. THE USE OF GRADE RINGS ARE ALLOWED TO SET THE MANHOLE TO FINISHED GRADE. FOR GRADE RINGS 4" OR LESS, THE RING AND COVER SHALL BE ANCHORED TO THE CONE USING 5/8" DIAMETER STAINLESS STEEL BOLTS WITH WEDGE ANCHORS. FOR GRADE RINGS OVER 4", THE RING AND COVER SHALL BE ANCHORED TO THE GRADE RING, USING 5/8" DIAMETER x 5-1/2" STAINLESS STEEL BOLTS WITH WEDGE ANCHORS.
7. FOR OUTFALL AREAS, THE RING AND COVER SHALL BE SET A MINIMUM OF 18" ABOVE FINISHED GRADE, UNLESS OTHERWISE APPROVED.
8. THIS DETAIL IS TO BE USED ON ALL MANHOLES LOCATED WITHIN FLOODPLAINS OR AS SHOWN PER PLAN.

# STANDARD NON-TRAFFIC AREA WATER-TIGHT MANHOLE

N.T.S.

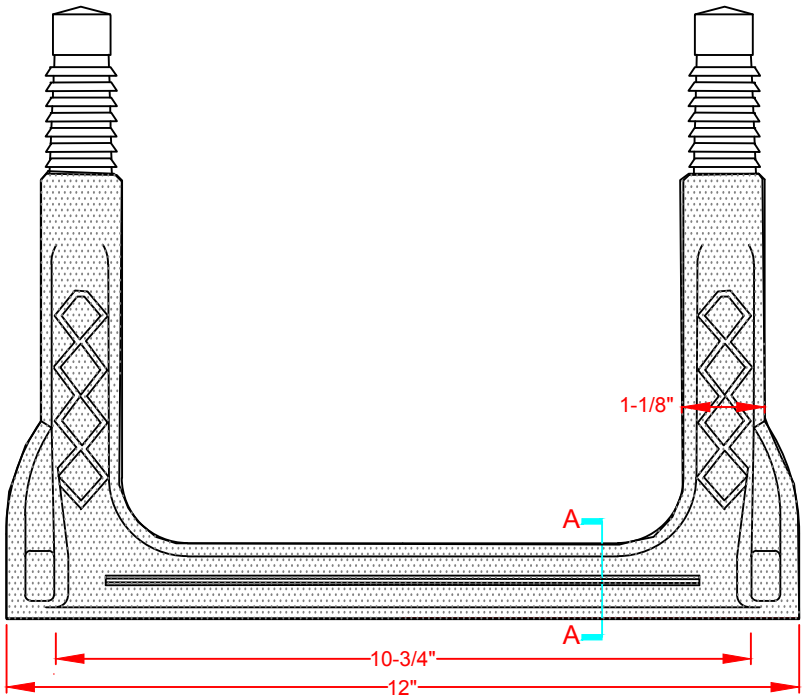
| SHEET NO. | DWG. NO. | DWG. BY: |
|---|---|---|
| 1 OF 1 | S.8 | W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

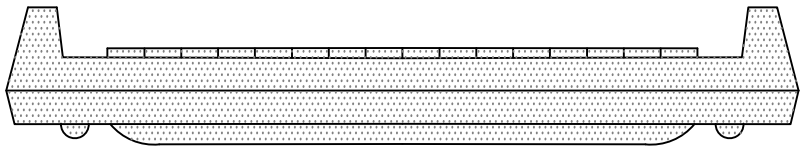
811 Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

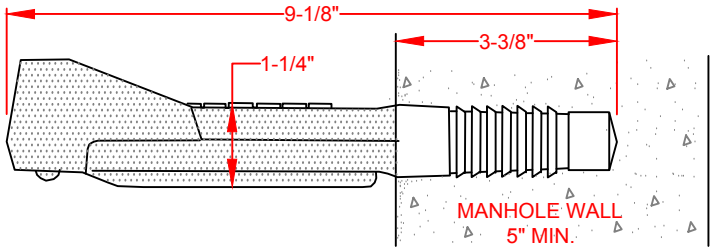
S8-RING-COVER-WATERTIGHT.dwg



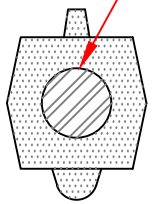

PLAN VIEW



FRONT VIEW



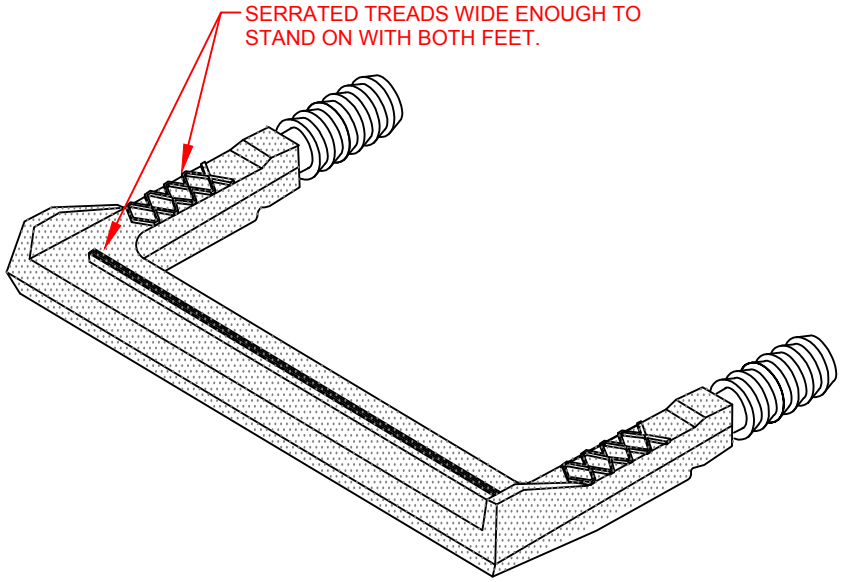

SIDE VIEW




SECTION "A-A"

NOTES:

1. COPOLYMER POLYPROPYLENE PLASTIC STEP SHALL BE PLACED 16" OC IN ALL STRUCTURES 5' DEPTH OR GREATER.
2. STEPS SHALL BE INSTALLED BY MANUFACTURER AND SHALL BE ALIGNED OVER STRUCTURE INVERT OUT.
3. DIMENSIONS SHOWN ARE TO CONVEY THE DESIRED SIZE OF THE STEP AND CONSTRUCTION MAY BE ACCEPTABLE PROVIDED MATERIAL SUBMITTAL IS APPROVED BY THE TOWN OF MURPHY.
4. MATERIALS OF CONSTRUCTION AND METHOD OF INSTALLATION SHALL BE IN ACCORDANCE WITH OSHA STANDARDS AND ASTM C-478.




ISOMETRIC VIEW OF STEP

# STRUCTURE STEP

N.T.S.

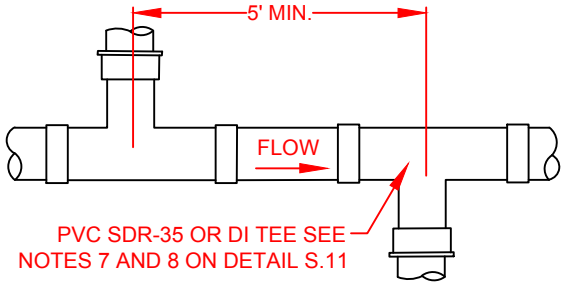
| SHEET NO. | DWG. NO. | DWG. BY: |
|---|---|---|
| 1 OF 1 | S.9 | W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

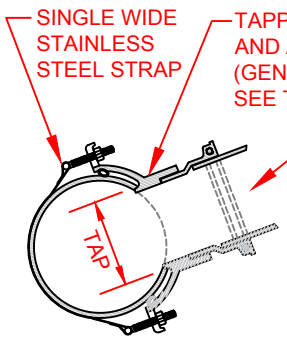
Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

S9-STEP.dwg



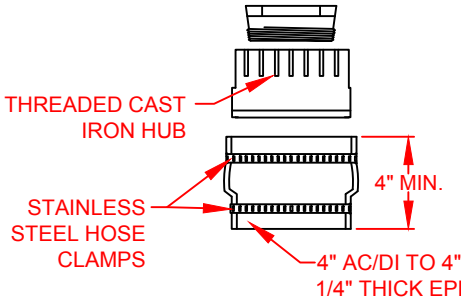

STANDARD TEE CONNECTION




TAPPING SADDLE (OPTIONAL)

NOTE: TAP SHALL BE 4-1/2" FOR 4" LATERAL, AND SHALL BE 6-1/2" FOR 6" LATERAL.


TRAFFIC CAP




CLEANOUT CAP ASSEMBLY




FOR SEWER LATERAL NOTES SEE TOWN OF MURPHY STANDARD DETAIL S.11

# SEWER LATERAL (4-INCH AND 6-INCH)

N.T.S.

| SHEET NO. | DWG. NO. | DWG. BY: | NO. | DATE | REVISION |
|---|---|---|---|---|---|
| 1 OF 1 | S.10 | W.A.S. | | | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | | | |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

S10-RESSLAT.dwg

# SEWER LATERAL NOTES

1. HOLE IN SANITARY SEWER MAIN MUST BE CUT WITH SHELL CUTTER NO HAMMER TAPS ALLOWED.
2. LATERAL SHALL CONFORM TO ASTM SPECS. D-3034 SDR-35 UNLESS OTHERWISE INDICATED AS DI.
3. ALL PIPE AND FITTINGS SHALL BE 4" OR 6" UNLESS OTHERWISE SPECIFIED.
4. ALL DI PIPE SHALL HAVE AN INTERIOR LINING OF CERAMIC EPOXY (PROTECTO 401). THE ENTIRE DI LATERAL SHALL BE COMPRISED OF DI PIPE AND MECHANICAL JOINT FITTINGS.
5. ALL CONNECTIONS SHALL HAVE RUBBER GASKET SEALS INSTALLED.
6. SANITARY SEWER LATERAL CLEANOUT STACK SHALL BE LOCATED 18" FROM WATER LATERAL LOCK VALVE WHEN IN THE SAME DITCH.
7. INSTALLATION OTHER THAN AS SHOWN MUST BE APPROVED BY THE TOWN OF MURPHY.
8. CONNECTIONS TO THE TOP OF MAIN SHALL NOT BE ALLOWED, UNLESS OTHERWISE APPROVED BY THE TOWN OF MURPHY PROJECT COORDINATOR.
9. THE DESIGN ENGINEER SHALL DETERMINE THE SLOPE AND DEPTH OF THE LATERAL BASED ON THE TOPOGRAPHY OF THE LOT.
10. LATERAL SHALL CONFORM TO 2% MINIMUM SLOPE FOR 4" OR 1% MINIMUM SLOPE FOR 6". THE MAXIMUM LENGTH OF A SEWER LATERAL SHALL BE 60 FEET, UNLESS OTHERWISE APPROVED BY THE TOWN OF MURPHY.
11. SEE INTERIOR DROP STRUCTURE MORTAR SLIDE AND SHELF DETAIL FOR VERTICAL DROPS OF MAINS AND LATERALS.
12. LATERALS LESS THAN 3' IN DEPTH OR GREATER THAN 20' DEPTH SHALL UTILIZE DUCTILE IRON PIPE AND FITTINGS WITH CERAMIC EPOXY (PROTECTO 401), OR WHEN SEPARATION REQUIREMENTS CANNOT BE MET.
13. ENTIRE SEWER LATERAL ASSEMBLY SHALL BE AIR TESTED CONCURRENTLY WITH SEWER MAIN.
14. INDIVIDUAL LATERALS SHALL BE CLEANED AND FLUSHED PRIOR TO FLUSHING SANITARY SEWER MAINS.
15. LATERAL SHALL NOT BE BACK-FILLED UNTIL INSPECTED BY THE TOWN OF MURPHY PROJECT COORDINATOR.
16. WYE CONNECTIONS SHALL NOT BE USED TO TIE LATERALS INTO A MANHOLE.
17. IF BENDS ARE APPROVED BY THE PROJECT COORDINATOR, STONE BEDDING IS REQUIRED TO BE INSTALLED FROM UNDISTURBED SOIL TO BOTTOM OF BEND.
18. PVC COMBINATION SHALL BE A MOLDED WYE AND BEND, GASKETED, SDR-35, AS MANUFACTURED BY HARCO, GPK OR APPROVED EQUAL.
19. NO MORE THAN 4, FOUR INCH LATERALS OR 3, SIX INCH LATERALS SHALL ENTER A 4' DIAMETER TERMINAL MANHOLE. NO MORE THAN 2 LATERALS (REGARDLESS OF SIZE) SHALL ENTER ALL OTHER 4' DIAMETER MANHOLES. ALL LATERALS SHALL HAVE AN INDIVIDUAL TROUGH. 5' DIAMETER MANHOLES SHALL BE USED IF THE ABOVE CONDITIONS ARE NOT MET.
20. ALL LATERALS (4" AND 6") SHALL UTILIZE A 4" RISER (STACK).
21. FOR SINGLE FAMILY RESIDENTIAL LOTS, CLEANOUT SHALL BE LOCATED 18" FROM RIGHT-OF-WAY OR EASEMENT. FOR ALL NON-SINGLE FAMILY LOTS, CLEANOUT SHALL BE NO CLOSER THAN 10' TO FRONT OF BUILDING, UNLESS OTHERWISE APPROVED BY THE TOWN OF MURPHY.

THE FOLLOWING TABLE SUMMARIZES THE MATERIALS TO BE UTILIZED FOR SEWER MAIN TO LATERAL CONNECTIONS:

| | **PVC Main** | **DI Main** |
|---|---|---|
| **DI Lateral** | **DI fitting or approved saddle** | **MJ fitting or approved saddle** |
| **PVC Lateral** | **PVC fitting or approved saddle** | **MJ fitting with transition gasket or approved saddle** |

NOTE: REFER TO THE TOWN OF MURPHY TECHNICAL SPECIFICATIONS FOR ADDITIONAL INFORMATION.

SEWER LATERAL NOTES
(4-INCH AND 6-INCH)

SHEET NO. 1 OF 1

DWG. NO. S.11

DWG. BY: W.A.S.

DATE: 9/9/2019

APPROVED BY: J.S.S.

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

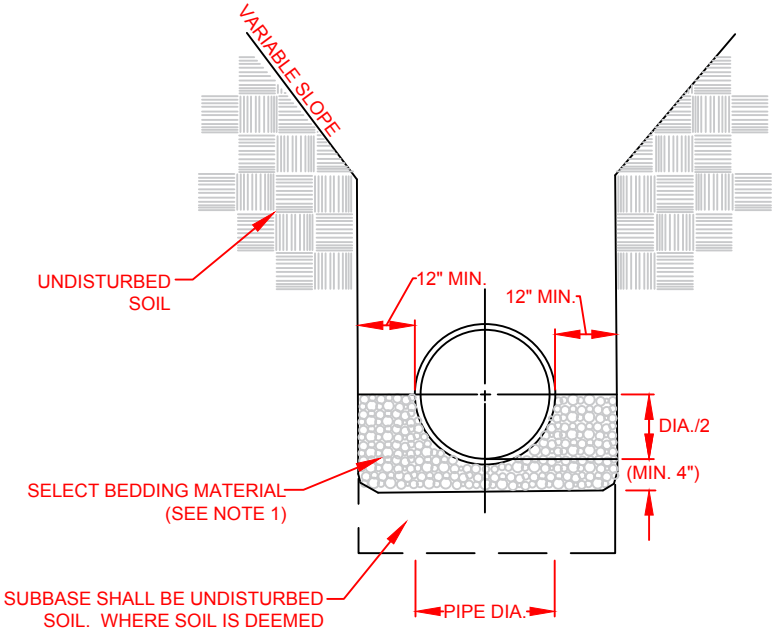
Know what's **below.** **Call** before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

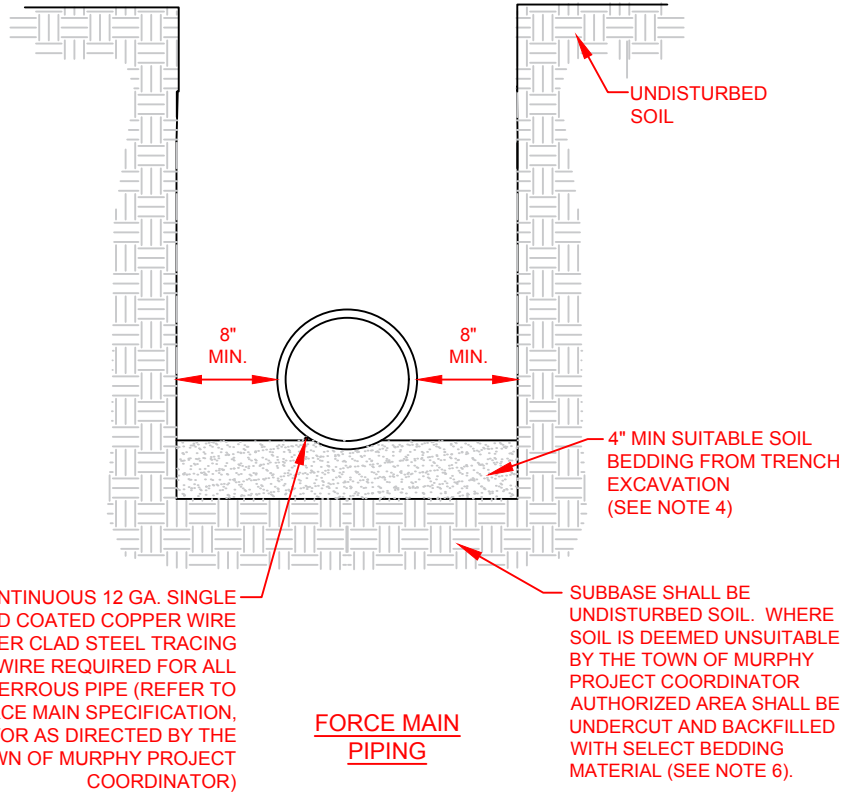
S11-RESSLAT-NOTES.dwg

NOTES:

1. THE SELECT BEDDING MATERIAL SHALL BE WELL GRADED CRUSHED ROCK (NO. 5 OR NO. 57 STONE) FOR THE FULL WIDTH OF THE TRENCH.
2. SELECT BEDDING MATERIAL SHALL EXTEND TO UNDISTURBED TRENCH WALLS.
3. SELECT BEDDING MATERIAL SHALL BE PROPERLY PLACED TO THE SPRING LINE OF THE PIPE FOR ITS ENTIRE LENGTH.
4. SUITABLE SOIL BEDDING IS DEFINED AS "NATIVE" SOIL EXCAVATED FROM THE TRENCH, FREE OF ROCKS, FOREIGN MATERIAL, AND FROZEN EARTH.
5. SUITABLE BEDDING MATERIAL SHALL EXTEND TO UNDISTURBED TRENCH WALLS.
6. IF GROUND CONDITIONS WARRANT, IT MAY BE NECESSARY TO BED DUCTILE IRON FORCE MAINS IN SELECT BEDDING MATERIAL (NO. 5 OR NO. 57 STONE) TO THE SPRINGLINE OF THE PIPE. SUCH INSTALLATION SHALL BE AS DIRECTED BY THE TOWN OF MURPHY PROJECT COORDINATOR.




GRAVITY PIPING




FORCE MAIN PIPING

# SEWER BEDDING

N.T.S.

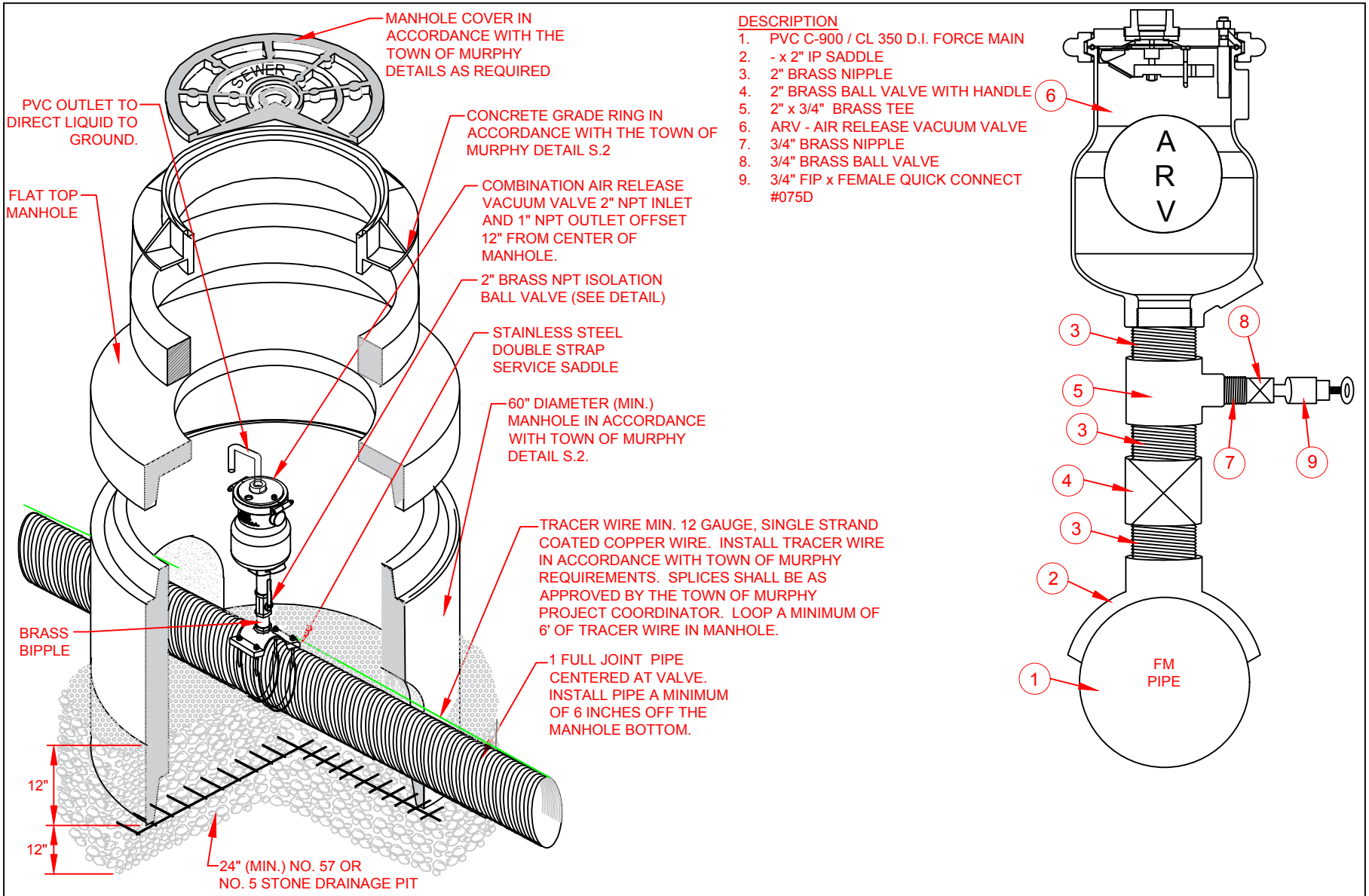
| SHEET NO. 1 OF 1 | DWG. NO. S.12 | DWG. BY: W.A.S. |
|---|---|---|
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |


TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906


Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

S12-SEWER-BEDDING.dwg




# COMBINATION AIR RELEASE VACUUM VALVE (SEWER SERVICE)

N.T.S.

| | | | |
|---|---|---|---|
| SHEET NO. 1 OF 2 | DWG. NO. S.13 | DWG. BY: W.A.S. | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | |


TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906


Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

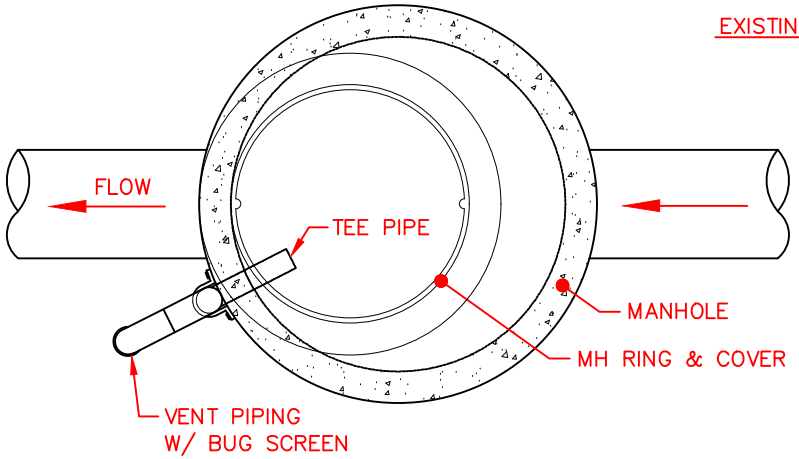
S13-SEWER-AIR-RELEASE-VALVE.dwg

NOTES:

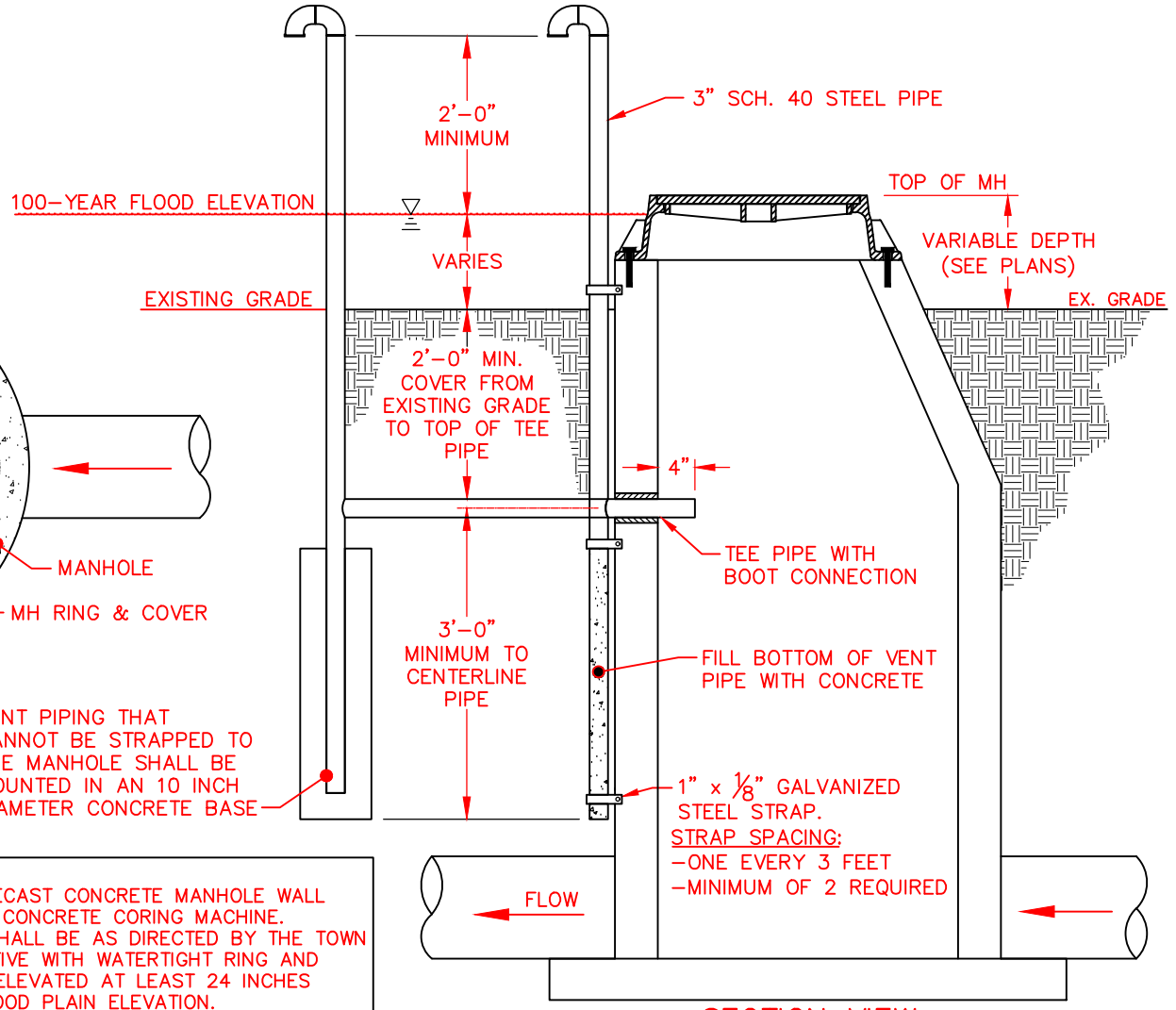
1. COMBINATION AIR RELEASE VALVES SHALL BE OF THE SINGLE HOUSING STYLE THAT COMBINES THE OPERATING FEATURES OF BOTH AN AIR VACUUM AND AIR RELEASE VALVE.
2. THE COMBINATION AIR RELEASE VALVE SHALL HAVE 2" NPT INLET AND 1" NPT OUTLET CONNECTIONS AND A 3/16 INCH DIAMETER ORIFICE (OR ORIFICE SHALL BE DETERMINED BY THE ENGINEER) FOR A MAX. 200PSI WORKING PRESSURE.
3. ALL MATERIALS SHALL MEET THE STANDARDS AND SPECIFICATIONS OF THE TOWN OF MURPHY.
4. MANHOLE, FRAME, AND COVER SHALL BE IN ACCORDANCE WITH TOWN OF MURPHY STANDARD DETAILS.
5. 2" TAPPING SADDLE SHALL BE DUCTILE IRON WITH STAINLESS STEEL STRAPS, BOLTS, NUTS, AND WASHERS.
6. SADDLES FOR PIPE SIZES 8" THRU 24" SHALL BE DOUBLE STRAP.
7. ALL INTERNAL PARTS SHALL BE 316 STAINLESS STEEL.
8. THE COMBINATION AIR RELEASE VALVE SHALL HAVE A SINGLE FLOAT DESIGN.
9. ALL COMBINATION AIR RELEASE VALVES SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
10. ALL COMBINATION AIR RELEASE VALVES SHALL BE CRISPIN MODEL UX20, ARI D-020, H-TEC 986, OR APPROVED EQUAL.
11. COMBINATION AIR RELEASE VALVE SHALL BE OFFSET 12" FROM CENTER OF MANHOLE. OFFSET THE RING AND COVER TO ALLOW ACCESS.
12. TOP OF FORCE MAIN SHALL BE A MIN. 4' DEEP AT AIR RELEASE VALVE, UNLESS OTHERWISE REQUIRED DUE TO FORCE MAIN AND/OR COMBINATION AIR RELEASE VALVE SIZE.
13. COMBINATION AIR RELEASE VALVE BODIES SHALL BE MADE OF STAINLESS STEEL OR REINFORCED NYLON.

| | | | | | | |
|---|---|---|---|---|---|---|
| COMBINATION AIR RELEASE VACUUM VALVE (SEWER SERVICE) | | | TOWN OF MURPHY<br>5 WOFFORD STREET<br>MURPHY, NC , 28906<br>Know what's below. Call before you dig. | NO. | DATE | REVISION |
| SHEET NO. 2 OF 2 | DWG. NO. S.13 | DWG. BY: W.A.S. | | | | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | | | | |

S13-SEWER-AIR-RELEASE-VALVE.dwg




PLAN VIEW




SECTION VIEW

VENT PIPING THAT CANNOT BE STRAPPED TO THE MANHOLE SHALL BE MOUNTED IN AN 10 INCH DIAMETER CONCRETE BASE

NOTES:
1. VENT PIPE OPENING IN PRECAST CONCRETE MANHOLE WALL SHALL BE CORED WITH A CONCRETE CORING MACHINE.
2. LOCATION OF VENT PIPE SHALL BE AS DIRECTED BY THE TOWN OF MURPHY REPRESENTATIVE WITH WATERTIGHT RING AND COVER VENT TOP TO BE ELEVATED AT LEAST 24 INCHES ABOVE THE 100 YEAR FLOOD PLAIN ELEVATION.
3. 4 INCH PIPING MAY BE SUBSTITUTED FOR THE 3 INCH PIPING.

# MANHOLE VENT

N.T.S.

SHEET NO. 1 OF 1

DWG. NO. S.14

DWG. BY: W.A.S.

DATE: 9/9/2019

APPROVED BY: J.S.S.

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

S14-MH-VENT.dwg

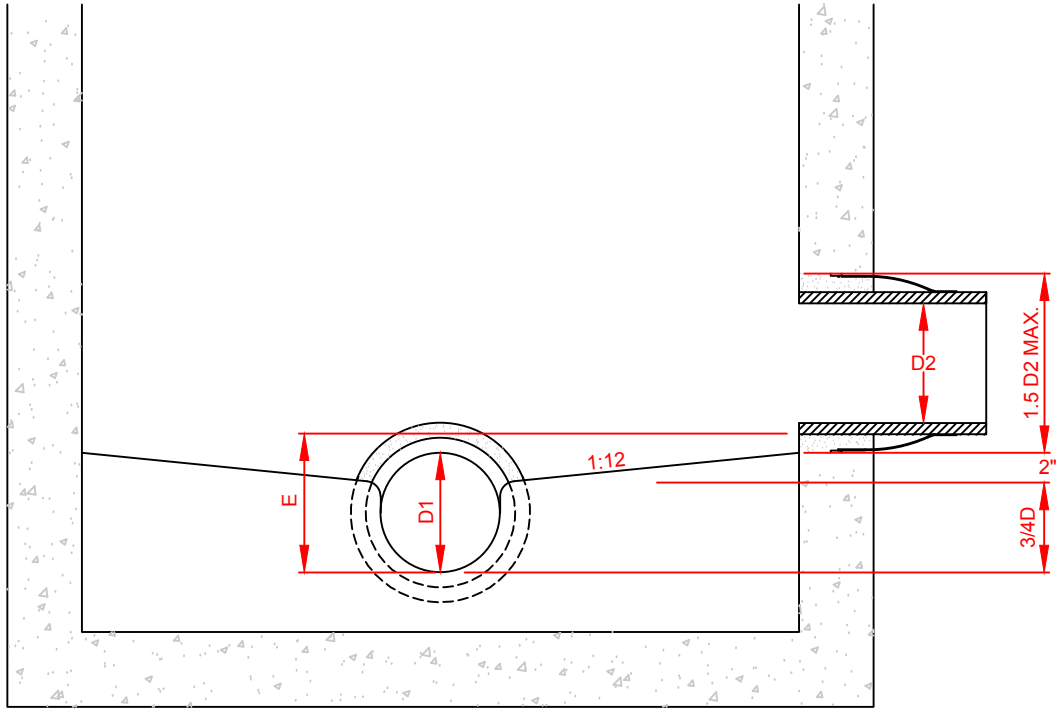
TO FIND "E" ENTER CHART AT LEFT WITH EFFLUENT PIPE SIZE AND ENTER PIPE AT TOP WITH INFLUENT PIPE SIZE. "E" DISTANCE IS POINT OF CONVERGENCE OF COLUMN AND R/W.

| D1 \ D2 | 4" | 6" | 8" | 12" | 15" | 18" | 24" |
|---|---|---|---|---|---|---|---|
| 8 | 9.00 | 9.50 | 10.00 | - | - | - | - |
| 12 | 11.00 | 11.50 | 12.00 | 13.00 | - | - | - |
| 15 | 14.25 | 14.75 | 15.25 | 16.25 | 17.00 | - | - |
| 18 | 16.50 | 17.00 | 17.50 | 18.50 | 19.25 | 20.00 | - |
| 24 | 21.00 | 21.50 | 22.00 | 23.00 | 23.75 | 24.50" | 26.00 |

WHERE 5' MANHOLE IS REQUIRED ADD 1/2" TO "E" DISTANCE TO ACCOUNT FOR THE ADDITIONAL 6" OF SHELF SLOPE.

NOTES:

1. SEE TOWN OF MURPHY STANDARD MANHOLE AND PIPE SLIDE, MORTAR SLIDE, AND SHELF DETAILS FOR ADDITIONAL INFORMATION.
2. THE "E" DISTANCES INDICATED ARE FOR CONNECTION TO AN EXISTING OUTFALL AND ARE THE MINIMUM DISTANCE ALLOWABLE.
3. WHERE SANITARY SEWER OUTFALLS AND MAINS ARE BEING CONSTRUCTED THE TOP OF THE EFFLUENT PIPE AND THE TOP OF THE INFLUENT PIPE SHALL BE AT THE SAME ELEVATION UNLESS CONDITIONS ARE PROHIBITIVE TO THIS PRACTICE.




MAIN OR LATERAL MIN. SLOPE
4" @ 2.00% MIN.
6" @ 0.67% MIN./MAIN
6" @ 2.00% MIN./LATERAL
8" @ 0.40% MIN.
12" @ 0.22% MIN.
15" @ 0.15% MIN.
18" @ 0.12% MIN.

# MH CONNECTION DESIGN GUIDE

N.T.S.

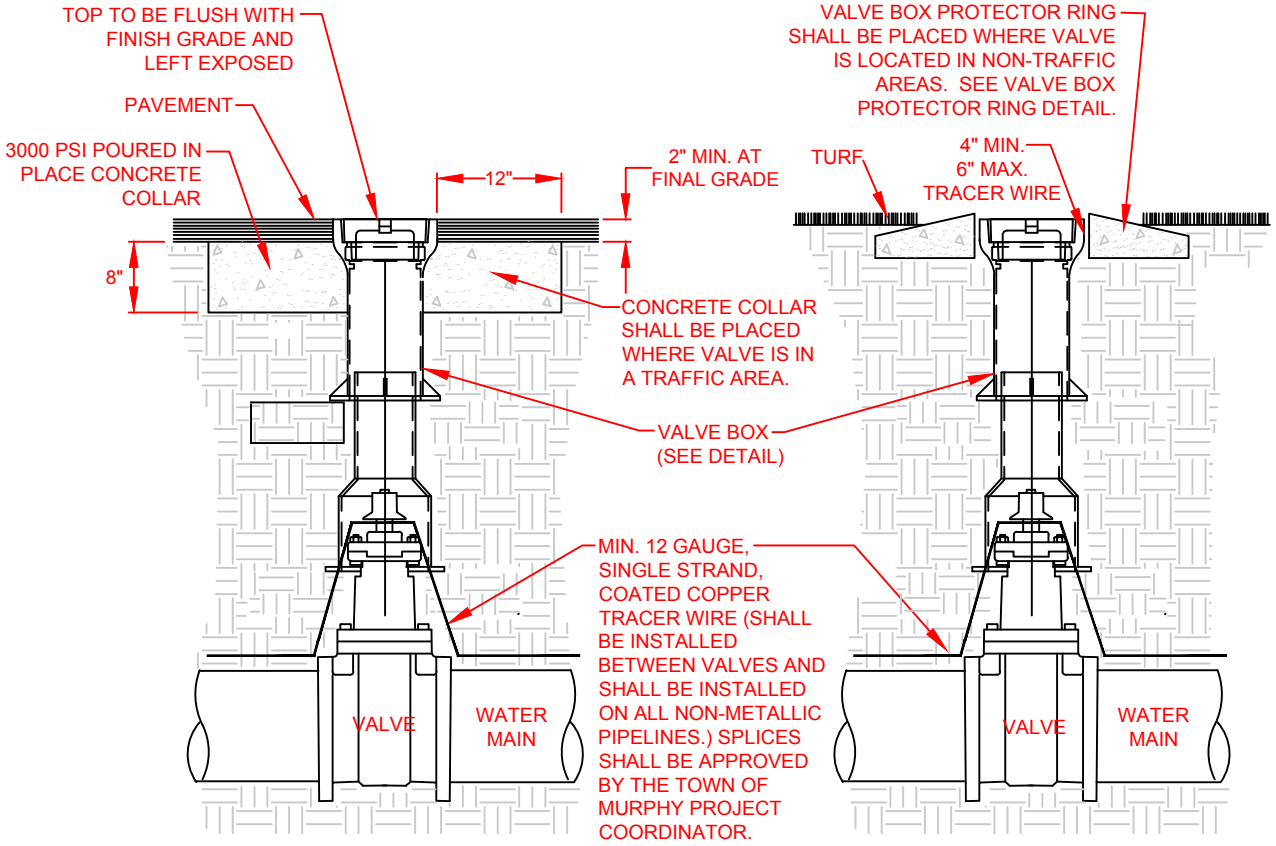
| SHEET NO. | DWG. NO. | DWG. BY: |
|---|---|---|
| 1 OF 1 | S.15 | W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |


TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906


Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

S15-PENETRATION-DETAIL.dwg




VALVE IN TRAFFIC AREA

VALVE IN NON-TRAFFIC AREA

NOTES:

1. ALL MATERIALS SHALL BE IN ACCORDANCE WITH TOWN OF MURPHY STANDARDS.
2. RESILIENT WEDGE IRON BODY GATE VALVE SHALL BE AS MANUFACTURED BY MUELLER CORP., AMERICAN DARLING OR CLOW CORP.
3. ALL VALVES SHALL HAVE 2" SQUARE OPERATING NUT AND SHALL OPEN COUNTERCLOCKWISE.
4. VALVE BODY, BONNET, AND GATE SHALL BE IN ACCORDANCE WITH AWWA C-509/C-515 AND NSF61.
5. VALVE BODY AND BONNET SHALL BE COATED ON ALL INTERIOR AND EXTERIOR SURFACES WITH A FUSION BONDED EPOXY IN ACCORDANCE WITH AWWA C-550-90.
6. ALL VALVES 24" AND SMALLER SHALL HAVE A SAFE WORKING PRESSURE OF 250PSI.
7. SEE VALVE BOX DETAIL FOR ADDITIONAL INFORMATION.
8. SEE VALVE BOX PROTECTOR RING DETAIL FOR ADDITIONAL INFORMATION.
9. VALVE BOX SECTIONS ARE REQUIRED. THE USE OF PIPE IN LIEU OF VALVE BOX SECTIONS SHALL NOT BE PERMITTED.

# FORCE MAIN GATE VALVE

N.T.S.

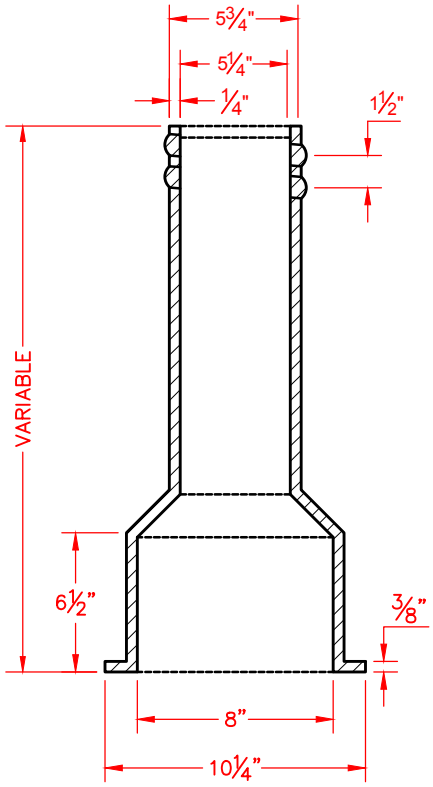
| | | | |
|---|---|---|---|
| SHEET NO. 1 OF 1 | DWG. NO. S.16 | DWG. BY: W.A.S. | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

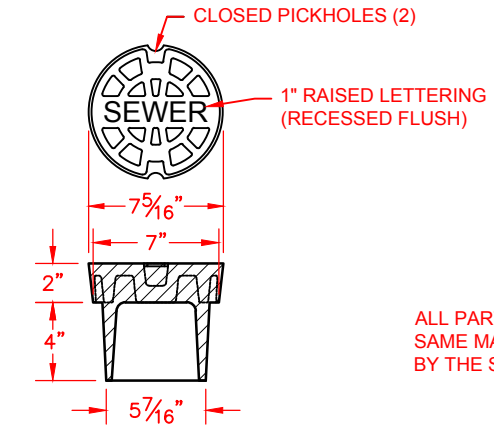
Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

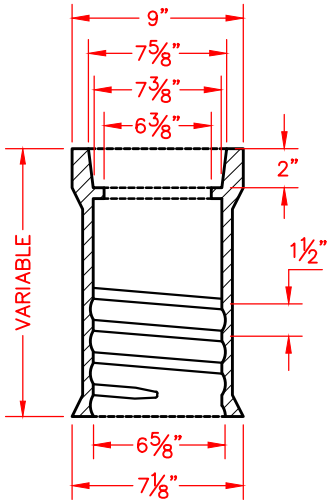
W16-GATEVALVE.dwg



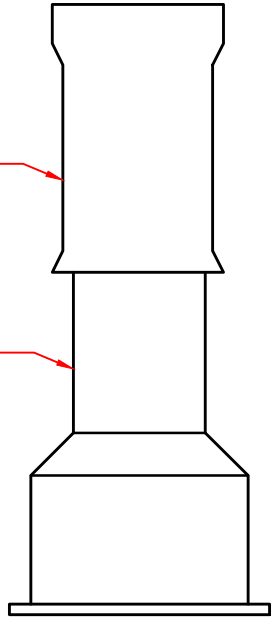

BOTTOM SECTION




LID




TOP SECTION



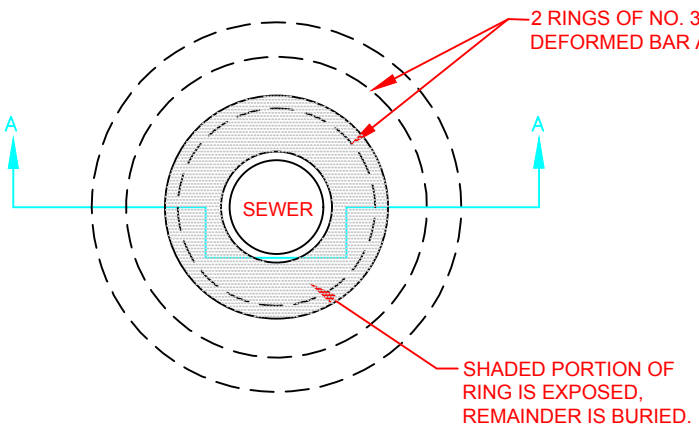

COMPLETE BOX

NOTES:

1. VALVE BOX SHALL HAVE RAISED LETTERS "SEWER" CAST INTO COVER.
2. DIMENSIONS SHOWN VARY BASED UPON THE MANUFACTURER. ACTUAL DIMENSIONS SHALL BE APPROVED BY THE TOWN OF MURPHY.
3. VALVE BOX SECTIONS ARE REQUIRED. THE USE OF PIPE IN LIEU OF VALVE BOX SECTIONS SHALL NOT BE PERMITTED.
4. TRACING WIRE SHALL BE INSTALLED OUTSIDE OF BOX.
5. REFER TO TOWN OF MURPHY DETAIL S.16 FOR INSTALLATION REQUIREMENTS.

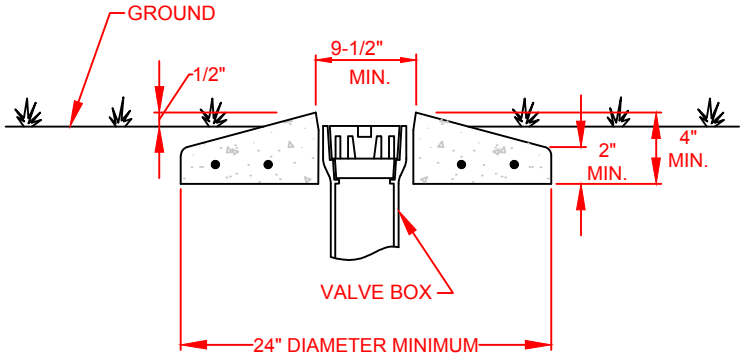
| VALVE BOX<br>N.T.S. | | | TOWN OF MURPHY<br>5 WOFFORD STREET<br>MURPHY, NC , 28906<br>811 Know what's below. Call before you dig. | NO. | DATE | REVISION |
|---|---|---|---|---|---|---|
| SHEET NO.<br>1 OF 1 | DWG. NO. S.17 | DWG. BY: W.A.S. | | | | |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. | | | | |

S17-VALVEBOX.dwg

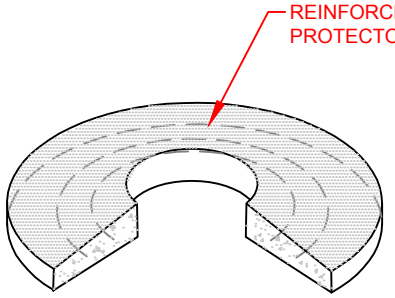



PLAN
N.T.S.

NOTES:
1. CONCRETE PROTECTOR RING SHALL BE 2500PSI PRECAST REINFORCED CONCRETE.
2. VALVE BOX SHALL BE AT GRADE WITH PROTECTOR RING EXTENDING 1/2" ABOVE GRADE.
3. SEE GATE VALVE AND BOX DETAIL.
4. VALVE BOX PROTECTOR RINGS SHALL BE INSTALLED AROUND VALVE BOX IN UNPAVED NON-TRAFFIC AREAS AND SHALL NOT CREATE A HINDRANCE TO MOWING OPERATIONS.




SECTION A-A
N.T.S.




CUT AWAY VIEW
N.T.S.

| VALVE BOX PROTECTOR RING<br>N.T.S. | | |
|---|---|---|
| SHEET NO.<br>1 OF 1 | DWG. NO. S.18 | DWG. BY: W.A.S. |
| | DATE: 9/9/2019 | APPROVED BY: J.S.S. |

TOWN OF MURPHY
5 WOFFORD STREET
MURPHY, NC , 28906

Know what's below. Call before you dig.

| NO. | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |

S18-CONC-PROTECTOR-RING.dwg