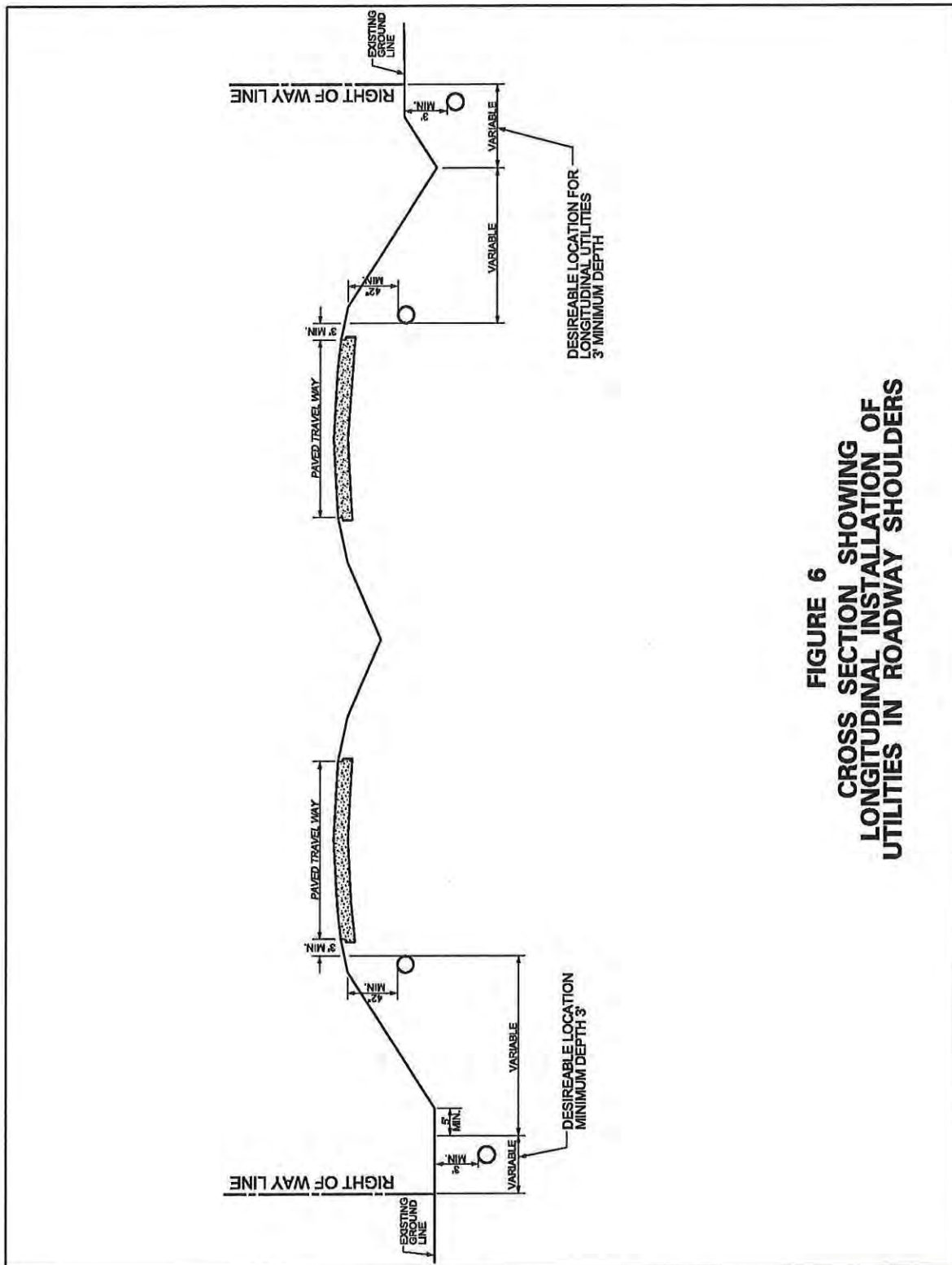


### **SCDOT BORING AND OPEN CUT PROVISIONS**

1. Applicant shall be responsible for all pavement repairs if boring procedure causes any damage to the pavement. If damage occurs, applicant shall notify the Greenville County Maintenance Permits Office immediately at (864) 241-1224.
2. Applicant shall be responsible for the placement of secured steel plates on open cut of pavement if work is incomplete or left overnight.
3. All open excavations within SCDOT right-of-way shall be properly barricaded when work is not being performed.
4. Any sidewalk or curb and gutter damaged or removed during installation of a utility shall be replaced to current SCDOT Standard Specifications.
5. Applicant shall complete all asphalt repairs using the attached asphalt pavement repair detail.
6. Any pavement markings, to included RPM's, disturbed shall be replaced to original state.
7. Ditches and/or shoulders disturbed under this permit shall be restored to the original grade and cross section to ensure positive drainage.
8. All areas disturbed shall be reseeded and monitored until vegetation is established.
9. Applicant shall be responsible for all future maintenance of any pavement disturbance caused by the utility installation or repair.

## Appendix B: Pipelines

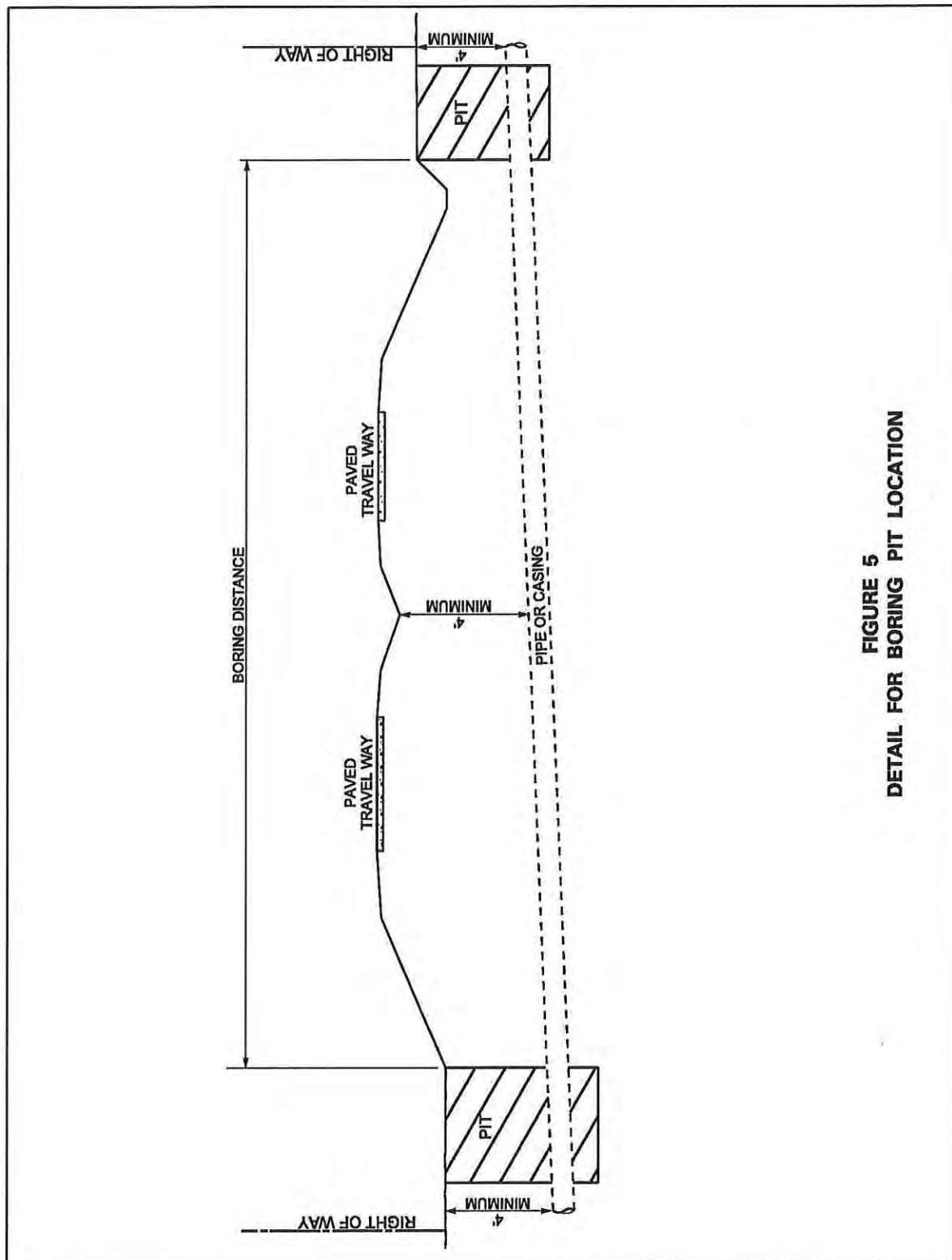
Figure 6 – Longitudinal Installation of Utilities in Roadway Shoulders



**FIGURE 6**  
**CROSS SECTION SHOWING**  
**LONGITUDINAL INSTALLATION OF**  
**UTILITIES IN ROADWAY SHOULDERS**

## Appendix B: Pipelines

### Figure 5 – Detail for Boring Pit Location



**FIGURE 5**  
**DETAIL FOR BORING PIT LOCATION**

## Appendix B: Pipelines

Figure 1A – Example of Features for Unencased Pipeline Crossings

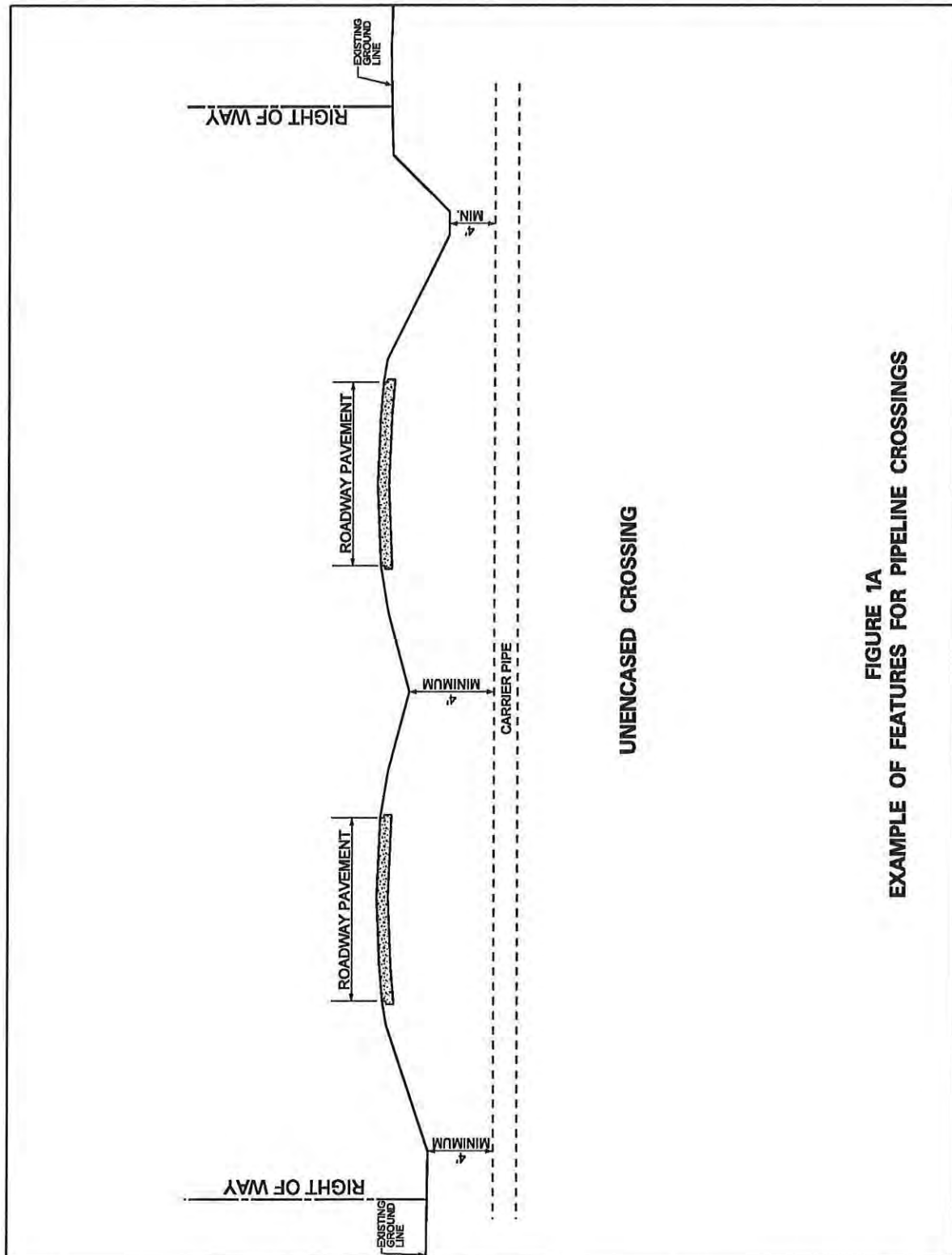


FIGURE 1A  
EXAMPLE OF FEATURES FOR PIPELINE CROSSINGS

## Appendix B: Pipelines

Figure 1 – Example of Features for Encased Pipeline Crossings

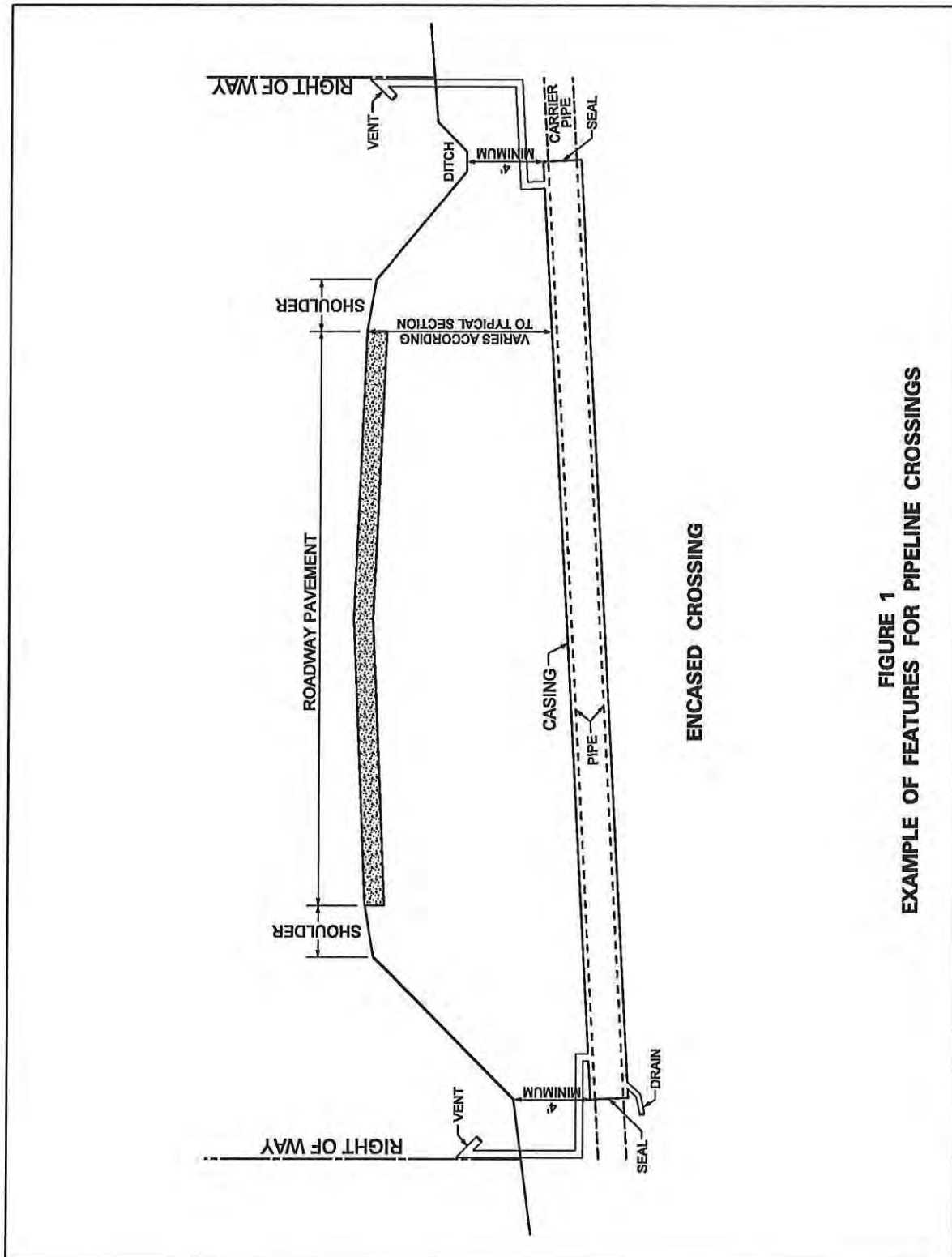
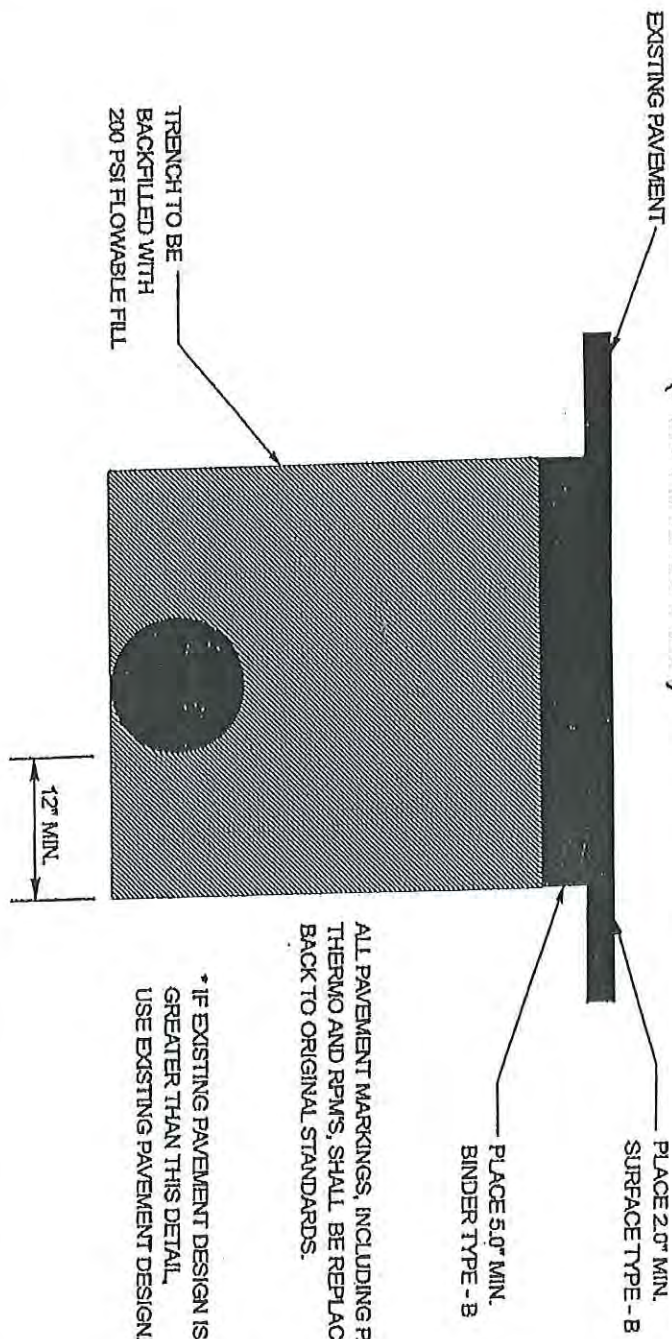


FIGURE 1  
EXAMPLE OF FEATURES FOR PIPELINE CROSSINGS



# ASPHALT PAVEMENT REPAIR (FLOWABLE FILL)



## Appendix B: Pipelines

Figure 2 – Examples of Encasement and Allied Mechanical Protection

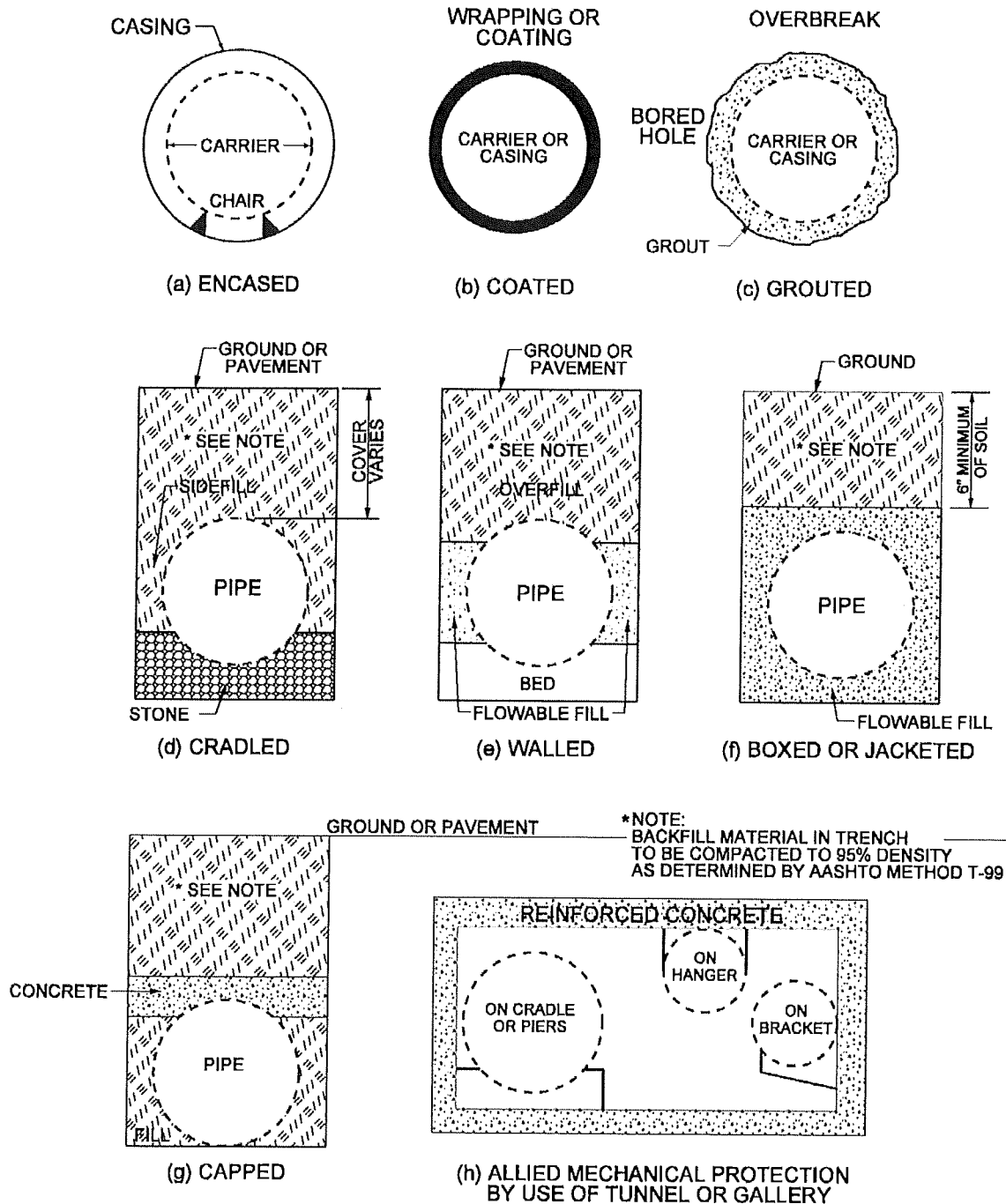
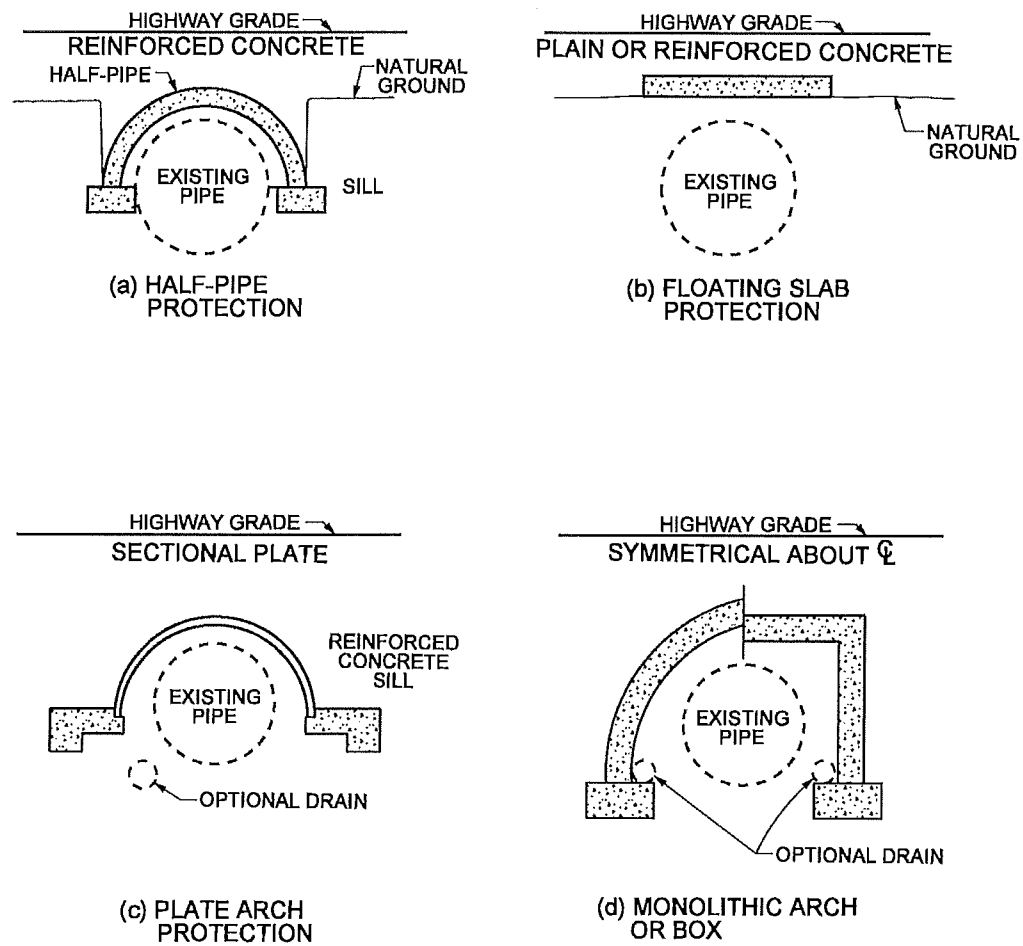


FIGURE 2  
EXAMPLES OF ENCASEMENT AND ALLIED MECHANICAL PROTECTION

## Appendix B: Pipelines

Figure 3 – Examples of Protection of Existing Pipelines

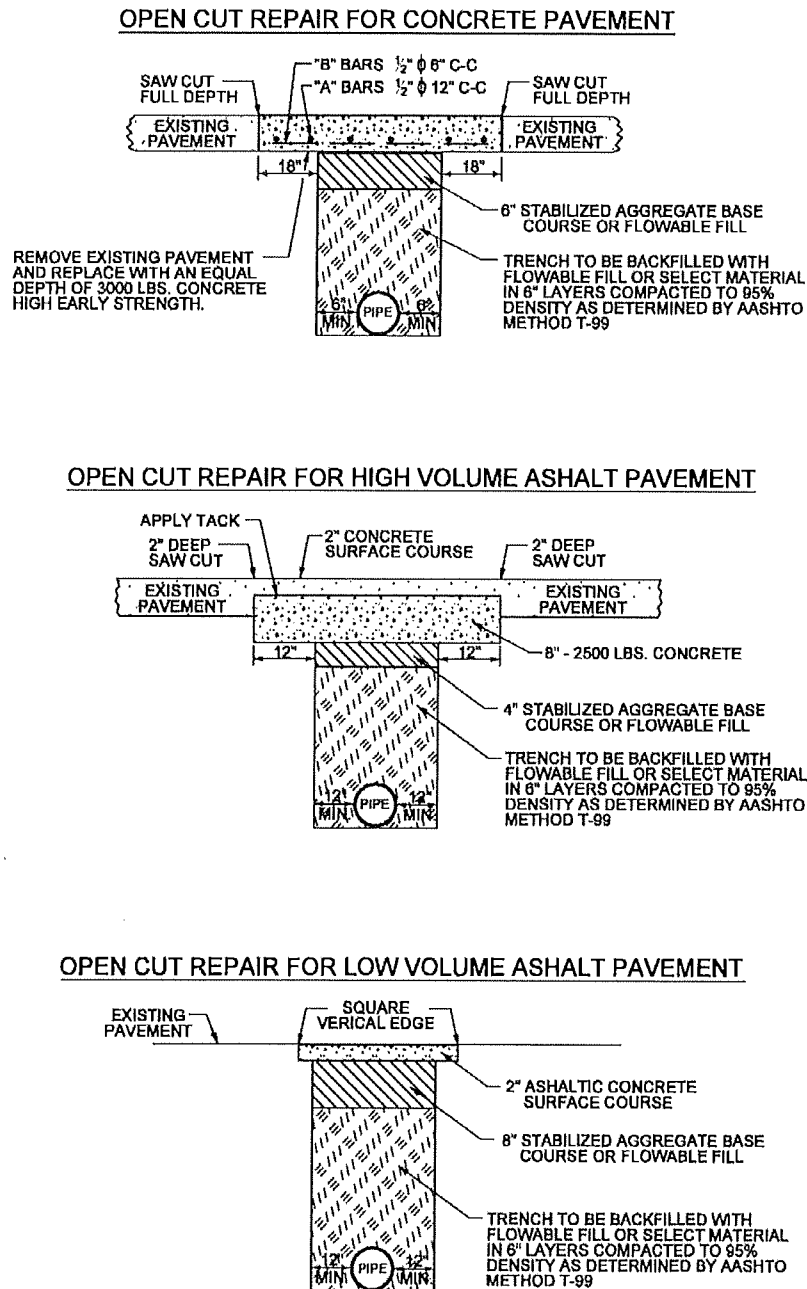


**FIGURE 3**  
**EXAMPLES OF PROTECTION OF EXISTING PIPELINES**



## Appendix B: Pipelines

### Figure 4 – Pavement Repairs



**FIGURE 4  
PAVEMENT REPAIRS**

FIGURE 1: UPPER AND LOWER STATE MAP

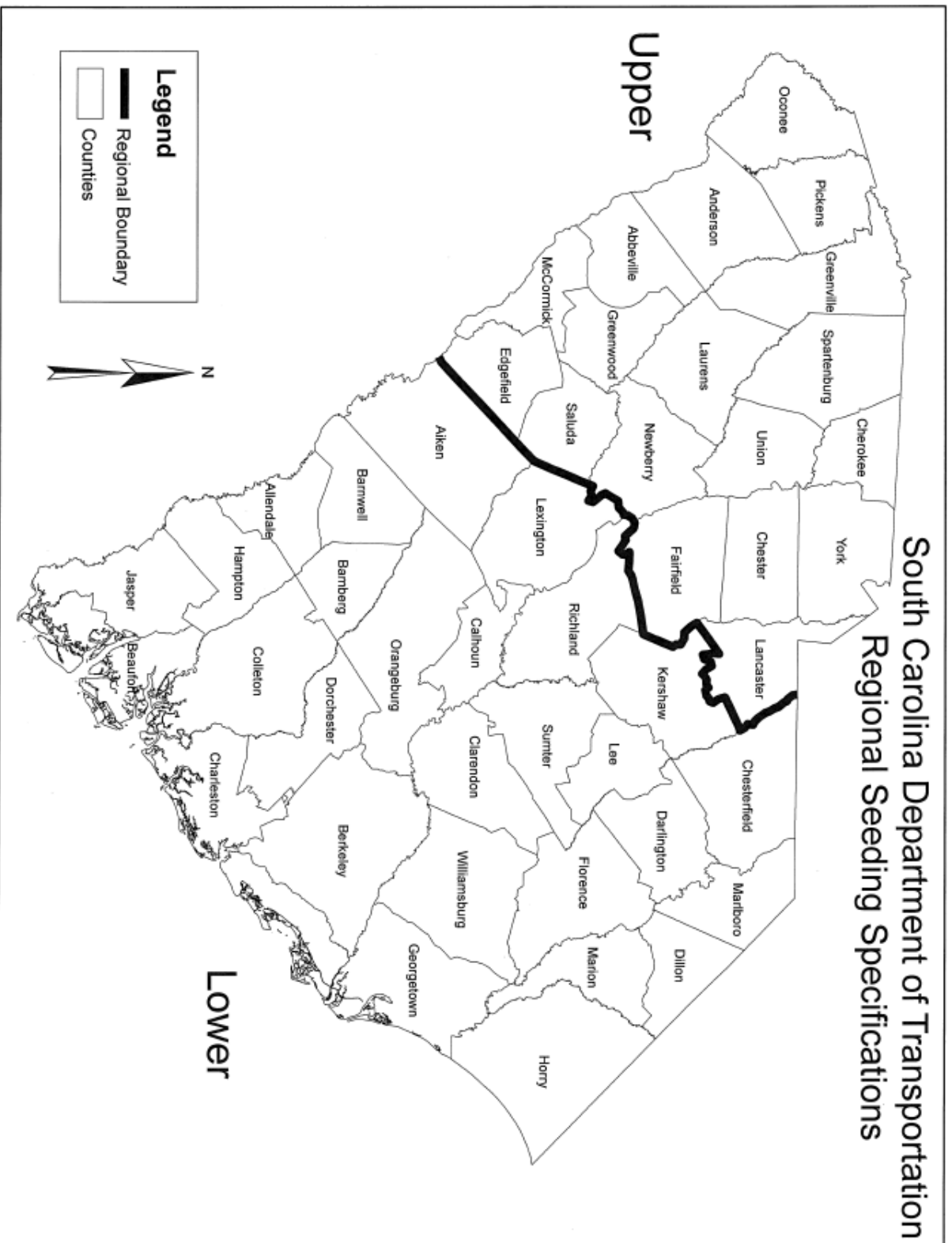


TABLE 1: PERENNIALS

\* Months shaded in gray represent applicable planting dates.

COMMON NAME <sup>6</sup>	BOTANICAL NAME	APPROVED SITE(S)	PLANTING RATE (lbs/acre)	PLANTING LOCATION	Planting Dates*											
					JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
TURF-TYPE GRASSES (SELECT ONE)																
Bahiagrass <sup>1</sup>	Paspalum notatum	Shoulders, Slopes, or Medians	30	Upper State Lower State												
Common Bermudagrass <sup>2</sup> (hulled = hull absent)	Cynodon dactylon	Shoulders, Slopes, or Medians	50	Upper State Lower State												
Common Bermudagrass <sup>2</sup> (unhulled = hull present)	Cynodon dactylon	Shoulders, Slopes, or Medians	60	Upper State Lower State												
Carpet Grass / Centipedegrass Combo	Axonopus affinis Eremochloa ophiuroides	Shoulders, Slopes or Medians	15 10	Upper State Lower State												
Tall Fescue (KY-31) <sup>3</sup>	Festuca arundinacea	Shoulders, Slopes, or Medians	75	Upper State Lower State												
GRASSES																
Weeping Lovegrass	Eragrostis curvula	Slopes	10	Upper State Lower State												
Indiangrass	Sorghastrum nutans	Slopes	10	Upper State Lower State												
Little Bluestem	Andropogon scoparius	Slopes	10	Upper State Lower State												
Coastal Panicgrass	Panicum amarum	Slopes	20	Upper State Lower State												
Switchgrass	Panicum virgatum	Slopes	10	Upper State Lower State												
Perennial Rye Grass <sup>4</sup>	Lolium perenne	Shoulders, Slopes, or Medians	15	Upper State Lower State												
Virginia Wild Rye	Elymus virginicus	Shoulders, Slopes, or Medians	6	Upper State Lower State												
LEGUMES <sup>4</sup>																
White Clover	Trifolium repens	Shoulders, Slopes, or Medians	5	Upper State Lower State												
Crownvetch	Coronilla varia	Slopes	25	Upper State Lower State												
Sericea Lespedeza (Scarified seed)	Lespedeza cuneata	Slopes	50	Upper State Lower State												
Sericea Lespedeza (Unscarified seed)	Lespedeza cuneata	Slopes	80	Upper State Lower State												

<sup>1</sup>Bahiagrass: Use at discretion of RCE based on project location.<sup>2</sup>Common Bermudagrass: Do not use Giant Bermudagrass (NK-37).<sup>3</sup>Tall Fescue (KY-31): Do not use Tall Fescue (Lolium arundinaceae).<sup>4</sup>Perennial Rye Grass: Do not use Annual Italian Rye grass (Lolium multiflorum).

\* Months shaded in gray represent applicable planting dates.

<sup>5</sup>Only use pre-inoculated legumes or use an appropriate inoculant with the seed at plant<sup>6</sup>If Common Name of seed is not available, use seed with the listed Botanical Name.

TABLE 2: ANNUALS

\* Months shaded in gray represent applicable planting dates.

COMMON NAME <sup>5</sup>	BOTANICAL NAME	APPROVED SITE(S)	NURSE CROP RATE (lbs/acre)	TEMP COVER RATE (lbs/acre)	PLANTING LOCATION	Planting Dates*											
						JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Crimson Clover <sup>1</sup>	Trifolium incarnatum	Shoulders, Slopes, or Medians	20	20	Upper State Lower State												
Lespedeza <sup>1</sup> Kobe / Korean	Lespedeza striata / stipulacea	Shoulders, Slopes	15	60	Upper State Lower State												
Browntop Millet <sup>2</sup>	Panicum ramosum	Shoulders, Slopes, or Medians	10	40	Upper State Lower State												
German Millet <sup>2</sup> (Foxtail Millet)	Setaria italica	Shoulders, Slopes, or Medians	10	40	Upper State Lower State												
Japanese Millet <sup>2</sup>	Echinochloa crusgalli	Slopes	10	50	Upper State Lower State												
Oats	Avena sativa	Slopes	40	110	Upper State Lower State												
Hairy Vetch <sup>1</sup>	Vicia villosa	Slopes	15	50	Upper State Lower State												
Pearl Millet	Pennisetum glaucum	Slopes	15	50	Upper State Lower State												
Sudangrass	Sorghum bicolor	Slopes, Buffers	20	60	Upper State Lower State												
Barley	Hordeum vulgare	Slopes	55	110	Upper State Lower State												
Wheat <sup>4</sup>	Triticum spp.	Slopes, Buffers	35	110	Upper State Lower State												
Rye Grain <sup>3,4</sup>	Secale cereale	Shoulders, Slopes, or Medians	40	110	Upper State Lower State												

<sup>1</sup> Only use pre-inoculated legumes or an appropriate inoculant with the seed at planting.

\* Months shaded in gray represent applicable planting dates.

<sup>2</sup> Mow Millet (no lower than 3 inches) once it reaches a height of 18 - 24 inches or at the discretion of the RCE to reduce competitiveness with permanent vegetation.<sup>3</sup> Rye Grain: Do not use Annual Italian Rye Grass (Lolium multiflorum).<sup>4</sup> Mow Wheat and Rye Grain (no lower than 3 inches) once they reach a height of 18 - 24 inches or at the discretion of the RCE to reduce competitiveness with permanent vegetation.<sup>5</sup> If the Common Name of the seed listed is not available, use seed with the listed Botanical Name. Do not use Wild Bird, Wild Animal, or Domestic Feed Seed.

## Communication Services, LLC

At Communication Services, LLC. (CSL), our business is utility construction and maintenance. For more than 30 years, CSL has provided utility construction, utility locating, utility maintenance and utility management services for our electric, telephone, CATV, fiber optic and wireless customers. *We specialize in the following: Aerial and underground utility construction, directional drilling, trenching, bonding grounding, drop cabling, duct systems, fiber optic cable systems, ftp – fiber to the premises, joint trench, power distribution construction, street light construction.*

The experienced professionals at CSL understand that every client, and every project, whether a two week build-out or a multi-year contract, is different. That's why we specialize in looking at things from every angle. We approach projects and services with your objectives as our requirements - from concept to completion. By focusing on our goal of providing superior service, tailored to our customer's specific needs, CSL has built a strong reputation for safe, reliable, on-time and on-budget delivery.

Communication Services, is a state licensed contractor in the following states, AL, AR, FL, NC and SC, all services offered may not be available in your specific state, please call your local office to confirm. Our state license numbers can be found on the 'Contact Us' page.

Headquartered in Marshville, North Carolina we maintain offices in *Charlotte, NC; Sanford NC; Yadkinville, NC; Marshville, NC; Tryon, NC; Matthews, NC; Concord, NC; Pell City, AL; Dothan AL; Andalusia, AL; Summerdale, AL; Lexington, SC; Concord, NC; Conway, AR*

### History

Communication Services, LLC . (CSL) has been in business since 1981, starting in Alabama. Throughout the years the company has consistently completed projects effectively and efficiently to achieve our main goal of providing quality service for our customers. The initial cable television construction expanded to include copper telephone facility construction in the mid 1980's.

The addition of power distribution and fiber optics in the mid 1990's naturally complimented our previous work in the field of telecommunications and made CSL a full service utility construction firm for our clients. We are keeping step with technology, ready to tailor our services to fit your needs.

### Horizontal Directional Boring work experience

Communication Services, LLC has over 18 years of experience with Horizontal Directional Boring Projects, with having completed construction on over 400 miles of large metropolitan builds which required an extensive amount of Horizontal Directional Boring. CSL Safety Director Wayne Maddox is certified by CSX Railroad to do horizontal directional boring.

### Safety

At CSL we are committed to providing a safe work zone. We diligently implement all OSHA standards. Although CSL has always strived to be safety conscious and our safety rating is outstanding, we have set a new goal for our company: to be recognized as a "SHARP" contractor. At CSL the goal is to foster an environment that mandates the performance bar be significantly raised and employee commitment to safety not only meet but exceed compliance requirements for OSHA safety standards that will take everyone's commitment to be successful. To that end CSL is pleased to have Wayne Maddox head up our team as an experienced Safety Director to develop and implement our quest to become a "SHARP" contractor. Mr. Maddox brings a wealth of experience from within the construction industry. This initiative will provide an opportunity for the entire company to create a culture that will contribute to a common goal — *"Actively caring and constantly improving the safety and health of all employees". Tim Victory*

## In the News

**What's New at  
Communication Services, LLC**



## **Philosophy**

Our goal at CSL is to provide our clients unparalleled service. We realize that every client has their own unique needs. We strive to build our services to custom fit your needs. We don't want to be just another contractor; we want to be an integral part of your team.

## CRITERIA TO ALLOW HORIZONTAL DIRECTIONAL DRILLING USING A CUTTING HEAD

This guideline is for perpendicular crossing of roadways and does not apply to utility installations that run parallel to the roadway within the right-of-way.

All lines under pressure or transporting a hazardous material will require a steel casing or approved equal with vents installed at the right-of-way limits.

A Performance Bond is required for a period of 5 years from the completion date of the installation to cover any roadway failures. The values of the bond shall be related to the pipe diameter installed and is shown in Table 1. Should the repairs exceed this amount, then the utility company is still responsible for the cost of the repairs and no new permits shall be issued to the utility until the repair costs have been satisfied. The utility has the option to supply individual bonds, a yearly bond or have SCDOT named as an additional insurer on their general liability insurance.

Notify the Resident Maintenance Engineer for the county in which the work is to be done by fax or email 48 hours before performing the boring operation.

Only perpendicular crossings will be allowed. Any other type of crossing will be evaluated on a case by case basis for non-controlled access roads only.

The permit application submittal must include at a minimum the following information:

### CHECKLIST

- ☒ 1. Site layout, project schedule, and company experience record.  
**[See Attached Drawings]**
- ☒ 2. Location of entry and exit points, access pit locations, and equipment and pipe layout areas.  
**Please see detail sheets and construction drawings for the entry and exit points, access handholes and bore locations.**
- ☒ 3. Proposed drill path alignment (both horizontal and vertical) to include the lowest point of the roadway cross section.  
**Please see detail sheets and construction drawings attached**
- ☒ 4. Location and clearances of all existing utility crossings and structures.  
**Please see detail sheets and construction drawings attached. As built drawings will be provided when work is complete.**
- ☒ 5. Depth of cover over the casing.  
**[(4) Four feet]**
- ☒ 6. Soil analysis to a depth of five feet below the proposed drill elevation.  
**[See Attached Report]**
- ☒ 7. Supply the theoretical amount of drilling fluid to be used during the drilling operations (calculation base on drilling diameter and number of pre-reams).  
**[25 Gal. /10 Ft]**



- ☒ 8. Supply data sheet showing the actual amount of drilling fluid used during the drilling operation.  
**[see attached information sheet; final information to be provided on As-builts]**
- ☒ 9. Provide the source of the make-up water for the drilling fluids.  
Local **Greenville County Water**
- ☒ 10. Supply field pH and hardness reading for the makeup water, drilling fluids on the data sheet each time new fluids are mixed.  
**[see attached information sheet; reading is performed at time of drilling and will be provided at time on As-Builts]**
- ☒ 11. On systems that recycle drilling fluids, complete testing logs shall be filled out to verify that the drilling fluids are being maintained in accordance with the original mix or to demonstrate the reason for changing the drilling fluid mix during the completion of pull.  
**[see attached information sheet; all final information provided on As-Builts]**
- ☒ 12. Length, product pipe diameter, pipe material, pipe wall thickness, and pipe ream diameter for proposed directional drill.  
**Pipe length=varies per location; Product pipe diameter= 1.50"; Pipe material=HDPE, SDR 11; Wall thickness=0.141"; Bend radius=28 Deg. 108.2' min.; Pipe ream diameter=1.9"**
- ☒ 13. Detailed pipe calculations confirming ability of product pipe or casing pipe to withstand installation loads.  
**Blue Diamond Industries, LCC-3399 Tates Creek Road, Suite 110, Lexington, KY 40502  
(859)224-0415 office or (859)224-0543 fax  
Size + 1.50" SDR 11 Weight/LF (lbs.) =0.314 - Pipe dimensions = 1.9" (OD) - 1.50" (ID) 0.141" (Wall).**
- ☒ 14. Proposed and actual viscosity, density, and composition of drilling fluids whether they are bentonite based or polymer based (based on soil analysis).  
**Currently water only no mix.**
- ☒ 15. Name of drilling fluids being used for boring (company name), name of the field representative (drilling fluids manufacturer) that will provide the technical support, fluids testing and recommendations as needed during the drilling and pulling phase.
- ☒ 16. Construction method including diameter of pilot hole, number and size of pre-reams.  
**The method of boring will consist of one forward shot with a conventional paddle style bit at a depth of 4' using 3- 1.50" HDPE pipes with a 1.875" pilot hole. No pre-reaming or back reaming will be required.**
- ☒ 17. Drilling fluid pumping capacity in gallons per minute (gpm), and gallons per rod (gpr), pressures, and flow rates proposed and actual pumping rates (rates may change as soil conditions and soil types change).  
**25 gpm Max flow rate for Vermeer  
Anticipated Pressures = 1000 psi  
Anticipated flow rates = 4-5 gpm  
Actual to be supplied on the As-Builts upon completion of work**

- ☑ 18. Show all right-of-way-lines, controlled access lines, property lines and other utility right-of-way or easements. **[See Attached Drawings]**
- ☑ 19. Show all elevations. **[See Attached Drawings]**
- ☑ 20. Type and capacity of drilling machine to include the manufacturer, model number, thrust/pullback (in lbs.), maximum torque, drilling speed, drill pipe length, drilling distance and power source.  
**Vermeer Model # 2330**  
**Thrust 23,000 lbs. | Pull back 30,000 lbs.**  
**Max. Torque 3000 ft-lbs**  
**Drill pipe length = 10'; Drilling distance up to 600'**  
**Power source = (Turbocharged) diesel**
- ☑ 21. Type of tracking method/system, operation range and accuracy.  
**[Sub site 66 TKRW Tracker]**
- ☑ 22. Type and capacity of mud mixing system.  
**Water only**
- ☑ 23. A detailed plan for monitoring ground surface movement (settled or heave) due to the drilling operation at the time of drilling and subsequent to the drilling operation being completed. **[On site Inspector to monitor the ground and bore track for movement during the drilling, reaming and pullback processes, from beginning to end, during and after bore, to insure there is no disturbance to soil.]**
- ☑ 24. Contingency plan for frac-out or drilling hole failure. **[See attached frac-out plan]**  
**Mill 20 feet on either side of disturbance and repair according to SCDOT guide lines**
- ☑ 25. Traffic control plan when applicable. **See attached**
- ☑ 26. Disposal plan for spend drilling fluids, i.e.: (land farming, landfill, etc.) **Landfill**
- ☑ 27. Upon completion of the drilling operation supply accurate **as built** drawing within 30 days to the Resident Maintenance Engineer. The As-Built drawing must include the following information: Actual path alignment, depth of cover for the casing, actual length, product diameter, casing diameter, actual viscosity, density and composition of drilling fluid, actual fluid pumping capacity, pressure and flow rates, and all final elevations...  
**[As-Built once work is complete]**
- ☑ 28. Confirm the drilling unit is equipped with an electrical strike safety package and a safety plan in the event of an electrical strike. **Yes**

The following Table details the recommended minimum depths below the lowest point on the road cross-section:

**Table 1: PERFORMANCE BOND AMOUNTS FOR DIFFERENT PIPE DIAMETERS**

For pipes 2 inches to 6 inches in diameter the minimum cover shall be 4 feet. Performance Bond value \$10,000.
For pipes greater than 6 inches to 14 inches in diameter the minimum cover shall be 10 Feet. Performance Bond value \$20,000.
For pipes greater than 14 inches to 24 inches in diameter the minimum cover shall be 15 feet. Performance Bond value \$40,000.
For pipes greater than 24 inches to 48 inches in diameter the minimum cover shall be 25 feet. Performance Bond value \$75,000.



# BARO-LUBE GOLD SEAL™

## Drilling Fluid Lubricant

**Description** BARO-LUBE GOLD SEAL™ lubricant is a liquid additive specifically formulated for use in industrial drilling applications where environmental constraints preclude the use of hydrocarbon-based additives. BARO-LUBE GOLD SEAL lubricant is designed to reduce friction under extreme pressure (metal-to-metal) and in the borehole (metal-to-formation).

- Applications/Functions**
- Helps reduce drill rod torque and drag
  - Helps lubricate drill rods and casing in close tolerance boreholes
  - Helps reduce heat generated at bit face
  - Helps reduce bit balling and mud rings on rods
  - Helps minimize potential for differential sticking

- Advantages**
- Water soluble lubricant
  - Mixes in fresh or saltwater-based drilling fluids
  - Compatible with most drilling fluid additives
  - Mild odor - acceptable underground
  - Increases lubricating properties of bentonite and polymer based drilling fluid systems
  - Stable at elevated sub-surface temperatures up to 300°F)

- Typical Properties**
- Appearance Amber liquid
  - Specific Gravity 0.94 (7.8 lb/gal)
  - Flash point, PMCC >200°F (93°C)

**Recommended Treatment**

Approximate Amounts of BARO-LUBE GOLD SEAL™ lubricant Added to Water-Based Drilling Fluids		
% by Volume	Quarts/100 Gallons	Liters/m <sup>3</sup>
1.0 – 2.0	4 - 8	10 - 20

*Note:*

- Soaping out of this product could take place in drilling fluids containing high concentrations of divalent cations such as Calcium.
- For maximum efficiency maintain drilling fluid slurry density below 10 pounds per gallon (1.2 g/cm<sup>3</sup>)
- As a friction reducer in problematic zones or deviated holes slug 1 to 2 quarts (1-2 liters) down pipe to reduce torque and drag

---

<b>Packaging</b>	BARO-LUBE GOLD SEAL™ lubricant is packaged in a 5-gallon (19-liter) plastic container.
<b>Availability</b>	BARO-LUBE GOLD SEAL lubricant can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

---

**Baroid Industrial Drilling Products**

**Product Service Line, Halliburton**

3000 N. Sam Houston Pkwy. E.

Houston, TX 77032

<b>Customer Service</b>	(800) 735-6075 Toll Free	(281) 871-4612
<b>Technical Service</b>	(877) 379-7412 Toll Free	(281) 871-4613

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ITEM # 24  
ATTACHMENT

**FRACTION MITIGATION  
CONTINGENCY PLAN  
FOR DIRECTIONAL DRILLING**

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# **FRAC-OUT CONTINGENCY PLAN (FCP)**

## **1.0 Introduction and Purpose**

Directional bore operations have a potential to release drilling fluids into the surface environment through frac-outs (A frac-out is the condition where drilling mud is released through fractured bedrock into the surrounding rock and sand and travels toward the surface.) Because drilling muds consist largely of a bentonite clay-water mixture, they are not classified as toxic or hazardous substances. However, if it is released into water bodies, bentonite has the potential to adversely impact fish and invertebrates.

While drilling fluid seepage associated with a frac-out is most likely to occur near the bore entry and exit points where the drill head is shallow, frac-outs can occur in any location along a directional bore. This Frac-Out Contingency Plan (FCP) establishes operational procedures and responsibilities for the prevention, containment, and clean-up of frac-outs associated with the proposed directional drilling utility project of \_\_\_\_\_.

All personnel and Sub-Contractors responsible for the work must adhere to this plan during the directional drilling process.

The specific objectives of this plan are to:

1. Minimize the potential for a frac-out associated with directional drilling activities;
2. Provide for the timely detection of frac-outs;
3. Protect the environmentally sensitive riverbed and associated riparian vegetation;
4. Ensure an organized, timely, and "minimum-impact" response in the event of a frac-out and release of drilling bentonite; and
5. Ensure that all appropriate notifications are made immediately to the customer, management and safety personnel.

## **2.0 Description of Work:**

The proposed project consists of: *(Explain work task in detail to crew members.)*

Drilling operations will be halted by the drill rig operators immediately upon detection of a drop in drilling pressure or other evidence of a frac-out. The clean-up of all spills shall begin immediately. Management & safety department shall be notified immediately of any spills and shall be consulted regarding clean-up procedures. A spill kit shall be on-site and used if a frac-out occurs. A vacuum truck and containment materials, such as straw bales, shall also be on-site prior to and during all operations. The Site Supervisor will be immediately notified. In the event of a frac-out, the on-site foreman/supervisor will conduct an evaluation of the situation and direct recommended mitigation actions, based on the following guidelines:

- a. If the frac-out is minor, easily contained, has not reached the surface and is not threatening sensitive resources, drilling operations may resume after use of a leak stopping compound or redirection of the bore;

- b. If the frac-out has reached the surface, any material contaminated with Bentonite shall be removed by hand to a depth of 2-feet, contained and properly disposed of, as required by law. The drilling contractor shall be responsible for ensuring that the bentonite is either properly disposed of at an approved disposal facility or properly recycled in an approved manner. The Site Supervisor shall notify and take any necessary follow-up response actions in coordination with agency representatives. The Site Supervisor will coordinate the mobilization of equipment stored at off-site locations (e.g., vacuum trucks) on an as needed basis;

### **3.0 Site Supervisor/Foremen Responsibilities:**

The Site Supervisor/Foremen has overall responsibility for implementing this FCP. The Site Supervisor/Foremen will ensure that all employees are trained prior to all drilling. The Site Supervisor/Foremen shall be notified immediately when a frac-out is detected. The Site Supervisor/Foremen will be responsible for ensuring that the safety department is aware of the frac-out, coordinating personnel, response, cleanup, regulatory agency notification and coordination to ensure proper clean-up, disposal of recovered material and timely reporting of the incident. The Site Supervisor/Foremen shall ensure all waste materials are properly containerized, labeled, and removed from the site to an approved disposal facility by personnel experienced in the removal, transport and disposal of drilling mud.

The Site Supervisor/Foremen shall be familiar with all aspects of the drilling activity, the contents of this Frac-out Contingency Plan and the conditions of approval under which the activity is permitted to take place. The Site Supervisor/Foremen shall have the authority to stop work and commit the resources (personnel and equipment) necessary to implement this plan. The Site Supervisor/Foremen shall assure that a copy of this plan is available (onsite) and accessible to all construction personnel. The Site Supervisor/Foremen shall ensure that all workers are properly trained and familiar with the necessary procedures for response to a frac-out, prior to commencement of drilling operations.

#### **4.0 Equipment:**

The Site Supervisor shall ensure that:

- All equipment and vehicles are to be checked and maintained daily to prevent leaks of hazardous materials;
- Spill kits and spill containment materials are available on-site at all times and that the equipment is in good working order;
- Equipment required to contain and clean up a frac-out release will either be available at the work site or readily available at an offsite location within 15-minutes of the bore site; and
- If equipment is required to be operated near a riverbed, absorbent pads and plastic sheeting for placement beneath motorized equipment shall be used to protect the riverbed from engine fluids;

#### **5.0 Training**

Prior to the start of construction, the Site Supervisor/Foremen, shall ensure that the crew members receive training in the following:

- The provisions of the Frac-out Contingency Plan, equipment maintenance and site specific permit and monitoring requirements;
- Inspection procedures for release prevention and containment equipment and materials;
- Contractor/crew obligation to immediately stop the drilling operation upon first evidence of the occurrence of a frac-out and to immediately report any frac-out releases;
- Contractor/crew member responsibilities in the event of a release;
- Operation of release prevention and control equipment and the location of release control materials, as necessary and appropriate; and
- Protocols for communication with agency representatives who might be on-site during the clean-up effort.

#### **6.0 Drilling Procedures**

The following procedures shall be followed each day, prior to the start of work. The Frac-out Contingency Plan shall be available on-site during all construction. The Site Supervisor/Foremen shall be on-site at any time that drilling is occurring or is planned to occur. The Site Supervisor/Foremen shall ensure that a Job Briefing meeting is held at the start of each day of drilling to review the appropriate procedures to be followed in case of a frac-out. Questions shall be answered and clarification given on any point over which the drilling crew or other project staff has concerns.

Drilling pressures shall be closely monitored so they do not exceed those needed to penetrate the formation. Pressure levels shall be monitored randomly by the operator. Pressure levels shall be set at a minimum level to prevent frac-outs. During the pilot bore, maintain the drilled annulus. Cutters and reamers will be pulled back into previously-drilled sections after each new joint of pipe is added.

Exit and entry pits shall be enclosed by silt fences and straw. A spill kit shall be on-site and used if a frac-out occurs. A vacuum truck shall be readily available on-site prior to and during all drilling operations. Containment materials (Straw, silt fencing, sand bags, frac-out spill kits, etc.) shall be staged on-site at location where they are readily available and easily mobilized for immediate use in the event of an accidental release of drilling mud (frac-out). If necessary, barriers (straw bales or sedimentation fences) between the bore site and the edge of the water source, shall be constructed, prior to drilling, to prevent released bentonite material from reaching the water.

Once the drill rig is in place, and drilling begins, the drill operator shall stop work whenever the pressure in the drill rig drops, or there is a lack of returns in the entrance pit. At this time the Site Supervisor/Foremen shall be informed of the potential frac-out. The Site Supervisor/Foremen and the drill rig operator(s) shall work to coordinate the likely location of the frac-out. The location of the frac-out shall be recorded and notes made on the location and measures taken to address the concern. The following subsections shall be adhered to when addressing a frac-out situation.

Water containing mud, silt, bentonite, or other pollutants from equipment washing or other activities, shall not be allowed to enter a lake, flowing stream or any other water source. The Bentonite used in the drilling process shall be either disposed of at an approved disposal facility or recycled in an approved manner. Other construction materials and wastes shall be recycled, or disposed of, as appropriate.

#### **6.1 Vac-Truck:**

A vacuum truck shall be staged at a location from which it can be mobilized and relocated so that any place along the drill shot, can be reached by the apparatus, within 10 minutes of a frac-out.

#### **6.2 Field Response to Frac-out Occurrence:**

The response of the field crew to a frac-out release shall be immediate and in accordance with procedures identified in this Plan. All appropriate emergency actions that do not pose additional threats to sensitive resources will be taken, as follows:

- a. Directional boring will stop immediately;
- b. The bore stem will be pulled back to relieve pressure on frac-out;
- c. The Site Supervisor/Foremen will be notified to ensure that management and the safety department is notified, adequate response actions are taken and notifications made;
- d. The Site Supervisor/Foremen shall evaluate the situation and recommend the type and level of response warranted, including the level of notification required;
- e. If the frac-out is minor, easily contained, has not reached the surface and is not threatening sensitive resources, a leak stopping compound shall be used to block the frac-out. If the use of leak stopping compound is not fully successful, the bore stem shall be redirected to a new location along the desired drill path where a frac-out has not occurred;
- f. If the frac-out has reached the surface, any material contaminated with Bentonite shall be removed by hand, to a depth of 2-feet, contained and properly disposed of, as required by law. A dike or berm may be constructed around the frac-out to entrap released drilling fluid, if necessary. Clean sand shall be placed and the area returned to pre-project contours; and
- g. If a frac-out occurs, reaches the surface and becomes widespread, the Site Supervisor/Foremen shall authorize a readily accessible vacuum truck and bulldozer stored off-site to be mobilized. The vacuum truck may be either positioned at either end of the line of the drill so that the frac-out can be reached by crews on foot, or may be pulled by a bulldozer, so that contaminated soils can be vacuumed up.

### **6.3 Response Close-out Procedures:**

When the release has been contained and cleaned up, response closeout activities will be conducted at the direction of the Site Supervisor/Foremen and shall include the following:

- a. The recovered drilling fluid will either be recycled or hauled to an approved facility for disposal. No recovered drilling fluids will be discharged into streams, storm drains or any other water source;
- b. All frac-out excavation and clean-up sites will be returned to pre-project contours using clean fill, as necessary; and
- c. All containment measures (fiber rolls, straw bale, etc.) will be removed, unless otherwise specified by the Site Supervisor/Foremen.

#### **6.4 Construction Re-start:**

For small releases not requiring external notification, drilling may continue, if 100 percent containment is achieved through the use of a leak stopping compound or redirection of the bore and the clean-up crew remains at the frac-out location throughout the construction period.

For releases requiring external notification and/or other agencies, construction activities will not restart without prior approval from the safety department.

#### **6.5 Bore Abandonment:**

Abandonment of the bore will only be required when all efforts to control the frac-out within the existing directional bore have failed.

#### **7.0 Notification:**

In the event of a Frac-out that reaches a water source, the Site Supervisor/Foremen will notify safety department so they can notify the appropriate resource agencies. All agency notifications will occur within 24 hours and proper documentation will be accomplished in a timely and complete manner. The following information will be provided:

1. Name and telephone number of person reporting;
2. Location of the release;
3. Date and time of release;
4. Type and quantity, estimated size of release;
5. How the release occurred;
6. The type of activity that was occurring around the area of the frac-out;
7. Description of any sensitive areas, and their location in relation to the frac-out;
8. Description of the methods used to clean up or secure the site; and
9. Listing of the current permits obtained for the project.

#### **7.1 Communicating with Regulatory Agency Personnel:**

All employees and subcontractors will adhere to the following protocols when permitting Regulatory Agency Personnel arrive on site. Regulatory Agency Personnel will be required to comply with appropriate safety rules. Only the Site Supervisor/Foremen and the safety department are to coordinate communication with Regulatory Agency Personnel.

## **7.2 Documentation:**

The Site Supervisor/Foremen shall record the frac-out event in his or her daily log. The log will include the following: Details on the release event, including an estimate of the amount of bentonite released, the location and time of release, the size of the area impacted, and the success of the clean-up action. The log report shall also include the: Name and telephone number of person reporting; Date, How the release occurred; The type of activity that was occurring around the area of the free-out; Description of any sensitive areas, and their location in relation to the frac-out; Description of the methods used to clean up or secure the site; and a listing of the current permits obtained for the project.

## **8.0 Project Completion and Clean-up:**

- a. All materials and any rubbish-construction debris shall be removed from the construction zone at the end of each workday;
- b. Sump pits at bore entry and exits will be filled and returned to natural grade; and
- c. All protective measures (fiber rolls, straw bale, silt fence, etc.) will be removed unless otherwise specified by the Site Supervisor/Foremen.



# Blue Diamond Conduit Sizes and Dimensions

*Based on Controlled Outside Diameter*

ASTM F 2160  
SDR Pipe Data

SDR 9

SDR 11

SDR 13.5

Nominal Duct Size	Nominal OD	Nominal ID	Min Wall	Weight lbs/ft	Nominal ID	Min Wall	Weight lbs/ft	Nominal ID	Min Wall	Weight lbs/ft
1/2"	0.840	0.633	0.093	0.099	0.667	0.076	0.085	0.696	0.062	0.072
3/4"	1.050	0.797	0.117	0.152	0.839	0.095	0.130	0.874	0.078	0.110
1"	1.315	1.003	0.146	0.235	1.051	0.120	0.200	1.100	0.097	0.169
1 1/4"	1.660	1.270	0.184	0.372	1.338	0.151	0.314	1.394	0.123	0.264
1 1/2"	1.900	1.452	0.211	0.488	1.534	0.173	0.409	1.599	0.141	0.343
2"	2.375	1.816	0.264	0.762	1.917	0.216	0.639	2.002	0.176	0.531
2 1/2"	2.875	2.198	0.319	1.117	2.321	0.261	0.936	2.424	0.213	0.778
3"	3.500	2.676	0.389	1.655	2.825	0.318	1.387	2.950	0.259	1.153
4"	4.500	3.440	0.500	2.737	3.633	0.409	2.293	3.794	0.333	1.906
5"	5.562	4.252	0.618	4.182	4.490	0.506	3.505	4.689	0.412	2.912
6"	6.625	5.064	0.824	5.931	5.348	0.602	4.971	5.585	0.491	4.130

ASTM F 2160  
SDR Pipe Data

SDR 15.5

SDR 17

Nominal Duct Size	Nominal OD	Nominal ID	Min Wall	Weight lbs/ft	Nominal ID	Min Wall	Weight lbs/ft
1/2"	0.840	-	-	-	-	-	-
3/4"	1.050	0.895	0.068	0.098	0.906	0.062	0.092
1"	1.315	1.147	0.084	0.151	1.140	0.077	0.139
1 1/4"	1.660	1.426	0.107	0.235	1.445	0.098	0.218
1 1/2"	1.900	1.635	0.123	0.305	1.656	0.112	0.282
2"	2.375	2.049	0.153	0.469	2.076	0.140	0.434
2 1/2"	2.875	2.482	0.185	0.685	2.516	0.169	0.629
3"	3.500	3.021	0.226	1.015	3.064	0.206	0.932
4"	4.500	3.885	0.290	1.678	3.939	0.265	1.540
5"	5.562	4.801	0.359	2.563	4.868	0.327	2.352
6"	6.625	5.719	0.427	3.637	5.799	0.390	3.337

ASTM F 2160  
SDR Pipe Data

SCH 40

SCH 80

Nominal Duct Size	Nominal OD	Nominal ID	Min Wall	Weight lbs/ft	Nominal ID	Min Wall	Weight lbs/ft
1/2"	0.840	-	-	-	-	-	-
3/4"	1.050	0.804	0.113	0.148	0.722	0.154	0.189
1"	1.315	1.029	0.133	0.218	0.936	0.179	0.278
1 1/4"	1.660	1.360	0.140	0.295	1.255	0.191	0.384
1 1/2"	1.900	1.590	0.145	0.352	1.476	0.200	0.465
2"	2.375	2.047	0.154	0.472	1.913	0.218	0.644
2 1/2"	2.875	2.445	0.203	0.744	2.290	0.276	0.983
3"	3.500	3.042	0.216	0.974	2.864	0.300	1.316
4"	4.500	3.896	0.282	1.387	3.786	0.337	1.924
5"	5.562	5.009	0.258	1.904	4.768	0.375	2.671
6"	6.625	6.031	0.280	2.444	5.709	0.432	3.674

Please note that some sizes and dimensions may require additional equipment or extended lead times and may be required to be manufactured in straight lengths. Please inquire for details.

# Blue Diamond UL Listed Conduit Sizes and Dimensions

*Based on Controlled Outside Diameter*

UL 651B		SCH 40			SCH 80			SDR 13.5		
Nominal Duct Size	Nominal OD	Nominal ID	Min Wall	Weight lbs/ft	Nominal ID	Min Wall	Weight lbs/ft	Nominal ID	Min Wall	Weight lbs/ft
3/4"	1.050	0.804	0.113	0.148	0.722	0.154	0.189	-	-	-
1"	1.315	1.029	0.133	0.218	0.936	0.179	0.278	-	-	-
1 1/4"	1.660	1.360	0.140	0.295	1.255	0.191	0.384	-	-	-
1 1/2"	1.900	1.590	0.145	0.352	1.476	0.200	0.465	1.599	0.141	0.343
2"	2.375	2.047	0.154	0.472	1.913	0.218	0.644	2.002	0.176	0.531
2 1/2"	2.875	2.445	0.203	0.744	2.290	0.276	0.983	-	-	-
3"	3.500	-	-	-	2.864	0.300	1.316	2.950	0.259	1.153
4"	4.500	3.998	0.237	1.387	3.786	0.337	1.924	3.794	0.333	1.906
5"	5.562	5.009	0.258	1.904	4.768	0.375	2.671	4.689	0.412	2.912
6"	6.625	6.031	0.280	2.444	5.709	0.432	3.674	5.585	0.491	4.130

# Blue Diamond Conduit Sizes and Dimensions

*Based on Controlled Inside Diameter*

Follows Dimensions  
of ASTM D 2239

		SIDR 9			SIDR 11.5			SIDR 15		
Nominal Duct Size	Nominal ID	Nominal OD	Min Wall	Weight lbs/ft	Nominal OD	Min Wall	Weight lbs/ft	Nominal OD	Min Wall	Weight lbs/ft
1"	1.049	1.302	0.117	0.194	1.251	0.091	0.151	1.209	0.070	0.117
1 1/4"	1.380	1.707	0.153	0.328	1.640	0.120	0.255	1.584	0.092	0.197
1 1/2"	1.610	1.989	0.179	0.444	1.910	0.140	0.343	1.845	0.107	0.264
2"	2.067	2.554	0.230	0.732	2.448	0.180	0.559	2.363	0.138	0.426
2 1/2"	2.469	-	-	-	2.924	0.215	0.798	2.818	0.165	0.600
3"	3.068	-	-	-	3.634	0.267	1.232	3.502	0.205	0.926
4"	4.026	-	-	-	4.768	0.350	2.122	4.595	0.268	1.595
5"	5.046	-	-	-	5.976	0.439	3.334	5.759	0.336	2.506

Follows Dimensions  
of ASTM D 2239

		True SIDR 9			True SIDR 11.5		
Nominal Duct Size	Nominal ID	Nominal OD	Min Wall	Weight lbs/ft	Nominal OD	Min Wall	Weight lbs/ft
1 1/4"	1.250	1.548	0.139	0.271	1.487	0.109	0.211
1 1/2"	1.500	1.853	0.167	0.385	1.781	0.130	0.300
2"	2.000	2.471	0.222	0.685	2.369	0.174	0.524
4"	4.000	4.942	0.444	2.740	4.737	0.348	2.095

Please note that some sizes and dimensions may require additional equipment or extended lead times and may be required to be manufactured in straight lengths. Please inquire for details.