

APPENDIX B

PROJECT SPECIFIC ENVIRONMENTAL CONSTRUCTION PLANS

Bayou Bridge Pipeline, LLC

BAYOU BRIDGE PIPELINE PROJECT

SPILL PREVENTION AND RESPONSE (SPAR) PLAN

October 2017

1.0 GENERAL DESCRIPTION OF SPILL PREVENTION AND RESPONSE PLAN

Bayou Bridge Pipeline, LLC (BBP) has prepared a Spill Prevention and Response (SPAR) Plan which is designed to minimize hazards to human health and/or the environment from any unplanned sudden or non sudden releases of oils, toxic, hazardous, or other polluting materials to the air, soil, surface water or groundwater. BBP through its Contractors and Inspectors shall be responsible for the administration and implementation of this plan. This plan is intended to provide minimum requirements for spill prevention and response during construction activities. The Contractor may develop their own spill prevention and response plan or use an existing plan provided that the plan used contains, at a minimum, all of the provisions of BBP's SPAR Plan.

This plan identifies the:

- Measures taken for spill preparedness and prevention;
- Emergency response procedures describing the actions that BBP and Contractor personnel will take in response to leaks, spills, or discharges of oil and hazardous substances/materials;
- Designated emergency coordinator(s) and his/her responsibilities;
- Spill incident reporting procedures; and
- Contact numbers for the local police and fire departments, hospitals, and state and local emergency planning committees.

Prior to the start of construction in an area, the Contractor shall designate storage, refueling, loading, and unloading locations which minimize the environmental and safety impacts associated with releases of fuel, lubricants, or hazardous substances. These areas will be designated using the following guidelines.

- Refueling shall not occur within 100 feet of a waterbody or in an upland area at least 100 feet from a wetland boundary without BBP Environmental Inspector coordination and approval.
- Hazardous materials, including chemicals, fuels, and lubricating oils, shall not be stored within 100 feet of a wetland, waterbody, or designated municipal watershed area without BBP Environmental Inspector coordination and approval.
- Refueling and storage of hazardous materials, including chemicals, fuels, and lubricating oils is prohibited within 200 feet of private wells and 500 feet of community and municipal wells.
- No potentially hazardous materials, other than essential equipment fuels (gasoline, diesel, etc.) or standard lubricants (engine oils, grease, etc.) shall be transported into the right-of-way or construction area without BBP Environmental Inspector coordination and approval.

<p>CONTRACTOR will be required to comply with all applicable requirements of the 40 CFR 112, Oil Pollution Prevention, for any facility set up for the storage of fuel, oil, or other hydrocarbons, or refueling of vehicles and equipment, if the facility triggers compliance with the rule. This would include the development and implementation by CONTRACTOR of a Spill Prevention, Control, and Countermeasures (SPCC) Plan if necessary.</p>

The following table provides a list of the fuels, lubricants, and coolants that could be present on the pipeline construction right-of-way and identifies the typical total volumes.

Typical Fuels, Lubricants, and Coolant	
Fluids	Typical Amounts
Diesel	6,000 -12,000 Gallons
Gasoline	5,000 - 10,000 Gallons
Engine Oil	< 100 Gallons
Transmission/ Drive Train Oil	< 50 Gallons
Hydraulic Oil	< 100 Gallons
Gear Oil	< 50 Gallons
Lubricating Grease	20-30 cases of 24 cans per case
Ethylene Glycol	<100 Gallons
Propylene Glycol	<100 Gallons

2.0 SPILL AND LEAK PREVENTION AND PREPAREDNESS

2.1. PREVENTION AND PREPAREDNESS

The Contractor will take the following precautions to prevent a spill from occurring and to be prepared in the event that a spill does occur.

2.1.1. Containers

- All containers shall be stored on pallets and surrounded with temporary containment. Small cans of gasoline, diesel, solvents, etc., should be stored within the temporary containment when not in use.
- No incompatible materials shall be stored in the same containment area.
- Containment areas shall be capable of containing 110% of the volume of the largest container in the storage area plus sufficient freeboard for rainfall.
- All container storage areas shall be inspected daily for leaks and deterioration.
- Leaking and/or deteriorated containers shall be replaced as soon as the condition is first detected.
- No storage area shall be unattended for periods longer than (1) day.

2.1.2. Tanks

- The contractor shall operate only those tanks for fuel and material storage which meet the approval of BBP. Single wall tanks shall be provided with temporary containment as described in Section 2.1.1 for containers.
- Self-supporting tanks shall be constructed of carbon steel or other materials compatible with the contents of each tank.
- All tanks and storage areas shall be inspected daily for leaks and deterioration.
- Vehicle mounted tanks shall be equipped with flame/spark arrestors on all vents to ensure that self ignition does not occur.

- Tanks will not be used to store incompatible materials in sequence unless first thoroughly decontaminated.

2.1.3. Loading/Unloading Areas

- Transferring of liquids and refueling shall only occur in pre-designated locations at least 100 feet from all waterbodies and wetlands, 200 feet from any water well, and 500 feet from municipal or community water supply wells unless prior approval is obtained from the BBP Environmental Inspector.
- All loading/unloading areas will be inspected for spills prior to and immediately after each use and closely monitored during use to prevent leaks and spills, and ensure immediate response in the event of a spill.
- All hose connections shall be inspected for leaks. If leaks should occur, the operation shall cease until the leak is repaired or a containment pan is placed under the leaking connection.

2.1.4. Spill Response Kits

- Any service vehicle used to transport lubricants and fuel must be equipped with an oil spill response kit adequately stocked to respond to a minor oil/fuel spill event.
- Chemical spill response kits, adequately stocked to respond to a minor chemical spill event, shall be available in areas where appropriate.
- Additionally, spill response kits shall be available on the right-of-way and on or near operating equipment as deemed appropriate by the BBP Environmental Inspector.
- Equipment such as hydraulic track hoes and hydraulic pumps that could fail and cause a reportable spill must be equipped with an oil spill response kit adequately stocked to respond to a minor oil/fuel spill event.

2.2. EMPLOYEE TRAINING

All personnel involved in the construction of the proposed facilities will be trained on the contents of the SPAR Plan. Training briefings will be conducted by the Contractor Superintendent or his designee and the BBP Environmental Inspector on the job site.

2.3. SPILL RESPONSE EQUIPMENT

The construction project will have adequate manpower and equipment necessary to divert any spill from reaching waterbodies and wetland areas. Emergency equipment may include, but is not limited to, shovels, backhoes, dozers, front-end loaders, oil absorbent booms, pillows, socks and/or mats and chemical absorbent pulp, pillows, socks and/or mats.

3.0 INITIAL SPILL RESPONSE PROCEDURES

This section provides a description of spill response procedures to be performed to address spills that occur during this construction project.

3.1. COMPANY AND CONTRACTOR RESPONSIBILITIES

The Contractor and BBP on-site personnel have responsibilities for spill prevention and response. **In addition to the oversight of initial spill response activities, BBP's Environmental Inspector and Environmental Project Manager will determine if state and/or federal notifications are required and make notification accordingly.**

The Contractor will have a designated Environmental Coordinator for the site. The Contractor's Environmental Coordinator will be responsible for the Contractor's initial spill response activities. The responsibilities of the Contractor and BBP will be as follows:

3.1.1. Contractor Responsibilities

- The Contractor will be responsible for taking immediate action to safely control and contain any spills or releases of oil, petroleum products, and hazardous substances/materials.
- All spills or releases (including any sheen created on water or releases to the atmosphere) must be reported immediately to the BBP Environmental Inspector. The Contractor shall supply necessary manpower and equipment to control, contain, and clean up all spills and releases resulting from their operations.

3.1.2. BBP Environmental Inspector Responsibilities

- BBP's Environmental Inspector or his designee will be responsible for making appropriate agency notifications of spills and releases.
- BBP will be responsible for the oversight of the initial spill response activities.
- BBP will provide supporting personnel and equipment to address releases as required.
- In the event of a spill the Environmental Inspector shall obtain as much information as possible regarding the cause of the event, the type and amount of material spilled or released, and corrective measures or response activities being taken.
- Consult the BBP Environmental Project Manager immediately and determine if the spill or release is a reportable event. The Environmental Inspector will also notify the BBP Field Construction Office for releases of:
 - One pound or more of a solid material;
 - Five gallons or more of a liquid material;
 - Any spill to water, including any sheen on water.
- Obtain a copy of the Contractor's written spill report as soon as it is available and forward a copy to the Environmental Project Manager.

3.1.3. BBP Environmental Project Manager Responsibilities

- Upon receiving spill information from the Environmental Inspector, determine if the release requires reporting to any federal, state, or local regulatory agencies.

- If reporting is required, direct the Environmental Inspector to notify the appropriate regulatory agencies. This includes both verbal and any follow-up written reports.
- Contact outside remediation services if necessary, in coordination with the BBP Environmental Inspector, to assist with incidents which require additional resources.

3.2. UNPLANNED AND PLANNED CRUDE OIL RELEASES

3.2.1. Unplanned Crude Oil Releases

Unplanned crude oil releases are reportable events in some of the states that BBP operates in. In the event that an unplanned release of crude oil occurs during activities related to the project the Contractor shall immediately notify the BBP Environmental Inspector of the event.

3.2.2. Planned Crude Oil Releases

Some of the states that BBP operates in require prior notification and/or approval for planned releases of crude oil to the atmosphere such as blowdowns. In the event that a planned release of crude oil is scheduled to occur during activities related to the project the Contractor shall contact the BBP Environmental Inspector a minimum of two weeks prior to the event and confirm that notifications have been made and/or approvals obtained if required.

3.3. SPILL CLEAN-UP AND WASTE DISPOSAL

Spill clean-up and subsequent waste disposal of contaminated media will be the responsibility of the Contractor subject to the approval of the BBP Environmental Project Manager.

4.0 KEY EMERGENCY CONTACTS

The key personnel who will be contacted in the event of an emergency or spill incident include the following: **(Information to be supplied prior to construction.)**

I. BBP Emergency Contacts

1. BBP Emergency Coordinator
2. Field Construction Office
3. Environmental Project Manager: C. Gus Borkland, O: 610-859-5419; C: 215-620-5934
4. Area Office (in case of pipeline liquid spills)

II. Contractor Emergency Contact

1. Contractor Emergency Coordinator

III. Federal Authorities

1. EPA – National Response Center: 1-800-424-8802

IV. State Authorities

1. Louisiana Oil Spill Coordinator's Office: 877-925-6595

V. Local Authorities

Louisiana		
Parish	Department	Phone
Calcasieu	Parish Police (Calcasieu Parish Sheriff)	337-431-1331
	Local Fire Department	337-439-5501
	Hospital (Lake Area Medical Center)	337-474-6370
	Ambulance	9-1-1
	Parish Office Of Emergency Management	337-721-3800
Jefferson Davis	Parish Police (Jefferson Davis Sheriff)	337-821-2102
	Local Fire Department	337-821-5507
	Hospital (Jennings American Legion Hospital)	337-616-7000
	Ambulance	9-1-1
	Parish Office Of Emergency Management	337-824-3850
Acadia	Parish Police (Acadia Parish Sheriff)	337-788-8700
	Local Fire Department	337-778-4106
	Hospital (Acadia General Hospital)	337-783-3222
	Ambulance	9-1-1
	Parish Office Of Emergency Management	337-783-4357
Vermilion	Parish Police (Vermilion Parish Sheriff)	337-893-0871
	Local Fire Department	337-898-4258
	Hospital (Abbeville General Hospital)	337-893-5466
	Ambulance	9-1-1
	Parish Office Of Emergency Management	337-898-4308
Lafayette	Parish Police (Lafayette Parish Sheriff)	337-232-9211
	Local Fire Department	337-291-8700
	Hospital (Lafayette General Medical Hospital)	337-289-7991
	Ambulance	9-1-1
	Parish Office Of Emergency Management	337-291-5075
New Iberia	Parish Police (New Iberia Parish Sheriff)	337-369-3711

Louisiana		
Parish	Department	Phone
	Local Fire Department	337-369-2370
	Hospital (Iberia Medical Center)	337-364-0441
	Ambulance	9-1-1
	Parish Office Of Emergency Management	337-369-4427
St. Martin	Parish Police (St. Martin Parish Sheriff)	337-332-0011
	Local Fire Department	337-394-6416
	Hospital (St. Martin Hospital)	337-332-2178
	Ambulance	9-1-1
	Parish Office Of Emergency Management	337-394-2812
Iberville	Parish Police (Iberville Parish Sheriff)	225-687-5100
	Local Fire Department	225-687-7335
	Hospital (Ochsner Medical Center-Iberville Complex)	225-761-5200
	Ambulance	9-1-1
	Parish Office Of Emergency Management	225-687-5140
Ascension	Parish Police (Ascension Parish Sheriff)	225-621-8300
	Local Fire Department	225-647-7342
	Hospital (Prevost Memorial Hospital)	225-473-7931
	Ambulance	9-1-1
	Parish Office Of Emergency Management	225-621-8360
Assumption	Parish Police (Assumption Parish Sheriff)	985-369-7281
	Local Fire Department	985-369-2558
	Hospital (Assumption Community Hospital)	985-369-3600
	Ambulance	9-1-1

Louisiana		
Parish	Department	Phone
	Parish Office Of Emergency Management	985-369-7386
St. James	Parish Police (St. James Parish Sheriff)	225-562-2200
	Local Fire Department	225-869-8067
	Hospital (St. James Parish Hospital)	225-869-5512
	Ambulance	9-1-1
	Parish Office Of Emergency Management	225-562-2364

Stormwater Pollution Prevention Plan

Bayou Bridge Pipeline Project

January 2017

Table of Contents

1.0	INTRODUCTION	1
1.1	RESPONSIBILITY FOR IMPLEMENTATION	1
2.0	SITE DESCRIPTION	1
2.1	PROJECT NAME, LOCATION, AND PURPOSE	1
2.2	NATURE OF THE CONSTRUCTION ACTIVITY	2
2.3	SEQUENCE OF MAJOR SOIL-DISTURBING EVENTS	2
3.0	CONTROLS	3
3.1	EROSION AND SEDIMENT CONTROLS.....	4
3.1.1	Short- and Long-Term Goals and Criteria (as applicable).....	4
3.1.2	Temporary Erosion Control Measures	4
3.1.3	Stabilization Practices	7
3.1.3.1	Upland Areas.....	7
3.1.3.2	Revegetation and Seeding	8
3.1.3.3	Wetland Restoration.....	9
3.1.3.4	Riparian Areas.....	10
3.1.4	Other Surface Applications	10
3.2	STORMWATER MANAGEMENT	11
3.3	OTHER CONTROLS	12
3.3.1	Waste Materials.....	12
3.3.2	Offsite Vehicle Tracking.....	12
4.0	MAINTENANCE	12
5.0	INSPECTIONS.....	13
6.0	PLAN MODIFICATION.....	14
7.0	REQUIRED REPORTS, DOCUMENTATION, AND RECORDKEEPING	14
7.1	RECORDS RETENTION	14
7.2	INSPECTION REPORTS.....	15
7.3	LOG OF CONSTRUCTION AND BMP INSTALLATION AND MAINTENANCE ACTIVITIES.....	15
8.0	SWPPP CERTIFICATION	16
8.1	BBP'S CERTIFICATION.....	16
8.2	CONTRACTOR'S/SUBCONTRACTOR'S CERTIFICATION	16

Appendices

Appendix A	Best Management Practices Figures
Appendix B	Spill Prevention and Response Plan
Appendix C	Inspection Forms and Instructions

List of Acronyms

BBP	Bayou Bridge Pipeline, LLC
BMPs	Best Management Practices Figures
CEI	Chief Environmental Inspector
CM	Construction Manager
EI	Environmental Inspector
EPA	Environmental Protection Agency
MP	Milepost
NPDES	National Pollutant Discharge Elimination System
Project	Bayou Bridge Pipeline Project
ROW	Right-of-way
SPAR	Spill Prevention and Response Plan
SWPPP	Stormwater Pollution Prevention Plan

1.0 INTRODUCTION

Bayou Bridge Pipeline, LLC (BBP) will implement this Stormwater Pollution Prevention Plan (SWPPP) during construction of the Bayou Bridge Pipeline Project (Project). The primary purpose of this SWPPP is to minimize the impacts of stormwater runoff during Project construction activities through the implementation of Best Management Practices (BMPs).

1.1 RESPONSIBILITY FOR IMPLEMENTATION

The Construction Manager is responsible for implementation of the SWPPP. As stated in the construction contract or as otherwise agreed, the Contractor may be responsible for all or part of the implementation of the SWPPP. Where Environmental Inspectors (EI) or Chief Inspectors (CI) are utilized, they will fulfill the responsibilities as described herein. If neither an EI nor CI is utilized for the Project, those responsibilities will be assumed by the Construction Manager (CM) or a designee.

2.0 SITE DESCRIPTION

2.1 PROJECT NAME, LOCATION, AND PURPOSE

Project Name: Bayou Bridge Pipeline Project

Project Purpose: BBP's primary objective for the proposed Project is to allow for transport of approximately 280,000 barrels per day of crude oil from the Clifton Ridge Marine Terminal in Lake Charles, Louisiana to various crude oil terminals located near St. James, Louisiana. Overall, the Project's purpose is to provide an efficient, safe, and reliable transportation solution to move crude oil within the United States markets, which meets the need to improve United States energy independence and provide a more reliable supply of crude oil to United States refineries for processing to meet domestic needs for fuels and other petroleum derivative products.

Project Location: The proposed Project is located in Calcasieu, Jefferson Davis, Acadia, Vermilion, Lafayette, Iberia, St. Martin, Iberville, Ascension, Assumption, and St. James Parishes, Louisiana. BBP proposes to construct, own, and operate approximately 162.68 miles of new 24-inch-diameter crude oil pipeline that will commence south of Lake Charles in Calcasieu Parish, Louisiana and will terminate near St. James in St. James Parish, Louisiana. The 162.68 miles of pipe will consist of a 161.56-mile mainline and a 1.12-mile lateral. The proposed Project also involves the construction of two pump stations and other ancillary facilities along the proposed pipeline. The pump stations will be located near milepost (MP) 41.20 and MP 99.00 in Jefferson Davis and St. Martin parishes, respectively.

2.2 NATURE OF THE CONSTRUCTION ACTIVITY

BBP proposes to install the new pipeline within a variable-width construction right-of-way (ROW). Actual workspace width will depend on site engineering and available workspace constraints. In general, the pipeline will be constructed using an approximate 100-foot-wide construction ROW, which includes a 50-foot-wide permanent easement and a 50-foot-wide temporary easement. The temporary easement will be allowed to revert to its original land use following construction.

2.3 SEQUENCE OF MAJOR SOIL-DISTURBING EVENTS

To minimize impacts, construction will be expedited as practical to reduce the time soils are exposed. The following represents a typical sequence of major soil-disturbing events during the Project.

- Installation of stabilized construction entrances and surface water (including wetlands) protection BMPs.
- Wetland and waterbody boundaries and buffers will be marked and maintained until ground disturbing activities are completed. A 15-foot buffer will be maintained where practicable, except in non-flowing streams and during the period of trenching, pipe laying, and backfilling within flowing streams.
- Clearing of the Project area as necessary. This may include clearing of brush and trees to create ROW needed for temporary workspace, soil storage, construction activities, and areas needed for access to particular construction sites within the Project area. Raw timber and slash to support equipment crossing of wetlands will not be utilized.
- Installation of additional BMPs for erosion and stormwater management, as needed; including temporary bridges and mats where necessary to prevent heavily silt-laden trench water from reaching any wetland or waterbody directly or indirectly.
- Pipe stringing, bending, welding, and testing.
- Excavation of ditch (trackhoes or similar equipment will be used to excavate the ditch to the required depth).
- Installation of pipe in ditch.
- Tie-ins of the sections of pipeline which will be welded together in the ditch.
- Backfilling the ditch line (excavated soil will be used to cover the pipe).

- Hydrostatic testing of the pipeline as necessary.
- Removal of temporary erosion/sediment controls when other construction activity is completed, temporary controls are replaced by permanent controls and/or final stabilization is achieved.

3.0 CONTROLS

This section describes controls used to prevent or control stormwater pollution. BBP's BMPs are based on the current best accepted practices endorsed by the American Gas Association, Gas Research Institute, Association of Pipeline Contractors, Environmental Protection Agency (EPA), and U.S. Army Corps of Engineers (USACE). **Appendix A** contains diagrams showing typical installation of BMPs.

The Project's EIs are responsible for determining the schedule and placement of BMPs. This plan will be updated by the Contractor, EI, and/or CI to identify the location and schedule of planned or installed controls as the need for these controls is determined.

When used from this point forward in this Plan, "EI" will refer to the responsible person, whether it is the EI, CI, Health, Safety and Environmental Coordinator, or Project Manager or other responsible person.

The following represents a typical sequence of major soil-disturbing events during the Project and the control measures that will be implemented.

- Clearing of the Project area as necessary. This may include clearing of brush and trees in the ROW, in additional temporary workspace areas adjacent to the ROW needed for soil storage, and/or in areas needed for access to particular construction sites within the Project area. The Project's EIs will implement such measures as temporary slope breakers, silt fencing, and hay/straw bales prior to any soil-disturbing activities, and will install additional BMPs for erosion and stormwater management, as needed based on existing site conditions.
- Excavation of ditch (trackhoes or similar equipment will be used to excavate the ditch to the required depth). The Project's EIs will implement such measures as temporary slope breakers, silt fencing, and hay/straw bales prior to excavation activities, and will install additional BMPs for erosion and stormwater management, as needed based on existing site conditions.

- Backfilling the ditch line (excavated soil will be used to cover the pipe). The Project's EIs will implement such measures as temporary slope breakers, silt fencing, and hay/straw bales prior to backfilling, and will install additional BMPs for erosion and stormwater management, as needed based on existing site conditions.
- Performing cleanup and stabilization. This phase will begin after backfilling and will continue throughout the remainder of the Project's construction. This phase will include minor grading to level small areas, and revegetation. Project areas to be stabilized by vegetation will be seeded and mulched.
- The Project's EIs will remove temporary erosion/sediment controls when other construction activity is completed and final stabilization is achieved.

3.1 EROSION AND SEDIMENT CONTROLS

3.1.1 Short- and Long-Term Goals and Criteria (as applicable)

- (a) The construction phase erosion and sediment controls are designed to retain sediment on-site to the greatest extent practicable.
- (b) Control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections or other information indicates that a control has been installed and/or used inappropriately and/or incorrectly, the control shall be replaced and/or modified as needed.
- (c) If sediment escapes the Project area, off-site accumulations of sediment must be removed at a frequency sufficient to minimize off-site impact (e.g., fugitive sediment in street could be washed into storm sewers by the next rain and/or pose a safety hazard to users of public streets).
- (d) Sediment must be removed from sediment traps when capacity has been reduced by 50 percent.
- (e) Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges (e.g., screening outfalls, picked up daily).

3.1.2 Temporary Erosion Control Measures

The following temporary erosion and sediment controls will be utilized as necessary:

Temporary Slope Breakers: Temporary slope breakers (water bars/terraces) will be installed as necessary (at the EI's discretion) diagonally across the ROW on slopes to control erosion by reducing and shortening the velocity, length and concentration of runoff according to the figures provided in **Appendix A**. These breakers will divert water to a well-vegetated area. If a vegetated area is not available, erosion control barriers will be installed to filter the runoff at the outlet of the slope breakers and off of the construction ROW. Silt fence, hay/straw bales, or sandbags may be used in place of temporary slope breakers at the discretion of the EIs.

Natural vegetation acts as an effective filter medium for silt removal from surface runoff. Its use as a sediment barrier results in less disturbance to the land than other methods. In areas where natural vegetation is not present or does not constitute a suitable barrier, temporary sediment and/or erosion control barriers will be installed. Temporary sediment barriers, typically hay/straw bale filters or silt fences, dissipate the energy of flowing water to allow settlement of sediment from surface water runoff.

Silt Fence/Hay/Straw Bales: Silt fences and hay/straw bales will be installed in accordance with figures provided in **Appendix A**. Sediment barriers will be placed around delineated wetlands and waterbodies within the ROW during times of construction, regardless of the presence of flowing or standing water. The silt fences and/or hay/straw bales will be installed as necessary to prevent erosion and sediment laden runoff from stormwater discharges. These measures will remain in place until permanent revegetation measures have reached a minimum of 70 percent cover as compared to similar cover in an adjacent area that is undisturbed by construction. Noxious weeds within the revegetated area will not exceed the comparable percent cover to that of adjacent undisturbed areas.

For open waterbodies, floating sediment curtains will be used in place of straw bales and silt fences in waterbodies with no or low water flow when the depth of the non-flowing water exceeds the height of straw bales and the silt fencing. The floating sediment curtains will be placed along the edge of each side of the construction ROW to ensure sediment containment.

Silt fence and hay bale structures are also used to control erosion and sedimentation for hydrostatic test water discharges. Bale filters are effective for small rills that can be spanned by one or two bales. Bales are constructed of hay (or straw) that is securely bound to form a berm, which is held in place by two stakes driven through each bale. The first stake is driven at an angle toward the previously positioned bale, and the second stake is driven perpendicular to ground surface. The bindings of the bales will be horizontal. Filter fabric fences (silt fences) perform the same function as hay bale berms, but have the advantage of ease of installation, versatility, and light weight.

A silt fence is a geotextile fabric with fence posts spaced no more than 10 feet apart. Both silt fences and hay/straw bales will be installed according to the manufacturer's instructions where site conditions allow. Otherwise, the silt fence will be imbedded in the ground a minimum of 6 inches. Where two sections are joined, they will be overlapped a minimum of 6 inches. Accumulated sediment will be removed regularly and the silt fencing inspected to ensure the bottom of the silt fence remains imbedded in the ground. A sufficient stockpile of silt fence will be maintained on-site for emergency use.

Hay bales may be left in place. These barriers are required after the initial disturbance of the soil and are typically installed at the following locations:

- At the outlet of a temporary slope breaker when vegetation is not enough to control erosion.
- Along banks of waterbodies between the graded ROW and the waterbody after clearing.
- Downslope of any stockpiled soil in the vicinity of waterbodies and wetlands.
- At the base of slopes adjacent to road crossings where vegetation has been disturbed.
- At sideslope and downslope boundaries of the construction where runoff is not otherwise directed by temporary slope breakers.
- In the ROW at boundaries between wetlands and adjacent disturbed upland areas to prevent flow of sediment into the wetland where runoff is not otherwise directed by a temporary slope breaker
- At the edge of the ROW to prevent siltation of ponds, wetlands, or other waterbodies adjacent to the downslope of the ROW or as necessary to contain spoil and sediment within the ROW.
- For hydrostatic test water discharges, the water should be released directly into the silt fence/hay bale structures in conjunction with other approved velocity dissipating devices.

Temporary Trench Plugs: Temporary trench plugs prevent water diversion from waterbodies or drainage tiles into upland portions of the pipeline trench during construction and prevent silt-laden stormwater from flowing down the trench into waterbodies. The EIs or CI will determine the need for and spacing of trench plugs. Otherwise, the Contractor will install hard trench plugs (undisturbed soil) on either side of waterbody crossings or drain tiles. Topsoil will not be used for trench plugs.

Temporary Spoil Storage: Waterbody crossing spoil, including upland spoil from crossing of streams up to 30 feet in width, will be stored in the construction ROW at least 10 feet from the water's edge or in additional temporary workspace areas. Temporary in-stream spoil storage in streams larger than 30 feet in width will be performed in accordance to any required federal permit and any federal or state statutes, rules and standards.

3.1.3 Stabilization Practices

The stabilization measures of the pipeline ROW incorporate permanent erosion and sedimentation measures. However, in the event that final restoration cannot be implemented immediately post-construction, temporary erosion and sedimentation control measures will be employed as specified by the Contractor until the weather is suitable for final cleanup.

3.1.3.1 Upland Areas

Temporary Stabilization:

- Temporary stabilization measures will be initiated as soon as practicable in portions of the ROW where construction activities have temporarily or permanently ceased. Where the initiation of stabilization measures by the 14th day is precluded by weather, stabilization measures will be initiated as soon as machinery is able to access the ROW. If activities resume within 21 days from when the activities ceased, stabilization measures do not have to be initiated by the 14th day following cessation of the activity. These guidelines are based on National Pollutant Discharge Elimination System requirements and may be modified based on state-specific PDES regulations.
- In the event that construction is completed more than 30 days before the seeding season for perennial vegetation, areas adjacent to waterbodies will be mulched with 3 tons/acre of straw, or its equivalent, to a minimum of 100 feet on either side of the waterbody. These guidelines are based on National Pollutant Discharge Elimination System (NPDES) requirements and may be modified based on state-specific PDES regulations.
- Temporary sediment barriers may be removed from an area when that area is successfully revegetated (i.e., if the ROW surface condition is similar to adjacent undisturbed lands). These guidelines are based on NPDES requirements and may be modified based on state-specific PDES regulations.

Permanent Stabilization:

- Erosion and sedimentation control practices (installation of structures, revegetation, and

maintenance practices) will be implemented to minimize the potential for soil erosion or sedimentation of streams and to restore the ROW and any other disturbed areas. Final grading will be completed within 10 days of construction completion (including the installation of permanent erosion control measures in the areas of steep slopes only), weather permitting. Construction debris will be removed from the ROW and the ROW will be graded so that the soil is left in proper condition for planting.

- The disturbed ROW will be graded to pre-construction contours, as practical, with a small crown of soil left over the ditch to compensate for settling, as approved by the CM, EIs, and/or CI. Openings will be left in the completed crown to restore lateral surface drainage to pre-construction patterns.
- Where topsoil has been segregated, the topsoil will be spread back along the ROW in an even layer.
- Fences that were cut and replaced by gaps during construction will be repaired to at least their equivalent state during pre-construction activities.
- Permanent slope breakers will be constructed after final grading and prior to seeding in accordance with the applicable regulations to replace temporary barriers at pedestrian, trail, road, waterbody, and wetland crossings.

3.1.3.2 Revegetation and Seeding

Seed, fertilizer, and agricultural lime application will be accomplished at the following rates and mixtures unless otherwise instructed by applicable permits or land managing agency requirements:

- Seed Mixture: Seed mixes have been developed through consultation with local Natural Resources Conservation Offices
- Fertilizer: 5-19-19 at a rate of 300 pounds per acre, but could vary based on landowner/site-specific conditions.
- Agricultural Lime: at a rate of 2,000 pounds per acre, but could vary based on landowner/site-specific conditions.
- Final revegetation standards that will be used by BBP for stabilization of the ROW will be determined through discussions with the individual state and local agencies and through the permit process.
- The ROW will be seeded after final grading in accordance with recommended seeding

dates, weather, and soil conditions permitting.

- Turf, ornamental shrubs, and other landscaping materials will be restored in accordance with landowner agreements. Selection is based on adaptation of plants to the soils and climate, ease of establishment, suitability for specific use, longevity or ability to re-seed, maintenance required, aesthetic values, and landowner agreement. Personnel familiar with local horticultural and turf establishment practices must perform the restoration work.
- Where broadcast or hydro seeding is to be done, the seedbed will be prepared as necessary to ensure sites for seeds to lodge and germinate.
- Where hand broadcast seeding is used, the seed will be applied at one-half the rate in each of two separate passes.
- The seedbed will be prepared to a depth of 3 to 4 inches using appropriate equipment to provide a firm, smooth seedbed that is free of debris.
- The Project area should be seeded as deemed appropriate by the CM and/or EIs. If seeding cannot be done soon after final grading, temporary erosion and sediment controls will be used and seeding of permanent cover will be done at the beginning of the next seeding season. Meanwhile, temporary stabilization measures will be implemented as appropriate.
- Seed will be purchased in accordance with the Pure Live Seed specifications for seed mixes and used within 12 months of testing.
- Legume seed will be treated with an inoculant specific to the species. The manufacturer's recommended inoculant rates will be used.
- The seed will be uniformly applied and covered 0.5 to 1 inch deep, depending on seed size. A seed drill equipped with cultipacker is preferred, but broadcast or hydro seeding can be used at double the recommended seeding rates. Where broadcast seeding is used, the seedbed will be firmed with a cultipacker, roller, or similar method after seeding.
- Other alternative seed mixes specifically requested by the landowner or land-managing agency may be used.
- Areas that are seeded after the recommended seeding date should be mulched if permitted.

3.1.3.3 Wetland Restoration

- BBP's approach to wetland mitigation and restoration involves a combination of impact

minimization during construction, substrate and hydrology restoration, and vegetation establishment involving successful natural processes as a key component.

- The construction workspace for the Project will be designed to limit impacts to wetlands.
- During the restoration phase, segregated topsoil will be replaced over the trench line and wetland contours and drainage patterns will be restored to approximate original condition. Surface rocks and boulders that had been windrowed during the construction phase will be distributed in a natural pre-construction configuration in the temporary work areas. Following restoration of the substrate, wetlands will typically be seeded with annual ryegrass or other seed mixture as directed by regulatory agencies.

3.1.3.4 Riparian Areas

Riparian areas are defined as "on or pertaining to the bank of a natural course of water" (stream, pond, lake, or wetland). The EPA defines "riparian areas" as areas adjacent to streams and lakes where the high water table creates distinct soil and vegetative characteristics from the adjacent uplands.

- Following installation of the pipeline, stream banks and riparian areas will be re-contoured and stabilized. Banks will typically be stabilized with an herbaceous mixture and erosion control fabric such as jute netting. Rock rip-rap may be used to stabilize particularly erosive or unstable areas at the recommendation/approval of the state agencies and by the USACE.

3.1.4 Other Surface Applications

Other surface applications will be applied as outlined below unless otherwise instructed by applicable permits or land managing agency requirements:

- (a) Mulch: After seeding, mulch may be applied as determined necessary by the EIs at a rate of approximately 2 tons/acre on the entire ROW except on wetlands, lawns, agricultural crop areas, and areas where hydro-mulch is used. Mulching before seeding may be done if construction or restoration activity is interrupted for an extended period, such as when seeding cannot be completed due to seeding period restrictions. Except for site-specific locations that may be identified during construction, mulch before seeding if final cleanup (including final grading and installation of permanent erosion controls in the areas of steep slopes) is not completed in an area within approximately 10 days after construction completion.

If mulching occurs before seeding, the Contractor shall increase mulch application on slopes within 100 feet of waterbodies and wetlands to a rate of 3 tons/acre. Up to 1 ton/acre of wood chips may be added to mulch if areas are top-dressed with 11 pounds/acre available nitrogen (at least 50 percent of which is slow release).

If a mulch blower is used, the strands will not be shredded to less than 8 inches in length to allow anchoring. The mulch will be anchored immediately after placement to minimize loss by wind and water. When anchoring by mechanical means, the Contractor shall use a mulch-anchoring tool to properly crimp the mulch to a depth of 2 to 3 inches.

When anchoring with liquid mulch binders, the Contractor shall use the rates recommended by the manufacturer. The Contractor shall not use liquid mulch binders within 100 feet of wetlands or waterbodies.

- (b) Matting/Netting: Matting or netting consists of jute, wood excelsior, or similar materials, and will be installed by the Contractor to anchor mulch and stabilize the surface of the soil during the critical period of vegetative establishment, where directed by the EIs.

Matting or netting will be applied to critical, sensitive areas (e.g., steep slopes, banks of waterbodies, bar ditches) as specified by the EIs. On waterbody banks, the matting or netting will be installed at the time of the final bank re-contouring. In the event that erosion control fabric is not readily available, BBP will temporarily use mulch anchored via crimping (or some other means) or hydro mulch until the erosion control fabric material becomes available. Matting or netting will be anchored with pegs or staples as recommended by the manufacturer.

3.2 STORMWATER MANAGEMENT

Stormwater management will be conducted through stormwater flow attenuation, velocity dissipation devices, and water filtration. BBP's construction procedures describe the criteria for placement and use of stormwater control methods/devices. The EIs will have the authority to determine the location of these controls.

If herbicides or pesticides are to be used for vegetation maintenance, the applications of those substances will be in accordance with applicable landowner and land management or state agency specifications. BBP will not use herbicides or pesticides in or within 100 feet of any waterbody except as specified by the appropriate land management or state agency.

3.3 OTHER CONTROLS

3.3.1 Waste Materials

- (a) Trash, litter, and debris will be collected for off-site disposal; it will not be discarded along the ROW. Refuse will be disposed of according to state and local regulations.
- (b) Solid waste that contains (or at any time contained) oil, grease, solvents, or other petroleum products, falls within the scope of the oil and hazardous substances control, cleanup and disposal procedures of BBP's Spill Prevention and Response (SPAR) Plan (**Appendix B**). This material shall be segregated for handling and disposal as hazardous waste under the provisions of the SPAR Plan.

3.3.2 Offsite Vehicle Tracking

- (a) A stabilized construction entrance will be used, if appropriate, to reduce vehicle tracking of soil and sediments. Access to the ROW will normally be from existing public roads. Attempts will be made to locate roadway crossings/access points to ensure that safe and accessible conditions exist throughout the construction phase. Use of 50-foot-long crushed stone or mat access pads, sweeping, culvert installation, and other forms of rutting protection may be used subject to local permit conditions. Periodic sweeping and scraping will remove sediment tracked onto public roads. If crushed stone access pads are used in active agricultural areas, the stone will be placed on a synthetic fabric to facilitate later removal.
- (b) The stabilized construction entrances will be installed before clearing and grading. Once other construction activities permanently cease in an area, that area will be stabilized by reseeded and/or mulching as needed. Once revegetation has been judged successful, temporary erosion/sediment control structures will be removed.

4.0 MAINTENANCE

Erosion and sediment control measures and other protective measures identified in this SWPPP must be maintained in effective operating condition. If site inspections required by Section 5 of this SWPPP identify erosion control devices that are not operating properly, maintenance shall be performed before the next anticipated storm event, or as necessary to maintain the continued effectiveness of erosion controls. If maintenance prior to the next anticipated storm event is impractical, maintenance must be scheduled and accomplished as soon as practicable. Temporary sediment barriers will remain in place until permanent revegetation measures have been judged successful.

5.0 INSPECTIONS

The EIs will inspect disturbed areas of the Project area that have not been finally stabilized (including areas used for storage of materials that are exposed to precipitation, staging areas, temporary contractor yards, access roads, structural control measures, and locations where vehicles enter or exit the site). The Project area should be considered stabilized when construction activity ceases and a uniform vegetative cover (see below) has been established.

Areas that are not revegetated should be considered to have achieved final stabilization when they have a permanent cover that will prevent erosion of soil by wind or water. At that time, activity under this plan, including inspections, will cease. Inspections shall be conducted as follows and/or in accordance with the applicable National or State-Specific Pollution Discharge Elimination System guidelines:

- Conduct **daily inspections and following any storm event of 0.5 inch of precipitation or greater**, except those portions of the site that have been finally or temporarily stabilized, for which inspections will be conducted at least weekly. Inspections should continue until disturbed areas are completely stabilized (for areas to be revegetated, this means that perennial vegetation cover has reached a uniform cover of at least 70 percent of the preconstruction cover).
- **Inspect control measures** daily in areas of active construction or equipment operation and on a weekly basis in areas with no construction. Inspect within 24 hours of the end of a storm event that is 0.5 inch of rainfall or greater. Control measures will be maintained in good working order; if repair is necessary, it should be initiated within 24 hours of report.
- **Inspect disturbed** areas for evidence of or potential for pollutants entering the drainage system. Sediment from silt fences should be removed regularly and the fence inspected to ensure that the bottom of the fence remains imbedded in ground. Damaged hay/straw bales will be replaced with new bales as necessary.
- **Inspect material storage areas** where materials are exposed to precipitation for evidence of potential for pollutants entering the drainage system.
- **Inspect vehicle entrances** for evidence of off-site sediment tracking.
- **Inspect discharge points**, if accessible, to determine if erosion control measures are effective in preventing significant impacts to receiving waters. If these points are inaccessible, inspectors should inspect nearby downstream locations.

- **Inspect vegetation** after the first and second growing season after seeding to determine the success of revegetation. Wetland revegetation is considered successful if at least 80 percent of the total cover is native species and the level of diversity of the native species present after construction is at least 50 percent of the level originally found in the wetland. Restoration shall be considered successful if the ROW surface condition is similar to adjacent undisturbed lands.
- **Complete an inspection report of each inspection.** Inspection forms and form instructions provided in **Appendix C** provide additional guidance.

See Section 7 for additional detail on requirements for construction activity and inspection documentation and record keeping.

6.0 PLAN MODIFICATION

This plan may need to be modified and/or updated based on information and experience gathered during actual construction activities (e.g., include or modify BMPs designed to correct problems, etc.). If changes to the design, construction, or maintenance that can have significant effect on the potential for discharging pollutants in stormwater at the site occur, this plan should be modified accordingly by the Contractor, EI, and/or CI. In addition, if the plan proves to be ineffective in controlling pollutants, any necessary modifications to the application of the practices presented in this plan should be made by the Contractor, EI, and/or CI in order to prevent the discharge of pollutants into stormwater.

7.0 REQUIRED REPORTS, DOCUMENTATION, AND RECORDKEEPING

7.1 RECORDS RETENTION

All documents will be retained as part of the SWPPP for at least three years from the date that the site is finally stabilized as required by BBP's document retention policies. The following documentation will be kept on file at the construction site:

- A copy of this SWPPP and referenced attachment(s)
- Inspection reports
- Log of construction and BMP installation/maintenance activities and/or construction alignment sheets/construction plans showing the placement of BMPs.

7.2 INSPECTION REPORTS

A separate report will be developed for each inspection. Inspection reports will identify any incidents of non-compliance. Where a report does not identify any incidents of non-compliance, the report will contain a certification that the facility is in compliance with this SWPPP. In addition, inspection reports should:

- Summarize the scope of the inspection.
- Provide the name(s), title(s), and qualifications of personnel making the inspection.
- Indicate the date(s) of the inspection.
- Provide weather information and a description of any discharges occurring at the time of the inspection.
- Provide weather information for the period since the last inspection (or since commencement of construction activity if first inspection), including:
 - A best-estimate of the beginning of each storm event,
 - Duration of each storm event,
 - Approximate amount of rainfall for each storm event (in inches), and
 - If any discharges occurred.
- Indicate the location(s) of discharges of sediment or other pollutants from the site.
- Indicate the location(s) of BMPs that need to be maintained.
- Indicate the location(s) of BMPs that failed to operate as designed or proved inadequate for that particular location and plans for correction of the problem (including implementation dates of corrective action).
- Indicate location(s) where additional BMPs are needed that did not exist at the time of inspection.

7.3 LOG OF CONSTRUCTION AND BMP INSTALLATION AND MAINTENANCE ACTIVITIES

In addition to inspection and maintenance reports, keep a record of construction activity on the site with this SWPPP. In particular, keep record of the following:

- The dates when major grading activities occur in a particular area.
- The date when construction activities cease in an area, temporarily or permanently.
- The date when an area is stabilized, temporarily or permanently.
- Erosion control maintenance activities.

8.0 SWPPP CERTIFICATION

8.1 BBP'S CERTIFICATION

I certify under penalty of law that this document and its appendices were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____ Date: _____
 Print
 Name: _____
 Title: _____
 Company: _____

8.2 CONTRACTOR'S/SUBCONTRACTOR'S CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of the governing PDES permit that authorizes the stormwater discharges associated with industrial activity from the construction site identified as part of this certification.

Signed: _____ Date: _____
 Print
 Name: _____
 Title: _____
 Company: _____

I certify under penalty of law that I understand the terms and conditions of the governing PDES permit that authorizes the stormwater discharges associated with industrial activity from the construction site identified as part of this certification.

Signed: _____ Date: _____

Print
Name: _____

Title: _____

Company: _____

I certify under penalty of law that I understand the terms and conditions of the governing PDES permit that authorizes the stormwater discharges associated with industrial activity from the construction site identified as part of this certification.

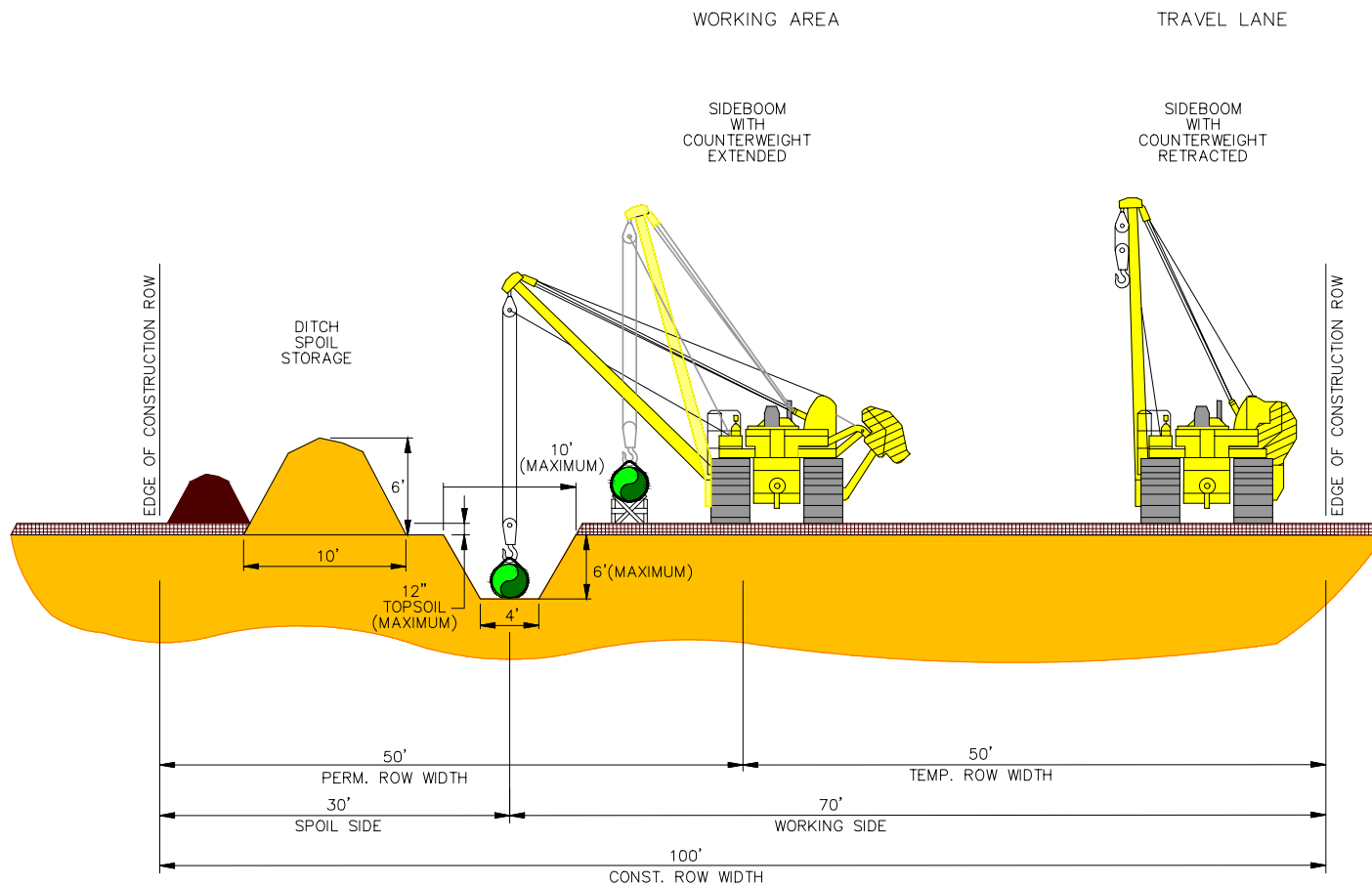
Signed: _____ Date: _____

Print
Name: _____

Title: _____

BBP: _____

APPENDIX A
BEST MANAGEMENT PRACTICES FIGURES

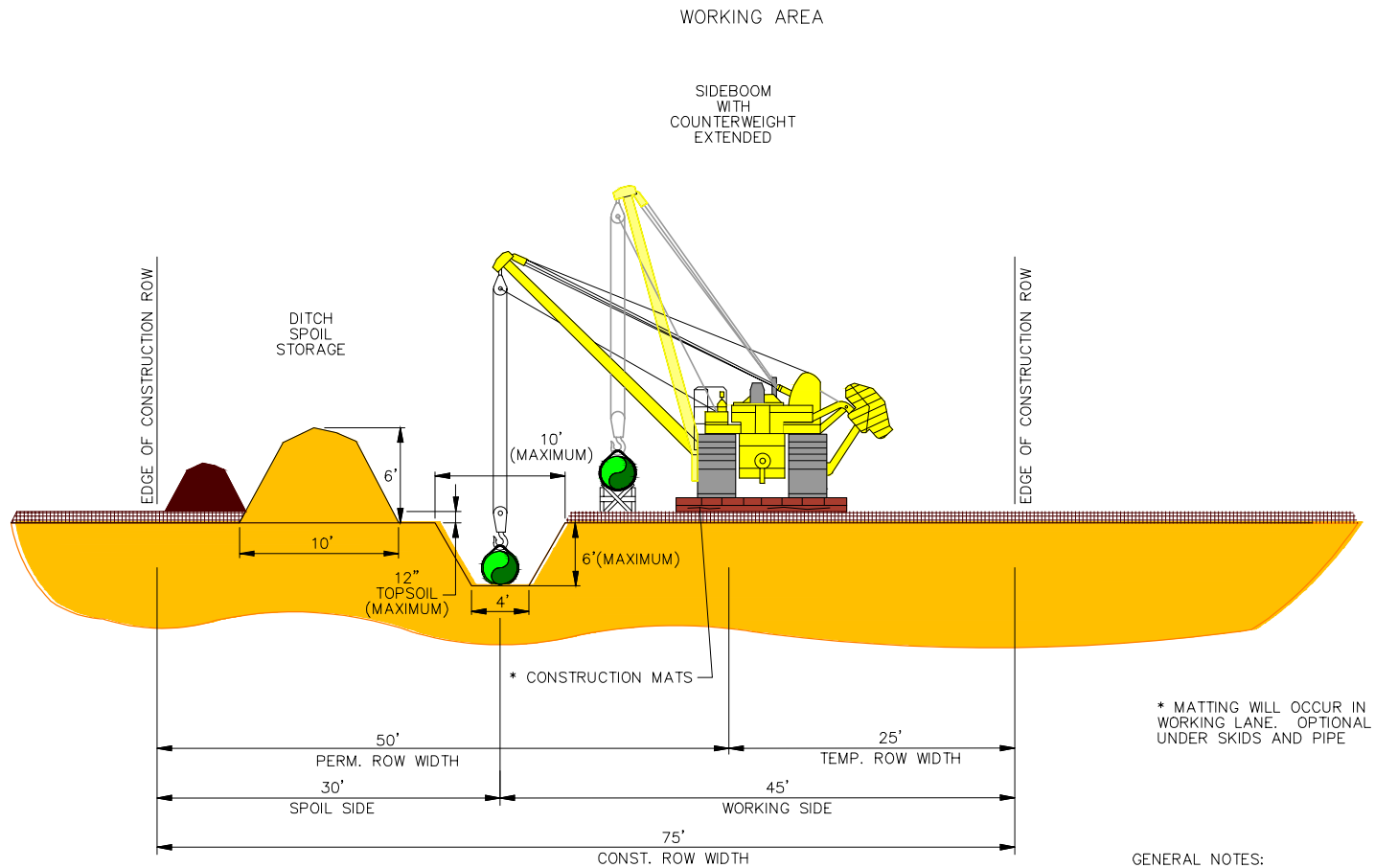


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX 77084
PH: (281) 616-0100
TRC PROJ. #03595, LIC. No. EF 4088

NO.	REVISION	DATE	APPR.
SCALE	DATE	DRAWN	CHECKED
NTS	1/27/16	JRW	AL
			BAM

MAINLINE CONSTRUCTION
UPLAND CONSTRUCTION
RIGHT-OF-WAY
BAYOU BRIDGE PIPELINE, LLC

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-B-013	1 OF 1



GENERAL NOTES:

1. EXTRA DEPTH MAY BE REQUIRED FOR CONCRETE COATED PIPE OR WEIGHTS

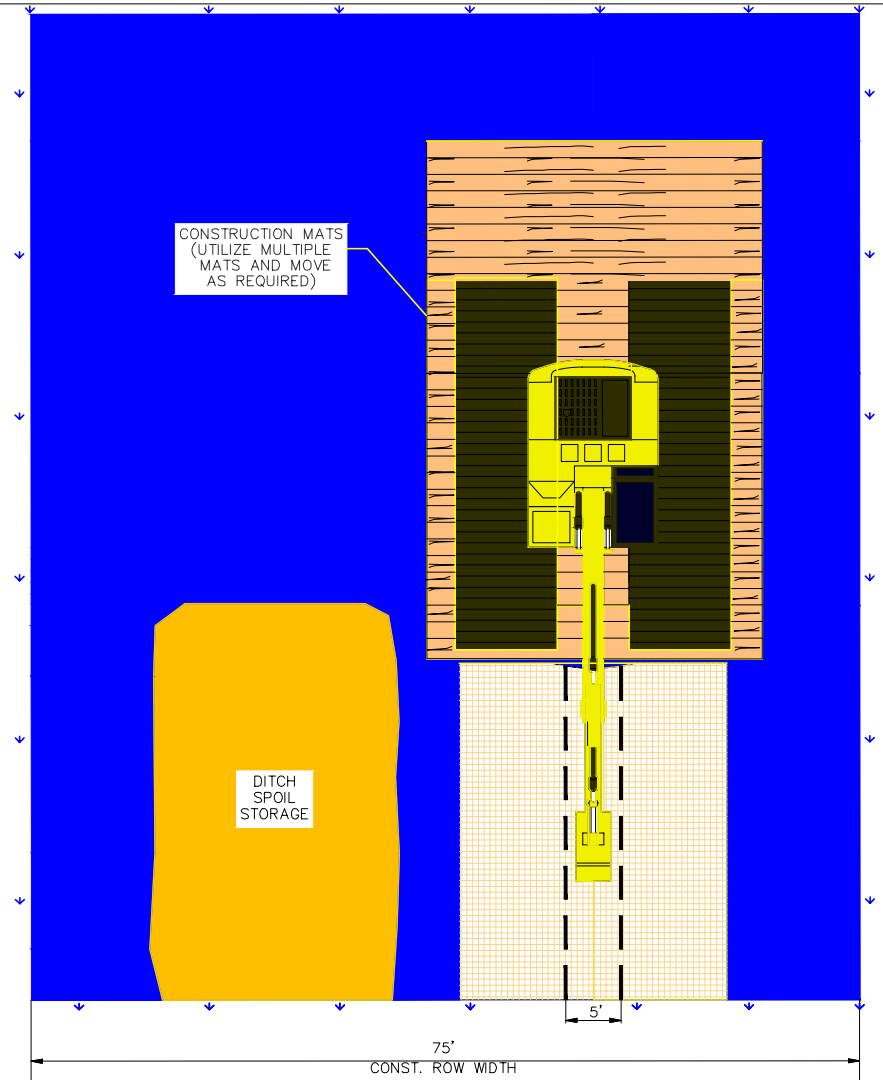
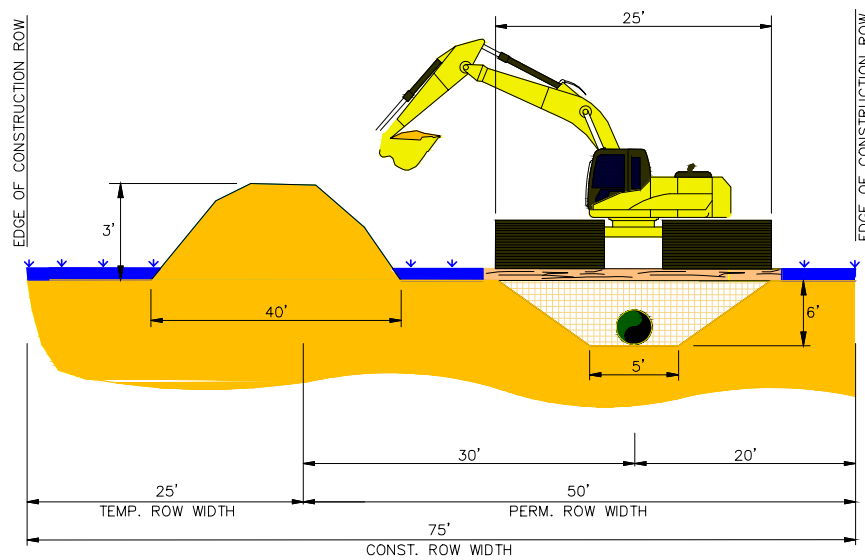


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX 77064
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

NO.	REVISION	DATE	APPR.

MAINLINE CONSTRUCTION
WETLAND CONSTRUCTION
RIGHT-OF-WAY
BAYOU BRIDGE PIPELINE, LLC

SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.	DRAWING NUMBER	SHEET
NTS	1/27/16	JRW	AL	BAM		STD-B-012	1 OF 1



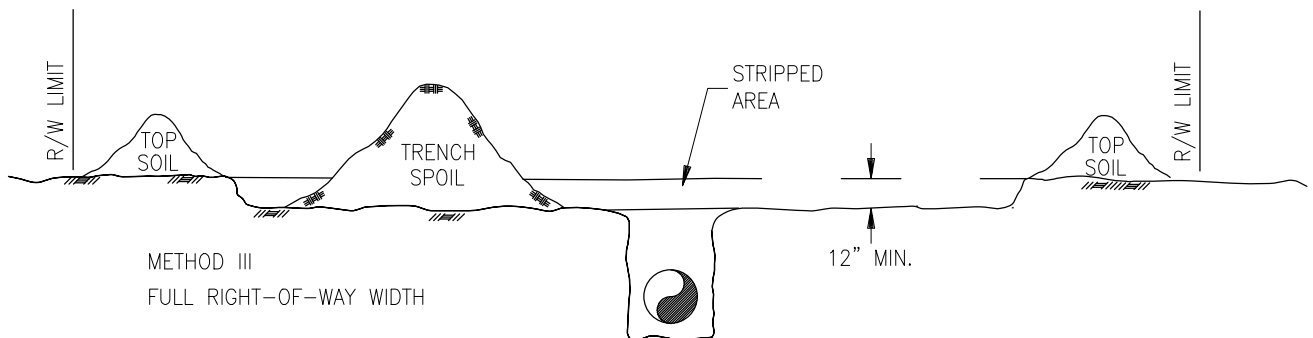
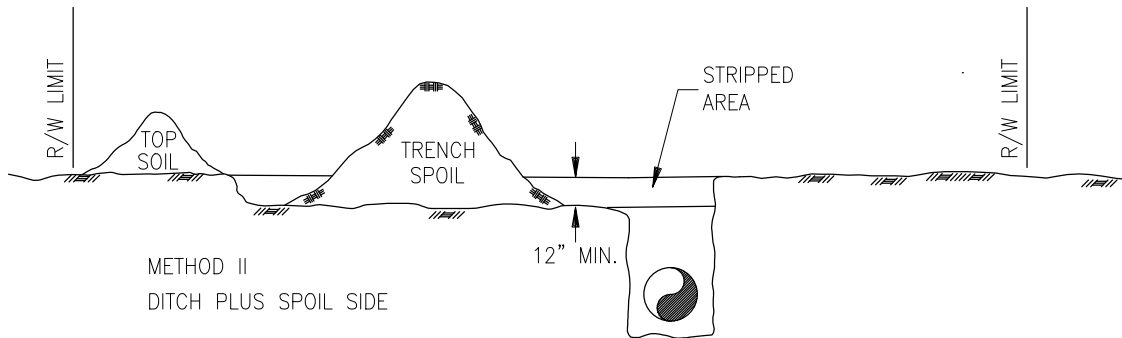
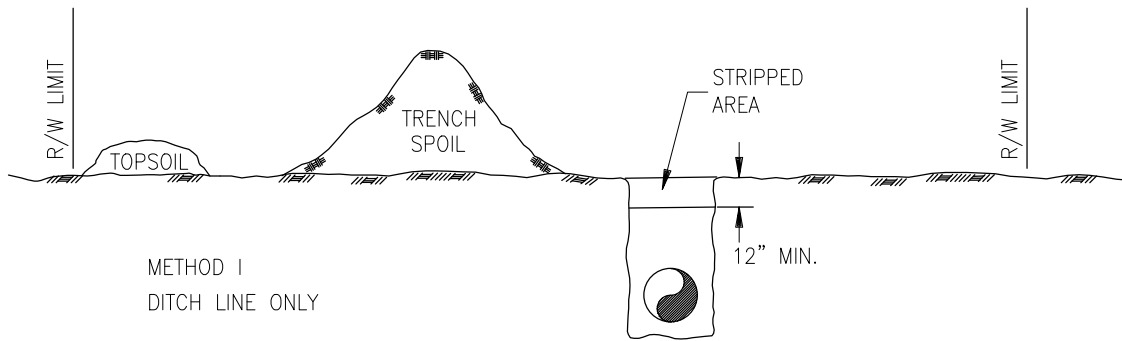
16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX 77084
PH: (281) 616-0100
TRC PROJ. #53595, L.C. No. EF 4588

NO.	REVISION	DATE	APPR.
SCALE	DATE	DRAWN	CHECKED
NTS	2/17/16	JRW	AL
			BAM

MAINLINE CONSTRUCTION
SUBMERGED WETLAND
RIGHT-OF-WAY
BAYOU BRIDGE PIPELINE, LLC

DRAWING NUMBER
STD-B-014

SHEET
1 OF 1



NOTES

1. STORE TOPSOIL ON ONE OR BOTH SIDES OF THE RIGHT-OF-WAY ADJACENT TO STRIPPED AREAS AS SHOWN ABOVE.
2. MAINTAIN A MINIMUM 3 FEET SEPARATION BETWEEN THE TOPSOIL AND THE TRENCH SPOIL PILES.
3. RETURN TOPSOIL EVENLY OVER STRIPPED AREA AFTER TRENCH BACKFILL HAS SUFFICIENTLY SETTLED OR HAS BEEN COMPACTED.
4. REMOVE ALL ROCKS GREATER THAN 4 INCHES IN DIAMETER FROM STRIPPED TOPSOIL.

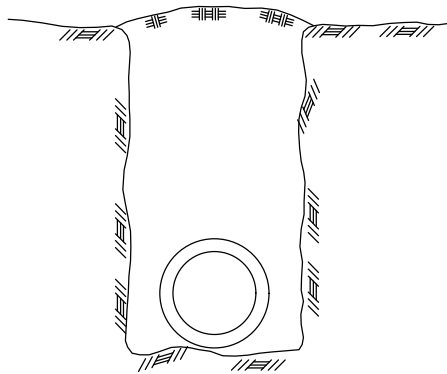


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

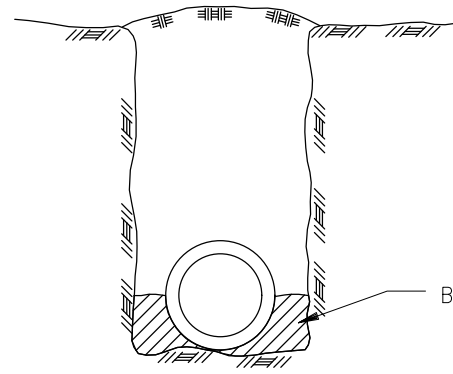
PIPELINE STANDARD TOPSOIL STRIPPING METHODS

NO.	REVISION			DATE	APPR.
SCALE	DATE	DRAWN	CHECKED	APPROVED	
NTS	03-JAN-03				

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-009	1 OF 1

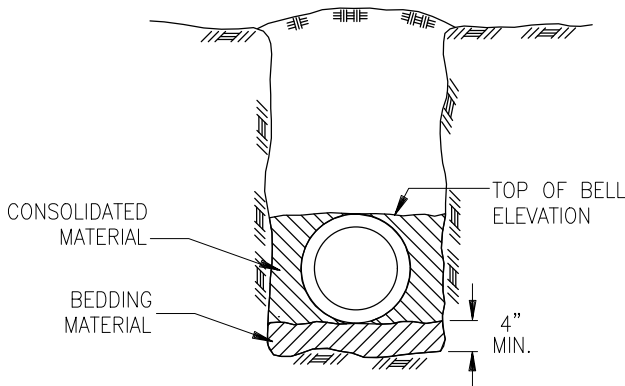


TYPE 1 TRENCH

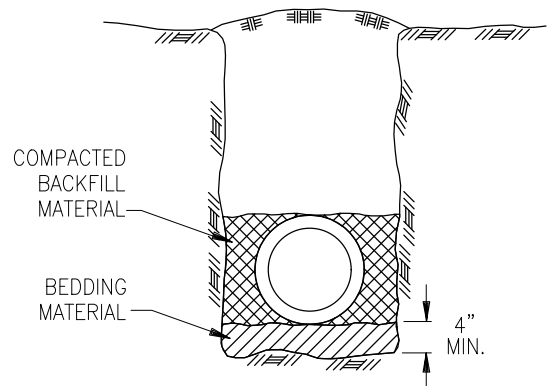


BEDDING MATERIAL
(SEE NOTE 2)

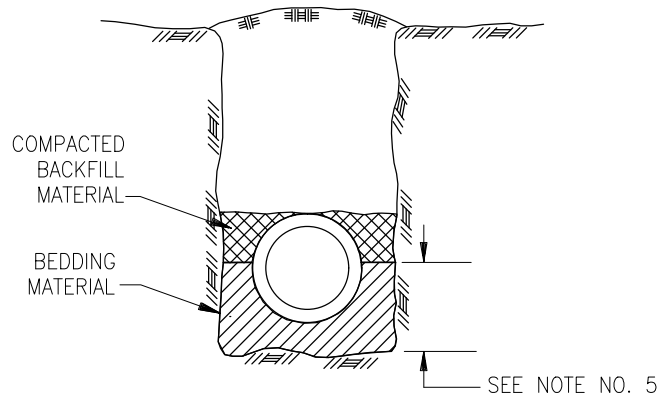
TYPE 2 TRENCH



TYPE 3 TRENCH
(SEE NOTE NO. 3)



TYPE 4 TRENCH
(SEE NOTE NO. 4)



TYPE 5 TRENCH
(SEE NOTE NO. 5)




16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

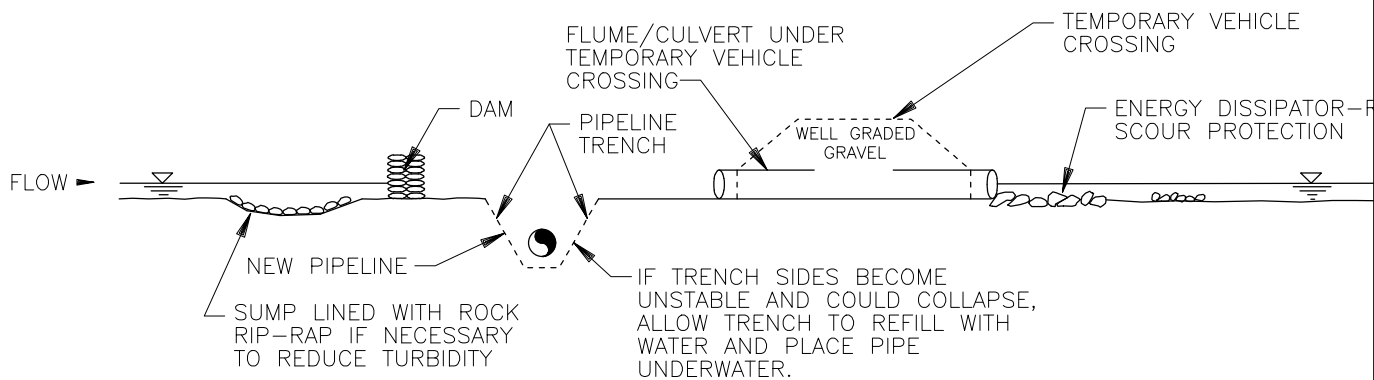
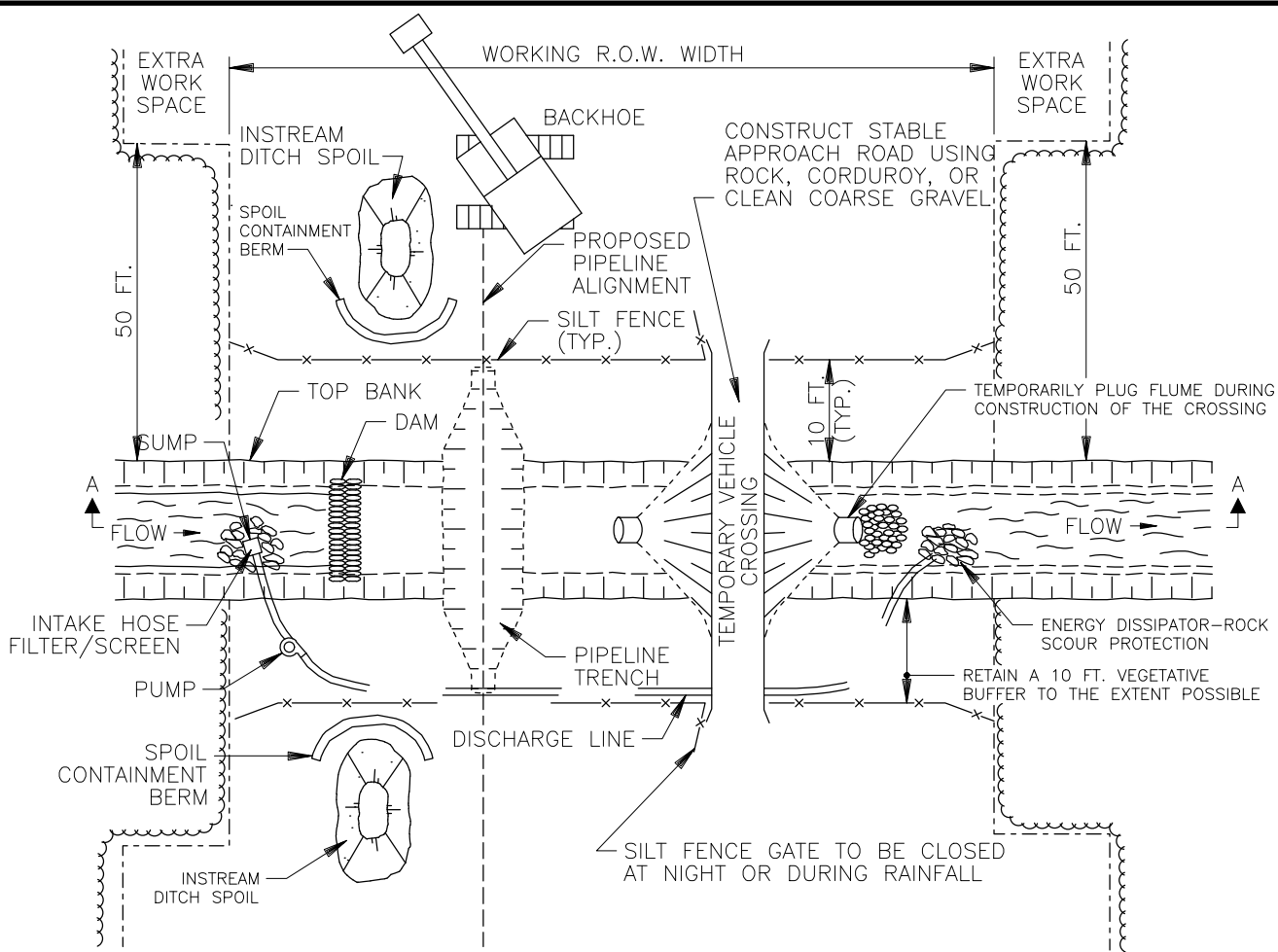
TRENCH AND BACKFILL TYPE DETAILS

NO.	REVISION	DATE	APPR.
SCALE	DATE	DRAWN	CHECKED
NTS	03-JAN-03		

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-305	1 OF 2

1. FOR A TYPE 1, THE PIPE SHALL BE INSTALLED DIRECTLY ON THE UNDISTURBED EARTH AT THE BOTTOM OF THE TRENCH AND BACKFILLED PER THE SPECIFICATIONS.
2. FOR A TYPE 2, THE TRENCH IS IDENTICAL TO A TYPE 1 EXCEPT THAT THE DEPTH FROM THE BOTTOM OF THE TRENCH TO THE CENTERLINE OF THE DUCTILE IRON PIPE IS BACKFILLED WITH LIGHTLY CONSOLIDATED EXCAVATION MATERIAL.
3. FOR TYPE 3, THE TRENCH SHALL HAVE A 4 INCH MINIMUM PIPE BEDDING MATERIAL INSTALLED. THE BEDDING MATERIAL SHALL BE LOOSE SOIL OR SELECT MATERIAL. LOOSE SOIL OR SELECT MATERIAL IS DEFINED AS SAND OR NATIVE SOIL EXCAVATED FROM THE TRENCH FREE OF ROCKS, FOREIGN MATERIAL AND FROZEN MATERIAL. FROM PIPE BEDDING ELEVATION TO THE TOP OF THE PIPE ELEVATION, THE BACKFILL MATERIAL SHALL BE LIGHTLY CONSOLIDATED MATERIAL.
4. FOR TYPE 4, THE TRENCH SHALL HAVE A MINIMUM DEPTH EQUAL TO WHICHEVER IS THE GREATER DEPTH OF 4 INCHES PIPE BEDDING OR $\frac{1}{8}$ OF THE PIPE DIAMETER AND SHALL BE COMPOSED OF SAND, GRAVEL OR CRUSHED ROCK. FROM THE PIPE BEDDING ELEVATION TO THE TOP OF PIPE ELEVATION THE BACKFILL SHALL BE COMPACTED IN 6-INCH MAXIMUM LIFTS TO 80 PERCENT MODIFIED PROCTOR AS DETERMINED BY ASTM D698.
5. FOR TYPE 5, THE TRENCH SHALL HAVE THE PIPE BEDDING MATERIAL A MINIMUM OF 4 INCHES UNDER THE PIPE UP TO THE CENTERLINE OF THE PIPE. THE PIPE BEDDING MATERIAL SHALL BE COMPACTED AND SHALL BE COMPOSED OF GRANULAR MATERIAL. FROM THE TOP OF THE PADDING MATERIAL TO THE TOP OF THE PIPE, THE BACKFILL SHALL BE COMPACTED AND COMPOSED OF GRANULAR OR SELECT MATERIAL. THE PADDING MATERIAL AND THE BACKFILL MATERIAL TO THE TOP OF THE PIPE SHALL BE COMPACTED IN 6-INCH MAXIMUM LIFTS TO 90 PERCENT MODIFIED PROCTOR AS DETERMINED BY ASTM D698.
6. ALL OF THE BACKFILL FOR TYPE 1, FROM CENTERLINE OF PIPE FOR TYPE 2 AND FROM THE TOP OF PIPE ELEVATION FOR TYPE 3, 4, AND 5, TO GRADE ELEVATION THE BACKFILL SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.
7. FOR ALL TRENCH TYPES, THE BODY OF THE DUCTILE IRON PIPE SHALL BE COMPLETELY SUPPORTED BY THE BODY OF THE PIPE. THE BELL PORTION SHALL NOT SUPPORT THE PIPE WEIGHT DURING INSTALLATION WHICH WILL REQUIRE HAND EXCAVATION AT THE BELL END AREAS.
8. FOR TYPES 1 AND 2, THE MINIMUM WIDTH OF THE TRENCH IS O.D. PLUS 12 INCHES. FOR TYPES 3, 4 AND 5, THE MINIMUM WIDTH OF THE TRENCH IS O.D. PLUS 24 INCHES WITH THE PIPE BEING CENTERED IN THE TRENCH AS MUCH AS IS PRACTICAL.
9. THE TRENCH WALLS ABOVE THE TOP OF PIPE ELEVATION SHALL BE SHORED OR SLOPED FOR STABILITY AS REQUIRED TO PROVIDE A SAFE WORK ENVIRONMENT.
10. MINIMUM COVER IS 4'-0". THIS REQUIRED DEPTH IS MEASURED FROM THE TOP OF BELL JOINT AREA AND WHEN APPLICABLE FROM THE TOP OF CONCRETE WEIGHT OR THE REQUIRED RIP-RAP HEIGHT PER STANDARD DRAWING STD-A-010 TO THE TOP OF ORIGINAL GRADE.

 <div style="text-align: right;"> 16350 PARK TEN PLACE, SUITE 101 HOUSTON, TX. 77084 PH: (281) 616-0100 TRC PROJ. #53595, LIC. No. EF 4588 </div>										
					TRENCH AND BACKFILL TYPE DETAILS					
NO.	REVISION			DATE	APPR.					
SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.	DRAWING NUMBER			SHEET	
NTS	03-JAN-03					STD-A-305			2 OF 2	



SEE SHEET 2 FOR NOTES.



16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

NO.	REVISION	DATE	APPR.

SCALE	DATE	DRAWN	CHECKED	APPROVED
NTS				

TYPICAL DAM AND PUMP CROSSING		
WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-105	1 OF 2

DAM AND PUMP CROSSING

THE FOLLOWING IS A SEQUENCE OF CONSTRUCTION AND MITIGATION MEASURES TO BE FOLLOWED AT ALL "DAM AND PUMP" TYPE CROSSINGS.

SEQUENCE OF ACTIVITIES

- STEP 1. CLEAR AND GRADE CERTIFICATED RIGHT-OF-WAY AS NECESSARY.
- STEP 2. IMPLEMENT THE TEMPORARY EROSION AND SEDIMENT CONTROLS.
- STEP 3. FABRICATE PIPE.
- STEP 4. INSTALL DRY STREAM CROSSING MATERIALS.
- STEP 5. EXCAVATE TRENCH AND INSTALL PIPE.
- STEP 6. BACKFILL AND RESTORE STREAM BANKS.
- STEP 7. REMOVE DAMS.
- STEP 8. IMPLEMENT THE PERMANENT EROSION AND SEDIMENTATION CONTROLS.

NOTES:


1. WHERE NECESSARY, OBTAIN PRIOR APPROVAL BEFORE USING THE DAM AND PUMP METHOD.
2. SCHEDULE INSTREAM ACTIVITY FOR LOW FLOW PERIODS AND FOR THE APPROPRIATE TIMING WINDOW.
3. MARK OUT AND MAINTAIN LIMITS OF AUTHORIZED WORK AREAS WITH FENCING OR FLAGGING TAPE TO AVOID UNNECESSARY DISTURBANCE OF VEGETATION. ENSURE EQUIPMENT OPERATORS WORKING ON THE CROSSING HAVE BEEN BRIEFED ABOUT THIS PLAN AND THE MEASURES NEEDED TO PROTECT WATER QUALITY. INSTALL PRE-WORK SEDIMENT CONTROL MEASURES AS SPECIFIED IN THE PLAN. ALL NECESSARY EQUIPMENT AND MATERIALS TO BUILD THE DAMS AND TO PUMP WATER MUST BE ON SITE OR READILY AVAILABLE PRIOR TO COMMENCING IN-WATER CONSTRUCTION. PIPE SHOULD BE STRUNG, WELDED AND COATED AND READY FOR INSTALLATION PRIOR TO WATERCOURSE TRENCHING.
4. CONTRACTOR SHALL SUPPLY, INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES, AS DEPICTED OR ALONG DOWN GRADIENT SIDES OF WORK AREAS AND STAGING AREAS SUCH THAT NO HEAVILY SILT LADEN WATER ENTERS STREAM.
 - a. NO HEAVILY SILT LADEN WATER SHALL BE DISCHARGED DIRECTLY OR INDIRECTLY INTO THE STREAM.
 - b. EROSION AND SEDIMENT CONTROL STRUCTURE LOCATIONS AS DEPICTED ARE APPROXIMATE AND MAY BE ADJUSTED AS DIRECTED BY THE COMPANY INSPECTOR TO ACTUAL SITE CONDITIONS.
 - c. SILT FENCE OR STRAW BALE INSTALLATIONS SHALL INCLUDE REMOVABLE SECTIONS TO FACILITATE ACCESS DURING CONSTRUCTION. UTILIZE STRAW BALE BARRIERS ONLY IN LIEU OF A SILT FENCE WHERE FREQUENT ACCESS IS REQUIRED.
 - d. SEDIMENT LADEN WATER FROM TRENCH DEWATERING SHALL BE DISCHARGED TO A WELL VEGETATED UPLAND AREA, INTO A STRAW BALE DEWATERING STRUCTURE OR GEOTEXTILE FILTER BAG.
 - e. SEDIMENT CONTROL STRUCTURES MUST BE IN PLACE AT ALL TIMES ACROSS THE DISTURBED PORTIONS OF THE RIGHT-OF-WAY EXCEPT DURING EXCAVATION/INSTALLATION OF THE CROSSING PIPE.
 - f. SOFT DITCH PLUGS MUST REMAIN IN PLACE AT CONVENIENT LOCATIONS TO SEPARATE MAINLINE DITCH FROM THE RIVER CROSSING UNTIL THE RIVER CROSSING IS INSTALLED AND BACKFILLED.
5. TO THE EXTENT POSSIBLE, MAINTAIN A MINIMUM 10 FEET VEGETATIVE BUFFER STRIP BETWEEN DISTURBED AREAS AND THE WATERCOURSE. INSTALL AND MAINTAIN A SILT FENCE UPSLOPE OF THE BUFFER STRIP ON EACH SIDE OF THE WATERCOURSE. THE SILT FENCE SHOULD INCORPORATE REMOVABLE "GATES" AS REQUIRED TO ALLOW ACCESS WHILE MAINTAINING EASE OF REPLACEMENT FOR OVERNIGHT OR DURING PERIODS OF RAINFALL.
6. CONSTRUCT A TEMPORARY SUMP UPSTREAM OF THE DAM AND LINE WITH ROCKFILL IF A NATURAL POOL DOES NOT EXIST. INSTALL THE PUMP OR PUMP INTAKE IN THE POOL OR SUMP. DISCHARGE WATER ONTO AN ENERGY DISSIPATOR DOWNSTREAM OF THE WORK AREA.
7. EXCAVATED MATERIAL MUST NOT BE STOCKPILED WITHIN 10 FT. OF THE WATERCOURSE. THIS MATERIAL MUST BE CONTAINED WITHIN BERM CONTAINMENT, WITH SECONDARY SILT FENCE PROTECTION TO PREVENT SATURATED SOIL FROM FLOWING BACK INTO THE WATERCOURSE.
8. CHEMICALS, FUELS, LUBRICATING OILS SHALL NOT BE STORED AND EQUIPMENT REFUELED WITHIN 100 FT. OF THE WATERBODY. PUMPS ARE TO BE REFUELED AS PER THE SPCC PLANS.

MAINTENANCE OF STREAMFLOW

IF THERE IS ANY FLOW IN THE WATERCOURSE, INSTALL PUMPS TO MAINTAIN STREAMFLOW AROUND THE BLOCKED OFF SECTIONS OF CHANNEL. THE PUMP IS TO HAVE 1.5 TO 2 TIMES THE PUMPING CAPACITY OF ANTICIPATED FLOW. A SECOND STANDBY PUMP OF EQUAL CAPACITY IS TO BE READILY AVAILABLE AT ALL TIMES. AN ENERGY DISSIPATOR IS TO BE BUILT TO ACCEPT PUMP DISCHARGE WITHOUT STREAMBED OR STREAMBANK EROSION. IF THE CROSSING IS PROLONGED BEYOND ONE DAY THE OPERATION NEEDS TO BE MONITORED OVERNIGHT.

9. STAGING AREAS ARE TO BE LOCATED AT LEAST 50 FT. FROM THE WATER'S EDGE (WHERE TOPOGRAPHIC CONDITIONS PERMIT) AND SHALL BE THE MINIMUM SIZE NEEDED.
10. DAMS ARE TO BE MADE OF STEEL PLATE, INFLATABLE PLASTIC, DAM, SAND BAGS, COBBLES, WELL GRADED COARSE GRAVEL FILL, OR ROCK FILL. DAMS MAY NEED KEYING INTO THE BANKS AND STREAMBED. ENSURE THAT THE DAM AND VEHICLE CROSSING ARE LOCATED FAR ENOUGH APART TO ALLOW FOR A WIDE EXCAVATION. CAP FLUMES USED UNDER VEHICLE CROSSING DURING DRY CROSSING.
11. DEWATER AREA BETWEEN DAMS IF POSSIBLE. DEWATERING SHOULD OCCUR IN A STABLE VEGETATIVE AREA A MINIMUM OF 50 FT. FROM ANY WATERBODY. THE PUMP DISCHARGE SHOULD BE DISCHARGED ONTO A STABLE SPILL PAD CONSTRUCTED OF ROCKFILL SANDBAGS, OR TIMBERS TO PREVENT LOCALIZED EROSION. THE DISCHARGE WATER SHOULD ALSO BE FORCED INTO SHEET FLOW IMMEDIATELY BEYOND THE SPILL PAD BY USING STRAW BALES AND THE NATURAL TOPOGRAPHY. IF IT IS NOT POSSIBLE TO DEWATER THE EXCAVATION DUE TO SOILS WITH A HIGH HYDRAULIC CONDUCTIVITY, THE EXCAVATION AND PIPE PLACEMENT IS TO BE CARRIED OUT IN THE STANDING WATER. PUMP ANY DISPLACED WATER AS DESCRIBED ABOVE TO PREVENT OVERTOPPING OF DAMS.
12. EXCAVATE TRENCH THROUGH PLUGS AND STREAMBED FROM BOTH SIDES, RE-POSITIONING DISCHARGE HOSE AS NECESSARY. LOWER THE PIPE IN THE TRENCH AND BACKFILL IMMEDIATELY. DURING THIS OPERATION WORK IS TO BE COMPLETED AS QUICKLY AS POSSIBLE.
13. CONTRACTOR SHALL RESTORE THE STREAM BED AND BANKS TO APPROXIMATE PRE-CONSTRUCTION CONTOURS, BUT NOT TO EXCEED 2 HORIZONTAL TO 1 VERTICAL.
 - a. CONTRACTOR SHALL INSTALL PERMANENT EROSION AND SEDIMENT CONTROL STRUCTURES AS INDICATED ON A SITE SPECIFIC BASIS. IN THE ABSENCE OF SITE SPECIFIC INFORMATION, A FLEXIBLE CHANNEL LINER SUCH AS NAG C125 OR C350 WHICH IS CAPABLE OF WITHSTANDING ANTICIPATED FLOW SHALL BE INSTALLED. ALTERNATIVELY, ROCK RIP-RAP SHALL BE INSTALLED.
 - b. ANY MATERIALS PLACED IN THE STREAM TO FACILITATE CONSTRUCTION SHALL BE REMOVED DURING RESTORATION. BANKS SHALL BE STABILIZED AND TEMPORARY SEDIMENT BARRIERS INSTALLED AS SOON AS POSSIBLE AFTER CROSSING, BUT WITHIN 24 HOURS OF COMPLETING THE CROSSING.
 - c. MAINTAIN A SILT FENCE OR STRAW BALE BARRIER ALONG THE WATER COURSE UNTIL VEGETATION IS ESTABLISHED IN ADJACENT DISTURBED AREAS.
14. WHEN THE STREAMBED HAS BEEN RESTORED, THE CREEK BANKS ARE TO BE CONTOURED TO A STABLE ANGLE AND PROTECTED WITH EROSION RESISTANT MATERIAL COMPATIBLE WITH FLOW VELOCITY BETWEEN DAMS (E.G., EROSION CONTROL BLANKETS, CRIBBING, ROCK RIP-RAP, ETC.). THE DAMS ARE TO BE REMOVED DOWNSTREAM FIRST. KEEP PUMP RUNNING UNTIL NORMAL FLOW IS RESUMED. COMPLETE BANK TRIMMING AND EROSION PROTECTION. IF SANDBAGS ARE USED FOR THE DAMS, PLACE AND REMOVE BY HAND TO AVOID EQUIPMENT BREAKING BAGS.

REFER TO SHEET 1

		16350 PARK TEN PLACE, SUITE 101 HOUSTON, TX, 77084 PH: (281) 616-0100 TRC PROJ. #53595, LIC. NO. EF 4588					
				TYPICAL DAM AND PUMP CROSSING			
NO.		REVISION		DATE		APPR.	
SCALE		DATE		DRAWN		CHECKED	
NTS							
				APPROVED		WEI PROJ. NO.	
						DRAWING NUMBER	
						SHEET	
						STD-A-106	
						2 OF 2	



1 OF 2

DRY FLUME CROSSINGS

THE FOLLOWING IS A SEQUENCE OF CONSTRUCTION AND MITIGATION MEASURES TO BE FOLLOWED AT ALL "DRY FLUME" TYPE CROSSINGS.


SEQUENCE OF ACTIVITIES


- STEP 1. CLEAR AND GRADE CERTIFICATED RIGHT-OF-WAY AS NECESSARY.
- STEP 2. IMPLEMENT THE TEMPORARY EROSION AND SEDIMENT CONTROLS.
- STEP 3. FABRICATE PIPE.
- STEP 4. INSTALL DRY STREAM CROSSING MATERIALS.
- STEP 5. EXCAVATE TRENCH AND INSTALL PIPE.
- STEP 6. BACKFILL AND RESTORE STREAM BANKS.
- STEP 7. REMOVE FLUME CROSSING.
- STEP 8. IMPLEMENT THE PERMANENT EROSION AND SEDIMENTATION CONTROLS.

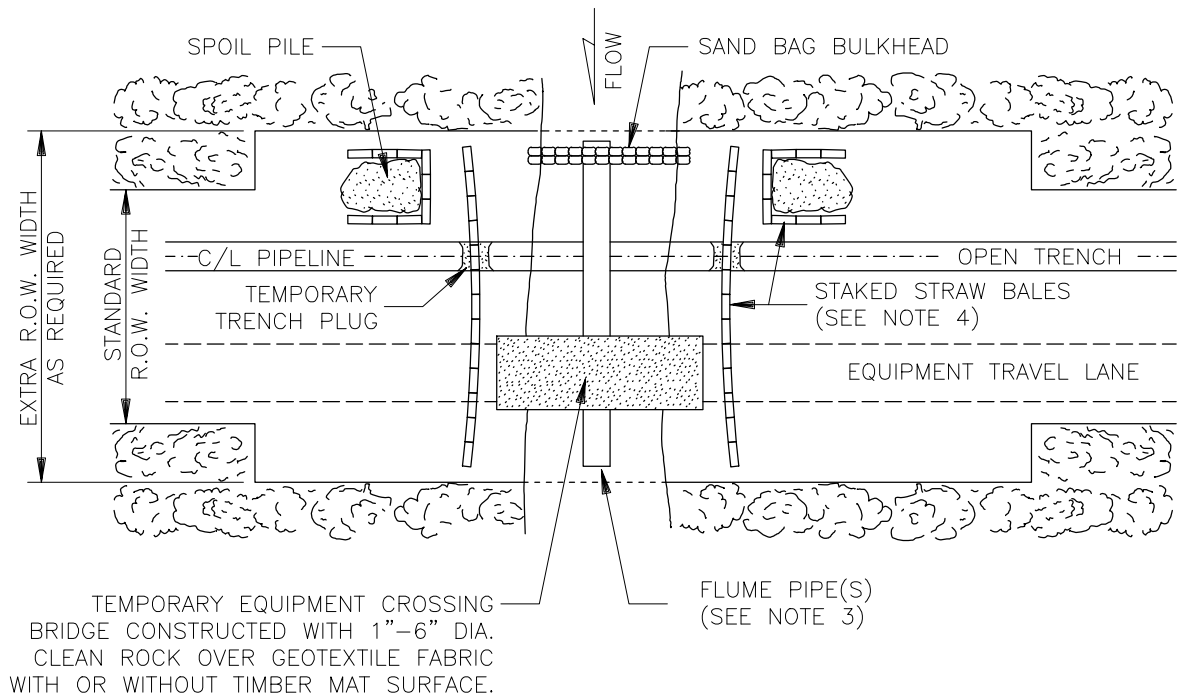
NOTES:

1. MARK OUT AND MAINTAIN LIMITS OF AUTHORIZED WORK AREAS WITH FENCING OR FLAGGING TAPE TO AVOID UNNECESSARY DISTURBANCE OF VEGETATION. ENSURE EQUIPMENT OPERATORS WORKING ON THE CROSSING HAVE BEEN BRIEFED ABOUT THIS PLAN AND THE MEASURES NEEDED TO PROTECT WATER QUALITY.
2. ALL NECESSARY EQUIPMENT AND MATERIALS TO BUILD THE FLUME MUST BE ON SITE OR READILY AVAILABLE PRIOR TO COMMENCING IN-WATER WORK.
3. TO THE EXTENT POSSIBLE, MAINTAIN A MINIMUM 10 FT. VEGETATIVE BUFFER STRIP BETWEEN DISTURBED AREAS AND THE WATERCOURSE. INSTALL AND MAINTAIN A SILT FENCE OR STRAW BALE BARRIER UPSLOPE OF THE BUFFER STRIP ON EACH SIDE OF THE WATERCOURSE.
4. CONTRACTOR SHALL SUPPLY, INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES, AS DEPICTED OR ALONG DOWN GRADIENT SIDES OF WORK AREAS AND STAGING AREAS SUCH THAT NO HEAVILY SILT LADEN WATER ENTERS STREAM.
 - a. NO HEAVILY SILT LADEN WATER SHALL BE DISCHARGED DIRECTLY OR INDIRECTLY INTO THE STREAM.
 - b. EROSION AND SEDIMENT CONTROL STRUCTURE LOCATIONS AS DEPICTED ARE APPROXIMATE AND MAY BE ADJUSTED AS DIRECTED BY THE COMPANY INSPECTOR TO ACTUAL SITE CONDITIONS.
 - c. SILT FENCE OR STRAW BALE INSTALLATIONS SHALL INCLUDE REMOVABLE SECTIONS TO FACILITATE ACCESS DURING CONSTRUCTION. UTILIZE STRAW BALE BARRIERS ONLY IN LIEU OF A SILT FENCE WHERE FREQUENT ACCESS IS REQUIRED.
 - d. SEDIMENT LADEN WATER FROM TRENCH DEWATERING SHALL BE DISCHARGED TO A WELL VEGETATED UPLAND AREA INTO A STRAW BALE DEWATERING STRUCTURE OR GEOTEXTILE FILTER BAG.
 - e. SEDIMENT CONTROL STRUCTURES MUST BE IN PLACE AT ALL TIMES ACROSS THE DISTURBED PORTIONS OF THE RIGHT-OF-WAY EXCEPT DURING EXCAVATION/INSTALLATION OF THE CROSSING PIPE.
 - f. SOFT DITCH PLUGS MUST REMAIN IN PLACE AT CONVENIENT LOCATIONS TO SEPARATE MAINLINE DITCH FROM THE RIVER CROSSING UNTIL THE RIVER CROSSING IS INSTALLED AND BACKFILLED.
5. PIPE SHALL BE STRUNG AND WELDED FOR READY INSTALLATION PRIOR TO WATERCOURSE TRENCHING.
6. FLUME CAPACITY DURING DRY CROSSING SHALL BE SUFFICIENT TO ACCOMMODATE 1.5 TIMES THE FLOW MEASURED AT THE TIME OF CONSTRUCTION PROVIDED THAT THE FLUMES WILL BE IN PLACE NOT MORE THAN 96 HOURS AND NO PRECIPITATION IS FORECAST. FLUME CAPACITY FOR VEHICLE ACCESS SHALL BE SUFFICIENT TO PASS THE 2 YEAR DESIGN FLOW OR THE FLOW REASONABLY EXPECTED TO OCCUR DURING THE INSTALLATION. EXCESS FLUMES REQUIRED FOR LONGER TERM ACCESS SHALL BE CAPPED DURING DRY CROSSING PROCEDURES.
7. ENSURE THAT THE DAMS AND VEHICLE-CROSSING ARE LOCATED FAR ENOUGH APART TO ALLOW FOR A WIDE EXCAVATION. FLUMES ARE TO BE SET WITH 10 PERCENT OF THEIR DIAMETER BELOW STREAMBED LEVEL WHERE SOIL CONDITIONS PERMIT (OTHERWISE INSTALLED AT STREAM GRADE AND SLOPE).
8. PLACE IMPERVIOUS DAMS AT EACH END OF THE FLUME, UPSTREAM FIRST, THEN DOWNSTREAM. ACCEPTABLE ALTERNATIVES INCLUDE GRAVEL WITH RIP-RAP PROTECTION, SAND BAGS, STEEL PLATE AND ROCKFILL. DURING INSTALLATION, INSTALL AN IMPERVIOUS MEMBRANE, IF NECESSARY, TO LIMIT LEAKAGE, DAMS MAY NEED KEYING INTO THE BANK AND STREAMBED.
9. EXCAVATE TRENCH THROUGH PLUGS AND UNDER FLUME FROM BOTH SIDES. WORK IS TO BE COMPLETED AS QUICKLY AS POSSIBLE.
 - a. LOWER IN PIPE BY PASSING UNDER FLUME AND BACKFILL IMMEDIATELY WITH SPOIL MATERIAL.
 - b. IT IS NOT NECESSARY TO DEWATER THE IN-STREAM TRENCH, HOWEVER, DISPLACED WATER SHALL BE PUMPED TO A STABLE UPLAND AREA TO AVOID OVERTOPPING OF DAMS DURING PIPE PLACEMENT.
 - c. IF THE SPOIL MATERIAL IS NOT SUITABLE, USE IMPORTED CLEAN GRANULAR MATERIAL.
 - d. IF BLASTING IS REQUIRED, USE CONTROLLED BLASTING TECHNIQUES TO PREVENT DAMAGE TO THE FLOW CONVEYANCE SYSTEM. ALTERNATIVELY, BLASTING MAY BE ACCOMPLISHED PRIOR TO FLUME INSTALLATION BY DRILLING THROUGH THE OVERBURDEN.
10. EXCAVATED MATERIAL MUST NOT BE STOCKPILED WITHIN 10 FT. OF THE WATERCOURSE. THIS MATERIAL MUST BE CONTAINED WITHIN BERM CONTAINMENT, WITH SECONDARY SILT FENCE PROTECTION TO PREVENT SATURATED SOIL FROM FLOWING BACK INTO THE WATERCOURSE.
11. DEWATERING OF THE ONLAND TRENCH SHOULD OCCUR IN A STABLE VEGETATED AREA A MINIMUM OF 50 FT. FROM ANY WATERBODY. THE PUMP DISCHARGE SHOULD BE DIRECTED ONTO A STABLE SPILL PAD CONSTRUCTED OF ROCKFILL OR TIMBERS TO PREVENT LOCALIZED EROSION. THE DISCHARGE WATER SHOULD ALSO BE FORCED INTO SHEET FLOW IMMEDIATELY BEYOND THE SPILL PAD BY USING STRAW BALES AND THE NATURAL TOPOGRAPHY.
12. FLUMES SHOULD BE REMOVED AS SOON AS POSSIBLE, WHEN NO LONGER REQUIRED FOR PIPE LAYING OR FOR ROAD ACCESS, IN THE FOLLOWING MANNER:
 - a. REMOVE THE VEHICLE CROSSING RAMP. BANKS ARE TO BE RESTORED TO A STABLE ANGLE AND PROTECTED WITH EROSION RESISTANT MATERIAL COMPATIBLE WITH THE FLOW CONDITIONS (E.G., EROSION CONTROL BLANKETS, CRIBBING, ROCK RIP-RAP, ETC.) TO THE MAXIMUM EXTENT POSSIBLE BEFORE REMOVING THE DAMS.
 - b. REMOVE DOWNSTREAM DAM.
 - c. REMOVE UPSTREAM DAM.
 - d. REMOVE FLUME.
 - e. COMPLETE BANK TRIMMING AND EROSION PROTECTION. IF SANDBAGS ARE USED FOR THE DAMS, PLACE AND REMOVE BY HAND TO AVOID EQUIPMENT BREAKING BAGS.
13. CONTRACTOR SHALL RESTORE THE STREAM BED AND BANKS TO APPROXIMATE PRE-CONSTRUCTION CONTOURS, BUT NOT TO EXCEED 2 HORIZONTAL TO 1 VERTICAL.
 - a. CONTRACTOR SHALL INSTALL PERMANENT EROSION AND SEDIMENT CONTROL STRUCTURES AS INDICATED ON A SITE SPECIFIC BASIS. IN THE ABSENCE OF SITE SPECIFIC INFORMATION, A FLEXIBLE CHANNEL LINER SUCH AS NAG C125 OR C350 WHICH IS CAPABLE OF WITHSTANDING ANTICIPATED FLOW SHALL BE INSTALLED. ALTERNATIVELY, ROCK RIP-RAP SHALL BE INSTALLED.
 - b. ANY MATERIALS PLACED IN THE STREAM TO FACILITATE CONSTRUCTION SHALL BE REMOVED DURING RESTORATION. BANKS SHALL BE STABILIZED AND TEMPORARY SEDIMENT BARRIERS INSTALLED AS SOON AS POSSIBLE AFTER CROSSING, BUT WITHIN 24 HOURS OF COMPLETING THE CROSSING.
 - c. MAINTAIN A SILT FENCE OR STRAW BALE BARRIER ALONG THE WATER COURSE UNTIL VEGETATION IS ESTABLISHED IN ADJACENT DISTURBED AREAS.

REFER TO SHEET 1

 <p>16350 PARK TEN PLACE, SUITE 101 HOUSTON, TX 77064 PH: (281) 616-0100 TRC PROJ. #53595, LIC. NO. EF 4588</p>		<p>TYPICAL DRY FLUME CROSSING</p>		
NO.	REVISION	DATE	APPR.	
SCALE	DATE	DRAWN	CHECKED	APPROVED
NTS				
WEI PROJ. NO.		DRAWING NUMBER		SHEET
		STD-A-100		2 OF 2

<div><div>16350 PARK TEN PLACE, SUITE 101 HOUSTON, TX. 77084 PH: (281) 616-0100 TRC PROJ. #53595, LIC. No. EF 4588</div></div>					PIPELINE STANDARD DRY STREAM CROSSING (PUMP AROUND & FLUME EQUIPMENT CROSSING)				
NO.	REVISION			DATE	APPR.				
SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.	DRAWING NUMBER		SHEET	
NTS						STD-A-035		1 OF 1	



NOTES:

1. USE FLUME TRENCH METHOD FOR SMALL STREAMS SUPPORTING COLD OR WARM WATER FISHERIES.
2. LOWER PIPE INTO TRENCH BY PASSING UNDER THE FLUME PIPES.
3. USE AS MANY FLUME PIPES (MIN. 20" DIA.) AS REQUIRED TO INSURE FLOW IS NOT OBSTRUCTED BY BRIDGE.
4. WHEN MORE THAN ONE FLUME PIPE IS REQUIRED, MINIMUM SPACING BETWEEN FLUME PIPES IS 0.5 TIMES THE NOMINAL DIAMETER OF THE FLUME PIPE.
5. STRAW BALES TO BE IN PLACE ACROSS TRAVEL LANE DURING PERIODS OF NO CONSTRUCTION ACTIVITY.
6. MINIMUM CLEAN ROCK COVER OVER FLUME PIPE(S) IS 1.0' – 0.0".

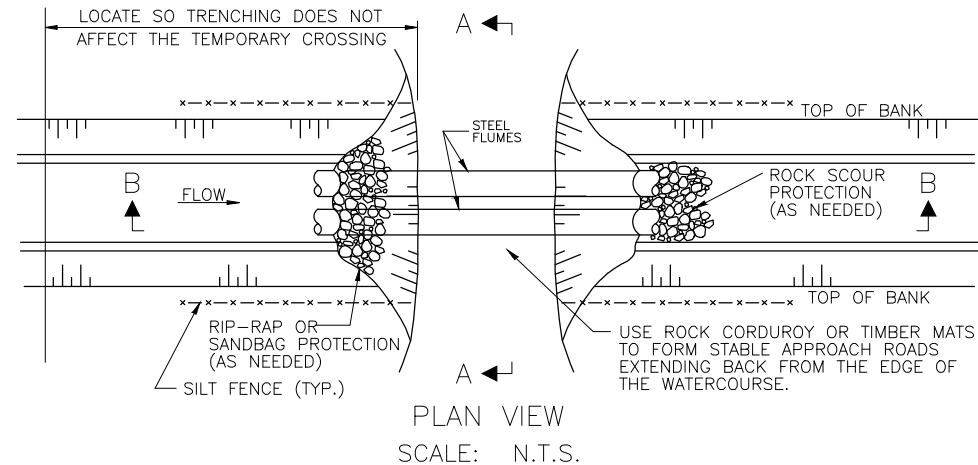
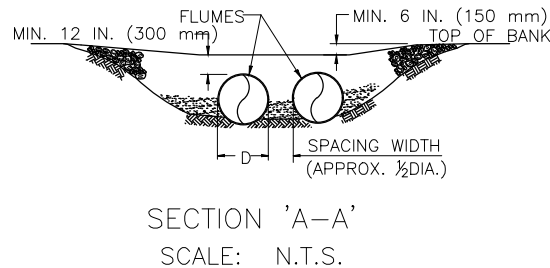


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

NO.	REVISION	DATE	APPR.
SCALE	DATE	DRAWN	CHECKED
NTS			

APPROVED	WEI PROJ. NO.	DRAWING NUMBER	SHEET
		STD-A-110	1 OF 1

PIPELINE STANDARD
DRY STREAM CROSSING
(FLUME & TRENCH AND
EQUIPMENT CROSSING)



THE FOLLOWING IS A SEQUENCE OF CONSTRUCTION AND MITIGATION MEASURES TO BE FOLLOWED AT ALL TEMPORARY FLUME VEHICLE CROSSINGS.

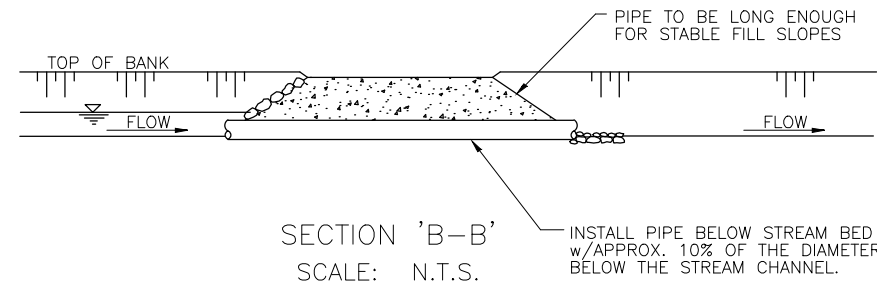
1. A PORTABLE FLEXI-FLOAT, OR TEMPORARY BRIDGE MAY BE SUBSTITUTED FOR THE TEMPORARY FLUME CROSSING.


2. THE LENGTH OF THE FLUME SHALL BE SUFFICIENT TO SPAN THE ENTIRE AREA REQUIRED FOR VEHICULAR ACCESS, EXTENDING 4 FT. BEYOND TOE OF FILL MATERIAL, SO TRENCHING WILL NOT AFFECT THE ROAD CROSSING. A LONGER PIPE IS TO BE USED, IF NEEDED, TO MAINTAIN STABLE SIDE SLOPES. FLUME CAPACITY TO BE BASED ON THE 2-YEAR DESIGN FLOW OR MAXIMUM FLOW ANTICIPATED TO OCCUR DURING INSTALLATION, AS SPECIFIED IN CONSTRUCTION DOCUMENTS.

3. WHERE PRACTICAL, BACKFILL AROUND THE PIPES AT THE ROAD WITH CLEAN, COARSE ROCK FILL MATERIAL. IF SCOUR IS POSSIBLE, RIP-RAP IS TO BE PLACED ON THE STREAM BED DOWN-STREAM OF THE PIPE OUTLET EXTENDING A MINIMUM OF TWO PIPE DIAMETERS. ALTERNATIVELY, TIMBER EQUIPMENT MATS, SAND BAGS OR TIMBER CORDUROY MAY BE USED TO FORM THE TRAVEL SURFACE.

4. TO REDUCE MUD ENTERING THE WATER FROM EQUIPMENT TRACKS, THE APPROACH ROAD LEADING TO THE CULVERT CROSSING MUST BE RAISED AND STABLE SO EQUIPMENT LOADS ARE SUPPORTED A SUFFICIENT DISTANCE BACK FROM THE WATER. IF CUTS ARE NEEDED TO OBTAIN A SATISFACTORY GRADE, THEY ARE TO BE DUG WITH SIDE DITCHES AND STABLE SLOPES. EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED TO LIMIT THE POTENTIAL FOR SEDIMENT TO ENTER THE WATERBED (E.G., CHECK DAMS, SILT FENCE, RIP-RAP, SEED AND MULCH, SEDIMENT TRAPS, ETC.).

5. PERIODICALLY CHECK THE TEMPORARY CROSSING INSTALLATION AND REMOVE ANY BUILD-UP OF SEDIMENT OR DEBRIS ON THE BRIDGE. DISPOSE OF THIS MATERIAL AT LEAST 100 FT. FROM THE WATERCOURSE AND ABOVE THE HIGH WATER LEVEL.



				16350 PARK TEN PLACE, SUITE 101 HOUSTON, TX. 77084 PH: (281) 616-0100 TRC PROJ. #53595, LIC. No. EF 4588				TYPICAL FLUME EQUIPMENT CROSSING			
NO.	REVISION			DATE	APPR.						
SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.	DRAWING NUMBER		SHEET			
NTS						STD-A-101		1 OF 1			

PLAN VIEW

NOTES:

SCALE: N.T.S.

1. APPLICABLE TO MINOR (<10') WATERBODIES THAT ARE NOT FLOWING AT THE TIME OF CONSTRUCTION, OR DO NOT SUPPORT A SIGNIFICANT FISHERY.
2. VEHICLE ACCESS IS ONLY REQUIRED WHERE NECESSARY TO FACILITATE EQUIPMENT MOVEMENT AND MAY CONSIST OF TIMBER MATS, TEMPORARY BRIDGES, RAIL FLATCARS OR FLUME CROSSINGS.
3. INSTALL SOFT PLUGS FOLLOWING EXCAVATION OF MAINLINE DITCH THROUGH CROSSING.
4. INSTALL SEDIMENT BARRIERS AS INDICATED. PROTECT ACCESS WITH SILT FENCE GATES OR STRAW BALE BARRIERS.
5. MAINLINE PIPE SECTION MAY SPAN CROSSING IN PREPARATION FOR LOWER IN.
6. SILT FENCE OR STRAW BALE "GATE" TO BE CLOSED AT NIGHT OR DURING RAINFALL.




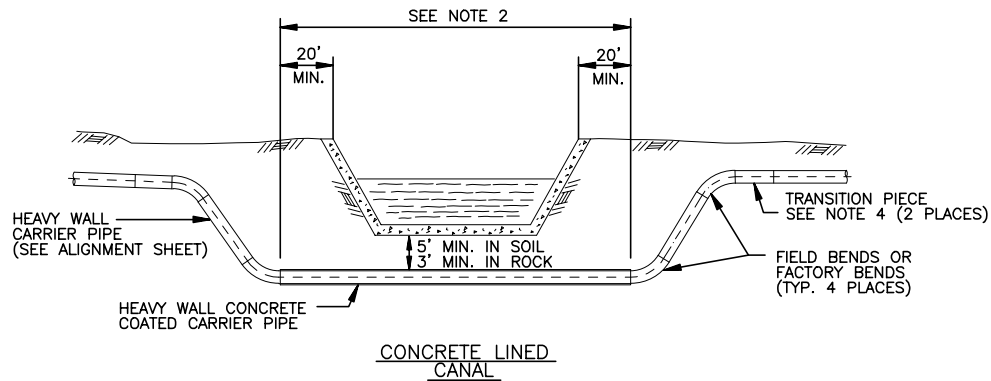
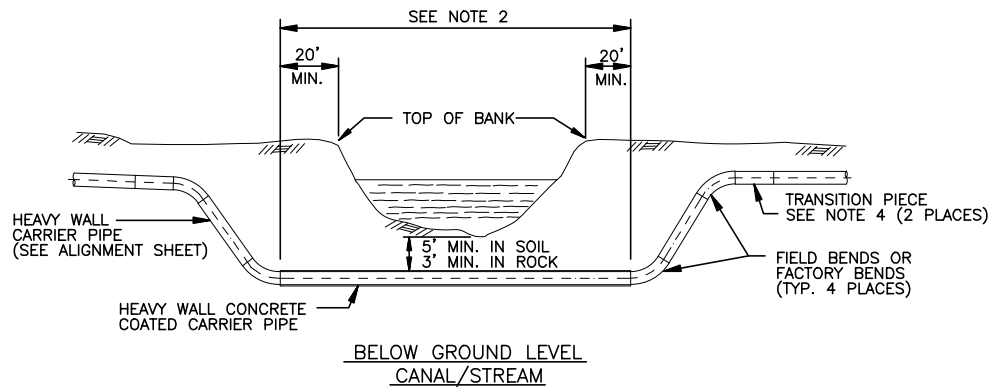
16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

NON-FLOWING
INTERMITTENT/AGRICULTURAL
OPEN CUT CROSSING

NO.	REVISION			DATE	APPR.			
SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.	DRAWING NUMBER		SHEET
NTS						STD-A-096		1 OF 1

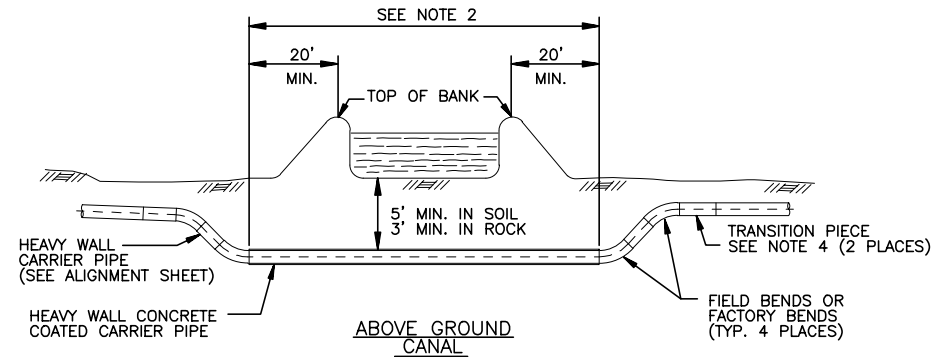


				16350 PARK TEN PLACE, SUITE 101 HOUSTON, TX. 77084 PH: (281) 616-0100 TRC PROJ. #53595, LIC. No. EF 4588			
NO. _____				REVISION _____			
DATE _____				APPR. _____			
SCALE _____				DATE _____			
DRAWN _____				CHECKED _____			
APPROVED _____				WEI PROJ. NO. _____			
NTS _____				DRAWING NUMBER _____			
STD-A-029				SHEET _____			
1 OF 1				1 OF 1			



NOTES:

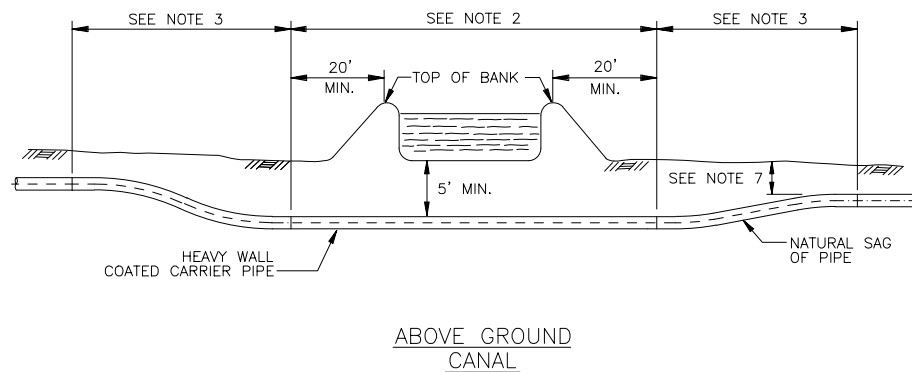
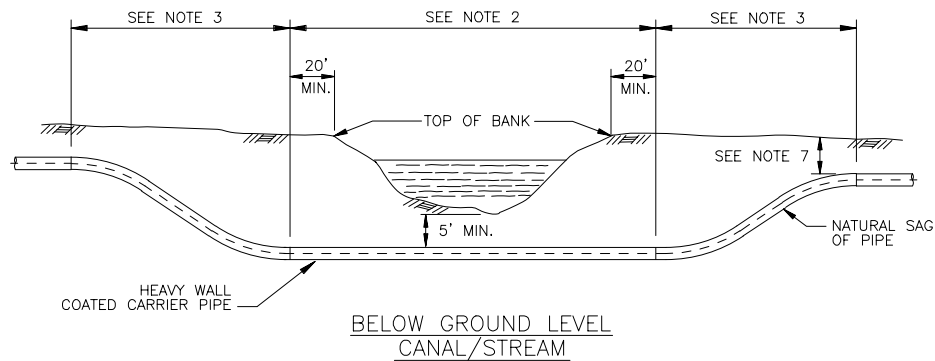
1. CROSSING INSTALLATION SHALL BE IN ACCORDANCE WITH APPLICABLE PERMITS.
2. PIPE IN THIS AREA SHALL BE CONCRETE COATED PER DWG. WEI-STD-A-016 OR PER DWG. WEI-STD-A-015 IF CONCRETE WEIGHT COATING IS SPECIFIED. PIPE SHALL BE LEVEL UNDER CROSSING TO THE LENGTH AND DEPTH SHOWN.
3. CONTINUOUS CONCRETE COATING MATERIALS FOR PIPE WILL BE FURNISHED AND INSTALLED BY CONTRACTOR.
4. INSTALL TRANSITION PIECE AS REQUIRED FOR DIFFERENT WALL THICKNESS PIPE AT CROSSING PER ALIGNMENT SHEETS.
5. THIS STANDARD DRAWING IS APPLICABLE TO ALL FABRICATED CANAL/STREAM CROSSINGS UNLESS NOTED OTHERWISE IN THE CONSTRUCTION DRAWINGS OR SPECIFICATIONS.
6. CONCRETE-LINED AND ABOVE-GROUND CANAL CROSSINGS SHALL BE INSTALLED BY BORING RIGHT-OF-WAY TO RIGHT-OF-WAY. BELOW GROUND CANALS/STREAMS MAY BE INSTALLED BY OPEN CUT IF ALLOWED BY THE PERMIT.
7. OPEN CUT CANAL CROSSING BACKFILL SHALL BE OF SELECT MOIST BACKFILL MATERIAL, PLACED IN LAYERS AND THOROUGHLY COMPACTED BY MECHANICAL TAMPING TO 95% OF COMPACTION, AS PER ASTM D-1557-70, OR AS REQUIRED BY CANAL OWNER.



16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX 77064
PH: (713) 616-0100
TRC PROJ. #55995, UIC. NO. TX-F-82

PIPELINE STANDARD
FABRICATED CANAL
AND STREAM CROSSING

NO.	REVISION	DATE	APPR.	WEI PROJ. NO.	DRAWING NUMBER	SHEET
SCALE	DATE	DRAWN	CHECKED	APPROVED		
NTS					STD-B-012	1 OF 1



NOTES:

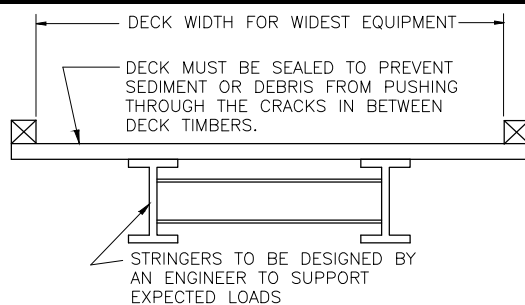
1. CROSSING INSTALLATION SHALL BE IN ACCORDANCE WITH APPLICABLE PERMITS.
2. PIPE SHALL BE LEVEL UNDER CROSSING TO THE LENGTH AND DEPTH SHOWN.
3. PIPE SHALL BE LAID TO EXTRA DEPTH AT THESE LOCATIONS TO ACCOMMODATE FREE-STRESS BENDING.
4. THIS STANDARD DRAWING IS APPLICABLE TO ALL FREE-STRESS CANAL/STREAM CROSSINGS UNLESS NOTED OTHERWISE IN THE CONSTRUCTION DRAWINGS OR SPECIFICATIONS.
5. ABOVE-GROUND CANAL CROSSINGS SHALL BE INSTALLED BY BORING RIGHT-OF-WAY TO RIGHT-OF-WAY. BELOW-GROUND CANALS/STREAMS MAY BE INSTALLED BY OPEN CUT.
6. OPEN CUT CANAL CROSSING BACKFILL SHALL BE OF SELECT MOIST BACKFILL MATERIAL, PLACED IN LAYERS AND THOROUGHLY COMPACTED BY MECHANICAL TAMPING TO 95% OF COMPACTION, AS PER ASTM D-1557-70, OR AS REQUIRED BY CANAL OWNER.
7. 3' FT COVER ON MAINLINE; 4' FT COVER ON AGRICULTURAL LANDS.



16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX 77064
PH: (281) 416-9100
TRC PROJ. #53595, LC. No. EF 4588

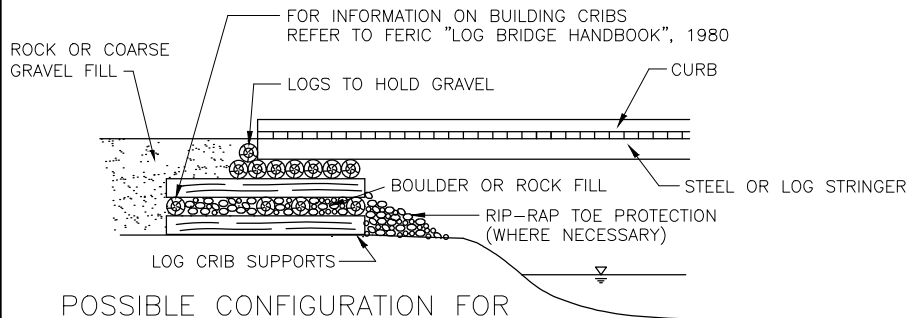
PIPELINE STANDARD
FREE-STRESS CANAL
AND STREAM CROSSING

NO.	REVISION	DATE	APPR.	WEI PROJ. NO.	DRAWING NUMBER	SHEET
SCALE	DATE	DRAWN	CHECKED	APPROVED		
NTS					STD-B-013	1 OF 1



SECTION 'A-A'

ALL BRIDGES TO HAVE CURBS 6" OR HIGHER TO CONTAIN SEDIMENT OR DEBRIS.



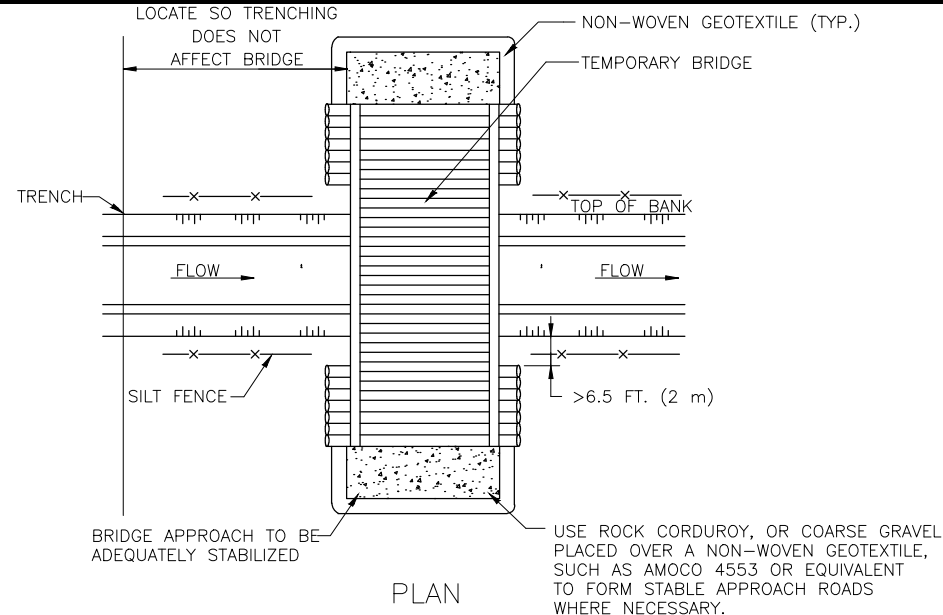
POSSIBLE CONFIGURATION FOR TEMPORARY CRIB ABUTMENT

THE FOLLOWING IS A SEQUENCE OF CONSTRUCTION AND MITIGATION MEASURES TO BE FOLLOWED AT ALL TEMPORARY BRIDGE CROSSINGS.

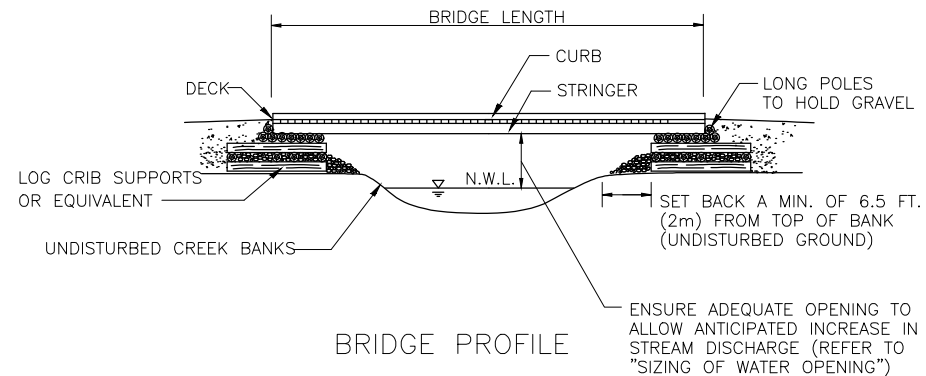
1. A PRE-FABRICATED BRIDGE OR FLATBED RAILCAR , FLEXI-FLOAT OR FLUMED VEHICLE CROSSING MAY BE SUBSTITUTED FOR THE TEMPORARY BRIDGE.
2. INSTALL THE BRIDGE IN A MANNER THAT WILL MINIMIZE SEDIMENT ENTERING THE WATER. STRINGERS MUST BE DESIGNED TO SUPPORT THE LOADS EXPECTED ON THE BRIDGE. CURBS AT LEAST 6 IN. HIGH MUST BE INSTALLED ALONG THE EDGE OF THE DECK TO CONTAIN SEDIMENT AND DEBRIS ON THE BRIDGE. FASTENERS CONNECTING COMPONENTS MUST BE STRONG ENOUGH TO HOLD THEM IN POSITION DURING THE LIFE OF THE BRIDGE. CRIBS ARE TO BE FILLED WITH ROCK OR COBBLE. RIP-RAP EROSION PROTECTION IS TO BE PLACED AROUND THE CRIBS AND ON ANY FILL SLOPES PROJECTING INTO THE WATER.

ROAD APPROACHES LEADING TO THE BRIDGE MUST BE RAISED AND STABLE SO EQUIPMENT LOADS ARE SUPPORTED A SUFFICIENT DISTANCE BACK FROM THE WATER TO REDUCE SEDIMENT AND DEBRIS ENTERING THE STREAM FROM EQUIPMENT TRACKS. DO NOT USE SOIL TO CONSTRUCT OR STABILIZE EQUIPMENT BRIDGES. IF CUTS ARE NEEDED TO OBTAIN A SATISFACTORY GRADE, THEY ARE TO BE DUG WITH SIDE DITCHES AND STABLE SLOPES. EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED TO KEEP SEDIMENT ON LAND (E.G., SILT FENCING, FILTER CLOTH, RIP-RAP, SEED AND MULCH, ETC.).


PERIODICALLY CHECK BRIDGE INSTALLATION AND REMOVE ANY BUILD-UP OF SEDIMENT OR DEBRIS ON THE BRIDGE.



PLAN




BRIDGE PROFILE

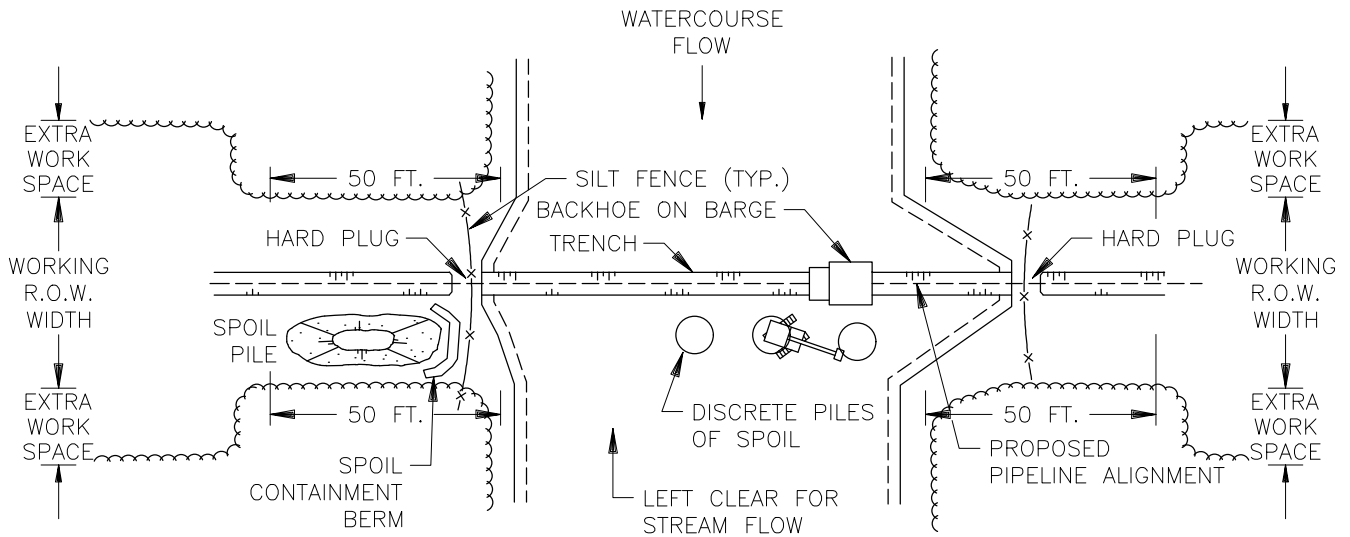
					16350 PARK TEN PLACE, SUITE 101 HOUSTON, TX. 77084 PH: (281) 616-0100 TRC PROJ. #53595, LIC. No. EF 4588			
					TYPICAL TEMPORARY BRIDGE			
NO.	REVISION			DATE	APPR.			
SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.	DRAWING NUMBER		SHEET
NTS						STD-A-098		1 OF 1

NOTES:

- 1- WORK SPACE MAXIMUM LIMITS ARE DEPICTED. STAGING FOR MAKEUP LOCATED A MINIMUM OF 50 FEET FROM WATERBODY.
- 2- CLEARING MARK CLEARING LIMITS AND MINIMIZE CLEARING OF RIPARIAN VEGETATION. WOODY VEGETATION SHALL BE CUT AT GROUND LEVEL AND THE STUMPS/ROOTS LEFT IN PLACE TO THE EXTENT POSSIBLE.
- 3- TOPSOIL STRIPPING TOPSOIL SHALL BE STRIPPED FROM ALL WETLAND AREAS OVER THE DITCH LINE AND SPOIL AREAS.
- 4- SPILL PREVENTION CONTRACTOR SHALL INSTALL SIGNS 100 FEET MINIMUM FROM EACH STREAM BANK AND WETLAND TO IDENTIFY THE HAZARDOUS MATERIALS EXCLUSION AREA.
- 5- EROSION & A. SEDIMENT CONTROL CONTRACTOR SHALL SUPPLY, INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES, AS DEPICTED OR ALONG DOWN GRADIENT SIDES OF WORK AREAS AND STAGING AREAS SUCH THAT NO HEAVILY SILT LADEN WATER ENTERS STREAM OR WETLAND.
 - B. NO HEAVILY SILT LADEN WATER SHALL BE DISCHARGED DIRECTLY OR INDIRECTLY INTO THE STREAM. ALL EROSION AND SEDIMENT CONTROL STRUCTURE LOCATIONS AS DEPICTED ARE APPROXIMATE AND MAY BE ADJUSTED AS DIRECTED BY THE COMPANY INSPECTOR TO SUIT ACTUAL SITE CONDITIONS. SILT FENCE OR STRAW BALE INSTALLATIONS SHALL INCLUDE REMOVABLE SECTIONS TO FACILITATE ACCESS DURING CONSTRUCTION.
 - C. SEDIMENT LADEN WATER FROM TRENCH DEWATERING SHALL BE DISCHARGED TO A WELL VEGETATED UPLAND AREA, INTO A STRAW BALE DEWATERING STRUCTURE OR GEOTEXTILE FILTER BAG. SEDIMENT CONTROL STRUCTURES MUST BE IN PLACE AT ALL TIMES ACROSS THE DISTURBED CONSTRUCTION RIGHT OF WAY EXCEPT DURING EXCAVATION /INSTALLATION OF THE CROSSING PIPE.
 - D. SOFT DITCH PLUGS MUST REMAIN IN PLACE AT CONVENIENT LOCATIONS TO SEPARATE MAINLINE DITCH FROM THE RIVER CROSSING UNTIL THE RIVER CROSSING IS INSTALLED AND BACKFILLED.
 - E. TRENCH BREAKERS ARE TO BE INSTALLED AT THE SAME SPACING AND IMMEDIATELY UPSLOPE OF PERMANENT SLOPE BREAKERS, OR AS DIRECTED BY THE COMPANY.
- 6- INSTALLATION CONTRACTOR SHALL MAINTAIN HARD PLUGS IN THE DITCH AT THE RIVER EDGE UNTIL JUST PRIOR TO PIPE INSTALLATION. CONTRACTOR SHALL EXCAVATE TRENCH AND INSTALL PIPE AS EXPEDIENTLY AS PRACTICAL TO REDUCE THE DURATION OF WORK ACTIVITIES IN THE STREAM BED.
- 7- SPOIL PLACEMENT CONTRACTOR SHALL PLACE TRENCH SPOIL ONLY IN CERTIFICATED WORK SPACE AND A MINIMUM OF 10 FEET FROM THE STREAM BANKS TO PREVENT ENTRY OF SPOIL INTO THE STREAM FLOW. SPOIL SHALL BE CONTAINED AS NECESSARY USING EITHER A STRAW BALE BARRIER OR AN EARTH/ROCK BERM.
- 8- CLEANUP BANK STABILIZATION RESTORATION CONTRACTOR SHALL RESTORE THE STREAM BED AND BANKS TO APPROXIMATE PRECONSTRUCTION CONTOURS, UNLESS OTHERWISE APPROVED BY THE COMPANY. CONTRACTOR SHALL INSTALL PERMANENT EROSION AND SEDIMENT CONTROL STRUCTURES AS INDICATED. ANY MATERIALS PLACED IN THE STREAM TO FACILITATE CONSTRUCTION SHALL BE REMOVED DURING RESTORATION. BANKS SHALL BE STABILIZED AND TEMPORARY SEDIMENT BARRIERS INSTALLED AS SOON AS POSSIBLE AFTER CROSSING, BUT WITHIN 24 HOURS OF COMPLETING THE CROSSING. MAINTAIN A SILT FENCE OR STRAW BALE BARRIER ALONG THE WATER COURSE AND WETLAND BOUNDARIES UNTIL VEGETATION IS ESTABLISHED IN ADJACENT DISTURBED AREAS.
- 9- TEMPORARY VEHICLE CROSSING VEHICLE CROSSING CAN BE CONSTRUCTED USING EITHER A FLUME CROSSING OR A TEMPORARY BRIDGE.
- 10- REFERENCE REFER TO WATER BODY AND WETLAND CROSSING PROCEDURES FOR REQUIREMENTS.

REFER TO SHEET 1

		16350 PARK TEN PLACE, SUITE 101 HOUSTON, TX. 77084 PH: (281) 616-0100 TRC PROJ. #53595, LIC. No. EF 4588		TYPICAL OPEN CUT WET CROSSING								
NO.		REVISION					DATE		APPR.			
SCALE		DATE					DRAWN		CHECKED		APPROVED	
NTS												
WEI PROJ. NO.				DRAWING NUMBER				SHEET				
				STD-A-095				2 OF 2				



PLAN VIEW

SCALE: N.T.S.

NOTES:

1. SCHEDULE INSTREAM ACTIVITY FOR LOW FLOW PERIODS AND FOR THE APPROPRIATE TIMING WINDOW.
2. OBTAIN ADDITIONAL TEMPORARY WORK SPACE TO ALLOW INSTREAM SPOIL TO BE STORED ON BANKS WHERE POSSIBLE. THE SIZE OF THE AREA REQUIRED WILL DEPEND UPON THE ENCOUNTERED SOIL TYPE AND TOPOGRAPHIC CONDITIONS.
3. PIPE MAKEUP AREA TO BE LOCATED AT LEAST 50 FT. BACK FROM THE EDGE OF THE WATERCOURSE.
4. MAINTAIN HARD PLUGS AT BANK.
5. THE INSTREAM PIPE SECTION SHOULD BE FABRICATED, TESTED AND COATED PRIOR TO COMMENCEMENT OF INSTREAM ACTIVITY.
6. TRENCH THROUGH WATERCOURSE, RETAINING TRENCH/HARD PLUGS AT EACH BANK UNTIL JUST PRIOR TO PIPE INSTALLATION.
7. STOCKPILE AS MUCH SPOIL ON BANKS AS POSSIBLE. CONSTRUCT SPOIL CONTAINMENT BERM AND/OR SUMP WITH SECONDARY SILT FENCE PROTECTION TO PREVENT SATURATED SPOIL FROM FLOWING BACK INTO WATERCOURSE. ALL INSTREAM SPOIL STORED ON LAND SHOULD BE KEPT A MINIMUM OF 10 FT. FROM THE EDGE OF THE WATERCOURSE.
8. PLACE INSTREAM STORAGE IN DISCRETE PILES ON DOWNSTREAM SIDE OF TRENCH, AVOIDING AREAS OF HIGHEST WATER VELOCITY. DO NOT WINDROW SPOIL ACROSS THE CHANNEL OR BLOCK MORE THAN 2/3 OF THE CHANNEL WIDTH. MAINTAIN STREAM FLOW IF PRESENT, THROUGHOUT CROSSING CONSTRUCTION. LOWER IN AND BACKFILL IMMEDIATELY. RESTORE STREAM CHANNEL TO APPROXIMATE PRE-CONSTRUCTION PROFILE. ATTEMPT TO COMPLETE ALL INSTREAM ACTIVITY AS QUICKLY AS POSSIBLE.
9. RESTORE AND STABILIZE WATERCOURSE BANKS AND APPROACHES AS CLOSE TO ORIGINAL GRADE AS POSSIBLE. INSTALL BANK PROTECTION AS SPECIFIED IN THE CONSTRUCTION DRAWINGS.

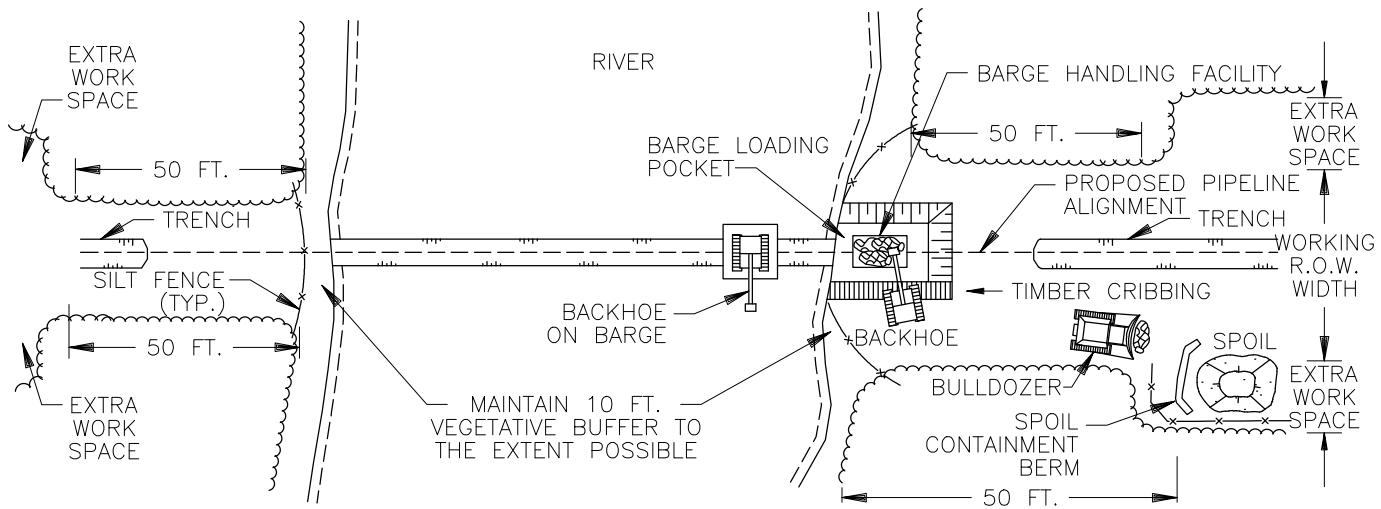


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77064
PH: (281) 616-0100
TRC PROJ. #53595, LIC. NO. EF 4588

NO.	REVISION	DATE	APPR.
SCALE	DATE	DRAWN	CHECKED
NTS			

OPEN CUT WET CROSSING USING
IN-STREAM OR BARGE MOUNTED
EQUIPMENT & SIDE CAST METHOD

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-103	1 OF 1



PLAN VIEW

SCALE: N.T.S.

NOTES:

1. SCHEDULE INSTREAM ACTIVITY FOR LOW FLOW PERIODS AND FOR THE APPROPRIATE TIMING WINDOW.
2. THE INSTREAM PIPE SECTION SHOULD BE FABRICATED, TESTED AND COATED PRIOR TO COMMENCEMENT OF INSTREAM ACTIVITY.
3. BARGE CAN BE STABILIZED BY TUG BOAT, SPUDS, WINCHED CABLES CONNECTED TO DEADMAN ANCHORS ON SHORE, OR A COMBINATION OF THESE METHODS.
4. BARGE HANDLING FACILITY TO BE EXCAVATED DEEP ENOUGH TO ACCOMMODATE LOADED BARGE WITH CRIBBING USED ON AT LEAST ONE SIDE TO ALLOW LOADING AND UNLOADING BY BACKHOE.
5. THE INSTREAM SPOIL REMOVED BY THE BARGE IS TO BE STOCKPILED IN A SPOIL CONTAINMENT AREA LOCATED A MINIMUM OF 50 FT. FROM THE RIVER'S EDGE. THE SPOIL IS TO BE LOCATED BEHIND BERM CONTAINMENT WITH SECONDARY SILT FENCE PROTECTION.
6. REMOVE SPOIL FROM THE BARGE BY BACKHOE AND MOVE TO CONTAINMENT AREA BY BULLDOZER, LOADER, OR TRUCK.
7. RESTORE AND STABILIZE WATERCOURSE BANKS AND APPROACHES AS CLOSE TO ORIGINAL GRADE AS POSSIBLE. INSTALL BANK PROTECTION AS SPECIFIED IN THE CONSTRUCTION DRAWINGS.

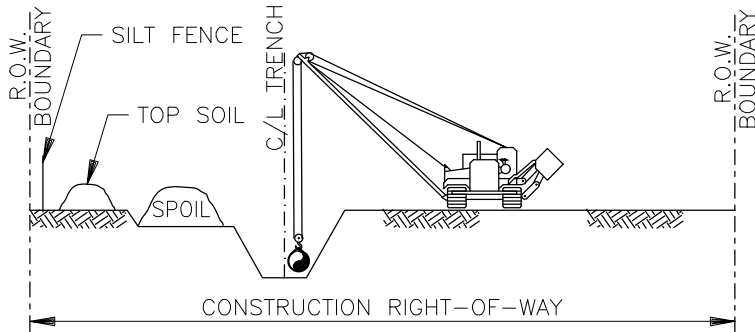


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

NO.	REVISION	DATE	APPR.
SCALE	DATE	DRAWN	CHECKED
NTS			

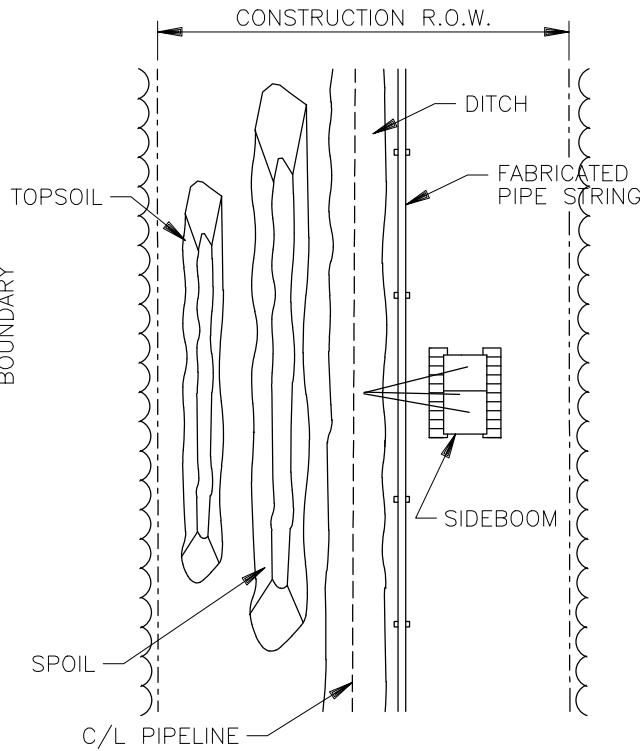
OPEN CUT WET CROSSING
WITH BACKHOE ON BARGE AND
ON SHORE SPOIL CONTAINMENT

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-104	1 OF 1



CROSS SECTION

SCALE: N.T.S.



PLAN VIEW

SCALE: N.T.S.

CONSTRUCTION PROCEDURE NOTES:

1. FLAG WETLAND BOUNDARIES PRIOR TO CLEARING.
2. NO REFUELING OF MOBILE EQUIPMENT IS ALLOWED WITHIN 100 FEET OF WETLAND. PLACE "NO FUELING" SIGN POSTS 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER SPCC PLAN.
3. INSTALL TEMPORARY SLOPE BREAKER UPSLOPE WITHIN 100 FEET OF WETLAND BOUNDARY IF DIRECTED BY THE ENVIRONMENTAL INSPECTOR.
4. CONSTRUCT WHEN DRY, IF POSSIBLE. IF SITE BECOMES WET AT TIME OF TRENCHING, AVOID SOIL COMPACTION BY UTILIZING PREFABRICATED EQUIPMENT MATS.
5. AVOID ADJACENT WETLANDS. INSTALL SEDIMENT BARRIERS (STRAW BALES AND/OR SILT FENCE) AT DOWN SLOPE EDGE OF RIGHT-OF-WAY ALONG WETLAND EDGE IF EVIDENT, OTHERWISE INSTALL BARRIER ON BOTH EDGES.
6. RESTRICT ROOT GRUBBING TO ONLY THAT AREA OVER THE DITCHLINE AND DITCH SPOIL AREAS. GRIND STUMPS IF NECESSARY IN OTHER AREAS TO FACILITATE CONSTRUCTION.
7. CONDUCT TRENCH LINE TOPSOIL STRIPPING (IF TOPSOIL IS NOT SATURATED). SALVAGE TOPSOIL TO ACTUAL DEPTH OR A MAXIMUM DEPTH OF 12 INCHES, AS DETERMINED BY THE ENVIRONMENTAL INSPECTOR. SEGREGATED TOPSOIL PILE MAY BE LOCATED ON SPOIL SIDE, AS REQUIRED.
8. TRENCH THROUGH WETLANDS.
9. PIPE SECTION MAY BE FABRICATED WITHIN THE WETLAND AND ADJACENT TO ALIGNMENT, OR IN STAGING AREA OUTSIDE THE WETLAND AND WALKED IN.
10. LOWER-IN PIPE. PRIOR TO BACKFILLING TRENCH, TRENCH PLUG REQUIREMENTS SHALL BE DETERMINED BY THE ENVIRONMENTAL INSPECTOR. BACKFILL TRENCH.
11. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY, REPLACE TOPSOIL AND INSTALL PERMANENT EROSION CONTROL.
12. REMOVE ANY TIMBER MATS OR PREFABRICATED MATS FROM WETLANDS UPON COMPLETION.
13. NO FILL SHALL BE PLACED UNDERNEATH BOARD MATS DURING PROJECT CONSTRUCTION.

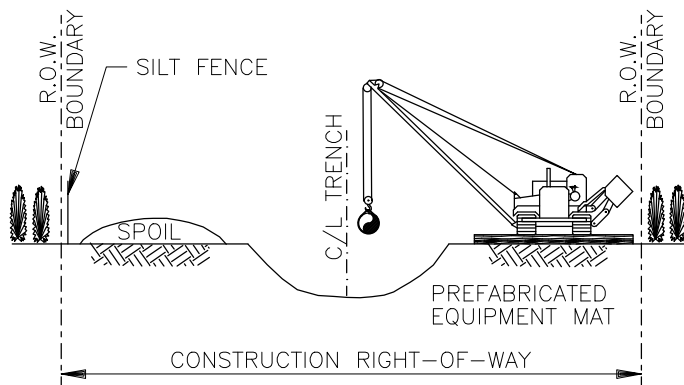


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

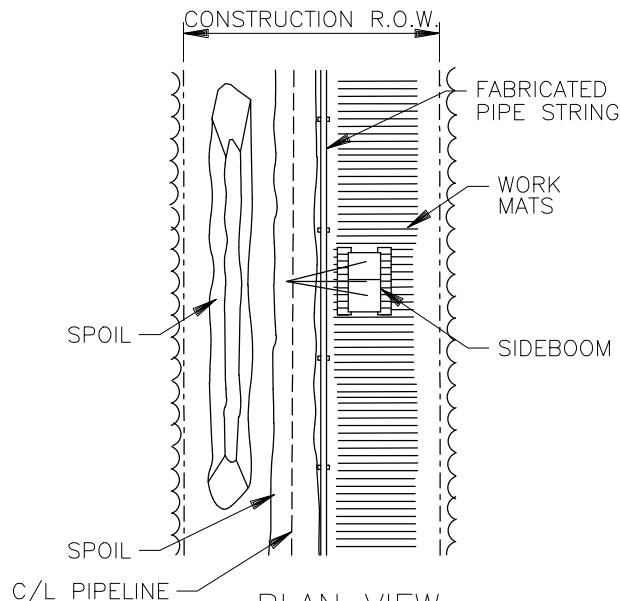
TYPE 1 'DRY'
WETLAND CROSSING

NO.	REVISION				DATE	APPR.
	SCALE	DATE	DRAWN	CHECKED	APPROVED	
	NTS					

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-107	1 OF 1



CROSS SECTION
SCALE: N.T.S.



PLAN VIEW
SCALE: N.T.S.

CONSTRUCTION PROCEDURE NOTES:

1. FLAG WETLAND BOUNDARIES PRIOR TO CLEARING.
2. NO REFUELING OF MOBILE EQUIPMENT IS ALLOWED WITHIN 100 FEET OF WETLAND. PLACE "NO FUELING" SIGN POSTS 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER SPCC PLAN.
3. INSTALL TEMPORARY SLOPE BREAKER UPSLOPE WITHIN 100 FEET OF WETLAND BOUNDARY IF DIRECTED BY THE ENVIRONMENTAL INSPECTOR.
4. MINIMIZE SOIL COMPACTION BY UTILIZING PREFABRICATED EQUIPMENT MATS.
5. AVOID ADJACENT WETLANDS. INSTALL SEDIMENT BARRIERS (STRAW BALES AND/OR SILT FENCE) AT DOWN SLOPE EDGE OF RIGHT-OF-WAY AND ALONG WETLAND EDGE AS REQUIRED.
6. RESTRICT ROOT GRUBBING TO ONLY THAT AREA OVER THE DITCHLINE AND DITCH SPOIL AREAS. GRIND STUMPS IF NECESSARY IN OTHER AREAS TO FACILITATE CONSTRUCTION.
7. TOPSOIL STRIPPING SHALL NOT BE REQUIRED IN SATURATED SOIL CONDITIONS.
8. LEAVE HARD PLUGS AT THE EDGE OF WETLAND UNTIL JUST PRIOR TO TRENCHING.
9. INSTALL TIMBER MATS THROUGH ENTIRE WETLAND AREA. EQUIPMENT NECESSARY FOR RIGHT-OF-WAY CLEARING MAY MAKE ONE (1) PASS THROUGH THE WETLAND BEFORE MATS ARE INSTALLED.
10. TRENCH THROUGH WETLANDS.
11. PIPE SECTION MAY BE FABRICATED WITHIN THE WETLAND AND ADJACENT TO ALIGNMENT, OR IN STAGING AREA OUTSIDE THE WETLAND AND WALKED IN.
12. LOWER-IN PIPE, INSTALL TRENCH PLUGS AT WETLAND EDGES IF DIRECTED BY THE ENVIRONMENTAL INSPECTOR AND BACKFILL IMMEDIATELY.
13. REMOVE ANY TIMBER MATS OR PREFABRICATED MATS FROM WETLANDS UPON COMPLETION.
14. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY, REPLACE TOPSOIL AND INSTALL PERMANENT EROSION CONTROL.
15. GENERALLY, SEEDING IN WETLANDS WILL NOT BE NECESSARY SINCE WETLANDS REVEGETATE QUICKLY AND SOD WILL REMAIN INTACT EXCEPT OVER TRENCH. THE CONTRACTOR SHALL SEED ANY WETLANDS THAT MAY REQUIRE SEEDING AS DETERMINED BY THE ENVIRONMENTAL INSPECTOR.
16. NO FILL SHALL BE PLACED UNDERNEATH BOARD MATS DURING PROJECT CONSTRUCTION.

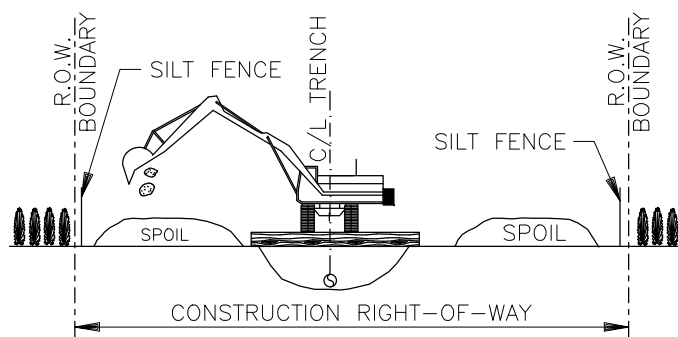


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

TYPE II 'WET' SATURATED
WETLAND CROSSING

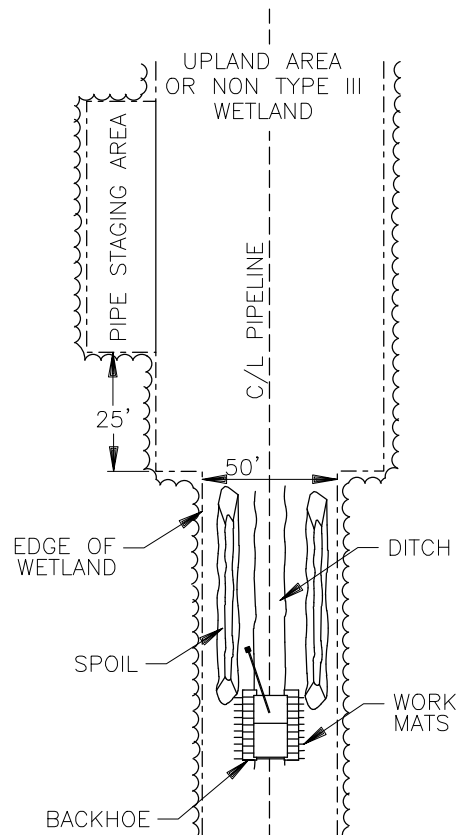
NO.	REVISION				DATE	APPR.
SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.	DRAWING NUMBER
NTS						

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-108	1 OF 1



CROSS SECTION

SCALE: N.T.S.



PLAN VIEW

SCALE: N.T.S.

CONSTRUCTION PROCEDURE NOTES:

1. REDUCE THE CONSTRUCTION RIGHT-OF-WAY TO 75 FEET OR LESS IN TYPE III WETLAND.
2. FLAG WETLAND BOUNDARIES PRIOR TO CLEARING.
3. NO REFUELING OF MOBILE EQUIPMENT IS ALLOWED WITHIN 100 FEET OF WETLAND. PLACE "NO FUELING" SIGN POSTS 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER SPCC PLAN.
4. INSTALL TEMPORARY SLOPE BREAKER UPSLOPE WITHIN 100 FEET OF WETLAND BOUNDARY AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.
5. RESTRICT ROOT GRUBBING TO ONLY THE AREA OVER THE DITCHLINE.
6. TOPSOIL STRIPPING SHALL NOT BE REQUIRED IN SATURATED SOIL CONDITIONS.
7. UTILIZE AMPHIBIOUS EXCAVATORS (PONTON MOUNTED BACKHOES) OR TRACKED BACKHOES SUPPORTED BY FABRICATED TIMBER MATS OR FLOATS, TO EXCAVATE TRENCH. IF FABRICATED TIMBER MATS ARE USED FOR STABILIZATION, THE BACKHOE SHALL GRADUALLY MOVE ACROSS THE WETLAND BY MOVING THE MAT FROM IMMEDIATELY BEHIND TO IMMEDIATELY IN FRONT OF THE BACKHOE'S PATH.
8. AVOID ADJACENT WETLANDS. INSTALL SEDIMENT BARRIERS (STRAW BALES AND/OR SILT FENCE) AT EDGE OF RIGHT-OF-WAY AND ALONG WETLAND EDGE AS REQUIRED.
9. FABRICATE PIPE IN A STAGING AREA OUTSIDE THE TYPE III WETLAND AS INDICATED ON THE CONSTRUCTION DRAWINGS.
10. LEAVE HARD PLUGS AT THE EDGE OF TYPE III WETLAND UNTIL JUST PRIOR TO PIPE PLACEMENT.
11. FLOAT PIPE IN PLACE, LOWER-IN, INSTALL TRENCH PLUGS AT WETLAND EDGES OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR AND BACKFILL IMMEDIATELY.
12. REMOVE ANY MATS OR FILL CONSISTING OF NON-NATIVE MATERIAL FROM WETLANDS UPON COMPLETION.
13. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY AND INSTALL PERMANENT EROSION CONTROL.
14. WETLANDS CROSSED USING PUSH/PULL METHOD TEND TO BE TOO WET FOR EFFECTIVE SEEDING. HOWEVER, IF THE SITE IS DRY ENOUGH AND IF DIRECTED BY THE ENVIRONMENTAL INSPECTOR, THE RIGHT-OF-WAY SHALL BE SEED WITH ANNUAL RYE GRASS TO STABILIZE THE AREA UNTIL INDIGENOUS WETLAND SPECIES CAN RE-ESTABLISH THEMSELVES.
15. NO FILL SHALL BE PLACED UNDERNEATH BOARD MATS DURING PROJECT CONSTRUCTION.



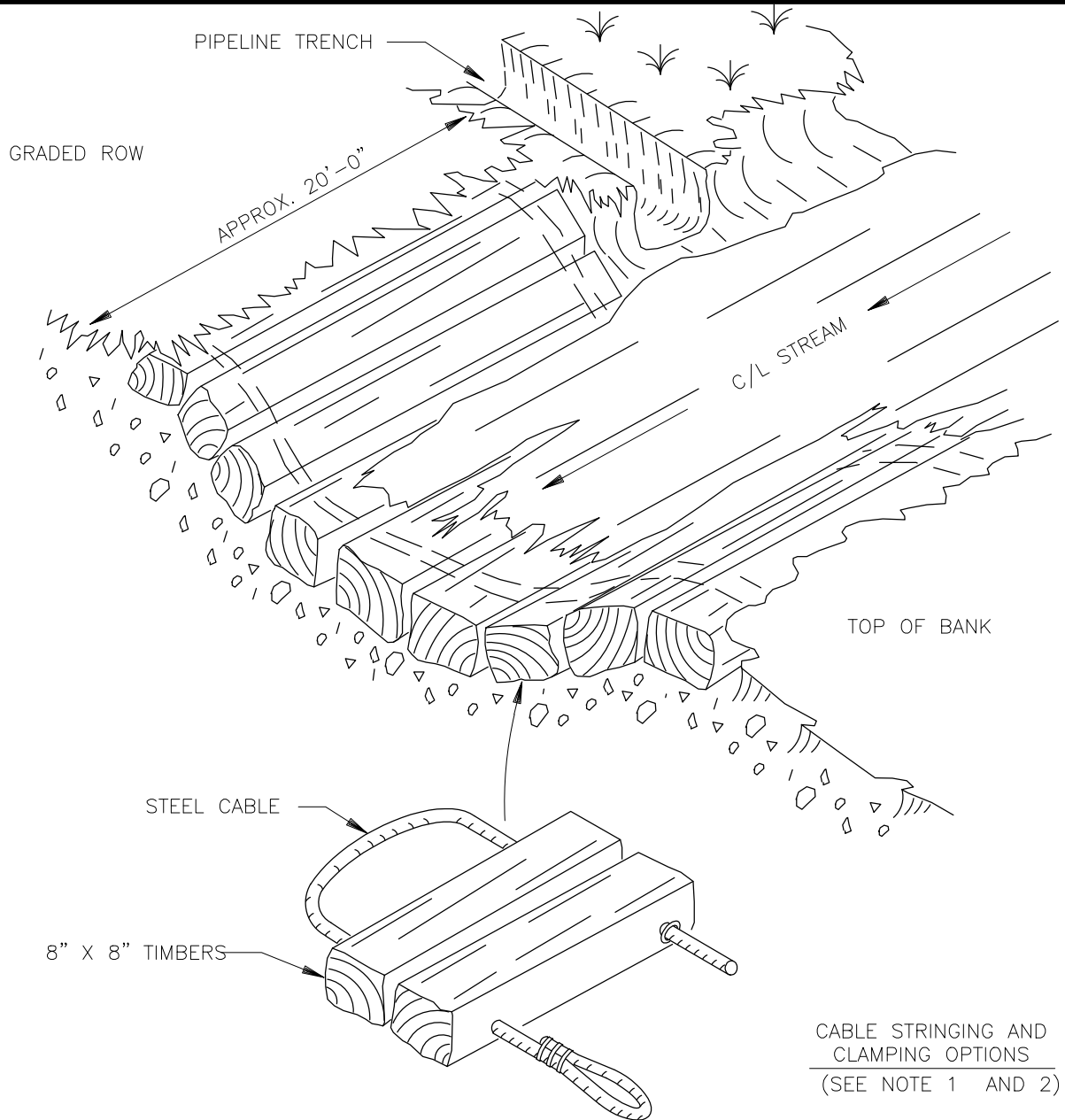
16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. NO. EF 4588

TYPE III 'WET' FLOODED
WETLAND CROSSING
(PUSH / PULL)

NO.	REVISION	DATE	APPR.

SCALE	DATE	DRAWN	CHECKED	APPROVED
NTS				

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-109	1 OF 1



NOTES:

1. STEEL CABLES TO BE STRUNG THROUGH BOTH ENDS OF TIMBERS.
2. STEEL CABLES TO BE SECURED BY ANY OF FOLLOWING MEANS:
 - CLAMP ENDS OF CABLE INTO A LIFTING LOOP.
 - CLAMP ENDS OF CABLE SO CABLE CAN'T BE PULLED BACK THROUGH TIMBERS.
 - LOOP END OF STRUNG CABLE BACK THROUGH HOLES AT OTHER END OF TIMBER.
3. ALL MATERIALS TO BE SUPPLIED BY CONTRACTOR.



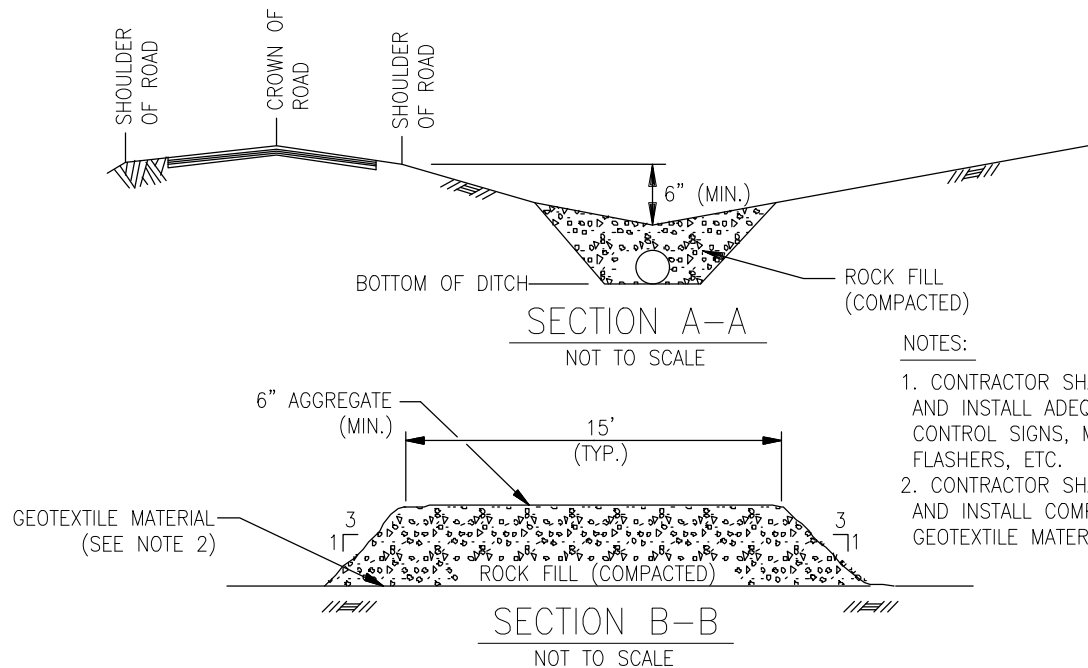
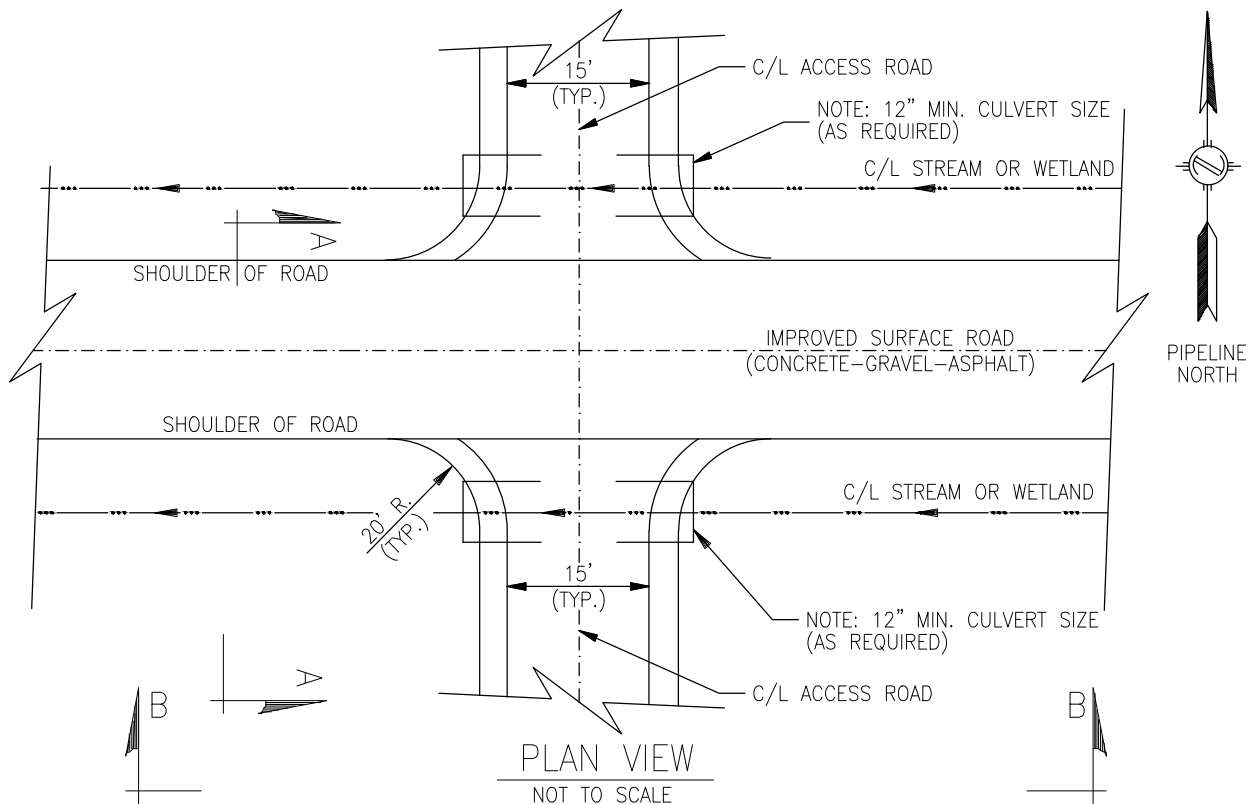
16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

NO.	REVISION			DATE	APPR.
SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.
NTS					

PIPELINE STANDARD
MUD BOARDS
(EQUIPMENT MATS)

STD-A-037

1 OF 1



NOTES:

1. CONTRACTOR SHALL FURNISH AND INSTALL ADEQUATE TRAFFIC CONTROL SIGNS, MARKERS, FLASHERS, ETC.
2. CONTRACTOR SHALL FURNISH AND INSTALL COMPANY APPROVED GEOTEXTILE MATERIAL.

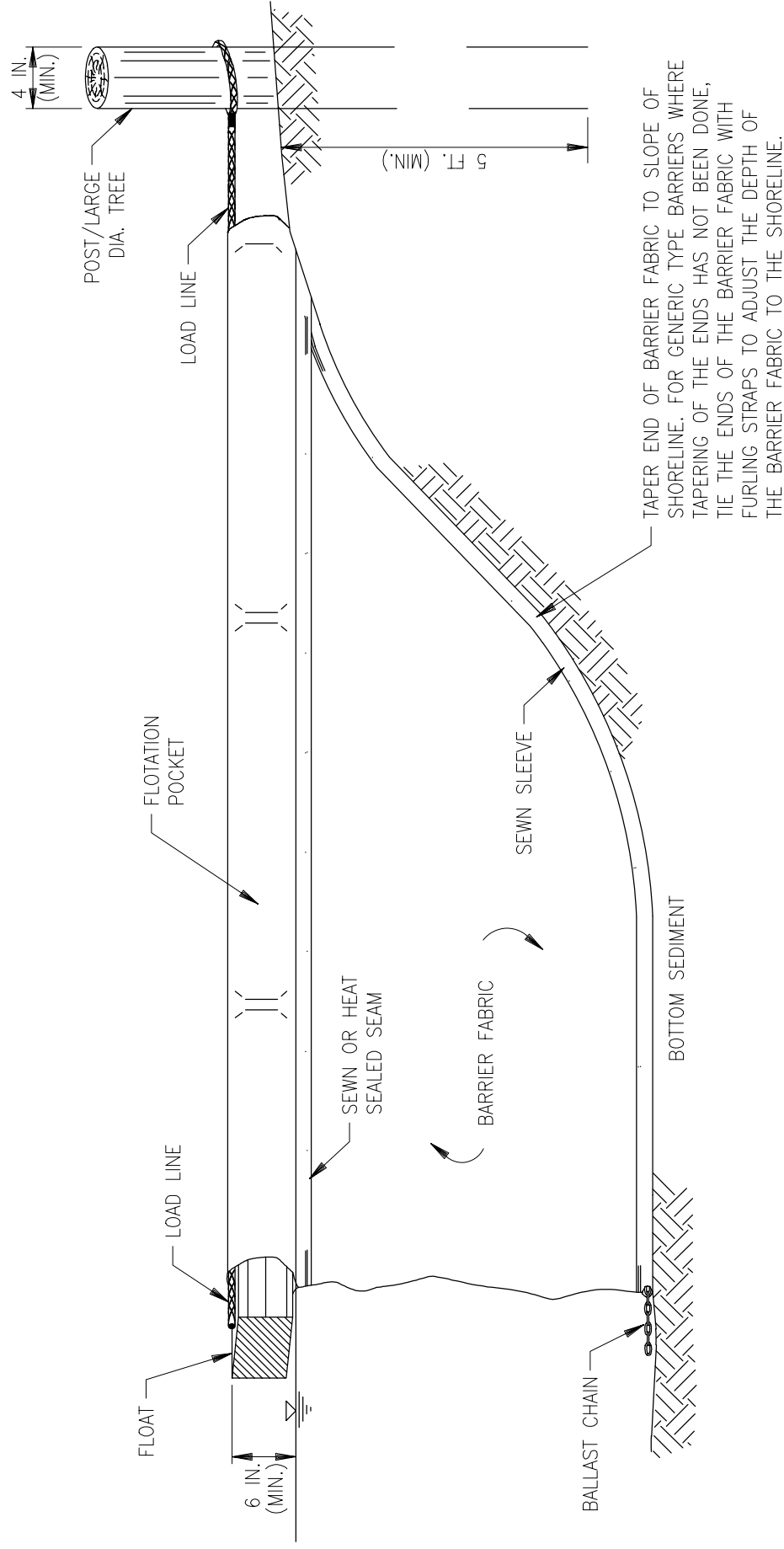


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77064
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

0	ISSUED FOR PERMIT	3/31/16	AL
NO.	REVISION	DATE	APPR.
SCALE	DATE	DRAWN	CHECKED
NTS	3/31/16	SD	JRW
			APPROVED
			AL

TYPICAL CULVERT
INSTALLATION IN STREAM/
WETLAND CROSSING

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-233	1 OF 1



1. TO BE USED ONLY WHERE SPECIFIED ON THE CONSTRUCTION DRAWINGS.
2. NOT TO BE USED TO FILTER STEADY STREAM FLOW.



16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

NO.	REVISION		DATE		APPR.	
	SCALE	DATE	DRAWN	CHECKED	APPROVED	
	NTS					

TYPICAL FLOATING SEDIMENT BARRIER

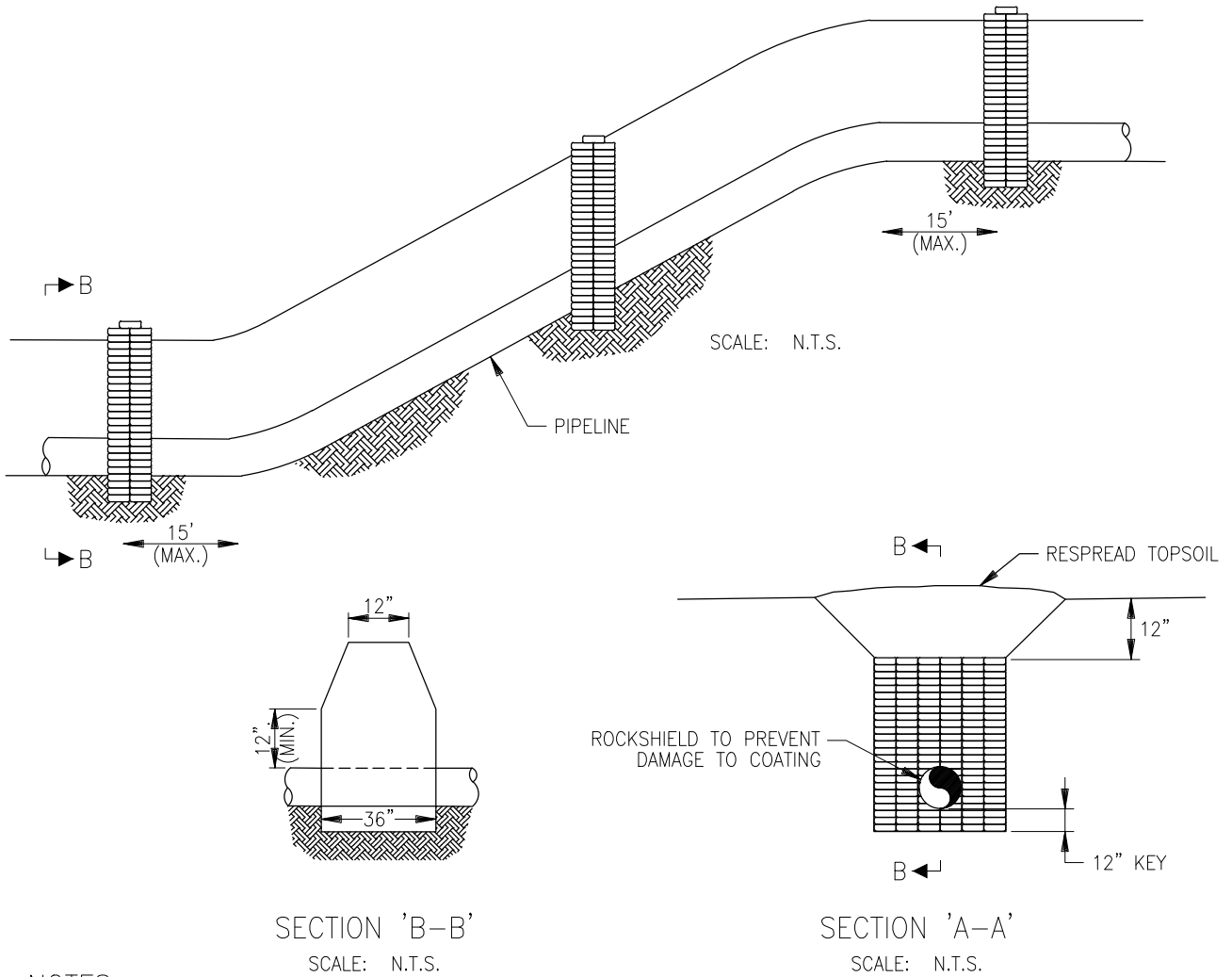
WEI PROJ. NO.

DRAWING NUMBER

SHEET

STD-A-205

1 OF 1



NOTES:

1. INSTALL TRENCH BREAKERS WHERE PIPELINE TRENCH MAY DRAIN A WETLAND OR DIVERT A STREAM AS DIRECTED BY THE COMPANY. BREAKERS SHALL ALSO BE INSTALLED WHERE NATURAL DRAINAGE PATTERN, PROFILE AND TYPE OF BACKFILL MATERIAL MAY RESULT IN LOSS OF BACKFILL MATERIAL OR ALTERATION OF NATURAL DRAINAGE PATTERN.
2. INSTALL TRENCH BREAKERS IMMEDIATELY UPSLOPE OF ALL DIVERSION BERMS UNLESS OTHERWISE AUTHORIZED BY THE COMPANY REPRESENTATIVE.
3. SLOPE BREAKER LOCATIONS AND SPACING SHALL BE DETERMINED IN ACCORDANCE WITH "THE UPLAND EROSION CONTROL, REVEGETATION AND MAINTENANCE PLAN" AND ENVIRONMENTAL SPECIFICATIONS.
4. KEY EACH TRENCH BREAKER A MINIMUM OF ONE (1) FT. INTO BOTTOMS AND SIDES OF TRENCH.
5. OPEN WEAVE HEMP OR JUTE SACKS SHALL BE FILLED WITH AN AVERAGE 55 LBS. MIXTURE OF:
 - 1) ONE (1) PART CEMENT AND SIX (6) PARTS SAND OR SUBSOIL, OR
 - 2) ONE (1) PART CEMENT, THREE (3) PARTS FLYASH, AND FIVE (5) PARTS SAND OR SUBSOIL WITH JUST SUFFICIENT WATER TO PERMIT MIXTURE TO EXUDE AND BOND SACKS TOGETHER. TOPSOIL IS NOT TO BE USED IN SACKS. ALTERNATIVELY, FOAM TRENCH BREAKERS MAY BE USED AS SPECIFIED BY THE ENVIRONMENTAL INSPECTOR.



16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

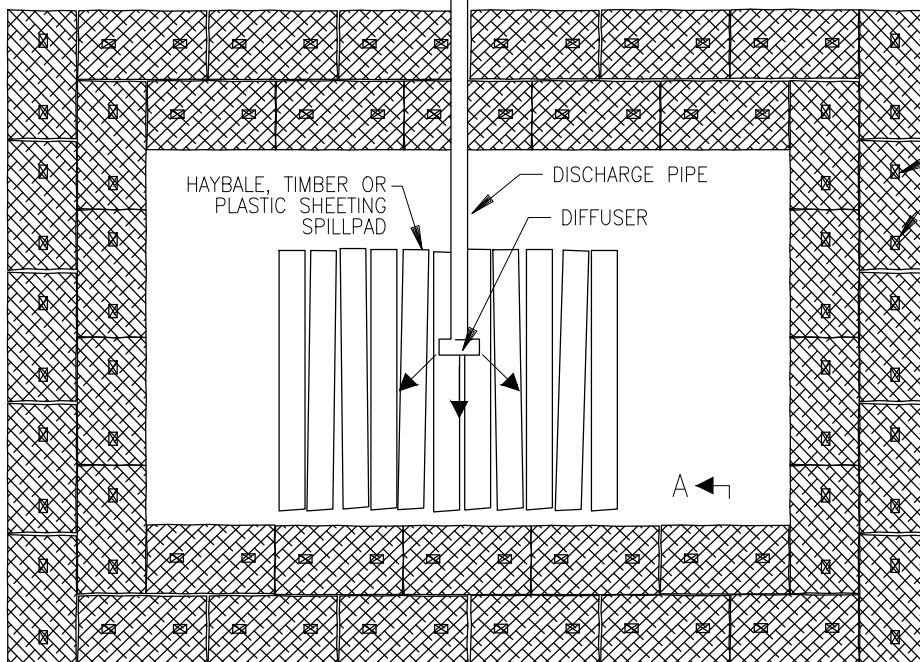
TYPICAL PERMANENT TRENCH BREAKERS

NO.	REVISION			DATE	APPR.
SCALE	DATE	DRAWN	CHECKED	APPROVED	
NTS					

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-198	1 OF 1

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-201	1 OF 1

GENTLE SLOPE—
NATURAL GRADE



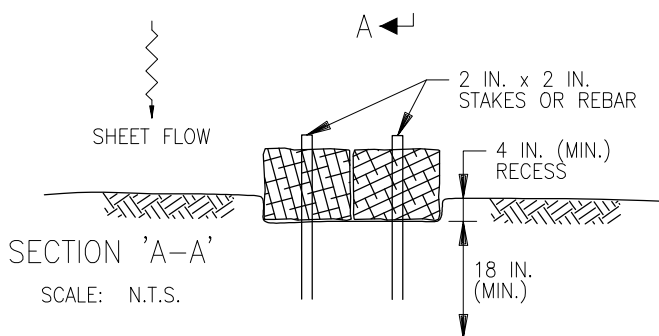
2 IN. x
2 IN.
STAKES
OR REBAR
(TYP.)

STRAW
BALES
(TYP.)

GENTLE SLOPE—
NATURAL GRADE

PLAN

SCALE: N.T.S.



SECTION 'A-A'

SCALE: N.T.S.

NOTES:

1. INSTALL A STRAW BALE DEWATERING STRUCTURE WHEREVER IT IS NECESSARY AND AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR TO PREVENT THE FLOW OF HEAVILY SILT LADEN WATER INTO WATERBODIES OR WETLANDS. ALL DEWATERING ACTIVITIES SHALL BE IN ACCORDANCE WITH ENVIRONMENTAL SPECIFICATION AND RELEVANT PERMITS.
2. DISCHARGE SITE SHOULD BE WELL VEGETATED AND LOCATED AT LEAST 50 FEET FROM ANY WATERCOURSE. THE TOPOGRAPHY OF THE SITE SHOULD BE SUCH THAT WATER WILL FLOW INTO THE DEWATERING STRUCTURE AND AWAY FROM ANY WORK AREAS. THE AREA DOWNSLOPE FROM THE WATERING SITE MUST BE REASONABLY FLAT OR STABILIZED BY VEGETATION OR OTHER MEANS TO ALLOW THE FILTERED WATER TO CONTINUE AS SHEET FLOW.
3. DIRECT THE PUMPED WATER ONTO A STABLE SPILL PAD CONSTRUCTED OF ROCKFILL, WEIGHTED TIMBERS, OR A WOVEN GEOTEXTILE STAKED TO THE GROUND SURFACE, SUCH AS MIRAFI 600X, TERRAFIX 400W, OR A COMPANY APPROVED EQUIVALENT. BEYOND THE SPILL PAD FORCE THE DISCHARGE WATER INTO SHEET FLOW USING STRAW BALES AND THE NATURAL TOPOGRAPHY.
4. DISCHARGE RATES SHOULD BE SUCH THAT THE CAPACITY OF THE STRUCTURE WILL NOT BE EXCEEDED.
5. DISCHARGE WATER SHALL BE FORCED INTO SHEET FLOW IMMEDIATELY BEYOND THE SPILL PAD USING A COMBINATION OF STRAW BALES AND THE NATURAL TOPOGRAPHY. RECESS STRAW BALES A MIN. OF FOUR (4) INCHES. DRIVE TWO (2) STAKES OR REBAR INTO EACH BALE TO ANCHOR THEM IN PLACE.
6. MANUFACTURED FILTER BAGS ARE A SUITABLE ALTERNATIVE TO STRAW BALE STRUCTURES FOR TRENCH DEWATERING. FILTER BAGS SHALL BE INSTALLED AS SPECIFIED BY THE MANUFACTURER. DISPOSE OF FULL FILTER BAGS AT AN APPROVED OFF-SITE FACILITY.

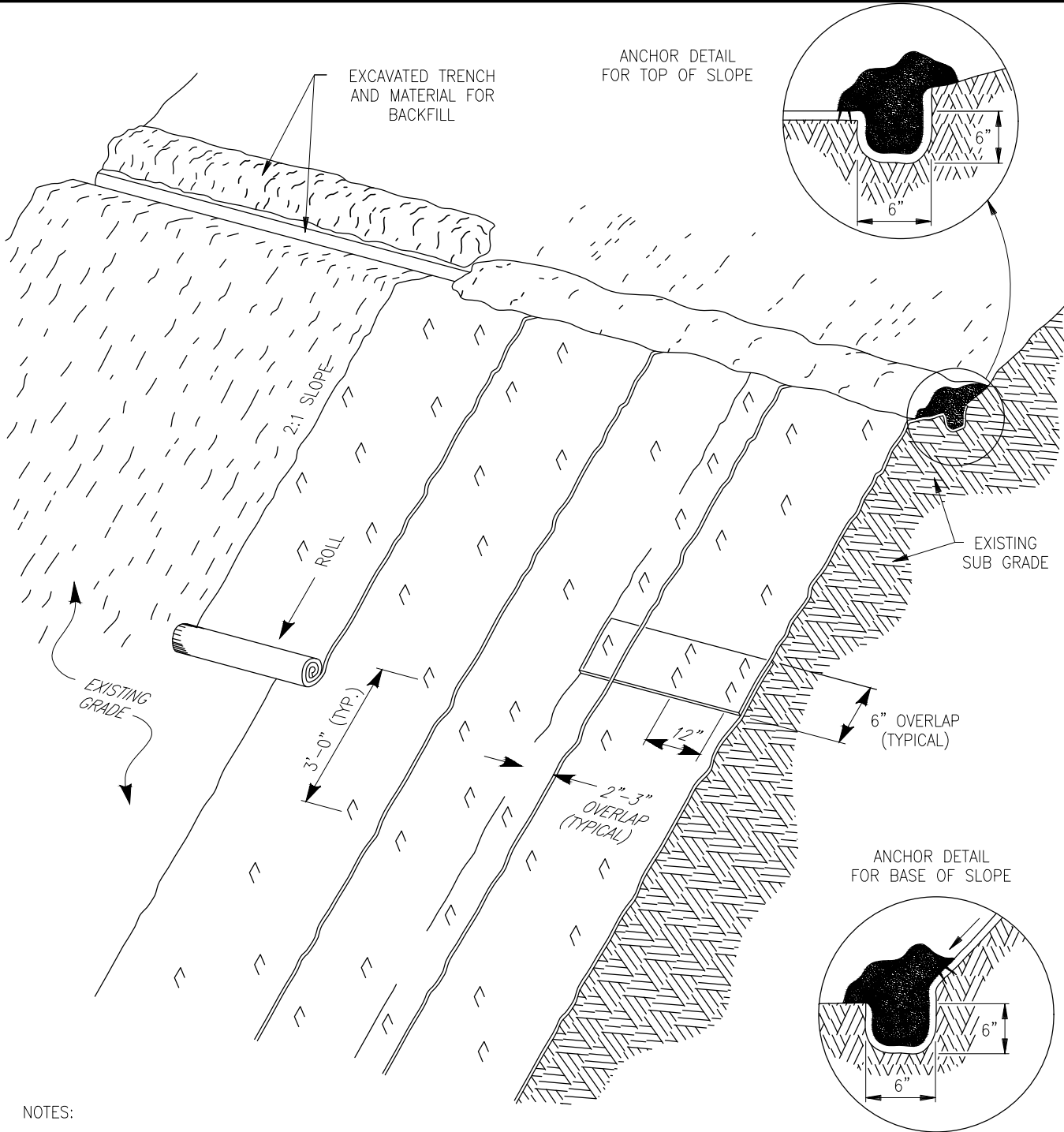


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX, 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

TYPICAL STRAW BALE
DEWATERING STRUCTURE

NO.	REVISION	DATE	APPR.
SCALE	DATE	DRAWN	CHECKED
NTS			

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-204	1 OF 1



NOTES:

1. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS; MAT/BLANKETS SHALL HAVE GOOD SOIL CONTACT.
2. LAY BLANKET LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL; DO NOT STRETCH MATERIAL.
3. STAPLES SHALL BE INSTALLED PER THE STAPLE LAYOUT DETAIL AND WITH STANDARD MAT STAPLES.
4. ON SLOPED AREAS MATTING SHOULD BE INSTALLED VERTICALLY DOWNSLOPE.

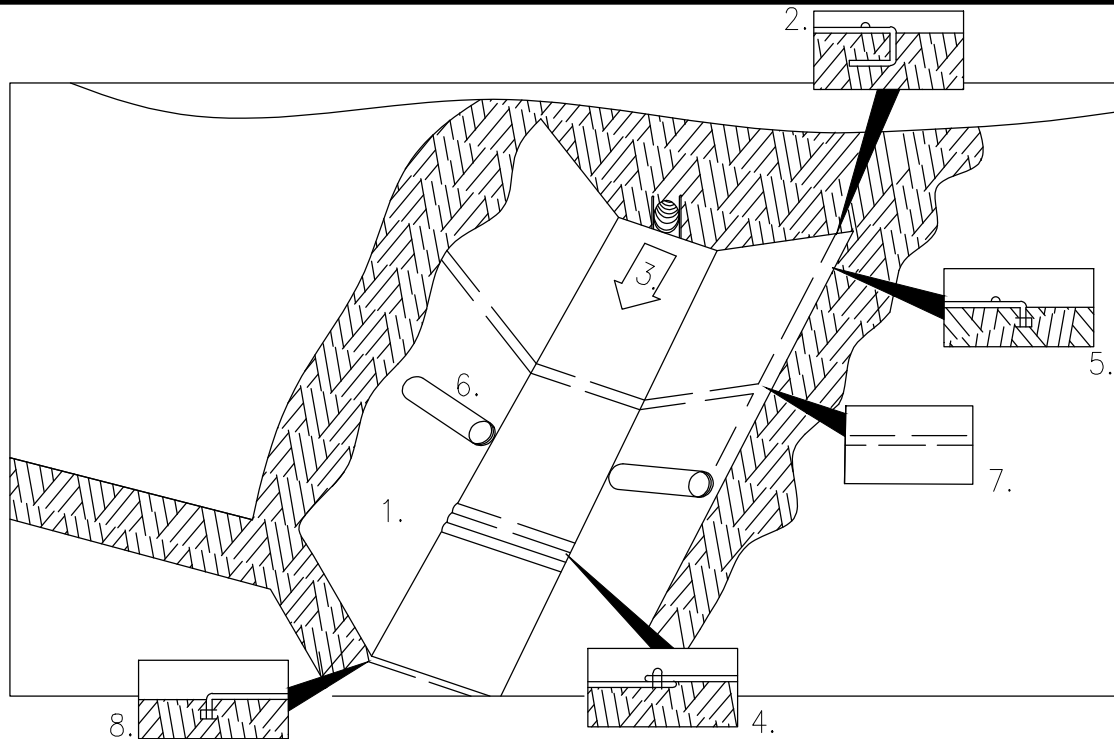


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

NO.	REVISION	DATE	APPR.
SCALE	DATE	DRAWN	CHECKED
NTS			
			APPROVED

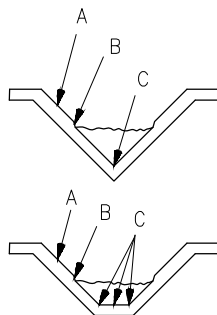
EROSION CONTROL BLANKET
MEASURE 1

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-123	1 OF 1



CRITICAL POINTS

- OVERLAPS AND SEAMS
- PROJECTED WATER LINE
- CHANNEL BOTTOM/SIDE SLOPES VERTICES



NOTES:

- HORIZONTAL STAPLE SPACING SHOULD BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINT ALONG THE CHANNEL SURFACE.
- REFER TO THE GENERAL STAPLE PATTERN GUIDE FOR CORRECT STAPLE PATTERN RECOMMENDATIONS FOR CHANNELS.

NOTES:

- PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING APPLICATION OF LIME, FERTILIZER, AND SEED
- BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE BLANKET IN A 6" DEEP x 6" WIDE TRENCH; BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
- ROLL CENTER BLANKET IN DIRECTION OF WATER FLOW ON BOTTOM OF CHANNEL.
- PLACE BLANKETS END OVER END (SINGLE STYLE) WITH A 6" OVERLAP. USE A DOUBLE ROW OF STAGGERED STAPLES, 4" APART, TO SECURE BLANKETS.
- FULL LENGTH EDGE OF BLANKETS AT THE TOP OF SIDE SLOPES MUST BE ANCHORED IN 6" DEEP x 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
- BLANKETS ON SIDE SLOPES MUST BE OVERLAPPED 4" OVER THE CENTER BLANKET AND STAPLED.
- IN MEDIUM TO HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT INTERVALS. USE A ROW OF STAPLES 4" APART OVER THE ENTIRE WIDTH OF THE CHANNEL. PLACE A SECOND ROW 4" BELOW THE FIRST ROW IN A STAGGERED PATTERN.
- THE TERMINAL END OF THE BLANKETS MUST BE ANCHORED IN A 6" DEEP x 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.

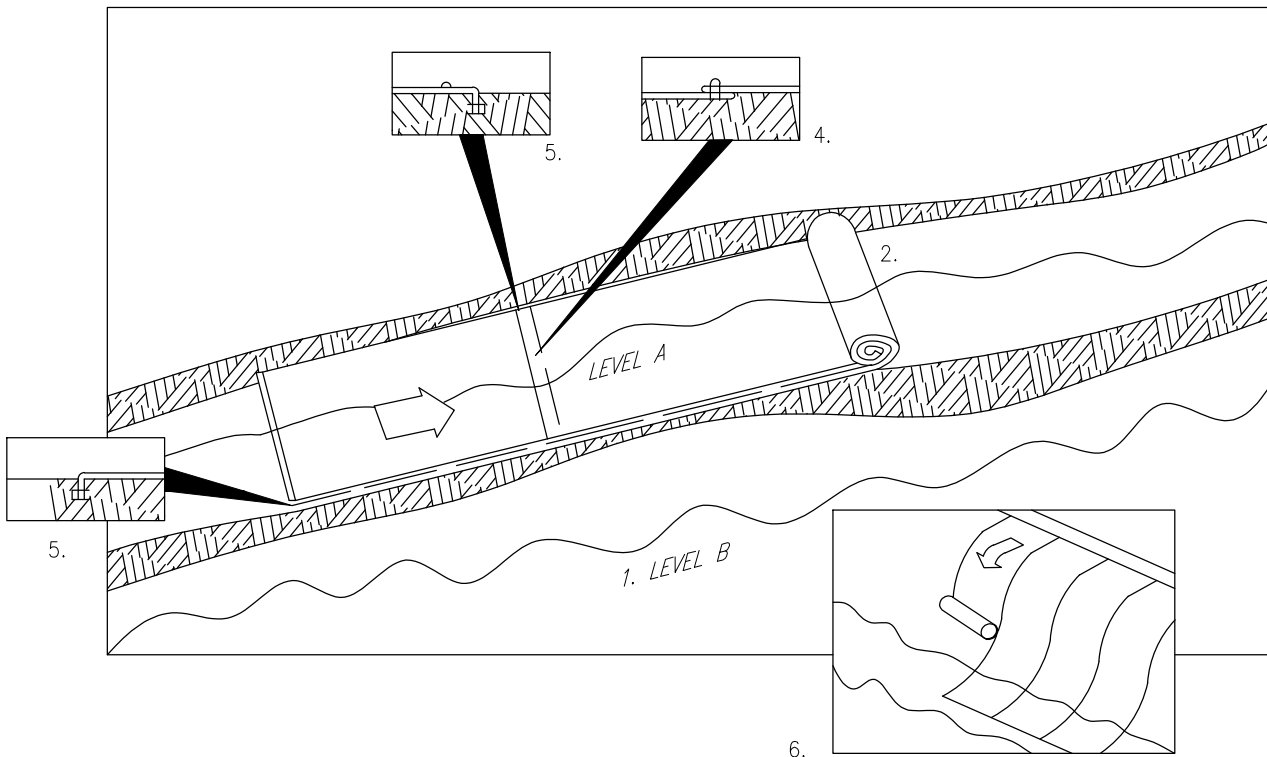


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

EROSION CONTROL BLANKET MEASURE 2

NO.	REVISION	DATE	APPR.
SCALE	DATE	DRAWN	CHECKED
NTS			

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-124	1 OF 1



NOTES:

1. FOR OPTIMUM PERFORMANCE, AND IF POSSIBLE, LOWER WATER FROM LEVEL A TO LEVEL B BEFORE INSTALLING
2. PREPARE SOIL BEFORE INSTALLING BLANKETS INCLUDING APPLICATION OF LIME, FERTILIZER AND SEED.
3. THE TOP EDGE OF THE BLANKET MUST BE ANCHORED IN A 6" DEEP x 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
4. PLACE BLANKETS END OVER END WITH 6" OVERLAP. STAPLE THROUGH BOTH BLANKETS OF THE OVERLAPPED AREA APPROXIMATELY 12" APART.
5. THE EDGE OF THE BLANKET THAT FALLS BELOW NORMAL WATER LEVEL MUST BE ANCHORED IN A 6" DEEP x 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. (STONE MAY BE SUBSTITUTED FOR SOIL BACKFILL).
6. IF BANK IS STEEP, OR IF WATER LEVEL VARIES MORE THAN THE WIDTH OF THE BLANKET, USE VERTICAL INSTALLATION.
7. IN LOOSE SOIL CONDITIONS; THE USE OF 12" OR LONGER METAL/WASHER PINS MAY BE NECESSARY TO PROPERLY ANCHOR THE BLANKETS.
8. REFER TO THE GENERAL STAPLE PATTERN GUIDE FOR CORRECT STAPLE PATTERN RECOMMENDATIONS FOR SHORELINES.

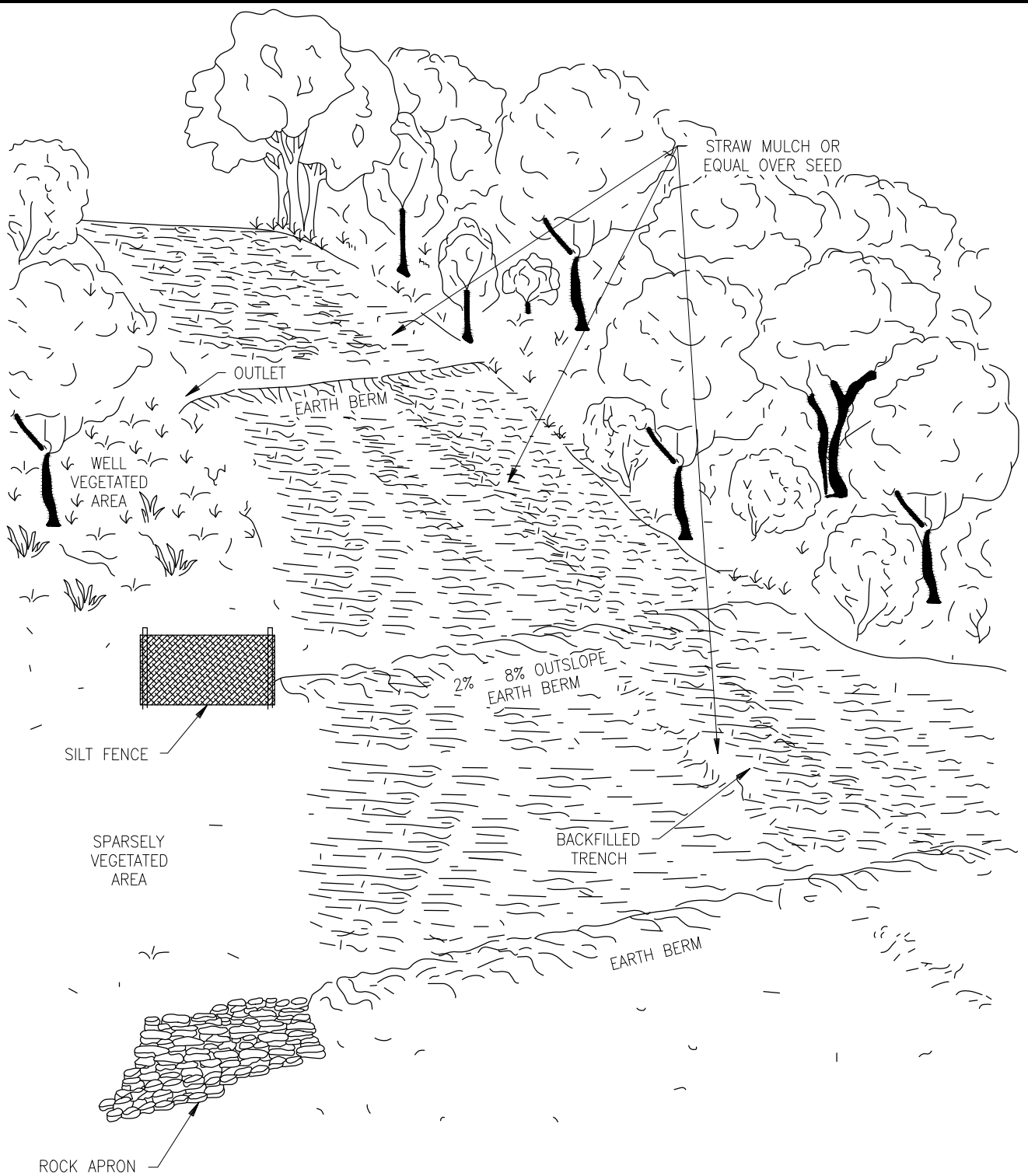


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

EROSION CONTROL BLANKET
MEASURE 3

NO.	REVISION	DATE	APPR.

SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.	DRAWING NUMBER	SHEET
NTS						STD-A-125	1 OF 1



NOTES:
SILT FENCE REMOVED WHEN
VEGETATION ESTABLISHED.



16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77064
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

EROSION CONTROL

NO.	REVISION	DATE	APPR.

SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.	DRAWING NUMBER	SHEET
NTS						STD-A-111	1 OF 1

TYPICAL DRAWING: NONE

APPLICATION RATES AND LOCATIONS:

1. HYDRO-MULCH WITH TACKIFIER SHALL BE USED AT LOCATIONS IDENTIFIED ON THE CONSTRUCTION DRAWINGS AND/OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR TO PROTECT SOIL AGAINST EROSION. AREAS TARGETED FOR HYDRO MULCH INCLUDE SLOPES BETWEEN 40% AND 60%.
2. THE CONTRACTOR SHALL BE REQUIRED TO USE EXTENSION HOSES TO REACH INACCESSIBLE AREAS.
3. HYDRO-MULCH AND TACKIFIER SHALL BE APPLIED AT A RATE OF 3000 LBS/ACRE AND 120 LBS/ACRE RESPECTIVELY. IN A SINGLE APPLICATION HYDRO-MULCH AND TACKIFIER SHALL PRODUCE A UNIFORM, MAT-LIKE COVERING THE GROUND.
4. WHEN DIRECTED BY THE ENVIRONMENTAL INSPECTOR, TOPSOIL STOCKPILES SHALL BE TACKIFIED AT A RATE OF 120 LBS/ACRE TO CONTROL WIND EROSION.

HYDRO-MULCH MATERIAL:

1. THE HYDRO-MULCH MATERIAL SHALL CONSIST OF WOOD FIBERS MEETING THE FOLLOWING PHYSICAL AND CHEMICAL PROPERTIES:

* MOISTURE CONTENT	12 %	3.0%
* ORGANIC MATTER (OVEN-DRIED BASIS)	99.2 %	0.2%
* ASH CONTENT	0.8 %	0.2%
* WATER HOLDING CAPACITY	1000 GRAMS MIN.	

NOTE: WATER HOLDING CAPACITY - 100 GRAMS OF OVEN DRIED MULCH SATURATED, DRAINED AND WEIGHTED.
2. THE HYDRO-MULCH MATERIAL SHALL MEET THE FOLLOWING ADDITIONAL REQUIREMENTS:
 - * THE FIBERS SHALL NOT CONTAIN ANY GROWTH GERMINATION INHIBITING FACTORS.
 - * THE FIBERS SHALL NOT BE PRODUCED FROM RECYCLED MATERIAL SUCH AS SAWDUST, CARDBOARD OR PULP AND PAPER PLANT RESIDUE.
 - * THE FIBERS SHALL BE DYED TO FACILITATE VISUAL METERING DURING APPLICATION.
3. THE HYDRO-MULCH SHALL BE SUPPLIED IN 50 POUND NET WEIGHT BAGS. EACH PACKAGE SHALL BE MARKED BY THE MANUFACTURER TO SHOW THE AIR-DRY CONTENT.
4. THE HYDRO-MULCH MATERIAL SHALL BE OF SUCH CONSISTENCY THAT AFTER BEING COMBINED IN A SLURRY TANK WITH WATER AND APPROVED TACKIFIER, THE FIBERS IN THE MATERIAL SHALL BE UNIFORMLY SUSPENDED TO FORM A HOMOGENEOUS SLURRY.
5. THE HYDRO-MULCH MATERIAL SHALL BE MANUFACTURED BY WEYERHAEUSER COMPANY, FIBER MARKETING INTERNATIONAL OR AN APPROVED EQUAL AND BE SUPPLIED IN PACKAGES MARKED BY THE MANUFACTURER TO SHOW THE AIR DRY WEIGHT CONTENT. MULCH WHICH HAS BEEN DAMAGED BY MOISTURE OR OTHER MEANS SHALL NOT BE ACCEPTED.
6. IF REQUESTED, THE CONTRACTOR SHALL SUBMIT A MINIMUM ONE (1) POUND BAG OF THE PRODUCT PROPOSED TO USE ON THE PROJECT TO COMPANY FOR TESTING OR, IF REQUESTED, THE CONTRACTOR SHALL SUBMIT A SIGNED STATEMENT CERTIFYING THAT THE MATERIAL FURNISHED HAS BEEN LABORATORY AND FIELD TESTED AND THAT IT MEETS REQUIREMENTS FOR ITS INTENDED USE. EXPRESS MAY ACCEPT THE HYDRO-MULCH MATERIAL FOR USE BASED ON A CERTIFICATE OF COMPLIANCE.

TACKIFIER MATERIAL:

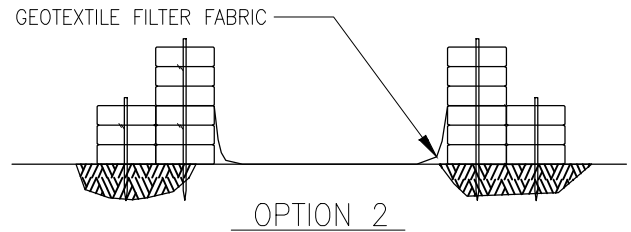
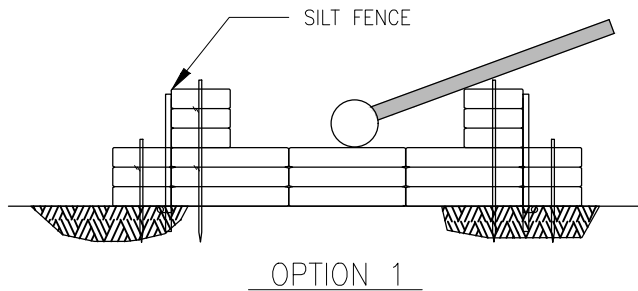
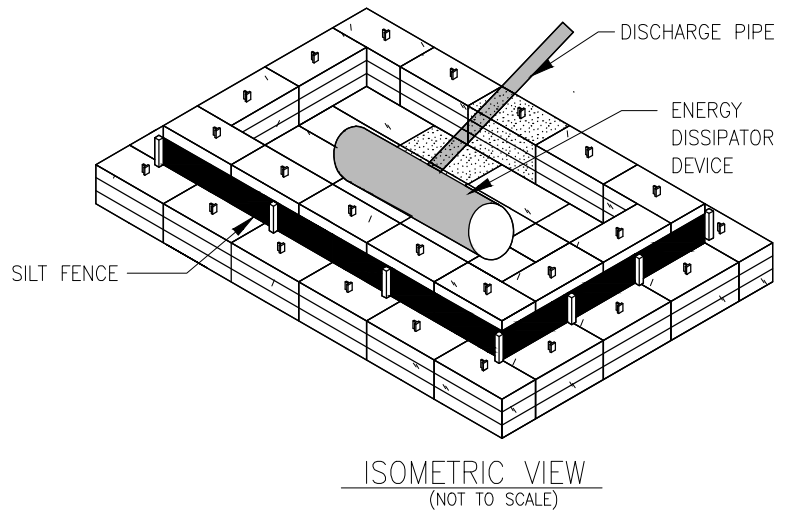
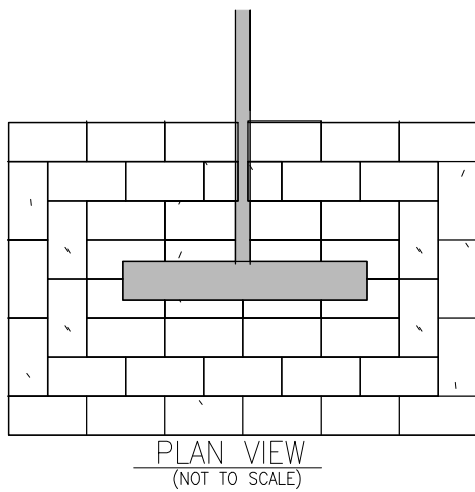
1. TACKIFIER SHALL MEET THE FOLLOWING REQUIREMENTS:
 - * BE A BIODEGRADABLE ORGANIC FORMULATION.
 - * CONSIST OF SPECIFICALLY BLENDED COMPATIBLE HYDROCOLLOIDS (SOLUBLE POLYSACCHARIDES, GUAR GUM OR PLANTAGO). STARCH BASED TACKIFIERS ARE UNACCEPTABLE.
 - * HAVE AN EQUILIBRIUM AIR-DRY MOISTURE CONTENT AT TIME OF MANUFACTURE OF 8% | 2% WITH A MINIMUM WATER HOLDING CAPACITY OF 6.5 TIMES BY WEIGHT OF DRY MATERIAL.
 - * HAVE THE CHARACTERISTICS OF HYDRATING AND UNIFORMLY DISPERSING IN CIRCULATING WATER TO FORM A HOMOGENEOUS SLURRY AND REMAIN IN SUCH A STATE IN THE HYDRAULIC MIXING UNIT (USUALLY A HYDRO-MULCHER).
2. TACKIFIER SHALL BE SUPPLIED IN PACKAGES MARKED BY THE MANUFACTURER TO SHOW WEIGHT CONTENT. TACKIFIER WHICH HAS BEEN DAMAGED BY MOISTURE OR OTHER MEANS SHALL NOT BE ACCEPTED.



16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

HYDRO-MULCH
AND TACKIFIER

NO.		REVISION			DATE	APPR.			
SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.	DRAWING NUMBER	SHEET		
NTS						STD-A-128	1 OF 1		



NOTES:

1. INSTALL A STRAW BALE DEWATERING STRUCTURE WHEREVER IT IS NECESSARY AND AS DIRECTED BY THE ENGINEER TO PREVENT THE FLOW OF HEAVILY SILT LADEN WATER INTO WATER BODIES OR WETLANDS. ALL DEWATERING ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH PERMIT CONDITIONS.
2. DISCHARGE SITE SHOULD BE WELL VEGETATED AND LOCATED AT LEAST 100FT. FROM ANY WATERCOURSE. THE TOPOGRAPHY OF THE SITE SHOULD BE SUCH THAT WATER WILL FLOW INTO THE DEWATERING STRUCTURE AND AWAY FROM ANY WORK AREAS. THE AREA DOWNSLOPE FROM THE WATERING SITE MUST BE REASONABLY LEVEL OR STABILIZED BY VEGETATION OR OTHER MEANS TO ALLOW THE FILTERED WATER TO CONTINUE AS SHEET FLOW.
3. DIRECT THE PUMPED WATER ONTO A STABLE SPILL PAD CONSTRUCTED OF STRAW BALES, ROCK FILL, WEIGHTED TIMBERS, OR A WOVEN GEOTEXTILE STAKED TO THE GROUND SURFACE.
4. DISCHARGE RATES SHOULD BE SUCH THAT THE STRUCTURE WILL NOT OVERFLOW.
5. DISCHARGE WATER TO BE FORCED INTO SHEET FLOW IMMEDIATELY BEYOND THE SPILL PAD USING A COMBINATION OF STRAW BALES AND THE NATURAL TOPOGRAPHY. RECESS STRAW BALES A MINIMUM OF 4 in. DRIVE TWO STAKES OR REBAR INTO EACH BALE TO ANCHOR THEM IN PLACE.
6. MANUFACTURED FILTER BAGS ARE A SUITABLE ALTERNATIVE TO STRAW BALE STRUCTURES FOR TRENCH DEWATERING.
7. ENERGY DISSIPATOR DEVICE SHALL BE ANCHORED BY CONTRACTOR.

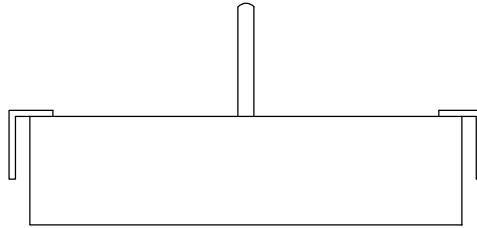


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

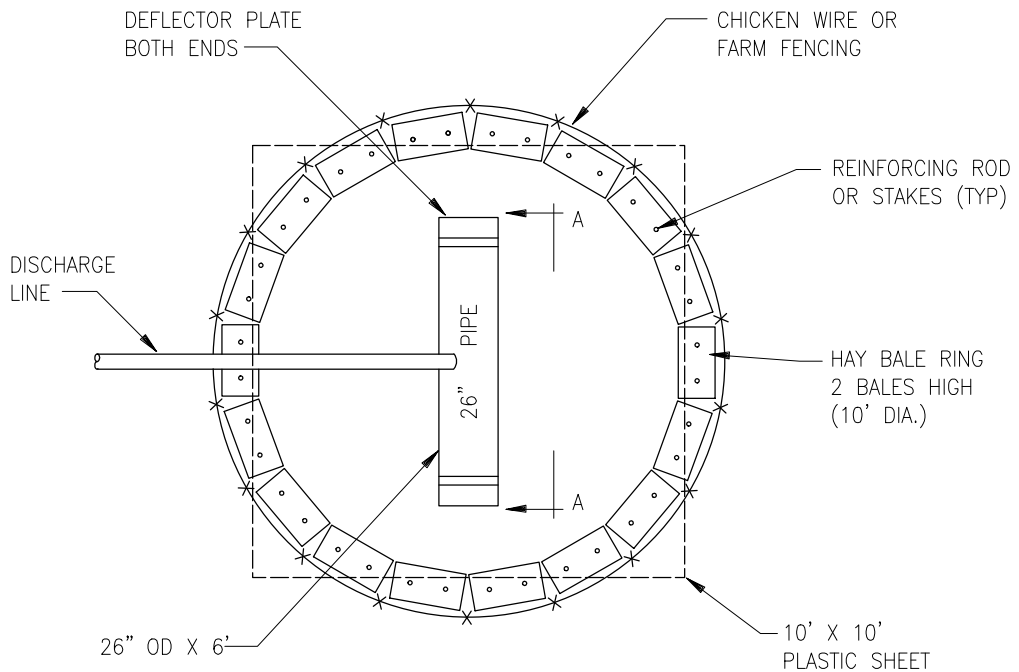
HYDROSTATIC TEST
DEWATERING
(METHOD 1)

NO.	REVISION	DATE	APPR.

SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.	DRAWING NUMBER	SHEET
NTS							



VIEW A-A



PLAN VIEW

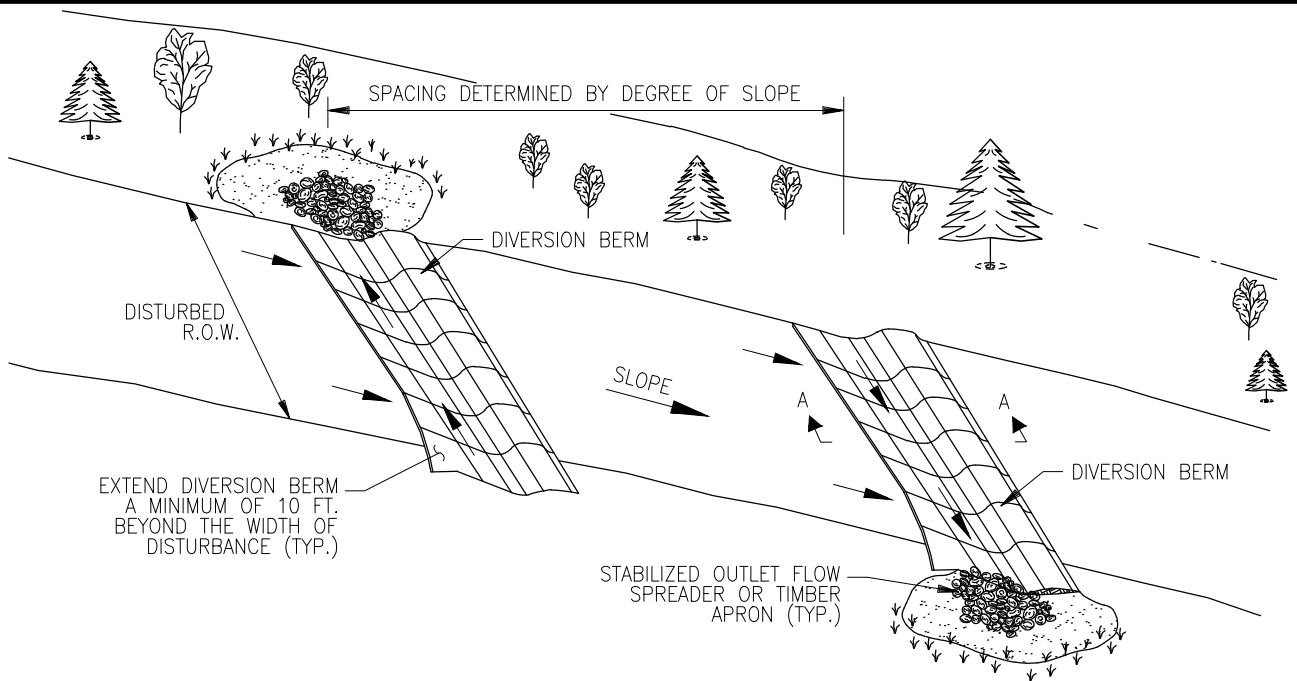


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

NO.	REVISION	DATE	APPR.

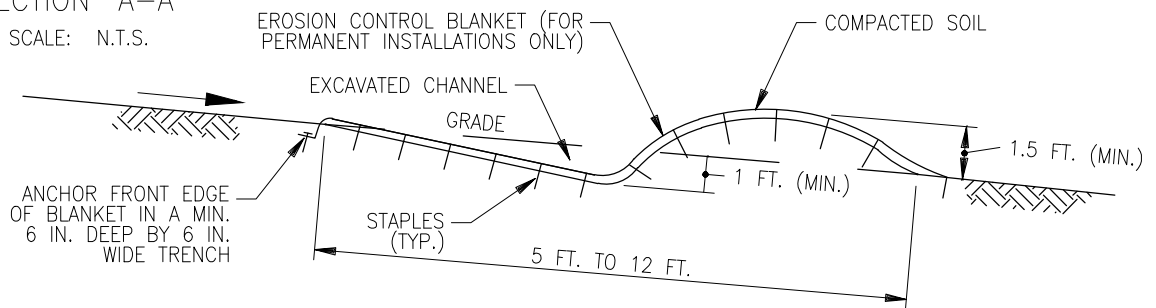
METHOD FOR DISCHARGING WATER TO GROUND

SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.	DRAWING NUMBER	SHEET
NTS						STD-A-117	1 OF 1



SECTION 'A-A'

SCALE: N.T.S.



NOTES:

1. ADDITIONAL BERMS WILL BE INSTALLED WITH ALTERNATE DIRECTIONS OF FLOW.
2. EROSION CONTROL BLANKET FOR PERMANENT DIVERSION BERMS SHALL CONSIST OF NORTH AMERICAN GREEN SC150 OR EQUIVALENT.
3. UPSLOPE EDGE OF BLANKET TO BE ANCHORED IN A 6 INCH x 6 INCH TRENCH.
4. TOTAL WIDTH OF BLANKET INSTALLATION TO BE AT LEAST 6 FT., (INCLUDING ANCHORING DETAILS).
5. LONGITUDINAL SLOPE TO BE GREATER THAN 1% AND LESS THAN 5%.
6. ENERGY DISSIPATING DEVICES CAN INCLUDE FENCES, ROCK, OR BLANKETS.
7. FOR TEMPORARY USE PRIOR TO FINAL CLEAN-UP, DIVERSION BERMS DO NOT REQUIRE A LINING, AND MAY BE DESTROYED EACH DAY TO ALLOW CONSTRUCTION ACTIVITIES, HOWEVER, THEY SHALL BE RECONSTRUCTED NIGHTLY. TEMPORARY BERMS CAN TYPICALLY BE CONSTRUCTED WITH A SINGLE PASS OF A BULLDOZER. MAINTAIN BREAKS IN SPOIL PILES TO ACCOMMODATE BERMS. MODIFY BERMS AS NECESSARY TO AVOID DISCHARGE OF RUN-OFF WATER INTO ANY OPEN DITCH.

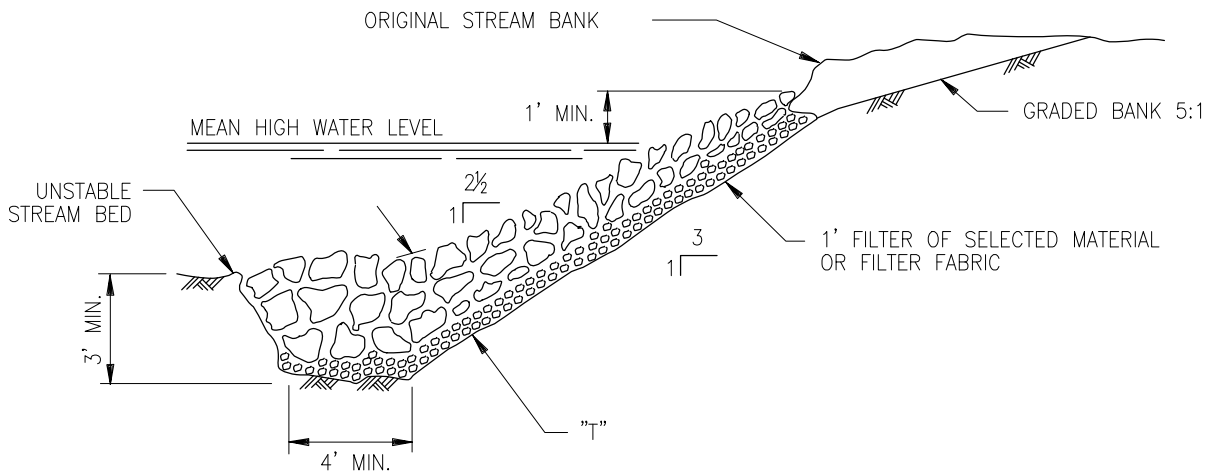


16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

PERMANENT WATER BARS OR TERRACES

NO.	REVISION			DATE	APPR.
	SCALE	DATE	DRAWN	CHECKED	APPROVED
	NTS				

WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-112	1 OF 1



EXCAVATED TOE DETAIL

VELOCITY	RIP RAP			
FT./SEC. 12-15	MAX. SIZE (POUNDS) 250	AVG. SIZE (POUNDS) 50-80	20% SIZE* (POUNDS) 20	"T" DESIGN THICKNESS 15"-27"

* INDICATES THAT NOT MORE THAN 20% OF TOTAL ROCK QUANTITIES SHALL BE LESS THAN 20 LBS. EACH.

1. ALL AREAS TO BE REVETTED SHALL BE CLEARED OF ALL TREES, BRUSH, LOGS, STUMPS AND DEBRIS.
2. RIP RAP SHALL BE PLACED IN SUCH A MANNER AS TO PRODUCE A REASONABLY WELL GRADED MASS.
3. THE FINISHED RIP RAP SHALL BE FREE OF OBJECTIONABLE POCKETS OF SMALL STONES.
4. PLACING OF RIP RAP WHICH MAY CAUSE SEGREGATION OF VARIOUS SIZES, WILL NOT BE PERMITTED.
5. RIP RAP SHALL BE NATURAL OR BROKEN STONE OR OTHER MATERIAL ACCEPTABLE TO THE COMPANY AND GOVERNING AGENCY.
6. THE FINISHED RIP RAP TO BE ACCEPTED BY THE GOVERNING AGENCY PRIOR TO LEAVING THE AREA.



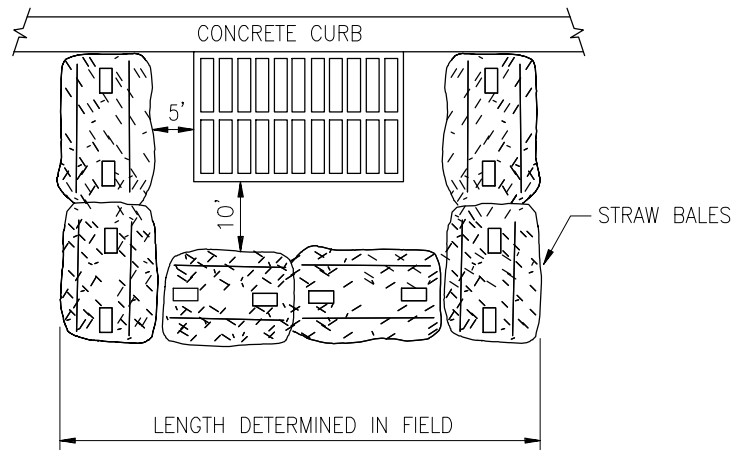
16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

NO.	REVISION				DATE	APPR.
SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.	DRAWING NUMBER
NTS						

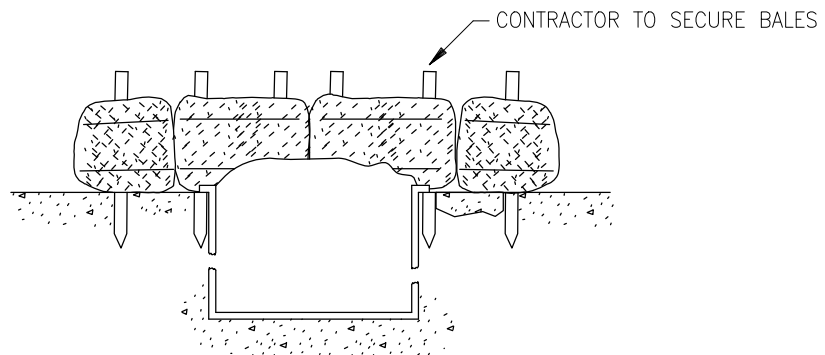
PIPELINE STANDARD
DESIGN FOR ROCK RIP RAP
INSTALLATION (EXCAVATED TOE)

STD-A-044

1 OF 1



TOP VIEW



FRONT VIEW

NOTES:

1. INSTALL PRIOR TO GRADING.
2. ANGLE FIRST STAKE TOWARD PREVIOUSLY POSITIONED BALE.
3. IMBED BALES IN EARTH APPROXIMATELY 4".
4. WHEN REMOVING BALES, SCATTER SILT AND STRAW ACROSS RIGHT-OF-WAY.
5. ALL MATERIALS TO BE SUPPLIED BY CONTRACTOR.



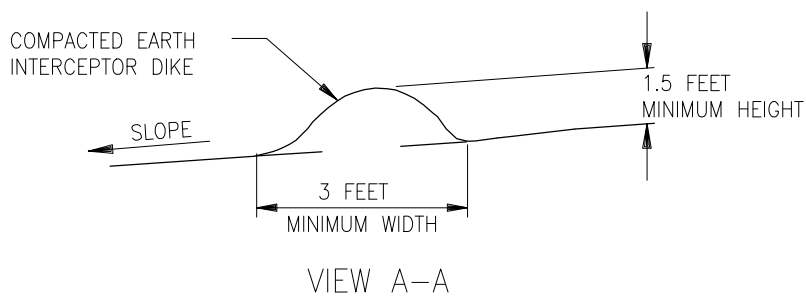
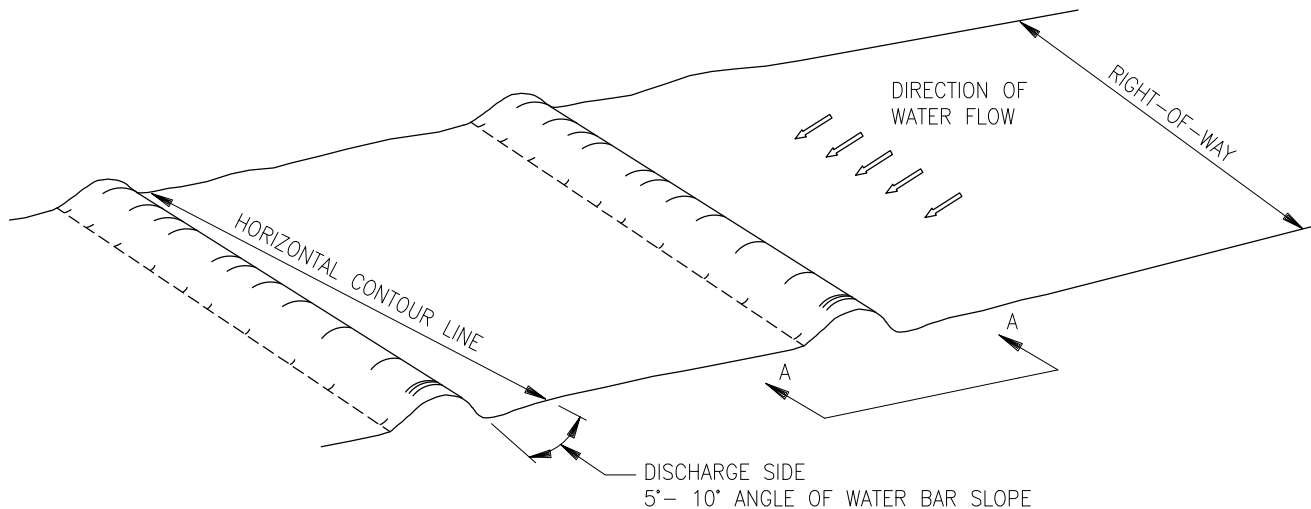
16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77084
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

NO.	REVISION			DATE	APPR.
SCALE	DATE	DRAWN	CHECKED	APPROVED	WEI PROJ. NO.
NTS					

PIPELINE STANDARD
EROSION CONTROL
INLET PROTECTION

STD-A-207

1 OF 1



SLOPE BREAKER SPACING	
GRADE, %	SPACING
0 - 5	NONE REQ'D
5 - 15	300
15 - 30	200
> 30	100

NOTES:

- WATER SHALL BE DIVERTED OFF THE GRADED RIGHT-OF-WAY BY CONSTRUCTING DIKES ACCORDING TO THE FOLLOWING PROCEDURE.
 - THE HORIZONTAL CONTOUR LINE ACROSS THE ENTIRE RIGHT-OF-WAY WIDTH WILL BE ESTABLISHED AT EACH INTERCEPT OR DIKE. THE HORIZONTAL CONTOUR LINE WILL BE PERPENDICULAR TO THE DIRECTION OF FLOW. A SURVEYOR'S LEVEL OR HAND LEVEL WILL BE USED TO LOCATE THE CONTOUR LINE.
 - THE WATER BAR SHALL SLOPE DOWNHILL 5° - 10° FROM HORIZONTAL CONTOUR LINE AND TOWARD DISCHARGE SIDE. CHANNEL THE FLOW TO THE SIDE OF THE GRADED RIGHT-OF-WAY WITH THE BEST VEGETATIVE COVER AND TOPOGRAPHY. IF VEGETATION IS SPARSE SECURE OUTLET WITH STRAW BALES.
- SLOPE BREAKER SPACING SHALL BE IN ACCORDANCE WITH LOCAL SOIL CONSERVATION SERVICE RECOMMENDATIONS. IN ABSENCE OF THESE RECOMMENDATIONS THE ABOVE TABLE SHALL BE USED.
- REFER TO "ENVIRONMENTAL AND RIGHT-OF-WAY STIPULATIONS" FOR INSTALLATION.



16350 PARK TEN PLACE, SUITE 101
HOUSTON, TX. 77064
PH: (281) 616-0100
TRC PROJ. #53595, LIC. No. EF 4588

NO.	REVISION	DATE	APPR.

SCALE	DATE	DRAWN	CHECKED	APPROVED
NTS				

PIPELINE STANDARD EROSION CONTROL INTERCEPTOR DIKES		
WEI PROJ. NO.	DRAWING NUMBER	SHEET
	STD-A-038	1 OF 1

