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KEYSTONE PIPELINE PROJECT

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

Prepared By

April 4, 2006
Rev. 3

1.0 INTRODUCTION

The construction mitigation and reclamation requirements described in this Plan apply to work on all project lands including the following:

- Uplands including agricultural (cultivated or capable of being cultivated) lands, pasture lands; range lands; grass lands; forested lands; lands in residential, commercial, or industrial areas; lands in public rights of way; and lands in private rights of way
- Wetlands
- Waterbodies and Riparian lands

Keystone shall implement the construction mitigation and reclamation actions contained in this Plan to the extent that they do not conflict with the requirements of any applicable federal, state and local rules and regulations and other permits and approvals that are obtained by Keystone for the Project. Additionally, Keystone may deviate from specific requirements of this Plan on specific private lands as determined through negotiations with Landowners or as required to suit actual site conditions as determined and directed by Keystone. All work must be in compliance with federal, State, and Local permits.

2.0 GENERAL CONDITIONS

2.1 Training

The Contractor shall ensure that all persons (Contractor's and Subcontractors' Personnel) engaged in work associated with the pipeline's construction are informed of the construction issues and concerns, and that they attend and receive training regarding these requirements as well as all laws, rules and regulations applicable to the work.

Different levels of training shall be required for different groups of Contractor personnel. Contractor supervisors, managers, field foremen and other Contractor personnel designated by Keystone shall attend a full-day, comprehensive environmental training session. All other Contractor personnel shall attend a one-to-two-hour group training session before the beginning of construction, and during construction as environmental issues and incidents warrant. Additional training sessions shall be held for newly assigned personnel.

All Contractor personnel shall attend the training session prior to entering the construction right-of-way. All Contractor personnel shall sign an acknowledgement of having attended the appropriate level of training and shall display a hard hat sticker acknowledging attendance at environmental training. In order to insure successful compliance, Contractor personnel shall attend repeat or supplemental training, if compliance is not satisfactory or as new, significant issues arise.

All visitors and any other personnel without specific work assignments shall be required to attend a brief safety and environmental awareness orientation.

Experienced, well-trained personnel are essential for the successful implementation of this Plan. Keystone and its Contractors shall undergo prevention and response, as well as safety training. The program shall be designed to improve awareness of safety requirements, pollution control laws and procedures and proper operation and maintenance of equipment.

2.2 Advance Notice of Access to Property Prior to Construction

Prior to the start of construction of the pipeline, Keystone shall provide the Landowner or tenant with a minimum of 24 hours prior notice (unless otherwise negotiated with the landowner and as described in the project line list) before accessing his/her property for the purpose of constructing the pipeline. Additionally, the Landowner or tenant shall be provided with Keystone contact information. Landowners may utilize contact information to inform Keystone of any concerns related to the work. Keystone

Prior notice shall first consist of a personal contact or a telephone contact, whereby the Landowner or tenant is informed of Keystone's intent to access the land. If the Landowner or tenant cannot be reached in person or by telephone, Keystone shall mail or hand deliver to the Landowner or tenant's home a dated, written notice of Keystone's intent. The Landowner or tenant need not acknowledge receipt of the written notice before Keystone can enter the Landowner's property.

2.3 Other Notifications

The Contractor shall notify, in writing, both Keystone's Representative and the authority having jurisdiction over any road, railroad, canal, drainage ditch, river, foreign pipeline, or other utility, at least 48 hours (excluding Saturdays, Sundays, and Statutory Holidays), or as specified on the applicable permit(s), prior to commencement of pipeline construction, in order that the said authority may appoint an Inspector to ensure that the crossing is constructed in a satisfactory manner.

The Contractor shall notify Keystone immediately of any spill of a potentially hazardous substance as well as any existing soil contamination discovered during construction.

The Contractor shall immediately notify Keystone of the discovery of previously unreported historic property, other significant cultural materials, or suspected human remains uncovered during pipeline construction activities.

2.4 Damages to Private Property

Pipeline construction activities shall be confined to the construction right-of-way, temporary work space, and additional temporary work space and approved access routes.

Keystone shall reasonably compensate Landowners for any construction-related damages caused by Keystone which occur on or off of the established pipeline construction right-of-way.

Keystone shall reasonably compensate Landowners for damages to private property caused by Keystone beyond the initial construction and reclamation of the pipeline, to include those damages caused by Keystone during future construction, operation, maintenance, and repairs relating to the pipeline.

2.5 Appearance of Worksite

The construction right-of-way shall be maintained in a clean neat condition at all times. At no time shall litter be allowed to accumulate at any location on the construction right-of-way. The Contractor shall provide a daily garbage detail with each major construction crew to keep the construction right-of-way clear of trash, pipe banding and spacers, waste from coating products, welding rods, timber skids, defective materials and all construction and other debris immediately behind construction operations unless otherwise approved by Keystone. Paper from wrapping or coating products or lightweight items shall not be permitted to be scattered around by the wind.

The traveled surfaces of roads, streets, highways, etc. (and railroads when applicable) shall be cleaned free of mud, dirt or any debris deposited by equipment traversing these roads or exiting from the construction right-of-way.

2.6 Access

Prior to the pipeline's installation, Keystone and the Landowner shall reach a mutually acceptable agreement on the route that shall be utilized by the Contractor for entering and exiting the pipeline construction right-of-way should access to the construction right-of-way not be practicable or feasible from adjacent segments of the pipeline construction right-of-way or from public highway or railroad right-of-way.

All construction vehicles and equipment traffic shall be confined to the public roads, private roads acquired for use by Keystone and the construction right of way. If temporary alternative private roads for access are constructed they shall be designed to not impede proper drainage and shall be built to minimize soil erosion.

Sufficiently sized gaps shall be left in all spoil and topsoil wind rows at all temporary private access roads and obvious livestock or wildlife trails unless agreed with the Landowner prior to construction that these access points can be blocked during construction.

All construction related private roads and access points to the right of way shall be marked with signs. Any private roads not to be utilized during construction shall also be marked.

2.7 Above-Ground Facilities

Locations for above-ground facilities shall be selected in a manner so as to be as unobtrusive as reasonably possible to on-going agricultural or other Landowner activities occurring on the lands adjacent to the facilities. If this is not feasible,

such facilities shall be located so as to incur the least hindrance to the adjacent agricultural operations (i.e., located in field corners or areas where at least one side is not used for cropping purposes) provided the location is consistent with the design constraints of the pipeline. Additionally, they shall be located to avoid existing drain tile systems to the extent possible.

2.8 Minimum Depth of Cover

The pipeline shall be installed so that the top of the pipe and coating is:

- A minimum depth of 4 feet below the surface of all uplands and wetlands except in consolidated rock where the minimum shall be 3 feet
- A minimum clearance of 1 foot below any existing foreign pipeline, utility, drain tile or any other existing underground facility and a minimum of 4 feet below the surface of all uplands and wetlands. Should any existing foreign pipeline, utility, drain tile or any other existing underground facility owner permit the pipeline to cross above, there must be a minimum 1 foot clearance and a minimum of 4 feet below the surface of all uplands and wetlands
- At a minimum depth of 5 feet below the bottom of road ditches
- At a minimum depth of 5 feet below the bottom of waterbodies including rivers, creeks, streams, ditches and drains. This depth shall normally be maintained over a distance of 15 feet on each side of the waterbody measured from the top of the defined stream channel

If concrete weights are utilized for negative buoyancy of the pipeline, the minimum depth of cover shall be measured from the top of the concrete weight to the original ground contour.

Depth of cover requirements may be modified by Keystone based on site specific conditions. However, all depths shall be in compliance with all established codes.

2.9 Threatened and Endangered Species

Keystone will contract a qualified biologist to conduct a survey of sensitive species associated with native tall-grass prairie. The biologist will document locations of the sensitive species found during the survey. If sensitive species are identified in the construction right of way, Keystone will work with the relevant regulatory authorities to determine if any additional protection measures would be required. Once construction is complete, disturbance in native prairie will be reclaimed to native prairie species using native seed mixes specified by applicable state and federal agencies with the intent there will be no net loss of native prairie habitat.

A number of sensitive species are associated with native tall-grass prairie, especially where larger remnant tracts are present. In order to minimize impacts to native prairie, no permanent developments such as access roads or pump stations will be constructed in native prairie tracts if possible. Where avoidance of native tall-grass prairie by the pipeline ROW is unfeasible, appropriate surveys

will be implemented to ensure populations of sensitive wildlife species are not affected.

Keystone will contract a qualified biologist to conduct a survey of breeding bird habitat within 330 feet (100 meters) from proposed surface disturbance activities that would occur within the breeding season. The biologist will document active nests, bird species, and other evidence of nesting (e.g., mated pairs, territorial defense, birds carrying nesting material, transporting of food). If an active nest for Important Migratory Bird Species (USFWS BCC, PIF Priority Bird Species, State Sensitive Species) is documented during the survey, Keystone will work with the relevant regulatory authorities to determine if any additional protection measures would be required.

Immediately prior to construction activities during the raptor breeding season (February 1 – July 31), breeding raptor surveys will be conducted by a qualified biologist through areas of suitable nesting habitat to identify any potentially active nest sites in the project area. If raptors are identified within 0.5 mile to the construction right of way, Keystone will work with the relevant regulatory authorities to develop mitigation measures. These measures will be implemented on a site-specific and species-specific basis in coordination with state agency wildlife biologists.

Along the ROW within historical range of Indiana bat and gray bat (Missouri, Illinois and eastern Oklahoma), Surveys shall be completed during the roosting season in suitable woodland habitats to determine if any active maternity roosts are present in or near the pipeline ROW. If a maternity roost is located, then applicable mitigation will be developed in consultation with USFWS and state wildlife agency personnel.

Prior to surface disturbance activities within karst terrain, a geological investigation will be completed to determine the presence and type of karst features. The investigation will identify the location, distribution, and dimensions of rock cavities within the potential influence zone of construction. In addition, a qualified biologist will conduct surveys for exposed caves that may contain sensitive resources (e.g., bat roosts and nesting raptors) within 0.25 mile from surface disturbance activities. In the event that cave features or sensitive resources are identified, the USFWS or appropriate state wildlife agency will be contacted and applicable mitigation measures developed.

2.10 Non-Hazardous Waste Disposal

Non-hazardous pipeline construction wastes include human waste, trash, pipe banding and spacers, waste from coating products, welding rods, timber skids, cleared vegetation, stumps, rock and all other construction debris.

All waste which contains (or at any time contained) oil, grease, solvents, or other petroleum products falls within the scope of the oil and hazardous substances control, clean up and disposal procedures. This material shall be segregated for handling and disposal as hazardous wastes.

The Contractor shall be responsible for human wastes to be handled and disposed of exclusively by means of portable self-contained toilets during all construction operations. Wastes from these units shall be collected by a licensed Contractor for disposal only at licensed and approved facilities.

The Contractor shall remove all trash from the construction right-of-way on a daily basis unless otherwise approved or directed by Keystone.

The Contractor shall dispose of all drill cuttings and drilling mud at a Keystone-approved location. Disposal options may include spreading over the construction right-of-way in an upland location approved by Keystone, hauling to an approved licensed landfill, or other site approved by Keystone.

The Contractor shall remove all extraneous vegetative, rock and other natural debris from the construction right-of-way by the completion of clean-up

The Contractor shall remove all trash and wastes from Contractor yards, pipe yards and staging areas when work is completed at each location.

The Contractor shall dispose of all waste materials at licensed waste disposal facilities. Wastes shall not be disposed of in any other fashion such as un-permitted burying or burning.

2.11 Hazardous Wastes

The Contractor shall ensure that all hazardous and potentially hazardous materials are transported, stored and handled in accordance with all applicable legislation. Workers exposed to or required to handle dangerous materials shall also be trained in accordance with the applicable legislation and the manufacturer's recommendations.

The Contractor shall dispose of all hazardous materials at licensed waste disposal facilities. Hazardous wastes shall not be disposed of in any other fashion such as un-permitted burying or burning.

All transporters of oil, hazardous substances, and hazardous wastes shall be licensed and certified according to the applicable state vehicle code. Incidents on public highways shall be reported to the appropriate agencies.

All hazardous wastes being transported off-site shall be manifested. The manifest shall conform to requirements of the appropriate state agency. The transporter shall be licensed and certified to handle hazardous wastes on the public highways. The vehicles as well as the drivers must conform to all applicable vehicle codes for transporting hazardous wastes. The manifest shall conform to regulations of the DOT 49 CFR 172.101, 172.202, and 172.203.

If toxic or hazardous waste materials or containers are encountered during construction, the Contractor shall stop work immediately to prevent disturbing or further disturbing the waste material and shall immediately notify Keystone. The Contractor shall not restart work until clearance is granted by Keystone.

2.12 Noise Control

The Contractor shall minimize noise during non-daylight hours and within 1 mile of residences or other noise-sensitive areas such as hospitals, motels or campgrounds. Keystone shall attempt to abide by municipal bylaws regarding noise near residential and commercial/industrial areas. The Contractor shall provide notice to Keystone if noise levels are expected to exceed bylaws for a short duration.

The Contractor shall minimize noise in the immediate vicinity of herds of livestock or poultry operations, which are particularly sensitive to noise.

Keystone shall install noise attenuation, if necessary, to ensure that noise levels from Keystone's above-ground facilities comply with the applicable state or local standards.

2.13 Weed Control

The Contractor shall thoroughly clean all construction equipment, including timber mats, prior to moving the equipment to the job site to limit the potential for the spread of noxious weeds, insects and soil-borne pests. The Contractor shall clean the equipment with high-pressure washing equipment.

Prior to construction, Keystone will mark all areas of the right of way which contain infestations of noxious, invasive species or soil borne pests. Such marking will clearly indicate the limits of the infestation along the right of way. During construction, the Contractor shall clean the tracks, tires, and blades of equipment by hand (track shovel) or compressed air to remove excess soil prior to movement of equipment out of weed and/or soil-borne pest infested areas.

The Contractor shall use mulch and straw or hay bales that are free of noxious weeds for temporary erosion and sediment control.

The Contractor shall implement pre-construction treatments such as mowing prior to seed development or herbicide application to areas of noxious weed infestation prior to other clearing, grading, and trenching or other soil disturbing work at the identified locations as indicated on the construction drawings.

The Contractor shall apply herbicides, where required, within 1 week, or as deemed necessary for optimum mortality success, prior to disturbing the area by clearing, grading, trenching or other soil disturbing work. Herbicides shall be applied by applicators appropriately licensed or certified by the state in which the work is conducted. All herbicides applied preconstruction shall be non-residual or shall have a significant residual effect no longer than 30 days. Herbicides applied during construction shall be non-residual.

The Contractor shall not use herbicides in or within 100 feet of a wetland or waterbody.

After pipeline construction, on any construction right-of-way over which Keystone has jurisdiction as to the surface use of such land (i.e., valve sites, metering

stations, pump stations, etc.), Keystone shall provide for weed control to limit the potential for the spread of weeds onto adjacent lands used for agricultural purposes. Any weed control spraying performed by Keystone shall be done so by a State licensed pesticide applicator.

Keystone shall be responsible for reimbursing all reasonable costs incurred by owners of land adjacent to above-ground facilities when the Landowners must control weeds on their land which can be reasonably determined to have spread from land with Keystone's above-ground facilities.

2.14 Dust Control

The Contractor shall at all times control air borne dust levels during construction activities to levels acceptable to Keystone. The Contractor shall employ water trucks, sprinklers or calcium chloride as necessary to reduce dust to acceptable levels. Utilization of calcium chloride would be limited to roads.

Dust shall be strictly controlled where the work approaches dwellings, farm buildings and other areas occupied by people and when the pipeline parallels an existing road or highway. This shall also apply to access roads where dust raised by construction vehicles may irritate or inconvenience local residents. The speed of all Contractor vehicles shall be controlled while in these areas.

The Contractor shall take appropriate precautions to prevent fugitive emissions caused by sand blasting operations from reaching any residence or public building. The Contractor shall place curtains of suitable material, as necessary, to prevent wind-blown particles from sand blasting operations from reaching any residence or public building.

2.15 Off Road Vehicle Control

Keystone shall offer to Landowners or managers of forested lands to install and maintain measures to control unauthorized vehicle access to the construction right-of-way where appropriate. These measures may include the following unless otherwise approved or directed by Keystone based on site specific conditions or circumstances:

- Signs;
- Fences with locking gates;
- Slash and timber barriers, pipe barriers, or boulders lined across the construction right-of-way; and
- Conifers or other appropriate trees or shrubs across the construction right-of-way.

2.16 Fire Prevention and Control

The Contractor shall comply with all Federal, State, County and Local fire regulations pertaining to burning permits and the prevention of uncontrolled fires. The following mitigative measures shall be implemented to prevent fire hazards and control of fires:

- A list of relevant Authorities and their designated representative to contact shall be maintained on the construction site by construction personnel
- Adequate fire fighting equipment in accordance with the regulatory requirements shall be available on site.
- The level of forest fire hazard shall be posted at the construction office (where visible for all workers) and make them aware of it and related implications.
- The Contractor shall provide equipment to handle any possible fire emergency. This shall include, although not be limited to, water trucks, portable water pumps, chemical fire extinguishers, hand tools such as shovels, axes, chain saws, etc. and heavy equipment adequate for the construction of fire breaks when required.
- Specifically, the Contractor shall supply and maintain in working order an adequate supply of fire extinguishers for each crew that is engaged in work such as welding, cutting, grinding, burning of brush or vegetative debris, etc.
- In the event of a fire, the Contractor shall immediately use resources required to contain the fire. The Contractor shall then notify local emergency response personnel.
- All tree clearing activities are to be carried out in accordance with local rules and regulations for the prevention of forest fires.
- Burning shall be done in compliance with state and/or county regulations and in the center of the right of way and in small piles to avoid overheating or damage to trees or other structures along the right of way.
- Flammable wastes shall be removed from the construction site on a regular basis.
- Flammable materials kept on the construction site must be stored in approved containers away from ignition sources.
- Smoking shall be prohibited around areas with flammable products.
- Smoking shall be prohibited on the construction site when the fire hazard is high.

2.17 Road and Railroad Crossings

Railroad and highway crossings shall be bored or where permitted by the local road authorities having jurisdiction, open-cut. The pipeline shall be installed without casing unless required by permit. Generally, secondary and unimproved roads, public and private roads, shall be open-cut.

The Contractor shall maintain access across all open-cut roads during construction where an alternate bypass is not available.

At all road crossings and/or contiguous construction where workers and equipment are working, approaching traffic shall be cautioned to reduce speed

by road signs. All signage shall be in accordance with crossing permits and state or county highway regulations.

2.18 Adverse Weather

The Contractor shall restrict certain construction activities and work in cultivated agricultural areas in excessively wet soil conditions to minimize rutting and soil compaction. In determining when or where construction activities should be restricted or suspended during wet conditions, the Contractor shall consider the following factors:

- the extent that rutting may cause mixing of topsoil with subsoil layers or damage to tile drains.
- excessive buildup of mud on tires and cleats.
- excessive ponding of water at the soil surface.
- the potential for excessive soil compaction.

The Contractor shall implement mitigative measures as directed by Keystone in order to minimize rutting and soil compaction in excessively wet soil conditions which may include:

- restricting work to areas on the spread where conditions are not prohibitive.
- using low ground weight or wide-track equipment or other low impact construction techniques.
- limiting work to areas that have adequately drained soils or have a cover of vegetation such as sod, crops or crop residues sufficient to prevent mixing of topsoil with subsoil layers or damage to drain tiles.
- installing geotextile material or construction mats in problem areas.

3.0 SPILL PREVENTION AND CONTAINMENT

Spill prevention and containment applies to the use and management of hazardous materials on the construction right-of-way and all ancillary areas during construction. This includes the refueling or servicing of all equipment with diesel fuel, gasoline, lubricating oils, grease, hydraulic and other fluids during normal upland applications and special applications within 100 feet of perennial streams or wetlands.

3.1 Spill Prevention

3.1.1 Staging Areas

Staging areas (including Contractor yards and pipe stockpile sites) shall be set up for each construction spread. Hazardous materials at staging areas shall be stored in compliance with federal and state laws. The following spill prevention measures shall be implemented by the Contractor:

- Contractor fuel trucks shall be loaded at existing bulk fuel dealerships or from bulk tanks set up for that purpose at the staging area. In the former case, the bulk dealer is responsible for preventing and controlling spills;

- Fuels and lubricants shall be stored only at designated staging areas. Storage of fuel and lubricants in the staging area shall be at least 100 feet away from the water's edge. Refueling and lubrication of equipment shall be restricted to upland areas at least 100 feet away from stream channels and wetlands;
- Contractors shall be required to perform all routine equipment maintenance at the staging area and recover and dispose of wastes in an appropriate manner;
- Temporary liners and berms and/or dikes (secondary containment) shall be constructed around the above-ground bulk tanks, so that potential spill materials shall be contained and collected in specified areas isolated from any waterbodies. Tanks shall not be placed in areas subject to periodic flooding or washout;
- Drivers of tank trucks are responsible for safety and spill prevention during tank truck unloading. Procedures for loading and unloading tank trucks shall meet the minimum requirements established by the Department of Transportation;
- Warning signs requiring drivers to set brakes and chock wheels shall be displayed at all tanks. Proper grounding of equipment shall be undertaken during fuel transfer operations. Drivers shall observe and control the fueling operations at all times to prevent over-filling the temporary tank;
- Prior to departure of any tank truck, all vehicle outlets shall be closely examined by the driver for leakage, and tightened, adjusted or replaced to prevent liquid leakage while in transit;
- A supply of sorbent and barrier materials sufficient to allow the rapid containment and recovery of any spill shall be maintained at the construction staging areas. Sorbent and barrier materials shall also be utilized to contain runoff from contaminated areas;
- Shovels and drums shall be kept at each of the individual staging areas. In the event that small quantities of soil become contaminated, shovels shall be utilized to collect the soil and the material shall be stored in 55 gallon drums. Large quantities of contaminated soil may be bio-remediated on-site, subject to government approval, or collected utilizing heavy equipment, and stored in drums or other suitable containers prior to disposal. Should contamination occur adjacent to staging areas as a result of runoff, shovels and/or heavy equipment shall be utilized to collect the contaminated material. Contaminated soil shall be disposed of in accordance with state and federal regulations;
- Temporary above-ground tanks shall be subject to visual inspection on a monthly basis and when the tank is refilled. Inspection records shall be maintained. Operators shall routinely keep tanks under close surveillance and potential leaks or spills shall be quickly detected;
- Visible fuel leaks shall be reported to the Contractors' designated representative and corrected as soon as conditions warrant. Keystone's designated representative shall also be informed;
- Drain valves on temporary tanks shall be locked to prevent accidental or unauthorized discharges from the tank.

Keystone may allow modification of the above specifications as necessary

to accommodate specific situations or procedures. Any modifications must comply with all applicable regulations and permits.

3.1.2 Construction Right-of-way

Rubber-tired vehicles (pick-up trucks, buses) shall normally refuel at the construction staging areas or commercial gas stations. Tracked machinery (backhoes, bulldozers) shall be refueled and lubricated on the construction right-of-way. Equipment maintenance shall be conducted in staging areas when practical. When impractical, repairs to equipment can be made on the construction right of way when approved by Keystone's representative.

The following preventive measures apply to refueling and lubricating activities on the construction right-of-way:

- Construction activities shall be conducted to allow for prompt and effective clean up of spills of fuel and other hazardous materials. Each construction crew, including clean-up crews shall have on hand sufficient tools and material to stop leaks and supplies of absorbent and barrier materials to allow rapid containment and recovery of spilled materials and must know and follow the procedure for reporting spills;
- Refueling and lubrication of construction equipment shall be restricted to upland areas at least 100 feet away from stream channels and wetlands. Where this is not possible (e.g., trench dewatering pumps), the equipment shall be fueled by designated personnel with special training in refueling and spill containment and clean up. The Environmental Inspector shall ensure that signs are installed identifying restricted areas;
- Spent oils, lubricants, filters, etc. shall be collected and disposed of at an approved location in accordance with state and federal regulations;
- Equipment shall not be washed in streams.

Keystone may allow modification of the above specifications as necessary to accommodate specific situations or procedures. Any modifications must still comply with all applicable regulations and permits.

3.2 Contingency Plans

The Contractor shall develop emergency response procedures for all incidents (e.g., spills, leaks, fires) involving hazardous materials which could pose a threat to human health and/or the environment. The procedures shall address activities in all work areas, as well as during transport to and from the construction right-of-way and to any disposal or recycling facility.

3.3 Equipment

The Contractor shall retain emergency response equipment that shall be available at all areas where hazardous materials are handled or stored. This equipment shall be readily available to respond to a hazardous material emergency. Such equipment shall include, but not be limited to, the following:

- first aid kit/supplies
- phone or communications radio
- protective clothing (tyvek suit, gloves, goggles, boots)
- hand held fire equipment
- absorbent material and storage containers
- non-sparking bung wrench and shovel
- brooms and dust pan

Hazardous material emergency equipment shall be carried in all mechanic and supervisor vehicles. This equipment shall include, at a minimum:

- first aid kit/supplies
- phone or communications radio
- 2 sets of protective clothing (tyvek suit, gloves, goggles, boots)
- 1 non-sparking shovel
- 6 plastic garbage bags (20 gallon)
- 10 absorbent socks and spill pads
- hand held fire extinguisher
- barrier tape
- 2 orange reflector cones

Fuel and service trucks shall carry a minimum of 20 pounds of suitable commercial sorbent material.

The Contractor shall inspect emergency equipment weekly, and service and maintain equipment regularly. Records shall be kept of all inspections and services.

3.4 Emergency Notification

Emergency notification procedures between the Contractor and Keystone shall be established in the preplanning stages of construction, and the Keystone representative shall be identified to serve as contact in the event of a: spill during construction activities. In the event of a spill which meets government reporting criteria, the Contractor shall notify the Keystone representative immediately who, in turn, shall notify the appropriate regulatory agencies.

If a spill occurs into navigable waters of the United States, Keystone shall notify the National Response Center (NRC) at 1·800-424-8802. For spills which occur on public lands, into surface waters or into sensitive areas the appropriate governmental agency's district office shall also be notified.

3.5 Spill Containment and Countermeasures

In the event of a spill of hazardous material, Contractor personnel shall:

- notify the appointed Keystone representative;
- identify the product hazards related to the spilled material and implement appropriate safety procedures, based on the nature of the hazard;

- control danger to the public and personnel at the site;
- implement spill contingency plans and mobilize appropriate resources and manpower;
- isolate or shutdown the source of the spill;
- block manholes or culverts to limit spill travel;
- initiate containment procedures to limit the spill to as small an area as possible, to prevent damage to property or areas of environment concern (e.g., watercourses);
- commence recovery of the spill and clean-up operations.

When notified of a spill, the Keystone representative shall immediately ensure that:

- action is taken to control danger to the public and personnel at the site;
- spill contingency plans are implemented and that necessary equipment and manpower are mobilized;
- measures are taken to isolate or shutdown the source of the spill;
- all resources necessary to contain, recover and clean up the spill are available;
- any resources requested by the Contractor from Keystone are provided;
- the appropriate agencies are notified. For spills which occur on public lands, into surface waters or into sensitive areas the appropriate federal or state managing office office shall also be notified and involved in the incident.

On a land spill, berms shall be constructed with available equipment to physically contain the spill. Personnel entry and travel on contaminated soils shall be minimized. Sorbent materials shall be applied or, if necessary, heavily contaminated soils shall be removed to an approved facility. Contaminated sorbent materials and vegetation shall also be disposed of at an approved facility.

On a spill threatening a water body, berms and/or trenches shall be constructed to contain the spill prior to entry into a water body. Deployment of booms, skimmers and sorbent materials shall be necessary if the spill reaches the water. The spilled product shall be recovered and the contaminated area shall be cleaned up with in consultation with spill response specialists and appropriate government agencies.

4.0 UPLANDS (AGRICULTURAL, FOREST, PASTURE, RANGE AND GRASS LANDS)

4.1 Interference with Irrigation Systems

If existing irrigation systems (pivot, wheel or other type spray irrigation systems), irrigation ditches, or sheet flow irrigation shall be impacted by the construction of the pipeline, the following mitigative measures shall be implemented unless otherwise approved or directed by Keystone:

- If it is feasible and mutually acceptable to Keystone and the Landowner or Landowner's designate, temporary measures shall be implemented to

allow an irrigation system to continue to operate across land on which the pipeline is also being constructed.

- If the pipeline and/or temporary work areas intersect an operational (or soon to be operational) pivot or other spray irrigation system, Keystone shall establish with the Landowner or Landowner's designate an acceptable amount of time the irrigation system may be out of service or if, as a result of pipeline construction activities, an irrigation system interruption results in crop damages, either on the pipeline construction right-of-way or off the construction right-of-way, the Landowner shall be reasonably compensated for all such crop damages.
- If the pipeline and/or temporary work areas intersect an operational sheet flow irrigation system, Keystone shall establish with the Landowner or Landowner's designate an acceptable amount of time the irrigation system may be out of service or if, as a result of pipeline construction activities, an irrigation system interruption results in crop damages, either on the pipeline construction right-of-way or off the construction right-of-way, the Landowner shall be reasonably compensated for all such crop damages.
- Irrigation ditches that are active at the time of construction shall not be stopped or obstructed except for the length of time to install the pipeline beneath the ditch (typically, one day or less) unless otherwise approved or directed by Keystone.

4.2 Clearing

The objective of clearing is to provide a clear and unobstructed right of way for efficient construction of the pipeline. The following mitigative measures shall be implemented:

- construction traffic shall be restricted to the construction right-of-way, existing roads and approved private roads
- construction right-of-way boundaries including pre-approved temporary workspace shall be clearly staked to prevent disturbance to unauthorized areas
- if crops are present, they shall be mowed or disced to ground level unless an agreement is made for the Landowner to remove for personal use.
- burning is prohibited on cultivated land.
- construction right of way at timber shelterbelts in agricultural areas shall be reduced to the minimum necessary to construct the pipeline

4.3 Topsoil Removal and Storage

The objective of topsoil handling is to maintain topsoil capability by conserving topsoil for future replacement and reclamation and to minimize the degradation of topsoil from compaction, rutting, loss of organic matter, or soil mixing so that successful reclamation of the right of way can occur. The following mitigative measures shall be implemented during topsoil removal and storage unless otherwise approved or directed by Keystone based on site specific conditions or circumstances However, all work shall be conducted in accordance with applicable permits.

- In cultivated agricultural lands, unless otherwise specified by the Landowner, the actual depth of the topsoil shall be stripped from the area to be excavated above the pipeline to a maximum of 12 inches. When grading is required, the topsoil shall be removed from the entire area to be graded and stored. When grading is required, the topsoil shall be removed from the entire area to be graded and stored.
- In non-cultivated agricultural lands, the actual depth of topsoil shall be stripped from the area to be excavated above the pipeline. When grading is required, the topsoil shall be removed from the entire area to be graded and stored.
- Stripped topsoil is to be stockpiled in a windrow along the edge of the right of way. The Contractor shall perform its work in order to minimize the potential for subsoil and topsoil to be mixed.
- Under no circumstances shall the Contractor use topsoil to fill a low area
- If required due to excessively windy conditions, following the removal of the topsoil, topsoil piles shall be tackified using either water or a suitable tackifier.
- The surface drainage network in the vicinity of the right of way shall be maintained by keeping gaps in the rows of topsoil in order to prevent any accumulation of water on the land.
- Topsoil shall not be utilized to construct ramps at road or waterbody crossings.

4.4 Grading

The objective of grading is to develop a right of way that allows the safe passage of equipment and meets the bending limitations of the pipe. The following mitigative measures shall be implemented during grading unless otherwise approved or directed by Keystone based on site specific conditions or circumstances. However, all work shall be conducted in accordance with applicable permits.

- All grading shall be undertaken with the understanding that original contours and drainage patterns shall be re-established during clean up.
- Agricultural areas that have been land formed with terraces shall be surveyed to establish pre-construction contours to be utilized for restoration of the terraces after construction.
- On steep slopes, or wherever erosion potential is high, temporary erosion control measures shall be implemented.
- Bar ditches adjacent to existing roadways that shall be crossed during construction shall be adequately ramped with grade or ditch spoil to prevent damage to the road shoulder and ditch.
- Where the construction surface remains inadequate to support equipment travel, timber mats, timber riprap or other method shall be used to stabilize surface conditions.

The Contractor shall limit the interruption of the surface drain network in the vicinity of the right of way, using the appropriate methods:

- Providing gaps in the rows of subsoil and topsoil in order to prevent any accumulation of water on the land.
- Preventing obstructions in furrows, furrow drains and ditches.
- Installing flumes and ramps in furrows, furrow drains and ditches to facilitate water flow across the construction right of way and allow for construction equipment traffic.
- Installing flumes over the trench for any watercourse where flow is continuous during construction.

4.5 Temporary Erosion and Sediment Control

4.5.1 General

Temporary erosion and sediment control measures shall be installed immediately after initial disturbance of the soil and maintained throughout construction (on a daily basis) and reinstalled as necessary until replaced by permanent erosion control structures or restoration of the construction right-of-way is complete.

Specifications and configurations for erosion and sediment control measures may be modified by Keystone as necessary to suit actual site conditions. However, all work shall be conducted in accordance with applicable permits.

The Contractor shall inspect all temporary erosion control measures at least daily in areas of active construction or equipment operation, weekly in areas with no construction or equipment operation, and within 24 hours of each significant rainfall event. The Contractor shall repair all ineffective temporary erosion control measures as expediently as practicable.

4.5.2 Sediment Barriers

Sediment barriers shall be constructed of silt fence, staked hay or straw bales, compacted earth (e.g., driveable berms across travel lanes), sand bags, or other appropriate materials.

The Contractor shall install sediment barriers in accordance with **Details 1 and 2** or as otherwise approved or directed by Keystone. The aforementioned sediment barriers may be used interchangeably or together depending on site specific conditions. In most cases, silt fences shall be utilized where longer sediment barriers are required.

Sediment barriers shall be installed below disturbed areas where there is a hazard of off-site sedimentation. These areas include:

- The base of slopes adjacent to road crossings
- The edge of the construction right-of-way adjacent to and up gradient of a roadway, flowing stream, spring, wetland or impoundment
- At trench or test water discharge locations where required

- Where waterbodies or wetlands are adjacent to the construction right-of-way, the Contractor shall install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil and sediment within the construction right-of-way
- Across the entire construction right-of-way at flowing waterbody crossings
- Right-of-way immediately upslope of the wetland boundary at all standard (saturated or standing water) wetland crossings as necessary to prevent sediment flow into the wetland. Sediment control barriers are not required at "dry" wetlands
- Along the edge of the construction right-of-way within standard (saturated or standing water) wetland boundaries as necessary to contain spoil and sediment within the construction right-of-way. Sediment control barriers are not required at "dry" wetlands

Sediment barriers placed at the toe of a slope shall be set with sufficient distance from the toe of the slope, if possible, in order to increase ponding volume.

Sediment control barriers shall be placed so as not to hinder construction operations. If silt fences or straw bale sediment barriers in lieu of driveable berms are placed across the entire construction right-of-way at waterbodies, wetlands, or upslope of roads, a provision shall be made for temporary traffic flow through a gap for vehicles and equipment to pass within the structure. Immediately following each day's shutdown of construction activities, a row of straw bales or a section of silt fence shall be placed across the up-gradient side of the gap with sufficient overlap at each end of the barrier gap to eliminate sediment bypass flow, followed by bales tightly fitted to fill the gap. Following completion of the equipment crossing, the gap shall be closed using silt fence or straw bale sediment barrier.

The Contractor shall maintain straw bale and silt fence sediment barriers by removing collected sediment and replacing damaged bales. If sediment loading is greater than approximately 40% full behind a straw bale or silt fence sediment barrier, or if directed by Keystone, sediment shall be removed and placed in an area where it shall not reenter the barrier. If straw bale filters cannot be cleaned out due to access problems, the Contractor shall place a new row of sediment barriers upslope.

The Contractor shall use mulch and straw bales that are free of noxious weeds. Mulch or straw bales that contain evidence of noxious weeds or other undesirable species shall be rejected by the Contractor.

The Contractor shall remove sediment barriers except those needed for permanent erosion and sediment control during clean up of the construction right-of-way.

4.5.3 Trench Plugs

The Contractor shall use trench plugs at the edge of flowing waterbody crossings and at the edge of wetlands with standing water to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody. Trench plugs shall be of sufficient size to withstand upslope water pressure.

4.5.4 Temporary Slope Breakers (Water Bars)

The Contractor shall not install temporary slope breakers (water bars) in cultivated land.

The Contractor shall install temporary slope breakers on slopes greater than approximately 5% in non-cultivated lands where the base of the slope is less than 50 feet from waterbody, wetland, and road crossings at the following recommended spacing:

Slope (%)	Spacing (feet)
5 - 15	300
>15 - 30	200
>30	100

The gradient of each slope breaker shall be 2 to 8 percent.

Temporary slope breakers shall be constructed of soil, silt fence, staked straw bales, sand bags or similar materials authorized by Keystone.

The Contractor shall direct the outfall of each temporary slope breaker to a stable, well vegetated area or construct an energy-dissipating device at the end of the slope breaker and off the construction right-of-way as shown in **Detail 3.** The outfall of each temporary slope breaker shall be installed to prevent sediment discharge into wetlands, waterbodies, or other sensitive resources.

Specifications and configurations for temporary slope breakers may be modified by Keystone as necessary to suit actual site conditions. However, all work shall be conducted in accordance with applicable permits.

4.5.5 Drainage Channels or Ditches

Drainage channels or ditches shall be used on a limited basis to provide drainage along the construction right-of-way and toe of cut slopes as well as to direct surface runoff across the construction right-of-way or away from disturbances and onto natural undisturbed ground. Channels or ditches shall be constructed by the Contractor during grading operations. Where there is inadequate vegetation at the channel's or ditch's outlet, sediment barriers, check berms or other appropriate measures shall be used to control erosion.

4.5.6 Temporary Mulching

The Contractor shall install temporary mulch before seeding if construction or restoration activity is interrupted for extended periods. The Contractor shall not apply temporary mulch in cultivated areas unless specifically requested by the Landowner. The Contractor shall not apply mulch within wetland boundaries.

Temporary mulch applied on slopes shall be spread uniformly to cover at least 75 percent of the ground surface at an approximate rate of 2 tons/acre of straw or its equivalent. Mulch application on slopes within 100 feet of waterbodies and wetlands shall be increased to an approximate rate of 3 tons/acre of straw or equivalent

4.5.7 Tackifier

When inordinately windy conditions result in excessive topsoil movement and topsoil piles wetted with water is not preventing wind erosion, the Contractor shall temporarily suspend topsoil handling operations and apply a tackifier to topsoil stockpiles at the rate recommended by the manufacturer.

Should construction traffic, cattle grazing, heavy rains, or other related construction activity disturb the tackified topsoil piles and there is a potential for wind erosion, additional tackifier shall be applied by the Contractor.

4.6 Stringing

The objective of stringing is to place the line pipe along the construction right of way for bending and welding in an expedient and efficient manner.

The Contractor shall utilize one or more of the following mitigation measures as applicable and when necessary to reduce compaction on the working side of the right of way or as directed by Keystone. However, all work shall be conducted in accordance with applicable permits.

- Prohibiting access by certain vehicles.
- Using only machinery possessing low ground pressure (tracks or extra-wide tires).
- Control access thus minimizing the frequency of all vehicle traffic.
- Hastening drainage through digging drainage ditch to re-establish surface drainage as required.
- Using timber riprap, matting, or geotextile fabric overlain with soil.
- Stopping construction entirely for a period of time.

4.7 Trenching

The objective of trenching is to provide a ditch of sufficient depth and width with a bottom to continuously support the pipeline. During trenching operations, the following mitigative measures shall be implemented unless otherwise approved or directed by Keystone based on site specific conditions or circumstances. However, all work shall be conducted in accordance with applicable permits.

- Segregating subsoil materials from topsoil in separate, distinct rows with a separation that shall limit any admixing of topsoil and subsoil during handling of these materials.
- Gaps must be left in the spoil piles that coincide with breaks in the strung pipe to facilitate natural drainage patterns and to allow the passage of livestock or wildlife.
- Trenching operation shall be followed as closely as practicable by lower-in and backfill operations to minimize the length of time the ditch is open
- Construction debris (e.g., welding debris) and other garbage shall not be deposited in the ditch.

Should blasting be necessary for removal of rock, the following mitigation measures shall be implemented:

- Where blasting is required, operations shall be done accordingly to laws and regulations governing explosives.
- Prior to using explosives, the Contractor shall advise residents of the immediate area, in order to prevent any risk of accidents or undue disturbances.
- Blasting mats or subsoil shall be piled over the trench line to prevent any rocks from being blown outside the construction right of way.
- Each blasting location shall be cleared and cleaned up before and after all blasting operations
- Blasting shall be carried out during regular daylight working hours.

4.7.1 Trench Dewatering/Well Points

The Contractor shall make all reasonable efforts to discharge trench water in a manner that avoids damage to adjacent agricultural land, crops and pasture. Damage includes, but is not limited to the inundation of crops for more than 24 hours, deposition of sediment in ditches, and the deposition of gravel in fields or pastures.

If trench dewatering is necessary in an area where salt damage to adjacent crops is evident, the Keystone Inspector shall conduct a field conductivity test on the trench water before it is discharged. If the conductivity of the trench water is determined to potentially affect soil quality, it shall not be discharged to areas where salt damage to crops is evident, but shall be directed as feasible so that water flows over a well vegetated, non-cropland area or through an energy dissipater and sediment barrier, then directed to nearby ditches or brackish wetlands or waterbodies.

When pumping water from the trench for any reason the Contractor shall ensure that adequate pumping capacity and sufficient hose is available to permit dewatering as follows:

- No heavily silt-laden trench water shall not be allowed to enter a waterbody or wetland directly but shall instead be diverted through a well vegetated area, a geotextile filter bag or a permeable berm (straw bale or Keystone approved equivalent); and

- Trench water shall not be disposed of in a manner which could damage crops or interfere with the functioning of underground drainage systems.

The Contractor shall screen the intake hose and keep the hose either one foot off the bottom of the trench or in a container to minimize entrainment of sediment.

4.8 Welding, Field Joint Coating, and Lower In

The objectives of welding, field joint coating and lower in are to provide continuous segments of pipeline, to provide corrosion protection to the weld areas of the pipeline, and to place the pipeline in the center of the trench, without stress, at the required depth of cover. The following mitigative measures shall be followed during pipe welding, field joint coating, and lower in, unless otherwise specified by Keystone in response to site specific conditions or circumstances. However, all work shall be conducted in accordance with applicable permits.

- Shavings produced during bevelling of the line pipe are to be removed immediately following this operation to ensure that livestock and wildlife do not ingest this material. When welding operations have created a continuous line of pipe that may be left on the right of way for an extended period of time due to construction or weather constraints, a gap in the welded pipe shall be provided to allow for access at farm road crossings and also for passage of livestock and/or wildlife.
- Prior to the application of epoxy powder, urethane epoxy or other approved pipe coatings, a tarp shall be placed underneath the pipe to collect any overspray of epoxy powder and/or liquid drippings. Excess powder and/or liquid or other hazardous materials (e.g. brushes, rollers, gloves, etc.) shall be continuously collected and removed from the construction right-of-way.

4.9 Padding and Backfilling

The objective of padding (when required) and backfilling is to cover the pipe with material that is not detrimental to the pipeline and pipeline coating. The following mitigative measures shall be utilized during backfilling, unless otherwise approved or directed by Keystone based on site specific conditions or circumstances. All work shall be conducted in accordance with applicable permits.

- Excessive water accumulated in the trench shall be eliminated prior to backfilling.
- In the event it becomes necessary to pump water from open trenches, the Contractor shall pump the water and discharge it into existing water drainages in a manner that shall avoid damaging adjacent agricultural land, crops, and/or pasture.
- If it is impossible to avoid water-related damages (including inundation of crops for more than 24 hours, deposition of sediment in ditches and other water courses, and the deposition of gravel in fields, pastures, and any water courses), Keystone shall reasonably compensate the Landowners for the damages or shall correct the damages so as to restore the land, crops, pasture, water courses, etc. to their pre construction condition.
- All pumping of water shall comply with existing drainage laws and local ordinances relating to such activities and provisions of the Clean Water Act.
- Prior to backfilling, all drain tile shall be permanently repaired, inspected and the repair documented as described in Section 5.5
- Prior to backfilling, trench breakers shall be installed on slopes where required to minimize the potential for water movement down the ditch and potential subsequent erosion.
- In backfilling the trench, the stockpiled subsoil shall be placed back into the trench before replacing the topsoil.
- Topsoil shall not be utilized for padding the pipe.
- Backfilling shall be done without mixing spoil with topsoil.
- Backfill shall be compacted to a minimum of 90% of pre-existing conditions where the trench line crosses tracks of wheel irrigation systems (pivots).
- To reduce the potential for ditch line subsidence, spoil shall be replaced and compacted by backhoe bucket and/or by the wheels or tracks of equipment traversing down the trench.
- The top 4 feet or the actual depth of top cover, whichever is less, within the pipeline trench, bore pits, or other excavations shall not be backfilled with soil containing rocks of any greater concentration or size than existed prior to the pipeline's construction.

4.10 Clean Up

The objective of clean up activities shall be to prepare the right of way and other disturbed areas to approximate pre-activity ground contours where appropriate and to replace spoil and stockpiled material in a manner which preserves soil capability and quality to a degree reasonably equivalent to the original or that of representative undisturbed land. The following mitigative measures shall be utilized during clean up, unless otherwise approved or directed by Keystone based on specific conditions or circumstances. However, all work shall be conducted in accordance with applicable permits.

- Clean up shall occur immediately following backfilling operations when weather allows it.
- All garbage and construction debris (i.e., lathing, ribbon, welding rods, pipe bevel shavings, pipe spacer ropes end caps, pipe skids, etc.) shall be collected and disposed of at approved disposal sites.

- The right of way shall be re-contoured with spoil material to approximate pre-construction contours and as necessary to limit erosion and subsidence. Loading of slopes with unconsolidated spoil material shall be avoided during slope re-contouring. Topsoil shall be replaced after re-contouring of the grade with subsoil. The topsoil shall be replaced on the subsoil storage area and over the trench so that after settling occurs, the topsoil's approximate original depth and contour (with an allowance for settling) shall be achieved.
- Surface drainage shall be restored and re-contoured to conform to the adjacent land drainage system.
- Erosion control structures such as permanent slope breakers and cross ditches shall be installed on steep slopes where necessary to control erosion by diverting surface run-off from the right of way, to stable and vegetated off right of way areas.
- After construction, all temporary access shall be returned to prior construction conditions unless specifically agreed with the Landowner or otherwise specified by Keystone.
- Installation of warning signs, aerial markers, and cathodic protection test leads in locations that shall not impair farming operations and are acceptable to the Landowner
- All bridges, fences and culverts existing prior to construction shall be restored to meet or exceed approximate pre-construction conditions. Caution shall be utilized when re-establishing culverts to ensure that drainage is not improved to a point that would be detrimental to existing waterbodies and wetlands.
- All temporary gates installed during construction shall be replaced with permanent fence unless otherwise requested by the Landowner.

4.11 Reclamation and Re-vegetation

The objectives of reclamation and re-vegetation are to return the disturbed areas to approximately pre-construction use and capability. This involves the treatment of soil as necessary to preserve approximate pre-construction capability and the stabilization of the work surface in a manner consistent with the initial land use. The following mitigative measures will be utilized unless otherwise approved or directed by Keystone based on site specific conditions or circumstances. However, all work shall be conducted in accordance with applicable permits.

4.11.1 Relieving Compaction

- Compaction shall be alleviated on all agricultural land traversed by construction equipment. Cropland that has been compacted shall be ripped a minimum of 3 passes at least 18 inches deep and all pasture and woodland shall be ripped or chiseled a minimum of three passes at least 12 inches deep.
- Areas of the construction right of way that were stripped for topsoil salvage shall be ripped a minimum of 3 passes (in cross patterns) prior to topsoil replacement. The approximate depth of ripping shall be 18 inches (or a lesser depth if damage may occur to existing drain tile systems). Following ripping, the subsoil surface shall be graded

smooth and any subsoil clumps broken up (disc and harrow) in an effort to avoid topsoil mixing.

- The decompacted construction right of way shall be tested by the Contractor at regular intervals for compaction in agricultural and residential areas disturbed by construction activities. Tests shall be conducted on the same soil type under similar moisture conditions in undisturbed areas immediately adjacent to the right of way to approximate pre-construction conditions. Penetrometers or other appropriate devices shall be used to conduct tests
- Topsoil shall be replaced to pre-existing depths once ripping and discing of subsoil is complete. Topsoil compaction on cultivated fields shall be alleviated by cultivation.
- If there is any dispute between the Landowner and Keystone as to what areas need to be ripped or chiseled, the depth at which compacted areas should be ripped or chiseled, or the necessity or rates of lime and fertilizer application, the appropriate county Soil and Water Conservation District's opinion shall be considered by Keystone and the Landowner.

Plowing under of organic matter including wood chips, manure, or planting of a new crop, such as alfalfa, to decrease soil bulk density and improve soil structure or any other measures in consultation with the Soil Conservation service shall be considered if mechanical relief of compaction is deemed not satisfactory.

4.11.2 Rock Removal

- In agricultural land, rocks that are exposed on the surface due to construction activity shall be removed from the right of way prior to and after topsoil replacement to an equivalent quantity, size and distribution of rocks to that of adjacent lands.
- Clearing of rocks may be carried out with a mechanical rock picker or by manual means, provided that preservation of topsoil is assured. Rock removed from the right of way shall be hauled off the Landowner’s premises or disposed of on the Landowner’s premises at a location that is mutually acceptable to the Landowner and to Keystone.

4.11.3 Soil Additives

If site specific conditions warrant and if agreed to by the Landowner, the Contractor shall apply amendments (fertilizer and soil pH modifier materials and formulations) that are commonly used for agricultural soils in the area in which they are applied and in accordance with written recommendations from the local soil conservation authority, land management agencies, or Landowner. Amendments shall be incorporated into the normal plow layer as soon as possible after application.

4.11.4 Seeding

- The final seed mix shall be based on input from the local Soil Conservation Services and the availability of seed at the time of reclamation. The Landowner may request specific seeding requirements during easement negotiations.
- Certificates of seed analysis are required for all seed mixes to limit the introduction of noxious weeds.
- Seed not utilized within 12 months of seed testing shall be approved by Keystone prior to use.Seeding shall follow clean up and topsoil replacement as closely as possible. Seed shall be applied to all disturbed surfaces (except cultivated fields unless requested by the Landowner) as indicated on the Consruction Drawings
- If mulch was applied prior to seeding for temporary erosion control, the Contractor shall remove and dispose of the excess mulch prior to seedbed preparation to ensure that seedbed preparation equipment and seed drills do not become plugged with excess mulch; to ensure that seed can adequately contact the soil surface; and to ensure that seed incorporation or soil packing equipment can operate without becoming plugged with mulch.
- The Contractor may evenly re-apply and anchor (straw crimp) the removed temporay mulch on the construction right-of-way following seeding.
- Identified seeding areas shall be seeded at a rate appropriate for the region and stability of the reclaimed surface. Seeding rates shall be based on Pure Live Seed.
- Weather conditions, construction right-of-way constraint, site access, and soil type shall influence the seeding method to be used (i.e., drill seeding versus broadcast seeding). All areas seeded by the Contractor, except for temporary cover crops, shall be drill seeded unless the right of way is too steep to facilitate drill seeding. Temporary cover crop seed shall be broadcast.
- The Contractor shall delay seeding as necessary until the soil is in the appropriate condition for drill seeding.
- The Contractor shall use a Truax (brand) or equivalent-type drill seeder equipped with a cultipacker designed and equipped to apply grass and grass-legume seed mixtures with mechanisms such as seed box agitators to allow even distribution of all species in each seed mix, with an adjustable metering mechanism to accurately deliver the specified seeding rate and with a mechanism such as depth bands to accurately place the seed at the specified depth.
- The Contractor shall operate drill seeders at an appropriate speed so the specified seeding rate and depth is maintained.
- The Contractor shall calibrate drill seeders so that the specified seeding rate is planted. The row spacing on drill seeders shall not exceed 8 inches.
- The Contractor shall plant seed at depths cosistent with the local or regional agricultural practices.
- Broadcast or hydro seeding used, in lieu of drilling, shall utilize double the recommended seeding rates. Where seed is broadcast, the Contractor shall use a harrow, cultipacker or other equipment

immediately following broadcasting to incorporate the seed to the specified depth and to firm the seedbed.

- The Contractor shall delay broadcast seeding during high wind conditions if even distribution of seed is impeded.
- The Contractor shall hand rake all areas that are too steep, or otherwise cannot be safely harrowed or cultipacked, in order to incorporate the broadcast seed to the specified depth.
- Hydro-seeding may be used, on a limited basis, where the slope is too steep or soil conditions do not warrant conventional seeding methods. Fertilizer, where specified, may be included in the seed, virgin wood-fiber, tackifier and water mixture. When hydro-seeding, virgin wood-fiber shall be applied at the rate of approximately 3,000 pounds per acre on an air-dry weight basis as necessary to provide at least 75% ground cover. Tackifier shall consist of biodegradable, vegetable-based material and shall be applied at the rate recommended by the manufacturer. The seed, mulch and tackifier slurry shall be applied so that it forms a uniform, mat-like covering of the ground.
- Keystone shall work with Landowners to discourage cattle from using the construction right-of-way during the first growing season by utilization of temporary fencing or deferred grazing.

4.11.5 Permanent Erosion and Sediment Control

The Contractor shall restore all existing Landowner soil conservation improvements and structures disturbed by pipeline construction to the approximate pre-construction line and grade. Soil conservation improvements and structures include, but are not limited to, grassed waterways, toe walls, drop inlets, grade control works, terraces, levees and farm ponds.

4.11.5.1 Trench Breakers

The Contractor shall install trench breakers in steep terrain where necessary to limit the potential for trench line erosion and at the base of slopes adjacent to waterbodies and wetlands.

Trench breakers shall be constructed of materials such as sand bags, sand/cement bags, bentonite bags, or polyurethane foam by the Contractor **(Detail 7)**. The Contractor shall not use topsoil in trench breakers.

4.11.5.2 Permanent Slope Breakers (Water Bars)

Permanent slope breakers (water bars) shall be constructed of soil or, in some instances, sand bags.

The Contractor shall construct permanent slope breakers (water bars) on the construction right-of-way where necessary to limit erosion, except in cultivated and residential areas. Slope breakers shall divert surface runoff to adjacent stable vegetated areas or to energy-dissipating devices as shown on **Detail 3.** Permanent slope breakers (water bars) shall be installed as specified on the Construction Drawings or generally with a minimum spacing as shown on the following table:

Slope (%)	Spacing (feet)
5 - 15	300
>15 – 30	200
>30	100

The gradient (fall) for each slope breaker shall be two percent (2%) to eight percent (8%) unless otherwise approved by Keystone based on site specific conditions.

The Contractor shall construct slope breakers to divert surface flow to a stable, well-vegetated area. In the absence of a stable area, the Contractor shall construct appropriate energy-dissipating devices at the end of the slope breaker and beyond the area disturbed by construction. .

4.11.5.3 Mulching

The Contractor shall apply mulch on all areas with high erosion potential and on slopes greater than 8 percent unless otherwise approved by Keystone based on site specific conditions or circumstances. The Contractor shall spread mulch uniformly over the area to cover at least 75 percent of the ground surface at an approximate rate of 2 tons/acre of straw or its equivalent.

Mulch application includes straw mulch or hydro mulch and tackifier. The Contractor shall not apply mulch in cultivated areas unless requested by the Landowner.

The Contractor shall use mulch that is free of noxious weeds.

The Contractor shall apply mulch immediately following seeding. The Contractor shall not apply mulch in wetlands.

If a mulch blower is used, the majority of strands of the mulching material shall not be shredded to less than 8 inches in length to allow anchoring. The Contractor shall anchor mulch immediately after application to minimize loss by wind and water.

When anchoring (straw crimping) by mechanical means, the Contractor shall use a tool specifically designed for mulch anchoring with flat, notched disks to properly crimp the mulch to a depth of approximately 2 to 3 inches. A regular farm disk shall not be used to crimp mulch.

In soils possessing high erosion potential, the Contractor may be required to make two passes of the mulch-crimping tool, passes must be as perpendicular to the others as possible.

When anchoring with liquid mulch binders (tackifiers), the Contractor shall use a biodegradable tackifier derived from a vegetable-based, organic source. The Contractor shall apply mulch binders at rates recommended by the manufacturer.

The Contractor shall limit the use of liquid mulch binders (tackifiers) for anchoring straw and the use of hydromulch and tackifier to areas that are too steep or rocky to safely or effectively operate mechanical mulch-anchoring tools.

4.11.5.4 Erosion Control Matting

Erosion control matting shall be applied where shown on the Construction Drawings as shown on **Detail 4.** The Contractor shall anchor the erosion control matting with staples or other approved devices.

The Contractor shall use erosion control matting made of biodegradable, natural fiber such as straw or coir (coconut fiber).

The Contractor shall prepare the soil surface and install the erosion control matting to ensure it is stable and the matting makes uniform contact with the soil of the slope face or stream bank underneath with no bridging of rills, gullies or other low areas.

4.11.5.5 Riprap and Stream Bank Stabilization

In most cases, the banks and streambeds of waterbodies shall be restored to their approximate original contours. Erosion protection shall be applied as specified in the construction drawings.

Generally most restored banks will be protected through the use of flexible channel liners installed as specified in **Detail 19.**

If the original stream bank is excessively steep and unstable and/or flow conditions are severe, a more stable final contour

may be specified and alternate stabilization measures may be installed.

Alternate stabilization measures may consist of rock rip rap, or bio-stabilization or engineered structures such as brush layering, logwalls, cribwalls, or vegetated geo-grids. See **Details 20, 22, 23, and 24.**

Stream bank riprap structures shall consist of a layer of stone, underlain with approved filter fabric or a gravel filter blanket. Riprap shall extend from the stabilized streambed to the top of the stream bank, where practicable, native rock shall be utilized.

4.11.6 Fences

Upon completion of all backfilling, clean-up and restoration including mulching and seeding of the construction right-of-way, permanent repairs shall be made to all fences by using either the original material or good quality new material similar to existing fences.

Early or historic fences shall be carefully reassembled by hand from the original material. Where the original material has deteriorated to a state that makes it unsalvageable, replacement material similar to the original shall be used if possible.

4.11.7 Right-of-way and Pipeline Markers

Upon completion of all backfilling, clean-up and restoration including mulching and seeding of the construction right-of-way and during the time when the Contractor is making permanent repairs to fences, the Contractor shall install pipeline markers on each side of all roads, railroads, fence lines, stream crossings and other areas where the pipeline markers do not conflict with intended land use.

4.12 Pasture and Range Lands

The following mitigative measures shall be implemented in addition to the requirements previously stated in Sections 4.1 thru 4.11 unless otherwise approved by Keystone based on site specific conditions or circumstances. However, all work shall be conducted in accordance with applicable permits.

- Access across the right of way during construction shall be provided at locations requested by Landowners, if practicable.
- Bevel shavings produced during pipe bevel operations are to be removed immediately to ensure that livestock and wildlife do not ingest this material.
- Litter and garbage shall be collected and removed from the construction site at the end of the day's activities.
- Temporary gates shall be installed at fence lines for access to the construction right of way. These gates shall remain closed at all times. Upon completion of construction, the temporary gates shall be removed and the permanent fence replaced.

- Feeding or harassment of livestock or wildlife is prohibited.
- Construction personnel shall not be permitted to have firearms or pets on the construction right-of-way.
- All food and wastes shall be stored and secured in vehicles and/or appropriate facilities.
- Areas of disturbance in native range shall be seeded with a native seed mix after topsoil re-placement.
- Improved pasture shall be seeded with a seed mix approved by individual Landowners.

4.13 Forested Lands

Mitigation measures are required to ensure that pipeline construction activities have a minimal impact on forested lands and their habitat.

Clearing, grubbing and grading of trees, brush and stumps shall be performed in accordance with the following mitigative measures in addition to the requirements previously stated in Sections 4.1 thru 4.11 unless otherwise approved or directed by Keystone based on site specific conditions or circumstances. However, all work shall be conducted in accordance with applicable permits.

- Prior to the start of clearing activity, right of way boundaries including pre-approved temporary workspaces shall be clearly staked to prevent disturbance to unauthorized areas.
- If trees are to be removed from the construction right-of-way, Keystone shall consult with the Landowner or Landowner's designate to see if there are trees of commercial or other value to the Landowner. Timber shall be salvaged as per Landowner request.
- If there are trees of commercial or other value to the Landowner, Keystone shall allow the Landowner the right to retain ownership of the trees with the disposition of the trees to be negotiated prior to the commencement of land clearing and included in the easement agreement.
- If not performed by the Landowner, the construction right of way Contractor shall salvage all merchantable timber from designated areas.
- Tree stumps shall be grubbed only 5 feet either side of the trench line and where necessary for grading a level surface for pipeline construction equipment to operate safely
- Keystone shall follow the Landowner's or Landowner designate's desires as stated in the easement agreement regarding the disposal of trees, brush, and stumps of no value to the Landowner by burning, burial, etc., or complete removal from any affected property.
- Timber salvage operations shall use cut off-type saw equipment. Felling shall be undertaken in a manner that minimizes butt shatter, breakage and off right of way disturbance. Skidders or alternate equipment shall be used to transport salvaged logs to stacking sites.
- Trees shall be felled in such a way that they fall toward the centre line of the right of way to avoid breaking trees and branches off right of way. Leaners or felled trees that inadvertently fall into adjacent undisturbed vegetation shall be salvaged.
- Trees and slash falling outside the right of way shall be recovered and disposed of

- Salvaged logs shall be limbed and topped before removal from the construction right-of-way. Log decks (if required) shall be oriented to best facilitate loading by picker trucks and be located adjacent to the working side of the right of way where possible.
- The Contractor shall not be allowed to dispose of woody debris in wooded areas along the pipeline right of way.
- Pruning of branches hanging over the right of way shall be done only when necessary for construction. Any branch that is broken or seriously damaged should be cut off near its fork and the collar of the branch preserved.
- All tree wastes, stumps, tree crowns, brushes, branches and other forest debris shall be either burned, chipped (using a mobile chipper) or removed from the right of way according to Keystone instructions contained in the specific mitigation measures. Burial of this waste material on the site by the Contractor shall require the Landowner's specific authorization. Chips must not be spread over cultivated land. However, they may be spread and incorporated with mineral soil over the forest floor at a density that shall not prevent re-vegetation of grass.
- Stump removal and brush clearing shall be done with bulldozers equipped with brush rakes to preserve organic matter.
- Decking sites shall be established, approximately 2000 feet apart in timbered areas, on sites located on approved temporary workspace in existing cleared areas, in non-merchantable stands of timber or, if no other options are available, in merchantable timber stands. Deck sites shall be appropriately sized to accommodate the loading equipment.
- The Contractor shall remove decked timber from the construction right-of-way and transport to a designated all weather access point or mill if the Landowner does not want the timber.

4.14 Residential and Commercial/Industrial Areas

4.14.1 Residential Area

The principal measures that shall be used to mitigate impacts on existing residential areas include the following unless otherwise directed or approved by Keystone based on site specific conditions or circumstances. However, all work shall be conducted in accordance with applicable permits.

- notifying Landowners prior to construction;
- posting warning signs as appropriate
- reducing the width of construction right of way, if practicable, by eliminating the construction equipment passing lane, reducing the size of work crews, or utilizing the "stove pipe" or "drag section" construction techniques;
- removing fences, sheds, and other improvements as necessary for protection from construction activities;
- preserving, to the extent possible, mature trees and landscaping while ensuring the safe operation of construction equipment;
- fencing the edge of the construction work area adjacent to a residence for a distance of 100 feet on either side of the residence to ensure that construction equipment and materials, including the spoil pile, remain within the construction work area;

- limiting the hours during which operations with high-decibel noise levels (i.e., drilling and boring) can be conducted;
- limiting dust impact through prearranged work hours and by utilizing dust minimization techniques;
- ensuring that construction proceeds quickly through such areas (thus, minimizing exposure to nuisance effects such as noise and dust);
- maintaining access and traffic flow during construction activities, particularly for emergency vehicles;
- cleaning up construction trash and debris daily;
- fencing or plating open ditches during non-construction activities;
- immediately after backfilling the trench, restoring all lawn areas, shrubs, specialized landscaping, fences and other structures, etc. within the construction work area consistent with its pre-construction appearance or the requirements of the Landowner. Restoration work shall be done by personnel familiar with local horticultural and turf establishment practices;
- If the pipeline centerline is within 25 feet of a residence, ensuring that the trench is not excavated until the pipe is ready for installation and that the trench shall be backfilled immediately after pipe installation.

4.14.2 Commercial / Industrial Area

Commercial/industrial areas traversed by the pipeline would be subjected to both short and long-term impacts similar to residential areas. Temporary, short-term construction impacts may include disruption, inconvenience, and loss of potential revenues.

The principal measures that shall be used to mitigate impacts on existing commercial/industrial areas are as follows unless otherwise directed or approved by Keystone based on site specific conditions or circumstances. However, all work shall be conducted in accordance with applicable permits.

- notifying business owners prior to construction;
- reducing the width of construction right of way, if practicable, by eliminating the construction equipment passing lane, reducing the size of work crews, or utilizing the “stove pipe” or “drag section” construction techniques;
- removing fences and other improvements as necessary for protection from construction activities;
- fencing the edge of the construction work area adjacent to a business for a distance of approximately 100 feet on either side of the commercial/industrial building to ensure that construction equipment and materials, including the spoil pile, remain within the construction work area;
- preserving, to the extent possible, mature trees and landscaping while ensuring the safe operation of construction equipment;
- limiting the hours during which operations with high-decibel noise levels (i.e., drilling and boring) can be conducted;
- limiting dust impact through prearranged work hours and by utilizing dust minimization techniques;

- ensuring that construction proceeds quickly through such areas (thus, minimizing exposure to nuisance effects such as noise and dust);
- maintaining access and traffic flow during construction activities, particularly for emergency vehicles;
- cleaning up construction trash and debris daily;
- fencing or plating open ditches during non-construction activities;
- immediately after backfilling the trench, restoring all lawn areas, shrubs, specialized landscaping, fences and other structures, etc. within the construction work area consistent with its pre-construction appearance or the requirements of the business owner. Restoration work shall be done by personnel familiar with local horticultural and turf establishment practices;
- If the pipeline centerline is within 25 feet of a commercial/industrial building, ensuring that the trench is not excavated until the pipe is ready for installation and that the trench shall be backfilled immediately after pipe installation.

4.14.3 Site – Specific Plans

For any residence or commercial/industrial building closer than 25 feet to the construction work area, Keystone shall prepare a site-specific construction plan. The plan shall include:

- a description of construction techniques to be used;
- a dimensioned site plan that shows, as a minimum:
    - the location of the residence or commercial/industrial area in relation to the new pipeline;
    - the edge of the construction work area;
    - the edge of the new permanent construction right-of-way; and
    - other nearby topographical obstacles including landscaping, trees, structures, roads, parking areas, or ditches/streams, etc.
- a description of how Keystone would ensure that the trench is not excavated until the pipe is ready for installation and that the trench is backfilled immediately after pipe installation.

Figure 1 represents a typical site specific plan.

4.14.4 Landowner Complaint Resolution Procedure

Keystone shall implement a Landowner complaint procedure as follows:

- Landowners should first contact the construction spread office to express their concern over restoration and/or mitigation of environmental damages on their property. The Construction Manager, or his designated representative, shall respond to the Landowner within approximately 24 hours of receipt of the phone call.
- If the Landowner has not received a response or are not satisfied with the response, they can then contact Keystone's representative at XXX-

XXX-XXXX. The Landowners should expect a response within 48 hours.

- If the Landowner has not received a response or is not satisfied with the response, they should contact Keystone's Hotline at XXX-XXX-XXXX.

4.15 Operations and Maintenance

Operations and maintenance programs such as vegetation management, pipeline maintenance, integrity surveys, hydrostatic testing or other programs may have an impact on the final reclamation of the right of way. To ensure that the integrity of the facility and land surface reclamation of the right of way is maintained after completion of construction and that regulatory requirements are adhered to during operations, the following measures shall be implemented unless otherwise directed by Keystone in response to site specific conditions or circumstances. However, all work shall be conducted in accordance with applicable permits.

- Keystone shall monitor the pipeline right of way and all stream crossings for erosion or other potential problems that could affect the integrity of the pipeline. Any erosion identified shall be reclaimed as expediently as practicable by Keystone or by compensation of the Landowner to reclaim the area.
- Trench depressions on ditch line which may interfere with natural drainage, vegetation establishment or land use shall be repaired as expediently as practicable by Keystone or by compensation of the Landowner to repair the area.
- Post construction monitoring inspections shall be conducted of disturbed areas after the first growing season to determine the success of revegetation. Areas which have not been successfully re-established shall be revegetated by Keystone or by compensation of the Landowner to reseed the area. If, after the first growing season, revegetation is successful, no additional monitoring shall be conducted.
- In non-agricultural areas, revegetation shall be considered successful if, upon visual survey, the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands.
- In agricultural areas, revegetation shall be considered successful if crop yields are similar to adjacent undisturbed portions of the same field.
- Restoration shall be considered successful if the surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless requested otherwise by the Landowner or land managing agency), revegetation is successful, and drainage has been restored.
- Weed control measures shall be implemented as required in conjunction with the Landowner.
- Keystone shall be responsible for correcting all tile line repairs or irrigation systems that fail due to pipeline construction, provided those repairs were made by Keystone. Keystone shall not be responsible for tile line repairs which Keystone compensates the Landowner to perform.
- When requested by Landowners, in cultivated land, Keystone shall monitor the yield of land impacted by construction with the help of agricultural specialists. If alterations are indicated from that of adjacent lands, Keystone

will compensate the Landowner for reduced yields and shall implement procedures to return the land to equivalent capability.

- In residential areas, Landowners may use the right-of-way provided they do not interfere with the rights granted to Keystone. Trees or bushes, structures, including houses, toolsheds, garages, poles, guy wires, catch basins, swimming pools, trailers, leaching fields, septic tanks, and any other objects not easily removable, shall not be permitted on the permanent construction right-of-way without the written permission of Keystone, because they could impair access for maintenance of the pipeline.
- Keystone shall maintain communication with the Landowner and or tenant throughout the operating life of the pipeline to allow expedient communication of issues and problems as they occur. Keystone shall provide the Landowners with corporate contact information for these purposes. Keystone shall work with Landowners to prevent excessive erosion on lands disturbed by construction. Reasonable methods shall be implemented to control erosion. This may not be implemented if the property across which the pipeline is constructed is bare cropland which the Landowner intends to leave bare until the next crop is planted.
- If the Landowner and Keystone cannot agree upon a reasonable method to control erosion on the Landowner's property, the recommendations of the appropriate county Soil and Water Conservation District shall be considered by Keystone and the Landowner.

5.0 DRAIN TILE SYSTEMS

5.1 General

If underground drainage tile is damaged by the pipeline installation, it shall be repaired in a manner that assures the tile line's proper operating condition at the point of repair. Keystone may elect to negotiate a fair settlement with the affected county or Landowner for repair of the damaged drain tile. In the event the Landowner chooses to have the damaged tile repaired by Keystone, the Contractor shall follow these guidelines and procedures to identify the location of drain tiles; to mitigate damages to drain tiles prior to and during construction; to repair drain tiles damaged during installation of the pipeline; to inspect the proper repair of drain tiles; and to provide post-construction monitoring to determine any impacts caused by repair of drain tiles. Since all public and private drain tile systems are unique, i.e., varying age, depth of cover, type of material, geometry on the land, etc., it is not possible to develop a standard procedure for resolving each county's or Landowner's drain tile issues. These guidelines provide a basis on which to develop site specific methodology to mitigate damage and to repair drain titles affected by construction of the Keystone pipeline. Actual measures will be developed based on site specific information unique to specific installations. However, all work will be conducted in accordance with applicable permits.

5.2 Identification and Classification of Drain Tile Systems

Personnel shall attempt to identify and classify existing drain tile systems by meeting with local public officials and county engineers, and meeting with individual private Landowners and/or tenants.

5.2.1 Publicly Owned Drain Tiles

Personnel shall identify and meet with the responsible county or local authority responsible for publicly owned drain tiles. Publicly owned drain tiles shall be identified and documented onto Keystone's 1" = 2000' USGS quad strip maps and additional data collected for input into an electronic spreadsheet by county; township, range, and section; responsible agency; and size, type, and depth of cover (if known). This data shall be cross referenced to the centerline survey to be completed by Keystone. Additionally, any public records including maps or easement instruments on the drain tiles shall be acquired as well as any requirements of the local authority for installation of the Keystone pipeline.

5.2.2 Privately Owned Drain Tiles

Right-of-way agents shall meet with Landowners and tenants of privately owned land along Keystone's pipeline route. As a minimum, the right-of-way agents shall ascertain the data concerning drain tiles outlined on a Landowner questionnaire. The questionnaire requests data concerning type of drain tile system; size, type of material and depth of cover; preference for repair of drain tiles; and identification of local drain tile contractors. These data shall be collected into an electronic spreadsheet for utilization by right-of-way personnel in negotiating payments for easements and damages and by engineering/construction personnel for inclusion in specifications for the construction contractor.

5.3 Mitigation of Damage to Drain Tile Systems

Keystone shall undertake mitigation measures to reduce damage to publicly and privately owned drain tile systems prior to and during installation of the pipeline.

5.3.1 Non-interference with Drain Tile

Keystone's pipeline shall be installed at a depth of cover and elevation to not interfere with the elevation and grade of existing drain tiles where practicable. Where not practicable, Keystone shall pursue alternative mitigation measures mutually acceptable to the Landowner and jurisdictional agencies. Typically, the pipeline shall be installed below the elevation of drain tiles with a minimum clearance of 12 inches. **Detail 25**, Typical ROW Layout/Soil Handling, represents a typical drain tile crossing by the pipeline with additional temporary work space to facilitate handling of topsoil and trench spoil created by the additional depth of cover for the pipeline.

5.3.2 Non-disturbance of Drain Tile Mains

Publicly owned and privately owned drain tile mains shall be identified through the processes identified in Section 5.2. Drain tile mains are essential to the overall drainage system of a land area and may cause the pipeline construction Contractor excessive pumping/dewatering of the pipe

trench unless temporarily repaired and maintained until permanently repaired.

Keystone shall review drain tile mains and consider their size, flow rate, type of material, depth of cover, and geographic location. If determined to be practicable and reasonable for construction, the drain tile main shall not be cut and repaired during mainline installation (a pipe section shall be left out and installed by a tie-in crew without damaging the drain tile main).

5.3.3 Relocation or Replacement of Existing Drain Tiles Prior to Construction

In many instances, drain tile systems that have been installed after the installation of adjacent existing pipelines, were installed with "headers" parallel to the existing pipeline with periodic jumpovers as depicted on **Detail 26**, Header/Main Crossovers of Keystone Pipeline. The distance of these headers from the existing pipeline may vary.

Some of these drain tile headers may be most effectively relocated and/or replaced to the east of the Keystone pipeline and the existing header capped and made into a single drain tile as depicted on **Detail 27**, Relocate/Replace Drainage Header/Main. This could reduce the number of drain tile crossings on a particular Landowner by a significant quantity, thereby reducing the risk that repairs will fail.

5.3.4 Future Drain Tiles/Systems

Personnel shall attempt to determine where public agencies and private Landowners or tenants are proposing to install drain tile systems in the future to the extent possible. These locations shall be input into an electronic spreadsheet by county; township, range, and section; Landowner or responsible public agency; and proposed size and depth of cover. Keystone shall endeavor to construct the pipeline at a depth and elevation to accommodate the future installation of the proposed drain tile systems.

5.3.5 Other Mitigation Measures

Other mitigation measures that may be implemented during installation of the pipeline are as follows:

- Not removing topsoil from the working side of the construction right-of-way to prevent crushing of drain tile by heavy equipment
- Spreading ditch and spoil side topsoil (not subsoil) over the working side to provide additional soil depth to protect existing drain tiles.
- The Contractor shall restrict the work, if practicable, of the pipe lower-in crew if ground conditions are too wet to adequately support the heavy equipment.
- Travel of heavy equipment shall be limited to the working lane of the construction right-of-way where possible.

- Travel of heavy equipment shall be limited to one pass over the drain tile per work crew where possible.
- Should tile be crushed on the working side of the right of way, the topsoil would be removed and replaced during the drain tile replacement.

5.4 Responsibility for Repair of Drain Tile Systems

Temporary and permanent drain tile repairs shall be the responsibility of the Contractor. The physical repairs shall be made by qualified and experienced drain tile repair personnel.

5.4.1 Local Drain Tile Contractor Repair

Keystone shall identify and qualify local drain tile contractors in the geographical area of the pipeline route from interviews with local public officials and Landowners/tenants as well as the drain tile contractors. The preferred responsibility for permanent repair of drain tiles shall be for the pipeline Contractor to subcontract the supervision and repair to local reputable drain tile contractors that are acceptable to the local Landowners/tenants.

5.4.2 Pipeline Contractor Repair

In the event local drain tile contractors are not available to subcontract the supervision and repair, responsibility for permanent repair shall be with the pipeline contractor's supervision, equipment, and labor.

5.4.3 Landowner/Tenant Repair

Keystone shall allow the Landowner or tenant responsibility for the permanent repair of his drain tiles if requested during negotiations for the easement and if not precluded by jurisdictional regulatory agencies. The Landowner/tenant shall be requested to ensure their ability to coordinate and complete the drain tile repair in a timely manner to accommodate the pipeline Contractor to allow the pipeline Contractor to completely backfill the damaged drain tile for repair by Landowner/tenant in the immediate future. Keystone shall require that its representative be present to ensure the permanent drain tile repairs are made in accordance with the minimum requirements of this manual.

5.5 Drain Tile Repairs

The Contractor shall endeavour to locate all tile lines within the construction right-of-way prior to and during the pipeline's installation so repairs can be made if necessary.

5.5.1 Temporary Repairs During Construction

Drain tiles damaged/cut by excavation of the pipeline trench shall be marked with a lath and ribbon in the spoil bank. Care shall be taken to locate markers where the chance of disturbance shall be minimized and a written record maintained of each drain tile crossing. A work crew following the pipeline trench crew shall complete a temporary repair to allow continuing flow. **Detail 28**, Temporary Drain Tile Repair, depicts the materials and installation to complete the temporary repair. If a drain tile

line shall not be temporarily repaired, the open ends of the drain tile shall be screened to prevent entry of foreign materials and small animals.

5.5.2 Permanent Repairs

Permanent repairs shall be made for all drain tiles damaged by installation of the pipeline.

5.5.2.1 Ditch Line Only Repairs

If water is flowing through a damaged tile line, the tile line shall be immediately and temporarily repaired until such time that permanent repairs can be made. If tile lines are dry and water is not flowing, temporary repairs are not required if the permanent repair is made within 7 days of the time damage occurred. The temporary repair shall be removed just prior to lowering-in the pipeline.

Drain tiles must be permanently repaired before the pipeline trench is backfilled and within 14 days of construction completion, weather and soil conditions permitting. All tile lines shall be repaired with materials of the same or better quality as that which was damaged. The drain tile marker shall not be removed until the tile repairs have been inspected, approved, and accepted by Keystone's inspectors, the Counties' inspectors, where applicable, and/or the Landowner or tenant. **Detail 29**, Permanent Repair Method of Drain Tiles, depicts the minimum materials and installation to complete a permanent repair.

5.5.2.2 Ditch Line and Temporary Work Space Repairs

Prior to making the permanent drain tile repair, the Contractor shall probe a segmented sewer rod with a plug that is not more than 15% smaller than the internal diameter of the drain tile to determine if additional damage has occurred to the drain tile. If the probe does not freely insert into the drain tile across the temporary workspace of pipeline construction, the Contractor shall excavate, expose and repair the damaged drain tile to its original or better condition.

5.6 Inspection/Acceptance of Drain Tile Repairs

Drain tile repairs shall be inspected by Keystone pipeline construction inspectors, County inspectors, as applicable, and the Landowner or tenant or their representative.

Keystone pipeline shall designate inspector(s) for the sole purpose and responsibility for inspection of repair of drain tiles. These inspectors shall be, if possible, employed from local drain tile installation contractors, local farmers with extensive drain tile experience, or previously employed or retired employees of local

jurisdictions familiar with drain tile installation and repair. In the event that a sufficient quantity of inspectors from the prior described sources are not available, Keystone shall conduct in-the-field training seminars on drain tile repair for additional inspection personnel.

Inspection personnel shall observe the permanent repair of all drain tiles to ensure utilization of the proper type and size of replacement drain tile; the drain tile is installed at the proper grade; the drain tile is properly supported; backfill beneath the drain tile is properly placed and compacted; and the replacement drain tile is properly tied into the existing drain tile. The inspections shall be documented on the Drain Tile Inspection Report Forms.

A drain tile repair shall not be accepted until Keystone's construction inspector AND the Landowner or tenant or their designated representative approves the inspection form.

6.0 WETLAND CROSSINGS

6.1 General

Aboveground facilities shall not be located in a wetland, except where the location of such facilities outside of wetlands would preclude compliance with U.S. Department of Transportation pipeline safety regulations.

Wetland boundaries shall be clearly marked in the field with signs and/or highly visible flagging during construction.

In the event a waterbody crossing is located within or adjacent to a wetland crossing, the measures of Section 7 shall be implemented to the extent practicable.

A "dry" wetland typically has groundwater level existing some depth below the surface. Trench excavations are typically stable and normal in width. Equipment can traverse the wetland without the support of mats or timber rip-rap.

A "standard" wetland environment typically has soils that are saturated and non-cohesive. Difficult trenching conditions are likely resulting in excessively wide trenches. In these wetland environmental types, supplemental support in the form of timber rip-rap or prefabricated equipment mats may be required for construction equipment to safely and efficiently operate.

A "flooded" wetland involves the presence of standing water over much of the wetland area. Equipment typically cannot traverse the wetland and must generally move around that portion of the area. Access is typically limited to marsh backhoes or equipment working from flexi floats or equivalent.

Keystone may allow modification of the following specifications as necessary to accommodate site specific conditions or procedures. Any modifications must still comply with all applicable regulations and permits.

6.2 Easement and Workspace

The Contractor shall maintain wetland boundary markers in place during construction in all areas and until permanent seeding are completed in non-cultivated areas.

The width of the construction right-of-way shall be reduced to 85 feet or less in "standard" wetlands unless non-cohesive soil conditions require utilization of a greater width.

The Contractor shall locate all extra work areas (such as staging areas and additional spoil storage areas) at least 10 feet away from wetland boundaries, where topographic conditions permit.

The Contractor shall limit clearing of vegetation between extra work areas and the edge of the wetland to the construction right-of-way and limit the size of extra work areas to the minimum needed to construct the wetland crossing.

6.3 Vehicle Access and Equipment Crossing

The only access roads, other than the construction right-of-way, that the Contractor shall use in wetlands are those existing roads shown on the Construction Drawings.

The Contractor's construction equipment operating in saturated wetlands or wetlands with standing water shall be limited to that needed to clear the construction right-of-way, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction right-of-way to the extent practicable

If equipment must operate within a wetland containing standing water or saturated soils, the Contractor shall use the following methods for equipment access unless otherwise approved by Keystone based on site specific conditions:

- Wide-track or balloon-tire construction equipment.
- Conventional equipment operated from timber and slash (riprap) cleared from the right of way, timber mats, or prefabricated equipment mats

6.4 Temporary Erosion and Sediment Control

The Contractor shall install sediment barriers across the entire construction right-of-way immediately upslope of the wetland boundary at all standard wetland crossings, as necessary, to prevent sediment flow into the wetland. Sediment barriers must be properly maintained by the Contractor throughout construction and reinstalled as necessary. In the travel lane, these may incorporate removable sediment barriers or driveable berms. Removable sediment barriers can be removed during the construction day, but shall be re-installed after construction has stopped for the day and/or when heavy precipitation is imminent The Contractor shall maintain sediment barriers until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. The

Contractor shall not install sediment barriers at wetlands designated as “dry” unless otherwise specified by Keystone.

Where standard wetlands are adjacent to the construction right-of-way, the Contractor shall install sediment barriers along the edge of the construction right-of-way as necessary to prevent a sediment flow into the wetland.

6.5 Wetland Crossing Procedures

The following general mitigative procedures shall be followed by the Contractor in all wetlands unless otherwise approved or directed by Keystone based on site specific conditions. However, all work shall be conducted in accordance with applicable permits.

- Minimizing the duration of construction-related disturbance within wetlands to the extent practicable.
- Attempting to use no more than two layers of timber riprap to stabilize the construction right-of-way.
- Cutting vegetation off at ground level leaving existing root systems in place and remove it from the wetland for disposal.
- Limiting pulling of tree stumps and grading activities to directly over the trench line. Not grading or removing stumps or root systems from the rest of the construction right-of-way in wetlands unless safety-related construction constraints require removal of tree stumps from under the working side of the construction right-of-way.
- Segregating the top 12 inches of topsoil from the area disturbed by trenching in standard wetlands, where practicable. After backfilling is complete, restoring topsoil to its approximate original stratum.
- Dewatering the trench in such a manner that does not cause erosion and heavily silt-laden water does not flow directly into any wetland or waterbody.
- The Contractor shall avoid sand blasting in wetlands to the extent practicable. If sandblasting is performed within a wetland, the Contractor shall place a tarp or suitable material in such a way as to collect as much waste shot as possible and dispose of the collected waste. The Contractor shall clean up all visible deposits of wastes and dispose of the waste at an approved disposal facility.
- Removing all timber riprap and prefabricated equipment mats upon completion of construction.
- Locating hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable.
- Locating hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable.
- Not storing hazardous materials, chemicals, fuels, lubricating oils, or perform concrete coating activities in a wetland, or within 100 feet of any wetland boundary.
- Attempting to refuel all construction equipment in an upland area at least 100 feet from a wetland boundary. If construction equipment must be refueled in a wetland or within 100 feet of any wetland boundary, follow the procedures outlined in Section 3.

- Where the pipeline trench may drain a wetland, the Contractor shall construct trench breakers and/or seal the trench to maintain the original wetland hydrology.
- After backfilling is complete, restoring the segregated topsoil to its approximate original location over the trench.

Specific procedures for each type of wetland crossing method are listed below and shall be designated on the Construction Drawings but may be modified depending on site conditions at the time of construction. However, all work shall be conducted in accordance with applicable permits.

6.5.1 "Dry" Wetland Crossing Method

Topsoil shall be segregated. Pipe stringing and fabrication may occur within the wetland adjacent to the trench line or adjacent to the wetland in a designated extra workspace.

The "dry" wetland crossing procedure depicted in **Detail 8** shall be used where this type of wetland is identified on the Construction Drawings. The following are exceptions to "standard" wetland crossing methods:

- The width of the construction right-of-way for upland construction is maintained through the wetland.
- Where extra work areas (such as staging areas and additional spoil storage areas) are designated on the Construction Drawings, they may be placed no closer than 10 feet from the wetland's edge.
- Sediment barriers are not required across or along the edges of the construction right-of-way.
- If the wetland is cultivated, the topsoil shall be stripped using the trench and spoil side method at the same depth as the adjacent upland areas
- Seeding requirements for agricultural lands shall be applied to farmed wetlands.

6.5.2 "Standard" Wetland Crossing Method

Topsoil stripping is impracticable due to the saturated nature of the soil. Pipe stringing and fabrication may occur within the wetland adjacent to the trench line or adjacent to the wetland in a designated extra workspace. Based upon the length of a standard wetland crossing and presence of sufficient water to float the pipe, the Contractor may elect to install a standard wetland crossing utilizing the “push/pull” method.

The standard wetland crossing procedure depicted in **Detail 9** shall be used where this type of wetland is identified on the Construction Drawings.

Procedures unique to standard wetlands include:

- Limiting construction right of way width to a maximum of 85 feet unless site conditions warrant a wider width
- Utilizing low ground pressure construction equipment or support equipment on timber rip rap or timber mats
- Installing sediment barriers across the entire right of way where the right of way enters and exits the wetland

6.5.3 Flooded "Push/Pull" Wetland Crossing Method

In these wetlands, standing surface water or high groundwater levels are present. Difficult trenching conditions may exist, and trench widths of up to 35 feet are common. Topsoil stripping is impossible due to the flooded conditions. Pipe stringing and fabrication is required adjacent to the wetland in a designated extra workspace. And the pipe pushed and/or pulled with floatation into place.

The "Push/Pull" Wetland crossing procedure as depicted in **Detail 10** shall be used where water is sufficient to float the pipeline in the trench and other site conditions allow.

Clean metal barrels or styrofoam floats may be used to assist in the flotation of the pipe. Metal banding shall be used to secure the barrels or floats to the pipe. All barrels, floats and banding shall be recovered and removed upon completion of lower-in. Back fill shall not be allowed before recovery of barrels, floats and banding.

6.6 Restoration and Reclamation

All timber riprap, timber mats, and prefabricated equipment mats shall be removed upon completion of construction. The Contractor shall replace topsoil, as applicable, and spread to its original contours in the wetland as possible with no crown over the trench. Any excess spoil shall be removed from the wetland. The Contractor shall stabilize wetland edges and adjacent upland areas by establishing permanent erosion control measures and re-vegetation, as applicable, during final clean up.

For each standard wetland crossed, the Contractor shall install a permanent slope breaker and trench breaker at the base of slopes near the boundary between the wetland and adjacent upland areas. The Contractor shall locate the trench breaker immediately upslope of the slope breaker.

In the absence of detailed re-vegetation plans or until the appropriate seeding season for permanent wetland vegetation in standard wetlands, the Contractor shall apply a temporarily cover crop on the construction right-of-way at a rate adequate for germination and ground cover using annual ryegrass or oats unless standing water is present. The Contractor shall apply the temporary cover crop during final clean up. For farmed wetlands, apply seeding requirements for agricultural lands or as required by the Landowner.

The Contractor shall not use fertilizer, lime or mulch in wetlands unless required in writing by the appropriate land management or state agency.

6.7 Operations and Maintenance

Vegetation maintenance shall not be conducted over the full width of the permanent right-of-way in wetlands. However, to facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 30 feet wide may be maintained in an herbaceous state. In addition, trees within 30 feet of the pipeline greater than 15 feet in height may be selectively cut and removed from the permanent right-of-way.

Herbicides and pesticides shall not be used in or within 100 feet of a wetland except as allowed by the appropriate land management agency or state agency.

The success of wetland re-vegetation shall be monitored after construction until wetland re-vegetation is successful except in circumstances where property is purchased and developed.

Wetland re-vegetation shall be considered successful if the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent wetland areas that were not disturbed by construction. If re-vegetation is not successful at the end of 3 years, a remedial re-vegetation plan shall be developed in consultation with a professional wetland ecologist to actively re-vegetate the wetland. Re-vegetation efforts shall continue until wetland re-vegetation is successful.

7.0 WATERBODIES AND RIPARIAN LANDS

7.1 General

The Contractor shall comply with requirements of all permits issued for the waterbody crossings by Federal, State or local agencies.

"Waterbody" includes any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies such as ponds and lakes:

- "Minor Waterbody" includes all waterbodies less than or equal to 10 feet wide at the water's edge at the time of construction.
- "Intermediate Waterbody" includes all waterbodies greater than 10 feet wide but less than or equal to 100 feet wide at the water's edge at the time of construction.
- "Major Waterbody" includes all waterbodies greater than 100 feet wide at the water's edge at the time of construction.

In the event a waterbody crossing is located within or adjacent to a wetland crossing, the Contractor shall implement the provisions of Section 6, Wetland Crossings, to the extent practicable.

The Contractor shall supply and install advisory signs in a readily visible location along the construction right-of-way, a distance of approximately 100 feet on each

side of the crossing and on all roads which provide direct construction access to waterbody crossing sites. Signs shall be supplied, installed, maintained and then removed upon completion of the project. Additionally, signs shall be supplied and installed by the Contractor on all intermediate and major waterbodies accessible to recreational boaters warning boaters of pipeline construction operations.

The Contractor shall not store hazardous materials, chemicals, fuels, lubricating oils, or perform concrete coating within approximately 100 feet of any waterbody. The Contractor shall not refuel construction equipment within 100 feet of any waterbody. If the Contractor must refuel construction equipment within 100 feet of a waterbody, it must be done in accordance with the requirements outlined in Section 3.

Throughout construction, the Contractor shall maintain adequate flow rates to protect aquatic life and to prevent the interruption of existing downstream uses.

Keystone may allow modification of the following specifications as necessary to accommodate specific situations or procedures. Any modifications must comply with all applicable regulations and permits.

7.2 Easement and Work Space

The permanent easement, temporary work space, additional temporary work space and any special restrictions shall be depicted on the Construction Drawings. The work shall be contained within these areas and be limited in size to the minimum required to construct the waterbody crossing.

The Contractor shall locate all extra work areas (such as staging areas and additional spoil storage areas) at least 10 feet from the water's edge if practicable.

At all waterbody crossings, the Contractor shall install flagging across the construction right-of-way at least 10 feet from the banks prior to clearing and ensure that riparian cover is maintained where practicable during construction.

7.3 Vehicle Access and Equipment Crossings

The Contractor shall inspect equipment for fluid leaks prior to entering or crossing over waterbodies.

Equipment bridges are not required at minor waterbodies unless dry crossing procedures are specified or unless the waterbody supports a state designated fishery.

Equipment crossings shall be constructed as described in **Details 16, 17 and/or 18**.

Equipment crossings shall be perpendicular to drainage bottoms whenever possible.

The Contractor shall be responsible for the installation, maintenance and removal of all temporary access crossings including portable bridges, bridges made from timber or mats, flumes, culverts, sand bags, subsoil, or coarse granular material and riprap.

The Contractor shall ensure that culverts and flumes are sized and installed of sufficient diameter to accommodate the existing flow of water and those that may potentially be created by sudden runoffs. Flumes shall be installed with the inlet and outlet at natural grade if possible.

Where bridges, culverts or flumes are installed across the working area, the Contractor shall be responsible for maintaining them (e.g. preventing collapse, clogging or tilting). All flumes and culverts shall be removed as soon as possible upon completion of construction

The width of the temporary access road across culverts and flumes and the design of the approaches and ramps shall be adequate for the size of vehicle and equipment access required. The ramps shall be of sufficient depth and constructed to prevent collapse of the flumes, and the approaches on both sides of the flume shall be feathered.

Where culverts are installed for access and a waterbody is expected or possibly shall be constructed by the dry flume method, the culvert shall be of sufficient length to convey the stream flow through the construction zone.

The Contractor shall maintain equipment bridges to minimize soil from entering the waterbody.

7.4 Waterbody Crossing Methods

Construction methods pertinent to waterbody crossings are presented below. Selection of the most appropriate method at each crossing shall be depicted on the Construction Drawings but may be amended or changed based on site-specific conditions (i.e., environmental sensitivity of the waterbody, depth and rate of flow, subsurface soil conditions, site specific construction considerations, and the expected time and duration of construction) at the time of crossing. Each waterbody crossing shall be accomplished using one of the following construction methods:

- Non-flowing Open Cut Crossing Method - (**Detail 11**)
- Flowing Open Cut Crossing Method – Minor, Intermediate or Major Waterbody - (**Detail 12**)
- Flowing Open Cut Crossing – Dry Flume Method - (**Detail 13**)
- Flowing Open Cut Crossing – Dry Dam and Pump Method - (**Detail 14**)
- Horizontal Directional Drill Crossing - (**Detail 15**)
- Horizontal Bore Crossing - (**Detail 21**)

7.4.1 Non-flowing Open Cut Crossing Method

The Contractor shall utilize the Non-flowing Open Cut Crossing Method (**Detail 11**) for all waterbody crossings (ditches, gullies, drains, swales, etc.) with no perceptible flow at the time of construction. Should site conditions change and the waterbody is flowing at the time of construction, the Contractor shall install the crossing utilizing the flowing open cut crossing method unless otherwise approved by Keystone.

7.4.2 Flowing Open Cut Crossing Method of Minor, Intermediate and Major Waterbodies

For minor waterbody crossings, except where the flume method is used, the Contractor shall complete construction in the waterbody (not including blasting, if required) as shown on **Detail 12** within 24 hours if practicable.

For intermediate waterbodies, the Contractor shall attempt to complete trenching and backfill work within the waterbody (not including blasting if required) within 48 hours if practicable as shown on **Detail 12.**

The Contractor shall construct each major waterbody crossing in accordance with a Site Specific Plan as shown in the Construction Drawings. The Contractor shall complete in-stream construction activities as expediently as practicable.

7.4.3 Flowing Open Cut Crossing – Dry Flume Method

Where required, the Contractor shall utilize the Flowing Open Cut Crossing – Dry Flume Method as shown on **Detail 13** with the following "dry ditch" techniques:

- flume pipe shall be installed after blasting (if necessary), but before any trenching;
- sand bag or sand bag and plastic sheeting diversion structure or equivalent shall be used to develop an effective seal and to divert stream flow through the flume pipe (some modifications to the stream bottom may be required in order to achieve an effective seal);
- flume pipe(s) shall be aligned to prevent bank erosion and streambed scour;
- flume pipe shall not be removed during trenching, pipe laying, or backfilling activities, or initial streambed restoration efforts; and
- all flume pipes and dams that are not also part of the equipment bridge shall be removed as soon as final clean up of the stream bed and bank is complete

7.4.4 Flowing Open Cut Crossing – Dry Dam and Pump Method

Where specified in the construction drawings, the Contractor shall utilize the Flowing Open Cut Crossing – Dry Dam and Pump Method as shown

on **Detail 14**. The dam and pump crossing method shall meet the following performance criteria:

- sufficient pumps shall be used to maintain 1.5 times the flow present in the stream at the time of construction;
- at least one back up pump must be available on site;
- dams shall be constructed with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner);
- screen pump intakes shall be installed;
- streambed scour shall be prevented at pump discharge; and dam and pumps shall be monitored to ensure proper operation throughout the waterbody crossing.

7.4.5 Horizontal Directional Drill Crossings

Where required, the horizontal directional drill method **as shown on Detail 15** shall be utilized for designated major and sensitive waterbodies. The Contractor shall construct each directional drill waterbody crossing in accordance with a Site Specific Plan as shown in the Construction Drawings.

Drilling fluids and additives utilized during implementation of a directional drill shall be non-toxic to the aquatic environment.

The Contractor shall develop a contingency plan to address a frac-out during a directional drill. The plan shall include instructions for monitoring during the directional drill and mitigation in the event that there is a release of drilling fluids. Additionally, the waterbody shall be monitored downstream by the Contractor for any signs of drilling fluid.

The Contractor shall dispose of all drill cuttings and drilling mud at a Keystone-approved location. Disposal options may include spreading over the construction right-of-way in an upland location approved by Keystone, hauling to an approved licensed landfill, or other site approved by Keystone.

7.4.6 Horizontal Bore Crossings

Where required, the horizontal bore method **as shown on Detail 21** shall be utilized for crossing waterbodies. The Contractor shall construct each horizontal bore waterbody crossing in accordance with a Site Specific Plan as shown in the Construction Drawings.

7.5 Clearing

Except where rock is encountered and at non flowing open cut crossings, all necessary equipment and materials for pipe installation must be on-site and assembled prior to commencing trenching in a waterbody. All staging areas for materials and equipment shall be located at least 10 feet from the waterbody

edge. The Contractor shall preserve as much vegetation as possible along the waterbody banks while allowing for safe equipment operation.

Clearing and grubbing for temporary vehicle access and equipment crossings shall be carefully controlled to minimize sediment entering the waterbody from the construction right-of-way.

Clearing and grading shall be performed on both sides of the waterbody prior to initiating any trenching work. All trees shall be felled away from watercourses.

Plant debris or soil inadvertently deposited within the high water mark of waterbodies shall be promptly removed in a manner that minimizes disturbance of the waterbody bed and bank. Excess floatable debris shall be removed above the high water mark from areas immediately above crossings.

Vegetation adjacent to waterbodies which are to be installed by horizontal directional drill or boring methods shall not be disturbed except by hand clearing as necessary for drilling operations.

7.6 Grading

The construction right-of-way adjacent to the waterbody shall be graded so that soil is pushed away from the waterbody rather than towards it when possible.

In order to minimize disturbance to woody riparian vegetation within extra workspaces adjacent to the construction right-of-way at waterbody crossings, the Contractor shall minimize grading and grubbing of waterbody banks. Grubbing shall be limited to the ditchline plus an appropriate width to accommodate the safe installation of vehicle access and the crossing to the extent practicable.

7.7 Temporary Erosion and Sediment Control

The Contractor shall install sediment barriers across the entire construction right-of-way at all flowing waterbody crossings.

The Contractor shall install sediment barriers immediately after initial disturbance of the waterbody or adjacent upland. Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete.

Where waterbodies are adjacent to the construction right-of-way, the Contractor shall install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil and sediment within the construction right-of-way.

7.8 Trenching

The following requirements apply to all waterbody crossings except those being installed by the non-flowing open cut crossing method.

All equipment and materials shall be on site before trenching in the active channel of all minor waterbodies containing state designated fisheries, and in intermediate and major waterbodies. All activities shall proceed in an orderly manner without delays until the trench is backfilled and the stream banks stabilized. The Contractor shall not begin in-stream activity until the in-stream pipe section is complete and ready to be installed in the waterbody.

The Contractor shall use trench plugs at the end of the excavated trench to prevent the diversion of water into upland portions of the pipeline trench and to keep any accumulated upland trench water out of the waterbody. Trench plugs must be of sufficient size to withstand upslope water pressure.

The Contractor shall conduct as many in-stream activities as possible from the banks of the waterbodies. The Contractor shall limit the use of equipment operating in waterbodies to that needed to construct each crossing.

The Contractor shall place all spoil from minor and intermediate waterbody crossings, and upland spoil from major waterbody crossings in the construction right-of-way at least 10 feet from the water's edge or in additional extra work areas. No trench spoil, including spoil from the portion of the trench across the stream channel, shall be stored within a waterbody unless the crossing cannot be reasonably completed without doing so.

The Contractor shall install and maintain sediment barriers around spoil piles to prevent the flow of spoil into the waterbody.

Spoil removed during ditching shall be used to backfill the trench usually with a backhoe, clamshell or a dragline working from the waterbody bank. Sand, gravel, rockshield, or fill padding shall be placed around the pipe where rock is present in the channel bottom.

7.9 Pipe Installation

The following requirements apply to all waterbody crossings except those being installed by the non-flowing open cut crossing method.

A "free stress" pipe profile shall be used at all minor, intermediate, and major waterbodies with gradually sloping stream banks. The "box bend" pipe profile shall be used for intermittent and major waterbodies with steep stream banks.

The trench shall be closely inspected to confirm that the specified cover and that adequate bottom support can be achieved, and shall require Keystone approval prior to the pipe being installed. Such inspections shall be performed by visual inspection and/or measurement by a Keystone Representative. In rock trench, the ditch shall be adequately padded with clean granular material to provide continuous support for the pipe.

The pipe shall be pulled into position or lowered into the trench and shall, where necessary, be held down by weights, as-built recorded and backfilled immediately to prevent the pipe from floating.

The Contractor shall provide sufficient approved lifting equipment to perform the pipe installation in a safe and efficient manner. As the coated pipe is lowered in, it shall be prevented from swinging or rubbing against the sides of the trench. Only properly manufactured slings, belts and cradles suitable for handling coated pipe shall be used. All pipes shall be inspected for coating flaws and/or damage as it is being lowered into the trench. Any damage to the pipe and/or coating shall be repaired.

7.10 Backfilling

The following requirements apply to all waterbody crossings except those being installed by the non-flowing open cut crossing method.

Trench spoil excavated from waterbodies shall be used to backfill the trench across waterbodies.

After lowering-in has been completed, but before backfilling, the line shall be re-inspected to ensure that no skids, brush, stumps, trees, boulders or other debris is in the trench. If discovered, such materials or debris shall be removed from the trench prior to backfilling.

For each major waterbody crossed, the Contractor shall install a trench breaker at the base of slopes near the waterbody unless otherwise directed by Keystone based on site specific conditions. The base of slopes at intermittent waterbodies shall be assessed on-site and trench breakers installed only where necessary.

Slurred muck or debris shall not be used for backfill. At locations where the excavated native material is not acceptable for backfill or must be supplemented, the Contractor shall provide granular material approved by Keystone.

If specified in the Construction Drawings, the top of the backfill in the stream shall be armored with rock riprap or bio-stabilization materials as appropriate.

7.11 Stabilization and Restoration of Stream Banks and Slopes

The stream bank contour shall be re-established. All debris shall be removed from the streambed and banks. Stream banks shall be stabilized and temporary sediment barriers shall be installed within 24 hours of completing the crossing if practicable.

Approach slopes shall be graded to an acceptable slope for the particular soil type and surface run off controlled by installation of permanent slope breakers. Where considered necessary, the integrity of the slope breakers shall be ensured by lining with erosion control blankets.

Immediately following reconstruction of the stream banks, the Contractor shall install seed and flexible channel liners on waterbody banks as shown in **Detail 19**.

If the original stream bank is excessively steep and unstable and/or flow conditions are severe or if specified on the Construction Drawings, the banks

shall be stabilized with rock riprap, gabions, stabilizing cribs, or bio-stabilization measures to protect backfill prior to reestablishing vegetation.

Stream bank riprap structures shall consist of a layer of stone, underlain with approved filter fabric or a gravel filter blanket in accordance with **Detail 20**. Riprap shall extend from the stabilized streambed to the top of the stream bank, where practicable, native rock shall be utilized.

Bio-stabilization techniques which may be considered for specific crossings are shown in **Details 22, 23, and 24.**

The Contractor shall remove equipment bridges as soon as possible after final clean up.

8.0 HYDROSTATIC TESTING

8.1 Testing Equipment Location

The Contractor shall provide for the safety of all pipeline construction personnel and the general public during hydrostatic test operations by placing warning signs in populated areas.

The Contractor shall locate hydrostatic test manifolds 100 feet outside wetlands and riparian areas to the maximum extent practicable.

8.2 Test Water Source and Discharge Locations

Keystone is responsible for acquiring all permits required by federal, state and local agencies for procurement of water and for the discharge of water used in the hydrostatic testing operation. Keystone shall provide the Contractor with a copy of the appropriate withdrawal/discharge permit for hydrostatic test water. The Contractor shall keep the water withdrawal/discharge permit on site at all times during testing operations.

Any water obtained or discharged shall be in compliance with permit notice requirements and with sufficient notice for Keystone's Testing Inspector to make water sample arrangements prior to obtaining or discharging water. In some instances sufficient quantities of water may not be available from the permitted water sources at the time of testing. Withdrawal rates may be limited as stated by the permit. Under no circumstances shall an alternate water source be used without prior authorization from Keystone.

The Contractor shall be responsible for obtaining any required water analyses from each source to be used in sufficient time to have a lab analysis performed prior to any filling operations. The sample bottle shall be sterilized prior to filling with the water sample. The analysis shall determine the pH value and total suspended solids. Each bottle shall be marked with:

- Source of water with pipeline station number
- Date taken
- Laboratory order number

- Name of person taking sample

Staging/work areas for filling the pipeline with water shall be located a minimum of 50 feet from the waterbody or a wetland boundary if topographic conditions permit. The Contractor shall install temporary sediment filter devices adjacent to all streams that runoff may enter.

The Contractor shall screen the intake hose to prevent the entrainment of fish or debris. The hose shall be kept off the bottom of the waterbody. Refueling of construction equipment shall be conducted a minimum distance of 100 feet from the stream or a wetland. Pumps used for hydrostatic testing within 100 feet of any waterbody or wetland shall be operated and refueled in accordance with Section 3.

The Contractor shall maintain adequate flow rates in the waterbody to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users.

The Contractor shall not use chemicals in the test water. The Contractor shall not discharge any water containing oil or other substances that are in sufficient amounts as to create a visible color film or sheen on the surface of the receiving water.

Potential hydrostatic water sources for the mainline and the Cushing Extension are as follows:

Table 1 – Mainline Drainage Basins and Water Sources

Drainage Basins & Water Sources	Approximate Location Where Pipeline Crosses Water Source (Mile Post)
Pembina River	7
Tongue River	17
Carter Creek	24
Branch Forest River	46
Sheyenne River	167
Logen Dam	290
Nat'l Wildlife Prod. Area	351
Rock Creek	358
Lutz Lake	363
Wolf Creek	387
James River	417
Missouri River	431
Elk Horn River	498
Shell Creek	527
Platte River	537
Big Blue River	568
West Fork Big Blue River	587
Big Blue River	652
Missouri River	743
Grand River	834
Mussel Fork River	850
Mussel Fork River	856
Silver Creek (East Fork)	865
South Fork Salt River	912
Culver River	972
Pardenne Creek Runs Into Miss. River	988
Mississippi River	1014
Cahokie Creek	1020
Shoal Creek	1048

Table 2 – Cushing Extension Drainage Basins and Water Sources

Drainage Basins & Water Sources	Approximate Location Where Pipeline Crosses Water Source (Mile Post)
Little Blue River	4.2
Republican River	52.1
Smokey Hill River	76.2
Cottonwood River	117.0
Whitewater River	158.0
Stewart Creek (0.3 mile upstream of Walnut River)	185.1
Arkansas River	206.1
Salt Fork Arkansas River	238.5
Cimarron River	284.4

Selected road, railroad, and river crossing pipe sections may be specified to be pre-tested for a minimum of 4 hours. The water for pre-testing of any road and railroad crossings shall be hauled by a tanker truck from an approved water source. Water for pre-testing of a river crossing may be hauled or taken from the respective river if it is an approved water source. Since the volume of water utilized in these pretests shall be relatively small, the water shall be discharged overland along the construction right-of-way and allowed to soak into the ground utilizing erosion and sediment control mitigative measures.

Selection of final test water sources will be determined based on site conditions at the time of construction and applicable permits.

8.3 Filling the Pipeline

After final positioning of the pipe, the Contractor shall fill the pipe with water. Pipe ends shall not be restrained during the fill. The fill pump shall be set on a metal catch pan of sufficient dimensions to contain all leaking lubricants or fuel and prevent them from entering the water source. The suction inlet must be placed in a screened enclosure located at a depth that shall not allow air to be drawn in with the water. The screened enclosure shall be such that the fill water is free of organic or particulate matter.

The Contractor shall provide a filter of the backflushing or cartridge type with a means of cleaning without disconnecting the piping. The filter shall have the specifications of 100 mesh screen. If the cartridge type is used, a sufficient quantity of cartridges shall be on hand at the filter location. The Contractor shall install the filter between the fill pump and the test header. The Contractor shall be responsible for keeping the backflush valve on the filter closed during the filling operation. The Contractor shall be responsible for the proper disposal of materials backflushed from the filter or filter cartridges. The Contractor shall not be allowed to backflush the filter into the stream or other water source.

During water-filling of the pipeline, the Contractor shall employ the use of fill pumps capable of injecting water into the pipeline at a maximum rate of approximately 0.7 to 1.0 mile per hour, except as limited by permits or the maintenance of adequate flow rates in the waterbody, as indicated approximately as follows:

Nominal OD	Max. GPM
30"	3000

The Contractor shall restrict flow rates if necessary to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users.

8.4 Dewatering the Pipeline

The Contractor shall comply with state-issued NPDES permits for discharging test water.

The Contractor shall not discharge any water containing oil or other substances that are in sufficient amounts as to create a visible color film on the surface of the receiving water.

The Contractor shall not discharge into state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate Federal, State, and local permitting agencies grant written permission.

The Contractor shall calculate, record and provide to Keystone the day, date, time, location, total volume, maximum rate and methods of all water discharged to the ground or to surface water in association with hydrostatic testing.

The Contractor shall regulate the pig velocity discharge rate (3000 gpm maximum), use energy dissipation device(s), and install sediment barriers, as necessary, to prevent erosion, streambed scour, suspension of sediments, or excessive stream flow. Water must be disposed of using good engineering judgment so that all federal, state, and local environmental standards are met. Dewatering lines shall be sufficient strength and be securely supported and tied down at the discharge end to prevent whipping during this operation.

To reduce the velocity of the discharge, The Contractor shall utilize an energy-dissipating device described as follows:

8.4.1 Splash Pup

A splash pup consists of a piece of large diameter pipe (usually over 20" O.D.) of variable length with both ends partially blocked that is welded perpendicularly to the discharge pipe. As the discharge hits against the inside wall of the pup, the velocity is rapidly reduced and the water is allowed to flow out either end. A variation of the splash pup concept, commonly called a diffuser, incorporates the same design, but with capped ends and numerous holes punched in the pup to diffuse the energy.

8.4.2 Splash Plate

The splash plate is a quarter section of 36-inch pipe welded to a flat plate and attached to the end of a 6-inch discharge pipe. The velocity is reduced by directing the discharge stream into the air as it exits the pipe. This device is also effective for most overland type discharge.

8.4.3 Plastic Liner

In areas where highly erodible soils exist or in any low flow drainage channel, it is a common practice to use layers of visqueen (or any of the new construction fabrics currently available) to line the receiving channel for a short distance. One anchoring method may consist of a small load of rocks to keep the fabric in place during the discharge.

8.4.4 Straw Bale Dewatering Structure

Straw bale dewatering structures are designed to dissipate and remove sediment from the water being discharged. Straw bale structures are used for on-land discharge of wash water and hydrostatic test water and in combination with other energy dissipating devices for high volume discharges. A straw bale dewatering structure is shown In Detail 6.

9.0 DRAWINGS AND FIGURES

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Detail 2	Typical Straw or Hay Bale Barrier
Detail 3	Permanent Slope Breakers (Water Bars)
Detail 4	Erosion Control Matting Installation
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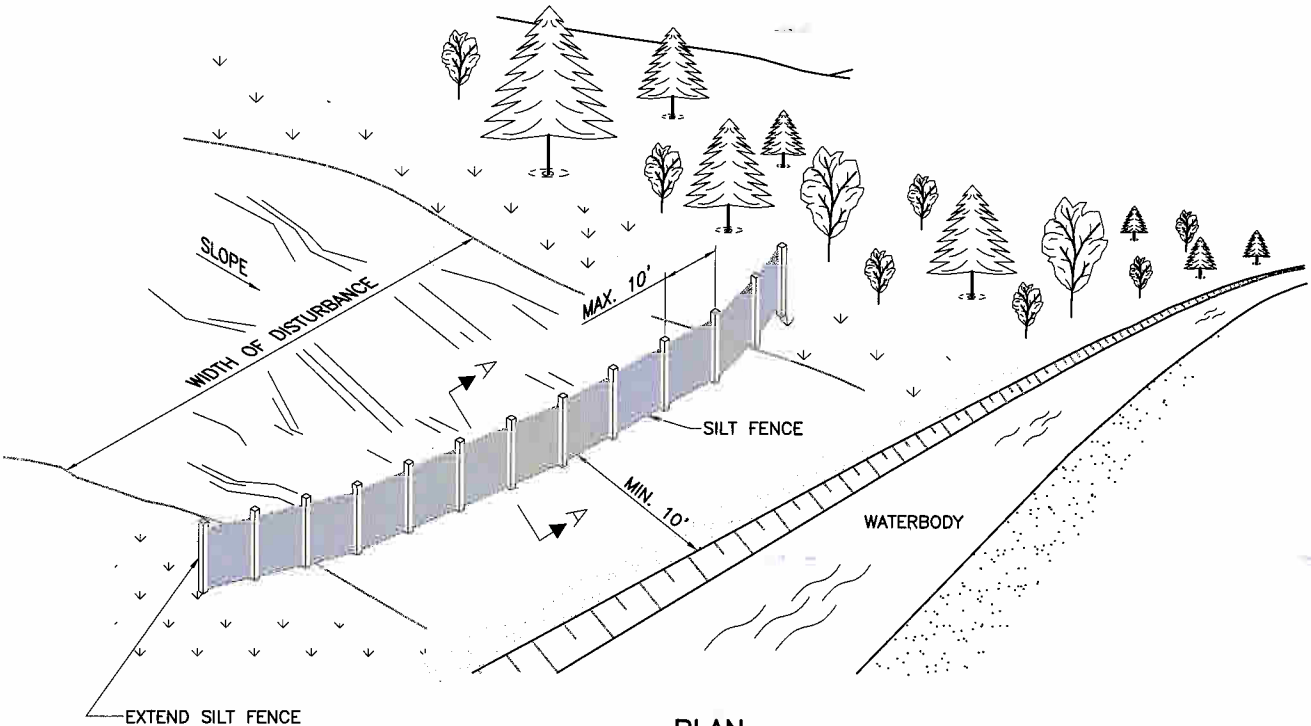
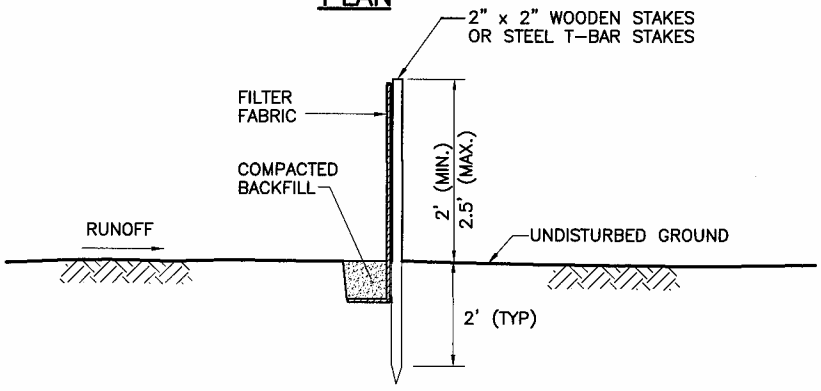
Detail 26	Header/Main Crossovers of Keystone Pipeline
Detail 27	Relocate/Replace Drainage Header/Main
Detail 28	Temporary Drain Tile Repair
Detail 29	Permanent Repair Method of Drain Tiles
Figure 1	Typical Site Specific Plan



PLAN



SECTION A–A

NOTES:

1. MATERIAL SHOULD BE WOVEN GEOTEXTILE FABRIC SUCH AS EXXON GTF 180 OR MIRAFI 600X, OR AN APPROVED EQUIVALENT. SECONDARY REINFORCEMENT, SUCH AS A CONSTRUCTION BARRIER FENCE OR WIRE MESH CAN ALSO BE USED BEHIND THE FILTER FABRIC.
2. SILT FENCE TO BE REINFORCED WITH 2" x 2" WOODEN STAKES OR STEEL T–BAR STAKES PLACED EVERY 8' OR CLOSER AS CONDITIONS REQUIRE.
3. ATTACH FILTER FABRIC AT EACH POST AT A MINIMUM OF 3 LOCATIONS.
4. THE FILTER FABRIC MINIMUM LENGTH OF 1' IS TO BE ANCHORED IN A TRENCH WITH WELL COMPACTED BACKFILL OVER THE FABRIC TO PREVENT UNDERMINING.
5. TO ELIMINATE POSSIBLE END FLOW, BOTH ENDS OF THE SILT FENCE SHALL BE TURNED AND EXTENDED UPSLOPE.
6. SILT FENCES ARE TO BE CHECKED AND MAINTAINED ON A REGULAR BASIS. REMOVE ANY BUILD–UP OF SEDIMENT.
7. WHERE ANCHORING CONDITIONS FOR THE SILT FENCE ARE POOR, PLACE STRAW BALES ON DOWNSTREAM SIDE OF THE SILT FENCE.
8. INSTALLATION TO BE MODIFIED BY KEYSTONE AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

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KEYSTONE PIPELINE PROJECT

NO.	REVISION	DATE
1	GENERAL EDITORIAL REVISION	APR.04,2006
0	ISSUED FOR DEPARTMENT OF STATE FILING	MAR.10,2006

TYPICAL SILT FENCE BARRIER

PROJECT: 50388E

DETAIL 1

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
K-00-P-7000-300	ALS	JTG	RG

LAST PLOT DATE: Tue, 04 Apr 2006 - 3:25pm

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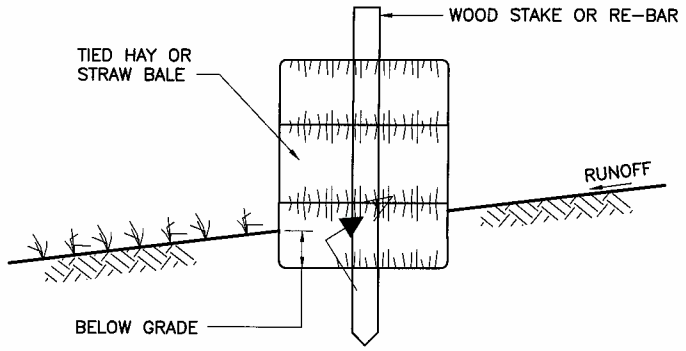
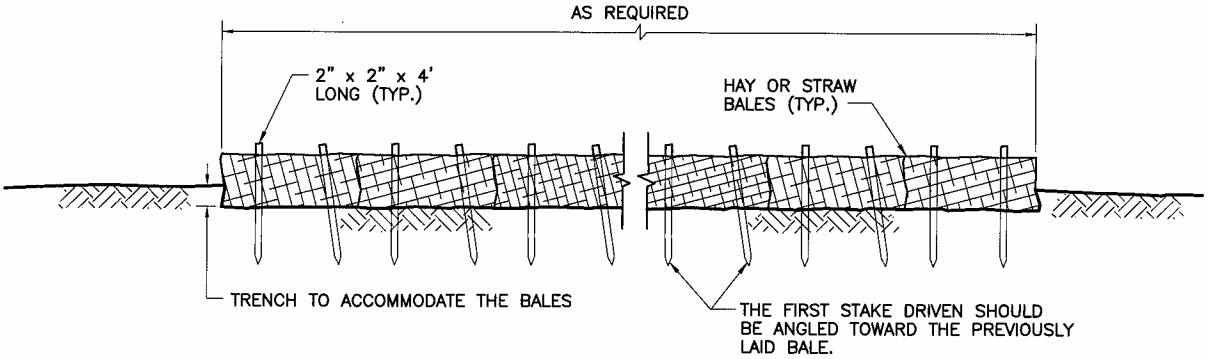


SECTION



SECTION

NOTES:

1. TO ELIMINATE POSSIBLE END FLOW, BOTH ENDS OF THE STRAW BALE BARRIER SHOULD BE TURNED AND EXTENDED UPSLOPE.
2. EACH BALE SHOULD BE SECURED BY AT LEAST 2 STAKES. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER. ANY GAPS CAN BE FILLED IN BY WEDGING LOOSE STRAW BETWEEN THE BALES. STAKES SHOULD BE DRIVEN. REBAR OR STANDARD "T" OR "U" STEEL POSTS CAN BE USED AS STAKES, BUT IT SHOULD BE NOTED THAT THEY MAY POSE A HAZARD TO EQUIPMENT IF THE BALES DISINTEGRATE.
3. COMPACT THE EXCAVATED SOIL AGAINST THE UPHILL SIDE OF THE BARRIER TO PREVENT PIPING.
4. STRAW OR HAY BALE BARRIERS REQUIRE CONTINUAL MAINTENANCE TO REMOVE COLLECTED SEDIMENT AND REPLACE DAMAGED BALES. PAY CLOSE ATTENTION TO THE REPAIR OF DAMAGED BALES, END RUNS AND UNDERCUTTING BENEATH BALES.
5. TO ELIMINATE POSSIBLE END FLOW, BOTH ENDS OF STRAW OR HAY BALE RUNS SHOULD BE TURNED AND EXTENDED UPSLOPE
6. INSTALLATION TO BE MODIFIED BY KEYSTONE AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

PREPARED BY:
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TYPICAL STRAW OR HAY BALE BARRIER

PROJECT: 50388E

DETAIL 2

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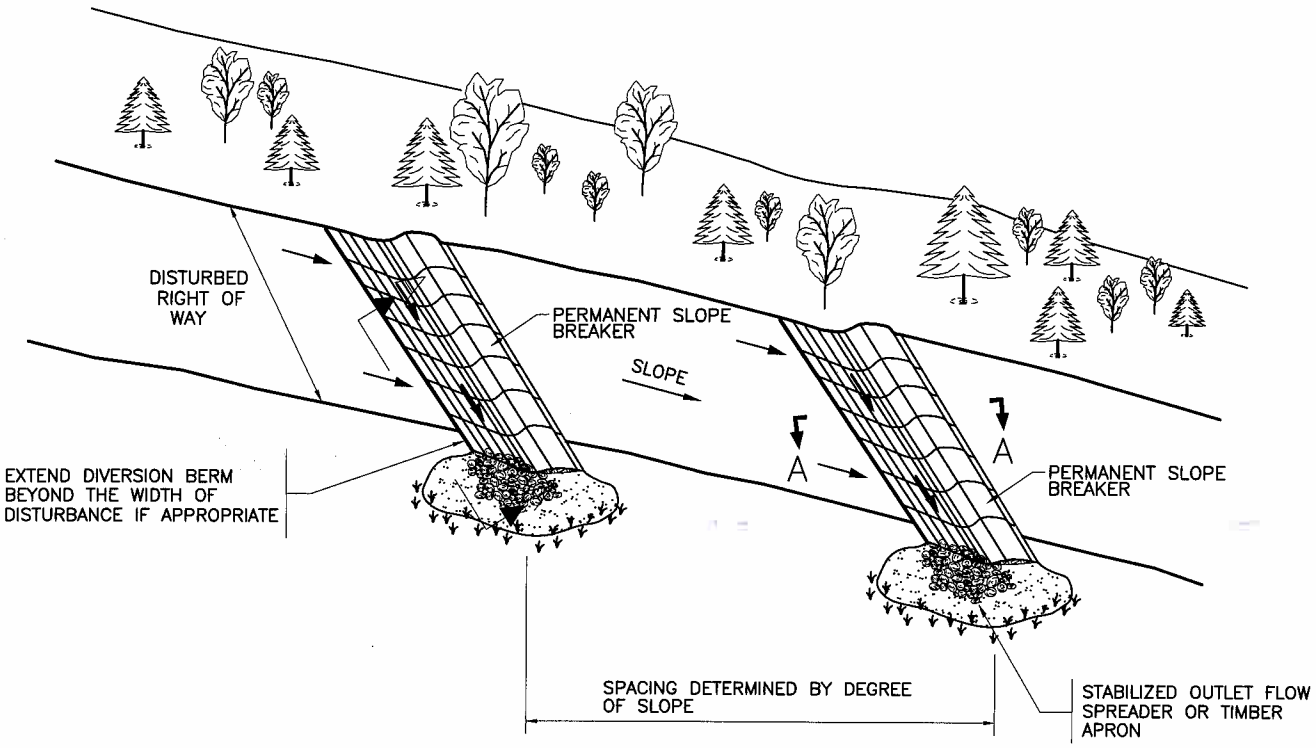
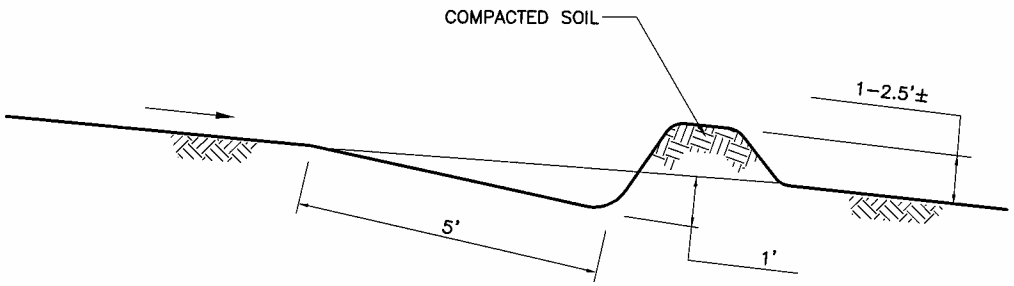


SECTION



SECTION A–A

PERMANENT SLOPE BREAKER DETAIL

NOTES:

1. PERMANENT SLOPE BREAKERS TO PROVIDE POSITIVE DRAINAGE TO A STABILIZED OUTLET.
2. INSTALLATION SPECIFICATIONS TO BE MODIFIED BY KEYSTONE AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

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PERMANENT SLOPE BREAKERS (WATER BARS)

PROJECT: 50388E

DETAIL 3

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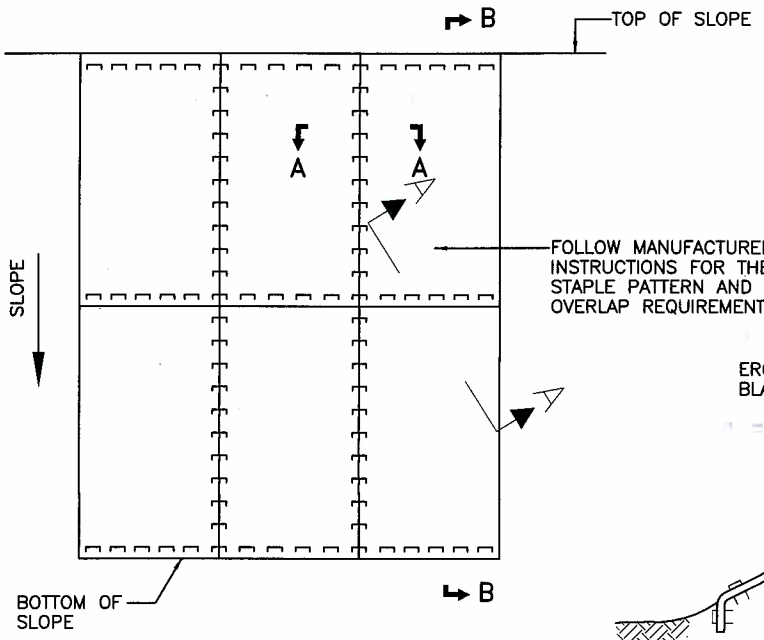
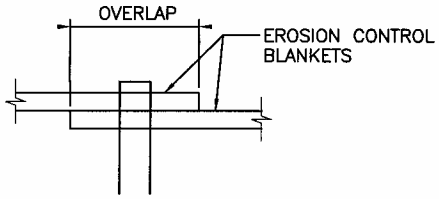
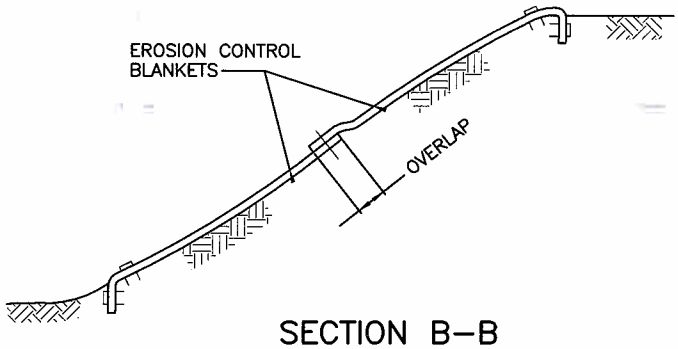


PLAN VIEW



SECTION A–A



SECTION B–B

NOTES:

1. INSTALL MATTING IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. PREPARE SOIL BEFORE INSTALLING MATTING, INCLUDING GRADING, REMOVAL OF LARGE ROCKS AND DEBRIS, AND THE APPLICATION OF SEED AND FERTILIZER IF NOT USING PRE–SEEDED MATTING.
3. EROSION CONTROL MATTING SHALL EXTEND COMPLETELY ACROSS DISTURBED AREAS TO PROTECT ERODIBLE SURFACES.
4. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE MATTING IN A TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
5. ROLL THE MATTING DOWN THE SLOPE IN THE DIRECTION OF THE WATER FLOW.
6. AS AN ALTERNATIVE TO STAPLES, WOODEN STAKES CAN BE USED.
7. ENSURE COMPLETE CONTACT BETWEEN THE MATTING AND THE SLOPE FACE. ADDITIONAL STAPLES CAN BE USE TO ELIMINATE GAPS.
8. INSTALLATION SPECIFICATIONS TO BE MODIFIED BY KEYSTONE AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

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EROSION CONTROL MATTING INSTALLATION

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DETAIL 4

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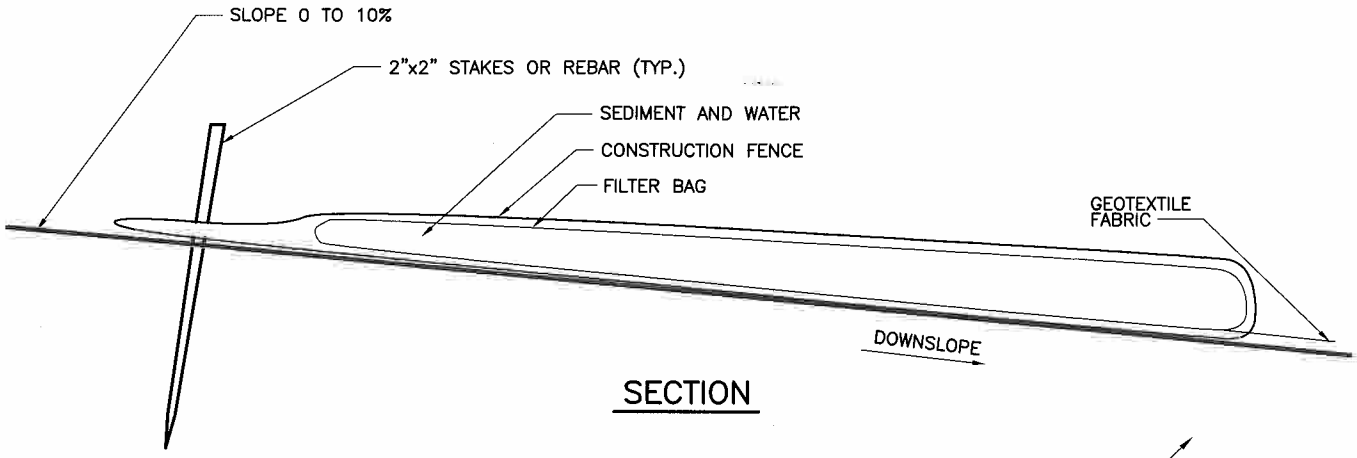
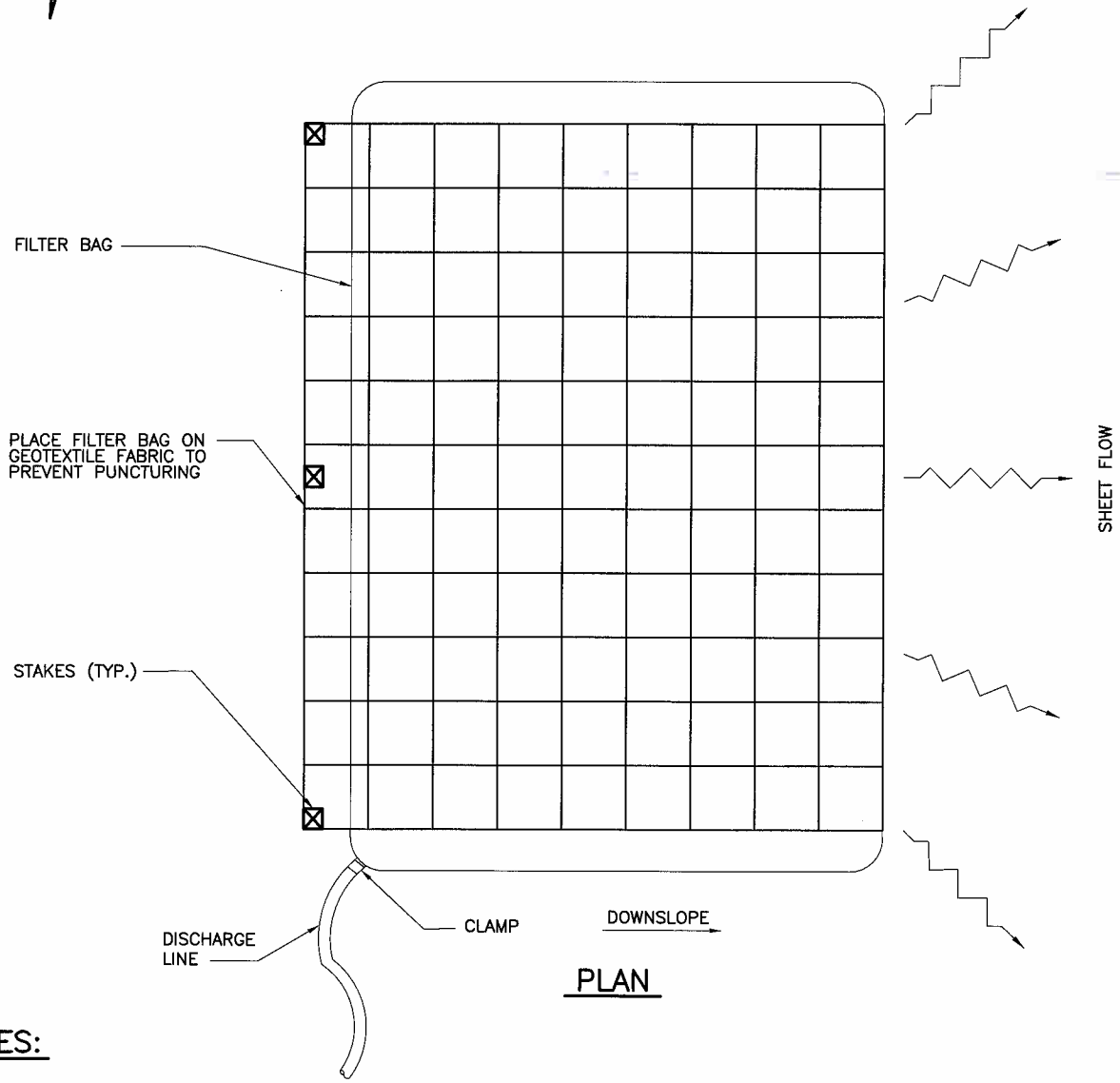


SECTION



PLAN

NOTES:

1. MANUFACTURED FILTER BAGS ARE A SUITABLE ALTERNATIVE TO STRAW BALE STRUCTURES FOR TRENCH DEWATERING. FILTER BAGS SHALL BE INSTALLED AS SPECIFIED BY THE MANUFACTURER.
2. INSTALLATION SPECIFICATIONS TO BE MODIFIED BY KEYSTONE AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

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TYPICAL DEWATERING FILTER BAG

PROJECT: 50388E

DETAIL 5

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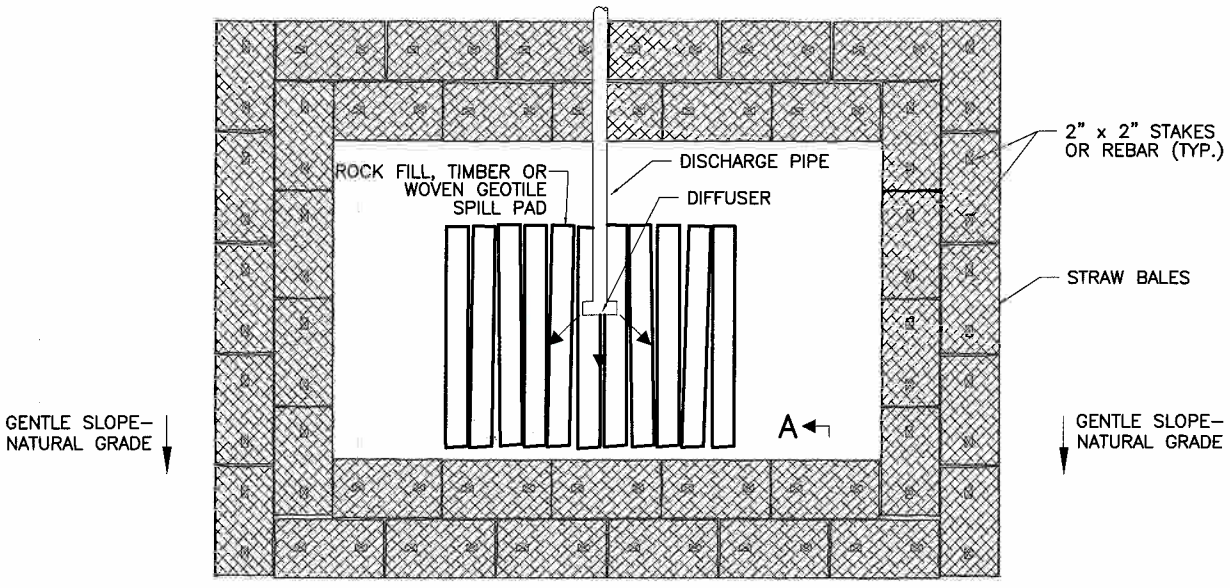

PLAN

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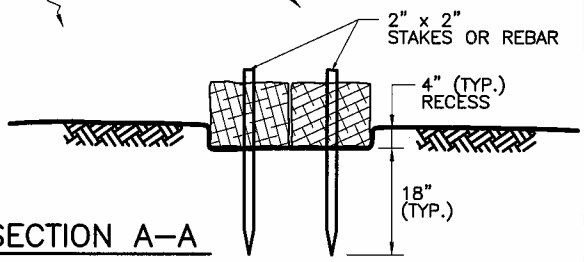

SECTION A–A

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.

2. DISCHARGE SITE SHOULD BE WELL VEGETATED AND LOCATED AT LEAST 50 FEET FROM ANY WATERBODY. 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 DEWATERING 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. DRIVE TWO (2) STAKES OR REBAR INTO EACH BALE TO ANCHOR THEM IN PLACE.

6. INSTALLATION SPECIFICATIONS TO BE MODIFIED BY KEYSTONE AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

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TYPICAL STRAW BALE DEWATERING STRUCTURE

PROJECT: 50388E

DETAIL 6

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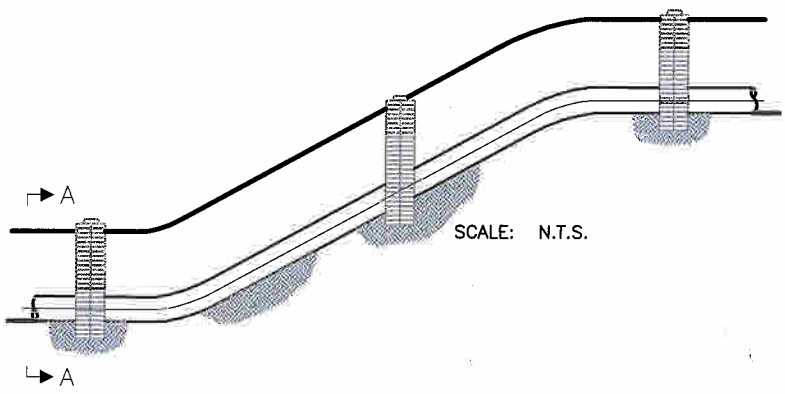

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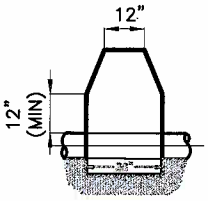

SECTION 'B–B'
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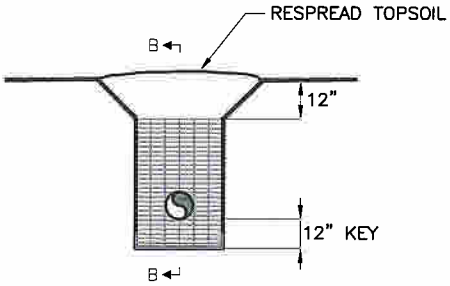

SECTION 'A–A'
SCALE: N.T.S.

NOTES:

1. TRENCH BREAKERS TO BE INSTALLED AS SHOWN ON THE CONSTRUCTION DRAWINGS, WHERE DESCRIBED IN THE PLAN, AND AS DIRECTED BY KEYSTONE.

2. 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
   3) SAND
   WITH JUST SUFFICIENT WATER TO PERMIT MIXTURE TO EXUDE AND BOND SACKS TOGETHER. TOPSOIL IS NOT TO BE USED IN SACKS.

3. KEY EACH TRENCH BREAKER A MINIMUM OF ONE (1) FT. INTO BOTTOMS AND SIDES OF TRENCH.

4. FOAM TRENCH BREAKERS MAY BE USED IN LIEU OF SAND SACK TRENCH BREAKERS.

5. INSTALLATION SPECIFICATIONS TO BE MODIFIED BY KEYSTONE AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

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TYPICAL PERMANENT TRENCH BREAKERS

PROJECT: 50388E

DETAIL 7

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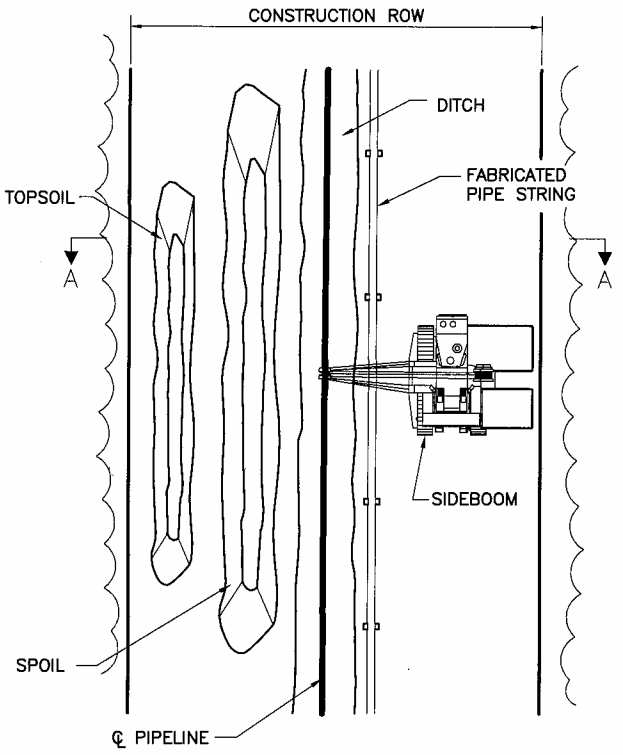
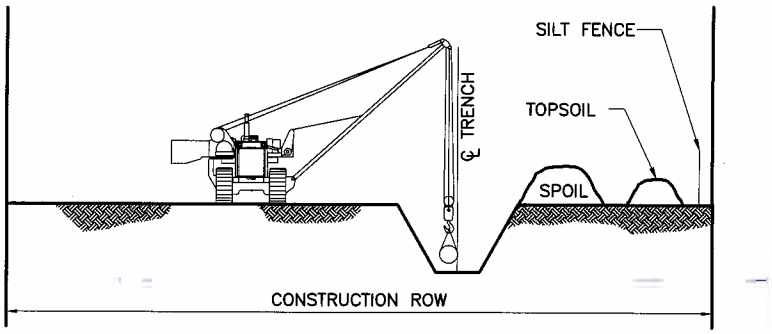


PLAN VIEW



SECTION "A–A"

CONSTRUCTION PROCEDURES:

1. IF A WETLAND IS BEING CULTIVATED AND BEING FARMED, NO WETLAND CONSTRUCTION PROCEDURES ARE REQUIRED.
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 APPROXIMATELY 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER KEYSTONE'S SPILL PREVENTION PROCEDURES.
4. INSTALL TEMPORARY SLOPE BREAKER UPSLOPE WITHIN 100 FEET OF WETLAND BOUNDARY IF DIRECTED BY KEYSTONE.
5. CONSTRUCT WHEN DRY, IF POSSIBLE. IF SITE BECOMES WET AT TIME OF TRENCHING, AVOID SOIL COMPACTION BY UTILIZING TIMBER RIP–RAP OR PREFABRICATED EQUIPMENT MATS.
6. 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.
7. RESTRICT ROOT GRUBBING TO ONLY THAT AREA OVER THE DITCHLINE AND REMOVE STUMPS FROM WETLAND FOR DISPOSAL.
8. CONDUCT TRENCH LINE TOPSOIL STRIPPING (IF TOPSOIL IS NOT SATURATED). SALVAGE TOPSOIL TO ACTUAL DEPTH OR A MAXIMUM DEPTH OF 12 INCHES,
9. TRENCH THROUGH WETLANDS.
10. PIPE SECTION TO BE FABRICATED WITHIN THE WETLAND AND ADJACENT TO ALIGNMENT, OR IN STAGING AREA OUTSIDE THE WETLAND AND WALKED IN.
11. LOWER–IN PIPE. PRIOR TO BACKFILLING TRENCH, IF REQUIRED, TRENCH PLUGS SHALL BE INSTALLED AS REQUIRED. BACKFILL TRENCH.
12. RESTORE GRADE TO NEAR PRE–CONSTRUCTION TOPOGRAPHY, REPLACE TOPSOIL AND INSTALL PERMANENT EROSION CONTROL.
13. IF UTILIZED, REMOVE TIMBER MATS OR PREFABRICATED MATS FROM WETLANDS UPON COMPLETION.

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"DRY" WETLAND CROSSING METHOD

PROJECT: 50388E

DETAIL 8

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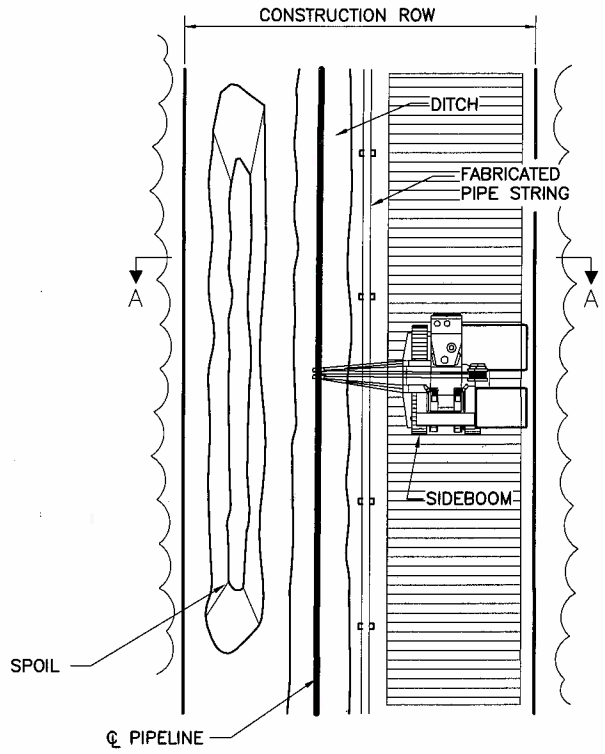
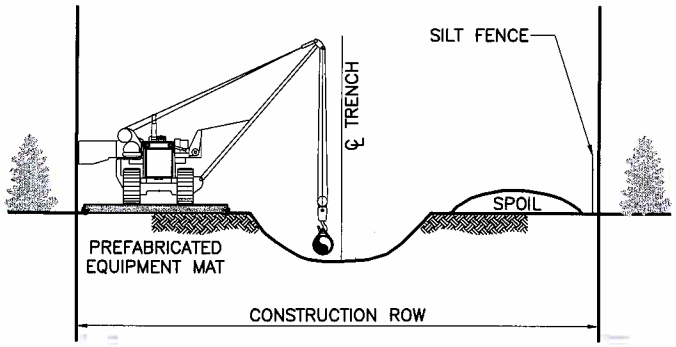


PLAN VIEW



SECTION "A–A"

CONSTRUCTION PROCEDURES:

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 APPROXIMIATLY 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER KEYSTONE'S SPILL PREVENTION PROCEDURES.
3. INSTALL TEMPORARY SLOPE BREAKER UPSLOPE WITHIN 100 FEET OF WETLAND BOUNDARY IF DIRECTED BY KEYSTONE.
4. INSTALL TIMBER MATS/RIP–RAP THROUGH ENTIRE WETLAND AREA. EQUIPMENT NECESSARY FOR RIGHT–OF–WAY CLEARING MAY MAKE ONE (1) PASS THROUGH THE WETLAND BEFORE MATS ARE INSTALLED.
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 AND REMOVE FROM WETLAND FOR DISPOSAL.
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. PIPE SECTION MAY BE FABRICATED WITHIN THE WETLAND AND ADJACENT TO ALIGNMENT, OR IN STAGING AREA OUTSIDE THE WETLAND AND WALKED IN.
10. TRENCH THROUGH WETLANDS.
11. LOWER–IN PIPE, INSTALL TRENCH PLUGS AT WETLAND EDGES AS REQUIRED AND BACKFILL IMMEDIATELY.
12. REMOVE TIMBER MATS OR PREFABRICATED MATS FROM WETLANDS UPON COMPLETION.
13. RESTORE GRADE TO NEAR PRE–CONSTRUCTION TOPOGRAPHY, REPLACE TOPSOIL AND INSTALL PERMANENT EROSION CONTROL.

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STANDARD WETLAND CROSSING METHOD

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DETAIL 9

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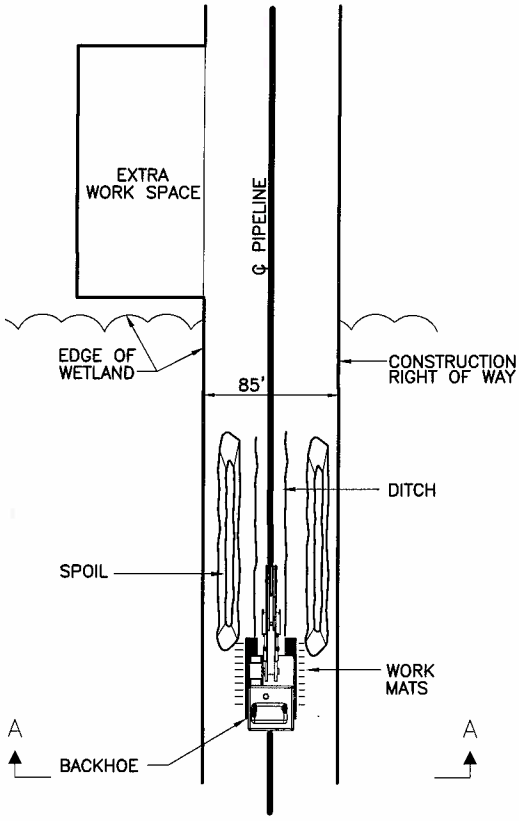
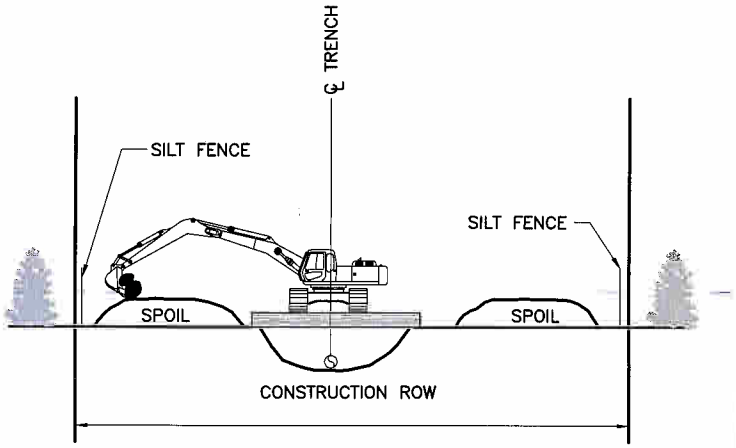


PLAN VIEW



SECTION "A–A"

CONSTRUCTION PROCEDURES:

1. FLAG WETLAND BOUNDARIES PRIOR TO CLEARING.
2. NO REFUELING OF MOBILE EQUIPMENT IS ALLOWED WITHIN APPROXIMATELY 100 FEET OF WETLAND. PLACE "NO FUELING" SIGN POSTS 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER KEYSTONE'S SPILL PREVENTION PROCEDURES.
3. INSTALL TEMPORARY SLOPE BREAKER UPSLOPE WITHIN 100 FEET OF WETLAND BOUNDARY AS DIRECTED BY KEYSTONE.
4. RESTRICT ROOT GRUBBING TO ONLY THE AREA OVER THE DITCHLINE.
5. TOPSOIL STRIPPING SHALL NOT BE REQUIRED IN SATURATED SOIL CONDITIONS.
6. UTILIZE AMPHIBIOUS EXCAVATORS (PONTOON 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.
7. AVOID ADJACENT WETLANDS. INSTALL SEDIMENT BARRIERS (STRAW BALES AND/OR SILT FENCE) AT EDGE OF RIGHT–OF–WAY AND ALONG WETLAND EDGE IF PRACTICAL.
8. FABRICATE PIPE IN STAGING AREA OUTSIDE THE WETLAND IN THE EXTRA WORK SPACE AS INDICATED ON THE CONSTRUCTION DRAWINGS.
9. LEAVE HARD PLUGS AT THE EDGE OF THE WETLAND UNTIL JUST PRIOR TO PIPE PLACEMENT.
10. FLOAT PIPE IN PLACE, LOWER–IN, INSTALL TRENCH PLUGS AT WETLAND EDGES WHERE REQUIRED AND BACKFILL IMMEDIATELY.
11. REMOVE TIMBER MATS OR PREFABRICATED MATS OF NON–NATIVE MATERIAL FROM WETLANDS UPON COMPLETION.
12. RESTORE GRADE TO NEAR PRE–CONSTRUCTION TOPOGRAPHY AND INSTALL PERMANENT EROSION CONTROL.

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KEYSTONE PIPELINE PROJECT

NO.	REVISION	DATE
1	GENERAL EDITORIAL REVISION	APR.04.2006
0	ISSUED FOR DEPARTMENT OF STATE FILING	MAR.10.2006

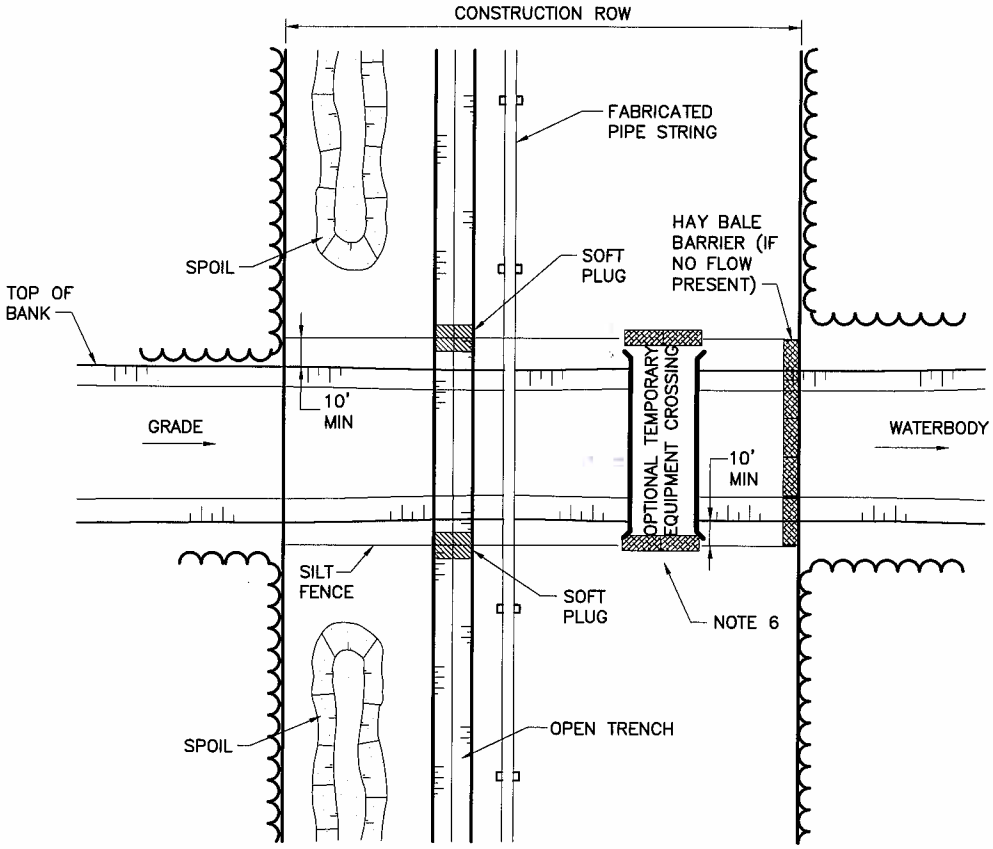
PUSH/PULL WETLAND CROSSING METHOD

PROJECT: 50388E

DETAIL 10

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
K-00-P-7000-300	ALS	JTG	RG

LAST PLOT DATE: Tue, 04 Apr 2006 - 3:26pm



PLAN VIEW

CONSTRUCTION PROCEDURES:

1. METHOD APPLIES TO CROSSINGS WHERE NO FLOWING WATER IS PRESENT AT THE TIME OF CROSSING OR AS OTHERWISE SHOWN ON THE CONSTRUCTION DRAWINGS.
2. CONTRACTOR MAY "MAINLINE THROUGH" THE CROSSING OR UP TO BOTH SIDES OF THE CROSSING; STRING, WELD, COAT AND WEIGHT (IF NECESSARY), USING THE MAINLINE CREW WITH THE PIPE SKIDDED OVER THE CROSSING.
3. NO REFUELING OF MOBILE EQUIPMENT WITHIN APPROXIMATELY 100 FEET OF DRY CHANNEL. REFUEL STATIONARY EQUIPMENT AS PER KEYSTONE'S SPILL PREVENTION PROCEDURES.
4. INSTALLATION OF TEMPORARY EQUIPMENT CROSSING IS OPTIONAL AT THE DISCRETION OF KEYSTONE.
5. IN AGRICULTURAL LAND, STRIP TOPSOIL FROM SPOIL STORAGE AREA. STOCKPILE TOPSOIL AND SPOIL SEPARATELY. TOPSOIL AND SPOIL WILL NOT BE STOCKPILED IN THE CROSSING CHANNEL AND WILL BE PLACED A MINIMUM OF 10 FEET FROM CROSSING BANKS WITHIN THE CONSTRUCTION RIGHT OF WAY.
6. CONSTRUCT SEDIMENT BARRIERS ACROSS THE ENTIRE CONSTRUCTION RIGHT OF WAY FOLLOWING CLEARING AND GRADING AND MAINTAIN UNTIL CONSTRUCTION OF THE CROSSING. EROSION CONTROL MEASURES SHALL BE REINSTALLED IMMEDIATELY FOLLOWING BACKFILLING OF TRENCH AND STABILIZATION OF BANKS. BARRIERS MAY BE TEMPORARILY REMOVED TO ALLOW CONSTRUCTION ACTIVITIES BUT MUST BE REPLACED BY THE END OF EACH WORK DAY.
7. IN-STREAM SPOIL TO BE STORED OUT OF THE STREAM CHANNEL A MINIMUM OF 10 FEET FROM HIGH BANK AND WITHIN THE CONSTRUCTION RIGHT OF WAY.
8. BACKFILL WITH NATIVE MATERIAL.
9. RESTORE CROSSING CHANNEL TO APPROXIMATE PRE-CONSTRUCTION PROFILE AND SUBSTRATE.
10. RESTORE CROSSING BANKS TO APPROXIMATE ORIGINAL CONDITION AND STABILIZE WITH EROSION CONTROL.

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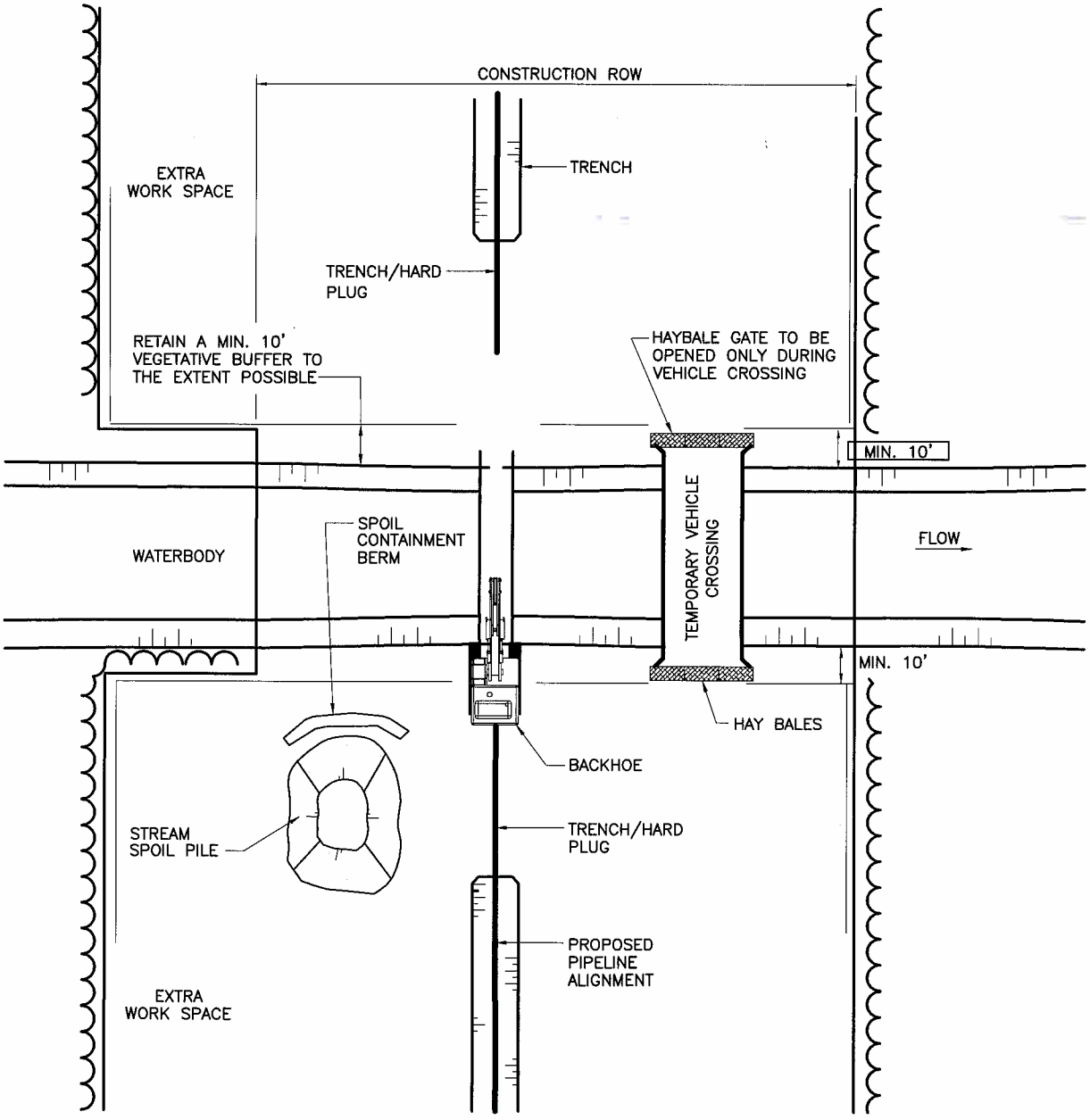
NON-FLOWING WATER BODY CROSSING METHOD

PROJECT: 50388E

DETAIL 11

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY	LAST PLOT DATE
K-00-P-7000-300	ALS	JTG	RG	Tue, 04 Apr 2006 - 3:28pm

SEE DETAIL 12a FOR
CONSTRUCTION PROCEDURE



PLAN VIEW

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TYPICAL FLOWING WATERBODY CROSSING METHOD

PROJECT: 50388E

DETAIL 12

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
K-00-P-7000-300	ALS	JTG	RG

LAST PLOT DATE: Tue, 04 Apr 2006 - 3:26pm

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CONSTRUCTION PROCEDURES:

1. RIGHT-OF-WAY BOUNDARIES AND WORK SPACE LIMITS SHALL BE CLEARLY DELINEATED. STAGING FOR MAKEUP SHALL BE LOCATED A MINIMUM OF 10 FEET FROM WATERBODY.

2. CLEARING LIMITS WILL BE CLEARLY DELINEATED AND A 10 FOOT VEGETATIVE BUFFER STRIP BETWEEN DISTURBED AREA AND THE WATERBODY SHALL BE MAINTAINED TO THE EXTENT POSSIBLE. ALL CLEARING SHALL BE MINIMIZED TO THE EXTENT POSSIBLE AND TO ONLY THAT NECESSARY FOR CONSTRUCTION. WOODY VEGETATION SHALL BE CUT AT GROUND LEVEL AND THE STUMPS/ROOTS LEFT IN PLACE TO THE EXTENT POSSIBLE.

3. TOPSOIL SHALL BE STRIPPED FROM THE DITCH LINE IN ALL WETLANDS RIPARIAN.

4. CONTRACTOR SHALL INSTALL SIGNS APPROXIMATELY 100 FEET MINIMUM FROM EACH WATERBODY AND WETLAND TO IDENTIFY THE HAZARDOUS MATERIALS EXCLUSION AREA.

5. EROSION AND SEDIMENT CONTROL

   A. 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 WATERBODY OR WETLAND.

   B. NO HEAVILY SILT LADEN WATER SHALL BE DISCHARGED DIRECTLY OR INDIRECTLY INTO THE WATERBODY. 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 WATERBODY CROSSING UNTIL THE WATER 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. CONTRACTOR SHALL MAINTAIN HARD PLUGS IN THE DITCH AT THE WATERBODY 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 WATERBODY BED.

7. CONTRACTOR SHALL PLACE TRENCH SPOIL ONLY IN CERTIFICATED WORK SPACE AND A MINIMUM OF 10 FEET FROM THE WATERBODY BANKS TO PREVENT ENTRY OF SPOIL INTO THE WATERBODY. SPOIL SHALL BE CONTAINED AS NECESSARY USING EITHER A STRAW BALE BARRIER OR AN EARTH/ROCK BERM.

8. CONTRACTOR SHALL RESTORE THE WATERBODY 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 WATERBODY 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 WATERBODY AND WETLAND BOUNDARIES UNTIL VEGETATION IS ESTABLISHED IN ADJACENT DISTURBED AREAS.

9. VEHICLE CROSSING CAN BE CONSTRUCTED USING EITHER A FLUME CROSSING OR A TEMPORARY BRIDGE. VEHICLE CROSSING ONLY REQUIRED IF STREAM SUPPORTS A STATE DESIGNATED FISHERY.

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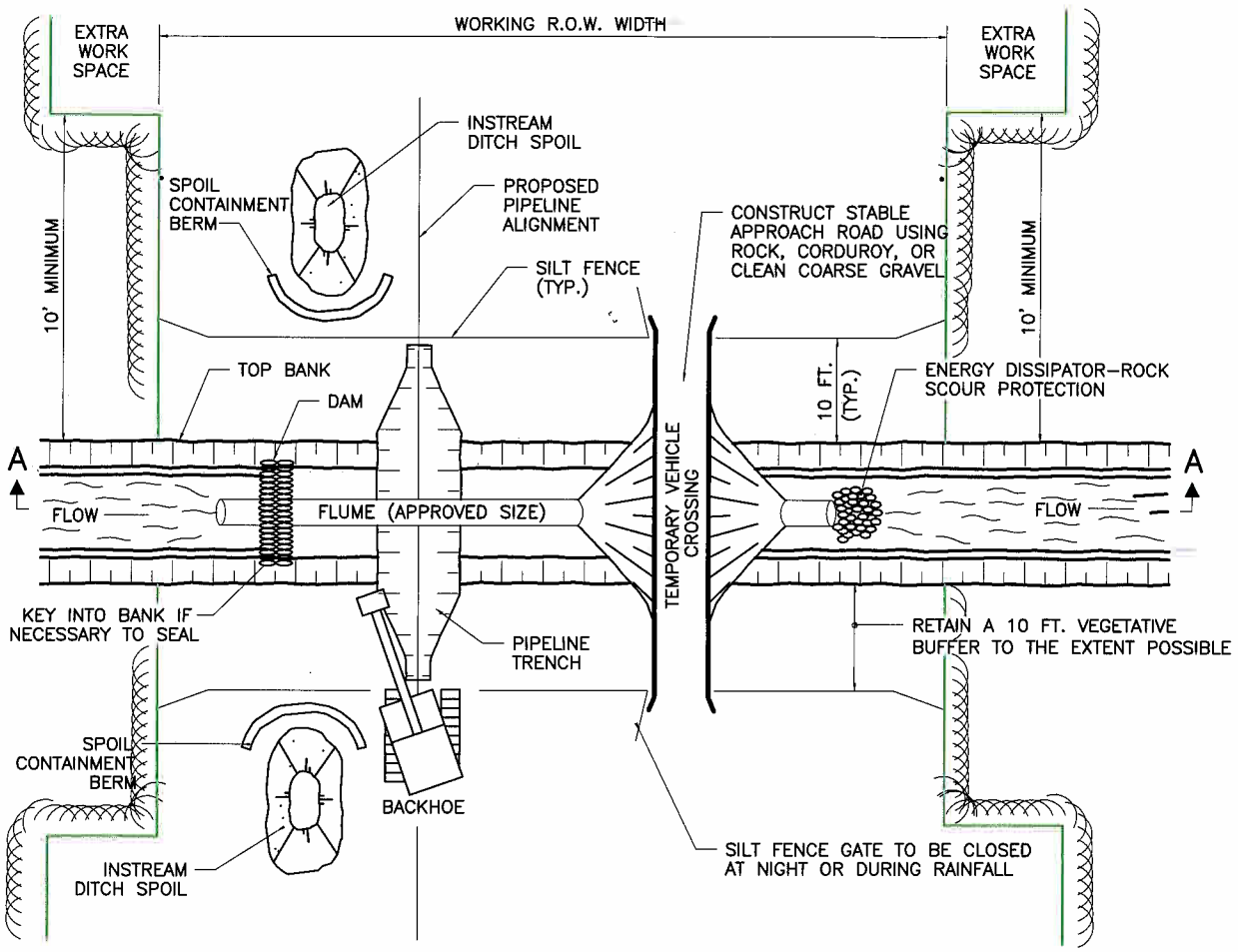
TYPICAL FLOWING WATERBODY CROSSING METHOD

PROJECT: 50388E

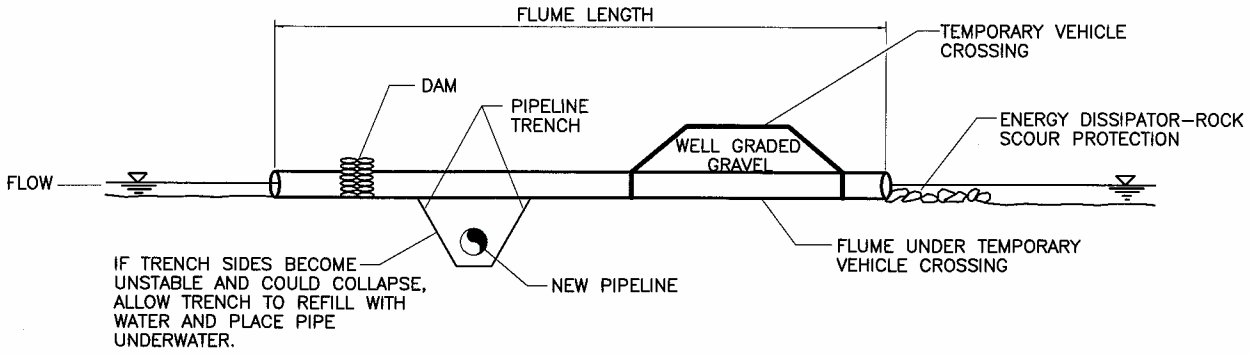
DETAIL 12a

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
K-00-P-7000-300	ALS	JTG	RG

LAST PLOT DATE: Tue, 04 Apr 2006 – 3:26pm



PLAN VIEW



SECTION 'A–A'

NOTES:
1. PIPELINE PLACEMENT WITHIN RIGHT–OF–WAY CONCEPTUAL ONLY.
2. SEE DETAIL 13a FOR CONSTRUCTION PROCEDURES.

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TYPICAL DRY FLUME CROSSING METHOD

PROJECT: 50388E

DETAIL 13

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
K-00-P-7000-300	ALS	JTG	RG

LAST PLOT DATE: Tue, 04 Apr 2006 – 3:28pm

CONSTRUCTION PROCEDURES:

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 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 SHALL BE CONTAINED 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. RESTORE THE STREAM BED AND BANKS TO APPROXIMATE PRE-CONSTRUCTION CONTOURS, BUT NOT TO EXCEED 2 HORIZONTAL TO 1 VERTICAL.
   a. 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.

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TYPICAL DRY FLUME CROSSING METHOD

PROJECT: 50388E

DETAIL 13a

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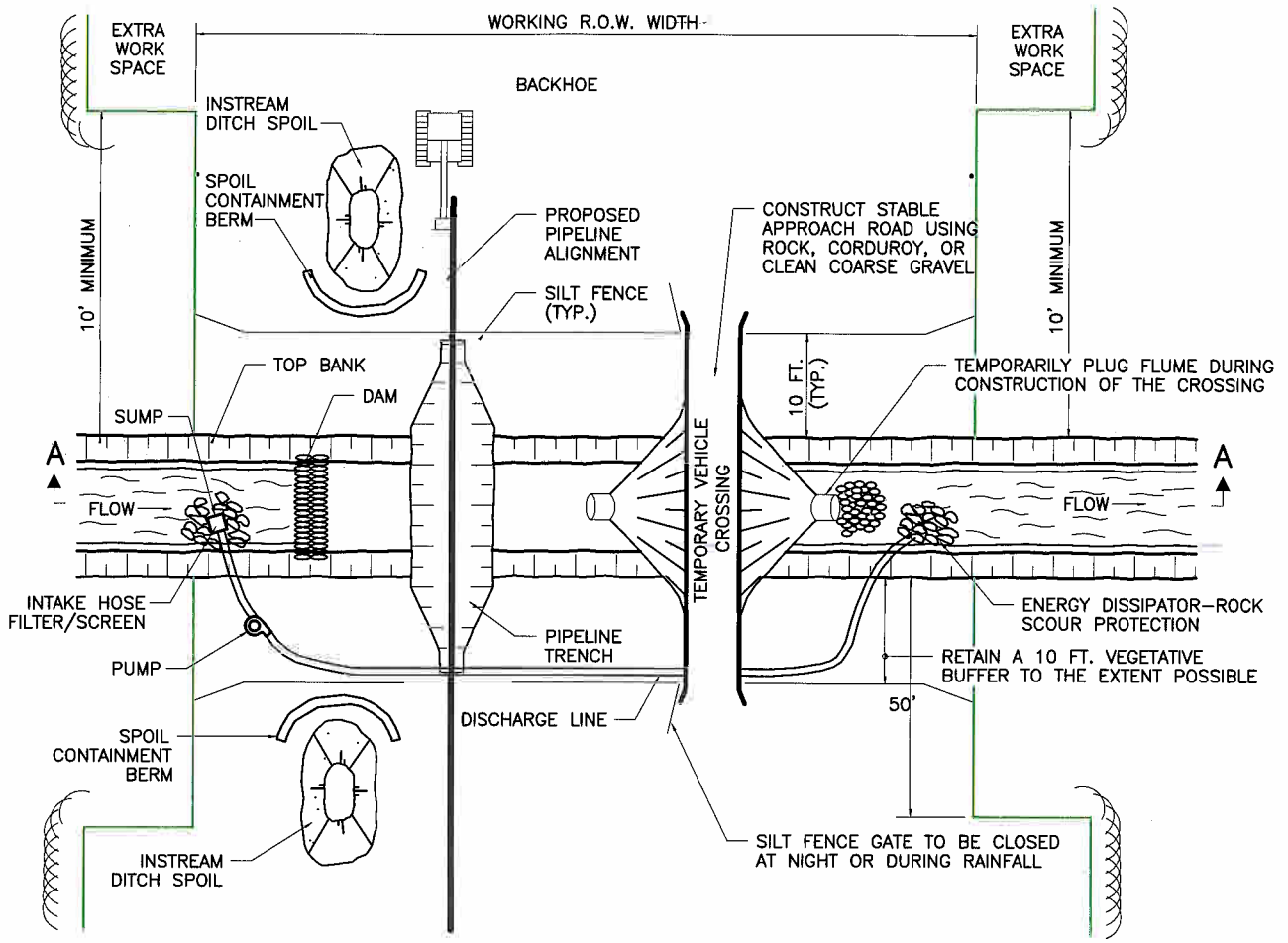
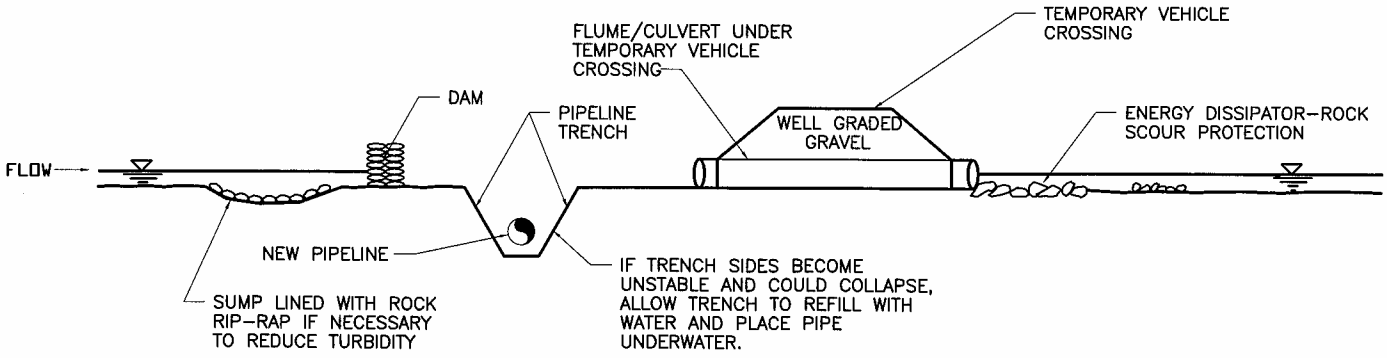
K-00-P-7000-300	ALS	JTG	RG	Tue, 04 Apr 2006 - 3:28pm



PLAN VIEW



SECTION 'A-A'

NOTES:
1. PIPELINE PLACEMENT WITHIN RIGHT-OF-WAY CONCEPTUAL ONLY.
2. SEE DETAIL 14a FOR CONSTRUCTION PROCEDURE

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TYPICAL DAM AND PUMP CROSSING

PROJECT: 50388E

DETAIL 14

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
K-00-P-7000-300	ALS	JTG	RG

LAST PLOT DATE: Tue, 04 Apr 2006 - 3:26pm

CONSTRUCTION PROCEDURES:

1. WHERE NECESSARY, OBTAIN PRIOR APPROVAL BEFORE USING THE DAM AND PUMP METHOD.
2. 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 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.
3. SCHEDULE INSTREAM ACTIVITY FOR LOW FLOW PERIODS IF POSSIBLE
4. 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.
5. CONTRACTOR SHALL SUPPLY, INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES, AS DEPICTED AND 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 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.
6. 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.
7. 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.
8. 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.
9. 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.
10. STAGING AREAS ARE TO BE LOCATED AT LEAST 10 FT. FROM THE WATER'S EDGE (WHERE TOPOGRAPHIC CONDITIONS PERMIT) AND SHALL BE THE MINIMUM SIZE NEEDED.
11. 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.
12. 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 DISCHARGED WATER SHALL NOT BE ALLOWED TO FLOW INTO ANY WATERCOURSE OR WETLAND. 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.
13. 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.
14. 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.
15. 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.

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KEYSTONE PIPELINE PROJECT

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TYPICAL DAM AND PUMP CROSSING

PROJECT: 50388E

DETAIL 14a

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY	LAST PLOT DATE
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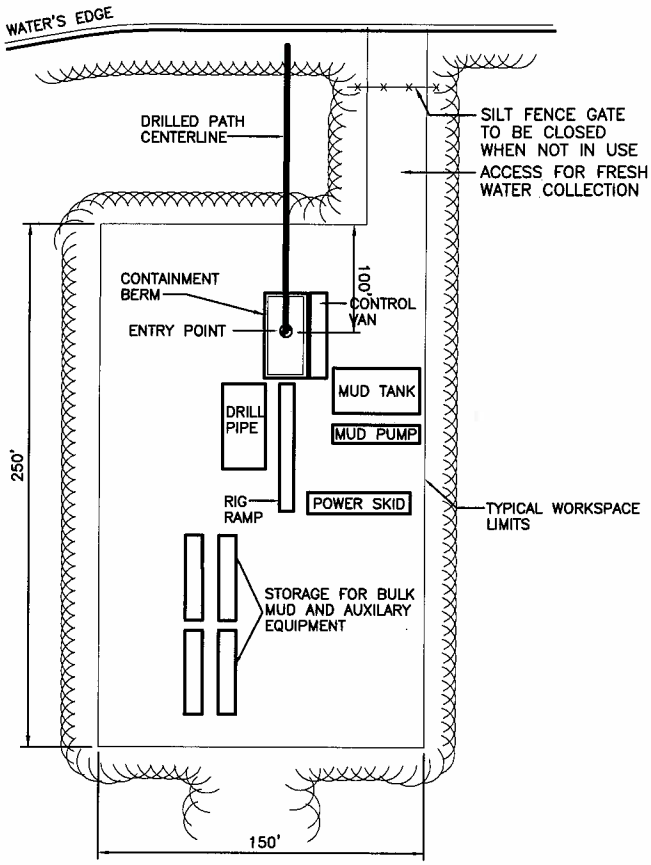
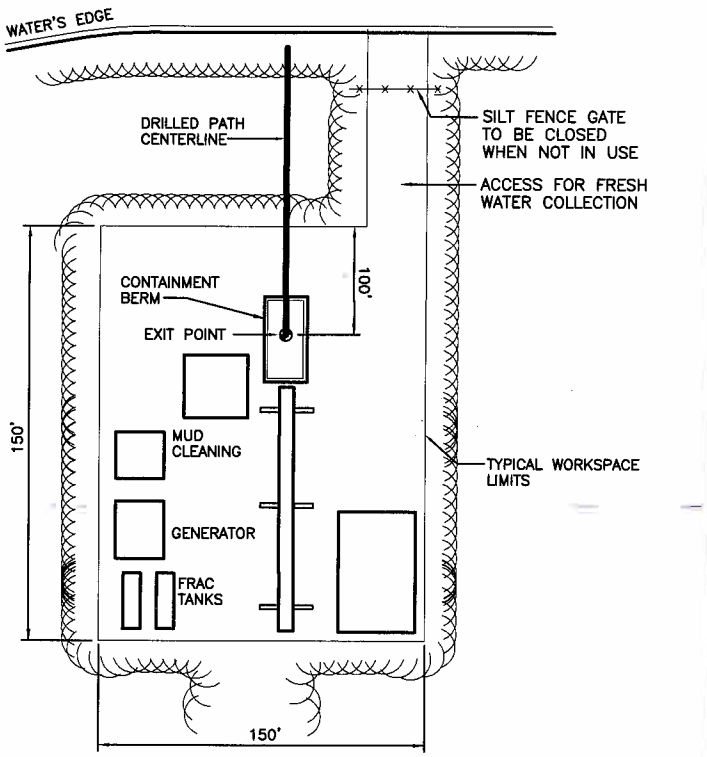
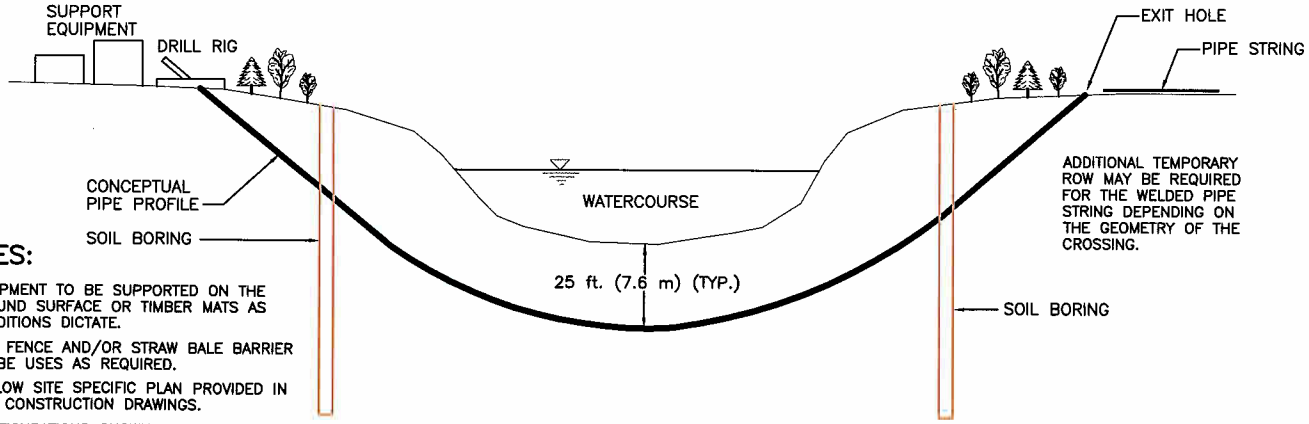


SITE PLAN
ENTER SIDE



SITE PLAN
EXIT SIDE



PROFILE

NOTES:

1. EQUIPMENT TO BE SUPPORTED ON THE GROUND SURFACE OR TIMBER MATS AS CONDITIONS DICTATE.
2. SILT FENCE AND/OR STRAW BALE BARRIER TO BE USES AS REQUIRED.
3. FOLLOW SITE SPECIFIC PLAN PROVIDED IN THE CONSTRUCTION DRAWINGS.
4. CONFIGURATIONS SHOWN ARE TYPICAL AND SHALL BE MODIFIED BY KEYSTONE AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS

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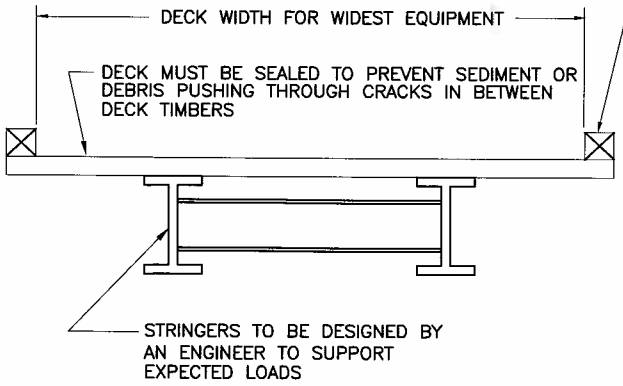
TYPICAL HORIZONTAL DRILL (HDD) SITE PLAN & PROFILE

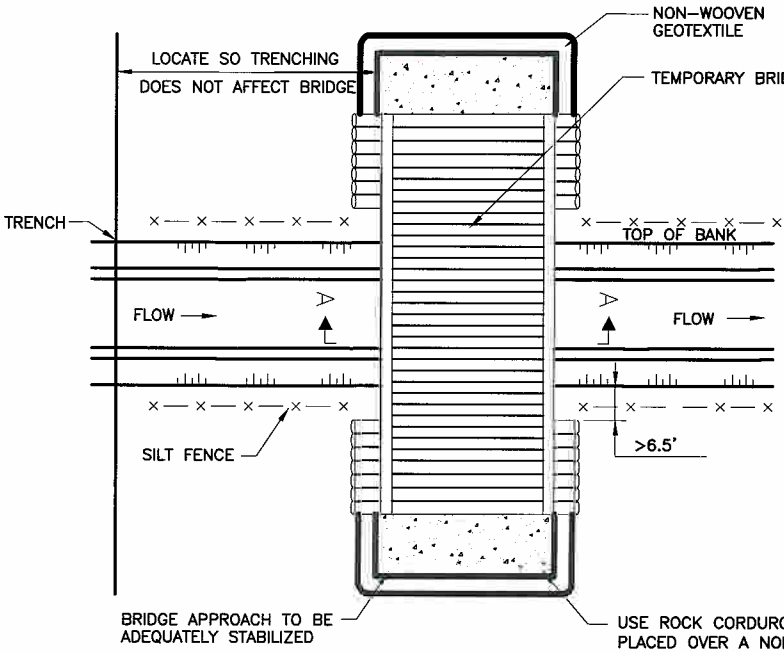
PROJECT: 50388E

DETAIL 15

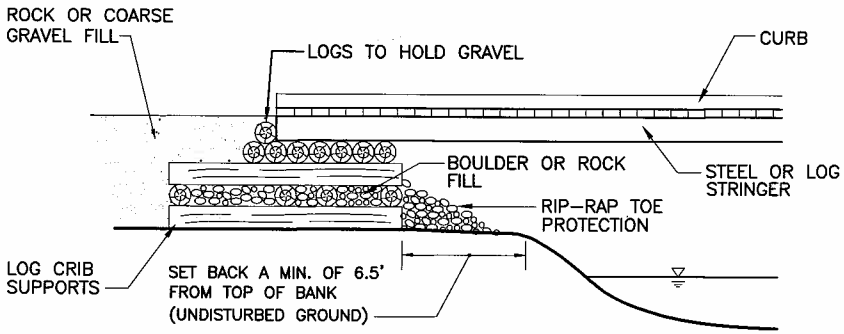
DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY	LAST PLOT DATE
K-00-P-7000-300	ALS	JTG	RG	Tue, 04 Apr 2006 - 3:26pm



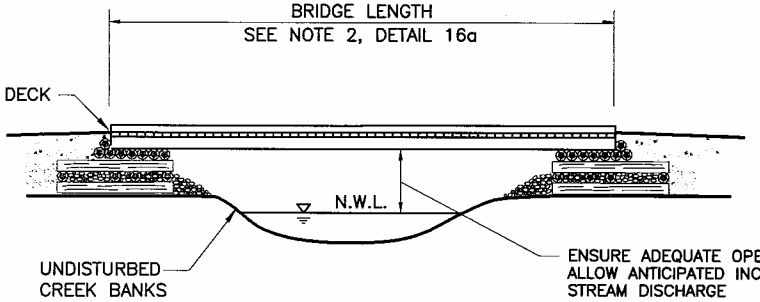
SECTION A–A



PLAN



TYPICAL TEMPORARY CRIB ABUTMENT



BRIDGE PROFILE

NOTES:

1. SEE DETAIL 16a FOR CONSTRUCTION PROCEDURES

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TYPICAL TEMPORARY BRIDGE CROSSING

PROJECT: 50388E

DETAIL 16

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
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CONSTRUCTION PROCEDURES:

IN GENERAL TERMS, THE FOLLOWING IS A SEQUENCE OF CONSTRUCTION PROCEDURES THAT ARE RECOMMENDED TO BE FOLLOWED FOR TEMPORARY BRIDGE CROSSINGS:

1. A PORTABLE BRIDGE, FLEXI–FLOAT, OR FLUMED VEHICLE CROSSING MAY BE SUBSTITUTED FOR THE TEMPORARY BRIDGE. IT IS IMPORTANT THAT THE SIZE OF THE TOTAL OPENING BE SELECTED SO THE STRUCTURE CAN SAFELY PASS FLOOD FLOWS THAT CAN REASONABLY BE EXPECTED TO OCCUR DURING THE LIFE OF THE CROSSING.

2. DETERMINE BRIDGE LENGTH REQUIRED AND FOLLOW EITHER METHOD A) OR B) FOR DETERMINING THE OPENING SIZE. IF A) IS FOLLOWED, A MINIMUM 6.5 ft. SETBACK FROM TOP OF BANK MUST BE PRESERVED AS A "NO DISTURBANCE AREA." IF ABUTMENTS OR PIERS IN THE STREAMBED ARE REQUIRED, METHOD B) IS TO BE FOLLOWED.

3. 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 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 WATERBODY.

4. 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 WATERBODY FROM EQUIPMENT TRACKS. THIS MAY REQUIRE USING MATERIALS SUCH AS GRAVEL, ROCK OR CORDUROY. 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.)

5. MAINTAIN A SILT FENCE ON EACH SIDE OF THE WATERBODY EXTENDING A MINIMUM OF 10 ft. BEYOND THE WIDTH OF DISTURBANCE UNTIL VEGETATION HAS BEEN ESTABLISHED IN UPSLOPE AREAS.

6. PERIODICALLY CHECK BRIDGE INSTALLATION AND REMOVE ANY BUILD–UP OF SEDIMENT OR DEBRIS ON THE BRIDGE. DISPOSE OF THIS MATERIAL IN A LOW LYING AREA AT LEAST 100 ft. FROM THE WATERBODY.

7. REMOVE TEMPORARY CROSSINGS AS SOON AS POSSIBLE AFTER FINAL CLEAN–UP. MATERIALS PLACED ALONG THE WATERBODY SHOULD BE COMPLETELY REMOVED DURING FINAL CLEAN–UP. REMOVAL SHOULD NOT NOT OCCUR OUTSIDE THE CONSTRUCTION WINDOWS.
   SURPLUS GRAVEL IS TO BE SPREAD ON THE RIGHT–OF WAY AS GRAVEL SHEETING, IF GRADATION IS SUITABLE, OR MOVED AT LEAST 100 ft. FROM TOP OF BANK FOR DISPOSAL. BRIDGE MATERIALS ARE TO BE REMOVED FROM THE CROSSING AREA. THE WATERBODY BED AND BANKS ARE TO BE RESTORED TO A STABLE ANGLE AND PROTECTED WITH EROSION RESISTANT MATERIAL COMPATIBLE WITH THE EXPECTED FLOW CONDITIONS.

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TYPICAL TEMPORARY BRIDGE CROSSING

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DETAIL 16a

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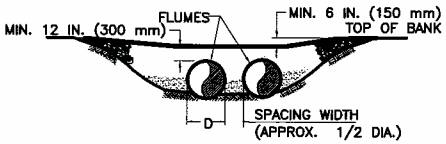


SECTION 'A–A'

CONSTRUCTION PROCEDURES:

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

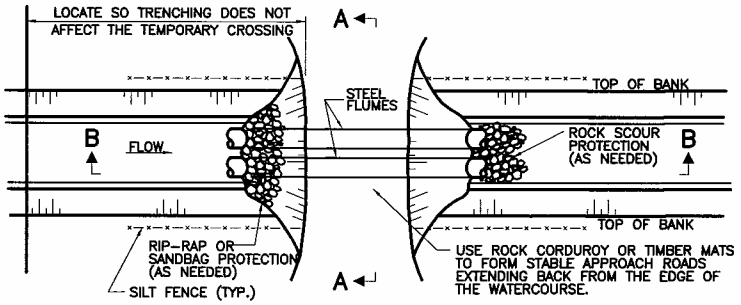
1. A PORTABLE FLEXI–FLOAT, OR TEMPORARY BRIDGE MAY BE SUBSTITUTED FOR THE TEMPORARY FLUME CROSSING.

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.

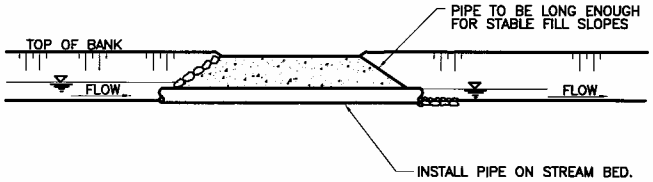
3. WHERE PRACTICAL, BACKFILL AROUND THE PIPES AT THE ROAD WITH CLEAN, COARSE ROCK FILL MATERIAL. IF SCOUR IS POSSIBLE, RIP–RAP IS TO BE PLACED ON THE STREAM BED DOWN–STREAM OF THE PIPE OUTLET EXTENDING A MINIMUM OF TWO PIPE DIAMETERS. ALTERNATIVELY, TIMBER EQUIPMENT MATS, SAND BAGS OR TIMBER CORDUROY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



PLAN VIEW



SECTION 'B–B'

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KEYSTONE PIPELINE PROJECT

TYPICAL FLUME BRIDGE CROSSING

PROJECT: 50388E

DETAIL 17

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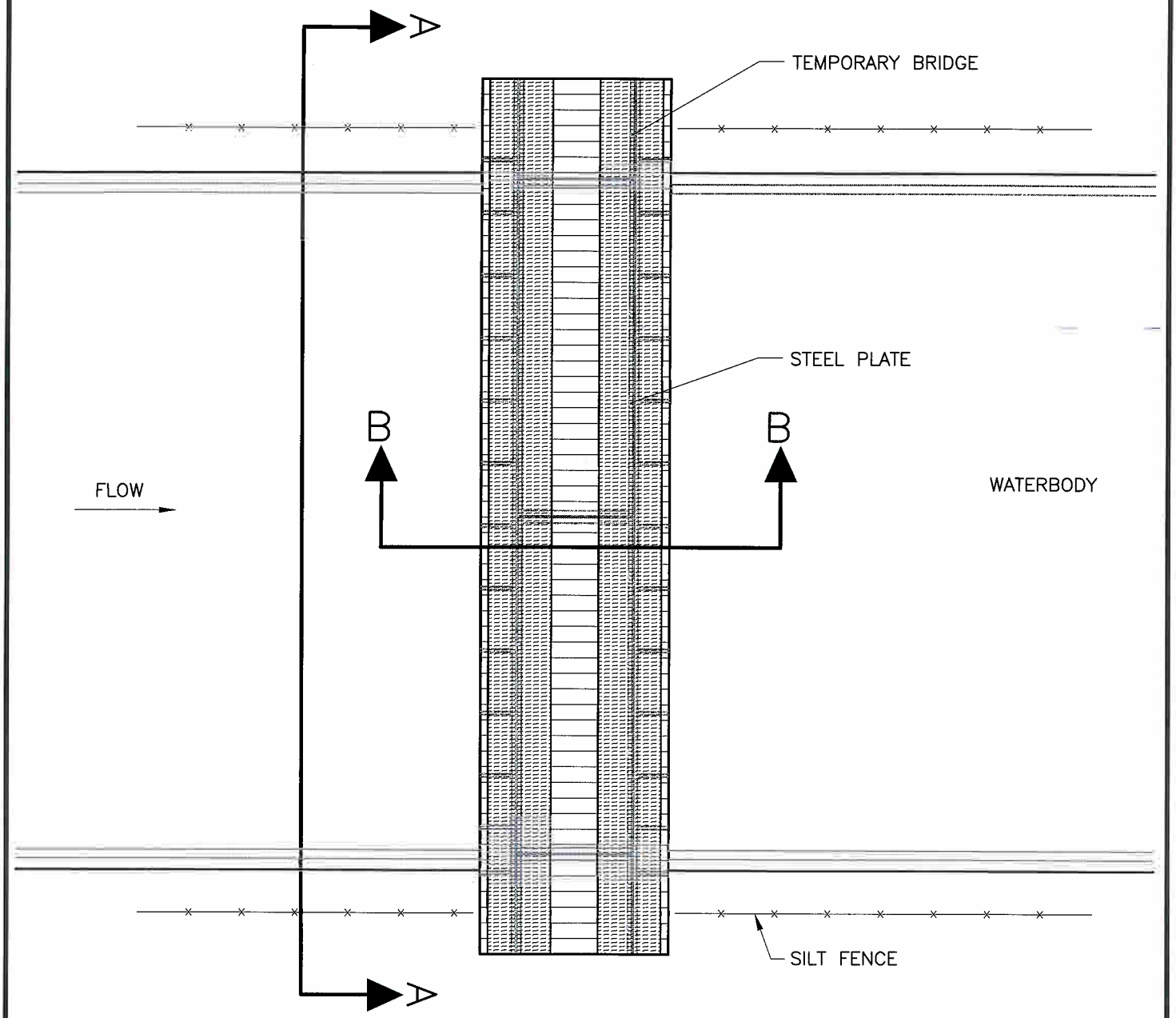

NOTES:

1. SEE DETAIL 18a FOR CONSTRUCTION PROCEDURES

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TYPICAL RAILCAR BRIDGE CROSSING

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DETAIL 18

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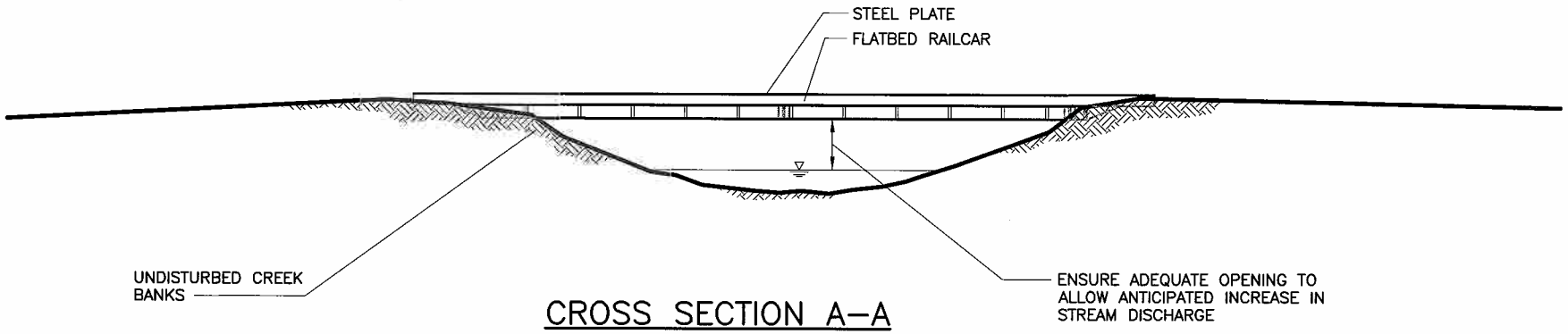
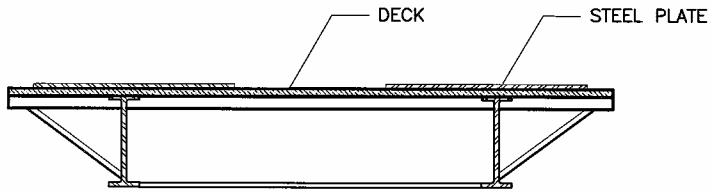


CROSS SECTION A–A

CONSTRUCTION PROCEDURES:

1. THIS TYPICAL DRAWING PROVIDES FOR A RAILCAR BRIDGE EQUIPMENT CROSSING.
2. BRIDGE SHOULD BE A MINIMUM OF 12 FEET LONGER THAN BANK TO BANK WIDTH.
3. BEST MANAGEMENT PRACTICES UTILIZING EROSION CONTROL DEVICES, SUCH AS HAY BALES AND SILT FENCE ARE REQUIRED TO PREVENT SEDIMENTATION OF THE STREAM. EROSION PROTECTION SHALL BE PLACED ON THE STREAM BANKS.
4. DURING FINAL CLEAN–UP, REMOVE TEMPORARY EQUIPMENT CROSSINGS AS SOON AS POSSIBLE. INSTALLED MATERIALS, SUCH AS HAY BALES AND SILT FENCE MUST BE REMOVED AND DISPOSED IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS AND REQUIREMENTS. THE STREAM BED, BANKS AND AREAS AFFECTED BY CONSTRUCTION OF THE TEMPORARY EQUIPMENT CROSSING SHOULD BE RESTORED TO A STABLE CONDITION. IF REQUIRED TO PREVENT TRANSPORT OF SEDIMENTATION TO THE STREAM, SILT FENCE SHOULD BE INSTALLED AT THE TOP OF THE BANKS.



CROSS SECTION B–B

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TYPICAL RAILCAR BRIDGE CROSSING

PROJECT: 50388E

DETAIL 18a

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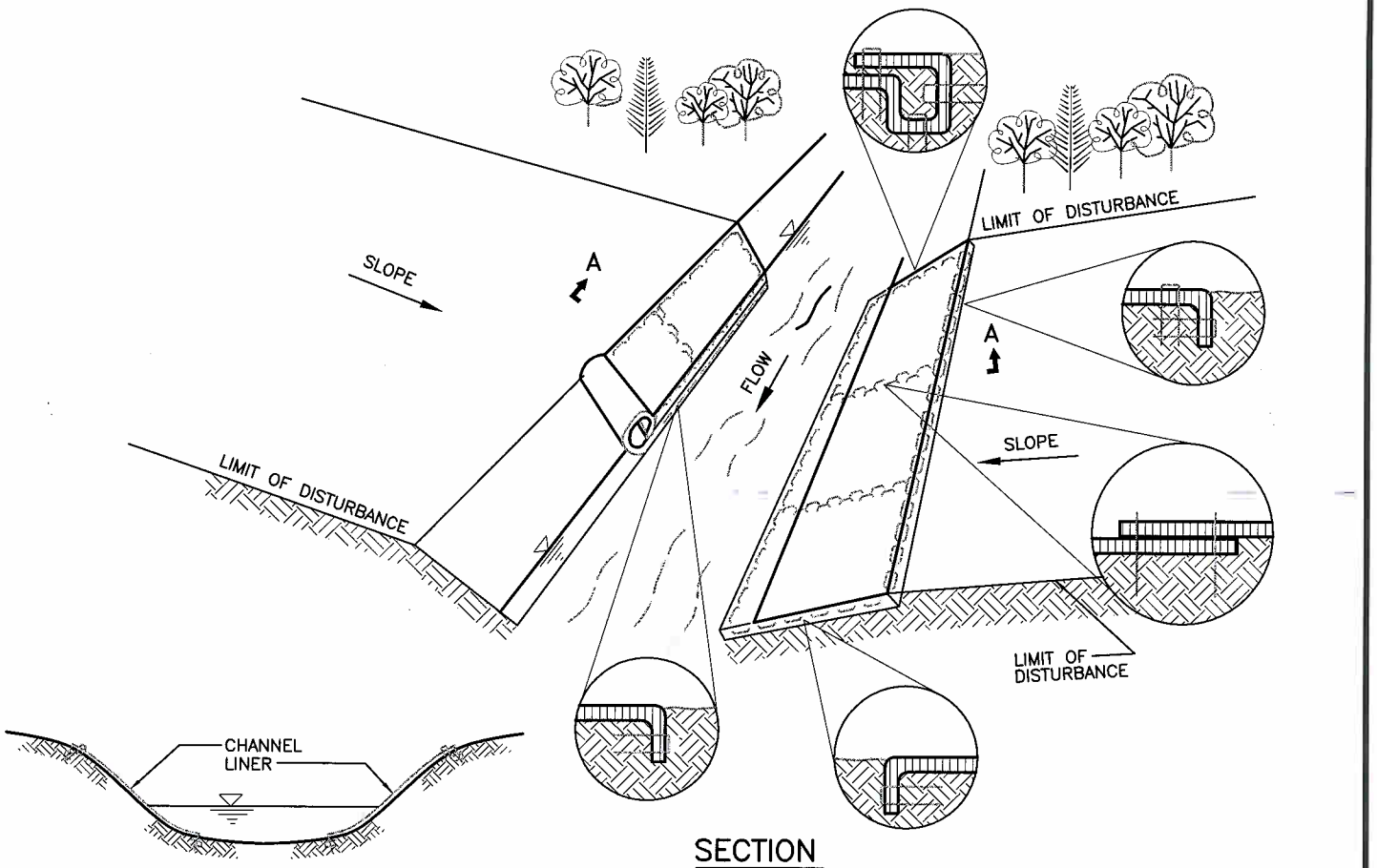

SECTION

SECTION A–A

NOTES:

1. INSTALL AND ANCHOR LINERS FOLLOWING MANUFACTURER'S INSTRUCTIONS.
2. PREPARE SOIL BEFORE INSTALLING CHANNEL LINER, INLCUDING THE APPLICATION OF FERTILIZER AND SEED. CHANNEL LINERS SHOULD EXTEND COMPLETELY ACROSS DISTURBED BANK AREAS TO PROTECT ERODIBLE SURFACES.
3. BEGIN AT THE END OF THE CHANNEL BY ANCHORING THE LINER IN A TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
4. ROLL LINER IN DIRECTION OF WATER FLOW.
5. INSTALL LINERS END–OVER–END (SHINGLE STYLE) WITH OVERLAP USEING A DOUBLE ROW OF STAGGERED STAPLES 4 in. (100 mm) APART TO SECURE LINER.
6. IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 ft. (9 TO 12 m) INTERVALS. USE A ROW OF STAPLES 4 in. (100 mm) BELOW THE FIRST ROW IN A STAGGERED PATTERN.
7. INSTALL CHANNEL LINER TO THE TOP OF THE DEFINED CHANNEL SECTION. TWO OR MORE ROWS OF BLANKETS MAY BE NECESSARY, THESE LINERS MUST BE OVERLAPPED 4 in. (100 mm) AND STAPLED.
8. THE CHANNEL LINER SHOULD EXTEND TO THE BASE OF THE CHANNEL AND STAPLED. FOR CHANNELS WITH VERY LITTLE OR NO FLOW. EXTEND A MIN. OF 1 ft. (300 mm) BELOW THE LOW WATER LEVEL AND STAPLE IN PLACE.
9. INSTALLATION SPECIFICATIONS TO BE MODIFIED BY KEYSTONE AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

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KEYSTONE PIPELINE PROJECT

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FLEXIBLE CHANNEL LINER INSTALLATION

PROJECT: 50388E

DETAIL 19

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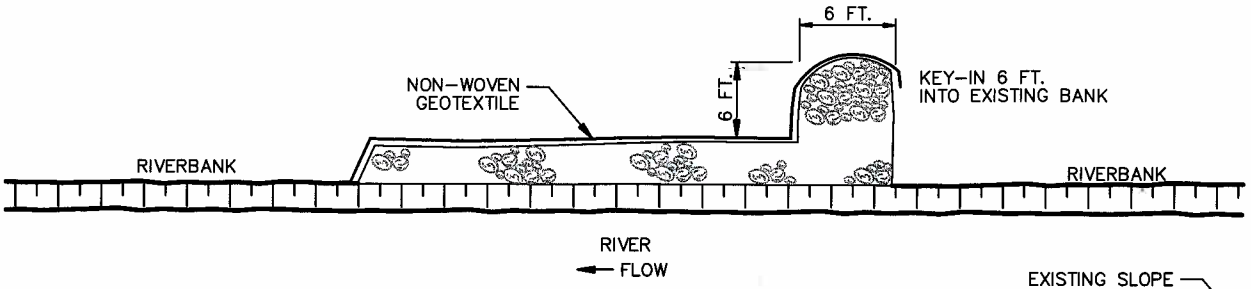
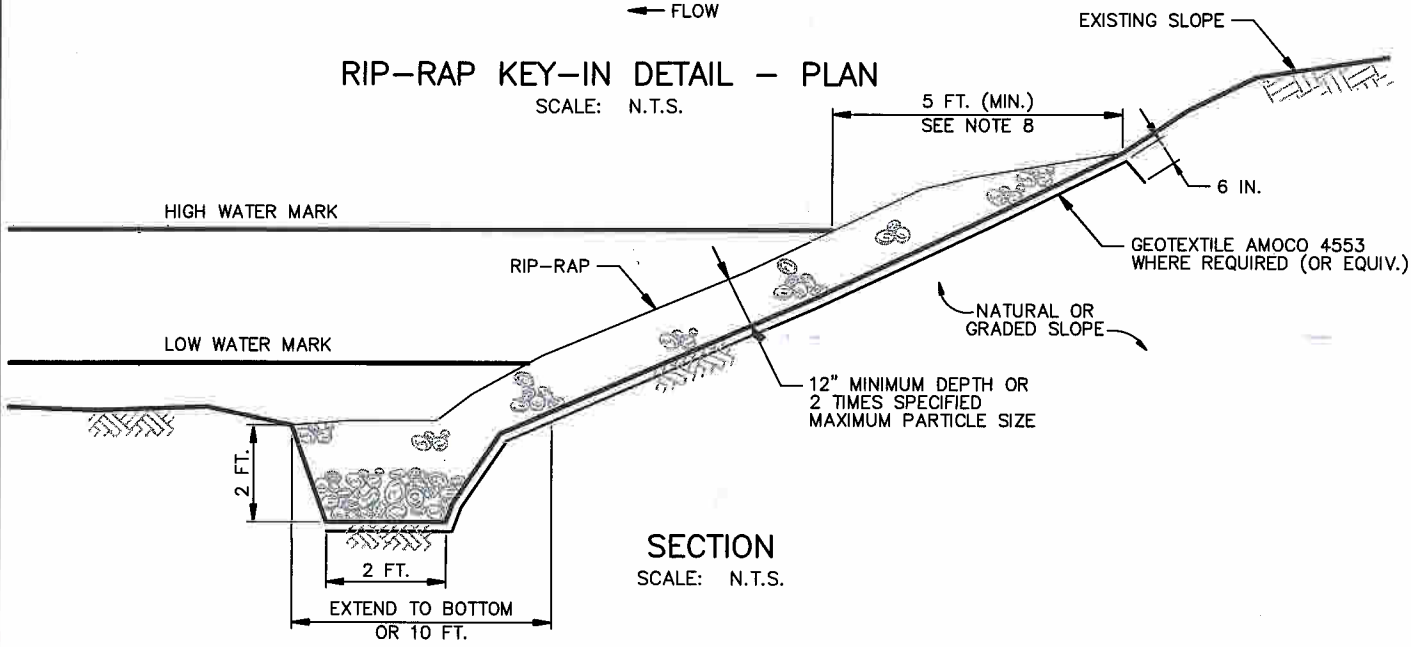


RIP-RAP KEY-IN DETAIL - PLAN

SCALE: N.T.S.



SECTION

SCALE: N.T.S.

NOTES:

1. REMOVE ALL STUMPS, ORGANIC MATERIAL, AND PREPARE BANKS TO A STABLE CONFIGURATION TO A MAXIMUM SLOPE OF 2 HORIZONTAL TO 1 VERTICAL.
2. CONSTRUCT TOE TRENCH TO KEY IN BOTTOM OF RIP-RAP PROTECTION.
3. INSTALL FILTER CLOTH (GEOTEXTILE), SUCH AS AMOCO 4553 OR EQUIVALENT, UNDER ROCK WHERE SPECIFIED OR AS DIRECTED BY THE COMPANY. ADJOINING EDGES OF CLOTH SHALL OVERLAP A MINIMUM OF 12"
4. ROCK UTILIZED FOR RIP-RAP SHALL CONSIST OF SOUND, DURABLE ROCK, AND RESISTANT TO WEATHERING. INDIVIDUAL PIECES SHOULD BE ANGULAR, BLOCK SHAPED, AND HAVE A MINIMUM SPECIFIC GRAVITY OF 2.2.
5. INSTALL RIP-RAP TO A THICKNESS OF APPROXIMATELY 2 TIMES THE MAXIMUM EQUIVALENT DIAMETER OF THE RIP-RAP. EACH LOAD SHOULD BE WELL GRADED. A WELL GRADED MIXTURE IS COMPOSED 60% (MINIMUM) OF LARGER SIZES WITH 40% OF SMALLER SIZES TO FILL THE VOIDS.
6. SIZE OF RIP-RAP IS DEPENDENT UPON THE PREDICTED FLOW CONDITIONS.
7. KEY IN THE EDGES OF THE RIP-RAP AND FILTER CLOTH TO NATURAL GROUND CONTOURS SO THAT UNDERMINING DOES NOT OCCUR.
8. RIP-RAP IS TO BE INSTALLED TO 2 FT. ABOVE THE NORMAL HIGH WATER MARK OR 5 FT. ALONG THE SLOPE, WHICHEVER IS LESS.
9. INSTALLATION SPECIFICATIONS TO BE MODIFIED BY KEYSTONE TO SUIT ACTUAL SITE CONDITIONS.

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TYPICAL ROCK RIP-RAP

PROJECT: 50388E

DETAIL 20

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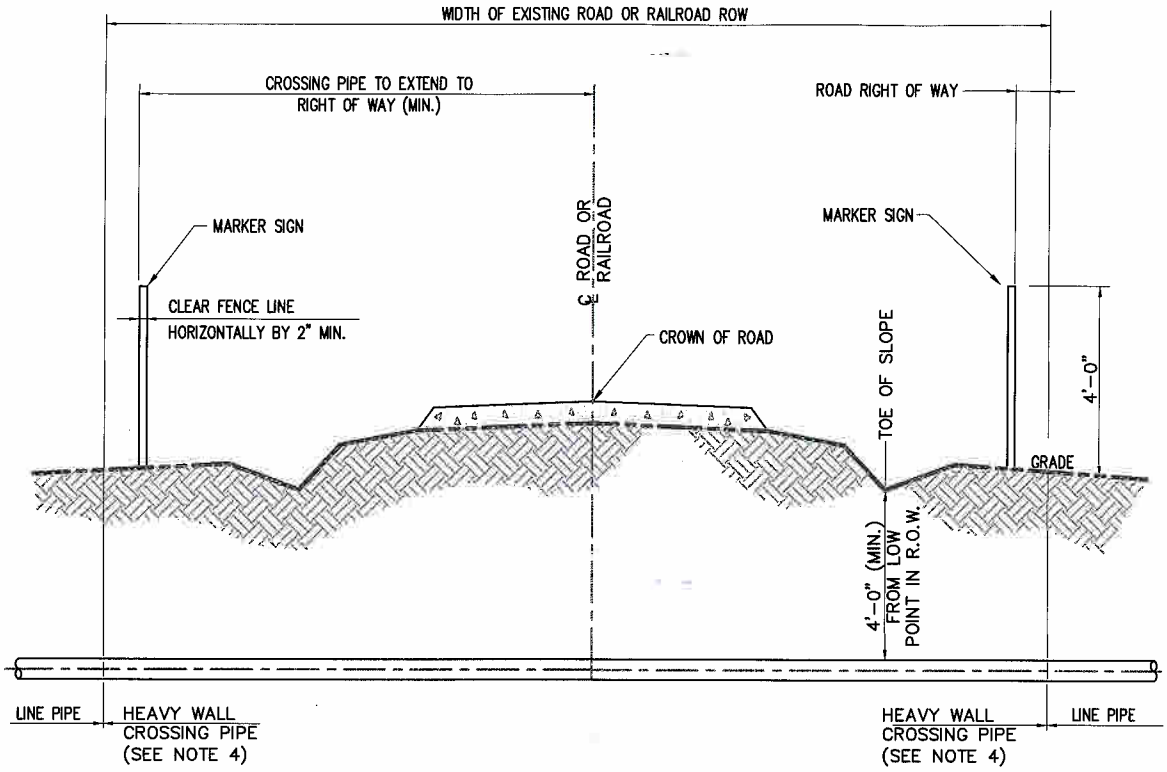
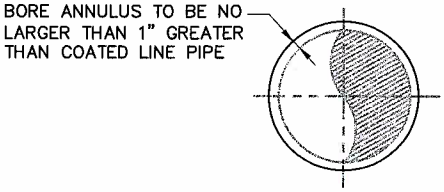


TYPICAL UNCASED ROAD CROSSING BORED



NOTES:

1. CROSSINGS SHALL BE IN ACCORDANCE WITH APPLICABLE PERMIT.
2. ROAD CROSSING PIPE SHALL EXTEND AT MINIMUM TO RIGHT OF WAY LINE UNLESS OTHERWISE SPECIFIED.
3. THE TYPE AND MINIMUM REQUIRED LENGTH OF PIPE FOR CROSSINGS OF ROADS SHALL BE AS SPECIFIED ON ALIGNMENT SHEETS.
4. PIPE FOR BORED CROSSINGS TO INCLUDE ABRASION-RESISTANT (ARB) COATING.
5. PIPELINE MARKER & TEST STATIONS TO BE INSTALLED ON ROW LINE NEXT TO FENCE IF POSSIBLE.
6. THE CROSSING PIPE SHALL BE STRAIGHT WITH NO VERTICAL OR HORIZONTAL BENDS WITHIN ROAD RIGHT OF WAY.

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KEYSTONE PIPELINE PROJECT

NO.	REVISION	DATE
1	GENERAL EDITORIAL REVISION	APR.04.2006
0	ISSUED FOR DEPARTMENT OF STATE FILING	MAR.10.2006

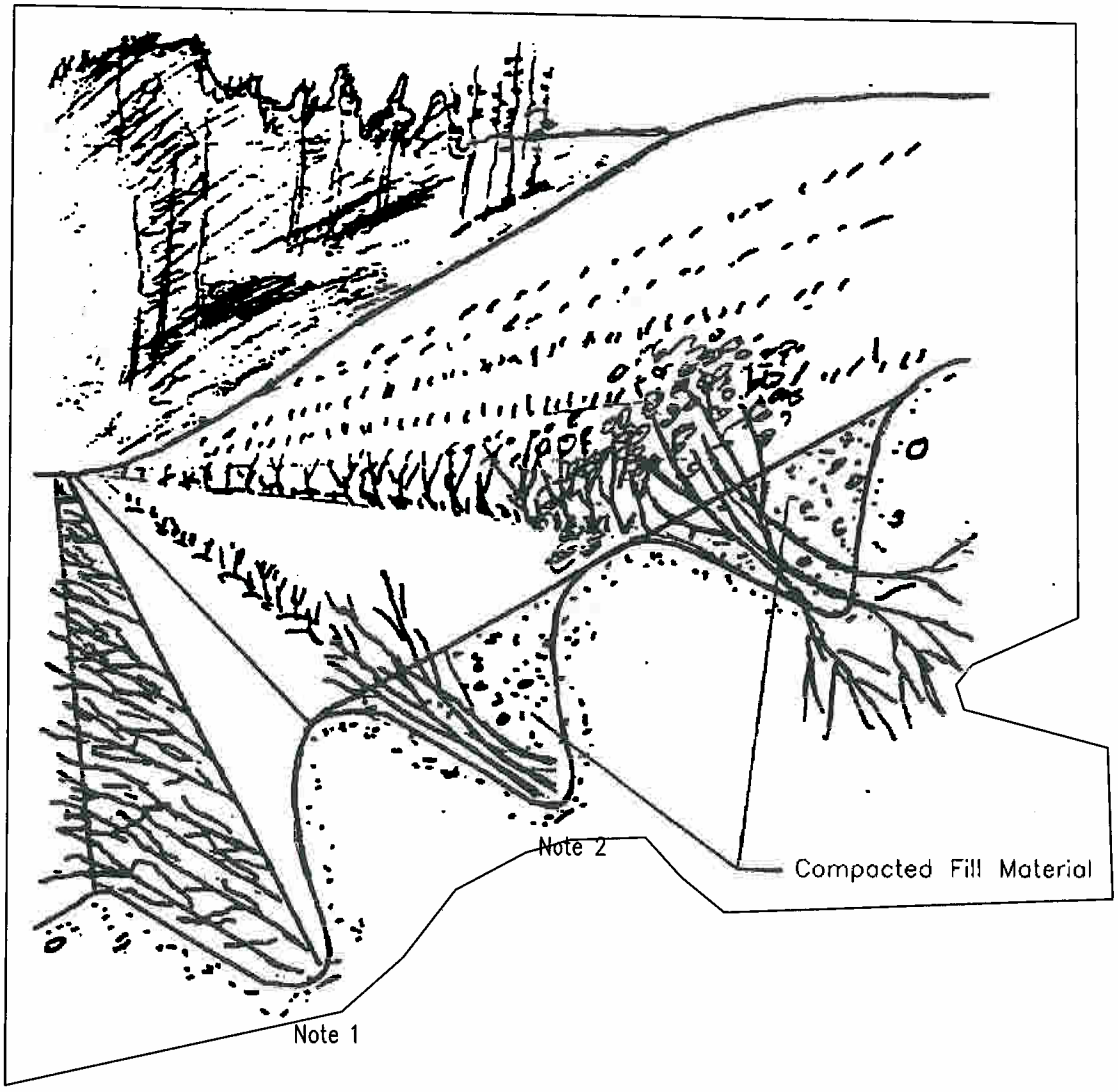
TYPICAL UNCASED ROAD CROSSING BORE DETAIL

PROJECT: 50388E

DETAIL 21

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
K-00-P-7000-301	AH	JTG	RG

LAST PLOT DATE: Tue, 04 Apr 2006 - 5:01pm



NOTES:

1. CUT TRENCH ACROSS SLOPE. FILL WITH DORMANT WOODY PLANT MATERIAL.
2. FILL IS PLACED ON TOP OF BRANCH LAYER AND COMPACTED.
3. INSTALLATION SPECIFICATIONS TO BE MODIFIED BY KEYSTONE AS NECESSARY TO SUIT SITE CONDITIONS.

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NO.	REVISION	DATE
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STREAMBANK RECLAMATION-BRUSH LAYER IN CROSS CUT SLOPE

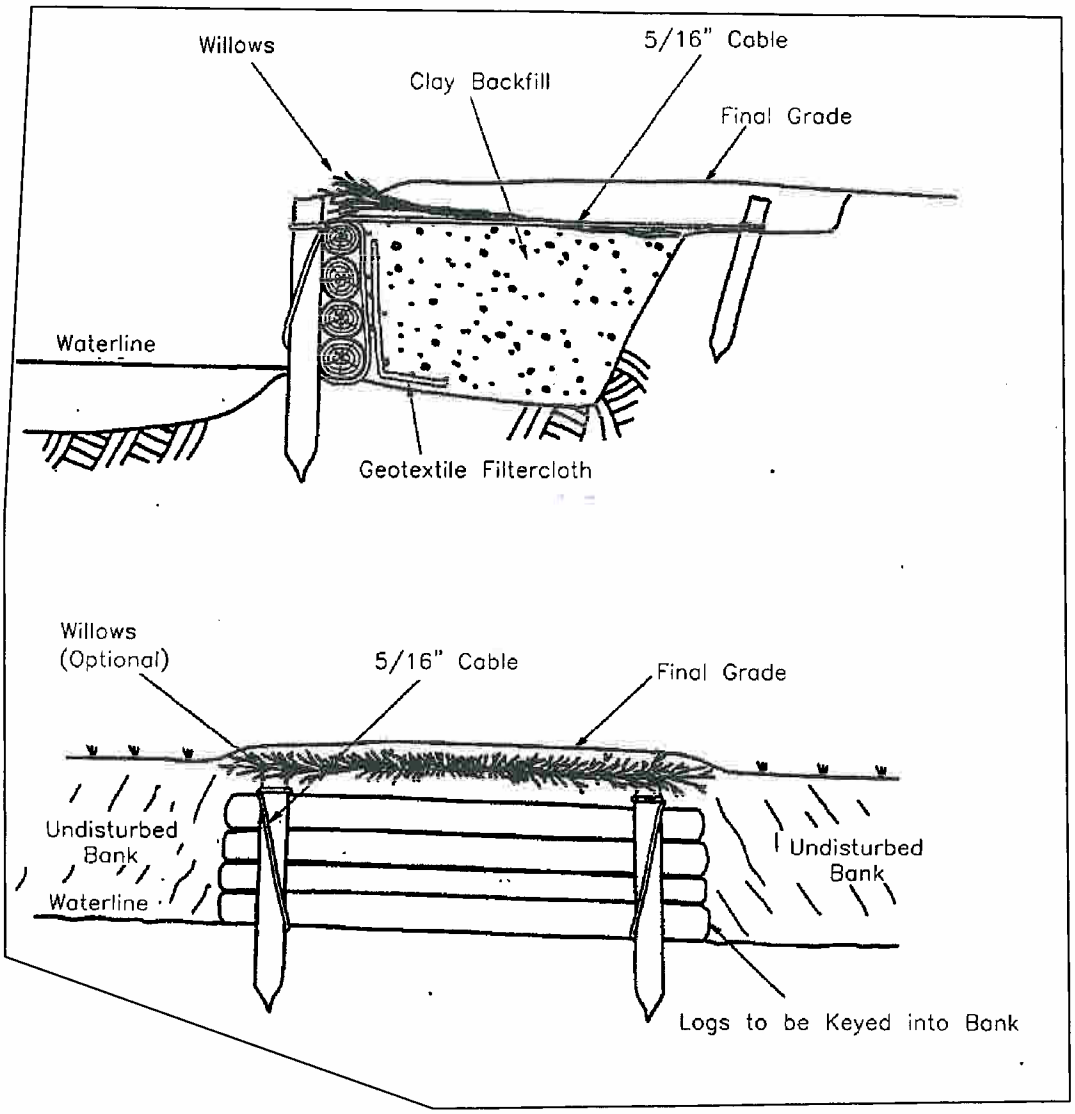
PROJECT: 50388E

DETAIL 22

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
K-00-P-7000-301	NY	GC	LAG

LAST PLOT DATE: Tue, 08 Apr 2008 - 3:31pm

X:\Drawings\50388A KEYSTONE\DRAWING FILES\DRAWINGS\TYPICALS\DETAIL-22.dwg 4/3/2008 4:09:48 PM EST



NOTES:

1. LOG WALLS TO BE CONSTRUCTED USING CONIFEROUS MATERIAL.
2. NATURE BACKFILL OR LOOSE GRADE MATERIAL SHOULD BE USED AS FILL MATERIAL.
3. ANCHOR PILINGS OR DEADMAN ANCHORS TO BE USED TO SECURE CABLE IN BANK.
4. NON-WOVEN FILTER CLOTH (NYLEX C34 OR EQUIVALENT) TO BE USED TO LINE LOG WALL.
5. INSTALLATION SPECIFICATIONS TO BE MODIFIED BY KEYSTONE AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

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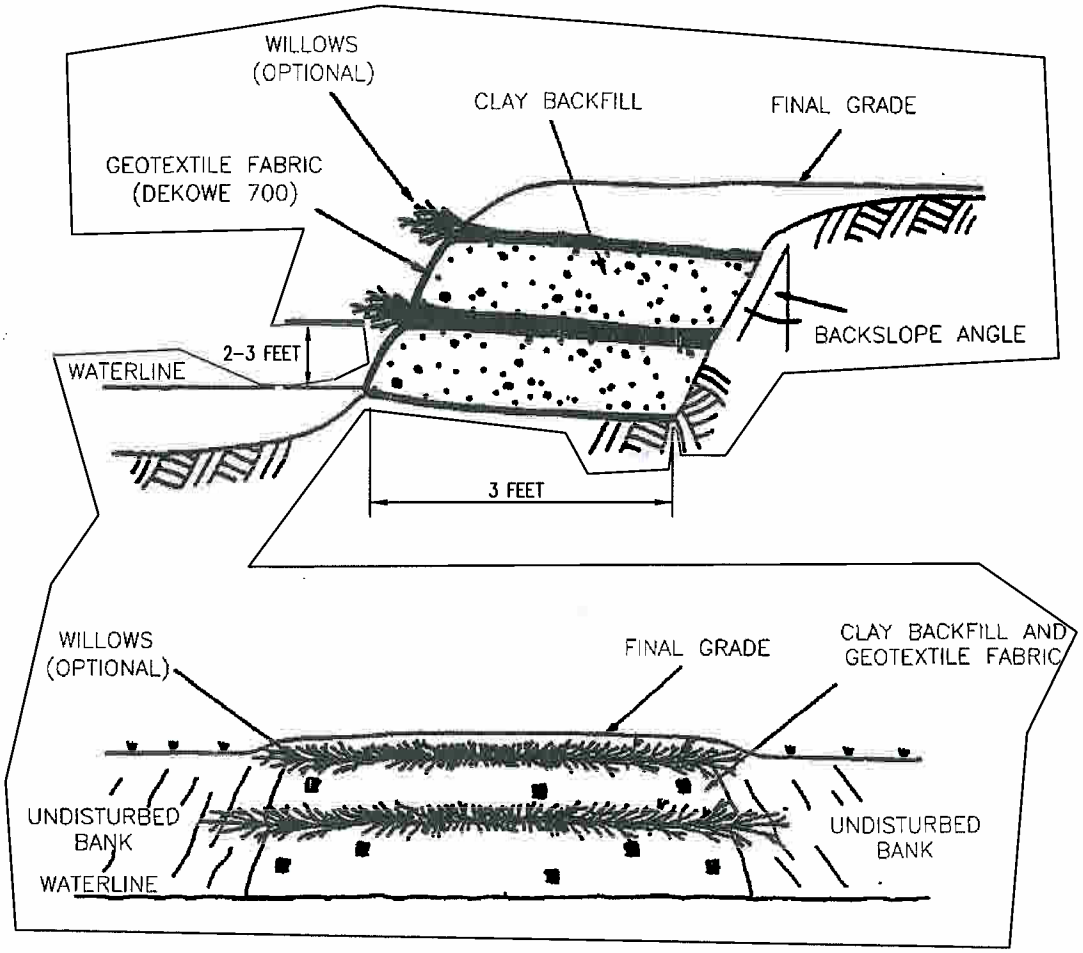
STREAMBANK RECLAMATION-LOGWALL

PROJECT: 50388E

DETAIL 23

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
K-00-P-7000-301	NY	GC	LAG

LAST PLOT DATE: Tue, 04 Apr 2006 - 3:33pm



NOTES:

1. NATURE BACKFILL OR LOOSE GRADE MATERIAL SHOULD BE USED TO MINIMIZE AIR SPACES. THIS ALLOWS PROPER SOIL FABRIC CONTACT, WHICH MINIMIZES STEELING AND SCOURING DURING RUNOFF AND ENSURES SURVIVAL OF THE WILLOW CUTTINGS.
2. PLYWOOD FORMS (8X2 FEET) MAY BE REQUIRED TO HELP RECONSTRUCT STEEP OR VERTICAL BANKS.
3. GRID LAYERS SHOULD NOT EXCEED 3 FEET IN HEIGHT WITH A MINIMUM OF 3 FEET SET IN BANK.
4. WILLOWS SHOULD BE HARVESTED AS CLOSE TO INSTALLATION AS POSSIBLE, PREFERABLY THE PREVIOUS DAY BUT NO MORE THAN 2 DAYS EARLY.
5. WILLOWS SHOULD BE 0.5 TO 1 INCH IN DIAMETER AND 2 TO 3 FEET LONG WITH NO MORE THAN 10 INCHES LEFT EXPOSED.
6. PLANTING RATE SHOULD BE APPROXIMATELY 1 STEM PER 6 INCHES.
7. INSTALLATION TO BE MODIFIED BY KEYSTONE AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

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KEYSTONE PIPELINE PROJECT

STREAMBANK RECLAMATION-VEGETATED GEOTEXTILE INSTALLATION

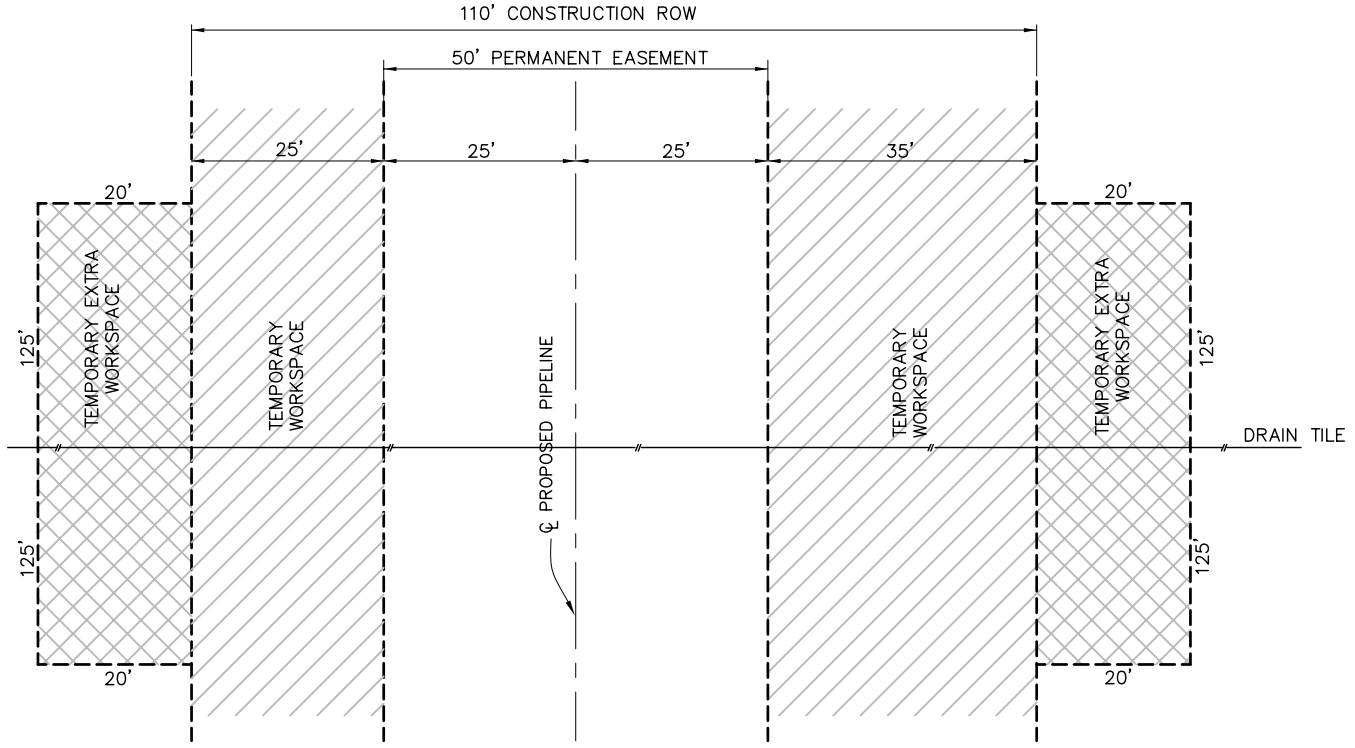
NO.	REVISION	DATE
1	GENERAL EDITORIAL REVISION	APR.04.2006
0	ISSUED FOR DEPARTMENT OF STATE FILING	MAR.10.2006

PROJECT: 50388E

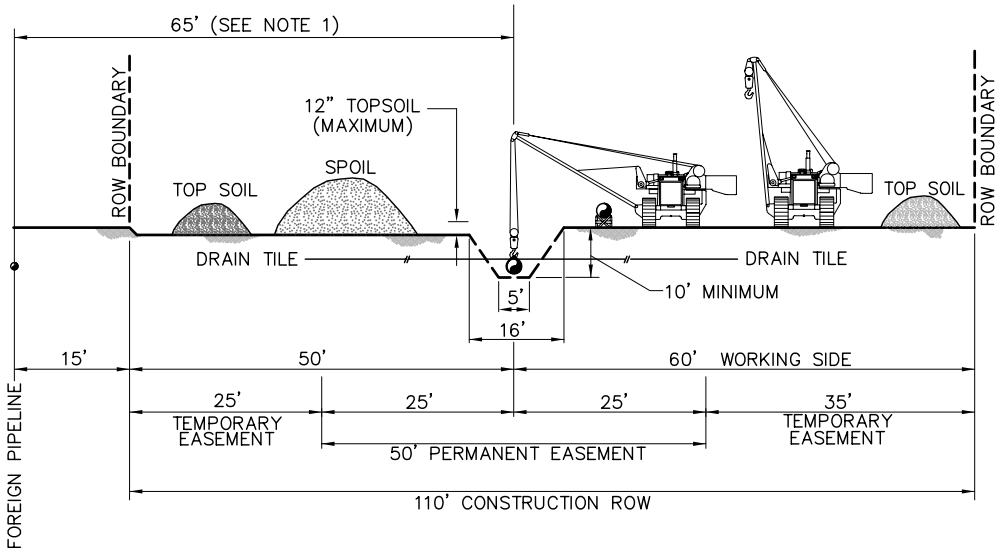
DETAIL 24

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
K-00-P-7000-301	NY	GC	LAG

LAST PLOT DATE: Tue, 04 Apr 2006 - 3:34pm



PLAN



ELEVATION

N.T.S.

NOTES:

1. THE OFFSET FROM A FOREIGN PIPELINE, WHERE APPLICABLE, WILL BE 40' FOR MOST LOCATION. BUT MAY BE INCREASED OR DECREASED DEPENDING ON THE SITE SPECIFIC CONSTRUCTION REQUIREMENTS.
2. THE MINIMUM CLEARANCE BETWEEN THE TOP OF PIPE AND THE BOTTOM OF DRAIN TILE WILL BE 12 INCHES.
3. INSTALLATION SPECIFICATIONS TO BE MODIFIED BY KEYSTONE AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

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KEYSTONE PIPELINE PROJECT

TYPICAL ROW LAYOUT/SOIL HANDLING 110' CONST. R.O.W. 50' ESMT. DRAIN TILE CROSSING

NO.	REVISION	DATE
1	GENERAL EDITORIAL REVISION	APR.04.2006
0	ISSUED FOR DEPARTMENT OF STATE FILING	MAR.10.2006

PROJECT: 50388E

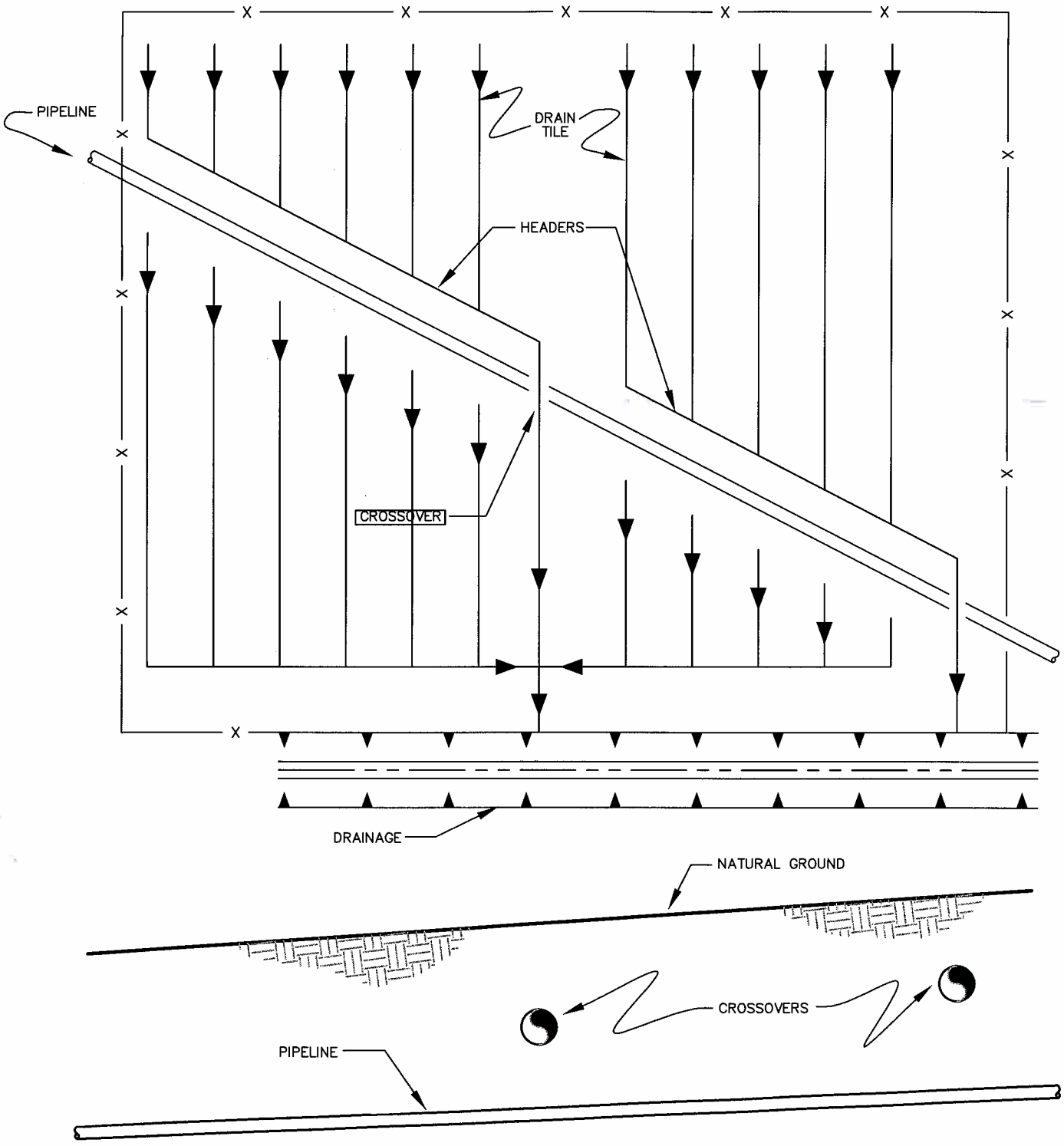
DETAIL 25

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
K-00-P-7000-305	ALS	BLS	RG

LAST PLOT DATE: Wed, 05 Apr 2006 - 3:38pm

X:\Drawings\50388A KEYSTONE\DRAWING FILES\DRAWINGS\TYPICALS\DETAIL-25.dwg 4/5/2006 2:38:31 PM EST

HEADER / MAIN CROSSOVERS OF PIPELINE



PROFILE

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NO.	REVISION	DATE
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HEADER / MAIN CROSSOVERS OF PIPELINE

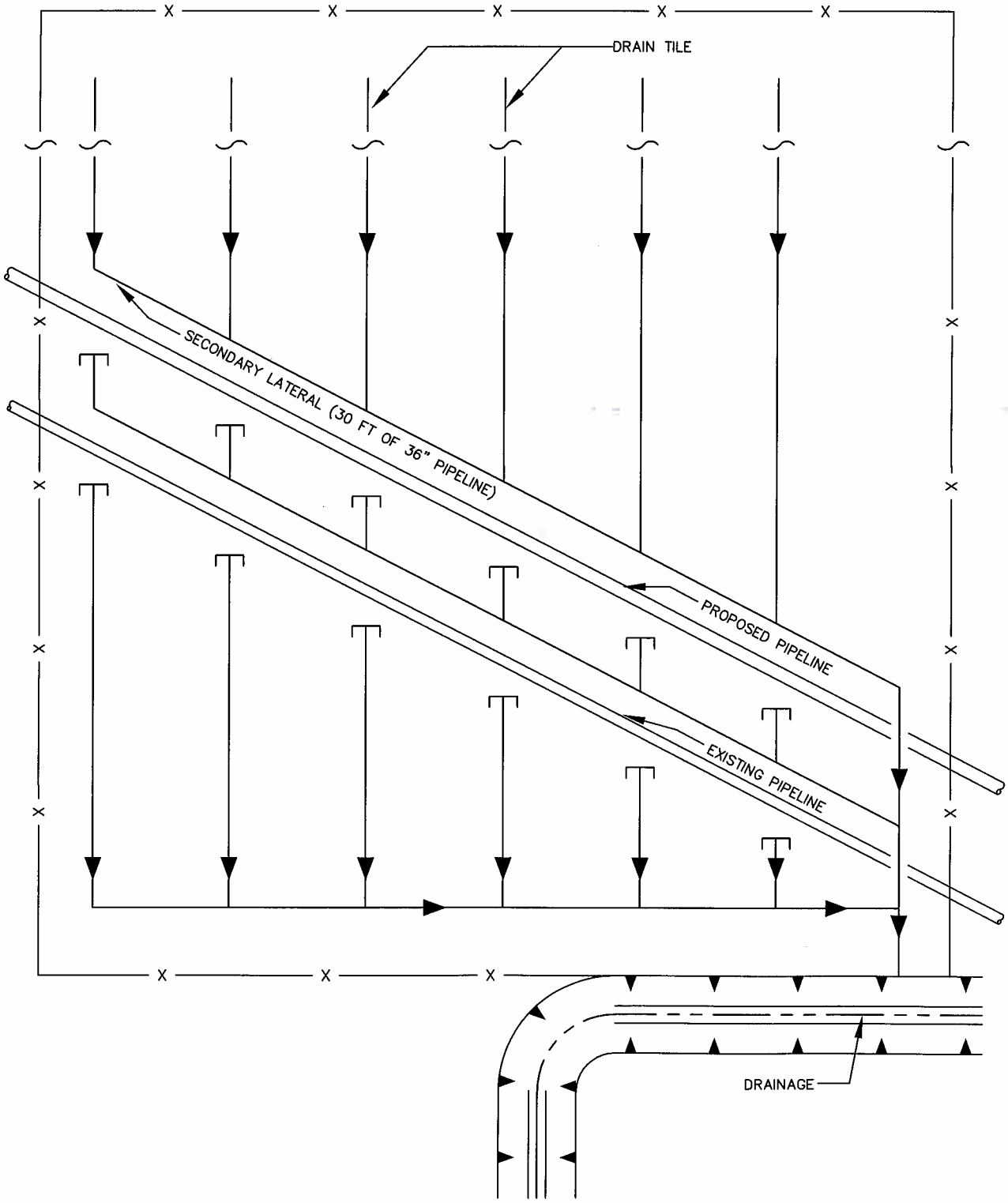
PROJECT: 50388E

DETAIL 26

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
K-00-P-7000-304	ALS	JTG	RG

LAST PLOT DATE: Tue, 04 Apr 2006 - 3:43pm

RELOCATE / REPLACE DRAINAGE HEADER / MAIN



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HEADER / MAIN CROSSOVERS OF PIPELINE

PROJECT: 50388E

DETAIL 27

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
K-00-P-7000-304	ALS	JTG	RG

LAST PLOT DATE: Tue, 04 Apr 2006 - 3:46pm

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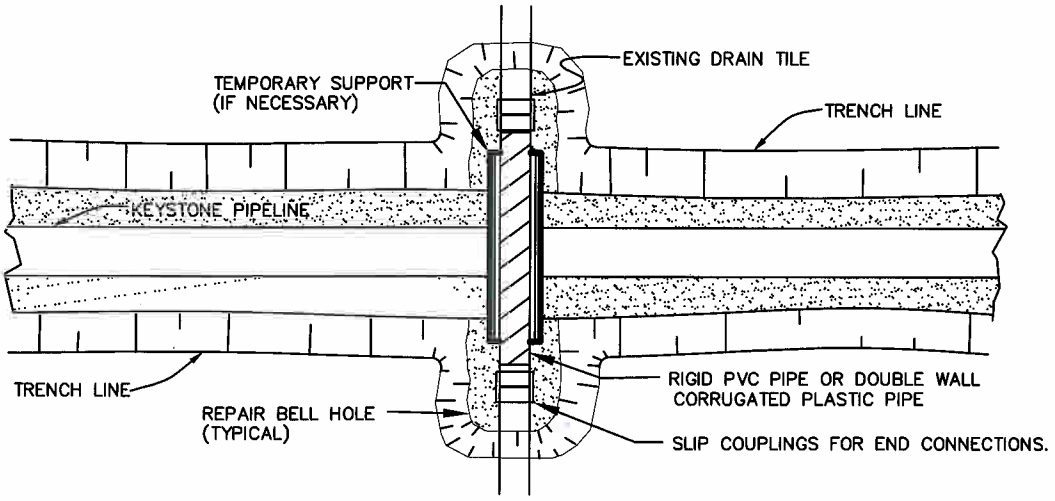
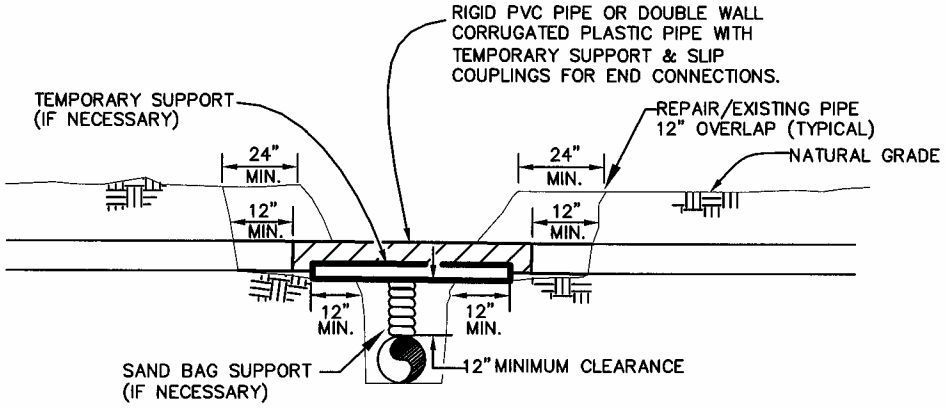


PLAN



CROSS SECTION

NOTES:

1. IMMEDIATELY REPAIR TILE IF WATER IS FLOWING THROUGH TILE AT TIME OF TRENCHING.
2. SCREEN ALL EXPOSED ENDS OF TILE LINES.

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KEYSTONE PIPELINE PROJECT

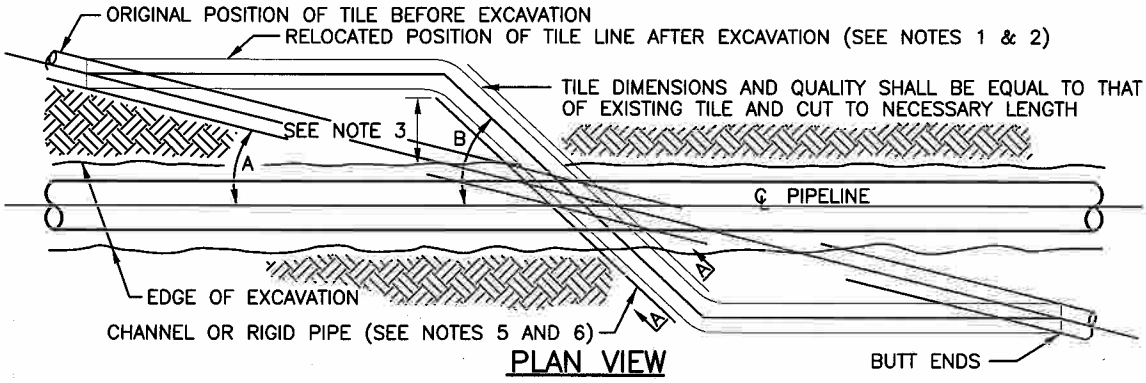
DRAINAGE AND IRRIGATION
TEMPORARY DRAIN TILE
REPAIR

NO.	REVISION	DATE
0	ISSUED FOR DEPARTMENT OF STATE FILING	MAR.10.2006

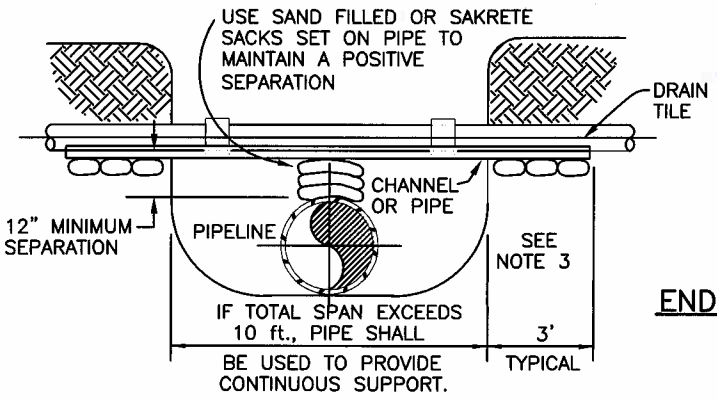
PROJECT: 50388E

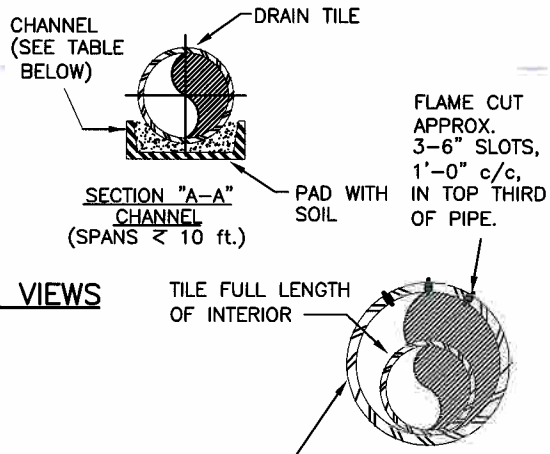
DETAIL 28

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY	LAST PLOT DATE
K-00-P-7000-301	NY	GC	LAG	Tue, 04 Apr 2006 - 3:48pm



PLAN VIEW





END VIEWS

NOTES

1. TILE REPAIR SHALL MAINTAIN ORIGINAL ALIGNMENT AND GRADIENT WHEN ANGLE "A", BETWEEN PIPELINE AND ORIGINAL TILE, IS MORE THAN 20° UNLESS OTHERWISE DIRECTED BY KEYSTONE REPRESENTATIVE.
2. WHEN ANGLE A IS LESS THAN 20°, UNLESS OTHERWISE DIRECTED BY COMPANY, ANGLE "B" SHALL BE 45° FOR USUAL WIDTHS OF TRENCH. FOR EXTRA WIDTHS IT MAY BE GREATER AS DIRECTED BY KEYSTONE REPRESENTATIVE.
3. 3'–0" MINIMUM LENGTH OF CHANNEL OR RIGID PIPE SHALL BE SUPPORTED BY UNDISTURBED SOIL, OR IF CROSSING IS NOT AT RIGHT ANGLES TO GAS PIPELINE, EQUIVALENT LENGTH PERPENDICULAR TO TRENCH. SHIM WITH SAKRETE, SAND BAGS OR CONCRETE BLOCKS TO UNDISTURBED SOIL FOR SUPPORT AND DRAINAGE GRADIENT MAINTENANCE (TYPICAL BOTH SIDES).
4. DRAINAGE TILE SHALL BE REPLACED SO THAT ITS FORMER GRADIENT AND ALIGNMENT ARE RESTORED.
5. DIAMETER OF RIGID PIPE SHALL BE OF ADEQUATE SIZE TO ALLOW FOR THE INSTALLATION OF THE TILE FOR THE FULL LENGTH OF THE RIGID PIPE.
6. OTHER METHODS OF SUPPORTING DRAIN TILE MAY BE USED IF THE ALTERNATE PROPOSED IS EQUIVALENT IN STRENGTH TO THE CHANNEL/PIPE SECTIONS SHOWN AND IF APPROVED BY THE KEYSTONE REPRESENTATIVE IN ADVANCE. SITE SPECIFIC ALTERNATE SUPPORT SYSTEM TO BE DEVELOPED BY KEYSTONE REPRESENTATIVE AND FURNISHED TO CONTRACTOR FOR SPANS IN EXCESS OF 20 FEET, TILE GREATER THAN 10" DIAMETER, AND FOR "HEADER" SYSTEMS.
7. ALL MATERIAL TO BE FURNISHED BY CONTRACTOR.
8. PRIOR TO REPAIRING TILE, CONTRACTOR SHALL PROBE INTO THE EXISTING TILE TO THE FULL WIDTH OF THE RIGHT OF WAY TO DETERMINE IF ADDITIONAL DAMAGE HAS OCCURRED. ALL DAMAGED/DISTURBED TILE SHALL BE REPAIRED AS NEAR AS PRACTICABLE TO ITS ORIGINAL OR BETTER CONDITION.
9. "NIGHT CAP" OPEN ENDS OF PIPE AND/OR DRAIN TILES IF REPAIRS ARE NOT COMPLETED BY END OF WORK DAY.

MINIMUM SUPPORT TABLE			
TILE SIZE	CHANNEL SIZE	PIPE SIZE	
3"	4" ● 5.4 #/ft.	4"	STD. WT
4"–5"	5" ● 6.7 #/ft.	6"	STD. WT
6"–9"	7" ● 9.8 #/ft.	8"–10"	STD. WT
10"	10" ● 15.3 #/ft.	12"	STD. WT

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NO.	REVISION	DATE
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DRAINAGE AND IRRIGATION PERMANENT DRAIN TILE REPAIR

PROJECT: 50388E

DETAIL 29

DRAWING NUMBER	DRAWN BY	CHECKED BY	APPROVED BY
K-00-P-7000-301	NY	GC	LAG

LAST PLOT DATE: Tue, 04 Apr 2006 – 3:50pm

K:\Drawings\50388A KEYSTONE\DRAWING FILES\DRAWINGS\TYPICALS\DETAIL-29.dwg 4/4/2006 3:49:30 PM EST

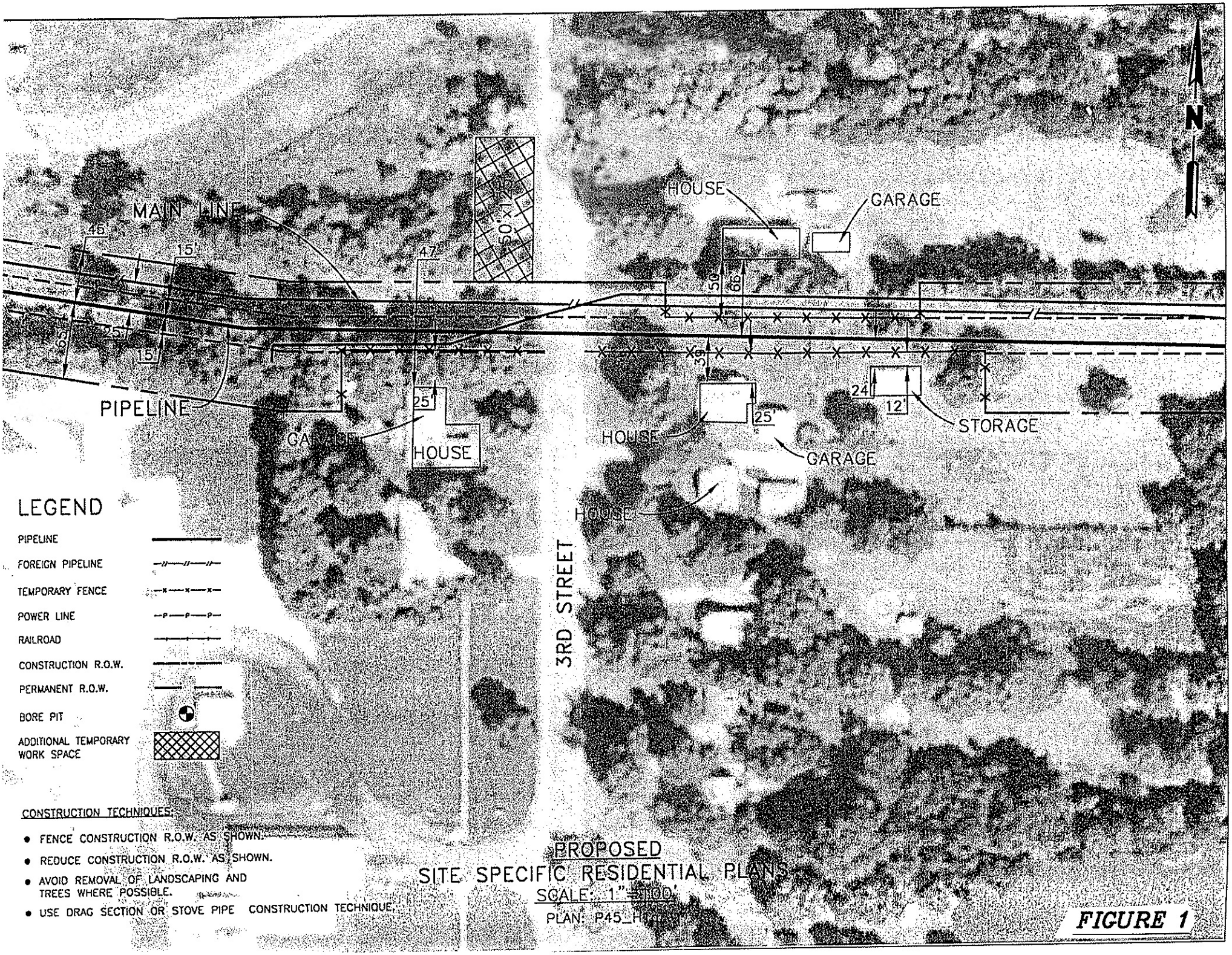
MAIN LINE
45'
15'
47'
50' x 50'
HOUSE
GARAGE
50'
66'
65'
25'
15'
39'
24'
12'
PIPELINE
25'
GARAGE
HOUSE
HOUSE
25'
GARAGE
STORAGE
HOUSE
3RD STREET
N
LEGEND
PIPELINE
FOREIGN PIPELINE
TEMPORARY FENCE
POWER LINE
RAILROAD
CONSTRUCTION R.O.W.
PERMANENT R.O.W.
BORE PIT
ADDITIONAL TEMPORARY WORK SPACE
CONSTRUCTION TECHNIQUES:
• FENCE CONSTRUCTION R.O.W. AS SHOWN.
• REDUCE CONSTRUCTION R.O.W. AS SHOWN.
• AVOID REMOVAL OF LANDSCAPING AND TREES WHERE POSSIBLE.
• USE DRAG SECTION OR STOVE PIPE CONSTRUCTION TECHNIQUE.
PROPOSED
SITE SPECIFIC RESIDENTIAL PLANS
SCALE: 1" = 100'
PLAN: P45_H

FIGURE 1

Appendix F
Waterbody Crossing Table

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
KEYSTONE MAINLINE					
NORTH DAKOTA					
Cavalier	0.6	Unnamed	Intermittent Stream/River		
Cavalier	1.7	Unnamed	Intermittent Stream/River		
Cavalier	2.6	Unnamed	Intermittent Stream/River		
Cavalier	3.6	Unnamed	Intermittent Stream/River		
Cavalier	5.1	Unnamed	Intermittent Stream/River		
Pembina	7.1	Pembina River	Perennial Stream/River	Fish and Other Aquatic Biota; Recreation, Class 1A	Fully Supporting but Threatened
Pembina	10.5	Unnamed	Intermittent Stream/River		
Pembina	10.8	Unnamed	Intermittent Stream/River		
Pembina	13.1	Unnamed	Intermittent Stream/River		
Pembina	16.1	Unnamed	Intermittent Stream/River		
Pembina	16.6	Unnamed	Intermittent Stream/River		
Pembina	16.7	Unnamed	Intermittent Stream/River		
Pembina	17.0	Unnamed	Intermittent Stream/River		
Pembina	17.4	Unnamed	Intermittent Stream/River		
Pembina	17.8	Unnamed	Intermittent Stream/River		
Pembina	18.4	Tongue R.	Perennial Stream/River	Fish and Other Aquatic Biota, Class II	Fully Supporting but Threatened
Pembina	20.4	Unnamed	Intermittent Stream/River		
Pembina	20.6	Unnamed	Intermittent Stream/River		
Pembina	21.5	Unnamed	Intermittent Stream/River		
Pembina	22.8	Unnamed	Intermittent Stream/River		
Pembina	23.7	Unnamed	Intermittent Stream/River		
Pembina	24.7	Unnamed	Intermittent Stream/River		
Pembina	26.1	Unnamed	Intermittent Stream/River		
Pembina	26.7	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Pembina	27.9	Unnamed	Intermittent Stream/River		
Pembina	29.4	North Branch Parker River	Intermittent Stream/River	Fish and Other Aquatic Biota, Class III	Fully Supporting but Threatened
Pembina	31.0	Unnamed	Intermittent Stream/River		
Pembina	31.8	Unnamed	Intermittent Stream/River		
Walsh	33.2	Unnamed	Intermittent Stream/River		
Walsh	33.3	Unnamed	Intermittent Stream/River		
Walsh	34.2	Unnamed	Intermittent Stream/River		
Walsh	35.3	Unnamed	Intermittent Stream/River		
Walsh	36.3	Unnamed	Intermittent Stream/River		
Walsh	37.1	Unnamed	Intermittent Stream/River		
Walsh	37.4	Unnamed	Intermittent Stream/River		
Walsh	38.1	Unnamed	Intermittent Stream/River		
Walsh	38.6	Unnamed	Intermittent Stream/River		
Walsh	39.1	Unnamed	Intermittent Stream/River		
Walsh	41.5	Unnamed	Intermittent Stream/River		
Walsh	42.2	Unnamed	Intermittent Stream/River		
Walsh	42.2	Unnamed	Intermittent Stream/River		
Walsh	42.3	Unnamed	Intermittent Stream/River		
Walsh	42.4	Unnamed	Intermittent Stream/River		
Walsh	42.9	Unnamed	Intermittent Stream/River		
Walsh	43.1	Unnamed	Intermittent Stream/River		
Walsh	43.6	Unnamed	Intermittent Stream/River		
Walsh	43.7	Unnamed	Intermittent Stream/River		
Walsh	43.9	Unnamed	Intermittent Stream/River		
Walsh	44.3	Unnamed	Intermittent Stream/River		
Walsh	44.7	Unnamed	Intermittent Stream/River		
Walsh	45.0	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Walsh	45.2	Unnamed	Intermittent Stream/River		
Walsh	46.0	Unnamed	Intermittent Stream/River		
Walsh	46.3	Unnamed	Intermittent Stream/River		
Walsh	46.8	Unnamed	Intermittent Stream/River		
Walsh	46.9	Unnamed	Intermittent Stream/River		
Walsh	47.2	Unnamed	Intermittent Stream/River		
Walsh	47.7	Unnamed	Intermittent Stream/River		
Walsh	47.8	Unnamed	Intermittent Stream/River		
Walsh	47.8	Unnamed	Intermittent Stream/River		
Walsh	48.3	Unnamed	Intermittent Stream/River		
Walsh	48.5	Unnamed	Intermittent Stream/River		
Walsh	48.5	Unnamed	Intermittent Stream/River		
Walsh	48.9	Unnamed	Intermittent Stream/River		
Walsh	49.3	Unnamed	Intermittent Stream/River		
Walsh	49.8	Unnamed	Intermittent Stream/River		
Walsh	50.0	Unnamed	Intermittent Stream/River		
Walsh	50.3	Unnamed	Intermittent Stream/River		
Walsh	50.6	Unnamed	Intermittent Stream/River		
Walsh	50.7	Unnamed	Intermittent Stream/River		
Walsh	50.7	Unnamed	Intermittent Stream/River		
Walsh	51.0	Unnamed	Intermittent Stream/River		
Walsh	51.1	Unnamed	Intermittent Stream/River		
Walsh	51.5	Unnamed	Intermittent Stream/River		
Walsh	51.8	Unnamed	Intermittent Stream/River		
Walsh	52.0	Unnamed	Intermittent Stream/River		
Walsh	52.6	Unnamed	Intermittent Stream/River		
Walsh	53.1	Unnamed	Intermittent Stream/River		
Walsh	54.0	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Walsh	54.2	Unnamed	Intermittent Stream/River		
Walsh	54.5	Middle Branch Forest River	Perennial Stream/River	Fish and Other Aquatic Biota	Not Supporting
Walsh	55.3	Unnamed	Intermittent Stream/River		
Walsh	55.6	Unnamed	Intermittent Stream/River		
Walsh	56.2	Unnamed	Intermittent Stream/River		
Nelson	57.4	Unnamed	Intermittent Stream/River		
Nelson	58.1	Unnamed	Intermittent Stream/River		
Nelson	58.8	Unnamed	Intermittent Stream/River		
Nelson	59.1	Unnamed	Intermittent Stream/River		
Nelson	59.4	Unnamed	Intermittent Stream/River		
Nelson	60.2	Unnamed	Intermittent Stream/River		
Nelson	60.3	Unnamed	Intermittent Stream/River		
Nelson	60.4	Unnamed	Intermittent Stream/River		
Nelson	61.1	Unnamed	Intermittent Stream/River		
Nelson	61.7	Unnamed	Intermittent Stream/River		
Nelson	61.8	Unnamed	Intermittent Stream/River		
Nelson	62.1	Unnamed	Intermittent Stream/River		
Nelson	62.4	Unnamed	Intermittent Stream/River		
Nelson	62.5	Unnamed	Intermittent Stream/River		
Nelson	62.9	Unnamed	Intermittent Stream/River		
Nelson	63.7	Unnamed	Intermittent Lake/Pond		
Nelson	64.0	Unnamed	Intermittent Stream/River		
Nelson	64.6	Unnamed	Intermittent Stream/River		
Nelson	65.0	Unnamed	Intermittent Lake/Pond		
Nelson	66.0	Unnamed	Intermittent Lake/Pond		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Nelson	66.9	N. Branch Turtle River	Intermittent Stream/River	Class II (Turtle River)	Not Supporting
Nelson	67.8	Unnamed	Intermittent Stream/River		
Nelson	69.0	Unnamed	Intermittent Stream/River		
Nelson	69.4	Unnamed	Intermittent Stream/River		
Nelson	69.5	Unnamed	Intermittent Stream/River		
Nelson	69.7	Unnamed	Intermittent Lake/Pond		
Nelson	75.8	Unnamed	Intermittent Stream/River		
Nelson	76.6	Goose River	Intermittent Stream/River	Fish and Other Aquatic Biota; Recreation, Class IA	Not Supporting; Fully Supporting but Threatenend
Nelson	77.7	Unnamed	Intermittent Stream/River		
Nelson	79.0	Unnamed	Intermittent Stream/River		
Nelson	79.9	Unnamed	Intermittent Stream/River		
Nelson	84.6	Unnamed	Intermittent Stream/River		
Nelson	84.7	Goose Creek	Intermittent Stream/River		
Nelson	84.9	Unnamed	Intermittent Stream/River		
Nelson	87.4	Unnamed	Intermittent Stream/River		
Nelson	91.3	Unnamed	Intermittent Stream/River		
Nelson	91.6	Unnamed	Intermittent Stream/River		
Nelson	93.0	Unnamed	Intermittent Stream/River		
Steele	96.1	Unnamed	Intermittent Stream/River		
Steele	96.2	Unnamed	Intermittent Stream/River		
Steele	101.3	Unnamed	Intermittent Stream/River		
Steele	105.8	Unnamed	Intermittent Stream/River		
Steele	106.9	Unnamed	Intermittent Stream/River		
Steele	107.3	Unnamed	Intermittent Stream/River		
Steele	109.1	Unnamed	Intermittent Stream/River		
Steele	109.5	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Steele	112.6	Unnamed	Intermittent Stream/River		
Steele	113.1	Unnamed	Intermittent Stream/River		
Steele	116.5	Unnamed	Intermittent Stream/River		
Steele	117.9	Unnamed	Intermittent Stream/River		
Steele	119.8	Unnamed	Intermittent Stream/River		
Steele	120.0	Unnamed	Intermittent Stream/River		
Barnes	127.1	Unnamed	Intermittent Stream/River		
Barnes	127.7	Unnamed	Intermittent Stream/River		
Barnes	132.0	Unnamed	Intermittent Stream/River		
Barnes	134.1	Unnamed	Intermittent Stream/River		
Barnes	143.6	Unnamed	Intermittent Stream/River		
Barnes	144.4	Unnamed	Intermittent Stream/River		
Barnes	145.5	Unnamed	Intermittent Stream/River		
Barnes	147.5	Unnamed	Intermittent Stream/River		
Barnes	150.4	Unnamed	Intermittent Stream/River		
Barnes	151.0	Unnamed	Intermittent Stream/River		
Barnes	151.3	Unnamed	Intermittent Stream/River		
Barnes	151.5	Unnamed	Intermittent Stream/River		
Barnes	153.8	Unnamed	Intermittent Stream/River		
Barnes	154.0	Unnamed	Intermittent Stream/River		
Barnes	158.6	Unnamed	Intermittent Stream/River		
Barnes	162.2	Unnamed	Intermittent Stream/River		
Barnes	162.4	Unnamed	Intermittent Stream/River		
Ransom	168.5	Sheyenne River	Perennial Stream/River	Fish and Other Aquatic Biota; Recreation, Class IA	Fully Supporting but Threatened; Fully Supporting but Threatened/Not Supporting
Ransom	168.7	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Ransom	169.6	Unnamed	Intermittent Stream/River		
Ransom	169.7	Unnamed	Intermittent Stream/River		
Ransom	171.6	Unnamed	Intermittent Stream/River		
Ransom	172.5	Unnamed	Intermittent Stream/River		
Ransom	173.1	Unnamed	Intermittent Stream/River		
Ransom	173.2	Unnamed	Intermittent Stream/River		
Ransom	175.7	Unnamed	Intermittent Stream/River		
Ransom	176.8	Unnamed	Intermittent Stream/River		
Ransom	179.9	Unnamed	Intermittent Stream/River		
Ransom	180.2	Unnamed	Intermittent Stream/River		
Ransom	183.3	Unnamed	Intermittent Stream/River		
Sargent	197.2	Pond	Intermittent Lake/Pond		
Sargent	203.5	Unnamed	Intermittent Stream/River		
Sargent	206.6	Unnamed	Intermittent Stream/River		
Dickey	214.1	Unnamed	Intermittent Stream/River		
Dickey	215.4	Unnamed	Intermittent Stream/River		
SOUTH DAKOTA					
Marshall	228.5	Crow Creek	Intermittent Stream/River		
Marshall	228.6	Unnamed Ditch	Canal		
Day	244.3	Antelope Creek	Intermittent Stream/River		
Day	244.8	Unnamed	Intermittent Stream/River		
Day	244.8	Unnamed	Intermittent Stream/River		
Day	244.9	Unnamed	Intermittent Stream/River		
Day	244.9	Unnamed	Intermittent Stream/River		
Day	245.1	Unnamed	Intermittent Stream/River		
Day	248.3	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Day	249.6	Unnamed	Intermittent Stream/River		
Day	251.1	Unnamed	Intermittent Stream/River		
Day	251.8	Unnamed	Intermittent Stream/River		
Day	252.8	Unnamed	Intermittent Stream/River		
Day	253.8	Unnamed	Intermittent Stream/River		
Day	253.9	Pond	Intermittent Lake/Pond		
Day	253.9	Pond	Intermittent Lake/Pond		
Day	255.5	Unnamed	Intermittent Stream/River		
Day	256.2	Unnamed	Intermittent Stream/River		
Day	257.5	Unnamed	Intermittent Stream/River		
Day	258.7	Mud Creek	Perennial Stream/River		
Day	260.1	Unnamed	Intermittent Stream/River		
Day	260.4	Unnamed	Intermittent Stream/River		
Day	261.3	Unnamed	Intermittent Stream/River		
Day	264.5	Unnamed	Intermittent Stream/River		
Day	264.7	Unnamed	Intermittent Stream/River		
Day	265.7	Unnamed	Intermittent Stream/River		
Day	265.9	Unnamed	Intermittent Stream/River		
Day	266.2	Unnamed	Intermittent Stream/River		
Day	267.6	Unnamed	Intermittent Stream/River		
Day	268.1	Unnamed	Intermittent Stream/River		
Day	269.1	Unnamed	Intermittent Stream/River		
Day	269.8	Unnamed	Intermittent Stream/River		
Day	270.7	Unnamed	Intermittent Stream/River		
Day	271.3	Unnamed	Intermittent Stream/River		
Day	271.4	Unnamed	Intermittent Stream/River		
Day	272.1	Unnamed	Intermittent Stream/River		
Day	272.2	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Clark	273.9	Unnamed	Intermittent Stream/River		
Clark	276.4	Unnamed	Intermittent Stream/River		
Clark	276.8	Unnamed	Intermittent Stream/River		
Clark	277.3	Unnamed	Intermittent Stream/River		
Clark	277.7	Unnamed	Intermittent Stream/River		
Clark	279.0	Unnamed	Intermittent Stream/River		
Clark	279.1	Unnamed	Intermittent Stream/River		
Clark	279.7	Unnamed	Intermittent Stream/River		
Clark	280.3	Unnamed	Intermittent Stream/River		
Clark	280.5	Unnamed	Intermittent Stream/River		
Clark	281.5	Unnamed	Intermittent Stream/River		
Clark	282.2	Unnamed	Intermittent Stream/River		
Clark	283.7	Unnamed	Intermittent Stream/River		
Clark	284.8	Unnamed	Intermittent Stream/River		
Clark	285.6	Unnamed	Intermittent Stream/River		
Clark	287.5	Unnamed	Intermittent Stream/River		
Clark	288.2	Unnamed	Intermittent Stream/River		
Clark	288.9	Unnamed	Intermittent Stream/River		
Clark	290.2	Unnamed	Intermittent Stream/River		
Clark	290.7	Unnamed	Intermittent Stream/River		
Clark	292.5	Unnamed	Intermittent Stream/River		
Clark	298.1	Foster Creek	Intermittent Stream/River		
Clark	299.1	Unnamed	Intermittent Stream/River		
Clark	304.1	Unnamed	Intermittent Stream/River		
Clark	304.3	Unnamed	Intermittent Stream/River		
Clark	306.2	Unnamed	Intermittent Stream/River		
Beadle	309.5	Unnamed	Intermittent Stream/River		
Beadle	311.2	Unnamed	Intermittent Lake/Pond		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Beadle	311.2	Unnamed	Intermittent Lake/Pond		
Beadle	311.2	Unnamed	Intermittent Lake/Pond		
Beadle	313.2	Unnamed	Intermittent Lake/Pond		
Beadle	313.8	Unnamed	Intermittent Stream/River		
Beadle	315.0	Unnamed	Intermittent Stream/River		
Beadle	315.1	Pond	Intermittent Lake/Pond		
Beadle	315.6	Pearl Creek	Intermittent Stream/River	Warm water (WW) marginal fish life propagation waters; limited-contact recreation waters	
Beadle	316.7	Unnamed	Intermittent Stream/River		
Beadle	317.1	Unnamed	Intermittent Stream/River		
Beadle	317.8	Middle Pearl Creek	Intermittent Stream/River		
Kingsbury	326.1	South Fork Pearl Creek	Intermittent Stream/River		
Kingsbury	335.0	Unnamed	Intermittent Stream/River		
Kingsbury	337.4	West Redstone Creek	Intermittent Stream/River		
Miner	340.0	Unnamed	Intermittent Stream/River		
Miner	343.1	Redstone Creek	Intermittent Stream/River	WW marginal fish life propagation waters; limited-contact recreation waters (classification for segment in Sanborn county)	
Miner	345.0	Unnamed	Intermittent Lake/Pond		
Miner	346.0	Unnamed	Intermittent Stream/River		
Miner	347.4	Unnamed	Intermittent Stream/River		
Miner	361.4	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Miner	362.1	Rock Creek	Intermittent Stream/River	WW marginal fish life propagation waters; limited-contact recreation waters (classification for segment in Hanson county)	
Miner	362.3	Rock Creek	Intermittent Stream/River	WW marginal fish life propagation waters; limited-contact recreation waters (classification for segment in Hanson county)	
Miner	362.3	Rock Creek	Intermittent Stream/River	WW marginal fish life propagation waters; limited-contact recreation waters (classification for segment in Hanson county)	
Hanson	367.9	Unnamed Pond	Intermittent Lake/Pond		
Hanson	367.9	Unnamed Pond	Intermittent Lake/Pond		
Hanson	372.6	Unnamed	Intermittent Stream/River		
Hanson	375.7	Wolf Creek	Intermittent Stream/River	WW marginal fish life propagation waters; limited-contact recreation waters	No Data
Hanson	377.6	Unnamed	Intermittent Stream/River		
McCook	379.6	Unnamed	Intermittent Stream/River		
McCook	384.0	Wolf Creek	Intermittent Stream/River	WW marginal fish life propagation waters; limited-contact recreation waters	No Data
McCook	386.5	Unnamed	Intermittent Stream/River		
McCook	386.7	Unnamed	Intermittent Stream/River		
McCook	387.6	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Hutchinson	390.5	Pond	Intermittent Lake/Pond		
Hutchinson	391.0	Wolf Creek	Perennial Stream/River	WW marginal fish life propagation waters; limited-contact recreation waters	No Data
Hutchinson	394.8	Unnamed	Intermittent Stream/River		
Hutchinson	396.0	Unnamed	Intermittent Stream/River		
Hutchinson	397.6	Unnamed	Intermittent Stream/River		
Hutchinson	398.7	Unnamed	Intermittent Stream/River		
Hutchinson	400.1	Unnamed	Intermittent Stream/River		
Hutchinson	401.0	Unnamed	Intermittent Stream/River		
Hutchinson	401.7	Unnamed	Intermittent Stream/River		
Hutchinson	406.1	Unnamed	Intermittent Stream/River		
Hutchinson	406.6	Unnamed	Intermittent Stream/River		
Hutchinson	406.8	Unnamed	Intermittent Stream/River		
Hutchinson	408.3	Unnamed	Intermittent Stream/River		
Hutchinson	408.9	Unnamed	Intermittent Stream/River		
Hutchinson	410.4	Unnamed	Intermittent Stream/River		
Yankton	414.0	Unnamed	Intermittent Stream/River		
Yankton	418.0	Unnamed	Intermittent Stream/River		
Yankton	418.4	Unnamed	Reservoir Side		
Yankton	418.4	Unnamed	Reservoir Side		
Yankton	421.7	James River	Perennial Stream/River	WW semiperm fish life propagation waters; limited-contact recreation waters	No Data
Yankton	423.5	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Yankton	428.0	Beaver Creek	Perennial Stream/River	WW marginal fish life propagation waters; limited-contact recreation waters	
Yankton/Cedar	435.8	Missouri River	Artificial Path	Primary Contact Recreation; Aquatic Life Use; Agriculture Water Supply; Industrial Water Supply	Inhibited; Inhibited; Supported; Supported
NEBRASKA					
Cedar	436.8	Unnamed	Intermittent Stream/River		
Cedar	438.2	Antelope Creek	Perennial Stream/River	No Data	No Data
Cedar	439.9	Unnamed	Intermittent Stream/River		
Cedar	440.3	Unnamed	Intermittent Stream/River		
Cedar	440.6	Unnamed	Intermittent Stream/River		
Cedar	441.8	Unnamed	Intermittent Stream/River		
Cedar	442.1	Unnamed	Intermittent Stream/River		
Cedar	442.7	Unnamed	Intermittent Stream/River		
Cedar	443.2	Unnamed	Intermittent Stream/River		
Cedar	443.4	Unnamed	Intermittent Stream/River		
Cedar	444.8	Unnamed	Intermittent Stream/River		
Cedar	445.9	Unnamed	Intermittent Stream/River		
Cedar	446.2	Unnamed	Intermittent Stream/River		
Cedar	446.6	Unnamed	Intermittent Stream/River		
Cedar	447.3	Unnamed	Intermittent Stream/River		
Cedar	447.9	West Bow Creek	Perennial Stream/River		
Cedar	448.9	Unnamed	Intermittent Stream/River		
Cedar	450.1	Unnamed	Intermittent Stream/River		
Cedar	450.7	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Cedar	451.1	Unnamed	Intermittent Stream/River		
Cedar	451.3	Norwegian Bow Creek	Perennial Stream/River	No Data	No Data
Cedar	452.1	Unnamed	Intermittent Stream/River		
Cedar	452.8	Unnamed	Intermittent Stream/River		
Cedar	453.6	Unnamed	Intermittent Stream/River		
Cedar	454.9	Unnamed	Intermittent Stream/River		
Cedar	455.5	Unnamed	Intermittent Stream/River		
Cedar	455.5	Unnamed	Intermittent Stream/River		
Cedar	455.6	Pond	Intermittent Lake/Pond		
Cedar	456.6	Bow Creek	Perennial Stream/River	No Data	No Data
Cedar	457.4	Unnamed	Intermittent Stream/River		
Cedar	459.7	Unnamed	Intermittent Stream/River		
Cedar	460.2	Pearl Creek	Intermittent Stream/River		
Cedar	461.5	Unnamed	Intermittent Stream/River		
Cedar	461.8	Unnamed	Intermittent Stream/River		
Cedar	462.2	Unnamed	Intermittent Stream/River		
Cedar	462.6	Unnamed	Intermittent Stream/River		
Cedar	463.8	Unnamed	Intermittent Stream/River		
Cedar	463.9	Unnamed	Intermittent Stream/River		
Cedar	465.1	Unnamed	Intermittent Stream/River		
Cedar	465.6	Unnamed	Intermittent Stream/River		
Cedar	466.1	Unnamed	Intermittent Stream/River		
Cedar	466.9	Unnamed	Intermittent Stream/River		
Cedar	467.4	Unnamed	Intermittent Stream/River		
Cedar	467.6	Unnamed	Intermittent Stream/River		
Cedar	468.4	Unnamed	Intermittent Stream/River		
Cedar	469.3	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Cedar	470.2	Middle Logan Creek	Perennial Stream/River	No Data	No Data
Cedar	471.0	Unnamed	Intermittent Stream/River		
Wayne	473.9	Dog Creek	Intermittent Stream/River		
Wayne	475.2	Unnamed	Intermittent Stream/River		
Wayne	475.3	Unnamed	Intermittent Stream/River		
Wayne	476.3	Deer Creek	Intermittent Stream/River		
Wayne	477.0	Tributary to Deer Creek	Intermittent Stream/River		
Wayne	478.0	Tributary to Deer Creek	Intermittent Stream/River		
Wayne	480.0	Unnamed	Intermittent Stream/River		
Wayne	481.2	South Branch Deer Creek	Intermittent Stream/River		
Wayne	481.6	Unnamed	Intermittent Stream/River		
Wayne	485.1	Unnamed	Intermittent Stream/River		
Wayne	486.1	Unnamed	Intermittent Stream/River		
Wayne	487.0	Spring Branch	Intermittent Stream/River		
Wayne	489.4	Unnamed	Intermittent Stream/River		
Wayne	490.4	Unnamed	Intermittent Stream/River		
Stanton	491.1	Unnamed	Intermittent Stream/River		
Stanton	492.6	Unnamed	Intermittent Stream/River		
Stanton	494.3	Unnamed	Intermittent Stream/River		
Stanton	495.0	Unnamed	Intermittent Stream/River		
Stanton	496.2	Unnamed	Intermittent Stream/River		
Stanton	497.1	Pleasant Run	Intermittent Stream/River		
Stanton	497.6	Unnamed	Intermittent Stream/River		
Stanton	499.7	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Stanton	502.8	Elkhorn River	Artificial Path	Primary Contact Recreation; Aquatic Life Use	Inhibited; Supported
Stanton	503.5	Union Creek	Perennial Stream/River		
Stanton	506.3	Unnamed	Intermittent Stream/River		
Stanton	507.5	Unnamed	Intermittent Stream/River		
Stanton	508.7	Unnamed	Intermittent Stream/River		
Stanton	508.8	Unnamed	Intermittent Stream/River		
Stanton	509.0	Unnamed	Intermittent Stream/River		
Stanton	510.5	Unnamed	Intermittent Stream/River		
Stanton	510.5	Unnamed	Intermittent Stream/River		
Stanton	512.6	Unnamed	Intermittent Stream/River		
Stanton	513.3	Unnamed	Intermittent Stream/River		
Stanton	515.1	Unnamed	Intermittent Stream/River		
Platte	517.3	Unnamed	Intermittent Stream/River		
Platte	517.9	Unnamed	Intermittent Stream/River		
Platte	519.4	Unnamed	Intermittent Stream/River		
Colfax	522.3	Unnamed	Intermittent Stream/River		
Colfax	522.3	Unnamed	Intermittent Stream/River		
Colfax	524.9	Unnamed	Intermittent Stream/River		
Colfax	525.0	Unnamed	Intermittent Stream/River		
Colfax	532.5	Shell Creek	Perennial Stream/River	No Data	No Data
Colfax	534.5	Unnamed	Intermittent Stream/River		
Colfax	538.2	Unnamed	Canal/Ditch		
Colfax	538.7	Unnamed	Intermittent Stream/River		
Colfax	539.8	Lost Creek	Perennial Stream/River	No Data	No Data
Colfax	539.8	Unnamed	Intermittent Stream/River		
Colfax	540.4	Unnamed	Intermittent Stream/River		
Colfax	541.0	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Colfax	541.3	Unnamed	Intermittent Stream/River		
Colfax	542.0	Platte River	Artificial Path	Primary Contact Recreation; Aquatic Life Use; Agriculture Water Supply	Inhibited; Inhibited; Supported
Colfax	542.3	Trib to Platte River	Artificial Path		
Butler	542.5	Trib to Platte River	Perennial Stream/River		
Butler	544.4	Deer Creek	Perennial Stream/River	No Data	No Data
Butler	547.2	Deer Creek	Perennial Stream/River	No Data	No Data
Butler	547.4	Pond	Perennial Lake/Pond		
Butler	547.6	Unnamed	Intermittent Stream/River		
Butler	550.9	Unnamed	Intermittent Stream/River		
Butler	554.6	Unnamed	Intermittent Stream/River		
Butler	557.1	Unnamed	Intermittent Stream/River		
Butler	559.6	Unnamed	Intermittent Stream/River		
Butler	560.5	Unnamed	Intermittent Stream/River		
Butler	561.1	Unnamed	Intermittent Stream/River		
Butler	563.7	Unnamed	Intermittent Stream/River		
Butler	565.7	Unnamed	Intermittent Stream/River		
Seward	566.6	Unnamed	Intermittent Stream/River		
Seward	573.2	Big Blue River	Perennial Stream/River	Aquatic Life Use; Agriculture Water Supply	Inhibited; Supported
Seward	575.6	Lincoln Creek	Perennial Stream/River		
Seward	576.1	Unnamed	Intermittent Stream/River		
Seward	577.9	Unnamed	Intermittent Stream/River		
Seward	579.2	Lone Tree Creel	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Seward	580.6	Crooked Creek	Perennial Stream/River		
Seward	583.5	Unnamed	Intermittent Stream/River		
Seward	583.7	Pond	Perennial Lake/Pond Side		
Seward	583.9	Unnamed	Intermittent Stream/River		
Seward	585.8	Coon Creek	Intermittent Stream/River		
Seward	586.1	Unnamed	Intermittent Stream/River		
Seward	586.6	Unnamed	Intermittent Stream/River		
Seward	586.8	Unnamed	Intermittent Stream/River		
Seward	587.2	Unnamed	Intermittent Stream/River		
Seward	588.2	Unnamed	Intermittent Stream/River		
Seward	588.8	Unnamed	Intermittent Stream/River		
Seward	589.3	Unnamed	Intermittent Stream/River		
Seward	589.9	Unnamed	Intermittent Stream/River		
Seward	590.1	Unnamed	Intermittent Stream/River		
Saline	590.9	West Fork Big Blue River	Perennial Stream/River	Primary Contact Recreation; Aquatic Life Use; Agriculture Water Supply	Inhibited; Inhibited; Supported
Saline	591.8	Unnamed	Intermittent Stream/River		
Saline	593.1	Unnamed	Intermittent Stream/River		
Saline	595.0	Squaw Creek	Intermittent Stream/River		
Saline	597.3	Turkey Creek	Perennial Stream/River	No Data	No Data
Saline	598.8	Spring Creek	Perennial Stream/River		
Saline	599.7	Unnamed	Intermittent Stream/River		
Saline	600.2	Unnamed	Intermittent Stream/River		
Saline	603.3	Brush Creek	Intermittent Stream/River		
Saline	604.2	Unnamed	Intermittent Stream/River		
Saline	604.8	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Saline	605.5	Dry Creek	Intermittent Stream/River		
Saline	605.8	Unnamed	Intermittent Stream/River		
Saline	606.5	Unnamed	Intermittent Stream/River		
Saline	608.0	Unnamed	Intermittent Stream/River		
Saline	609.4	Plummers Branch	Intermittent Stream/River		
Saline	609.5	Plummers Branch	Intermittent Stream/River		
Saline	609.6	Unnamed	Intermittent Stream/River		
Saline	610.8	Unnamed	Intermittent Stream/River		
Saline	612.8	Swan Creek	Perennial Stream/River	Aquatic Life Use: Agriculture Water Supply	Supported; Supported
Saline	614.6	Unnamed	Intermittent Stream/River		
Jefferson	616.1	Unnamed	Intermittent Stream/River		
Jefferson	616.4	Unnamed	Intermittent Stream/River		
Jefferson	617.1	Unnamed	Intermittent Stream/River		
Jefferson	618.4	Unnamed	Intermittent Stream/River		
Jefferson	621.3	Unnamed	Intermittent Stream/River		
Jefferson	622.1	Cub Creek	Perennial Stream/River	No Data	No Data
Jefferson	623.0	Unnamed	Intermittent Stream/River		
Jefferson	627.0	Unnamed	Intermittent Stream/River		
Jefferson	629.0	Big Indian Creek	Intermittent Stream/River		
Jefferson	630.3	Unnamed	Intermittent Stream/River		
Jefferson	630.7	Unnamed	Intermittent Stream/River		
Jefferson	633.0	Unnamed	Intermittent Stream/River		
Jefferson	633.1	Unnamed	Intermittent Stream/River		
Jefferson	633.5	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Jefferson	634.3	Unnamed	Intermittent Stream/River		
Jefferson	634.6	Unnamed	Intermittent Stream/River		
Jefferson	635.5	Unnamed	Intermittent Stream/River		
Jefferson	636.0	Unnamed	Intermittent Stream/River		
Jefferson	636.2	Unnamed	Intermittent Stream/River		
Jefferson	637.0	Unnamed	Intermittent Stream/River		
Jefferson	637.7	Unnamed	Intermittent Stream/River		
NEBRASKA REX Parallel					
Jefferson	637.8	Unnamed	Canal/Ditch		
Jefferson	638.1	Unnamed	Intermittent Stream/River		
Jefferson	638.7	Unnamed	Intermittent Stream/River		
Jefferson	639.1	Unnamed	Intermittent Stream/River		
Jefferson	639.4	Unnamed	Perennial Stream/River		
Jefferson	640.0	Unnamed	Canal/Ditch		
Jefferson	640.9	Unnamed	Intermittent Stream/River		
Jefferson	641.9	Unnamed	Perennial Stream/River		
Gage	642.0	Unnamed	Intermittent Stream/River		
Gage	643.9	Horseshoe Creek	Perennial Stream/River		
Gage	645.2	Unnamed	Intermittent Stream/River		
Gage	646.6	Unnamed	Intermittent Stream/River		
Gage	648.2	Unnamed	Intermittent Stream/River		
Gage	648.8	Unnamed	Intermittent Stream/River		
Gage	649.1	Little Indian Creek	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Gage	649.2	Little Indian Creek	Intermittent Stream/River		
KANSAS					
Marshall	650.0	Unnamed	Canal/Ditch		
Marshall	651.0	Unnamed	Canal/Ditch		
Marshall	651.0	Unnamed	Canal/Ditch		
Marshall	651.0	Unnamed	Perennial Stream/River		
Marshall	651.0	Unnamed	Canal/Ditch		
Marshall	651.7	Meadow Creek	Canal/Ditch	No Data	No Data
Marshall	652.0	Unnamed	Canal/Ditch		
Marshall	652.6	Unnamed	Perennial Stream/River		
Marshall	653.1	Indian Creek	Perennial Stream/River	No Data	No Data
Marshall	654.0	Unnamed	Canal/Ditch		
Marshall	654.3	Unnamed	Canal/Ditch		
Marshall	654.9	Unnamed	Canal/Ditch		
Marshall	655.4	Unnamed	Intermittent Stream/River		
Marshall	655.8	Unnamed	Intermittent Stream/River		
Marshall	656.0	Unnamed	Canal/Ditch		
Marshall	656.3	Deer Creek	Perennial Stream/River	General Purpose; Aquatic Life; Recreational Use (contact use, not open to public)	No Data
Marshall	656.4	Unnamed	Canal/Ditch		
Marshall	657.4	Unnamed	Intermittent Stream/River		
Marshall	658.6	Big Blue River	Perennial Stream/River	No Data	No Data
Marshall	658.9	North Elm Creek	Perennial Stream/River	General Purpose; Aquatic Life; Recreational Use (contact use, not open to public)	No Data

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Marshall	659.5	Trib To North Elm Creek	Perennial Stream/River	General Purpose; Aquatic Life; Recreational Use (contact use, not open to public)	No Data
Marshall	659.6	Trib To North Elm Creek	Perennial Stream/River	General Purpose; Aquatic Life; Recreational Use (contact use, not open to public)	No Data
Marshall	659.6	Unnamed	Intermittent Stream/River		
Marshall	662.2	Unnamed	Intermittent Stream/River		
Marshall	662.2	North Elm Creek	Perennial Stream/River	General Purpose; Aquatic Life; Recreational Use (contact use, not open to public)	No Data
Marshall	662.6	Trib to North Elm Creek	Intermittent Stream/River		
Marshall	664.7	Unnamed	Intermittent Stream/River		
Marshall	667.9	Unnamed	Intermittent Stream/River		
Marshall	668.5	Trib To Robidoux Creek	Perennial Stream/River		
Marshall	668.6	Unnamed	Manmade Ditch		
Marshall	668.9	Unnamed	Intermittent Stream/River		
Marshall	669.0	Unnamed	Intermittent Pond		
Marshall	669.6	Unnamed	Manmade Ditch		
Marshall	670.2	Trib To Robidoux Creek	Perennial Stream/River		
Marshall	670.4	Unnamed	Intermittent Stream/River		
Marshall	671.4	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Marshall	671.6	Unnamed	Intermittent Stream/River		
Marshall	671.7	Robidoux Creek	Perennial Stream/River	General Purpose; Aquatic Life; Recreational Use (contact use, not open to public)	No Data
Marshall	672.7	Unnamed	Manmade Ditch		
Marshall	673.6	Unnamed	Manmade Ditch		
Marshall	675.7	Unnamed	Manmade Ditch		
Nemaha	681.2	Negro Creek	Intermittent Stream/River	No Data	No Data
Nemaha	682.5	Unnamed	Intermittent Stream/River		
Nemaha	682.9	Unnamed	Intermittent Stream/River		
Nemaha	683.2	Unnamed	Intermittent Stream/River		
Nemaha	683.5	Unnamed	Intermittent Stream/River		
Nemaha	683.8	Unnamed	Intermittent Stream/River		
Nemaha	684.0	Unnamed	Intermittent Stream/River		
Nemaha	684.4	Unnamed	Intermittent Stream/River		
Nemaha	684.5	North Fork Wildcat Creek	Intermittent Stream/River	No Data	No Data
Nemaha	684.6	Unnamed	Intermittent Stream/River		
Nemaha	685.0	Unnamed	Intermittent Stream/River		
Nemaha	685.2	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Nemaha	685.8	Wildcat Creek	Perennial Stream/River	General Purpose; Special Aquatic Life; (contact use, not open to public); Domestic Water Supply; Food Procurement Use; Ground Water Recharge; Irrigation Use;	No Data
Nemaha	686.1	Unnamed	Intermittent Stream/River		
Nemaha	686.5	Unnamed	Intermittent Stream/River		
Nemaha	686.7	Unnamed	Manmade body		
Nemaha	688.4	Unnamed	Intermittent Stream/River		
Nemaha	688.7	Unnamed	Manmade body		
Nemaha	689.6	South Fork Big Nemaha River	Perennial Stream/River	General Purpose; Special Aquatic Life; (contact use, not open to public); Domestic Water Supply; Food Procurement Use; Ground Water Recharge; Irrigation Use;	No Data
Nemaha	690.2	Unnamed	Intermittent Stream/River		
Nemaha	690.3	Unnamed	Intermittent Stream/River		
Nemaha	691.2	Harris Creek	Perennial Stream/River	General Purpose; Expected Aquatic Life Use	No Data
Nemaha	691.9	Unnamed	Intermittent Stream/River		
Nemaha	692.9	Unnamed	Manmade Pond		
Nemaha	693.3	Unnamed	Manmade Pond		
Nemaha	693.6	Unnamed	Intermittent Stream/River		
Nemaha	693.9	Trib To Harris Creek	Perennial Stream/River		
Nemaha	694.5	Unnamed	Intermittent Stream/River		
Nemaha	694.5	Unnamed	Perennial Stream/River		
Nemaha	696.5	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Nemaha	696.6	Unnamed	Intermittent Stream/River		
Nemaha	697.1	Unnamed	Intermittent Stream/River		
Nemaha	697.4	Unnamed	Intermittent Stream/River		
Nemaha	698.3	Unnamed	Intermittent Stream/River		
Nemaha	700.3	Unnamed	Intermittent Stream/River		
Nemaha	700.5	Craig Creek	Perennial Stream/River	No Data	No Data
Nemaha	700.7	Unnamed	Intermittent Stream/River		
Nemaha	701.1	Unnamed	Manmade Ditch		
Nemaha	702.4	Unnamed	Intermittent Stream/River		
Nemaha	702.9	Unnamed	Intermittent Stream/River		
Nemaha	703.0	Unnamed	Intermittent Stream/River		
Brown	704.1	Unnamed	Intermittent		
Brown	704.5	Unnamed	Intermittent Stream/River		
Brown	704.7	Unnamed	Intermittent Stream/River		
Brown	704.8	Unnamed	Intermittent Stream/River		
Brown	705.2	Unnamed	Intermittent Stream/River		
Brown	705.3	Unnamed	Intermittent Stream/River		
Brown	705.7	Delaware River	Perennial Stream/River	No Data	No Data
Brown	706.7	Trib To Delaware River	Perennial Stream/River		
Brown	707.6	Trib To Delaware River	Perennial Stream/River		
Brown	708.5	Unnamed	Intermittent Stream/River		
Brown	709.3	Walnut Creek	Perennial Stream/River	General Purpose; Expected Aquatic Life Use	No Data

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Brown	710.2	Walnut Creek	Perennial Stream/River	General Purpose; Expected Aquatic Life Use	No Data
Brown	710.8	Unnamed	Intermittent Stream/River		
Brown	711.5	Unnamed	Intermittent Stream/River		
Brown	712.5	Unnamed	Intermittent Stream/River		
Brown	712.5	Unnamed	Intermittent Stream/River		
Brown	712.9	Wolf River	Perennial Stream/River		
Brown	713.8	Unnamed	Intermittent Stream/River		
Brown	714.4	Unnamed	Intermittant Lake/Pond		
Brown	714.5	Unnamed	Intermittant Lake/Pond		
Brown	716.5	Unnamed	Intermittent Stream/River		
Brown	716.7	Unnamed	Intermittent Stream/River		
Brown	716.8	Unnamed	Intermittent Stream/River		
Brown	717.0	Unnamed	Intermittent Stream/River		
Brown	717.8	Unnamed	Intermittent Stream/River		
Brown	718.2	Unnamed	Intermittent Stream/River		
Brown	718.4	Unnamed	Intermittent Stream/River		
Brown	718.9	Unnamed	Intermittent Stream/River		
Brown	719.8	Unnamed	Intermittent Stream/River		
Brown	719.9	Unnamed	Intermittent Stream/River		
Brown	720.1	Unnamed	Intermittent Stream/River		
Brown	720.3	Middle Fork Wolf River	Perennial Stream/River	General Purpose; Expected Aquatic Life Use; Domestic Water Supply; Food Procurement Use; Groundwater Recharge; Industrial Water Supply; Irrigation Use	No Data
Brown	721.3	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Brown	722.0	Unnamed	Manmade Ditch		
Brown	722.6	Buttermilk Creek	Perennial Stream/River	General Purpose; Expected Aquatic life use; Primary Contact Recreation is by Law or Written Permission of the Landowner	No Data
Brown	722.8	Unnamed	Intermittent Stream/River		
Brown	723.0	Unnamed	Manmade Ditch		
Brown	723.2	Unnamed	Intermittent Stream/River		
Brown	723.2	Unnamed	Intermittent Stream/River		
Brown	724.0	Unnamed	Intermittent Stream/River		
Brown	725.0	South Fork Wolf River	Perennial Stream/River	General Purpose; Expected Aquatic Life Use; Domestic Water Supply; Food Procurement Use; Ground Water Recharge; Industrial Water Supply; Irrigation Use;	No Data
Brown	725.1	Unnamed	Intermittent Stream/River		
Brown	725.4	Unnamed	Intermittent Stream/River		
Brown	725.9	Unnamed	Intermittent Stream/River		
Brown	727.6	Squaw Creek	Perennial Stream/River	General Purpose; Expected Aquatic life use; Primary Contact Recreation is by Law or Written Permission of the Landowner	No Data
Brown	727.7	Unnamed	Intermittent Stream/River		
Brown	727.9	Unnamed	Intermittent Stream/River		
Brown	728.1	Unnamed	Canal/Ditch		
Doniphan	728.4	Unnamed	Intermittent Stream/River		
Doniphan	728.7	Unnamed	Manmade Pond		
Doniphan	729.1	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Doniphan	729.5	Unnamed	Perennial Stream/River		
Doniphan	729.7	Halling Creek	Perennial Stream/River	General Purpose; Aquatic Life Use	No Data
Doniphan	734.9	Unnamed	Intermittent Stream/River		
Doniphan	736.1	Unnamed	Perennial Stream/River		
Doniphan	736.8	Unnamed	Intermittent Stream/River		
Doniphan	737.8	Jordan Creek	Intermittent Stream/River		
Doniphan	738.3	Unnamed	Intermittent Stream/River		
Doniphan	739.9	Unnamed	Intermittent Stream/River		
Doniphan	740.1	Unnamed	Intermittent Stream/River		
Doniphan	740.6	Rock Creek	Perennial Stream/River	General Purpose; Aquatic Life Use	No Data
Doniphan	741.7	Unnamed	Intermittent Stream/River		
Doniphan	741.8	Unnamed	Intermittent Stream/River		
Doniphan	742.5	Unnamed	Intermittent Stream/River		
Doniphan	742.5	Unnamed	Intermittent Stream/River		
Doniphan	742.7	Unnamed	Intermittent Stream/River		
Doniphan	743.0	Unnamed	Intermittent Stream/River		
Doniphan	743.0	Trib to Brush Creek	Intermittent Stream/River		
Doniphan	743.0	Trib to Brush Creek	Intermittent Stream/River		
Doniphan	743.6	Brush Creek	Intermittent Stream/River	General Purpose; Aquatic Life Use	No Data
Doniphan	744.4	Unnamed	Intermittent Stream/River		
Doniphan	745.1	Trib to Missouri River	Perennial Stream/River		
Doniphan	745.3	Unnamed	Intermittent Stream/River		
Doniphan	745.5	Unnamed	Intermittent Stream/River		
Doniphan	745.9	Unnamed	Intermittent Stream/River		
Doniphan	746.2	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Doniphan	746.9	Unnamed	Intermittent Stream/River		
Doniphan	747.1	Unnamed	Intermittent Stream/River		
Doniphan	747.8	Unnamed	Intermittent Stream/River		
MISSOURI REX Parallel					
Buchannan	748.5	Missouri River	Artificial Path	Irrigation Use; Livestock and Wildlife; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation; Secondary Contact Recreation; Drinking Water Supply; Industrial Process and Industrial Cooling Water	KS - State-listed fish species occurrence; MO - State-listed pallid sturgeon occurrence; No Data
Buchannan	752.0	Unnamed	Canal/Ditch		
Buchannan	752.5	Unnamed	Intermittent Stream/River		
Buchannan	752.8	Unnamed	Intermittent Stream/River		
Buchannan	753.1	Unnamed	Intermittent Stream/River		
Buchannan	753.3	Unnamed	Intermittent Stream/River		
Buchannan	754.0	Contrary Creek	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation	No Data
Buchannan	754.2	Unnamed	Canal/Ditch		
Buchannan	754.8	Unnamed	Intermittent Stream/River		
Buchannan	755.5	Unnamed	Intermittent Stream/River		
Buchannan	757.0	Trib to Pigeon Creek	Perennial Stream/River		
Buchannan	757.1	Unnamed	Intermittent Stream/River		
Buchannan	757.3	Unnamed	Manmade Ditch		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Buchannan	757.6	Unnamed	Intermittent Stream/River		
Buchannan	757.9	Trib to Pigeon Creek	Perennial Stream/River		
Buchannan	758.0	Unnamed	Intermittent Stream/River		
Buchannan	758.3	Unnamed	Intermittent Stream/River		
Buchannan	758.5	Unnamed	Intermittent Stream/River		
Buchannan	759.0	Unnamed	Intermittent Stream/River		
Buchannan	759.1	Unnamed	Canal/Ditch		
Buchannan	759.3	Unnamed	Intermittent Stream/River		
Buchannan	759.5	Trib to Pigeon Creek	Perennial Stream/River		
Buchannan	759.7	Trib to Pigeon Creek	Perennial Stream/River		
Buchannan	760.3	Unnamed	Intermittent Stream/River		
Buchannan	760.5	Unnamed	Intermittent Stream/River		
Buchannan	760.7	Pigeon Creek	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation	No Data
Buchannan	760.9	Pigeon Creek	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation	No Data
Buchannan	761.7	Unnamed	Canal/Ditch		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Buchannan	762.2	Platte River	Perennial Stream/River	Irrigation Use; Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation; Secondary Contact Recreation; Drinking Water Supply	No Data
Buchannan	762.6	Unnamed	Intermittent Stream/River		
Buchannan	762.7	Unnamed	Intermittent Stream/River		
Buchannan	763.0	Trib to Platte River	Perennial Stream/River		
Buchannan	763.4	Unnamed	Intermittent Stream/River		
Buchannan	763.5	Unnamed	Intermittent Stream/River		
Buchannan	763.7	Trib to Platte River	Perennial Stream/River		
Buchannan	763.9	Unnamed	Intermittent Stream/River		
Buchannan	764.1	Trib to Platte River	Perennial Stream/River		
Buchannan	764.3	Unnamed	Intermittent Stream/River		
Buchannan	764.6	Unnamed	Intermittent Stream/River		
Buchannan	764.7	Unnamed	Intermittent Stream/River		
Buchannan	765.9	Unnamed	Intermittent Stream/River		
Buchannan	766.7	Malden Creek	Perennial Stream/River	No Data	No Data
Buchannan	768.6	Wolfpen Creek	Perennial Stream/River	No Data	No Data
Clinton	769.2	Jenkins Branch	Perennial Stream/River	No Data	No Data
Clinton	771.2	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Clinton	772.9	Castile Creek	Perennial Stream/River	Class C, Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation; Secondary Contact Recreation; Drinking Water Supply	
Clinton	773.6	Unnamed	Intermittent Stream/River		
Clinton	777.2	Unnamed	Manmade Pond		
Clinton	777.4	Unnamed	Intermittent Stream/River		
Clinton	777.8	Unnamed	Intermittent Stream/River		
Clinton	778.1	Unnamed	Intermittent Stream/River		
Clinton	778.2	Unnamed	Intermittent Stream/River		
Clinton	778.4	Unnamed	Intermittent Stream/River		
Clinton	778.6	Horse Fork	Perennial Stream/River		
Clinton	778.8	Unnamed	Intermittent Stream/River		
Clinton	779.2	Unnamed	Manmade Pond		
Clinton	780.0	Unnamed	Intermittent Stream/River		
Clinton	780.2	Unnamed	Intermittent Stream/River		
Clinton	780.5	Unnamed	Intermittent Stream/River		
Clinton	780.6	Unnamed	Intermittent Stream/River		
Clinton	780.9	Little Platte River	Perennial Stream/River	Class C, Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation; Secondary Contact Recreation, Class C	State spawning water (3/15-6/15)

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Clinton	781.8	Trib to Little Platte River	Perennial Stream/River		
Clinton	781.9	Trib to Little Platte River	Perennial Stream/River		
Clinton	784.2	Unnamed	Intermittent Stream/River		
Clinton	784.6	Unnamed	Intermittent Stream/River		
Clinton	784.8	Unnamed	Canal/Ditch		
Clinton	785.1	Unnamed	Intermittent Stream/River		
Clinton	785.2	Unnamed	Intermittent Stream/River		
Clinton	785.3	Unnamed	Intermittent Stream/River		
Clinton	785.6	Shoal Creek	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation; Secondary Contact Recreation	No Data
Clinton	786.3	Little Shoal Creek	Perennial Stream/River	No Data	No Data
Clinton	786.5	Unnamed	Intermittent Stream/River		
Clinton	786.6	Unnamed	Intermittent Stream/River		
Clinton	786.8	Unnamed	Intermittent Stream/River		
Clinton	787.0	Unnamed	Intermittent Stream/River		
Clinton	787.3	Unnamed	Intermittent Stream/River		
Clinton	788.0	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Clinton	788.2	Deer Creek	Perennial Stream/River	No Data	No Data
Clinton	788.6	Unnamed	Intermittent Stream/River		
Clinton	789.6	Plum Creek	Perennial Stream/River	No Data	No Data
Clinton	789.8	Unnamed	Intermittent Stream/River		
Clinton	789.9	Unnamed	Intermittent Stream/River		
Clinton	790.0	Unnamed	Intermittent Stream/River		
Caldwell	790.3	Unnamed	Manmade Ditch		
Caldwell	790.9	Trib to Plum Creek	Perennial Stream/River		
Caldwell	791.2	Unnamed	Intermittent Stream/River		
Caldwell	792.2	Unnamed	Canal/Ditch		
Caldwell	792.4	Unnamed	Intermittent Stream/River		
Caldwell	792.7	Unnamed	Intermittent Stream/River		
Caldwell	793.9	Unnamed	Intermittent Stream/River		
Caldwell	794.4	Log Creek	Perennial Stream/River	No Data	No Data
Caldwell	794.7	Unnamed	Perennial Lake/Pond		
Caldwell	795.0	Unnamed	Canal/Ditch		
Caldwell	795.4	Log Creek	Perennial Stream/River	No Data	No Data

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Caldwell	796.3	Trib to Log Creek	Perennial Stream/River	No Data	No Data
Caldwell	796.3	Trib to Log Creek	Perennial Stream/River	No Data	No Data
Caldwell	796.6	Unnamed	Intermittent Stream/River		
Caldwell	796.9	Unnamed	Intermittent Stream/River		
Caldwell	797.3	Unnamed	Intermittent Stream/River		
Caldwell	798.5	Long Creek	Perennial Stream/River		
Caldwell	798.9	Unnamed	Intermittent Stream/River		
Caldwell	799.1	Trib to Log Creek	Perennial Stream/River		
Cladwell	799.3	Unnamed	Manmade Ditch		
Caldwell	799.5	Unnamed	Perennial Stream/River		
Caldwell	800.3	Unnamed	Intermittent Stream/River		
Caldwell	800.5	Unnamed	Intermittent Stream/River		
Caldwell	801.2	Brush Creek	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption	State spawning water (3/15-6/15)
Caldwell	801.6	Unnamed	Intermittent Stream/River		
Caldwell	801.7	Trib to Brush Creek	Perennial Stream/River		
Caldwell	802.3	Unnamed	Intermittent Stream/River		
Caldwell	802.5	Unnamed	Canal/Ditch		
Caldwell	803.2	Unnamed	Intermittent Stream/River		
Caldwell	803.2	Unnamed	Intermittent Stream/River		
Caldwell	803.7	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Caldwell	804.5	Crabapple Creek	Perennial Stream/River	Class C, Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation	State spawning water (3/15-6/15)
Caldwell	804.7	Unnamed	Intermittent Stream/River		
Caldwell	804.9	Unnamed	Canal/Ditch		
Caldwell	805.0	Unnamed	Intermittent Stream/River		
Caldwell	805.3	Unnamed	Intermittent Stream/River		
Caldwell	805.3	Unnamed	Intermittent Stream/River		
Caldwell	806.2	Unnamed	Intermittent Stream/River		
Caldwell	807.3	Trib to Mud Creek	Perennial Stream/River		
Caldwell	807.7	Trib to Mud Creek	Perennial Stream/River		
Caldwell	807.9	Unnamed	Intermittent Stream/River		
Caldwell	808.2	Unnamed	Canal/Ditch		
Caldwell	808.3	Trib to Mud Creek	Perennial Stream/River		
Caldwell	808.3	Unnamed	Intermittent Stream/River		
Caldwell	808.6	Unnamed	Intermittent Stream/River		
Caldwell	808.7	Trib to Mud Creek	Perennial Stream/River		
Caldwell	809.0	Unnamed	Intermittent Stream/River		
Caldwell	809.0	Unnamed	Intermittent Stream/River		
Caldwell	809.5	Unnamed	Intermittent Stream/River		
Caldwell	809.8	Trib to Mud Creek	Perennial Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Caldwell	809.9	Unnamed	Intermittent Stream/River		
Caldwell	810.0	Trib to Mud Creek	Perennial Stream/River		
Caldwell	810.4	Unnamed	Canal/Ditch		
Caldwell	811.2	Trib to Mud Creek	Perennial Stream/River		
Caldwell	811.3	Unnamed	Intermittent Stream/River		
Caldwell	812.2	Mud Creek	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation	No Data
Caldwell	812.5	Jimmy Bond	Canal/Ditch		
Caldwell	812.7	Willow Creek	Perennial Stream/River		
Caldwell	813.4	Unnamed	Pond		
Caldwell	813.9	Trib to Mud Creek	Perennial Stream/River		
Caldwell	814.1	Unnamed	Intermittent Stream/River		
Caldwell	814.4	Unnamed	Intermittent Stream/River		
Carroll	814.7	Unnamed	Canal/Ditch		
Carroll	814.9	Unnamed	Intermittent Stream/River		
Carroll	815.5	Unnamed	Canal/Ditch		
Carroll	815.9	Turkey Creek	Perennial Stream/River		
Carroll	816.1	Trib to Turkey Creek	Perennial Stream/River		
Carroll	816.4	Unnamed	Intermittent Stream/River		
Carroll	816.6	Unnamed	Intermittent Stream/River		
Carroll	817.6	Unnamed	Manmade Ditch		
Carroll	818.0	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Carroll	818.5	Unnamed	Intermittent Stream/River		
Carroll	818.9	Unnamed	Intermittent Stream/River		
Carroll	819.0	Unnamed	Intermittent Stream/River		
Carroll	819.9	Trib to Turkey Creek	Perennial Stream/River		
Carroll	820.5	Trib to Turkey Creek	Perennial Stream/River		
Carroll	820.7	Trib to Turkey Creek	Perennial Stream/River		
Carroll	821.3	Unnamed	Intermittent Stream/River		
Carroll	821.4	Unnamed	Canal/Ditch		
Carroll	821.7	Trib to Turkey Creek	Perennial Stream/River		
Carroll	821.8	Trib to Turkey Creek	Perennial Stream/River		
Carroll	822.1	Trib to Turkey Creek	Perennial Stream/River		
Carroll	822.9	Trib to Big Creek	Perennial Stream/River		
Carroll	823.1	Trib to Big Creek	Perennial Stream/River		
Carroll	823.4	Trib to Big Creek	Perennial Stream/River		
Carroll	823.5	Unnamed	Manmade Ditch		
Carroll	824.3	Unnamed	Manmade Ditch		
Carroll	824.9	Unnamed	Intermittent Stream/River		
Carroll	825.3	Trib to Big Creek	Perennial Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Carroll	825.3	Unnamed	Intermittent Stream/River		
Carroll	825.8	Unnamed	Canal/Ditch		
Carroll	826.0	Unnamed	Intermittent Stream/River		
Carroll	827.1	Trib to Big Creek	Perennial Stream/River		
Carroll	827.6	Unnamed	Intermittent Stream/River		
Carroll	827.9	Unnamed	Intermittent Stream/River		
Carroll	829.5	Unnamed	Perennial Stream/River		
Carroll	829.8	Unnamed	Canal/Ditch		
Carroll	830.2	Unnamed	Perennial Stream/River		
Carroll	830.4	Unnamed	Intermittent Stream/River		
Carroll	831.7	Bridge Creek	Perennial Stream/River		
Carroll	832.0	Big Creek	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation	No Data
Carroll	832.5	Unnamed	Intermittent Stream/River		
Carroll	832.8	Unnamed	Intermittent Stream/River		
Carroll	833.6	Wolf Branch	Perennial Stream/River		
Carroll	834.0	Unnamed	Perennial Stream/River		
Carroll	834.2	Unnamed	Perennial Stream/River		
Carroll	835.0	Unnamed	Intermittent Stream/River		
Carroll	835.8	Unnamed	Manmade Ditch		
Carroll	835.5	Unnamed	Intermittent Stream/River		
Carroll	836.0	Unnamed	Intermittent Stream/River		
Carroll	837.2	Little Hurricane	Intermittent Stream/River		
Carroll	837.5	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Carroll	838.2	Unnamed	Perennial Stream/River		
Carroll	838.4	Unnamed	Intermittent Stream/River		
Carroll	838.5	Unnamed	Perennial Stream/River		
Carroll	839.8	Unnamed	Perennial Stream/River		
Carroll	840.4	Unnamed	Intermittent Stream/River		
Carroll	840.4	Unnamed	Intermittent Stream/River		
Carroll	840.6	Grand River	Perennial Stream/River	Irrigation Use; Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation; Secondary Contact Recreation; Drinking Water Supply	No Data
Chariton	841.1	Unnamed Slough	Perennial Stream/River		
Chariton	842.1	Unnamed	Intermittent Stream/River		
Chariton	842.6	Unnamed	Intermittent Stream/River		
Chariton	842.7	Unnamed	Intermittent Stream/River		
Chariton	842.8	Potter Slough	Intermittent Stream/River		
Chariton	843.9	Unnamed	Intermittent Stream/River		
Chariton	845.9	Salt Creek	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation;	No Data
Chariton	846.1	Unnamed	Intermittent Stream/River		
Chariton	846.7	Unnamed	Intermittent Stream/River		
Chariton	846.9	Unnamed	Intermittent Stream/River		
Chariton	847.7	Unnamed	Intermittent Stream/River		
Chariton	848.3	Brush Creek	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Chariton	848.8	Unnamed	Intermittent Stream/River		
Chariton	849.2	Unnamed	Intermittent Stream/River		
Chariton	849.5	Unnamed	Intermittent Stream/River		
Chariton	849.6	Unnamed	Perennial Lake/Pond		
Chariton	849.7	Unnamed	Intermittent Stream/River		
Chariton	849.8	Unnamed	Intermittent Stream/River		
Chariton	849.9	Unnamed	Intermittent Stream/River		
Chariton	850.1	Unnamed	Intermittent Stream/River		
Chariton	851.0	Unnamed	Intermittent Stream/River		
Chariton	851.7	Unnamed	Intermittent Stream/River		
Chariton	851.8	Lake Creek	Perennial Stream/River	Irrigation use; Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Heath-Fish Consumption; Whole Body Contact Recreation	No Data
Chariton	852.0	Unnamed	Intermittent Stream/River		
Chariton	852.9	Unnamed	Intermittent Lake/Pond		
Chariton	853.2	Unnamed	Intermittent Stream/River		
Chariton	853.6	Unnamed	Canal/Ditch		
Chariton	854.1	Unnamed	Perennial Stream/River		
Chariton	854.3	Palmer Creek	Perennial Stream/River		
Chariton	854.7	Unnamed	Intermittent Stream/River		
Chariton	855.5	Unnamed	Intermittent Stream/River		
Chariton	856.0	Unnamed	Intermittent Stream/River		
Chariton	856.4	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Chariton	857.7	Mussel Fork	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Heath-Fish Consumption; Whole Body Contact Recreation	No Data
Chariton	858.2	Unnamed	Intermittent Stream/River		
Chariton	859.1	Unnamed	Pond		
Chariton	859.6	Unnamed	Intermittent Stream/River		
Chariton	860.7	Unnamed	Intermittent Stream/River		
Chariton	860.7	Unnamed	Intermittent Stream/River		
Chariton	860.8	Long Creek	Perennial Stream/River		
Chariton	861.6	Unnamed	Intermittent Stream/River		
Chariton	861.9	Unnamed	Intermittent Stream/River		
Chariton	862.4	Chariton River	Perennial Stream/River	Irrigation Use; Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Heath-Fish Consumption; Whole Body Contact Recreation; Secondary Contact Recreation	No Data
Chariton	863.1	Unnamed	Intermittent Stream/River		
Chariton	863.5	Unnamed	Intermittent Stream/River		
Chariton	863.7	Unnamed	Intermittent Stream/River		
Chariton	863.9	Unnamed	Intermittent Stream/River		
Chariton	864.2	Unnamed	Intermittent Stream/River		
Chariton	865.0	Puzzle Creek	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Heath-Fish Consumption; Whole Body Contact Recreation	No Data
Chariton	866.5	Unnamed	Intermittent Stream/River		
Chariton	867.0	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Chariton	867.1	Unnamed	Intermittent Stream/River		
Chariton	867.3	Unnamed	Intermittent Stream/River		
Chariton	867.3	Unnamed	Intermittent Stream/River		
Chariton	867.9	Unnamed	Intermittent Stream/River		
Chariton	868.0	Middle Fork Little Chariton River	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Heath-Fish Consumption; Whole Body Contact Recreation	No Data
Chariton	868.2	Unnamed	Pond		
Chariton	868.4	Lake Branch	Intermittent Stream/River		
Chariton	868.7	Lake Branch	Intermittent Stream/River		
Chariton	869.1	Unnamed	Intermittent Stream/River		
Chariton	870.1	Unnamed	Intermittent Stream/River		
Chariton	870.3	Unnamed	Intermittent Stream/River		
Chariton	870.3	Unnamed	Intermittent Stream/River		
Chariton	870.6	Unnamed	Intermittent Stream/River		
Chariton	871.1	Unnamed	Intermittent Stream/River		
Chariton	871.6	East Fork Little Chariton River	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Heath-Fish Consumption; Whole Body Contact Recreation	No Data
Chariton	871.9	Unnamed	Pond		
Rand	872.2	Unnamed	Intermittent Stream/River		
Rand	873.2	Unnamed	Intermittent Stream/River		
Rand	873.6	Unnamed	Intermittent Stream/River		
Rand	874.5	Unnamed	Intermittent Stream/River		
Rand	874.8	Unnamed	Intermittent Stream/River		
Rand	875.9	Unnamed	Intermittent Stream/River		
Rand	876.2	Unnamed	Perennial Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Rand	876.5	Unnamed	Intermittent Stream/River		
Rand	876.6	Unnamed	Intermittent Stream/River		
Rand	877.1	Unnamed	Intermittent Stream/River		
Rand	877.6	Unnamed	Perennial Lake		
Rand	877.8	Unnamed	Intermittent Stream/River		
Rand	878.1	Unnamed	Intermittent Stream/River		
Rand	878.2	Unnamed	Intermittent Stream/River		
Rand	878.3	Unnamed	Intermittent Stream/River		
Rand	878.7	Unnamed	Intermittent Stream/River		
Rand	878.7	Unnamed	Intermittent Stream/River		
Rand	878.8	Unnamed	Intermittent Stream/River		
Rand	879.5	Unnamed	Intermittent Stream/River		
Rand	879.6	Unnamed	Intermittent Stream/River		
Rand	879.9	Unnamed	Intermittent Stream/River		
Rand	880.0	Unnamed	Intermittent Stream/River		
Rand	880.2	Unnamed	Intermittent Stream/River		
Rand	880.5	Unnamed	Intermittent Stream/River		
Rand	881.0	Unnamed	Perennial Lake/Pond		
Rand	881.3	Unnamed	Intermittent Stream/River		
Rand	881.4	Unnamed	Intermittent Stream/River		
Rand	882.0	Unnamed	Intermittent Stream/River		
Rand	882.3	Unnamed	Intermittent Stream/River		
Rand	882.5	Unnamed	Intermittent Stream/River		
Rand	882.7	Unnamed	Intermittent Stream/River		
Rand	882.8	Unnamed	Intermittent Stream/River		
Rand	883.1	Unnamed	Intermittent Stream/River		
Rand	883.3	Unnamed	Intermittent Stream/River		
Rand	883.8	Unnamed	Perennial Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Rand	885.5	Moniteau Creek	Intermittent Stream/River		
Rand	891.0	Unnamed	Intermittent Stream/River		
Rand	891.5	Unnamed	Intermittent Stream/River		
Rand	892.1	Unnamed	Intermittent Stream/River		
Rand	892.8	Unnamed	Intermittent Stream/River		
Rand	893.0	Unnamed	Intermittent Stream/River		
Rand	893.4	Unnamed	Lake/Pond		
Rand	893.5	Unnamed	Intermittent Stream/River		
Rand	893.6	Unnamed	Intermittent Stream/River		
Rand	894.1	Unnamed	Intermittent Stream/River		
Rand	894.2	Big Creek	Perennial Stream/River	No Data	No Data
Audrain	895.4	Boat Branch	Intermittent Stream/River		
Audrain	895.4	Unnamed	Intermittent Stream/River		
Audrain	896.8	Unnamed	Intermittent Stream/River		
Audrain	897.3	Sailing Creek	Perennial Stream/River	No Data	No Data
Audrain	897.3	Unnamed	Intermittent Stream/River		
Audrain	897.7	Unnamed	Intermittent Stream/River		
Audrain	900.9	Long Branch	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Heath-Fish Consumption; Whole Body Contact Recreation	No Data
Audrain	901.8	Unnamed	Intermittent Stream/River		
Audrain	902.4	Unnamed	Intermittent Stream/River		
Audrain	903.2	Unnamed	Intermittent Stream/River		
Audrain	903.7	Unnamed	Intermittent Stream/River		
Audrain	904.0	Goodwater Creek	Perennial Stream/River	No Data	No Data
Audrain	904.1	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Audrain	905.2	Unnamed	Intermittent Stream/River		
Audrain	905.8	Unnamed	Perennial Stream/River		
Audrain	907.6	Unnamed	Intermittent Stream/River		
Audrain	907.6	Unnamed	Intermittent Stream/River		
Audrain	908.3	Youngs Creek	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Heath-Fish Consumption; Whole Body Contact Recreation	No Data
Audrain	912.9	Unnamed	Intermittent Stream/River		
Audrain	913.4	Unnamed	Intermittent Stream/River		
Audrain	913.4	Unnamed	Intermittent Stream/River		
Audrain	913.7	Unnamed	Intermittent Stream/River		
Audrain	913.9	Unnamed	Intermittent Stream/River		
Audrain	914.2	Unnamed	Intermittent Stream/River		
Audrain	914.4	Unnamed	Intermittent Stream/River		
Audrain	914.8	Unnamed	Intermittent Stream/River		
Audrain	915.2	Unnamed	Intermittent Stream/River		
Audrain	916.1	Unnamed	Intermittent Stream/River		
Audrain	916.6	Skull Lick Creek	Perennial Stream/River	No Data	No Data
Audrain	916.8	Unnamed	Intermittent Stream/River		
Audrain	917.7	Unnamed	Perennial Stream/River		
Audrain	918.5	Salt Creek	Perennial Stream/River		
Audrain	919.1	Unnamed	Intermittent Stream/River		
Audrain	919.5	Unnamed	Intermittent Stream/River		
MISSOURI					
Audrain	921.7	Trib to Bean Branch	Perennial Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Audrain	921.7	Trib to Bean Branch	Perennial Stream/River		
Audrain	921.9	Unnamed	Lake/Pond		
Audrain	921.9	Unnamed	Lake/Pond		
Audrain	922.4	Bean Branch	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Heath-Fish Consumption; Whole Body Contact Recreation	No Data
Audrain	923.7	Unnamed	Intermittent Stream/River		
Audrain	925.0	Unnamed	Intermittent Stream/River		
Audrain	925.2	Unnamed	Intermittent Stream/River		
Audrain	925.9	Trib of Littleby Creek	Intermittent Stream/River		
Audrain	926.1	Littleby Creek	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Heath-Fish Consumption; Whole Body Contact Recreation	No Data
Audrain	928.6	West Fork Cuivre River	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Heath-Fish Consumption; Whole Body Contact Recreation	No Data
Audrain	929.5	Trib to West Fork Cuivre River	Perennial Stream/River		
Audrain	930.8	Mams Slough	Perennial Stream/River		
Audrain	931.1	Unnamed	Perennial Stream/River		
Audrain	931.7	Unnamed	Intermittent Stream/River		
Audrain	932.5	Johns Branch	Perennial Stream/River		
Montgomery	934.6	Unnamed	Intermittent Stream/River		
Montgomery	935.0	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Montgomery	936.9	Unnamed	Intermittent Stream/River		
Montgomery	937.4	Unnamed	Perennial Stream/River		
Montgomery	938.6	Unnamed	Intermittent Stream/River		
Montgomery	939.2	Unnamed	Intermittent Stream/River		
Montgomery	939.8	Coon Creek	Perennial Stream/River		
Montgomery	940.4	Unnamed	Intermittent Stream/River		
Montgomery	941.0	Unnamed	Channel Intermittent Stream/River		
Montgomery	941.3	Unnamed	Lake/Pond		
Montgomery	941.4	Unnamed	Lake/Pond		
Montgomery	942.0	Unnamed	Intermittent Stream/River		
Montgomery	942.6	Unnamed	Channel Intermittent Stream/River		
Montgomery	943.0	Unnamed	Channel Intermittent Stream/River		
Montgomery	943.2	Unnamed	Channel Intermittent Stream/River		
Montgomery	943.3	Unnamed	Channel Intermittent Stream/River		
Montgomery	943.4	Unnamed	Channel Intermittent Stream/River		
Montgomery	943.4	Unnamed	Channel Intermittent Stream/River		
Montgomery	945.8	Unnamed	Intermittent Stream/River		
Montgomery	946.6	Unnamed	Intermittent Stream/River		
Montgomery	947.3	Long Branch Creek	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Montgomery	947.4	Unnamed	Channel Intermittent Stream/River		
Montgomery	947.6	Unnamed	Lake/Pond		
Montgomery	948.1	Unnamed	Intermittent Stream/River		
Montgomery	948.4	Unnamed	Intermittent Stream/River		
Montgomery	948.7	Elkhorn Creek	Perennial Stream/River		
Montgomery	948.8	Unnamed	Intermittent Stream/River		
Montgomery	949.5	Unnamed	Intermittent Stream/River		
Montgomery	950.6	Unnamed	Intermittent Stream/River		
Montgomery	950.9	Unnamed	Intermittent Stream/River		
Montgomery	951.0	Brush Creek	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Heath-Fish Consumption; Whole Body Contact Recreation	No Data
Montgomery	951.6	Unnamed	Intermittent Stream/River		
Montgomery	952.1	Unnamed	Lake/Pond		
Montgomery	952.6	Unnamed	Intermittent Stream/River		
Montgomery	952.7	Unnamed	Intermittent Stream/River		
Montgomery	952.7	Unnamed	Intermittent Stream/River		
Montgomery	953.3	Unnamed	Intermittent Stream/River		
Montgomery	953.6	Unnamed	Intermittent Stream/River		
Lincoln	955.4	Bear Creek	Perennial stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Heath-Fish Consumption; Whole Body Contact Recreation; Class C	No Data
Lincoln	955.6	Unnamed	Intermittent Stream/River		
Lincoln	957.0	Camp Creek	Perennial Stream/River	No Data	No Data
Lincoln	958.4	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Lincoln	958.6	Unnamed	Intermittent Stream/River		
Lincoln	959.3	Unnamed	Perennial Stream/River		
Lincoln	960.8	Unnamed	Perennial Stream/River		
Lincoln	961.6	Unnamed	Intermittent Stream/River		
Lincoln	961.9	Turkey Creek	Perennial Stream/River		
Lincoln	962.5	Unnamed	Intermittent Stream/River		
Lincoln	962.9	Unnamed	Intermittent Stream/River		
Lincoln	963.4	Unnamed	Intermittent Stream/River		
Lincoln	963.8	Unnamed	Lake/Pond		
Lincoln	963.8	Unnamed	Lake/Pond		
Lincoln	964.3	Cottonwood Branch	Intermittent Stream/River		
Lincoln	965.0	Unnamed	Intermittent Stream/River		
Lincoln	965.6	Unnamed	Intermittent Stream/River		
Lincoln	966.0	Unnamed	Intermittent Stream/River		
Lincoln	967.6	Spring Creek	Intermittent Stream/River		
Lincoln	967.8	Unnamed	Intermittent Stream/River		
Lincoln	969.3	Unnamed	Intermittent Stream/River		
Lincoln	970.3	Unnamed	Intermittent Stream/River		
Lincoln	970.5	Unnamed	Intermittent Stream/River		
Lincoln	971.1	Cuivre River	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation; Secondary Contact Recreation	No Data
Lincoln	971.9	Sugar Creek	Intermittent Stream/River		
Lincoln	972.7	Unnamed	Intermittent Stream/River		
Lincoln	973.6	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Lincoln	974.2	Unnamed	Intermittent Stream/River		
Lincoln	974.4	Unnamed	Intermittent Stream/River		
Lincoln	975.3	Unnamed	Intermittent Stream/River		
Lincoln	975.8	Unnamed	Lake/Pond		
Lincoln	976.4	Unnamed	Intermittent Stream/River		
Lincoln	976.9	Keelstone Branch	Intermittent Stream/River		
Lincoln	977.3	Unnamed	Lake/Pond		
Lincoln	977.9	Groshong Branch	Intermittent Stream/River		
Lincoln	979.0	Campbell Branch	Intermittent Stream/River		
Lincoln	979.5	Unnamed	Intermittent Stream/River		
Lincoln	980.4	Unnamed	Intermittent Stream/River		
Lincoln	981.6	Cuivre River	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation; Secondary Contact Recreation	No Data
St. Charles	982.2	Unnamed	Intermittent Stream/River		
St. Charles	986.0	Unnamed	Perennial Stream/River		
St. Charles	986.9	Unnamed	Intermittent Stream/River		
St. Charles	989.3	Peruque Creek	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation; Secondary Contact Recreation	No Data
St. Charles	990.4	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
St. Charles	991.4	Bellaeau Creek	Intermittent Stream/River		
St. Charles	995.3	Unnamed	Intermittent Stream/River		
St. Charles	995.7	Dardenne Creek	Perennial Stream/River	Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation; Secondary Contact Recreation	No Data
St. Charles	998.0	Unnamed	Intermittent Stream/River		
St. Charles	998.5	Unnamed	Intermittent Stream/River		
St. Charles	999.9	Unnamed	Intermittent Stream/River		
St. Charles	1000.1	Unnamed	Intermittent Stream/River		
St. Charles	1001.0	Unnamed	Intermittent Stream/River		
St. Charles	1001.7	Unnamed	Intermittent Stream/River		
St. Charles	1009.8	Unnamed	Lake/Pond		
St. Charles	1009.8	Unnamed	Lake/Pond		
ILLINOIS					
Madison	1021.1	Mississippi River	Perennial Stream/River	Irrigation; Livestock and Wildlife Watering; Protection of Warm Water Aquatic Life and Human Health-Fish Consumption; Whole Body Contact Recreation; Secondary Contact Recreation; Drinking Water Supply; Industrial Process Water and Cooling Water	Not Assessed

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Madison	1021.6	Mississippi River	Perennial Stream/River	Aquatic Life; Fish Consumption; Public Water Supply; Primary Contact; Secondary Contact; Aesthetic Quality	Fully Supporting; Not Supporting; Fully Supporting; Not Supporting; Not Assessed; Not Assessed
Madison	1025.0	Unnamed	Lake/Pond		
Madison	1025.0	Unnamed	Lake/Pond		
Madison	1026.2	Indian Creek	Perennial Stream/River	Aquatic Life; Fish Consumption; Primary Contact; Secondary Contact; Aesthetic Quality	Not Supporting; Fully Supporting; Not Assessed; Not Assessed; Not Assessed
Madison	1027.2	Cahokia Canal	Perennial Stream/River	Aquatic Life; Fish Consumption; Primary Contact; Secondary Contact; Aesthetic Quality	Fully Supporting; Fully Supporting; Not Supporting; Not Assessed; Not Assessed
Madison	1028.4	Unnamed	Intermittent Stream/River		
Madison	1031.3	Mooney Creek	Perennial Stream/River	Aquatic Life; Fish Consumption; Primary Contact; Secondary Contact; Aesthetic Quality	Not Assessed
Madison	1031.4	Unnamed	Perennial Stream/River		
Madison	1031.8	Unnamed	Perennial Stream/River		
Madison	1032.0	Unnamed	Intermittent Stream/River		
Madison	1033.0	Unnamed	Perennial Stream/River		
Madison	1034.7	Unnamed	Intermittent Stream/River		
Madison	1035.0	Unnamed	Intermittent Stream/River		
Madison	1035.0	Unnamed	Intermittent Stream/River		
Madison	1036.8	Unnamed	Intermittent Stream/River		
Madison	1036.9	Unnamed	Intermittent Stream/River		
Madison	1036.9	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Madison	1037.0	Silver Creek	Perennial Stream/River	Aquatic Life; Fish Consumption; Primary Contact; Secondary Contact; Aesthetic Quality	Not Supporting; Fully Supporting; Not Assessed; Not Assessed; Not Assessed
Madison	1037.8	Unnamed	Perennial Stream/River		
Madison	1038.6	Unnamed	Channel Intermittent Stream/River		
Madison	1040.6	Unnamed	Channel Intermittent Stream/River		
Madison	1041.0	Sugar Fork	Perennial Stream/River	Aquatic Life; Fish Consumption; Primary Contact; Secondary Contact; Aesthetic Quality	Not Assessed
Madison	1042.7	Sand Creek	Perennial Stream/River	Aquatic Life; Fish Consumption; Primary Contact; Secondary Contact; Aesthetic Quality	Not Assessed
Madison	1043.2	Tributary of Sand Creek	Perennial Stream/River		
Madison	1046.0	Silver Lake	Lake	Aquatic Life; Fish Consumption; Public Food and Processing Water Supplies; Primary Contact; Secondary Contact; Aesthetic Quality	Not Supporting; Not Supporting; Not Supporting; Not Assessed; Not Assessed; Not Supporting
Madison	1047.7	Unknown	Perennial Stream/River		
Madison	1048.1	Unknown	Perennial Stream/River		
Madison	1049.0	Unnamed	Perennial Stream/River		
Fayette	1050.9	Unnamed	Perennial Stream/River		
Fayette	1053.4	Trib of Shoal Creek	Perennial Stream/River		
Fayette	1054.3	Unnamed	Intermittent Stream/River		
Fayette	1054.5	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Fayette	1055.0	Unnamed	Intermittent Stream/River		
Fayette	1055.3	Shoal Creek	Perennial Stream/River	Aquatic Life; Fish Consumption; Public and Food Processing Water Supplies; Primary Contact; Secondary Contact; Aesthetic Quality	Not Supporting/Fully Supporting; Fully Supporting/Not Assessed; Not Supporting; Not Supporting/Not Assessed; Not Assessed
Fayette	1056.1	Unnamed	Perennial Stream/River		
Fayette	1056.6	Trib of Shoal Creek	Perennial Stream/River		
Fayette	1056.8	Trib of Shoal Creek	Intermittent Stream/River		
Fayette	1056.9	Unnamed	Perennial Stream/River		
Fayette	1058.7	Pond	Pond Side		
Fayette	1058.7	Trib of Beaver Creek	Perennial Stream/River		
Fayette	1059.4	Beaver Creek	Perennial Stream/River		
Fayette	1061.0	Pond	Lake/Pond		
Fayette	1061.6	Little Beaver Creek	Perennial Stream/River	Aquatic Life; Fish Consumption; Primary Contact; Secondary Contact; Aesthetic Quality	Not Assessed
Fayette	1061.8	Trib of Little Beaver Creek	Perennial Stream/River		
Fayette	1062.0	Pond	Lake/Pond		
Fayette	1062.0	Pond	Lake/Pond		
Fayette	1062.3	Trib of Little Beaver Creek	Perennial Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Fayette	1062.3	Trib of Little Beaver Creek	Perennial Stream/River		
Fayette	1062.4	Unnamed	Intermittent Stream/River		
Fayette	1063.1	Unnamed	Intermittent Stream/River		
Fayette	1063.3	Unnamed	Intermittent Stream/River		
Fayette	1064.2	Unnamed	Intermittent Stream/River		
Fayette	1066.0	Unnamed	Perennial Stream/River		
Fayette	1066.5	Unnamed	Intermittent Stream/River		
Fayette	1067.1	Spring Branch Creek	Perennial Stream/River		
Fayette	1067.5	Tributary of Spring	Perennial Stream/River		
Fayette	1068.3	Unnamed	Lake/Pond		
Bond	1069.7	Unnamed	Lake/Pond		
Bond	1070.3	Hurricane Creek	Perennial Stream/River		
Bond	1070.7	Unknown	Perennial stream/river		
Bond	1070.8	Unknown	Drainage slough		
Bond	1071.9	Unknown	Lake/Pond		
Bond	1072.0	Unknown	Lake/Pond		
Bond	1072.1	Kaskaskia River	Perennial Stream/River	Aquatic Life; Fish Consumption; Public Food and Processing Water Supplies; Primary Contact; Secondary Contact; Aesthetic Quality	Not Supporting/Not Assessed; Fully Supporting; Not Supporting; Not Supporting/Fully Supporting/Not Assessed; Not Assessed
Bond	1072.6	Unnamed	Perennial Stream/River		
Bond	1074.1	Unnamed	Manmade Ditch		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Bond	1074.5	Unnamed	Manmade Ditch		
Bond	1074.7	Unnamed	Manmade Ditch		
Marion	1075.5	Unnamed	Manmade Ditch		
Marion	1076.4	Unnamed	Intermittent Stream/River		
Marion	1076.9	Unnamed	Intermittent Artificial Path		
Marion	1077.0	Unnamed	Intermittent Artificial Path		
Marion	1077.1	Willet RD Creek	Perennial Stream/River		
CUSHING EXTENSION					
NEBRASKA					
Jefferson	0.6	Unnamed	Intermittent Stream/River		
Jefferson	1.7	Unnamed	Intermittent Stream/River		
Jefferson	1.8	Unnamed	Intermittent Stream/River		
Jefferson	1.9	Unnamed	Intermittent Stream/River		
Jefferson	1.9	Unnamed	Intermittent Stream/River		
KANSAS					
Washington	4.1	Little Blue River	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Primary Contact Recreation Not Open to Public; Secondary Contact Recreation Not Open To Public; Domestic Water Supply; Food Procurement Use; Groundwater Recharge; Industrial Water Supply; Irrigation; Livestock Watering	Supporting
Washington	6.8		Perennial Stream/River		
Washington	9.1	Unnamed	Connector		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Washington	9.6	Mill Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Secondary Contact Recreation Not Open to Public; Food Procurement Use	Supporting
Washington	12.1	Mill Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Secondary Contact Recreation Not Open to Public; Food Procurement Use	Supporting
Washington	13.5	Mill Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Secondary Contact Recreation Not Open to Public; Food Procurement Use	Supporting
Washington	22.6	Coon Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Primary Contact Recreation Not Open to Public; Food Procurement	Supporting
Washington	23.9	Unnamed	Perennial Stream/River		
Washington	26.2	Unnamed	Connector		
Washington	28.7	Unnamed	Intermittent Stream/River		
Washington	29.7	Unnamed	Intermittent Stream/River		
Washington	31.3	Unnamed	Intermittent Stream/River		
Washington	32.1	Unnamed	Intermittent Stream/River		
Clay	33.3	Unnamed	Intermittent Stream/River		
Clay	34.7	Carter Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Secondary Contact Recreation Not Open to Public	Supporting
Clay	34.8	Carter Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Secondary Contact Recreation Not Open to Public	Supporting
Clay	34.8	Carter Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Secondary Contact Recreation Not Open to Public	Supporting

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Clay	34.9	Carter Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Secondary Contact Recreation Not Open to Public	Supporting
Clay	35.0	Carter Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Secondary Contact Recreation Not Open to Public	Supporting
Clay	36.3	West Fancy Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Primary Contact Recreation Not Open to Public; Food Procurement	Supporting
Clay	36.4	Unnamed	Intermittent Stream/River		
Clay	37.9	Unnamed	Intermittent Stream/River		
Clay	37.9	Unnamed	Intermittent Stream/River		
Clay	39.6	Unnamed	Intermittent Stream/River		
Clay	40.8	Unnamed	Intermittent Stream/River		
Clay	43.8	Unnamed	Intermittent Stream/River		
Clay	43.9	Unnamed	Intermittent Stream/River		
Clay	43.9	Lincoln Creek	Intermittent Stream/River	General Purpose Waters; Expected Aquatic Life Use; Secondary Contact Recreation Not Open to Public	Supporting
Clay	45.5	Unnamed	Intermittent Stream/River		
Clay	51.2	Republican River	Artificial Path	General Purpose Waters; Special Aquatic Life Use; Primary Contact Recreation Not Open to Public; Domestic Water Supply; Food Procurement Use; Groundwater Recharge; Industrial Water Supply; Irrigation; Livestock Watering	Supporting
Clay	52.5	Unnamed	Intermittent Stream/River		
Clay	54.0	Unnamed	Perennial Stream/River		
Clay	54.9	Unnamed	Intermittent Stream/River		
Clay	55.4	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Clay	57.8	Unnamed	Intermittent Stream/River		
Clay	58.1	Unnamed	Intermittent Stream/River		
Clay	59.3	Unnamed	Intermittent Stream/River		
Clay	60.1	Unnamed	Intermittent Stream/River		
Clay	60.8	Unnamed	Intermittent Stream/River		
Clay	62.0	Unnamed	Intermittent Stream/River		
Clay	62.7	Unnamed	Intermittent Stream/River		
Dickinson	63.9	Unnamed	Intermittent Stream/River		
Dickinson	64.6	Unnamed	Intermittent Stream/River		
Dickinson	68.8	Chapman Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Primary Contact Recreation Not Open to Public; Domestic Water Supply; Food Procurement Use; Groundwater Recharge; Industrial Water Supply; Irrigation; Livestock Watering	Supporting
Dickinson	69.5	Unnamed	Intermittent Stream/River		
Dickinson	70.3	Unnamed	Perennial Stream/River		
Dickinson	70.7	Unnamed	Intermittent Stream/River		
Dickinson	71.2	Unnamed	Intermittent Stream/River		
Dickinson	71.9	Unnamed	Intermittent Stream/River		
Dickinson	72.0	Unnamed	Intermittent Stream/River		
Dickinson	76.6	Smoky Hill River	Artificial Path	General Purpose Waters; Expected Aquatic Life Use; Primary Contact Recreation Not Open to Public; Domestic Water Supply; Food Procurement Use; Groundwater Recharge; Industrial Water Supply; Irrigation; Livestock Watering	Supporting
Dickinson	78.3	Unnamed	Intermittent Stream/River		
Dickinson	78.6	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Dickinson	79.5	Unnamed	Intermittent Stream/River		
Dickinson	80.1	Unnamed	Intermittent Stream/River		
Dickinson	80.1	Unnamed	Intermittent Stream/River		
Dickinson	81.5	Unnamed	Intermittent Stream/River		
Dickinson	83.6	Unnamed	Intermittent Stream/River		
Dickinson	85.1	Unnamed	Perennial Stream/River		
Dickinson	86.2	Unnamed	Intermittent Stream/River		
Dickinson	87.1	Carry Creek	Perennial Stream/River	General Purpose Waters; Special Aquatic Life Use; Food Procurement	Supporting
Dickinson	87.7	Unnamed	Intermittent Stream/River		
Dickinson	89.7	Unnamed	Intermittent Stream/River		
Dickinson	90.3	Unnamed	Intermittent Stream/River		
Dickinson	91.1	Unnamed	Intermittent Stream/River		
Dickinson	91.7	Unnamed	Intermittent Stream/River		
Dickinson	92.1	West Branch Lyon Creek	Perennial Stream/River	General Purpose Waters; Special Aquatic Life Use; Food Procurement	Supporting
Dickinson	95.3	Unnamed	Intermittent Stream/River		
Dickinson	95.9	Unnamed	Intermittent Stream/River		
Dickinson	96.3	Unnamed	Perennial Stream/River		
Dickinson	97.2	Unnamed	Perennial Stream/River		
Dickinson	98.8	Unnamed	Perennial Stream/River		
Marion	100.0	Unnamed	Perennial Stream/River		
Marion	101.4	Unnamed	Intermittent Stream/River		
Marion	101.7	Unnamed	Intermittent Stream/River		
Marion	103.3	Unnamed	Intermittent Stream/River		
Marion	105.2	Unnamed	Intermittent Stream/River		
Marion	105.2	Unnamed	Intermittent Stream/River		
Marion	105.3	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Marion	106.4	Unnamed	Intermittent Stream/River		
Marion	108.7	Unnamed	Intermittent Stream/River		
Marion	109.4	Unnamed	Intermittent Stream/River		
Marion	111.6	Unnamed	Intermittent Stream/River		
Marion	111.6	Unnamed	Intermittent Stream/River		
Marion	111.9	Unnamed	Intermittent Stream/River		
Marion	112.7	Unnamed	Intermittent Stream/River		
Marion	114.1	Mud Creek	Perennial Stream/River	General Purpose Waters; Special Aquatic Life Use; Domestic Water Supply; Food Procurement	Supporting
Marion	116.9	Unnamed	Intermittent Stream/River		
Marion	117.1	Cottonwood River	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Primary Contact Recreation Not Open to Public; Domestic Water Supply; Food Procurement; Groundwater Recharge; Industrial Water Supply; Irrigation; Livestock Watering	Supporting
Marion	118.9	Spring Branch	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use	Supporting
Marion	118.9	Unnamed	Intermittent Stream/River		
Marion	119.9	Unnamed	Intermittent Stream/River		
Marion	120.6	Unnamed	Intermittent Stream/River		
Marion	122.6	Unnamed	Intermittent Stream/River		
Marion	123.4	Catlin Creek	Perennial Stream/River	General Purpose Waters; Special Aquatic Life Use; Food Procurement	Supporting
Marion	124.2	Unnamed	Intermittent Stream/River		
Marion	124.3	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Marion	128.2	Doyle Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Domestic Water Supply; Food Procurement; Groundwater Recharge; Industrial Water Supply; Irrigation; Livestock Watering	Supporting
Marion	129.0	Unnamed	Intermittent Stream/River		
Marion	129.1	Unnamed	Intermittent Stream/River		
Marion	129.2	Unnamed	Intermittent Stream/River		
Marion	129.5	Unnamed	Intermittent Stream/River		
Marion	133.1	Unnamed	Intermittent Stream/River		
Marion	133.4	Unnamed	Intermittent Stream/River		
Marion	134.5	Unnamed	Intermittent Stream/River		
Butler	136.2	Unnamed	Perennial Stream/River		
Butler	136.3	Unnamed	Intermittent Stream/River		
Butler	136.8	Unnamed	Intermittent Stream/River		
Butler	137.4	Unnamed	Intermittent Stream/River		
Butler	139.4	Unnamed	Intermittent Stream/River		
Butler	140.1	Unnamed	Perennial Stream/River		
Butler	140.2	Unnamed	Perennial Stream/River		
Butler	140.2	Unnamed	Perennial Stream/River		
Butler	142.5	East Branch Whitewater River	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Domestic Water Supply; Food Procurement; Groundwater Recharge; Industrial Water Supply; Irrigation; Livestock Watering	Supporting
Butler	145.0	Diamond Creek	Perennial Stream/River	No Data	No Data

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Butler	145.6	Brush Creek	Intermittent Stream/River	No Data	No Data
Butler	146.5	Unnamed	Intermittent Stream/River		
Butler	148.8	Fourmile Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Food Procurement	Supporting
Butler	150.4	Unnamed	Intermittent Stream/River		
Butler	150.9	Rock Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use	Supporting
Butler	151.6	Unnamed	Intermittent Stream/River		
Butler	152.4	Unnamed	Intermittent Stream/River		
Butler	153.3	Unnamed	Intermittent Stream/River		
Butler	155.0	Spring Branch	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use	Supporting
Butler	156.0	Unnamed	Intermittent Stream/River		
Butler	158.3	Whitewater River	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Domestic Water Supply; Food Procurement; Groundwater Recharge; Industrial Water Supply; Irrigation; Livestock Watering	Supporting
Butler	159.1	Badger Creek	Intermittent Stream/River	General Purpose Waters; Expected Aquatic Life Use; Domestic Water Supply	Supporting
Butler	160.0	Unnamed	Intermittent Stream/River		
Butler	160.6	Unnamed	Intermittent Stream/River		
Butler	160.6	Unnamed	Intermittent Stream/River		
Butler	160.6	Unnamed	Perennial Stream/River		
Butler	164.1	Dry Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use	Supporting
Butler	165.4	Unnamed	Perennial Stream/River		
Butler	167.6	Unnamed	Perennial Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Butler	168.0	Fourmile Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Primary Contact Recreation Not Open To Public; Domestic Water Supply; Food Procurement; Groundwater Recharge; Industrial Water Supply; Irrigation; Livestock Watering	Supporting
Butler	169.6	Unnamed	Intermittent Stream/River		
Butler	170.9	Unnamed	Intermittent Stream/River		
Butler	172.5	Unnamed	Intermittent Stream/River		
Butler	174.9	Eightmile Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Domestic Water Supply; Food Procurement; Groundwater Recharge; Industrial Water Supply; Irrigation; Livestock Watering	Supporting
Butler	175.7	Unnamed	Intermittent Stream/River		
Butler	176.2	Unnamed	Intermittent Stream/River		
	176.9	Unnamed	Intermittent Stream/River		
Butler	177.5	Unnamed	Intermittent Stream/River		
Butler	178.1	Unnamed	Intermittent Stream/River		
Cowley	178.9	Unnamed	Intermittent Stream/River		
Cowley	180.9	Polecat Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use; Food Procurement	Supporting
Cowley	182.3	Unnamed	Intermittent Stream/River		
Cowley	183.1	Unnamed	Intermittent Stream/River		
Cowley	185.4	Stewart Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use	Supporting
Cowley	185.5	Stewart Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use	Supporting

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Cowley	185.6	Stewart Creek	Perennial Stream/River	General Purpose Waters; Expected Aquatic Life Use	Supporting
Cowley	187.0	Unnamed	Intermittent Stream/River		
Cowley	188.2	Unnamed	Intermittent Stream/River		
Cowley	188.3	Crooked Creek	Intermittent Stream/River	General Purpose Waters; Expected Aquatic Life Use	Supporting
Cowley	188.4	Unnamed	Intermittent Stream/River		
Cowley	190.2	Unnamed	Intermittent Stream/River		
Cowley	191.2	Unnamed	Intermittent Stream/River		
Cowley	191.6	Unnamed	Intermittent Stream/River		
Cowley	195.2	Unnamed	Intermittent Stream/River		
Cowley	196.2	Unnamed	Intermittent Stream/River		
Cowley	196.5	Unnamed	Intermittent Stream/River		
Cowley	198.3	Unnamed	Intermittent Stream/River		
Cowley	200.0	Unnamed	Intermittent Stream/River		
Cowley	201.4	Spring Creek	Intermittent Stream/River	General Purpose Waters; Expected Aquatic Life Use	Supporting
Cowley	201.8	Unnamed	Intermittent Stream/River		
Cowley	205.3	Unnamed	Intermittent Stream/River		
Cowley	206.4	Arkansas River	Artificial Path	General Purpose Waters; Special Aquatic Life Use; Primary Contact Recreation by Law or Written Permission; Domestic Water Supply; Food Procurement; Groundwater Recharge; Industrial Water Supply; Irrigation; Livestock Watering	Supporting
Cowley	207.8	Unnamed	Intermittent Stream/River		
Cowley	209.8	Unnamed	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
OKLAHOMA					
Kay	212.5	Chilocco Creek	Intermittent Stream/River		
Kay	213.3	Unnamed	Intermittent Stream/River		
Kay	216.3	Bois d'Arc Creek	Intermittent Stream/River	Agriculture; WW Aquatic Community; Hydropower; Primary Contact Recreation; Public and Private Water Supply; Fish Consumption; Aesthetics	Fully Supporting; Insufficient Information; Insufficient Information; Not Supporting; Fully Supporting; Not Assessed; Fully Supporting
Kay	217.2	Bois d'Arc Creek	Perennial Stream/River	Agriculture; WW Aquatic Community; Hydropower; Primary Contact Recreation; Public and Private Water Supply; Fish Consumption; Aesthetics	Fully Supporting; Insufficient Information; Insufficient Information; Not Supporting; Fully Supporting; Not Assessed; Fully Supporting
Kay	219.5	Unnamed	Intermittent Stream/River		
Kay	222.6	Bois d'Arc Creek	Perennial Stream/River	Agriculture; WW Aquatic Community; Hydropower; Primary Contact Recreation; Public and Private Water Supply; Fish Consumption; Aesthetics	Fully Supporting; Insufficient Information; Insufficient Information; Not Supporting; Fully Supporting; Not Assessed; Fully Supporting
Kay	223.0	Bois d'Arc Creek	Perennial Stream/River	Agriculture; WW Aquatic Community; Hydropower; Primary Contact Recreation; Public and Private Water Supply; Fish Consumption; Aesthetics	Fully Supporting; Insufficient Information; Insufficient Information; Not Supporting; Fully Supporting; Not Assessed; Fully Supporting
Kay	226.2	Bois d'Arc Creek	Perennial Stream/River	Agriculture; WW Aquatic Community; Hydropower; Primary Contact Recreation; Public and Private Water Supply; Fish Consumption; Aesthetics	Fully Supporting; Insufficient Information; Insufficient Information; Not Supporting; Fully Supporting; Not Assessed; Fully Supporting

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Kay	230.8	Bois d'Arc Creek	Perennial Stream/River	Agriculture; WW Aquatic Community; Hydropower; Primary Contact Recreation; Public and Private Water Supply; Fish Consumption; Aesthetics	Fully Supporting; Insufficient Information; Insufficient Information; Not Supporting; Fully Supporting; Not Assessed; Fully Supporting
Kay	232.6	Unnamed	Intermittent Stream/River		
Kay	234.1	Bois d'Arc Creek	Perennial Stream/River	Agriculture; WW Aquatic Community; Hydropower; Primary Contact Recreation; Public and Private Water Supply; Fish Consumption; Aesthetics	Fully Supporting; Insufficient Information; Insufficient Information; Not Supporting; Fully Supporting; Not Assessed; Fully Supporting
Kay	235.0	Bois d'Arc Creek	Perennial Stream/River	Agriculture; WW Aquatic Community; Hydropower; Primary Contact Recreation; Public and Private Water Supply; Fish Consumption; Aesthetics	Fully Supporting; Insufficient Information; Insufficient Information; Not Supporting; Fully Supporting; Not Assessed; Fully Supporting
Kay	236.8	Bois d'Arc Creek	Perennial Stream/River	Agriculture; WW Aquatic Community; Hydropower; Primary Contact Recreation; Public and Private Water Supply; Fish Consumption; Aesthetics	Fully Supporting; Insufficient Information; Insufficient Information; Not Supporting; Fully Supporting; Not Assessed; Fully Supporting
Kay	238.5	Cowskin Creek	Intermittent Stream/River	No Data	No Data
Kay	239.0	Salt Fork Arkansas River	Artificial Path	Aesthetics; Agriculture;WW Aquatic Community; Industrial and Municipal Process and Cooling Water;Primary Contact Recreation; Public and Private water supply; Fish Consumption	Insufficient Data; Fully Supporting/Not Assessed; Not Supporting, Fully Supporting; Not Supporting; Not Assessed; Not Assessed
Kay	240.8	Deadman Creek	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Noble	248.5	Red Rock Creek	Perennial Stream/River		
Noble	252.7	Unnamed	Intermittent Stream/River		
Noble	254.3	Unnamed	Intermittent Stream/River		
Noble	254.8	Greasy Creek	Intermittent Stream/River		
Noble	257.8	Unnamed	Intermittent Stream/River		
Noble	258.7	Unnamed	Intermittent Stream/River		
Noble	260.3	Black Bear Creek	Perennial Stream/River		
Noble	261.6	Unnamed	Intermittent Stream/River		
Noble	262.6	Unnamed	Intermittent Stream/River		
Noble	264.2	Long Branch	Intermittent Stream/River		
Noble	266.7	Unnamed	Intermittent Stream/River		
Payne	269.2	East Brush Creek	Intermittent Stream/River		
Payne	270.0	Unnamed	Intermittent Stream/River		
Payne	271.1	Little Stillwater Creek	Intermittent Stream/River		
Payne	271.3	Unnamed	Intermittent Stream/River		
Payne	273.0	Unnamed	Intermittent Stream/River		
Payne	274.4	Unnamed	Intermittent Stream/River		
Payne	275.8	Unnamed	Intermittent Stream/River		
Payne	278.0	Unnamed	Intermittent Stream/River		
Payne	279.0	Unnamed	Intermittent Stream/River		
Payne	279.7	Unnamed	Intermittent Stream/River		
Payne	283.2	Long Branch	Intermittent Stream/River		

Table F-1 Major and Sensitive Waterbodies

State / County	Approx. MP	Waterbody Name	Intermittent, Perennial, Reservoir, or Lake	State Water Quality Classification	Supports Use Designation
Payne	284.7	Cimarron River	Artificial Path		
Payne	286.5	Unnamed	Intermittent Stream/River		
Payne	287.6	Cabin Creek	Intermittent Stream/River		
Payne	288.9	Cabin Creek	Intermittent Stream/River		
Payne	289.0	Cabin Creek	Intermittent Stream/River		
Payne	289.0	Cabin Creek	Intermittent Stream/River		
Payne	289.2	Cabin Creek	Intermittent Stream/River		

Appendix G
Special Status Species
and
Species of Concern Tables

Table G-1 Special Status Species Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Mammals					
Gray bat *Myotis grisescens*	FE; IL-E	This species forages primarily within forested areas along streams and lakes. Winter roosts are in deep vertical caves with domed halls. Large summer colonies utilize caves that trap warm air and provide restricted rooms or domed ceilings. Maternity roosts typically are in caves with stream flow and are separate from summer bachelor roosts.	None. Although the project crosses the historic range of this species, the species is not known to occur along the project route.	Yes. The project does not occur within roosting habitat for this species. Occurrence would be limited to migrating individuals.	Tuttle 1979; Brady et al. 1992.
Indiana bat *Myotis sodalis*	FE; MO-E; IL-E	This species forages primarily in riparian forests and flood-plains, as well as in upland forests, low field, and pastures. Maternity roosts are located beneath loose bark of living and dead trees (especially oak and hickory spp.). Young are generally born in June. Winter hibernacula occur in caves and mines with 85% of this species population hibernating in Shannon, Washington, and Iron counties, MO.	High. Suitable roosting and foraging habitats occur in Missouri and Illinois. No winter hibernacula and maternity roosts are known to occur within the project vicinity.	No.	Harvey et al. 1999; MDC 2000a.
Gray wolf *Canis lupus*	FT; ND-SC	No particular habitat preference. Habitats may include: alpine, desert, conifer forest, hardwood forest, mixed forest, grasslands, savannas, shrubland/ chaparral, tundra, and woodlands.	Low. This species has been extirpated from most of the project route. However, wolves from Canada may wander into north end of ROW in North Dakota in Pembina and Walsh counties.	No.	Hoffmeister 1986; Clark and Stromberg 1987; Mech 1970; Mech and Boitani 2003.
Plains spotted skunk *Spilogale putorius interrupta*	SD-SC; MO-E	This species inhabits upland grassland prairie, brushy areas, cultivated land, and forests. Their dens are located below ground in grassy banks, rocky crevices or along fence rows, as well as above ground in hay stacks, woodpiles, hollow logs, trees, or on brushy heaps. Young are born from April to July.	None.	Yes. The project does not occur within the geographic range of this species.	

Table G-1 Special Status Species Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Eastern spotted skunk *Spilogale putorius*	KS-T; MO-E; SD-SC	This species prefers forest edge, prairie, brushy areas, and cultivated land, especially if rock outcrops and shrubs are present. Their dens are located below ground in grassy banks, rocky crevices or along fence rows, as well as above ground in hay stacks, woodpiles, brushy heaps, hollow logs, and abandoned buildings or outbuildings. Young are born in May or June.	Moderate. Habitat for this species occurs along the project route. This species has been recorded in Marshall, Nemaha, Brown, and Doniphan counties in KS.	No.	Collins et al. 1995; MDC 2000a.
River otter *Lontra Canadensis*	NE-T; IL-E	Key habitats are rivers, streams, lakes, ponds, marshes, estuaries, and beaver flowages, especially near waterbodies with wooded shorelines or nearby wetlands. When inactive, occupies hollow logs, spaces under roots, logs, or overhangs, abandoned beaver lodges, dense thickets near water, or burrows of other animals; such sites also are used for rearing young	Moderate. This species has been identified as occurring along the project route at the Elkhorn and Platte River crossings in Stanton and Colfax counties, NE. This species is also known to occur within 5 miles of ROW in IL.	No.	NatureServe 2006.
Birds					
Least bittern *Ixobrychus exilis*	MO-SC; IL-T	Nest in freshwater wetlands with dense, tall growths of emergent vegetation (particularly *Typha* spp, *Carex* spp., *Scirpus* spp., or *Phragmites australis*) interspersed with some woody vegetation and open, fresh water. In the north-central U.S., breeding and nesting may occur from May-July. Incubation lasts for 17-20 days; young usually leave nest by the 13th-15th day.	Moderate. Suitable nesting habitat for this species could occur along the project route. Thsi species has been identified in Buchanan, Chariton, Lincoln, and St. Charles counties in MO, and in Madison and Fayette counties in IL.	No.	Weller 1961; Bohlen 1989; Gibbs et al. 1992.

Table G-1 Special Status Species Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Bald eagle *Haliaeetus leucocephalus*	FT; ND-SC; SD-T; NE-T; KS-T; MO-E; IL-T; OK-T	This species typically occurs near large bodies of water that support suitable roosting and foraging habitat. Nest sites are located in proximity to open water and generally are found in mature heterogeneous stands of multi-storied trees, but also may nest on cliffs. Winter habitat typically includes areas of open water, adequate food sources, and sufficient diurnal perches and night roosts. Breeding season: January through July. Winter season: November 15 through March 15.	Moderate. Nesting and winter roosts would be limited to river corridors along the project route. A historic nest has been documented in the vicinity of the project ROW at the Missouri River crossing in Yankton, SD. State designated critical habitat occurs at the Big Blue and Missouri river crossings in KS.	No.	Collins et al. 1995; Kingery 1998; MDC 2000a.
Peregrine falcon *Falco peregrinus*	IL-T; NE-SC; KS-E	This species is found over a wide variety of habitats, but are generally located near open water or marshes that support high concentration of shorebirds or waterfowl. Nest sites occur on tall steep-walled cliffs, bridges, or buildings. Preferred foraging habitat includes lakes, rivers, and wet meadows. Breeding season: April 15 to July 15.	None. No nesting habitat occurs in the project vicinity.	Yes. Occurrence by this species along the project route would be limited to foraging and migrating individuals.	Collins et al. 1995; MDC 2000a.
Greater Prairie-chicken *Tympanuchus cupido*	MO-E; ND-SC	Prime habitat for this species includes mid-grass and tall-grass prairies bordered by open oak woodlands, oak forests, and cropland. In western Kansas, they nest in sand-sage prairie and forage in corn and wheat fields. In Missouri, nesting habitat is limited to cropland and nearby prairies mainly on the Osage Plains. Breeding season: March through July.	Low. This species could potentially be found in Audrain County MO. This species is known to occur within 5 miles of the projexct route in Sargent County, ND.	No.	http://mdc.mo.gov/nathis/birds/birdatlas/maintext/0400024.htm

Table G-1 Special Status Species Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
King rail *Rallus elegans*	MO-E; NE-SC	This species inhabits fresh and brackish wetlands. King rails prefer wetlands with abundant grasses, sedges, rushes and cattails. Nest sites occur in herbaceous cover over shallow water in river floodplains. The adult King Rail molts completely after nesting and is flightless for nearly a month. Breeding season: April-June	Low. Potentially suitable wetland habitat could ocur along the project route in Buchanan, Carroll, Chariton, Lincoln, and St. Charles counties, MO. This species has also been identified in Seward County, NE.	No.	MDC 2000a; Meanley 1992.
Whooping crane *Grus americana*	FE; ND-SC; SD-E; NE-E; OK-E; KS-E	During migration, this species feeds and roosts in a variety of habitats including croplands, large and small freshwater marshes, the margins of lakes and reservoirs, and submerged sandbars in rivers. Spring and Fall migration through the project regions generally occurs from February through April and from October through November, respectively.	Low. The project area occurs east of the primary migration route for this species. However, this species has been documented in Barnes County, ND; Beadle and Clark counties, SD; Saline County, NE; Marshall County, KS; and Noble Pawnee, and Payne counties, OK.	No.	Collins et al. 1995; Meine and Archibald 1996.
Snowy plover *Charadrius alexandrinus*	KS-T	This species inhabits open alkaline flats, mudflats, sandy shorelines, sandbars with little vegetation along rivers, lakes, ponds, and marshlands. Nesting often occurs on white saline flats. Breeding season: May 1 through August 15.	Low. Habitat for this species could potentially occur along the project route in KS. This species has been recorded in Cowley County, KS.	No.	Collins et al. 1995.

Table G-1 Special Status Species Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Piping plover *Charadrius melodus*	FT; ND-SC; SD-T; NE-T; KS-T	This species inhabits open sandy areas and saline flats with little vegetation along rivers, lakes, ponds, and marshlands. It nests on sandbars and sand and gravel beaches with short, sparse vegetation along inland lakes, on natural and dredge islands in rivers, on gravel pits along rivers, and on salt-encrusted bare areas on interior alkali ponds and lakes. Sparse clumps of grass or herbaceous vegetation are important habitat components. Breeding season: May 1 through August 15.	Low. Potential breeding habitat would be limited to the Missouri River (Yankton, County, SD), Elkhorn River (Stanton County, NE), and Platte River (Colfax, NE).	No.	Collins et al. 1995; PRESP 2004.
Eskimo curlew *Numenius borealis*	FE; SD-E; KS-E	This species is an extremely rare spring migrant that feeds and rests in burned-over prairies, agricultural areas, wetlands, and marshes.	None.	Yes. This has not been documented in the project vicinity since the mid 1900's.	Meine and Archibald 1996.
Interior least tern *Sterna antillarum athalassos*	FE; SD-E; NE-E; MO-E; OK-E; KS-E	Nesting habitat consists of sparsely vegetated sandy, gravelly, or silty, beaches and sandbars within wide, unobstructed river channels or salt flats along lake shorelines and irrigation reservoirs. Nest locations are generally away from the water's edge since nesting typically begins while river flows are high and relatively small amounts of sandy habitat is exposed. Breeding season: May 1 through August 15.	Low. Potential breeding habitat would be limited to the Missouri River (Yankton, County, SD), Elkhorn River (Stanton County, NE), and Platte River (Colfax, NE).	No.	USFWS 1990.
Barn owl *Tyto alba*	MO-E; IL-E	This cavity-nesting species is primarily a bird of open country - residential and agricultural areas, old fields and woodland edges. Nests in buildings, tree cavities, caves, cliff crevices, and cut bank burrows Breeding season: late winter, spring, and/or early summer.	Low. Potential breeding habitat could occur along the project route. crossed by ROW. This species has been recorded in St. Charles County, MO; and Fayette and Marion counties in IL.	No.	INHS 2005; Hands et al. 1989a; Bunn et al. 1982; Taylor 1994.

Table G-1 Special Status Species Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Loggerhead shrike *Lanius ludovicianus*	MO-SC; IL-T	This species is found in open areas with mixed shrub/brush hedgerows and scattered thorny trees. Thorny plant species (osage orange, honey locus, multiflora rose, wild crabapple) are important for impaling prey. In MO and IL, nesting peaks in late April, with a second peak in late May in MO.	Low. Potential breeding habitat could occur along the project route. crossed by ROW. This species has been recorded in Buchanan County, MO; and Bond, Fayette, and Marion counties in IL.	No.	INHS 2005; Yosef and Grubb 1994; Tyler 1992; Kridelbaugh 1983; Porter et al. 1975.
Henslow's sparrow *Ammodramus henslowii*	KS-SC; MO-SC; IL-E	This species breeds in a variety of grassland habitats with tall, dense grass and herbaceous vegetation. Meadows, open grasslands and weedy and abandoned fields, all with wet areas, dense grass-forb mosaics and scattered small woody growths appear to be essential. Breeding season: April-July.	Low. Potential breeding habitat could occur along the project route. This species has been recorded in Butler, Dickinson, and Nemaha counties, KS; Randolph and Clinton counties, MO; and Marion County, IL.	No.	INHS 2005; Robins 1971; Clawson 1991; Zimmerman 1988; Skinner 1975; Herkert 1994, 1997.
Yellow-crowned night heron *Nyctanassa violacea*	IL-E	This species nests on barrier islands, dredge spoil islands, and bay islands that contain forested wetlands or scrub/shrub thickets. Colonies may be located in dense shrubby thickets, forests with an open understory. They use similar habitat types for nesting and roosting, avoiding areas with insufficient cover. They hunt along the shores of tidal creeks and tide pools within salt and brackish marshes dominated by salt marsh cordgrass.	Low. Potential nesting could be crossed by the project ROW. This species has been identified within 5 miles from the ROW in Fayette County, IL.	No.	http://www.state.nj.us/dep/fgw/ensp/pdf/end-thrtened/ycnheron.pdf

Table G-1 Special Status Species Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Pied-billed grebe *Podilymbus podiceps*	IL-T	This species breeds on seasonal or permanent ponds with dense stands of emergent vegetation, bays and sloughs. Uses most types of wetlands in winter.	Low. Potential nesting could be crossed by the project ROW. This species has been identified within 5 miles from the ROW in Fayette County, IL.	No.	Cornell Lab of Ornithology 2003.
Northern Harrier *Cicus cyaneus*	MO-E	This species breeds in marshes, meadows, grasslands, and cultivated fields. Perches on ground or on stumps or posts. Nests on the ground, commonly near low shrubs, in tall weeds or reeds, sometimes in bog; or on top of low bush above water, or on knoll of dry ground, or on higher shrubby ground near water, or on dry marsh vegetation.	Low. Potential nesting could be crossed by the project ROW in MO.	No.	NatureServe 2006.
Fish					
Chestnut lamprey *Ichthyomyzon castaneus*	KS-T	This species is found in moderate-sized rivers and large creeks. Spawning occurs in smaller tributary streams in swift shallow riffles where the gravel is clean. Eggs are laid in a nest in the river bottom. Spawning period: spring or summer.	Moderate. Known to occur in Missouri River in Kansas.	No.	KDWP 2004; Haslouer et al. 2005; Becker 1983.
Pallid sturgeon *Scaphirhynchus albus*	FE; SD-E; NE-E; KS-E; MO-E; IL-E	This species is distributed from the headwaters of the Missouri River (Fort Benton-Great Falls, Montana) through the Mississippi River to New Orleans, Louisiana. It inhabits bottom areas of large turbid rivers that have strong current and a firm sandy substrate. They also may be found along sandbars and behind wing dikes. Spawning period: April through August.	Moderate. Known to occur in South Dakota, Nebraska, Kansas, Missouri, and Illinois in the Missouri, James, and Mississippi rivers.	No.	Collins et al. 1995; Lee et al. 1980. PRESP 2004.

Table G-1 Special Status Species Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Lake sturgeon *Acipenser fulvescens*	NE-T; MO-E; IL-E	This species is generally bottom dwelling and occurs in large rivers and shallow areas of large lakes. They are most often associated with silt-free deep run and pool habitats of rivers (i.e., >5 ft deep), and generally avoid aquatic vegetation. Gravelly tributary streams of rivers and lakes serve as spawning habitat, although rocky, wave-swept areas near lake shores and islands serve as spawning habitat when preferred habitats are unavailable. Spawning period: late-spring.	Moderate. Known to occur in South Dakota and Nebraska in the Missouri River.	No.	USFWS 2001; Harkness and Dymond 1961; MDC 2000a.
Flathead chub *Platygobio gracilis*	KS-T	This species occurs from the Rio Grande to the Arctic Circle in small creeks and the largest rivers that have turbid fluctuating water levels and unstable sand bottoms. This species relies on flood flows to spawn successfully. Spawning occurs after water levels have subsided after peak flows, when water temperatures are warmer and substrate is more stable. Relies on flood flows to spawn successfully. Spawns after rivers have subsided following peak flow.	Low. Known to occur in Kansas in the Missouri and South Fork Nemaha rivers.	No.	KDWP 2004; Collins et al. 1995; Haslouer et al. 2005.
Silver chub *Macrhybopsis storeriana*	MO-SC KS-E	This species is a fish of large sandy rivers. It lives on or near the bottom where it finds food by sight or taste. It is found in deep water during the summer months. Little is known about the reproductive biology of this species.	Low. Known to occur in Kansas in Cowley County streams and Missouri in Chariton County streams.	No.	KDWP 2004; Haslouer et al. 2005.
Sturgeon chub *Macrhybopsis gelida*	NE-E; KS-T MO-SC SD-T	This species prefers large turbid sandy rivers over substrate of small gravel and coarse sand. It is often found in areas swept by currents especially at heads of islands or exposed sandbars. Spawning period: late spring to midsummer.	Low. Known to occur in South Dakota, Nebraska, Kansas, and Missouri in the Platte and Missouri rivers.	No.	KDWP 2004; Haslouer et al. 2005; MDC 2000a.

Table G-1 Special Status Species Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Sicklefin chub *Macrhybopsis meeki*	NE-SC; KS-E MO-SC SD-E	This species requires continuously and heavily turbid waters of large rivers where it frequents areas of strong current flowing over sand or gravel substrate. Spawning period: spring (likely from late March and May).	Low. Known to occur in South Dakota, Nebraska, Kansas, and Missouri in the Platte and Missouri rivers.	No.	KDWP 2004; Haslouer et al. 2005; MDC 2000a.
Western silvery minnow *Hybognathus argyritis*	KS-T; MO-SC	This species prefers protected areas in large, turbid rivers and prairie streams. In streams they are typically found in water less than one foot deep and shallow shore water heavily vegetated with emergent grasses and reeds. In protected areas of larger rivers, they move in large schools of 50 to l00 individuals along the bottom in deep, quiet water. While little is known about spawning, this species probably scatters eggs on silt substrate in quiet water.	Low. Known to occur in Kansas in the Missouri and South Fork Big Nemaha rivers and in Missouri in the Missouri River.	No.	KDWP 2004; Pflieger 1997.
Blacknose shiner *Notropis heterolepsis*	ND-SC; NE-E; MO-SC	This species prefers clean weedy lakes and streams.	Low. Known occurrence in Nebraska and Kansas in the Missouri River. Potential occurrence in North Dakota in the Sheyenne River.	No.	Lee et al. 1980.
Silverband shiner *Notropis shumard*	KS-T	This species is found in slow-flowing pools of large, turbid rivers. It prefers moderately deep, flowing water along sand or gravel bars. The life history of this fish is relatively unknown but it probably spawns in summer. Spawning period: late spring or summer.	None. Potential occurrence in Kansas.	Yes. No records for streams crossed by pipeline route.	Collins et al. 1995.

Table G-1 Special Status Species Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Topeka shiner *Notropis topeka*	FE; SD-SC; KS-T; MO-E; NE-E	This species inhabits pool and run areas in the headwaters of small prairie streams with high water quality and cool temperatures. These streams generally exhibit intermittent flow during summer; however pools are maintained by spring or groundwater percolation. The substrate of these occupied streams consist mainly of clean gravel, however bedrock and clay hardpan overlain by a thin silt layer are not uncommon. Spawning period: late spring and summer.	Moderate. Known to occur in South Dakota in Wolf Creek, in Nebraska in the Missouri River and in Kansas in the Missouri River and North Fork Elm Creek and potential occurrence in Cowley County.	No.	KDWP 2004; Bessken 1997; Cross and Collins 1995; Pflieger 1997.
Northern redbelly dace *Chrosomus eos*	NE-T	This species occurs a variety of habitats ranging from streams to bog lakes.	Low. Known occurrence in Nebraska in the Missouri River.	No.	Lee et al. 1980.
Finescale dace *Phoxinus neogaeus*	NE-T	This species occurs in a variety of habitats ranging from streams to bog lakes.	None. Known occurrence in Nebraska in the Missouri River.	No.	Lee et al. 1980.
Amphibians					
Illinois chorus frog *Pseudacris strecheri illino*	IL-T	Sand prairies and remnants such as sandy agricultural fields and waste areas. Burrows in sand and emerges after heavy, early spring rains to breed in nearby flooded fields, ditches, and other vernal ponds.	Low. Potential habitat could occur along the project route. This species has been recorded within 5 miles of ROW in Madison County, IL.	No.	INHS 2006.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Reptiles					
Western fox snake *Elaphe vulpine vulpina*	MO-E	This species inhabits cultivated fields, along wooded stream valleys and in natural prairies that adjoin marshes. It is active between late April and October. Small mammal burrows and brush piles are used as den sites during winter hibernation. Mating begins in April and females lay eggs under logs or leaf litter in May or June. Young hatch in August or September.	Low. Potential habitat could occur along the project route. This species has been recorded in Lincoln and Buchanan counties, MO.	No.	MDC 2000a.
Smooth earth snake *Virginia valeriae*	KS-T	This species inhabits rocky hillsides in moist woodlands and woodland edges in river and stream valleys where they may be found on the slopes under leaf litter, rocks, or logs. During winter, it utilizes deep crevices on rocky hillsides. Mating begins in the spring after emergence from hibernation. Mating may also occur in the fall. Young hatch in August or September.	None.	Yes. The project does not occur within the geographic range of this species.	GPNC 2005; Collins 1993.
Massasauga *Sistrurus catenatus* spp.	FC; NE-T MO-E; IL-E	This subspecies prefers marshy and swamp areas dominated by cordgrass, sedges, and bulrushes, as well as lowland areas along river and lakes. The snakes hibernate singly in mammal burrows, crayfish burrows, and in crevices or rock piles close to water. Courtship and mating occurs in spring and young are born in late July through early September.	Moderate. Potential habitat could occur along the project route. This species has been recorded in Jefferson and Gage counties, NE; Chariton, Randolph, and St. Charles counties, MO; and Bond, Fayette, and Madison counties, IL.	No.	Briggler and Johnson 2004; Collins 1993; Johnson and Figg 1993; MDC 2000a; Seigel 1986.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
False map turtle *Graptemys pseudogeo-graphica*	SD-T	This species inhabits slow to swift current rivers and streams, river sloughs, oxbow lakes, ponds, impoundments, and backwaters. They are devoted baskers, often resting just below the surface on submerged branches from fallen trees and projecting logs.	Low. Occurrence by this species would be limited to the Missouri River crossing in Yankton, SD. This species has been documented near Gavin's Point along the Missouri River.	No.	USGS 1995.
Kirtland's snake *Clonophis kirtlandi*	IL-T	This species inhabits prairie wetlands, wet meadows, and grassy edges of creeks, ditches, and ponds, usually in association with crayfish burrows. It also has been found in damp habitat remnants in vacant lots of urban settings. Secretive and nocturnal, it shelters beneath logs and surface debris, or in crayfish burrows, by day.	Moderate. Potential habitat could occur along the project route. This species has been recorded within 5 miles of ROW in Fayette County, IL.	No.	INHS 2006.
Invertebrates					
Dakota skipper *Hesperia dacotae*	FC; ND-SC; SD-SC	This species is considered an obligate of undisturbed native prairie. The butterfly inhabits wet lowland prairie dominated by bluestem grasses and dry upland prairie dominated by mixed bluestem and needle stem grasses. Both habitat types contain an abundance of flowering plants and have alkaline soils. Adults emerge in mid-June to early July, and mate during a flight period that lasts for about three weeks.	High. The project ROW occurs within the known range of this species. This species has been documented in Ransom, Sargent, and Barnes counties, ND; and marshall and Day counties, SD.	No.	Vaughn and Shepherd 2005; Dana 1983; McCabe 1981.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Spectaclecase *Cumberlandia monodonta*	FC; MO-SC	This species occurs in large rivers and is a habitat-specialist. It is found in riverine microhabitats sheltered from the main force of current. Occurs in substrates from mud and sand to gravel, cobble, and boulders in relatively shallow riffles and shoals with slow to swift current. The species appears to spawn twice a year during relatively short periods in the autumn and spring.	Low. Potential occurrence in Lincoln County, MO.	No.	USFWS 2002; Baird 2000.
Scaleshell mussel *Leptodea leptodon*	FE; SD-SC; NE-E	Occurs in riffles with moderate to high gradients in creeks to large rivers. Typically associated with riffles, relatively strong currents, and substrate of mud, sand, or assemblages of gravel, cobble, and boulder. Restricted to rivers with relatively good water quality in stretches with stable channels. Little is known concerning the reproduction of this species.	Low. Known to occur in South Dakota and Nebraska in the Missouri River.	No.	Oesch 1995; Cummings and Mayer 1992; Roberts 2004.
Higgins' eye pearlymussel *Lampsilis higginsi*	FE; SD-SC	Found in substrates of mud with a mixture of gravel and stones. Prefers rapidly flowing water. The exact breeding season is unknown.	Low. Known to occur in South Dakota in the Missouri River and Illinois in the Mississippi River.	No	Hornbach 2004; Cummings and Mayer 1992.
Winged mapleleaf *Quadrula gragosa*	FE; SD-SC	The species is found in riffles with clean gravel, sand, or rubble bottoms.	Low. Known to occur in South Dakota in the James River.	No.	USFWS 2005.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Plants					
Decurrent false aster *Boltonia decurrens*	FT; MO-E; IL-T	The species grows in open muddy bottomlands and is dependent upon disturbance from cyclical flooding to maintain the habitat suitable for its survival. Historically, it was found on the shores of lakes and the banks of streams. Currently, it is most common in disturbed lowland areas where human-caused disturbance provides adequate habitat. Flowers: July-October.	Moderate. Potential habitat could occur along the project route. Populations currently known for the Mississippi River near St. Louis and along the Illinois River in west-central Illinois.	No.	USFWS 1990; MDC 2000b.
Small white lady's-slipper *Cypripedium candidum*	NE-T	This species is found in wetland prairie habitats: mesic blacksoil prairie, wet blacksoil prairie, glacial till hill prairie, sedge meadow, calcareous fen, glade. Found on calcareous soils. Flowering occurs May-June.	Low. Potential habitat could occur along the project route. Known distribution includes wetland areas in Nebraska.	No.	Bowles 1983; NatureServe 2005.
Eastern prairie fringed orchid *Platanthera leucophaea*	FT; IL-E	Mesic-wet calcareous tallgrass sand or silt loam prairie. May also be found in open graminoid portions of lake margins, sedge, meadows, and marshes, wet prairie or open swamps, or bogs and shores. Flowering begins late June to early July. Flowers do not appear annually.	Moderate. Potential habitat could occur along the project route. Known distribution includes prairie and wetland areas in Missouri, Illinois, and Oklahoma.	No.	Bowles 1983; USFWS 1991.
Western prairie fringed orchid *Platanthera praeclara*	FT; SD-SC; NE-T	Occurs in mesic upland tallgrass prairie in the southern part of its range, often in swales, and wet-mesic tallgrass prairie and sedge meadows in the northern part of its range. Also known from prairies and swales in sand dune complexes that are fed by shallow underground water. Flowers June-July.	Moderate. Potential habitat could occur along the project route. Known distribution includes all states along ROW except Oklahoma. Native prairie crossed by ROW in North Dakota, Nebraska, and Kansas.	No.	MDC 2000b; Seig and King 1995; Sieg and Bjugstad 1994.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Prairie bush-clover *Lespedeza leptostachya*	FT; IL-E	In Illinois, this species is generally found on dry gravel prairies and dry-mesic prairies It is often found on north-facing prairie slopes. On these slopes, it typically occurs either in thin soil at the margins of rocks or in gravelly loamy soil. Flowers in July, August.	None.	Yes. Known primarily from northern Illinois and not known from any Illinois counties crossed by ROW. Also no suitable native prairie crossed by ROW in Illinois.	CPC 2005; TNC 1995; Sather 1990; http://www.centerforplantconservation.org; http://plants.usda.gov/java/nameSearch
Running buffalo clover *Trifolium stoloniferum*	FE; MO-E	This species is commonly found in areas of rich soils in the ecotone between open forest and prairie; and moist, partially shaded woodlands- sometimes along stream or river terraces. Also found in areas disturbed by grazing or mowing. This species historically grew along bison trails. Flowers: April-June.	Moderate. Potential habitat could occur along the project route. Known distribution includes Kansas, Missouri, and Illinois. Suitable habitat may be crossed by ROW.	No.	MDC 2000b; USFWS 2005.
Royal Catchfly *Silene regia*	IL-E	This species is found in habitats that include mesic black soil prairies, openings in upland forests, savannas, scrubby barrens, and open areas along roadsides and railroads.	High. The project ROW occurs within the known range of this species. This species has been documented in Madison County, IL within 5 miles of ROW.	No.	Hilty 2006; EIU 2006.
Prairie Spiderwort *Tradescantia bracteata*	IL-T	Common spiderwort likes sandy soils and seems to be most abundant where grazing is light to moderate. Dry typical prairie and dry sand prairies.	High. The project ROW occurs within the known range of this species. This species has been documented in Madison County, IL within 5 miles of ROW.	No.	USFS 2002.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Spring Ladies' Tresses *Spiranthes vernalis*	IL-E	This species is typically found in upland dry to mesic forests, dry to mesic prairies, and successional cultured fields.	High. The project ROW occurs within the known range of this species. This species has been documented in Madison County, IL within 5 miles of ROW.	No.	USFS 2002.

FE = Federally endangered
FT = Federally threatened
FC = Federal candidate

ND-SC = North Dakota Species of Conservation Priority
SD-E = South Dakota endangered.
SD-T = South Dakota threatened.
SD-SC = South Dakota Species of Concern
NE-SC = Nebraska species of special concern.
KS-E = Kansas endangered.
KS-T = Kansas threatened.
KS-SC = Kansas species in need of conservation.
MO-E = Missouri endangered.
MO-SC = Missouri species of conservation concern.
IL-E = Illinois endangered.
IL-T = Illinois threatened.
OK-E = Oklahoma endangered.
OK-T = Oklahoma threatened.

Table G-2 Species of Special Concern Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Mammals					
Fisher *Martes pennanti*	ND-SC	This species inhabits upland and lowland forests, including coniferous, mixed, and deciduous forests. Fishers generally avoid areas with little forest cover or significant human disturbance and conversely prefer large areas of contiguous interior forest.	None. The historic range of this species extends into the extreme northeast portion of North Dakota in Pembina County.	Yes. The project does not cross suitable habitat for this species.	Powell et al. 2003; NatureServe 2005.
Long-tailed weasel *Mustela frenata*	MO-SC	This species is commonly found in woodlands, field edges, riparian grasslands, swamps, and marshes; preferred habitat in MO is woodlands and thickets near water. Dens are in abandoned mammal burrows, rock crevices, brushpiles, stump hollows, or spaces among tree roots. Breeding period: July-August. Litters born April through May.	High. Suitable habitat for this species occurs along the project route. This species has been located in Randolph and Carroll counties in MO.	No.	MDC 2004a; Svendsen 2003.
Southern flying squirrel *Glaucomys volans*	KS-SC	In Kansas southern flying squirrels are found in the eastern third of the state, being fairly restricted to thick stands of deciduous forest. Pine and hardwood trees provide suitable foraging and nesting habitat. Snags are important for nesting. Breeding period: February to March and again from June-July; gestation is 40 days; pups weaned at 5 weeks.	Low. Relatively small amounts of forest habitat would be crossed in Kansas. This species has been recorded in Doniphan County, KS.	No.	MOK 2002; Hall 1951; Fitzgerald 1994.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Southern bog lemming *Synaptomys cooperi*	KS-SC	Two subspecies occur in Kansas, *Synaptomys cooperi gossi* in the eastern half of the state, and *S. c. paludis* in a small area in the southwestern part of the state. Southern bog lemmings inhabit communities of thick matted ground cover with high overhead vegetation in both forest and grassland, but are not restricted to bogs. Favored habitats include vegetation surrounding springs, damp to wet grasslands, and marshes. Upland grasslands near wetland and riparian areas are also used. Breeds year-round; peak April-September.	Low. Relatively small amounts of forest habitat would be crossed in Kansas. This species has been recorded in Nemaha and Brown counties in KS.	No.	MOK 2002; Schwartz and Schwartz 1981.
Birds					
Red-necked grebe *Podiceps grisegena*	SD-SC	Nesting habitat includes wetlands with patches of open water and stands of bulrush or similar emergent vegetation. Fresh water lakes, lagoons, floodwaters, and calm rivers with some emergent vegetative cover are commonly used. Prefers areas having both open water and wetland vegetation. Eggs laid from May-June; incubate for 22-27 days; young fledge at about 8-10 weeks.	Low. Suitable breeding habitat for this species occurs along the project route. This species has been recorded in Marshall and Day counties in SD.	No.	WIDNR 2005; NatureServe 2005.
Pied-billed grebe *Podilymbus podiceps*	MO-SC	This species inhabits ponds with much shoreline and emergent vegetation, marshes with areas of open water 15 to 25 inches deep and marshy inlets and bays. Found on ponds, sloughs, flooded areas, marshy parts of lakes and rivers. Nesting occurs May-July; Incubate 23 days; young fledge in approximately 35 days.	Low. Suitable breeding habitat for this species occurs along the project route. This species has been recorded in Carroll and Buchanan counties in MO.	No.	NPWRC 2005; MDC 2004b.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
American white pelican *Pelecanus erythrorhynchos*	SD-SC	This species inhabits rivers, lakes, reservoirs, estuaries, bays, marshes. Rests on islands and peninsulas. Nests usually on islands or peninsulas in brackish or freshwater lakes, isolated from mammalian predators. Nests on low, flat or gently sloping terrain in a slight depression or on a mound of earth and debris. Nesting begins in May or June; incubation averages 31-32 days; young fledge at 9-10 weeks.	Low. Suitable breeding habitat for this species would be limited to the Missouri River crossing in Yankton County, SD.	No.	Evans and Knopf 1993; NatureServe 2005.
Great egret *Ardea alba*	MO-SC	This species is a rare breeder in Missouri. They may be found in marshes, swampy woodlands, streams, lakes, and ponds; also fields and meadows. Nests primarily in tall trees, usually with other colonial water birds; in woods or thickets near water. Returns to the same colony sites year after year. Nesting occurs May-July; incubation lasts 23-25 days; young fledge at about 6 weeks.	Low. Suitable breeding habitat for this species occurs along the project route. This species has been documented in Chariton County, MO.	No.	Parnell et al. 1988; Robbins and Easterla 1992; MDC 2004b.
Cooper's hawk *Accipiter cooperii*	SD-SC MO-SC	Breeds in deciduous, mixed, and coniferous forests. In MO, this species nests in mature, even-aged forests with moderate canopy closure, frequently consisting of short-leaf pine *(Pinus echinata)*. Breeding season April-June. Eggs usually laid April-May. Incubation 30–35 days; young remain in nest about 4 weeks; fledglings remain in vicinity of nest and continue to be fed by parents until about 8 weeks old.	High. Suitable breeding habitat for this species occurs along the project route. This species has been located in Marshall County in SD, and Chariton, Lincoln, and St. Charles counties in MO.	No.	MDC 2004b; Rosenfield and Bielefeldt 1993; CLO 2005.

Table G-2 Species of Special Concern Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Red-shouldered hawk *Buteo lineatus*	MO-SC	This species is found along rivers and swamps in extensive bottomland hardwood forests. It requires mature canopy structure with large, low-branching hardwoods for nesting, and prefers areas with wetland openings nearby. Like the red-tailed hawk, this species hunts from a perch. Breeding occurs February-April; eggs laid March-June; young leave the nest at 5-6 weeks.	Moderate. Suitable habitat for this species would be limited to riverine woodland habitats. This species has been located in Chariton and Lincoln counties, MO.	No.	MDC 2004b; Crocoll 1994; Hands et al. 1989b; Robbins and Easterla 1992.
Broad-winged hawk *Buteo platypterus*	SD-SC	Breeding habitat includes broadleaf and mixed forest, preferring denser situations, less frequently in open woodland. Regularly nests near wet areas and forest openings, edges, and woodland roads. Migrates along ridges, river valleys, and shorelines. Eggs laid mid-May; incubation 30-38 days; leave nest at 29-31 days.	Low. This species is considered to be a rare breeder in eastern SD. This species has been documented in Marshall County, SD.	No.	NatureServe 2005; Palmer 1988.
Sora *Porzana carolina*	MO-SC	Primarily found in shallow freshwater emergent wetlands (e.g., marshes of cattail, sedge, blue-joint, or bulrush), less frequently in bogs, fens, wet meadows, and flooded fields. Can use very small marshes (e.g., < one-half-acre). Nesting begins April-May; incubation lasts 18-20 days; young leave nest within a few days.	Low. Suitable breeding habitat for this species occurs along the project route. This species has been documented in Buchanan County, MO.	No.	MDC 2004b; NatureServe 2005.
Black tern *Chlidonias niger*	ND-SC; SD-SC; KS-SC	This species is found in marshes, along sloughs, rivers, lakeshores, and impoundments, or in wet meadows, typically in sites with mixture of emergent vegetation and open water. Nests may be placed in a variety of vegetative situations, from dense stands of emergent vegetation to open water. Nesting begins in April; eggs generally laid in May.	Low. Suitable breeding habitat for this species occurs along the project route. This species has been located in Marshall County in SD, and Marshall, Brown, and Doniphan counties in KS.	No.	NDGF 2005; NatureServe 2005.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Common tern *Sterna hirundo*	SD-SC	This species is commonly found on lakes, rivers, and marshes. Nests on sandy, pebbly, or stony beaches, matted vegetation, marsh islands, and grassy areas; in large lakes or along rivers. Eggs are laid mostly May-July; incubation lasts 21-27 days; young first fly at about 4 weeks.	Low. Suitable breeding habitat for this species occurs along the project route. This species has been located in Marshall and Day counties in SD.	No.	NatureServe 2005.
Short-eared owl *Asio flammeus*	KS-SC; MO-SC	This species breeds and forages in grasslands, prairies, wetlands, and croplands. Large blocks of suitable habitat (100 ha; 250 ac) seem necessary to support breeding pairs. The birds nest on the ground, usually on a dry site, often elevated on a small hummock. Eggs laid in April or May; young leave the nest by June.	Low. Suitable habitat for this species occurs along the project route. This species has been located in Marshall and Doniphan counties in KS, and Carroll and St. Charles counties in MO.	No.	RMBO 2000.
Whip-poor-will *Caprimulgus vociferus*	KS-SC	This species is generally found in open woodlands with well spaced trees and a low canopy. Lays eggs on ground in open site under trees or under bush. Eggs laid mostly May-June; incubation 17-20 days; young first fly at about 20 days.	Low. Relatively small amounts of forest and woodland habitat would be crossed in Kansas. This species has been documented in Doniphan County, KS.	No.	NatureServe 2005.
Sprague's pipit *Anthus spragueii*	ND-SC	This species is found in grasslands with mid-height vegetation including upland mixed-grass prairie, alkaline meadows, and wet meadow zones around alkali and freshwater lakes. The breeding season in North Dakota extends from late April through early September, with peak singing in mid-May. Nests with eggs have been found range from June 7 to June 30 in North Dakota; incubation period is unknown.	Low. Suitable breeding habitat for this species occurs along the project route. This species has been recorded in Grand Forks, ND.	No.	Stewart 1975; NatureServe 2005

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Cerulean warbler *Dendroica cerulea*	KS-SC	Most commonly found in large, contiguous forest tracts, composed of structurally mature hardwoods with a high, variably closed canopy, usually near water. Eggs laid from May to July; incubation 9-10 days by female. Young fledge 12 days after hatching.	Moderate. Suitable breeding habitat for this species would be crossed by the ROW. This species has been documented in Brown, Doniphan, and Cowley counties in KS.	No.	CLO 2005; Hamel 2000; Robbins et al. 1992.
Baird's sparrow *Ammodramus bairdii*	ND-SC	This species is most often found in ungrazed or lightly grazed mixed-grass prairie, wet meadows, local pockets of tall grass prairie, and some types of disturbed habitats. Nests on ground in dry area in tangled grass, sometimes under low shrub. Breeding season is from late May through mid-August in ND. Eggs laid mostly June-July; incubation 11-12 days; young leave nest at 8-10 days, hide in grass, first fly at 13 days, and begin to leave parents' territory at 19 days.	Low. Small amounts of grassland habitat would be crossed in ND. This species has been recorded in Grand Forks, ND.	No.	Stewart 1975; Terres 1980; NatureServe 2005.
Bobolink *Dolichonyx oryzivorus*	KS-SC	This species prefers tall grasslands such as wet meadows, hayfields, and moist tallgrass prairie. It is an irregular transient and summer resident in eastern and central Kansas, arriving in May and departing in the Fall. Nesting commences on the ground in a shallow depression.	Low. Relatively small amounts of grassland habitat would be crossed in KS. This species has been recorded in Marshall and Nemaha counties in KS.	No.	KDWP 2004; Martin and Gavin 1995.
Yellow-headed blackbird *Xanthocephalus xanthocephalus*	MO-SC	This species is primarily found in prairie wetlands, but is also common in wetlands associated with prairie parklands, mountain meadows, and arid regions. Typically the species nests in deeper-water palustrine wetlands dominated by cattail (*Typha* spp.), bulrush (*Schoenoplectus* spp.), or reed (*Phragmites* spp.). Breeding season: April-June. Incubation lasts 12-13 days. Young leave nest 9-12 days after hatching; unable to fly until about 21 days old.	Low. Suitable breeding habitat for this species occurs along the project route. This species has been recorded in Buchanan County in MO.	No.	Twedt and Crawford 1995; Terres 1980; NatureServe 2005.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Pileated woodpecker *Dryocopus pileatus*	ND-SC	This species prefers habitats of dense deciduous, coniferous, mixed forest, open woodland, and second growth forests. Prefers woods with a tall closed canopy and a high basal area. Most often in areas of extensive forest or minimal isolation from extensive forest. Nests are in cavities excavated by both sexes usually in dead stubs in shaded places, where the cavity entrance averages about 14 m above ground	Low. This species has been recorded in Sargent County, ND.	Yes. The project would not cross potential nesting habitat for this species.	NatureServe 2006.
Swamp sparrow *Melospiza georgianan*	ND-SC	This species prefers to breed in marshes, wet brushy fields, meadows, lakeshores, stream borders, swamps, pine barrens shrub-sedge bogs. It will build nests in tussocks of grass, sedge, or in low bush, commonly over water. In migration and winter it is found in weedy fields, brush, thickets, scrub, and forest edges.	Low. Small amounts of wetland habitat would be crossed in ND. This species has been recorded in Sargent County, ND.	No.	NatureServe 2006.
Fish					
Hornyhead chub *Nocomis biguttatus*	ND-SC	Generally in small to medium size, moderate to low gradient, cool to warm, typically clear, gravelly streams; in pools and slow to moderate runs, occasionally associated with higher aquatic plants. Spawns in spring and early summer over gravel nest made by male in relatively shallow water often below a riffle.	Low. Known to occur in North Dakota in the Forest River.	No.	Lee et al. 1980; Vives 1990; NatureServe 2005.
Spotted sucker *Minytrema melanops*	KS-SC	This species avoids currents, living in pools of small streams and overflow ponds in the floodplains of rivers. The pools occupied usually have firm bottoms and aquatic vegetation or other plant debris. They seem to require clear, relatively soft water. This fish spawns in late spring or summer. Intolerant of extensive siltation. Spawns in riffle areas in late winter and spring.	Low. Potential occurrence in Cowley and Butler counties in Kansas.	No.	KDWP 2004; NatureServe 2005.

Table G-2 Species of Special Concern Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Blue sucker *Cycleptus elongatus*	KS-SC; MO-SC; NE-SC	This species is typically found in large rivers and lower parts of major tributaries. It concentrates in "chutes" or rapids where the water is deep and the bottom is rocky, wholly free of silt. It probably spawns in spring, often migrating upstream following egg-laying.	Moderate. Known to occur in Kansas and Missouri in the Missouri River	No.	Moss et al. 1983; Cross and Collins 1995; Pflieger 1997; KDWP 2004.
Highfin carpsucker *Carpiodes velifer*	MO-SC	This species favors clean streams with clear water and rocky bottoms. Found in rivers, oxbows, sloughs, and ponds over sand or gravel bottom; generally in rivers where current is moderate to swift or in quiet water adjacent to river channels. Spawns in spring and summer.	None. Potentially occurs in Missouri in Lincoln County.	Yes. No records for streams crossed in Missouri.	Becker 1983; NatureServe 2005.
Pugnose shiner *Notropis anogenus*	ND-SC	Found in clear, heavily vegetated glacial lakes and vegetated pools and runs of low gradient creeks and rivers, over bottoms of sand, mud, marl, or gravel. Mostly in shallows in warm months, probably in deep water during rest of year. Spawns June-July.	Low. Potential occurrence in North Dakota in the Forest and Sheyenne rivers.	No.	Becker 1983; NatureServe 2005.
River shiner *Notropis blennius*	KS-SC; SD-SC	This species is found in pools and main channels of large rivers and the lower parts of main tributaries, in water of varying clarity (usually turbid) over substrate of silt, sand, and gravel. Spawns from June to late August.	High. Known to occur in Kansas in the Missouri River, and South Dakota near Gavin's Point Dam.	No.	NatureServe 2005.
Ghost shiner *Notropis buchanani*	MO-SC	This species is found in low-gradient sections of creeks and rivers having moderate flow and moderately clear to turbid water, and near the confluence of large rivers or creeks where they inhabit quiet pools, eddies, or backwaters away from the current. Spawns from May to August.	Moderate. Potential occurrence in Missouri in Audrain, Montgomery, Lincoln, and St. Charles counties.	No.	Page and Burr 1991; Nico and Jacobs 2005; NatureServe 2005.
Brassy minnow *Hybognathus hankinsoni*	KS-SC; MO-SC	This species is typically found in small, clear, sluggish weedy creeks or small rivers with sand, gravel, or mud bottoms. Also common in cool ponds, lakes, and in overflow ponds near rivers. Spawns in spring.	Low. Known to occur in Kansas and Missouri in the Missouri River.	No.	Becker 1983; Cross and Collins 1995.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Plains minnow *Hybognathus placitus*	KS-SC; MO-SC	This species is found in silt-laden streams and rivers, slower water and side pools over beds of sand and silt with slight to moderate erratic flows. Spawns in spring and summer.	Low. Known to occur in Kansas in the Missouri and South Fork Big Nemaha rivers and Missouri in the Missouri River.	No.	Rees et al. 2005; Cross and Collins 1995; Eberle 1995.
Blacknose dace *Rhinichthys atratulus*	KS-SC	This species prefers small, usually cool, gravelly streams of high to moderate gradient. They use pools, slower runs, and backwaters as microhabitats. The Kansas population appears to be a remnant, found only in areas where the last glacier extended. Spawns from about May to July.	None. Potential occurrence in Kansas In Marshall and Nemaha counties.	Yes. No known records of occurrence for streams crossed in Marshall and Nemaha counties.	KDWP 2004; NatureServe 2005.
Plains killifish *Fundulus zebrinus*	MO-SC	This species is found in channels, backwaters, or edges of shallow in sandy-bottomed, turbid headwaters, creeks, and small to medium rivers with slow to moderate current. Spawns in summer.	Low. Potential occurrence in Missouri in Clinton County.	No.	Rahel and Thel 2004; Pflieger 1997.
Western sand darter *Etheostoma clarum*	MO-SC	This species is usually found in medium and large rivers; most common in slight to moderate current over sandy bottom, though also known from areas of gravel or silt. Buries in sand. Spawns in summer.	Low. Potential occurrence in Missouri in Lincoln County.	No.	Pflieger 1997; NatureServe 2005.
American eel *Anguilla rostrata*	SD-SC	This occurs in large pools in streams during their freshwater life stage. They are nocturnal and usually spend the day hidden under rocks or logs.	Low. Known to occur in North Dakota in the Missouri River.	No.	Eddy and Underhill 1974.
Trout-perch *Percopsis omiscomaycus*	SD-SC	This species prefers lakes and large rivers. They spawn in May through June by ascending rivers and using sand or gravel substrates.	Low. Known to occur in North Dakota in the Sheyenne and Pembina rivers.	No.	Eddy and Underhill 1974.
Rosyface shiner *Notopis rubellus*	ND-SC	This species was in the Table 3.7 SOC1 but not this one so it was added but we need to get habitat information references from Rollin.	Low. Known to occur in North Dakota in the Sheyenne and Pembina rivers.	No.	

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Bigmouth shiner *Nortropis dorsalis*	KS-SC	This species appears to favor small streams, up to 12 meters in width and one meter in depth, although its presence in larger rivers has been noted. It is found in runs and pools of shallow open headwaters, creeks, and small to medium rivers with sand substrate, and,sometimes also in lakes. Channelization of prairie streams has increased favorable habitat in some areas. This species spawns in mid-water, with eggs drifting downstream.	Low. Known to occur in Kansas in Brown County streams.	No.	NatureServe 2006, COSEWIC 2003.
Amphibians					
Ringed salamander *Ambystoma annulatum*	MO-SC	Found in forested areas in vicinity of breeding pools; usually under objects or underground. Brief breeding period occurs after heavy late summer to early fall rains, September-November in Missouri. Eggs hatch in about 2-4 weeks; larval period lasts 6-8 months; metamorphosis occurs April-June.	None. Although this species is known to occur in Montgomery and Lincoln counties in MO, its known range is south of the ROW.	Yes. The project occurs outside the geographic range of the species.	Briggler et al. 2004; Trauth et 1989; Petranka 1998.
Great Plains toad *Bufo cognatus*	MO-SC	This species is found in grasslands, semidesert shrublands, open floodplains, and agricultural areas; typically in stream valleys. Burrows underground when inactive. Breeds after heavy warm rains in spring or summer.	Low. This species could occur within suitable habitat along the project route. This species has been recorded in Buchanan and Carroll counties in MO.	No.	Johnson 2000; NatureServe 2005.
Northern cricket frog *Acris crepitans*	SD-SC	This species inhabits the edges of sunny marshes, marshy ponds, and small slow-moving streams in open country. It may periodically range into adjacent non-wetland habitats. Eggs laid late spring-early summer. Hibernation sites are underground on land near water; may hibernate communally.	Low. This species could occur within suitable habitat along the project route. This species has been recorded in Hanson, Hutchinson, and Yankton counties in SD.	No.	Hammerson 1999; Conant and Collins 1998; NatureServe 2005.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Northern crawfish frog *Rana areolata circulosa*	MO-SC	Generally found in grasslands, prairies, and woodlands near small creeks or marshes. Often, this species takes shelter in crayfish burrows or other animal burrows. Breeds February to April. Breeding takes place in early spring after heavy rains.	Low. This species could occur within suitable habitat along the project route. This species has been recorded in Lincoln County, MO.	No.	Johnson 1982; Wright and Wright 1995.
Reptiles					
Blanding's turtle *Emydoidea blandingii*	SD-SC; MO-SC	This species inhabits productive, clean, shallow waters with abundant aquatic vegetation and soft muddy bottoms over firm substrates. It is found in ponds, marshes, swamps, bogs, wet prairies, river backwaters, sloughs, slow moving rivers, protected coves, and lake shallows and inlets. Extensive marshes bordering rivers provide excellent habitat.	Low. This species could occur within suitable habitat along the project route. This species has been recorded in Yankton County, SD, and in St. Charles County, MO.	No.	Behler and King 1996; Conant and Collins 1998; Ernst et al. 1994.
Spiny softshell *Apalone spinifera*	SD-SC	These turtles are found in large rivers, impoundments, lakes, ponds along rivers, pools along intermittent streams, oxbows; usually in areas with open sandy or mud banks and soft bottom. Basks on shores or on partially submerged logs. Burrows in bottom of pool during winter inactivity. Eggs are laid June-July in nests dug in open areas in sand, gravel, or soft soil near water. Eggs hatch September-October.	Moderate. This species has been documented along the Missouri River in Yankton , SD.	No.	Collins 1993; Ernst et al. 1994; NatureServe 2005.
Smooth softshell *Apalone mutica*	SD-SC	This species occurs in large rivers and streams with moderate to fast currents. Very infrequently found in lakes, impoundments, and shallow bogs. Waterways with sandy bottoms and a few rocks or aquatic plants are preferred. Sandbars are important for basking and egg laying sites. They seem to prefer larger rivers and live in colonies along certain portions.	Moderate. This species has been recorded at the James River and other locations in Yankton County, SD.	No.	http://el.erdc.usace.army.mil/elpubs/pdf/si06.pdf http://www.herpnet.net/Iowa-Herpetology/reptiles/turtles/smooth_softshell.html

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Northern prairie skink *Eumeces septentrionalis*	ND-SC	Habitat includes open sandy areas of pine barrens and bracken grassland, grassy dunes, sandy banks of creeks and rivers and along roadsides, open grass-covered rocky hillsides near streams, and forest edges and woodland. Eggs are laid in shallow nests dug in loose moist soil under logs, boards, rocks, or other objects. Usually hatch in 1-2 months (mid-late July).	Low. Relatively small amounts of habitat would be crossed by the ROW. This species has been recorded in Barnes, Ransom, and Sargent counties in ND.	No.	Conant and Collins 1998; Somma 1987; Collins 1993; NatureServe 2005.
Eastern hognose snake *Heterodon platirhinos*	KS-SC	This species found in open areas with sandy soil near water; wooded upland hillsides, fields, woodland meadows, prairie, forest-grassland ecotone, river valleys, and stream courses. Burrows into soil. Overwinters in burrows. Eggs laid May-August; hatch in 39-65 days.	Low. This species could occur within suitable habitat along the project route. This species has been recorded in Doniphan County, KS.	No.	Collins 1993; NatureServe 2005.
Timber rattlesnake *Crotalus horridus*	KS-SC; NE-SC	In the central mid-west, optimum habitat for this species is high, dry ridges with oak-hickory forest interspersed with open areas (Minton 1972), and "deciduous forest, especially along hilltop rock outcrops in thick woods" (Fitch 1958). It may also be found in swampy areas and floodplains (Mount 1975). Mating season is in the early spring when the snake emerges from hibernation. The young are born in Autumn from August through October.	Moderate. This species could occur within suitable habitat along the project route. This species has been recorded in Marshall and Doniphan counties in KS.	No.	Fitch 1958, 1982, 1985; Collins 1993.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Ringneck snake *Diadophis punctatus*	SD-SC	This species prefers moist habitats in prairie areas of the mid-west. It has become an ecotonal species, occurring both in the patches of woods and the prairie. It is found in open grassland, pasture, and prairie to forested areas, usually hardwoods but also in other wooded areas. It prefers south or west facing hillsides and is generally found under rocks or on rocky hillsides in forested areas. It requires rocks, logs, stumps, fallen bark; habitats are usually moist. Sometimes found in moist caves.	Low. This species could occur within suitable habitat along the project route. This species has been recorded within 5 miles of ROW in Yankton County, SD.	No.	http://wfs.sdstate.edu/sdgap/herps.html
Fox Snake *Elaphe vulpine*	SD-SC	This species prefers moist areas, such as river valleys, marsh borders, river bottom forests, upland hardwoods, pine barrens, open prairies, scrub areas, and hedge rows; they rarely are far from rivers or streams. May be abundant in heavily farmed prairie areas, frequently found in alfalfa fields and bromegrass.	Low. This species could occur within suitable habitat along the project route. This species has been recorded within 5 miles of ROW in Yankton County, SD.	No.	http://wfs.sdstate.edu/sdgap/herps.html
Invertebrates					
Ottoe skipper *Hesperia ottoe*	SD-SC	This butterfly is found in mid-grass to tall grass undisturbed prairies on the Great Plains. It is strictly a species of prairie habitat. It is an avid nectar feeder, and needs abundant nectar sources to maintain a population. adult males emerging before females in late June and July; females may be found as late as early August in some years.	Low. This species could occur within suitable habitat along the project route. This species has been recorded in Day County, SD.	No.	MNFI 2005; Brock and Kaufmann 2003; NatureServe 2005.
Powesheik skipperling *Oarisma powesheik*	SD-SC	This species is an obligate resident of undisturbed tall-grass prairies. Primary habitat is virgin prairie, but this butterfly also occurs in fens and grassy lakeshores. There is one brood between June and August.	Low. This species could occur within suitable habitat along the project route. This species has been recorded in Marshall and Day counties, SD.	No.	Shepherd et al. 2005; NatureServe 2005.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Regal fritillary *Speyeria idalia*	ND-SC; MO-SC	Found in tall-grass prairie and other open sites including damp meadows, marshes, wet fields, and pastures. Larvae are obligate feeders on *Viola.* Flight: One brood from mid-June to mid-August; Most eggs are laid in August. Violets, including bird's foot violet (*Viola pedata*), are the only suitable larval hosts.	Moderate. This species could occur within suitable habitat along the project route. This species has been recorded in Sargent and Ranson counties, ND, and Buchanan, Randolph, and Caldwell counties in MO.	No.	Opler et al. 1995; Heitzman and Heitzman 1987; MDC 2000c.
Prairie mound ant *Formica montana*	MO-SC	This species is found in tall-grass prairies, but may occasionally also occur in open oak or pine-dominated woodlands.	Low. This species could occur within suitable habitat along the project route. This species has been recorded in Chariton County, MO.	No.	Trager 1998.
Wallace's deepwater mayfly *Raptoheptagenia cruentata*	KS-SC	The microhabitat for this species has not been documented.	Low. This species could occur within suitable habitat along the project route. This species has been recorded in Doniphan County, KS.	No.	NatureServe 2006.
Round hickorynut *Obovaria olivaria*	MO-SC	This species is found in large rivers and lakes in sand or sand/gravel substrates.	Low. Potential occurrence in Lincoln County, MO.	No.	Cummings and Mayer 1992; Oesch 1995; Box and Mossa 1999.
Fat mucket mussel *Lampsilis siliquoidea*	KS-SC	This mussel is an obligate riverine species preferring slow moving current. They can tolerate a wide variety of substrates, but generally do not occur in areas of shifting sand.	Low. Potential occurrence in Marshall County, KS.	No.	Cummings and Mayer 1992; KDWP 2004.
Creeper mussel *Strophitus undulates*	KS-SC	This species is an obligate riverine species found in perennial streams where it prefers gravel substrates.	Low. Potential occurrence in Marshall County, KS.	No.	Cummings and Mayer 1992; KDWP 2004.
Threeridge *Amblema plicata*	SD-SC	This species is found in small to large rivers and impoundments in sand, mud or gravel.	Low. Known to occur in South Dakota in Wolf Creek and James River.	No.	Cummings and Mayer 1992 (online field guide, INHS).
Rock pocketbook *Arcidens confragosus*	SD-SC	This species is found in medium to large rivers in pools and areas of reduced flow in mud and sand.	Low. Known to occur in South Dakota in Wolf Creek and James River.	No.	Cummings and Mayer 1992 (online field guide, INHS).

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Plain pocketbook *Lampsilis cardium*	SD-SC	This species is found in small creeks to large rivers in mud, sand, or gravel.	Low. Known to occur in South Dakota in Wolf Creek.	No.	Cummings and Mayer 1992 (online field guide, INHS).
Black sandshell *Ligumia recta*	SD-SC	This species is found in medium to large rivers in riffles or raceways in gravel or firm sand.	Low. Known to occur in South Dakota in Wolf Creek.	No.	Cummings and Mayer 1992 (online field guide, INHS).
Yellow sandshell *Lampsilis teres*	SD-SC KS-SC	This species is found in medium to large rivers in sand or fine gravel.	Low. Known to occur in South Dakota in the James River. Known to occur in Kansas in Cowley County streams within 5 miles of ROW.	No.	Cummings and Mayer 1992 (online field guide, INHS).
Mapleleaf *Quadrula quadrula*	SD-SC	This species is found in medium to large rivers and reservoirs with a mud, sand, or gravel bottom.	Low. Known to occur in South Dakota in Wolf Creek.	No.	Cummings and Mayer 1992 (online field guide, INHS).
Deertoe *Truncilla truncata*	SD-SC	This species is found in medium to large rivers in mud, sand, or gravel.	Low. Known to occur in South Dakota in Wolf Creek, James River, and Missouri River.	No.	Cummings and Mayer 1992 (online field guide, INHS).
Wabash pigtoe *Fusconaia flava*	SD-SC	This species is found in creeks to large rivers in mud, sand, or gravel.	Low. Known to occur in South Dakota in the James River.	No.	Cummings and Mayer 1992 (online field guide, INHS).
Hickorynut *Obovaria olivaria*	SD-SC MO-SC	This species is found in large rivers (rarely in medium or small streams) in sand or mixed sand and gravel.	Low. Known to occur in South Dakota in the James River.	No.	Cummings and Mayer 1992 (online field guide, INHS).
Pimpleback *Quadrula pustulosa*	SD-SC	This species is found in medium to large rivers in mud, sand, or gravel.	Low. Known to occur in South Dakota in the James River.	No.	Cummings and Mayer 1992 (online field guide, INHS).
Fawnsfoot *Truncilla donaciformis*	SD-SC KS-SC	This species is found in large rivers or the lower reaches of medium-sized streams in sand or gravel.	Low. Known to occur in South Dakota in the James and Missouri Rivers. Known to occur in Kansas in Marion County streams within 5 miles of ROW.	No.	Cummings and Mayer 1992 (online field guide, INHS).

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Plants					
Indian rice grass *Achnatherum hymenoides*	KS-SC	Adapted to a wide variety of soils, but does not do well on wet or poorly drained soils. It is dominant on sandy stony, gravelly, and shallow soils in the upland and semi-desert climatic zones. It is also adapted to soils high in lime. It is moderately salt and alkali tolerant. Flowering: May-August.	High. Known to occur in Kansas in Marshall County within 5 miles of ROW.	No.	Tirmenstein 1999; Owensby 2002; Gould 1988; Hitchcock 1971.
Auriculate false foxglove *Agalinis auriculata*	MO-SC	This species is found in mesic to wet-mesic tallgrass prairie. A fall-blooming hemiparasitic annual, this species requires open places in the vegetation for its seed to germinate - perhaps created in the past by herds of bison or elk. Flowering Period: Early August to late August.	None.	Yes. Known county distribution in Missouri is near ROW, but no native tallgrass prairie crossed by ROW.	CPC 2005; ONHI 1999.
Wild sarsaparilla *Aralia nudicaulis*	MO-SC	Typically occurs on rich wooded slopes of limestone soils; in MO it is known from dry to moist deciduous forests, coniferous forests, and mixed woods, and also in swamps, and on stabilized dunes- surviving as a Pleistocene relic. Flowers: May-June.	None.	Yes. Known county distribution in Missouri outside of ROW.	Steyermark 1963; Weber and Whitman 2001; NatureServe 2005.
Wooley milkweed *Asclepias lanuginosa*	SD-SC	This species is found in dry woods, prairies, hillside prairies, rocky soils. Flowering: June-July.	High. Known to occur in South Dakota in Clark County within 5 miles of ROW.	No.	Larson 1993.
Subarctic lady-fern *Athyrium filix-femina*	ND-SC	In the Dakotas, this species is found along swamp margins, wooded banks and alluvial woods. Categorized as an aquatic or wetland species.	High. Known to occur in North Dakota in Pembina County within 3 miles of ROW.	No.	Larson 1993.
Texas bergia *Bergia texana*	MO-SC	This species is found on muddy or sandy shores and flats; rare. Flowers: June-October.	Moderate. Known county distribution in Missouri near ROW.	No.	Steyermark 1963; NPWRC 2005; USDA [no date].
Earlyleaf brome *Bromus latiglumis*	MO-SC	Found on wooded slopes and bluffs and the alluvial banks of streams, usually in limestone areas. Flowers: July-August.	Moderate. Known range includes ROW and potential habitat crossed by ROW.	No.	Steyermark 1963; Hitchcock and Chase 1971.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Nottoway Valley brome *Bromus nottowayanus*	MO-SC	Usually grows on rich, loamy soils in bottomland forests along rivers and streams, and occasionally in mesic woods. It is typically not far (<50 m) from a river or stream.	Moderate. Known range includes ROW and potential habitat crossed by ROW.	No.	Mackenzie and Ladd 1995; Hitchcock and Chase 1971.
Bellow-beaked sedge *Carex albicans* var. *australis*	MO-SC	This species is found on acidic, dry soils of sandstone and granite, also calcareous regions, wooded slopes, sandstone ridges, woodland clearings, in partial shade of deciduous forests. Fruiting April-June.	Moderate. Known range includes ROW and potential habitat crossed by ROW.	No.	FNAA 2004.
Bauxbaum's sedge *Carex Buxbaumii*	ND-SC	This species is found in bogs, wet meadows, springs and fens. Flowering: late May-June.	High. Known to occur in North Dakota in Barnes County within 3 miles of ROW.	No.	Larson 1993.
Creseted sedge *Carex cristatella*	KS-SC	Habitats include openings in wet meadows, moist woodlands, swamps, soggy thickets, wet prairies, sedge meadows, sloughs, low-lying areas along rivers, powerline clearances in woodlands, and ditches. This sedge occurs in both degraded and higher quality habitats. Flowering: late spring – early summer.	High. Known to occur in Kansas in Brown County within 5 miles of ROW.	No.	Hilty 2006; USDA no date.
Raven-foot sedge *Carex crus-corvi*	KS-SC	This species is found in wet meadows, wet prairies, swamps, floodplain woods, and roadside ditches. Flowering: May-July.	High. . Known to occur in Kansas in Doniphan County within 5 miles of ROW.	No	FNA 2004; USDA no date.
Bristly-stalk sedge *Carex leptalea*	ND-SC	This species is found in bogs, and wet woodlands. Flowering: June-July.	High. Known to occur in North Dakota in Pembina and Cavalier counties within 3 miles of ROW.	No.	Larson 1993.
Blue cohosh *Caulophyllum thalictroides*	ND-SC	This species is found in rich valley woodlands, ravines, north-facing wooded slopes, moist base of bluffs. Flowering: April-May.	High. Known to occur in North Dakota in Ransom County within 3 miles of ROW.	No.	Tenaglia 2006.
Coast sandbur *Cenchrus incertus*	KS-SC	This species is found on dry, sandy, cultivated and disturbed areas. Flowering: May-September.	High. Known to occur in Kansas in Cowley County within 5 miles of ROW.	No.	Hall and Vandiver 1990.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Lanceleaf coreopsis *Coreopsis lanceolata*	KS-SC	This species is found in dunes, dry woods, and meadows, in full sun to partial sun, and very dry to somewhat moist sites. Naturally occurs in open sandy banks, roadsides, grasslands, banks, bluffs, in oak-pine woodland, and in other sandy areas. Flowering: April-June.	High. Known to occur in Kansas in Brown County within 5 miles of ROW.	No.	Hilty 2006; Tenaglia 2006.
American yellow lady's-slipper *Cypripedium parviflorum*	ND-SC	Look for yellow lady's slipper in moist places in tallgrass prairie, especially near trees or shrubs along lakeshores. Plants likely will not tolerate heavy grazing as the roots would be easily damaged by trampling in the soft soils that the plant prefers. Flowering: 25 May-20 June.	High. Known to occur in North Dakota in Pembina, Cavalier, and Sargent counties within 3 miles of ROW.	No.	Kantrud 1995; Mergen 2006; Hapeman 2006.
Showy lady's-slipper *Cypripedium reginae*	ND-SC	This species is found almost exclusively in calcareous wetlands, though it may also occur in wet woodlands. Flowering: 20 June – 5 July.	High. Known to occur in North Dakota in Pembina and Cavalier counties within 3 miles of ROW.	No.	Hapeman 2006.
Spinulose woodfern *Dryopteris carthusiana*	ND-SC	This species is found in wet alluvial woods or swamps.	High. Known to occur in North Dakota in Pembina County within 3 miles of ROW.	No.	Larson 1993.
Crested woodfern *Dryopteris cristata*	ND-SC	This species is found in wet alluvial woods or swamps.	High. Known to occur in North Dakota in Pembina County within 3 miles of ROW.	No.	Larson 1993.
Walter's barnyard grass *Echinochloa walteri*	MO-SC	This species is distributed on low ground; rarely in standing water; It is basic to alkaline marshes.	High. Known to occur in St.Charles County, MO within 1 mile of ROW.	No.	USFS 2002.
Lance-like spike rush *Eleocharis lanceolata*	MO-SC	This species is found on wet, sandy, open ground, muddy margins of small ponds, and in moist depressions on glades. May also be found along stream banks and in pine woodlands. Flowers: June-October	None.	Yes. Known distribution only in three counties in southern portion of Missouri not near ROW.	Steyermark 1963; FNAA 2004; http://plants.usda.gov/
Small spikerush *Eleocharis parvula*	ND-SC	This species is found on wet saline or alkaline flats and shores. Flowering: July-early Sept.	High. Known to occur in North Dakota in Nelson and Sargent counties within 3 miles of ROW.	No.	Larson 1993.

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Green keeled cottongrass *Eriophorum viridi-carinatum*	ND-SC	This species grows in cold, calcareous sphagnum bogs, and swamps, and as well as on permafrost tussocks and calcicoles.	High. Known to occur in North Dakota in Pembina County within 3 miles of ROW.	No.	Williams 1990.
Spotted Joe-pye-weed *Eupatorium maculatum var bruneri*	KS-SC	This species is found in moist black soil prairies, sand prairies, sedge meadows, marshes, fens, and swampy thickets with small trees or shrubs. It's not often found in highly disturbed areas. Flowering: July-September.	High. Known to occur in Kansas in Doniphan County within 5 miles of ROW.	No.	Hilty 2006; FNA 2004.
Fringed gentian *Gentianopsis crinita*	ND-SC	This species typically occurs in low, moist native grassland. Flowering: September-October.	High. Known to occur in North Dakota in Pembina County within 3 miles of ROW.	No.	Kantrud 1995.
Plains frostweed *Helianthemum bicknellii*	ND-SC	This species inhabits prairies, rocky open areas. Usually found in dry, sandy soil. Also in woodlands and glades Flowering Period: Early June to late July.	High. Known to occur in North Dakota in Pembina County within 3 miles of ROW.	No.	KYNPC 2006.
Greater Canadian St. John's wort *Hypericum majus*	KS-SC	The taxon grows along ponds, lakesides or other low, wet places. It is a facultative wetland species. Flowering: July-September.	High. Known to occur in Kansas in Washington County within 5 miles of ROW.	No.	WA DNR no date.
Narrow leaf morning glory *Ipomoea shumardiana*	KS-SC	This species is found in eastern Kansas through central Oklahoma to north Texas. It is described as a prairie species. Flowering: June-August.	High. Known to occur in Kansas in Cowley County within 5 miles of ROW.	No.	Shinners 1961; Correll and Johnston 1970.
Butternut *Juglans cinerea*	MO-SC	This tree species is found in mixed hardwood forests; often on stream benches and terraces, on slopes, in the talus of rock ledges, and on other sites with good drainage. Flowers: April-May.	Moderate. . Known county distribution in Missouri near ROW, and suitable habitat may be crossed by ROW.	No.	Harlow et al. 1996, Steyermark 1963.
Star duckweed *Lemna trisulca*	MO-SC	This species is found in cool, freshwater creeks, and in shallow lakes, ponds and marshes. Flowering: (rare) late spring-summer.	High. Known to occur in St. Charles County, MO within 1 mile of ROW.	No.	Armstrong 2006.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Loesel's twayblade *Liparis loeselii*	ND-SC	This species is found in bogs, wet ditches, old sand pits and moist meadows. While it often grows in acidic soils, it can be found just as frequently in strongly basic soils. The critical factor seems to be a lack of competing vegetation. Flowering: 10 July- 20 July.	High. Known to occur in North Dakota in Pembina County within 3 miles of ROW.	No.	Hapeman 2006.
Prairie loosestrife *Lysimachia quadriflora*	SD-SC	This species is found in wet meadows and around pond margins, usually where sandy. Often found on calcareous soils. Flowering: July-August.	High. Known to occur in South Dakota in Brown County within 5 miles of ROW.	No.	Larson 1993; Tenaglia 2006.
Yellow false mallow *Malvastrum hispidum*	MO-SC	Occurs usually on rocky prairies, limestone, sandstone, or cherty limestone glades, bluffs, open alluvial valleys, and along gravel bars. Flowers: July-September.	Moderate. Known county distribution in Missouri near ROW, and suitable habitat may be crossed by ROW.	No.	Steyermark 1963.
Tender creeping-cucumber *Melothria pendula*	KS-SC	This species is found in rich or rocky low woods, at the base of limestone bluffs, and in alluvial woods, often along streams. Flowering: July-September.	High. Known to occur in Kansas in Cowley County within 5 miles of ROW.	No.	Tenaglia 2006.
Prairie false dandelion *Microseris cuspidata*	MO-SC	This species occurs on dry, open prairies. Prefers rocky, loose, or gravelly soils. Flowers: April-June.	None.	Yes. ROW near known distribution near Lincoln County, Missouri but no prairie habitat crossed by ROW.	Haddock 2005; GPFA 1986.
Naked Bishop's cap *Mitella nuda*	ND-SC	Moist forests, thickets, bogs and swamps, often growing among mosses; rare, with records from Bottineau and Pembina counties, ND.	High. Known to occur in North Dakota in Pembina County within 3 miles of ROW.	No.	Larson 1993.
Thread-like naiad *Najas gracillima*	MO-SC	This submersed annual herb is found in the clear water of natural, soft-water lakes. Flowers July-Sept.; fruits Aug.-Oct.	None.	Yes. No suitable habitat crossed by ROW.	OHDNR 2005; Steyermark 1963.
Adder's tongue *Ophioglossum vulgatum*	MO-SC	This species is found in shaded secondary woods, wooded slopes, forested bottomlands, and floodplain woods. Leaves appear spring-early summer. Spores mature April-June.	Low. This species could occur within suitable habitat along the project route, especially woodlands crossed by ROW in MO.	No.	FNAA 2004; Steyermark 1963.

Table G-2 Species of Special Concern Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Lanceolateleaf rock moss *Orthotrichum elegans*	MO-SC	An epiphytic moss generally found on tree trunks and branches.	Low. This species could occur within suitable habitat along the project route, especially woodlands crossed by ROW in Missouri.	No.	Anderson et al. 1990.
Pendant-pod point vetch *Oxytropis deflexa*	ND-SC	This species is found primarily on drier prairies and plains; also open wooded areas. Flowering: June-July.	High. Known to occur in North Dakota in Pembina County within 3 miles of ROW.	No.	Sedivec and Barker 1998.
Oklahoma phlox *Phlox oklahomensis*	KS-SC	This species is adapted to tallgrass and midgrass prairies and populations thrive in areas of low to moderate grazing. Populations occur both on the gently rolling uplands (0-15% slopes) and on steeper slopes of canyons. Plants are most abundant on north-facing slopes, and well-drained grassland soils that have weathered from calcareous shales. Flowering: March-May.	High. . Known to occur in Kansas in Butler County within 5 miles of ROW.	No	Springer and Tyrl 1989, 2003.
Heart-leaved plantain *Plantago cordata*	MO-SC	This species is semi-aquatic, found in areas of dolomitic limestone. It often grows in rock crevices or gravel bars in shallow, clear streams (and adjacent floodplains) running through heavily wooded areas. This species requires a very specific stream habitat, in which the processes of erosion and deposition are regular and predictable. Flowers: April-June.	Moderate. Known county distribution in Missouri near ROW, and suitable habitat may be crossed by ROW.	No.	Bowles and Apfelbaum 1989; CPC 2005; NatureServe 2005.
Jacon's ladder *Polemonium reptans*	KS-SC	Typical habitat for this species is rich low woods, thickets at the base of bluffs, and moist ground near streams. Flowering: April-June.	High. Known to occur in Kansas in Brown County within 5 miles of ROW.	No.	Tenaglia 2006; Hilty 2006.
Prickly gooseberry *Ribes cynosbati*	ND-SC	Habitats include thin rocky woodlands, wooded slopes, woodland borders, and limestone bluffs. Some disturbance is beneficial to this species if it reduces the overhead tree canopy.	High. Known to occur in North Dakota in Ransom County within 3 miles of ROW.	No.	Hilty 2006.

Table G-2 Species of Special Concern Identified for the Keystone Pipeline Project

Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Prairie Willow *Salix humilis*	SD-SC	Habitats include moist to slightly dry black soil prairies, sand prairies, sandy savannas, barrens, and gravelly seeps. It can be found in either lowland or upland areas, depending on the variety or local ecotype.	High. Known to occur in South Dakota in Brown and Marshall counties within 5 miles of ROW.	No.	Hilty 2006; Larson 1993.
Rocky Mountain bulrush *Schoenoplectus saximontanus*	MO-SC	This species is generally found on damp sandy soils near freshwater ponds, ditches, or watercourses. Fruiting occurs summer to fall.	Moderate. Known range includes ROW and potential habitat crossed by ROW.	No.	FNAA 2004.
Oval ladies' tresses *Spiranthes ovalis* var. *erostellata*	MO-SC	This species is typically found in moist, rich woodlands, thickets, old fields, second-growth woodlands, wooded hillsides. Flowering: September-October.	Moderate. Known range includes ROW and potential habitat crossed by ROW.	No.	Steyermark 1963; FNAA 2004.
Goat's-rue *Tephrosia virginiana*	NE-SC	This species is found on sandy soils in open woods, glades, prairies, and along roadsides. It is often an indicator of shallow soils. Flowering: May -July.	Moderate. Known range includes ROW and potential habitat crossed by ROW.	No.	FNAA 2004; Steyermark 1963; MDC 2004c; GPFA 1986.
Nodding pogonia *Triphora trianthophora*	KS-SC	This species is mainly found in moist lowland woods, ravines, stream valleys, bottoms in the lower 1/2 of Missouri. The white flowers only last for one day and are frequented by bees from the family *Halictidae*. Flowering: August-Sept.	Moderate. Known range includes ROW and potential habitat crossed by ROW.	No.	FNAA 2004; GPFA 1986.
Rock elm *Ulmus thomasii*	MO-SC	This species is found in mesic hardwood forests, moist, well-drained uplands, rocky ridges, flood plains, streambanks and on limestone outcrops.	Moderate. Known county distribution in Missouri near ROW, and suitable habitat may be crossed by ROW.	No.	Harlow et al. 1996; FNAA 2004; Steyermark 1963.
Flatleaf bladderwort *Utricularia intermedia*	ND-SC	This aquatic species is found in bogs, ponds, swamps, slow-moving streams, and wet sedge or rush meadows. Flowering: July-August.	High. Known to occur in North Dakota in Pembina County within 3 miles of ROW.	No.	WA DNR no date.
Lesser bladderwort *Utricularia minor*	ND-SC	This species is found in open bogs, sedge meadows, and marshlands; preferring calcium-rich shallow water.	High. Known to occur in North Dakota in Pembina County within 3 miles of ROW.	No.	Neid 2006.

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Species	Status	Habitat Association	Potential for Occurrence Within the Project ROW	Eliminated From Detailed Analysis	References
Bird's-foot violet *Viola pedata*	NE-SC	Found in rocky or dry open woodlands; on slopes, ridges, prairies, glades, and roadsides, most always in acid soils. Flowers: April-June, often again Sept.-Dec.	Low. This species could occur within suitable habitat along the project route, especially woodlands crossed by ROW in Nebraska.	No.	Steyermark 1963; GPFA 1986.

ND-SC = North Dakota Species of Conservation Priority
SD-SC = South Dakota Species of Concern
IA-SC = Iowa special concern species.
NE-SC = Nebraska species of special concern.
KS-SC = Kansas species in need of conservation.
MO-SC = Missouri species of conservation concern.