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Route Selection Study

Vectren Z-167 12" Natural Gas Pipeline Relocation Project around the Dayton International Airport

Project No. 13135

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This study has been prepared for Vectren Energy Delivery of Ohio, Inc. for inclusion with their application to the Ohio Power Siting Board for a Certificate of Environmental Compatibility and Public Need

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Acronyms

ESRI	Esri Inc., Redlands, CA
GIS	Geographic Information System
HCA	High Consequence Area
HDD	Horizontal Directional Drill
NRHP	National Register of Historic Places
ODNR	Ohio Department of Natural Resources
OGRIP	Ohio Geographically Referenced Information Program
OHI	Ohio Historic Inventory
OHPO	Ohio Historic Preservation Office
OPSB	Ohio Power Siting Board
OWI	Ohio Wetland Inventory
ROW	Right-of-Way
USDA/NRCS	United States Department of Agriculture, Natural Resources Conservation Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTI	Utility Technologies International Corporation

I. INTRODUCTION

This document presents the Route Selection Study conducted by Utility Technologies International Corporation (UTI) for Vectren on the proposed relocation of a 12" natural gas transmission pipeline around the Dayton International Airport located in Montgomery County, Ohio. It replaces the original study conducted in July 2013 with some minor revisions in the routes as recommended by the City of Union, the City of Dayton and the Dayton International Airport, to accommodate future planned growth around the airport.

The proposed project will replace the existing transmission supply line that currently goes through the center of the airport and is not readily accessible to conduct the required integrity management assessments on the pipeline. The proposed project will connect into the existing pipeline at Corporate Center Drive south of the airport, route around the airport to the west, avoiding the city of Vandalia, and reconnect to the pipeline at the northwestern corner of the airport. Due to the physical constraints of the Dayton International Airport, the city of Vandalia, Interstates 70 and 75, and existing nature preserves, the proposed routes overlap along the southern and western sections of the project, sharing more than twenty percent in common of the proposed right-of-way. The proposed pipeline routes range from 4.5 to 8.5 miles in length and are between 23 and 77 percent in common with the Preferred Route. A waiver from the provision for alternate routes not to exceed more than twenty-percent in common right-of-way (4906-05-04(A)) was requested and approved by the Ohio Power Siting Board on August 9, 2013.

The Route Selection Study identifies major constraints and uses an evaluation process to compare alternatives that avoid or minimize adverse effects to the environment and community. Evaluations and scoring include environmental, cultural, socioeconomic/land-use, and engineering/construction issues for the study.

II. PURPOSE AND OBJECTIVES

The purpose of this Route Selection Study is to assist in identifying routes that are best suited for the project and to comply with the regulatory filing requirements. The Route Selection Study serves as part of the application for a Certificate of Environmental Compatibility and Public Need to the Ohio Power Siting Board (OPSB) for the project and has been developed in accordance with the provisions of Ohio Administrative Code 4906-15-03 for natural gas transmission facilities.

The objective of the Route Selection Study is to identify suitable routes that minimize impacts on the ecology, sensitive land-uses, and cultural features to the greatest extent practical and increase public safety while maintaining economic and technical feasibility. The final result of this process is the identification of the Preferred and Alternate Routes for the OPSB application for a Certificate of Environmental Compatibility and Public Need.

III. ROUTE SELECTION

This Study involved the collection and evaluation of environmental, cultural, land-use, and engineering data in order to evaluate potential routes for the proposed relocation of the pipeline. The study area and potential pipeline routes were identified and subsequently scored and ranked to facilitate the selection of the Preferred and Alternate routes.

A. Route Selection Study Area Delineation

The study area for the route selection process is located in Montgomery County, Ohio. Delineation of the study area was based on a review of the United States Geologic Survey (USGS) maps, state and county road maps, aerial photographs, and visual observations of the area. Constraints such as the city of Vandalia, Dayton International Airport, transportation routes, major water bodies, nature preserves, and the location of the relatively fixed end points for tying into the natural gas pipeline played key roles in determining the study area dimensions and routing selections. The study area, shown in Figure 1, is limited geographically to the northeast corner of Montgomery County.

Residential areas to the southeast of the Dayton Airport were a major deciding factor with respect to the pipeline routing. Residences are concentrated along the eastern route beside the airport and were avoided, when possible, with the other viable candidate route segments. UTI investigated one route to the east of the airport to attempt to comply with the no more than twenty-percent in common provision. However, as the data shows it is not a top candidate for consideration.

B. Screening Attributes

The screening attributes, or features of the study area, were identified after the study area was delineated. Screening attributes represent possible constraints on the development of the natural gas pipeline. The attributes were classified as environmental, cultural, land-use, and engineering characteristics, all of which are part of the OPSB certification application requirements as well as other regulatory requirements.

UTI utilized ArcGIS (ESRI) software to evaluate the attributes identified within the relocation project area. Datasets, shapefiles, and imagery were obtained from multiple sources and included USGS 7.5-minute topographic maps (Tipp City and West Milton), aerial imagery (obtained from OGRIP), and GIS data resources available from the Ohio Department of Natural Resources (ODNR), the Ohio Historic Preservation Office (OHPO), United States Department of Agriculture Natural Resources Conservation Service (USDA/NRCS), the Montgomery County Auditor, and ESRI, Inc. Data sources were verified and updated based on a field reconnaissance conducted in June and July 2013.

A constraint map was prepared by acquiring ecological, cultural, land-use, and engineering data obtained from various sources. The constraint map was created using 2011 aerial imagery of the study area and is provided in Figure 2 at a scale of 1:36,000. Constraint maps at a larger scale (1:12,000) have also been provided as Figures 2a through 2g. Figure 2 depicts the individual route segments that were analyzed. A list of the candidate routes (comprised with their segments) is presented in Table 1. Raw constraint data for the ecological and cultural attributes is presented in Table 2 and Table 3 contains the raw constraint data for the land use and engineering attributes.

Table 1 - Candidate Routes

Route	Segments												Length (ft)	Length (miles)
A	E-1												23,636	4.48
B		S-1		S-3	S-4	S-5				W-4			34,881	6.61
C			S-2	S-3	S-4	S-5				W-4			37,866	7.17
D		S-1		S-3	S-4	S-5			W-3			N-2	37,886	7.18
E			S-2	S-3	S-4	S-5			W-3			N-2	40,871	7.74
F		S-1		S-3	S-4			W-2			N-1	N-2	40,214	7.62
G			S-2	S-3	S-4			W-2			N-1	N-2	43,199	8.18
H		S-1		S-3			W-1				N-1	N-2	42,160	7.98
I			S-2	S-3			W-1				N-1	N-2	45,145	8.55

Table 2 - Raw data for Ecological and Cultural Attributes

Raw Data	**Ecological**					**Cultural**			
Route #	Length of route crossing wooded lots	# of wetlands within 1,000-ft	Percent hydric/partially hydric soils within 1000-ft	# of stream crossings	Recorded endangered or threatened species areas crossed by center line	NRHP sites within 1,000-ft	Known archaeological sites within 1,000-ft	Ohio Historical Inventory sites within 1,000-ft	Cemeteries within 1,000-ft
A	750	4	93	3	0	0	0	17	1
B	3404	7	81	4	0	0	1	4	0
C	2710	6	78	3	0	0	4	4	0
D	3954	7	81	5	0	0	1	2	0
E	3260	6	79	4	0	0	4	2	0
F	3813	13	77	5	0	0	1	2	1
G	3119	12	75	4	0	0	4	2	1
H	3693	12	69	5	0	0	1	2	2
I	2999	11	68	4	0	0	4	2	2

Table 3 - Raw Data for Land-Use and Engineering Attributes

Raw Data	**Land-Use**					**Engineering**					
Route #	# of buildings within 1,000-ft	# of properties crossed	Percent of Prime Farm Land with 1,000-ft	Sensitive land-uses within 1,000-ft	Institutional land-uses within 1,000-ft	# of road crossings	% of route not on City of Dayton property	% of route not adjacent to existing road ROW	Length of route	Percent High Consequence Area	# of HDD Crossings
A	586	0	14	4	4	21	79	0	23636	39	24
B	87	3	36	3	1	9	33	51	34881	21	12
C	201	3	40	4	1	9	51	36	37866	25	12
D	121	3	35	3	1	9	63	58	37886	3	12
E	235	3	39	4	1	9	78	43	40871	8	12
F	138	5	41	3	1	9	64	60	40214	3	12
G	252	5	45	4	1	9	78	43	43199	8	12
H	159	2	51	3	1	10	68	57	42160	2	13
I	273	2	54	4	1	10	81	44	45145	8	13

1. Ecological Attributes

A list of ecological attributes was developed with the intent that potential routes would avoid these areas to the greatest extent practical, and minimize impacts where avoidance was impractical. The following attributes were considered as environmental constraints in the siting process:

- Woodlots and areas requiring clearing within the right-of-way for the pipeline
- Ohio Wetland Inventory (OWI) Map – wetlands within 1,000-ft buffer around the center line of the proposed route were included in the data for the route. OWI maps are useful in providing a suggestion of where a wetland may be located based on the presence of hydrology. However, they are not definitive indicators of the presence of a wetland, and must be field checked to validate the mapped information.
- Hydric & Partially Hydric Soils – Hydric soils are formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part and are commonly associated with wetland areas and are strongly influenced by the presence of water. Hydric soils and wetlands are not the same thing, but hydric soils, along with wetland-adapted plants and the presence of water for some time during the year, is to be considered a wetland. Soils were evaluated within the 1,000-ft buffer around the proposed route.
- Perennial, intermittent, and ephemeral surface drainage crossings
- Recorded endangered, threatened, and protected species locations

Woodlots and surface drainages were identified based on available aerial photography, USGS topographic maps, and field surveys. OWI digital GIS coverage of the project area was superimposed on the project maps to determine potential wetland areas. Soils were evaluated using data from the USDA/NRCS web soil survey, Soil Survey of Montgomery County, Ohio (2004), and GIS data obtained from the USDA/NRCS. Endangered and threatened species communities were all equally weighted based on information obtained from the United States Fish and Wildlife Service's (USFWS) Information, Planning, and Conservation System as well as information received from the Ohio Department of Natural Resource's (ODNR) Natural Heritage Database.

2. Cultural Attributes

A list of cultural features was developed with the intent that potential routes would avoid these areas to the extent possible. Cultural features typically include documented historically and architecturally significant buildings, sites that have been excavated or are believed to contain artifacts, and tracts of land used for burial and private or public memorial. The significance of these attributes as a constraint is a result of the predominating institutions, beliefs, and customs that characterize a set of people. The following attributes were considered as cultural constraints in the siting process:

- Sites listed on the National Register of Historic Places (NRHP) – Sites that are listed on the NRHP include districts, buildings, structures and objects that are significant in American culture, engineering, architecture, and archeology. Information was obtained from a records search with the Ohio Historic Preservation Office (OHPO) in June 2013.

- Ohio Historic Inventory (OHI) buildings – the OHI is used to record basic information on architectural and historic properties in Ohio. Data was obtained from a records search through the OPHO in June 2013.
- Known archaeological sites – Documented archaeological data were obtained from a records search through the OHPO conducted in June 2013.
- Known cemeteries – Cemeteries were mapped with the aid of USGS topographic maps, road maps, ESRI GIS maps, and land-use field surveys.

Recorded NRHP, OHI, and known archaeological listings are maintained by the OHPO in electronic GIS databases via the OHPO web site. Information provided by OHPO was imported into ArcGIS and used for this study. Cemeteries were identified through a review of topographic and road maps, supplemented with land-use field surveys. No NRHP sites were identified within 1,000-ft of any of the routes.

3. Land-Use Attributes

A list of land-use features was developed with the intent that potential routes would avoid sensitive areas, while utilizing existing or planned facilities, to the greatest extent possible. The following land-use attributes were considered in the siting process:

- Building structures (e.g., single homes and residential subdivisions, trailer parks, apartments, businesses, industrial buildings, and hotels) within the 1,000-ft buffer around the pipeline route.
- Properties that were crossed or bisected by the pipeline route.
- Prime farm land within the 1,000-ft buffer around the pipeline route.
- Sensitive land-uses (e.g., parks, wildlife refuges, conservations areas, and golf courses) within the 1,000-ft buffer.
- Institutional land-uses (e.g., churches, schools, and hospitals) within the 1,000-ft buffer.

Building structures, sensitive land-uses and institutional land-uses within 1,000-ft of the routes were obtained via USGS topographic maps, aerial photography, property survey data, ESRI GIS data, and land-use field surveys. Parcel maps and aerial imagery were used to determine the number of properties crossed by the pipeline route. Prime farm land within 1,000-ft of the pipeline route was determined off soil survey data obtained through the USDA/NRCS.

4. Engineering Attributes

The list of engineering attributes was developed with the intention to avoid disruption to permanent transportation routes and right-of-way. Furthermore, it was sought to increase public safety to the pipeline, decrease engineering and right-of-way acquisition challenges and subsequent increases in construction costs. The following attributes were engineering considerations in the siting process:

- Road crossings – Data for road crossings were obtained from street maps and USGS topographic maps. The cost of construction for a pipeline increases significantly in relation to the amount of transportation routes that must be bored or crossed and mitigated.
- Percentage of the route that is not on the City of Dayton's property – utilizing property owned by the City of Dayton for the installation of the pipeline has multiple benefits:

  - The relocation of the pipeline on the City of Dayton's property is mutually beneficial to both Vectren and the City due to the current location of the pipeline through the airport.
  - The number of contacts that need to be made for the acquisition of the right-of-way is reduced.
  - Impacts to private land owners are reduced.
- Percentage of the route that is not adjacent to road rights-of-way (ROW) – Generally, following existing ROW decreases construction costs and minimizes impacts to land owners.
- Total route length – The length of the route was scored with direct proportional significance as a constraint. As pipeline route length increased, the score increased as well.
- Percent of the route that falls within a probable High Consequence Area (HCA) per 49 CFR 192.903, method 2. Consequences of inadvertent releases from pipelines can vary greatly, depending on where the release occurs, and the commodity involved in the release. Releases from pipelines can adversely affect human health and safety, cause environmental degradation, and damage personal or commercial property. HCAs require additional focus, efforts, and analysis to ensure the integrity of the pipeline. Typically a pipeline corridor that contains fewer HCAs generally increases public safety.
- Number of Horizontal Directional Drills (HDD) – HDD methods are employed to reduce any environmental impacts associated with crossing streams and wetland areas. Additionally, HDD methods are used to reduce road restrictions when it is necessary for the pipeline to cross public roadways. HDD increases the construction costs significantly versus open trenching methods.

The number of road crossings, percentage of the route adjacent to existing ROW and the number of HDDs per route was determined based on available USGS topographic maps, aerial imagery, and the project area investigations. Route lengths were calculated using ArcGIS. The percentage of HCAs was determined using aerial imagery, land-use field surveys and potential impact circles using Equation 1.

Equation 1 – Potential Impact Radius

$$\textbf{Potential Impact Radius} = 0.69 * \sqrt{(p*d^2)}$$

Where:
p = maximum allowable operating pressure
d = diameter of the pipeline in inches

IV. IDENTIFICATION OF POTENTIAL CORRIDORS

After the constraint data were collected and plotted on the base map, the base map was reviewed to identify potential corridors for the project. The primary focus was to identify potential corridors that avoided, where practical, the identified constraints or to minimize potential impact where constraints could not be avoided.

Preferred routing options for the pipeline included a balance of the following:

- Routes within or adjacent to existing utility and/or transportation easements
- Routes that avoid residences, HCAs and potential disruption to the greatest extent possible
- Routes that avoid woodland, wetlands, and stream crossings

Using the constraint map, routes were selected that generally avoided sensitive areas. Where complete avoidance was not practical, the next best options were those where impacts could be minimized. The application of this methodology generally resulted in corridors that ran adjacent to or within existing road rights-of-way and along the boundary of agricultural fields for much of their lengths. Additionally, route placement was selected through the collaborative of effort between Vectren, the City of Union, the City of Dayton and the Dayton International Airport to avoid potential impacts with planned future development around the airport. Furthermore, the constraints associated with the airport and residential neighborhoods (in particular those to the south and east of the airport) limited the number of possible routes available. As such, many of the routes have multiple segments in common.

A. Route Segment Descriptions

Routes segments that were selected for comparison are shown in Figure 2. Detailed aerial imagery maps are provided in Appendix A. A discussion of each evaluated candidate route segment is provided in Table 4:

Table 4 - Route Descriptions

Route	Description
A Segment: E-1	**Route A** is approximately 4.48 miles long. The route starts at the south end of the Dayton International Airport near the intersection of Corporate Center Drive and West National Road. The pipeline heads east along W National Rd and turns north on North Dixie Drive, along the east edge of airport. The route turns west at Lightner Road and continues following the road until it ties back into the existing pipeline at the northwest corner of the airport. This route bisects through the highly populated area of Vandalia, Ohio and will impact several mature trees growing along the route. This route was included as an option to achieve the no more than twenty-percent in common provision and ranked 8th out of the nine routes evaluated.

B Segments: S-1, S-3, S-4, S-5, and W-4	**Route B** is approximately 6.61 miles long. The route starts south of the airport on the south side Corporate Center Drive, turns and crosses the road heading northwest alongside a woodlot, then turns west, utilizing properties owned by the City of Dayton. The route parallels property lines and follows alongside woodlots and turns north after crossing an unnamed tributary to Stillwater River. The route crosses National Road and turns west after crossing the road and follows along the north side of road through a woodlot. It turns north at the parcel boundary and then northeast after emerging from the woodlot. The route crosses through two agricultural fields, crosses Jackson Road and parallels the north side of Dog Leg Road. The route crosses Dog leg Road continuing northeast until it comes close to the airport's security fence, where it is directed north toward Old Springfield Rd. The route then turns east, paralleling the south side of Old Springfield where it crosses Mill Creek and a large parking area. It then crosses to the north side of Old Springfield Road before the intersection with Peters Pike and is then directed east to cross Peters Pike. After the crossing the route is redirected north and then to the east, to follow on the south side of Macy Lane, where it ties back into the existing pipeline at the airport boundary. The route ranked the best out of the nine evaluated and is Preferred Route.
C Segments: S-2, S-3, S-4, S-5, and W-4	**Route C** is approximately 7.17 miles long. Route C differs from Route B with the first segment, S-2. The route starts south of the airport on Stonequarry Road where it will tie into the existing line that lies just east of the Vandalia Sports Complex. The route heads west past Morton Middle School and north along Peters Pike where it turns west and crosses the Dayton International Airport Access Road. The route continues heading west until it crosses the unnamed tributary to Stillwater River where it turns north, crossing West National Road. The route turns west after crossing the road and follows along the north side of road through a woodlot. It turns north at the parcel boundary and northeast after emerging from the woodlot. The route crosses through two agricultural fields, crosses Jackson Road and parallels the north side of Dog Leg Road. The route crosses Dog leg Road continuing northeast until it comes close to the airport's security fence, where it is directed north toward Old Springfield Rd. The route then turns east, paralleling the south side of Old Springfield where it crosses Mill Creek and a large parking area. It then crosses to the north side of Old Springfield Road before the intersection with Peters Pike and is then directed east to cross Peters Pike. After the crossing the route is redirected north and then to the east, to follow on the south side of Macy Lane, where it ties back into the existing pipeline at the airport boundary. The route ranked 3rd out of the nine evaluated and is 77% in common with the Preferred Route, Route B.

D Segments: S-1, S-3, S-4, S-5, W-3, and N-2	**Route D** is approximately 7.18 miles long. The route starts south of the airport on the south side Corporate Center Drive, turns and crosses the road heading northwest alongside a woodlot, then turns west, utilizing properties owned by the City of Dayton. The route parallels property lines and follows alongside woodlots and turns north after crossing an unnamed tributary to Stillwater River. The route crosses National Road and turns west after crossing the road and follows along the north side of road through a woodlot. It turns north at the parcel boundary and then northeast after emerging from the woodlot. The route crosses through two agricultural fields, crosses Jackson Road and then jogs slightly to align with west side of Dog Leg Road, continues to follow Dog Leg Road north, crosses the road to the east side, then veers slightly more eastward into an agricultural field approximately one quarter mile before Old Springfield Rd to avoid a residential area. It crosses north of Old Springfield Rd and follows along the east side of a woodlot, turns east following parcel lines, crosses Mill Creek, follows along the south side of two woodlots and then turns north. The route crosses Brush Creek as it turns back toward the east along North Montgomery County Line Road and ties back into the existing pipeline at the northwest corner of the airport. The route ranked 2nd out of the nine evaluated and is the Alternate Route for the relocation of the pipeline. It is 59% in common with the Preferred Route, Route B.
E Segments: S-2, S-3, S-4, S-5, W-3, and N-2	**Route E** is approximately 7.74 miles long. Route E differs slightly from Route D with the first segment, S-2. The route starts south of the airport on Stonequarry Road where it will tie into the existing line that lies just east of the Vandalia Sports Complex. The route heads west past Morton Middle School and north along Peters Pike where it turns west and crosses the Dayton International Airport Access Road. The route continues heading west until it crosses the unnamed tributary to Stillwater River, where it turns north. The route crosses National Road and turns west after crossing the road and follows along the north side of road through a woodlot. It turns north at the parcel boundary and then northeast after emerging from the woodlot. The route crosses through two agricultural fields, crosses Jackson Road and then jogs slightly to align with west side of Dog Leg Road, continues to follow Dog Leg Road north, crosses the road to the east side, then veers slightly more eastward into an agricultural field approximately one quarter mile before Old Springfield Rd to avoid a residential area. It crosses north of Old Springfield Rd and follows along the east side of a woodlot, turns east following parcel lines, crosses Mill Creek, follows along the south side of two woodlots and then turns north. The route crosses Brush Creek as it turns back toward the east along North Montgomery County Line Road and ties back into the existing pipeline at the northwest corner of the airport. The route ranked 6th out of the nine evaluated and is 40% in common with the Preferred Route, Route B.

F Segments: S-1, S-3, S-4, W-2, N-1, and N-2	**Route F** is approximately 7.62 miles long. The route begins at the south side of the airport on Corporate Center Drive, crosses north of the road, and heads westward utilizing properties owned by the City of Dayton. The route parallels property lines and follows alongside woodlots and turns north after crossing an unnamed tributary to Stillwater River. The route crosses National Road and turns west after crossing the road and follows along the north side of road through a woodlot. It turns north at the parcel boundary and then northeast after emerging from the woodlot. The route crosses through two agricultural fields, crosses Jackson Road. The route turns north, paralleling the east side of Jackson Road and a new section of road that is in the early stages of construction by the county. The route veers slightly to the east to avoid residential areas and concrete lined drainage channels and then turns east and north around a woodlot until it intersects with North Montgomery County Line Road. The route continues east along Montgomery County Line Road, crossing Mill Creek and Brush Creek, and ends where it ties back into the existing pipeline at the northwest corner of the airport. The route ranked 4th out of the nine evaluated and is 48% in common with the Preferred Route, Route B.
G Segments: S-2, S-3, S-4, W-2, N-1, and N-2	**Route G** is approximately 8.18 miles long. Route G differs slightly from Route F with the first segment, S-2. The route starts south of the airport on Stonequarry Road where it will tie into the existing line that lies just east of the Vandalia Sports Complex. The route heads west past Morton Middle School and north along Peters Pike where it turns west and crosses the Dayton International Airport Access Road and continues heading west. The route turns north after crossing an unnamed tributary to Stillwater River. The route crosses National Road and turns west after crossing the road and follows along the north side of road through a woodlot. It turns north at the parcel boundary and then northeast after emerging from the woodlot. The route crosses through two agricultural fields, crosses Jackson Road. The route turns north, paralleling the east side of Jackson Road and a new section of road that is in the early stages of construction by the county. The route veers slightly to the east to avoid residential areas and concrete lined drainage channels and then turns east and north around a woodlot until it intersects with North Montgomery County Line Road. The route continues east along Montgomery County Line Road, crossing Mill Creek and Brush Creek, and ends where it ties back into the existing pipeline at the northwest corner of the airport. The route ranked 7th out of the nine evaluated and is 31% in common with the Preferred Route, Route B.

H Segments: S-1, S-3, W-1, N-1, and N-2	**Route H** is approximately 7.98 miles long. The route begins at the south side of the airport on Corporate Center Drive, crosses north of the road, and heads westward utilizing properties owned by the City of Dayton. The route parallels property lines and follows alongside woodlots. It crosses an unnamed tributary to Stillwater River. The route crosses National Road and turns west after crossing the road and follows along the north side of road through a woodlot. It turns north at the parcel boundary. Continuing north, paralleling property lines, the route diverts slightly to avoid a few residential houses. The route turns east when it intersects with North Montgomery County Line Road. After approximately a quarter mile the route diverts around a residential area and back on Montgomery County Line Road. The route continues east along Montgomery County Line Road, crossing Mill Creek and Brush Creek, and ends where it ties back into the existing pipeline at the northwest corner of the airport. The route ranked 5th out of the nine evaluated and is 38% in common with the Preferred Route, Route B.
I Segments: S-2, S-3, W-1, N-1, and N-2	**Route I** is approximately 8.55 miles long. Route I differs slightly from Route H with the first segment, S-2. The route starts south of the airport on Stonequarry Road, where it ties into the existing line that lies just east of the Vandalia Sports Complex. The route heads west past Morton Middle School and turns north along Peters Pike for approximately one and a half miles, where it turns west and crosses the Dayton International Airport Access Road. The route parallels property lines and follows alongside woodlots. It crosses an unnamed tributary to Stillwater River. The route crosses National Road and turns west after crossing the road and follows along the north side of road through a woodlot. It turns north at the parcel boundary. Continuing north, paralleling property lines, the route diverts slightly to avoid a few residential houses. The route turns east when it intersects with North Montgomery County Line Road. After approximately a quarter mile the route diverts around a residential area and back on Montgomery County Line Road. The route continues east along Montgomery County Line Road, crossing Mill Creek and Brush Creek, and ends where it ties back into the existing pipeline at the northwest corner of the airport. The route ranked last out of the nine evaluated and is 23% in common with the Preferred Route, Route B.

V. ROUTE SCORING

A. Route Scoring Rationale

The natural gas pipeline route selection process involves balancing the varying constraints identified in the study area. One way to compare the alternatives is to develop a ranking system based on attributes that are linked to the objectives of the route selection. This approach is a multi-objective decision analysis and has been used to assist in decisions routing other natural gas pipelines.

Based on a review of regulatory and other documents, UTI identified objectives of the route selection as involving the minimization of environmental, cultural, land-use, and engineering/construction impacts. Nineteen quantifiable attributes relating to these objectives were developed. Each attribute for every route was scored as described in the following sections. After the attribute table was completed, the objectives of the Route Selection Study were revisited and the route that most closely matched the objectives was selected as the best candidate.

Some studies have determined that it was necessary to apply weights to data associated with the constraints or categories as they relate to the project study area and the different aspects identified. In regards to the relocation of the transmission pipeline around the Dayton International Airport it was determined that all constraints and categories are equal and no weighting was applied. This was determined after careful consideration by subject matter experts within both Vectren and UTI of the nature of the project, sensitivity of the area to disruption by the scope of the project, and the characteristics of the study area.

Numerical scoring of the routes was conducted according to the following steps:

- *Step 1 Assembly of the "Raw" Route Data*: Nine (9) potential routes were identified. Scoring was completed for each of these potential routes. Where appropriate, attributes crossed by the proposed project centerline were measured. Wetlands, soil types, residences, cultural, archaeological, as well as institutional and other sensitive land-uses were considered within the 1,000-ft buffered corridor to reflect the potential impacts associated with the constraint. The other various constraints were calculated when the centerline of route intersected the constraint (e.g., streams, properties and road crossings).

- *Step 2: Data Normalization*: In order to assign scores to the data, the data was normalized so that each constraint could be directly compared according to the same, non-dimensional scale. The formula used to normalize each constraint in the Study was:

Equation 2 - Data Normalization

$$X_{i,\,0\text{ to }1} = \frac{X_i - X_{Min}}{X_{Max} - X_{Min}} * 100$$

Where:
X_i = Each data point i
X_{Min} = the minima among all the data points
X_{Max} = the maxima among all the data points
$X_{i,\,0\text{ to }1}$ = the data point i normalized between 0 and 1

Using the data range for each attribute to normalize the score has several advantages. One of these advantages is that all of the constraints were scored out of 100 possible points, and were therefore directly comparable and equally weighted. Another is that the relative distribution of the data within each constraint was maintained, eliminating the unnecessary grouping of the data as used in other methods of ranking.

- *Step 3: Scoring Constraints*: After the data was normalized, the scores for each of the constraints within each attribute (ecological, cultural, land-use, and engineering) were divided by the number of constraints within the attribute so that the total score from each attribute was out of 100 possible points. This method provides the ability to apply weights to constraints within an attribute if it is determined to be more significant than others without impacting the scores within the other categories. Based on the nature of the study area, weights were not applied to any of the constraints in this study. The lower the score for the attribute the better the overall route score.

- *Step 4: Totaling Attributes to Find Route Score*: The attribute groups for each route were totaled to provide a final score. The result is a scale with a best possible score of 0 and a worst possible score of 400.

B. Data Sources and Scoring

1. Ecological

Ecological data is provided in Table 5. The length of the route crossing wooded lots was calculated using ArcGIS, USGS topographic maps and aerial imagery and was visually verified during the field reconnaissance. Wetland data was collected from OWI and national hydrography datasets. The percentage of hydric and partially hydric soils was calculated using soil survey datasets obtained from the USDA/NRCS. Other environmental data was collected from publicly available sources including, ODNR and the US Fish and Wildlife Service (USFWS). All of the candidate routes (east and west) cross three streams which, after normalizing the data, changed their value to zero. Recorded endangered or threatened species were all treated equally between the routes.

Table 5 - Ecological data, score and rank

Ecological Normalized Data Totals								
Route #	Length (miles)	Length of route Crossing Wooded Lots	# of Wetlands within 1,000-ft	Percent Hydric/Partially Hydric Soils within 1000-ft	# of Stream Crossings	Recorded endangered or threatened species areas crossed by center line	**Total Ecological Score**	**Ecological Rank**
A	4.48	0	0	20	0	0	**20**	**1**
B	6.61	17	7	10	0	0	**34**	**5**
C	7.17	12	4	8	0	0	**25**	**2**
D	7.18	20	7	10	0	0	**37**	**7**
E	7.74	16	4	9	0	0	**29**	**3**
F	7.62	19	20	7	0	0	**46**	**9**
G	8.18	15	18	6	0	0	**38**	**8**
H	7.98	18	18	1	0	0	**37**	**6**
I	8.55	14	16	0	0	0	**30**	**4**

2. Cultural

Cultural data is provided in Table 6. Recorded NRHP, known archaeological sites, and OHI sites were obtained from OHPO. Cemeteries were identified through a review of topographic and road maps, supplemented by field land-use surveys. This information was imported into ArcGIS and analyzed. There were no NRHP sites within 1,000-feet of any of the candidate routes.

Table 6 - Cultural route data, score and rank

Cultural Normalized Data Totals							
Route #	Length (miles)	NRHP sites within 1,000-ft	Known Archaeological sites within 1,000-ft	OHI sites within 1,000-ft	Cemeteries within 1,000-ft	**Total Cultural Score**	**Cultural Rank**
A	4.48	0	0	25	13	**38**	**7**
B	6.61	0	6	3	0	**10**	**2**
C	7.17	0	25	3	0	**28**	**5**
D	7.18	0	6	0	0	**6**	**1**
E	7.74	0	25	0	0	**25**	**4**
F	7.62	0	6	0	13	**19**	**3**
G	8.18	0	25	0	13	**38**	**7**
H	7.98	0	6	0	25	**31**	**6**
I	8.55	0	25	0	25	**50**	**9**

3. Land-Use

The number of buildings, sensitive land-uses, and institutional land-uses were analyzed utilizing USGS topographic maps, aerial imagery, Ohio point of interest datasets, and field reconnaissance. Parcel data and aerial imagery were used to obtain the information for the properties crossed by the pipeline and USDA/NRCS soil survey data was used to obtain the data for the percentage of prime farm land within 1,000-feet of the pipeline. Information used to score and rank each candidate route based on the land-use attributes is provided in Table 7.

Table 7 - Land-Use route data, score and rank

Land-Use Normalized Data Totals								
Route #	Length (miles)	# of buildings within 1,000-ft	# of properties crossed	Percent of Prime Farm Land with 1,000-ft	Sensitive land-uses within 1,000-ft	Institutional land-uses within 1,000-ft	**Total Land-Use Score**	**Land-Use Rank**
A	4.48	20	0	0	20	20	**60**	**8**
B	6.61	0	12	11	0	0	**23**	**1**
C	7.17	5	12	13	20	0	**50**	**5**
D	7.18	1	12	11	0	0	**24**	**2**
E	7.74	6	12	13	20	0	**50**	**6**
F	7.62	2	20	14	0	0	**36**	**4**
G	8.18	7	20	16	20	0	**62**	**9**
H	7.98	3	8	19	0	0	**29**	**3**
I	8.55	7	8	20	20	0	**55**	**7**

4. Engineering

Road crossing data was collected from USGS topographic maps, aerial imagery, transportation datasets, county engineering maps, and field reconnaissance. Parcel maps and datasets were used to analyze the percent of the route that was not within the City of Dayton's property. Route lengths and percentages of the routes adjacent to existing road ROW were calculated using ArcGIS. Aerial imagery and potential impact circles were used to analyze the percent probable HCAs on the routes. Information obtained that was used to score and rank each candidate route based on the engineering attributes is provided in Table 8.

Table 8 - Engineering route data, score and rank

Engineering Normalized Data Totals									
Route #	Length (miles)	# of road crossings	% of route not on City of Dayton Property	% of route not adjacent to existing road ROW	Length of route	Percent Probable High Consequence Area	# of HDD Crossings	Total Engineering Score	Engineering Rank
A	4.48	17	16	0	0	17	17	**66**	**9**
B	6.61	0	0	14	9	8	0	**31**	**1**
C	7.17	0	6	10	11	10	0	**38**	**3**
D	7.18	0	10	16	11	0	0	**38**	**2**
E	7.74	0	16	12	13	3	0	**44**	**5**
F	7.62	0	11	17	13	0	0	**40**	**4**
G	8.18	0	16	12	15	3	0	**45**	**7**
H	7.98	1	12	16	14	0	1	**45**	**6**
I	8.55	1	17	12	17	2	1	**51**	**8**

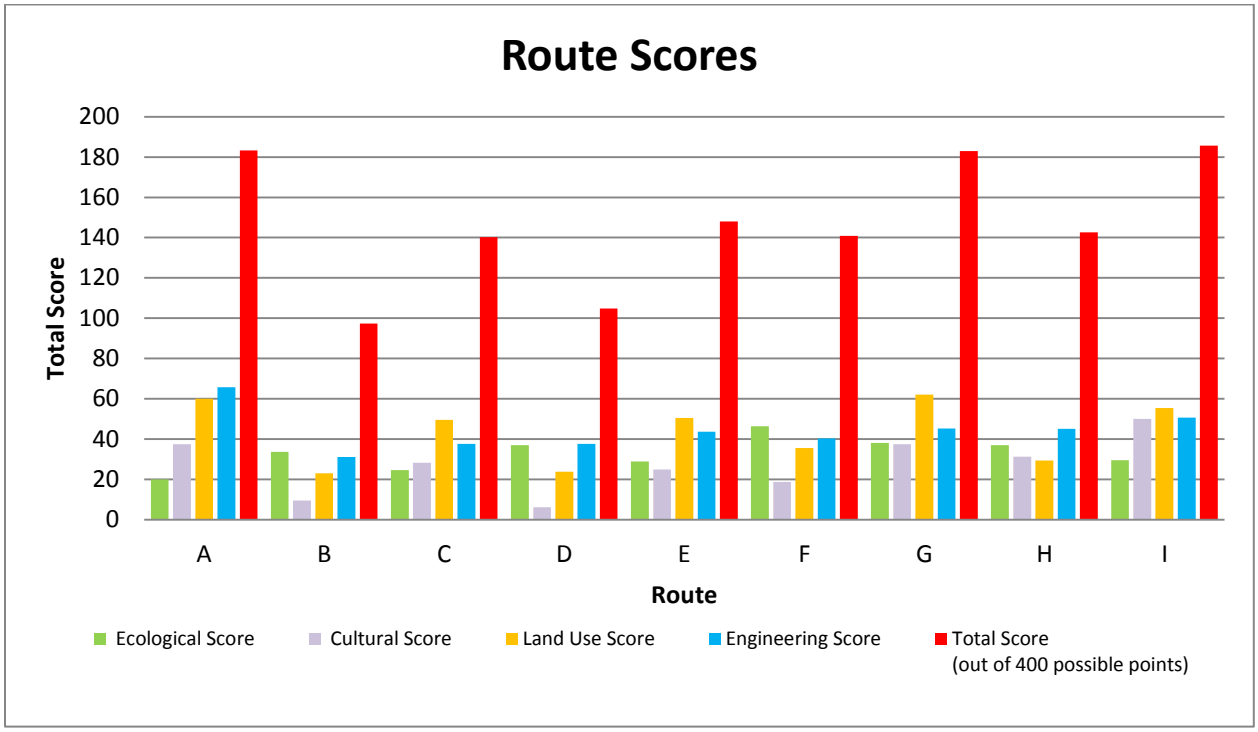
VI. DISCUSSION OF ROUTE SELECTION

The results of the Route Selection Study are provided in Table 9 and depicted as a bar chart on Figure 3. The Preferred route (Route B) had the lowest score at 97. The Alternate route (Route D) had the second lowest score at 105. Both the Preferred and Alternate Routes scored more than forty percent better than the next ranking routes (Routes C, F, and H).

Table 9 - Route selection study results

Route Totals			**Ecological**		**Cultural**		**Land-Use**		**Engineering**		**Total Score** (out of 400 possible points)	**Overall Rank**
Route #	Segments	Length (miles)	Total Ecological Score	Ecological Rank	Total Cultural Score	Cultural Rank	Total Land-Use Score	Land-Use Rank	Total Engineering Score	Engineering Rank		
A	E-1	4.48	20	1	38	7	60	8	66	9	**183**	**8**
B	S-1 S-3 S-4 S-5 W-4	6.61	34	5	10	2	23	1	31	1	**97**	**1**
C	S-2 S-3 S-4 S-5 W-4	7.17	25	2	28	5	50	5	38	3	**140**	**3**
D	S-1 S-3 S-4 S-5 W-3 N-2	7.18	37	7	6	1	24	2	38	2	**105**	**2**
E	S-2 S-3 S-4 S-5 W-3 N-2	7.74	29	3	25	4	50	6	44	5	**148**	**6**
F	S-1 S-3 S-4 W-2 N-1 N-2	7.62	46	9	19	3	36	4	40	4	**141**	**4**
G	S-2 S-3 S-4 W-2 N-1 N-2	8.18	38	8	38	7	62	9	45	7	**183**	**7**
H	S-1 S-3 W-1 N-1 N-2	7.98	37	6	31	6	29	3	45	6	**143**	**5**
I	S-2 S-3 W-1 N-1 N-2	8.55	30	4	50	9	55	7	51	8	**186**	**9**

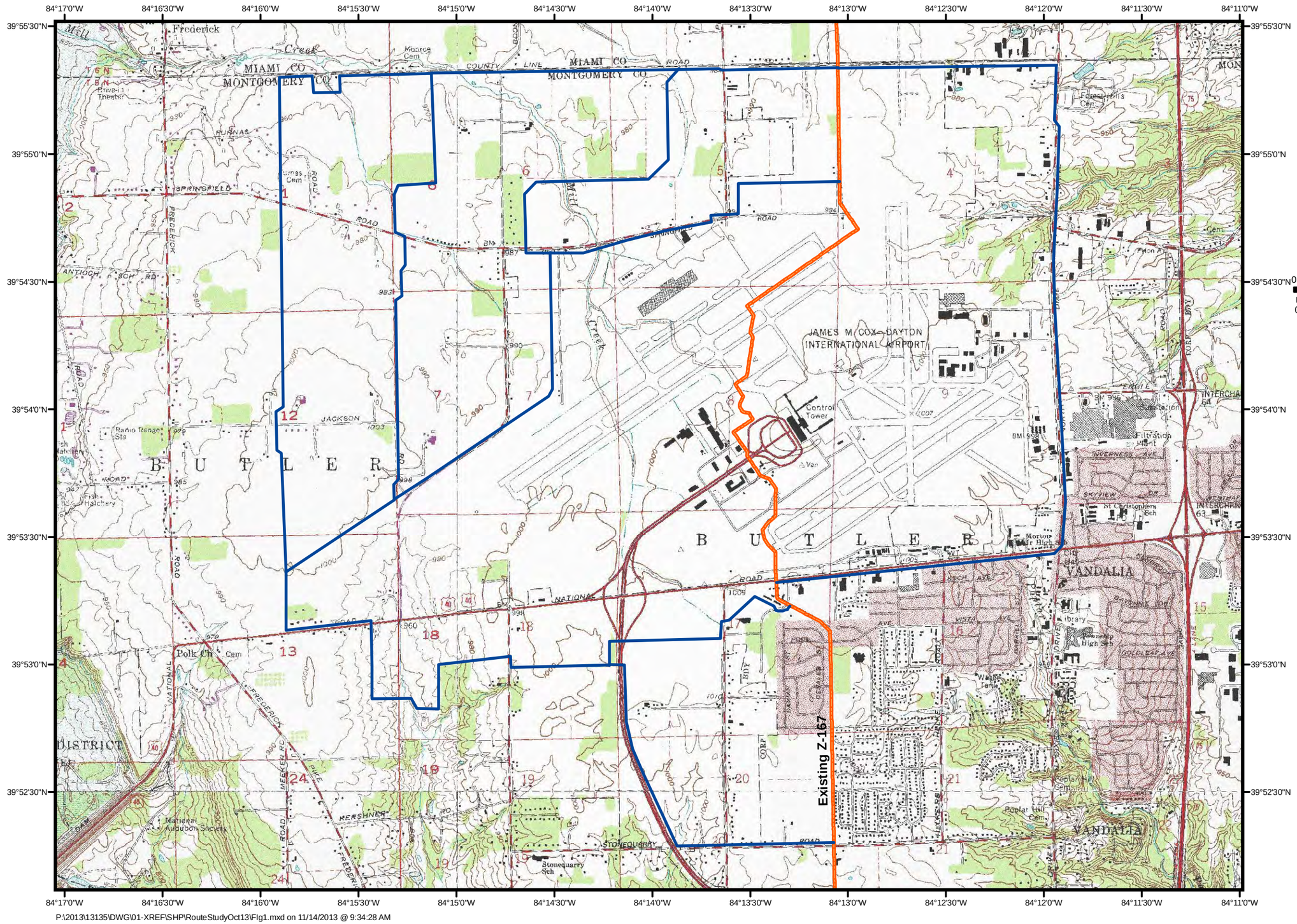
Figure 3 - Route Score Chart



The route selection study scored each route based on ecological, cultural, land-use, and engineering impacts. Based on UTI's study, the Preferred Route (Route B), when compared with the Alternate Route (Route D), will result in a lower number of trees requiring clearing and has the least impact on private land owners by utilizing more of the City of Dayton's property. Although the Preferred Route contains a higher percentage of high consequence areas than the Alternate Route it is preferable over the Alternate Route because it avoids the areas where the City of Union and the Dayton International Airport have planned future growth.

Route C, (ranked 3rd with 140 points), Route F (ranked 4th with 141 points), and Route H (ranked 5th with 143 points) all scored more than forty-percent worse than Preferred Route, Route B, and thirty-percent worse than the Alternate Route, Route D. These routes ranked lower than the Preferred and Alternate Routes with the cultural, land use, and engineering aspects evaluated in the study.

Additionally, reports received from the Montgomery County Engineers on soil boring data in the area indicate the depth to bedrock along segment W-2 (and west) of the route is less than 18" in several locations. To meet Vectren's safety pipeline standards the transmission pipeline would need to be placed at a depth no less than 48" which would require more invasive techniques to be used on any of the routes utilizing the W-1 or W-2 segments (Routes F, G, H and I) and would create other socioeconomic issues during construction such as noise, dust, and potential blasting. Therefore, Routes B and D appear to be the best candidates for the Application to the Ohio Power Siting Board for the Certificate of Environmental Compatibility and Public Need.



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Utility Technologies International
4700 Homer Ohio Lane
Groveport, OH 43125
(614) 482-8080

VECTREN

Z-167 Route Selection Study

Study Area
Figure 1

1:36,000

0 0.25 0.5 1 Miles

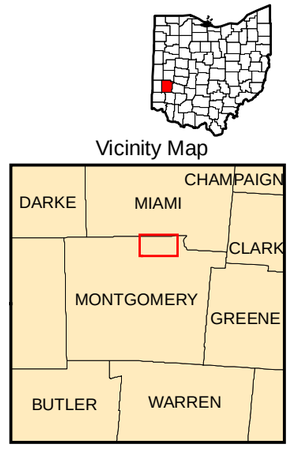
0 650,000 1,300,000 2,600,000 Feet

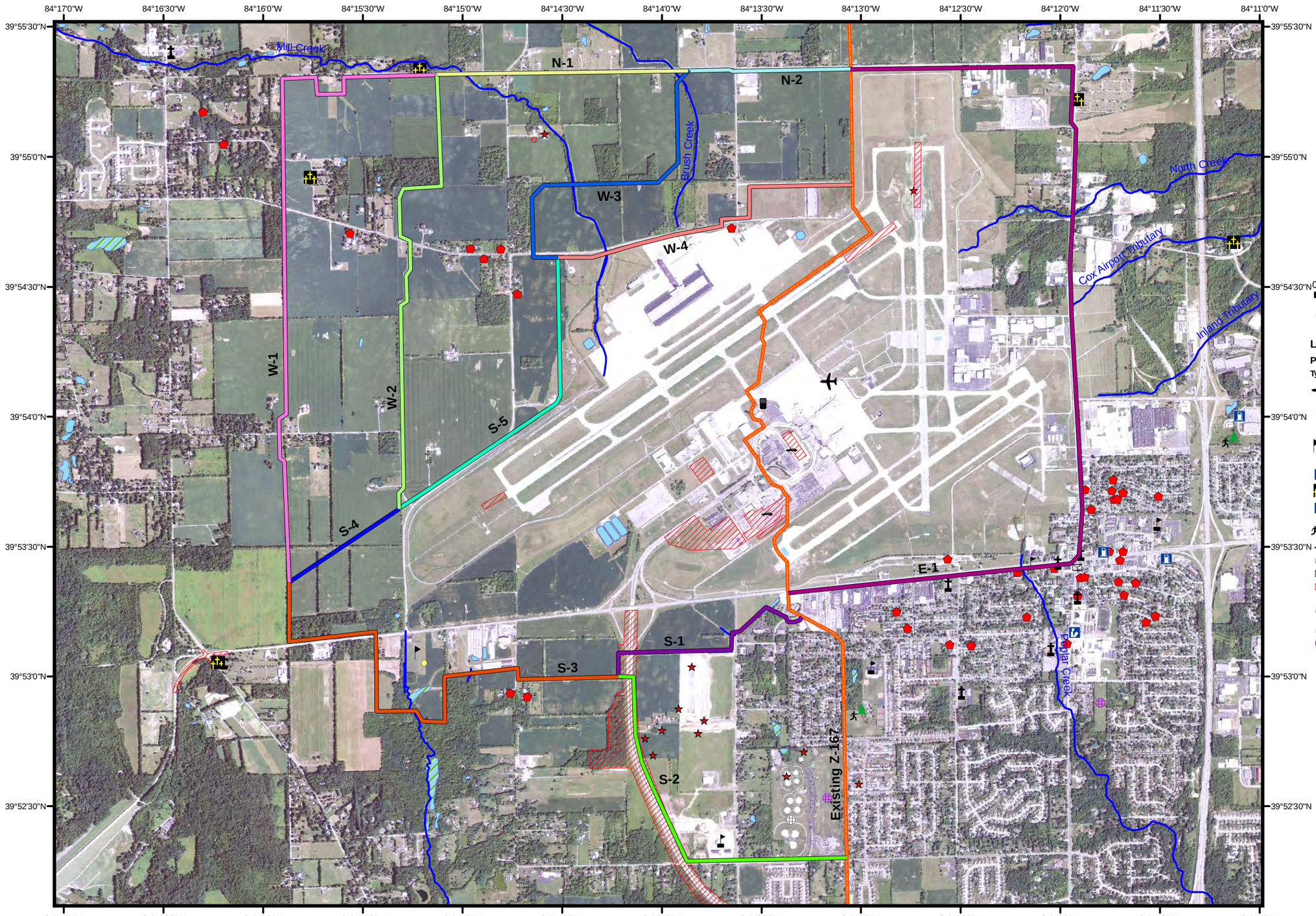
Legend

- Proposed Routes
- Z-167 Existing Pipeline

N
W E
S

Vicinity Map





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Z-167 Route Selection Study

Constraint Map
Figure 2

1:36,000

0 0.25 0.5 1 Miles

0 650,000 1,300,000 2,600,000 Feet

Legend

Point of Interest

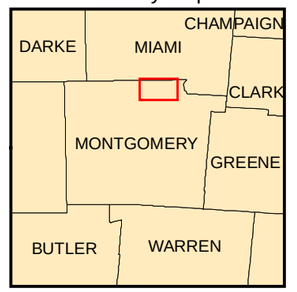
Type

- Airport
- Airport Tower
- Church
- Driving Range
- Fuel
- Cemetery
- Library
- Park
- Parking
- Pitch
- Post Office
- Post Office - Historic
- Power Tower
- School
- Soccer

- Phase I Study Areas
- Achaeological Sites
- Historical Building
- Streams
- Pond
- Z-167 Existing Pipeline

N W E S

Vicinity Map



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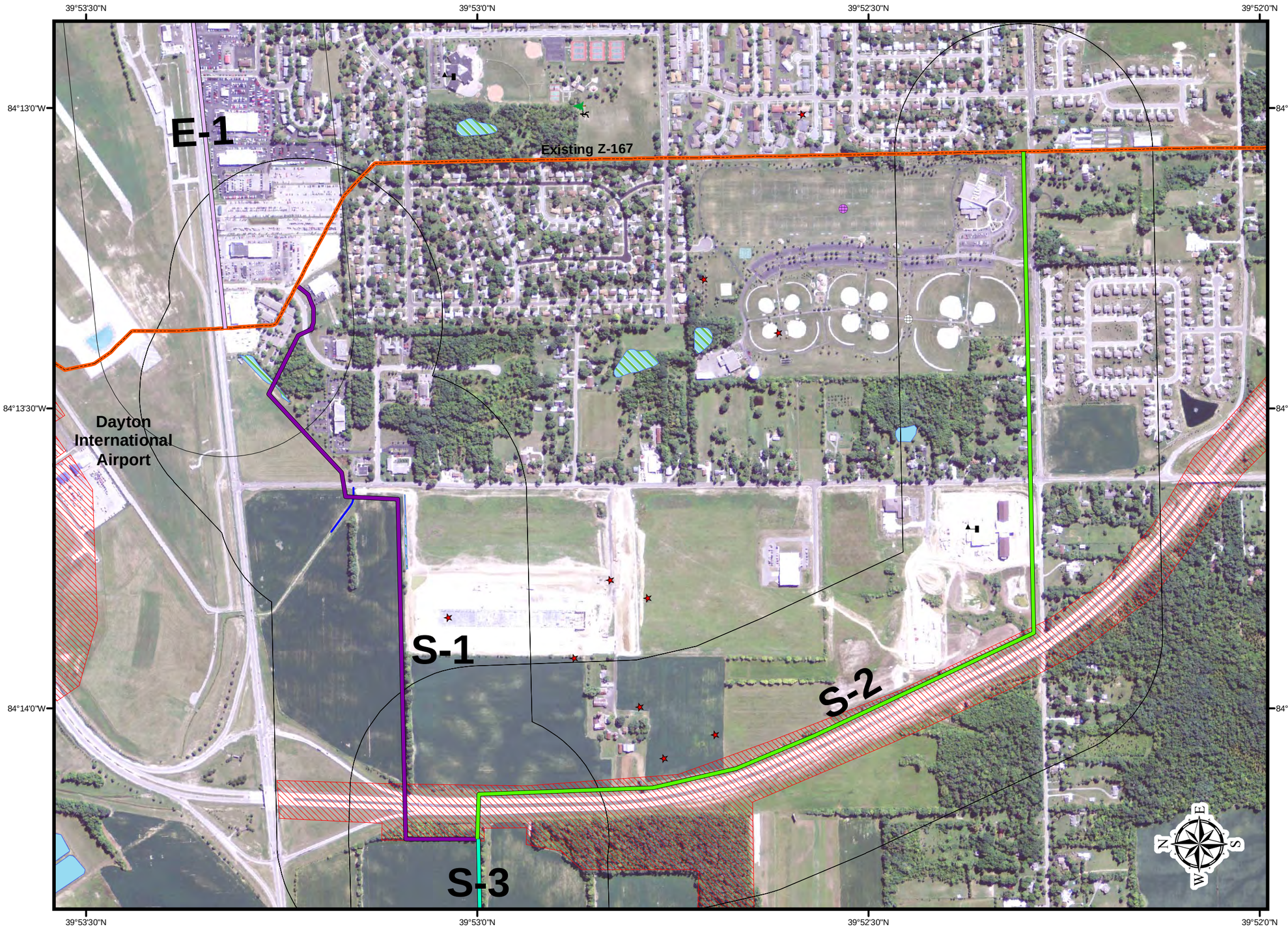

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(614) 482-8080

VECTREN

Z-167 Route Selection Study

Constraint Map
Figure 2a

1:12,000

0 0.05 0.1 0.2 Miles

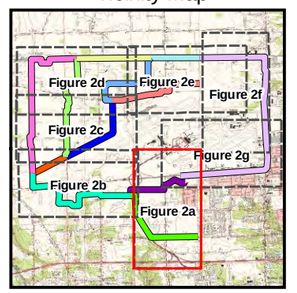
0 650,000 1,300,000 2,600,000 Feet

Legend

Point of Interest
- Airport
- Airport Tower
- Church
- Driving Range
- Cemetery
- Park
- Parking
- Pitch
- School
- Soccer

Type
- Phase I Study Areas
- 2000' Corridor
- Achaeological Sites
- Historical Building
- Streams
- Wetland
- Pond
- Z-167 Existing Pipeline
- 2000' Corridor

Vicinity Map



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84°16'0"W
84°15'30"W
84°15'0"W
84°14'30"W
39°53'30"N
39°53'0"N

W-1
W-2
S-4
S-1
S-2
S-3
Dayton International Airport
Unnamed Tributary (Stillwater River RM 6.4)

N
W
E
S

Utility Technologies International
4700 Homer Ohio Lane
Groveport, OH 43125
(614) 482-8080

VECTREN

Z-167 Route Selection Study

Constraint Map
Figure 2b

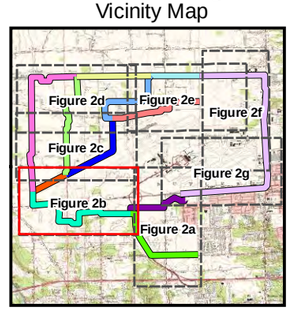
1:12,000
0 0.05 0.1 0.2 Miles
0 650,000 1,300,000 2,600,000 Feet

Legend

Point of Interest
- Airport
- Airport Tower
- Church
- Driving Range
- Cemetery
- Park
- Parking
- Pitch
- School
- Soccer

Type
- Phase I Study Areas
- 2000' Corridor
- Achaeological Sites
- Historical Building
- Streams
- Wetland
- Pond
- Z-167 Existing Pipeline
- 2000' Corridor

Vicinity Map



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84°16'0"W 84°15'30"W 84°15'0"W 84°14'30"W

39°54'30"N

39°54'0"N

W-1

W-2

W-3

W-4

S-4

S-5

Mill Creek

Dayton International Airport

N W E S

Utility Technologies International
4700 Homer Ohio Lane
Groveport, OH 43125
(614) 482-8080

VECTREN

Z-167 Route Selection Study

Constraint Map
Figure 2c

1:12,000

0 0.05 0.1 0.2 Miles

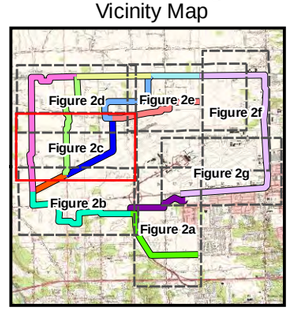
0 650,000 1,300,000 2,600,000 Feet

Legend

Point of Interest Type
- Airport
- Airport Tower
- Church
- Driving Range
- Cemetery
- Park
- Parking
- Pitch
- School
- Soccer

- Phase I Study Areas
- 2000' Corridor
- Achaeological Sites
- Historical Building
- Streams
- Wetland
- Pond
- Z-167 Existing Pipeline
- 2000' Corridor

Vicinity Map



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84°16'0"W 84°15'30"W 84°15'0"W 84°14'30"W

39°55'30"N

39°55'0"N

39°54'30"N

Mill Creek

Brush Creek

W-1

N-1

W-2

W-3

W-4

S-5

Dayton International Airport

N W E S

Utility Technologies International
4700 Homer Ohio Lane
Groveport, OH 43125
(614) 482-8080

VECTREN

Z-167 Route Selection Study

Constraint Map
Figure 2d

1:12,000

0 0.045 0.09 0.18 Miles

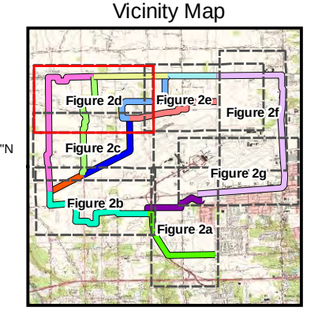
0 650,000 1,300,000 2,600,000 Feet

Legend

Point of Interest
- Airport
- Airport Tower
- Church
- Driving Range
- Cemetery
- Park
- Parking
- Pitch
- School
- Soccer

Type
- Phase I Study Areas
- 2000' Corridor
- Achaeological Sites
- Historical Building
- Streams
- Wetland
- Pond
- Z-167 Existing Pipeline
- 2000' Corridor

Vicinity Map



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84°14'0"W 84°13'30"W 84°13'0"W 84°12'30"W

39°55'30"N

39°55'0"N

39°54'30"N

Brush Creek

N-1

N-2

E-1

W-3

W-4

Existing Z-167

Dayton International Airport

North Creek

N W E S

Utility Technologies International
4700 Homer Ohio Lane
Groveport, OH 43125
(614) 482-8080

VECTREN

Z-167 Route Selection Study

Constraint Map
Figure 2e

1:12,000

0 0.05 0.1 0.2 Miles

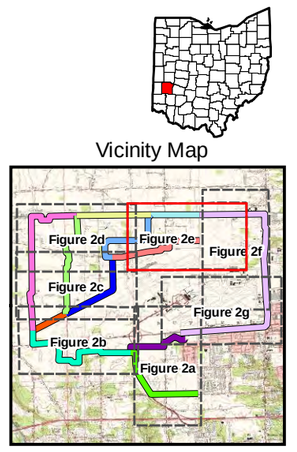
0 650,000 1,300,000 2,600,000 Feet

Legend

Point of Interest
- Airport
- Airport Tower
- Church
- Driving Range
- Cemetery
- Park
- Parking
- Pitch
- School
- Soccer

Type
- Phase I Study Areas
- 2000' Corridor
- Achaeological Sites
- Historical Building
- Streams
- Wetland
- Pond
- Z-167 Existing Pipeline
- 2000' Corridor

Vicinity Map



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39°55'30"N 39°55'0"N 39°54'30"N 39°54'0"N

84°12'0"W 84°12'30"W 84°13'0"W

Deer Cliff Run

Cox Airport Tributary

Inland Tributary

North Creek

E-1

N-2

W-4

Existing Z-167

Dayton International Airport

N E S W

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Groveport, OH 43125
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VECTREN

Z-167 Route Selection Study

Constraint Map
Figure 2f

1:12,000

0 0.05 0.1 0.2 Miles

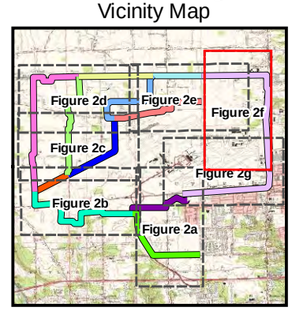
0 650,000 1,300,000 2,600,000 Feet

Legend

Point of Interest
- Airport
- Airport Tower
- Church
- Driving Range
- Cemetery
- Park
- Parking
- Pitch
- School
- Soccer

Type
- Phase I Study Areas
- 2000' Corridor
- Achaeological Sites
- Historical Building
- Streams
- Wetland
- Pond
- Z-167 Existing Pipeline
- 2000' Corridor

Vicinity Map



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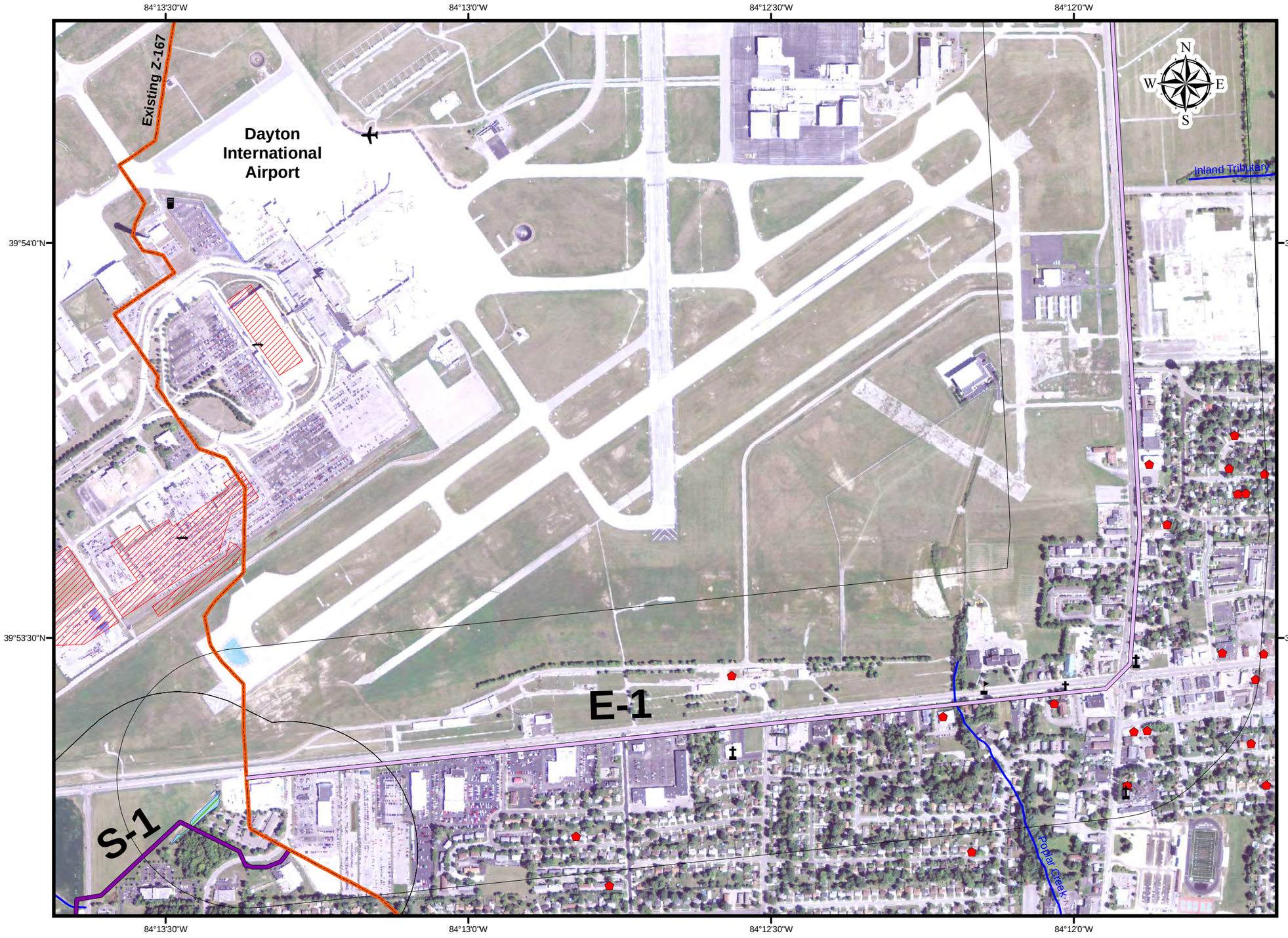

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Z-167 Route Selection Study

Constraint Map
Figure 2g

1:12,000

0 0.05 0.1 0.2 Miles

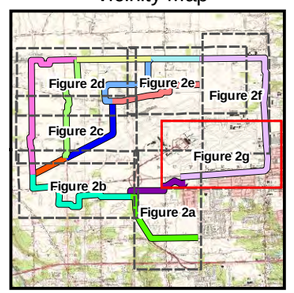
0 650,000 1,300,000 2,600,000 Feet

Legend

Point of Interest
- Airport
- Airport Tower
- Church
- Driving Range
- Cemetery
- Park
- Parking
- Pitch
- School
- Soccer

Type
- Phase I Study Areas
- 2000' Corridor
- Achaeological Sites
- Historical Building
- Streams
- Wetland
- Pond
- Z-167 Existing Pipeline
- 2000' Corridor

Vicinity Map



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APPENDIX 4-1

VECTREN
Live Smart

2013

Z-167 Relocation Project's Environmental Construction Standards

Prepared By:
Utility Technologies International
4700 Homer Ohio Lane
Groveport, Ohio 43125
(614)482-8080

Table of Contents

I. INTRODUCTION

Vectren Energy Delivery of Ohio (Vectren) is committed to complying with the applicable environmental rules and regulations of Federal, State, and local governments. Vectren's goal is to meet these requirements in the pursuit of a cleaner, safer environment for future operations.

Recognizing this goal, it is Vectren's plan that all construction, operation and maintenance activities be conducted in a safe manner that minimize impacts on stream and wetland ecosystems, wildlife habitat, cultural resources and the human environment. To this end, Utility Technologies International, on behalf of Vectren, has prepared this Environmental Construction Standards (ECS) for the Z-167 Relocation Project around the Dayton International Airport and to provide further details on the Application for a Certificate of Environmental Compatibility and Public Need to the Ohio Power Siting Board (OPSB). The ECS provides the minimum requirements to be applied to all construction, operation and maintenance activities.

The general objective of this ECS is to provide Vectren personnel and Vectren's contractors with instructional information, complete with a 'practical approach to environmental concerns which can arise before, during and after facility construction. More specific objectives include:

- minimize impacts to environmentally sensitive areas;
- use the minimum land required for safe and efficient construction, operation, and maintenance of the facilities;
- provide threatened and endangered species awareness;
- prevent erosion and sedimentation during construction; and
- complete construction in a safe and timely manner.

Words and/or phrases which have special meaning (shown in **bold** at first occurrence in text) and acronyms have been defined in Section IX.

The intent of the ECS is to confine project-related disturbance to the identified **construction work areas** and to minimize erosion and enhance revegetation in those areas. Any project-related ground disturbance (including erosion) outside of these areas is subject to compliance with all applicable survey[1] and mitigation requirements.

The ECS is focused primarily on Z-167 Relocation Project's construction, operation, and maintenance and will be used as the base document for the Storm Water Pollution Prevention Plan (SWP3) for the Project. The SWP3 will contain the details and specifications that will be used on the Project site that are discussed in this ECS. Federal, State and local agencies having regulations more stringent than this ECS shall supersede[2].

[1] Will include all environmental and regulatory mandated surveys such as but not limited to, threatened and endangered species surveys, archeology surveys, wetland delineations etc.

[2] Deviations that involve measures different from those contained in this ECS will only be permitted by written approval from the Gas Transmission Engineering Manager.

II. UPLAND CONSTRUCTION

A. GENERAL

This chapter describes typical upland pipeline construction.

The **upland** pipeline construction spread operates as a moving assembly line performing specialized procedures in an efficient, planned sequence. Figure 1 presents this typical upland pipeline construction sequence. In addition, special construction crews install and alter fences, bore under roads, streams, and install **wetland** crossings that are not done by conventional upland techniques.

While construction work is ongoing, the construction work area will be kept clean of all trash and debris resulting from the work. Non- hazardous materials and waste shall be disposed of in an approved landfill. Hazardous waste shall be disposed of in accordance with Vectren's policies and Federal, State and local regulations.

B. RIGHT-OF-WAY WIDTH

For the relocation of the Z-167 pipeline, Vectren will utilize a 50-foot wide permanent right-of-way (**ROW**) and a 30-foot wide temporary construction ROW as illustrated in Figure 2. After the construction work area is restored, the temporary work areas are allowed to revert to its previous uses. The permanent ROW is maintained as Vectren's permanent ROW for the facility.

In addition, there may be instances where extra work areas are needed for topsoil conservation, equipment staging, pipe and material storage, temporary and permanent access, and related construction activities. Such areas will be identified in the project plans and will undergo all required environmental and cultural resources reviews prior to use. Alternate construction methods may be required in narrow construction work area situations to safeguard workers, equipment, the pipeline, and the environment.

C. CLEARING

The construction work area is cleared to the width specified in the ROW agreements. During clearing operations, all brush and trees will be felled into the construction work area to prevent off-construction work area damage to trees and structures.

Should substantial soil disturbance take place during clearing install temporary erosion and sedimentation controls as described in Section D-3.

1. Wood Products

All wood products (i.e., sawlogs, pulpwood or cordwood) will be removed and properly disposed of from the project area.

2. Brush

All brush cleared from the ROW will be disposed of by one of the following methods:

- Brush may be burned, where permitted by law. The necessary burning permits will be obtained. Fires will be of reasonable size and located and patrolled so that they will not spread off the construction work area.
- The brush may be chipped and given away, or thinly spread (less than 2 inches thick over the construction work area except in **agricultural lands** or within 50 feet of streams, floodplains, or wetlands. Chipping will be limited to those areas where agreed to with the landowner. During **restoration**, soil will be augmented by the addition of 12 to 15 pounds of nitrogen per ton of chips to aid re-vegetation*.
- Brush may be hauled off-site. Off-site disposal in other than commercially operated disposal locations is subject to compliance with all applicable survey, landowner approval and mitigation requirements.

  * One ton of chips spread 1 inch thick cover approximately ¼ acre.

3. Fence Crossings

Where it is necessary to remove fences, adequate temporary fences or gates as illustrated in Figure 3 will be installed **immediately** or in accordance with landowner agreement. Such temporary fences or gates will be kept closed, except when necessary for construction purposes per landowner agreement. Once construction is completed, permanent fence repairs will be completed. All fences that have been cut or removed will be permanently repaired during restoration to match the original type of the fence as much as possible. Where there is any doubt as to the usability-of old fence material, new material will be used in making repairs. Fence repairs will be subject to the approval of the landowner.

D. GRADING

Grading is necessary to provide a smooth and even surface for safe and efficient operation of construction equipment. Grading will be the minimum amount necessary and includes prompt installation of erosion control devices such as interceptor diversions, **sediment filter devices**, and equipment crossings at streams to minimize soil loss and subsequent sedimentation.

1. Tree Stump and Rock Removal and Disposal

Tree stumps and large rocks will be cut, graded or removed as necessary to permit construction and to provide adequate clearance for mechanical equipment and other vehicles. Tree stumps that are adjacent to roads will be cut close to the ground or removed.

Stumps and large rocks will be hauled from the site and disposed of in an approved landfill or other suitable area. Off-site disposal in other than commercially operated disposal location is

subject to compliance with all applicable survey, landowner approval and mitigation requirements.

2. Topsoil Conservation

Unless the landowner or land management agency specifically approves otherwise, prevent the mixing of topsoil with subsoil by stripping topsoil from the trench in:

a) Actively cultivated or rotated croplands and pastures;
b) Residential areas;
c) Hayfields; and
d) Other areas at the landowner's or land managing agency's request.

At least the top 12 inches of topsoil will be segregated in areas with deep soils (more than 12 inches of topsoil). Soils with less than 12 inches of topsoil will have every effort made to segregate the entire topsoil layer. Segregated topsoil may not be used for padding the pipe. Figure 4 illustrates topsoil conservation techniques.

Topsoil will be stockpiled separately from all subsoil and will be replaced last during backfilling and **final grading**. The **Inspector** will determine if additional erosion control devices are needed in topsoil storage areas.

In residential areas, topsoil replacement (i.e., importation of topsoil) is an acceptable alternative to topsoil segregation.

3. Erosion Control Devices Installed During Grading

Temporary erosion controls will be installed prior to or immediately after the initial disturbance of soil. Examples of some effective and versatile erosion control devices are interceptor diversions and sediment filter devices, illustrated and described in Figures 5A, 5B, 6, and 7. Erosion control devices for the Z-167 Relocation Project will be specified in the Storm Water Pollution Prevention Plan (SWP3).

Erosion control devices will be installed, maintained and inspected as directed by the Storm Water Pollution Prevention Plan (SWP3).

4. Temporary Road Entrances

Temporary road entrances, as illustrated in Figures 8, 9, and 10, will be installed during grading where the construction work area crosses public roads when needed to maintain safe conditions and to prevent tracking soil and mud onto public roads. These installations are designed to remove mud from vehicle tires and tracks before accessing the road. In addition, public, roads will be swept, shoveled or scraped as necessary to keep the road surface safe. If the public road is gravel, the temporary entrance is not required to be graveled. Typical erosion control measures at road crossings are illustrated in Figure 11. If no access is required onto the roadway the

installation of a construction entrance is not required, however, safety fencing should be installed across the ROW and signs designating "no entrance" can be erected to avoid any unintentional entrances.

E. ACCESS ROADS

Access for the construction of the Z-167 Relocation will be off existing roadways and within the obtained easements for the construction of the pipeline. No additional access roads are anticipated. However, in the event it has been determined that an access road is necessary for the construction of the pipeline, Vectren will coordinate with the appropriate regulatory agencies prior to its construction.

F. RESIDENTIAL AREAS

The following mitigation measures will be implemented for all residences within fifty-feet of the construction work area:

- mature trees and landscaping will not be removed from within the edge of the construction work area unless necessary for safe operation of construction equipment;
- immediately after backfilling the trench, all lawn and landscaping will be restored to final restoration, or temporary restoration pending weather and soil conditions;
- while the trench is open, the edge of the construction work area adjacent to the residence will be safety fenced for a distance of 100 feet on either side of the residence to ensure that equipment, materials and spoil remain within the construction work area;
- a minimum of 25 feet will be maintained between the residence and construction work area for a distance of 100 feet on either side of the residence. If the facility must be within 25 feet of a residence, it must be installed such that the trench does not remain open overnight.

G. TRENCHING

1. Trenching Specifications

Typically, the trench will not remain open for longer than 30 days in any area unless authorized by the Inspector (additional restrictions for stream and wetland areas are provided in Section III).

- Sediment filter devices will be installed around spoil storage areas before digging bore pits, stream crossings, and as necessary wetland crossings.
- If it is necessary to pump water from the trench or bore pits, the water will be pumped into a heavily vegetated upland area, a sediment trap as illustrated in Figure 12A, a sediment filter bag, Figure 12B, or through a sediment filter device as illustrated in Figures 6 and 7 at least 10 feet from any stream or wetland in order to minimize erosion and subsequent sedimentation of streams or wetlands. Water impounded in the trench will not be released directly or by overland flow into any **waterbody** or wetland.

When the trench must remain open for a greater length of time, appropriate erosion controls and safety measures will be employed as directed by the Inspector.

2. Temporary Construction Access Over the Trenchline

Where access across the trenchline is required, temporary facilities such as trench plugs and fences, wooden mats or steel plates will be constructed or installed to permit safe crossing of livestock, vehicles, equipment, and persons from one side of the trench to the other.

3. Drainage Tile and Irrigation Facilities

Attempts will be made to locate existing drain tiles and irrigation systems. Vectren personnel will contact landowners and/or the local National Resource Conservation Service (NRCS) to locate drainage tile facilities and irrigation systems. When advised by the landowner or NRCS that a landowner contemplates (within three years) the installation of drainage tile in areas crossed by the pipeline, the pipeline will be installed at a sufficient depth to accommodate the drainage tile.

All drainage tiles crossed by construction activities will be marked and probed to determine if damage has occurred. Drainage tile removed, cut, broke, or otherwise damaged during construction will be repaired or replaced as illustrated in Figure 13. Qualified personnel will be used for all testing and repairs. Temporary measures approved by the Inspector will be taken to provide suitable drainage until permanent repairs are made. Water flow will be maintained in crop irrigation systems unless shutoff is coordinated with affected parties.

H. BACKFILLING SPECIFICATIONS

Backfilling will follow pipe lowering as closely as practical. Topsoil will not be used to pad the pipe. Soil that has been excavated during construction and not used for backfill will be evenly spread over the cleared construction work area or removed from the site and properly disposed. All waste materials such as barrels, cans, drums, stumps, coating and wrap, rubbish, waste, or other refuse will not be placed in the trench.

Trenchline barriers as illustrated in Figure 14A, 14B, and 14C will be placed in the trench prior to backfilling to prevent water movement and subsequent erosion. An engineer or similarly qualified professional shall determine the need for and spacing of trenchline barriers. Otherwise, trenchline barriers shall be installed at the spacing illustrated in Figure 14B and up-slope of any permanent interceptor diversions.

Excess rock, including blast rock, may be used to backfill the trench to the top of the existing bedrock profile. Care should be taken to not damage the pipeline.

I. FINAL GRADING, RESTORATION AND STABILIZATION

After construction activities, all disturbed areas will be stabilized with either (1) final grading and restoration; or (2) **temporary stabilization** measures specified in the SWP3.

1. Final Grading

Final grading will be completed within ten calendar days of backfilling, weather and soil conditions permitting. When conditions require a delay, the ten day time frame will not start until conditions are suitable for grading. Should unsuitable soil conditions persist, or be expected to persist, for more than ten calendar days, the Inspector will record the conditions and require the installation of temporary stabilization measures, and final grading and restoration will be delayed. In no case shall final grading be delayed beyond the end of the next recommended seeding season.

If final grade can be established, but conditions are not ideal for permanent seeding, the Inspector will specify application of temporary stabilization measures (including temporary seeding), and may also consider concurrent application of final seed mix and mulch as provided in Table 1 or per the local conservation authority.

The construction right-of-way will be graded to restore its pre-construction contours.

During final grading, soil over the trench may be mounded to allow for future settling. Where fill in the trench or major depressions have settled below ground level, additional fill will be added as needed, and the area brought to final grade. The Inspector may approve a temporary travel lane in the construction work area where needed to facilitate the remainder of construction and/or restoration. This travel lane must be restored when access through the area is no longer required.

Conserved topsoil will be returned during final grading.

Excess rock will be removed from at least the top twelve-inches of soil to the extent practicable in all rotated and permanent agricultural land, hayfields, pastures, residential areas, and other areas at the landowner's request. The size, density and distribution of rock on the construction work area should be similar to adjacent areas not disturbed by construction. Diligent efforts will be made to remove rocks greater than four-inches if, off-construction work areas do not contain rocks greater than four- inches. The landowner may approve other rock size provisions in writing.

Final erosion control devices will be installed during final grading. Sediment filter devices needed to protect off-construction work area resources will be installed or rebuilt **promptly** after final grading. Final interceptor diversions will not be installed in agricultural or pasture land without landowner's consent.

2. Soil Compaction Testing

Topsoil and subsoil may be tested for compaction at regular intervals in agricultural and residential areas disturbed by construction activities. Tests will be conducted on the same soil type under similar moisture conditions in undisturbed areas to identify approximate preconstruction conditions. U.S. Army Corps of Engineers-style cone penetrometers or other appropriate devices to conduct tests will be used.

Severely compacted agricultural areas will be plowed with a paraplow or other deep tillage implement. In areas where topsoil has been segregated, the subsoil will be plowed before replacing the segregated topsoil. Arrangements may also be made with the landowner to plant and plow under a "green manure" crop, such as alfalfa, to decrease soil bulk density and improve soil structure. Additional tilling will be conducted if subsequent construction and cleanup activities result in further compaction.

Appropriate soil compaction mitigation will be performed in severely compacted residential areas.

3. Restoration

Restoration as defined in Definition of Terms - Section IX, will begin within six days of final grading, weather and soil conditions permitting. Fertilizer and lime will be disked into the soil (except rocky soils) to a depth of three- to four-inches to prepare a seedbed. In rocky soils, fertilizer and lime may be incorporated into the soil with tracked equipment. Seeding and mulching the construction work area will promptly follow seedbed preparation. Mulch will be adequately anchored to minimize loss due to wind and water. Mulch tacifiers, used in accordance with the manufacturer's recommendations, may be used as an alternative. Liquid mulch binders will not be used within 100 feet of wetlands or waterbodies.

The typical application rates for lime, fertilizer, seed and mulch are listed in Table 1. They will be used unless the ROW agreement, permit or local NRCS provides project-specific recommendations. If Tall Fescue is used, plant endophyte free certified seed.

Lime and fertilizer applications should be equivalent to Table 1 if hydro-seeding is used, unless ROW agreement, permit or the local NRCS provides project specific recommendations. Hay or straw mulch shall be applied in accordance with Table 1 over hydro-seeding. Hydro-mulch can be used in conjunction with (for texture purposes) but not substituted for hay or straw mulch. The seedbed will be **scarified** to facilitate lodging and germination of seed.

Seed will be uniformly applied and covered in accordance with SWP3 and the written recommendations of the Ohio Rainwater and Development Guidelines.

Seeding rates will be based on Pure Live Seed and used within twelve months of seed testing. Legume seed will be treated with an inoculate specific to the species. Conventional seeding will use four times the manufactures recommended rate of inoculate and ten times the recommended rate for hydro-seeding.

In the absence of recommendations from the local conservation authority, a seed drill equipped with a cultipacker is preferred for application, but broadcast or hydro-seeding can be used at double the recommended seeding rates. Where seed is broadcast, firm the seedbed with a cultipacker, roller or other suitable means after seeding.

Restoration will not be performed in agricultural lands from the beginning of the spring thaw through May 15 unless requested by the landowner. Restoration will be coordinated with the

landowner's planting schedule. Active pasturelands will not be mulched. Grazing deferment plans will be developed with willing landowners, grazing permittees, and land management agencies as appropriate to minimize grazing disturbance of revegetation efforts.

Permanent seeding, liming, and fertilizing may be performed by the landowner. The Inspector will ensure that the restoration is satisfactory and consistent with the regulatory requirements.

All turf, ornamental shrubs, and specialized landscaping will be restored as per the agreement with the landowner. Restoration work must be performed by personnel familiar with local horticultural and turf establishment practices.

Jute netting as illustrated in Figure 15 or equivalent approved by the Inspector may be used on **steep slopes** or high velocity areas (e.g. drainage channels and conveyances) to help stabilize the construction work area.

Restoration will be considered successful after meeting the requirements of "final stabilization" in the Ohio EPA Permit No. OHC000004, General Permit for Construction Activities under the National Pollutant Discharge Elimination System. The SWP3 details the requirements for achieving final stabilization for the Project.

4. Temporary Stabilization

Temporary stabilization will occur as needed and within the timetable prescribed in the SWP3. The seeding and mulching rates are provided in Table 2. Consideration will be given to the following when determining if temporary stabilization measures are to be implemented:

- if final grading will not be completed in an area within 14 days after the trench in that area is backfilled (10 days in residential areas);
- anticipated weather conditions;
- resources on and off the construction work area to be protected; or
- construction or restoration activity is interrupted for extended periods.

If temporary stabilization measures are utilized, final grading and/or restoration must commence once weather and soil conditions permit.

Mulch will be applied according to the specifications outlined in this section except during temporary restoration where it will be increased on slopes (8 percent or more) within 100-feet of waterbodies and wetlands to a rate of 6,000-lbs/acre (3 tons).

5. Restoring Man-Made Structures

All existing man-made installations that are disturbed or damaged during construction along new ROW will be repaired or replaced and left in equivalent or better condition than they were found prior to construction, unless alternative arrangements with landowners dictate otherwise.

J. NOISE IMPACT MITIGATION and DUST CONTROL

1. Noise Impacts

Construction equipment will be properly muffled and maintained to avoid producing excessive noise near **noise sensitive areas**. General construction activities shall be limited to the hours of 7:00 a.m. to 7:00 p.m., or until dusk when sunset occurs after 7:00 p.m. However, the Vandalia Armory and Range's, located off Corporate Center Drive, driveway may be crossed outside of normal hours to accommodate continued access to the facility for their customers.

Noise levels will be monitored and procedures will be in compliance with applicable OSHA standards.

2. Dust Control

Fugitive dust on the Project route and surrounding areas will be minimized through the use of best management practices such as with the application of water to the soil, reducing the speed of equipment, promptly removing any tracked out sediment on public roads, and with the application of mulch and/or tackifiers.

K. HYDROSTATIC TESTING

Vectren will verify the pipeline's integrity by hydrostatic testing. Water will be drawn from local sources (e.g., public water supplies, streams, ponds) in a manner that will minimize impacts to the environment and other existing users, while maintaining adequate stream flow. Water from State-designated **high-quality streams** or **exceptional value waters**, waterbodies which provide habitat for Federal or State listed threatened or endangered species, or streams utilized as public water supplies will not be used unless other water sources are not readily available and the appropriate federal, state or local agency permits its use.

Intake hoses will be screened.

Hydrostatic test manifolds will be located outside of wetland and riparian areas to the maximum extent practicable.

All required Federal, State and local approvals for withdrawal and/or discharge of hydrostatic test water will be obtained prior to such activities.

All permit conditions will be met, which may include notifying the appropriate State agency of withdraw/discharge and collection of samples in accordance with permit conditions.

All welds will be radiographically inspected or hydrostatically tested before pipe installation under waterbodies or wetlands.

The discharge of the hydrostatic test water will be performed in a manner that minimizes erosion and in accordance with the Ohio Environmental Protection Agency's OHH000002 Hydrostatic

Test Water Permit. Energy of the released test water will be dissipated by discharging the water with one of the following methods:

- into a well-vegetated upland area;
- into a tank(s)
- into a body of water (with all required permits); or
- through sediment filter devices or a sediment trap to filter out various particulate matter or allow it to infiltrate through the soil, Figure 12C.

If necessary, the water may have the discharge rate regulated with energy dissipation device(s); and/or sediment barriers installed to prevent erosion, streambed scour, suspension of sediments, or excessive stream flow. During the discharge, the Inspector must ensure that erosion and sedimentation are properly controlled and that the activity is in compliance with permit requirements and regulations.

No water shall be discharged into waters from State designated exceptional value waters, waterbodies which provide habitat for threatened or endangered species, or streams utilized as public water supplies unless the appropriate federal, state or local agency grants permission.

Methanol may be injected, after discharging the water, to dry the pipe. Excess methanol will be retrieved from the facility and used during subsequent operation of Vectren's facilities.

Details on hydrostatic testing water discharges will be specified in the SWP3.

III. STREAM AND WETLAND CROSSINGS

A. STREAM CROSSINGS

1. General

The Z-167 Relocation Project will cross five streams. There are two main methods of crossing a stream, each has its advantages and disadvantages depending on the site-specific conditions. The most expeditious and common method is trenching. This involves digging a trench across the stream, lifting the welded pipe into place using side booms and track-hoes, laying the pipe into the trench, and backfilling and re-contouring. Where the streambed is comprised of cobbles or flags, these will be replaced on top of the backfilled material to restore the streambed to as near to original condition as possible. The goal is that all is achieved in one pass in a single day during low flow conditions. Construction at each stream location can be scheduled to proceed at low flow conditions, independent of the remainder of the pipeline construction. The relatively short time frame minimizes potential erosion problems. The relatively flat topography of the Project area means that erosion potential is relatively low, making trenching an attractive option.

The second method involves directional boring under the channel. This method is usually limited to streams with significant flow, which have a sensitive biological community or are navigable

and would be disrupted by channel obstruction. Most of the steams in the Project area do not exhibit these characteristics.

2. Trench Method

Stream crossings using the trench method will be covered under USACE Nationwide Permit #12 for Utility Line Activities. The main objective of any waterbody crossing is to construct the pipeline in a manner which minimizes erosion and subsequent sedimentation into the waterbody. Crossings will be constructed as close as possible to right angles with the waterbody channel. Adequate downstream flow rates will be maintained at all times to protect aquatic life and prevent the interruption of existing downstream uses. Each waterbody crossing will be treated as a separate construction entity, such that trenching, pipe installation, backfilling and temporary stabilization or final restoration are completed in the minimum number of consecutive calendar days possible.

Whenever a time limit is imposed on a crossing procedure, that time limit is only applicable to trenching, lowering in, and backfilling. Clearing, grading and equipment crossing installation and removal activities are not included as part of the separate construction entity. Construction equipment will not be allowed within the banks except as provided in this Section.

When water levels are temporarily high, the Inspector will direct that starting any waterbody crossing be postponed until water levels subside or that the method be changed to directional drilling.

Any extra work areas will be located at least 50 feet away from the water's edge. Pipe assembly for the waterbody crossing is usually performed in the extra work areas prior to or concurrently with trenching.

Standards relating to spill prevention at waterbodies are contained in Section IV., "Spill Prevention".

Waterbody buffers (extra work area setbacks, refueling restrictions, etc.) must be clearly marked in the field with signs and/or highly visible flagging until construction related ground disturbing activities are completed.

a) Crossing Techniques

Two un-named tributaries may be crossed using the dry-ditch (flume pipe) or Dam and Pump techniques to install pipelines across waterbodies, Figures 16, 17, and 18 illustrate these methods. Mill Creek, Brush Creek and an un-named tributary to Stillwater River will be crossed utilizing directional drilling methods discussed in Section C below.

b) Clearing

Tree and brush clearing will be performed as previously described in Section II, "Upland Construction". All cleared materials will be disposed of at least 50 feet from the water's edge.

c) Grading

Grading equipment will not enter the water to grade the banks. Waterbody banks will be graded only where, and as much as, necessary to permit safe and efficient operation of construction equipment. During grading operations, sediment filter devices will be installed promptly as close to the water as practical. All disturbed areas within 50 feet of the water's edge will be promptly mulched. The mulch will be maintained until the waterbody crossing restoration is complete. Spoil from grading will be piled at least 10 feet from the stream banks and immediately protected with sediment filter devices so that it will not erode into the waterbody. On waterbody crossings with approaches sloped 5 percent or greater, interceptor diversions will be installed 50 feet from the water's edge to divert surface runoff into adjacent vegetation. If vegetation is sparse or nonexistent, a sediment filter device will be installed at the discharge of the diversion. Install a sediment filter device across the entire construction right-of-way at the base of slopes 5 percent or greater where the base of the slope is less than 50 feet from a stream. Adequate room will be left between the sediment filter device and base of the slope for sediment deposition.

Construction equipment bridges consisting of culvert(s) with clean rock backfill or equipment pads as illustrated in Figures 19 and 20 will be installed during grading operations at all waterbodies. For proper culvert installation, the Inspector may permit grading/excavating equipment to enter the water. Equipment bridges are not required at minor waterbodies that are not jurisdictional waters (e.g., agricultural or intermittent drainage ditches). However, if an equipment bridge is used, it must be constructed in accordance with the SWP3. Construct equipment bridges to maintain unrestricted flow and to prevent soil from entering the stream.

d) Trenching

Prior to trenching within the waterbody, water impounded in the trench will be pumped into a sediment filter device, sediment trap, or heavily vegetated upland area. Prevent the flow of spoil or heavily silt-laden water into any waterbody.

Sediment filter devices for trench spoil will be installed prior to commencing trenching activities. Sediment filter devices can be temporarily removed from the trench line to allow trenching activities to proceed.

All spoil from the waterbody crossings must be placed in the construction ROW at least 10 feet from the water's edge or in additional extra work areas.

The minimum depth of cover for all waterbody crossings is 48 inches in normal soils and 24 inches in consolidated rock.

Trench plugs will be used at all non-flumed waterbody crossings 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 must be of sufficient size to withstand upslope water pressure.

For dry ditch method crossings, use sand bag or sandbag and plastic sheeting diversion structure or equivalent to develop an effective seal and to divert stream flow through the flume pipe (some

modifications to the stream bottom may be required to achieve an effective seal). In addition, the flume pipe will not be removed during trenching, pipe-laying, or backfilling activities, or initial streambed restoration efforts.

e) Backfilling

Waterbody bottoms will be returned as near as practical to their original contours. Spoil from the trench will be used as backfill. The sediment filter devices at the water line will be promptly reinstalled after backfilling.

f) Restoration

The preferred restoration method is to achieve final grade and restore the waterbody, its banks, and 50 foot buffers within 24 hours of backfilling. In the absence of site-specific seeding recommendations, the specifications listed in Table 1 will be used. If conditions do not permit the preferred method, the construction work area not in use for access will be promptly rough graded and stabilized in accordance with Table 2.

The banks of waterbodies shall be stabilized and temporary sediment barriers installed within 24 hours of completing the crossing. For dry-ditch crossings, complete bank stabilization before returning flow to the waterbody channel.

Liquid mulch binders will not be used within 100 feet of waterbodies.

Permanent interceptor diversion and a trench breaker will be installed for each waterbody crossed at the base of slopes near the waterbody. Figures 5A and 5B and Figures 14A and 14C illustrate examples of these diversions and breakers. The trench breaker will be located immediately upslope of the slope breaker. The SWP3 also address these locations and details.

All equipment bridges will be removed once access in the area is no longer required.

Return all waterbody banks to preconstruction contours or to a stable angle of repose as approved by the **Environmental Inspector**.

Revegetate disturbed riparian areas with conservation grasses and legumes or native plant species, preferably woody species.

Application of riprap must comply with applicable permit terms and conditions. In general, riprap will be of field or quarry run stone, which is hard and durable. The riprap will be large enough to prevent normal waterbody current from moving it, typically 6 inch rock for slow moving waterbodies and 12 inch or larger rock for others. The riprap will be placed at least 18 inches thick and generally thicker at the base. The riprap slope will be no steeper than 1:1 and should conform with the remainder of the waterbody bank slopes where they are flatter than 1:1.

Erosion control fabric, Figure 15, such as jute thatching or bonded fiber blankets will be installed at a minimum, on waterbody banks at the time of final bank re-contouring. Erosion control fabric will be anchored with staples or other appropriate devices recommended by the manufacturer.

Sediment filter devices will be removed once permanent revegetation is successful.

3. DIRECTIONAL DRILLING METHODS

a) General

Directional drilling methods are often used to reduce impacts associated with crossing in streams. This method is usually limited to streams with significant flow, which have a sensitive biological community or are navigable and would be disrupted by channel obstruction.

A directional bore is, however, not free of its own drawbacks. First, the boring machines are rather large and require access to the stream bank areas. The impact on the adjacent properties used for access for this machinery has to be weighed against the potential impact of trenching the stream. Second, the drilling operation uses bentonite mud slurry that is transported to the site and stored in a tank. In shallow bores, there is a risk that the drilling mud can find its way to the surface through natural fissures and pathways. Third, the drilling process is more time consuming than trenching and more costly. Based on this combination of factors, it is considered preferable to limit drilling to those streams that have significant biota, flow conditions and sensitive habitats.

b) Directional Drilling Techniques

Directional boring equipment will be set up on upland surfaces, outside of the stream's riparian zone. Silt fence or other appropriate erosion controls specified in the SWP3 will be installed between the bore entrance and exit pits and the stream.

During the directional bore process, there is a risk of an **inadvertent return** or frac-out where drilling mud reaches the surface through cracks in bedrock and surface soils. Containment measures taken during an inadvertent return will include reduction or elimination of drilling pressure, straw bale containment, and removal of drilling mud.

The area affected by an inadvertent return will be restored as closely as possible to original conditions. An environmental inspector shall be on site during the stream crossing activities ensure requirements near these sensitive ecological resources are met.

An Inadvertent Return (Frac-Out) Contingency Plan has been written for the Z-167 stream crossings and shall be followed during all directional drilling activities. This plan is located in Appendix A.

B. WETLAND CROSSINGS

1. General

The main objective of any wetland crossing is to construct the pipeline and restore the original contour of the wetland. Wetlands will be marked in the field by a knowledgeable person prior to

the start of construction. The Inspector will maintain these field markings during construction. A maximum 75-foot wide construction work area may be used through wetlands. One small wetland (0.22 acres in size) is crossed by the Z-167 Relocation. There will be no permanent impacts to this wetland as a result of this project.

Mulch will not be used as a temporary erosion control measure in wetlands.

Aboveground facilities will not be located in any wetland for the construction of the Z-167 Relocation.

When water levels are temporarily high, the Inspector will delay starting construction in the wetland until after the water levels subside. The Project Engineer may also choose to cross the wetland utilizing the directional drilling methods discussed above in III.A.3.

Wetland areas outside of the ROW will be clearly identified with flagging and posted with signs "Wetland - Keep Out."

Standards relating to spill prevention at wetlands are contained in Section IV, "Spill Prevention, Control and Countermeasure."

2. Crossing Techniques

The Z-167 Relocation will cross one wetland, located northwest of the intersection of National Road and Corporate Center Drive. Upland construction techniques may be used in wetlands without standing water or saturated soils, provided the top 12 inches of soil taken from the trench is stockpiled separately from the remaining excavated material. The construction right-of-way may be used for access when the wetland soil is firm enough to avoid rutting or when the construction right-of-way has been appropriately stabilized to avoid rutting (e.g., with timber riprap, prefabricated equipment mats, or terra mats). If the wetland cannot be appropriately stabilized, all construction equipment other than that which is needed to install the wetland crossing shall use access roads located in upland areas. Access through the wetland shall be restricted to only necessary equipment crossing the wetland where stabilized to avoid rutting.

Construction activity in non-saturated wetlands will minimize the amount of time activities are occurring in the wetland, such as the length of time the trench is open.

Construction activity in wetlands with standing water or saturated soils will be treated as separate construction activities, such that trenching, pipe installation, backfilling, and restoration are completed in the minimum number of consecutive calendar days necessary. Clearing, grading and equipment crossing installations are not included as part of the separate construction activity. The "push-pull" or "float" technique of pipe installation will be utilized whenever water and other site conditions permit. The pipeline will be assembled in an upland area unless the wetland is dry enough to adequately support skids and pipe.

Low-ground-weight construction equipment will be used if standing water or saturated soils are present in the wetland. Additionally, normal equipment may operate in the wetland on timber riprap (only 2 layers), prefabricated equipment mats or terra mats. Tree stumps, rock, soil

imported from outside the wetland or brush will not be used to stabilize the construction work area or as equipment pads in wetlands. Remove all equipment mats, and timber riprap during the restoration of the wetland.

Staging areas will be located at least 50 feet from the wetland edge except where the adjacent upland consist of actively cultivated or rotated cropland or other disturbed land and will be limited to the minimum necessary to construct the crossing. If topographic conditions do not permit a 50-foot setback, these areas must be located at least 10 feet from the wetlands' edge with prior approval for the Natural Resources Permitting group.

The only access road, other than the construction work area, that can be used in wetland are those existing roads that can be used with no modification and no impact on the wetland.

Construction equipment operating in wetland areas will be limited to that needed to clear the construction work area, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the ROW. All other construction equipment shall use access roads located in upland areas to the maximum extent practicable. Where access roads in upland areas do not provide reasonable access, limit all other construction equipment to one pass through the wetland using the construction work area.

A typical wetland crossing is illustrated in Figure 21.

The wetland may also be crossed using directional drilling methods as described above in A.3.

3. Clearing

The wetland crossed with the Z-167 Relocation will not require any tree or brush clearing as described in Section II, "Upland Construction."

4. Grading

Grading in wetlands will consist of the minimum necessary for safe and efficient equipment operation. Grading activities will be limited to directly over the trenchline. Grading activities will not remove stumps or root systems from the rest of the construction work area in wetlands unless the Project Engineer and Environmental Inspector determine that safety-related construction constraints require removal of tree stumps from under the working side of the construction work area. Areas where stumps are removed will be noted by the Inspector so, if necessary, those areas can be replanted with woody vegetation as described in wetland restoration.

Sediment barriers will be installed along the edge of the construction area as necessary where wetlands are adjacent to the construction work area to prevent sediment flow into the wetland. These sediment barriers will be removed after successful construction work area restoration has occurred and the area is stabilized.

Sediment filter devices will be installed promptly across the construction work area during grading at any wetland edge and maintained until construction work area revegetation is

complete. Temporary interceptor diversions will be installed adjacent to wetlands. Locations for these devices are illustrated in Figure 21.

5. Trenching

Sediment filter devices can be temporarily removed from the trenchline to allow trenching activities to proceed. Spoil piles will be protected with sediment filter devices, if determined necessary by the Inspector, to prevent the flow of spoil off the construction work area.

6. Backfilling

If trench dewatering is required, the water will be discharged through a sediment trap, or into a heavily vegetated area outside the wetland, so that any heavily silt-laden water does not enter directly into the wetland. Spoil from the trench will be used as backfill. The surface will be re-contoured as closely as practical to the original so that drainage patters will not be changed. In wetlands without standing water or saturated soils, the conserved top soil layer will be returned to the surface during backfilling.

Sediment filter devices will be promptly installed after backfilling.

Trenchline barriers will be constructed where the pipeline trench may drain to a wetland and/or the trench bottom sealed as necessary to maintain the original wetland hydrology. A permanent interceptor diversion and trenchline barrier will be installed at the base of slopes near the boundary between the wetland and adjacent upland areas. Locate the trenchline barriers immediately upslope of the interceptor diversion.

Concrete coating activities will not take place within 100 feet of any wetland.

7. Restoration

A trench breaker will be installed at the base of the slopes near the boundary between the wetland and adjacent upland areas. A permanent slope breaker/interceptor diversion will be installed across the construction right-of-way at the base of a slope greater than 5 percent where the base of the slope is less than 50 feet from the wetland, or as needed to prevent sediment transport into the wetland. In addition, install sediment barriers/sediment filter devices as shown in Figure 21. An earthen berm may be suitable as a sediment barrier adjacent to the wetland if approved by the Environmental Inspector.

Upon completion of construction in wetland areas with standing water or saturated soils, all access improvements will be promptly removed. In the absence of specific recommendations from conservation authorities, the seed mix and rate specified in Table 2 will be used. Fertilizer, lime or mulch will not be used, unless required in writing by a jurisdictional agency.

Asphaltic emulsions will not be used to stabilize mulch within 100 feet of wetlands. Liquid mulch binders will not be used within 100 feet of wetlands.

IV. SPILL PREVENTION, CONTROL AND COUNTERMEASURE (SPCC)

A. GENERAL

While the Project is unlikely to require implementation of an approved SPCC plan, spills of any amount of petroleum products or polluting materials are to be prevented. The following will be followed to help avoid spills and minimize the impact of spills which may occur:

- Bulk quantities of diesel fuel and gasoline, not to exceed 1,320 gallons, may be stored in one location, fuel depot (location specified on the SWP3) for the Project. Adequate spill containment measures, such as containment dikes, combined with impervious lining will be installed before fuel storage tanks are filled, and will be maintained throughout the Project. Bulk quantities of hazardous liquids (e.g., solvents and lubricants) will be stored at the fuel depot location.
- An SPCC Plan will be implemented if more than 1,320 gallons of oil or other petroleum products are stored at the Project site. (For the purposes of SPCC rule compliance, only those containers with storage capacity of at least 55 gallons are included in the calculation of total site storage capacity.) At no time may the 1,320-gallon site storage threshold for oil or other petroleum products be exceeded without prior approval from Vectren Environmental Affairs.
- Generally, fuel will be stored at the equipment staging areas and as much equipment as practical will be refueled there. Any equipment that must be refueled in the field will be fueled from tanks carried to the work site. Fuel carriers (greater than 110 gallons capacity) will not be permitted to cross wetlands or waterbodies. Equipment refueling will not be performed within 100 feet of any body of water or wetland, except by hand-carried cans (5 gallon maximum capacity), when necessary. Care will be taken during refueling not to overfill or spill fuel onto the housing of equipment.
- Lesser quantities of fuel (up to 500 gallons) and solvents and lubricants (e.g., motor oils, hydraulic fluid) may be stored along the construction work area as necessary to service equipment used on the Project (quantities vary depending on the size of the construction spread being used), provided that this storage does not conflict with other parts of this plan. Sorbent booms and clean-up kits will be kept at all storage locations and will be readily available at all times.
- All fuel storage areas will be located at least 100 feet from streams, ponds, or wetlands; at least 200 feet from active private water wells, and at least 400 feet from municipal water wells. Equipment servicing, lubricating and refueling will also be in accordance with these requirements whenever possible (i.e., except when stationary equipment such as drilling rigs is being used). Where these conditions cannot be met, the Environmental Inspector will prepare a supplemental SPCC plan, based on field conditions, to protect these resources.

- Use of hazardous materials for vehicle maintenance will follow the same requirements mentioned above for equipment refueling. Impervious or sorbent materials will be placed under the work area before the work begins. Additional sorbent materials will also be readily available. Waste materials created during maintenance (e.g., used oil) will be collected for proper disposal. The work site and the vehicle will be checked by a Vectren inspector after the maintenance work is complete to ensure that all hazardous materials are properly contained. All waste material, including partially used or empty containers, discarded parts, clean up rags, and used sorbent materials, as well as empty hazardous materials containers will be collected for proper disposal.
- All motor fuel, lube oil, chemicals, and other polluting substances will be tightly sealed and clearly labeled at all times.
- Fuel trucks, pumps, mechanics' vehicles, the contractor's foremen's vehicles and Vectren Inspectors' vehicles will be equipped with spill kits containing absorbent materials approved for petroleum products.
- Construction equipment will not be washed in any body of water or wetland, nor will runoff resulting from washing operations be permitted to directly enter any body of water or wetland area.
- Construction equipment, vehicles, materials, hazardous materials, chemicals, fuels, lubricating oils, and petroleum products will not be parked, stored, or serviced within 100 feet of waterbodies or wetlands.
- All equipment will be checked, by a Vectren inspector, daily for leaks prior to beginning work in bodies of water or wetlands. Steps will be taken to repair leaks or remove the equipment from service, if necessary.

B. OIL SPILL RESPONSE, REPORTING AND CLEANUP

Spills of oil or other petroleum products are to be reported immediately to Vectren's Environmental Department at (812) 491-4601. Vectren's Environmental Scientist will be responsible for contacting the appropriate agencies, except as provided for below.

If contact has been unsuccessful *and* a call has not been returned within 20 minutes *and* the spill has impacted a waterbody (sheen on the surface of the water) *or* if the quantity spilled exceeds 25-gallons, the person discovering the spill or release shall contact:

National Response Center: 1-800-424-8802 (within 24-hours of discovery)

And

Ohio Environmental Protection Agency: 800-282-9378 (within 30-minutes of discovery)

Report the location, time of release (or discovery), estimate of amount released, clean-up/mitigation procedures, and contact information. Continue calling Vectren's Environmental Department until a representative is reached.

If a spill should occur, Vectren will ensure immediate action is taken to minimize the impact of the spill, and see that appropriate cleanup action is immediately undertaken.

In the event of a spill into or near bodies of water or wetlands, the following will occur immediately:

- the source will be immediately stopped;
- the spill will be contained by placing absorbing booms or constructing dikes;
- the spill will be collected with absorbing materials, skimmed off water surfaces with booms, and/or the contaminated soil will be excavated;
- the waste materials will be properly stored and disposed in accordance with local, federal and state regulations.
- the affected areas will be restored as closely as possible to their previous condition.

If the spill is such that Vectren personnel or the on-site contractor cannot immediately and effectively respond, Vectren's environmental contractor, who specializes in spill cleanup, will be employed.

Summit Environmental Services

(877) 421-1744

V. ENDANGERED SPECIES

The Endangered Species Act prohibits harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing and collecting listed species, unless specifically permitted, or attempting to engage in such activities within the United States or its territorial seas.

Stiff penalties may be imposed for violations of the Endangered Species Act. Felonies may be punished with fines up to $50,000 and/or one year imprisonment for crimes involving endangered species, and $25,000 and/or six months imprisonment for crimes involving threatened species. Misdemeanors or civil penalties are punishable by fines up to $25,000 for crimes involving endangered species and $12,000 for crimes involving threatened species. A maximum of $1,000 can be assessed for unintentional violations.

A. GENERAL

Correspondence with the Ohio Department of Natural Resources (ODNR) and the U.S. Fish and Wildlife Service (USFWS) indicated that the Z-167 Relocation Project is within the range of six species that are currently listed or are candidates for listing as Federal and/or State endangered, threatened or rare species. The species identified by the ODNR and USFWS along with their

habitats, agency comments and procedures in the event they are identified within the construction limits have been provided in the following sections. None of these species were observed during the initial field surveys of the pipeline.

Work shall be immediately suspended in the area and the Project Engineer and Environmental Scientist contacted if any of these species are observed within the construction limits.

The Environmental Scientist shall notify the Ohio Department of Natural Resources, the U.S. Fish and Wildlife Service, and the staff at the Ohio Power Siting Board within 24-hours of an encounter with one of the threatened or endangered species listed below.

Illustrations have been provided as a reference only. Qualified biologists are required to specifically identify species.

No animal, protected or not, shall be intentionally harassed, harmed, or killed by any Vectren employee, contractor, or person working on the Z-167 Relocation Project.

1. Land Species

a) Upland Sandpiper (*Bartramia longicauda*)

Figure V-1 - Upland Sandpiper, Photo Source: Wikipedia, Johnath, 2010

The upland sandpiper utilizes dry grasslands including native grasslands, seeded grasslands, grazed and un-grazed pasture, hayfields, and grasslands established through the Conservation Reserve Program.

ODNR stated that construction activities must be avoided in these areas during their nesting period of April 15 through July 31.

Field investigations determined that there was limited to no suitable habitat for nesting along the pipeline route.

Construction activities shall be immediately suspended in the area if this species is identified within the Project construction limits between April 15th and July 31st and Mark Wannemueller contacted at (812) 491-4601.

b) Indiana Bat (*Myotis sodalis*)

Figure V-2 - Indiana bat, Photo Source: USFWS, 2006

The Indiana bat habitat consists of suitable trees with diameter at breast height of at least three inches (3" DBH) that include dead and dying trees with exfoliating bark, crevices, or cavities in upland areas or riparian corridors and living trees with exfoliating bark. Both agencies stated that if suitable habitat must be removed for the construction of the pipeline, cutting must occur between October 1 and March 31.

Suitable roosting and foraging habitat for the Indiana bat was observed along the pipeline route. Bat roost trees have been identified and will only be cleared as necessary within the permanent easement to ensure pipeline safety. Clearing of any potential Indiana bat roost trees will occur between October 1 and March 31, when the Indiana bat is in winter hibernacula.

Vectren will consult with ODNR and USFWS should circumstances require working in areas where, or during times when impacts to listed species might occur.

c) Eastern Massasauga (*Sistrurus catenatus*)

Figure V-3 - Eastern massasauga, Photo Source: Wikipedia, Tim Vickers, 2008

Massasaugas live in an area that extends from western New York and southern Ontario to Southern Iowa. The eastern massasauga is listed as endangered, threatened, or a species of concern in every state and province in which it lives. This species is known to live near wet areas, including wetlands, wet prairie, or nearby woodland or shrub edge habitat.

It is noted that massasauga snakes also occupy dry goldenrod meadows with early successional woody species such as dogwood or multiflora. Massasaugas depend on wetlands for food and shelter but often use nearby upland areas during part of the year. Draining wetlands for farms, roads, homes, and urban development has eliminated much of the massasauga habitat in many states.

ODNR indicated that the Project is unlikely to affect this species. However, if an Eastern massasauga is encountered during Project construction the work will immediately stop in the vicinity of the snake and Mark Wannemueller contacted at (812) 491-4601. Mark will be responsible for contacting the ODNR Department of Wildlife, Frank Lopez, at (419) 625-8062 and notifying the staff at the OPSB.

2. Aquatic Species

Due to the Project location and use of directional drilling methods to cross **perennial streams**, no impacts to these species are expected. Additionally, responses received from the ODNR and USFWS stated that using open trenching methods to cross two streams identified was unlikely to impact these species. Correspondences with these agencies are available upon request.

Follow procedures outlined in the Inadvertent Return Plan for the Project, Appendix A.

Contact Mark Wannemueller at (812) 491-4601 in the event of an inadvertent return occurring within a stream.

a) Rayed Bean (*Villosa fabalis*)

Figure V-4 - Rayed bean, Photo Source: USFWS, Angela Boyer

The rayed bean generally lives in smaller headwater creeks, but are sometimes found in large **rivers** and wave-washed areas of glacial lakes. They prefer gravel or sand substrates, and are often found in and around roots of aquatic vegetation.

b) Snuffbox (*Epioblasma triquetra*)

Figure V-5 - Snuffbox, Photo Source: USFWS, G Thomas Watters, Ohio State University

The snuffbox is usually found in small to medium-sized creeks, inhabiting areas with a swift current, although it is also found in Lake Erie and some larger rivers.

c) Eastern Hellbender (*Cryptobranchus alleganiensis alleganiensis*)

Figure V-6 - Eastern hellbender, Photo Source: OhioAmphibians.com

The hellbender is a long-lived, entirely aquatic salamander that inhabits perennial streams with large flat rocks. In-water work can reduce availability of large cover rocks and can destroy hellbender nests and/or kill the adults and juveniles. Increased sediment to the stream can also smother large cover rocks and gravel/cobble substrate making them unsuitable for refuge and nesting. Additionally, altered flow regimes can also adversely affect their habitat.

B. SPECIES IDENTIFICATION

All personnel working on the Z-167 Relocation Project shall be familiar with the Threatened and Endangered Species that have been identified by the ODNR and USFWS.

Any observations of these species shall be immediately reported to the Project Engineer and Environmental Scientist.

It is important to note that the photos included in this ECS are for illustration purposes only and should not be used to verify or disprove the presence of any of the listed species. Contact the Project Engineer and/or Environmental Scientist immediately in the event that one of these species is suspected of being within the construction limits of the Z-167 Relocation Project.

VI. MAINTENANCE

A. GENERAL

Maintenance of Vectren's ROWs is an ongoing process that is governed by Vectren policy, Certificate and Permit conditions and landowner agreements. However, to facilitate periodic corrosion and leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be maintained annually in a herbaceous state.

Maintenance activities will be performed with emphasis on preservation and enhancement of the environment. All applicable certificate and permit conditions will be incorporated into the future maintenance plan of the facility.

Specific procedures when required by regulations will be developed in coordination with the appropriate agency to prevent the introduction or spread of noxious weeds and soil pests resulting from construction and restoration activities.

B. UPLAND AREAS

Plant growth on the ROW will be inspected regularly and maintained for the life of the facility. Follow-up inspections will occur after the first and second growing season.

Revegetation efforts will continue until revegetation is successful.

Problems with drainage and irrigation systems resulting from pipeline construction in active agricultural areas will be monitored and corrected until restoration is successful.

Erosion problems on the facility ROW and access roads will be reported to the Project Engineer. Corrective measures will be performed as needed. Erosion control devices that are no longer required must be removed. Removal of the erosion control devices will be at the discretion of the Environmental Inspector. Similarly, additional erosion control devices will be installed as required.

Maintain all temporary sediment barriers in place until permanent revegetation measures are successful or the upland areas adjacent to wetlands, waterbodies, or roads are stabilized. Remove temporary sediment barriers from an area once that area is successfully restored.

Efforts to control unauthorized off-road vehicle use, in cooperation with the landowner, shall continue throughout the life of the project. Maintain signs, gates, and vehicle trails as necessary.

C. WATERBODIES, WETLANDS, AND ENVIRONMENTALLY SENSITIVE AREAS.

Vectren will comply with applicable federal, state and local laws, regulations, codes and ordinances when conducting ROW maintenance in waterbodies, wetlands, and other environmentally sensitive areas.

Herbicides and/or pesticides shall not be used in or within 100 feet of a waterbody or wetland except as specified by the appropriate land management or state agency and in accordance with the product label.

Attempts will be made to prevent the invasion or spread of undesirable exotic vegetation (i.e., purple loosestrife and phragmites) within wetland areas disturbed during construction. Typically, these efforts include Vectren's wetland construction techniques and the use of approved herbicides.

VII. ENVIRONMENTAL CONSTRUCTION MANAGEMENT AND INSPECTION

A. GENERAL

Vectren is responsible for compliance with the terms and conditions of all applicable environmental permits issued for the Project. One or more Environmental Inspectors will be assigned to the Z-167 Relocation Project and will report to the Vectren employee in responsible charge. Environmental Inspectors shall have peer status with all other activity inspectors.

B. ENVIRONMENTAL INSPECTOR

The Environmental Inspector is responsible for ensuring that the construction activity is performed in accordance with the terms and conditions specified in permits issued by the Ohio Department of Natural Resources, the Ohio Environmental Protection Agency, and/or the U.S. Army Corps of Engineers. The Environmental Inspector has the authority to stop work and order appropriate corrective action as outlined in Section VII.E. At a minimum, the Environmental lnspector(s) shall be responsible for:

- ensuring compliance with the requirements of these Environmental Construction Standards (ECS), the Stormwater Pollution Prevention Plan (SWP3), any terms or conditions of the approval issued by the Ohio Power Siting Board (OPSB), and any other environmental permits obtained for the Project;
- identifying, documenting and overseeing corrective actions, as necessary to bring an activity back to compliance.

- verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing;
- verifying the location of drainage and irrigation systems;
- identifying erosion/sediment control and stabilization needs in all areas;
- locating dewatering structures and interceptor diversions to ensure they will not direct water into known environmentally sensitive and/or jurisdictional areas where restrictions have been imposed by agencies through the issuance of environmental permits;
- verifying that trench dewatering activities do not result in the deposition of sand, silt, and/or sediment near the point of discharge into a wetland or waterbody. If such deposition is occurring, the dewatering activity shall be stopped and the design of the discharge shall be changed to prevent reoccurrence;
- advising the Project Lead Coordinator when conditions (such as wet weather) make it advisable to restrict construction activities in agricultural areas;
- ensuring restoration of contours and topsoil;
- verifying that the soils imported for use in agricultural and residential areas are noxious weed free certified;
- ensuring that temporary erosion controls are properly installed and maintained;
- inspecting temporary erosion control measures at least on a weekly basis and within 24 hours of each ½ inch or greater rainfall.
- ensuring the repair of all ineffective temporary erosion control measures;
- keeping records of compliance with the Storm Water Pollution Prevention Plan, and any certificates, and other Federal or State environmental permits during active construction and restoration;Verifying the location of signs and visible flagging marking the boundaries of wetlands, waterbodies and other environmentally sensitive areas.

C. ENVIRONMENTAL TRAINING

The Project Engineer for the Z-167 Relocation and/or the Vectren employee in responsible charge will be responsible for assuring that the Environmental Inspector(s), other inspectors and any contractor's foreman have been trained in all environmental aspects of the activity, and fully understands the environmental conditions contained in the activity's SWP3.

Additional training will be conducted for construction personnel when requested by the Team Leader or when permit/certificate conditions mandate.

D. CONTRACTOR'S ENVIRONMENTAL COMPLIANCE SPECIALIST

For construction activities that utilize an outside contractor, the contractor will be required to provide at least one environmental compliance specialist. This specialist will become thoroughly familiar with Vectren's SWP3 for the activity. The specialist will be responsible for the contractor's efforts to correctly install and maintain environmental control devices and for

construction in environmentally sensitive areas. Contractor's specialist will work in cooperation with Vectren's employees responsible for environmental compliance.

The Contractor's Environmental Specialist must be available at all times during the project and have the appropriate number of available employees to adequately implement the project's SWP3.

E. ENVIRONMENTAL CONSTRUCTION MANAGEMENT

The Environmental Inspector and each functional inspector shall have the authority to stop work on a particular construction function to which they are assigned if it deviates from the terms and conditions of environmental permits issued for the Project. The deviation shall be reported immediately to the Vectren employee in responsible charge of the activity and the Environmental Inspector. The Project Engineer, Vectren Lead Coordinator for the Project, and the Environmental Inspector will be responsible for the resolution of the deviation.

Stop work authority for the entire construction activity rests with the Vectren employee in responsible charge or the Project Engineer.

Vectren’s Environmental Scientist may, from time to time, perform inspections of construction activities. The Environmental Scientist will have stop work authority during these inspections should deviations from the activity's environmental permits be observed. Any corrective actions that are required shall be taken as soon as possible.

F. ENVIRONMENTAL VARIANCES

Unapproved variances from the terms and conditions of environmental permits and this ECS are not permitted.

Any proposed variance from this ECS will require approval from the Gas Transmission Engineering Manager.

VIII. EMERGENCY CONSTRUCTION

In the event of an emergency that threatens public safety, the Company employee in responsible charge will take such action as is necessary to contain the emergency giving due regard to minimizing environmental impact. In conjunction with other Vectren policies, the requirements contained in this ECS will be followed as close as possible.

IX. DEFINITION OF TERMS

AGRICULTURAL LANDS: Permanent or rotated croplands, hayfields, and pastures.

CONSTRUCTION WORK AREA: Construction work areas include permanent and temporary right-of-way, contractor's yards, pipe and materials storage yards, and access roads.

ECS: Environmental Construction Standards

ENVIRONMENTAL INSPECTOR: The Inspector responsible for environmental compliance on a construction project.

EPA: Environmental Protection Agency

EXCEPTIONAL VALUE WATER(S): A stream or waterbody which constitutes an outstanding national, State, regional or local resource, such as waters of national, State or county parks or forests, or waters which are used as a source of unfiltered potable water supply, or waters of wildlife refuges or State game lands, or waters which have been characterized by the Fish Commission as "Wilderness Trout Streams." and other waters of substantial recreational or ecological significance.

FINAL GRADING: Includes returning the construction work area as closely as practical to its original contour, redistributing conserved topsoil, and installing final interceptor diversions.

HIGH QUALITY STREAM: A cold-water fishery or significant warm-water fishery as designated by a State resource agency.

IMMEDIATE: Without interval of time; "right now".

INSPECTOR: Collectively: the Chief Inspector, Environmental Inspector, Environmental Coordinator, or any other inspector assigned to do an environmental task.

INADVERTENT RETURN: An unintentional release of drilling fluids to the surface through fractured bedrock or poorly consolidated soils during a directional bore. Drilling fluids consist of bentonite clay-water mixtures and are not classified as toxic or hazardous. However, if released into water bodies, it has the potential to adversely impact water quality.

LOW-GROUND-WEIGHT: Construction equipment that is designed "specifically for" or "frequently used in" areas where compaction and sinking is to be minimized. This equipment can be less than 5 lbs/in^2 or contain wider tracks than the standard minimum width tracks for the model equipment to be used.

MINOR WATERBODY: A waterbody less than or equal to 10 feet across (when measured perpendicular to the direction of flow) at the water's edge at the time of construction.

NRCS: Natural Resource Conservation Service

NOISE SENSITIVE AREA: Includes residences, schools, churches, cemeteries, hospitals, farms, camping facilities and outdoor amphitheaters and playgrounds.

PERENNIAL STREAM (WATERBODY): A waterbody which generally flows continuously in years of normal rainfall; waterbody level is generally lowest in the fall, highest in the spring; designated with a solid line on topographic maps and environmental construction drawings.

PROMPTLY: By the end of the work day.

RESTORATION: Includes fertilizing, liming, disking, seeding and mulching, and crimping mulch.

RIVER: A waterbody which is either 100 feet wide or more, or which is named as a "river" on the latest USGS topographical map.

ROW: Right-of-way.

SCARIFY: To make shallow cuts into the soil surface. This should be accomplished with a disk, rake, tracked equipment (grousers or other suitable means).

SEDIMENT FILTER DEVICE: Properly embedded silt fence or staked bales (Figures 7 & 8).

SPCC: Spill Prevention Control and Countermeasure Plan

STEEP SLOPE: Slope of 33% or greater.

SWP3: Storm Water Pollution Prevention Plan

TEMPORARY STABILIZATION: Includes installing temporary interceptor diversions and sediment filter devices, mulching critical areas and at times, seeding to hold soil in place until final grading and restoration can be accomplished.

UPLANDS: All areas which are not waterbodies (rivers, streams, etc.) or wetlands.

USFWS: U.S. Fish and Wildlife Service

WATERBODY: Includes any natural or artificial waterbody, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies such as ponds and lakes.

WETLAND: Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

X. TABLES

All specifications for seed mixes and requirements are detailed in the SPW3 and will be in compliance with the General Construction Storm Water Permit, OHC000004 and Ohio's Standards for Stormwater Management and Development and Urban Stream Protection "Rainwater and Land Development" book and other permits, as applicable.

Table 1 - Seed Mix Requirements for Upland ROW and Waterbody Crossings

Type		**Rate (lbs/acre)**
Seed[1]	Orchard Grass and/or Tall Fescue[2]	20
	Birdsfoot-trefoil (Empire)[3]	7
	Annual Rye	10
Fertilizer	10-10-10 (or equivalent)	600[4]
Agricultural Lime		4,000
Mulch	Hay or Straw	4,000

[1] Pure live seed within 12 months of testing.
[2] If tall fescue is used, plant endophyte-free certified seed.
[3] Legumes to be inoculated by manufacturer's recommendations, if not available legumes are to be inoculated at 4 times recommended rate for conventional methods. 10 times recommended rate for hydro seeding.
[4] Where wood chips are spread, additional nitrogen (12 to 15 lbs per ton of chips) will be spread.

Table 2 - Seed Mix for Temporary Stabilization

Type		**Rate (lbs/acre)**
Seed	Annual Rye	40
Mulch	Hay or Straw	6,000

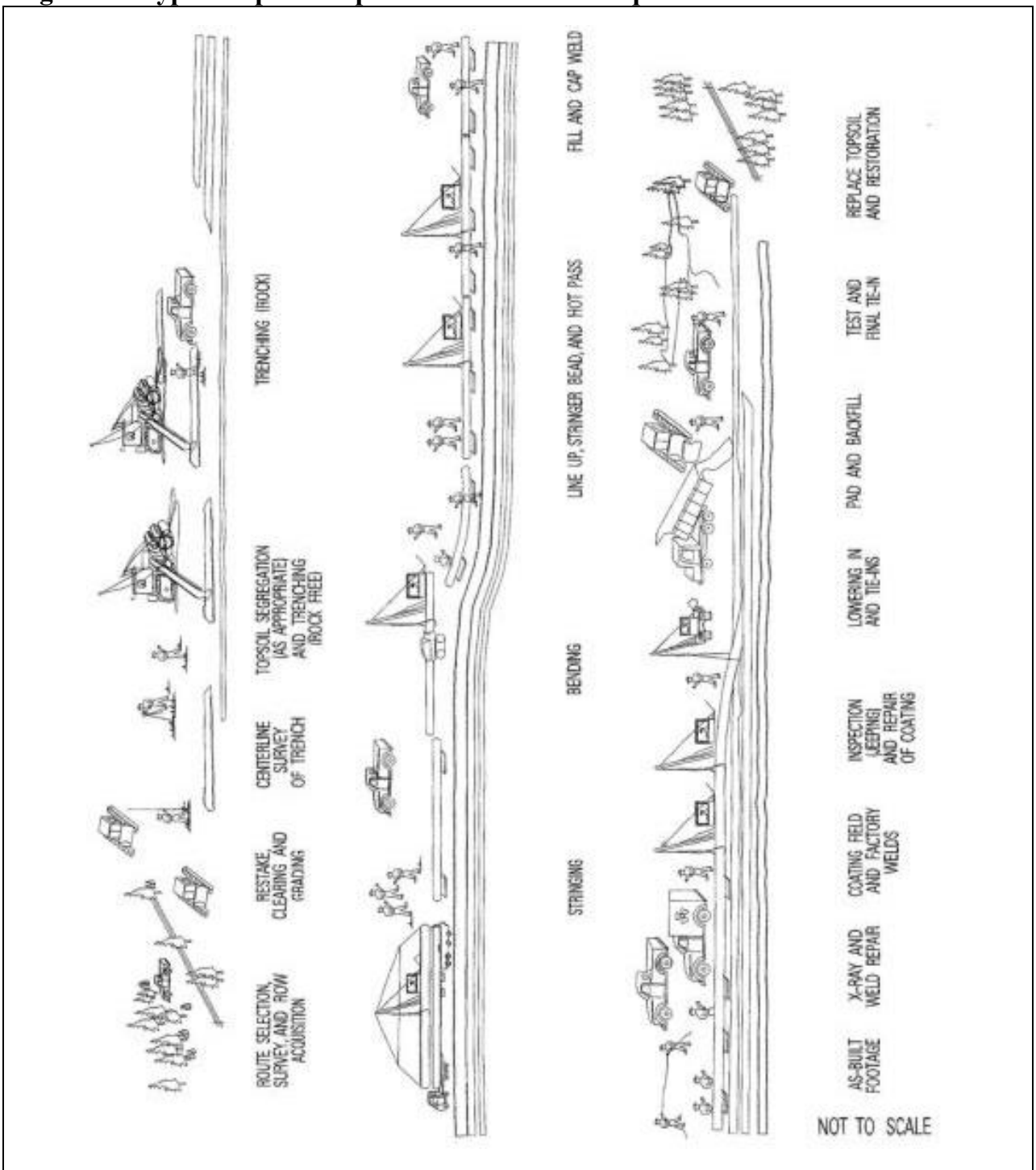
Table 3 - Seed Mix Requirements in Wetlands

Type		**Rate (lbs/acre)**
Seed*	Annual Rye	40

* Annual Rye is used as a temporary revegetative measure until indigenous plants reestablish cover. A monitoring program will be in effect to ensure adequate cover is established.

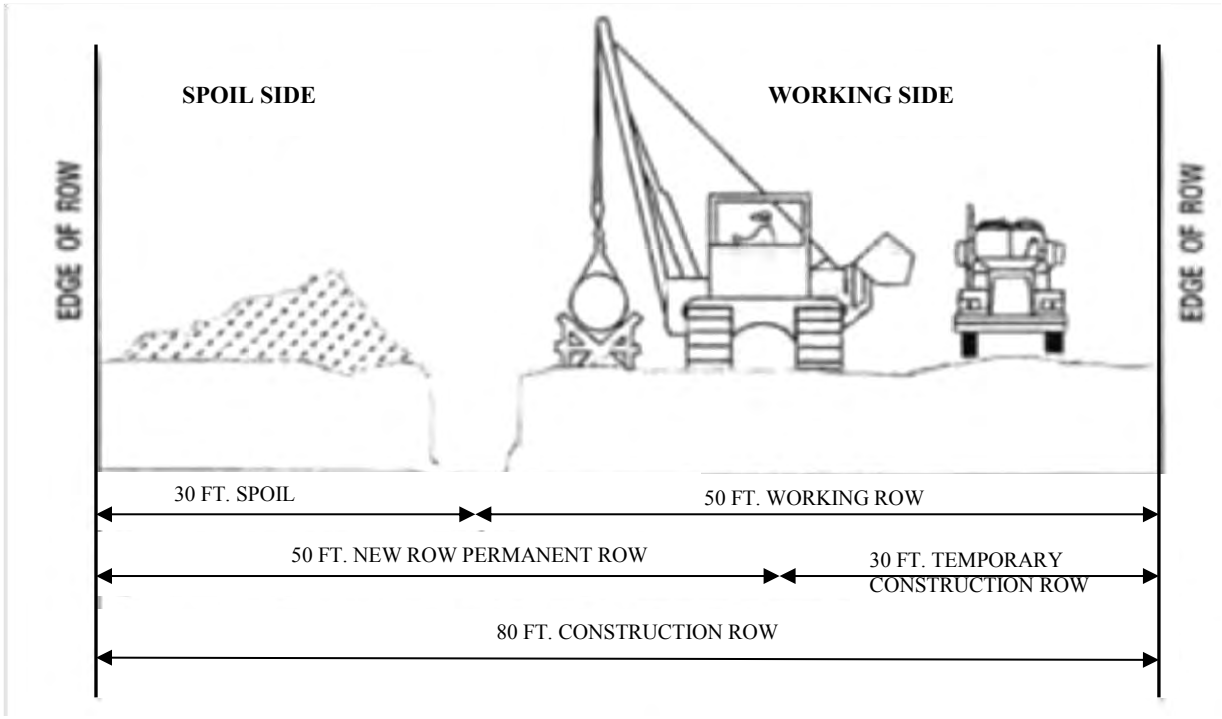
XI. FIGURES

Figure 1 - Typical Upland Pipeline Construction Sequence



VECTREN Live Smart Environmental Construction Standards	**TYPICAL UPLAND PIPELINE CONSTRUCTION SEQUENCE**	**FIGURE - 1**

Figure 2 - Typical 80-ft. Construction Right-of-Way



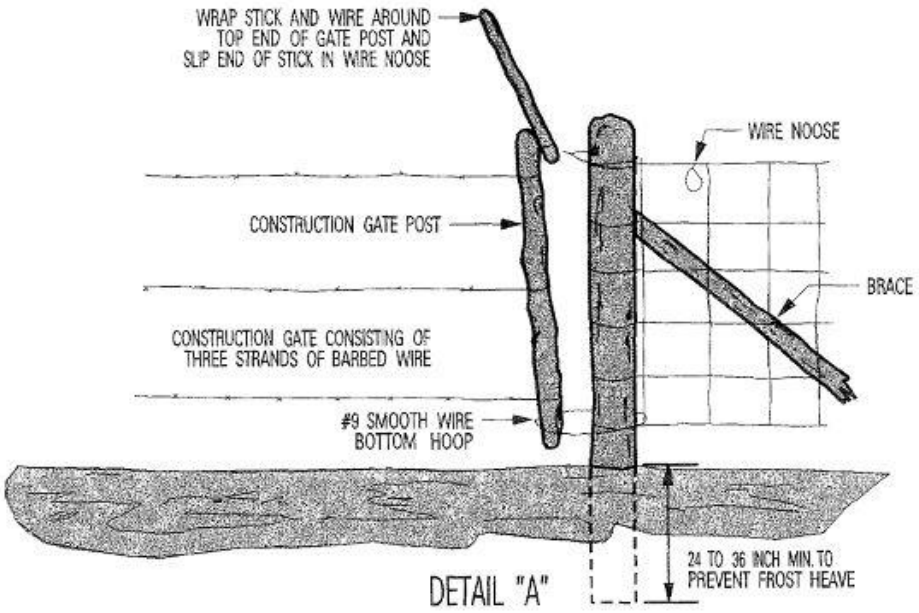
NOTES:

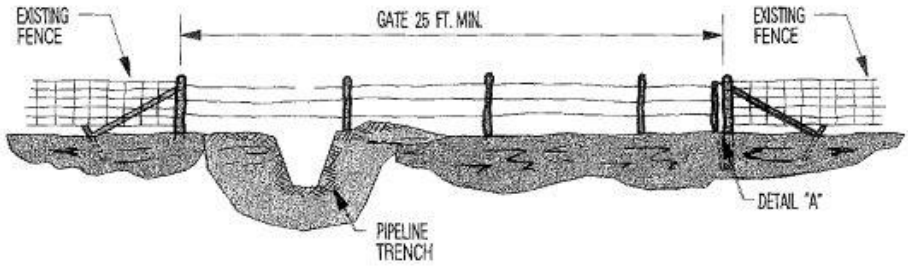
1. USE FOR 12-INCH OR GREATER DIAMETER PIPELINE
2. THE DIMENSIONS SHOWN ON THIS FIGURE ARE TYPICAL
3. VARIATIONS FOR STAGING AREAS MAY BE NECESSARY DUE TO SITE SPECIFIC TERRAIN FEATURES; HOWEVER, UNLESS OTHERWISE STATED BY THE PROJECT ENGINEER THE MAXIMUM WIDTH OF CONSTRUCTION ROW WILL BE 80-FEET

NOT TO SCALE

VECTREN Live Smart Environmental Construction Standards	**TYPICAL 80 FT CONSTRUCTION RIGHT-OF-WAY**	**FIGURE - 2**

Figure 3 - Temporary Construction Gate



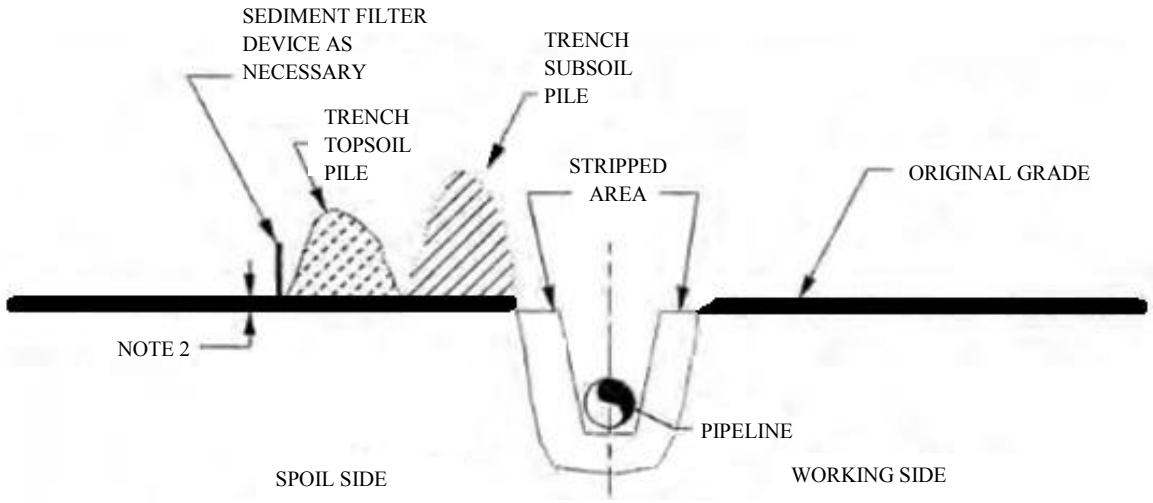


NOTES:
1. IF EXISTING FENCE POSTS ARE STEEL "T" BAR TYPE, THEN REMOVE THE STEEL "T" BAR POST ON BOTH SIDES OF THE GATE OPENING AND REPLACE WITH TEMPORARY WOODEN POSTS, BRACED AS SHOWN.
2. SUITABLE SUBSTITUTES FOR THE STICK AND WIRE GATE FASTENER ARE PERMISSIBLE.

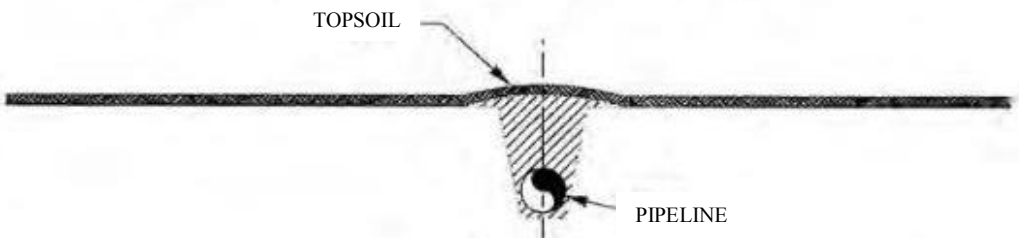
NOT TO SCALE

VECTREN Live Smart Environmental Construction Standards	**TEMPORARY CONSTRUCTION GATE**	**FIGURE - 3**

Figure 4 - Typical Soil Conservation



TRENCHLINE METHOD



REPLACED

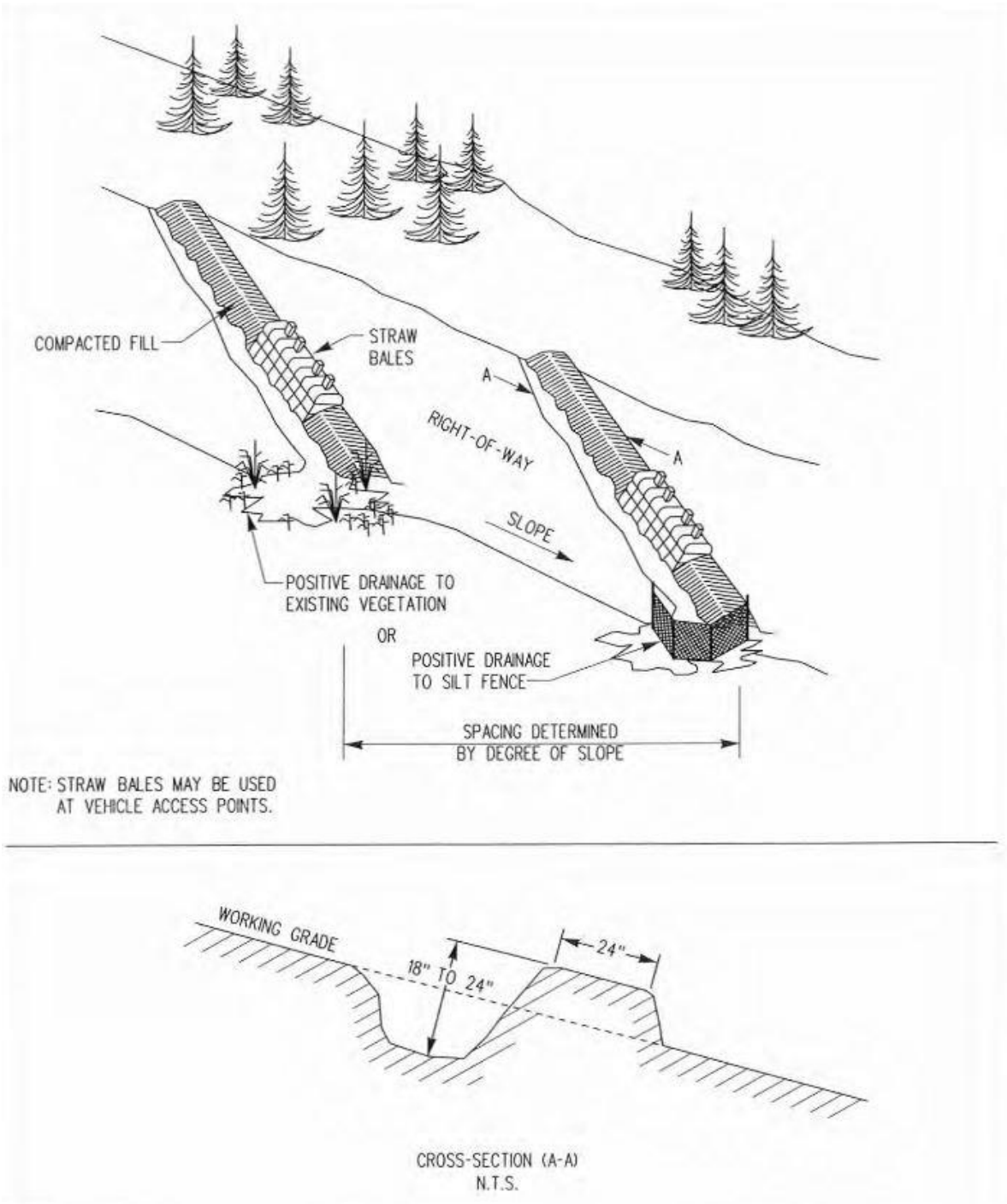
NOTES:

1. OTHER CONFIGURATIONS OF TOPSOIL AND SUBSOIL ARE ACCEPTABLE PROVIDED THEY ARE KEPT SEPARATE.
2. UP TO 12 INCHES OF TOPSOIL REMOVED
3. TOPSOIL AND SUBSOIL PILES WILL BE ADEQUATELY PROTECTED FROM EROSION AND SEDIMENTATION BY USE OF SEDIMENT FILTER DEVICES OR MULCH

NOT TO SCALE

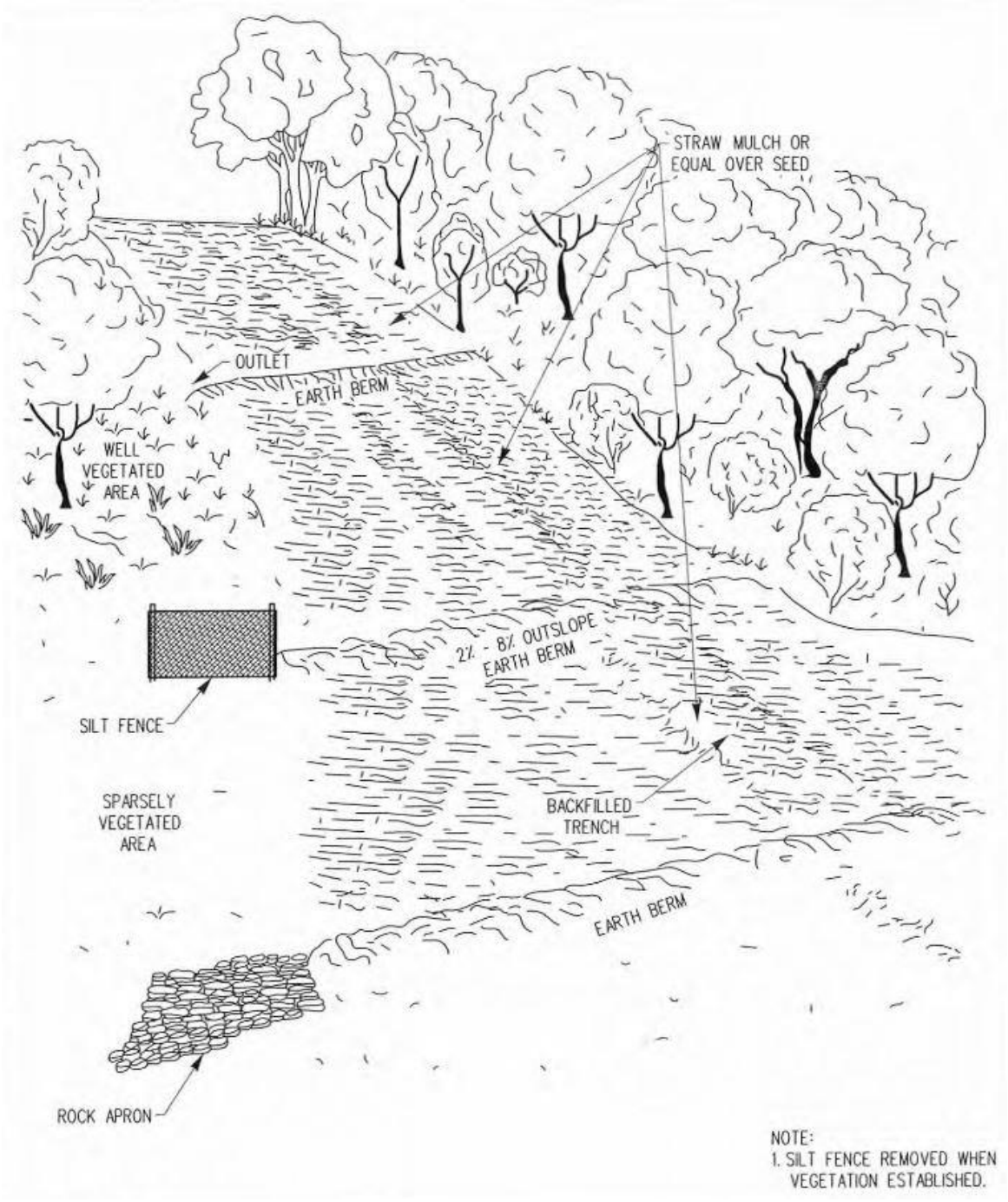
VECTREN Live Smart Environmental Construction Standards	**TYPICAL TOPSOIL CONSERVATION**	**FIGURE - 4**

Figure 5A - Temporary Interceptor Diversions



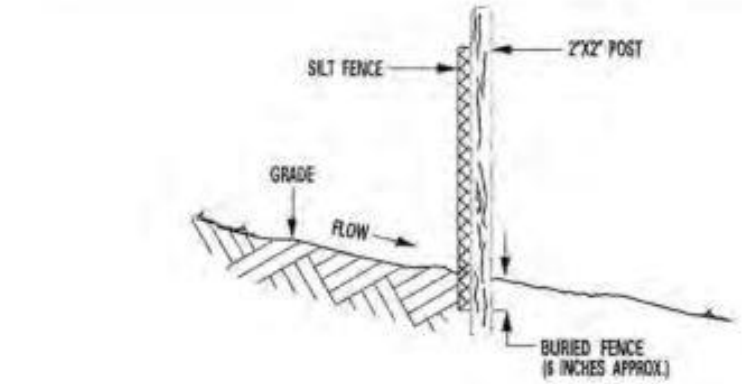
VECTREN Live Smart Environmental Construction Standards	**INTERCEPTOR DIVERSIONS / SLOPE BREAKERS**	**FIGURE - 5A**

Figure 5B - Permanent Interceptor Diversions

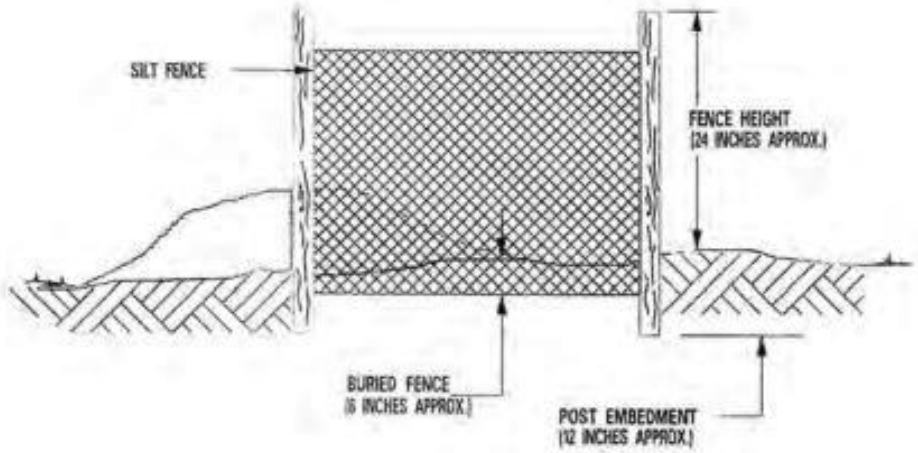


VECTREN Live Smart Environmental Construction Standards	**INTERCEPTOR DIVERSIONS / SLOPE BREAKERS**	**FIGURE - 5B**

Figure 6 - Sediment Filter Device: Silt Fencing



SIDE VIEW



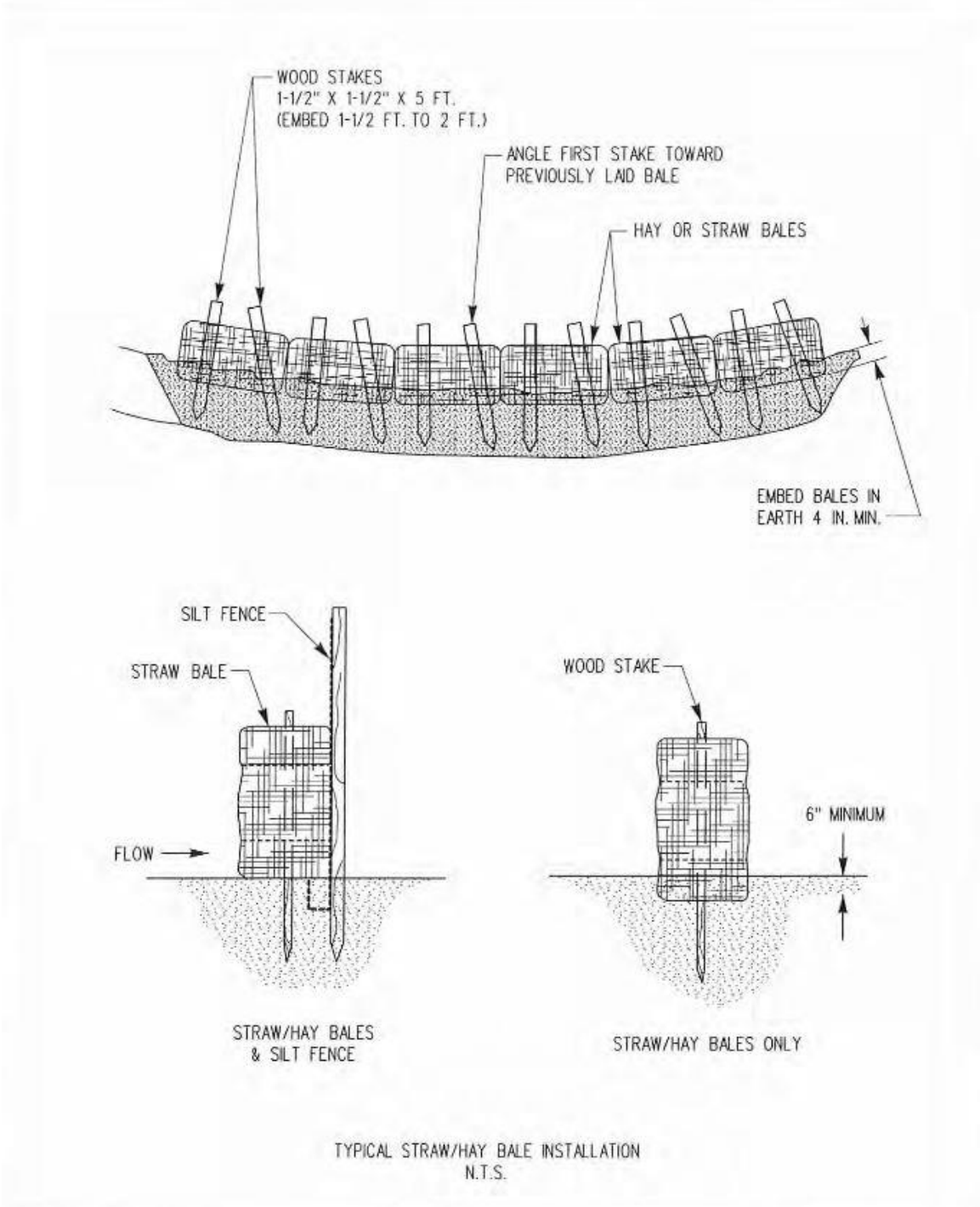
FRONT VIEW

NOTE: SILT FENCE CAN ALSO BE INSTALLED (USING THE SAME SPECIFICATIONS AS PRESENTED ABOVE) IN OTHER SITUATIONS FOR EROSION AND SEDIMENTATION CONTROL.

SEDIMENT FILTER DEVICE SILT FENCING
NOT TO SCALE

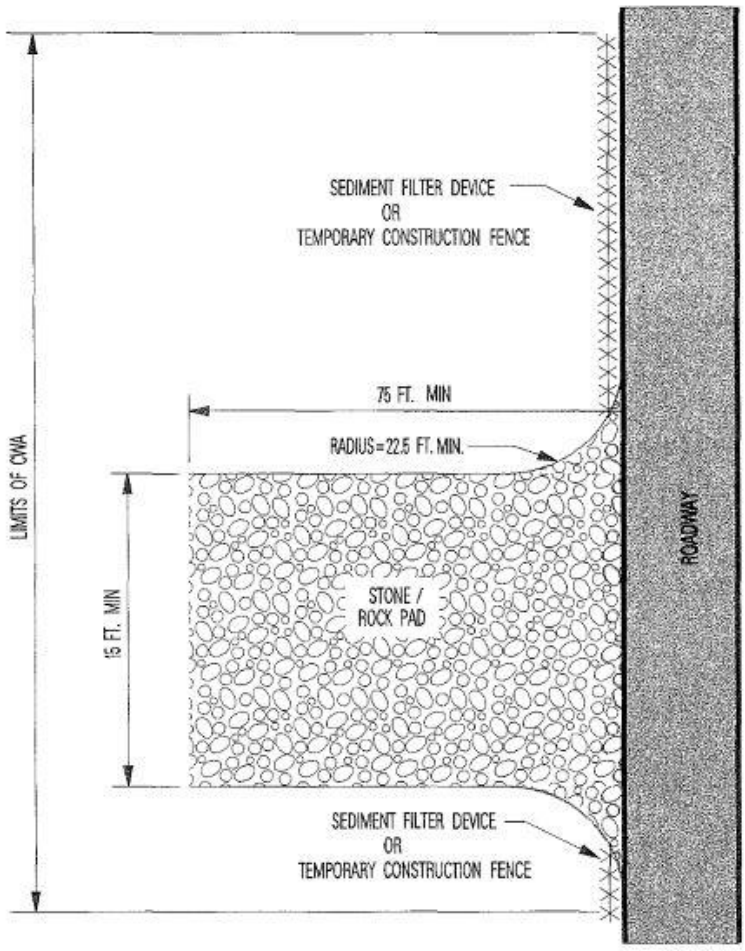
VECTREN Live Smart Environmental Construction Standards	**SEDIMENT FILTER DEVICE SILT FENCING**	**FIGURE - 6**

Figure 7 - Sediment Filter Device: Staked Bales



VECTREN Live Smart Environmental Construction Standards	**SEDIMENT FILTER DEVICE STAKED BALES**	**FIGURE - 7**

Figure 8 - Temporary Road Entrance: Rock Pads

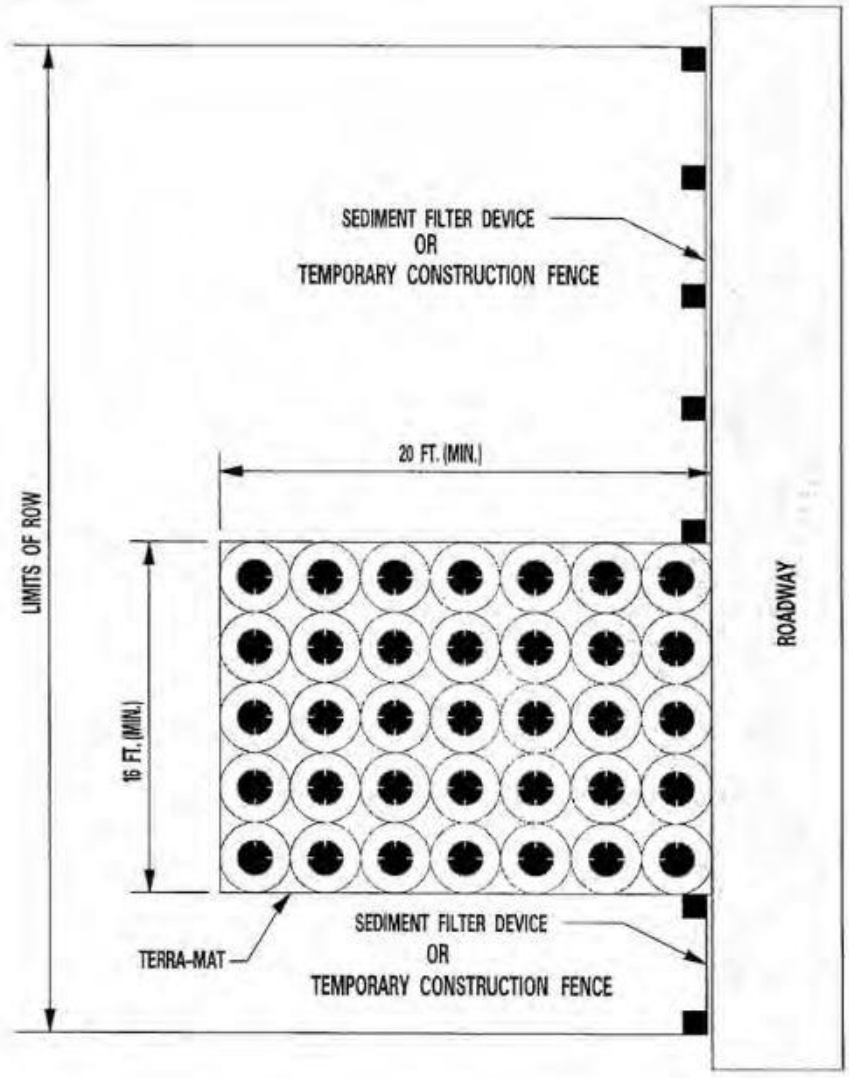


NOTES:
1. STONE SIZE WILL BE AASHTO NUMBER 1 COARSE AGGREGATE OR EQUIV. (4 INCH DIAMETER MINIMUM)
2. ROCK PAD WILL BE AT LEAST 6 INCHES THICK.
3. THE ROAD ENTRANCE WILL HAVE A GEOTEXTILE FABRIC BENEATH THE ROCK PAD.
4. IF ROCK PAD BECOMES COVERED WITH MUD SO AS TO BECOME INEFFECTIVE, ADDITIONAL STONE WILL BE ADDED.
5. ALL STONE AND FABRIC MUST BE REMOVED DURING ROW RESTORATION.
6. REMOVE TOPSOIL PRIOR TO INSTALLATION IN AGRICULTURAL LAND.

NOT TO SCALE

VECTREN Live Smart Environmental Construction Standards	**TEMPORARY ROAD ENTRANCE ROCK PADS**	**FIGURE - 8**

Figure 9 - Temporary Road Entrance: Terra-Mats

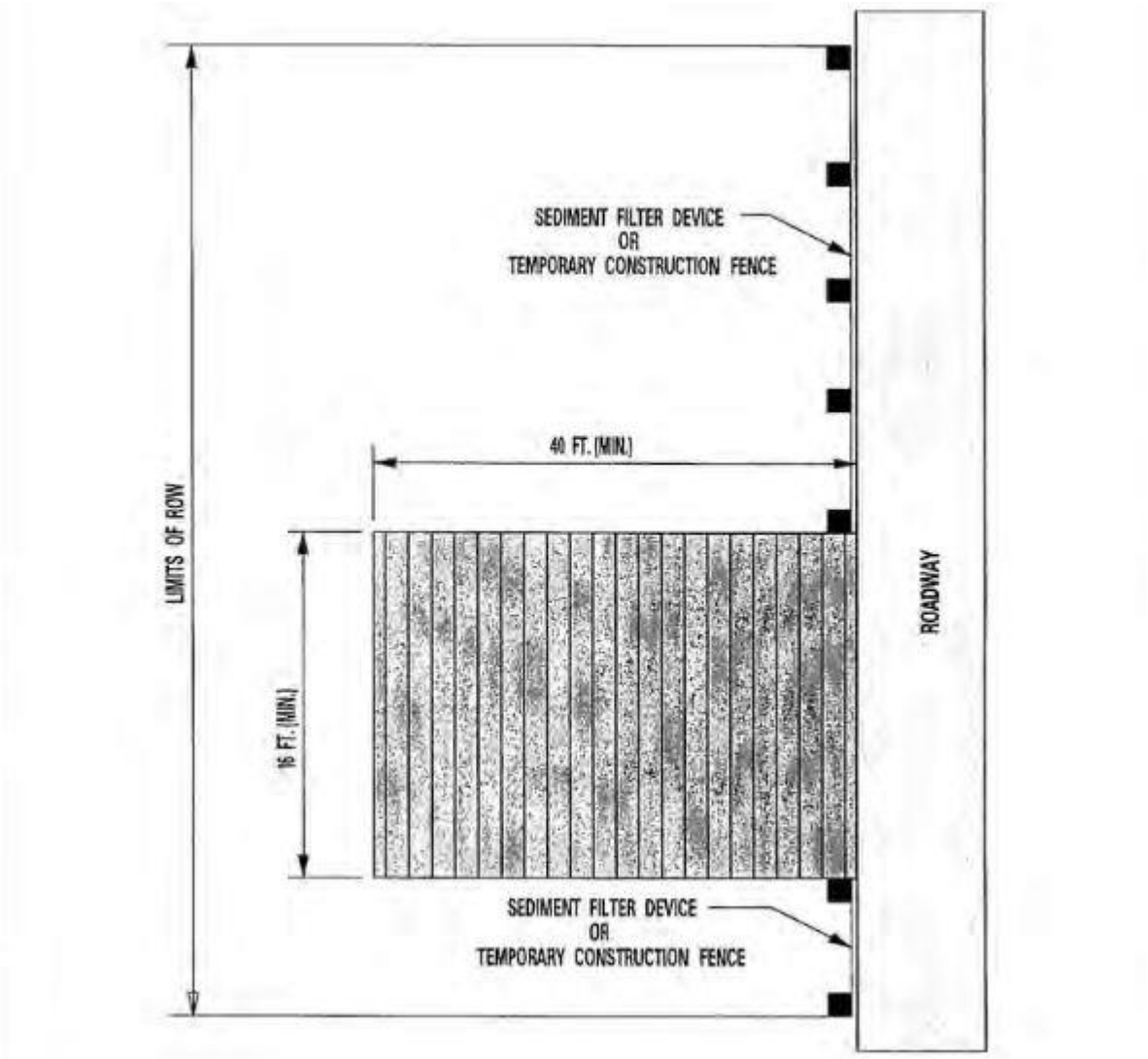


NOTES:
1. TERRA-MATS ARE CONSTRUCTED BY OVERLAPPING TIRES AND INTERCONNECTED CABLE.
2. TERRA-MATS WILL BE UNDERLAIN WITH GEOTEXTILE FABRIC.
3. TERRA-MATS SHOULD BE MAINTAINED SO AS NOT TO ALLOW EXCESS MUD TO ACCUMULATE.

NOT TO SCALE

VECTREN Live Smart Environmental Construction Standards	**TEMPORARY ROAD ENTRANCE TERRA-MATS**	**FIGURE - 9**

Figure 10 - Temporary Road Entrance: Board Road

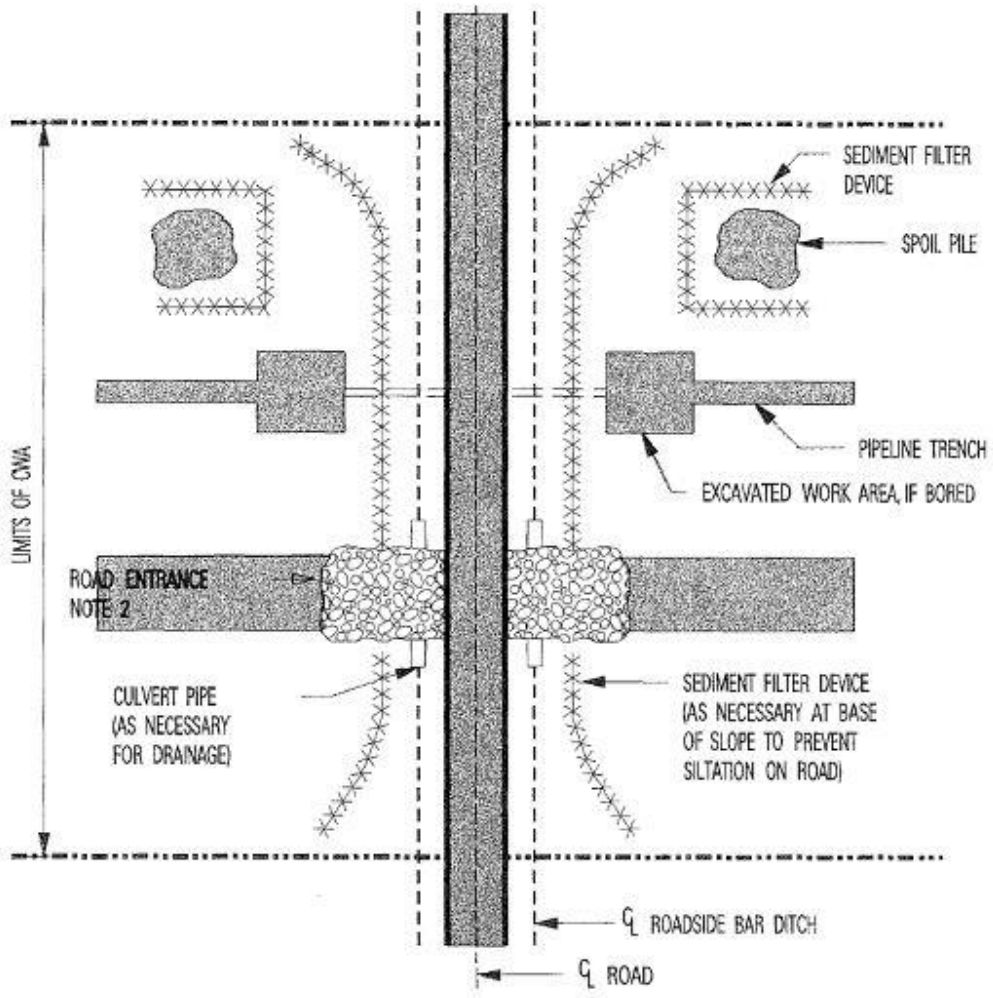


NOTES:
1. BOARD ROADS TO BE USED IN WETLANDS AND ROADWAY ENTRANCES FOR TEMPORARY ACCESS ROADS.
2. BOARD ROADS ARE CONSTRUCTED BY LAYERING A BASE OF THE INTERLOCKING MATS PARALLEL TO THE ROAD IN A STAGGERED MANNER, OTHER METHODS OF BOARD ROAD CONSTRUCTION MAY BE USED IF APPROVED BY THE PROJECT ENGINEER.
3. BOARD ROADS WILL BE UNDERLAIN WITH GEOTEXTILE FABRIC.

NOT TO SCALE

VECTREN Live Smart Environmental Construction Standards	**TEMPORARY ROAD ENTRANCE BOARD ROAD**	**FIGURE - 10**

Figure 11 - Typical Erosion Control Measures at Road Crossings

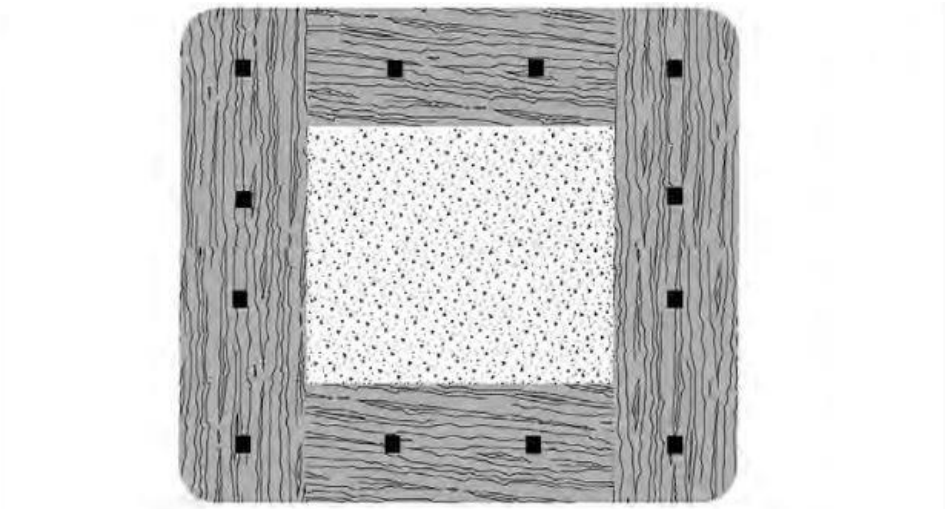


NOTES: 1. REFER TO FIGURE 8 FOR DETAILS ON ROCK ROAD ENTRANCES.

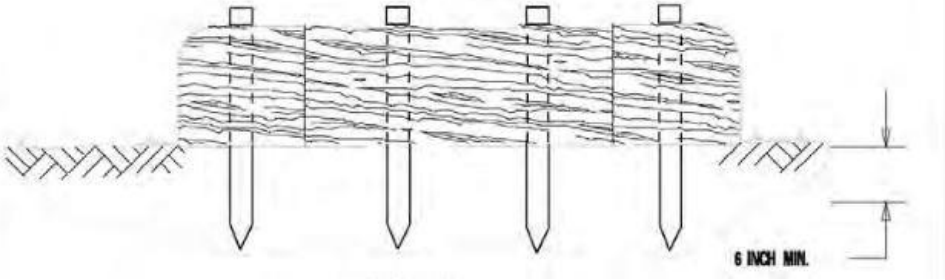
NOT TO SCALE

VECTREN Live Smart Environmental Construction Standards	**TYPICAL EROSION CONTROL MEASURES AT ROAD CROSSINGS**	**FIGURE - 11**

Figure 12A - Sediment Trap: Bales



PLAN VIEW



SIDE VIEW

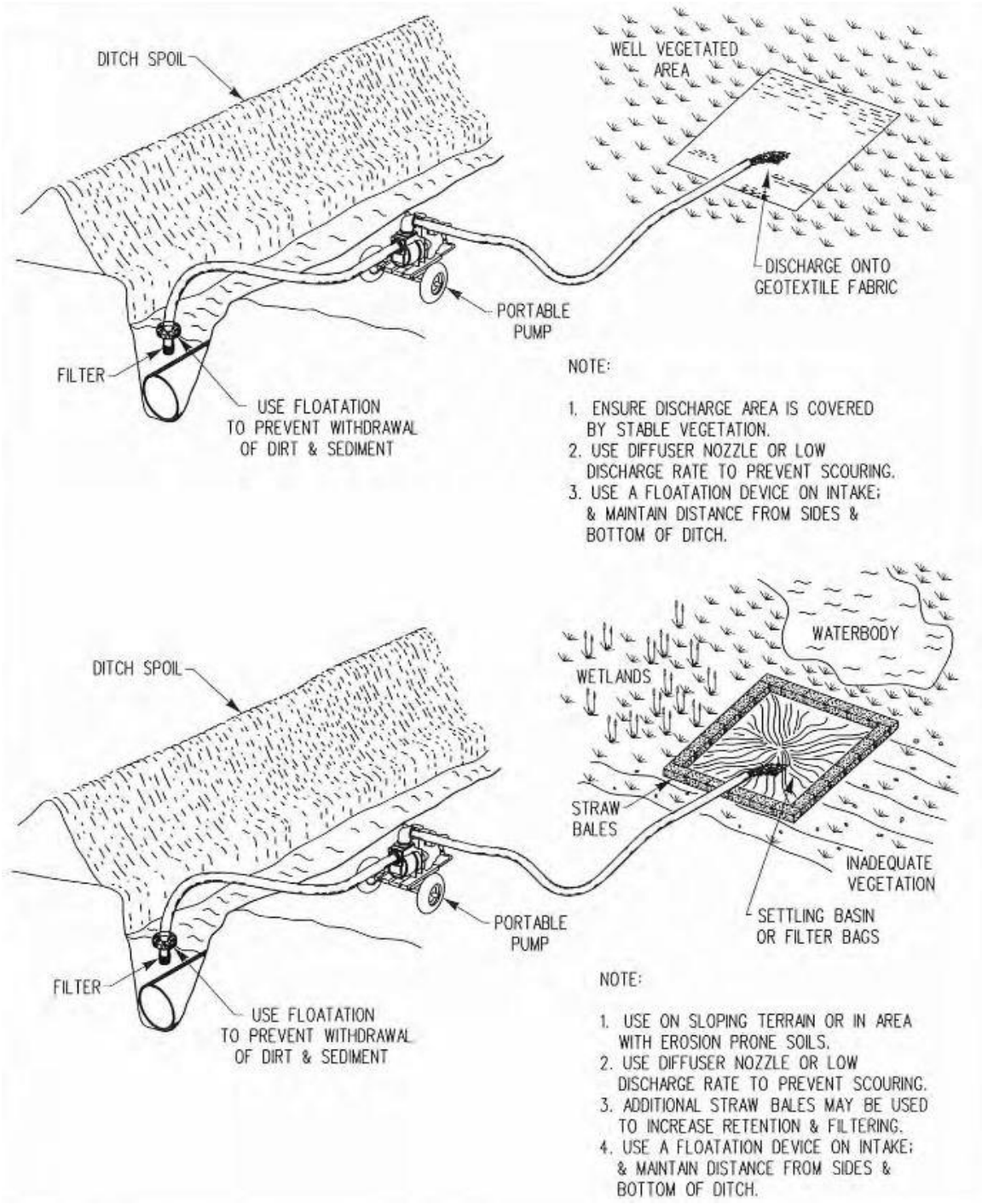
NOTES:

1. INSTALL BALES AS SHOWN. IF ADDITIONAL STORAGE VOLUME IS NECESSARY, SECURE ADDITIONAL BALES ON TOP OF INITIAL BOTTOM LAYER AND/OR BY INCREASING THE NUMBER BALES IN BOTTOM LAYER.
2. SECURE EACH BALE AND EACH LAYER OF BALES USING EITHER TWO REBARS OR TWO WOODEN STAKES PER BALE.
3. PLACE A 5- TO 6-INCH DEEP LAYER OF ¾- TO 1-INCH CLEAN STONE OR STRAW ON GROUND INSIDE BALES.
4. THE SEDIMENT TRAP WILL NOT BE GREATER THAN TWO BALES IN HEIGHT FOR SIX-BALE BOTTOM CONSTRUCTION WITHOUT ADDITIONAL REINFORCEMENT OF TRAP WALLS.
5. A FILTER BAG MAY ALSO BE UTILIZED INSIDE THE TRAP TO HELP FILTER TO THE DISCHARGE.

NOT TO SCALE

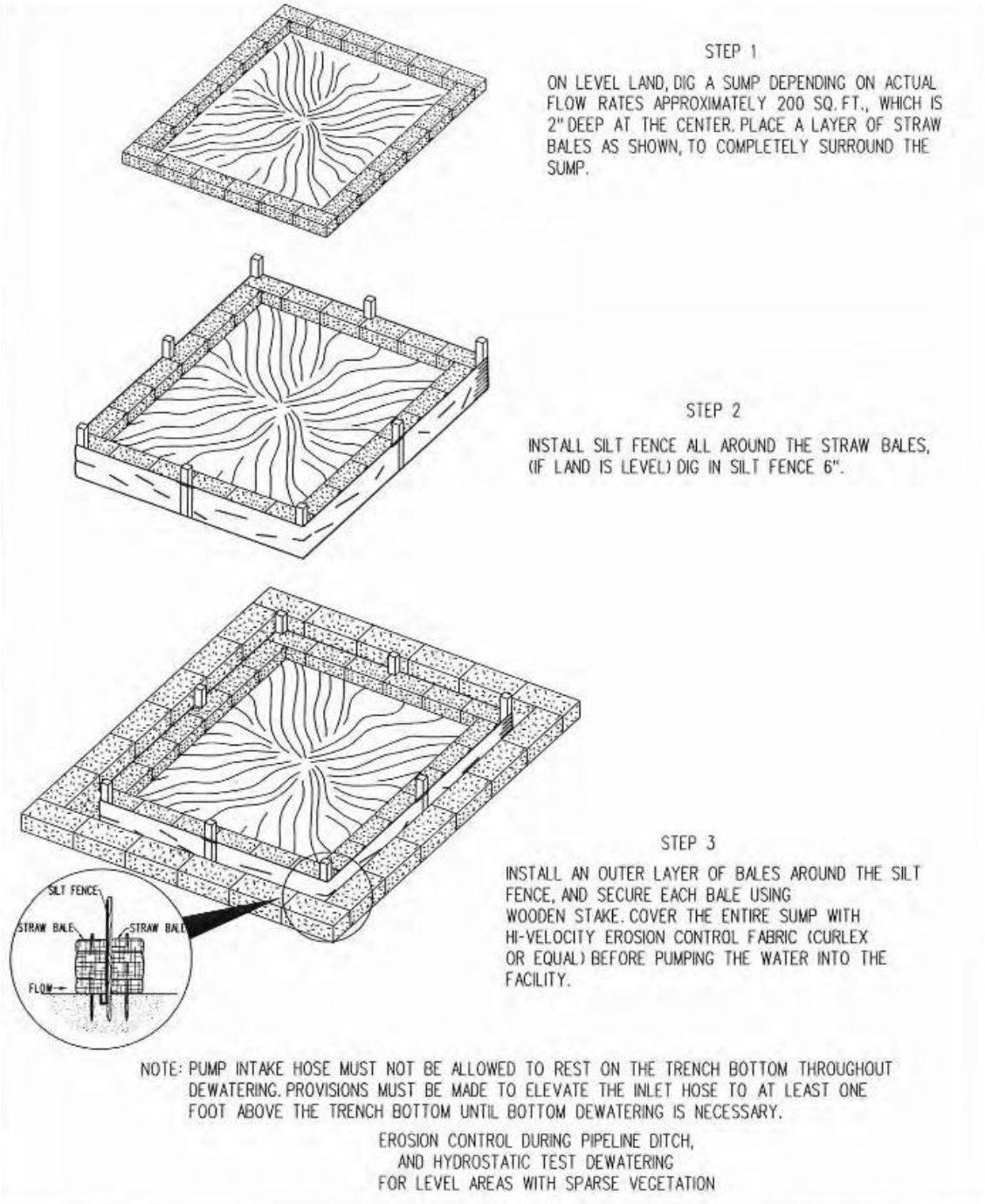
VECTREN Live Smart Environmental Construction Standards	**SEDIMENT TRAP BALES**	**FIGURE - 12A**

Figure 12B – Sediment Trap: Trench Dewatering



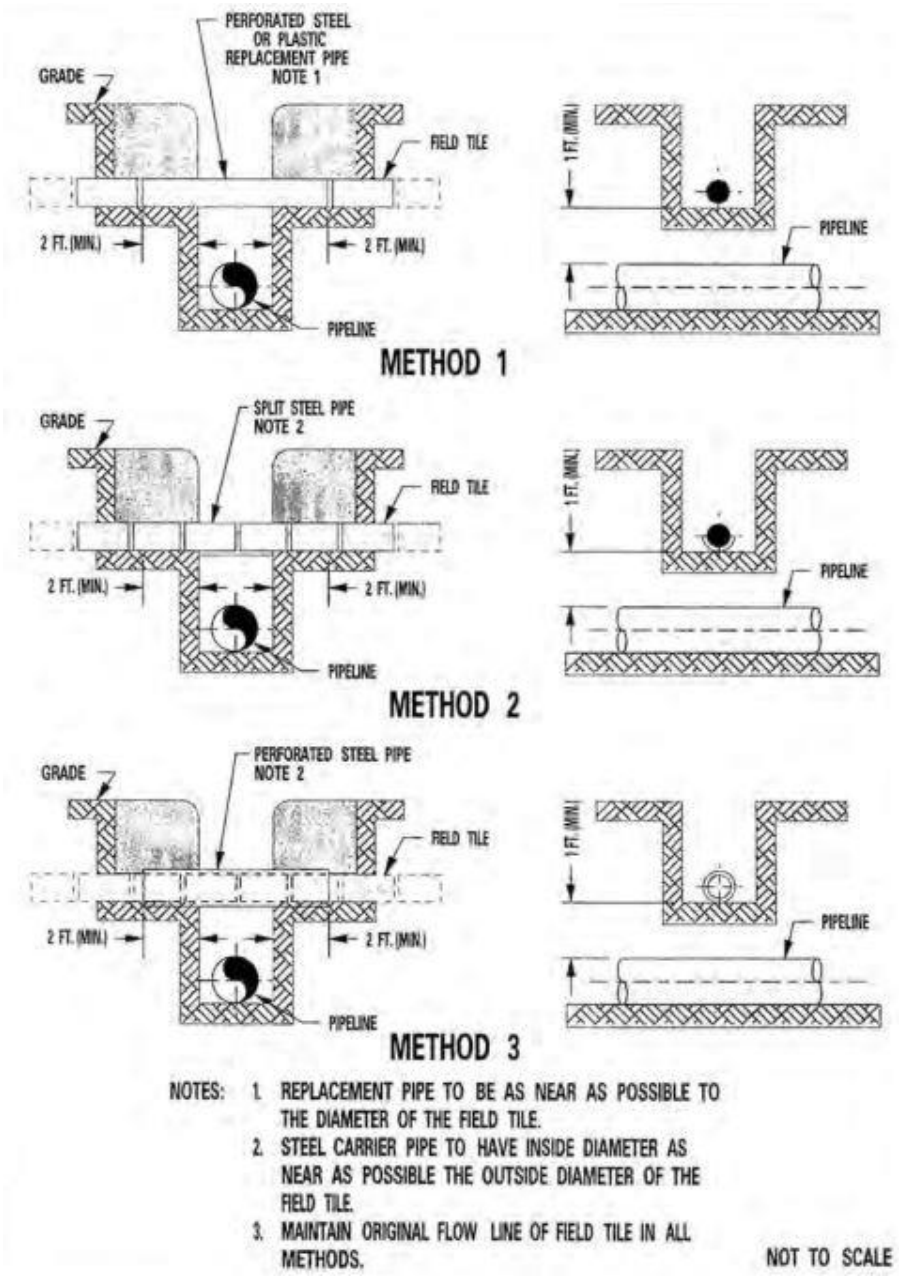
VECTREN Live Smart Environmental Construction Standards	**SEDIMENT TRAP TRENCH DEWATERING**	**FIGURE - 12B**

Figure 12C - Sediment Trap: Trench Dewatering



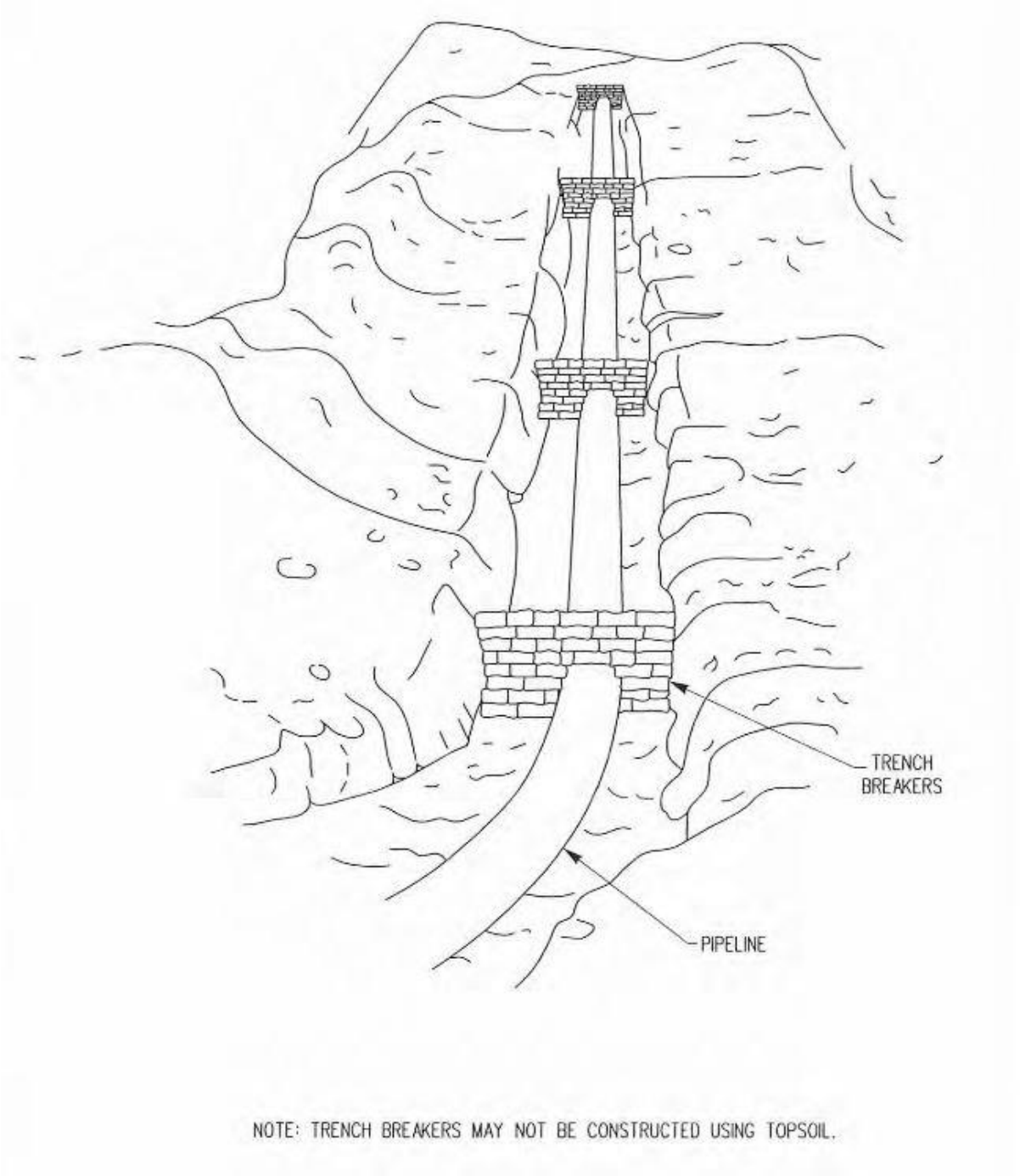
VECTREN Live Smart Environmental Construction Standards	**SEDIMENT TRAP TRENCH DEWATERING**	**FIGURE - 12C**

Figure 13 - Field Tile Replacement Methods



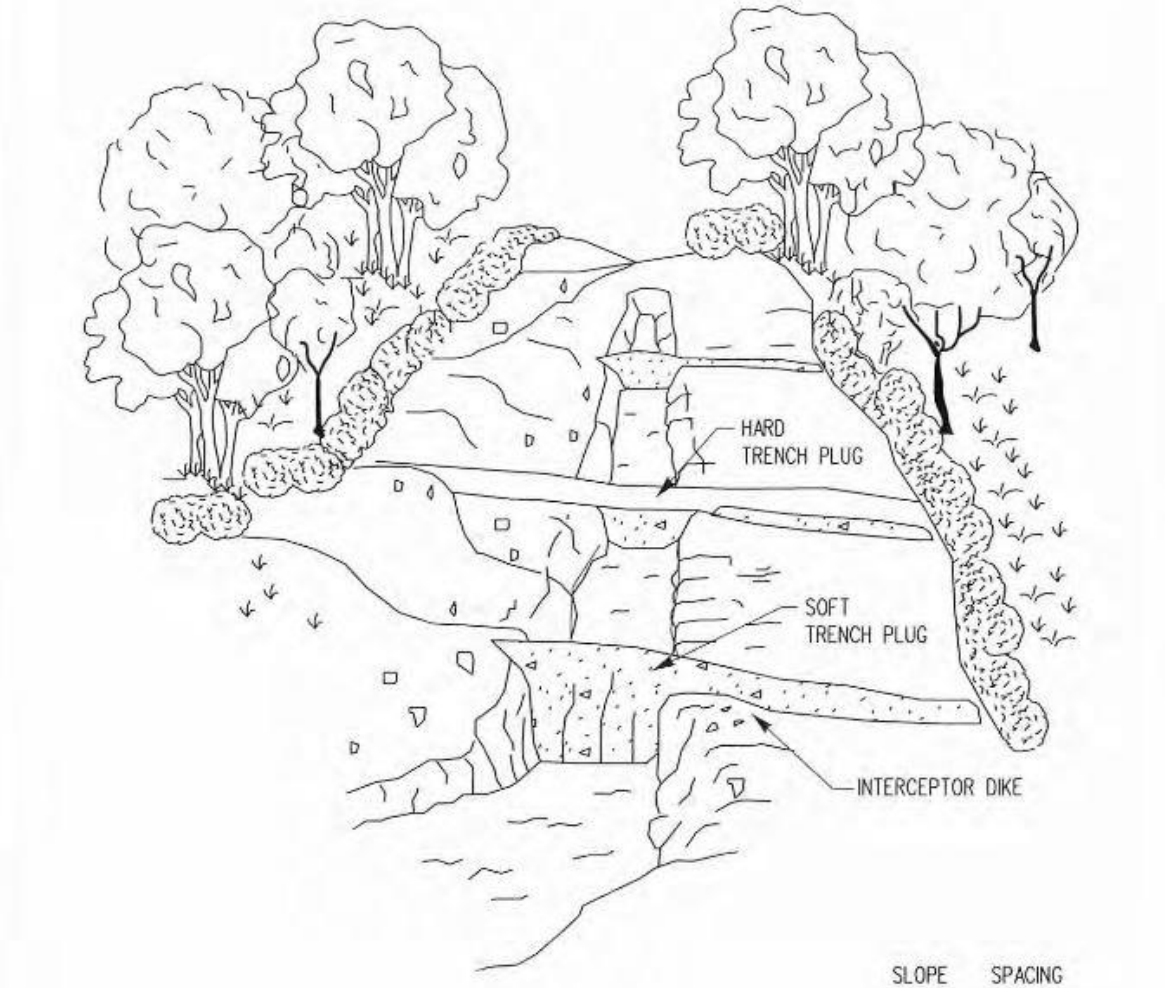
VECTREN Live Smart Environmental Construction Standards	**FIELD TILE REPLACEMENT**	**FIGURE - 13**

Figure 14A - Trenchline Barriers and Breakers



VECTREN Live Smart Environmental Construction Standards	**TRENCHLINE BARRIERS AND BREAKERS**	**FIGURE - 14A**

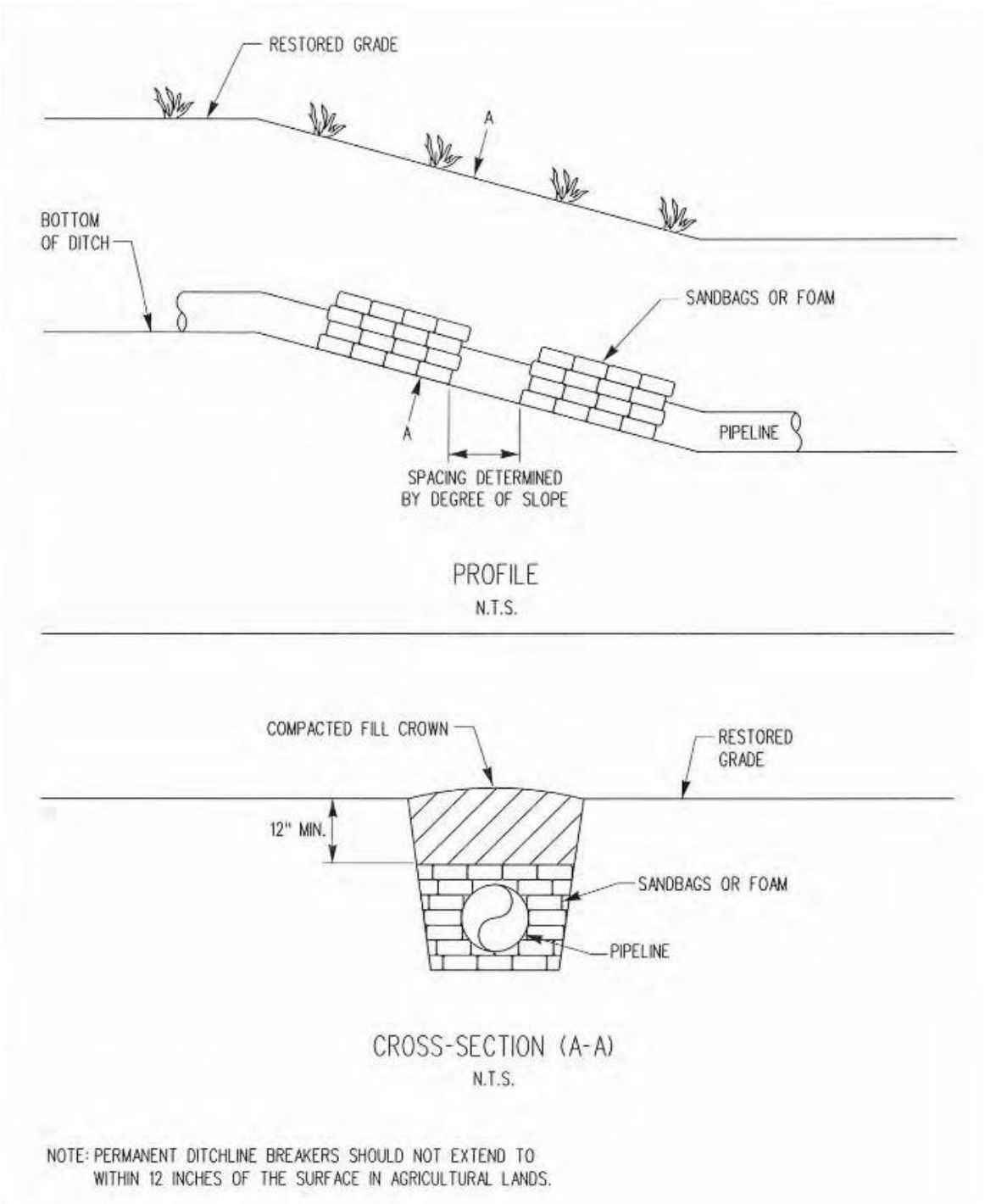
Figure 14B - Temporary Trenchline Breakers



NOTES:
1. TEMPORARY TRENCH PLUGS MAY BE USED IN CONJUNCTION WITH INTERCEPTOR DIVERSIONS TO PREVENT WATER FROM OVERFLOWING INTO SENSITIVE RESOURCE AREAS.
2. DIVERT TRENCH OVERFLOW TO A WELL-VEGETATED OFF-R.O.W. LOCATION OR INSTALL APPROPRIATE ENERGY DISSIPATING DEVICE.
3. DO NOT USE TOPSOIL FOR INSTALLING TEMPORARY SOFT PLUGS.

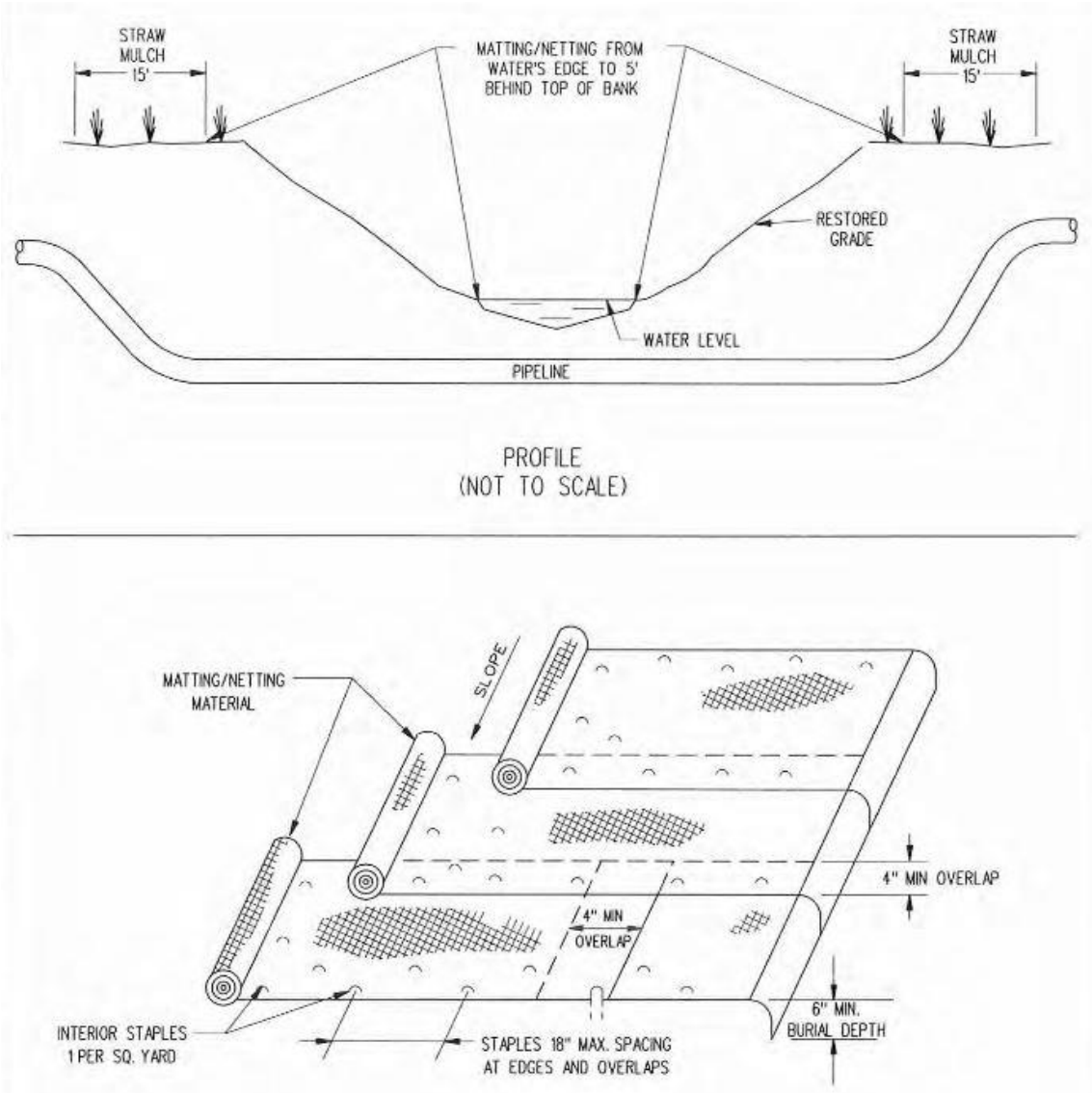
VECTREN Live Smart Environmental Construction Standards	**TEMPORARY TRENCHLINE BREAKERS**	**FIGURE - 14B**

Figure 14C - Permanent Trenchline Breakers



VECTREN Live Smart Environmental Construction Standards	**PERMANENT TRENCHLINE BREAKERS**	**FIGURE - 14C**

Figure 15 - Erosion Control Blanket

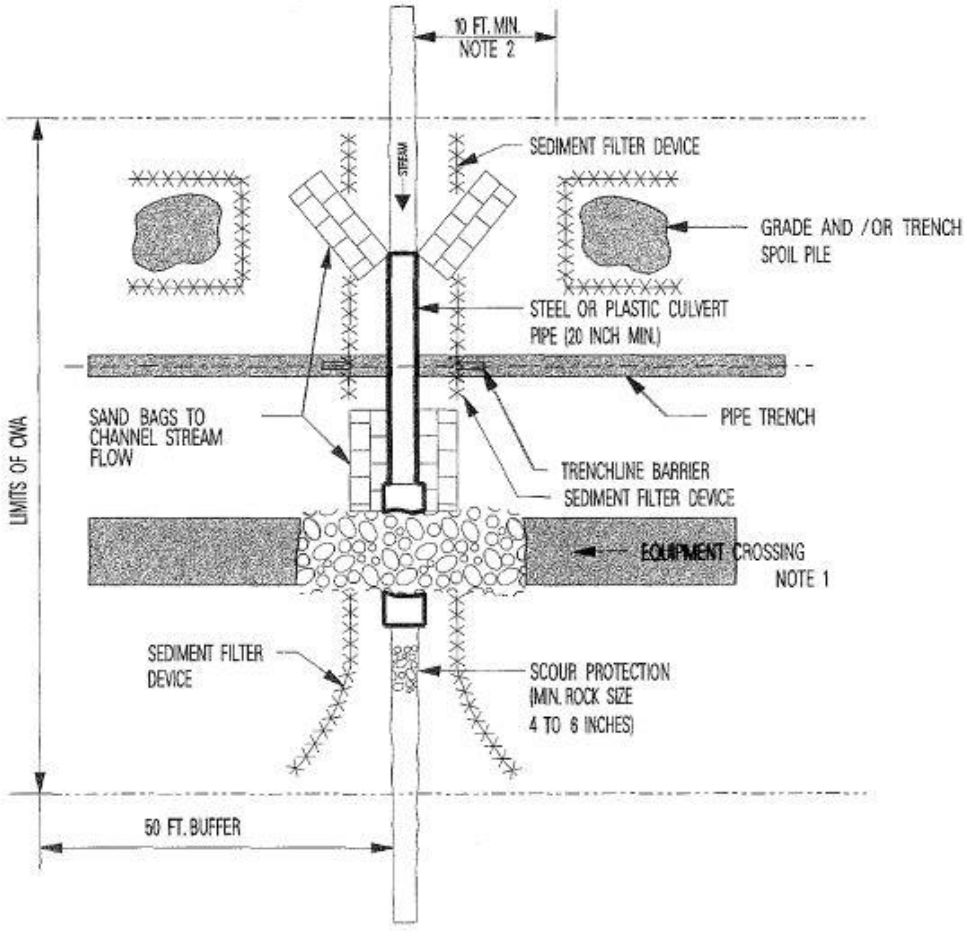


NOTES:
1. RIGHT-OF-WAY TO BE MULCHED PRIOR TO THE INSTALLATION OF MATTING/NETTING.
2. MATTING/NETTING SHALL BE RUN HORIZONTAL AND PARALLEL TO THE GROUND CONTOUR.
3. STAPLES SHALL BE 10-INCHES LONG, STANDARD MATTING/NETTING STAPLES.

NOT TO SCALE

VECTREN Live Smart Environmental Construction Standards	**EROSION CONTROL BLANKET**	**FIGURE - 15**

Figure 16 - Typical Stream Crossing: Dry Ditch

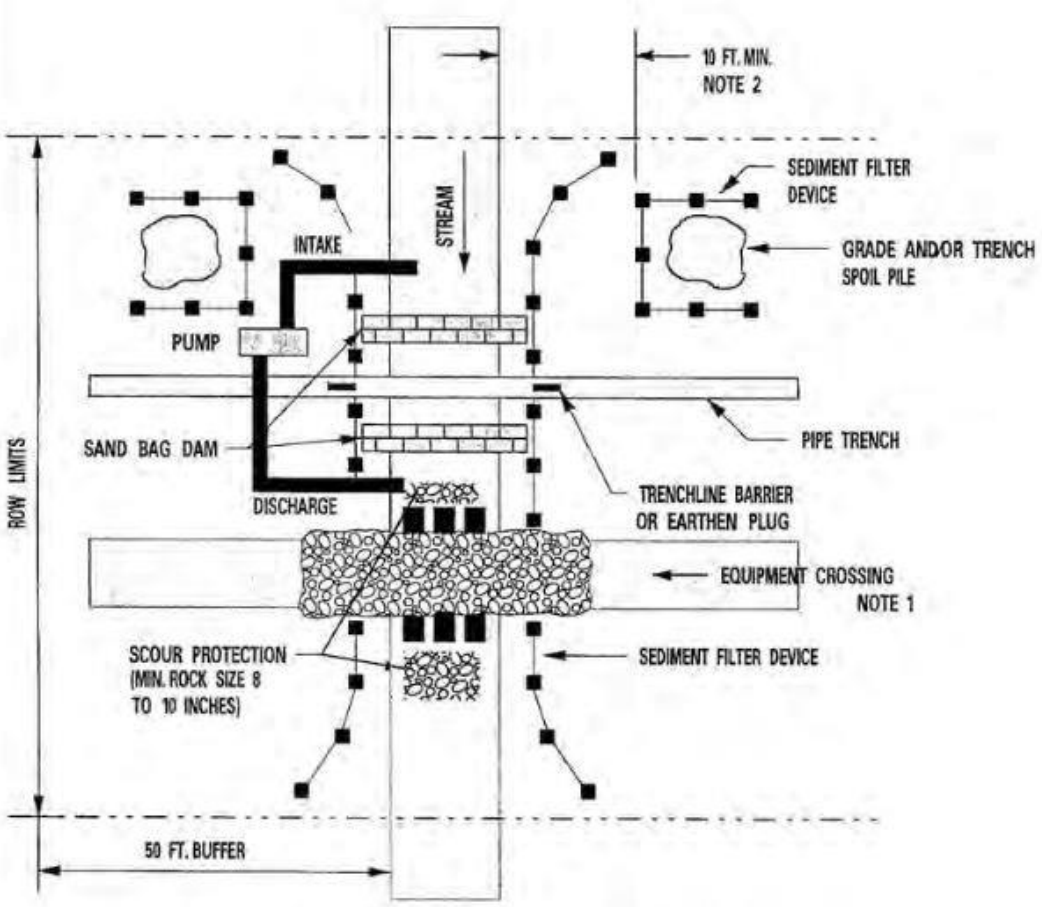


NOTES:
1. EQUIPMENT CROSSINGS ARE TO BE PREPARED AS ILLUSTRATED IN FIGURES 22 & 23.
2. GRADE AND TRENCH SPOIL WILL BE STOCKPILED AT LEAST 10 FEET FROM THE WATER'S EDGE, TOPOGRAPHY PERMITTING.
3. INSTALL FLUME PIPE AFTER BLASTING, BUT BEFORE TRENCHING.
4. USE SAND BAG OR SAND BAG AND PLASTIC SHEETING DIVERSION STRUCTURE, OR EQUIVALENT.
5. PROPERLY ALIGN FLUME PIPE.
6. DO NOT REMOVE FLUME PIPE DURING TRENCHING, PIPELAYING, OR BACKFILLING ACTIVITIES.
7. REMOVE ALL FLUME PIPES AND DAMS THAT ARE NOT ALSO PART OF THE EQUIPMENT BRIDGE AFTER FINAL CLEANUP BUT BEFORE PERMANENT SEEDING.

NOT TO SCALE

VECTREN Live Smart Environmental Construction Standards	**TYPICAL STREAM CROSSING DRY-DITCH**	**FIGURE - 16**

Figure 17 - Typical Stream Crossing: Dam and Pump

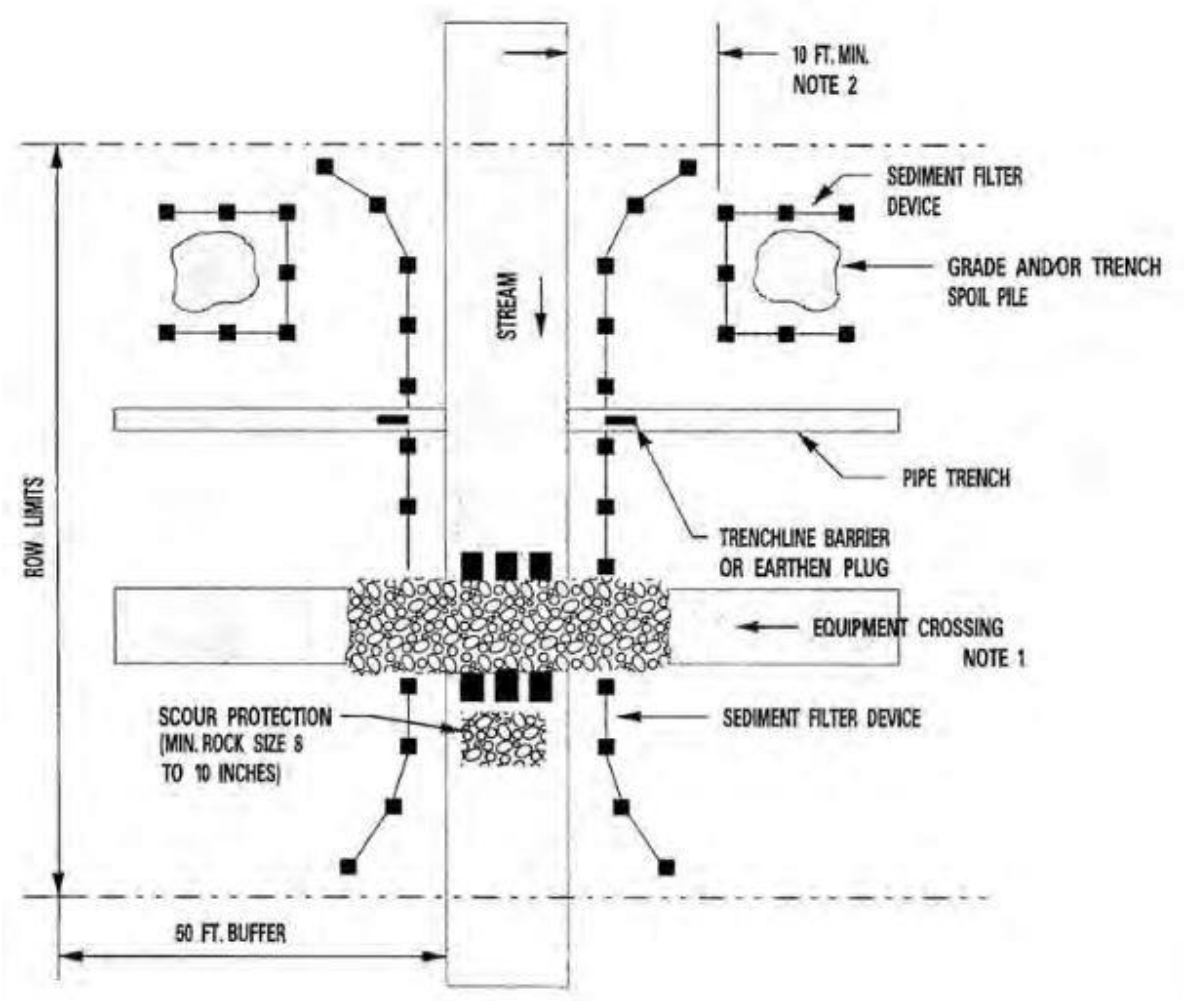


NOTES:
1. EQUIPMENT CROSSINGS ARE TO BE INSTALLED AS ILLUSTRATED IN FIGURES 19 OR 20.
2. GRADE AND TRENCH SPOIL WILL BE STOCKPILED AT LEAST 10-FEET FROM THE WATERS EDGE, TOPOGRAPHY PERMITTING.
3. PUMP INTAKES WILL BE SCREENED, PREVENT STREAMBED SCOUR AT DISCHARGE.
4. SUFFICIENT PUMP CAPACITY WILL BE USED TO MAINTAIN STREAM FLOW AT ALL TIMES UNTIL BACKFILL AND REMOVAL OF SANDBAG DAM.
5. BACKUP PUMPS 9AS SAME NUMBER AND CAPACITY AS ACTIVE PUMPS) WILL BE READILY AVAILABLE IN WORKING CONDITION ON SITE AT CROSSING.
6. CONSTRUCT DAMS WITH MATERIAL THAT PREVENT SEDIMENT AND OTHER POLLUTANTS FROM ENTERING THE WATERBODY.
7. MONITOR THE DAM AND PUMPS TO ENSURE PROPER OPERATIONS THROUGHOUT THE WATERBODY CROSSING.

NOT TO SCALE

VECTREN Live Smart Environmental Construction Standards	**TYPICAL STREAM CROSSING DAM AND PUMP**	**FIGURE - 17**

Figure 18 - Typical Stream Crossing: Wet-Ditch



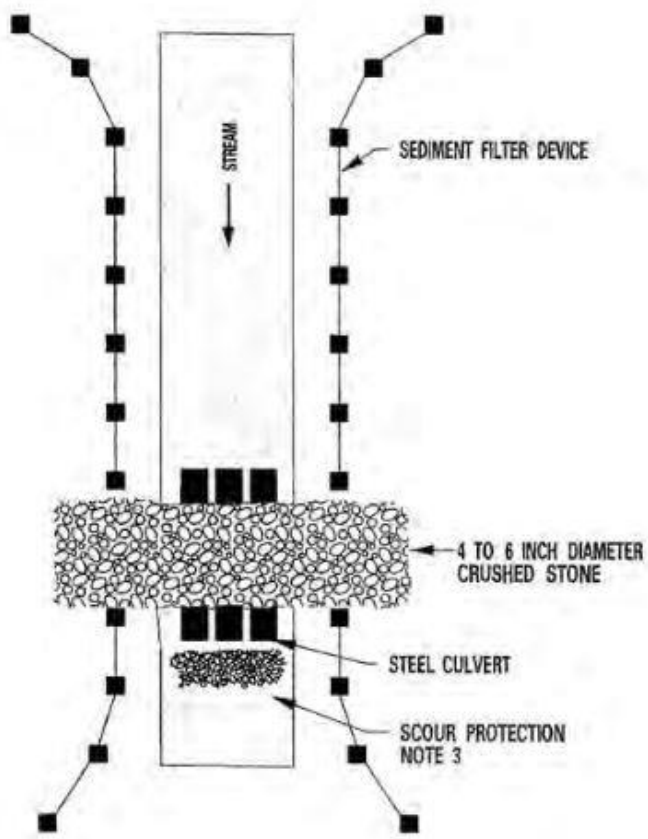
NOTES: 1. EQUIPMENT CROSSINGS ARE TO BE PREPARED AS ILLUSTRATED IN FIGURES 19 AND 20.

2. GRADE AND TRENCH SPOIL WILL BE STOCKPILED AT LEAST 10-FEET FROM THE WATERS EDGE, TOPOGRAPHY PERMITTING.

NOT TO SCALE

VECTREN Live Smart Environmental Construction Standards	**TYPICAL STREAM CROSSING WET-DITCH**	**FIGURE - 18**

Figure 19 - Temporary Equipment Crossing: Culvert and Stone

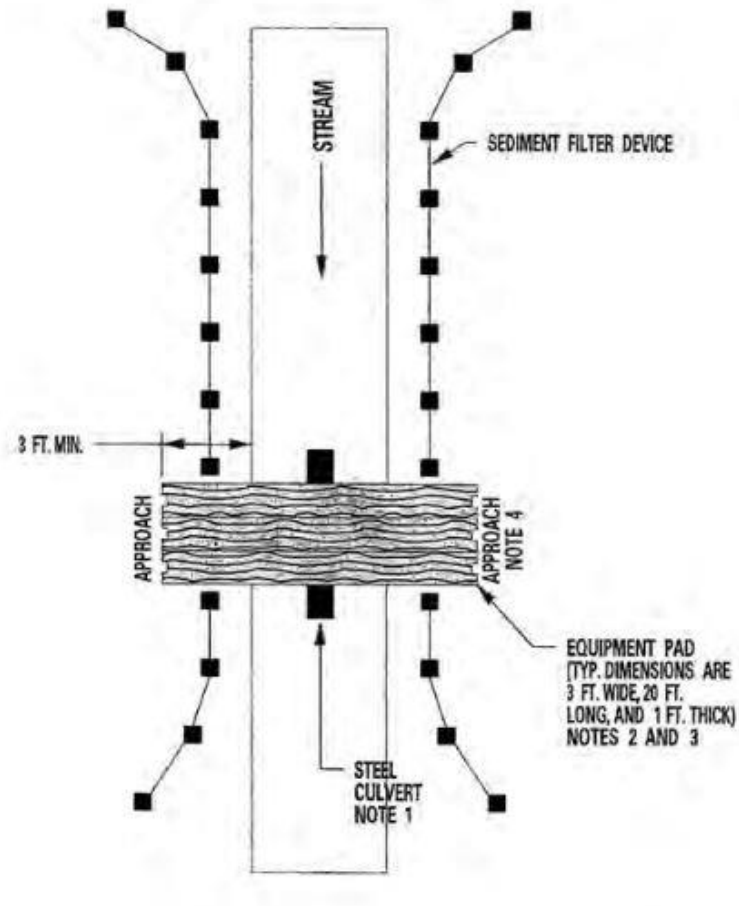


NOTES:
1. MINIMUM CONTOURING OF THE BOTTOM NECESSARY TO LAY THE CULVERTS LEVEL MAY BE DONE.
2. USE AS MANY CULVERTS AS REQUIRED TO SPAN ENTIRE STREAM BED. (CULVERTS SHALL BE PLACED SIDE BY SIDE.)
3. STONES WILL BE PLACED AT THE OUTLET OF ALL CULVERTS TO PROVIDE SCOUR PROTECTION IN THE EXISTING CHANNELS. MINIMUM ROCK SIZE: 8 TO 10 INCHES.
4. MINIMUM CULVERT DIAMETER 20 INCHES .
5. MAINTAIN ROCK AS NOT TO ALLOW MUD TO ENTER THE STREAM.
6. ALIGN CULVERTS TO PREVENT BANK EROSION.

NOT TO SCALE

VECTREN Live Smart Environmental Construction Standards	**TEMPORARY EQUIPMENT CROSSING CULVERT AND STONE**	**FIGURE - 19**

Figure 20 - Temporary Equipment Crossing: Equipment Pads

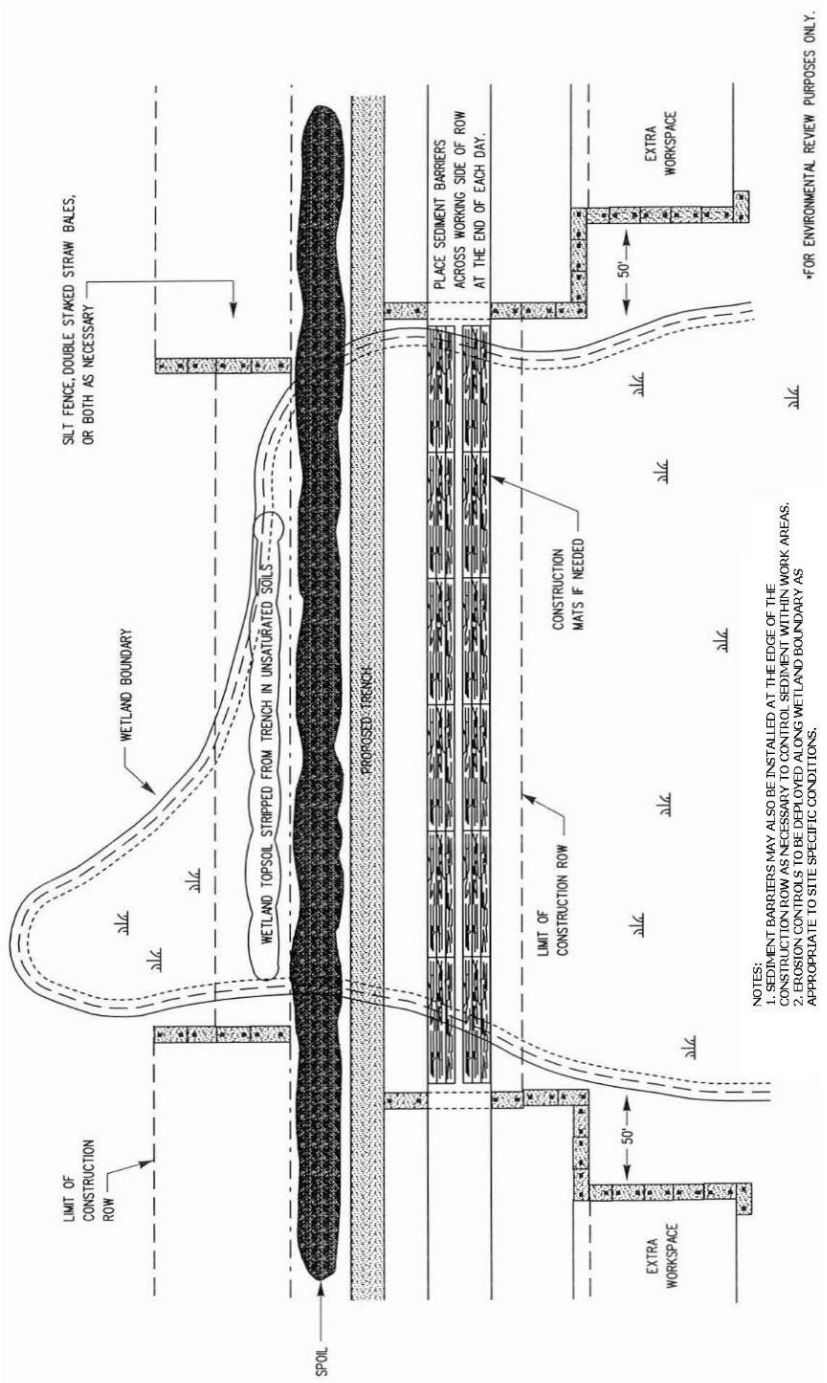


NOTES:
1. CULVERT PIPE UTILIZED IF ADDITIONAL SUPPORT IS REQUIRED. ALIGN CULVERT TO PREVENT SCOUR OR BANK EROSION.
2. ADDITIONAL PADS CAN BE PUT SIDE BY SIDE IF EXTRA WIDTH IS REQUIRED.
3. EQUIPMENT PAD TYPICALLY CONSTRUCTED OF HARD-WOOD; MUST ACCOMMODATE THE LARGEST EQUIPMENT USED.
4. RAMP APPROACHES CAN EITHER BE GRADED OR DUG INTO GROUND. IF NECESSARY, CRUSHED STONE WILL BE USED TO RAMP UP TO THE EQUIPMENT PADS.
5. MINIMUM CULVERT DIAMETER 20 INCHES.
6. MAINTAIN PADS SO AS NOT TO ALLOW MUD TO ENTER THE STREAM

NOT TO SCALE

VECTREN Live Smart Environmental Construction Standards	**TEMPORARY EQUIPMENT CROSSING EQUIPMENT PADS**	**FIGURE - 20**

Figure 21 - Typical Wetland Crossing



VECTREN Live Smart Environmental Construction Standards	**TYPICAL WETLAND CROSSING**	**FIGURE - 21**

APPENDIX A

Z-167 Natural Gas Pipeline Relocation
around the
Dayton International Airport

Directional Drilling

Inadvertent Return (Frac-Out) Contingency Plan

July 2013

1. General

This protocol outlines steps to be taken when responding to "frac outs" that may occur during horizontal directional drilling (HDD) installation of natural gas pipelines.

After-the-fact permits may be required from state and federal agencies depending on the location of the incident and the amount of drilling mud released into the environment.

NOTE: There are caves and sinkholes, also known as "karst terrain," in some parts of the service territory. Special planning must occur before any HDD installation near karst features to minimize the potential for release of drilling mud into these areas.

2. Materials and equipment to be kept on site or readily available

Containment materials such as straw bales, silt fence and coir fiber logs shall be kept on site during boring operations.

For large projects, a vacuum truck may already be available on site. For smaller projects, either of the emergency response contractors listed on the following page may be used as an "on call" vacuum truck resource without any project-specific prior coordination.

3. Immediate response actions

Upon discovering a frac out, take safe actions to:

1. **Stop the release.** Following industry best practices, stop the boring rig or reduce pressure to keep drilling mud from reaching the surface.
2. **Contain the release.** Place straw bales, silt fence, coir fiber logs or other structural sediment control measures to keep the drilling mud from leaving the project site and from entering surface waterways and wetlands.
    - Determine the flow path that the drilling mud is most likely to follow;
    - Place containment materials in the flow path of the drilling mud;
    - Monitor the containment area to ensure drilling mud does not escape; and
    - Place additional containment materials as needed to stop the drilling mud from spreading.
3. **Notify others.** Call the project manager. Notify Environmental Affairs immediately upon discovering a frac out that has reached an environmentally sensitive area, including but not limited to karst sinkholes, rivers, lakes, streams, ponds, creeks or roadside ditches.
4. **Begin cleanup.** See following page for more information.

4. Cleaning up the drilling mud

In environmentally sensitive areas, begin removing the drilling mud as soon as it has been stopped and contained. If the release is ongoing, removal may begin before the release is stopped.

Drilling mud contained in upland areas (not in a karst sinkhole, wetland, surface water or floodway) may be left in place to dry. Once dry, remove the drilling mud to pre-existing grade and use the dried material as backfill in the pipe trench.

For releases to environmentally sensitive areas, the following emergency response and cleanup contractors may be used:

SUMMIT ENVIRONMENTAL SERVICES, LLC

24-hr Emergency Response (877) 421-1744

(Located in Dayton, Evansville and Indianapolis)

THE ENVIRONMENTAL QUALITY COMPANY

(800) 592-5489

(Located in Indianapolis)

5. Environmental Affairs actions upon notification of frac out

Environmental Affairs shall make all required notifications to local, state or federal environmental agencies and apply for any after-the-fact permits.

Environmental Affairs Contact

Mark Wannemueller

Office: (812) 491-4601

Cell: (812) 306-8395

Summary: Amended Application of Vectren Energy Delivery of Ohio, Inc. - Appendices 3-1 and 4-1 electronically filed by Teresa Orahood on behalf of Sally Bloomfield