



Memorandum

To: Upper Charles Trail Committee
Town of Hopkinton
18 Main Street
Hopkinton, MA 01748

Date: June 14, 2019

Project #: 13539.09

From: Jack Madden, PE

Re: Phase 8 Upper Charles River Trail
Feasibility Study -DRAFT
Hopkinton, MA

1.1 Project Background

This Feasibility Report includes existing conditions, feasible alternatives, impacts, estimated construction costs, and anticipated permitting actions associated with the design and construction of a Shared Use Path (SUP) connecting East Main Street north to southern the terminus of proposed Upper Charles Trail "Phase 9" in the Town of Hopkinton, MA. Completion of this Feasibility Report is the initial step in moving this project through the Town's funding and procurement process. The purpose of this Feasibility Report is to help inform the Town's decision on whether or not to pursue the further design and construction of this facility.

2.1 Project Area Boundaries

The Project Area consists of combination of privately-owned and Town-owned land parcels bounded by Route 135 to the south, private parcel U12 15 0 and Town-owned parcel U13 8 2 to the west, private parcel R8 35 C to the north, and private parcel U17 1 0 to the east.

2.2 Project Area General Land Uses

This project proposes to construct an SUP on Town-owned parcels where possible and through existing open space on private parcels where necessary. Phase 8 proposes an alignment that encroaches on parcels currently being redeveloped as part of Legacy Farms, a major mixed-use residential development. The development of the 700-acre private parcel is under the guidance of a Master Plan agreement with the Town of Hopkinton. The Upper Charles Trail (UCT) is compatible with the goals and requirements for connectivity within and beyond the varying uses and restricted land within the Town's Open Space Mixed Use District (OSMUD).

In addition to the proposed trail network within the Legacy Farms property, existing transmission corridors have been considered for the proposed alignment as well. There is a significant natural gas distribution facility, managed by Enbridge, Inc., adjacent to the project area. **Discussions with Legacy Farms, and Enbridge, Inc.** management teams have provided suitable constraints and opportunities for consideration in planning for the alignment of the UCT Phase 8. **A memorandum of understanding with each partnering property owner is included as an attachment to this memo.**

3.1 Design Policy Related to Bicycle and Pedestrian Accommodation

The US Department of Transportation (USDOT) policy and the Massachusetts Department of Transportation (MassDOT) policy is to incorporate safe and convenient walking and bicycling facilities into transportation projects. The USDOT policy states that every transportation agency, including state DOT's, has the responsibility to improve

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conditions and opportunities for walking and bicycling and to integrate walking and bicycling into their transportation systems. Because of the numerous individual and community benefits that walking and bicycling provide — including health, safety, environmental, transportation, and quality of life — transportation agencies are encouraged to go beyond minimum standards to provide safe and convenient facilities for these modes.

3.2 Definitions of Bikeway Types

The following types of bikeways were considered during the preparation of this memo. These bikeway definitions are taken from the *AASHTO Guide for the Development of Bicycle Facilities 2012 Fourth Edition*.

DRAFT



Marked Shared Lane



Paved Shoulder



Bike Lane



Shared-Use Path

- **Shared Lane Bikeway** – Shared lane bikeways are best used on minor local neighborhood streets with low speeds and low traffic volumes where bicycles can share the road without special provisions. Generally the speed differential between motorists and bicyclist is typically 15 mph or less and motor vehicle speeds of 30 mph or less. Traffic volumes on the roadway are typically less than approximately 1000 vehicles per day.
- **Marked Shared Lane Bikeway** – Marked shared-lane bikeways are best used on local collectors or minor arterials with narrow travel lanes where bike lanes are not feasible due narrow lanes, space constraints and right-of-way limitations. Traffic volumes can be variable but the motor vehicle speed limit should be 35 mph or less.
- **Paved Shoulder** – Paved shoulders are paved areas adjacent to the roadway travel lanes delineated by a longitudinal pavement marking. Paved shoulder bikeways are best used on rural roadways that connect town centers or other attractions but can be used in urban areas. Traffic volumes can be variable but the motor vehicle posted speed should be in the range of 40-55 mph. The width of the shoulder should be dependent on characteristics of the adjacent motor vehicle traffic (i.e. wider shoulders should be used on higher speed roadways) but a shoulder width of 4 feet is considered the minimum for bicycle travel.
- **Bike Lane** – A bike lane is a portion of a roadway that has been designated for preferential or exclusive use by bicyclists by pavement markings and if used, signs. Bike lanes can be used on major roads to provide quick and direct bicycle access to the same destinations as motorists. Bike lanes can also be used on collector roads or congested urban streets. Generally roadway design speeds are more than 25 mph. Traffic volumes can vary as the motor vehicle/bicycle speed differential is generally a more important factor in the decision to provide bike lanes.
- **Shared-Use Path** – A shared-use path (SUP) is a bikeway outside of the roadway traveled way and physically separated from motorized vehicular traffic by a buffer or barrier. The SUP can be either within the roadway right-of-way or on an independent alignment. SUP's are also used by pedestrians including skaters, wheelchairs users and joggers/walkers. The types of design criteria for SUP's (design speed, minimum curve radii, stopping sight distance, etc.) are of similar type for design of roadways but modified based on the operating characteristics of a bicycle as a vehicle and bicyclist as a vehicle operator.



Rail-with-Trail

Rail-with-Trail – A rail-with-trail is a SUP parallel and adjacent to a railroad.

Rail-to-Trail – A rail-to-trail is a SUP constructed within the remaining bed of a former rail line. Often the rail bed had been constructed by cutting and filling the existing terrain to maintain straight alignment and gentle even grades which is compatible with ADA accessibility requirements.

3.3 Design Criteria

The project design criteria has been derived based on standard engineering practice and the successful application of regulatory standards and guidelines. The primary references for the project criteria listed include:

- The American with Disabilities Act (ADA) Design Guidelines for Shared-Use Paths;
- The Massachusetts Department of Transportation *Massachusetts Highway Department Project Development and Design Guide*, 2006.
- The Massachusetts Department of Transportation *Separated Bike Lane Planning and Design Guide*, 2012.
- The American Association of State Highway and Transportation Officials (AASHTO) *2012 Guide for the Development of Bicycle Facilities, 4th Edition*, (AASHTO Bike Guide);
- AASHTO *2011 A Policy on Geometric Design of Highways and Streets* (The AASHTO Green Book);
- USDA Forest Service, *Equestrian Design Guidebook for Trails, Trailheads and Campgrounds*, 2007;
- The *Manual on Uniform Traffic Control Devices* (MUTCD) 2009 Edition with revisions and applicable Interim Approvals; and
- Related DOT Engineering Directives.

4.1 Design Criteria

The Phase 8 Upper Charles River Trail (Phase 8) would provide a traffic-separated Shared-Use-Path (SUP) from East Main Street to the southern edge of private parcel R8 35 C owned now or formerly by Hopkinton LNG Corporation using a combination of existing cart path alignments and undeveloped right of way. The existing terrain within the project limits is rugged with poorly drained areas, exposed tree roots and rocks and variable topography.

In order to comply with current Federal Highway Administration (FHWA) guidelines for accessibility in the design of SUP's, grades and surfaces would need to accommodate users with disabilities to the greatest extent practicable. Where full compliance with accessibility guidelines for pedestrian facilities located within the public right-of-way

(PROWAG) cannot be met due to physical or regulatory constraints, the AASHTO Bike Guide shall be followed. AASHTO's best practices for designing sidewalks and trails requires that no less than 70% or of the grades along an SUP be 5% or less; and that any grade over 5% provide rest areas at regular intervals. In addition, with any grades greater than 6% a 30mph design speed should be used to calculate horizontal curves and stopping sight distance.

The alignment for Phase 8 of the UCT has been identified as follows (See Figure 1):

- From the northern edge of the East Main Road (SR135) Right of Way on Town-owned parcel R13 8 3, Phase 8 heads in a mostly northeasterly direction along the embankment of a drainage channel to the eastern edge of the property line where it turns directly north along the property line and along an existing cart path onto parcel R13 8 1 now or formerly owned by Legacy Farms, LLC. Phase 8 continues along the cart path where it meanders along the cart path alignment to maintain a maximum 5% grade. Phase 8 continues generally in a northerly direction to the southeast corner of parcel R8 35 C where it joins at the southern terminus of the proposed Upper Charles Trail "Phase 9" (approximately 4,000LF).

5.1 General Applicable Environmental Guidance

This Feasibility Report was developed using data provided by the Massachusetts Office of Geographic Information Systems (MassGIS). This database is a compilation of information acquired from a broad base of public and private agencies and serves as a useful tool for the purposes of planning and assessing potential suitability of land use and development. The findings below are useful for identifying stakeholders and anticipating permitting requirements for the proposed alternatives. Further research, field verification and field survey will be needed to verify the findings of this report before proceeding to final design.

5.2 Anticipated Impacts and Criteria

This section describes the anticipated environmental impacts of the three SUP alignments and other criteria for evaluation, including:

- Relocation Impacts and Right of Way Acquisition
- Considerations Relating to Pedestrians and Bicyclists
- Air Quality Impacts
- Noise Impacts
- Impacts to Outstanding Resource Water
- Impacts to Wetlands
- Floodplain Impacts
- Impacts to Certified Vernal Pools
- Impacts to NHESP Priority and Estimated Habitats
- Impacts to Areas of Critical Environmental Concern
- Impacts to National Register Historic District and Property

- MassDEP Approved Wellhead Protection Area (Zone II)
- Impacts to Hazardous Waste Sites
- Construction Impacts
- Visual Impacts
- Impacts to Public Utilities
- Public Facilities Connections
- Environmental Justice Impacts
- Construction Costs
- Operations and Maintenance

For a summary of anticipated impacts, see Table 1

5.2.1 Relocation Impacts and Right-of-Way Acquisition

The Alternative Alignments under consideration utilize parcels owned by the Town where possible; however, the proposed Phase 8 UCT will traverse parcel R13 8 1 now or formerly owned by Legacy Farms, LLC. In discussions with Legacy Farms representatives and (see attached meeting notes and other correspondence), an alignment was determined that will be compatible with the requirements of the agreements between Legacy Farms and the Town of Hopkinton as well as the needs and expectations of the Upper Charles Trail Committee in Hopkinton.

5.2.2 Considerations Relating to Pedestrians and Bicyclists

The proposed alignment will improve pedestrian and bicyclists' access to open space within the Town-owned property and facilitate future expansion to existing open space and recreational trails.

The proposed SUP is entirely separate from the roadway therefore safety considerations pertaining to vehicle traffic have not been considered. The Alignment was chosen based on the accessibility of the terrain to all types of users including young children, elderly, and handicapped individuals.

Although the grade change within the project area is significant, the preferred Alternative will maintain a maximum grade of 5% where possible by utilizing switch-backs. The resulting running grade will maintain a lower speed differential between cyclists and pedestrians and will be accessible to a wider range of user ages and abilities.

The proposed facility will accommodate equestrian users as well on a gravel sidepath adjacent to the paved SUP. The FHWA recommended buffer between Bicyclists/Pedestrians and horse traffic shall be incorporated in the final design. Where a minimum 8' buffer is not possible, a vertical barrier such as a wood railing shall be included between the two adjacent paths (See Figures 2 and 3).

5.2.3 Air Quality Impacts

Air quality in the study area would not be substantially affected by project construction because of the temporary nature of bikeway construction and the confined right-of-way.

An air quality analysis has not been performed as part of this Alternatives evaluation report nor is it deemed to be needed.

5.2.4 Noise Impacts

Construction activities would result in a moderate but temporary noise impact to receptors at various locations adjacent to proposed construction. Noise levels would vary depending on the type and number of pieces of equipment active at any one time. Noise impacts during construction can be mitigated by limiting the construction time periods.

5.2.5 Impacts to Outstanding Resource Water

Massachusetts Department of Environmental Protection (DEP) has designated certain waters for protection based on their outstanding socio-economic, recreational, ecological and/or aesthetic values.

Based on the MassGIS database, there are no Outstanding Resource Waters within the project area.

5.2.6 Impacts to Wetlands

Potential impacts to wetlands fall under the jurisdiction of the DEP. The wetlands boundary information used in the Alternatives Analysis was derived from aerial infrared photography and field checked by the DEP's Wetlands Conservancy Program (WCP).

While every effort will be made to minimize the impact of wetland areas in final design, based on the MassGIS data, there are several locations in the study area in which the preferred alignment appears to approach the edges of wetland areas including the 100' wetlands buffer zone.

- **Direct Impact to Freshwater Wetlands:** The proposed alignment would have no direct impact within wetlands.
- **100' Buffer Area Impacts:** The proposed alignment would impact approximately **2,827 SF** within the 100' wetland buffer area.
- **200' Riverbank Impacts:** The proposed alignment would have no direct impact within a 200' Riverbank area.

5.2.7 100 Year Floodplain Impacts

The most current National Flood Insurance Program (NFIP) data was used to determine the potential flood hazard for the area of study. The primary risk classifications used are the 1-percent-annual-chance flood event, the 0.2-percent-annual-chance flood event, and areas of minimal flood risk.

Based on the MassGIS database, the study area is not within the 100-year floodplain.

5.2.8 Certified Vernal Pools

The Natural Heritage and Endangered Species Program (NHESP) certifies vernal pools according to the Guidelines for the Certification of Vernal Pool Habitat (MA Division of Fisheries and Wildlife, 2009). Certified vernal pools are protected under the state Water Quality Certification regulations, the state Title 5 regulations, and the Forest Cutting Practices Act regulations, as well as those certified vernal pools that fall under the jurisdiction of the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00).

Based on the MassGIS database, the proposed alignments do not impact certified vernal pools.

5.2.9 NHESP Priority and Estimated Habitat

The NHESP maintains a database of the habitats of State-listed rare species in Massachusetts based on observations documented in the last 25 years. Areas delineated as Priority Habitats include wetlands, uplands and marine habitats. The Estimated Habitats of Rare Species are based on occurrences of rare wetland wildlife observed within the last 25 years and entered into the NHESP database.

Based on the MassGIS database, there are no NHESP Priority and Estimated Habitats within the project limits.

5.2.10 Areas of Critical Environmental Concern

The Secretary of Energy and Environmental Affairs (EEA) has designated places in Massachusetts that receive special recognition because of the quality and significance of their natural and cultural resources. These areas, identified as Areas of Critical Environmental Concern (ACEC), require a stricter environmental review of certain kinds of proposed development administered by the Department of Conservation and Recreation (DCR) on behalf of the EEA.

Based on the MassGIS database, there are no ACEC's identified within the project limits.

5.2.11 National Register Historic Properties and Districts

The historic resources considered in this analysis are those included in the Massachusetts Cultural Resource Information System (MACRIS) maintained by the Massachusetts Historical Commission (MHC). These resources include buildings, burial grounds, structures and objects as well as areas and districts recognized by the National Register of Historic Places and local historic and preservationist agencies.

Based on the MassGIS database, there are no National Register impacts anticipated within our project limits.

5.2.12 MassDEP Approved Wellhead Protection Area (Zone II)

Wellhead protection areas are important for protecting the recharge area around public water supply (PWS) groundwater sources. A Zone II is a wellhead protection area that has been determined by hydro-geologic modeling and approved by the DEP's Drinking Water Program (DWP). A Zone II classification is that area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at approved yield, with no recharge from precipitation).

Based on the MassGIS database, the proposed alignment will impact approximately **56,718 SF (1.3 Ac)** of Approved Wellhead Protection Areas.

All proposed construction, operations, and maintenance activities will be coordinated with MassDEP to minimize impact within the Approved Wellhead Protection Areas (see Figure 1).

5.2.13 Hazardous Materials Sites

The DEP's Bureau of Waste Site Cleanup (BWSC) maintains a database of all reported releases of oil or hazardous material into the environment. The dataset reviewed in this Alternatives Analysis includes confirmed Hazardous Material Sites with Activity and Use Limitation (AUL). The AUL is a legal document that identifies activities and uses of the property that may or may not occur and the owner's obligation and maintenance conditions that must be followed to ensure the safe use of the property.

Based on the MassGIS database, there are no known hazardous materials sites located within our project limits.

5.2.14 Construction Impacts

Construction of the project will be performed primarily along existing footpath alignments in open space on Town-owned and private parcels currently under development. Impacts will be limited to the disturbance to natural habitats and existing recreational resources.

Existing footpaths are considered an established intrusion in the natural environment. Anticipated impact in the construction phase was calculated on the entire alignment including existing footpath segments and would be approximately $4,750' \times 30' = 142,500 \text{ SF (3.3 Ac.)}$.

5.2.15 Visual Impacts

The preferred alignment will have moderate visual impacts. Every effort will be made in the design phase to provide attractive amenities to the trail. To minimize the impact to private property owners, considerations have been made to keep the proposed alignment a minimum of 50' from adjacent residential parcels. Where this is insufficient, a vegetated screening may be provided in areas where the trail approaches existing residential lots adjacent to the trail.

5.2.16 Public Utilities

Known existing utilities within the project area include overhead electric transmission lines and underground gas transmission lines. It is in the interest of the UCT to minimize impacts from their proposed facility on existing utilities in order to reduce overall cost of their project and delays in design and construction. While the proposed SUP alignment was located to avoid overlap with these facilities, impacts, particularly in the area approaching the crossing of East Main Street may be unavoidable.

The proposed alignment has been coordinated with an Enbridge Representative on February 21, 2019 (Algonquin Gas) to ensure that any potential impact to the gas pipeline facility will follow the restrictions outlined in the company's published guidelines for developers (see attached). While assurances were given that the construction of an equestrian trail and SUP in the areas shown on the plan would likely meet the approval of Enbridge, a formal agreement with Enbridge prior to final design would not be possible.

Involvement with Enbridge in both the planning and design phases is recommended to determine feasibility, cost and safety in construction.

5.2.17 Public Facilities

The proposed alternative will improve bicycle and pedestrian connectivity within and beyond the project area to residential, retail and public facilities.

Overall, the Upper Charles Trail Phase 8 will provide continuity to the proposed shared use path between future Phase 10 and future Phase 9 segments of the Upper Charles Trail in Hopkinton. When complete the Upper Charles Trail in Hopkinton will connect the existing Upper Charles Trail in Milford with the future Upper Charles Trail in Ashland.

Locally, the Phase 8 alignment is consistent the bicycle and pedestrian connectivity requirements of the Legacy Farms Master Plan Special Provision (MPSP) trail network.

5.2.18 Environmental Justice

According to the MassGIS database, the project is not located within an area identified as an Environmental Justice Zone.

5.2.19 Construction/Design Cost

Preliminary construction estimates have been calculated based on four typical cross sections developed for an SUP alignment along an undeveloped right-of-way. Items include site clearing, excavation for and placement of new pavement structure, gravel equestrian path boardwalk structure, loam and seed, and signing and striping.

Anticipated cost for each item was researched using the most current available (6/2018-6/2019) MassDOT Weighted Bid Prices, which are based on actual competitive bid pricing on MassDOT construction contracts. Contingencies for Mobilization (3%), Construction (40%), and additional MassDOT Construction (25%) are based on empirical data and are included in the overall preliminary construction estimates.

The preliminary construction cost estimate for the proposed alignment is: _____.

For survey and mapping, soil borings, geotechnical design, path design, permitting, and construction bidding services, 15% - 20% of the construction cost should be budgeted.

5.2.20 Maintenance & Operations

Maintenance

Basic maintenance activities include keeping the trail surface free of debris, identifying and correcting surface hazards, keeping signs and pavement markings in good condition, identifying restricted areas within the Approved Wellhead Protection Areas, and cutting back encroaching vegetation to maintain adequate sight distances on the bikeway and at road crossings. Having a written operations and maintenance plan and an emergency response plan will also enable town officials to determine manpower and budgets needed to implement these plans.

We recommend coordination with the Town Public Safety Officers, School Department and the Department of Public Works regarding access and maintenance so that their recommendations can be incorporated into the project design.

Operations

The project vision for this portion of the Bikeway is a continuous facility for non-motorized travel with portions suitable for use by both bicyclists and pedestrians. The alternatives presented comply with accepted industry standards and criteria for an SUP and encourages users to comply with uniform traffic operations and laws. Thus, the signs, pavement markings and other amenities are designed to convey that message through the use of common standards of color, shape and graphics as used on typical roadway signs without "over-signing" the natural landscape.

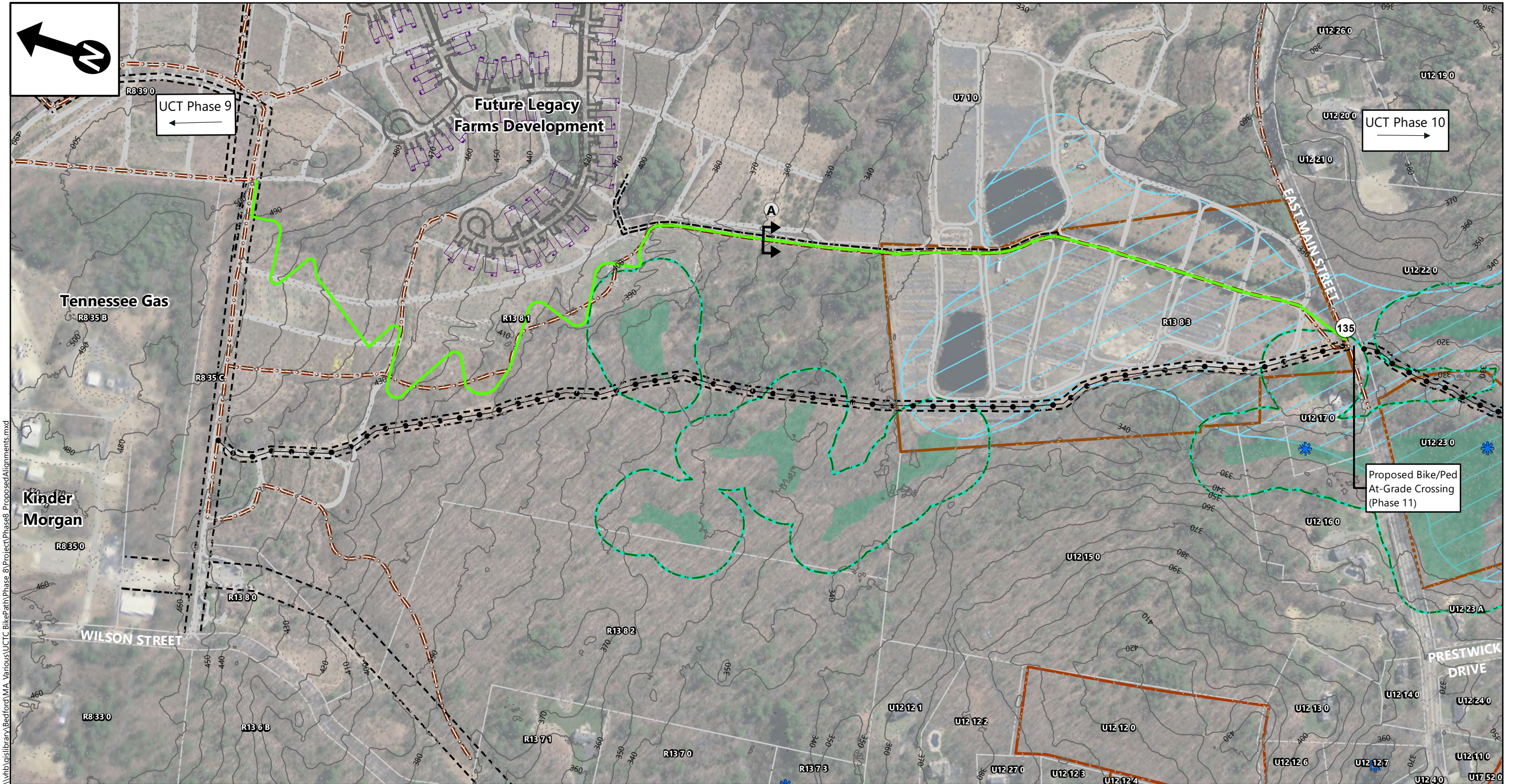
It is recommended that for the off-road SUP sections, "trail use rules" be posted at trail access points, as appropriate. Additionally, it is recommended that the Town review their existing by-laws as they relate to trails and shared-use facilities to verify if changes or additions are needed.

6.1 Conclusion

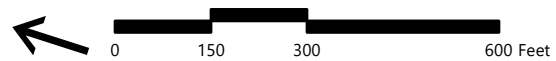
The proposed alignment of the UCT Phase 8 was developed from coordinating the interests of the Town of Hopkinton, the UCTC and the Legacy Farms Developer. Considerations were made to minimize the impacts to wetlands, existing utilities and adjacent properties.

The proposed trail adheres to minimum federal standards and design criteria (ADAAG, FHWA) in order to maximize options for future funding for design and construction.

While the specific alignment arrived at through the design process may deviate from that proposed in this feasibility study, the proposed alignment described herein has been reviewed and approved by stakeholders identified by the UCT for the purposes of this feasibility study. Further public review and approval will be required in the design phase in order to vet completion of this project to the greatest extent possible.



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- | | | | |
|--------------------------------------|-----------------------|--|--------------------------|
| Proposed UCT Bike/Ped and Equestrian | MPSP Trail | NHESP Potential Vernal Pools | Conservation/Public Land |
| Cross Section | Utility Easement | MassDEP Wetland | Parcel Boundaries |
| Gas Pipeline | 100-ft Wetland Buffer | MassDEP Approved Wellhead Protection Areas (Zone II) | Town Boundary |
| Gravel | 2 ft Contours | | 10 ft Index Contours |
| Pavemet | | | |
| Building | | | |

Proposed Alignment

- Resources Not Present Within The Project Vicinity:
- | | |
|---|-------------------------------|
| 1. Chapter 21E Sites | 5. MHC Historic District |
| 2. Certified Vernal Pool | 6. NHESP Priority Habitat |
| 3. 100- Year Floodplain | 7. Outstanding Resource Water |
| 4. Areas of Critical Environmental Concern (ACEC) | 8. RFA |

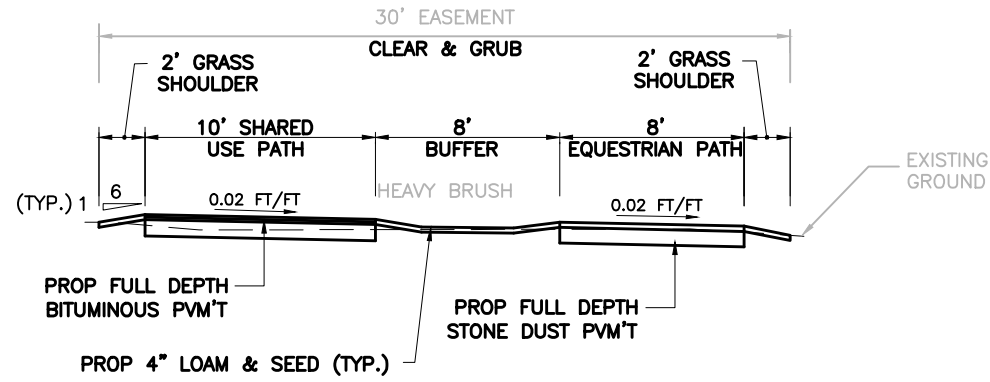
Hopkinton & Ashland, MA

Upper Charles Trail Phase 8

Source Info: MassGIS, VHB

Table 1: UCT Phase 8 Impact Summary

#	Impact Criteria	Impact from Proposed Facility
1.	Relocation Impacts and ROW Acquisition	TBD. May require an easement through the Legacy Farms property. MOU pending.
2.	Considerations Relating to Pedestrians and Bicyclists	Facility will provide an ADA accessible path with spur connections to residential, commercial, and public resources. Equestrian access is provided as well. Separation between bicycles/pedestrians and equestrian users shall meet minimal federal standards.
3.	Air Quality Impacts	Temporary minor impacts during construction
4.	Noise Impacts	Temporary minor impacts during construction
5.	Outstanding Resource Water (ORW) Impacts	0 SF impact to Outstanding Resource Waters
6.	Wetlands	2,827 SF impact to 100' Buffer Area 0 SF impact to 200' Riverbank Wetlands
7.	Floodplain Impacts	Project limits are not in floodplain.
8.	Certified Vernal Pools	There are no certified vernal pools within the project limits.
9.	Threatened or Endangered Species (NHESP)	There are no Priority Habitats within the project limits.
10.	Areas of Critical Environmental Concern (ACEC)	There are no ACEC's within the project limits.
11.	National Register Districts	There are no National Register Districts within the project limits.
12.	MassDEP Approved Wellhead Protection Area (Zone II)	56,718 SF (1.3 Ac.) impact to MassDEP Approved Wellhead Protection Areas.
13.	Hazardous Waste Sites	There are no Hazardous Materials Sites within our project limits.
14.	Construction Impacts	Area impacted = 4,750' X 30' = 142,500 SF (3.3 Ac.)
15.	Visual Impacts	Plan minimizes visual impact from adjacent residential properties.
16.	Public Utilities	Impact to existing utilities is not anticipated.
17.	Public Facilities Connections	Phase 8 improves connections to/from Legacy Farms to UCT corridor including local employment, schools, and recreational facilities.
18.	Environmental Justice	There are no Environmental Justice areas within our project limits.
19.	Construction/Design Cost	TBD
20.	Operations and Maintenance	Recommend a written operations and maintenance plan and an emergency response plan.



SHARED USE PATH WITH EQUESTRIAN FACILITY
FACING NORTH

PAVEMENT NOTES:

PROPOSED FULL-DEPTH BITUMINOUS PAVEMENT

SURFACE: 1-3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5)
OVER
2-1/4" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0)
OVER
SUBBASE: 8" GRAVEL BORROW, TYPE b

PROPOSED FULL-DEPTH STONE DUST PAVEMENT

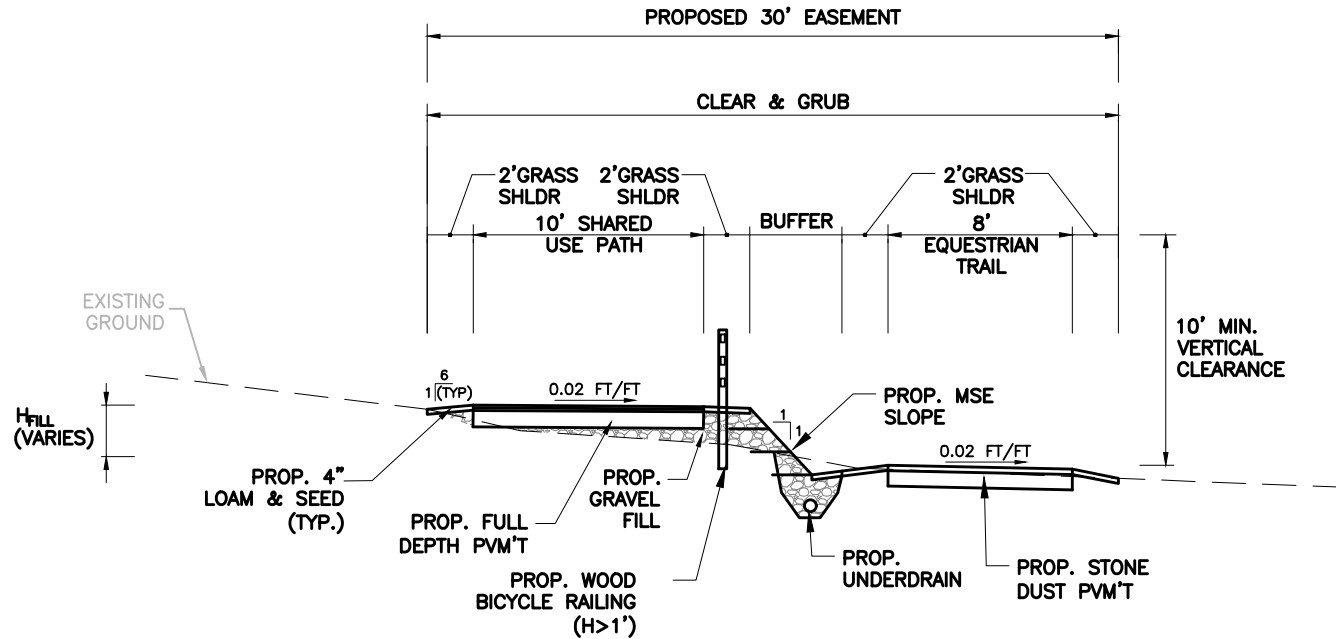
SURFACE: 4" CRUSHED BLUESTONE "STONE DUST" 95% COMPACTED
OVER
SUBBASE: 8" GRAVEL BORROW, TYPE B



Typical Section
Phase 8
Upper Charles River Trail
Hopkinton, MA

Figure 2

9/10/2018



SHARED USE PATH WITH EQUESTRIAN SIDE PATH
 30 FT. EASEMENT
 10% MAX CROSS SLOPE
 LOOKING WEST

PAVEMENT NOTES:

PROPOSED FULL-DEPTH BITUMINOUS PAVEMENT

SURFACE: 1-3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5)

OVER

2-1/4" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0)

OVER

SUBBASE: 8" GRAVEL BORROW, TYPE B

PROPOSED FULL-DEPTH STONE DUST PAVEMENT

SURFACE: 4" CRUSHED BLUESTONE "STONE DUST" 95% COMPACTED

OVER

SUBBASE: 8" GRAVEL BORROW, TYPE B



Typical Section
 Phase 8
 Upper Charles River Trail
 Hopkinton, MA

Figure 3

9/10/2018



Developer Guidebook

This guide is designed to help developers, local planning commissions and public officials coordinate and work with Spectra Energy to ensure safe development near our pipelines and facilities.

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Welcome

Spectra Energy is committed to the safe, reliable operations of our more than 19,000 miles of interstate natural gas transmission pipelines in North America.

Some of our pipeline facilities are located right here...on your land...in your community. That's why it's important for us to work with you.

Whether you are a landowner with a pipeline on your property, or a developer, planner or contractor interested in excavating, building or developing near our pipelines, you need to understand the guidelines that must be followed when you're around our facilities. We want to provide you with information about how you may use your land.

We share with you the responsibility for keeping our neighbors, co-workers and communities safe. And, we take this responsibility very seriously.

To help ensure the safety of our pipeline and that we continue to meet all safety regulations and standards, Spectra Energy must review and approve every proposal impacting land immediately above and around our

pipelines, defined as rights-of-way or easements, as well as land near our pipelines.

Whether you're planting a garden or building a subdivision, you need to let us know about your plans and get our written authorization before moving forward.

Working together, your project will get done the right way – efficiently, cost effectively and safely.

That starts with you contacting us, as early as possible, so we may share information about our facilities and your project.

This guidebook outlines our review and approval process as well as the requirements applicable to many of the activities that take place near our pipelines. The information, while not all-inclusive, is designed to help you begin your planning. The Spectra Energy representative identified in the *Your Spectra Energy Contact* section of this guide will provide you with more detailed information that is specific to your project.

What you need to know:

- Exact location of our pipelines
- Guidelines about activities around our pipelines
- **"811 - Call Before You Dig"** – always contact your local One Call Dig Safe Center before beginning any excavation

What we need to know:

- Scope of your project
- Exact location where you plan to develop, construct or excavate
- Your project schedule

About Spectra Energy

Spectra Energy operates about 19,300 miles of high-pressure natural gas transmission pipelines in North America. Our long-haul pipelines cross North America (much like interstate highways) transporting natural gas from supply basins to industrial facilities, power plants and local distribution companies. Local distribution companies then deliver the natural gas to homes and businesses.

We also own and operate more than 300 billion cubic feet of natural gas storage as well as natural gas gathering and processing, natural gas liquids operations and local distribution assets.

Our Pipeline Systems and Storage Facilities

Our extensive infrastructure network in the United States is comprised of several interconnected interstate pipeline transmission systems that extend from Texas to Maine. In your area, our pipeline or storage facility may be referred to by its system name:

- Algonquin Gas Transmission
- Big Sandy Pipeline
- Bobcat Gas Storage
- Dauphin Island Gathering Partners (owned by DCP)
- East Tennessee Natural Gas
- Egan Hub Storage
- Maritimes & Northeast Pipeline
- Moss Bluff Hub
- Ozark Gas Gathering
- Ozark Gas Transmission
- Saltville Gas Storage
- Steckman Ridge
- Texas Eastern Transmission

For more information about Spectra Energy or our businesses, visit us at www.spectraenergy.com.

Your Spectra Energy Contact

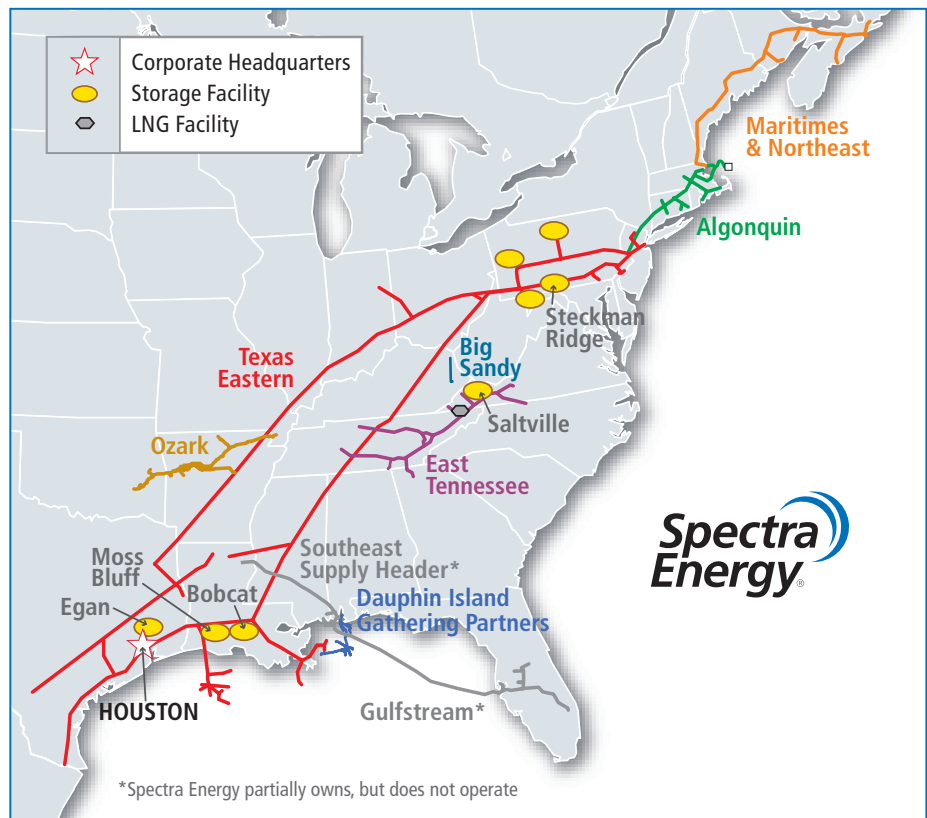
The Spectra Energy representative listed in this section will be your point of contact with Spectra Energy. These representatives are familiar with the requirements we have developed to keep our pipelines safe. They will review and evaluate your plans with appropriate company personnel, and, if the plans are acceptable, issue an approval letter or agreement specific to your planned activity. If the plans are not accepted, we will work with you so you can make appropriate changes.

Spectra Energy Representative

Contact Name:

Office Address:

Phone Number:



Pipeline Safety

At Spectra Energy, our job is to keep our pipelines operating safely and reliably – 24 hours a day, seven days a week. We do this through a rigorous, ongoing program of monitoring, inspection and maintenance that enables us to effectively sustain the structural integrity of our pipelines.

Serious pipeline incidents, such as leaks or ruptures, are rare on transmission pipelines. But, when they occur, they can cause significant harm to persons or property.

That's why we must be informed of any and all activities along our easements.

Many of the requirements that you must follow are based upon the federal regulations governing pipeline safety. Because our pipelines are a transportation system for natural gas, we are under the jurisdiction of the U.S. Department of Transportation (U.S. DOT).

Within U.S. DOT, the Pipeline and Hazardous Materials Safety Administration's (PHMSA) oversees our operations.

We work closely with PHMSA as well as other federal and state agencies to ensure our facilities meet or exceed regulatory requirements for pipeline safety.

Spectra Energy and the Pipelines and Informed Planning Alliance (PIPA)

Spectra Energy supports the Pipelines and Informed Planning Alliance (PIPA). PIPA, sponsored by PHMSA, is a coalition of about 130 stakeholders working together to further enhance the safety of communities that are home to existing high-pressure transmission pipelines.

PIPA's November 2010 Report outlines recommendations to guide stakeholders in understanding risks and making informed decisions when planning for land use and development near large-diameter transmission pipelines.

More information about PIPA may be found on the next page or online at www.PipelineInformedPlanning.com.

What You Can Do

As our neighbor, you can help us monitor our pipelines by contacting our local Area Office or Gas Control Center if you notice:

- Suspicious activity along our right-of-way or at any of our valve stations
- Construction activity that is not approved
- Exposed pipeline

Appendix A provides information that will be helpful to you in identifying and responding to potential natural gas pipeline incidents. You may wish to post this information in a convenient place.

More Information about PIPA

The Pipelines and Informed Planning Alliance (PIPA) is a stakeholder initiative led and supported by the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA). PIPA's goal is to improve safety for the communities that surround high-pressure transmission pipelines.

PIPA works toward this goal by promoting effective communication among stakeholders, raising awareness of pipelines, and sharing recommended practices to reduce pipeline risks to the public.

Main Points

- PIPA's goal is to improve safety for the communities that surround high-pressure transmission pipelines.
- PIPA's recommended practices are intended to complement existing regulations or laws.
- PIPA helps communities make risk-informed decisions for land-use planning and development adjacent to pipelines.
- PIPA is led and supported by PHMSA.

Pipeline Rights-of-Way Easements

Rights-of-way easements are corridors around pipelines where development is restricted or prohibited. These easements enhance the safety of communities near pipelines by reducing construction-related damage, and ensuring operator access to pipelines to inspect, maintain or respond to any emergency.

However, pipeline companies and pipeline safety regulators have little authority over development and activity outside of, but adjacent to, pipeline easements. These land use responsibilities normally fall on local and state government through their planning, zoning and permitting authorities.

Consensus Recommended Land-Use Planning Practices

In 2007, approximately 130 stakeholder representatives began working together to develop recommendations for all stakeholders concerning

land-use practices near existing transmission pipeline infrastructure.

Their efforts led to consensus recommended practices intended to increase safety for people who live in communities near pipelines.

Risk-Informed Land-Use Decisions

PIPA encourages decision makers and stakeholders to work closely with pipeline operators during the land-use planning process. Operators can provide governments and developers the specific characteristics of each pipeline, allowing all those involved to make risk-informed decisions about the type and layout of developments and activities permitted near pipeline easements.

PIPA Recommendations Complement Existing Laws and Regulations

PIPA's recommended best practices are intended to complement – not override – existing regulations, laws, zoning restrictions, ordinances and other current requirements that address land use planning and development in areas near transmission pipelines.

Spectra Energy fully supports and actively participates in PIPA.

Everyone Benefits from Natural Gas Pipelines

- Almost 100 percent of natural gas is transported by pipelines.
- Pipelines transport fuel to the industries that make our products and create our jobs.
- The energy needs of more than 100 U.S. military installations are met through natural gas transmission pipelines.



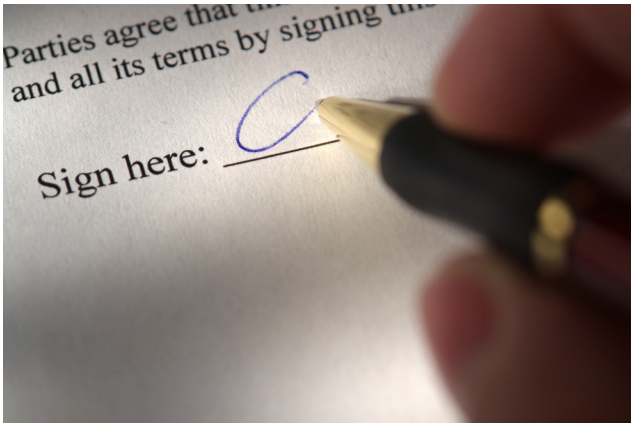
Easement Defined

A permanent easement agreement, called a Grant of Easement, is a legal document by which a property owner conveys to another party the use of a portion of his or her land for a specific purpose. In this guidebook, we also use the term “right-of-way” to refer to an easement.

Spectra Energy’s Grants of Easement give us certain rights to construct, operate and maintain pipeline facilities authorized by the Federal Energy Regulatory Commission, the federal agency responsible for approving the routing, construction and operation of interstate natural gas pipeline facilities. Our agreements allow the right of free and ready ingress and egress over and upon the easements.

The landowner retains actual ownership of the land covered by the grant of easement. If the property is sold, the rights and responsibilities under the easement stay with the property under the new owner.

The easement width is generally defined within the body of the agreement. However, if there is no width defined, then the easement is considered open or undefined. In such cases, we will consider, upon request, executing an agreement that would define the width. Each request is considered on a case-by-case basis.



Use of the Easement – Encroachment Defined

Under the terms of our easement agreement, the landowner may use the surface of their land so long as the activities do not interfere with the rights granted to Spectra Energy to maintain and operate our facilities. We must have clear, ready access to our pipelines.

An encroachment is any structure or activity that may interfere with our ability to use or access the right-of-way.

Examples of encroachments that interfere with our use of the easement and are not allowed within the easement include, but are not limited to: buildings, houses, garages, excess vegetation, mobile homes, trailers, sheds, trees, poles, decks, patios and swimming pools.

Activities with greater impact should be reviewed and meet certain criteria necessary to protect the pipeline. This list includes, but is not limited to: landscaping, building fences, grading, constructing roads or driveways, blasting, logging and mining.

In the *Encroachments* section, we describe many of the more common activities that take place on and around our easements and outline some, but not all, of the requirements for these activities. If an activity is not included in this guidebook, do not assume it is approved. Instead, check with your Spectra Energy Representative.

Our Review and Approval Process

Please know that we stand ready to work with you and will make reasonable efforts to accommodate your requests.

Our easement agreement allows us to safely maintain and operate our pipeline facilities and stipulates that you must get our written authorization prior to conducting certain activities within or near our easement. (*See the Encroachments section of this guide*)

Here are the steps to follow:

- ✔ Contact us early and include us in your planning
- ✔ Know the requirements specific to your project
- ✔ Send us your plans for review and approval
- ✔ Satisfy the conditions in our approval letter
- ✔ Respect our rights to maintain and operate our facilities
- ✔ Remember to always dial **811** prior to any excavation activity

The pages ahead guide you through these steps. Any time you need more information, call your Spectra Energy representative.

✔ Contact Us Early and Include Us in Your Planning

Your Spectra Energy representative will coordinate the review and approval process. They are trained and qualified to provide you with accurate information on the location of our facilities; explain the requirements for your project; and support you on-site as you build or excavate across or near our easement.

It is essential that you know the exact location as well as the width of our easements and depth of our pipelines. And, this information must be shown on your plans. (*See Design Drawing Requirements in Appendix B for more details.*) Your Spectra Energy representative will coordinate locating and staking our pipelines at selected points at no cost to you.

As you plan your project, you should be aware that our pipeline was designed according to the land's original use. If you want to change that surface use, you will be responsible for all the costs associated with the changes required.

✔ Know the Requirements Specific to Your Project

Landscaping and gardening...installing fences, sidewalks, driveways, roads or parking lots...building a home, garage or swimming pool...logging and farming...mining and blasting. These and other activities impact the safe operations of our pipelines when they occur within the pipeline right-of-way.

Some are allowed with conditions and restrictions; some unduly interfere with our pipelines and are not permitted at all. Regardless of the type of activity or development, it is an encroachment to our right-of-way and you must have written authorization.

The *Encroachments section* of this guidebook provides you with guidelines and requirements for many, but not all, encroachment activities. Your Spectra Energy representative will supplement this information with additional measures specific to your plans.

We Cannot Emphasize Enough:

- You must notify us of your plans and receive our written authorization before starting your project.
- We'll determine the exact location of our pipeline for you and be on-site when any work is done near or on our easement.
- You are required to contact **"811 - Call Before You Dig"** prior to beginning any type of excavation.

Please contact your Spectra Energy representative with any questions. Our offices are typically staffed from 7:30 a.m. to 4:00 p.m. during the work week.

If an emergency arises outside that timeframe, you should call our Gas Control Center at 1-800-231-7794.

✔ Send Us Your Plans for Review and Approval

No two projects are alike so we review each project on an individual basis. Your Spectra Energy representative will gather information from you, then consult with the appropriate departments in our company. The review will be based upon federal safety regulations, our engineering standards and the design of our pipeline.

You should allow two to four weeks for a complete review. The more concise and accurate the information you provide, the more efficient our review will be. *(The typical review process is illustrated below.)*

Based on your plans, we will determine what, if any, alterations will be required to our pipeline facilities or to your project. If applicable, we will furnish you with an estimate of costs and a drawing showing the necessary pipeline alterations. As we noted, the cost to excavate the pipeline and restore surface improvements will be your responsibility. And, of course, we must be on-site during this work.

Once your proposal is authorized, you will receive an approval letter and/or agreement outlining the conditions that must be met in order for your project to begin.

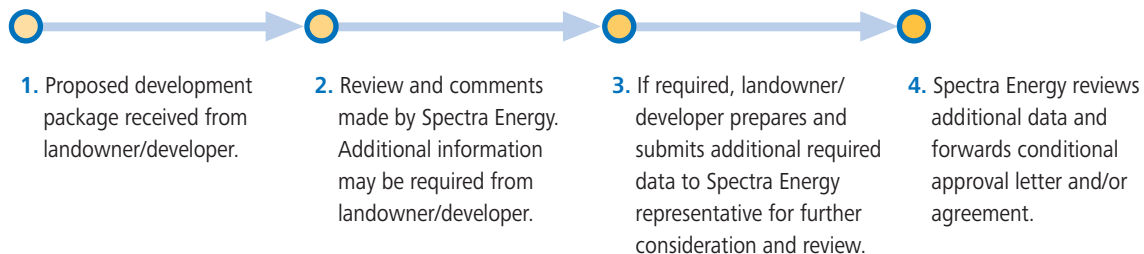
✔ Follow the Conditions in Our Approval Letter/Agreement

You, as the requesting party, and Spectra Energy must execute the approval letter/agreement prior to the start of any work. And, you are required to adhere to the conditions.

As part of the agreement, you will give us at least three (3) working days advance notice prior to the actual commencement of any work or excavation over or near our right-of-way so that we may locate our pipeline and be present during excavation or construction activities.

Three copies of the approval letter/agreement will be executed. We will retain two copies, and one will be given to the requesting party for his/her records.

Review Process



Data Required for Project Review

Your proposal package must include:

- A cover letter describing the proposed project with the name, address and telephone number of the owner/developer.
- Three (3) complete sets of drawings of the project with:
 - A scale plan of the location that depicts the elevation of the existing pipeline and, where changes in grade are expected, existing and proposed elevations of our easement.
 - A ground profile indicating where changes in grade will be made in the right-of-way by, for example, road crossings, excavation or fill.
- For property development, three sets of engineer's plats of the subdivision or project, along with profiles, based on actual pipeline elevation, of any streets that will cross the pipeline. Profile drawings will be provided upon request.

Your Spectra Energy representative will be able to provide you with Spectra Energy's Transmission Guideline TG10, "Requirements for Construction Near Company Pipelines," for any more specific requirements.

All agreements covering the permanent installation of encroachments will be recorded in the applicable public records office. Agreements for temporary encroachments will be recorded at the discretion of the company.

Important for You to Know: Our approval will become null and void in the event that a period of one (1) year from the initial approval date has elapsed with no substantial construction activity having taken place. This circumstance will require plans be resubmitted to us for review.

Respect Our Rights to Maintain and Operate Our Facilities

Operations on our entire pipeline system are monitored around the clock, and we continually maintain and inspect our pipeline easements. That's why we must have access to our right-of-way.

Here are parts of our maintenance and inspection program that may be visible to you:

Pipeline Markers

In following the federal regulations, we place markers and signs along our rights-of-way to inform the public of the presence of our pipelines. Markers and signs help reduce the possibility of damage to or interference with the pipeline.



Please note – Markers indicate the approximate, and not necessarily the exact, location of the pipeline within the easement; and the absence of a marker is no assurance that a pipeline is not present.

Markers and signs include the name of the Spectra Energy pipeline business unit and telephone number to call if any abnormal condition or suspicious activity is detected that would threaten the integrity of the pipeline.

Markers or signs should never be removed or relocated by anyone other than Spectra Energy personnel.

Pipeline Patrols

Pipeline patrols monitor our easements and facilities. Using airplanes, land vehicles and foot patrols, we regularly survey our rights-of-way to detect activities such as third party excavation, unauthorized construction, ground changes and potential leaks in the pipeline.

Company planes typically conduct aerial patrols of main pipeline rights-of-way on a regular basis and, in some places, as often as three times a week. We perform ground patrol in some highly populated areas and other areas of interest.

Right-of-Way Maintenance

We maintain our rights-of-way so the locations of our pipelines are clearly apparent to the public and to any other individuals who might consider excavation in the area. Also, mowing and clearing allow better visibility for our air and ground patrols to discover activity that could lead to pipeline damage.

Accidents can easily be prevented by knowing exactly where – and where not – to dig.

☑ **Remember to Always Dial 811 Prior to Any Excavation Activity**



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

Before digging around or near pipelines, you are required to contact **811** – your One Call or Dig Safe Center. This free service allows us and other underground facility operators a chance to mark the facilities in the area before excavation begins.

One Call notification programs are critical to reducing the risk of damage to underground pipeline facilities

and other utilities. Excavation can rupture our facilities, damage pipeline coating and, if left unchecked, cause corrosion.

When we receive notification from a One Call or Dig Safe Center that someone intends to dig near our pipeline facilities, we send personnel to mark the location of the facilities in the vicinity of the proposed digging or other earth disturbance activities and have company employees on-site when the excavation occurs.

Should you hit a buried facility, do not try to fix it; immediately leave the area, and call our local office or Gas Control Center. Telephone numbers are posted on nearby pipeline markers. If you believe gas may be escaping from the pipeline, please also call 911.

We support and participate in One Call or Dig Safe notification programs in all the states in which we operate pipeline facilities. We are also a sponsor of the Common Ground Alliance (CGA), a non-profit organization working to ensure public safety, environmental protection and the integrity of all underground facilities by promoting effective damage prevention best practices.

For more information on damage prevention and a list of state One Call or Dig Safe Center phone numbers, visit www.call811.com, sponsored by CGA.



Encroachments

As you plan your project, keep in mind that we must have open, clear visibility to monitor our pipeline corridors by air, on foot and from vehicles. And, we must have unobstructed ability to access our easement.

We've said it before and we'll say it again:

- You must provide us with your plans, receive our written approval and comply with the conditions in the approval letter/agreement. This is true for any activity that you plan to undertake near or on our rights-of-way, not just those listed here.
- We will be on-site during activities on or near our right-of-way.
- You are required to contact **811** prior to beginning any type of excavation.

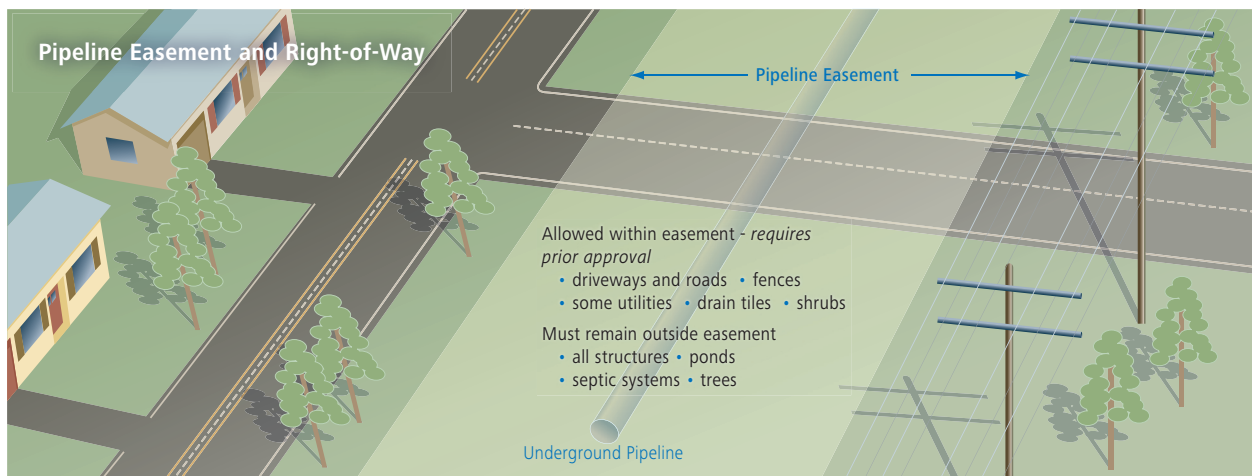
The following pages provide information about many, but not all, of the requirements that must be met in order for us to approve your project.

Agriculture

Since the pipeline typically has a minimum of three (3) to four (4) feet of soil cover following restoration, farming may resume over the pipeline.



- Shrubs and bushes may be planted on the right-of-way provided they do not exceed five (5) feet in height at maturity and are not within ten (10) feet of the pipeline.
- Plants and trees that grow more than five (5) feet in height cannot be permitted on the easement. Tall plantings inhibit access and hinder aerial surveillance of the right-of-way. (See *Landscaping for more information.*)



Blasting and Vibration Activities

Blasting can have profound impacts on our facilities. Please read this information carefully since requirements vary depending upon distances from our pipeline.



No blasting is permitted within our right-of-way, and no blasting shall occur outside our right-of-way if we determine that such blasting may be detrimental to our facilities.

No blasting will be allowed **within 150 feet** of our pipeline without having first received written approval from Spectra Energy.

We must be advised of any blasting proposed **within 200 feet**, or **500 feet** for large scale quarry-type blasting, of our facilities.

When blasting **within 300 feet** of our pipeline, the following will be required:

- All persons, companies or other parties associated with the blasting operations will comply with all federal, state and local regulations.
- All blasting operations will be conducted by experienced, trained and state licensed personnel each of whom shall be in good standing with these licensing entities. Documentation of licensed blasters will be provided to us prior to any blasting or as otherwise requested.
- The contractor's blasting plan will include, at a minimum, the following information:
 - Explosive type
 - Delay types and intervals
 - Delay pattern
 - Maximum shot hole depth and diameter
 - Hole spacing
 - Drilling pattern
 - Maximum charge per hole
 - Maximum charge per delay
 - Type of blasting mats and method of placement
- No more than one charge will be fired during each delay period.
- Blasting and excavation near our pipeline must comply with Spectra Energy's Transmission Guideline TG111

for such work. Your local Spectra Energy representative will be able to provide you with the document and form.

- The drilling pattern and initiation procedure must provide the greatest relief possible in a direction away from the pipeline and will minimize vibration and ground movement.
- Do not conduct blasting unless we are present.
- In the event the specified peak particle velocity is exceeded, the contractor will be liable to pay the full cost of inspecting our pipeline and any repairs and/or replacements that result from the damage caused by such actions.

Vibration

Activity that may induce vibration in the ground near the pipeline (large soil compaction equipment, driving piles, etc.) must be approved by a Spectra Energy representative. To obtain approval, you must submit a plan covering all such activities **within 300 feet** of the pipeline.

Burning

Please do not burn within the easement area. If you need to discuss this further, contact your Spectra Energy representative.

Deep Plowing

Deep plowing can cause severe pipeline damage. To review your plowing needs, contact your Spectra Energy representative who will meet with you on-site.

Depth of Cover

Our pipelines are installed with at least three (3) to four (4) feet of cover, though erosion may reduce this amount.

- No cover may be removed from the surface of the right-of-way since such removal increases the possibility of damage to the pipeline.
- The grade over the pipeline cannot be reduced or increased without our express written permission. Adding cover increases the load on the pipe and impacts our work area as well as the ability to maintain safe excavation in accordance with Occupational Safety and Health Administration (OSHA) standards.
- Small amounts of clean fill that is free of rocks, stumps and debris may be added following consultation and approval from us.

Drain Tiles

All drain tiles must:

- Cross the pipeline facilities and right-of-way as close to 90 degrees as possible.
- Maintain at least 18 inches of vertical separation between any crossing and the pipeline, preferably crossing below the pipeline.

Parallel drain tiles are not allowed within the easement area.

Erosion

All soil erosion must be stabilized immediately.

Fences

Fences generally may be placed on the pipeline easement provided they are approved and meet certain criteria required to protect the pipeline.



- Parallel fencing is not allowed within the easement.
- Fences may cross the pipeline right-of-way at or near right angles.
- Wire type, stockade, decorative and similar type fencing must be easily removable and replaceable.
- Fence posts must be located a minimum of five (5) feet away from the pipeline.
- All fences must include a minimum of a 10-foot gate or gates at the entrance and exit of the property.

- The gate(s) must have double locks to allow our maintenance crews access to and passage along the right-of-way.
- In the event the pipeline right-of-way cannot be easily accessed, we will not be responsible for any damage done to the fencing.

Heavy Equipment Crossing

Crossing the pipeline with heavy equipment can compromise our pipeline's safety. Depending on the equipment's size and type of tracks or wheels, the weight load on the surface may place extra stress on the pipeline.

- No heavy equipment is to be moved across the easement prior to notifying us and obtaining approval from **your Spectra Energy representative**.
- We will meet with you on-site to determine the best crossing location, taking into account soil stability and rock composition.
- Minimum cover and other requirements will be determined on an individual basis.
- Once a suitable crossing location is mutually determined, you may not cross elsewhere.

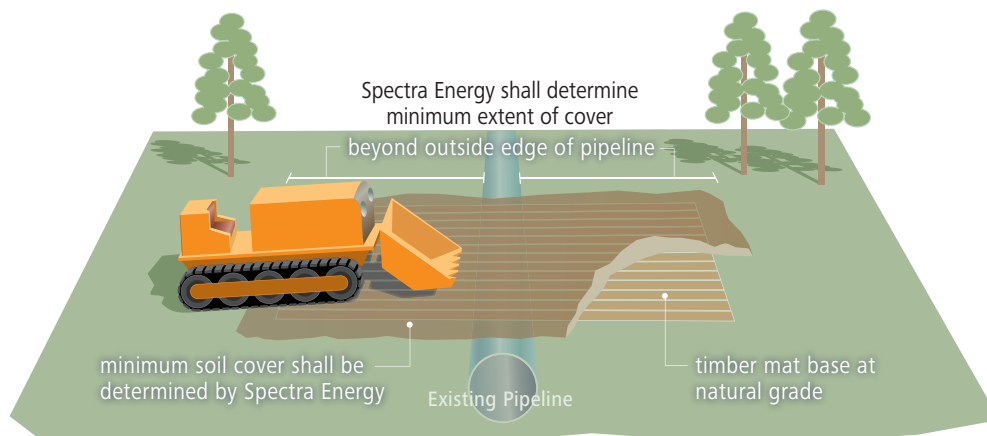
Landscaping

Landscaping within the easement is restricted. Under the terms of easement agreements with landowners, we reserve the right to cut and remove, from time to time, any trees and/or shrubs that interfere with the operations and maintenance of our facilities.

Trees

- Planting of trees is not permitted within the pipeline right-of-way. Trees inhibit access to the pipeline and easement and block the line of sight for our pilots. Also, there is the potential that root structures will

Heavy Equipment Crossing



damage the coating of the pipeline, leading to the possibility of corrosion and eventual weakening of the pipeline.

- We consider trees to be plants that grow to an excess of five (5) feet in height at maturity. This would include such species as fir, pine, arborvitae, hemlock, maple, rhododendron, birch, willow, fruit trees and others.

Shrubs and Bushes

- Planting of shrubs, bushes or other plants associated with landscaping may be placed on our right-of-way provided they do not exceed five (5) feet in height at maturity.
- Shrubs may not be planted within ten (10) feet of the pipeline. Shrubs include such species as English and dwarf yews, holly, heather, dwarf rhododendron, azalea, barberry and others.

Logging / Timber Harvesting

For logging activities, the approval letter/agreement will cover any applicable installations of earthen bridges, temporary erosion controls, restoration and final inspection of the site. In addition, you or your logging company may be required to post a bond that ensures the restoration of the easement area.

- You will identify your preferred crossing location(s). Then, we will meet on-site with your forester to review the site conditions and proposed activity.
- We must be contacted at least 72 hours prior to the approved activity and be present when the activity takes place.
- No skidding along or within the easement will be allowed.
- No staging areas or stockpile areas will be allowed within the confines of the easement.
- A perpendicular crossing will be permitted as long as adequate measures to protect the pipeline are documented and put in place. The actual pipeline crossing must be bridged with approved material.

We will determine the requirement for mats and/or a logging bridge constructed of wood, slash, gravel or other materials over the pipeline. The bridge must be maintained throughout the job.

- All soils on the easement must be stabilized and re-seeded to prevent erosion. Any potential for erosion and/or required temporary erosion control devices, within the easement area, will be addressed prior to the commencement of the logging activity.
- Should the work be suspended for more than four (4) weeks, all ruts on the easement area will be filled and graded and the area seeded with a temporary cover to prevent erosion.
- Upon completion of the logging activities all ruts will be leveled and filled.
- Any permanent erosion control devices, such as terraces, removed or destroyed during the logging activity will be restored.
- Temporary erosion control devices will be installed to ensure proper re-vegetation of the easement area.
- All disturbed areas within the easement will be seeded and mulched with a conservation blend or a seed approved by the Soil Conservation Agent or the State Forester.
- At least 72 hours prior to the completion and restoration of the easement area, we will meet with you on-site to determine if the area has been satisfactorily restored and the site stabilized.

Surface Mining

Surface mining activity is not allowed within the easement. Our approval for surface mining activity near our easement will be contingent upon the lateral support of the soil adjacent to the pipeline.

To initiate a mining operation, first confirm the arrangements made during a meeting with your contractor and us.

Information worth repeating –

- You must provide us with your plans, receive our written approval and comply with the conditions in the approval letter/agreement. This is true for any activity that you plan to undertake near or on our rights-of-way, not just those listed here.
- We will be on-site during activities on or near our right-of-way.
- You are required to contact **811** prior to beginning any type of excavation.

Be sure to advise your contractor of the following issues:

- If the top edge of the slope of the high wall is to remain **less than 30 feet in height**, then no excavation shall be allowed within 37-1/2 feet of our pipeline. The slope of the high wall shall be maintained parallel to the pipeline.
- If the top edge of the slope of the high wall is **greater than 30 feet**, then the top edge of the slope will be maintained 25 feet from the pipeline and the bottom edge of the slope will be maintained at a distance measured at one-half the measurement of the high wall plus 25 feet from the pipeline. In each case, the cut will move away from the pipeline beginning at these points. The stripping operation must be completed and overburden replaced on one side of the pipeline before stripping begins on the opposite side.
- There shall be no blasting operations conducted within a specified number of feet of our pipeline without a blasting plan submitted by the contractor and approved by us. You should refer to the *Blasting* section for more detailed information on blasting.

In places where the blasting operations will be conducted within the specified number of feet of our pipeline but not closer than a specified distance, such blasting will be conducted in accordance with the appropriate state laws and rules **and** under a Blasting Plan that has been submitted by the contractor to Spectra Energy and approved by a Spectra Energy representative. *The Blasting Plan shall include the maximum charge which will be fired during a single delay period. Spectra Energy's representative shall have full access required to verify that the approved Blasting Plan is being followed.*

- In the event the terms of the blasting agreement are exceeded, you or your contractor will be liable to pay

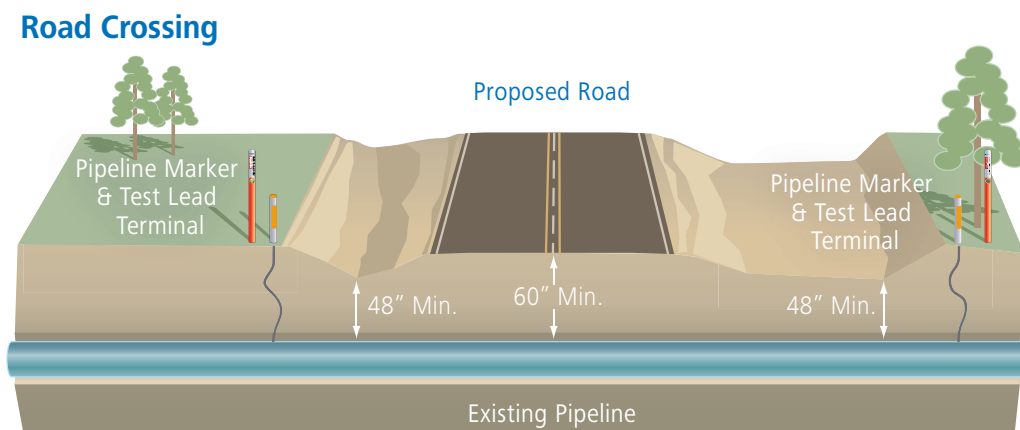
the full cost of inspecting our pipeline and any repairs and/or replacements that result from the damage caused by such actions.

- There shall be no augering from the area being left to support and protect the pipeline and easement area.
- We are aware that you need to cross our right-of-way for water drainage and vehicle haul roads. These crossings will be designed, constructed and placed as directed by us. There shall be no overburden placed within our right-of-way except for haul roads as directed above. You or your contractor will remove these haul road crossings when they are no longer necessary and the grade has returned to elevation and right-of-way conditions.

Roads, Streets, Driveways, Railroads and Parking Lots

Roads, streets, driveways, railroads and parking lots generally are permitted to be placed across the pipeline easement provided that certain criteria, necessary to protect the pipeline, are met. These requirements will be spelled out in our approval letter/agreement.

- Plans or drawings for road crossings and driveways within our right-of-way must be submitted at least 30 days prior to the commencement of work.
- Plans for roads and driveways must include a cross section showing the existing and proposed grades based upon our existing pipeline.
- Test holes will be required at all proposed road and driveway crossings to determine grades. Notify 811 and your Spectra Energy representative prior to any test hole excavation. These holes may be installed only when we are on-site and will be completed at your expense.



- Roads, streets and driveway crossings should be as perpendicular as practicable to the right-of-way.
- Roads, streets and railroads may not be placed along and within our right-of-way.
- Paving may be permitted over our right-of-way under certain conditions. However, it must be kept to a minimum. Each blacktop proposal is evaluated on its own merits. You will be required to pay for the installation of additional test leads and/or soil test holes along the paved area, as applicable, to allow us to monitor the integrity of our cathodic protection program and to check for leakage.
- Protective measures must be approved and installed prior to heavy equipment and trucks crossing or operating on the right-of-way. Road-legal vehicles may cross the right-of-way on existing public roadways without prior approval.
- As discussed in *Depth of Cover*, the grade over the pipeline cannot be reduced or increased without our permission.

In some instances, we may be required by federal regulations and company standards to alter or adjust our pipeline facilities to accommodate crossings, new loads from cars and trucks, or any allowable change of grade or excavation. You and/or the developer will be responsible for the expense of the required alteration or adjustment.

Structures

No structures shall be constructed on the right-of-way. Structures interfere with our ability to maintain the pipeline or reach it promptly.

These structures include – but are not limited to:

- Above Ground Utility Connections
- Buildings
- Decks
- Driveway Columns
- Fire Hydrants
- Garages
- Headwalls
- Houses
- Light Poles
- Mobile Homes
- Patios
- Poles
- Retaining Walls
- Septic Systems
- Sheds
- Spillways
- Swimming Pools (Above and Below Ground)
- Trailers
- Wing Walls

To ensure that no structures are placed in our right-of-way, we will determine the specific easement width as it crosses your property. Contact your Spectra Energy representative to set up a time for us to mark the right-of-way boundaries for you.

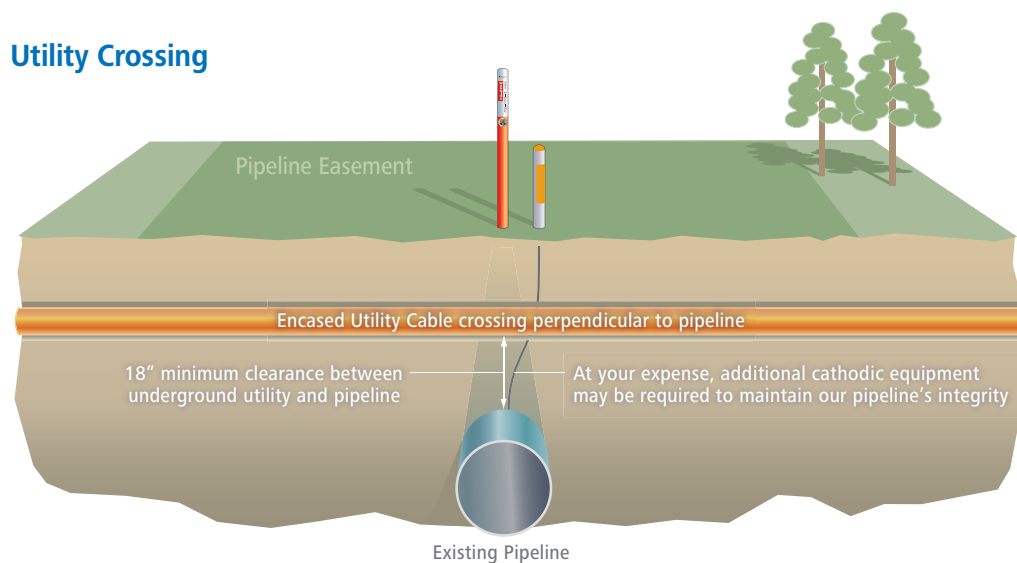
Utilities

Foreign Lines and Underground Utilities

Foreign lines may not interfere with the safe operations of our pipeline. Foreign lines include underground utilities such as sewers, drain lines, water pipes, gas pipes or underground electric or telephone cables. See *pages 15 and 16* for additional information.

Any crossing of our right-of-way is to be approved only after a written agreement containing a "Hold Harmless" Clause in favor of Spectra Energy has been signed by both parties.

- Foreign lines may not be placed parallel to our pipeline within our easement.



- Foreign lines may cross the right-of-way provided they are designed to clear the pipeline by a minimum of 12 inches, preferably below the pipeline. Additional separation may be required in marshy areas or other areas where the 12-inch clearance would have a potential to cause future problems.
- If these crossing requirements present undue difficulties, foreign lines may be installed above the pipeline with our prior approval. These lines also must be installed with no less than 12 inches of clearance. We will not be responsible for any damage or required repairs caused by our operations and maintenance activities when foreign lines are installed above our pipeline.
- On lines placed above or below our pipeline, we may require protective measures such as a concrete encasement, ditch marking tape and/or above ground markers.
- Suitable backfill shall be placed between the foreign line and our pipeline.
- The installation of test leads, two No. 12 THW black insulated solid copper wires, attached at the point of crossing for corrosion control monitoring may be required for metallic foreign lines. Test wires shall be routed underground and terminated at a point that we specify. In special cases, such as areas subject to ground movement, additional requirements may apply.

Power and Communications Lines

Specific requirements for power and communications lines must be followed. Power lines are defined as conductors for transmitting a supply of energy either direct current (DC) or alternating current (AC) at any voltage, supplying power of **more than 150 watts**.

Communication lines are defined as conductors for telephone, telegraph, signal, control, telemeter and television antenna systems. These circuits may be private or public and operate **at a voltage not exceeding 400 volts to ground or 750 volts between any two points of the circuit**. The transmitted power on these lines **does not exceed 150 watts**.

- Buried power or communication lines shall cross our pipeline at right angles and should be located so they subject the pipeline to the least practicable disturbance.
- All buried conductors, whether in conduit or direct burial cable, are to be installed in accordance with requirements of the latest editions of the National Electric Safety Code (National Bureau of Standards Handbook 81) and the National Electrical Code (NFPA

No. 70: ANSI C1). We consider the specified codes to be the minimum requirements.

- Direct burial cable for communication lines or power lines that do not exceed 600 volts should be laid with at least 18 inches separation between the cable and the pipeline.
- Power lines exceeding 600 volts shall be placed at least 18 inches from the pipeline and are to be protected by rigid steel conduit or non-metallic conduit covered with a minimum of three (3) inches of concrete with covering that is colored red. Conduits and concrete shall extend a minimum of ten (10) feet on each side of the pipeline crossing.
- We will be present during installation of the conductor and any associated conduit.
- Where practical, all buried cable crossings shall be permanently marked with signs showing the location of the cable and/or conduit.

Specific to Fiber Optic Cables

- High capacity fiber optic cable shall be installed in a rigid non-metallic conduit or covered in six (6) inches to eight (8) inches of concrete which has been colored with an orange dye extending across the entire right-of-way.
- The fiber optic cable shall be installed a minimum of 12 inches below the pipeline across the entire width of our right-of-way, unless an alternative crossing design is approved by us.
- Orange warning tape shall be buried a minimum of 18 inches directly above the fiber optic cable across the entire width of our right-of-way, where practical.
- The fiber optic cable crossing shall be clearly and permanently marked with identification signs on both sides of our right-of-way.

Specific to Electrical Cables

The following information must be furnished to us:

- Number, spacing and voltage of cables
- Line loading and phase relationship of cables
- Grounding system
- Position of cables and load facilities relative to our pipeline

We will determine the crossing design for electrical lines carrying voltages **more than 7,600 volts** on an individual basis.

Similarly, specific installation requirements for cables carrying **less than 600 volts** will be determined on a case-by-case basis.

The following installation requirements will apply to electrical cables carrying **more than 600 volts but less than 7,600 volts**:

- The electrical cable shall be installed in a rigid non-metallic conduit covered in a minimum thickness of two (2) inches of concrete that is colored with a red dye and extends across our entire right-of-way.
- The electrical cable shall be installed a minimum of 12 inches below the pipeline across the entire width of our right-of-way, unless approved by us.
- Each phase conductor shall be surrounded with a spirally wound, concentric neutral conductor. The neutral may be within the outer cable jacket.
- Red warning tape shall be buried a minimum of 18 inches directly above the electric cable across the entire width of our right-of-way, where practical.

- The electric cable crossing shall be clearly and permanently marked with identification signs on both sides of our right-of-way.

Overhead Lines

Overhead power line and telephone line installations must be reviewed on an individual basis.

- At a minimum, overhead lines are required to be installed with a clearance of at least 25 feet above the grade of our right-of-way.
- Pole or guy installation is not permitted on our right-of-way.

Water Impoundments

Water impoundments are not allowed within our easement.

Doing Your Part

As you've learned, safety is critically important to us – it's our top priority. But, we need your help to ensure the safety of our natural gas pipelines and, in turn, the communities in which we live and work.

To develop your project safely and efficiently, remember these five points:

- Always dial **811** prior to any excavation activity
- Present us with plans for review and approval
- Do not begin work until your plans are approved
- Meet the conditions and requirements in our approval letter/agreement
- Do not conduct any work on our easement until and unless we are on-site

And, please contact us if you see any suspicious activity or exposed pipe along our right-of-way.

Doing Our Part

Communication is key to moving your project forward safely. We will respond to your questions and provide you with clear, concise information. We will review your plans in a timely manner. And, we will provide you with the support you need to get your job done.

We look forward to working with you.



Appendix A

In Case of Emergency

Pipeline leaks are rare, but being able to recognize and respond to a potential leak or rupture is an important part of living and working safely around underground pipelines. Your personal safety should be your first concern should you encounter any of these signs or conditions.

Two important things to remember:

- Do not attempt to extinguish a natural gas fire
- Do not attempt to operate any pipeline valves or equipment

Signs of a natural gas pipeline RUPTURE:

- Loud roaring or explosive sound; OR
- Very large flames and loud roaring noise.

Follow these steps:

- If there are no flames present:
 - Immediately evacuate the area
 - Do not start or turn off motor vehicles or electrical equipment (such as cell phones, pagers, two-way radios, or lights) as this could cause the gas to ignite
 - Abandon any equipment being used in or near the area
 - Move far enough away from the noise until you can have a normal conversation
 - Discourage others from entering the area
 - From this safe location, call 911 or contact the local fire or law enforcement and
 - Notify the operator of the pipeline
- If flames are present:
 - Move behind a structure that provides protection until there is a reduction in noise
 - Plan a route away from the fire that offers shelter

- Driving away from the area is acceptable
- Move far enough away from the flames until you feel comfortable
- Discourage others from entering the area
- From this safe location, call 911 or contact the local fire or law enforcement and
- Notify the operator of the pipeline

Any one of these is a sign of a suspected natural gas pipeline LEAK:

- Whistling or hissing sound;
- Distinctive, strong odor, often compared to rotten eggs;
- Dense fog, mist or white cloud;
- Bubbling in water, ponds or creeks;
- Dust or dirt blowing up from the ground; or
- Discolored or dead vegetation above the pipeline right-of-way.

Follow these steps:

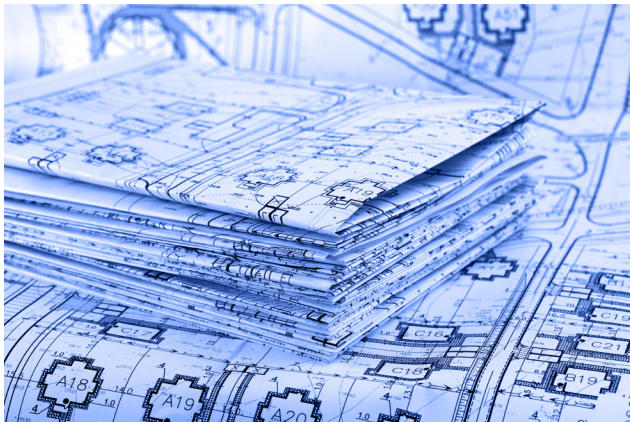
- Carefully evacuate the immediate area to where you can no longer hear, see or smell the gas
- Avoid introducing any sources of ignition in the area
- Do not start or turn off motor vehicles or electrical equipment (such as cell phones, pagers, two-way radios, or lights) as this could cause a spark
- Abandon any equipment being used in or near the area
- Avoid any open flames
- Discourage others from entering the area
- Call 911 or contact the local fire or law enforcement from a safe location
- Notify the operator of the pipeline

Appendix B

Design Drawing Requirements

The following statements, in quotations, must be boldly displayed on every sheet on which Spectra Energy facilities appear.

- “Any vehicular/equipment crossing of Spectra Energy facilities shall not be allowed without prior approval from the Area Manager. Temporary protection of the facility may be required.”
- “Horizontal location of Spectra Energy facilities determined by ground field survey location of a stakeout on _____.”
- “Vertical location of Spectra Energy facilities at vehicular/utility crossing(s) determined by ground field survey location of a stakeout on _____.”
- “No activity whatsoever may be performed on Spectra Energy right-of-way, or near Spectra Energy facilities, without a Spectra Energy inspector on the site. Spectra Energy inspectors may be arranged by contacting the Spectra Energy Representative listed on *page 1* of this guide at least 72 hours in advance of the work.”



Below is standard labeling for all drawings on which our company facilities appear:

- The pipeline(s) shall be labeled “EXISTING [insert system name]’s _____ INCH HIGH PRESSURE, NATURAL GAS PIPELINE” on all drawings. Proper pipeline diameter(s) to fill in the blank will be provided by us when we mark the pipelines.
- Right-of-way width must be clearly labeled on all drawings. If the company has multiple pipelines, pipeline centerline spacing dimensions also must be clearly labeled on all drawings.
- “Approval by Spectra Energy of the proposed design drawings does not relieve the landowner/ developer from further compliance with any and all Spectra Energy specifications, nor does it imply affirmation by Spectra Energy of the accuracy of submitted drawings. Spectra Energy reserves the right to set forth additional requirements if deemed necessary.”

How to Contact Us

If you need general information or have a *non-emergency question*, please call us toll-free at **1-888-293-7867**, email us at askspectra@spectraenergy.com – or write to us at:

Spectra Energy
5400 Westheimer Court
Houston, TX 77056

05/08/2012