

## **APPENDIX 2**

# **CROSSING AND DESIGN REQUIREMENTS**

The below requirements should be adhered to when designing your crossing. Individual requirements or conditions will appear on the crossing consent as required.

### **1.0 GENERAL CONSIDERATIONS**

#### **1.1 ANGLE OF CROSSING**

The angle of crossing by railways, highways, or utilities shall be as close as possible to 90 degrees, but not less than 45 degrees in any case.

#### **1.2 FIXTURES**

All above ground appurtenances and other support fittings; e.g. poles, anchors, sheds, manholes, catch basins, valves etc., are to be located outside the pipeline right-of-way.

#### **1.3 RESTORATION of EASEMENT**

The surface of the easement shall be restored to its original slope, contour, finish and depth of cover.

#### **1.4 CLEAN FILL**

Clean fill shall be used around the pipelines and over the right-of-way.

#### **1.5 PROTECTIVE ENVELOPE**

An envelope at least 30 cm. (12") thick of sand or clean fill acceptable to the Inspector must be hand compacted around the pipeline. Alternatively an acceptable rock shield material may be used to provide a cushion between the pipe coating and backfill in rocky, coarse and abrasive soils.

#### **1.6 TEMPORARY FENCE**

A highly visible temporary fence, securely affixed, must be erected to restrict access to the pipeline and easement wherever:

- .... An open excavation is on the right-of-way and exposes the pipeline,
- .... Equipment will be working in the vicinity of the pipeline,
- .... Precautions are required to protect the public and the pipeline.

### **2.0 UTILITIES**

#### **2.1 CLEARANCE**

The proposed utility crossing shall be designed to maintain a minimum clearance of 30 cm. either above or below the pipeline.

## **2.2 UNIFORM DEPTH**

The proposed utility must maintain a reasonably uniform installation profile across the full width of the pipeline right-of-way.

## **2.3 NO CONNECTIONS WITHIN RIGHT-OF-WAY**

No splices, joints or other connections shall be made to cables within the pipeline right-of-way. Joints in sewer and water main pipes shall not be made over or under the petroleum pipelines.

## **2.4 UTILITY MARKERS**

Permanent visible warning signs for the utility crossing must be placed and maintained within 3 meters of the point of crossing.

## **2.5 RIGID CONDUIT**

Multiple underground cables must be placed in a concrete or rigid conduit for the full width of the right-of-way, or for a distance of 7.6 meters (25 feet) on either side of the pipeline.

## **2.6 SELF-SUPPORTING CONDUITS**

Conduit duct structures over top of the pipeline must be designed to be self-supporting when exposed for a 3 meter span.

## **2.7 PROBING PROTECTION**

Plastic gas lines and PVC ducts must have a layer of concrete paving stones placed above them at the crossing of the petroleum pipelines to guard against possible probing bar damage.

## **2.8 INSULATE METALLIC STRUCTURES**

All metallic installations must be wrapped with a non-conductive insulating material for a minimum distance of 8 meters on either side of the pipeline.

## **2.9 CATHODIC PROTECTION**

Metallic installations that cannot be adequately insulated are required to be bonded to the pipeline in accordance with the specifications in the accompanying drawing. A new test lead with suitable test point may need to be installed to provide Corrosion control. design must conform to CSA Standard C22-3, No.4.

## **2.10 OVERHEAD POWER LINES**

Overhead power line crossings must conform to CSA Standard C22-3.- No. 6

## **2.11 AERIAL MARKERS**

Aerial warning devices shall be installed on overhead power lines at the crossing point to facilitate safe aerial patrol of the pipeline.

### **3.0 ROADS AND PARKING LOTS**

#### **3.1 CLEARANCE**

The travelled surface of all roadways, trails or access lanes must be at least 1.2 meters (4 feet) above the top of the pipeline or casing pipe. The ground surface at all points elsewhere in the road right-of-way must be at least 0.8 meters above the top of the pipeline or casing pipe.

#### **3.2 TEMPORARY VEHICLE AND EQUIPMENT CROSSINGS**

- (a) Equipment crossing the pipeline must use one established crossing point with a minimum cover of 1.2 meters or additional material is required to provide adequate depth of cover, or adequate mechanical protection is necessary, to mitigate the stress on the pipeline,
- (b) Excavation machinery shall not be placed on top of the pipeline unless additional depth of cover is provided or adequate mat protection used as a condition for equipment crossing the pipeline (see Exhibit 4.4)
- (c) In all cases it is the Applicant's responsibility to prove the adequacy of depth of cover or mechanical protection to avoid introducing additional stress on the pipeline.

#### **3.3 SUBGRADE MATERIAL**

All subgrade material shall be of sufficient strength to safely withstand the design loading conditions and resist the transmission of stress to the pipeline. Where materials are not adequate for wheel loads, a suitable protective mat or pre-cast concrete slabs installation is required. See Exhibits 4.3 and 4.4 for details. Sun-Canadian reserves the right to request an engineering soil loading assessment depending on the nature of the proposed traffic and equipment.

#### **3.4 NOISE WALLS**

Noise attenuation walls that cross over the pipeline shall have a removable section over the entire width of the pipeline easement to allow access to the pipeline.

#### **3.5 PARKING LOTS**

Wherever possible, parking areas should leave an un-paved or "green" strip over the pipeline right-of-way to allow access to the buried pipeline without disturbing the pavement. Sun-Canadian reserves the right to request the installation of a leak detection system depending on the extent of the hardened surface. Special use conditions will apply to parking lots.

If Sun-Canadian Pipe Line Company Limited is required to break the asphalt driving or parking surface in order to perform normal pipeline maintenance and repairs, it shall be the Applicant's responsibility and cost to repair the surface. EXCEPT IN AN EMERGENCY, Sun-Canadian will consult with the parking lot owner or operating authority prior to undertaking any excavations through the surface area.

## **4.0 RAILWAY CROSSINGS**

All railway crossings shall be laid in accordance with the approval and conditions set by the Transport Canada Standard TC E-10, and C.S.A. Standard Z662.

## **5.0 DRAIN TILES, OPEN DRAINS, DITCHES AND SWALES:**

### **5.1 INSTALLING DRAIN TILE HEADERS**

Drain tiles crossing the right-of-way are to be kept to a minimum by installing headers along the right-of-way boundaries.

### **5.2 SECONDARY HEADERS**

If required to facilitate drainage networks, secondary headers may be installed within the right-of-way, but no closer than 5 meters from the pipeline.

### **5.3 CLEARANCES**

Clearances from the pipeline to:

- Drain tiles (non conductive material) ..... 5 cm (2 inches)
- Ditch bottoms ..... 80 cm (30 inches)
- Culverts (conductive drain pipe) ..... 30 cm (12 inches)

## **6.0 LANDSCAPING**

### **6.1 DEPTH OF COVER**

The minimum clearance depth between modified final grade and the pipeline shall be 80 cm (30 inches)

### **6.2 CLEARANCE TO POSTS**

Fence posts and landscape poles shall be kept at least 1.5 meters (5 feet) away from the pipeline.

### **6.3 TREES**

The pipeline right-of-way must be kept clear of trees and berms. Shrubbery is permitted subject to the following restrictions:

- shrubs, hedges with a growth height of less than 1.5 meters are acceptable
- plantings (shrubs, hedges, ornamental trees) with a growth height of 1.5 meters or more must be kept at least 1.5 meters off the centerline of pipeline.

## **7.0 SPECIAL PROJECT CONSIDERATIONS**

### **7.1 PIPELINE SUPPORTS-MAJOR EXCAVATIONS**

Adequate pipeline supports and trench shoring as approved by a professional engineer must be provided if over 7 meters of pipeline is exposed.

### **7.2 DRAGLINES**

Dragline equipment shall not be operated to excavated within 6 meters of the pipeline.

### **7.3 SPOIL PILES-TEMPORARY**

Temporary Spoil piles can be permitted on the right-of-way in cases where absolutely no other alternative is available for a duration no longer than 2 - 3 weeks. Spoil piles must be pushed onto the pipeline, and pulled off the pipelines. No working equipment is permitted directly over the pipeline

## **8.0 VIBRATION AND BLASTING CONTROLS**

### **8.1 BLASTING CLEARANCES**

The crossing party should use methods other than blasting on the right-of-way, where possible. No blasting allowed within 1.5 meters (5 feet) of the pipeline.

### **8.2 LIMITATIONS FOR BLASTING**

- (a) Maximum amplitude of vibration
  - explosives.....0.152 mm ( 0.006 in.)
  - repeated mechanical impacts .....0.076 mm ( 0.003 in.)
- (b) Maximum peak particle velocity: .....50 mm/sec ( 2 in./sec.)  
measured at the ground surface above the pipeline at the point nearest the blast site.  
Delays shall be designed to prevent cumulative readings.

### **8.3 IMPACT PROTECTION**

- (a) The pipeline must be protected from fly rock and impacts from hoe-rams, drills and other machinery.
- (b) All blasts must be controlled with the use matting or other safeguards.
- (c) Exposed pipeline must be banded with minimum "2x4" wood lagging and shall have a maximum unsupported span of no more than 7 meters

### **8.4 VIBRATION AND BLASTING SUPERVISION**

- (a) The crossing party shall notify Sun-Canadian Pipe Line Company Limited prior to any proposed blasting within 300 m of the pipeline.
- (b) The crossing party shall retain the services of a registered professional engineer, licensed in the Province of Ontario, to be on site to design, monitor and control all blasting activities within 60 m of the pipeline.
- (c) The crossing party shall provide Sun-Canadian Pipe Line Company Limited with a written copy of their plans for blasting within 60 m, or hoe ramming within 6 m of the pipeline at least 2 weeks prior to operations within that zone, and to allow a Sun-Canadian to coordinate a reduction in operating pressure of the pipeline.

- (d) Sun-Canadian Pipe Line Company Limited may retain an independent blasting consultant, at the expense of the crossing party, to monitor and approve any blasting within 60 m. of the pipeline.
- (e) No blasting shall take place within 60 meters. of the pipeline until Sun-Canadian Pipe Line Company Limited's Inspector or consultant approves each shot.
- (f) Representative readings shall be taken at the start of all pile driving / hoe ramming operations delivering more than 10,000 foot-pounds of energy on impact within 6 meters of pipeline.

#### **8.4 TIMING**

Blasting close to the pipeline should be arranged to be completed within a single day, if possible.

#### **8.5 RECORDS**

Prior to any blasts within the 60 m zone, or pile driving within 10 m of the pipeline, Sun-Canadian Pipe Line Company Limited or its consultant shall be supplied with a copy of seismographs, testifying that the vibration limitations listed above have not been exceeded at the pipeline by any previous blasts or impacts.

### **9.0 ENCROACHMENTS**

#### **9.1 TSSA GUIDELINES FOR DEVELOPMENT**

All proposed commercial and residential dwellings shall be situated in accordance with the attached *Guidelines for Development in the Vicinity of Oil and Gas Pipeline Facilities* as issued by the Technical Standards & Safety Authority (TSSA) Fuel Safety Division-August 1998 (see attached Appendix 3).

Sun-Canadian requests that any proposed development achieve the following guideline criteria;

- Pipeline easements shall not be incorporated into individual lots**
- Fences 1.8 meters (6 feet) high be installed on the edges of easement.**
- A minimum setback of 20 meters** must be maintained between the pipeline and buildings intended for human occupancy.
- A minimum setback of 100 meters** must be maintained between and pumps and compressors and buildings intended for human occupancy.