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Crossing Guidelines

Contents

Introduction

Trans Northern Pipelines Inc. ("TNPI") owns and operates pipelines carrying high-pressure refined petroleum products in Ontario and Quebec and operates the Alberta Products Pipe Line Ltd. ("APPL") pipelines carrying high pressure petroleum products in Alberta. Throughout this document TNPI refers to both TNPI and APPL operations within the three provinces, unless otherwise specified. This document is intended to help Third Party Applicants (not associated with TNPI) understand the application process to obtain TNPI's written consent and TNPI's technical requirements for activities requiring TNPI's written consent.

1 Regulatory Requirements

In Canada, pipelines are regulated by federal and provincial rules, laws and regulations. In Alberta, APPL is regulated by the Alberta Energy Regulator (AER) and in Ontario and Quebec since TNPI traverses provincial borders, TNPI is regulated by the Canada Energy Regulator (CER). For the purposes of this document, it will be outlined if the Regulatory requirements are different, otherwise the requirements as stipulated are the same for both Regulators. For more information on each of these regulators please visit their websites:

- Canada Energy Regulator (CER): www.cer-rec.gc.ca/index-eng.html
- Alberta Energy Regulator (AER): www.aer.ca

2 Activities Requiring Written Consent

Third Party Applicants wishing to work around TNPI's regulated pipelines require TNPI's **prior written consent** for:

a. any ground disturbance greater than Thirty (30) centimetres/one (1) foot within Thirty (30) metres measured perpendicular on either side of the pipeline(s); and
b. any cultivation greater than Forty-five (45) centimetres within Thirty (30) metres measured perpendicular on either side of the pipeline(s); and
c. a facility construction within TNPI's ROW ("ROW"); and
d. any use of vehicles or mobile equipment within TNPI's ROW that is not a travelled road.

3 Activities Permitted without Written Consent

Third Party applications seeking TNPI's Prior written consent are not required for:

a. Operating agricultural equipment across TNPI's pipelines for the purposes of agricultural activities in producing crops and raising animals and includes pasturing and cultivation activities such as tillage, ploughing, disking and harrowing so long as
   i) The loaded axle weight and tire pressures of the agricultural equipment are within the manufacturer's approved limits and operating guidelines

ii) TNPI has not provided notification that operation of agricultural equipment impacts the safety and security of the operating pipeline

b. Agricultural cultivation to a depth of less than Forty-five (45) centimetres or one and a half (1.5) feet

c. Any other excavation to a depth of less than Thirty (30) centimetres or one (1) foot provided that the excavation does not reduce the earth cover within the right of way

d. Under the AER regulated pipelines, a non-agricultural vehicle is permitted if:
   i) The vehicle or equipment is designed to minimize ground pressure
   ii) An off-highway vehicles as defined in Section 117(a)(iii) to (viii) of the Traffic Safety Act
   iii) A commercial vehicle of private passenger vehicle is defined in the Traffic Safety Act, having a nominal chassis rating of less than two (2) tonnes.

If the above conditions are not met then prior written consent from TNPI is required.

4 TNPI's ROW No Encroachment Policy

A defined strip of land, the right of way (ROW), grants TNPI rights, for pipeline construction, operation and maintenance. Encroachments and activities within the ROW are regulated to ensure pipeline safety and integrity. Approved installations must meet technical requirements specified in these guidelines.

The figure below illustrates the areas in proximity to TNPI's pipelines. The areas marked as **Prescribed Area** and **Controlled Area** together constitute the area whereby TNPI requires advanced notice of activities.

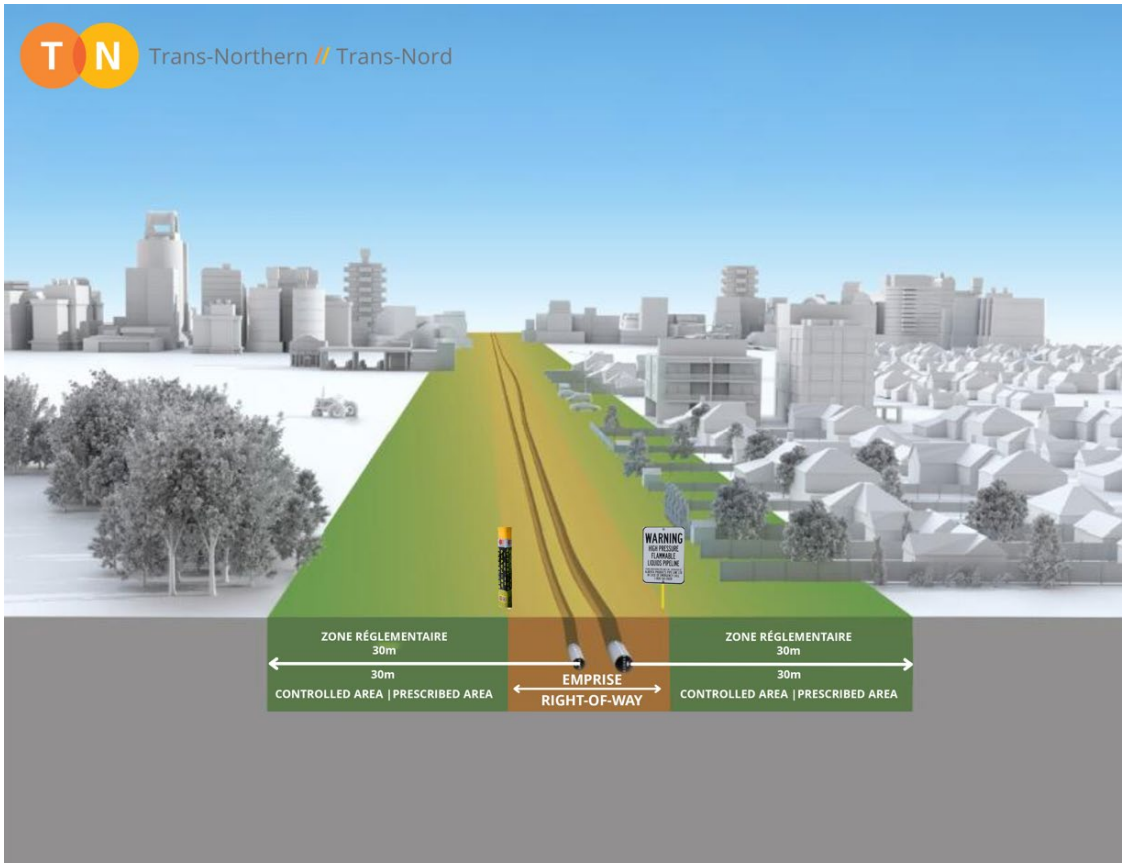


Figure 1 – ROW and Prescribed/Controlled Area

To operate and maintain its pipelines, TNPI must ensure encroachments do not impede access for scheduled maintenance or emergency response.

Examples of encroachments are:

- buildings, either temporary or permanent (including any overhang);
- fences parallel to the pipeline;
- retaining walls;
- paved parking lots;
- lighting poles/standards;
- golf course greens, tee boxes, sand-traps, parallel cart paths and sprinkler heads;
- patios, concrete slabs or decks;
- playground equipment, goal posts, tennis courts, and swimming pools;
- storage of any kind;
- addition of fill or debris;

- agricultural tile drainage (except for headers at the limits of the easement);
- extensive landscaping, tall growth tree plantings, including canopy (more than 1.8 metres high).

Underground and surface installations that are allowed are restricted to those which cross the pipeline at an angle as close as ninety degrees (90◦) as possible. Some examples are:

- utility crossings, open cut or bored;
- utility up-sizing by pipe bursting insertion;
- tile drainage headers and single tile crossings;
- open drainage ditches;
- ditch culverts;
- fences;
- roads, driveways, and laneways;
- landscaping (non-extensive).

These installations must conform to the technical requirements of these guidelines.

5 Requirements Before Construction

Prior to commencing your project, the pipeline(s) location and ROW limits must be marked by flags, paint, or stakes. TNPI is a member of each provincial One-Call/damage prevention centre, a free service that notifies members of proposed work so that all underground infrastructure is safely marked.

Your local centre can be contacted as shown below.

Province	Organization Name	Telephone	Website
Alberta	Utility Safety Partners	(800) 242-3447	www.utilitysafety.ca
Ontario	Ontario One-Call	N/A	www.ontarioonecall.ca
Quebec	Info-Excavation	(800) 663-9228	www.info-ex.com

For federally and provincially regulated pipelines, the legislation requires that pipeline companies provide a locate within seventy-two (72) hours or (3) three business days following the request to provide a locate. This is the time frame in which you should expect a response from TNPI indicating that a locate is necessary and will be scheduled.

Most projects will require a TNPI inspector to be on site when working near the pipeline(s). To schedule an inspector, call the Field Services office specified on the permit/agreement at least three business days before the start of construction and reference the permit/agreement number.

6 How to Apply for TNPI's Written Consent

To obtain prior written consent, the Third-Party Applicant shall:

i) Submit a detailed request and the TNPI application form and submit to TNPI's Crossings Department for a safety assessment.
ii) Drawings shall be submitted along with your application.
iii) For proposals such as subdivisions, grade separations and controlled access highways, TNPI will request complete issued for construction drawings. Drawings shall be prepared in accordance with the minimum standards as described in Section 6.
iv) Aerial photos can be acceptable for activities like brush clearing.
v) Fence installations do not require detailed drawings but must meet the requirements set out within these guidelines.

For Ontario & Quebec please submit application to:
Trans - Northern Pipelines Inc.
45 Vogell Road - Suite 310
Richmond Hill, Ontario
L4B 3P6

Email: crossingrequestseast@tnpi.ca

For Alberta, please submit application to:
Alberta Products Pipe Line Inc.
109-5305 McCall Way NE
Calgary, AB
T2E 7N7

Email: crossingrequests@tnpi.ca

7 Application Review and Written Consent

After applying for written consent, TNPI will review the application to ensure the proposed work is in compliance with these guidelines and does not pose a risk to the safety and security of the operating pipeline(s) and associated equipment. TNPI will advise if the submission is incomplete or if drawing alterations or additions are required. To ensure your application is handled in a timely manner, please ensure you have submitted all the requirements outlined in these guidelines.

TNPI's written consent shall remain in effect for a two-year period from the date of issue. After the two (2) year period, an extension must be applied for within two (2) months if the work has not been completed, otherwise, the permit/agreement will expire.

With the APPL pipeline(s) regulated by the AER, the written consent shall remain in effect for a two-year period from the date of construction for a permanent facility installation and one year from the date of issue for a temporary crossing. After these periods, an extension must be applied for within two (2) months if the work has not been completed, otherwise, the permit/agreement will expire.

A copy of TNPI's written consent and the approved drawing(s) must be kept on site by the applicant, for the duration of the project.

8 Minimum Drawings Standards

Approved drawings are a requirement to obtain TNPI's consent.

The minimum requirements include:

- The TNPI pipeline(s) must be shown on the drawing.
- A warning on the drawing stating: ***"Danger, High-Pressure Pipeline***".
- Drawing marked as IFC with its drawing number / version, where applicable.
- Drawing date, Version and or Revision date, if applicable.
- Dimensions and scale(s) stated in either metric or imperial units. Terrain drawings do not require scale so long as dimensions are identified.
- A drawing Legend either embedded in the drawing or on a separate sheet.

Additional information may be required in some cases. For this reason, TNPI should be contacted as early as possible requesting as-built drawings and pipeline data by emailing markupdrawings@tnpi.ca .

A Plan View Showing:

- Pipeline(s) location
- Pipeline ROW boundaries and dimensions
- North Arrow, Title Block and Drawing Legend on each drawing sheet.
- Legal Parcel or Property Description
- Key Map
- Location of crossing including all pertinent dimensions between crossing and nearest property line intersecting the pipeline. GPS coordinates.
- Fully dimensioned and minimum distances to underground and surface features.
- The angle between crossing and pipeline (must be as close to 90◦ as possible).

A Profile or Section View showing:

- For surface installations (e.g. roads, driveways, railways, ditches, landscaping, etc.): view along the pipeline(s).
- For buried installations: A section view along the installation.
- Pipeline depth before and after construction with ground elevations.

- The depth of other buried installations in proximity to the pipeline.
- All distances from new installation(s) to pipeline(s).
- Pipeline ROW boundaries and dimensions.

Description of Installation(s):

- For surface installations: Surface and subgrade materials, maximum anticipated wheel loading.
- For buried installations: Type of material, all dimensions.
- Detail Drawings or tables of any permanent protective measures required by TNPI (e.g. casings, reinforced slabs, protective wrappings, etc.).

9 When to Apply for Authorization by the Regulator

9.1 Canada Energy Regulator

The applicant may file an application with the CER to carry out construction activities along or under a pipeline, engage in a ground disturbance activity within the prescribed area or operate a vehicle or mobile equipment across the pipeline if:

- TNPI did not grant approval to the applicant for reasons of pipeline integrity, public safety or company policy;
- The applicant is unable to comply with the conditions set out in the TNPI written consent;
- Approval from the CER is also required in cases where TNPI suspends its permission for your activity and has not reinstated it.

An application must be filed with the CER with a copy provided to TNPI in writing to:

Secretary of the Commission
Canada Energy Regulator
Suite 210, 517 Tenth Avenue S.W
Calgary, Alberta T2P 0X8
Phone: 1-877-288-8803
Email: www.cer-rec.gc.ca

9.2 Alberta Energy Regulator

When there is no pipeline ROW, the AER may approve a ground disturbance if the activity cannot be reasonably obtained from TNPI.

10 Suspension of Written Consent

During construction, TNPI can amend or change the conditions specified within the permit/agreement to ensure that the construction or ground disturbance does not impair the safety of the pipeline. If TNPI's written conditions are not followed during the construction or ground disturbance activity, or any work practices threaten the safety and security of the pipeline then all construction and activity will be stopped immediately and if so required TNPI will officially suspend the written consent provided until such time as the safety violations or written condition violations can be remedied. The Regulator will be notified of such suspension.

11 Costs

There are no fees associated with the assessment and processing of crossing applications.

12 Unauthorized Construction Activity, Ground Disturbances and Vehicle Crossings

Crossings, construction activities, ground disturbances, agricultural activities and encroachments which require TNPI's prior written consent but proceed without TNPI's knowledge and approval are considered unauthorized. Similarly, crossings/activities and encroachments which are not permitted by TNPI are considered unauthorized.

All unauthorized crossings/activities and encroachments are reported to the applicable Regulator, and those taking place in Ontario may also be reported to the Technical Standards and Safety Authority (TSSA) for further investigation. The Regulator or TSSA may impose fines on those parties involved in unauthorized pipeline crossings/activities.

In Ontario fines may be imposed by the provincial One-Call centre for not requesting a locate prior to any ground disturbance.

13 Emergency Procedures

If it is evident or even suspected that a pipeline has been contacted and/or damaged, stop work immediately, shut off equipment, and clear the area. **Notify TNPI immediately by calling 1-800-361-0608**. This is a 24-hour number for all three provinces. This number is also posted on pipeline markers.

The caller should be prepared to supply the following information:

- Name, address, telephone number and where the caller can be located by anyone arriving to take charge of the incident.

- The geographic location of the incident. Specifically, lot, concession, township, municipality, address and nearest major road(s).
- Brief details of the incident: Type of damage and equipment involved. In the event of a puncture, indicate the amount of product and indicate if there is fire.
- Which police or fire department has been alerted.
- The time of the incident or the time the incident was first identified.

TNPI's personnel will supervise the containment and clean-up of any spills. It is important that TNPI be contacted as soon as it becomes evident that construction activity may involve its pipeline(s).

14 Technical Requirements

TNPI shall not allow mechanical excavation within five (5) metres of the pipeline without first exposing the pipeline by hydrovac or hand digging under the direct supervision of a TNPI Inspector. Mechanical excavation includes but is not limited to: auguring, mechanical excavator and directional boring. Any distances closer than five (5) metres must be hand dug. New infrastructure shall be designed to cross under TNPI's pipeline(s). If the TNPI pipeline is Horizontal Direction Drilled (HDD) at a deep depth, then there will be a review. For pipe such as a water main or gas main, new pressurized pipe installations operating under pressure, pressure tested sections shall be installed.

14.1 Utilities

Utilities shall cross the pipeline at an angle as close ninety degrees (90°) as possible. Utilities shall be constructed consistently level throughout the pipeline ROW. A minimum vertical clearance of fifty (50) centimetres shall be maintained between new utility installation and the top or bottom of the pipeline(s). A minimum clearance of fifty (50) centimetres shall be maintained when cured in place (trenchless) is used to replace an existing concrete or cast-iron utility to cross the pipe. No joints, bends or elbows shall be made within three (3) metres of TNPI's pipeline(s). In the event of low or high voltage power cables installed in the vicinity of the TNPI pipeline. TNPI has the right to request a Cathodic Protection Assessment to determine any required mitigation, at the applicant's expense. The pipelines must be exposed prior to any directionally drilled crossings and have a minimum clearance of One (1) metre. Pipe bursting across the pipeline is prohibited unless the pipeline(s) is exposed at the crossing.

14.2 Telecommunications

In the case of buried communication cables, no joints, splices or other connections shall be made within three (3) metres of TNPI's pipeline(s). Electrical power cables or telecommunications shall be placed in concrete or rigid conduit for the entire width of the pipeline ROW. A minimum separation of one (1) metre is required for concrete or rigid conduits installations measured from the bottom of pipeline(s). Telecommunication towers (microwave or cellular), broadcast towers, mast, or OTA transmit or receive sites whether AM, FM, Microwave, or Cellular shall not be installed within TNPI's ROW. The pipelines must be exposed prior to any directionally drilled

crossings and have a minimum clearance of One (1) metre. Pipe bursting across the pipeline is prohibited unless the pipeline(s) is exposed at the crossing.

14.3 Residential Service Drops

Concrete patio slabs shall be installed above home gas services and electrical (cable, fibre, telecommunications) power cable (conduit) over crossings.

14.4 Municipal Infrastructure

Appurtenances such as catch basins, manholes, valves, and other fittings shall not be located within five (5) metres or outside the TNPI's ROW whichever is greater.

14.5 Power Lines

The current type (AC or DC) and voltage shall be specified for an overhead power line. The vertical distance between the lowest wire of an overhead line catenary and the ground surface within the pipeline ROW shall not be less than the minimum vertical clearance as set out in the Canadian Electrical Code Part III, known as CSA Standard C22.3 No.1 for Overhead Systems and CSA 22.3 No 7 for Underground Systems, as amended from time-to-time. Installation of new poles, pylons, towers, guyed wires, anchors and any other supports of an overhead line shall be installed a minimum distance of ten (10) metres from the pipeline(s) or outside TNPI's ROW whichever is greater.

14.6 Roads, Laneways, Pathways, Driveways, and Ramps

A minimum clearance of one hundred and twenty (120) centimetres between the base of the asphalt layer and the top of the pipeline shall be maintained. Other clearances required are: One hundred and twenty (120) cm for concrete or asphalt sidewalks from the top the pipeline to the base layer; Seventy-Five (75) centimetres between the bottom (invert) of the ditch and the top of the pipeline; Thirty (30) centimetres between subdrains and the top of the pipeline. New road crossings may require the installation of a TNPI test post, at the cost of the applicant in accordance with TNPI's company standards.

14.7 Landscaping and Erosion Control

A minimum vertical clearance of one (1) metre shall be maintained between final grade and the top of TNPI's pipeline. The location of all proposed installations associated with the landscaping (fences, walkways, services, etc.) must be indicated on drawings. Planting details and schedule (types of planting) shall be provided with the landscape drawings. Fence posts shall be installed at a minimum horizontal distance of one and a half (1.5) metres/(5 feet) from TNPI's pipeline(s). TNPI requires that all landscaping and fences within the pipeline ROW do not obstruct the visibility from aerial surveillance. Plywood, wood board fences, and extensive vegetation will not be permitted. Fences at the immediate crossing of the pipeline(s) are to be an open style format such as a chain link style, with a maximum height of 1.8 metres (6 feet). The pipeline ROW is to be kept clear of trees and berms.

Shrubbery is permitted subject to the following restrictions:

- Ground cover vegetation of less than 0.5 metres (18 inches) is allowed directly over the pipeline.
- A maximum height of one (1) metre (3 feet) is restricted to a three (3) metre 10 foot) setback from the pipeline(s).
- A maximum height of 1.8 metres (6 feet), including canopy, on ROW areas are not permitted within three (3) metres (10 feet) from the pipeline(s).

14.8 Agricultural Drain Tiles, Open Drains, Ditches and Swales

A minimum clearance of five (5) centimetres is required between plastic drain tiles with a diameter less than ten (10) centimetres or four (4) inches from the pipeline(s). The number of crossings of the pipeline(s) shall be kept to a minimum by installing headers along the ROW boundaries. A secondary header may be installed within the ROW if required, but not to be installed closer than five (5) metres from the pipeline.

Drain tile drawing submissions shall conform to TNPI's minimum drawing requirements as outlined within these guidelines. A minimum Seventy-five (75) centimetres clearance is required between the bottom of the open channel and the top of the pipeline. A minimum Thirty (30) centimetre clearance is required between a culvert (CSP) and the top of the pipeline. Open ditches drains or swales shall not run parallel on top of the pipeline however may cross over as close as 90 degrees as possible. In all cases the minimum clearance from the top of the pipeline to the bottom or invert of the ditch shall be 0.75 metres.

Applicants seeking tile drain cost reimbursement for additional costs due to the presence of the pipeline(s) shall provide two drawings:

1) showing the tile system design with the pipeline present; and
2) showing the design without the pipeline and a comparable cost estimate.

Upon review, the applicant will receive an approval for the funds requested or modifications may be requested. With an approval of the funds requested, a final cost invoice shall be submitted to TNPI from the landowner with an HST number, if applicable. TNPI cannot remit payment to a drain tile contractor or a tenant farmer.

Boreholes and test pits (with or without monitoring/ probes shall be setback to a minimum of three (3) metres and must be installed and removed in the presence of a TNPI Inspector within 12 months. In addition, boreholes and test pits must be backfilled with a suitable material as advised by a TNPI Inspector.

Archaeological ploughing is permitted with a TNPI Inspector only, so long as the ploughing depth does not exceed thirty (30) centimetres and the equipment is evaluated for loading if crossing over the pipeline. Otherwise, written authorization (permit/agreement) is required.

14.9 Railways and Light Transit Systems (LRT)

Design and construction to be compliant with the current version of CSA Z662 required minimum clearances:

- 200 cm between the base of tracks and uncased pipelines;
- 120 cm between the base of tracks and cased pipelines;
- 75 cm between the bottom of ditches and pipeline.

Conditions under which uncased crossings may be installed are addressed under Section 4.12.3.2 of the Canadian Standards Association CSA-Z662- Oil & Gas Pipeline Systems, and the National Transportation Agency General Order No. E-10, Regulations Respecting Pipe Crossings Under Railways.

14.10 Residential and Commercial Grade Amenities

- underground and above ground swimming pools;
- sheds, garages, barns, gazebos
- parallel fences, pedestrian/road barriers;
- paved parking lots, car lots, large equipment /vehicle storage yards;
- catch basins, infiltration galleries, stormwater management retention structures;
- valve chamber, manholes/ or maintenance access holes;

- reinforced concrete box culverts;
- utility fittings (i.e., fire hydrants);
- all utility and lighting poles, including traffic standards;
- transformers/switchgear, and vaults;
- extensive landscaping, berms, tall growth trees, canopy more than 1.8 metres high.

The design must allow for controlled access to the unaffected portions of the pipeline ROW. Clean (free of contamination) fill must be used over the pipeline and ROW. Fill must be free of rocks and boulders. Noise attenuation barriers crossing the pipeline must include a removable section to allow access to the pipeline ROW. For fences crossing the pipeline(s), posts are to be kept 1.5 metres away from the center line of the pipeline(s). Where possible, floating fence construction should be considered.

15 Contractor Guidelines

15.1 Consequences of Uncontrolled Excavation

TNPI's pipelines are generally installed at a safe depth. The cover over the pipe can have been substantially reduced by erosion, farming, or landscaping over time. Damage by uncontrolled excavation is possible.

Damage to pipelines from mechanical excavation can have serious consequences. It could remove the protective coating resulting in concentrated corrosion and weaken the pipe wall. This could result in a leak or rupture which can result in a threat to life, property and the environment. In addition to pipelines, areas surrounding the pipeline also contain buried electrical and communication cables which are vital to ensuring the continued operation of the pipeline.

Do not rely on markers for pipeline location purposes, contact the provincial locate (one-call) centre or clickbeforeyoudig.com.

15.2 Click Before You Dig

Excavators are reminded that not all utility companies are members of the local provincial One-Call services. It is an excavator's responsibility to determine which utilities may be located within the work area. This takes planning and time, but hazard avoidance and damage prevention are worthwhile pursuits. Safe construction can be achieved by completing the following steps:

1. Contact the provincial locate/One-Call service.
2. Ask the municipality which utilities or pipelines may be present in the work area.
3. Research the telephone directory.
4. Research land title deeds.
5. Contact the property owner.

Before commencing any work, every job site should be carefully inspected for marker signs identifying the presence of pipelines or buried utilities and for visual evidence that there may be buried lines that have not been marked. Manholes, catch basins, pedestals, junction boxes, water and gas meters, valve chambers, conduits affixed to wood poles, test posts, even sunken ground may indicate the presence of underground structures.

Typical Pipeline Markers show TNPI's most common form of marking. **Please refer to Appendix B.**

15.3 Dig with care

When excavating, there is always a possibility that pipelines, or other utilities may not be located accurately or perhaps not at all. Errors are possible. Utility locators are often confused by the signals they obtain in urban environments. There are many underground utilities and signals are diffused by the presence of tramp iron, other conductors, abandoned utilities, parallel fences, overhead electrical lines, etc.

Information on pipeline depth is frequently not provided because it is prone to error. This is not error by omission, but simply changes in the grade elevation since the pipeline was originally installed. Engineering drawings and plant records, unless they utilize geodetic elevations, are unreliable sources of pipeline depth. When excavating, keep on the lookout for evidence of previous excavations. Virgin ground is usually harder than disturbed ground. Soft ground may indicate the presence of a trench or backfill material.

15.4 Required Locates

If you do not receive an all clear or locate within the regulated timeframe, call TNPI directly. ***Excavators must not to commence work until locates have been received***. To commence excavation without proper locates contravenes federal and provincial legislation and offenders can be fined.

If emergency locates are required, TNPI will offer this service on short notice. For a *genuine emergency* (i.e., service disruption with a work crew on-site), this will be done as soon as a locate personnel can be dispatched.

15.5 Meeting Pipeline Representative

A meeting between TNPI and the excavator is expected beforehand to ensure the nature of the work is clearly understood before a locate is provided. Following the locate, a report is provided to the excavator. This report should be neat, legible and clearly understood by both parties prior to signature. If anything is unclear, ask for clarification. The report is the document guiding your actions and will be referenced in the event of pipeline damage investigations arising from your activities.

Frequently, the locate report may contain special instructions provided by the TNPI inspector. Be certain you understand clearly what these special instructions are. They may be simple, such as erect a snow fence or a barricade. They may be more elaborate and restrictive such as hand dig to expose utility or build-up grade elevation before crossing with heavy equipment. Excavators must fully comply with all instructions provided by the TNPI Inspector.

15.6 TNPI Inspector Required On Site

TNPI expects that a TNPI inspector is on site before commencing any excavation near its pipelines. If work proceeds without the presence of a TNPI inspector, damage to TNPI's pipeline is more likely. Without a TNPI inspector on site to witness first-hand the uncovering of the pipeline, excavators may be faced with the cost of repairs previously caused by others. Furthermore, if the work site is backfilled without a TNPI inspector present, an excavator may be faced with re-excavation when the TNPI

inspector does arrive. Regulations require that TNPI is provided the opportunity to inspect its own pipeline prior to back-filling.

15.7 Mechanical Excavation or Ground Disturbance

Mechanical excavation of any buried pipeline is hazardous to both the pipeline and to the excavator.

No mechanical excavation is allowed within the ROW or within five (5) metres of the pipeline, whichever is greater. This is a minimum distance and may be extended by the TNPI inspector if warranted by the site conditions and the type and size of machinery used. To schedule a TNPI inspector, **TNPI requires at least three working days' notice.**

Under the direction of the TNPI inspector, the pipeline must be located and exposed by hand digging or hydro-vac to identify direction and depth before machine excavation is permitted. After the pipeline has been exposed, mechanical excavation shall not occur within one (1) metre of the pipeline. Hand excavation does not include the use of picks or spud bars, it simply means excavation by shovel or vacuum excavation.

Machinery will not be permitted to reach across the pipeline while excavating. Trench shoring shall maintain a minimum clearance of thirty (30) cm from the pipeline(s) and is to be removed upon completion of the crossing.

15.8 Hydro-Vac

The maximum pressure to be used at any time on a spinning tip nozzle during a pipeline excavation shall be 1500 psi or as defined by site permit/agreement conditions or the TNPI inspector on site.

Spinning tip (wand) nozzles shall be oscillating types to prevent a concentrated water stream. This type of tip can be identified by the circular pattern of water stream evident as pressure is first applied to the wand. Single tip nozzles are not allowed. If the wand or tube end can make direct contact with the buried structure it must have a rubber, neoprene or equivalent tip to eliminate any occurrence of mechanical damage. The wand end shall never remain motionless during excavation. A deadman trigger or valve shall be installed on the wand to be capable of stopping excavation on demand. Aiming directly at the underground infrastructure must always be avoided. Eight (8) inches or twenty (20) centimetres shall be maintained between the end of the pressure nozzle and the pipe and/or subsoil. The nozzle is never to be inserted into the subsoil while excavating the pipe. Truck set up or crossings must adhere to these guidelines and receive written consent including any mitigation measures to be followed. A Hydrovac truck shall be used to clean water to eliminate potential contamination. A Hydrovac truck must have a positive air shut-off working in a hazardous area. For multiple line crossings, or congested areas within a facility a hydrovac trench box shall be used to verify the lines within the excavation area.

15.9 Respect instructions from Pipeline Representative

During your work, the TNPI Inspector may remain on site to safeguard against damage to the pipeline(s). If necessary, the inspector may issue instructions over and above those that are cited on the locate

report. Be mindful that these instructions are issued with the intention of protecting the pipeline from damage and not to interfere with your work.

15.10 Pre-Construction Meeting

For some projects a pre-construction meeting will be required. The intent of this meeting is to inform crew members of the procedures and restrictions that must be observed while working over or near the pipeline(s). The meeting is to be attended by representatives of the contractor(s), TNPI and the authority responsible for the project. TNPI must be notified at least (3) three business days in advance of the scheduled meeting.

15.11 Barricading the Work Zone

In locations where TNPI pipeline(s) is exposed in an excavation which is near vehicular pathways (i.e., highway, road, parking lot, etc.), the Contractor or Project Owner shall erect concrete barricades or provide such measures as to prevent vehicles from entering the work zone. The barricades may be removed after the pipeline has been protected by backfill to a minimum depth of one (1) metre or existing cover, whichever is the lesser.

15.12 Fencing

Fencing (usually snow fencing) may be required to protect operating pipelines from heavy equipment and to restrict machines to designated travel ways.

15.13 Ramps

Ramps are required wherever the pipeline is buried under limited cover. In such cases, the pipeline(s) is vulnerable to damage from the direct weight of heavy construction equipment. In addition, the weight of these machines may cause buried rocks and debris to impact and damage the pipeline(s).

Written permission is required for the installation of ramps. The TNPI inspector will specify where and how ramps are to be constructed. The TNPI inspector must be present during the construction and removal. When constructing ramps, fill is to be placed over the pipeline using standoff equipment.

The minimum cover is 1.2 m (4 feet) unless the TNPI inspector specifies less. Under certain conditions, mats or steel plates may be used in lieu of ramps. Ramps are to be maintained and corrected for any settling throughout the course of construction.

15.14 Blasting and Vibratory Compactors

Blasting within thirty (30) metres of the pipeline(s) is to be strictly controlled and monitored in accordance with TNPI's Vibration Control Procedures. Please refer to Appendix C.

15.15 Backfill

The pipeline inspector must be on site during the backfill operation and must complete an inspection of the pipeline coating and a sketch before backfilling commences. The contractor must notify TNPI at least 24 hours prior to backfilling. Backfill above and below the pipeline(s) is to be free of rocks and contaminants. Sand or select material is to be used within 0.3 metres of the pipeline(s). To prevent future settlement in the vicinity of the pipeline, fill is to be compacted with a hand-operated compactor in approximately 0.15 metre layers.

15.16 Site Restoration

Unless otherwise specified in TNPI's consent, the Contractor is to return the ROW to its original condition. This includes the removal of temporary fencing or barricades, site trailers, spoil piles, trench shoring, and ramps. When removing ramps, keep heavy equipment off the pipeline(s). Care must be taken not to damage or remove pipeline warning signs or test posts.

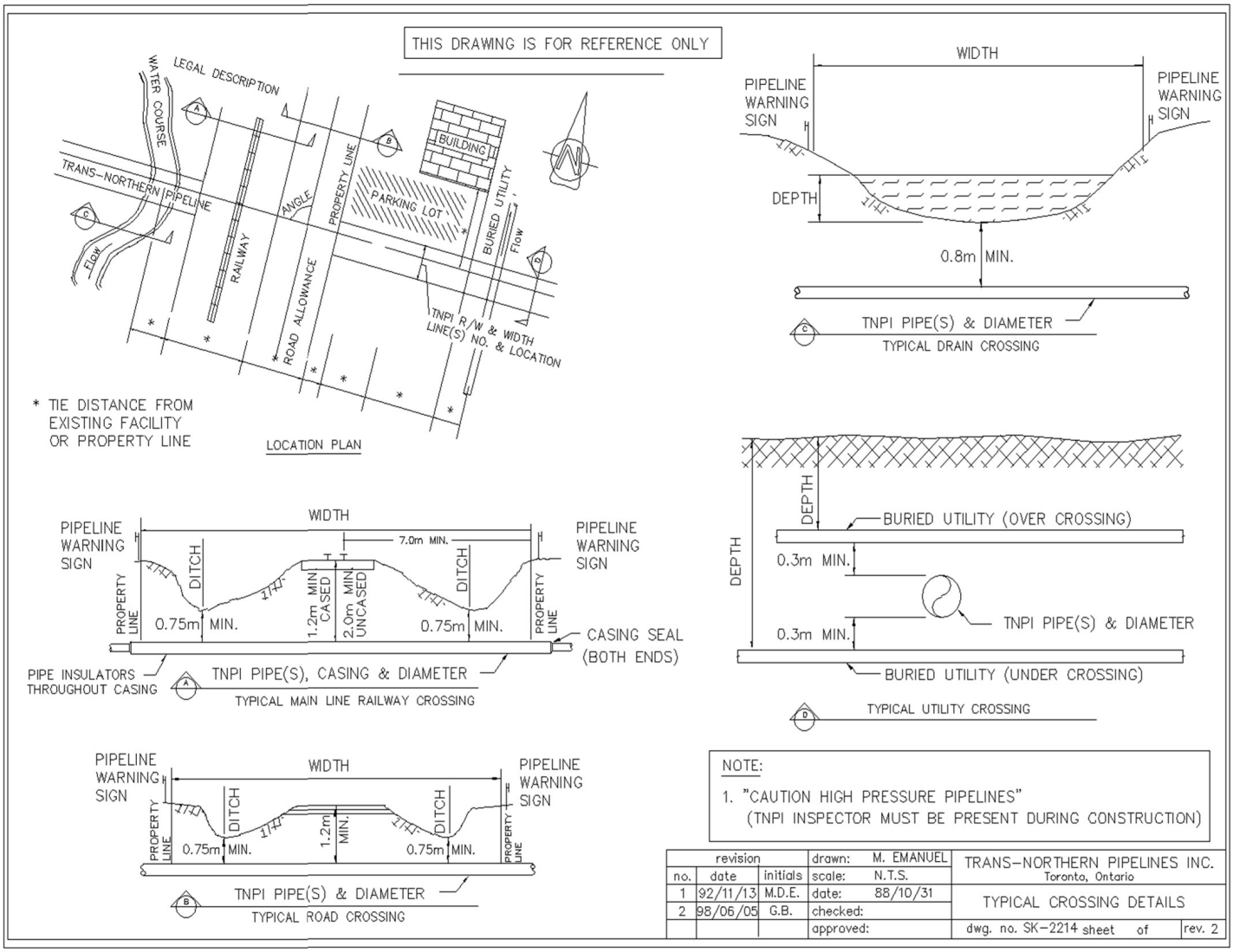
15.17 Costs

Notwithstanding existing agreements, all work consisting of realigning, raising or lowering of TNPI's pipeline, crossing applications or the addition of casing or other appurtenances thereto, shall be performed by TNPI and all costs and expenses of such work including any justifiable economic losses resulting from any shutdown of the pipeline or any other consequential loss directly attributable to such work shall be borne and paid for by the Applicant upon receipt of an invoice from TNPI, showing in reasonable detail the particulars of such costs, losses and expenses.

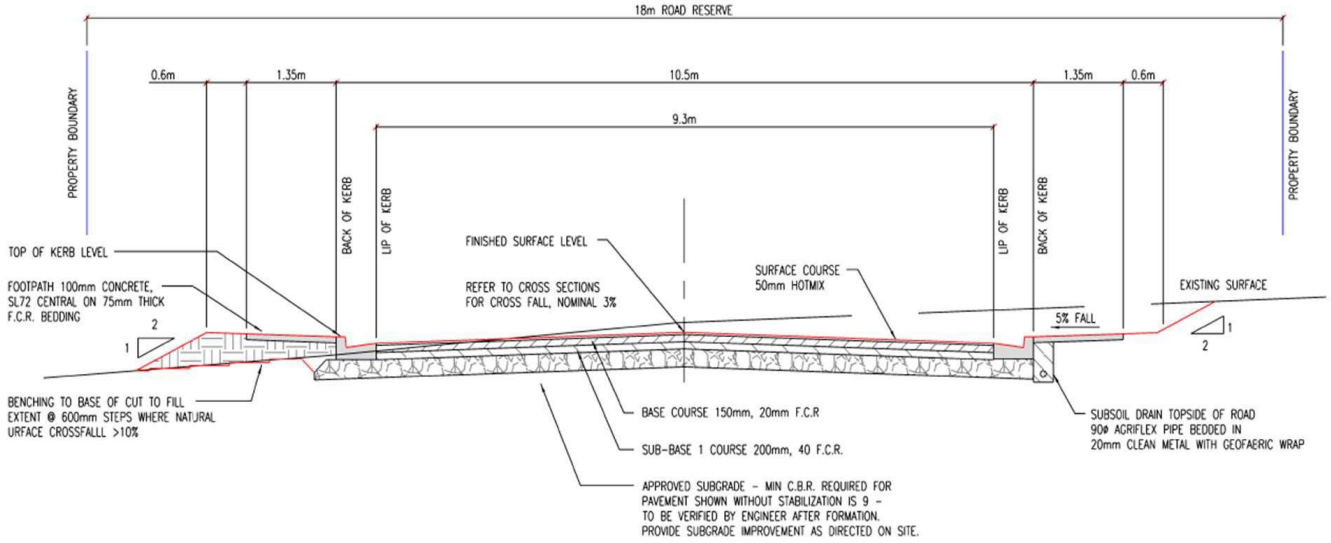
TNPI may also elect to recover the amount of the wages and expenses of its crossing-inspector from the Applicant upon submitting an invoice showing in reasonable detail the particulars of such wages and expenses. In addition, TNPI may require cathodic protection test stations to mitigate against corrosion. In such cases, TNPI will invoice the Applicant for such works (see reference drawing CP-1005 in Appendix A).

16 Appendix A - SAMPLE DRAWINGS

16.1 Typical Crossing Details

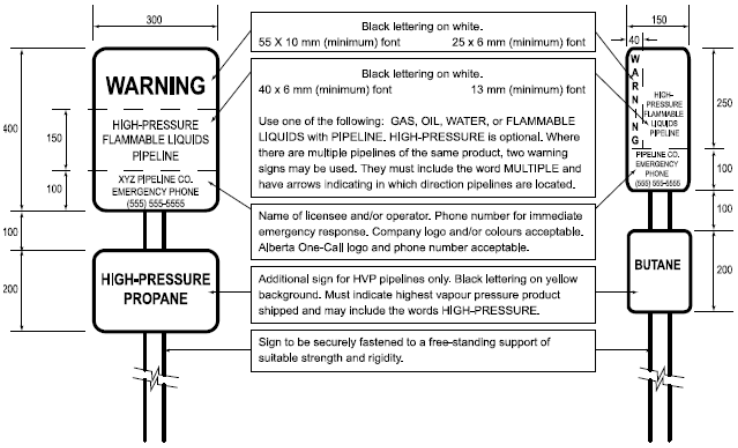


16.2 Sample of a Road Profile Design

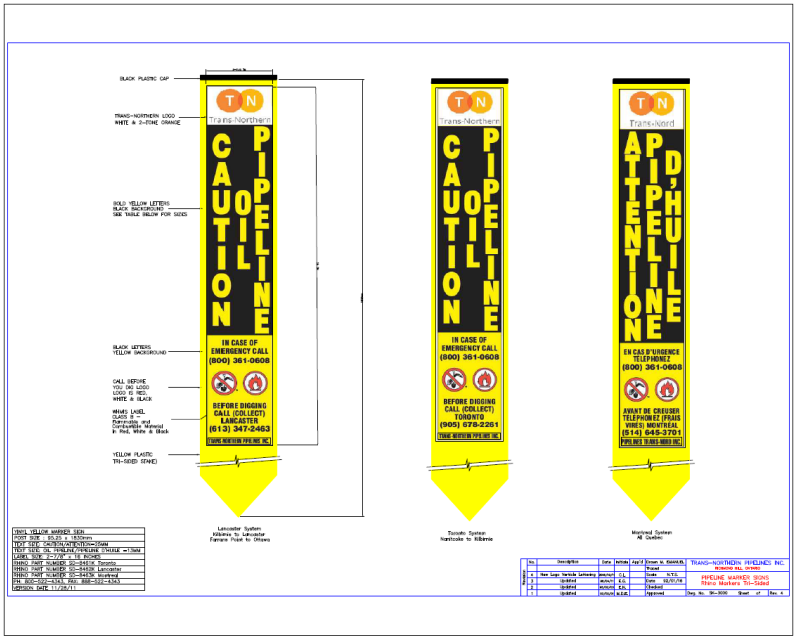


TYPICAL ROAD CROSS SECTION
SCALE 1:50

17 Appendix B - TYPICAL PIPELINE MARKERS



All dimensions are in millimetres (mm).
Approximately to scale.



18 Appendix C – VIBRATION CONTROL

18.1 VIBRATION CONTROL PROCEDURES

Regulations stipulate that the excavator shall comply with the conditions imposed by the pipeline company respecting excavation, directional boring or the use of explosives. Accordingly, TNPI has developed the following procedures. Compliance with all the following conditions is mandatory.

Blasting, Pile Driving, hoe ramming or compacting operations are not permitted within thirty (30) metres of the pipeline(s).

18.1.1 REQUIREMENTS FOR APPROVAL

AT LEAST THREE (3) WEEKS PRIOR to the initiation of blasting/pile driving operations, the contractor shall submit for approval:

- a technical report (signed by a registered professional engineer/geo-scientist/ designated specialist) presenting recommended blasting/ pile driving techniques recommended
- a blasting safety plan for the proposed operations and a vibration monitoring plan
- The technical blasting report shall include:
    - blasting pattern
    - drill hole arrays (spacing and burden)
    - delay patterns,
    - charge weights,
    - distribution and arrangement of charge in hole,
    - hole pattern, etc.

Upon receipt, the blasting report shall be reviewed by TNPI's consultant together with a summary of the condition of the affected pipe(s).
The summary shall address:

- date of installation, diameter,
- wall thickness,
- grade,
- M.A.O.P.,
- design pressure,
- coating
- and if applicable, the date of reconditioning and internal inspection.

The location of weldments shall be confirmed, as these may be non-destructively tested and if necessary, removed prior to any blasting/pile driving operations.

Upon approval, a permit/agreement will be issued.

As a condition of the permit/agreement, the contractor shall be required to monitor ALL BLASTING VIBRATIONS WITHIN THIRTY (30) METRES of the pipeline(s). The monitoring, recording and interpreting of vibrations shall always be by qualified personnel.

NO BLASTING shall take place within five (5) metres of an operating pipeline.

NO AUGERING within three (3) metres of an operating pipeline.

PILE DRIVING OR HOE RAMMING OPERATIONS delivering more than 10,000-foot pounds of energy on impact SHALL NOT TAKE PLACE within 6 metres of the pipeline(s) unless representative readings have been taken beforehand to determine the safe distance from the pipeline (s) for such operations.

VIBRATING COMPACTORS can be permitted to operate within the pipeline safety zone at a minimum distance from the pipeline(s) calculated by multiplying the maximum static roller weight (in tons) by a safety factor of 1.5, without the requirement for vibration monitoring on the pipeline.

18.1.2 Monitoring

The intensity of ground vibrations generated by blasting, pile driving or compacting operations, when monitored on the existing pipeline(s) at a location nearest to the source of vibration shall not exceed a maximum horizontal peak particle velocity of 50.8 mm/sec., or a maximum vertical peak particle velocity of 101.6 mm/sec., or a maximum amplitude of vibration of 0.1524 mm, or a maximum total energy ratio of 1.0. For blasting, millisecond delays shall be used to prevent cumulative readings.

When any recording indicates either the energy ratio, peak particle velocity limits, amplitude or energy ratio have been exceeded, blasting shall be suspended. Blasting shall not be resumed until the probable cause has been determined and corrective measures are taken.
Safety

TNPI's inspector shall be given a minimum of three (3) working days' notice in advance of the commencement of blasting, pile driving or compacting within 30 metres of the centre on either side of pipeline.

The contractor shall comply with the instructions of TNPI's field representative regarding the procedures to be followed while working within the prescribed area.

18.1.3 Non-Compliance

Should the Contractor exceed the vibration criteria on two consecutive recordings, notify the TNPI inspector who shall then inform the Contractor that the blasting/pile driving shall cease. The contractor shall complete the operation by other means acceptable to TNPI. Costs associated with assessments and investigations are to be paid by the Contractor.