CANADIAN GAS ASSOCIATION
ASSOCIATION CANADIENNE DU GAZ

CANADIAN GAS ASSOCIATION

JOINT UTILITY TRENCHING TASK FORCE

Guidance for Operators and Constructors

Distributed by Canadian Gas Association Joint Utility Trenching Task Force
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EXECUTIVE SUMMARY

Background

At the 2019 CGA Operations, Engineering & Integrity (OEI) Conference, a discussion took place during the Construction Roundtable regarding the need to realize efficiencies during pipeline installation work due to rising costs and evolving regulatory expectations. Many practices are used across the industry and there was a perceived benefit in collecting them in one place to aid industry members in their journey towards realizing these efficiencies. A proposal was made in late 2019 to the CGA Standing Committee on Operations and Safety (SCOS) for the striking of a Task Force. The Joint Utility Trenching Task Force began their work in late 2019.

Purpose

The Joint Utility Trenching Task Force was established by the SCOS in order that industry members might have a place to share best practices and in order to pool these practices and capture them in a single document (this document). Therefore this guidance document is intended to be used as a reference and a guide for organizations as they journey towards leveraging the benefits of joint trenching practices.

Scope

The JUT Task Force includes members from utilities and construction companies across Canadian jurisdictions. This guidance document covers practices across Canada in areas of new development where some combination of gas, electrical and communication services are being installed at the same time, typically at the time of initial road construction, and for distribution networks only.

Approach

The SCOS approved the striking of the Joint Utility Trenching Task Force in late 2019 and shortly thereafter, the Task Force held an initial teleconference. The Task Force also met in person during the 2020 Operations, Engineering, Integrity & Construction (OEIC) Conference to further its work. Task Force members completed the guidance document through a series of teleconferences and individual efforts throughout the course of 2020. The pandemic delayed somewhat the final delivery of the guidance document to early 2021.

CGA JOINT UTILITY TRENCHING TASK FORCE

Membership:

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DEFINITIONS

Contractor – the party providing the resources to install infrastructure

Developer – the party, who is typically the owner or of the land on which the work is located, or the owner's designate, who is responsible for creating the road and utility network to service parcels of land on which buildings or dwellings will be constructed

Joint Utility Trenching (JUT) – the coordinated practice of installing shallow utilities, typically natural gas distribution pipelines, electrical conduits and communication conduits, at the same time to minimize the number of excavations required, typically in areas of new development

Utility – the party who owns and operates infrastructure to provide natural gas, electrical power, telecommunications, water, sewer or other services

1. INTRODUCTION

The goal of this guideline is to provide a baseline understanding of joint utility trenching practices for the gas industry within Canada. This document is a living document and will be updated periodically (e.g. by the further addition of industry guidelines for assemblies or components as new technologies and code or standard changes are implemented).

1.1. BACKGROUND

The challenge of rising costs of installation was raised at the construction roundtable at the CGA Operations, Engineering & Integrity (OEI) conference in 2019. Utilities across Canada are under pressure to advance construction timelines and lower capital costs to meet regulatory requirements, customer needs and business objectives. Joint trenching was proposed as a key part of the solution to continue to meet evolving customer and stakeholder needs. It was apparent at this roundtable that most utilities are utilizing some form of joint trenching, but across Canada utilities are at varying stages from infancy to experienced, and methods and approaches to joint trenching differed by area. Participants from the roundtable identified an interest in determining how organizations are being innovative and efficient to utilize joint trenching in order to reduce installation costs.

The Joint Utility Trenching (JUT) Task Force was borne to collect information on current practices and lessons learned and identify opportunities for further rollout and possible standardization.

1.2. JOINT UTILITY TRENCHING

JUT coordinates the installation of shallow utilities, typically natural gas distribution pipelines, electrical conduits and communication conduits, to minimize the number of excavations required. Other buried conduits, such as power to streetlights or traffic signals, may be included in JUT. Natural gas transmission pipelines typically require specific right-of-way agreements that are not well-suited to JUT.

1.3. SCOPE

This document covers practices across Canada in areas of new development where some combination of gas, electrical and communication services are being installed at the same time, typically at the time of initial road construction, and for distribution networks only.

1.4. APPLICATION

This document is informative and does not replace any regulatory, code or standard requirements. Designers should consider whether the approaches outlined are suitable for the environments in which they are operating. The document uses natural terms, such as “should” to imply that nothing in this document is mandatory or binding on designers. Users should take these practices into consideration only when they determine the optimal course of action for their particular design.

2. RELEVANT STANDARDS

2.1. CSA Z662 RELEVANT CLAUSES

When considering JUT, designers should ensure the minimum clearances to other utilities outlined in Table 4.9 are achieved. Other jurisdictions or operators may require clearances in excess of these minimums. The designer may consider reduced clearances as allowed by clause 4.11.5. Designers should also consider the need for laterals at time of install or in the future and ensure designs accommodate required vertical separations when laterals are added.

When considering JUT, designers should ensure the minimum depth of cover requirements outlined in Table 12.2 are achieved. Other jurisdictions, such as municipal or provincial authorities or railway or agricultural operators, may require minimum depths of cover in excess of CSA Z662 requirements. Consideration should be given to ease of locating and ease of access for maintenance and repairs when accepting deeper depths of cover as part of JUT designs.

Padding and backfill materials and soil compaction should be considered in JUT design and at a minimum should meet the requirements of section 12.6.1 and 12.6.6.

2.2 CSA S250

When considering record requirements all parties participating in the JUT should consider the requirements of CSA S250. JUT presents an opportunity to create one complete set of as-built mapping records.

2.3 COMMON GROUND ALLIANCE BEST PRACTICES

The Common Ground Alliance offers a Best Practices document, which can aid utilities in principles of design, construction and record drawings. Practices in this document remain a relevant tool when designing and constructing utilizing JUT, but these Best Practices do not specifically address JUT and do not provide any unique practices that should be considered for this model.

3. INDUSTRY CONSIDERATIONS

This section will discuss some benefits that have been realized by jurisdictions utilizing JUT.

3.1. COST SHARING AND SAVINGS

Canadian utilities have recognized saving of approximately 30% by utilizing JUT, when compared to traditional independent trenching methods. JUT creates an opportunity for the utilities that are party to the agreement to share common costs such as mobilization and traffic control, and minimize costs of materials, equipment and labour for excavating, backfilling, compacting and restoring, as the overall width of the trench is significantly narrowed and shared. It also presents the opportunity to have one certified contractor install gas, electric and telecommunication infrastructure at the same time. This reduces the number of trades on site and optimizes installations. Options for approaches to joint contracts are discussed in section 4.4.

In addition to upfront savings on the capital cost of installation, utilities have reported reduced efforts and lower internal costs related to design, permitting and project management. Utilities also reduced the number and cost of damage claims, both damage claims on the gas system caused by other contractors installing additional infrastructure once gas was in place, and claims to the gas utility for damage to other infrastructure caused by the installation of the gas lines around existing utilities.

3.2. MUNICIPAL PLANNING EFFICIENCIES

Municipalities have experienced increased efficiency in reviewing and approving subdivisions, through the receipt of all utility information in one complete design and the use of common cross-sections in multiple subdivisions. There is a benefit to the idea of a “complete street” where all utility infrastructure is considered at the same stage of design to allow for dedicated corridors and straighter runs, as compared to an individual design model where utilities are incorporated at different stages of the design and approvals and may present the need for reduced clearances, varying horizontal alignment and multiple street crossings to maintain separations.

JUT has also been successful in shrinking the width of the overall utility trenches and corridor which has allowed municipalities in some areas to successfully install multiple utilities at edge of right-of-way or in easements adjacent to the property line, where space would generally not allow for separate utility trenches and easements or corridors. The narrower width also assists with creating space for two corridors to provide dual mains, when required, or reducing the width of the street.

Where municipalities are seeing increased needs for infrastructure, including trees, and developers often desire decreased street widths, JUT is part of the solution to offer a narrower overall street, while still encompassing all utility and municipal infrastructure in the right-of-way.

JUT may also allow for one set of record drawings and an expedited acceptance of the installed system by the individual utilities for municipal approval requirements.

3.3. THIRD PARTY BENEFITS

Developers & Contractors:

JUT offers developers added flexibility in construction scheduling. The models discussed in section 4.4 outline how a developer or contractor may be able to directly control a larger portion of the services design

and/or installation scope to expedite their project and protect them from utility-driven constraints and delays. Some municipalities may also offer a streamlined approach to approvals where pre-approved cross-sections or JUT designs are utilized. JUT decreases the coordination efforts required and minimizes risk of surface restoration occurring prior to utility installation, therefore avoiding duplicated efforts and costs to restore the impacted surfaces.

Ratepayers:

Ratepayers benefit any time the utility can demonstrate a decreased cost to install. JUT is one method that may accomplish this objective.

4. SUMMARY OF TASK FORCE CONSIDERATIONS

This section provides some generally tested and accepted principles across Canada.

4.1. TRENCH DESIGN

Approaches to trench design were reviewed across utilities. While exact depths, separation and configuration varied by jurisdiction, several common factors were most commonly used. The gas pipeline was typically the furthest from the centre line of the street, with depth of cover varying from the required minimum cover of 600mm to as deep as 1200mm, depending on ground conditions, local regulatory requirements and the environment in which the pipeline was installed. A vertical and horizontal separation of at least 300mm was maintained between the gas and any other utility, with some jurisdictions requiring greater separation. Where separations must be reduced, measures for damage prevention should be considered and are discussed in section 4.6. The other utilities, typically communication and power conduits, may be similarly offset, or may be vertically stacked in the same alignment.

Some jurisdictions installed parallel corridors on each edge of right-of-way to avoid the need for laterals crossing the roadway, while others installed one corridor and made considerations for stubbed road crossings at the time of initial infrastructure installation, thus avoiding the need to impact the traveled portion of the roadway to connected services in the future.

Two options for common alignments are presented in Figure 1. It should be noted that other variations on these options are utilized and that both options are presented for information only, with neither being deemed a superior installation.

4.2. CONSTRUCTABILITY

When considering the use of JUT, utilities must understand that the site ownership, control and contractor safety requirements generally fall to the developer. Considerations for utility requirements can be incorporated into JUT contracts, but may be challenging to contract and administer on a third-party owned and managed worksite. Any overarching developer requirements or constraints should be considered.

These sites typically have multiple contractors and trades on site, and may have equipment, materials and solid waste stored onsite. These development sites are generally busier and more congested than a standalone utility worksite, and these conditions should be considered when determining the feasibility of utilizing JUT.

These types of jobsites are typically changing at a rapid pace. Grades, access points and infrastructure installations can significantly differ in a short period of time. There is often a lack of records while these installations remain active, and prior to handover of the project and infrastructure to the ultimate owner. When planning for JUT installations, all parties to the trench and their contractor(s) should consider this lack of records and locates and ensure a process for obtaining and communicating accurate information on existing buried utilities is communicated. This may require coordination with other contractors onsite and sharing of as-built survey files prior to final approval and record distribution.

Cathodic protection (CP) may interfere with other underground structures, or may be impacted by adjacent infrastructure, if not properly installed with required clearances.

When electrical cables are installed in close proximity to polyethylene (PE) piping (typically less than 1000 mm), the localization conductive wire cable must be encased in another PE pipe.

4.3. COORDINATION WITH OTHER UTILITIES

Coordination, as well as determination of legal and contractual requirements, between parties of the joint trench is critical before, during and after construction. One challenge has been ensuring that elevations of future laterals do not conflict. Some utilities have addressed this by installing stubs to property line at time of the mainline construction. Installing service tapping tees and stubs during mainline trenching avoids the need to enter the utility corridor during servicing. Agreement and adherence to standard elevations can also ensure that spacing exists to add laterals to these lines in the future.

Utilities have adopted various approaches to ownership of the JUT design and project management. In one model, one of the parties to the JUT has primary responsibility for the design, permitting and project management of the installation. They may then need to recover some of these overhead costs from the other parties to the JUT. In another model the utilities that are party to the trench have contracted with a pre-approved consultant to complete the design, permitting and project management tasks, splitting the costs of these activities between the utilities. The utilities may approve the designer to compete their technical reviews and approvals, or they may require individual review and approval by each entity prior to construction. Alternately, the developer may complete these tasks using their own resources as outlined in the Developer-Driven contract in section 4.4.

4.4. CONTRACTS

Contractual models differ between utilities and some utilities offer a suite of options to developers. In all models the utilities that are party to the JUT must determine and ensure the competency of the installation contractor(s), as it relates to their infrastructure.

Developer-Driven:

In this model developers are empowered to utilize utility-approved standards to complete their own design, permitting and installation. The utility may implement approvals at any of the stages and may utilize their own resources to complete on-site inspection, or may train and pre-approve third-party inspectors, either from the developer or from the contractor. Utilities may choose to have one standard pre-approved rate, or may develop customized cost-share agreements for individual projects. In this model the utility would typically pre-approve the developer's contractor, or may provide developers a list of multiple approved contractors that they may choose to hire or invite to bid on their work.

Utility-Driven:

In this model the utility takes the lead on the design. The lead utility may be any one of the utilities that are party to the joint trench. This lead utility would complete the design utilizing a standard JUT cross-section that is pre-approved by all utilities party to the trench. The work is typically then tendered and the utilities in the JUT would complete a cost share agreement to share the cost of installation. The lead utility may also recover a portion of their design costs through this agreement.

Contractor Choice:

In this model the contractor typically has a pre-approved standard rate to install each utility. They are permitted to utilize JUT under the guidance of pre-approved standard cross-sections and specifications and may elect to take advantage of this method, or may choose to install using traditional trenching methods. The utility benefits from certainty of the rate, and the developer has the flexibility to choose the method best suited to their needs.

4.5. TRAINING, CERTIFICATION & INSEPCTION

Utilities should have a plan in place to address competency training and certification of contractor polyethylene fusers. As discussed in section 4.4, this may create a need for the utility to train multiple contractors that would not typically install gas in a standalone trenching model. Utilities need to determine the frequency of inspection, which could consider both onsite inspection and submission of fusion samples by the JUT contractor. Generally the inspection needs for JUT are expected to be similar to those required in a standalone trenching model; however the rate of installation may be expedited by having the JUT open in advance, such that the utility inspector can decrease their time required onsite.

4.6. RECORDS

Utilities may wish to consider identifying areas installed by JUT in their system records, as methods and areas for future daylighting and maintenance may differ. Alternatively, one set of records may be created covering the requirements of all utilities included in the JUT and shared between these parties. This ensures that all parties receive complete information of the infrastructure within the project limits, which provides a more thorough snapshot for future design and emergency response.

4.6 DAMAGE PREVENTION

Various methods have been incorporated into existing JUT design to increase protection to gas mains and decrease likelihood of damage. Some utilities have incorporated physical protection measures, such as additional sand padding, or sand bags between utilities where clearances are reduced. Where stubs to property line are incorporated with the main installation, many utilities are utilizing some combination of stub boxes, physical barriers over the stub end, locate balls and marker posts or signage. Lifting over the open trench is typically prohibited to reduce the risk of damages in case of failure of lifting equipment.

Some utilities have experienced a decrease in system damages in areas of JUT, perhaps due to the consistency of the corridor location and utility placement within the corridor, and subsequent locates being grouped into that same corridor and therefore requiring multiple utilities to mark the same area.

JUT may drive the requirement and opportunity to install any power and communication cables in conduit instead of by direct bury, which can minimize future damages of these cables.

JUT may require the use of stubs, which may be able to be better marked at protected and property line, than a main could if installed under hard surface within right-of-way limits. The use of these stubs avoids the need to expose the gas main or the main conduit in the future, thereby reducing the risk of damage to this infrastructure.

Some utilities have implemented GPS survey of lines installed by joint trench, for improved accuracy of records. Where this is an incremental cost, there is an opportunity to share the cost and the records between all utilities that are party to the JUT.

5. FUTURE CONSIDERATIONS

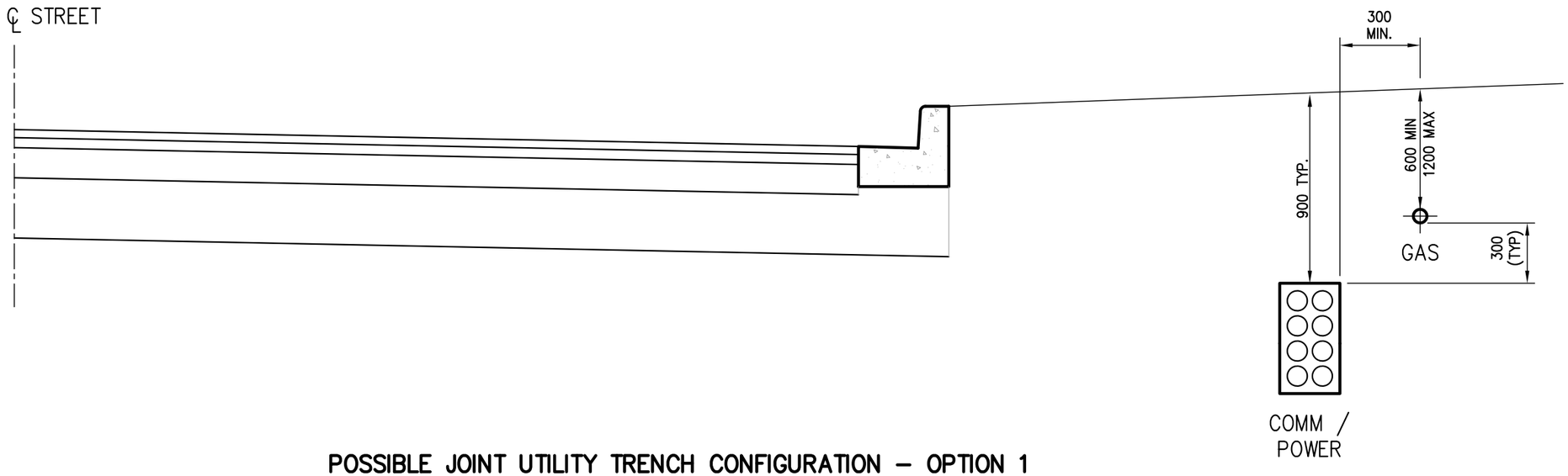
JUT has typically been utilized solely in areas of new development. When additional infrastructure is required for one utility in an existing market, it is unlikely that other utilities are expanding or replacing in the same areas at the same time. However, with a Canada-wide focus on the expansion of high-speed internet into rural areas there may be an opportunity to coordinate expansion of natural gas infrastructure to these areas at the same time. This consideration was not part of the original scope of this document, as there was little overlap at the time between areas of interest for telecommunications and natural gas utilities, and in many jurisdictions the telecommunications expansion was predominantly overhead infrastructure. If these conditions change in the future this opportunity may be revisited.

The JUT working group theorized on the drivers for reduced damage in areas of JUT; however, no quantifiable data was available to determine with certainty any of the root causes of this improvement. There may be an opportunity to mine data captured by the CGA Asset and Integrity Management Committee to further explore and analyze this trend.

6. CONCLUSION

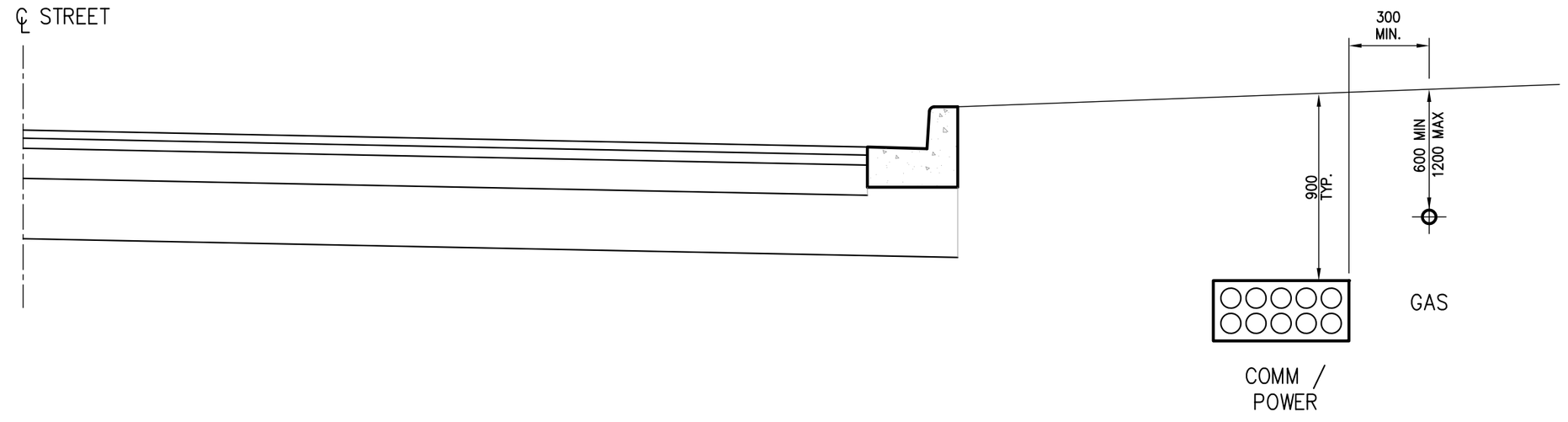
JUT has been proven in various Canadian jurisdictions to improve efficiency and lower the cost of installing infrastructure in areas of new development. While this document has highlighted some successful and common approaches and elements, there is no one single approach that has been demonstrated to be superior and determined to be appropriate for all environments and jurisdictions. JUT should be considered by designers in conjunction with standards and other design considerations for the project in which they are designing.

FIGURE 1: JOINT UTILITY TRENCH CONFIGURATION



POSSIBLE JOINT UTILITY TRENCH CONFIGURATION – OPTION 1

SCALE: 1 : 25



POSSIBLE JOINT UTILITY TRENCH CONFIGURATION – OPTION 2

SCALE: 1 : 25

NO.	REVISIONS	DATE	DWN	APP
1	ISSUED FOR REVIEW			

STAMP:

AREA:

CANADIAN GAS ASSOCIATION

PROJECT:

TITLE:

JOINT UTILITY TRENCH CONFIGURATIONS

DWG NO:

DESIGN:	DRAWN:	SCALE:
CHECKED:	APPROVED:	AS SHOWN

APPENDIX A. REFERENCES

Canadian Standards Association. *CSA Z662 Oil and gas pipeline systems*, 2019 edition

Canadian Standards Association. *CSA S250 Mapping of underground utilities*, 2011 edition

Common Ground Alliance. *The Definitive Guide for Underground Safety & Damage Prevention*, Version 17.0, available from https://bestpractices.commongroundalliance.com