



The City of Vancouver

UTILITIES DESIGN & CONSTRUCTION MANUAL

Engineering Services Department
Streets Division
Utilities Management Branch

Version 1.4

UTILITIES DESIGN & CONSTRUCTION MANUAL

The purpose of this manual is to provide standards, specifications and procedures to ensure that utility construction works on City streets are carried out in accordance with the best available practices, to minimize maintenance requirements, ensure optimal use of the City street right-of-way and reduce life cycle costs.

Companies shall comply with all applicable federal, provincial and municipal statutes, laws and by-laws or other applicable rules and regulations. Furthermore, all applicable permits must be obtained prior to commencing any work, with all works subject to inspection by the City.

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1.0 INTRODUCTION

The objective of the Utilities Design and Construction Manual is to provide for the efficient review of permit applications submitted by utility companies, within the City of Vancouver, ensuring that the City receives the information required to satisfy its role as custodian of the City street right-of-way.

The City is aware of the demand that exists for use of the City right-of-way, a scarce and limited resource. With numerous interests vying for both short and long-term use of the right-of-way, it is vitally important that a balance exist where its intended use, present and future, is protected. In achieving this balance, the City strives to provide streets that safeguard the public and help fulfill the City's mission, values and objectives.

The primary goal of the Utilities Design and Construction Manual is to create a transparent guidebook that outlines the requirements for utility installations in, on, or above the City streets. This manual provides standards for:

- Utility design requirements
- Utility permit submission requirements
- Utility construction requirements

Public streets are three dimensional corridors that host pedestrian and vehicle movements, provide access to properties and house underground and overhead utilities servicing residences and businesses. The Utilities Management Branch of the Engineering Services Department assumes the responsibility for managing the use of the utility corridors, ensuring equitable treatment for all utility companies, while simultaneously ensuring strict compliance to and enforcement of all City By-laws, including but not limited to the Street Utilities By-law, Street and Traffic By-law, Parking Meter By-law and Noise Control By-law.

This manual outlines the process for utility installations within City streets, establishing the requirements from the design of utility installation drawings for permits, to the final submission of Record Drawings. It is the intent of the Utilities Management Branch to streamline and standardize the utility installation and permit process, providing guidelines against which all permit plan submissions are reviewed. The merits of each utility installation permit will be measured accordingly and as right-of-way managers, the Utilities Management Branch recognizes that from time to time circumstances may arise where exceptions to the standards may be required to meet existing conditions. Only at the discretion of the Utilities Management Branch, can such deviations may be approved.

Activities of utility companies installing and operating works in City streets, are required to have the necessary permits issued under the Street Utilities By-law, or be party to a binding and enforceable agreement such as a Municipal Access Agreement, with the City. On occasion, the City may permit private utilities on streets, for the benefit of one or more adjacent properties, under the terms of a specific Encroachment Agreement pursuant to the Encroachment By-law.

With the City's ever-changing physical and social environment, it is expected that this manual will evolve over time. It is the responsibility of those employing the use of this manual, to ensure they have the most current and up-to-date version.

2.0 DEFINITIONS

For the purposes of this manual, the following definitions apply:

“Alignment”	means the location within a Service Corridor or on a City Structure approved by the City for installation of Equipment by the Company in accordance with the permit.
“Anchors/down guys”	means a heavy gauge wire attached from a utility pole to an anchoring structure in the ground to assist in holding a utility pole line.
“Approved work area”	means a location in a street or on a city support structure, adjacent to an approved alignment and approved by the street utilities committee, which a permit holder may occupy to do work in an approved alignment under a permit.
“Backfill”	means the material that has been used to fill in an excavation.
“City”	means the City of Vancouver.
“City Engineer”	means the chief administrator from time to time of the Engineering Services Department of the City of Vancouver and includes any person to whom the authority of the City Engineer has been delegated.
“City Structure”	means a City-owned bridge or viaduct in, on, over, under, along or across a Service Corridor.
“Conduit/Duct”	means the piping system used to carry electrical or communication wires and cables.
“Ductbank”	means a number of conduits or ducts bundled together or encased in concrete together.
“Encased”	means a concrete covering around an underground utility duct for protection from other construction activities. It is applied 75mm in thickness.
“Equipment”	includes: <ul style="list-style-type: none">(a) Systems, structures, utilities and facilities including telecommunication facilities defined in the Telecommunications Act (Canada);(b) Poles, cables, wires, governors, regulators, pipes, ducts, conduits, pedestals, vaults, braces, anchors, amplifiers, connection panels, transformers, valves, fittings and other equipment whether or not any of them form part of or are an accessory to the systems, structures, utilities, or facilities referred to in subsection (a); and

- (c) Wireless equipment, located under the street, that provide for the transmission, emission, or reception of voice, data, video and other signals by electromagnetic waves propagated in space.
- “Improved street”** means any public road that has curb and gutter and asphalt pavement. Street treatments may also include sidewalks, pedestrian bulges, traffic circles and trees.
- “Kiosk”** means aboveground structure containing utility equipment.
- “Lateral”** means an underground service to a property originating from a utility distribution system.
- “Mainway”** means an underground route or network containing the infrastructure of utility equipment.
- “Pavement degradation”** means the diminished lifespan or the increased need for maintenance of the pavement structure of a street resulting from the conduct of work in that street.
- “Permanent restoration”** means restoration of the surface of a street to a condition as near as possible to or better than that which existed before a permit holder has excavated, broken up, or otherwise disturbed the street during the course of doing work, including:
- (a) the repair or replacement of curbs, sidewalks, poles, conduits, or other facilities;
 - (b) testing, backfilling, permanent patching and line painting;
 - (c) if repaving or overlaying of the pavement has occurred during the five year period immediately prior to the date of issuance of the permit for such work, grinding and overlaying the full lane width of pavement;
 - (d) if repaving or overlaying of the pavement has occurred during the two year period immediately prior to the date of issuance of the permit for such work, grinding and overlaying the full width of the pavement from curb to curb.
- “Pilaster”** means the concrete surround, up to 300mm, at the base of a utility pole protecting a wire or cable entering the ground. It also denotes the protective fibreglass cover protecting that wire or cable and is placed from the concrete surround at the pole base to a height of 3.0m above the ground.
- “Property line”** means the boundary line between private property and the City street right-of-way.

“Service connection”	means an overhead or underground utility service to a property.
“Service Corridor”	means a street, lane, highway or other service corridor located within the City of Vancouver, but excludes a City Structure.
“Street”	means any public rights-of-way belonging to the City of Vancouver and includes lanes.
“Street Utilities Committee”	means a committee comprised of the City’s General Manager of Engineering Services and Deputy City Engineer.
“Use”	(noun) means to occupy, or to operate equipment in, an approved alignment.
“Utility Company”	means the entity owning plant in the City street right-of-way.
“Utility corridor”	means the alignment provided for a specific utility for their equipment installation.
“Utility Permit Drawing”	means a drawing of the proposed utility installation submitted to the City for approval.
“Vault”	means an underground chamber where utility equipment can be accessed.
“Work”	<p>means to excavate, or to place, erect, install, construct, repair, maintain, alter, extend, replace or re-locate equipment, in a street or on a city support structure, or to remove equipment from a street or city support structure, but does not include:</p> <ul style="list-style-type: none">(a) routine maintenance of existing equipment under a street; or(b) installation of equipment in existing ducts under a street; and <p>that does not involve excavation of a street or, in the opinion of the street utilities committee, cause undue disruption to a street or city support structure or to users of a street or city support structure.</p>

3.0 UTILITY DESIGN REQUIREMENTS

The following section outlines the utility design requirements for the installation of both underground and overhead utility plant, within the City street right-of-way. The City maintains its design requirements to safeguard the public, protect City staff and contractors, and preserve the integrity of all buried plant within its streets. It is the responsibility of the utility company to comply with the minimum requirements outlined in this section, with any divergence requiring the approval of the Utilities Management Branch. It is important to note that these requirements are not intended to replace standards set by regulators or those accepted as good engineering practices.

3.1 Depth of Cover

The minimum depth of cover for underground utilities within City streets varies depending on utility, plant type and location. The depth of cover for any utility is measured from the street surface to the top of the duct, if direct buried, or top of the concrete if the equipment is concrete encased. If the street elevation is subsequently altered, the utility may require modification to meet the minimum depth of cover requirements. When attempting to locate existing underground utility plant, it must not be assumed that all utilities are at standard depth. The table in Section 3.2 summarizes the minimum depth of cover, as it relates to the utility and plant type.

3.2 Minimum Depth of Cover Requirements

Utility	Type of Plant/Equipment	Placement Requirements	Minimum Depth (mm)
Gas (Terasen)	Services	Under travelled portion of road, including shoulders within right-of-way	610
		Elsewhere	460
	Mains (150mm diameter)	At Crown of Road	760
		At Low Point of Road	610
	Mains (200mm diameter)	At Crown of Road	910
		At Low Point of Road	610
Mains (250mm diameter and greater)	Profile Required	1070	
Hydro (BC Hydro)	Laterals (connections)	Site Specific	910
	Main Ducts	Profile Required	1070
	Manhole Roofs	Site Specific	460

Utility	Type of Plant/Equipment	Placement Requirements	Minimum Depth (mm)
Telephone, Cable and Communications	Laterals (connections)	Site Specific	910
	Main Ducts	Profile Required	1070
	Manhole Roofs	Site Specific	460
Coast Mountain Bus Company	DC Feeders	Profile Required	1070
Central Heat Distribution Limited (Steam Heat)	Main Pipes (including casing)	Profile Required	1070
	Service Pipes	Site Specific	910
	Vents and Trap Lines	Site Specific	460
Greater Vancouver Water District (Water)	Mains	Profile Required	1070
Greater Vancouver Sewerage & Drainage District (Sewer)	Mains	Profile Required	1500

3.3 Alignment

With the growth in demand for underground space, utility corridors are becoming a scarce and limited resource. In preserving the City street right-of-way for present and future use, the Utilities Management Branch coordinates its efforts to minimize the amount, while maximizing the efficient use, of underground space occupied by each utility.

To ensure a utility obtains the City's approval, all new utility installations should strive to minimize the amount of plant on and within City streets. Alignments selected for proposed utility installations must adhere to the following conditions:

- Alignments of any new plant should coincide with that of existing plant;
- When installing underground service to the same customer, those services running in parallel alignments are required to share a common trench. Joint trench details must be clearly illustrated on utility company drawings;
- When abandoning plant, the alignment should replace or be placed immediately adjacent to the existing plant;
- Alignments must be parallel or perpendicular to street property lines;
- A continuous alignment for the length of the installation is preferred;
- All horizontal bends must be 90 degrees and have a 0.91m radius;

- Any exceptions require approval from the Utilities Management Branch.

Service connection installations to individual properties must maintain a minimum horizontal separation of 0.9m, edge to edge from other utility equipment. The exception to the aforementioned requirement is sewer mains, where there is a minimum horizontal separation of 1.5m, edge to edge. These clearances ensure all health and safety standards are met, as well as affording safe work zones to install and maintain services.

The Utilities Management Branch recognizes that existing plant located within the City streets may present obstacles in satisfying the conditions in this section. If a utility company has any concerns selecting an alignment, the Utilities Management Branch is available to assist in determining a suitable alignment.

3.4 Utility Clearances

The City's utility clearance requirements have been developed over many years of field experience and by the application of a pragmatic approach that aims to balance all competing interests. Standard utility clearances between existing underground utilities have been established to minimize conflict and ensure a safe work zone exists around each utility's equipment. When construction activities require a utility to be temporarily or permanently relocated, arrangements that are equitable to all parties affected will be made via the Utilities Management Branch.

3.4.1 Vertical Utility Clearance

The minimum vertical clearance when crossing a utility is 0.3m. All vertical clearances are measured from the closest outside edge to closest outside edge of the utility plant. Any exceptions to this clearance will require approval from the affected utility or utilities, as well as the Utilities Management Branch.

3.4.2 Horizontal Utility Clearance

The minimum horizontal clearance between utilities is 0.9m, with the exception of access chambers, valve boxes, street light bases, etc., where the minimum horizontal clearance between these and other utilities is 0.3m. All horizontal clearances are measured from the closest outside edge to closest outside edge of the utility plant. Any exceptions to this clearance will require approval/agreement from the affected utility or utilities, as well as the Utilities Management Branch.

Sewer main construction often requires deep excavations with wider trenches to allow for extra shoring and safe working room. With the added concern of shallower utilities collapsing into deeper sewer trenches, the City places restrictive requirements on utilities, requiring a minimum horizontal clearance of 1.5m from all sewer mains. In addition, the City reserves the right to require additional clearance under special circumstances.

3.5 Concrete Encasement

Encasement in concrete is required for the following utilities:

- B.C. Hydro / British Columbia Transmission Corporation
- Coast Mountain Bus Company
- Cable and communication company ductbanks containing more than 16 conduits. The Utilities Management Branch may also require smaller ductbanks to be concrete encased under conditions of insufficient depth, wide radius bends or proximity to other utilities.
- Private encroachments may require concrete encasements.

The City requires that all concrete encased ducts shall:

- Be able to support their weight over a perpendicularly positioned utility trench;
- Have a minimum 75mm width around the conduit;
- Have both vertical sides of the concrete encased ductbank formed; and
- Meet minimum requirements as set by the most current C.S.A. Standard A23.1-04/A23.2-04 - Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard practices for Concrete.

3.6 Manholes

The following section outlines the City's design requirements as they pertain to standard manholes. The City's primary concerns focus on the location of manholes within the street corridor, capacity for adjustment and drainage provisions.

3.6.1 Location of Manholes

To preserve utility corridor space for present and future needs, the City requires that installation of manhole or access chambers:

- Have the longer side of the equipment aligned parallel to the property line;
- Be placed directly overtop the utility alignment and not offset to a side;
- Maintain a minimum clearance of 10.0m from street intersections. This requirement ensures ease of access and adequate visibility for vehicle traffic during maintenance activities;
- Preferably, be located in the boulevard or curb lane of the roadway, so as to minimize disruptions during construction and maintenance activities;
- Are not permitted within a lane entrance or intersection curb return areas (refer to items in Section 3.7.2 regarding ramp areas).

3.6.2 Vertical Adjustment Requirement

As there is a potential for vertical grade changes to City roads, manhole lids are required to be adjustable. To accommodate this, the manhole lid frame is to sit on either bricks, pre-cast concrete slabs or the equivalent. Furthermore, the neck of the manhole must be a minimum 450mm in height to allow vertical adjustment to meet the finished grade of the roadway.

3.6.3 Sewers and Drainage “D-Permits” for Utility Company Manhole Drains

A utility access chamber requiring a drainage connection to the City sewer network is required to have a “D” permit issued by the City’s Sewers and Drainage Design Branch. Arrangements to obtain a permit can be made by contacting the Sewer and Water Client Service Centre at 604.873.7357.

During the permit issuing process, the Sewers and Drainage Design Branch will determine the ideal location for the manhole drain. To assist in the sewer drain design, the City generally requires a two-week notice and a copy of the utility design drawing. There is an annual charge, per drain, to connect to the City’s storm, combined or sanitary sewer system, with the exception of a select number of City storm sewers. Manhole drains can be installed by the utility company to within 0.3m of the designated sewer main, and the City Sewer crews will then make the connection to the sewer network.

The City requires that the utility company’s installed portion of the manhole drain meet the applicable standards listed below for vitrified clay pipes or P.V.C. Class SDR-28.

- A.S.T.M. Standard C 700-91 - Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
- A.S.T.M. Standard C 425-91 - Compression Joints for Vitrified Clay Pipe and Fittings.
- C.S.A. Standard B-182.1-M92 - Plastic Drain and Sewer Pipe and Pipe Fittings.
- A.S.T.M. Standard D 2412-93 Standard Test Method for External Load Characteristics of Plastic Pipe by Parallel-Plate Loading.

When applying for a “D” permit for a manhole drain, the utility permit drawing must show the following:

- Connection including the chainage distance to the nearest perpendicular property line from the sewer main;
- Size of the proposed drain;
- Any connections between manholes to the draining manhole;

- The existing drainage system for each manhole shown on the design drawing (e.g., drain, rock pit, sump); and
- Identification numbers for all manholes.

In special circumstances, ductile iron pipe class C 1.52, conforming to ANSI/AWWA C151/A21.51-91 Ductile-Iron Pipe, Centrifugally Cast, for Water or other Liquids, should be substituted:

- When the depth of cover is less than 1.2m;
- When the depth of cover is greater than 3.7m;
- If ground conditions are unstable;
- When crossing under railway tracks;
- If crossing a utility less than 450mm away.

Utility companies must be cognisant that the City of Vancouver at no time guarantees the long-term location or availability of any manhole drains. From time to time, upgrades to the City's sewer network system may result in relocation of sewer mains. Costs associated with the relocation or removal of any existing drain, requested by the City, will be the responsibility of the utility company.

3.7 Surface Structures

The following sections detail loading and placement criteria of surface structures, including vaults and non-standard manholes.

3.7.1 Loading Criteria

The City requires that all structures located within the street right-of-way constructed with non-standard manhole frame and lid components, meet or exceed the City's minimum design load requirements. CAN/CSA S6-06, in conjunction with the BC Ministry of Transportation Supplement, shall be the minimum acceptable design standard for these structures. The City recognizes that vehicles of varying size and weight frequently occupy sidewalk and other non-travelled portions of the right-of-way, and note that the referenced design standard applies equally to structures within these areas. An exception to the aforementioned exists for those structures in sidewalk areas, where a design load reduction pursuant to Section 3.8.4.4 of the referenced CSA standard applies.

- The BC CL-625 vehicle shall be used for loading designs, recognizing that the BC design vehicle includes higher axle load ratings than the CSA design vehicle.
- Subject to the size of the intended structure, manhole frame and lid components must account for the probability of loading from multiple axles (i.e., loading from axles 2 and 3, etc.).

- As tridem axles are permitted on single-unit vehicles in BC, the City recommends this loading configuration be considered in designs (BC Commercial Transport Regulations).
- Several vehicle operators are known to operate vehicles within the City that exceed normal provincial loading regulations (e.g. Coast Mountain Bus Company states they have a provincial exemption to operate their buses to the full axle load rating of their vehicles. CMBC has stated that some of their buses have operational axle loads of up to 13,000 kg on a single drive axle - approx 127.5 kN - when operating at full capacity).
- There is always variability in the actual vehicle operating loads. While there are provincial regulations and City bylaws regulating allowable axle loading (BC Commercial Transport Act & Commercial Transport Act Regulations, City of Vancouver Street & Traffic Bylaw), it cannot be guaranteed that vehicles will not exceed these legal load limits. There are real possibilities that vehicles, particularly overweight vehicles, exceeding legal load limits will enter into sidewalk areas and other non-traveled portions of the street.

3.7.2 Placement Criteria

Alongside the aforementioned loading criteria, surface structures shall comply with the following requirements:

- Clearance shall be maintained near standard pedestrian ramps (City of Vancouver Curb Ramp Design Standard in the Street Restoration Manual). Placement criteria (applicable to double curb, large single ramp and lane curb ramp designs) shall be the greater of a:
 - (a) 2.0m setback from the BC/EC to the closest edge of the structure; or
 - (b) 3.0m setback from the adjoining street property line to the closest edge of the structure.
- Clearance shall be preserved to allow for construction of standard road configurations where existing curbs, sidewalks, etc. were not built to meet current standards (i.e., the provision for future flared lane entrances, curb ramps, etc.).
- Vault installations adjacent to existing buildings shall accommodate future grade changes, where existing elevations and structures (e.g., road, sidewalk, building grades, and curb face height) have not been constructed to current City standards.
- Vaults shall maintain a minimum 1.0m clearance from typical surface features such as poles, fire hydrants and street furniture.
- Vaults shall maintain the greater distance of:
 - (a) 1.5m measured at breast height (1.4m high) from the main trunk; or
 - (b) six times the tree trunk diameter (measured at breast height) from the main trunk of the tree at breast height,

from street trees. The City of Vancouver Park Board may conduct an inspection and/or review where proposed equipment is likely to affect the root system.

- Vaults should maintain a minimum 1.0m clearance from residential and business entrance/walkways.
- Standard clearances from all other utilities shall be maintained.
- The ideal location for vaults is between the back of the sidewalk and the property line (as close to the adjacent property line as possible).
- The vault roof is to be installed at the City design grade. In situations where there is an improved boulevard, the vault will meet existing street grade. For those installations in unimproved boulevards, the City will provide design grades at all four corners of the vault.
- Utility equipment is not permitted in roadways or crossings.
- Vaults should not be located in front of or behind bus-stop shelters.
- The maximum gap permitted for all grates shall be 6mm.
- A minimum allowance for a 100mm vertical adjustment of the equipment is required to accommodate changes to street grade and settling.
- All equipment (e.g., lids, covers) must take into account 'vulnerable street users' and have a minimum 0.5 and 0.6 wet and dry coefficient of friction, respectively.
- Equipment must be located within the existing utility alignments and/or corridors and will not be permitted where proposed placement may inhibit the use of a future corridor or limit optimum use of such space.
- To minimize the amount of utility corridor space occupied, equipment is to be installed with the longer side parallel to the property line.
- Vault locations should accommodate standard street treatments (e.g., utility strips, sidewalks, pedestrian lane crossings).
- Property owners shall be notified (depending on the size of the equipment) prior to the submission of any proposed drawing to the City, where equipment may possibly be situated. Notification is not a request for approval from property owners, but awareness for overall design considerations).
- Attention must be paid to overhead encroachments (e.g., awnings, building overhangs, canopies) that may be installed directly over proposed locations.
- Locates for all buried utility equipment and service connections within the immediate area of a proposed alignment must be undertaken and included on proposed drawings.
- Where equipment is to service a new development or redevelopment, plant shall be located on private property.
- Terasen Gas Regulator Station structures are only permitted on flankage streets.

3.8 Aboveground Surface Structures

The City's preferred location for aboveground surface structures is on private property, with the exception of communication kiosks, monitoring kiosks and Central Heat Distribution Limited vent planter equipment. This equipment may be placed on City streets, following review by the City Utilities Management Branch and neighbourhood consultation (includes providing adjacent property owners with an accurate rendering of the proposed facility). Final approval considerations include aesthetics as it relates to the overall streetscape, affects on vehicle and pedestrian movements, sightlines and the position of the equipment. The following sections detail the City's requirements for aboveground surface structures.

3.8.1 Location of Aboveground Surface Structures

B.C. Hydro Kiosks and Pad Mounted Transformers:

- This equipment is to be situated in a B.C. Hydro right-of-way, on private property, and is not permitted within the City street right-of-way.

Communication Kiosks:

- To be located between the back of sidewalk and property line, with a maximum offset of 1.2m from the property line to the roadside face of the box. Where boulevards are less than 4.4m in width, a minimum clear path of 3.15m from the gutter-line to the roadside face of the box must be maintained;
- Located on a flankage street, as to minimize the visual impact on the adjacent property;
- Not permitted within lane entrance or intersection curb return areas (refer to items in Section 3.7.2 regarding ramp areas).

Monitoring Kiosk:

- Located between the back of the sidewalk and property line, with a maximum offset of 1.0m to the roadside face of the box;
- Located on a flankage street, as to minimize the visual impact on the adjacent property;
- Not permitted within lane entrance or intersection curb return areas (refer to items in Section 3.7.2 regarding ramp areas).

Central Heat Distribution Vent Planters:

- Steam vents are to be installed flush with the ground. The vent planter is no longer approved for installation on City streets, with all existing planters eventually being removed.

City requirements regarding the minimum clearance between all utilities and the following street equipment/furniture are:

- 1.0m for all wood and steel poles
- 1.0m for all planters
- 1.0m for all fire hydrants
- 1.0m for street benches
- 1.0m for all vehicle crossings
- 1.0m for pedestrian entrances (not applicable to those located within curb return areas, as defined in Section 3.7.2)
- 0.3m from sidewalks and future sidewalks (not applicable to those located within curb return areas, as defined in Section 3.7.2)

In the downtown vicinity and abutting any commercial developments where buildings are built to (including over) the property line, the minimum unobstructed length of sidewalk or boulevard is 2.5m from any intersection. The Transportation Division may place additional restrictions on a site-by-site basis, where concerns regarding sight lines arise.

City requirements regarding kiosks, excluding those for use in wireless applications that are subject to the City of Vancouver Wireless Antenna Standards, specify that such equipment:

- Must be located on or as close as possible to lot lines;
- Not permitted adjacent to any school or playground; and
- Be positioned with the longer side and/or doors of the kiosk running parallel to the street property line.

3.8.2 Foundation Requirements

The City requires that all foundations of aboveground structures:

- Must not extend beyond the edges of the structure; and
- Shall be installed flush to meet street design grade.

3.9 Poles, Pilasters, Transformers and Anchors

The following section details the City's design requirements for utility poles, pilasters, transformers and anchors. The City does not permit any utility to install new pole lines or extensions to existing pole lines. Any additional poles proposed within an existing pole line will be discouraged and must be approved by the Utilities Management Branch. Moreover, the installation of new "H-frame" poles is not permitted.

New replacement poles awaiting installation are permitted to be stored on the City streets for a maximum of one week prior to installation, at the risk and responsibility of the utility company. The acceptable location for the temporary storage of the poles is on the boulevard of a flankage street. Conditions regarding storage include that poles shall:

- Be secured in place at all times;
- Not block moving or parked vehicles;
- Not impede pedestrian traffic; and
- Never be stored in front of a residence or business.

3.9.1 Location of Poles

When an additional pole is to be installed on a street or an existing pole is to be relocated, there are standard pole locations for placement. Existing conditions, specifically building setting, will generally restrict available locations. Generally, pole locations shall be:

- At lot lines or projected lot lines;
- A minimum 1.0m clear of vehicular crossings;
- A minimum 1.0m clear of fire hydrants;
- A minimum 1.0m clear of catchbasins;
- A minimum 1.0m clear of crosswalks.

Standard pole offsets (from pole centre to property line) in lanes with a right-of-way width of:

- Less than 3.1m, are not permitted;
- From 3.2m to 6.1m wide, is 0.40m; and
- From 6.2m to 10.1m wide (West End), is a minimum of 0.4m to 0.9m.

Standard pole offsets (from pole centre to property line) in streets with a pavement width of:

- Up to 11.0m is 4.0m; or
- From 11.1m to 12.0m is 3.0m.

For street widths greater than 20.0m or for those streets with boulevards narrower than the standard offset, the pole centre should be located 0.5m back of the curb face. Future curb locations must be confirmed with the Utilities Management Branch.

3.9.2 Overhead Transformers

All overhead transformer installations must be reviewed by the Utilities Management Branch, to ensure their presence minimizes the impact on the surrounding neighbourhood. Considerations taken into account include location, where overhead transformer installations must be immediately adjacent to the property requiring the service and ensuring that they meet or exceed applicable standards as established by the Canadian Electrical Code.

3.9.3 Concrete Pilasters

The maximum height of concrete pilasters as set by the City in:

- Lanes with guard is 300mm;
- A street boulevard with guard is 50mm; and
- A street sidewalk with guard is 50mm.

The concrete pilasters are not to extend into the travelled portion of the sidewalk or past the roadside face of the pole.

3.9.4 Down Guy and Anchor

The location of down guy and anchor equipment is determined by either BC Hydro or Telus, based on the needs of their equipment on pole lines. All new anchor locations must be approved by the Utilities Management Branch. Due to the serious impact this equipment can have on adjacent properties, a thorough review is carried out to ensure there is a balance between the needs of the utility company and affected property. The presence of existing anchors can also raise concerns for property redevelopment projects, resulting in a need to have the down guy and anchor relocated. The preferred resolution has involved altering the length of the existing down guy and anchor, to suit the proposed development. The following are general location requirements for down guy and anchors installations:

- The down guy must be parallel to the property line, maintain the same offset as the pole line and not extend past the street or lane property line;
- A sidewalk guy must be installed at right angles to the property line, with the anchor at a maximum distance of 0.3m from property line;
- Access to existing entrances or driveways must not be compromised; and
- The down guy must not cross in front of a gas meter, Pad Mounted Transformer, or any other utility equipment located on private property.

3.9.5 Steel Trolley Poles – Coast Mountain Bus Company

The location of Coastal Mountain Bus Company steel trolley poles must:

- Be at lot lines or projected lot lines;
- Maintain a minimum 1.0m clearance from vehicular crossings;
- Maintain a minimum 1.0m clearance from fire hydrants;
- Maintain a minimum clearance from intersection and lane curb return areas (as defined in Section 3.7.2);
- Maintain a minimum 1.0m clearance from catchbasins;
- Maintain a minimum 1.0m clearance from crosswalks;
- Be 430mm from the face of the curb to the centre line of the pole for A7E pole types;
- Be 460mm from the face of the curb to the centre line of the pole for A3E pole types;
- Be 535mm from the face of the curb to the centre line of the pole for A20E and A23E pole types.

The installation of guy wires, where new trolley poles and foundations are being installed, is not permitted.

3.10 Overhead Wires

The minimum above ground clearance for any overhead wire or cable installation across or along any street or lane shall be the greater of:

- The applicable clearance defined in the latest version of CSA Standard C22.3 No. 1-M87 - Overhead Systems and Underground Systems; or
- 4.9m.

Any utility with overhead wire installations found below the minimum height allowance, will be required to be adjusted upon receiving notification from the City.

3.11 Steam Heat Vents

Steam heat vents are permitted on City Streets (vent planters are not permitted within streets), provided they meet the following requirements:

- Vents must be flush with the surface (maximum 6mm surface deviation);
- Maintain a maximum allowable grate spacing of 6mm from edge to edge;
- Vents must not conduct heat at temperatures greater than 60 degree Celsius.

3.12 Surface Inlay Fibre

Surface Inlay Fibre ('SIF') is permitted on a conditional basis in the City of Vancouver. Utility companies wishing to utilize this installation technique are required to enter into a separate Municipal Access Agreement with the City specifically for the use of SIF, and adhere to installation standards. The current City Surface Inlay Installation Standards can be found in Appendix D.

4.0 UTILITY PERMIT SUBMISSION – DRAWING STANDARDS

The following section outlines the requirements for utility drawing submissions made to the City of Vancouver. All utility permit application submissions must include an electronic drawing of the proposed installation. As the City will not accept multiple works on a single drawing, Applicants must submit separate drawings for each installation. Upon request, the Utilities Management Branch will provide the City GIS base information for the area of the proposed utility design. In order to receive this information, the GIS Database License Agreement must first be completed and returned to the City. Submissions to the City include:

(A) Electronic Submission:

- See Appendix A - City of Vancouver External Utility Electronic Submission Standards. This supplement provides the submission template for electronic drawing submissions to the City.

(B) Manual Submission:

- Underground Construction - 3 copies
- Aerial Construction - 1 copy
- "Information Only" plans not requiring approval - 1 copy

In an effort to ensure consistency and accuracy, all submissions must adhere to City's drawing standards. Proposed utility designs shown superseded on a previously approved and constructed plan will not be accepted. They should not be included as a revision to an existing drawing, and will require a new drawing number, as well as meet all other approval requirements.

4.1 Standard Metric Scales

(A) Scales:

- 1:500 Horizontal scale for plan drawing
- 1:250 Horizontal scale for plan drawing in congested areas
- 1:100 Vertical scale for profile
- 1:25 Detail of ducts, poles, boxes, etc.
- 1:50 Detail of ducts, poles, boxes, etc.

(B) The metre (m) unit is used for:

- Horizontal distances
- Elevations (geodetic datum)

- Offsets
- Outside dimensions of manholes, boxes, etc.

(C) The millimetre (mm) is unit used for:

- Duct cross-section details
- Duct or pipe diameters

4.2 Base Plan

All base plan submissions to the City should include the following details:

- North arrow (at top corner of drawing)
- Street, lane and easement property lines
- Street names
- Lot lines and lot legal descriptions
- Title
- Scale

4.3 Title Block

(A) Location:

- The title block will include a description of the construction site using north-south and east-west street names (e.g., lane south of Broadway, Laurel Street to Oak Street, or 8th Avenue east of Cambie Street). Where possible, lanes should be described using "lane south" or "lane west" naming convention. For those permit applications with site services, if available the site address should be noted.

(B) Type of installation. This indicates whether the work is overhead or underground. Each work is to be detailed as follows:

- Overhead - Identify whether the work is a new installation or upgrade of existing utility equipment.
- Underground - Identify whether the work is a joint trench. This will reference the drawing number for any other works, another utility company may be installing or have installed in the joint trench construction (i.e., Telus, Hydro, etc.). All utility companies will submit separate utility permit drawings.

(C) Revisions to existing drawings:

- When a change that has been approved by the City is made on the permit drawing and the drawing has been resubmitted for approval, a revision number along with a brief description of the change (e.g., duct O/S on Cambie Street) must be included. Any drawing submitted as a revision will require re-approval.

4.4 Related Drawing

A related drawing is a drawing that includes work that is to be carried out in conjunction with work on the original drawing (e.g., aerial work, utility abandonment). Related drawings are to be referenced by an appropriate drawing number, and adhere to the City utility drawing standards.

4.5 Dimensions

All utility equipment shown on the permit drawing must be dimensioned as follows:

- Offsets are required from street or lane property lines (perpendicular to the property line), for all poles, ducts, pipes, manholes, boxes and valves;
- Distances are required from the closest street or lane property line (parallel to property line), for all poles, site services, duct bends, manholes, boxes and valves. This is commonly referred to as the "chainage" distance;
- The drawing must show all existing utilities, correctly dimensioned and labelled;
- Include the offset and description of the proposed ducts or pipes;
- Show outside dimensions of all manholes, boxes, etc., in separate detail;
- Radius and angle of all bends;
- Location and height of pole pilasters;
- Cross-section of the duct configuration, showing minimum cover, duct size and the outside dimensions for concrete encasement of ductbank (if applicable).

4.6 Profile

A profile is required for permit drawings for the following installations:

- All utility mainways;
- Any ductbank with over 16 or more ducts;
- Coast Mountain Bus Company DC feeder ductbanks;
- Terasen Gas mains over 250mm in diameter;

- Central Heat Distribution Limited mains;
- GVRD sewer and water mains.

The profile must clearly identify:

- Vertical scale;
- Size and number of ducts or pipes;
- Cross-section of all utilities being crossed, drawn to scale and labelled.

4.7 Record Drawings

Record Drawings serve as the final record of what has been installed within the City streets, and the City may be required to rely exclusively on a Record Drawing for design, construction or maintenance activities. The Record Drawing must show all information incorporated by the City upon approval, alongside those changes made in the field, and shall be provided to the City within 30 days following the completion of construction. All Record Drawings submitted to the City must be certified by the permit holder as the final Record Drawings.

4.8 Cancelled Drawings

The City must be promptly informed of any proposed utility permit drawing that has been cancelled.

4.9 Abbreviations

Abbreviation	Utility	Owner
C	Steam Heat Pipe	Central Heat Distribution Ltd.
E	Electrical Distribution Duct	B.C. Hydro
E#	High Voltage Transmission Duct	B.C. Hydro
E(TR)	Trolley D.C. Feeder	Coast Mountain Bus Company
E(G)	Cathodic Protection Duct for Gas Main	Terasen Gas
G	Gas Main	Terasen Gas
G@	Trunk Pressure Gas Main (operating at 700 kPa pressure)	Terasen Gas
G*	Trunk Pressure Gas Main (operating at over 700 kPa pressure)	Terasen Gas
(PTE)	Private Utility	Various
S	Sewer (combined, storm, or sanitary)	City of Vancouver
S(F.M.)	Sewer Force Main	City of Vancouver

Abbreviation	Utility	Owner
S(D)	Collector Sewer	G.V.R.D.
12"/8"S	Twin Sewer (size indicated)	City of Vancouver
8'x 8'S	Box Sewer (size indicated)	City of Vancouver
T	Telephone Duct	Telus
TeraSpan	Surface Inlaid Fibre Optic Cable	TeraSpan Networks
A2B	Surface Inlaid Fibre Optic Cable	A2B Fibre Inc.
Novus	Surface Inlaid Fibre Optic Cable	Novus Entertainment Inc.
T(co. name)	Telecommunications Duct	MTS Allstream
		Bell West
		MK Telecom
		Urban Networks Inc.
		Business Objects
		Navigata (A Sasktel Company)
		A2B Fibre Inc.
		Novus Entertainment Inc.
T.V. (Shaw)	Duct (Communication or T.V.)	Shaw Cablesystems Limited
V.E.D.	Vancouver Electrical Duct (City Communication)	City of Vancouver
S.L.	Street Lighting Duct	City of Vancouver
W	Water Main	City of Vancouver
W(D)	Feeder Water Main	G.V.R.D.

4.10 Utility Company Standards

All utility drawings submitted for permit approval must clearly indicate on the drawing if they require additional considerations for the following:

- Installation methods
- Vertical or horizontal clearances
- Special backfill
- Other issues unique to the utilities equipment

The Utilities Management Branch will assess whether accommodations for the utility plant can be made at the selected location, based on set standards, or if all may be better served with alternate location.

5.0 CONSTRUCTION REQUIREMENTS

Utility company installation and maintenance work on City streets will be subject to all applicable City standards, policies and codes. Work is to be carried out by the utility company's employees or their contractor, to the satisfaction of the City Engineer or its representatives. New overhead or underground utility construction on the street may only proceed once approval of the utility permit drawing has been granted from the Utilities Management Branch. This approval is valid for a period of six months from the signed date of approval. If construction has not commenced by the end of that period, the City must be notified that the installation has been cancelled, or a request to re-approve the drawing must be made. The City reserves the right to make changes or include special conditions to the drawing, and it is the sole responsibility of the utility company to ensure all changes are incorporated and conditions met.

Pavements, sidewalk cuts and excavations shall be backfilled and restored as outlined per the latest version of the City "Street Restoration Manual". Compaction tests may be required at the discretion of the City Utilities Inspector at the utility company's expense, with the findings sent to the City Utilities Inspector. Any grass, trees, shrubbery or landscaping damaged during construction shall be restored to their original condition, at the utility company's expense, as directed by the City.

5.1 Scheduling

All approved utility permit drawings are reviewed for traffic concerns, tree protection requirements, neighbourhood notifications and other issues unique to the selected alignment. As City streets are corridors shared by various interests, the Utilities Management Branch, after proposed work has been approved, requires a minimum of 48 hours notification prior to the commencement of all utility construction. The notification process provides adequate time for the City to identify and review any potential conflicts that may arise, as well as ensuring all construction requirements have been met. Utility construction projects requiring a traffic plan, must submit a plan for approval a minimum of five working days in advance of the construction start date. Furthermore, if there is a requirement for review and approval from the City Park Board, the additional notification will require a minimum of five working days.

The Utilities Management Branch serves as the single point of contact for all scheduling, as the Utilities Inspector is not available for scheduling issues. When a pre or post-construction meeting is requested by the utility company, the Utilities Inspector will act as the City representative. Arrangements for their attendance are made through the Utilities Management Branch.

Any construction commencing without proper notification to the Utilities Management Branch or neighbourhood where the work will be conducted, will result in an immediate stop work order. The City recognizes that circumstances can arise where exceptions to the above process will be necessary and all attempts will be made by the Utilities Management Branch to accommodate these exceptions to schedules.

5.2 Local Neighbourhood Notification Requirements

The utility company shall provide written notification, on utility company letterhead, of any pending construction projects to all residences and businesses within a defined area of the project, as specified by the Utilities Management Branch. The notification must be provided two weeks prior to the installation of the utility equipment and include:

- Utility company, contractor name and phone number;
- Type and location of the proposed installation;
- Start-up date and estimated duration of construction;
- Short description of work done, including City approval;
- Description of any anticipated traffic impacts.

Particular attention must be paid to those construction projects in locations where there are public facilities as such parks, community centres and schools. The utility company must contact the park, community centre or school to ensure that construction activities will not impose major inconveniences or adversely affect any special events that may be planned. Temporarily avoiding works in the adjacent properties may be required.

Any utility construction in the proximity of a fire hall or hospital must be coordinated by the utility company, such that public safety access can be maintained at all times.

The Utilities Management Branch must be informed and included in all construction notification correspondences.

5.3 Inspection

The City Utilities Inspector will conduct a site visit to each utility construction project at least once a day, and more if deemed necessary. The primary role of the Utilities Inspector is to oversee utility construction activities in relation to the City's established standards, policies and guidelines. This includes vehicle and pedestrian safety as it relates to the Traffic Management Plan and site cleanliness. Non-compliance with any standards, policies or guidelines may result in a stop work order.

5.4 Utility Company Inspector

Utilities installing plant on City streets are required to have a competent Utility Company Inspector. The primary responsibility of the inspector will be to ensure all construction requirements of the utility installation are adhered to, as laid out in the permit approval drawing. This includes, but is not limited to, being responsible for the performance of the contractor, correct installation of the utility equipment, ensuring public safety, site cleanliness, adherence to traffic requirements and neighbourhood notification. Furthermore, the inspector must be available during working hours through the course of the utility installation to address any issues.

The Utility Company Inspector acting in conjunction with the City Utilities Inspector, with approval of the Utilities Management Branch, may make changes to the construction schedule, equipment installation details, and traffic plan layout, if the construction activities deem it necessary. Conflicts that arise with surrounding residents or businesses are the responsibility of the Utility Company Inspector to address and resolve.

5.5 Utility Company Site Supervisor

At all times during the utility construction, plant installation or maintenance work, there will be a competent site supervisor. The site supervisor will assume the Utility Company Inspector's responsibilities when the Utility Company Inspector is unavailable.

5.6 Traffic Management Plan

As a condition of approval for the Utility Permit, the Utilities Management Branch may require an acceptable Traffic Management Plan be provided to the City, a minimum of five days prior to the start of construction activities. The Traffic Management Plan, submitted by the utility company, must outline the provisions for all forms of traffic control required during the duration of the construction project. The Traffic Management Plan will be in accordance with the current version of the "British Columbia Ministry of Transportation Traffic Control Manual for Work on Roadways".

Construction projects requiring lane closures must be approved in writing by the City. The Traffic Management Plan will indicate bicycle, pedestrian and vehicle routes, as well as address resident and business access requirements. It will outline the major user groups affected by the utility construction and may include, but not be limited to, the following:

- Emergency services
- Transit authorities
- Pedestrians, cyclists and motorists
- Transport and tour bus companies
- Ministry of Transportation
- Translink
- Residents, property owners and businesses
- Special events
- Schools and community centres
- Fire halls and hospitals
- Any other entity identified by the City of Vancouver

The Traffic Management Plan will detail the designated truck access and egress points, appropriate routes through the City and applicable staging areas.

The utility company is responsible for providing, installing, and maintaining all traffic control and protective devices as outlined in the aforementioned Ministry of Transportation Manual. The utility company will supply both construction warning (1.2m x 2.4m, 1.2m x 1.8m and 1.5m x 1.0m) and job site identification (1.5m x 1.0m) signage to be installed by the utility company within the work zone and by the City of Vancouver outside the work zone. All costs of supplies, installation, maintenance and removal will be the responsibility of the utility company.

If these criteria are not met by the utility company, the Utilities Management Branch will issue a stop work order, until the situation is rectified. Moreover, the utility company may also be issued a fine.

The Contractor identification sign will display the Contractor's name, a brief description of the work, and a telephone number that directly connects the caller to the Contractor's personnel, who are familiar with and are currently active on the project.

5.7 Allowable Hours for Construction

The Utilities Management Branch will determine the allowable hours for construction based on traffic volumes and compliance with the City Noise Control By-law No. 6555. The By-law requires all construction related activities to be carried out between the hours of 7:00am and 8:00pm on any weekday including Saturday and between the hours of 10:00am and 8:00pm on any Sunday. The utility company will also accommodate, where reasonable, special events and other construction related activities as determined by the City of Vancouver.

Extended hours of operation for specific construction activities on selected dates, at the discretion of the Utilities Management Branch, may be requested in writing from the Mayors Office. Exceptions must be received by the City a minimum of ten days prior to any construction activities.

As special events, statutory holidays, emergency work and unforeseen circumstances can cause variations in traffic flow, the utility company shall use good judgement when scheduling hours of work and possible lane closures.

If the utility company determines that some construction activities cannot be reasonably completed within the allotted timeframes, the City of Vancouver will consider proposed variances submitted by the utility company. Proposed variances must be submitted a minimum of ten days prior to the scheduled implementation of the traffic management plan.

Some construction activities, such as 24 hour tunnelling, may require long-term variances. A detailed noise study on anticipated noise levels and proposed mitigation measures will be undertaken by a qualified noise consultant. A variance may then be issued with a set of maximum noise levels and conditions that must be satisfied during variance hours to maintain this variance.

5.8 Street Restoration Manual

The Street Restoration Manual outlines standards, specifications, and procedures for construction and restoration works of street, sidewalk, utility service cuts and trenches, made in the proximity of City streets. The manual provides “best practices” guidelines for City forces and utility companies, ensuring that excavations, backfill material, installation and compaction procedures, density requirements, and surface restoration on City streets are carried out in accordance with the best available standards and procedures.

Any backfill product that is requested for use, and is not contained in the Street Restoration Manual, will require a review and specific written permission from the City prior to its use. A copy of the most current version of the manual is available in electronic format from the City web site at vancouver.ca/srm.

5.9 Pre/Post Construction Meetings

When a pre or post construction meeting is requested by the utility company, the City Utilities Inspector serves as the City representative. The role of the Utilities Inspector in all pre-construction meetings will be to review construction set-up, schedule, and ensure compliance with the requirements as set out by the Utilities Management Branch. At post-construction meetings, the Utilities Inspector examines the construction site documenting issues regarding the final restoration, and damages to City streets resulting from utility construction.

It is in the best interest of the utility company to maintain a photographic record of the construction site prior to the commencement of the construction, and upon the completion of the temporary restoration. This will detail any locations where disagreements may arise between the City, public, neighbours or other utilities.

5.10 Subsurface Locates

The City encourages utility companies to physically confirm the location of underground utilities prior to construction. Techniques such as “M” Scoping, Ground Penetrating Radar and test holes are all acceptable practices. Arrangements must be made through the Utilities Management Branch for all test hole sites. Records identifying underground equipment is available through the Utilities Management Branch office, with additional utility information available through BC One Call.

5.11 Temporary “No Stopping” Signs / Lost Meter Revenue

Utility construction projects occupying a vehicle traffic lane or blocking a pedestrian sidewalk will require the installation of temporary no stopping signs. This allows for the realignment of traffic patterns to accommodate construction activities, as well as providing safe routes for pedestrians and vehicles. A utility construction site occupying the street without temporary “no stopping” signs and operating contrary to existing parking regulations, in violation of the Parking By-Law, will be issued tickets and possibly a stop work order. In situations where the installation of temporary no stopping signs includes parking meters, the utility company will be charged lost meter revenue for each meter occupied.

5.12 Access to Properties

Vehicle and pedestrian access to commercial and residential properties must be maintained at all times. When trenching along these locations, the properties affected will be notified in advance of any construction activities. The advance notice will provide those affected the opportunity to make alternative access arrangements, if necessary. Construction trenches at property entrances must be backfilled or plated at the end of each day, to allow access.

5.13 Saw-Cutting

Saw cutting is only permitted once Traffic Regulations and/or a Traffic Plan has been submitted, approved and implemented. Slurry generated from saw-cutting activities may contain several contaminants, and as such, the utility company must ensure that their contractors are controlling and securing any slurry resulting from saw-cutting activities to meet or exceed applicable municipal, provincial and federal standards.

Some recommended methods in preventing the discharge of saw-cutting slurry include, but are not limited to, the following:

- Minimize the quantity of water used to cool the saw;
- Avoid saw-cutting activities in wet weather;
- Cover or barricade catchbasins using filter fabric, inlet filters or sand/gravel bags; and
- Shovel, absorb or vacuum all slurry discharge.

5.14 Trenchless Technology

The use of trenchless technologies in the City of Vancouver, as a means of installing underground utility equipment, must be approved by the Utilities Management Branch prior to any construction activities. The City requires those companies employing trenchless technologies to utilize test holes at all utility crossings to minimize the risk of damage to existing utility equipment, and for the safety of the surrounding neighbourhood.

5.15 Construction Material Storage

Utility companies, at their own risk and responsibility, are permitted to store construction materials and equipment within the area defined by their construction site, but must not create any risk of injury or obstruct movement of pedestrians and vehicles. All materials and equipment shall be neatly stacked, properly covered and secured at the end of each day. In addition, there will be no unnecessary storage of construction materials overnight on the construction site.

The loading and unloading of construction materials and equipment will take place between the hours of construction permitted by the traffic regulations.

5.16 Notification of Damage to Other Utilities

In the event that a contractor damages City owned equipment during construction, the contractor must immediately notify the appropriate City Operations Branch and the City Utilities Inspector. In failing to reach the Utilities Inspector, the contractor must notify the Utilities Management Branch office.

If utility equipment other than City owned equipment is damaged, the contractor must first notify the affected utility, and then the City Utilities Inspector or the Utilities Management Branch office.

5.17 Street Restoration - Temporary Pavement

When a utility company has elected not to complete the permanent restoration of their utility service cut, upon the completion of the civil build, all improved surfaces (sidewalk, pavement, curb and gutter) must be temporarily repaired with an asphalt patch. The repair must be flush with surrounding surfaces, providing a safe surface for both pedestrian and vehicle movement. On surfaces designated solely for pedestrian use, a 25mm thick layer of hot or cold mix asphalt is acceptable. On vehicle-travelled surfaces, the City requires a minimum thickness of 50mm of hot mix asphalt and a minimum 75mm on those streets classified as arterials. Temporary pavement repairs must be in accordance with the Street Restoration Manual drawings MF 137-AE-2, MF 137-AE-3 and MF 137-AE-4.

The City will notify the utility company, in writing, of its obligation to maintain the temporary patch for a term of ninety (90) days from the date that letter was issued, including monitoring the performance of the patch during this term. After ninety days have expired, the City will assume responsibility for the maintenance of the temporary patch. In the event that a temporary patch fails before the ninety days has expired, the City will, when possible, notify the utility company to repair the patch. However, in many circumstances, patch failures pose potential dangers to the public and in those situations the repair must be made immediately by City forces. All costs incurred by the City due to these incidents will be the responsibility of the utility company. Furthermore, the utility company will be held responsible for the performance of the backfill material during the life of its plant within the street. This includes that period of time when utility plant has been abandoned, and expires at the end of the warranty period following restoration, after the plant has been removed.

Following the completion of the utility installation, the Utilities Inspector will issue a cut-sheet and calculate the total area damaged by the utility construction project, type of pavement repair required, and provide a unit cost for that repair. The utility company will subsequently be billed for those costs. The City will schedule permanent repair of the temporary patch during its routine maintenance operations.

5.18 Street Restoration - Permanent Pavement

When a utility company elects to undertake permanent pavement repair, but is unable to complete the repair on the same day as the utility installation, they must ensure the construction site is safe until the following day, when the repair must be completed. If there is more than a one-day delay, the City requires the utility company to install a temporary patch on all damaged or excavated street surfaces.

The City Utilities Inspector must be notified following backfill operations to allow for inspection of the backfill. Following the inspection, the utility company may complete the permanent restoration in accordance with the City of Vancouver Street Utilities By-Law, as well as the most recent version of the Street Restoration Manual. This includes submitting a list of approved materials, mix design and test results for materials used, and a letter of certification that the work conforms to City standards, signed by a professional engineer or other approved materials testing professional. All permanent pavement repairs will be inspected by the City Utilities Inspector. If any deficiencies occur within the one-year period following the completion of the permanent restoration, the Utility Company will be responsible for all costs incurred in the reinstatement of the permanent restoration.

5.19 Pavement Degradation and Restoration

As utility cuts diminish the lifespan and increase the need for maintenance of the pavement structure, utility companies will be charged a pavement degradation fee based upon the age of the surface and area of excavation. In addition, utility companies that have excavated, broken up, or otherwise disturbed the street, are responsible for restoring the surface of a street to a condition as near as possible to or better than that which existed before construction. Utility companies, regardless of whether they elected to have City forces complete the restoration or perform the restoration themselves, are required to:

- Grind and overlay the full width of the pavement from curb to curb in the service corridor, if the pavement has been repaved or overlaid during the two year period immediately prior to the utility permit approval date;
- Grind and overlay the full lane width of pavement in the service corridor, if the pavement has been repaved or overlaid during the five year period immediately prior to the utility permit approval date;
- Apportion the cost of grind and overlay, if another utility has also excavated and disturbed the pavement in the subject area.

5.20 Emergency Work

When a utility company must undertake emergency work, they are required to immediately notify the Utilities Management Branch, who will in turn provide assistance in addressing traffic concerns, conflicts with other utilities, transit, emergency services and the neighbourhood. Emergency work is expected to be carried out until the repair has been completed. When an emergency road-cut or road activity is required, the City must be notified of the following:

- Name of the utility company and contractor undertaking the work;
- Description of the emergency work required;
- Preliminary drawing of the proposed repair work;
- Estimate of the duration of the work;
- Explanation for the work proceeding without the required permits and schedules.

5.21 Test Hole Installation

The installation of test holes within the City street right-of-way for environmental or geotechnical investigations can be arranged through the Utilities Management Branch. Requirements regarding their installation can be found in Appendix C.

5.22 Sewer Cleaning Costs

All costs associated with the removal of construction debris from a City sewer catchbasin will be the responsibility of the utility company. Appropriate precautions to prevent debris from entering into the City sewer system must be in place during construction.

5.23 Fire Hydrant Use Permit

A utility company must obtain a permit for the use of a City fire hydrant for water during utility construction. This can be arranged through the City of Vancouver Client Service Centre. A tested backflow prevention device is required to be attached to the fire hydrant to protect the integrity of the City's water system. Prior to obtaining a permit, test results for the backflow prevention device must be submitted to and be approved by the City Water Design Branch.

6.0 SUPPLEMENTARY INFORMATION

The following section provides valuable supplementary information for those engaged in utility design and construction activities within the City street right-of-way.

6.1 City Utility and Paving Schedule

The City of Vancouver Engineering Services Department provides frequent updates of their planned street construction program including grind and overlay, sidewalk, left turn bay, and sewer and water construction, as well as a host of other street upgrade programs. The comprehensive list contains the current year's projects, as well as long range plans of up to seven years. The Utilities Management Branch, in its efforts to promote construction coordination, e-mails project schedule information to utility companies for their internal review. The City's intent is to provide an opportunity for companies to forecast any conflicts with current City projects and assist with their long range planning schedules.

6.2 The Road Ahead

The "Road Ahead" web page on the City of Vancouver web site, at roadahead.ca, contains information about major roadwork projects with the City such as sewer and water main work, road closures and other works, that may potentially affect the public. In addition to providing information regarding major construction projects underway, posting traffic advisories and bike route detours, a free subscription service provides weekly bulletin updates, via e-mail, containing project updates, as well as what can be expected over the upcoming weeks. The information provided is intended to assist in the planning and scheduling of utility construction and maintenance projects.

6.3 Special pavements

In select areas throughout the City, a number of streets have been surfaced with special pavements. In this context, special pavements refer to all non-asphalt and non-concrete surfaces such as brick, granite, etc. When excavating through these surfaces, all efforts must be made to preserve the original surface material for reinstallation as part of the permanent restoration process. In other areas of the City, namely older streets and lanes, the original "historical" pavement surface (designated and protected under the authority of City Council) may have been repaired or overlaid with asphalt or concrete. When excavating these areas, all efforts must be made to separate these special pavements from the rest of the excavation spoils. Once excavated, the materials must be delivered to the City's National Works Yard (or alternate location) for storage. Upon delivery, the contents must be clean and free of gravel and other excavation spoils. In situations of uncertainty, where a utility company is unsure whether or not surface material should be preserved, they are advised to contact the Utilities Management Branch for direction.

Apart from the standard improved surface treatment of concrete sidewalks and concrete or asphalt roads, there are additional treatments that have been employed in select areas in the City. Some of these are unique to specific areas, while others are the result of initiatives from private developers. Developers utilising these treatments are expected to retain a stockpile of replacement materials. The Utilities Management Branch will coordinate with utility companies to resolve any issues that may arise in the event that an alignment conflicts with an existing unique streetscape facility (e.g., inlaid medallions, heritage plaques). Typically, these unique inlaid materials are of a modular nature, and can therefore be removed with little risk of damage prior to construction. It is the responsibility of the utility company to reinstate the street to its original condition preconstruction condition.

6.3.1 Geosynthetics

In select areas throughout the City, the underlying soil contains deep peat deposits, a low strength and highly compressible material that results in varying amounts of settlement when loaded. The pavement structures within these areas have been modified by the addition of geotextile fabric (resembles a heavy white or black cloth), and geogrid (resembles a black snow fence lying flat), to improve their performance.

The Utilities Management Branch has identified several known areas of peat deposit within the City that currently employ the use of geosynthetics as apart of the pavement structure, those include:

- 16th Avenue from Sophia Street to St. George Street;
- 17th Avenue from Carolina Street to the lane west of Fraser Street;
- 18th Avenue from Prince Albert Street to Fraser Street;
- Skeena Street from 2nd Avenue to 3rd Avenue;
- 19th Avenue from Fraser Street to Price Albert;
- *The City recognizes that the list of streets containing peat deposits, noted above, may be amended periodically as new locations are identified.*

Companies engaged in utility construction activities within these areas, whether excavating through or restoring the geotextile fabric, must follow the procedure as set out by the City.

Geotextile fabric is normally situated 300mm below the underside of the asphalt concrete pavement, and serves as a separation barrier to prevent the gravel material in the road base from pushing into the peat. Geogrid mesh is generally located within the gravel road base, approximately 200mm below the underside of the asphalt concrete pavement. The geogrid interlocks itself with the gravel road base and provides added strength to the pavement structure.

When utility construction requires the excavation of a trench in the aforementioned streets, caution must be taken to retain the geotextile and geogrid materials. Once the pavement surface has been saw cut and removed,

the trench should be hand dug to expose the geogrid, which should then be carefully cut and removed. It is important that the geogrid not be pulled from the trench during its removal, as attempts to pull it from the trench without first ensuring the mesh is free and cut properly, may potentially stretch or damage the geogrid and pavement structure beyond the limits of the excavation. Subsequently, the gravel road base beneath the geogrid should be hand dug to expose the geotextile fabric, and cleanly cut and removed from the trench.

During backfilling operations, for restoration of the utility trench, the City recommends that utility companies follow the steps outlined below:

- Gravel should be placed and compacted in 150mm lifts, until it is flush with the geotextile;
- A new piece of geotextile, free from tears or defects, should be placed in the trench with edges overlapping the existing in-place geotextile;
- Following replacement of the geotextile, backfilling may resume and the trench can be compacted to the level of the geogrid;
- The geogrid retained during the excavation process can be placed in the trench. It is important that the geogrid remain flat while in the trench and that the gravel directly covering the geogrid is placed carefully to ensure that the geogrid does not fold or kink;
- Overlap the new geogrid a minimum 300mm. Cut and tie pieces of the geogrid to the in-place geogrid using plastic "tie-wraps" at 100-150mm spacing;
- The remainder of the trench may be backfilled and compacted in two lifts, flush to the underside of the pavement.

In practice, it may be difficult to save the geotextile and geogrid during the excavation process. Never the less, it is important that the geotextile and geogrid be cut cleanly and carefully removed from the excavation. New geotextile and/or geogrid material is available through the City Streets Operations Branch.

6.4 Street Trees

Boulevard trees situated on City property are protected by the City of Vancouver Street Tree By-law. Utility companies and their contractors must make all efforts to protect trees from potential damage during construction and maintenance activities. When conflicts arise between a proposed utility design and existing street trees, the approved utility permit drawing will have a condition noted on it to contact the Park Board five days prior to commencing construction. It is important that the requirement to contact the Park Board be met to provide ample time for the Board to ensure it has the opportunity to assess the construction site, and determine construction techniques that will minimize disruption to the existing trees and their root systems. The Park Board may require an Arborist or qualified professional to be onsite during excavation activities to provide supervision.

Requirements for protecting trees within or near a construction site, during excavation and trenching activities include the following:

- Avoid trenching within the greater of:
 - (a) 1.5m measured at breast height (1.4m high) from the main trunk; or
 - (b) six times the tree trunk diameter (measured at breast height) from the main trunk of the tree at breast height
- Tunnel beneath roots whose diameters are greater than 1/3 the trunk diameter;
- Never remove more than 33 percent of the entire root mass of a tree and no more than 25 percent from one side;
- Take into consideration previous street and utility works that may have damaged roots on opposing sides of the tree;
- Torn roots are not acceptable. Always make clean cuts with sharp axes or saws;
- Excavations that require shoring must make provisions to allow large tree roots to cross the trench (i.e., in similar fashion that service connections cross shored trenches);
- Barrier fencing must be used for tree protection and must:
 - Allow for free and clear passage of pedestrians on the sidewalk and adjacent portion of boulevard;
 - Provide for clear visibility of fire hydrants, driveway access, crosswalks, etc. (“see-through” fencing such as snow fencing should be used);
 - Be 0.6m or more from the curb to provide for the opening of car doors; and
 - Be placed at minimum 0.3m from the edge of any sidewalk located within a boulevard.

6.5 Streams and Environmentally Sensitive Areas

It is the responsibility of the utility company to apply for, and secure all necessary permits and approvals from government agencies responsible for the protection of environmentally sensitive areas, prior to the City’s approval of the permit plan.

6.6 Bike Routes

The City of Vancouver has a well-established citywide bicycle route network that serves both commuter and recreational cyclists. With an emphasis on sustainability and its importance to the future of the City, City Council has adopted a list of sustainable transportation priorities, with the continued development of a citywide bicycle route network as a top priority.

A comprehensive map of the current bicycle route network can be found on the City web site. City bicycle routes are identified by the green bicycle route signs placed every second block, and stencilled pavement markings painted on the roadway. The Utilities Management Branch requires that utility companies make provisions for bicycle routes and cyclist movements, in the development of traffic plans, for those locations where bicycle routes coincide with utility projects.

6.7 Greenways

Greenways, in the City of Vancouver, are linear public corridors for both pedestrians and cyclists that connect parks, nature reserves, cultural features, historic sites, neighbourhoods and retail areas. Greenways can be waterfront promenades, urban walks, environmental demonstration trails, heritage walks and nature trails. They expand opportunities for urban recreation, provide alternative ways to move through the City, and enhance the experience of nature, community and city life. A comprehensive map of all City greenways is available on the City web site.

The development of City greenways may incorporate enhanced street tree planting, landscaping, public art, benches and other features, and as a result these corridors are often more congested than other City streets. The Utilities Management Branch requires utility companies make provisions for these greenways in their proposed works. In addition, specific greenways, because of their design, may only provide limited vehicle access. In such cases, the Utilities Management Branch will review and assist in determining optimal utility construction alignment.

6.8 Abandoned Plant

In the event that a utility company no longer requires the use of their authorized plant located within the City street right-of-way, they must notify the City Engineer promptly in writing of the abandonment. Upon notification, the Utilities Management Branch may require the utility company to remove or decommission the abandoned plant within ninety (90) days from the date of the notification. Proper notification ensures that City records are kept current and up-to-date, and that future right-of-way space is preserved.

All abandoned underground pipes must be capped off, with all openings sealed to prevent soils from washing into them. Pipes greater than 600mm in diameter and less than 1.5m in depth, measured from the top of the pipe, must be filled with washed sand, controlled density fill, or other comparable material that is acceptable to the City.

In situations where a utility company encounters abandoned equipment during construction within an approved alignment, including equipment of others, they will be held responsible for removing such equipment and all associated costs. The utility company must notify the Utilities Management Branch and if required, coordinate with the utility company owning the abandoned equipment, prior to its removal.

6.9 Survey Monuments

The City of Vancouver's survey control network consists of Provincial Integrated Survey Area monuments, as well as monuments installed and maintained by the City. In addition to these, the City in partnership with the Greater Vancouver Regional District, has installed High Precision Network monuments that include a GPS reference network system, meeting First Order survey accuracy standards.

The City has also resurveyed 78 of the City's Standard Integrated Survey Area monuments to provide elevations to First Order survey accuracy. These monuments have been designated as Secondary Benchmarks. The City's existing control

monuments are just as important, and regularly used by the City's Engineering Services, British Columbia Land Surveyors and many others, in their daily operations to provide horizontal and vertical control.

The City's Land Survey Branch has established the costs associated with the replacement of the various monuments at:

- High Precision Monuments (HPN):
 - \$7000 or
 - \$6300 if advanced notification is provided
- Secondary Benchmark Monuments (SB):
 - \$3000 or
 - \$2700 if advance notification is provided
- Standard Integrated Survey Monuments:
 - \$1600 for a City monuments

It is the responsibility of the utility company to provide the City with a minimum one-week notice for any monuments possibly at risk of damage during utility construction activities. In receiving adequate notice, the City will issue a 10 per cent reduction in the replacement fee for the HPN and SB monuments. All three types of survey monuments appear identical to the existing monuments used in the City. They are easily identifiable in the field as either a brass disc recessed in a chamber with a hinged metal lid cover in the sidewalk, or a brass disc set into a curb top or gutter. There may also be other survey markers found at intersection corners such as lead plugs and iron pins. The City should be notified of utility work in these areas, and a City crew may inspect the area for any existing legal survey marks and reference them as required. This service is provided by the Land Survey Branch, for utility works, at no cost.

To ensure every effort is made to protect monuments, the Utilities Management Branch, during the utility construction approval process, will review each proposed drawing for potential conflicts with monuments. However, it remains the responsibility of the utility company to take the necessary steps to locate and avoid these monuments, as well as making arrangements with the Utilities Management Branch for referencing and monitoring all monuments within the construction area. A map of all control monuments within the City, and a book listing all control monuments, their locations and elevations, is available from the Land Survey Branch.

Any monument that has been disturbed or removed will be considered destroyed if:

- The grade of the road at the location of the monument is being lowered or raised, as a result construction;
- The installation of any underground utility is occurring within a 2.0m radius from the monument. This will require the monument to be referenced and monitored by the City, to ensure no impact on its location has occurred;
- The installation of any aboveground equipment is occurring within a 2.0m radius from an HPN monument. Such installations may interfere with the GPS Reference Network System.

6.10 Payphones

The Utilities Management Branch reviews proposed payphone installations and grants approval subject to the following conditions.

- Social impact on the surrounding neighbourhood, which includes comments from local community police and the Neighbourhood Integrated Service Team representative. Those sites that raise social issues, attributed to the installation of a payphone, will be reviewed and dealt with by the City.
- Location:
 - Must be installed flush against the property line. Any requests to the contrary, may be considered with respect to the City Streetscape Design Standard, as payphone installations must be suitable with the surrounding environment;
 - Must not impede the movement of pedestrians along the sidewalk or restrict access to property, in any manner;
 - Must maintain a minimum horizontal clearance of 1.0m from the outside edge of any existing underground and overhead utilities, to the payphone booth;
 - Must not pose a safety hazard to the public. All proposed sites will be reviewed, in the field, for safety related issues.
- New overhead services to payphones will not be permitted. Payphones not acquiring utility service from an adjacent building will require underground service and will conform to the City Standards as laid out in this manual.
- A site drawing is required for review and approval of all proposed payphone installations. Drawings must conform to the following City Standards:
 - Submitted electronically, preferably on standard letter size paper and with all dimensions in metres at a scale of 1:100;
 - All above ground features incorporated in the streetscape at the proposed location, including offset dimensions from the sidewalk, boulevard, curb, poles, trees and street furniture, must be included;
 - Location of the proposed payphone should be dimensioned from the adjacent property line and the closest cross street.

Payphones that have been vandalized, damaged or left in a non-functioning condition, must be repaired immediately or removed from City streets.

6.11 Public Art

The City of Vancouver's Public Art Program encourages the development of public art throughout the City, and it is not uncommon to have art incorporated within the City street right-of-way. In any situation where public art is at risk of damage because of a proposed utility construction project, it is the responsibility of the utility company to provide the City with at least two weeks notice to allow the City to make the necessary arrangements for the temporary removal of the public art.

6.12 Damage and Graffiti

All aboveground utility structures are at risk of being damaged or defaced. City By-Law No. 7343 prohibits the placement of graffiti on private and City property. The Utilities Management Branch expects all utility companies will have in place, a regular maintenance program that includes inspection of their aboveground equipment for damage and graffiti, and its repair or removal if required.

6.13 Noisy Utility Equipment

The Utilities Management Branch will not permit audible noises emanating from utility equipment located within the City streets, at any time. Utility companies with equipment emitting audible noises, such as from a cooling fan, electrical transformer or other device, will be required to repair their apparatus to be effectively silent in operation.

6.14 Areaways

Areaways are underground extensions of private property onto City streets. The extent can range from a few square feet, to an underground structure surrounding the entire building perimeter, and extending up to 10 feet from the property line. Normally, an areaway is leased from the City, under the terms and conditions of an Agreement, and any utility wishing to access the space as part of the running line would be required to negotiate access from the parties to the Agreement.

APPENDIX A

CITY OF VANCOUVER EXTERNAL UTILITY ELECTRONIC SUBMISSION STANDARDS

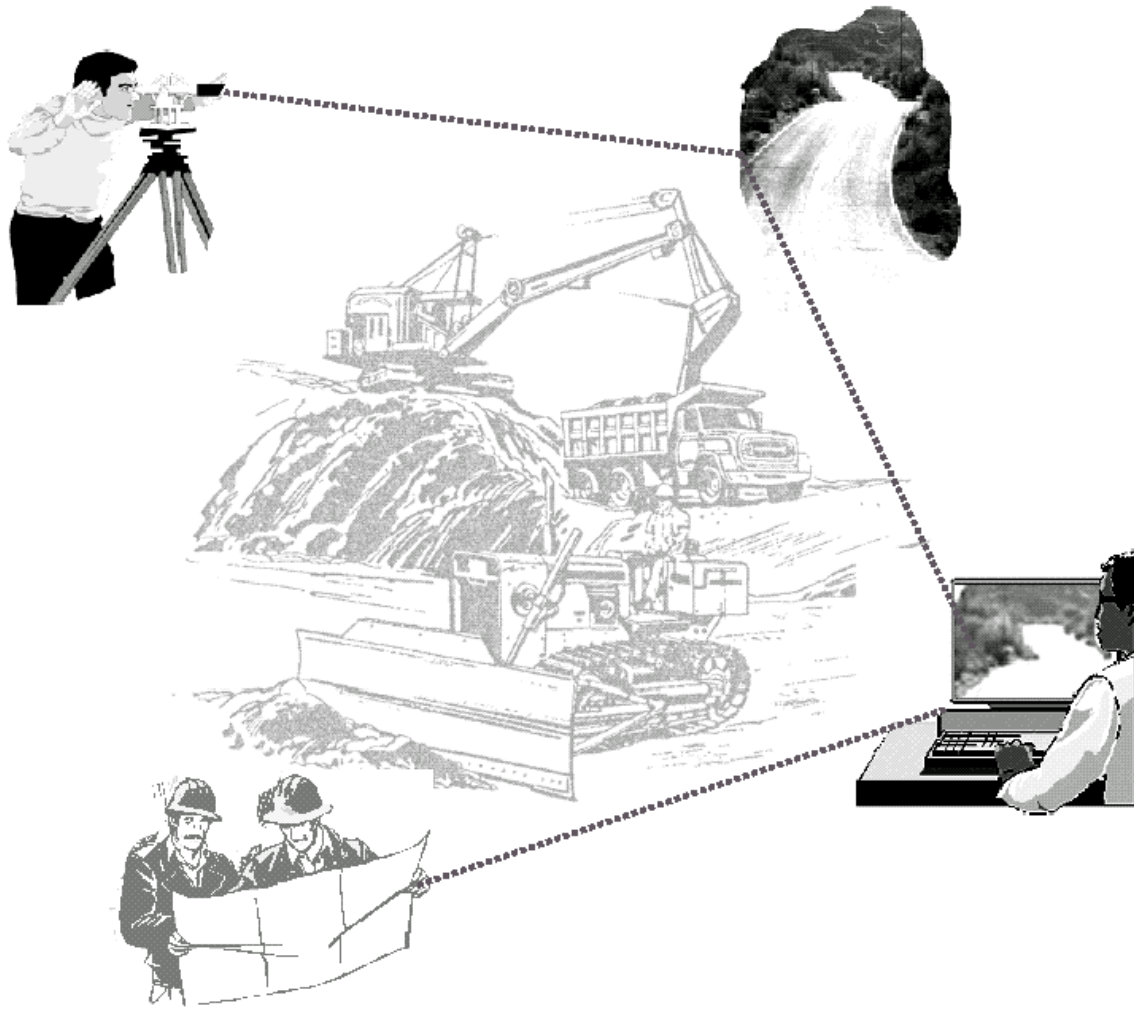


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1.0 INTRODUCTION

Digital spatial data specifications and standards are defined to provide corporate structure to data files. Adherence to these standards will assist in the preparation of drawing files and decrease the amount of verification necessary. In addition, these standards are designed to facilitate transfer of spatial data between branches of the City of Vancouver, software packages, projects, contractors, GIS and general users of the City of Vancouver's digital data. The ability to communicate effectively regarding digital data requires a common understanding regarding current data standards.

1.1 Purpose

The purpose of this manual is to provide guidance on the basic procedures for Computer Aided Design and Drafting (CADD) for external utility plan submissions at the City of Vancouver. These procedures and guidelines ensure consistent products, appearance and accuracy.

1.2 Roles and Responsibilities

The Utilities Management Branch is responsible for maintaining all communications regarding external utility plan submissions. Engineering Information Services is responsible for maintaining standard CADD base files and supporting standard layouts, templates, devices, symbols and server processes. CADD clients are responsible for maintaining the integrity of CADD base files, supporting information and server environment. CADD clients are responsible for the maintenance of base information as input to the City of Vancouver GIS for their specific program areas.

1.3 Scope

All users of the City of Vancouver's CADD server will incorporate and provide input to these standards to develop a citywide understanding of CADD. The information stored and distributed on the CADD server is proprietary. Reproduction or distribution of this data is strictly prohibited.

2.0 GENERAL DATA SPECIFICATIONS

The following section outlines the general data specifications as set by the City of Vancouver.

2.1 Projection

Universal Transverse Mercator Projection (UTM) is the standard projection used by the City of Vancouver.

2.1.1 UTM Zone

The City of Vancouver is in UTM Zone 10.

2.1.2 Origin

An origin set at 0,0,0 will be the standard for all digital spatial data files for the City of Vancouver.

2.1.3 Units of Resolution

Metres(m) is the resolution for digital data in the City of Vancouver.

2.1.4 Horizontal Datum

North American Datum of 1983 (NAD83) GVRD HPN.

2.1.5 Standard Units

Metric where possible. The City of Vancouver is implementing a migration to metric standards.

2.1.6 Coordinate System

Eastings and Northings will be used for coordinate location references. Autodesk Map UTM83-10 is the assigned coordinate system for the City of Vancouver.

2.1.7 Spheroid: WGS 84

2.1.8 Objects in Design Drawing

Objects in design drawing must correspond to the assigned coordinate system.

3.0 SURVEY MONUMENTS

3.1 Grid Coordinates

Grid coordinates are preferred for electronic record drawing submissions. If grid coordinates are not supplied, the ground transformation formula is required.

3.2 Tablet Marking

All surveys will note the tablet markings (e.g., V-2166) of the monument referenced from the City of Vancouver Integrated Survey Area No. 31.

3.3 Vertical Datum

The vertical datum used in the survey is required.

4.0 SECURITY

4.1 Virus Checking

All files from external sources will be scanned for viruses prior to opening or executing.

4.2 Submissions

E-mail address for plan submissions is streetutilitiespermit@vancouver.ca.

5.0 GENERAL AUTOCAD FILE FORMAT SPECIFICATIONS

5.1 Format and Version

AutoCAD 2007 drawing format (DWG) or newer is the standard file format for the City of Vancouver CADD files.

5.2 Naming Convention

All electronic Utility Plan submissions must be named by the Plan Number being submitted (e.g., DS-6709.dwg). Record Drawings must be submitted based upon a copy of the approved permit file number with the “_Record” suffix (i.e., DS-6709_Record.dwg).

5.3 Layer Driven Features

All element specifications will be determined by layer (i.e., colour, lineweight). All elements on a layer will conform to the standards and specifications for that layer (see layers).

5.4 Drawing Orientation

All drawings, with the exception of site plans (i.e., the inside of a chamber), will use project north alignment rather than true north. True north may be indicated with a north arrow based on current declination to indicate potential view rotation.

5.5 Topological Validation

The standards for topology must be met. Digital data must be vector and poly clean. The following errors are unacceptable: dangling nodes, undershoots, intersection errors, loops, open polygons, slivers and zero area polygons.

5.6 Base Information

City of Vancouver base information in AutoCAD format is available upon request. Please contact Utilities Management Branch for additional details.

6.0 DRAWING TEMPLATES

An AutoCAD template file, available upon request through the Utilities Management Branch, contains the recommended specifications for the submission of plan drawings to the City, including projection and datum information.

7.0 LAYERS

7.1 Utility Base Layers for Electronic Submission

Utility layers, listed in the table below, will be electronically processed to update the City of Vancouver GIS system. Layer names and object types (linetype or symbol column) are of primary importance for plan submission, a key to the seamless integration of external data.

When submitting a drawing containing an existing Telco Duct, the duct would be a line on the U_TELCO_DUCT layer. Similarly, if you are submitting a drawing with an existing Telco Manhole, it would be represented as a symbol (refer to Section 8.0 Symbols) on the U_TELCO_MANHOLE layer. For any new proposed equipment, please append ' PROPOSED' to the layer name (i.e., U_TELCO_DUCT_PROPOSED, U_TELCO_MANHOLE_PROPOSED, U_HYDRO_DISTRIBUTION_DUCT_PROPOSED).

Reference layers and other drawing layers not included in the layers table, can use their existing naming convention or use the standards set in the City of Vancouver comprehensive template and documentation that is available upon request.














LAYER NAME	LINETYPE or SYMBOL	COLOUR	DESCRIPTION
U_COV_ELECTRICAL_DUCT	CONTINUOUS	BLACK	Electrical Duct
U_COV_ELECTRICAL_DUCT_LBL	CONTINUOUS	BLACK	Electrical Duct Label
U_COV_ELECTRICAL_DUCT_LBL_REF	CONTINUOUS	BLACK	Electrical Duct Label Reference*
U_ENCROACHMENT_PRIVATE	CONTINUOUS	134	Private Encroachment
U_ENCROACHMENT_PRIVATE_LBL	CONTINUOUS	134	Private Encroachment Label
U_ENCROACHMENT_PRIVATE_REF	CONTINUOUS	134	Private Encroachment Reference
U_GAS_MAIN	CONTINUOUS	ORANGE	Gas Main
U_GAS_MAIN_ABANDONED	CONTINUOUS	WHITE	Abandoned Gas Main
U_GAS_MAIN_LBL	CONTINUOUS	ORANGE	Gas Main Label
U_GAS_MAIN_REF	CONTINUOUS	ORANGE	Gas Main Reference
U_GAS_VAULT	CONTINUOUS	ORANGE	Gas Vault
U_GAS_VAULT_REF	CONTINUOUS	ORANGE	Gas Vault Reference
U_HYDRO_DISTRIBUTION_BOX	SYMBOL LAYER	RED	Hydro Distribution Box
U_HYDRO_DISTRIBUTION_BOX_REF	CONTINUOUS	RED	Hydro Distribution Box Reference
U_HYDRO_DISTRIBUTION_DUCT	CONTINUOUS	RED	Hydro Distribution Duct
U_HYDRO_DISTRIBUTION_DUCT_LBL	CONTINUOUS	RED	Hydro Distribution Duct Label
U_HYDRO_DISTRIBUTION_DUCT_LBL_REF	CONTINUOUS	RED	Hydro Distribution Duct Label Reference
U_HYDRO_DISTRIBUTION_MANHOLE	SYMBOL LAYER	RED	Hydro Distribution Manhole
U_HYDRO_DISTRIBUTION_MANHOLE_REF	CONTINUOUS	RED	Hydro Distribution Manhole Reference
U_HYDRO_DISTRIBUTION_POLE	SYMBOL LAYER	RED	Hydro Distribution Pole
U_HYDRO_DISTRIBUTION_POLE_REF	CONTINUOUS	RED	Hydro Distribution Pole Reference
U_HYDRO_DISTRIBUTION_STUB	SYMBOL LAYER	RED	Hydro Distribution Stub
U_HYDRO_DISTRIBUTION_STUB_REF	CONTINUOUS	RED	Hydro Distribution Stub Reference
U_HYDRO_SUBSTATION	CONTINUOUS SYMBOL LAYER	RED	Hydro Substation
U_HYDRO_SUBSTATION_REF	CONTINUOUS	RED	Hydro Substation Reference
U_HYDRO_TRANSMISSION_DUCT	ACAD_ISO02W100	RED	Hydro Transmission Duct
U_HYDRO_TRANSMISSION_DUCT_LBL	CONTINUOUS	RED	Hydro Transmission Duct Label
U_HYDRO_TRANSMISSION_DUCT_LBL_REF	CONTINUOUS	RED	Hydro Transmission Duct Label Reference
_HYDRO_TRANSMISSION_DUCT_REF	ACAD_ISO02W100	RED	Hydro Transmission Duct Reference

LAYER NAME	LINETYPE or SYMBOL	COLOUR	DESCRIPTION
U_RESERVED_CORRIDOR	CONTINUOUS	CYAN	Reserved Utility Corridor
U_RESERVED_CORRIDOR_LBL	CONTINUOUS	CYAN	Reserved Utility Corridor Label
U_RESERVED_CORRIDOR_REF	CONTINUOUS	CYAN	Reserved Utility Corridor Reference
U_STEAMHEAT_MANHOLE	SYMBOL LAYER	MAGENTA	Steam Heat Manhole
U_STEAMHEAT_MANHOLE_REF	CONTINUOUS	MAGENTA	Steam Heat Manhole Reference
U_STEAMHEAT_PIPE	CONTINUOUS	MAGENTA	Steam Heat Pipe
U_STEAMHEAT_PIPE_LBL	CONTINUOUS	MAGENTA	Steam Heat Pipe Label
U_STEAMHEAT_PIPE_LBL_REF	CONTINUOUS	MAGENTA	Steam Heat Label Reference
U_STEAMHEAT_PIPE_REF	CONTINUOUS	MAGENTA	Steam Heat Pipe Reference
U_TELCO_ABANDONED	CONTINUOUS	YELLOW	Telco Object Abandoned
U_TELCO_BOX	SYMBOL LAYER	YELLOW	Telco Box
U_TELCO_BOX_REF	CONTINUOUS	YELLOW	Telco Box Reference
U_TELCO_CHAMBER	CONTINUOUS	YELLOW	Telco Chamber
U_TELCO_DUCT	CONTINUOUS	YELLOW	Telco Duct
U_TELCO_DUCT_LBL	CONTINUOUS	YELLOW	Telco Duct Label
U_TELCO_DUCT_LBL_REF	CONTINUOUS	YELLOW	Telco Duct Label Reference
U_TELCO_DUCT_REF	CONTINUOUS	YELLOW	Telco Duct Reference
U_TELCO_MANHOLE	SYMBOL LAYER	YELLOW	Telco Duct Manhole
U_TELCO_MANHOLE_REF	CONTINUOUS	YELLOW	Telco Duct Manhole Reference
U_TELCO_POLE	CONTINUOUS SYMBOL LAYER	YELLOW	Telco Pole
U_TELCO_POLE_REF	CONTINUOUS	YELLOW	Telco Pole Reference
U_TELCO_SACPAD	SYMBOL LAYER	YELLOW	Telco Sac Pad
U_TELCO_SACPAD_REF	CONTINUOUS	YELLOW	Telco Sac Pad Reference
U_TELCO_STUB	SYMBOL LAYER	YELLOW	Telco Stub
U_TELCO_STUB_REF	CONTINUOUS	YELLOW	Telco Stub Reference

Note: *reference (suffix _REF) layers are intended for those utility objects not included in design submission but necessary for reference.

8.0 SYMBOLS (BLOCKS)

Symbol name (or block name), its location based upon insertion point and layer inserted, are of primary importance. (Refer to Section 7.0 Layers for insertion symbol layer name). The symbol configuration or block shape, colour etc. is not critical.

CITY OF VANCOUVER, ENGINEERING SERVICES <u>UTILITY SYMBOLS</u>		
SYMBOL	SYMBOL NAME	DESCRIPTION
	u_hydro_distribution_box	UTILITY HYDRO DISTRIBUTION BOX
	u_hydro_distribution_manhole	UTILITY HYDRO DISTRIBUTION MANHOLE
	u_hydro_distribution_pole	UTILITY HYDRO DISTRIBUTION POLE
	u_hydro_distribution_stub	UTILITY HYDRO DISTRIBUTION STUB
	u_hydro_substation	UTILITY HYDRO SUBSTATION
	u_steamheat_manhole	UTILITY STEAMED HEAT MANHOLE
	u_telco_box	UTILITY TELEPHONE COMPANY BOX
	u_telco_manhole	UTILITY TELEPHONE COMPANY MANHOLE
	u_telco_pole	UTILITY TELEPHONE COMPANY POLE
	u_telco_sacpad	UTILITY TELEPHONE COMPANY SACPAD
	u_telco_stub	UTILITY TELEPHONE COMPANY STUB
	sl_node_pole_trolley	STREET ELECTRICAL TROLLEY POLE
	u_transit_pole	TRANSIT POLE

9.0 LINE STYLES

Line Styles are controlled by layer. Only standard AutoCAD line styles are supplied. Custom line styles are currently created on a per project basis.

APPENDIX B

Intentionally left blank at this time.

APPENDIX C

CITY OF VANCOUVER TEST HOLE INSTALLATION STANDARDS

The purpose of the Test Hole Installation Standards document is to provide for the efficient review of applications made to the City of Vancouver ("City"), by outlining requirements for the installation of test holes within the City street right-of-way. The City permits the installation of test holes for environmental and geotechnical testing purposes, and in its review considers location, existing utilities, pedestrian and vehicle volumes, as well as many other issues that may affect the proposed site. Upon approval of the application, the Utilities Management Branch ("UMB") will issue a Test Hole Permit ("permit"), which grants access to the City street for drilling purposes. The following sections provide specific details regarding the test hole application approval process and installation standards.

PERMIT APPROVAL PROCESS

Applicants wishing to install test holes within the street right-of-way are encouraged to use this document as a guideline when applying for a permit. This document outlines the requirements that must be met by an Applicant, for the efficient review and timely approval of the permit.

Applicants are required to submit a request to the UMB by way of a letter or an e-mail to the streetutilitiespermit@vancouver.ca address. The request should describe the location of the proposed test hole site by address, intersection, or a map clearly identifying the site. All Applicants requesting a permit for the first time after Jan. 1, 2009, must complete a City of Vancouver Data Licence Agreement ("Agreement"). The Agreement only needs to be completed once and remains in effect for the provision of data for future requests, until otherwise advised by the City. The Agreement is available for download through the City web site at <http://vancouver.ca/vanmap/pdfs/GISDataLicensingDocMay0508.pdf>.

Once the Applicant has completed and returned the Agreement and provided payment of the plan review fee, Utilities staff will issue a receipt for the plan review fee, provide a comprehensive map containing all underground utilities at the proposed site, and advise the Applicant whether a traffic plan will be required. The Applicant is to use the data supplied to produce an engineering drawing for permit approval. Please note that the UMB only accepts drawings in AutoCAD format, and does not accept submission of hardcopy drawings.

The following list of items must be submitted by the Applicant for permit approval:

- A letter detailing the issues pertaining to the proposed site. This will include the location, number of test holes per street, traffic concerns, overhead obstacles (i.e., this may prevent the set-up of a drill rig) and any additional site issues.
- A proposed construction schedule detailing the start and end dates for the work, including information regarding monitoring activities if a monitoring well is installed.
- A metric scaled drawing of the site, including all existing underground utilities, their size and offset from the property lines as shown on the utility maps. All proposed test hole locations must be referenced to the property line as well as to the closest cross street, and each must be labelled (TH1, TH2, etc. for test holes and MW1, MW2, etc. for monitoring holes) for identification. A sample drawing has been included below.

The UMB will review applications to ensure all submission requirements have been met. For those applications that do not satisfy all requirements, Applicants will be contacted and advised to make the appropriate revisions, and to resubmit the application. When the UMB is satisfied that all requirements have been met, the application will be approved. Staff will notify the Applicant to:

- Obtain a Test Hole Permit and Temporary Special Zone Permit (if required) a minimum five working days prior to the scheduled start.
- Submit a traffic plan (if required) a minimum five working days prior to scheduled start.
- Submit any requests for changes to the approved construction schedule a minimum of 48 hours prior to the start of work.
- Obtain a valid BC One Call ticket prior to starting work.

TEST HOLE PERMIT

The Test Hole Permit sets out the terms and conditions by which the City grants permission to an Applicant for the installation of test holes within the City street right-of-way. The following sections detail the fees associated with issuing the permit including the plan review fee, and deposits for inspection, street restoration and sidewalk protection from damage caused by the drill rig.

PLAN REVIEW FEE

All Applicants wishing to install test holes within the City street will be charged a plan review fee. The plan review fee covers the costs associated with UMB staff undertaking tasks involved in the application approval process. As test hole projects are typically dedicated to a single site containing 2 to 4 test holes, a \$500 (plus tax) per site fee, regardless of site size, will be charged. Payment of the plan review fee is required at the onset of the permit approval process, and UMB staff will only proceed once payment has been received.

INSPECTION FEE

An inspection fee of \$65 (plus tax) per block per day will be charged to all test hole installation projects. The UMB inspector will conduct at least three (3) site inspections for all test hole installation projects where no monitoring wells are installed. One prior to drilling activities, one following restoration, and a final inspection 90 days following restoration to ensure its performance is acceptable. For those test holes to be outfitted with monitoring wells, the UMB inspector will conduct four (4) site inspections. One prior to drilling activities, one following the installation of the monitoring well, another following the decommissioning (removal) of the monitoring well and restoration of the pavement, and a final inspection 90 days following restoration to ensure its performance is acceptable.

STREET RESTORATION AND DEPOSIT

The City of Vancouver Street Restoration Manual (“SRM”) provides standards, specifications and procedures for construction works on City streets. It specifies materials and methods for the restoration of works in a safe, proven and consistent manner. The restoration of all test holes installed within the City streets must conform to Section 02595 of the SRM. A copy of the manual is available for download through the City web site at vancouver.ca/srm.

A deposit for the cost of restoration of each test hole, based on the type of street treatment, will be secured when the permit is issued. All fees are based on the prevailing rate available from the UMB office. Deposits secured for those test holes installed in

asphalt road and grass boulevard/gravel verge are refundable, while those installed in concrete sidewalk and bus pads are non-refundable.

Refundable deposits held for street restoration will be released only if the City inspector considers the 90-day inspection of the restoration to be acceptable. If the restoration is deemed unacceptable, the deposit will be used for the repair of the test hole by City forces. In situations where deposits do not cover the true cost of repair to the test hole, the Applicant will be charged for the difference. Similarly, when the cost of repair is less than the deposit secured, a refund for the difference will be issued.

SIDEWALK DEPOSIT FOR DAMAGE CAUSED BY THE DRILL RIG

If a drill rig is to be placed on a City sidewalk, there will be an additional fee charged in the event that any sidewalk damage occurs. A \$1000 deposit will be secured when the permit is issued, and will be refunded if no damage has occurred.

UTILITY LOCATES

Applicants are required to contact BC One Call and obtain a valid ticket prior to commencing any excavation or drilling activities. In addition to the utility information provided by BC One Call, information regarding City water, storm and sanitary sewer service connections to properties is available by calling the Sewer and Water Client Service Centre at 604.873.7357.

TEMPORARY SPECIAL ZONE PERMIT AND TRAFFIC MANAGEMENT PLAN

A Temporary Special Zone ("TSZ") Permit may be required to remove parking to allow for work to be undertaken on a street. Before a TSZ Permit is issued, a Traffic Management Plan must be submitted to the UMB. This plan must include the following information:

1. The number of traffic lanes on the street in the worksite vicinity, noting any turning lanes.
2. The location of the drill rig and any other vehicles involved.
3. The area, in meters, of the work site required to be temporarily signed. This must include enough area for traffic control tapers, etc.
4. The number of days the "no stopping" signs are to be installed.
5. Any parking regulations in the affected area. This includes regulations on both sides of the street.
6. Any loading zones, taxi zones, consular zones, etc.
7. If any bus zones in the clearance area need to be cancelled or relocated, arrangements must be made with Translink prior to issuing any permits. This allows us to sign the temporary bus relocation, as requested by Translink on the same permit.
8. All parking meters to be hooded must be identified. Parking meter numbers, comprising six digits, are located on both the front and back of every meter.
9. A traffic coning plan of the worksite that includes all tapers and their dimensions, the number and type of all construction signs, barriers, high level warning devices, etc. in accordance with the "Traffic Control Manual for Work on Roadways".

With the information provided, the UMB will determine the traffic requirements for the project, associated fees, and the hours and days work will be permitted. Arrangements to obtain a TSZ Permit can be made through the UMB office.

APPENDIX D

CITY OF VANCOUVER SURFACE INLAY INSTALLATION STANDARDS

The Surface Inlay Installation Standards document has been developed to accommodate the installation of surface inlay fibre within the City street right-of-way on a conditional basis.

Surface inlay does not meet the utility installation standards for the City of Vancouver. However, considering the benefits of this facility with its ability for low impact installation into sensitive areas such as special pavements, congested utility corridors or areas with major traffic volumes, the City is permitting construction and operation of equipment on a conditional basis, with certain considerations. The installation of this technology at the surface of pavement or sidewalk puts it at extraordinary risk compared to other utility installation technologies, and as such, there can be no liability to the City of Vancouver for damages to this equipment incurred when the City or others undertake any works. With the inherent susceptibility to damage, the City strongly recommends redundancy be built into each installation project.

If these conditions are agreeable, the City of Vancouver will consider surface inlay subject to the following technical specifications:

1. Drawing Submissions - Drawings are to be submitted, in digital format, to the Utilities Management Office. They shall be in plan view and include surface structures such as asphalt road, sidewalk, curb and gutter, street lights, wood poles, trolley poles, bus shelters, and all other facilities that influence the alignment of your fibre. The proposed alignment will be clearly illustrated and its location will be described with proposed offsets from the property line to the equipment.
2. Alignment - The existing streetscape is the prime consideration for the choice of a running line. There are three types of settings encountered on the street right-of-way:

IMPROVED BOULEVARD

An improved boulevard includes the hard surface structures located between the face of the curb or edge of pavement and the property line. These are the sidewalk, fillerwalk and the top of the curb. Allowable alignments within this area include:

- Between the property line and a fillerwalk
- Between a fillerwalk and the back of the sidewalk
- Between the front of the sidewalk and a fillerwalk
- Between a fillerwalk and the back of the curb

UNIMPROVED BOULEVARD

An unimproved boulevard includes the grass area and gravel shoulder. Installation is acceptable anywhere within this area and can be installed with up to 225mm cover. The fibre may also be encased within an additional sheath for protection, subject to approval of the Utilities Management Branch on an individual basis. Those companies employing SIF within these areas should be aware that any unimproved boulevard may undergo future improvements, with the installation of sidewalks, curbs and gutters, street trees or a portion of an asphalt road.

TRAVELLED ROAD SURFACE

The travelled portion of the road includes materials consisting of asphalt, concrete and paving stones. Acceptable alignments in asphalt streets are between the edge of the road and the edge of the gutter, and a crossing perpendicular to the street (refer to depth criteria under "Construction" section). Alignments wholly within the asphalt running parallel to the street will not be permitted, except within lanes. Construction alignments in lanes, paved or unpaved, shall have an offset of 0.3m off the property line unless otherwise approved by the Utilities Management Branch. The approved alignment must be adhered to and no deviations around temporary street occupying items such as parked cars, garbage containers, etc., will be accepted. The criteria regarding equipment depth applies equally to installations within lanes.

A concrete road consists of large panels of concrete with thicknesses ranging from 125mm to 300mm, and a joint key that is typically 1/4 to 1/3 the thickness of the panel. Fibre may be installed in the seams between panels if it does not compromise the joint key (must not be disturbed) or cut across a panel. These seams will permit a running line parallel to the street or a crossing perpendicular to the street.

Paving stones come in a wide variety of styles and designs. An alignment for surface inlay fibre will be required to be within an existing seam between bricks. Running lines parallel to or perpendicular to the street are acceptable where they are found in these situations.

Any project that cannot meet the alignment criteria, must apply to the Utilities Management Branch for assistance to determine an acceptable alternative. Any alternate alignment chosen that cuts across or otherwise damages a concrete sidewalk stone or curb and gutter, will be charged the full replacement cost of that item.

CONSTRUCTION

Surface inlay construction must adhere to all City of Vancouver By-Laws and the Utilities Standards for utility construction. The City of Vancouver will determine construction specifics concerning traffic requirements including days and hours of work. When required, the City will request a traffic plan to be submitted. All construction on City streets must comply with the "Ministry of Transportation Traffic Control Manual for Work on Roadways".

DEPTH

The depth of installation will vary depending on type of street surface and whether the equipment is "direct buried" or encased within a protective sheath. The minimum depth for all installations will be such that 20mm will be allowed from the road surface to the top of the equipment for appropriate joint sealant adhesion. The following are depth guidelines for typical streets:

- Concrete sidewalk - Maximum 150mm in the joint only
- Boulevard and gravel verge - Maximum 225mm
- Gutter/road edge - Maximum 150mm
- Concrete road panel - In the joint, to the depth of the joint key
- Asphalt road - Refer to items 1 and 2 below.

1. Arterial Roads - The acceptable depth for installation in an asphalt road will be one-third the existing pavement depth. The thickness of existing pavement (including the concrete base) will be proven by the utility company prior to installation, with the removal of a 100mm diameter core that must be viewed and approved by the Utilities Inspector.

2. Residential Roads and Lanes - Most residential roads are only 50mm to 150mm thick. The maximum depth in residential streets will be one-third the existing pavement depth.

Any project that cannot meet the depth criteria must apply to the Utilities Management Branch to determine if an acceptable alternative exists. There will be no exceptions to the maximum depth criteria in an asphalt road.

WIDTH

The maximum width of a saw cut in the street is 13mm, although the width must be kept to a minimum at all times to preserve the asphalt or concrete surface integrity.

The permit drawing is required to show the proven depth of pavement at all asphalt installation locations by the removal of asphalt core samples. The core sample locations must be shown on the permit drawing, at least one per block. The Utilities Management Branch Inspector must be present when the core samples are taken.

JOINT SEALANT

The following steps must be taken to acquire an adequate joint sealant:

- The cut is required to be free of foreign debris, any water remaining within the cut is to be removed "dry" by compressed air or by other means.
- Once the equipment is placed into the cut, a minimum of 20mm vertical cover must be maintained between the road surface and the top of the equipment.
- The cut is backfilled by pouring 1118 fumed grout or any Portland cement based non-shrink grout into the cut, so it flows around and settles just above the equipment. Alternately, the cut can have foam spacers with a rubber hold-down installed over the cable. This will control the movement of the cable in the trench.
- The remainder of the cut is filled with Type 2 asphalt and sand mixture.
- Any excess of this mixture that overflows the cut is to be removed.

All backfill material is to be inspected yearly to ensure there has been no failure. Any deficiencies found are to be repaired immediately.

MATERIALS

In addition to the actual fibre, other construction equipment/materials are used in the deployment of this utility. At present, these include Cylindrical Access Nodes (CANS) and Vertical Deflecting Conduit (VDC).

- Cylindrical Access Nodes - CANS are used as splice points for fibre connections. Installations are restricted to street intersections, with a maximum of one node per block.
- Vertical Deflecting Conduit - VDC is used as a protective sheath for the fibre. It is accepted for installation in boulevards, sidewalk joints, gutter joints, concrete road joints and asphalt roads, where the depth and alignment criteria can be achieved.

All work within the street right-of-way requires an approved Municipal Access Agreement between the City of Vancouver and the utility company.

APPENDIX E

CITY OF VANCOUVER UTILITY ATTACHMENTS TO CITY STRUCTURES

The purpose of this document is to provide for the efficient review of applications made to the City of Vancouver ("City"), by outlining the general requirements for Utility Companies attaching utilities to a City Structure.

GENERAL REQUIREMENTS

1. The Utility Company shall submit a completed application form to the Utilities Management Branch ("Utilities Branch"), requesting approval to attach equipment to a City Structure, in accordance with the requirements in the Utilities Design & Construction Manual, Street Utilities By-law or applicable Agreement.
2. It is the responsibility of the Utility Company to provide detailed drawings clearly illustrating the proposed location of the equipment, attachment details including the type, size and depth of fasteners, supports, conduits, and any additional information deemed necessary by the Utilities Branch.
3. The Utilities Branch will forward all information provided by the Utility Company to the Structures Branch for a detailed review. Following its review, the Structures Branch will provide the Utilities Branch with its comments and/or interim approval, with the Utilities Branch issuing final approval.
4. The Utility Company shall not reduce the vertical clearance under a bridge and be mindful of the aesthetics of the proposed attachment, locating conduits within the bridge structure, ensuring that they are not visible below the bottom edge of the girder, where possible.
5. There shall be no attachments to the pre-stressed I-girders, railings or rail posts on any City Structure.
6. As a prerequisite for approval, the final design of the equipment attachment to a City Structure must be reviewed by the Structural Engineer of Record for the structure (the original Engineering Consultant firm responsible for designing the bridge), or if not possible, by a qualified Engineer acceptable to the Structures Branch.
7. The Utility Company shall acquire the services of a qualified Engineer who shall be directed to:
 - A. Conduct a detailed review of the final design for the proposed utility attachment to a City Structure.
 - B. Provide certification in the form of a signed and sealed letter stating that the utility attachment and/or any activities required to complete the attachment (e.g., coring), will not negatively affect the structural integrity of the City Structure, nor will it create any additional maintenance for the City.

- C. Provide details regarding acceptable locations for all holes to be cored into a City Structure (if required), as well as technical specifications on how existing rebar and core holes may be located as to minimize cutting of existing reinforcement in the concrete (e.g., with the use of a pacometer). All coring holes shall be laid out by the Engineer, with coring work only permitted following the written approval by the Structures Branch.
 - D. Provide technical specifications and details on how to locate the existing rebar in order to minimize cutting of the reinforcement in the concrete (e.g., with the use of a pacometer) for each utility support/fastener attachment of the City Structure.
 - E. Provide details on how the City Structure will be restored to its preconstruction state or condition (e.g., sealing of holes) prior to the Utility Company's work.
 - F. Provide details regarding any ongoing inspection or maintenance activities required by the Utility Company. Required activities shall be carried out by the Utility Company or its Agent, and a copy of such activity reports shall be provided to the Structures Branch in a timely manner.
 - G. Provide such information noted above, in a form prescribed by the City, to the Utilities Branch for review. All inspection and maintenance activities must be approved by the City, prior to such work being undertaken.
 - H. Provide personnel to be on-site during the first complete coring operation (if coring is required) and as required thereafter.
 - I. In the event that coring is required, provide details and confirmation regarding how many additional attachments can be made to the City Structure, and that the proposed utility attachment will not prevent future installations to the City Structure.
 - J. Sign an Agreement, in a form prescribed by the City Engineer, specifying the terms and conditions under which the Utility Company has been granted permission to attach the utility to the City Structure.
8. On approval by the Utilities Branch, the Utility Company must obtain a permit and:
 - A. Prepare a traffic management plan for approval by the Traffic Management Branch, that complies with city standards for vehicular and pedestrian traffic the work may impact
 - B. Provide an approved schedule of timing
 - C. Notify the City's Structures Branch at least 48 hours prior to commencement.
 9. Within 30 days following the completion of work, the Utility Company shall submit to the City Record Drawings sufficient, in the City Engineer's opinion, accurately establishing the exact location of approved work.