GPS INFRASTRUCTURE SURVEY STANDARD

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1 Introduction

This document was prepared to provide guidance and requirements for the City of Barrie (City) regarding the collection of GPS coordinate data (Northing, Easting and Elevation) on City owned infrastructure. This requirement provides a procedure to collect accurate and consistent data on City owned assets.

1.1 Purpose and Application

The purpose of this document is to provide a procedure to collect and document GPS data on City owned assets and is intended to ensure consistency in the quality, format and type of information being collected and submitted to the City.

Collecting accurate GPS data on municipal infrastructure establishes a reliable digital record of City assets. This information supports long term asset management, future development planning, maintenance activities and can reduce service disruptions to residents.

This document applies to situations that poses opportunities for the collection of GPS data on City-owned assets, including infrastructure which is located within City Parks, as outlined in Section 4.1. These include, but are not limited to:

- Repair locations
- Capital projects
- Greenfield development

GPS data collection shall apply to City-owned linear assets up to the point at which ownership transfers to a private owner. Privately owned infrastructure is not to be included. Where a private service connects to City-owned infrastructure, the connection point shall be captured; however, GPS data shall not be collected on the privately owned portion.

This document is not intended to replace project specific as-built submission requirements outlined in tender or contract documents, nor replace current review procedures in place. Additionally, it does not stipulate the equipment used or provide instruction on the operation of equipment required for the collection of the data.

1.2 Disclaimers

Rights of the City

The City reserves the right to amend, alter or to accept revisions to this document at any time.

Users Responsibilities

It is the user's responsibility to check the City's website for the current revision of this document.

It is also the user's responsibility to ensure that the adequate submission procedure and requirements for their project is followed.

Application

The requirements of this standard shall apply only where specifically identified in the applicable Site Plan or tender documents.

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3 Technical Requirements

The professional responsible for the survey and/or preparation of the submissions shall ensure that the data captured meets the requirements noted below. See *Appendix A* for a Contractor Liability Statement.

3.1 Accuracy

A 0.10m GPS vertical and horizontal tolerance will be permitted on all asset locations, unless otherwise indicated.

All features will be drawn accurately positioned with respect to its true position on the ground as opposed to conceptually drawn.

All feature classes provided will be topologically correct within themselves and free of any overlaps, gaps, slivers, and duplications.

3.2 Naming Convention

Any City owned assets which have been assigned a City ID (e.g. valves, hydrants, maintenance holes, etc.) shall be referenced by their assigned Asset Type and Label ID, as is shown in engineering drawings (eg. SAN000111, HV0001).

Assets which do not have an assigned Label ID shall follow the naming convention as outlined in *Appendix B*.

3.3 Metadata

Metadata will be required with all Project data (See *Appendix C* for an example). The metadata will include an abstract, purpose and process steps used to create the data. Attribute field definitions will also be required, including the naming convention used. Metadata will be attached to the GPS data through a metadata record and/or as a Readme file.

3.4 Coordinate Systems

Horizontal Coordinate System

The standard coordinate system for the City of Barrie is Universal Transverse Mercator (UTM) Zone 17 North with the North American Datum 1983 “NAD83 (Original)”. All submitted geodatabase layers will use this coordinate system.

Projected Coordinate System: UTM NAD 1983 Zone 17N (Original)

Projection: Transverse Mercator

Geographic Coordinate System: GCS North American 1983

Datum: North American 1983

Linear Unit: Metres

WKID 26917 (EPSG)

Vertical Coordinate System

The standard coordinate system for the City of Barrie is CGVD28 height. All submitted geodatabase layers will use this vertical coordinate system.

Datum: Canadian Geodetic Vertical Datum of 1928 (CGVD28).

Epoch: 2010.0

Unit: Metres

WKID 9245 (EPSG)

4 Deliverables

A GPS point (Easting “X” coordinate, Northing “Y” coordinate and Elevation “Z” coordinate) shall be captured for all infrastructure assets noted under section 4.1.

4.1 Infrastructure

One (1) GPS point shall be taken from the top, center of the asset, unless otherwise noted. Additional shots may be required, at the discretion of City Staff.

Water Infrastructure:

- Watermain:
  - All bends, both horizontal and vertical (90°, 45° etc.)
  - All deflections, one (1) point at every pipe joint for the extent of the deflection (measured on the crown of the pipe)
  - Crosses/tees
  - Plugs
  - All pipe transitions (pipe size changes or material changes)
- Main stops (including sample points to be abandoned at the end of project)
- Curb stops/box
- Services
  - One (1) point at main tie in and one (1) point at property line (measured from the top of the service pipe)
  - If the service does not run at a 90° angle from the main, two, evenly spaced points along the service shall be captured, or at any change in direction
- Valve boxes (including snake pits)
- Hydrants (measured from middle, front face of flange)
- Chambers (one (1) point at all four (4) corners)
- Grounding anodes
- Test stations (measured at front, center of base, at grade)
- Cathodic protection test stations (measured from middle, front face of test station)
- Yard hydrants (measured at front, center of base at grade)
- Pit setters
- Auto flushing stations

Sanitary Infrastructure:

- Sanitary Sewer Main:
  - All bends both horizontal and vertical (90°, 45° syphons etc.)
  - All deflections one (1) point at every pipe joint for the extent of the deflection (measured on the crown of the pipe)
  - All pipe transitions (pipe size changes or material changes)
- Sanitary laterals

    - One (1) point at main tie in and one (1) point at property line (measured from the top of the service pipe)
    - If the service does not run at a 90° angle from the main, two, evenly spaced locations along the service shall be captured, or at any change in direction
- Maintenance holes
    - Top of the lid
    - External drop structures (one (1) point at the top and one (1) point at the bottom of the structure)
    - Upstream and Downstream Inverts
        - One (1) point at the pipe obvert and one (1) point at the invert of all connecting pipes, laterals and devices, measured from the inside of the maintenance hole.

Storm Infrastructure:

- Storm Sewer Main:
    - All bends both horizontal and vertical (90°, 45° etc.)
    - All deflections, (one (1) point at every pipe joint for the extent of the deflection (measured on the crown of the pipe)
    - All pipe transitions (pipe size changes or material changes)
- Catch Basins
    - Catch basin leads: One (1) point at the beginning and one (1) point on end of lead
- Maintenance holes
    - Top of the lid
    - External drop structures (one (1) point at the top and one (1) point at the bottom of the structure)
    - Orifice controls/plates
    - Upstream and Downstream Inverts
        - One (1) point at the pipe obvert and one (1) point at the invert of all connecting pipes, laterals, and devices, measured from the inside of the maintenance hole.
- Storm Ponds
    - One (1) point on inlet and one (1) point on outlet pipes
    - All internal components (valves etc.)
- LIDs
    - One (1) point on each external corner
    - One (1) point on inlet and one (1) point on outlet pipes
    - All internal components (overflows, inspection ports etc.)
- Monitoring Ports
- Concrete box culverts and footings (one (1) point on the top centre of each end of each footing
- Foundation drain collectors
    - One (1) point at main tie in and one (1) point at property line (measured from the top of the service pipe)
    - If the service does not run at a 90° angle from the main, two, evenly spaced points along the service shall be captured, or at any change in direction
- Weather stations (measured from middle, front face of station)

Electrical Infrastructure (Utilities):

- Traffic detection loops (one (1) point at the beginning, at the end, and at any change in direction)
- Traffic light cables/conduit (one (1) point at the beginning, at the end, and at any change in direction)

- Light standard cables/conduit (one (1) point at the beginning, at the end, and at any change in direction)
- Power pedestals and disconnects (one (1) point at the beginning, at the end, and at any change in direction)

4.2 Breaks and Repairs

For repairs, a minimum of one (1) point shall be captured at the repair location. Unless otherwise noted, points shall be measured from the top center of the asset.

Examples include, but are not limited to:

- Asset relocations
- Addition of bends or appurtenances
- Pipe material changes (one (1) point at both extents of the material change, on top of pipe)
- Repair clamps or repair materials

5 GIS Submissions

5.1 Development/Reconstruction Submissions:

An electronic copy of all GIS information created in a digital GIS database (.gdb) or shapefile (.shp).

Submissions are to be sent to Engineering Records at: Engineering.Records@barrie.ca.

5.2 Internal Operations Submissions:

GPS data is to be collected in the field using the internal application (Field Maps) which can be downloaded to the user's device and paired with the GPS data collection device.

6 Appendix A

6.1 Contractor Liability Statement:

I (the undersigned) certify that all work performed is accurate, complete, and compliant with all applicable standards, regulations, and requirements governing the collection and submission of GPS data.

_____	_____
Full Name (Printed)	Company/Contractor
_____	_____
Signature	Date

7 Appendix B

7.1 Naming Convention:

Infrastructure Class	Code	Description
CLASS	Other	Other
CLASS	Sanitary	Sanitary
CLASS	Storm	Storm
CLASS	Utilities	Utilities
CLASS	Water	Water

Asset Type	Code	Description
TYPE	Bend	Bend
TYPE	Concrete Box Culvert Footing	Concrete Box Culvert Footing
TYPE	Foundation Drain Collector	Foundation Drain Collector
TYPE	LID Inlet	LID Inlet
TYPE	LID Inspection Port	LID Inspection Port
TYPE	LID Outlet	LID Outlet
TYPE	LID Overflow	LID Overflow
TYPE	LID Perimeter	LID Perimeter
TYPE	Light Standard Cable	Light Standard Cable
TYPE	Light Standard Conduit	Light Standard Conduit
TYPE	Monitoring Port	Monitoring Port
TYPE	Pipe Deflection	Pipe Deflection
TYPE	Pipe Material Transition	Pipe Material Transition
TYPE	Pipe Size Transition	Pipe Size Transition
TYPE	Power Pedestal	Power Pedestal
TYPE	Power Pedestal Disconnect	Power Pedestal Disconnect
TYPE	Sanitary Lateral	Sanitary Lateral
TYPE	Sanitary Maintenance Hole	Sanitary Maintenance Hole
TYPE	Sanitary Pipe	Sanitary Pipe
TYPE	Storm Catch Basin	Storm Catch Basin
TYPE	Storm Catch Basin Lead	Storm Catch Basin Lead
TYPE	Storm Headwall	Storm Headwall
TYPE	Storm Lateral	Storm Lateral
TYPE	Storm Maintenance Hole	Storm Maintenance Hole
TYPE	Storm Monitoring Port	Storm Monitoring Port
TYPE	Storm Pipe	Storm Pipe
TYPE	Storm Pond Inlet	Storm Pond Inlet
TYPE	Storm Pond Outlet	Storm Pond Outlet
TYPE	Traffic Detection Loop	Traffic Detection Loop
TYPE	Traffic Light Cable	Traffic Light Cable
TYPE	Traffic Light Conduit	Traffic Light Conduit

TYPE	Utility Pole	Utility Pole
TYPE	Utility Cable	Utility Cable
TYPE	Water Auto Flushing Station	Water Auto Flushing Station
TYPE	Water Chamber	Water Chamber
TYPE	Water Curb Stop	Water Curb Stop
TYPE	Water Grounding Anode	Water Grounding Anode
TYPE	Water Hydrant	Water Hydrant
TYPE	Water Pit Setter	Water Pit Setter
TYPE	Water Plug or Cap	Water Plug or Cap
TYPE	Water Sample Point	Water Sample Point
TYPE	Water Service	Water Service
TYPE	Water Tee or Cross	Water Tee or Cross
TYPE	Water Test Station	Water Test Station
TYPE	Water Valve	Water Valve
TYPE	Watermain	Watermain
TYPE	Weather Station	Weather Station

8 Appendix C

8.1 GIS Metadata Example:

Dataset Name: _____
Date Created: _____
Responsible Group / Contact: _____

1. Abstract (What is this data?)

Brief 2–3 sentence summary describing what this dataset contains.

2. Purpose (Why was it created?)

Describe the project this dataset supports.

3. Geographic Coverage

Area / Project Location: _____
Feature Type (Point / Line / Polygon / Raster): _____

4. Data Sources

☐ Field survey
☐ Asset management system
☐ As-built drawings
☐ Other: _____

5. Process Summary (How was it created?)

Describe the process of creating this dataset.

6. Attribute Definitions

Include definitions for any additional attributes added to the output dataset beyond the schema provided with the Standard.

Field Name | Description / Meaning / Asset ID
Describe the naming convention used.

7. Data Quality / Limitations

☐ No known limitations
☐ Known issues (describe): _____

Metadata completed by: _____
Metadata date: _____