



# **City of Mississauga**

## **1:2000 SCALE DIGITAL MAPPING SPECIFICATIONS**

**Version 2003 07 10**

Produced by

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## **1.0 STANDARDS FOR PHOTOGRAMMETRIC COMPILATION**

### **1.1 Equipment**

The method of compilation and the type of instrument employed shall be at the discretion of the Vendor but must be to a standard that ensures the quality and accuracy of the final map as specified hereunder.

### **1.2 Projection System**

All maps shall be compiled using rectangular coordinate values expressed in metres and based on the 6 degree Universal Transverse Mercator system, NAD 1983 (adopted).

### **1.3 Vertical Datum**

The City has its own vertical datum referred to as "The City of Mississauga Datum" and is defined as 0.121m higher than the 1978 G.S.C. re-adjustment, and will be shown in meters. All control provided by the City of Mississauga references this datum.

### **1.4 Language**

All information shown shall be in English.

### **1.5 Graphic Format and Representation**

Graphic representation of features is to be in accordance with that defined in the section of this document titled "*Feature Dictionary*". Exhibit 1 is included as a reference document depicting the overall format and style expected. Features that are not in the Feature Dictionary shall be in accordance with Exhibit 1. Any other feature selected by the Vendors will be in consultation with the City.

The City is using both MicroStation V7 and MicroStation V8 in its production of base data. All 2d files are supplied and must be redelivered in V7 format. All 3d files are supplied in V8 format and must be redelivered in V8 format.

### **1.6 Map Relief**

#### **1.6.1 Contours**

Relief shall be shown by contours at one metre intervals. Whenever the contour lines are spaced 2.5 centimetres or more apart (at a scale of 1:2000 - 50m ground, 0.5 metre machine interpolated contours shall be shown. The term 'relief' includes all those features necessary to portray the configuration and difference in height of the land surface included on the map. In addition to the accuracy specified, the contours shall be drawn so as to portray correctly the character of the terrain. The turning points of contours that define drainage channels shall be consistent in depicting the correct alignment of the channel and in reflecting the continuation of the drainage.

Contours may be generated from the updated DTM model. The DTM package used must support and be configured to use the supplied breaklines. The contour package must support smoothing. Excessive smoothing will be rejected. The supplied files should provide sufficient guidelines to those who wish to use this process. If the vendor elects to use this method then the vendor must deliver 3D contour files in V8 format. Edits must be complete to guaranty reasonable cartographic presentation at an output scale of 1:2000. Edits must be performed to remove contours that pass through buildings, under and overpasses, bridges and like structures including any other feature that causes contours

to be excessively stacked. Where contours must be dropped, due to excessive slope, the Index contours shall remain unless they are too closely spaced together. Regular cartographic rules apply when removing stacked contours:

- 1) Remove all intermediate contours between two index contours
- 2) Remove odd value index contours inside the upper and lower limits next

The 2d contours provided for update in this contract were generated from the 2002 DTM.

Depression contours shall be symbolized as per new (UDLS) specifications.

Every contour shall be drawn with the same line gauge except the index contours. The index contour interval shall be 5 metres, e.g. (205, 210, 215.....).

Contour values should read "uphill". If contour labels are generated automatically then the optimal distance between labels should be 400 meters. Additionally, sufficient labels must be included to allow for easy reading of the contours and to minimise the possibility of misreading the contours. It is especially important that spot heights be added in the case where labels cannot be placed for cartographic display reasons.

Where the ground is obscured by vegetation to the degree that standard accuracy is not obtainable, contours shall use the appropriate style (shown in broken lines).

### **1.6.2 Spot Elevations**

As with the contours, spot elevations may be derived from the updated DTM. The same rules stated for contours will hold for spot heights should the vendor elect to use this method within their production stream.

Spot elevations shall be shown where contours do not adequately express the character of the terrain. In addition, they shall be shown:

- (1) on intersections of roads, railways, trails, transmission lines and pipe lines; where a definite change occurs in the alignment of those features and at intervals of one hundred metres along these features.
- (2) at summits, knobs, depressions, saddles, along the rim and bottom of a gorge, gully and rock face;
- (3) at or near major buildings along the rim of open pit mines, quarries and gravel pits and at the lowest point of these features, at the foot and top of log piles, sand piles, mine dumps, embankments and cuttings, and on airport runways and landing strips;
- (4) on any water crossings;
- (5) water levels on all large ponds, below bridges, above and below dams.

Where the terrain is largely obscured by vegetation, spot elevations shall be read wherever the ground is visible to the extent that the reading can be obtained with confidence.

The City may indicate specific points on photographic prints where spot elevations are mandatory.

Spot elevations shall be shown to the closest 0.1 metre.

## 1.7 Digital Terrain Model Data

Digital Terrain Model Data is supplied in MicroStation DGN V8 format by Z Area. Areas requiring updates must have grid (mass) data and breakline features deleted and or modified to reflect the new terrain. Mass points are collected on a 10m grid. Please note that the Z-Areas have overlap with adjacent Z-Areas. Changes bordering one Z-Area must be duplicated in affected overlap Z-Areas.

Contours and spot heights can be generated from the terrain model, but in this case the graphic specifications of these features must coincide with items as described in Sections 1.6.1 and 1.6.2.

## 1.8 Map Detail/Buildings

The intention is to show buildings of a permanent or semi-permanent nature only. The following explanations will serve as a guide to assist the Vendor in interpreting the City requirement and to be used with discretion. All buildings must be closed shapes, including interior holes where and when they occur.

Buildings smaller than 20 square metres (one car garage) shall be omitted. All other buildings shall be shown to shape and scale as determined by the outline of their roofs. Protrusions and indentations of 2 metres or smaller shall be generalised.

Where two or more building units are joined directly, the built-up area shall be outlined to shape and scale as a single unit and the dividing lines between the units shall be ignored.

Paved areas and walkways (of significant size), and driveways both commercial and residential (differentiating between paved and unpaved where possible) shall be shown. Normally, steps are not shown, however, large sets of steps that are significant for proper representation of the topography, shall be shown. These features must snap to abutting features to allow for subsequent post processing by City staff.

Buildings under construction shall be shown as buildings if the construction is advanced far enough that the size and shape can be anticipated. Otherwise they should be omitted. Ruins of solid masonry or stone structures shall be outlined (by shape) and symbolized. Derelicts of wooden frame structures shall be omitted.

## 1.9 Transportation and Communications

Roads, streets wide enough for vehicular traffic shall be shown to size and shape differentiating between paved and unpaved where possible. The width of the roads will be defined either by the width from curb to curb, or the width of the travelled portion. Municipal walkways (sidewalks) and residential sidewalks of significant size are to be shown. Railways, tracks, trails, footpaths, transmission lines and above surface pipe lines of significance shall be shown to be standard symbols representing the centre line of the alignment. Individual poles, towers, or supports of these features shall be shown. Guy wires for large radio towers if visible are to be captured, pole guy wires are not captured. All abutting or ending features must snap to its parent element.

Service lines to individual buildings shall be omitted.

Railroad lines shall be shown separately on cross-country multiple track lines. However, where a large number of these features occur closely spaced such as in marshalling or

switching yards, refinery areas, etc., only the outer two lines shall be shown (UDLS) and the area in between annotated.

### **1.10 Linear Features**

Significant fences, walls, hedges and tree lines that are visible on the photography and in all cases those that appear to indicate a dividing line between adjacent properties shall be shown by UDLS.

### **1.11 Symbology (General)**

Symbology shall be generally in conformity with Exhibit 1. Extensive diversification in symbology should be avoided in depicting cultural features.

- (i) Enclosed structures such as oil and gas tanks, water towers, silos, etc; open structures such as radio, radar, microwave fire towers, etc; other features such as piers, docks, platforms, bridges, conveyors, dams, etc. shall be outlined if they are large or long enough to be shown to scale. All features in this class must be shapes or snapped elements.
- (ii) Embankments, cuttings, dykes and retaining walls shall be shown by a standard symbol if they are long enough to be shown to size, but too steep to be shown clearly by contours.

### **1.12 Annotations**

Annotations shall be in conformity with Exhibit 1. Annotations as to the composition of structures (wood, cement, etc.) classifications of buildings (Post Office, silo, greenhouses, etc.) shall be omitted except those specifically requested by the City.

### **1.13 Water Features**

The intention is to show lakes, streams, falls, reservoirs and canals of significance. Streams averaging more than 4 metres wide shall be shown in double lines to size. Where course of a water feature cannot be definitely established, the approximate location shall be shown by a broken line so as to indicate the continuity of drainage. All double line streams must snap to abutting features (starting and ending).

Where water flow direction is not obvious on any map sheet, appropriate flow arrows shall be inserted. Swamps will be portrayed by a standard symbol without outline. All ditches shall be shown including street ditches. The termination at culverts, etc., shall be shown in accordance with Exhibit 1.

### **1.14 Woodland**

Individual trees and clumps of trees of significant size will be outlined. Heavily wooded areas will be shown by area outline and defined as a UDLS.

### **1.15 Mining and Geology**

Mine shafts shall be shown to scale. Prominent rock outcrops, rock faces, open pit mines, quarries, gravel pits, mine dumps, sand piles, log piles, etc. that are of significance, shall be delineated and symbolised if they are too steep to be shown clearly by contours.

### **1.16 Street Hardware**

The only street hardware to be captured is that identifiable from photography with the exception of those specified in section 1.5 Graphical Format and Representation.

### 1.17 Mapping Accuracy

All basic information concerning the datum such as horizontal control points, projection and grid information shall be located within 0.4 m of its true position. Vendors are to comment on maximum achievable accuracy that may be attained from 1:8000 photography.

Ninety percent of all well-defined features with the exception of those unavoidably displaced by symbolisation shall be located within 0.4 m of its true ground position.

Ninety percent of all contours shall be accurate within one half of the contour interval.

Ninety percent of all spot elevations shall be accurate to within one quarter of the contour interval.

Accuracy indicated under 1.6.1 and 1.6.2 relate to ground not sufficiently obscured by vegetation cover to cause significant error. Horizontal displacement (within the permissible range) may decrease vertical error.

### 1.18 Digital CAD Mapping File Specifications

All digital aspects of this mapping shall be undertaken in accordance with this section of the document; titled "***Standards for Photogrammetric Compilation***".

The files should contain all information as designated in the Feature Dictionary for data sets 1 (Planimetric), 2 (Utility), 3 (Relief), 7 (Vegetation), and 10 (raw DTM) and 8 (3D Contours from DTM).

The mapping shall be in conformity with the planimetric, utility, relief, vegetation, 3D contour and DTM data sets of the Feature Dictionary.

The Vendor will update and return the digital files for each "Z-area" map (or Eastern and Western portion), as supplied by the City.

The working unit definition or unit of resolution (UOR) and spatial coordinate offset is as follows:

Working Unit Definition	2500 UOR's per metre		
MicroStation Format	MU	1717986	master units (m)
		SU	100
		PU	25
			sub units (cm)
			positional units

Global Origin: 0 east, 4 600 000 north

Supplied 3D V8 files shall be used as seed files for V8 submission requirements.

## 2.0 FEATURE DICTIONARY

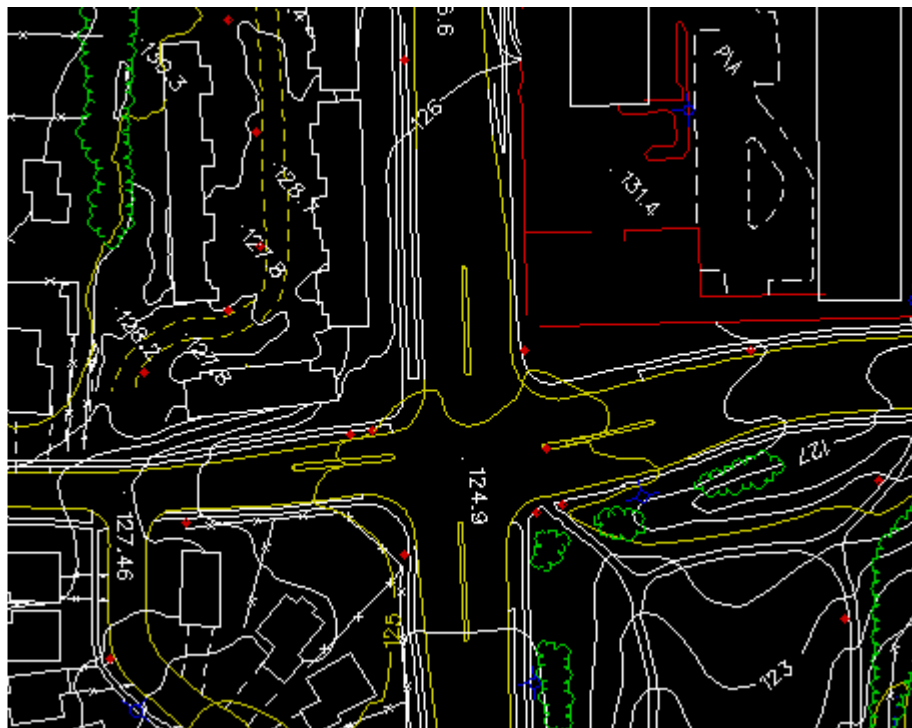
<b>FC</b>	code number assigned to feature classification
<b>Description</b>	name of feature or classification
<b>SET</b>	specific group or class of data (eg. Planimetric, Cadastral)
<b>LV</b>	level or layer number where data is to be stored, range 0 -63
<b>LC</b>	line style code, range 0 - 7 and UDLS (e.g. Fence, Railway)
<b>WT</b>	weight code, range 0 - 31
<b>CO</b>	colour code, range 0 - 253
<b>FT</b>	font number within standard and 2003CM2K font libraries, range 0 - 255
<b>TH</b>	text height expressed in metres (ground distance) related to a plot output scale of 1:2000
<b>spec</b>	denotes that additional information can be found within specifications or standards
<b>tbd</b>	denotes text height to be determined according to application

<b>FC</b>	<b>DESCRIPTION</b>	<b>SET</b>	<b>LV</b>	<b>LC</b>	<b>WT</b>	<b>CO</b>	<b>CHAR</b>	<b>FT</b>	<b>TH</b>
1003	Bridge	1	3	0	1	5			
1005	Building Outline - Major	1	5	0	3	0			
1006	Building Outline - Minor	1	4	0	3	0			
1007	Building Outline - Ruin	1	4	2	3	0			
1008	Cemetery Outline	1	21	2	1	0			
1009	Culvert - End	1	12	0	1	6			
1010	Dam	1	9	0	3	0			
1011	Ditch	1	12	6	1	1			
1012	Dock (Wharf, Jetty, Pier)	1	9	0	3	1			
1013	Driveway	1	8	2	0	0			
1014	Fence	1	11	Fence	0	0			
1015	Head wall	1	12	0	1	6			
1016	Park Area/Playground	1	13	0	1	2			
1017	Parking Lot Paved Outline	1	14	3	1	0			
1018	Pool	1	15	0	1	1			
1019	Rail Line	1	16	Railway	3	0			
1020	Retaining Wall	1	18	0	1	3			
1022	River / Stream	1	9	0	1	1			
1023	Road - Edge of Pavement	1	2	0	1	4			
1024	Road - Curbed	1	2	0	1	4			
1025	Road - U/C	1	2	2	1	4			
1026	Runway / Taxiway	1	17	0	1	4			
1027	Shoreline	1	9	0	1	1			
1028	Sidewalk Outline	1	7	0	1	0			
1029	Silo	1	19	0	3	3			
1030	Smokestack / Chimney	1	19	0	3	3			
1031	Tank	1	19	0	3	3			
1032	Trail	1	20	3	1	6			
1033	Wall	1	18	0	1	3			
1036	Area Under Construction	1	22	2	3	0			
1037	Baseball Screen	1	13	2	3	0			
1039	Building - Under Const.	1	4	3	3	0			
1040	Concrete Base	1	18	0	3	0			
1042	Culvert - Cell no.2007	1	12	0	3	0	37	8	2.5



<b>FC</b>	<b>DESCRIPTION</b>	<b>SET</b>	<b>LV</b>	<b>LC</b>	<b>WT</b>	<b>CO</b>	<b>CHAR</b>	<b>FT</b>	<b>TH</b>
1043	Driveway/Access way -Gravel	1	8		1	0	0		
1044	Dump - Feature Outline	1	23		2	1	5		
1045	Flooded Land - Outline	1	9		0	0	1		
1046	Text - General for clarity	1	24		0	1	0	1	3.5
1048	Marsh/Swamp - Outline	1	9		2	1	6		
1049	Marsh/Swamp Cell 2008	1	9		0	1	6	32	8 5.0
1052	Parking Lot - Gravel	1	14		2	1	0		
1053	Parking Area Text	1	14		0	1	0	1	3.5
1054	Pile	1	22		1	1	4		
1055	Road - Gravel	1	2		3	1	4		
1056	Steps - to scale (Major)	1	18		0	1	0		
1057	Text - Flooded	1	9		0	0	1	1	3.5
1060	Text - Plan 6 Leroy	1	24		0	1	4	1	3.5
2003	Hydrant	2	3		0	1	1	36	8 10.0
2005	Hydro-Pad Mnt. Transformer	2	7		0	1	0		
2006	Pole	2	5		0	1	3	34	8 2.0
2007	Tower / Pylon	2	6		0	1	3		
2008	Pipeline - Above ground	2	8		0	3	6		
3001	Contour - Depression	3,11	4	DepressionContour	5	0			
3002	Contour - Index	3,11	2		0	3	4		
3003	Contour - Primary	3,11	3		0	1	0		
3004	Spot Height	3,11	5		0	1	0	1	3.5
3005	Contour - Approx. Index	3,11	6		2	3	6		
3006	Contour - Approx. Intermed	3,11	7		2	1	6		
3007	Contour - Depres. Approx	3,11	8		2	5	4		
3009	Contour - Depres. Intermed	3,11	10		0	3	4		
3010	Contour - Interpolated	3,11	11		3	3	5		
3011	Contour - Depres. Interpol	3,11	12		3	1	5		
3012	Contour - Text	3,11	*	*	*	*		1	3.5
3013	Spot Height Dot	3,11	5		0	1	0	35	8 1.0
6001	Bench Marks	6	4		0	0	5	41	8 10.0
6002	Bench Mark Text	6	5		0	1	5	1	tbd
6003	Horizontal Cntl Monuments	6	2		0	0	6	40	8 10.0
6004	Horizontal Cntl Text	6	3		0	1	6	1	tbd
7001	Wooded Area Outline	7	10	TreeLine	1	2			
7002	Tree single	7	10		0	2	2	33	8 5.0
7003	Hedge	7	10	Hedge	1	2			
8001	Mass Points	10	29		0	3	1		
8002	Road Edges	10	32		0	1	3		
8003	Topographic Breakline	10	39		0	1	36		
8004	Wall Features	10	40		0	1	21		
8005	Double Line Water	10	48		0	1	1		
8006	Single Line Water	10	49		0	1	1		
8007	Railway Lines	10	34		0	1	19		
8008	Bridge Edges	10	35		0	2	7		

### Exhibit 1 "Graphic Representation"



### Exhibit 2 “DTM Feature Density Sample”

