GTAA Record Data Submissions

Engineering Data

Creation Date: April 26, 2010

Version: 1.1

Document Control

Version History

Version	Date	Changes
1.1	April 26, 2010	Modifications to content

Revision and Approval Control of Last Version

Task	Responsible	Position	Date
Preparation			
Revision			
Approval			

Reference Documents

Title	Author	Date	Description/Comments

Table of Contents
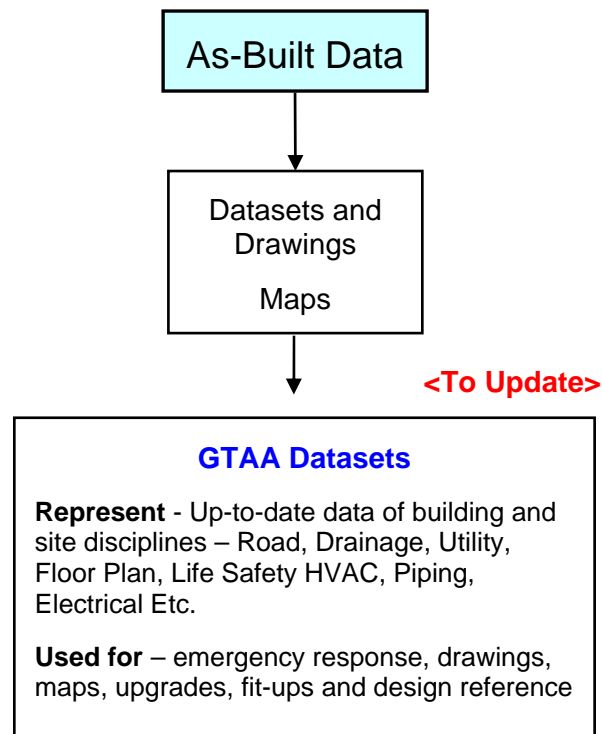
1   Overview

1.1   Purpose

Engineering Data requires that all as-built project data collected throughout the campus is delivered in accordance with the GTAA CAD Standards and GTAA Feature Symbology Manual. The as-built data is used for:

- map/drawing preparation
- pre-engineering project development and design reference and
- emergency response

If as-built data is not received in a timely manner and is not spatially accurate then emergency response, project planning and project implementation will be impacted, resulting in damage to existing assets, unnecessary delays and cost overruns.

1.2   Synopsis of Usage

As-built data used by the Engineering Data Department:

```
          ┌──────────────────┐
          │   As-Built Data  │
          └──────────────────┘
                   │
                   ▼
          ┌──────────────────┐
          │  Datasets and    │
          │    Drawings      │
          │                  │
          │      Maps        │
          └──────────────────┘
                   │           <To Update>
                   ▼
  ┌──────────────────────────────────┐
  │         GTAA Datasets            │
  │                                  │
  │ Represent - Up-to-date data of   │
  │ building and site disciplines –  │
  │ Road, Drainage, Utility,         │
  │ Floor Plan, Life Safety HVAC,    │
  │ Piping, Electrical Etc.          │
  │                                  │
  │ Used for – emergency response,   │
  │ drawings, maps, upgrades, fit-   │
  │ ups and design reference         │
  └──────────────────────────────────┘
```

1.3   Relevant Documents

| Document	Definition
GCS	GTAA CAD Standards
GFSM	GTAA Feature Symbology Manual

2   Data Description

2.1   Data Structure

Spatial data must be submitted to Engineering Data as discipline datasets as per the GTAA CAD Standards. *See Appendices E and F* for a list of discipline datasets. Discipline datasets must be submitted as MicroStation V8 (DGN) files.

Each discipline dataset submitted to the Engineering Data must be contiguous in nature (data is not split into individual sheets/drawings but is a single entity). *See Examples 1 and 2 below.*

Example 1 – Contiguous Dataset Water
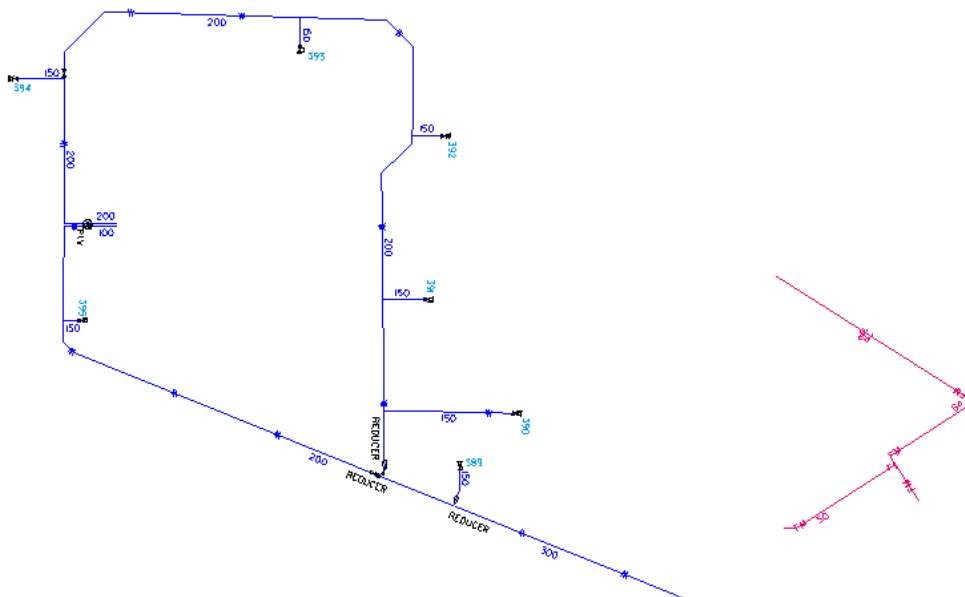
Example 2 – Terminal 1 Level 1 Architectural Floor Plan Dataset
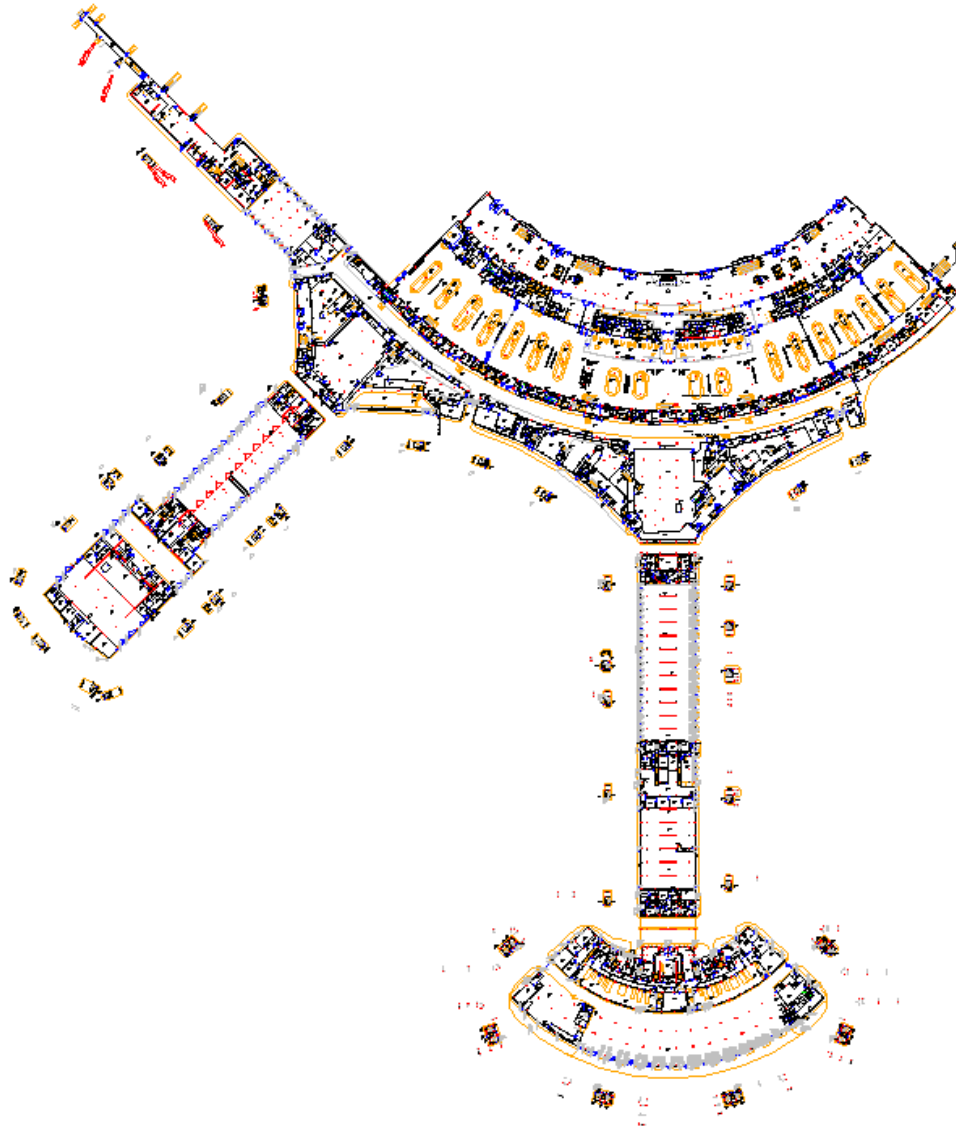
2.2 Data Content

Data within each discipline dataset must conform to GTAA CAD Standards and the GTAA Feature Symbology Manual.

2.2.1 Linear Features

- must be a line, line string or arc – bsplines and complex chains are not acceptable
- linear features which indicate a direction of flow must be entered so that the line style arrows point in the direction of flow
- linear features must be coincident at joins and intersections within a dataset and existing GTAA data where applicable

2.2.2 Shape/Polygon Features:

- must be a closed shape

2.2.3 Point Features

- must be a cell (symbol) taken from the GTAA cell libraries (gtasfs.cel or gtabsf.cel)
- Orientation must match the actual orientation of the object in the field and be logical in its appearance
- If a point feature is coincident with a line, line string or arc feature then the line feature it to be broken and the endpoints made coincident with the origin of the point feature

2.2.4 Text Features

- orientation should follow the feature if an underground service, otherwise the best readable orientation
- avoid overlapping text and leader lines

2.3 Coordinate System

Horizontal: 6° UTM (Universal Transverse Mercator), Zone 17 (Central Meridian 81 Degrees West), NAD 27 (North American Datum 1927), 1974 Adjustment

Vertical: GSC (Geodetic Survey of Canada) 1928 Datum, 1978 Southern Ontario Adjustment

All data submitted to Engineering Data must be geo-referenced to these systems in meters to 3 decimal places.

3 Data Rules

3.1 Accuracy

All as-built discipline datasets submitted to Engineering Data must show the final constructed location of each feature. Data reflecting the design location is not an as-built and will not be accepted.

3.2 Tolerances

Building Datasets

Unless more stringent tolerances are required by individual sections of the Plans and Specifications or a standard reference therein, tolerances for installed work shall be as follows:

- Plumb: less than 3mm in 3.0m
- Level: less than 3mm in 3.0m
- Square: 90 degrees ± 10 seconds
- Straight: less than 3mm in 3.0m under a 3.0m

Site Datasets

Site Feature	Datasets	Example Feature	Tolerance (meters)
Paint Markings (Aviation & Road)	pma – pmg	apron markings, parking, etc.	0.25
Paved Surfaces and Fence Lines	avs – fnc – mis – rds	road edge, fence line, etc	0.25
Buildings	bld	buildings, sheds	0.25
Surface features	env - equ – lgt – mis	gate controls, lights, posts, etc.	0.1
Topographic Features	geo – hyd – mis	boreholes, ditches, banks, etc.	0.25
Utility Hardware (civil)	ful – h&c – gas – san – stm – wtr	manhole, valves, etc.	0.1

Utility Hardware (power/com)	com – pwr	manhole, pulpit, etc	0.1
Utility Cables (underground)	com – pwr	cables	0.25
Utility Pipes (aboveground)	ful – gas – wtr	Raised service pipes	0.1
Utility Pipes (underground)	ful – h&c – gas – san – stm – wtr	sanitary pipes, power lines, etc.	0.25

4 Quality Control

4.1 Structure

Digital data submitted to Engineering Data will be reviewed to ensure the following requirements are met:

- file naming and structure
- datasets are contiguous
- coordinate system and location of data
- datasets conform to the GTAA CAD Standards and the GTAA Feature Symbology Manual

If any of the conditions listed above are not met, the as-built submission will be rejected.

The following documents will be used to assist Engineering Data Staff during the review process

- Building Submission Review Sheet Part 1

  o To view a sample of this document see *Appendices A*

- Site Submission Review Sheet Part 1

  o To view a sample of this document see *Appendices C*

4.2 Field Verification

Content of the digital data submitted to the GTAA will be reviewed to ensure that:

- as-built features in datasets supplied reflect current conditions in the field
- removals that occurred in the field have been indicated in either a digital or hard copy format

If any of the conditions listed above are not met, the as-built submission will be rejected.

The following documents will be used to assist Engineering Data Staff during the review process

- Building Submission Review Sheet Part 2

    o To view a sample of this document see *Appendices B*

- Site Submission Review Sheet Part 2

    o To view a sample of this document see *Appendices D*

4.3 Comments

The comments section at the bottom of each submission review sheet will contain a score from 1 to 10. The score is to indicate the quality of the submission (1) being the lowest and (10) the highest. Scores will be confidential but will be shared with the individual consultant. The scores may impact on any decision regarding consultant selection for future contract awards.

4.4 Summary

Data submitted to Engineering Data may include but is not limited to:

- Discipline Datasets
- Drawings
- Profiles
- Diagrams/Details/Sections
- Raster Documents
- O&M Manuals
- Reports
- Schedules and Inventories
- Code Compliance
- Other Documents Listed in the Contract Documents

All data submitted to Engineering Data must conform to the GTAA CAD Standards and the GTAA Feature Symbology Manual.

5   Glossary

File Type	Definition

As-Built	Accurate representation of project as constructed. Typically a scanned copy of marked-up hardcopy drawing(s).
CAD	Computer Aided Drafting - Vector based graphic representation of data.
Drawing	Portion of a project showing one or more disciplines with a standard border/layout surround.
Feature	Specific data type e.g. valve, catch basin, road edge, walls, railings sign etc.
Discipline	Similar features treated a group or category e.g. roads, drainage, architectural floor plan, HVAC etc.
Contiguous Data	Data contained in one seamless CAD file covering an entire project
Dataset	Contiguous CAD Data showing only as-constructed features.
Geo-Referenced	Data related to a defined geographic reference system.
Spatial Data	Data that has been geo-referenced
Raster	Pixel based graphic representation.

Appendix A – Building Submission Review Sheet Part 1

Engineering Data - Building Submission Review Sheet

Format and Structure   **Part 1 of 2 - Accepted/Rejected/Conditional**
                                                              Type:

Project Information:

Project No.:	
Project Description:	
Consultant:	
GTAA Project Manager:	
Date of Submission:	

Sheet Drawings:

	TIF	PDF	No	Comments
Sheet Drawings				
Elevations Details Sections				

Digital Data Structure:

	Yes	No	Comments
MicroStation			
Geo-referenced			

Digital Data Specifications:

	Yes	No	Comments
Colours			
Levels			
Line Styles			
Weights			
Cells			
Text Fonts/Sizes			

Dataset Disciplines Contiguous:

Dataset	Y/N/NA	Dataset	Y/N/NA	Dataset	Y/N/NA
Architectural (arc)		PA Zones (paz)		Found and Foot (fod)	
Furniture (arc_IF)		Spaces (GIS)		Framing (frm)	
ReflectiveCeiling(arc_RC)		Operations (ops)		Structural Steel (str)	
Life Safety (fir)		Security (sec)		CodeCompliance(ccd)	
Lighting (lgt)		Mech.HVAC(hva)		Asbestos Areas (asb)	
Lighting Zones (liz)		HVAC Zones (hvz)		Grid Lines (grid)	
General Power (gpd)		Mech. Piping (pip)			
Evacuation (eva)		Comm. (com)			

Comments:

Reviewed by: **Date:**

Appendix B – Building Submission Review Sheet Part 2

Engineering Data - Building Submission Review Sheet

Field Verification

Part 2 of 2 - Accepted/Rejected/Conditional Type:

Datasets:

Discipline	Content	Position	Comments
Architectural (arc)			
Interiors and Furniture (arc_IF)			
Reflective Ceiling (arc_RC)			
Life Safety (fir)			
Lighting (lgt)			
Lighting Zones (liz)			
General Power (gpd)			
Evacuation Routes and Zones (eva)			
Public Address Zones (paz)			
Space/Room Spaces (GIS)			
Operations (ops)			
Security (sec)			
Mechanical HVAC (hva)			
HVAC Zones (hvz)			
Mechanical Pipeing (pip)			
Communication (com)			
Foundations and Footings (fod)			
Framing Plan Details (frm)			
Structural Steel (str)			
Code Compliance (ccd)			
Asbestos Contaminated Areas (asb(			
Column Grid Lines (grid)			

Comments:

Reviewed by: **Date:**

Appendix C – Site Submission Review Sheet Part 1

Engineering Data – Site Submission Review Sheet

Format and Structure

Part 1 of 2 - Accepted/Rejected/Conditional
Type:

Project Information:

Project No.:	
Project Description:	
Consultant:	
GTAA Project Manager:	
Date of Submission:	

Sheet Drawings:

	TIF	PDF	No	Comments
Sheet Drawing – Site Layout				
Sheet Drawing - Details				

Digital Data Structure:

	Yes	No	Comments
MicroStation			
Geo-referenced			

Digital Dataset Specifications:

	Yes	No	Comments
Colours			
Levels			
Line Styles			
Weights			
Cells			
Text Fonts/Sizes			

Dataset Disciplines (Contiguous):

Dataset	Y/N/NA	Dataset	Y/N/NA	Dataset	Y/N/NA
Aviation (avs)		Gas (gas)		Paint - ground (pmg)	
Buildings (bld)		Boreholes (geo)		Power (pwr)	
Communication (com)		Hot & Chilled (h&c)		Roads (rds)	
Environment (env)		Hydrography (hyd)		Sanitary (san)	
Equipment (equ)		Lights (lgt)		Signs (sgn)	
Fences (fnc)		Miscellaneous (mis)		Storm (stm)	
Fuel (ful)		Paint – airside (pma)		Water (wtr)	

Comments:

Reviewed by: **Date:**

Appendix D – Site Submission Review Sheet Part 2

Engineering Data – Site Submission Review Sheet

Field Verification

Part 1 of 2 - Accepted/Rejected/Conditional
Type:

Datasets:

Discipline	Content	Position	Comments
Aviation Surfaces (avs)			
Buildings (bld)			
Communication (com)			
Environment (env)			
Equipment (equ)			
Fences (fnc)			
Gas (gas)			
Fuel (ful)			
Boreholes (geo)			
Hot & Chilled (h&c)			
Hydrography (hyd)			
Lights (lgt)			
Miscellaneous (mis)			
Paint – Airside (pma)			
Paint – Groundside (pmg)			
Power (pwr)			
Roads (rds)			
Sanitary (san)			
Signs (sgn)			
Storm (stm)			
Water (wtr)			

Comments:

Reviewed by: **Date:**

Appendix E Site Dataset Naming Convention

Naming conventions for individual discipline datasets submitted with an as-built must conform to the following naming convention. For a complete list of features per dataset refer to the GTAA CAD Standards

Dataset	Content
AVS	Aviation Surfaces
BLD	Buildings
COM	Communication Services
ENV	Environmental Testing Stations
EQU	Equipment (electrical)
FNC	Fences, Gates, Guardrails
FUL	Fuel Services
GAS	Gas Services
GEO	Boreholes
H&C	Hot and Chilled Services
HYD	Hydrography (creeks, ditches, ponds, etc.)
LGT	Lights
MIS	Miscellaneous
PMA	Paint markings – Airside
PMG	Paint Markings – Groundside
PWR	Power Services
RDS	Roads
SAN	Sanitary Services
SGN	Signs
STM	Storm Services
WTR	Water Services

Appendix F Building Dataset Naming Convention

Naming conventions for individual discipline datasets submitted with an as-built must conform to the following naming convention. For a complete list of features per dataset refer to the GTAA CAD Standards

Dataset	Content
ARC	Architectural Floor Plan
ASB	Asbestos Contaminated areas (shapes)
CCD	Code Compliance
COM	Communication
EVA	Evacuation Routes and Zones
FIR	Life Safety, Fire Alarm, Fire Suppression, Zones, Equipment and devices
FOD	Foundations and Footings
FRM	Framing Plan and Details
FUR	Furniture
GDP	General Power Distribution
GIS	Space/Room Limits to BOMA Standards
GRID	Column Grid Lines one per building
HVA	Mechanical HVAC, Ductwork, Equipment and Devices
HVZ	HVAC Zones
LIZ	Lighting Zones
OPS	Operations
PAZ	Public Address Zones
PIP	Mechanical Piping and Utilities, Plumbing
RFL	Reflective Ceiling and Lighting
SEC	Security
STR	Structural Steel