



Lower Mainland Facilities Management – Systems & Support

CAD Standards For Consultants

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Purpose and Use of the CAD Standards for Consultants

Purpose

The Consolidated Lower Mainland Facilities Management Systems and Support (LMFM), CAFM Services facilitates the continuity, quality control, and communication of Computer Aided Drafting (CAD) and Computer Aided Facility Management (CAFM) information for over 2 million square metres (20 million square feet) of space across the Lower Mainland, which is critical to the CAFM systems ability to manage LMFM real property and capital assets.

By the standardized collection of information for all owned and leased property through close contact with Consultants and LMFM Facilities Services employees, CAFM Services will:

- Consult on and monitor the compliance with the LMFM Facilities Services CAD/CAFM Standards and procedures
- Integrate Project Record/Asbuilt construction drawings into the LMFM existing condition drawings and update department changes to LMFM's centralized CAFM system
- Provide consultants with access to the current LMFM record/as-built drawings for use as a base for future facility projects
- Provide customers with updated information on LMFM's facilities as requested.

Use

This document has been written with specific instructions to consultants for producing and delivering Record/Asbuilt CAD drawings, and establishes the standards and guidelines to organize the data captured in the LMFM CAD and CAFM floor plan drawings. CAD Floor Plan Drawings are a 'stripped down' version of the Project As-built drawings and typically contain only 20 to 30% of the information on the project drawings. They are maintained as the current status of a building, and used as Xref (reference) files for the CAFM drawings. They are updated by using information from consultant's project asbuilt drawings as construction projects are completed and can then be provided back to the consultants for use as background information for future construction projects. CAFM Floor Plans - are further simplified drawings that contain only ARCHIBUS facility asset information

It is necessary to establish these standards to promote the sharing of information and to maintain the integrity of the CAFM system. CAD drawings are required for all projects, regardless of the size, or complexity of the project.

Definition of CAD Project As-Built Drawings

A final, complete set of drawings at the completion of a project that have been field verified after completion of the construction of the project and then revised as required to accurately incorporate any changes that were made to the original design during the construction period. These drawings are considered the archived record of the actual design and construction of the project and are saved in their original format as an historical record of the project.

Note: LMFM requires that consultants provide as-built CAD drawings on electronic media at the completion of each project. LMFM recognizes that these CAD files should not be used in whole or in part for the design and construction of other projects, and also, the consultants are not responsible for any subsequent changes made to the CAD files by LMFM. However, LMFM does reserve the right to use these CAD files as a source to generate CAD and CAFM floor plans for LMFM purposes.

Deliverables for CAD Project As-built Drawings

The following deliverables are to be provided by design consultants for all CAD drawings and are required for all projects, regardless of the size, or complexity of the project

Electronic File Format

CAD drawings must be submitted to Lower Mainland Facilities Management (LMFM) in AutoCAD 2014 format and in full compliance with Autodesk AutoCAD software (file extension = .DWG). Throughout this document, the use of the name AutoCAD always implies “Genuine Autodesk Software” unless otherwise noted. Include all relevant CTB files and Plot style tables.

DXF files submitted in place of DWG’s, will not be accepted at project closeout as a substitution for DWG CAD file deliverables.

Policy on CAD File Translation

Error-free AutoCAD Drawing Deliverables:

LMFM recognizes that many of its construction service providers do not use the same CAD systems as LMFM CAD/CAFM Services. However, LMFM expects that service providers who work with non-AutoCAD file formats will submit DWG formatted CAD files upon project closeout that are fully compliant with all of the standards outlined herein, and which have no significant loss of drawing entities or project data that can result from standard CAD file translation procedures.

All DWG files and CAD drawing entities submitted at the end of a project must be able to be manipulated using standard AutoCAD drafting procedures. ***Non-compliance with this policy may result in the rejection of CAD files submitted at project closeout in addition to delayed rendering of final project payment.***

For firms translating their native CAD file format into AutoCAD format also concerned about delivering error-free CAD files to LMFM upon project closeout, it is strongly recommended that thorough file translation testing be conducted before the drawing development phase of the project. This will assure early detection of file conversion issues, if any, and allow for corrective measures to be taken before the project closeout period.

Use of Revit

Firms using Autodesk Revit, are required, at the project completion, to submit the complete Building Information Model (BIM) in Revit format (.RVT) and additionally all drawing files must be exported to AutoCAD .DWG format files.

Scale, Units and Tolerances

All CAD drawings must be drafted at full scale in metric units, in that one drawing unit equals one millimeter. For Construction Projects, tolerances for construction drawings are implicit within professional service contracts. Drawings completed in Imperial units must be “hard converted” to Metric i.e. 25.4mm = 1 inch.

Fonts & Text Styles

Text styles and fonts may vary, but the use of font ROMANS.shx for most applications is preferable. Non Standard AutoCAD fonts are not acceptable.

CAD Standards for Consultants

Blocks & Attributes

Consultants may use their own standards for blocks and symbols as long as they are created as follows. Entities, which have been translated from non-AutoCAD based CAD systems, often fail to meet this requirement.

1. *All entities within a block must be created on layer 0.*
2. *Entities must be assigned colour by layer*
3. *Drawing entities translated into AutoCAD blocks from non-AutoCAD systems must revert to layer 0 when exploded within AutoCAD.*
4. *Nested blocks should not be used*
5. *Blocks should be inserted onto their appropriate discipline layer*
6. *Blocks should be created with an insertion angle of 0 degrees and have an insertion point attached appropriately to the block*
7. *File translations from non-AutoCAD systems, which result in wall blocks within AutoCAD, are unacceptable.*

Title Blocks

Consultants may use their own titleblocks. Each drawing should have only one title block inserted in paper space, with its lower left hand corner point inserted at a coordinate location of (0,0,0). The drawing's title block should contain the information listed below.

Project Information:

- Firm Name - representing the drawing author
- Project Name - **as specified by LMFM**
- Building Code/Number - **as specified by LMFM.**
- Building Name - *specify only if the project name does not include this information already, and the project is building specific*
- LMFM Project Number - **assigned by LMFM**
- Vendor Project Number - **assigned by vendor**
- LMFM Logo

Drawing Information:

- Drawing Title - **indicate the drawing content, e.g. floor plan, section, detail, etc.**
- Drawing Number – Use industry standard practice of including the discipline code as a pre-fix in the file name e.g. A-01, M-01 etc. See Section on Layering
- Date of Drawing - original drawing date, plus any significant revision dates
- Record Drawing Stamp – dated and signed
- Drawing Scale - representing the intended plot scale of the drawing with the title block
- North Arrow

Policy on Model Space and Paper Space

- Ensure that all items (title block, drawing, etc.) in the layout tab are within the selected paper size.

LMFM Site and Building Codes

Contact your LMFM Project Manager for the building identification codes and names that pertain to your project.

CAD Standards for Consultants

Policy on External Reference Files (XREFs)

LMFM will not accept the submission of any CAD drawing deliverable which contains references to external source drawing files. All externally referenced data sources that were used during the CAD drawing production phase should be purged, inserted, bound and retained as a block within a single drawing file, with no loss of layer naming, and include the title block, upon project completion and prior to drawing delivery to LMFM. All file types used such as logos, images, excel spreadsheets, etc. should be embedded. Use the Bind Insert command so that xref layers keep their original name.

Electronic Media

A full set of field verified Project Record As-built drawings for all disciplines must be submitted upon project completion. **Note:** As-built date stamp on all drawings is mandatory.

CAD Files*	All drawings on CD format
PDF** (Raster Files)	All drawings on CD format
Drawing Catalog Info	All information in ASCII format
Prints (Hardcopy)	All drawings, one set of full size and one set of ½ size (confirm with LMFM Project Manager). O&M manuals; Specifications etc.(if applicable)

Notes

* If some CAD drawings cannot be submitted due to Intellectual Property rights, they must be submitted in PDF. However, all floor plans MUST be submitted in CAD (DWG) format. No Exceptions!

** The PDF files MUST match and display the same as the CAD file.

The CD label should contain the following information:

- LMFM Project Number
- LMFM Project Name
- LMFM Project Manager
- Building Name
- Consultant Name
- Date Submitted
- Content: Record Dwgs; CAD; PDF; Excel

Drawing Catalog Information in Microsoft Excel Format

The Consultant is required to provide drawing catalog information (Drawing List) in a Microsoft Excel spreadsheet file. A separate record or line must be created for each drawing sheet submitted. If a sheet has information for more than one floor or building, create another record. Excel version to be compatible with the version used by LMFM.

An example Microsoft Excel spreadsheet follows:

HSDA Code	Site Code	Bldg Code	Project Name	Dwg Description	Discipline	Dwg #	File Name	Heath Area Project #	Consultant	Dwg Date

Example with information entered:

HSDA Code	Site Code	Bldg Code	Project Name	Dwg Description	Discipline	Dwg #	File Name	Heath Area Project #	Consultant	Dwg Date
FHA	303	0796	EAGLE RIDGE HOSPITAL EXTENDED CARE	DRAWING LIST, LEGEND, INSTALLATION HEIGHTS	ARCH	A-0	A-0	1994-1050	STANTEC	1994-05-30
RHS	650	0050	RICHMOND HOSPITAL PHASE 2 PROJECT	GROUND LEVEL DETAILS	STRUCT	S100	S100	1997-6010	BUSH BOHLMAN	1997-11-12
VA	303	0796	MEDICAL STUDENT & ALUMNI CENTRE	SITE PLAN	MECH	M-1	M-1	1993-3221	KEEN ENGINEERING	1996-10-24

CAD Standards for Consultants

Note the following:

- Text must be all CAPS.
- Contact your LMFM Project Manager to obtain the HSDA Code, Health Area Project #, Site Code, and Bldg Code for the project.
- Project Name as provided as specified by LMFM.
- Discipline must be one of the following:
 - ARCH (Architectural)
 - CIVIL (Civil services, topography, survey, contour lines)
 - COMM (Low power communication and auxiliary)
 - ELEC (Electrical power and lighting)
 - EQUIP (Equipment, IE: food services, elevators, and radiology equipment)
 - FIRE (Fire protection, IE: low power sensors and sprinklers)
 - LAND (Landscaping)
 - MECH (Mechanical, IE: HVAC and some plumbing)
 - PLUMB (Plumbing, including medical gases)
 - STRUCT (Structural and seismic)
- The file name should have the sheet number.
- The drawing date is the Record/As-built drawing date and not the date drawn. Format is YYYY-MM-DD.

CAD LAYERING STANDARDS

Background

LMFM has adopted the guidelines for layer name and use rules recommended by the “AIA CAD Layer Guidelines” 2005. This manual is published by the AIA (American Institute of Architects) and was developed through a task force comprising of representatives from the AIA, IFMA (International Facility Management Association), the American Consulting Engineers Council, the American Society of Civil Engineers and three U.S. Government agencies. It is a guideline for CAD layer designations which can be used to create drawings suitable for architectural, engineering and facility management applications. Where noted, LMFM has supplemented the AIA guidelines with its own rules and standards.

Purpose

This section contains a partial list of AIA core layers to be used when producing CAD Project As-built construction drawings for LMFM. The layering standards have been designed to:

- Ensure that all future CAD based design drawings completed for all LMFM facilities are structured and formatted on a consistent basis for archival and retrieval purposes.
- Organize drawing information in layers which can be used for both initial project development and on-going facility management purposes.
- Organize graphical information so that it can be effectively grouped and manipulated for display, editing and plotting purposes.

CAD/CAFM Core layers that are identified below by a diamond symbol (◆) should be used as the basis for construction drawings and supplemented as necessary by other layers in the expanded list.

The concepts are as follows:

- **Layer Names** - Layers must be identified by name, but may have a numeric suffix. This standard is based on the premise that layer names provide more flexibility in data organization and allow optimum user recognition of the layer content.
- **Layer Formats** - Two formats are commonly used to name layers. The long format uses 6 to 16 characters and provides better user recognition of the layer content. The short format uses an abbreviation of the long format within 3 to 8 characters, LMFM uses the abbreviated version.

Layer Name Formatting

Major Groups (Discipline Codes)

A-	Architectural	M-	Mechanical
C-	Civil	P-	Plumbing
E-	Electrical	Q-	Equipment
F-	Fire Protection	S-	Structural
G-	General	T-	Telecommunications
H-	Hazardous Materials	U-	(LMFM defined)
I-	Interiors	X-	Other disciplines
L-	Landscape	Z-	Contractor / shop drawings

Minor Groups

This group designation is a four-character designation used to subdivide the major groups on the basis of construction components or building contents (e.g., walls, doors, ceilings, furniture, **equipment, etc.**). **Layers which are designated by a major and minor group only are referred to as “CORE LAYERS”** (as indicated by diamond ♦) and are shown in Appendix on page 11. e.g. A-DOOR; A-WALL

Modifiers

This is an optional, four-character field for further differentiation of major groups. For example, partial height walls (A-WALL-PART) might be differentiated from full height walls (A-WALL-FULL). The use of a modifier is optional and is not required if the major and minor group designations for a layer are sufficient.

Modifiers can also be used to differentiate phases of new construction from remodeling and existing to remain, and can be used in place of or in addition to a minor group designation, such as A-WALL-NEWW or A-WALL-FULL-NEWW. In either case, the modifier is always the last four-characters of the layer name.

Information Layers - The layer names for each major group are further divided into two categories for CAD layer management purposes.

Building Information layers - generally represent physical aspects of the site and buildings such as walls, doors, site improvements, diffusers, etc. Identification labels such as room numbers are also included in this category. This type of information is often shared between drawings.

Drawing Information layers - comprise notes, dimensions, and similar information. This type of information is usually associated with a specific drawing. Other specialty requirements such as riser diagrams and schematic diagrams are also included in this category.

Special Groups

The designations ELEV, SECT and DETL are used as either minor groups or modifiers to identify elevations, sections and details. These special groups are not used in this layering standard as this information is not required for CAD and CAFM floor plans. However, these special groups may be used by consultants as required for design and construction drawings. The “Read-me” layer (x-RDME) may be used with all major groups to provide reference information on file organization. This layer is for user reference only and is not plotted.

Annotation and Title Blocks:

The major group ANNO consisting of Annotation and other elements on CAD drawings that do not represent physical aspects of a building, can be combined with any discipline code, e.g. ANNO-DIMS (dimensions) *asterisk represents any major group (discipline code)

Elevations, Sections, and Three-Dimensional Drawings:

Minor groups may be added to the major groups or used as modifiers of master layers: elevations, section, details, and three-dimensional views. e.g. *DETL-PATT (detail textures & hatch patterns) *asterisk represents any major group (discipline code):

The minor group ELEV can also be added to any major group layer to identify information only seen in 3D views. This facilitates integrating three-dimensional CAD models with two-dimensional plans, e.g. A-WALL (walls in plan view); A-WALL-ELEV (wall surfaces in 3D view).

APPENDIX

APPENDIX A: LMFM EXPANDED LAYERS (Construction Projects).....11

APPENDIX B: Project Closeout Steps.....18

APPENDIX A: LMFM EXPANDED LAYERS (Construction Projects)

CORE	LAYER	
◆	Name	Description
	Architectural	
◆	A-ANNO-TEXT	General Text
	A-ANNO-REDL	Redlines
	A-ANNO-SYMB	Symbols
	A-ANNO-LEGN	Legends and schedules
	A-ANNO-DIMS	Dimensions
	A-ANNO-TTLB	Border and Title Block
	A-ANNO-NOTE	Job Notes
	A-ANNO-NPLT	Construction lines, nonplotting information, viewports
	A-ANNO-KEYN	Key notes
	A-AREA	Area calculation boundary lines
	A-AREA-IDEN	Room numbers, tenant identifications, area calcs
	A-AREA-OCCP	Occupant or employee names
	A-AREA-PATT	Area cross hatching
	A-CLNG	Ceiling information
	A-CLNG-GRID	Ceiling grid
	A-CLNG-PATT	Ceiling patterns
	A-CLNG-SUSP	Suspended elements
◆	A-DOOR	Doors
	A-DOOR-IDEN	Door number, hardware group, etc.
◆	A-EQPM	Equipment - built in
	A-EQPM-CLNG	Ceiling-mounted or suspended equipment
	A-EQPM-FIXD	Fixed equipment
	A-EQPM-IDEN	Equipment identification numbers
	A-EQPM-MOVE	Moveable equipment
	A-FLOR	Floor information
	A-FLOR-CASE	Casework (manufactured cabinets)
◆	A-FLOR-EVTR	Elevator cars and equipment
◆	A-FLOR-HRAL	Stair and balcony handrails, guard rails
◆	A-FLOR-IDEN	Room numbers, names, targets, etc.
◆	A-FLOR-LEVL	Level changes, ramps, pits, depressions
	A-FLOR-PATT	Paving, tile, carpet patterns
	A-FLOR-SIGN	Signage
	A-FLOR-SPCL	Architectural specialties (accessories, etc.)
◆	A-FLOR-STRS	Stair treads, escalators, ladders
◆	A-FLOR-TPTN	Toilet partitions
	A-FLOR-WDWK	Architectural woodwork (field-built cabs/counters)
◆	A-GLAZ	Windows, curtain walls, glazed partitions
	A-GLAZ-FULL	Full-height glazed walls and partitions
	A-GLAZ-IDEN	Window number
	A-GLAZ-PHRT	Windows and partial-height glazed partitions
	A-GLAZ-SILL	Window sills
◆	A-ROOF	Roof
	A-ROOF-LEVL	Level changes

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	A-ROOF-OTLN	Roof outline
	A-ROOF-PATT	Roof surface patterns, hatching
◆	A-WALL	Walls - general
	A-WALL-INTR	Interior Building Wall
	A-WALL-FIRE	Fire wall patterning
	A-WALL-FULL	Full-height walls, stairs and shaft walls
	A-WALL-EXTR	Exterior Building Wall
	A-WALL-HEAD	Door / window headers (on reflected ceiling plans)
	A-WALL-JAMB	Door / window jambs (on floor plans only)
◆	A-WALL-MOVE	Moveable partitions
	A-WALL-PATT	Wall insulation, hatching and fill
	A-WALL-PRHT	Partial-height walls (on floor plans only)

CORE		LAYER
◆	Name	Description
	Civil	
	C-ANNO-DIMS	Dimensions
	C-ANNO-LEGN	Legends and schedules
	C-ANNO-NOTE	Notes
	C-ANNO-SYMB	Symbols
	C-ANNO-TEXT	General Text
	C-ANNO-TTLB	Border and Title Block
◆	C-BLDG	Proposed building footprints
	C-COMM	Site communication/telephone poles, boxes, towers
	C-FIRE	Fire protection-hydrants, connections
	C-NGAS	Natural gas-manholes, meters, storage tanks
	C-NGAS-UNDR	Natural gas-underground lines
◆	C-PKNG	Parking lots
	C-PKNG-ISLD	Parking islands
◆	C-PKNG-STRP	Parking lot striping, handicapped symbol
◆	C-PROP	Property lines, survey benchmarks
	C-PROP-BRNG	Bearings and distance labels
	C-PROP-CONS	Construction controls
	C-PROP-ESMT	Easements, rights-of-way, setback lines
◆	C-ROAD	Roadways
	C-ROAD-CNTR	Center lines
◆	C-ROAD-CURB	Curbs
	C-SSWR	Sanitary sewer-manholes, pumping stations
	C-SSWR-UNDR	Sanitary sewer-underground lines
	C-STRM	Storm drainage catch basins, manholes
	C-STRM-UNDR	Storm drainage pipe-underground
	C-TOPO	Proposed contour lines and elevations
	C-TOPO-RTWL	Retaining wall
	C-TOPO-SPOT	Spot elevations
	C-WATR	Domestic water- manholes, pumping, storage
	C-WATR-UNDR	Domestic water-underground lines

CAD Standards for Consultants

CORE	Name	LAYER	Description
◆	Electrical		
	E-ANNO-TEXT		General Text
	E-ANNO-SYMB		Symbols
	E-ANNO-LEGN		Legends and schedules
	E-ANNO-DIMS		Dimensions
	E-ANNO-TTLB		Border and Title Block
	E-ANNO-NOTE		Job Notes
	E-1LIN		One-line diagrams
	E-ALRM		Miscellaneous alarm system
	E-AUXL		Auxiliary systems
	E-CCTV		Closed-circuit TV
	E-COMM		Telephone, communications outlets
	E-CTRL		Electric control system
	E-CTRL-DEVC		Control system devices
	E-CTRL-WIRE		Control system wiring
	E-INTC		Intercom system
	E-LITE		Lighting
	E-LITE-CIRC		Lighting circuits
	E-LITE-CLNG		Ceiling-mounted lighting
	E-LITE-EMER		Emergency lighting
	E-LITE-EXIT		Exit lighting
	E-LITE-FLOR		Floor-mounted lighting
	E-LITE-IDEN		Luminaire identification and text
	E-LITE-JBOX		Junction box
	E-LITE-NUMB		Lighting circuit numbers
	E-LITE-ROOF		Roof lighting
	E-LITE-SPCL		Special lighting
	E-LITE-SWCH		Lighting-switches
	E-LITE-WALL		Wall-mounted lighting
	E-POWR		Power
	E-POWR-BUSW		Busways
	E-POWR-CABL		Cable trays
	E-POWR-CIRC		Power circuits
	E-POWR-CLNG		Power-ceiling receptacles and devices
	E-POWR-EQPM		Power equipment
	E-POWR-FEED		Feeders
	E-POWR-IDEN		Power identification, text
	E-POWR-JBOX		Junction box
	E-POWR-NUMB		Power circuit numbers
	E-POWR-OTLN		Power outline for backgrounds
	E-POWR-PANL		Power panels
	E-POWR-SWBD		Power switchboards
	E-POWR-URAC		Underfloor raceways
	E-POWR-WALL		Power wall outlets and receptacles
	E-RISR		Riser diagram
	E-SOUN		Sound/PA system

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CORE	Name	LAYER	Description
	Fire Protection		
	F-ANNO-TEXT		General Text
	F-ANNO-SYMB		Symbols
	F-ANNO-LEGN		Legends and schedules
	F-ANNO-DIMS		Dimensions
	F-ANNO-TTLB		Border and Title Block
	F-ANNO-NOTE		Job Notes
	F-CO2S CO2		system
	F-CO2S-EQPM		CO2 equipment
	F-CO2S-PIPE CO2		Sprinkler piping
	F-HALN		Halon
	F-HALN-EQPM		Halon equipment
	F-HALN-PIPE		Halon Piping
	F-IGAS		Inert gas
	F-IGAS-EQPM		Inert gas equipment
	F-IGAS-PIPE		Inert gas piping
	F-PROT		Fire protection systems
	F-PROT-ALRM		Fire alarm
	F-PROT-EQPM		Fire system equipment (hose cabinet/extinguishers)
	F-PROT-SMOK		Smoke detectors/heat sensors
	F-SPRN		Fire protection sprinkler system
	F-SPRN-CLHD		Sprinkler head-ceiling
	F-SPRN-OTHD		Sprinkler head-other
	F-SPRN-PIPE		Sprinkler piping
	F-SPRN-STAN		Sprinkler system standpipe
	F-STAN		Fire protection standpipe system
	Interior		
	I-ANNO-TEXT		General Text
	I-ANNO-SYMB		Symbols
	I-ANNO-LEGN		Legends and schedules
	I-ANNO-DIMS		Dimensions
	I-ANNO-TTLB		Border and Title Block
	I-ANNO-NOTE		Job Notes
	I-EQPM		Equipment
	I-EQPM-MOVE		Moveable equipment
◆	I-FURN		Furniture
	I-FURN-CASE		Cabinetry / casement
	I-FURN-CHAR		Chairs and other seating
	I-FURN-FILE		File cabinets
	I-FURN-FREE		Furniture - freestanding (desks, credenzas, etc.)
	I-FURN-IDEN		Furniture numbers
	I-FURN-PLNT		Plants
	I-FURN-PNLS		Furniture system panels
	I-FURN-POWR		Furniture system-power designation
	I-FURN-WKSF		Furniture system work surface components

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CORE	Name	LAYER	Description
	Landscaping		
	L-ANNO-TEXT		General Text
	L-ANNO-SYMB		Symbols
	L-ANNO-LEGN		Legends and schedules
	L-ANNO-TTLB		Border and Title Block
	L-ANNO-NOTE		Job Notes
	L-PLNT		Plant and landscape materials
	L-PLNT-BEDS		Rock, bark, and other landscaping beds
	L-PLNT-GRND		Ground cover and vines
	L-PLNT-PLAN		Planting plants
	L-PLNT-TREE		Trees
	L-PLNT-TURF		Lawn areas
	L-SITE		Site improvements
	L-SITE-BRDG		Bridges
◆	L-SITE-DECK		Decks
	L-SITE-FENC		Fencing
	L-SITE-FURN		Site furnishings
	L-SITE-PLAY		Play structures
	L-SITE-POOL		Pools and spas
	L-SITE-SPRT		Sports fields
	L-SITE-STEP		Steps
	L-SITE-WALL		Walls
	L-WALK		Walks and steps
	L-WALK-PATT		Walks and steps-cross-hatch patterns
	Mechanical		
	M-ANNO-TEXT		General Text
	M-ANNO-SYMB		Symbols
	M-ANNO-LEGN		Legends and schedules
	M-ANNO-TTLB		Border and Title Block
	M-ANNO-NOTE		Job Notes
	M-CMPA		Compressed air systems
	M-CMPA-CEQP		Compressed air equipment
	M-CMPA-CPIP		Compressed air piping
	M-CMPA-PEQP		Process air equipment
	M-CMPA-PPIP		Process air piping
	M-CONT		Controls and instrumentation
	M-CONT-THER		Thermostats
	M-CONT-WIRE		Low voltage wiring
	M-CWTR		Chilled water systems
	M-CWTR-EQPM		Chilled water equipment
	M-CWTR-PIPE		Chilled water piping
	M-EXHS		Exhaust system
	M-EXHS-DUCT		Exhaust system ductwork
	M-EXHS-EQPM		Exhaust system equipment
	M-EXHS-RFEQ		Rooftop exhaust equipment

CAD Standards for Consultants

M-FUME-EQPM	Fume hoods
M-FUME-EXHS	Fume hood exhaust system
M-HOTW	Hot water heating system
M-HOTW-EQPM	Hot water equipment
M-HOTW-PIPE	Hot water piping
M-HVAC	HVAC system
M-HVAC-CDFF	HVAC ceiling diffusers
M-HVAC-DUCT	HVAC ductwork
M-HVAC-EQPM	HVAC equipment
M-HVAC-ODFF	HVAC other diffusers
M-HVAC-RDFF	Return air diffusers
M-HVAC-SDFF	Supply diffusers
M-MDGS	Medical gas systems
M-MDGS-EQPM	Medical gas equipment
M-MDGS-PIPE	Medical gas piping
M-SPCL	Special systems
M-SPCL-EQPM	Special equipment
M-SPCL-PIPE	Special piping
M-STEM	Steam systems
M-STEM-CONP	Steam systems condensate piping
M-STEM-EQPM	Steam systems equipment
M-STEM-HPIP	High pressure steam piping
M-STEM-LPIP	Low pressure steam piping
M-STEM-MPIP	Medium pressure steam piping

CORE	NAME	LAYER	DESCRIPTION
◆	Plumbing		
	P-ANNO-TEXT	General Text	
	P-ANNO-SYMB	Symbols	
	P-ANNO-LEGN	Legends and schedules	
	P-ANNO-TTLB	Border and Title Block	
	P-ANNO-NOTE	Job Notes	
	P-ACID	Acid, alkaline, oil waste systems	
	P-ACID-PIPE	Acid, alkaline, oil waste piping	
	P-DOMW	Domestic hot and cold water systems	
	P-DOMW-CPIP	Domestic cold water piping	
	P-DOMW-EQPM	Domestic hot and cold water equipment	
	P-DOMW-HPIP	Domestic hot water piping	
	P-DOMW-RISR	Domestic hot and cold water risers	
	P-EQPM	Plumbing - miscellaneous equipment	
◆	P-FIXT	Plumbing fixtures, toilets, sinks	
	P-SANR	Sanitary drainage	
	P-SANR-EQPM	Sanitary equipment	
	P-SANR-FIXT	Plumbing fixtures	
	P-SANR-FLDR	Floor drains	
	P-SANR-PIPE	Sanitary piping	
	P-SANR-RISR	Sanitary risers	

CAD Standards for Consultants

P-STRM	Storm drainage system
P-STRM-PIPE	Storm drain piping
P-STRM-RFDR	Roof drains
P-STRM-RISR	Storm drain risers

CORE	Name	LAYER	Description
	Structural		
	S-ANNO-TEXT	General Text	
	S-ANNO-SYMB	Symbols	
	S-ANNO-LEGN	Legends and schedules	
	S-ANNO-DIMS	Dimensions	
	S-ANNO-TTLB	Border and Title Block	
	S-ANNO-NOTE	Job Notes	
	S-BEAM	Beams	
◆	S-COLS	Columns	
	S-FNDN	Foundation	
	S-FNDN-PILE	Piles, drilled piers	
	S-FNDN-RBAR	Foundation reinforcing	
◆	S-GRID	Column grid	
	S-GRID-DIMS	Column grid dimensions	
	S-GRID-EXTR	Column grid outside building	
	S-GRID-IDEN	Column grid tags	
	S-GRID-INTR	Column grid inside building	
	S-WALL	Structural bearing or shear walls	
	Telecomm		
	T-ANNO-TEXT	General Text	
	T-ANNO-SYMB	Symbols	
	T-ANNO-LEGN	Legends and schedules	
	T-ANNO-TTLB	Border and Title Block	
	T-ANNO-NOTE	Job Notes	
	T-CABL	Cable plan	
	T-DIAG	Diagram	
	T-EQPM	Equipment plan	
	T-JACK	Data/telephone jacks	
	T-JACK-AP	Wireless Access Point	
	T-JACK-CAM	Security camera	
	T-JACK-MISC	Nurse call, BMS, elevator phone, metre clock circuit, Hydro utility metre, Bell, panic button, etc.	
	T-JACK-VD	Voice/Data	

APPENDIX B: Project Closeout Steps

Before a project can be closed out all specified materials must be submitted to the appropriate LMFM Project Manager or representative in accordance with production standards and specific instructions described in this document. A **signed copy of the Closeout Checklist**, included at the end of this document must also be submitted with the CAD drawings, PDFs and hard copies delivered at the closeout phase of all projects. When a CAD Closeout Checklist has been signed and submitted, the vendor (architect, engineer, contractor, etc.) is assuring that all materials adhere to the standards and guidelines set forth in this document.

1. Place the following files on a CD and send to the assigned LMFM Project Manager with a transmittal letter containing the specified information:
 - a) All Record/As-built Drawings in an AutoCAD format (DWG).
 - b) All Record/As-built Drawings in Raster format (PDF).
 - c) Drawing Catalog Information file in Excel format (XLS).
2. Send the hard copy drawings to the assigned LMFM Project Manager with a transmittal letter containing the specified information.
3. Send the Project Closeout Checklist below and the CAD Quality Assurance Checklist on page 19, signed and dated with the above submittals.
4. The LMFM Project Manager will forward the CD and Closeout Checklist to LMFM CAD/CAFM Services for review for compliance to the LMFM CAD Standards and for inclusion into the existing condition drawings.

Note: If there are issues with the CD or if there are missing information, the CD will be forwarded to the LMFM Project Manager and the Project Manager will contact the Prime Consultant to resolve.

Project Closeout Checklist

- Properly Identified CD containing:
 - All project Record/As-built CAD drawings (DWG format).
 - All project Record/As-built Drawings in Raster Format (PDF format).
 - Drawing catalogue file in MS Excel format.
- 2 sets of Hard Copy Drawings (1 Full Size and 1 Half Size)
- If applicable, a separate CD containing the Operation & Maintenance Manuals; Specification in MS Word format or Raster format (PDF).

CAD Standards for Consultants

CAD Quality Assurance Checklist

The consultant should use the following checklist to ensure that the submitted drawings conform to LMFM CAD Standards.

CHECKLIST

File Format and Setup

- Electronic File Format
- Scale and Units
- Tolerances
- Fonts and Text Styles
- Blocks and Attributes
- Title blocks
- Policy on Model Space and Paper Space
- Policy on External Reference Files (XREFs)

Layering

- Layer Name Formatting
- Layer Attributes (Colors, Pens, Linetypes)
- LMFM CAD/CAFM Core Layers
- LMFM Expanded Layers

File Name Conventions

- Building and Floor Identification Codes
- Discipline Identification Codes

Policy on CAD File Translation

- Full AutoCAD Compliance
- Translation Testing Procedures (if applicable)

Project Closeout

- Deliverables
- Project Record/As-built Drawings
- CD Format
- Drawing Catalog Information in Microsoft Excel Format
- Closeout Steps (including Closeout Checklist)
- CAD Quality Assurance Checklist (signed and dated)

Name of Authorized Representative (please print): _____

Signature of Vendor Representative: _____

Phone Number: _____ Date: _____