Section 4:
Ontario Realty Corporation
CAD Standards and Guidelines

Ontario
Realty
Corporation

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immobilière
de l'Ontario

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ORC CAD Standards and Guidelines

4.1 File Format Standard

Drawing Data Format Requirements

The following AutoCAD Drawing (DWG file extension) formats will be accepted by ORC:
- o AutoCAD 2000-2008 (accepted)
- o AutoCAD 2006 (preferred)

The following file formats listed below can be submitted with the equivalent AutoCAD 2000 or AutoCAD 2008 formatted DWG files (converted) used to represent the data submitted:

Entity Based Platforms may include:
- o DXF Format
- o DGN Format
- o Pre AutoCAD 2000 DWG Format

Object Based Platforms may include:
- o Autodesk Revit
- o Autodesk AEC Objects from:
  - Autodesk Map
  - Autodesk Map3D
  - Autodesk Land Desktop
  - Autodesk Civil Design
  - Autodesk Civil 3D
  - Autodesk Architectural Desktop

Note: If your file format is not shown in either the entity or object based listings, do <u>not</u> include original files used to create the submitted DWG files.

Autodesk DWF 6.0 Format – this will be accepted format and preferred standard in vector based drawing data viewing for the purposes of project management, external distribution and general desktop viewing. This format will not be accepted without the supporting DWG files used to created the submitted DWF.

Autodesk PLT HPGL/2 Format – this will be accepted format and preferred standard in vector based plot files for the purposes of plotting sheet sets directly from files for hard copy distribution. This format will not be accepted without the supporting DWG files used to create the submitted PLT.

Bentley Microstation has the ability to open and save a DWG files and Autodesk Map has the ability to open and save a Microstation DGN file. Bentley's Microstation V8 provides native DGN and DWG editing, viewing and referencing functionality.

For more information on Bentley's Microstation V8 visit: http://www.bentley.com
For more information on Autodesk Map visit: http://www.autodesk.com

Document Data Format Requirements

All non-vector based data or "Document" data will require standard file format extensions compatible with Microsoft Office including:
- Word – DOC
- Excel - XLS
- Access – MDB, Dbase - DBF
- Powerpoint - PPT
- Internet Explorer – HTML

Adobe PDF Format - this will be accepted format and preferred standard in non-vector based document data viewing for the purposes of project management, external distribution and general desktop viewing. This format will not be accepted without the supporting document files used to create the submitted PDF.

4.2 File Naming Policy

The basic filename convention for ALL drawings and documents is primarily keyed off the unique building identification code as provided by ORC prior to requesting data. This Project ID or Building ID Number is used as the starting point for all files submitted by consultants. Also provided to the consultant will be the Level 1 and Level 2 codes required for submitting data. The other letter and number fields will be open to consultants but must comply with the syntax in the diagram at the bottom of the screen.

The objective of a filenaming policy is to be able to receive data from any type of consultant and based on the filename alone, ORC staff should be able to visually identify the following data at a glance:

Proposed Filenaming Syntax for all drawings and/or documents:

Filename	Description
Project ID or Building ID Number	Designated by ORC prior to request to submit data. Building ID's are prefixed with the Letter "B" in all cases. Project ID's are prefixed with the letter "P" in all cases. ORC project numbers have one alpha and 5 numeric characters.
Level 1 Designation	Designated by Consultant but is selected from the approved list of ORC Level 1 Designations.
Level 2 Designation	*Optional* - Designated by Consultant but is selected from the approved list of ORC Level 2 Designations.
Model Designation	*Optional* - Designated by Consultant but is selected from the approved list of ORC Model Designations.
Model Number	*Optional* - Designated by Consultant. Unique Number Field – usually defined as the Site Plan or Floor Plan Number.
Plan Type	*Optional* - Defined by Consultant. User Defined Field that can have any alphanumeric 4 character value. Could be used to designate the file as a Sheet Drawing or Sheet Number.
Submission Number	*Optional* – May be designated by ORC prior to request to submit data. Unique integer which denotes Phase or Submission Number. Default Value is 1.
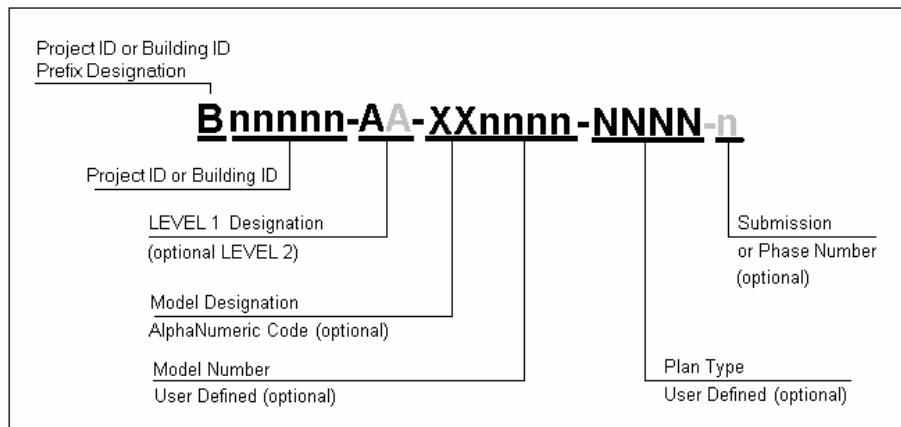
Level 1 Designation for ORC Drawing Documents

Level 1 Designation	Description
G	General
H	Hazardous Materials
V	Survey Mapping
B	Geotechnical
C	Civil
L	Landscape
S	Structural
A	Architectural
I	Interiors
Q	Equipment
F	Fire Protection
P	Plumbing
M	Mechanical
E	Electrical
T	Telecommunications

Level 2 Designation for ORC Drawing Documents

For a complete listing of the option Level 2 designations see Section 8 Page 4.
An example is:
> I-Interiors

The end result file name for an architectural interior drawing would be:
> Bnnnnn-**AI**-XXnnnn-NNNN-n

Model Type Designation for ORC Drawing Documents

| Model Designation	Description
FP	Floor Plan
SP	Site Plan
DP	Demolition Plan
EP	Equipment Plan
XP	Existing Plan
EL	Elevation
SC	Section
DT	Detail
SH	Schedules
3D	Isometric/3D
DG	Diagrams

4.3 **Layout Naming Policy**

Proposed Layout Name Syntax for all drawings and/or documents:

Please keep in mind only one layout per drawing will be accepted.

Filename	Description
Project ID or Building ID	Designated by ORC prior to request to submit data. Building ID uses a "B" prefix in all cases or Project ID uses a "P" prefix.
Plan Type	Defined by Consultant. User Defined Field that can have any alphanumeric 4 character value. Could be used to designate the Sheet Drawings "Sheet Number".

Sample Layout Naming Convention:
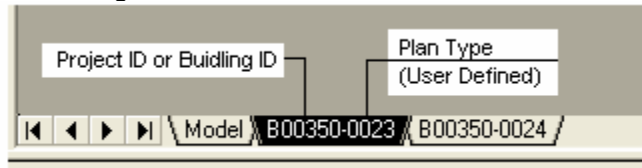

4.4 Minimum CAD Standards

Introduction

The "Minimum CAD Standards" listed below refers to Title Blocks and Layers.

Title Block Sheets
The ORC Titleblock Sheets are used as paperspace layout titleblocks.   Titleblocks and Logos are accessed via the ORC CAD Standards dialogue box. When the ORC titleblock sheet is used, consultants must populate the titleblock attributes with applicable information such as Project ID or Building ID. The revisions must be kept at the top right, and dated.

Note: These sheets should not be revised or edited with respect to presentation style as outlined in the copyright section 2 of this document.
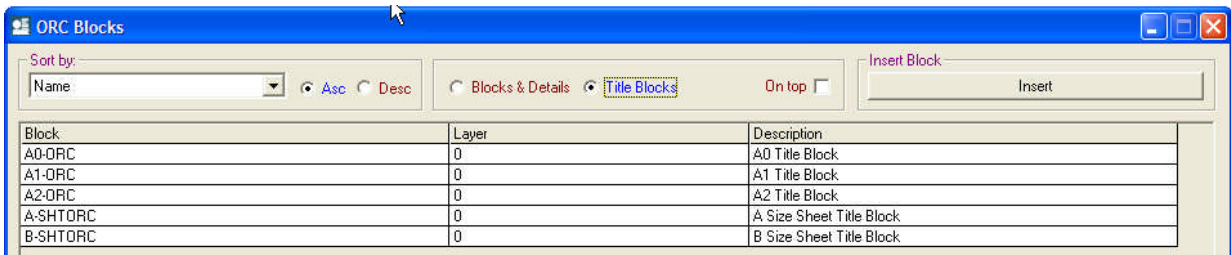
Layering Standard

National CAD Standard Layer Name Format
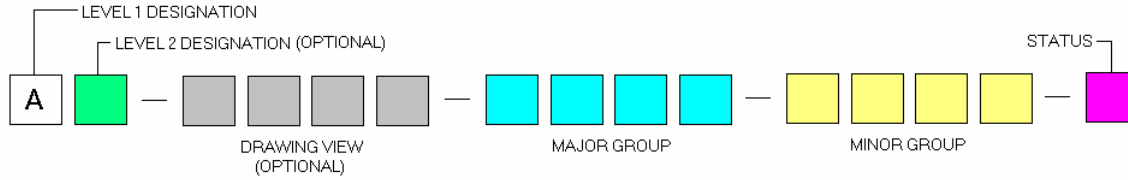
Level 1 Designation Code

Using the National CAD Standards v.2 Layering Standards we will be extracting the AIA/NCS standard for the ALL of the Level 1 Designators including:

- Architectural
- Civil
- Electrical
- Equipment
- Fire Protection
- General
- Geotechnical
- Hazardous Materials
- Interiors
- Landscape
- Mechanical
- Plumbing
- Structural
- Survey Mapping (optional)
- Telecommunications

Level 2 Designation Code

All Level 2 Designations for each Level 1 Designator will be included in the ORC Layering standard with menu access. The attached sample graphic shows the Level 2 designations for the Architectural (A) Level1 designation.

Major and Minor Codes

The standard Major and Minor designations for each Level 1 designation will be added to the ORC Layering standard with menu access. The attached sample graphic shows the Major and Minor group codes for Architectural Level 1 designation.

Common Codes

Level1 designations may have a "Common" minor code designation for any major code group. We have added any "common" minor code designations to the ORC Layering standard. The attached sample graphic shows the "common" minor group codes for the Architectural (A) Level 1 designator.

Annotation Codes

Any Major group code in any Level 1 designation may have an "Annotations" minor group code. "Annotations" pulldown which will cover the miscellaneous items such as text, dimensions and other supporting linework required for each major group code.

Status Code

For additional standardization we will suffix the ORC Layer name with the STATUS code. They currently include:
  a. "N" New work
  b. "E" Existing to remain
  c. "D" Existing to demolish
  d. "F" Future work
  e. "T" Temporary work
  f. "M" Items to be moved
  g. "X" Not in contract
  h. Phase numbers "1 thru 9"

4.5   **Suggested Guidelines**

The suggested guidelines are in relation to text styles, dimension styles, linetypes, drawing object, presentation and plotting/pen styles.   These are guidelines that that ORC has adopted but does not prohibit the consultant to use their own standards, with exception to the File Format, Naming Convention, Layering Standard and Title Block standard. All other minimum CAD standards listed below are subject to the consultant's internal requirements.

Linetype Standard

Access to NCS "Line Symbols" or custom linetypes will be done via the standard AutoCAD Layers dialogue box interface. The linetypes can be found by picking the linetype button.
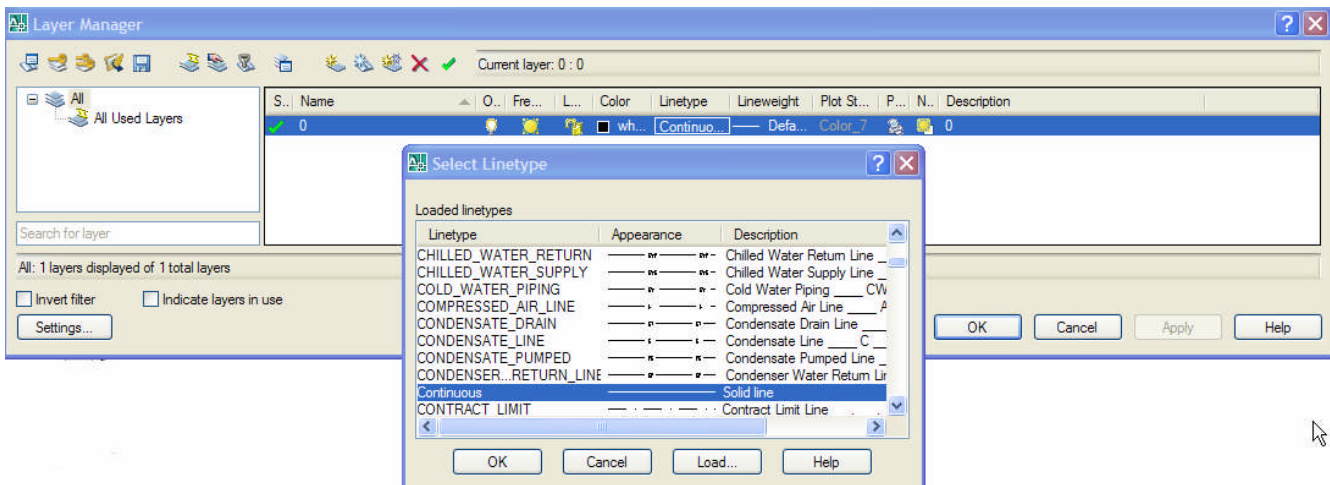
Note: This library is meant to be a resource for users that need standardized linetypes but is NOT REQUIRED for the CAD Data Submission process.

Symbol Standard

The ORC Symbols Library has been extracted from the Construction Specifications Institute (CSI) (www.csinet.org) Symbols Library distributed with the NCS v2.0 Standards. In order to use the CSI Symbols, ORC has updated and re-index the symbols for ORC Menu System. The CSI Symbols are accessible by picking the Blocks button on the main ORC CAD Standards Dialogue box. You access the blocks by picking the blocks button on the far right.

Note: This library is meant to be a resource for users that need standardized symbols but is NOT REQUIRED for the CAD Data Submission process.

Symbol Insertion Scale
The ORC symbols are inserted at 1:1 scale for imperial drawings and 25.4:1 scale for metric drawings.

Architectural Doors and Windows
The exception to this rule is the Architectural Doors and Windows category symbols which are inserted at 25.4:1 for imperial drawings and 645.16:1 for metric drawings.

Civil Symbols
The exception to this rule is the Civil category symbols which are drawn in metric and are inserted at 0.5:1 for metric drawings and 0.019685:1 for imperial drawings.

Symbol Insertion Layers
All symbols are inserted on an approved NCS layer name as a default layer name. The Status and Level 2 designations are set in memory prior to symbol insertions.

For more information about Symbol Standards please refer to "Section 6: National CAD Standards Model Review".

Pen Settings
ORC has a basic pen settings scheme that addresses the primary colour table only.
The standard colour/pen definitions will be used in all drawings received by ORC.
Drawing layer colours will be modified by the consultant to reflect the appropriate feature
or entity type. Colours outside this range will have a pen size of 0.25mm in all cases.

Full Size Plotting

Category	Pen	Size (mm)	Suggested Usage
Very Fine	1	0.13	Dimensions, Hatch
Fine	2	0.18	Notes, Annotations, Indicator Lines
Thin	3	0.25	Glazing, Equipment, Easement Lines, Minor Contours
Medium	4	0.35	Doors, Partitions, Sewers, Lot Lines, Major Contours
Wide	5	0.50	Walls, Slabs, Property Lines, Title Text
Extra Wide	6	0.70	Foot Prints, Borders, Section Lines
Very Wide	7	1.00	Limit of Phase, Contract or Works
60% Screen	8	0.25 / 60%	Feature Shading, Existing Features, Design by Others
30% Screen	9	0.25 / 30%	Feature Shading, Existing Features, Design by Others

Half Size Plotting

Category	Pen	Size (mm)	Suggested Usage
Very Fine	1	0.10	Dimensions, Hatch
Fine	2	0.13	Notes, Annotations, Indicator Lines
Thin	3	0.18	Glazing, Equipment, Easement Lines, Minor Contours
Medium	4	0.25	Doors, Partitions, Sewers, Lot Lines, Major Contours
Wide	5	0.35	Walls, Slabs, Property Lines, Title Text
Extra Wide	6	0.50	Foot Prints, Borders, Section Lines
Very Wide	7	0.70	Limit of Phase, Contract or Works
60% Screen	8	0.18 / 60%	Feature Shading, Existing Features, Design by Others
30% Screen	9	0.18 / 30%	Feature Shading, Existing Features, Design by Others

4.6 **Advanced CAD Standards**

Model Drawings

- o Model drawings will represent design features in model space. Filenaming strategy of Model drawings will ensure that only one Level 1 Designation be represented in each model drawing. For example, Architectural, Electrical and Mechanical drawings will be submitted as 3 individual files. That's not to say that the Electrical Model drawing cannot contain Architectural Level 1 Layer Designations. Model drawings should <u>not</u> have any Paper Space Layouts containing sheets.

Sheet Drawings

- o Sheet drawings will represent "attached" or "overlayed" model drawing(s) using scaled model space viewports created in one or more Paper Space layouts. Sheet Surrounds will be inserted or "attached" into each paper space layout with a plotting scale of 1:1. Viewport scaling is required to represent the design model drawing features.

Use of External References

- o External References should be attached on the X-ANNO-REFR where X denotes the Level 1 Designation. The Major Group ANNO and Minor Group REFR will always be used as the layer reference for attached External References.

- o External References should be attached using a Relative Path Name. The submission process will ultimately reduce all External Reference path settings to a single data folder which AutoCAD will search if relative paths cannot be found.

- o Nesting External References is <u>not</u> recommended by ORC but may be used if the design absolutely requires it. Ultimately, the digital submission of data will be the primary objective of consultants and if nesting external references causes errors or crashes during a standard drawing loading then the submission will be rejected by ORC.

- o Before running the layer audit report please ensure you "unload" each x-ref, to ensure the report will pass.

Typical Sheet Drawing Model – Single Layout

SHEET DRAWING - B00350-A-DG0022-1
PAPER SPACE LAYOUT - B00350-0022-L1
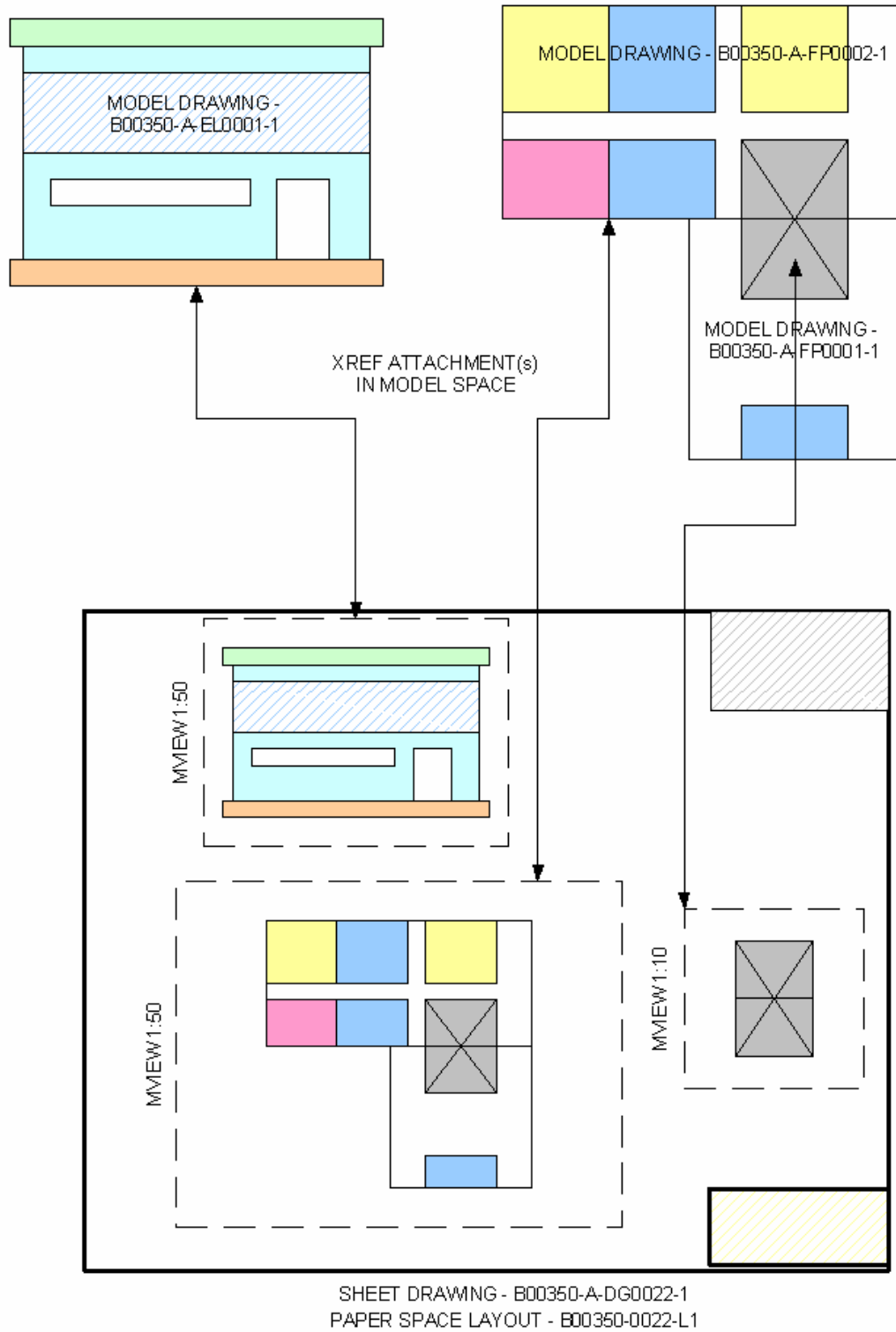
4.7 CAD Drawing Submission Process

Drawing Cleanup and Quality

Prior to submission, the following Drawing Cleanup and Quality checks must be performed:

- Drawings must be Purged of unused layers, blocks, linetypes, MLinetypes, text styles, dimension styles, shapes, plot styles
- Layers in Model Drawings will be turned ON and Thawed. Presentation of design is done in Sheet Drawings using standard layer control or layout viewport layer control.
- Layer Filters must be deleted.
- AEC Objects must be exploded and reduced to standard AutoCAD drawing objects.
- Any LWPolylines depicting "areas" must be considered "closed"

Using ORC Tools for Drawing Quality Audit and Data Submission

The use of the following tools will allow users to:
- Run an Audit Report of the Current Drawing
- Batch Audit Report for 2 or more drawings
- Load a previously saved translation excel file
- Save current state as a layer translation excel file
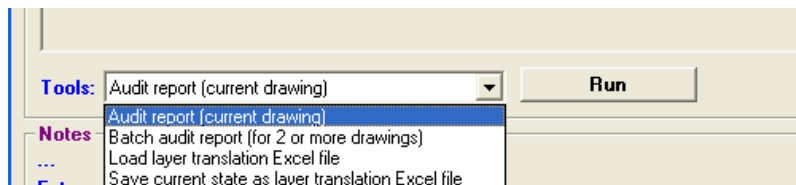
For More information about the use of these tools please refer to "Section 5: ORC CAD Standards Application User Guide"

CD-ROM File and Folder Structure

- One Project or Building per CD-ROM. CD-ROM Digital Drive Label must have the Project ID or Building ID and a Submission Number (as provided by ORC) for acceptance.
- All Data will be contained in a parent folder named after the Project ID or Building ID as provided by ORC.
- Documents (non-Drawing based files) will be stored in a single documents folder
- All drawings submitted will be stored in the single drawings folder. Working drawings or Temporary files will not be submitted. Files with AC$, BAK, DWT, DWS or any other non-compliant file format will not be submitted.
- The PDF standards audit report must also be included.
- All Plot Files (PLT) depicting sheet set plots of the drawings provided will be placed into the "Plot" folder.
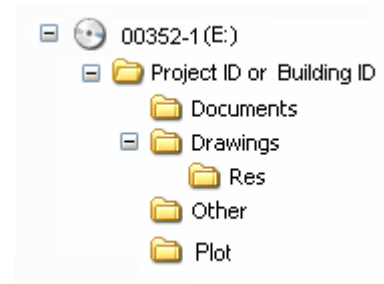
- Property specific design digital data that may be requested by ORC may go into the Other folder. This may contain associated property data like LandXML, ASCII or other design data that could be required by ORC.
- All CD-ROM Submissions will contain a PDF file showing the results of the Batch Audit performed on all submitted drawings. The number of non-conforming Layers in all cases should be 0 for each drawing submitted. The Long form or Short Form report should be saved into the parent Project ID folder.
- If the ORC Layer Translation Tool is used, then include the associated Translation file (XLS Format) in the parent Project ID folder.
- DWG's provided by ORC to consultant are not required unless they meet ORC Layer Standards.

Drawing Data Submission Process Model
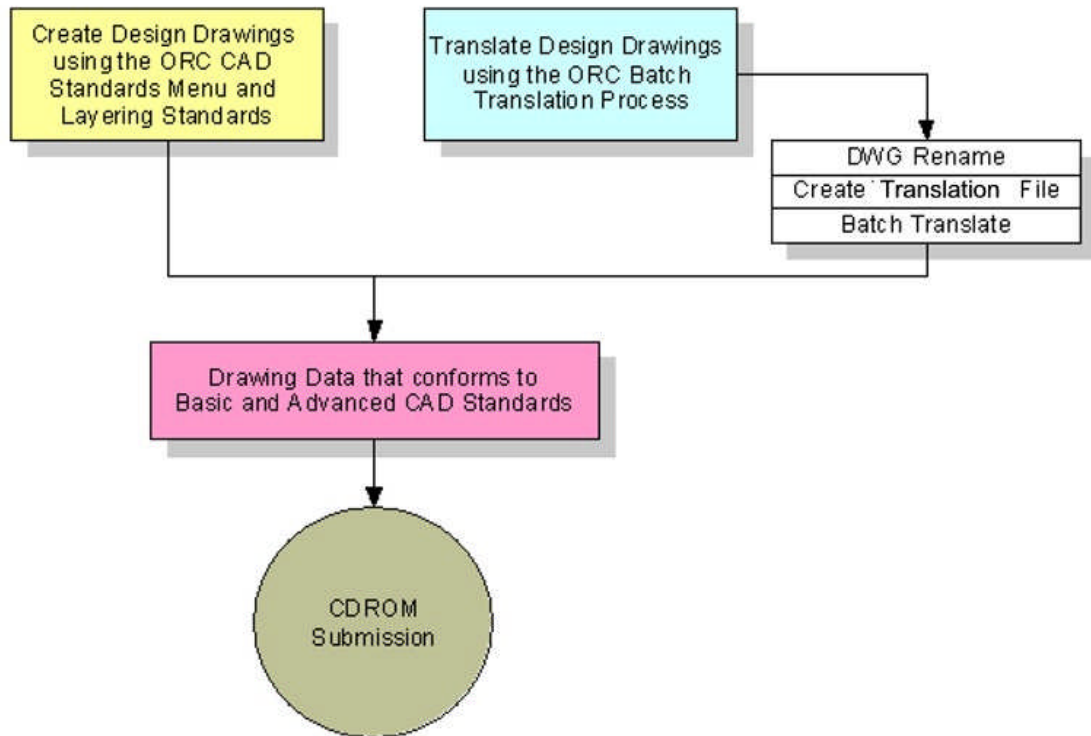
Drawing Data Exchange – Check In Process Model

Third Party	Submits Drawings

```
Third Party
    ┌──────────────┐
    │   Submits    │
    │   Drawings   │
    └──────┬───────┘
           │
ORC Internal Group
           ▼
    ┌──────────────┐
    │  PM/ FM/ LM  │
    │  Submits As- │
    │Built Drawings│
    └──────┬───────┘
           │
           ▼
┌────────────┐   ┌────────────┐   ┌────────────┐
│  Records   │──▶│  Verifies  │──▶│ Enter into │
│ Management │   │  drawings  │   │  LiveLink  │
│            │   │meets ORC   │   │(Full       │
│            │   │CAD standards│  │Drawing Set)│
└────────────┘   └────────────┘   └─────┬──────┘
                                        │
BLJC                                    ▼
                ┌────────────┐   ┌────────────┐   ┌────────────┐
                │BLJC receives│─▶│ Documents  │──▶│ Update As –Is│
                │floor plans │   │and verifies│   │ drawing for │
                │either      │   │ submitted  │   │   master    │
                │through     │   │drawings as │   │  drawings   │
                │email or CD │   │per BLJC    │   │             │
                │            │   │Standards   │   │             │
                └────────────┘   └────────────┘   └─────┬──────┘
                                                        │
                                                        ▼
                                                 ┌────────────┐
                                                 │  Post to   │
                                                 │  drawing   │
                                                 │ management │
                                                 │  as PDF    │
                                                 └────────────┘

                                    ┌────────────┐   ┌────────────┐   ┌──────┐
                                    │Post on-line│──▶│   Update   │──▶│ End  │
                                    │within Real │   │  activity  │   │      │
                                    │   Suite    │   │ logs and   │   │      │
                                    │            │   │ reporting  │   │      │
                                    └────────────┘   └────────────┘   └──────┘
```