

NTG Technical Drawings

Part 3 - Documentation Manual for BUILDINGS

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| Acronyms | Full form |
|-----------------|---|
| NTG | Northern Territory Government |
| CAD | Computer Aided Design |
| BIM | Building Information Modelling |
| Xref | Autodesk AutoCAD external reference file |
| Pdf | Portable Document Format |
| Superintendent | The nominated Superintendent for the specific project |

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1. Overview

This manual, including the checklist, outlines the documentation requirements for the production of all Northern Territory Government (NTG) **building** projects. It outlines the procedures for the preparation of building documentation for uniformity, presentation and data compliance for submission to Technical Records.

This manual “NTG Technical Drawings Part 3 – Documentation Manual for BUILDINGS” including the Building Documentation Checklist is to be read in conjunction, and compliance, with:

- [“NTG Technical Drawings Part 1 – Requirements for Technical Records Management”](#) for the specific electronic document requirements and principles.
- “NTG Technical Drawings Part 4 – APRODOCS” Currently under development.
- Australian Drafting Standards – see Clause 4.0 below

Where BIM is required for the project, read in conjunction with:

- Specific BIM requirements in the RFT

Where major civil or roads works are required as part of the project, read in conjunction with:

- [“NTG Technical Drawings Part 2 – Civil CADD Manual”](#) for civil works.

1.1. Conflict

Where this manual and the above listed NTG Technical Drawing manuals and standards conflict, this manual will take precedence but the intent of the overwritten requirements shall be considered and raised with the Superintendent.

2. Scope

This manual is to be applied to all NTG drawings of a technical nature that illustrate the design intent, construction detail, as-constructed information or the like. Gain prior approval from the Superintendent for all drawings deemed not requiring compliance with this manual. Examples of non-compliant drawings may include presentation drawings for media purposes and sketches.

Project drawings are to be comprehensive, coordinated and clearly represent the design that is required to be constructed. All information must be legible and adequate for tendering and construction without ambiguity. All measurement on the building drawings to be millimetres (mm), except site plans in metres (m).

NTG requires all documents to be produced in electronic format and acknowledges that various software platforms are used by industry for building documentation. To assist consistency within the NTG for quality assurance and documentation management, it is required that drawings produced in software other than the accepted application listed in this document is exported to the accepted file formats.

3. Software

3.1. Design Software

It is a requirement for all NTG projects that drawings supplied are submitted in a format suitable to the receiving software packages currently used in the NTG and as required by NTG Technical Records Part 1.

- Autodesk AutoCAD A commercial computer-aided design and drafting software application.
- Autodesk REVIT A building information modelling software for architects, landscape architects, structural engineers, mechanical, electrical, and plumbing engineers, designers and contractors.

3.2. Format

Drawings are to be compatible with the current NTG supported software version format and fully editable for any potential future works.

File and document deliverables to be in accordance with NTG Technical Drawings Part 1 – Requirements for Technical Records Management and accompanied with a 'data transmission record'.

It is the data supplier's responsibility to supply data in a format meeting the NTG standards. Drawings produced with applications other than the nominated accepted software (clause 3.1) shall be converted into a compatible format. The consultant shall be responsible for ensuring the correctness of the conversion process in all aspects meeting the NTG standards. Any cost of processing required due to incorrect and or poor conversion and or drafting shall be borne by the consultant.

4. General Drawing Standards

The drawings shall comply with Australian Standard AS1100 and the relevant discipline. Where the information provided in this manual and any relevant Australian Standards conflict, refer conflict to the Superintendent for advice.

- AS1100.101-1992 and AS1100.101-1992/Amdt1-1994: Technical drawing – General principles.
- AS1100.201-1992 and AS1100.201-1994/Amdt-1994: Technical drawing – Mechanical engineering drawing.
- AS1100.301-1985 and AS1100.301 Supp 1-1986: Architectural drawing.
- AS/NZS1100.501:200: Technical drawing – Structural engineering drawing.
- AS1100.401-1984: Technical drawing – Engineering survey and engineering survey design drawing.

4.1. Font

All character text within the body of the drawing must comply with the following criteria:

- Arial Narrow, True Type Font
(or similar technical based text style approved by the Superintendent).
- Font setting must be 'Width Factor = 1'
- Uppercase lettering only
(with the exception of abbreviations for metric units).
- One style of character used consistently throughout a drawings.

Exceptions:

- All special fonts used in the production of drawings are to be supplied by the Consultant, e.g. special fonts use in Company logo.
- NTG Title Blocks requires True Type Font Arial.

4.2. Text Attributes

The height (h) in millimetres of characters shall be one of the following:

1.8 2 2.5 3 3.5 4 5 7 10 14 20

The minimum accepted text heights for use in the presentation of NTG drawings are shown in Table 1.

TABLE 1: Text Heights

| Character Use | Minimum Character height (h), mm | | |
|--|-------------------------------------|-------------------|----|
| | Sheet Size | | |
| | A1 | Reduced: A1 to A3 | A3 |
| Subtitles, headings | 7 | 3.5 | 4 |
| View and section call out text | 5 | 2.5 | 2 |
| General notes, material list, dimensions | 3.5 | 1.8 | 2 |

4.3. Coloured on Drawings

Colour is not to be used on drawings unless noted below. Where colour is used, ensure that the colour used can be clearly reproduced in black and white and the intended information on the drawings is not lost through the process.

The following is a list of accepted applications for colour on drawings.

- 3D Perspective render for illustrative purposes
- Site Plan
- Photographs (where required)

- Demolition Plan
- Demolition Details

All drawing sheets with colours will be stamped 'print in colour', the below is a stamp available for download on the [NTG Technical Records website](#).

PRINT IN COLOUR

Where transparency filters are used, all lines and hatches shall be clearly visible when printed and where applicable reduced from A1 to A3.

4.4. Lines Types

All underground service lines shall be represented by use of complex lines or symbolic lines. Using colours only to represent services lines is not accepted.

4.5. Drawing Title Blocks

NTG has A3 and A1 drawing sheet templates which are to be used for all NTG projects, see NTG Technical Drawings Part 1 – Requirements for Technical Records Management for requirements.

These Title Blocks templates can be downloaded from the Technical Records website:

<http://internal.dipl.nt.gov.au/manage-projects/technical-records/technical-records>

All CAD drawing files to be submitted shall be clearly labelled with the following information:

- **** Region / Location / Project Title**
- **Drawing Title / Drawing Type**
- **** Asset Number and Project Number**
- Sheet Number and Total Sheets
- **** Drawing Number / Amendment Number**
- Designer / Drafter / Checkers / Design Project Leader / **** NTG Project Manager**
- Amendment Details

**** denotes information to be supplied by the Superintendent.**

4.6. Standard Drawing Templates

NTG has two standard AutoCAD drawing templates. Both templates contain the current NTG title blocks and loaded example layers, dimensions styles, text styles, line styles, drawings titles and symbols.

Consultants can opt to use these in their documentation or use their own template with the NTG Standard Title Block.

Multi Sheet Template is a single AutoCAD file suitable for multiple sheets layouts. Additional drawings sheets are added by creating additional paper space tabs.

This template is suited for smaller less complex projects, these templates can be downloaded from the Technical Records website:

- [NTG Multi-Sheet A3 March21.zip](#)

Single Sheet Template requires the Titleblock to be Xref'ed, each drawings sheet is represented by a single AutoCAD file.

This template is suited for all projects, these templates can be downloaded from the Technical Records website:

- [NTG Single-Sheet A3 March21.zip](#)

4.7. NTG Drawing Numbers

Request NTG project number through the Superintendent just prior to issuing 75% review drawings.

All spare drawings numbers are to be listed in the drawings index of the Cover Sheet. Excess drawing numbers may be acquitted through technical records, see [NTG Technical Drawings Part 1 – Requirements for Technical Records Management](#) for instructions.

4.8. Sheet Numbers

The sheet number must be preceded by the initial of the discipline and commence at sheet 01.

Architectural – A, Structural – S, Civil – C, Mechanical – M, Hydraulic – H, Electrical – E, Landscape - L

Examples: A01 of 3, S04 of 11

Use of 100 series numbers system for construction drawings, is subject to approval by the Superintendent.

No alternatives will be allowed.

4.9. Revisions

All changes to be clearly clouded and tagged from the 75% phase as a minimum, unless approved otherwise by the Superintendent.

TABLE 2: Revisions, Revision Clouds and Tags

| Revision | Revision No. | Comments |
|--------------------|--------------|---|
| 25% - 75% Review | Alphabetic | Where approved by the Superintendent, revision clouds and tag may not be required. |
| 75% - 100% Review | Alphabetic | Clearly cloud and tag all changes (unless approved otherwise) |
| 100% Complete | Numeric | Clear all revision clouds and tags upon Superintendent approval for issue of 'Contract Drawing'. |
| Tender Phase | Numeric | Clearly cloud and tag all changes during contract tender. |
| Permit to Build | Numeric | Clear all revision clouds and tags for drawings submission to Building Certifier for issue of a 'Permit to Build' |
| Construction Phase | Numeric | Clearly cloud and tag all changes during construction phase. |
| As Constructed | Numeric | Clearly cloud and tag all changes. |

4.10. Status Stamps

With the exception of "print in colour" stamp, see clause 4.3 and "As Constructed" stamp, see NTG Technical Records Part 1- Requirements for Technical Drawing Management. No status stamps are to be used when submitting drawings for Tender.

5. Drafting Requirements

5.1. North Point and Project Orientation

Site plans to be represented with the north point orientation vertically up the page (where possible).

All layout plans shall be accompanied with a north symbol, orientate to suit the project. Where possible all plans in a drawing set share the same orientation.

5.2. Scales

Scales to be appropriate for the particular elements drawn. Drawing details larger or smaller or positioned sparsely on drawing sheets necessitating extra drawings is to be avoided.

All construction details to be drawn to a recognised scale e.g. 1:15 or 1:9.5 are not recognised scales, except where details are distorted for a specific purpose, these details are to be marked 'not to scale'.

It is important that all symbols, construction details, line types and text are clearly articulated and legible when printed in A3.

5.3. Scale Bars

Provide scale bars for all site plans and layout plans.

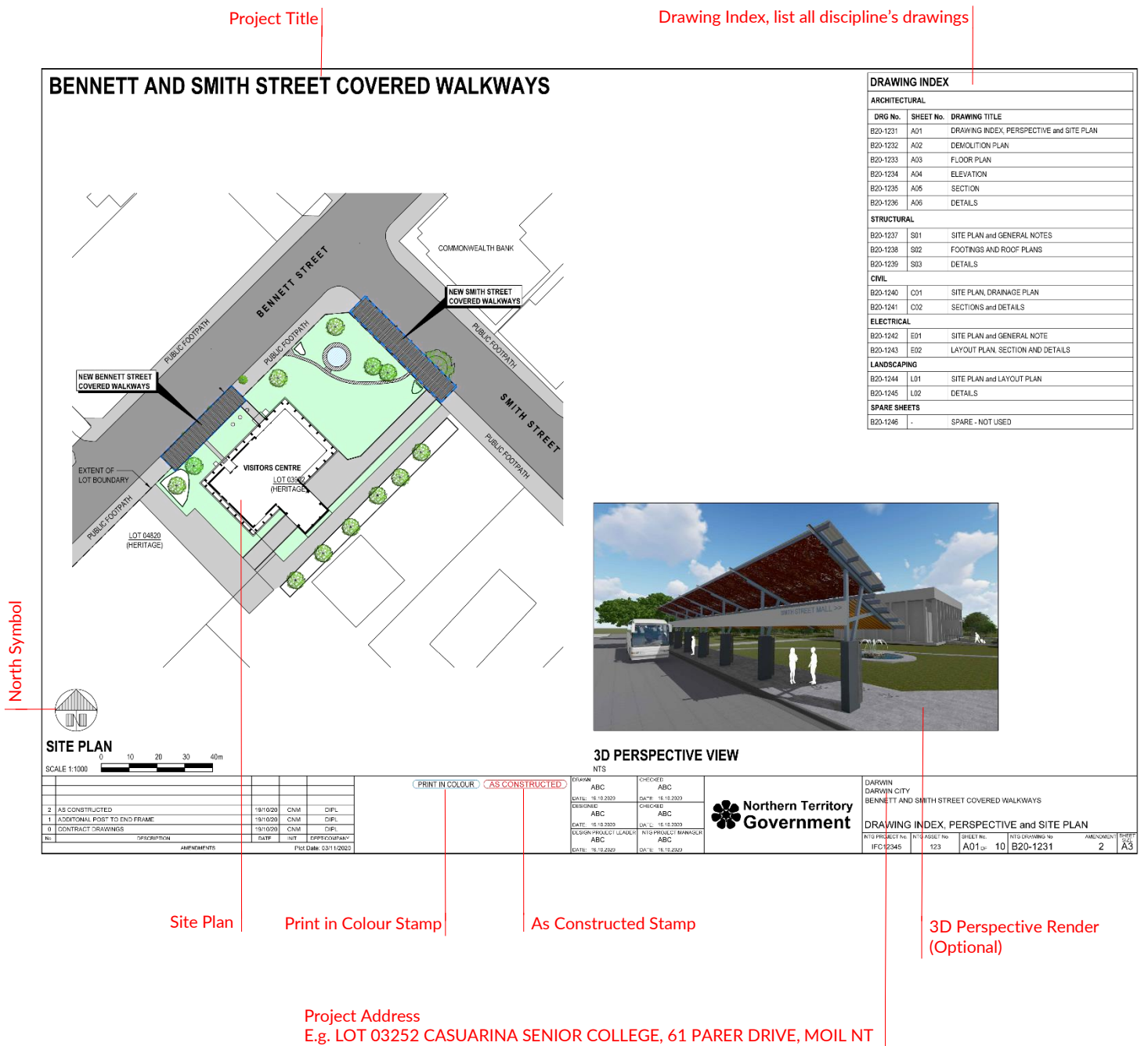
Referencing a scale used as a ratio, such as 1:100 at A3, is not permitted as it can lead to inaccuracy when if the reproduced drawing is slightly distorted during printing or photocopied.

5.4. Cover Sheet

All drawings shall be issued with a cover sheet containing;

- Project Title
- Drawings index, in accordance with NTG Technical Records Part 1
(Architectural to list drawings for all disciplines)
- Locality Plan (if in a remote location)
- Site Plan with North symbol
- Perspective Render (Optional)

FIGURE 1: Example Cover Sheet



6. AutoCAD Requirements

6.1. Model Space

All drawings are to be 1:1 scale, units of measurement in millimetres with the exception of Civil and Survey drawings in metres.

6.2. Layer Names

The intent of the layering system is to have an intuitive naming structure that will allow any item/object to be turned off and not affect any other information on the drawing.

6.3. Drawings Layer Naming Convention

Documentation shall adopt a layer naming convention organised in a systematic fashion with defined layer name data fields such as: Discipline, Major Group, Minor Group, and Status. It is mandatory that all external consultants adopt a layering convention similar to example FIGURE 2 or similar to suit the complexity of the project and allow the CAD file to be efficiently used and easily interpreted across all disciplines.

FIGURE 2: Example Drawings Layer Naming Convention

| | | | | | | | | | | | | | | | | | |
|------------|---|-------------|---|---|---|---|--|-------------|---|---|---|---|--------|---|---|---|---|
| A | - | W | A | L | L | - | | H | A | T | C | H | - | D | E | M | O |
| DISCIPLINE | - | MAJOR GROUP | | | | - | | MINOR GROUP | | | | - | STATUS | | | | |

6.4. Line Attributes

An AutoCAD plot style is an object property, it controls how each object or layer is plotted. Assigning a plot style to an object or layer overrides property such as colour, line weights and line type when plotting.

The approved plot styles are 'NTG - A3_BUILDINGS.ctb' and 'NTG - A1_BUILDINGS.ctb'.

The plot style assignment for line colour, weight and thickness is as shown in TABLE 3. This plot style adopts five main line thicknesses, all drawing details are to be represented by using these line thicknesses. Other line colours assigned with Plot Colour: Black may be used for differentiating elements in AutoCAD, unless colour lines are required for details purposed listed in clause 4.3.

A copies of the '.ctb' files can be downloaded from the Technical Records website:

- NTG - A3_BUILDINGS.ctb
- NTG - A1_BUILDINGS.ctb

TABLE 3: Line Colours and Weights

| | Lineweight (mm) | | AutoCAD Settings | | |
|-------------|-----------------|------|------------------|-------------|---------------|
| | A3 | A1 | Colour No. | Colour | Plot Colour |
| Main | 0.18 | 0.35 | 8 | Dark Grey | Black |
| | 0.25 | 0.50 | 7 | White/Black | Black |
| | 0.35 | 0.70 | 2 | Yellow | Black |
| | 0.50 | 1.00 | 1 | Red | Black |
| | 0.70 | 1.40 | 5 | Dark Blue | Black |
| Other lines | 0.18 | 0.35 | 3,4,6,9 | Various | Black |
| Coloured | 0.18 | 0.35 | 10 to 255 | Various | Object Colour |

AutoCAD users can have an additional transparency value applied to assigned colours.

6.5. External Reference Files

External reference files (Xref's) are design or raster files that can be attached and displayed, plotted, and (in the case of reference design files) used for construction purposes, but they cannot be modified in any way.

They improve the efficiency of the CAD process by displaying data from different design files in the active file. When one of the referenced drawings is changed that change is reflected in every design file that the file has been referenced into.

When drawing data is supplied to the NTG and has attached reference files, NTG require the attached files be merged or bound to the drawing where possible, otherwise include all related dependent files within a zip file in an eTransmit process.

6.6. Compression for submission

eTransmit - When you select a set of drawing files in a transmittal package, it automatically includes all related dependent files such as Xref's and font files. AutoCAD users may use eTransmit to include all related dependent files within a zip file or a folder option in a transmittal package.

It is the CAD operator's responsibility to supply data using a compression format appropriate to the NTG system.

PDF's - When submitting pdf's consider the file size and it's suitability for email transmission. Where individual pdf's exceed 8mb provide an additional lower quality version pdf for correspondence.

7. Media

Electronic drawings are to be saved in the latest software version or otherwise agreed in the tender documents.

7.1. Malware

All electronics files (Examples: zip, docx, xlsx, dwg, dgn, pdf etc.) including attachments from emails shall be scanned and FREE of any malware.

8. BUILDING DOCUMENTATION CHECKLIST

| | |
|-----------------|--|
| NTG Project No. | |
| Project Title | |
| Date | |
| Checked by | |

Reference Document:

1. NTG Technical Drawings Part 1 – Requirements for Technical Records Management
2. NTG Technical Drawings Part 3 – Documentation Manual: BUILDINGS

| Description | | Clause | Checked | Comments |
|-------------|--|---|---------|---|
| 1.0 | Scope | | | |
| 1.1 | Is BIM required for this project? | 1 | | Only if BIM has been specified. |
| 2.0 | Titleblock | | | |
| 2.1 | Cover sheet provided? | 5.4 | | |
| 2.2 | NTG Standard Titleblock? | 4.5 | | |
| 2.3 | Titleblock consistent across all project disciplines? | 4.5 | | |
| 2.4 | Sheet numbering sequential, proceeding with discipline code e.g. A01, A02...; A = Architectural S = Structural C = Civil M = Mechanical E = Electrical H = Hydraulic L = Landscape F = Fire | 4.8 | | |
| 2.5 | Revision numbers and description; | | | |
| 2.5.1 | <u>Design Phase Drawings</u> ; Revision No. : Alphabetic | Part 1 | | |
| 2.5.2 | <u>75% Review Drawings</u> ; All drawings issued with NTG drawings numbers | 4.7 | | |
| 2.5.3 | <u>Amendments post '75 Review'</u> ; Cloud and tag all changes | 4.9 | | |
| 2.5.4 | <u>Contract Drawings</u> ; Revision No. : 0 Rev. Description : Contract Drawing | Part 1 | | Clear all previous revisions from revision schedule. Clear all revision clouds and tags upon Superintendent approval for issue of 'Contract Drawing' for tender. |
| 2.5.5 | <u>Amendments post 'Contract Drawings'</u> ; Cloud and tag all changes | 4.9 | | |
| 2.5.6 | <u>As Constructed Drawings</u> ; Drawings sheet with no changes issued with amendment description 'As-Constructed – No Changes' | 4.9 , Part 1 | | Clearly cloud and tag all changes. |

| | Description | Clause | Checked | Comments |
|------------|---|------------------------|---------|---|
| 3.0 | Text Style | | | |
| 3.1 | Arial Narrow preferred or other True Type Font | 4.1 | | |
| 3.2 | Text width factor = 1 | 4.1 | | |
| 3.3 | All text on drawings in Uppercase | 4.2 | | |
| 3.4 | Minimum text heights; | | | |
| 3.4.1 | A3 Sheets : 2.0mm minimum | 4.2 | | |
| 3.4.2 | A1 Sheets : 3.5mm minimum | 4.2 | | |
| 3.4.3 | A1 to A3 Reduced : 1.8mm minimum | 4.2 | | |
| 4.0 | Line Types | | | |
| 4.1 | Underground service lines represented by use of complex lines or symbolic lines. | 4.4 | | Using colours only to represent services lines is not accepted. |
| 5.0 | Cover Page | | | |
| 5.1 | Project Title | 5.4 | | |
| 5.2 | Drawings index includes; - NTG Drawing Number - Sheet Number - Sheet Description - Include NTG Drawing Numbers 'Not Used' | 5.4 | | Excess reserved drawings numbers can be returned to Technical Records prior to issuing 'Contract Drawings'. |
| 5.3 | North Symbol | 5.1 | | All layout plans with North Symbol |
| 6.0 | Stamps | | | |
| 6.1 | All coloured drawings stamped 'print in colour'. | 4.3 | | Colours to listed drawings only. No colours on detail drawings. |
| 6.2 | Drawings sheets are clear of any unapproved stamps e.g. file save directory, plot date etc. | 4.10 | | If other stamps for internal document control is required, these may be placed on non-print layers. |
| 6.3 | As constructed drawings issued with 'As Constructed' stamp | Part 1 | | |
| 7.0 | Deliverables | | | |
| 7.1 | Drawings files in .dwg, .rvt or .pdf file format | 3.1 | | |
| 7.2 | Contract Drawings submitted to technical records and approved | Part 1 | | |
| 7.3 | As Constructed Drawings submitted to technical records and approved | Part 1 | | |
| 7.4 | Single DWG drawing file for each drawings sheet with the correct naming convention e.g. B20-1234(0) | Part 1 | | |
| 7.5 | Single PDF for each drawing sheet with the correct naming convention e.g. B20-1234(0) | Part 1 | | |
| 7.6 | BIM model in the native file formats | Part 1 | | |
| 8.0 | Media Transfer | | | |
| 8.1 | Consultant 'ftp' access for large file transfers | Part 1 | | |