Standard: Engineering Drawings / CAD General Requirements, Practices and Preparation of Drawings

Standard Number: HPC-9CA-01-0001-2012

Document Control		
Author	**Name:** Robert Golding **Position:** Drawings & CAD System Specialist	Digitally signed by Robert Golding Date: 2020.11.19 09:33:01 +08'00'
Peer Review	**Name:** Claire Hand **Position:** Engineering Drawings Systems Specialist	Claire Hand Digitally signed by Claire Hand Date: 2020.11.19 10:04:53 +08'00'
Endorsed By	**Name:** Sandeep Magan **Position:** Engineering Services Manager	Digitally signed by Sandeep Magan Date: 2020.11.19 11:32:25 +08'00'
Approved By *	**Name:** Marc Beckx **Position:** Manager Engineering and Project Services	Marc Beckx 2020.11.19 15:39:58 +08'00'
Date Created/Last Updated	19th November 2020	
Review Frequency **	3 years	
Next Review Date **	19th November 2023	

** This person will have the power to grant the process owner the authority and responsibility to manage the process from end to end.*

*** Frequency period is dependent upon circumstances– maximum is 5 years from last issue, review, or revision whichever is the latest. If left blank, the default must be 1 year unless otherwise specified.*

Revision Control		
Revision	**Date**	**Description**
3	19/11/2020	Updated with engineering requirements

Refer to Appendix A for Full Revision History.

STAKEHOLDERS *The following positions must be consulted if an update or review is required:*	
EPCM Contracts Manager	Senior Engineer Secondary Systems
Engineering Services Manager	Major Project Directors
Asset Managers	CAD Systems Specialist

TABLE OF CONTENTS

1 PURPOSE

Horizon Power requires accurate records of planned/installed plant and equipment. This requirement is in line with The Electricity Act (1945), WA Electricity (Licensing) Regulations (1991), Electricity (Supply Standards and System Safety) Regulations (2001) and good industry practice.

To achieve this goal, drawings shall be captured and managed during the design, the construction phase and upon completion of works. Drawings shall at all times accurately reflect the design intent and the actual constructed asset, at project completion. Drawings shall be signed off as accepted by an appropriate Horizon Power representative.

Regional Western Australia, the North West Interconnected System (NWIS) and most Non-interconnected Systems were previously managed by Western Power Corporation (WPC) and before that the State Energy Commission of Western Australia (SECWA). Almost all of Horizon Power's drawings in use today bear semblance of this legacy.

2 APPLICATION

This Standard applies to all Horizon Power staff and contractors that are involved in the production or modification of Horizon Power drawings.

3 NORMATIVE REFERENCES

The following normative documents contain provisions which, through reference in this text, constitute provisions of this Standard. All documents are subject to revision, and parties to agreements are encouraged to investigate the possibility of applying the most recent editions of the normative documents listed below.

3.1 Related/referenced documents

1. AS 1000 The international system of units and its application
2. AS 1100 Technical drawing
3. AS 1101 Graphic symbols for general engineering
4. AS 1102 Graphical symbols for electro technical documentation
5. AS 1103 Informative symbols for use on electrical & electronic equipment
6. AS 3702 Item designation in electro technology
7. HPC-9CA-01-0002-2012 Standard for Numbering & Titling.
8. HPC-SD-DC-FRM-0001 Drawing & Document Request Form
9. HPC-9CA-01-0005-2020 HorizonCAD Help Guide
10. HPA-SD-DC-DET-0001-01 Example Revision Layout Drawing

3.2 Definitions

The definitions and abbreviations below apply:

AutoCAD	AutoDesk application for CAD Design & Drawing.
Bentley Descartes	An imaging application integrated with MicroStation
CAD	Computer Aided Design
CIT	Monochrome (black and white) image / raster file.
DGN	MicroStation V8 Design File Format
Contractor	A person or company engaged by Horizon Power
Control	The organisation to which the drawing has been checked-out to for the purpose of modification
Drawing Management Group	Provides drawing and control services. Including systematic registration, dissemination, control, status reporting and storage of controlled drawings.
DWG	AutoCAD Design File Format
DXF	Legacy Drawing Exchange Format
EPCM	Engineering, Procurement, Construction & Management.
HPC	Horizon Power Corporation
Hybrid File	A CAD File containing both Vector & Raster elements
HorizonCAD	Horizon Power MicroStation Customisation Package.
Horizon Power Representative	Person authorised by Horizon Power to represent Horizon Power e.g. Project manager or their delegate
MicroStation	Bentley Systems application for CAD Design & Drawing
PDF	Adobe Systems Portable Document Format
Principal	Horizon Power Corporation
ProjectWise	Horizon Power's Drawing Management System
Raster Files	A raster image, also called a bitmap
TIFF	A Type of Image file
Vector Elements	Vector graphics is the use of geometrical primitives

4 REQUIREMENTS

All Horizon Power drawings shall comply with the following:

4.1 Format

All drawings are to be electronic format. MicroStation V8i is Horizon Power's approved CAD System. A MicroStation Customisation Package (CAD Build) has been created to assist see Section 4.2

The accepted file format is V8 DGN. All other formats must seek written approval from the Drawing Management Group before they will be accepted.

Appropriately, licensed and legally acquired computer software shall be used for the production of all drawing files.

4.2 Horizon Power MicroStation CAD Build

HorizonCAD has been created and tested up to MicroStation V8i SELECT series 10 and is the current version for Horizon Power. It can be supplied upon project initiation request, through the Horizon Power Drawing Management Group HPDC@horizonpower.com.au

The CAD Build is managed and maintained by Horizon Power's Drawing Management Group. Any revisions to the CAD build will be distributed by this group only.

4.3 Intellectual Property & Confidentiality

All drawings that have been created by, or for Horizon Power shall be regarded as Horizon Power's Intellectual Property, regardless of the drawing status (refer to Section 10) and all drawings shall be treated as confidential.

4.4 Ownership of Drawings

Drawings & Documents created by, or on behalf of Horizon Power are an asset of significant value to Horizon Power.

Drawings are and will remain the sole property of Horizon power and are not for distribution outside Horizon Power except where specifically authorised.

4.5 Data Formats

Horizon Power, Contractors and vendors shall submit Design plans or As-built Drawings in MicroStation V8 DGN format, accompanied by a PDF copy of the DGN file.

Copies of original plan or drawings shall preferably be As-built plans showing modifications to design intent during construction, including notes, comments or annotations.

4.6 Standards Compliance

Horizon Power reserves the right to reject drawings should they not comply with this document.

It is the Contractor or Draftsperson's responsibility to ensure that the drawings are to the correct Horizon Power Standards (including Australian Standard requirements) and display correctly within Horizon Power's network, regardless of the state of the file when it was received.

A Standards Checker has been provided within the Horizon Power MicroStation CAD Build. All Drawings will be checked by this tool prior to being accepted by the Drawing Management Team.

Horizon Power reserves the right to update the Standards Checker at any time.

4.7 Initial CAD Review

At the 15% review milestone, the Contractor shall submit a number of test drawings in native format to HPdrafting@horizonpower.com.au for review to ensure standards are met so the project will not be delayed at completion. The project can continue whilst the files are being reviewed. Any findings will be provided to the Contractor in writing and can be incorporated into the next review, they do not need to be resubmitted for review until the next milestone.

4.8 Approvals

Any approvals which the Principal is required or entitled to give under the Contract will in no way alter the Principal reliance on the skill and expertise of the Contractor or design group or alter the obligations of the Contractor or design group under the Contract, nor shall the giving of any such approval constitute an assumption by the Principal of any of the Contractor or design groups obligations or responsibilities under the Contract.

5 DRAWING MANAGEMENT

5.1 Items and Services Available

The following items / services are available from the Drawing Management Group.

- Drawing sheets, in electronic format which are contained in the Horizon Power CAD Build (HorizonCAD)
- Allocation of new drawing / document numbers
- Allocation of drawings / documents requiring revision
- MicroStation support package in electronic format (HorizonCAD)
- Clarification on Horizon Power Drawing Standards
- Access to Horizon Power ProjectWise

5.2 Drawing Requests

All requests for Horizon Power drawings shall be made through Horizon Power Drawing Management via email HPDC@horizonpower.com.au.

Please use the document detailed below for this process.

HPA-0000000-DC-FRM-0001 Drawing & Document Request Form

5.3 Request for Modification or Reservation

A request for modification is necessary when a person requires control of a particular drawing for revision which is in the ownership of Horizon Power in ProjectWise

A request for reservation is necessary when a person requires control of a particular drawing for revision which is currently being controlled by another contractor.

All modification and reserve requests must be submitted to HPDC@horizonpower.com.au using for the form listed in section 5.2

5.4 Submission of Documentation

A PDF copy of the signed hard copy, plus the corresponding CAD File shall be submitted to the Drawing Management Group under a transmittal. All IFC drawing issues shall have a PDF Vector and DGN File.

DGN shall also be provided for final Concept and tender drawings.

5.4.1 ProjectWise Deliverables Management

Horizon Power will accept the use of ProjectWise Deliverables Management for all submissions. Please inform HPDC if you have ProjectWise at Project Award. Max transmittal size is 100mb each.

5.4.2 Transmittals

All documentation will be transmitted to the Drawing Management group via HPDC@horizonpower.com.au and will include a zip folder containing a transmittal,

drawings being submitted and a separate Excel file containing the metadata associated with the submission.

The Supplier or Contractor is permitted to email transmittals directly to Drawing Management Group, providing the size of the transmittal and associated documentation is less than 10MB.

Where the size of the transmittal is equal to or greater than 10MB, this requires the transmittal to be exchanged via an FTP or File Sharing Service and the Supplier or Contractor will send an email notification to HPDC@horizonpower.com.au

The subject of the email will clearly list the Project number / PO Number, transmittal number and reason for issue.

- Principal will only accept electronic transmittal submissions via email or FTP / File Sharing Service.
- The transmittal shall have a unique number and contain the following information.
  - Principal Drawing / Document Number and revision.
  - Principal Drawing / Document Titles.
  - Principal Contract Number.
  - Reason for issue e.g. issued for information, issued for approval or issued for review and comment.
  - Date of issue. The date of issue shall be within 1 business day of the email notification date.
  - Supplier or Contactor Name and appropriate contact details.

6 DRAWING PRODUCTION METHODS

6.1 New drawings

All new drawings shall adhere to Section 4

Prior written approval shall be obtained from Horizon Power Drawing Management Group for drawings that are to be drafted making use of alternative software such as AutoCAD. Any Drawings created or edited using alternative software packages will be subject to the same Standards Checks. It is the Contractor's responsibility to ensure they meet the Standards set out in this document.

All formats shall conform to Horizon Power CAD standards and be converted to V8.dgn prior to submitting to Horizon Power.

Drawing Numbers shall be issued by Horizon Power Drawing Management Group in accordance with Standard HPC-9CA-01-0002-2012: Numbering and Titling Specification

Refer DM# 9118921.

6.2 Existing Drawings

All drawing modifications shall be completed using CAD Software, preferably MicroStation V8i, any drawings that are hand drawn or scanned (hybrid file) shall be inserted into a MicroStation DGN and edited in compliance with this document.

If editing a legacy Western Power drawing refer to Section 7

If editing a hybrid file refer to Section 8

6.3 Drawing Presentation

6.3.1 Border Sheet Sizes

- It is preferred, though not essential that all drawings be completed utilizing an A1 drawing sheet.
- Electrical diagrams shall use A1
- Electrical Distribution Drawings shall use A2, or A1 if more space is required.

For all other Drawings, standard drawing sheet sizes shall be used, namely A0, A1, A2, A3 and A4. In compliance with AS 1100.3 (1971). - No other sizes shall be used under any circumstances.

6.3.2 Title Blocks

- Horizon Power Title Blocks shall be used for all drawings and are supplied as part of the CAD build. Consultant and 3rd party Title blocks will not be accepted.
- The Horizon Power Title Blocks themselves shall not be edited under any circumstances.
- Horizon Power Title Blocks shall be inserted into the drawing as MicroStation cells only, any Title Blocks inserted as reference files shall be rejected.
- MicroStation Tags shall be used to display Title Information and are embedded with the Horizon Power Title Blocks supplied.

- Horizon Power Title Blocks shall be placed on either the Design Model, or a Sheet Model. Please note that Electrical Diagrams (i.e. Schematics Diagrams, Termination Diagrams) etc. shall be drawn in the Design Model.

6.4 Scale

Scales shall comply with AS 1100.101 (1992).

6.5 Projection

Drawings shall be drawn in the third angle projection.

6.6 Orientation

Drawings depicting plant layouts, buildings, etc. shall be drawn such that North is directed either to the top or the right margin of the drawing sheet.

All drawings shall be drawn top to bottom left to right.

6.7 Coordinates

All drawings depicting coordinates shall be provided using the Map Grid of Australia (MGA) 94 format, using either Zone 49, 50, 51 or 52 depending on the location of the project, unless otherwise agreed upon by Horizon Power.

Coordinates shall be shown in metres to two decimal places.

E.g.	1234.12 E	not	1234.123E
	1234.12 N	not	1234.123N

6.8 Text

The following applies for all Text.

- The only accepted font on the drawing shall be MicroStation Font 27 (ISOREC / ISO 3098B). Horizon Power will not accept drawings with other fonts used, including True Type Fonts or SHX Fonts
- If Horizon Power has approved the use of alternative software, the only other accepted font will be ISO 3098B
- Accepted Text Sizes are 1.8mm, 2.5mm, 3.5mm, 5.0mm, 7.0mm and 10.0mm
- Correct text justifications shall be used where possible

NOTE: The HorizonCAD MicroStation build has built in text tools to ensure the standards are maintained.

6.9 Grid References for Electrical Diagrams and Telecommunication Diagrams

All High Voltage and Medium Voltage Electrical schematic diagrams shall utilise the existing grid referencing on the border sheet.

All 415 volt Electrical schematic diagrams shall have a grid reference (e.g. Sheets shall start at 100-199, 200 -299 300-399 etc.).

6.10 Electrical Symbols and Telecommunications Symbols

Only cells provided in the HorizonCAD Build or cell library shall be used. For graphical symbols for Electrotechnology documentation and their use, refer to the above cell library and AS 1102.

Any proposed new cells shall be submitted for review to the custodian of this Standard.

6.11 Annotation Item

Horizon Power Annotation tools provided in the Horizon Power CAD Build shall be used.

6.12 Dimensioning

Dimensioning shall comply with AS 1100.

Dimension styles that are provided in the Horizon Power CAD Build symbology shall not be modified however rounding-off of units may be modified for tolerance purposes.

6.13 Element Symbology

Standard MicroStation symbology shall be used, except for layout drawings where custom line styles are provided within the Horizon Power CAD Build.

6.14 Levels and Work Points

Levels and work points shall be shown on all drawings, for clarification purposes, the view may be enlarged to clearly show the location of the point. The work point cell from the Horizon CAD Build shall be used.

6.15 Hatching

All hatching shall comply with AS 1100.

6.16 Clearance Outlines

Clearance outlines shall be clearly labelled, e.g. Crane Clearance, etc.

6.17 Views

View names and headings shall be in 5.0 mm high text.

6.18 Colours

Horizon Power uses the standard MicroStation colour table, i.e.

MicroStation Colour									
CO=0	CO=1	CO=2	CO=3	CO=4	CO=5	CO=6	CO=7	CO=8	CO=9
White	Dark Blue	Green	Red	Yellow	Magenta	Orange	Cyan	Dark Grey	Light Grey

6.19 Line Styles

MicroStation Line Style							
LC=0	LC=1	LC=2	LC=3	LC=4	LC=5	LC=6	LC=7
Continuous	Dot	Medium Dash	Long Dash	Dot – Dash	Short Dash	Dash – Dot – Dot	Long Dash – Short Dash

NOTE: AutoCAD line styles are not permitted.

6.20 Line Weights

CAD Line Weight	Plotted Line Weight
WT=0	0.09 mm
WT=1	0.13 mm
WT=2	0.18 mm
WT=3	0.25 mm
WT=5	0.50 mm
WT=7	0.75 mm
WT=11	1.00 mm
WT=12	1.25 mm
WT=13	1.50 mm
WT=14	1.75 mm

6.21 MicroStation Levels

Only Levels / Layers provided within HorizonCAD shall be used. See Appendix 3 for a full list (Please note this does not include Distribution Design Levels as they are included in HorizonCAD DistTools).

HorizonCAD restricts access for the user to create their own levels / layers.

In addition, elements are NOT to be placed on the Default Level.

Any Items placed onto the Default level, or on levels that are non-Horizon Power levels will result in the drawing not passing the Standards Checker.

6.22 Match Marks

Drawings making use of multiple sheets shall make use of match-marks and be considered as separate drawings (uniquely identified by sheet numbers for each drawing).

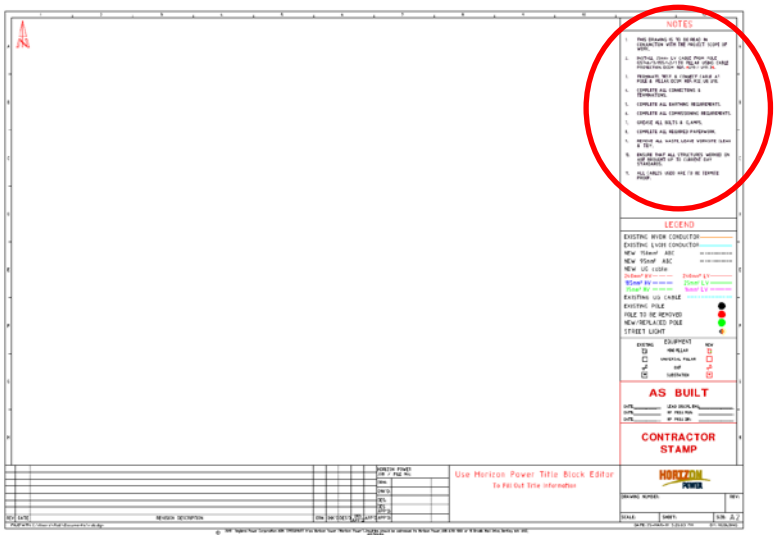
The first section or detail taken on the second drawing shall commence again from “A” or from “1” as applicable.

6.23 Notes

Notes shall be numbered and not underlined.

The lead drawing of a set of drawings can contain all notes referring to codes, standards, specifications, etc. These notes should not be repeated within the same set of drawings, providing each drawing references the notes.

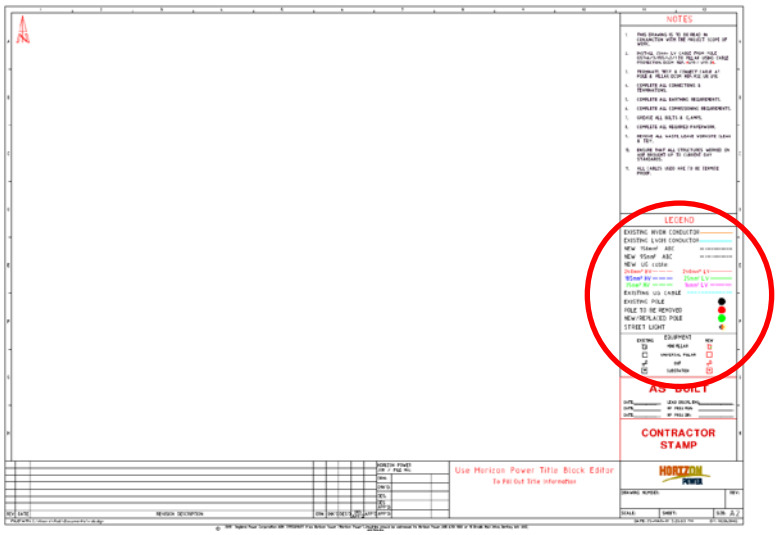
It is recommended that drawings notes are to be placed into a Side Panel on the Title Block with corresponding Header. HorizonCAD has tools available to easily insert these cells.



6.24 Legend

A legend can be shown on the first drawing sheet where unique symbols appear on a drawing. Where such symbols appear throughout a set of drawings, the legend need only be shown on the lead drawing providing it is referenced throughout.

Legends are to be placed into a Side Panel on the Title Block with corresponding Header as per below. HorizonCAD has tools available to easily insert these cells.



6.25 Drawing Titles & Numbers

Drawing Numbers shall be issued by Horizon Power Drawing Management Group in accordance with Standard HPC-9CA-01-0002-2012: Numbering and Titling Specification

Refer DM# 9118921.

Existing Drawing Titles that do not match the current Standard (refer HPC-9CA-01-0002-2012) are to be updated to suit.

Existing Drawing numbers are to remain as issued by the Drawing Management Group.

6.26 Revisions

All drawing revisions shall be recorded in the CAD File.

6.26.1 Revision Numbering

Horizon Power uses an “Alpha Numeric” revision numbering system, where the drawing revision shall be incremented by the next Alpha Value (i.e. A, B, C, D) until the Drawing is Accepted for Issuing, at which time the Revision is to change to Revision “0” and “Issued for Construction” and each subsequent revision shall be the following Numeric Value (i.e. 1, 2, 3, 4).

Interim Revisions shall be used between drawing approvals. (i.e. 1A, 1B).

In addition, the Values “o” and “’i” are not to be used due to the similarities when printed to Zero and One respectively.

6.26.2 Revision Cloud

When revising a drawing, a cloud shall be placed around each section being revised on the Drawing to indicate that the area has been modified since the last “As Built” drawing

Symbology and Revision Tools are included in the HorizonCAD Build. All clouds are to have a radius of 3 relative to the size of the Title Block Scale i.e. if the Title Block has been scaled to 1:200, the radius size shall be 600 (3 x 200).

The cloud shall be drawn neatly and shall not pass through dimensions or text where possible.

If there are any queries related to Revisions or Revision Clouding, please contact the Drawing Management Group.

For Information on IFC Clouds & Triangles, refer Section 9.2

For Information on As Built Clouds & Triangles, refer Section 9.3

6.26.3 Revision Triangle

A Revision Triangle is to be placed next to each revised area of the drawing, inside of a Revision Cloud.

A Cell has been created, along with Tools that are supplied within the HorizonCAD Build. The Cell contains a MicroStation Tag that will be automatically populated once placed on the drawing. The value is retrieved from the current drawing revision of the title block.

6.26.4 Consistency

The revision letter or number written in the Revision History block must be the same as the letter or number in the Title Block and all Revision Triangles.

The appropriate Revision clouds and Triangles are to be removed only when the drawings are revised from Issued for Construction (IFC) to As Built (AB). As Built drawings with clouds and revision triangles show the portions of the installation that are yet to be constructed.

IMPORTANT: The only Revision Clouds and Triangles the draftsperson / contractor is authorised to remove are those embedded by the draftsperson / contractor as part of the *same contract/project*.

To avoid confusion, Revision Clouds and Triangles which form part of a different contract/project may not be removed.

6.26.5 Exclusions

Non content changes that are made to the drawing do not need to be clouded. These can include

- Text Case
- Text Format
- Spelling or Grammatical Corrections
- Table / line format corrections
- Modifications to the Drawing Title (any updates to the title are to be sent to HPDC prior to updating)
- An independent element such as a table, notes, small detail view etc. moved to provide an overall better drawing layout

6.27 Holds

Where a piece of information on a drawing is tentative (e.g. the information might be enough for estimating but not sufficiently accurate for construction purposes), the Hold technique shall be applied as follows:

- Holds are only permitted on Interim Revisions. Any Holds that are placed on IFC drawings will be rejected by Horizon Power. For Drawings that require details to be confirmed on site please see Construction Notes
- Place a reverse cloud (to the symbology standard defined by the Horizon Power CAD Build) around the area in question.
- Insert the HOLD inside the cloud in 5 mm height text.
- Enter the reason inside the cloud in 3.5 mm high text (e.g. electrical diagrams to reserve space).

The HOLD shall be removed when the drawing is revised with required information.

6.28 Construction Notes

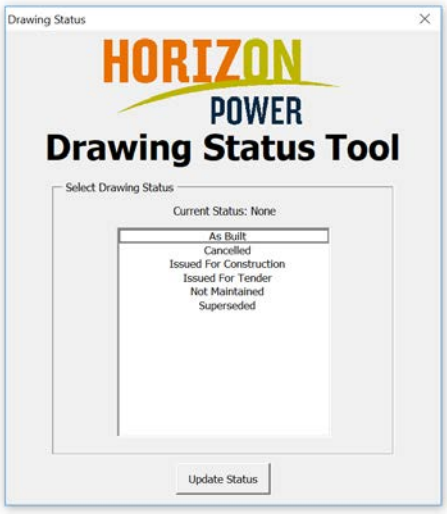
In cases where drawing(s) need to be Issued for Construction, but details are still to be confirmed on site, Construction Notes are to be added.

- The Area in question is to be Clouded with a Revision style cloud (i.e. not inverted)
- A Note is to be added explaining in detail the requirement from Construction crews
- Construction Note detail are to be added as close as possible to the cloud in question, however if there is insufficient space, the detail can be added to another area and referred to adjacent to the cloud.

6.29 Drawing Status Stamps

HorizonCAD has a predetermined selection of Status stamps available. A drawing can only have one Status at a time, the Drawing Status tool has been created to assist with this point.

All requests to alter the selection in HorizonCAD needs to be requested via the Drawing Management Group



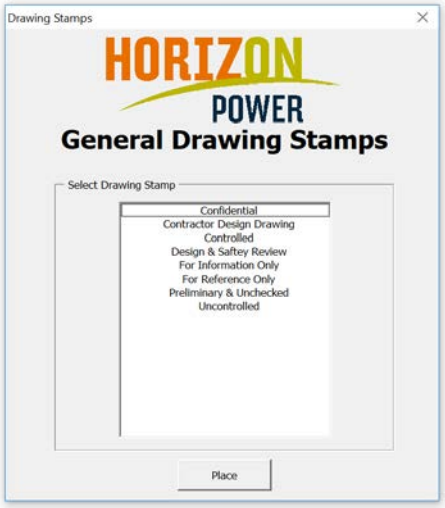
More information on Status' can be found in Section 10

Status stamps are to be placed at the bottom right corner of the drawing, above the Horizon Power logo, unless there is a Contractor Stamp, in which case it can be placed directly above the Contractor Stamp

6.30 General Drawing Stamps

The following Stamps do not indicate a status of the drawing but are used to display other information important to the drawing.

These are available in the “Drawing Stamps” tool within HorizonCAD.



More information on the stamps can be found in Section 11

Drawing stamps are to be placed at the bottom right corner of the drawing, above the Horizon Power logo, unless there is a Contractor Stamp or Status Stamp, in which case it can be placed directly above the Contractor Stamp & Status Stamp.

6.31 Contractor Information

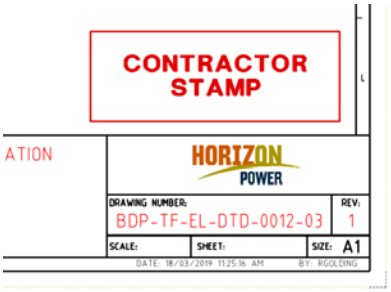
A Contractor identification logo/MicroStation Cell shall be placed on the drawing indicating the contractor’s details. If the logo cannot be placed as shown, it can be placed in an alternative corner of the drawing sheet that is not cluttered.

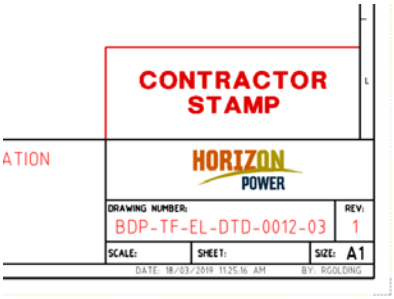
Any drawing that is found to be to be cluttered with data, the contractor’s logo can be left off if approved by Horizon Power Drawing Management Group.

It shall be no larger than 105 mm x 33 mm. An example can be found below.

The logo shall be placed onto the MicroStation Level “General_Logos” only. It is not to be located on the “Default” level under any circumstances.

Placement of the cell shall be in the bottom right corner on the drawing, directly above the drawing number. There shall be no spaces in between the Stamp and Title Block.





6.32 Checking

Where the contractor does not have their own procedure, it is recommended that Horizon Power's be followed. (Refer Appendix 2)

It is the responsibility of the Checker & Design Approver to ensure the drawing/document is correct, complies with all relevant standards and has all cross–referenced drawings confirmed.

7 UPDATING WESTERN POWER / SECWA DRAWINGS

Many of Horizon Power's drawings were once owned by WPC or SECWA and still contain Legacy information such as drawing numbers, title blocks/drawing borders and references etc.

When modifying a Legacy drawing for Horizon Power, the following shall be complied with to ensure that the drawing is updated correctly, regardless of the state of the file when received.

7.1 General Practices

The following applies for all General Practices.

- Any CAD Files in MicroStation V7 format shall be upgraded to V8 using the Horizon Power CAD Build.
- It is accepted that old WPC drawings will not comply with Horizon Power CAD specification. Existing line work and elements placed on levels 1 – 63 shall be remapped to new Horizon Power standard if minimal work is required or has been specified by Horizon Power.
- Any new elements placed on the drawing shall be drawn to the new standard, regardless of the size of the change – new items placed on existing levels shall be deemed as failure to comply with the standards. Levels required for the new standard are provided within the Horizon CAD Build.
- Revision description is to include a note stating it has been updated to Horizon Power's standards.

7.2 Drawing Numbers

Drawings with WPC numbering systems will continue to use its unique number unless specified by Horizon Power. The only instance where a new WPC number will be issued is if a new sheet of an existing sheet set is required (i.e. Sheet 3, Sheet 4 etc.).

Refer Standard HPC-9CA-01-0002-2012: Numbering and Titling Specification

Refer DM# 9118921.

7.3 Title Blocks/Drawing Borders

Any existing drawings being modified shall have its Title Block/Drawing Border replaced with the current Horizon Power Title Block. All drawing, reference and revision information shall be transferred to maintain drawing integrity.

Existing Title Block information shall be removed and re-entered to comply with Horizon Power Standard HPC-9CA-01-0002-2012: Numbering and Titling Specification

Refer DM# 9118921.

8 UPDATING HYBRID FILES

A Hybrid file is considered to be a MicroStation DGN file, with a raster image (scanned document) attached.

The preferred file format of Raster files is Intergraph Compatible CCITT Group 4 (.cit). If a CIT file results in a poor-quality image, Horizon Power will accept TIFF format files.

No other file types are permitted for use as Raster Images (such as PDF's, JPEG's, PNG's) unless written approval is gained from Horizon Power Drawing Management Group.

Bentley Descartes is recommended to be used for editing Raster Images within hybrid files.

When updating Hybrid files, the following shall apply.

- Where a modification is required to any part of the raster, it shall be deleted and redrawn in Vector Elements (Lines, Circles, Blocks, and Cells etc.) using the Horizon Power CAD Standard regardless of the state of the drawing when received.
- Modifications to the raster image must be permanent, i.e. no clipping or hiding will be permitted.
- Where revision to any part of a drawing general notes is required, ALL general notes on the drawing shall be converted to MicroStation text and the appropriate text styles shall apply. Refer Section 6
- Where a drawing requires a major change to more than 50% of the remaining CIT, the drawing shall be totally redrawn in vector. The existing CIT file is to be marked superseded or cancelled and returned to Horizon Power Drawing Management for processing.
- Any CIT files that are no longer required are to be noted on the transmittal on return to the Horizon Power Drawing Management Group. The CAD File is to have the Raster Reference removed.
- Revision areas shall be clouded as per the normal Drawing Revision procedure. Refer Section 6.25
- When submitting the Hybrid File both the MicroStation DGN file and the Raster file shall be submitted. It is the responsibility of the draftsperson making changes to the drawings to ensure that once opened within Horizon Power, the file displays correctly.

9 DRAWING APPROVAL PROCESS

All new drawings or drawing revisions shall be checked, for technical compliance, drafting presentation/accuracy and standards compliance. Drawings will then be signed by the person or persons undertaking the checking task.

The final approval of a drawing shall be completed by a Horizon Power employee, or authorised delegate. The “Approved” section in the signature block and revision block is intended for this – the Contractor does not sign the “Approved” section of the drawing.

The table below indicates the details needed for both IFC Signatures and Subsequent Revision Signatures.

Abbreviation	Description	Purpose	Preferred Position
DRN:	Drawn	Contains the details of the CAD Operator / Draftsperson responsible for creating / revising the drawing	Draftsperson
CHK’D:	Checked	Contains the details of the person responsible for ensuring the drawing is correct and to Horizon Power Standards	Senior Draftsperson / CAD Manager
DES:	Designed	Contains the details of the person responsible for the technical design of the drawing	Discipline Designer / Discipline Engineer
DES APP’D:	Design Approved* by Contractor or Horizon Power Representative (as applicable)	Contains the details of the person responsible for ensuring the design is correct (Peer Review) *Note: Cannot be same person as Designer*	Discipline Designer / Discipline Engineer / Discipline Senior Engineer
APP’D	Drawing Approved* by Horizon Power Representative.	Contains the details of the responsible Horizon Power person for accepting the drawing	Project Director / Asset Manager/ Engineering Services Manager / Authorised Delegate**

* Though the word Approved is used, Horizon Power deems “the word” to mean accepted and ready for formal issue.

**Authorised delegates typically include Engineering Managers as well as Project Managers, Project Directors, Design Managers, Principal Engineers, Asset Managers

9.1 First Issue Signatures

When a drawing is created, the Signature block within the Title Block (below) shall be remain blank.

- The Revision number for a First Issue drawing shall be “A”.
- The Revision Description for a First Issue drawing shall be “First Issue” unless otherwise noted by the Horizon Power Project Manager or a Horizon Power Delegate.

For more information, refer to Section 13

9.2 Issued for Construction

Each time a drawing is Issued for Construction (IFC) the Signature block within the Title Block (below) shall be updated to include the information of the people reviewing the drawing/design and applicable Project Number.

The existing information shall be removed and replaced.

For more information, refer to Section 13

HORIZON POWER JOB / FILE No:		
DRN:		
CHK'D:		
DES:		
DES APP'D:		
APP'D:		

The preferred presentation of names in the sections above is First Initial of Given Name followed by Surname. However, if there is insufficient space the persons initials (preferably 3 Initials) will suffice.

Example of preferred name display: R. GOLDING

Example of preferred Initial Display: RFG

- The Revision number for the first IFC drawing shall be “0”.
- Subsequent Revisions are to be the next numeric value i.e. if the Drawing is currently Rev 4, the next Rev number will be 5).
- The Project Number shall be added to the Revision title, e.g. “Issued for Construction for <Project Number>-<PO Number (if applicable).” For example,
  Issued for construction for C0001029-P46019
- A signature matrix is to be provided by the respective parties involved in the life of the project in writing to the Horizon Power Drawing Management Group.

9.3 As Built

When a drawing reaches As Built status, the following is to be completed on the CAD File, prior to submitting to HPDC

- The Revision Number to be the next numerical number after the previous revision.
- The Revision Description should read “Rev <X> As Built for <Project Number >-<PO Number (if applicable)”.
  For Example
  “Rev 2 As Built for C0001029-P46019”
- Revision Clouds & Triangles are to be removed for the **Revision being As Built only**. All other Clouds & Triangles are to remain until the components have been confirmed As Built.

For Example. A Disconnector has been replaced under Rev 3 and now requires the drawing to be updated to As Built. During this time design has been completed for the replacement of a Current Transformer under Rev 4. Some drawings contain clouds for Rev 3 & Rev 4. In this case, the Rev 4 Clouds & Triangles will remain but the Rev 3 Clouds will be removed. The drawing is then to be updated to Rev 5 with the Revision Description in the format listed above.

- All details on the drawings should be confirmed e.g. No Holds or TBC information is allowed.
- An As Built stamp is not required

[1] Horizon Power generally replaces assets in a staggered manner, leading to a result that only a part of the IFC drawing will be constructed. The allocation of different revision numbers to different assets enables this staggered construction approach to be managed without confusing / unnecessarily burdening the drawing management process.

9.4 Revision Signatures

The Horizon Power Drawing Border Revisions panel on all drawings (as below) shall be updated when a drawing is being revised. As soon as the draftsperson edits the drawing it is recommended to update the Revision Panel to include the following:

- Next Revision Number
- Date drawing edited
- Detailed description of the changes including a project number,
- Draftspersons initials

REV	DATE	REVISION DESCRIPTION	DRN	CHK'D	DES'D	DES APP'D	APP'D

Once the drawing has been signed off by the Checker, Designer, Design Approver and Approver, their initials shall be added to the appropriate field in the revision

block. Hard Copies of wet signature check prints are to be retained for auditing. Horizon Power accepts the use of Digital Signatures.

NOTE: If there is insufficient space for the desired revision description, 2 lines are allowed although not preferred. The below format shall be followed if using 2 lines for a Revision Description.

5	24.05.11	REVISION DESCRIPTION 5 LINE 1	RFG	NS	RFG	XXX	XXX
		REVISION DESCRIPTION 5 LINE 2					
4	20.05.11	REVISION DESCRIPTION 4	RFG	NS	RFG	XXX	XXX
3	20.05.11	REVISION DESCRIPTION 3	RFG	NS	RFG	XXX	XXX
2	20.05.11	REVISION DESCRIPTION 2	RFG	NS	RFG	XXX	XXX
1	20.05.11	REVISION DESCRIPTION 1	RFG	NS	RFG	XXX	XXX
REV	DATE	REVISION DESCRIPTION	DRN	CHK'D	DES'D	DES APP'D	APP'D

In a situation where the Revision Block is full, the oldest Revision is to be removed and all Revisions moved down 1 line, leaving the new Revision to be placed in the Top row.

NOTE: The HorizonCAD Build includes this functionality in the Title Block Editor

For more information, refer to Section 13

9.5 Acceptance of Drawings

- For Non Legacy Drawings (post 2012). Once a drawing has had a final Alpha revision approved by a Horizon Power representative i.e. Rev C “Issued for Client Review”. The drawing revision is to be revised to rev “0” (zero) and “Issued for Construction”. All previous alpha revisions are to be removed (unless it is an existing drawing, see below). All subsequent drawing revisions will be numerical.

- For Legacy Drawings with Alpha As Built / IFC Revisions (with history dating back to Western Power & SECWA for example), no revision information is to be removed, unless space is required in the Title Block for new revision information.

- All Drawings containing External reference files are to be merged or bound. The circular / internal references on the drawing sheet do not need to be merged on final submission to Horizon Power.

10 DRAWING STATUS

The following Status' and descriptions are to be used

10.1 As-built

A drawing that reflects the present day status of the plant or equipment.

10.2 Cancelled Drawing

Drawing has been made redundant due to the removal of equipment.

Where a deliverable is cancelled, the drawings shall be revised to the next revision, watermarked 'CANCELLED' and the revision description updated to reflect the reason for cancellation.

10.3 Issued For Construction

A drawing has been checked and complies with Horizon Power Technical Standards, CAD Standards and has completed a peer review shall be issued to the construction crews to begin to construct the plant or equipment, based on the drawing.

10.4 Issued for Review

The Drawing has been completed and checked by the Contractor and is ready for review by Horizon Power.

All projects must be submitted and approved at IFR to Horizon Power before the project can proceed to IFC.

10.5 Issued For Tender

The drawing has been completed and checked & approved to ensure technical & standards compliance. It is now ready to be submitted to Vendors to quote on equipment.

10.6 Issued For Use

The drawing has been checked and issued. For Standard Drawings Only. (CAD Stamp not supplied in CAD Build to External Contractors)

10.7 Not Maintained

Equipment is still in service, but the drawing does no longer reflect on site conditions.

10.8 Superseded Drawing

Information on the drawing has been transferred to a newer drawing.

Where a deliverable is superseded by a new drawing number, the existing drawing shall be revised to the next sequential revision, watermarked "Superseded" and the revision description updated to reference the new drawing number.

11 DRAWING STAMPS

11.1 For Information Only

Drawing is only for Information, it is not to be used for Construction Purposes.

11.2 For Reference Only

Drawing shall be used as Reference only.

11.3 Confidential

To be used when the drawing shall not be shared by anyone under any circumstances.

11.4 Contractor Design Drawing

Refer Section 12

11.5 Controlled

Drawing is in a Controlled State and managed by Horizon Power Drawing management Group. All drawings modified within the Horizon Power network should be thought of as Controlled.

11.6 Design & Safety Review

The Design Drawing is currently is ready or is currently undergoing a Design & Safety Review by engineers

11.7 Preliminary & Unchecked

Drawing is not yet approved for Horizon Power and shall not to be used for construction.

11.8 Uncontrolled

Drawing has been used outside of the Horizon Power

12 VENDOR / MANUFACTURER DRAWINGS

12.1 Production Methods

Vendor drawings will be accepted by Horizon Power Drawing Management Group, providing they meet the following conditions.

- A new Drawing will be created and shall utilize the Horizon Power Drawing Number System, refer Standard HPC-9CA-01-0002-2012: Numbering and Titling Specification. Refer DM# 9118921.
- Every effort should be made to source the Native / CAD File from the Vendor or Manufacturer.
- All Vendor / Manufacturer Drawings will be subject to the same Standards Checks as all other Horizon Power Drawings.
- First Revision to be 0

12.1.1 Native Files Available

If the Native Files are available, the Vendor / Manufacturer Drawing is to be scaled down (no less than 75% of its actual size) and inserted into a Horizon Power Title Block as vector elements. It will to adhere to all points in this document, in particular Section 6.

12.1.2 Native Files Not Available

In the event that Native files cannot be sourced, the Vendor / Manufacture Drawing is to be inserted as a Raster image. It will be scaled down (no less than 75% of its actual size). The new file then becomes a Hybrid File and will adhere to all points in this document, in particular Section 8.

12.2 Signing Vendor / Manufacturer Drawings

Vendor & Manufacturer drawings require sign off before they can be submitted to Horizon Power. In most cases, the drawings are not designed or checked by Horizon Power, however the below items are to be complied with.

- DRN (Drawn)
  HP or contractor draftsperson responsible for creating / double blocking the new DGN
- CHK'D DES'D DES APP'D (Checked, Designed, Design Approved)
  "VEN" to be input to indicate Vendor.
- APP (Approved)
  As per section 9

						DRAWING REFERENCES
	RFG	VEN	VEN	VEN	CH	
	DRN	CHK'D	DES'D	DES APP'D	APP'D	

HORIZON POWER JOB / FILE No:	C0001029-P46019	
DRN:	R. GOLDING	DD.MM.YY
CHK'D:	VENDOR	DD.MM.YY
DES:	VENDOR	DD.MM.YY
DES APP'D:	VENDOR	DD.MM.YY
APP'D:	C. HAND	DD.MM.YY

13 EXAMPLE REVISION DETAIL DRAWING

An example drawing has been produced to show revision scenarios.

It is provided in the Standards Folder in the CAD Build, or can be supplied independently

Refer HPA-SD-DC-DET-0001-01.

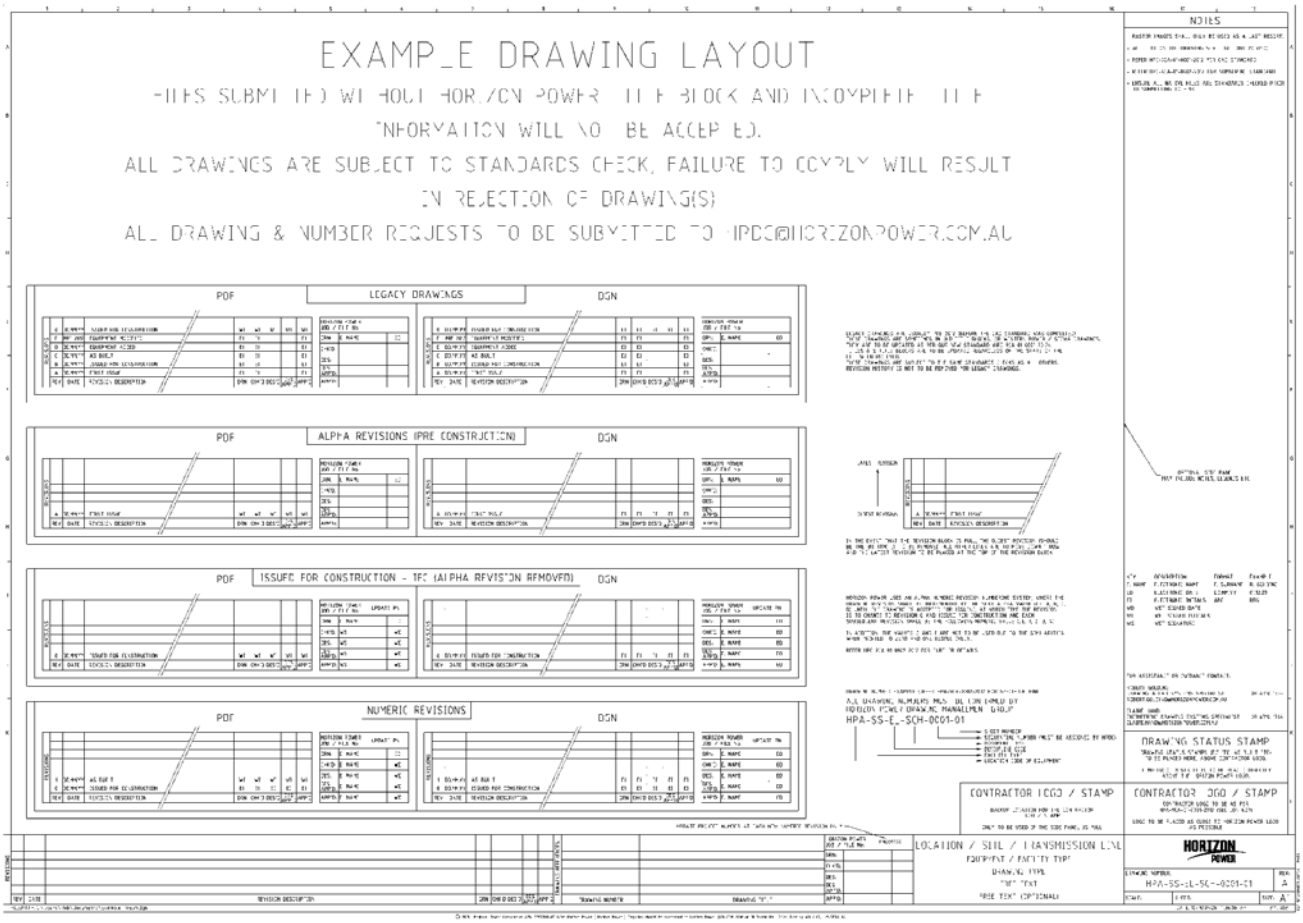


Image shown as example only.

14 ENGINEERING DETAIL

All drawings shall contain all available engineering detail to ensure that the necessary technical information is captured. This *INCLUDES BUT IS NOT LIMITED TO THE ITEMS BELOW*.

14.1 Single Line Diagrams

All plant / equipment on single line diagrams shall include the following minimum detail:-

- Capacity Ratings
- Voltage Ratings
- Basic Specification (e.g. vector group for transformers, CT/VT specifications, protection relay make and model).

14.2 Schematics, Wiring Diagrams and Termination Diagrams

All schematics, wiring diagrams and termination diagrams shall include all available information to enable future engineering works and drawing updates to occur without substantial rework. This shall include but not be limited to the following:-

- Relays, test blocks, terminals, etc shall be drawn to include all spare terminals.
- Wiring shall be drawn to show all spare cores.
- The make and model number of all relays, test blocks and terminals shall be included in the drawings.
- All terminal numbers must be shown, including spare terminals.
- Information must not be drawn twice. If a drawing contains particular details, other drawings which rely on these details should reference the detailed drawing.

14.3 Reference Drawings

All drawings which form references and are related to the drawing shall be recorded in the area located to the right hand side of the Revisions box. The absence of these references will render the completion status of this drawing to incomplete.

A1 REVISION INFORMATION

(Informative) Horizon Power has endeavoured to provide standards of the highest quality and would appreciate notification of errors or queries.

Each Standard makes use of its own comment sheet, which is maintained throughout the life of the standard, which lists all comments made by stakeholders regarding the standard.

A comment sheet found in **DM# 1565351** can be used to record any errors or queries found in or pertaining to this standard. This comment sheet will be referred to each time the standard is updated.

Date	Rev No.	Notes
19/11/2020	3	Updated with engineering requirements
03/07/2020	2	Draft
17/12/2019	1	Updated with engineering requirements
29/08/2013	0	First Issue

A2 RECOMMENDED CHECKING PROCEDURE

All Horizon Power drawing will be issued from the Drawing Management Group, via a transmittal requesting Horizon Power delegates to use the checking area provided by HPDC, no drawings are to be removed and checked elsewhere.

A consistent, methodical and detailed approach to the Checking and Mark-up of drawings is an integral part of any project.

The following Checking Process shall be undertaken using colour coding. The use of colour coding prints will help with a consistent approach to checking and drafting.

Task	Colour		Description
Additions	Red		Items to be added to the drawing
Deletions	Green		Items to be removed from the drawing
Notes	Blue		Temporary notes (not considered part of the revision) or for information purposes.
Back Drafted	Pink		Additions completed on the CAD file
Back Checked	Orange		Items added to the design file checked
Checked	Yellow		Drawing checked and correct – ready for Approval

The above will ensure that the draftsperson is presented with a consistent process to help ensure that the drawing revision shall be as accurate and efficient as possible.

Please note that Digital Mark-ups (e.g. created with Software such as Adobe Acrobat, Aconex etc.) can be used providing it complies with the above process.

NOTE: all drawings presented for checking shall be clean prints complete with a “Check Print” stamp.

When a detailed design drafting check has been completed and the check print stamp has been signed by the drafting checker, the complete package (check print and associated documents i.e. Vendor details) **SHALL** be given to the discipline engineer for the engineering review for check to be completed.

Only after both Design Drafter and Engineers have signed the check prints shall any back drafting required take place.

Checking Tips

- *Avoid the use of “White Out” or “Correction Tape” where possible, any drawing deletions should be marked in Green highlighter (this allows the reader to see what “was” there).*
- *Ensure the drawing being revised is the current drawing.*
- *Ensure any hand mark ups are as neat as possible, if there is insufficient space, attach a sketch or notes to the drawing. (This aids the back drafting progress).*

A2.1 GENERAL

The following checking process shall apply to all new drawings or any drawing that has undergone change or modification.

A2.2 DRAFTING CHECK

The first detailed check shall be carried out by the senior drafter or CAD coordinator.

The following shall be supplied with the check print set as a minimum:

- Design Sketched, or Red Line Mark ups
- Appropriate standards / template drawing as and when applicable
- Vendor data, the aim of this check is to ensure the drafting presentation, standards & processes have been followed.

A2.3 DESIGN CHECK

The design check shall be carried out after the drawing has been accepted by the senior drafter or section lead, and is carried out by senior designer or discipline engineer.

The following shall be supplied with the check print set as a minimum:

- Design, Sketches or Red Line Mark ups
- Appropriate standards / template drawing as and when applicable
- Relevant reference or correlating drawings
- The purpose of this check is to ensure the detail component of the drawing is correct i.e. Wire number's & to confirm design actually works

A2.4 DESIGN APPROVAL

The design approval shall be carried out after the senior designer or discipline engineer has accepted the drawing and is usually carried out by senior discipline engineer/section manager to confirm engineering design.

A2.5 FINAL APPROVAL

The final approval shall be carried out after the design approval has taken place.

To confirm that due process has been carried out and that the drawing has the approval of the relevant project manager/manager engineering services.

A2.6 PRIOR TO CHECKING

To ensure design drawings are thoroughly checked before being issued, the following information/documentation, as a minimum, **SHALL** be provided as part of the check package:

- Deliverables Drawing List
- Scheduled Issue Date
- Reason for the check and Issue Description
- Original description of design, sketches or drawings, particularly those containing engineering/client comments i.e. Scope of Work.

- Copies of or links to engineering calculations for equipment and cable sizing, etc.
- Copies of equipment/vendor data/component general arrangements, layouts, termination/wiring diagrams, required for the design drawing(s) to be checked.
- Copies of Overall Plant Layout, Civil/Structural/Mechanical/Piping layout/general arrangement drawings.
- Complete Equipment and Process Drive/Feeder list.
- A copy of all drawings that are cross referenced to the drawings being checked.

A2.7 CHECKING PROCESS

A2.8 PREPARE FOR CHECK

Before commencing, the checker shall ensure that all the Related Documents required to complete the check have been provided with the “check set”. Where information has not been provided, the checker shall inform the relevant project personnel and checking shall **NOT** commence until the information has been received.

The checkers shall familiarise themselves with the requirements of the related documents listed in Section 3.1 before commencing the drawing check. Whenever possible, the checker shall familiarise themselves with the site layout and the location of all existing equipment before commencing the drawing check.

A2.9 IMPORTANT THINGS FOR CHECKER

The following applies.

- If a significant error in drafting or design is detected the drafter shall immediately be alerted to discuss the problem.

  DO NOT WAIT UNTIL YOU HAVE FINISHED CHECKING

- "Cosmetic" changes and personal opinions (preferential engineering) shall be left out of check. Adhere to the guidelines and Horizon Power standards.

- Incorporate all the necessary corrections on a single check print.

- Review your final check comments with the Responsible Engineer before handing the check print back to the draftsperson or drawing originator.

- As far as you possibly can, work in a "collaborative" manner, not in isolation. Working by yourself often leads to duplication of effort.

A2.10 INPUT AND CONTENT

The following applies.

- **Format**

Check that the drawing has been formatted to the correct Horizon Power standards and that the correct drawing border sheet has been used.

- **Input**

  Check that all design inputs have been correctly and clearly referenced, and that they have been correctly applied in producing the drawing. These inputs typically comprise engineering calculations, input from other disciplines, standard documents, codes, standards, regulations and client-specific information.

- **Content**

  Ensure that the intent of the design has been correctly incorporated. Check that dimensions and calculations are correct and that interfaces with other disciplines have been correctly and clearly shown.

A2.11 DETAILED DRAFTING CHECK

- **Title Block**

  The title block shall be clear, concise and be completed in accordance with

- **Scales**

  A check shall be made to ensure that the drawing is actually drawn to scale and that the scale used is appropriate.

- **North Arrow and Orientation**

  Check correctness of location of north arrow relating to any plan view on drawings.

  Check orientation of drawing to ensure that this is consistent with plant layouts.

  Check that a Key Plan has been included where appropriate.

- **Reference Drawings**

  Check that all reference drawings are up to date and have been listed in the space provided in the reference block area of the border. Where drawings are cross referenced within the body of the drawing it is not necessary to add them to the reference drawing block.

- **Dimensions and Line-work**

  Check dimensions and line-work generally to ensure they comply with Horizon Power Standard.

- **Revision Record and Clouding**

Check that when a drawing has been revised, details of the revision have been entered in the appropriate columns of the Revision Block. Check that the latest revision has been identified on the body of the drawing by means of a cloud shape free hand outline and a triangle with the correct revision number or letter enclosed.

(Note: On certain presentation drawings and in cases where the revision is not specific to an area, the cloud may be omitted).

- **Identification and Date**

  Check that the Drafter's name and date drawing completed has been shown.

  When checking revisions ensure that signatures on the previous revisions have been added electronically.

- **Content**

  Check that the drawing meets all operational requirements and that it covers all aspects necessary to make it a proper, integral part of the project design. Ensure that the drawing does not unnecessarily duplicate or conflict with other work on the Project.

- **Text**

  Check that the correct text styles have been used in accordance with the Horizon Power standards.

  Check correct plant and equipment numbers have been used.

  Check that there is consistency in plant and equipment descriptions across all drawings.

- **Function of equipment or plant acceptability**

  Any doubts as to the correct function of plant and equipment shall be referred to the Engineer. It is not the Checker's responsibility to correct or alter the function of plant or equipment, to re-arrange an electrical circuit or change a layout.

- **Clarify Assumptions**

  Checkers shall not accept assumptions; checking shall be based on fact with back-up information from calculations. It may be necessary to have the Draftsperson layout points of contention to ensure correctness of the drawings.

  Where doubt exists due to insufficient or unclear information (e.g. on related or vendor drawings) a **HOLD** shall be placed on the relevant portion of the drawing.

Drawings (new or altered) shall be checked for fit against all related and reference drawings and all related and reference drawings updated to suit.

A2.12 ENGINEERING CHECK

- **Content**

  Check that the drawing meets all engineering requirements of the Project, complies with all Client standards, meets all statutory regulations, it incorporates all necessary safety aspects as an integral part of the design, is fit for purpose.

  Check all general notes and specifications.

- **Checker Comments or Questions**

  The Engineer shall review any comments or questions written or highlighted in blue on the Check Print.

  When the review is complete the Engineer shall initial and date each comment or question.

  On completion of the Engineering check, the check print **SHALL** be signed by the Discipline Engineer completing the check and presented to the Project Manager for their review.

  When the Project Manager has completed the review, the check print **SHALL** be signed and returned to the draftsperson for back drafting.

A3 MICROSTATION LEVEL LIST

Level Name	Library (DGNLIB)
Dimensions_25	HP Annotation
Dimensions_35	HP Annotation
Text_18	HP Annotation
Text_25	HP Annotation
Text_35	HP Annotation
Text_50	HP Annotation
Text_70	HP Annotation
General_Centre_Lines	HP General
General_Construction_Lines	HP General
General_Demolition	HP General
General_General	HP General
General_Grid	HP General
General_Hatch	HP General
General_Hidden (Non Plot)	HP General
General_Issue_Stickers	HP General
General_Logos	HP General
General_Markers	HP General
General_North_Arrow	HP General
General_Revisions	HP General
General_Scale_Bars	HP General
General_Title_Block	HP General
General_Title_Tags	HP General
Arch_Details_Sections	HP Levels
Arch_Landscaping	HP Levels
Arch_Plans_Elevations	HP Levels
Civil_Contours_Major	HP Levels

Level Name	Library (DGNLIB)
Civil_Contours_Minor	HP Levels
Civil_Coordinates	HP Levels
Civil_Creeks_Rivers	HP Levels
Civil_Design_Building_Outline	HP Levels
Civil_Drainage	HP Levels
Civil_Existing_Building_Outlines	HP Levels
Civil_Existing_Contours_Major	HP Levels
Civil_Existing_Contours_Minor	HP Levels
Civil_Existing_Services	HP Levels
Civil_Existing_Surface_Features	HP Levels
Civil_Fence	HP Levels
Civil_General	HP Levels
Civil_Roads	HP Levels
Civil_Roads_And_Drainage	HP Levels
Civil_Surface_Features_Major	HP Levels
Civil_Surface_Features_Minor	HP Levels
Civil_Survery_Information	HP Levels
Civil_Tadpoles_Ground_Slopes	HP Levels
Default	HP Levels
Elec_Cells	HP Levels
Elec_Communication	HP Levels
Elec_Earthing	HP Levels
Elec_Equipment	HP Levels
Elec_Exist_Equipment	HP Levels
Elec_General	HP Levels
Elec_HV	HP Levels
Elec_Instrumentation	HP Levels

Level Name	Library (DGNLIB)
Elec_Light_Small_Power	HP Levels
Elec_Linework	HP Levels
Elec_LV	HP Levels
Elec_OH_Line	HP Levels
Elec_Railway_Signals	HP Levels
Elec_Trays_Ladders	HP Levels
Instrum_61850	HP Levels
Instrum_Cells	HP Levels
Instrum_Comms	HP Levels
Instrum_Data	HP Levels
Instrum_Fibre_Optic	HP Levels
Instrum_General	HP Levels
Instrum_Scada	HP Levels
Instrum_Telephone	HP Levels
Mech_Cable_Ladders	HP Levels
Mech_Cells	HP Levels
Mech_Centreline	HP Levels
Mech_Detail	HP Levels
Mech_Ducting	HP Levels
Mech_Equipment	HP Levels
Mech_Existing	HP Levels
Mech_Existing_Equipment	HP Levels
Mech_Future	HP Levels
Mech_Hidden	HP Levels
Mech_HVAC	HP Levels
Mech_HVAC_Existing	HP Levels
Mech_Hydraulics	HP Levels

Level Name	Library (DGNLIB)
Mech_Machines	HP Levels
Mech_Pneumatics	HP Levels
Mech_Pulleys	HP Levels
Mech_Vendor_Equipment	HP Levels
Piping_Air	HP Levels
Piping_Cells	HP Levels
Piping_Existing	HP Levels
Piping_Firewater	HP Levels
Piping_Fuel	HP Levels
Piping_Future	HP Levels
Piping_Gas	HP Levels
Piping_General	HP Levels
Piping_Hydraulic	HP Levels
Piping_Oil	HP Levels
Piping_Pipe	HP Levels
Piping_Potable_Water	HP Levels
Piping_Primary	HP Levels
Piping_Secondary	HP Levels
Piping_Slurry	HP Levels
Piping_Waste_Oily	HP Levels
Piping_Waste_Water	HP Levels
Piping_Water	HP Levels
Spare_1	HP Levels
Spare_2	HP Levels
Spare_3	HP Levels
Spare_4	HP Levels
Spare_5	HP Levels

Level Name	Library (DGNLIB)
Spare_6	HP Levels
Spare_7	HP Levels
Spare_8	HP Levels
Spare_9	HP Levels
Struct_Beams	HP Levels
Struct_Bolts	HP Levels
Struct_Cells	HP Levels
Struct_Columns	HP Levels
Struct_Concrete	HP Levels
Struct_Existing	HP Levels
Struct_Foundations	HP Levels
Struct_General	HP Levels
Struct_Grating	HP Levels
Struct_Mesh	HP Levels
Struct_Primary Steel	HP Levels
Struct_Reinforcement	HP Levels
Struct_Secondary Steel	HP Levels
Struct_Slabs	HP Levels
Struct_Stairways_Handrails	HP Levels
Struct_Supports	HP Levels