The Government of the Hong Kong

Special Administrative Region

Development Bureau

CAD Standard for Works Projects

Version 1.03.00

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Contents

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1 INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

1.1.1 This document presents the standards to be used in the structuring and naming of CAD data and for creating, editing and plotting drawings under the CAD Standard for Works Projects [CSWP].

1.2 APPLICABILITY

1.2.1 The standards are applicable to all types of drawings produced for works projects, other than presentation drawings. A presentation drawing is defined as being a drawing prepared for a specific one-off purpose, having no relationship with other project drawings, no re-use and for which the use of non-CSWP standard fonts and colours is vital.

1.3 CAD SOFTWARE

1.3.1 The CSWP have been developed to be applied to the CAD software packages currently in use in the Works Departments. These packages are:

- AutoCAD 2000 or higher version.
- Microstation SE and J or higher version.

1.3.2 However, exchange of data between Microstation and AutoCAD 2000 should only be carried out using Microstation J version 7.1.1.36 or a higher version of Microstation J.

1.3.3 The Works Department will specify which package is to be used for each works project.

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2 PRINCIPLES BEHIND THE CSWP

The CSWP are based on good CAD practice

This section contains a brief description of what is considered to be good CAD practice in the production of drawings, together with some definitions that arise from this, which are referred to later in the document. The CSWP have been developed to support these principles.

CAD is not just an electronic drawing board

The benefits of CAD will be limited if the CAD system is used simply as an electronic drawing board. This simple approach to using CAD sees drawings as single entities, each one unrelated to another and closely mimics traditional drawing office practice. Instead of using a sheet of drawing film, which gets more and more battered as time goes by, the drawing is held as a computer file. From time to time, clean paper copies are made using a plotter. The crucial thing in such a system is that each drawing corresponds to a separate computer file.

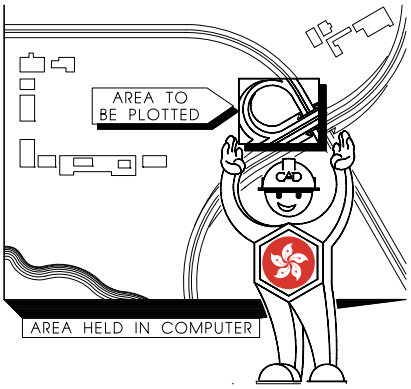
CAD is a tool for coordination

CAD can be much more than that. If used correctly it can be a powerful tool for **co-ordinating** a project and overcoming two fundamental problems that occur in both manual drafting and simple CAD systems used as a manual replacement; namely:

- Lack of edge-matching between sheets for projects that cannot be drawn on a single drawing, and
- Updating of background information issued by another discipline or other party.

How can CAD be used to solve these problems?

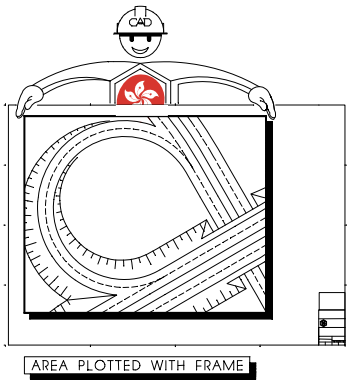
An unlimited drawing size



The traditional drawing is limited by the size of the film and the size of the drawing board. CAD files are not so limited. They can represent drawings that are far too big to plot in one piece. A large building or site may therefore be drawn complete in one file and only split up into more useable areas when plotted. In this way drafting and design work is not hindered by sheet boundaries.

There is a slight difficulty in doing this. With the simple approach to CAD, the drawing frame, title and revision notes can be carried in the file and plotted with everything else. This is not possible if the plot is a proportion of a larger drawing.

The best solution is for the CAD system to provide features for plot assembly. A plot is made by selecting areas from any number of drawings, combining and positioning them (perhaps scaling and rotating as well), and plotting as a whole. The master drawings are not modified by this process, and the system remembers the composition and layout of the plot, so reissue is no trouble.



A Co-ordination Model

Once CAD files are used in this way then the concept of a 'drawing' in the traditional sense becomes less important. The computer file is now representing a large part of the building; perhaps an entire floor plan. It is beginning to be used as a co-ordination **model** of the project.

For the successful co-ordination of project data, it is essential that the data remains unique. Unique data will be maintained by referencing the model files and never copying their data.

Drawings are views of model files

The CAD model principle involves the structuring of the project CAD data into a series of model files and drawing files which are then combined to form the project drawings.

Model Files

Model files are used to store all of the common project data either as 2D or 3D information. The majority of co-ordination work is carried out by combining the model files, through referencing, and establishing clashes etc. It is common practice to split model files up into discipline, categories and zones with the access status of the files being controlled.

The model files are then shared by all disciplines working on the project to co-ordinate and progress their part of the design in parallel with the overall design.

Drawing Files

Drawing files are merely windows on the project model, which record the information necessary to create a specific drawing. Drawing files will contain very little data and little of the production work is carried out in drawing files. Typically they will store annotation e.g. drawing number, title, revision, notes, dimensions and any information which is unique to that particular drawing and is unlikely to be used elsewhere.

The information presented in the drawing file is constructed by referencing the project model files. The degree of information and the appearance of that information which is displayed in the project model files can be controlled for that particular drawing.

The CAD Standards for Works Projects are based on BS 1192-5

These good drawing practice principles are used as the basis for the recommendations made in BS 1192-5:1998 Construction Drawing Practice - Guide For The Structuring And Exchange Of CAD Data. The standard is thorough and well thought out and has been used as the basis for many of the recommendations made in the CSWP.

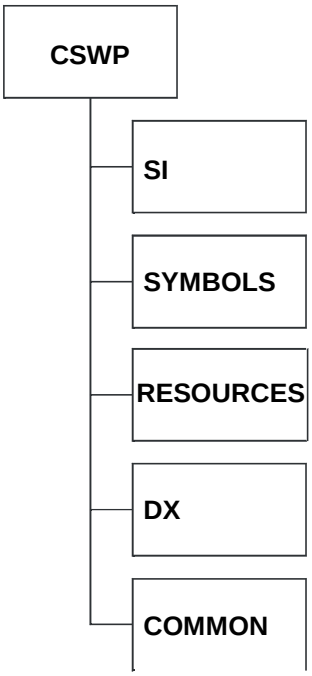
3 FOLDERS

This section addresses:

- Folders to be used for holding CSWP common data;
- Folders to be used for holding project data.

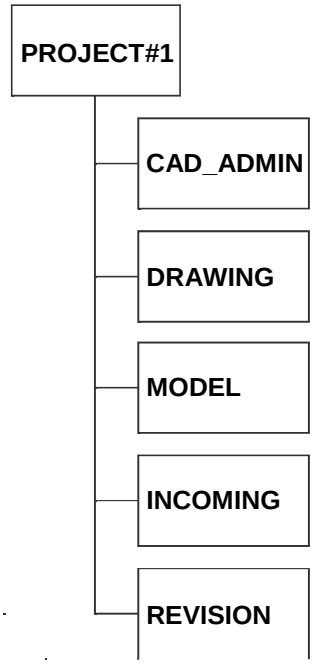
3.1 CSWP COMMON DATA FOLDERS

3.1.1 Each organisation that produces drawings to the CSWP shall create a folder area for holding CSWP data that is common to all projects.

Standard Folder (Directory) Structure common to AutoCAD and Microstation		
	CSWP	Standard CSWP library and other files that are applicable to all projects will be stored in sub-folders under the 'CSWP' folder
	CSWP \ SI	The 'Standard Interface' program files will be stored in this sub-folder.
	CSWP \ SYMBOLS	This sub-folder will hold the CSWP drawing symbols libraries - See Section 11.
	CSWP \ RESOURCES	This sub-folder will store the CSWP resource files such as Template files, Chinese font files (See Section 7.2) and Line-style files (See Section 12)
	CSWP \ DX	This sub-folder will store the CSWP standard settings file and mapping tables to be used for data exchange
	CSWP \ COMMON	This sub-folder will store files that are used organisation-wide

3.2 PROJECT DATA FOLDERS

3.2.1 A folder area shall be created for each project undertaken to the CSWP.

Standard Folder (Directory) Structure common to AutoCAD and Microstation		
	PROJECT#1 etc	Each project will be assigned a unique top-level folder that will be named using the project reference.
	PROJECT#1 \ CAD_ADMIN	This sub-folder will store standard files that are specific to the project e.g. drawing frames.
	PROJECT#1 \ DRAWING	This sub-folder will store the project's current drawing files*.
	PROJECT#1 \ MODEL	This sub-folder will store the project's current model files*.
	PROJECT#1 \ INCOMING[o]	This directory will store incoming (from others) project drawing and model files.
	PROJECT#1 \ REVISION	This directory is used to store previous revisions of files, if required.

***** It is recommended that model files and drawing files be split into the two directories as shown. However, in situations where reference links between the two types of files may be lost, then both types of file may be stored together in the DRAWING sub-folder.

[o] Model and drawing files received from other parties should be stored together in the INCOMING directory in order to avoid links between the two types of files from being lost. Incoming files should not be altered.

3.2.2 PROJECT REFERENCE CODING

For consistency, organisations that create drawings for a specific works project shall agree the project reference coding with the Works Department.

4 FILES

This section addresses:

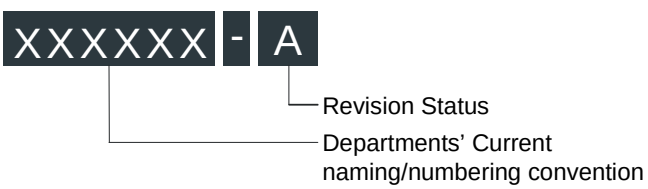
- File settings when creating new files;
- the naming of (numbered) Drawing Files;
- the naming of Model Files; and
- the assignment of Agent Responsible Codes to be used in model file and layer naming.

4.1 FILE SETTINGS

New files shall be created with the following properties:

		Microstation		
Units	Either Metres or Millimetres to suit the type of drawing - User Choice			
File Type 2D/3D	N/A	3D Microstation Design Files only to be used		
Working Units	Default settings		Metres Drawings	Millimetres Drawings
		Master Units	m	mm
		Sub Units	mm	-
		Sub Units/Master Units	1000	1
		Positional Units/Sub Units	1	1000
Global Origin	Default settings	Default Global Origin X 2,147,483.648 Y 2,147,483.648 Z 2,147,483.648		

4.2 DRAWING FILE NAMING

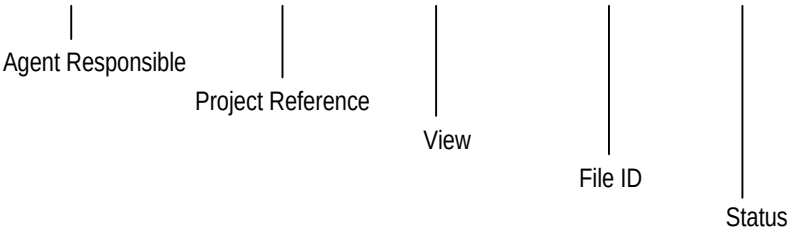
Drawing File Naming common to AutoCAD and Microstation
Users shall maintain their current file naming / numbering convention for drawing files. Normal practice is to name the file with the drawing number. The revision status shall be appended to the end of the filename, with the two fields separated by a hyphen.    Note - there is no limit to the number of characters used for drawing file naming

4.3 MODEL FILE NAMING

Model File Naming common to AutoCAD and Microstation

File Names shall be of the form:

HMW-XXXXXXXX-P-HWAYMK-N



If users require previous versions of model files to be kept, copies of each version can be placed in the Revision directory with the revision status appended to the end of the file name. The way to handle revisions in a Drawing Management System may be different.

HMW-XXXXXXXX-P-HWAYMK-N-A

			Coding
Agent responsible	Alphanumeric	3 - Fixed length	See Section 4.4
Project Reference	Alphanumeric	Minimum 1 Maximum 8	User-definable Project reference coding (to be agreed with the Works Department.) Use an underscore if no Project Reference specified
View	Alphabetic	1 - Fixed Length	D = detail I = isometric P = plan S = section E = elevation
File ID reference	Alphanumeric	Minimum 4, Maximum 8	User definable reference to describe the contents of the model file
Status	Alphabetic	1 - Fixed Length	A = As Built E = Existing to remain M = Maintenance / Record N = New Work R = Remove T = Temporary Work W = All Work
Note:	Each Field shall be separated by a Hyphen		

4.4 AGENT RESPONSIBLE CODES

Each project participant will be assigned a unique Agent Responsible Code which will have a fixed length of 3 alphanumeric (including ampersands), upper case characters. This code will enable the originator of the data to be identified.

The Agent Responsible Code lists will be administered by the CSWP Working Group. Requests for inclusion in the lists shall be submitted to csu@devb.gov.hk for consideration.

The lists of the Agent Responsible Codes can be downloaded from the Development Bureau web site www.devb-wb.gov.hk/cswp

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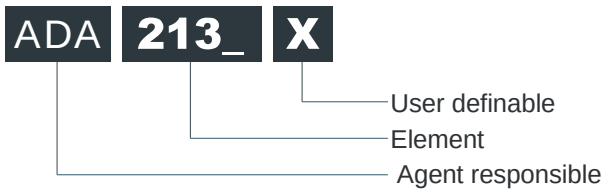
5 LAYERS

This section addresses:

- Layer naming;
- the assignment of layers; and
- provides the CSWP Element Coding tables

5.1 LAYER NAMING

Common to AutoCAD and Microstation		
Layer Naming Convention 		
		Coding
Agent responsible	3 (alphanumeric)	See Section 4.4
Element	4 (numeric)	From the CSWP Element Coding Tables See Element Coding Tables in Section 5.3
User definable	1 (alphanumeric)	User definable alphanumeric character.
Note: Underscore characters must be used to represent empty/unused characters		

5.1.1 USE OF THE ELEMENT CODING TABLES

There are three ways in which the element coding can be applied, the choice of which will depend on the degree to which it is required to break down the project data:

Example 1

Group the generic elements under the first number in each main class, e.g.

210_ can be used for all external wall elements.

Example 2

Group elements under their particular sub-class. e.g.

211_ Load bearing external walls

213_ Non-load bearing walls

Example 3

Further sub-divide the sub class. This provides flexibility, allows for greater sub-division of elements and allows for future expansion e.g.

2111 Load bearing external walls with 1 hour fire protection

2112 Load bearing external walls with 2 hour fire protection

2113 Load bearing external walls with 3 hour fire protection

5.1.2 USE OF THE USER DEFINABLE FIELD

5.1.2.1 This field provides users with a means of further breaking down data and gives a degree of flexibility within the layer naming system. The way in which the field is used is at the discretion of the user. Some examples of how the field can be used follow:

Example 1

The field could be used to distinguish between different options/phases. e.g.

HMW140_1 Highways Tunnel Option/Phase 1

HMW140_2 Highways Tunnel Option/Phase 2

Example 2

The field could be used to assign ownership to particular elements. e.g.

WDC511_W Fresh Water Pipes - WSD owned

WDC511_O Fresh Water Pipes - Other Department owned

5.2 LAYER ASSIGNMENT

	Microstation
AutoCAD layer assignment will follow the common convention of creating the relevant layers as and when they are required in accordance with the CSWP. No more than 63 layer names shall be used per file (until this restriction in Microstation is removed in future versions)	Microstation levels shall be assigned layer names using the CSWP layer naming convention. Each layer name shall be assigned to a separate level number e.g. Level 1 ADA2111M Level 2 ADA2112M Level 3 ADA213_M The CSWP will not use the level number assignment function. If users have a level assignment system in place then this can be maintained. If not, then it is recommended that layers are assigned numbers in the order in which they are created e.g. Level 1 First layer created Level 2 Second layer created Level 3 Third layer created No more than 63 layer names shall be used per file.

5.3 ELEMENT CODING TABLES

The CSWP Element Coding Tables are given on Pages 13 to 17.

Element Coding Tables

CLASSES 000 - 099 : GENERAL

000 - 009	VACANT
000	
001	
002	
003	
004	
005	
006	
007	
008	
009	
010 - 019	TITLES AND FRAMES
010	Titles and Frames (Grouped)
011	Frame
012	Drawing Number
013	Drawing Title
014	Drawing creation information
015	QA data e.g. automatic time/date/filename ref.
016	Scale
017	Drafting Body
018	Copyright
019	
020 - 029	GRIDS
020	Grids (Grouped)
021	National grid
022	National grid text
023	Site grid
024	Site grid text
025	Building / structure grid
026	Building / structure grid text
027	Geodetic Datumn
028	Setting Out Lines
029	
030 - 039	DIMENSIONS
030	Dimensions (Grouped)
031	Dimensions
032	Plan levels
033	Chainage
034	Setting out tables
035	Coordinates
036	
037	
038	
039	
040 - 049	TEXT (XXX1 ENGLISH, XXX2 CHINESE)
040	Text (Grouped)
041	Titles
042	Sizes
043	Descriptions
044	Notes
045	Schedules
046	Legends
047	
048	Reinforcement call-ups
049	Steelwork call-ups
050 - 059	GENERAL SYMBOLS
050	General Symbols (Grouped)
051	North point
052	Section, detail, elevation marks
053	Match lines / cut lines
054	Scale bars
055	Key Plan
056	
057	
058	
059	
060 - 069	HATCHING
060	Hatching (Grouped)
061	Hatching
062	Patterning
063	Fill tones
064	Highlighting
065	
066	
067	
068	
069	
070 - 079	REVISIONING
070	Revisioning (Grouped)
071	Revision clouds and marks
072	Revision box information
073	
074	
075	
076	
077	
078	
079	
080 - 089	TEMPORARY INFORMATION
080	Temporary Information (Grouped)
081	Construction lines
082	
083	
084	
085	Red-lining
086	
087	
088	
089	
090 - 099	VACANT
090	
091	
092	
093	
094	
095	
096	
097	
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099	

CLASSES 100 - 199 : GROUND, SUB-STRUCTURE

100 - 109	VACANT
100	
101	
102	
103	
104	
105	
106	
107	
108	
109	
110 - 119	GROUND
110	Ground (Grouped)
111	Ground relief
112	Geological boundaries and features
113	Ground composition
114	Ground water
115	Instrumentation
116	Ground Samples e.g. Boreholes/trialpits
117	Settlement
118	Geological Contours/Isopachs
119	Parts and accessories
120 - 129	EARTHWORKS
120	Earthworks (Grouped)
121	Ground profiling
122	Ground treatment
123	Dredging
124	Filling
125	Slopes
126	Berm
127	Trench
128	Reclamation
129	Parts and accessories
130 - 139	FLOOR BEDS
130	Floor Beds (Grouped)
131	Hard surfaces e.g. ground floors
132	
133	
134	Soft surfaces e.g. planted, unplanted beds
135	
136	Ground underwater e.g. pools
137	
138	Other types of floor beds
139	Parts and accessories
140 - 149	TUNNELS
140	Tunnels (Grouped)
141	Tunnel walls
142	Tunnel lining
143	Portals
144	Cross-passages
145	Emergency passage
146	Shafts
147	Adits
148	
149	Parts and accessories
150 - 159	VACANT
150	
151	
152	
153	
154	
155	
156	
157	
158	
159	
160 - 169	RETAINING WALLS, FOUNDATIONS
160	Retaining Walls, Foundations (Grouped)
161	
162	Retaining walls
163	Water retaining elements e.g. dams, caissons
164	Foundations not piled
165	
166	
167	
168	Other types of retaining foundation elements
169	Parts and accessories
170 - 179	PILE FOUNDATIONS
170	Pile Foundations (Grouped)
171	Sheet piling
172	Replacement, in-situ formed pile foundations
173	Displacement, pre-formed formed pile foundations
174	Small displacement
175	
176	
177	
178	Other types of pile foundations
179	Parts and accessories
180 - 189	OTHER SUBSTRUCTURE ELEMENTS
180	Other Substructure Elements (Grouped)
181	Underground Valve and Meter Chambers
182	
183	
184	Thrust Blocks
185	
186	
187	
188	
189	
190 - 199	PARTS & ACCESSORIES
190	Parts and Accessories (Grouped)
191	Blinding/ Screed
192	Waterproofing/Damp proofing
193	Insulation
194	Back fill
195	Formwork
196	Falsework/Scaffolding
197	Reinforcement
198	Mesh
199	

CLASSES 200 - 299 : STRUCTURE PRIMARY ELEMENTS,

200 - 209 VACANT
200
201
202
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204
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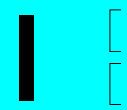
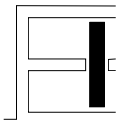
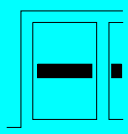
210 - 219 EXTERNAL WALLS
210 External Walls (Grouped)
211 Loadbearing walls including cavity
212
213 Non-loadbearing walls
214 Curtain walls
215
216 Framing and cladding walls
217
218 Other types of walls
219 Parts and accessories



220 - 229 INTERNAL WALLS, PARTITIONS
220 Internal Walls, Partitions (Grouped)
221 Loadbearing internal walls
222
223 Non-loadbearing internal walls
224 Baffle walls
225
226 Framing and cladding
227
228 Other types of internal walls
229 Parts and accessories



230 - 239 FLOORS, GALLERIES
230 Floors, Galleries (Grouped)
231
232 Monolithic, slab floors
233
234 Assembled, composite floors
235
236
237 Galleries, balconies
238 Other types of floors
239 Parts and accessories



240 - 249 STAIRS AND RAMPS
240 Stairs and Ramps (Grouped)
241 Straight stairs
242
243 Dog leg stairs
244 Curved stairs
245 Other types of stairs e.g. open well, escape
246 Ladders, step irons, sliding poles
247 Ramps
248 Other types of vertical circulation
249 Parts and accessories

250 - 259 VACANT
250
251
252
253
254
255
256
257
258
259

260 - 269 VACANT
260
261
262
263
264
265
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267
268
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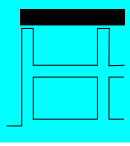
270 - 279 ROOFS
270 Roofs (Grouped)
271 Flat roof
272 Pitched roof
273
274 Folded plate roofs
275 Other roofs by form e.g. dome, spires, cylindrical
276 Roofs by structure e.g. arch, vaulted, suspended
277 Cantilevered roofs, canopies
278 Other types of roofs e.g. gabled, retractable
279 Parts and accessories



280 - 289 BUILDING FRAMES, OTHER PRIM. ELEMENTS
280 Building Frames, other Primary Elements (Grouped)
281
282 Column and beam frames
283 Column and slab frames
284
285 Column and cable frames
286 Space frames as building frames
287 Other building frames e.g. pin-jointed
288 Other types of primary elements e.g. shafts, chimneys
289 Parts and accessories

290 - 299 PARTS & ACCESSORIES
290 Parts and Accessories (Grouped)
291 Reinforcement
292 Steelwork
293 Cables/Post tensioned cables/Prestressed cables
294 Connection details
295 Fixing details
296 Joint details
297 Bearings
298
299

CLASSES 300 - 399 : SECONDARY ELEMENTS

300 - 309 VACANT
300
301
302
303
304
305
306
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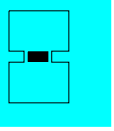
308
309

310 - 319 SECONDARY ELEMENTS TO WALLS,
310 Secondary Elements to Ext. Walls (Grouped)
311
312
313 Window/Door openings & parts to fill them
314 Window openings and windows
315 Doorways, entrances, exits and doors
316
317 Hatch openings and hatches to fill them
318 Others e.g. barred, louvred openings
319 Parts and accessories

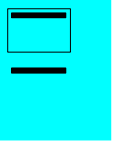
320 Secondary Elements to Internal Walls (Grouped)
321
322
323 Window/Door openings & parts to fill them
324 Window openings and windows
325 Doorways, room divider openings
326
327 Hatch openings, service voids
328 Others e.g. barred openings
329 Parts and accessories

330 Secondary Elements to Floors (Grouped)
331 Secondary suspended floors
332 Secondary floor beds
333 Plinths
334
335 Floor openings e.g. trap doorways
336
337
338 Others e.g. barred openings
339 Parts and accessories



340 Secondary Elements to Stairs & Ramps (Grouped)
341 Balustrades
342 Handrails
343 Guide rails
344
345
346
347
348
349 Parts and accessories

350 Suspended Ceilings (Grouped)
351 Jointless suspended ceilings
352 Louvred suspended ceilings
353 Ceiling openings and parts to fill them
354
355
356
357
358 Others e.g. ceiling walkways
359 Parts and accessories



360
361
362
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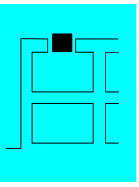
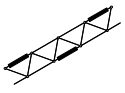
364
365
366
367
368
369

370 Secondary Elements to Roofs (Grouped)
371
372
373 Window/door openings & parts to fill them
374 Window openings e.g. roof lights, sky lights
375 Doorways e.g. trap door, access trap
376 Roof eaves, parapets and balustrades
377
378 Others e.g. walkways
379 Parts and accessories



380 Other Secondary Elements (Grouped)
381 Reinforcement
382 Steelwork
383 Louvers
384 Connection details
385 Fixing details
386 Joint details
387
388
389



390 Parts and Accessories (Grouped)
391
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CLASSES 400 - 499 : FINISHES TO STRUCTURE

400 - 409 VACANT
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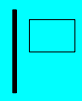
410 - 419 FINISHES TO EXTERNAL WALLS
410 External Walls (Grouped)
411 Applied finishes
412 Paint/Decoration
413 Rendering
414
415
416 Fitted finishes
417 Cladding
418 Tiles
419



420 - 429 FINISHES TO INTERNAL WALLS
420 Finishes to Internal Walls (Grouped)
421 Applied finishes
422 Paint/Decoration
423 Plaster
424
425
426 Fitted finishes
427 Cladding
428 Tiles
429 Skirting

430 - 439 FINISHES TO FLOORS
430 Finishes to Floors (Grouped)
431 Applied finishes
432 Paint/Decoration
433 Non slip finish
434 Screed
435 Fitted finishes
436 Tiles
437 Carpet
438
439

440 - 449 FINISHES TO STAIRS AND RAMPS
440 Finishes to Stairs and Ramps (Grouped)
441 Applied finishes
442 Paint/Decoration
443 Non slip finish
444
445 Fitted finishes
446 Stair nosing
447 Non slip nosing strip
448 Carpet
449

450 - 459 FINISHES TO CEILINGS
450 Finishes to Ceilings (Grouped)
451 Applied finishes
452 Paint/Decoration
453 Plaster
454
455 Fitted finishes
456 Cladding
457 Tiles
458
459

460 - 469 VACANT
460
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462
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470 - 479 FINISHES TO ROOFS
470 Finishes to Roofs (Grouped)
471 Applied finishes
472 Paint/Decoration
473 Screed
474
475 Fitted finishes
476 Cladding
477 Tiles
478
479

480 - 489 OTHER FINISHES TO STRUCTURE
480 Other Finishes to Structure (Grouped)
481 Featured Finishes
482 Decorations
483
484
485
486
487
488
489

490 - 499 PARTS AND ACCESSORIES
490 Parts and Accessories (Grouped)
491
492
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CLASSES 500 - 599 : SERVICES, MAINLY PIPED, DUCTED

500 - 509 VACANT
500
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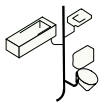
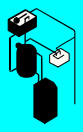
510 - 519 WATER SUPPLY - EXTERNAL
510 Water Supply External (Grouped)
511 Fresh water supply
512 Cooling water supply
513 Salt water supply
514 Raw water supply
515
516
517
518
519 Parts and accessories

520 - 529 WASTE DISPOSAL, DRAINAGE
520 Waste Disposal Drainage (Grouped)
521 Refuse, rubbish, garbage disposal
522 Gaseous waste
523 Sewage disposal foul drainage
524 Petrol, chemical wastes
525 Natural water drainage
526 Internal drainage (above ground drainage)
527 Below ground drainage including storage
528 Other types of waste disposal, drainage
529 Parts and accessories

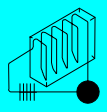


530 - 539 LIQUIDS SUPPLY
530 Liquids Supply (Grouped)
531 Cold water
532 Flushing water
533 Hot water from common supply
534 Steam
535 Hot water from individual appliance
536 Other water supply services
537 Petrol, oil
538 Other types of liquid supply
539 Parts and accessories

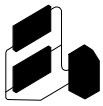


540 - 549 GASES SUPPLY
540 Gases Supply (Grouped)
541 Fuel gas, combustible gas supply
542 Vapour supply
543 Air supply
544 Other gas supply
545 Vacuum supply
546
547
548 Other types of gases supply
549 Parts and accessories

550 - 559 SPACE COOLING
550 Space Cooling (Grouped)
551 Central refrigeration
552
553
554
555 Local refrigeration
556
557
558 Other types of space cooling services
559 Parts and accessories



560 - 569 SPACE HEATING
560 Space Heating (Grouped)
561 Heating by power source
562 Communal heating
563 Central heating
564 Hot water, steam distribution
565 Warm air distribution
566 Electrical distribution
567 Other types of central heating
568 Other types of space heating services
569 Parts and accessories



570 - 579 AIR CONDITIONING, VENTILATION
570 Air Conditioning, Ventilation (Grouped)
571 Central air conditioning
572 Air heating only
573 Local air conditioning
574 Air heating only
575 Air treatment
576 Mechanical ventilation services
577 Unit ventilation
578 Other types of air conditioning
579 Parts and accessories

580 - 589 FIRE PROTECTION & FIRE SERVICES OTHER THAN ELECTRICAL
580 Fire Protection in General & Fire Services other than Electrical (Grouped)
581 Fire hydrant
582 Portable equipment e.g. extinguishers
583 Fixed Equipment e.g. hose pipes
584 Sprinkler/deluge system - water
585 Sprinkler /deluge system - chemical
586 Pressurisation system
587 Smoke extraction system
588
589 Parts and accessories

590 - 599 PARTS & ACCESSORIES
590 Parts and Accessories (Grouped)
591
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CLASSES 600 - 699 : SERVICES, MAINLY ELECTRICAL

600 - 609 VACANT
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609

610 - 619 ELECTRICITY SUPPLY
610 Electricity Supply (Grouped)

611	Radial distribution
612	Ring main distribution
613	Rising main distribution
614	
615	
616	Public mains supply
617	Privately generated supply
618	Other types of electrical supply services
619	Parts and accessories
620 - 629	POWER
620	Power (Grouped)
621	High voltage system (>1,000V rms)
622	Low voltage system (50 - 1,000V rms)
623	Extra-low voltage system (<50V rms)
624	
625	Uninterruptible power supply
626	Battery power systems
627	Power subcircuit
628	Power trunking/conduit
629	Parts and accessories
630 - 639	LIGHTING
630	Lighting (Grouped)
631	General lighting
632	Local lighting
633	Emergency lighting
634	Street lighting
635	Airfield lighting
636	Floodlighting
637	Waterproof lighting
638	Other types of lighting services
639	Parts and accessories
640 - 649	COMMUNICATIONS
640	Communications (Grouped)
641	Visual including audio-visual
642	CCTV
643	Audio
644	Signals other than visual or audio
645	Synchronous clocks
646	SCADA
647	Signalling
648	Other types of communications services
649	Parts and accessories
650 - 659	VACANT
650	
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659	
660 - 669	TRANSPORT
660	Transport (Grouped)
661	Lifts
662	Other types of internal lifts, hoists
663	Travelling cradles
664	Escalators
665	Conveyors/Travelators
666	Cable car, Gondola, Chair lift
667	Cranes
668	Other types of transport services
669	Parts and accessories
670 - 679	FIRE SERVICES ELECTRICAL
670	Fire Services Electrical (Grouped)
671	Audio/Visual fire alert system
672	Automatic fire detection and alarm system
673	Automatic heat detection and alarm system
674	Automatic smoke detection and alarm system
675	Manual fire alert system
676	Automatic leakage detection and alarm system
677	
678	
679	
680 - 689	SECURITY, CONTROL, OTHER SERVICES
680	Security, Control, Other Services (Grouped)
681	
682	Security services
683	
684	
685	
686	Other security protection services
687	Control services - proocess/monitoring
688	Other types of security, control services
689	Parts and accessories
690 - 699	PARTS & ACCESSORIES
690	Parts and Accessories (Grouped)
691	
692	
693	Earthing Protection
694	Lightning protection
695	
696	
697	
698	
699	

CLASSES 700 - 799 : FITTINGS, FURNITURE AND EQUIPMENT

700 - 709	VACANT
700	
701	
702	
703	
704	
705	
706	
707	
708	
709	
710 – 719	CIRCULATION FFE
710	Circulation FFE (Grouped)
711	Signs, symbols
712	Display fittings
713	Access fittings
714	Bollard/Cone/Barrier
715	Turnstiles
716	Flag
717	
718	Other types of circulation fittings
719	Parts and accessories
720 - 729	REST, WORK FFE
720	Rest, Work FFE (Grouped)
721	Rest fittings
722	Fittings for relaxation
723	Work fittings
724	
725	
726	Benches, tables, seating, chairs
727	
728	Other types of rest, work fittings
729	Parts and accessories
730 - 739	CULINARY FFE
730	Culinary FFE (Grouped)
731	Culinary work fittings
732	Sink, disposal units, washing up machines
733	
734	Culinary processing, cooking fittings
735	Culinary storage fittings
736	
737	Bar/Food counters, dining tables, seating
738	Other types of culinary, catering fittings
739	Parts and accessories
740 - 749	SANITARY FFE
740	Sanitary FFE (Grouped)
741	Sanitary suites
742	Washing fittings
743	Drying fittings
744	Disposal fittings
745	
746	
747	Supply fittings
748	Other types of sanitary, hygiene fittings
749	Parts and accessories
750 - 759	CLEANING FFE
750	Cleaning FFE (Grouped)
751	Washing fittings
752	
753	Drying fittings
754	Pressing, Ironing fittings
755	
756	
757	
758	Other types of cleaning, maintenance fittings
759	Parts and accessories
760 - 769	STORAGE, SCREENING FFE
760	Storage, Screening FFE (Grouped)
761	Composite storage fittings
762	Cupboards fittings
763	Drawers fittings
764	Shelving, racking fittings
765	Suspended storage fittings
766	Storage fittings with additional facility
767	Screening fittings
768	Other types of storage, screening fittings
769	Parts and accessories
770 - 779	SPECIAL ACTIVITY FFE
770	Special Activity FFE (Grouped)
771	Gymnasia/physical training facilities
772	Fighting sports facilities
773	One-to-one sports facilities e.g. squash
774	Bowling alleys
775	Athletics facilities
776	Racing facilities
777	Team ball games facilities
778	Equestrian facilities
779	Air sports facilities
780 - 789	OTHER FFE
780	Other FFE (Grouped)
781	
782	
783	Soft furnishings including upholstery
784	
785	
786	Works of art
787	
788	
789	
790 - 799	PARTS AND ACCESSORIES
790	Parts and Accessories (Grouped)
791	
792	Waste/Litter/Rubbish Bin
793	
794	
795	
796	
797	
798	
799	

CLASSES 800 - 899 : TRANSPORT INFRASTRUCTURE

800 - 809	GROUND SURVEY
800	Ground Survey (Grouped)
801	Survey control
802	Elevation Contours
803	Spot levels
804	Artificial and Building Features
805	Relief and Hydrographic Features
806	Road and Street Features
807	Utilities Features
808	Military Cable
809	
810 - 819	HIGHWAYS
810	Highways (Grouped)
811	Centre-lines
812	Setting out lines
813	Carriageway edges
814	Shoulders
815	Verges
816	Footpaths

817	Cycle-tracks
818	Paved area
819	Parts and accessories
820 - 829	STREET FURNITURE
820	Street Furniture (Grouped)
821	Safety features / Railing / Barriers
822	Weigh bridge
823	Toll gate
824	Speed humps
825	Vehicle stops
826	
827	
828	
829	Parts and accessories
830 - 839	TRAFFIC AIDS & MARKINGS
830	Traffic Aids & Markings (Grouped)
831	Traffic signs
832	Markings
833	Directional signs
834	Traffic signals and equipment
835	Cats eyes/Reflective studs
836	Traffic Bollards
837	
838	
839	Parts and accessories
840 - 849	RAILWAYS
840	Railways (Grouped)
841	Centre-lines
842	Setting out lines
843	Trackwork
844	Trackform
845	Tramways
846	
847	
848	Safety features / Railing / Barriers
849	Parts and accessories
850 - 859	BRIDGES
850	Bridges (Grouped)
851	Abutment
852	Anchor Block
853	Column
854	Pier
855	Tower
856	Deck
857	Parapet
858	Cable Support Systems
859	Parts and accessories
860 - 869	GROUND SURFACE - AIRFIELDS
860	Ground Surface - Airfields (Grouped)
861	Centre-lines, setting out lines
862	Pavement edges
863	Shoulders
864	Pavement jointing
865	
866	
867	
868	
869	Parts and accessories
870 - 879	VACANT
870	
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880 - 889	VACANT
880	
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889	
890 - 899	TRANSPORT INFR. PARTS & ACCESSORIES
890	Parts and Accessories (Grouped)
891	Reinforcement
892	Steelwork
893	Post tensioned cables/Prestressed cables
894	Connection details
895	Fixing details
896	Joint details
897	Bearings
898	
899	

CLASSES 900 - 999 : EXTERNAL WORKS

900 - 909	SITE PREPARATION
900	Site Preparation (Grouped)
901	Clearing/demolition
902	Sign Board
903	
904	
905	
906	
907	
908	
909	Parts and accessories
910 - 919	BOUNDARIES & ENCLOSURES
910	Boundaries & Enclosures (Grouped)
911	Gazettal limits
912	Planning boundaries
913	Lot/Land allocation boundaries
914	Site boundaries
915	Works areas
916	Hoardings / fences / gates
917	Reserves
918	Swept paths / kinematic envelopes
919	Parts and accessories
920 - 929	SURFACE WATER DRAINAGE
920	Surface Water Drainage (Grouped)
921	River/Stream/Ditch
922	Culvert/Channel/Catchwater/Nullah
923	Aqueduct
924	Pipe
925	Drain
926	Manhole
927	Catchpit
928	Pump
929	Parts and accessories
930 - 939	SEWERAGE
930	Sewerage (Grouped)
931	Pipe
932	Manhole
933	Sewer
934	Sewerage tank/Septic tank/Cesspools
935	Outfall
936	Sewage treatment plant
937	
938	
939	Parts and accessories
940 - 949	DUCTING (EXTERNAL)
940	Ducting (Grouped)
941	Ducts
942	Access chambers
943	Protective surround
944	
945	
946	
947	
948	
949	
950 - 959	MARINE WORKS
950	Marine Works (Grouped)
951	Bathymetric survey
952	Seabed contours
953	Breakwater
954	Dolphin
955	Floating jetty
956	Seawalls
957	Moorings / buoys
958	Fendering
959	Parts and accessories
960 - 969	MARINE FURNITURE
960	Marine Furniture (Grouped)
961	Notice board
962	Bollard
963	Handrail
964	Pillar box
965	Refuse containment room
966	Seawall block
967	Wave detector block
968	Tetrapod
969	
970 - 979	STRUCTURES IN EXTERNAL WORKS
970	Structures in External Works (Grouped)
971	Building outlines
972	Underground building outlines
973	Pylons/Antenna/Masts
974	
975	Utility connection points
976	
977	
978	Noise barriers
979	Parts and accessories
980 - 989	LANDSCAPING
980	Landscaping (Grouped)
981	Hard landscaping
982	Soft landscaping
983	Features eg. Sculptures / water features
984	Landscaping structures e.g. shade structure
985	
986	
987	Sports facilities
988	
989	
990 - 999	EXTERNAL WORKS PARTS & ACCESSORIES
990	Parts and Accessories (Grouped)
991	
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6 LINES

This section addresses:

- Line thicknesses;
- the assignment of line thicknesses;
- the use of LTSCALE and PSLTSCALE in AutoCAD; and
- symbols and special line-styles

6.1 LINE THICKNESSES

Line Thicknesses to be used in AutoCAD and Microstation
0.13mm 0.18mm 0.25mm 0.35mm 0.50mm 0.70mm 1.00mm 2.00mm

6.2 ASSIGNMENT OF LINE THICKNESSES

	Microstation
Line thickness shall be assigned by weight and not by colour. The CSWP line thickness can be selected from the standard AutoCAD line weight settings dialogue box. Only the CSWP line thickness values are to be selected, the 'default' line weight is not to be used.	Line thickness shall be assigned by weight and not by colour. Weight 0 = 0.13mm Weight 1 = 0.18mm Weight 2 = 0.25mm Weight 3 = 0.35mm Weight 4 = 0.50mm Weight 5 = 0.70mm Weight 6 = 1.00mm Weight 7 = 2.00mm

6.3 AutoCAD LIN LIBRARY FILE

6.3.1 The default AutoCAD LIN LIBRARY file shall be ACADISO.lin

6.4 AutoCAD LTSCALE AND PSLTSCALE SETTING

6.4.1 The LTSCALE factor in **drawing** files shall be the 1 x the Plot Scale

6.4.2 The LTSCALE factor in **model** files shall be the AutoCAD default value.

6.4.3 Note. If it is required to plot directly from a model file, then the LTSCALE factor should temporarily be set to 1 x the Plot Scale.

6.4.4 PSLTSCALE shall be set to 1.

6.5 SYMBOLS AND CUSTOM LINESTYLES

6.5.1 The naming of symbols and custom line-styles is described in Sections 11 and 12.

6.5.2 Symbol and custom line-style libraries are available from www.devb-wb.gov.hk/cswp .

7 TEXT

This section addresses:

- English Text:
  - Font types
  - Text sizes
  - Width factor
  - Line spacing
- Chinese Text:
  - Font type and specification
  - Text sizes
  - Width factor
  - Line spacing
- Special Characters

7.1 ENGLISH TEXT

7.1.1 FONTS

		Microstation
Font	Romans	Engineering
Font No in Microstation	N/A	Font No. 3
Style Name in AutoCAD	STANDARD	N/A

7.1.2 TEXT SIZES

	Thickness (mm)
2.00mm	0.25mm
2.50mm	0.25mm
3.50mm	0.35mm
5.00mm	0.50mm
7.00mm	0.70mm
10.00mm	1.00mm
20.00mm	2.00mm

7.1.3 WIDTH FACTOR

A width factor of 0.8 x Text Height shall be used

7.1.4 LINE SPACING

	Microstation
Line spacing between Multi-line text shall be set using the single (1.0x) setting.	Line spacing between Multi-line text shall be 0.5 x the maximum height of text in the line.

7.2 CHINESE TEXT

7.2.1 FONTS

Chinese Text Font files are not included within the CSWP downloadable resource files for licensing reasons. Users shall obtain font files that meet the following specification:

		Microstation
Font Styles	Ming Light (細明體) Ming Medium (中明體) Ming Bold (粗明體)	
Character Set	Each font shall contain all the standard BIG5 traditional Chinese characters (13,500 characters) and also all the Hong Kong Supplementary Character Set (HKSCS-2001 standard) as posted on the web site: http://www.info.gov.hk/digital21/eng/hkscs/download.html	
Internal Coding	Big-5	
File Type	A single true type font file for each of the three font styles	A single true type font file for each of the three font styles converted to a single Microstation .RSC file.

In implementing Chinese fonts the following shall be applied:

		Microstation
Font No. to be allocated in Microstation	N/A	Ming Light Font No. 195 Ming Medium Font No. 196 Ming Bold Font No. 197
Style Names to be given in AutoCAD	Style names for the three Chinese fonts shall be defined as follows, in English (language) within the AutoCAD file, irrespective of the language of the operating system or of the AutoCAD system. Ming Light MINGL Ming Medium MINGM Ming Bold MINGB	N/A

7.2.2 TEXT HEIGHTS

Text Height (mm)
3.00mm
3.75mm
5.25mm
7.50mm
10.50mm
15.00mm
30.00mm

7.2.3 WIDTH FACTOR

A width factor of 1.0 x Text Height shall be used.

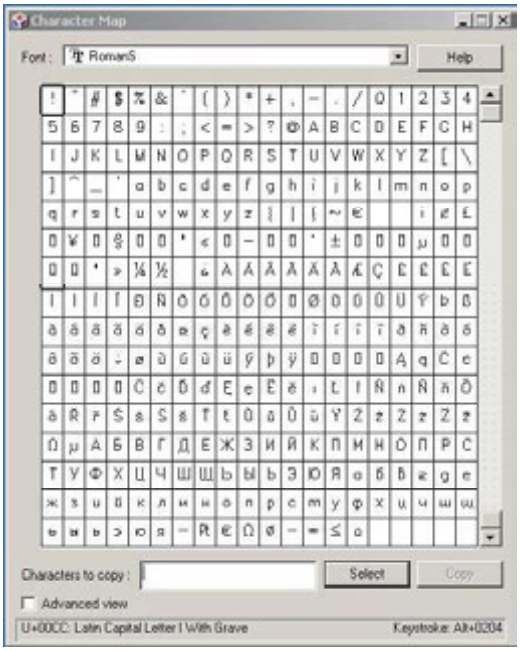
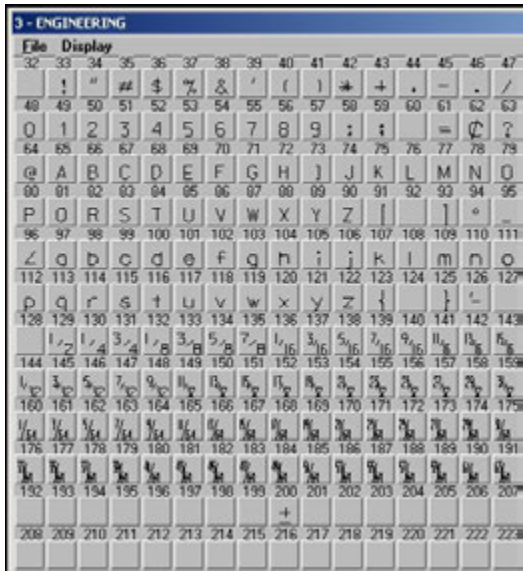
7.2.4 LINE SPACING

	Microstation
Line spacing between Multi-line text shall be set using the single (1.0x) setting.	Line spacing between Multi-line text shall be 0.5 x the maximum height of text in the line.

7.3 TEXT ON LANDS DEPARTMENT MAPPING

7.3.1 To avoid confusion, the CSWP font specifications are not applicable to the maps produced by Lands Department.

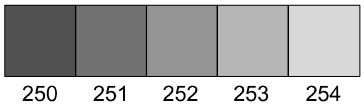
7.4 SPECIAL CHARACTERS

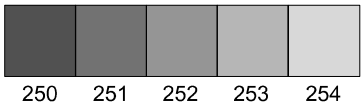
	Special Characters in Microstation
AutoCAD users shall use only the special characters available from the default ROMANS character map.  The following 'key-in' special characters can also be used: %%c for diameter symbol %%d for degrees symbol %%o for placing lines above text %%p for plus/minus symbol %%u for placing lines under text	Microstation users shall use only the special characters available from the default Font 3 (Engineering) 

8 COLOURS

<table>
<tr><th></th><th>Microstation</th></tr>
<tr><td>The default AutoCAD colour table shall be used.

Only colours 250 - 254 shall be used as grey scales.

Grey Scales
 
250 251 252 253 254</td><td>The following five grey scales shall be added to the default Microstation colour table. Only colours 250 - 254 shall be used as grey scales. (This will enable the AutoCAD and Microstation grey scales to be matched.)

Grey Scales
 
250 251 252 253 254

The RGB definition of the grey scales 250 - 254 are as follows:

<table>
<tr><th>Colour</th><th>R</th><th>G</th><th>B</th></tr>
<tr><td>250</td><td>176</td><td>176</td><td>176</td></tr>
<tr><td>251</td><td>200</td><td>200</td><td>200</td></tr>
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<tr><td>253</td><td>240</td><td>240</td><td>240</td></tr>
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9 SCALES

9.1 SCALE OF ORIGINAL CAD DATA

All elements shall be drawn at scale 1:1 in the CAD files.

The CAD data can then be plotted at different scales for different purposes using the CAD packages' plotting options.

9.2 GUIDELINES FOR PLOTTED SCALES

- Scales should be whole numbers
- The number of scales on any one drawing should be kept to a minimum
- The scale shall be clearly identified under the title of each portion of the drawing
- The scale chosen shall be large enough to permit clear and easy interpretation of the information
- Where different scales are used for horizontal and vertical dimensions, such as on profiles, each scale shall be clearly indicated.

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10 PAPER SIZES

PAPER SIZES TO BE USED FOR PLOTTED WORKING DRAWINGS

	Size (mm)
A0	841x1189
A1	594x841
A2	420x594
A3	297x420
A4	210x297
*B0	1000x1414
B1	707x1000
* The use of B0 should be kept to a minimum as it exceeds the maximum plot size of most plotters.	

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11 SYMBOL LIBRARIES

Note: Symbols will only be created and updated under the direction of the CSWP Working Group. The symbol libraries can be downloaded from the Development Bureau web site www.devb-wb.gov.hk/cswp

Folder, File and Symbol Naming for CSWP Symbol Libraries	
	Microstation
The CSWP\SYMBOLS folder will have 10 sub-folders named after the ten main divisions of the CSWP Element Coding table: \000 \100 \200 \300 \400 \500 \600 \700 \800 \900 These folders will contain up to ten sub-folders. The sub-folders will be named by: CSWP Element Main Class, e.g. \800\800 \800\810 \800\820 \800\830 \800\840 \800\850 \800\860 \800\890 The symbols will then be held in the Main Class sub-folder as individual .DWG files named with the symbol name, e.g. NORTHP.DWG (North-point) BHOLE.DWG (Bore-hole) TPIT.DWG (Trial Pit) Symbol file names not to exceed 6 characters to avoid truncation when transferred to Microstation.	The CSWP\SYMBOLS folder will have 10 sub-folders named after the ten main divisions of the CSWP Element Coding table: \000 \100 \200 \300 \400 \500 \600 \700 \800 \900 These folders will contain up to ten cell libraries. The cell libraries will be named by: CSWP Element Main Class, e.g. \800\800.CEL \800\810.CEL \800\820.CEL \800\830.CEL \800\840.CEL \800\850.CEL \800\860.CEL \800\890.CEL The symbols will then be held in the cell libraries and named with the symbol name, e.g. NORTHP (North-point) BHOLE (Bore-hole) TPIT (Trial-pit) Note that cell names cannot exceed 6 alphanumeric characters in Microstation.

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12 CUSTOM LINE-STYLE LIBRARIES

Note: Custom line-styles will only be created and updated under the direction of the CSWP Working Group. The line-style libraries can be downloaded from the Development Bureau web site www.devb-wb.gov.hk/cswp

Folder, File and Line-style Naming for CSWP Resource Files	
	Microstation
The AutoCAD custom line styles will be held in LIN library files located in the CSWP\RESOURCES directory. The LIN library files will be named and categorised according to the 10 element divisions in the CSWP Element Codes: CSWP\RESOURCES\000.lin CSWP\RESOURCES\100.lin CSWP\RESOURCES\200.lin CSWP\RESOURCES\300.lin CSWP\RESOURCES\400.lin CSWP\RESOURCES\500.lin CSWP\RESOURCES\600.lin CSWP\RESOURCES\700.lin CSWP\RESOURCES\800.lin CSWP\RESOURCES\900.lin The line styles will be held in the .LIN library files and given a name and a version number to allow for future modification.	The Microstation custom line styles will be held in resource files located in the CSWP\RESOURCES directory. The resource files will be named and categorised according to the 10 element divisions in the CSWP Element Codes: CSWP\RESOURCES\000.rsc CSWP\RESOURCES\100.rsc CSWP\RESOURCES\200.rsc CSWP\RESOURCES\300.rsc CSWP\RESOURCES\400.rsc CSWP\RESOURCES\500.rsc CSWP\RESOURCES\600.rsc CSWP\RESOURCES\700.rsc CSWP\RESOURCES\800.rsc CSWP\RESOURCES\900.rsc The line styles will be held in the resource files and given a name and a version number to allow for future modification.
Examples of custom line style names common to AutoCAD and Microstation	
Format: Name_Version, e.g. EXGAS_00 Existing Gas Line (initial version) EX11KV_01 Existing 11kv electricity line (first revision) RM1107_02 Road marking style 1107 (second revision)	

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13 SUMMARY OF REQUIREMENTS

13.1 MANDATORY / USER CHOICE

The following table summarises those parts of the CSWP that are mandatory and those for which the users are required / free to make choices.

				User Free to Choose
3	FOLDERS	CSWP Common Data Folders	Folder Structure and Naming	-
		Project Data Folders	Folder Structure	Top level folder name (to be agreed with Works Department) Division of model files into MODEL sub-folder Use of sub sub-folders for discipline split Use of REVISION folder
4	FILES	File Settings	Settings	Use of metres or millimetres units
		Drawing Files Naming	Format	Drawing number and revision
		Model Files Naming	Format Agent Responsible Code from prescribed list View from list Status from list	Use of Project ID (min 1 max 8 characters) File ID (min 4 max 8 characters)
5	LAYERS	Layer Naming	Format Agent Responsible Code from prescribed list Element Code from list Use of underscores to fill blank characters	User definable code
		Element Coding	First three digits from Element Coding Table provided	User is free to set the 4th digit, if required, or replace by underscore
6	LINES	Thicknesses	Choose from prescribed range	Thickness to suit drawn elements
		Assignment of Microstation line weight No. to thickness	Line weights prescribed to thicknesses	-
		Use of lines by weight in AutoCAD	Prescribed	-
		AutoCAD LIN file	ACADISO.lin prescribed	-
		AutoCAD LTSCALE and PSLTSCALE settings	Prescribed	-
		Custom Line-styles	Provided in library	Appropriate line-style

				User Free to Choose
7	TEXT	English Text	Font type Prescribed range of sizes Width factor Line spacing	- Choose appropriate size - -
		Chinese Text	Font styles, character set and internal coding specified Prescribed range of sizes Width factor Line spacing	- Choose appropriate size - -
		Special Characters	Special characters from specified fonts only	-
8	COLOURS	Colours	CSWP Colour Table	User is free to choose colours for presentation / colour drawings
9	SCALES	Scales	All data to be drawn at 1:1 and scaled for plotting	Appropriate scales for plotting
10	PAPER SIZES	Paper Sizes	Standard sizes for working drawings	Appropriate size for drawings
11	SYMBOLS	Symbol Libraries	Symbol libraries provided and downloadable from www.devb-wb.gov.hk/cswp	Appropriate symbol. If no appropriate symbol exists, Users shall use their own defined symbols with their descriptions shown in a legend and may propose these new symbols for the CSWP Working Group's consideration via the web site
12	CUSTOM LINE-STYLES	Line-style Libraries	Line-style Libraries provided and downloadable from www.devb-wb.gov.hk/cswp	Appropriate line-style. If no appropriate line-style exists, Users shall use their own defined line-styles with their descriptions shown in a legend and may propose these new line-styles for the CSWP Working Group's consideration via the web site

13.2 REFERENCES

The Agent Responsible Codes, Symbol Libraries and Line-style Resource files can be found on the Development Bureau web site www.devb-wb.gov.hk/cswp