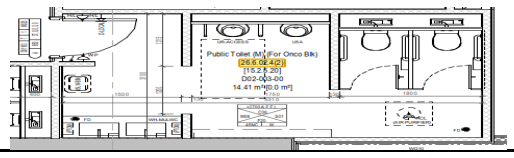
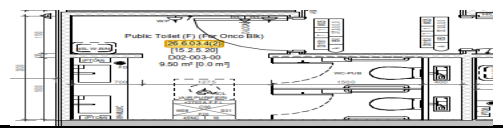
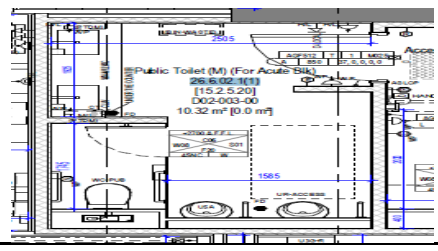
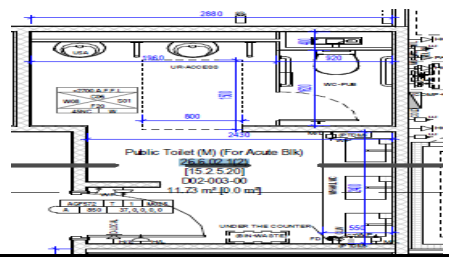
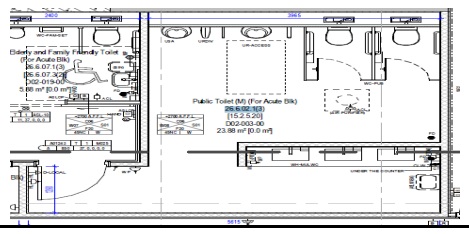
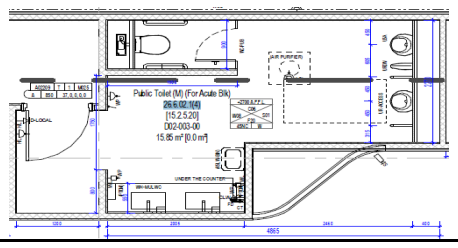
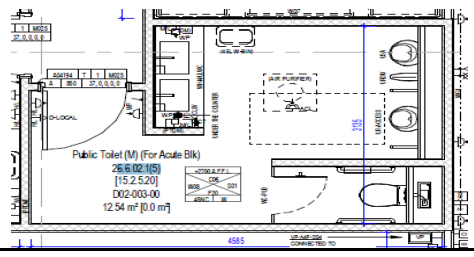
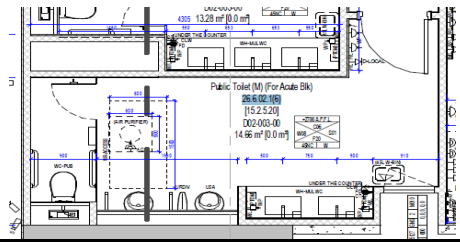
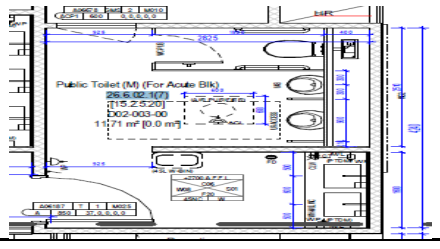
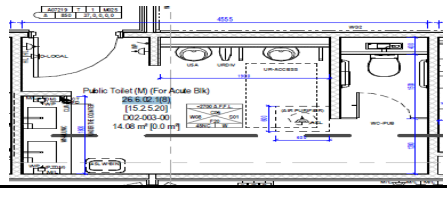
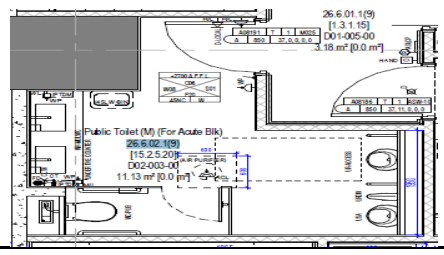
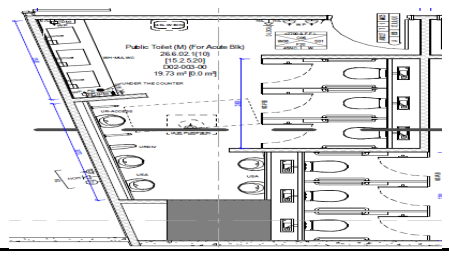
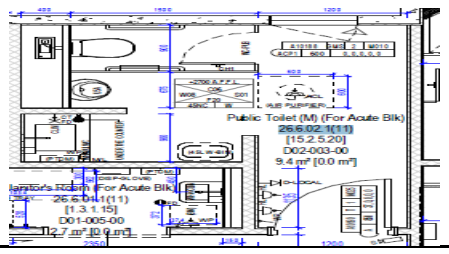
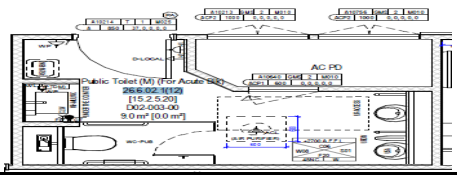
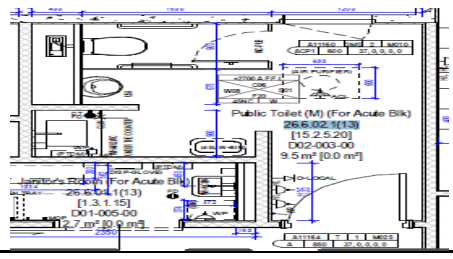
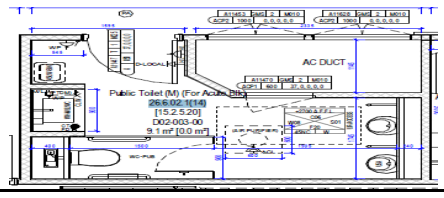
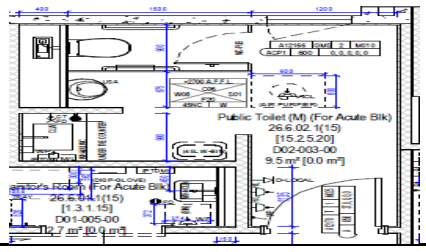
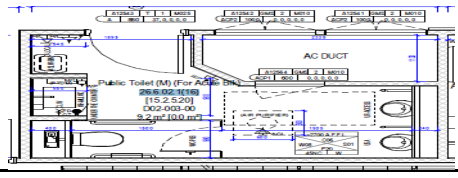
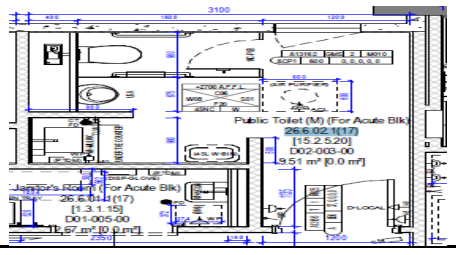
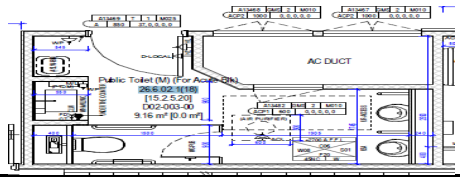
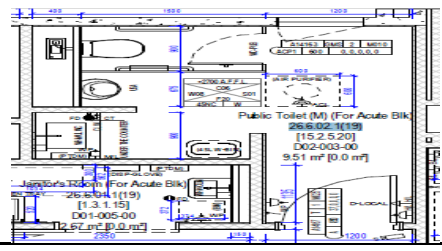
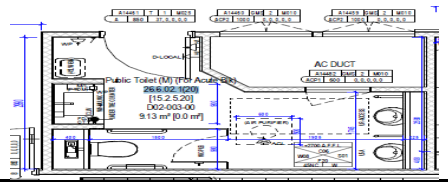
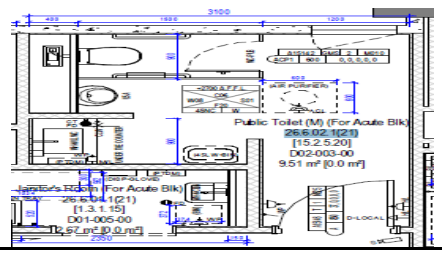
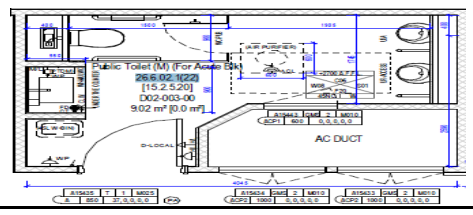
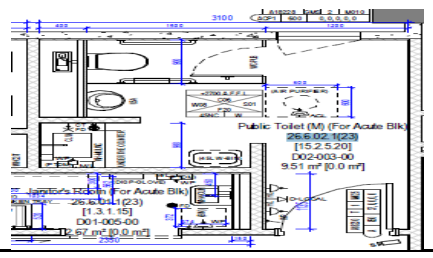
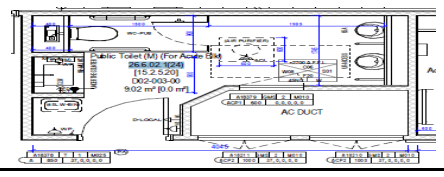
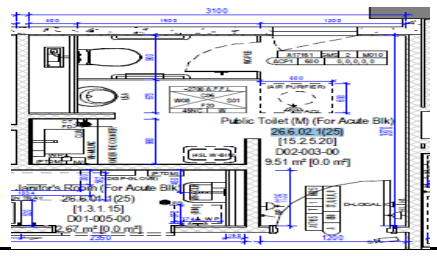
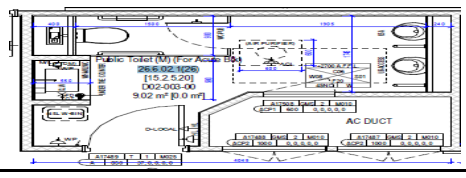
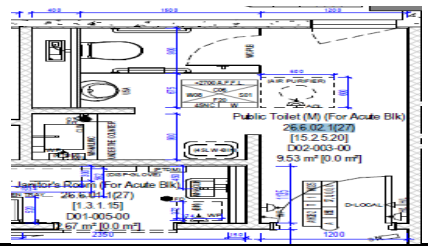
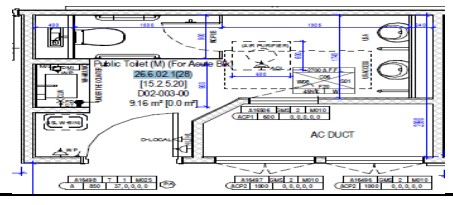
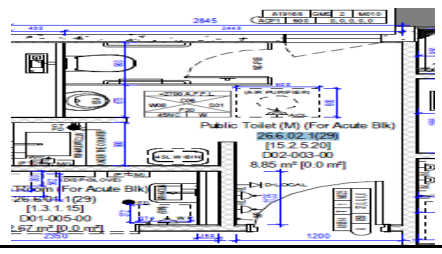
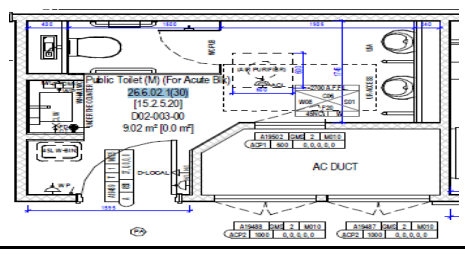
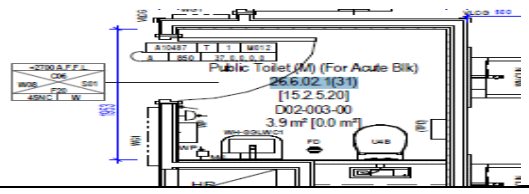
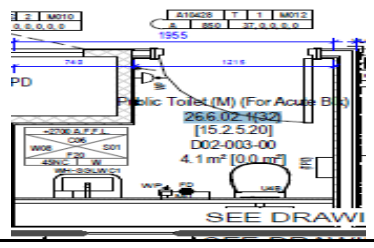
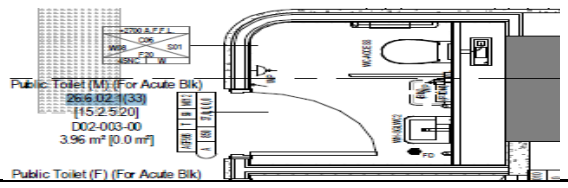
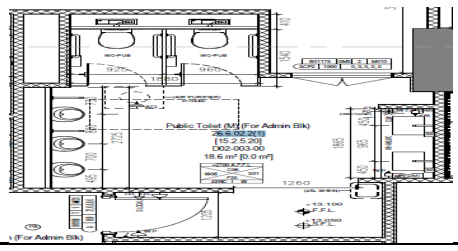
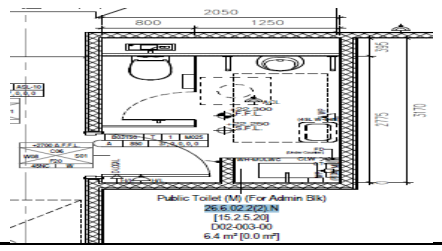
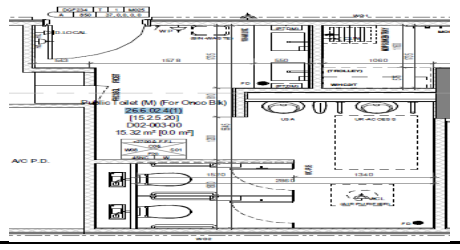
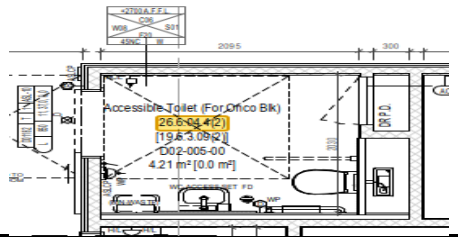
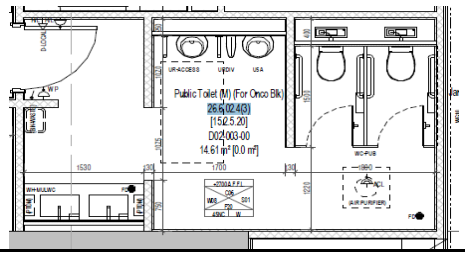
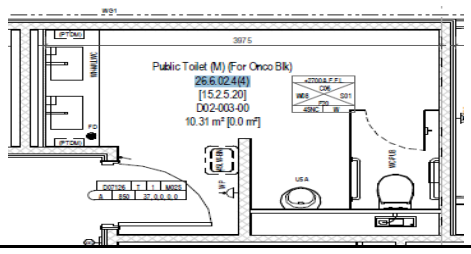
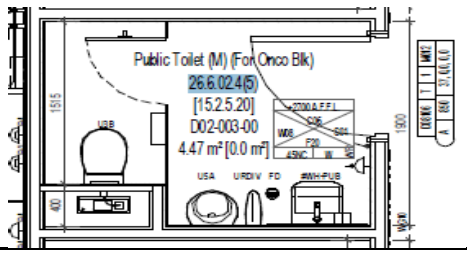
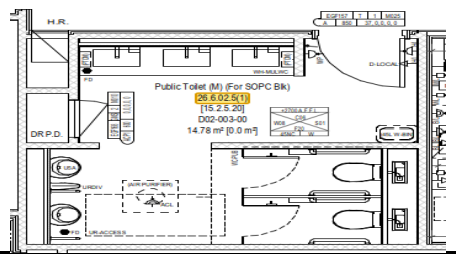
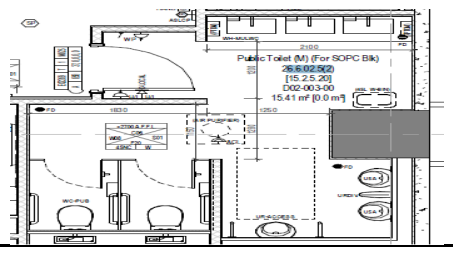
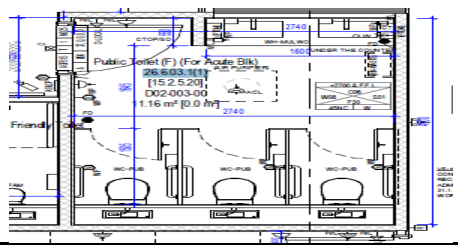
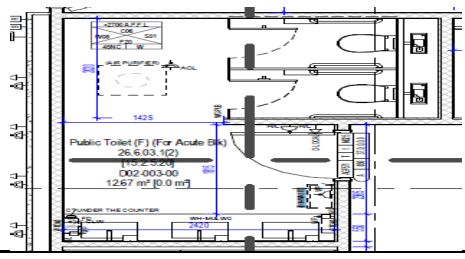
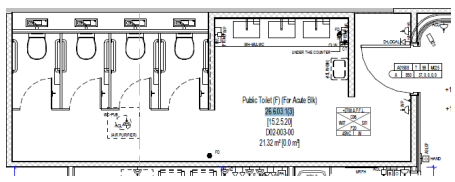
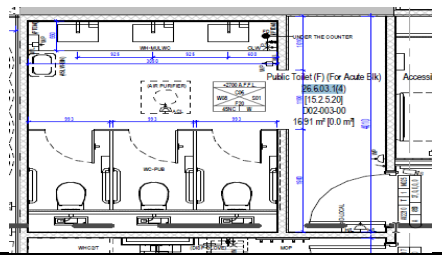
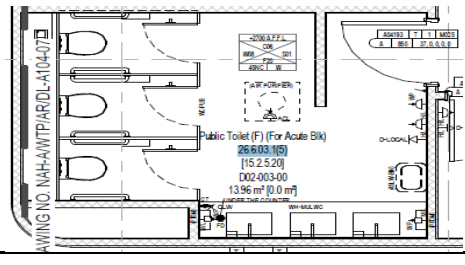
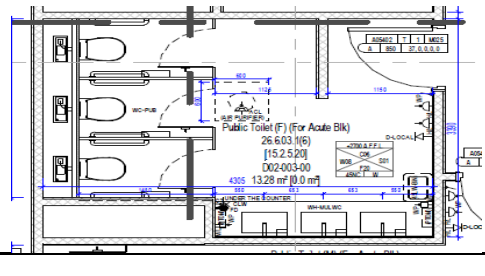
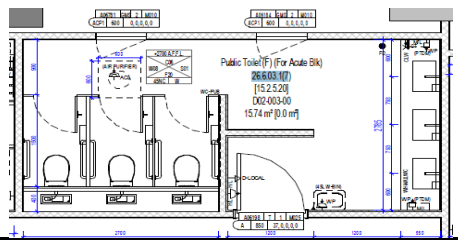
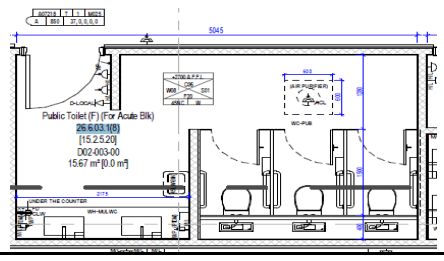
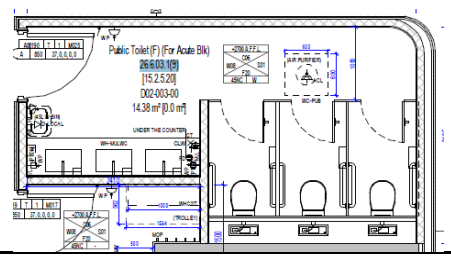
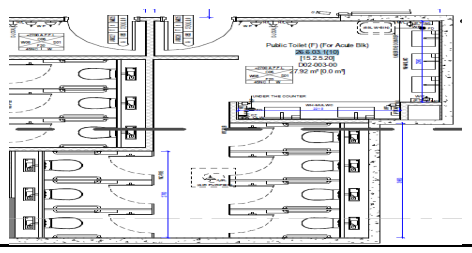
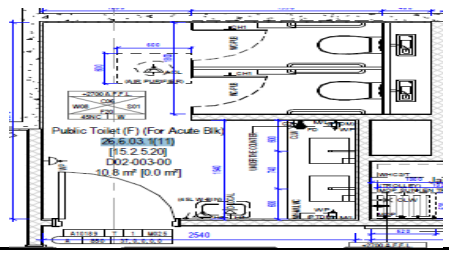
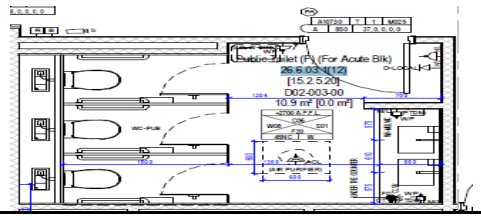
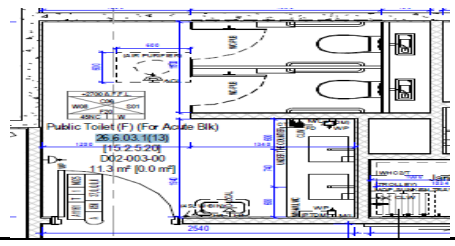
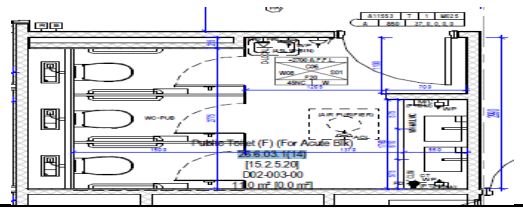
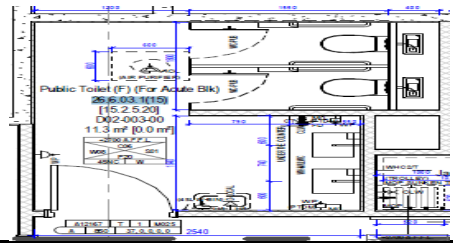
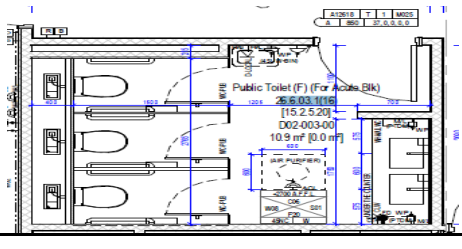
SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.02.4(2)	Public Toilet (M) (For Onco Blk)	D	1	1/F (ONCO)	Y	14.41		
26.6.03.4(2)	Public Toilet (F) (For Onco Blk)	D	1	1/F (ONCO)	Y	9.50		
26.6.02.1(1)	Public Toilet (M) (For Acute Blk)	A	G	G/F (ACUTE)	Y	10.32		
26.6.02.1(2)	Public Toilet (M) (For Acute Blk)	A	G	G/F (ACUTE)	Y	11.73		
26.6.02.1(3)	Public Toilet (M) (For Acute Blk)	A	1	1/F (ACUTE)	Y	23.88		
26.6.02.1(4)	Public Toilet (M) (For Acute Blk)	A	2	2/F (ACUTE)	Y	15.85		
26.6.02.1(5)	Public Toilet (M) (For Acute Blk)	A	4	4/F (ACUTE)	Y	12.54		
26.6.02.1(6)	Public Toilet (M) (For Acute Blk)	A	5	5/F (ACUTE)	Y	14.66		
26.6.02.1(7)	Public Toilet (M) (For Acute Blk)	A	6	6/F (ACUTE)	Y	11.71		
26.6.02.1(8)	Public Toilet (M) (For Acute Blk)	A	7	7/F (ACUTE)	Y	14.08		

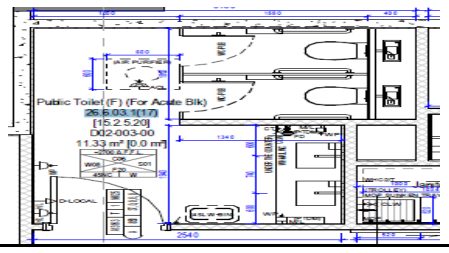
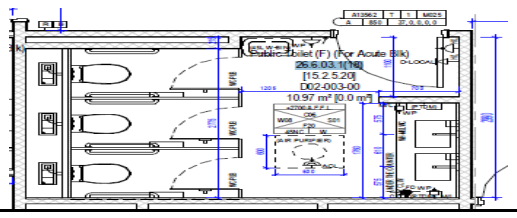
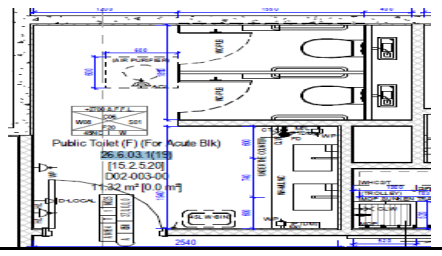
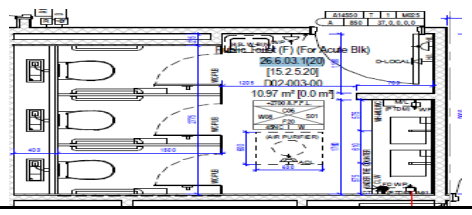
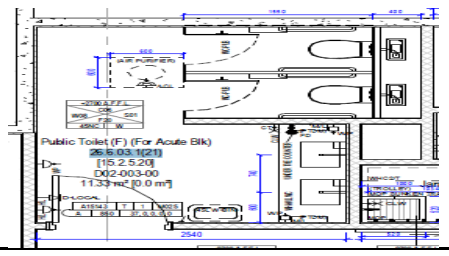
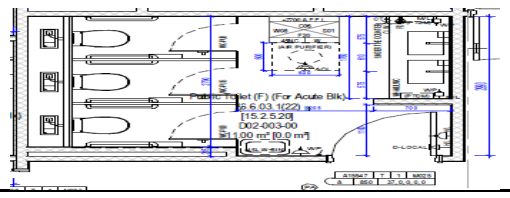
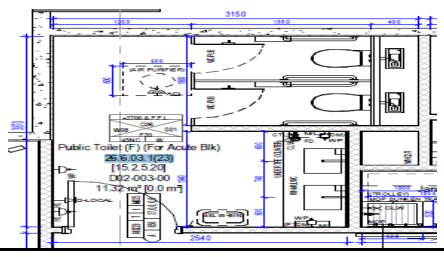
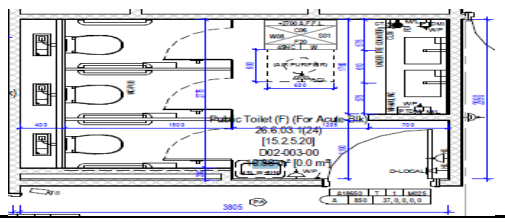
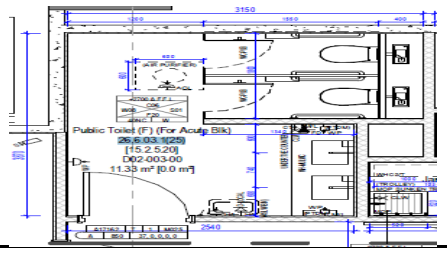
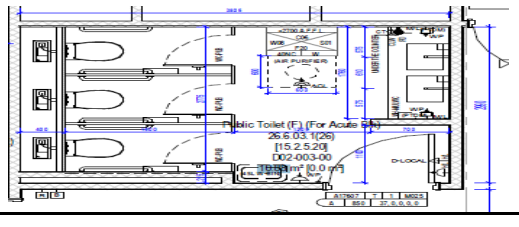
SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.02.1(9)	Public Toilet (M) (For Acute Blk)	A	8	8/F (ACUTE)	Y	11.13		
26.6.02.1(10)	Public Toilet (M) (For Acute Blk)	A	9	9/F (ACUTE)	Y	19.73		
26.6.02.1(11)	Public Toilet (M) (For Acute Blk)	A	10	10/F (ACUTE)	Y	9.40		
26.6.02.1(12)	Public Toilet (M) (For Acute Blk)	A	10	10/F (ACUTE)	Y	9.00		
26.6.02.1(13)	Public Toilet (M) (For Acute Blk)	A	11	11/F (ACUTE)	Y	9.50		
26.6.02.1(14)	Public Toilet (M) (For Acute Blk)	A	11	11/F (ACUTE)	Y	9.10		
26.6.02.1(15)	Public Toilet (M) (For Acute Blk)	A	12	12/F (ACUTE)	Y	9.50		
26.6.02.1(16)	Public Toilet (M) (For Acute Blk)	A	12	12/F (ACUTE)	Y	9.20		
26.6.02.1(17)	Public Toilet (M) (For Acute Blk)	A	13	13/F (ACUTE)	Y	9.51		
26.6.02.1(18)	Public Toilet (M) (For Acute Blk)	A	13	13/F (ACUTE)	Y	9.16		

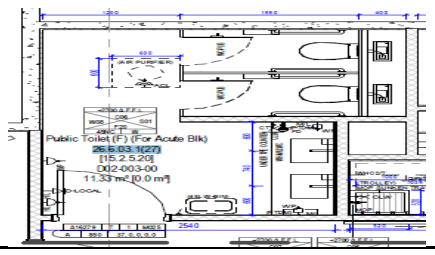
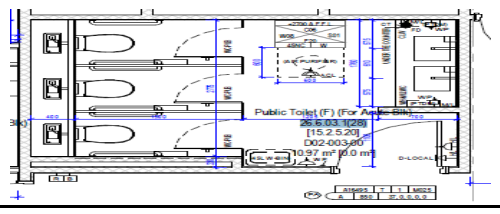
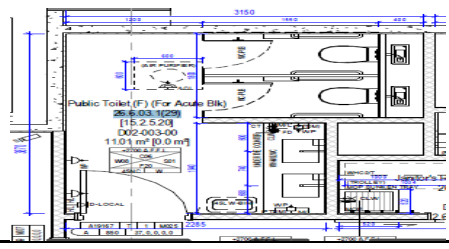
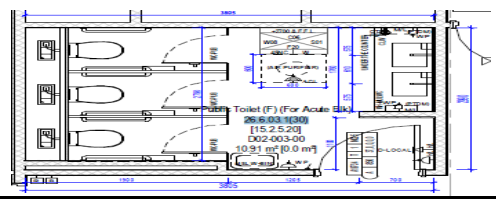
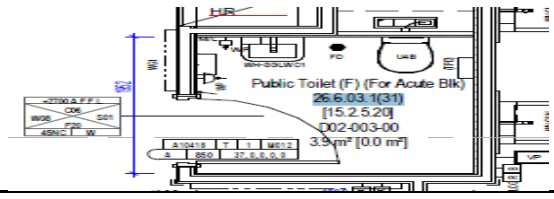
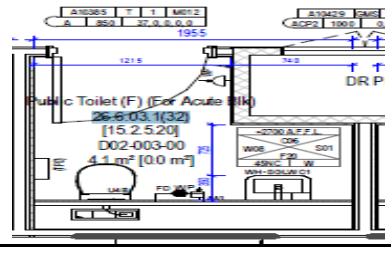
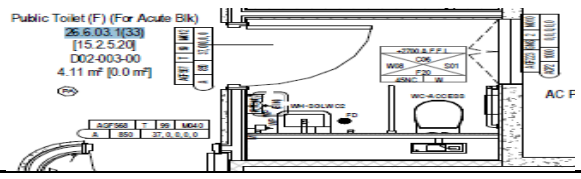
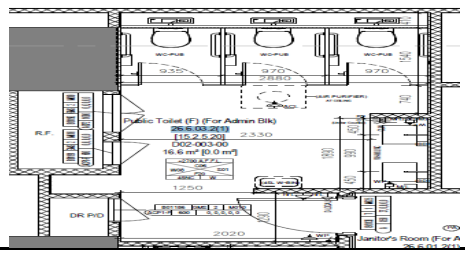
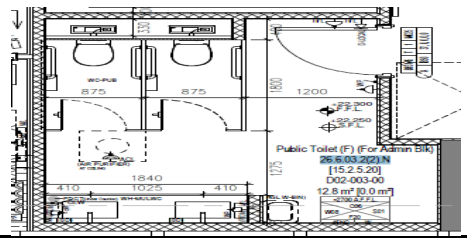
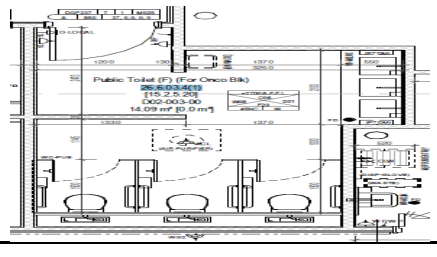
SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.02.1(19)	Public Toilet (M) (For Acute Blk)	A	14	14/F (ACUTE)	Y	9.51		
26.6.02.1(20)	Public Toilet (M) (For Acute Blk)	A	14	14/F (ACUTE)	Y	9.13		
26.6.02.1(21)	Public Toilet (M) (For Acute Blk)	A	15	15/F (ACUTE)	Y	9.51		
26.6.02.1(22)	Public Toilet (M) (For Acute Blk)	A	15	15/F (ACUTE)	Y	9.02		
26.6.02.1(23)	Public Toilet (M) (For Acute Blk)	A	18	18/F (ACUTE)	Y	9.51		
26.6.02.1(24)	Public Toilet (M) (For Acute Blk)	A	18	18/F (ACUTE)	Y	9.02		
26.6.02.1(25)	Public Toilet (M) (For Acute Blk)	A	17	17/F (ACUTE)	Y	9.51		
26.6.02.1(26)	Public Toilet (M) (For Acute Blk)	A	17	17/F (ACUTE)	Y	9.02		
26.6.02.1(27)	Public Toilet (M) (For Acute Blk)	A	16	16/F (ACUTE)	Y	9.53		
26.6.02.1(28)	Public Toilet (M) (For Acute Blk)	A	16	16/F (ACUTE)	Y	9.16		

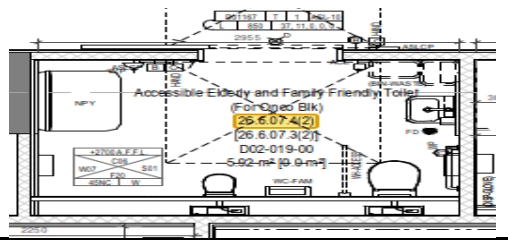
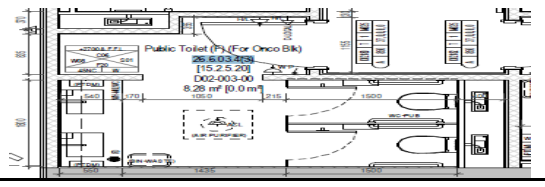
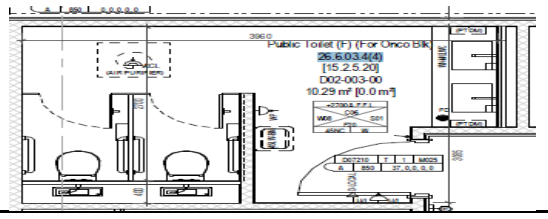
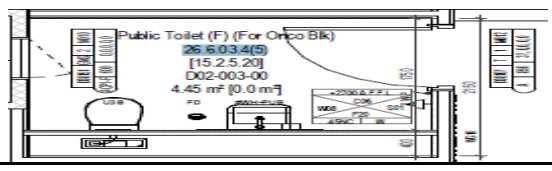
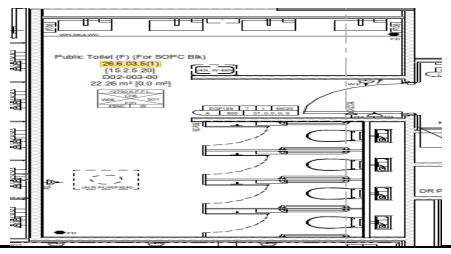
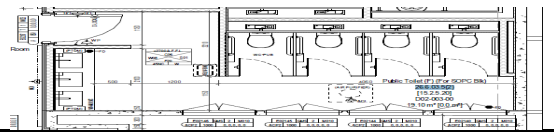
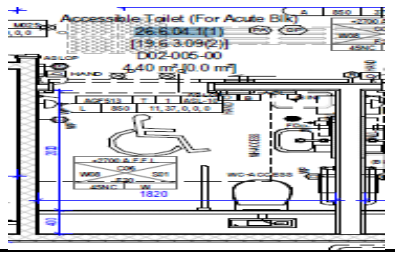
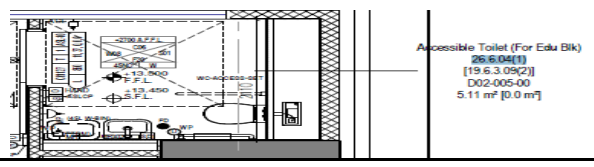
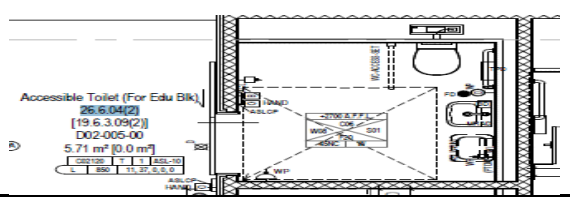
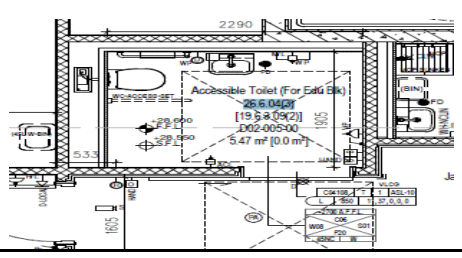
SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.02.1(29)	Public Toilet (M) (For Acute Blk)	A	19	19/F (ACUTE)	Y	8.85		
26.6.02.1(30)	Public Toilet (M) (For Acute Blk)	A	19	19/F (ACUTE)	Y	9.02		
26.6.02.1(31)	Public Toilet (M) (For Acute Blk)	A	10	10/F (ACUTE)	N	3.90		Y
26.6.02.1(32)	Public Toilet (M) (For Acute Blk)	A	10	10/F (ACUTE)	N	4.10		Y
26.6.02.1(33)	Public Toilet (M) (For Acute Blk)	A	G	G/F (ACUTE)	N	3.96		Y
26.6.02.2(1)	Public Toilet (M) (For Admin Blk)	B	1	1/F (ADMIN)	Y	18.60		
26.6.02.2(2).N	Public Toilet (M) (For Admin Blk)	B	3	3/F (ADMIN)	Y	6.40		
26.6.02.4(1)	Public Toilet (M) (For Onco Blk)	D	G	G/F (ONCO)	Y	15.32		
26.6.04.4(2)	Accessible Toilet (For Onco Blk)	D	1	1/F (ONCO)	N	4.21		Y
26.6.02.4(3)	Public Toilet (M) (For Onco Blk)	D	2	2/F (ONCO)	Y	14.61		

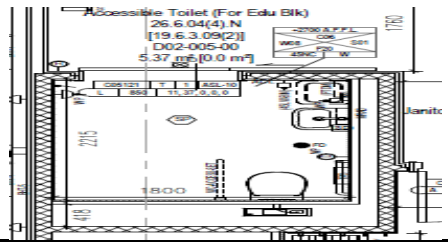
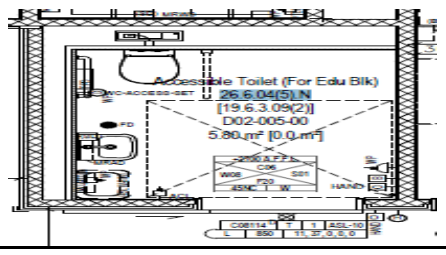
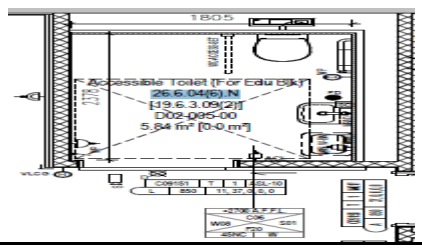
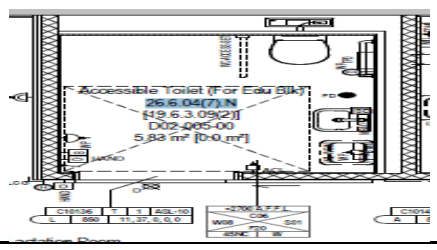
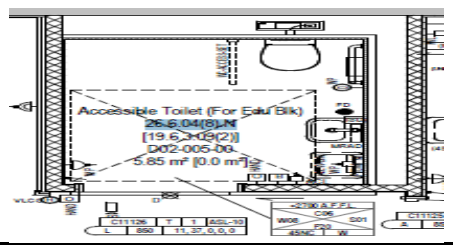
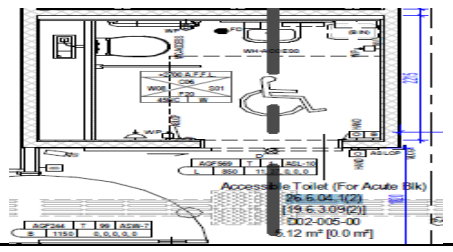
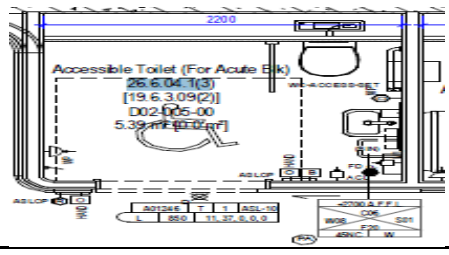
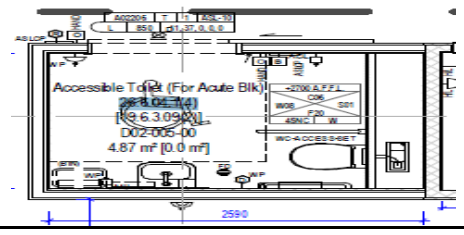
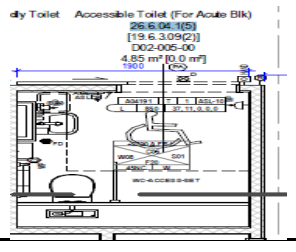
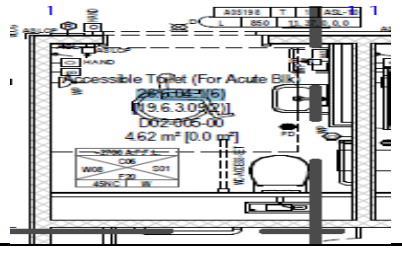
SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.02.4(4)	Public Toilet (M) (For Onco Blk)	D	7	7/F (ONCO)	Y	10.31		
26.6.02.4(5)	Public Toilet (M) (For Onco Blk)	D	8	8/F (ONCO)	Y	4.47		
26.6.02.5(1)	Public Toilet (M) (For SOPC Blk)	E	G	G/F (SOPC)	Y	14.78		
26.6.02.5(2)	Public Toilet (M) (For SOPC Blk)	E	2	2/F (SOPC)	Y	15.41		
26.6.03.1(1)	Public Toilet (F) (For Acute Blk)	A	G	G/F (ACUTE)	Y	11.16		
26.6.03.1(2)	Public Toilet (F) (For Acute Blk)	A	G	G/F (ACUTE)	Y	12.67		
26.6.03.1(3)	Public Toilet (F) (For Acute Blk)	A	1	1/F (ACUTE)	Y	21.32		
26.6.03.1(4)	Public Toilet (F) (For Acute Blk)	A	2	2/F (ACUTE)	Y	16.91		
26.6.03.1(5)	Public Toilet (F) (For Acute Blk)	A	4	4/F (ACUTE)	Y	13.96		
26.6.03.1(6)	Public Toilet (F) (For Acute Blk)	A	5	5/F (ACUTE)	Y	13.28		

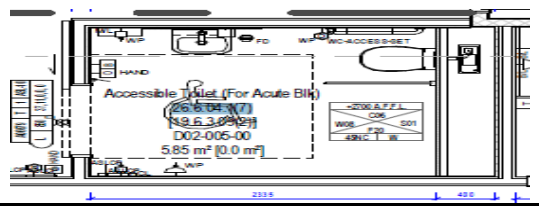
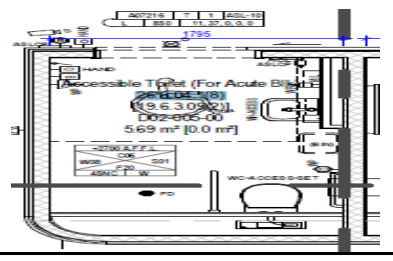
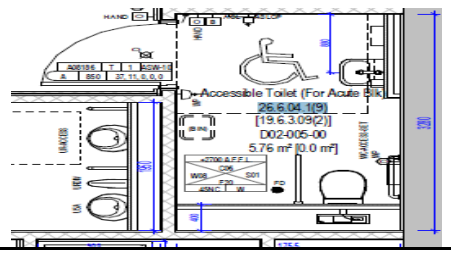
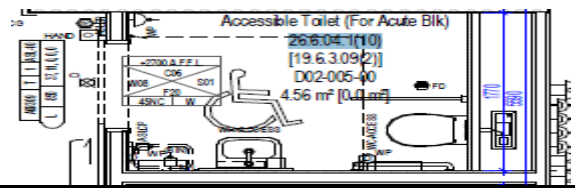
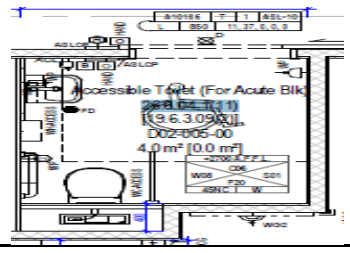
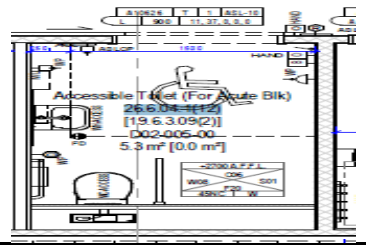
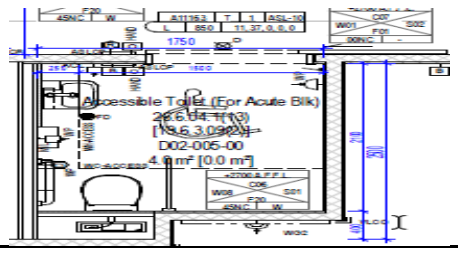
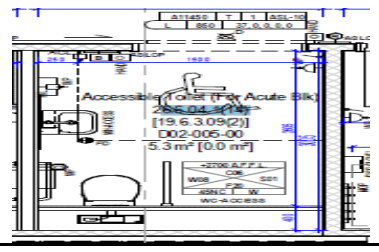
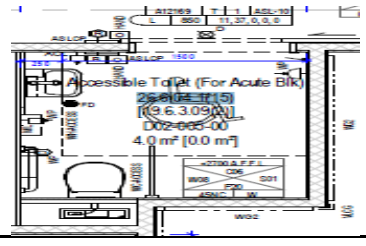
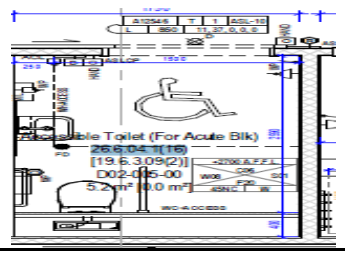
SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.03.1(7)	Public Toilet (F) (For Acute Blk)	A	6	6/F (ACUTE)	Y	15.74		
26.6.03.1(8)	Public Toilet (F) (For Acute Blk)	A	7	7/F (ACUTE)	Y	15.67		
26.6.03.1(9)	Public Toilet (F) (For Acute Blk)	A	8	8/F (ACUTE)	Y	14.38		
26.6.03.1(10)	Public Toilet (F) (For Acute Blk)	A	9	9/F (ACUTE)	Y	27.92		
26.6.03.1(11)	Public Toilet (F) (For Acute Blk)	A	10	10/F (ACUTE)	Y	10.80		
26.6.03.1(12)	Public Toilet (F) (For Acute Blk)	A	10	10/F (ACUTE)	Y	10.90		
26.6.03.1(13)	Public Toilet (F) (For Acute Blk)	A	11	11/F (ACUTE)	Y	11.30		
26.6.03.1(14)	Public Toilet (F) (For Acute Blk)	A	11	11/F (ACUTE)	Y	11.00		
26.6.03.1(15)	Public Toilet (F) (For Acute Blk)	A	12	12/F (ACUTE)	Y	11.30		
26.6.03.1(16)	Public Toilet (F) (For Acute Blk)	A	12	12/F (ACUTE)	Y	10.90		

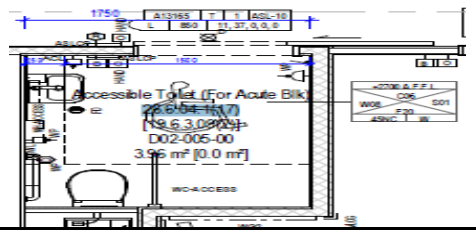
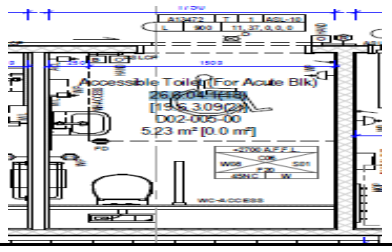
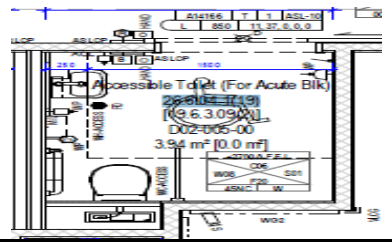
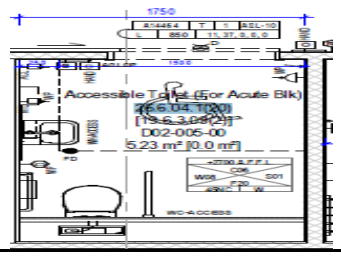
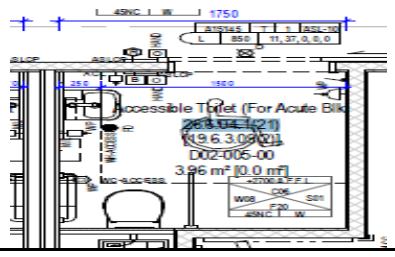
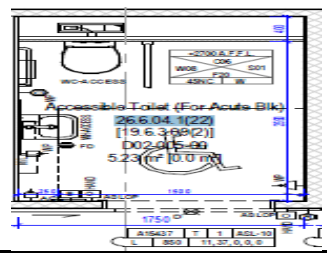
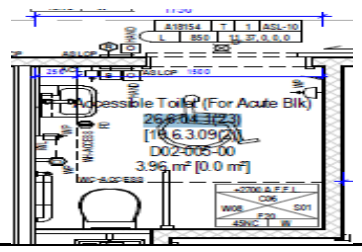
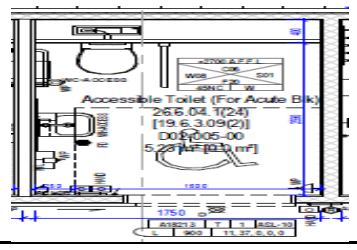
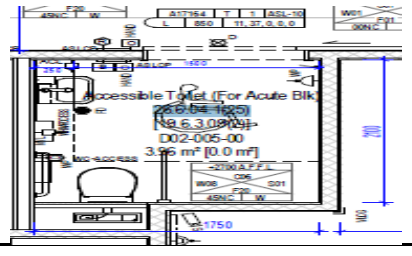
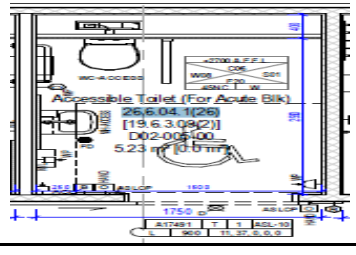
SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.03.1(17)	Public Toilet (F) (For Acute Blk)	A	13	13/F (ACUTE)	Y	11.33		
26.6.03.1(18)	Public Toilet (F) (For Acute Blk)	A	13	13/F (ACUTE)	Y	10.97		
26.6.03.1(19)	Public Toilet (F) (For Acute Blk)	A	14	14/F (ACUTE)	Y	11.32		
26.6.03.1(20)	Public Toilet (F) (For Acute Blk)	A	14	14/F (ACUTE)	Y	10.97		
26.6.03.1(21)	Public Toilet (F) (For Acute Blk)	A	15	15/F (ACUTE)	Y	11.33		
26.6.03.1(22)	Public Toilet (F) (For Acute Blk)	A	15	15/F (ACUTE)	Y	11.00		
26.6.03.1(23)	Public Toilet (F) (For Acute Blk)	A	18	18/F (ACUTE)	Y	11.32		
26.6.03.1(24)	Public Toilet (F) (For Acute Blk)	A	18	18/F (ACUTE)	Y	10.88		
26.6.03.1(25)	Public Toilet (F) (For Acute Blk)	A	17	17/F (ACUTE)	Y	11.33		
26.6.03.1(26)	Public Toilet (F) (For Acute Blk)	A	17	17/F (ACUTE)	Y	10.88		

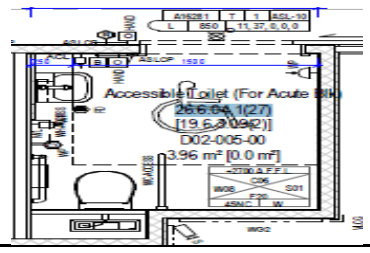
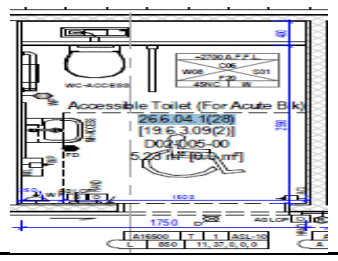
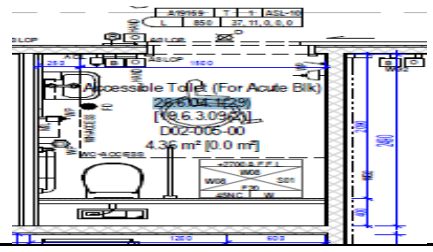
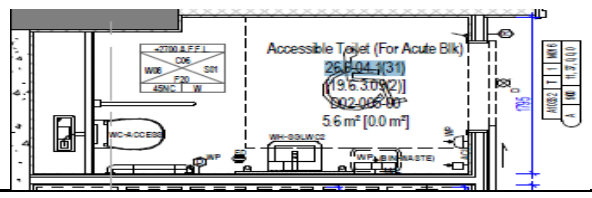
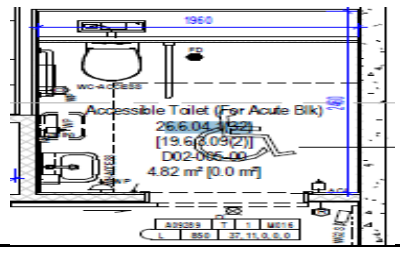
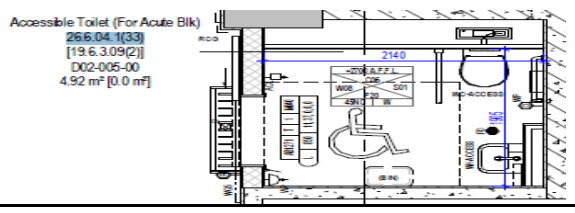
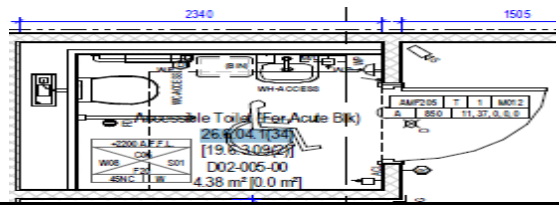
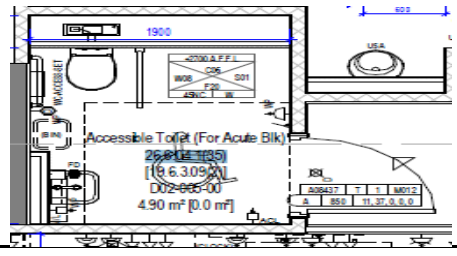
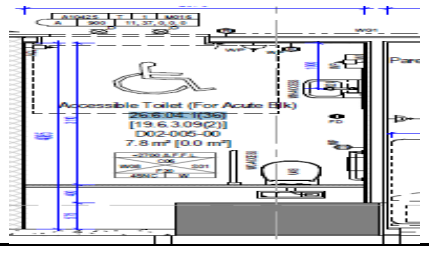
SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.03.1(27)	Public Toilet (F) (For Acute Blk)	A	16	16/F (ACUTE)	Y	11.33		
26.6.03.1(28)	Public Toilet (F) (For Acute Blk)	A	16	16/F (ACUTE)	Y	10.97		
26.6.03.1(29)	Public Toilet (F) (For Acute Blk)	A	19	19/F (ACUTE)	Y	11.01		
26.6.03.1(30)	Public Toilet (F) (For Acute Blk)	A	19	19/F (ACUTE)	Y	10.91		
26.6.03.1(31)	Public Toilet (F) (For Acute Blk)	A	10	10/F (ACUTE)	N	3.90		Y
26.6.03.1(32)	Public Toilet (F) (For Acute Blk)	A	10	10/F (ACUTE)	N	4.10		Y
26.6.03.1(33)	Public Toilet (F) (For Acute Blk)	A	G	G/F (ACUTE)	N	4.11		Y
26.6.03.2(1)	Public Toilet (F) (For Admin Blk)	B	1	1/F (ADMIN)	Y	16.60		
26.6.03.2(2).N	Public Toilet (F) (For Admin Blk)	B	3	3/F (ADMIN)	Y	12.80		
26.6.03.4(1)	Public Toilet (F) (For Onco Blk)	D	G	G/F (ONCO)	Y	14.09		

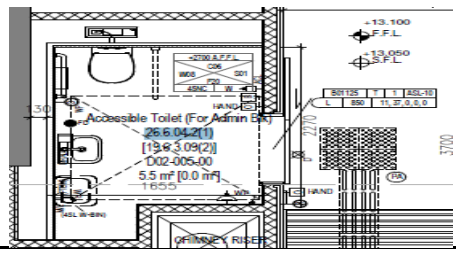
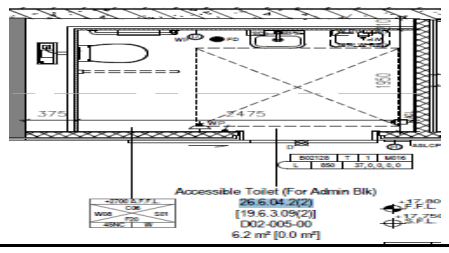
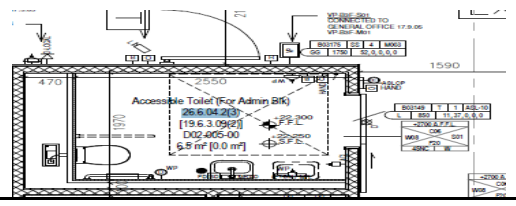
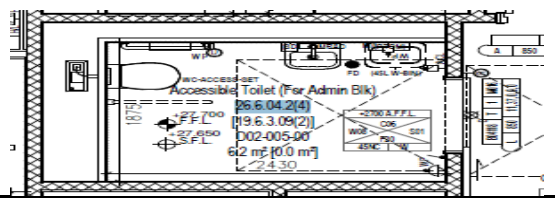
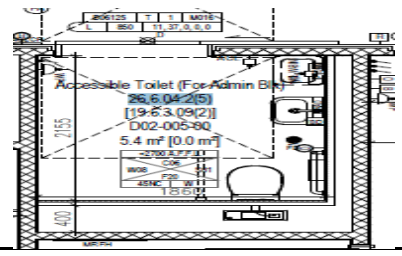
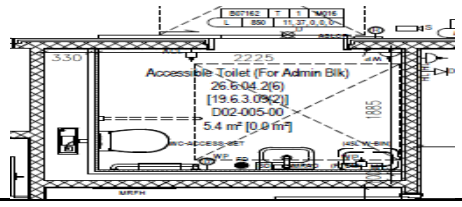
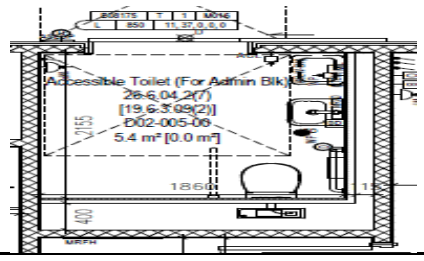
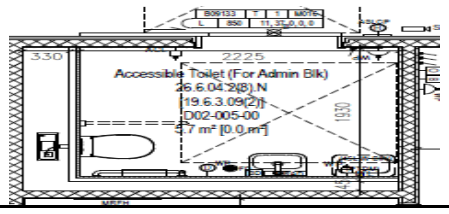
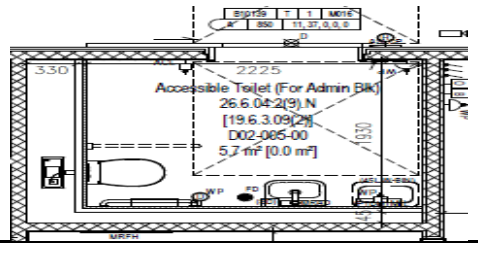
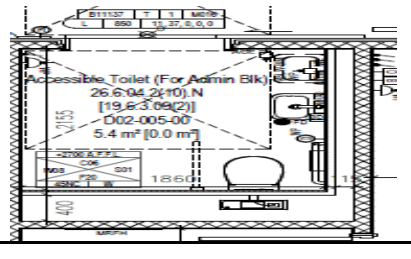
SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.07.4(2)	Accessible Elderly and Family Friendly Toilet (For Onco Blk)	D	1	1/F (ONCO)	N	5.92		Y
26.6.03.4(3)	Public Toilet (F) (For Onco Blk)	D	2	2/F (ONCO)	Y	8.28		
26.6.03.4(4)	Public Toilet (F) (For Onco Blk)	D	7	7/F (ONCO)	Y	10.29		
26.6.03.4(5)	Public Toilet (F) (For Onco Blk)	D	8	8/F (ONCO)	N	4.45		Y
26.6.03.5(1)	Public Toilet (F) (For SOPC Blk)	E	G	G/F (SOPC)	Y	22.26		
26.6.03.5(2)	Public Toilet (F) (For SOPC Blk)	E	2	2/F (SOPC)	Y	19.10		
26.6.04.1(1)	Accessible Toilet (For Acute Blk)	A	G	G/F (ACUTE)	N	4.40		Y
26.6.04(1)	Accessible Toilet (For Edu Blk)	C	1	1/F (EDU)				Y
26.6.04(2)	Accessible Toilet (For Edu Blk)	C	2	2/F (EDU)				Y
26.6.04(3)	Accessible Toilet (For Edu Blk)	C	4	4/F (EDU)				Y

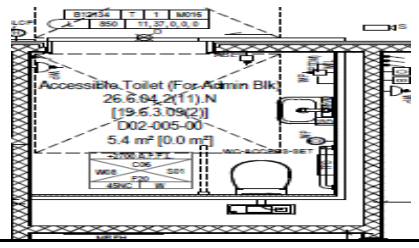
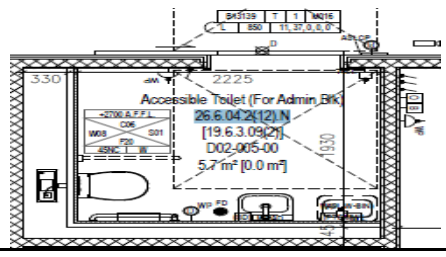
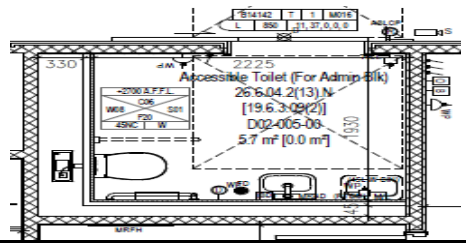
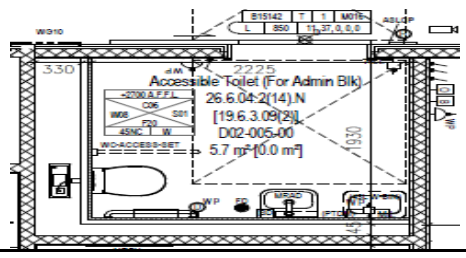
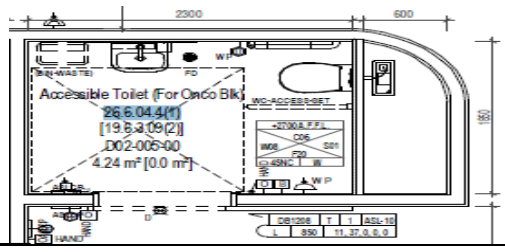
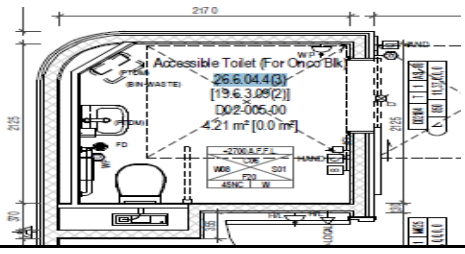
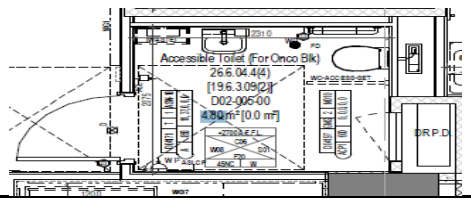
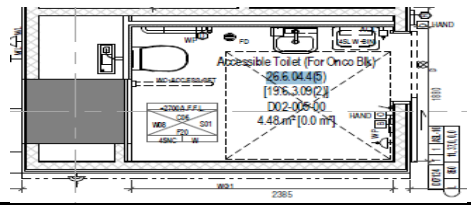
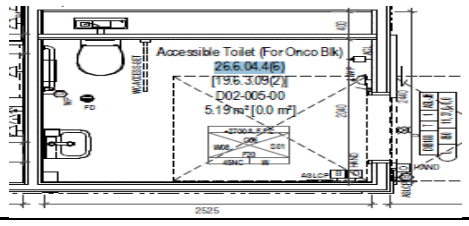
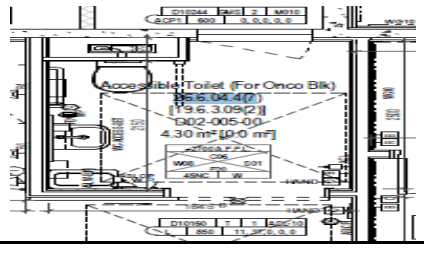
SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.04(4).N	Accessible Toilet (For Edu Blk)	C	5	5/F (EDU)				Y
26.6.04(5).N	Accessible Toilet (For Edu Blk)	C	8	8/F (EDU)				Y
26.6.04(6).N	Accessible Toilet (For Edu Blk)	C	9	9/F (EDU)				Y
26.6.04(7).N	Accessible Toilet (For Edu Blk)	C	10	10/F (EDU)				Y
26.6.04(8).N	Accessible Toilet (For Edu Blk)	C	11	11/F (EDU)				Y
26.6.04.1(2)	Accessible Toilet (For Acute Blk)	A	G	G/F (ACUTE)	N	5.12		Y
26.6.04.1(3)	Accessible Toilet (For Acute Blk)	A	1	1/F (ACUTE)	N	5.39		Y
26.6.04.1(4)	Accessible Toilet (For Acute Blk)	A	2	2/F (ACUTE)	N	4.87		Y
26.6.04.1(5)	Accessible Toilet (For Acute Blk)	A	4	4/F (ACUTE)	N	4.85		Y
26.6.04.1(6)	Accessible Toilet (For Acute Blk)	A	5	5/F (ACUTE)	N	4.62		Y

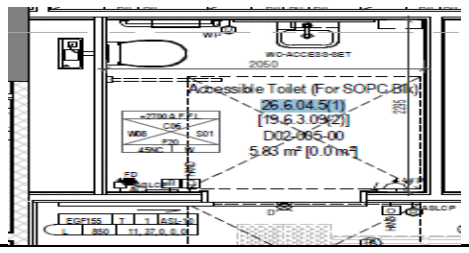
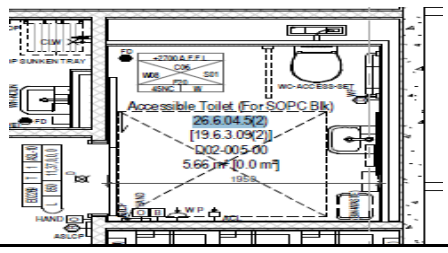
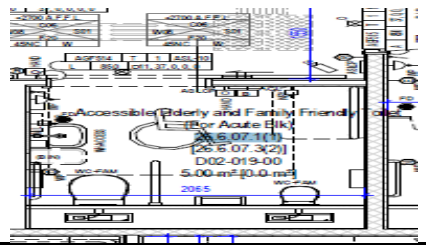
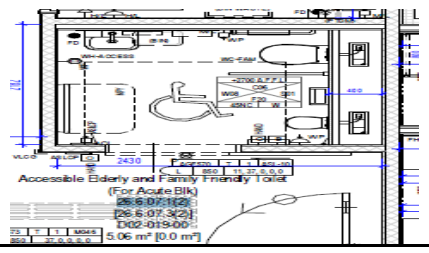
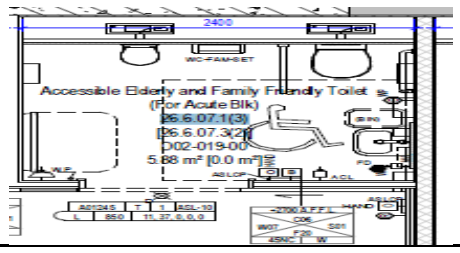
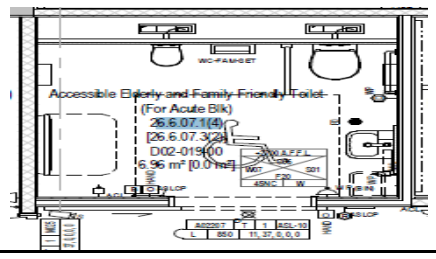
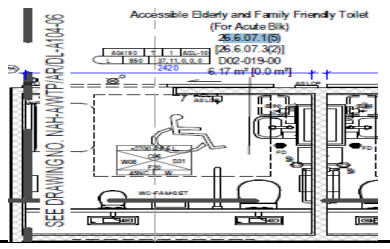
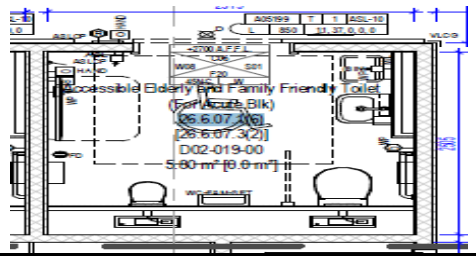
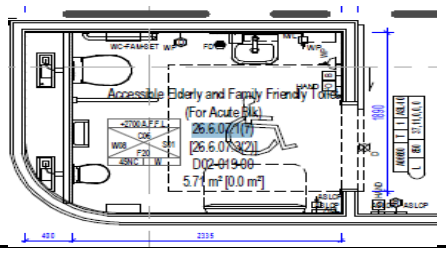
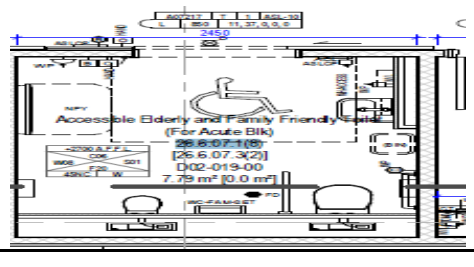
SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.04.1(7)	Accessible Toilet (For Acute Blk)	A	6	6/F (ACUTE)	N	5.85		Y
26.6.04.1(8)	Accessible Toilet (For Acute Blk)	A	7	7/F (ACUTE)	N	5.69		Y
26.6.04.1(9)	Accessible Toilet (For Acute Blk)	A	8	8/F (ACUTE)	N	5.76		Y
26.6.04.1(10)	Accessible Toilet (For Acute Blk)	A	9	9/F (ACUTE)	N	4.56		Y
26.6.04.1(11)	Accessible Toilet (For Acute Blk)	A	10	10/F (ACUTE)	N	4.00		Y
26.6.04.1(12)	Accessible Toilet (For Acute Blk)	A	10	10/F (ACUTE)	N	5.30		Y
26.6.04.1(13)	Accessible Toilet (For Acute Blk)	A	11	11/F (ACUTE)	N	4.00		Y
26.6.04.1(14)	Accessible Toilet (For Acute Blk)	A	11	11/F (ACUTE)	N	5.30		Y
26.6.04.1(15)	Accessible Toilet (For Acute Blk)	A	12	12/F (ACUTE)	N	4.00		Y
26.6.04.1(16)	Accessible Toilet (For Acute Blk)	A	12	12/F (ACUTE)	N	5.20		Y

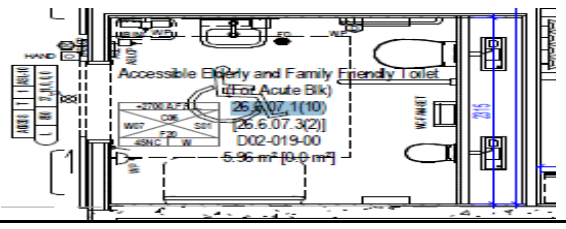
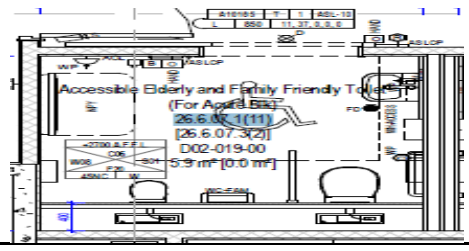
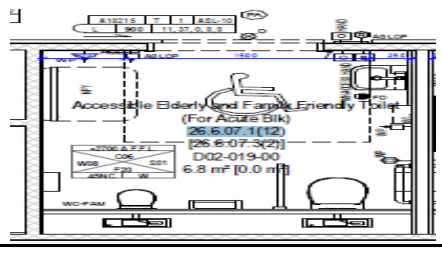
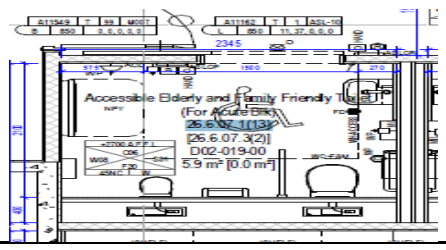
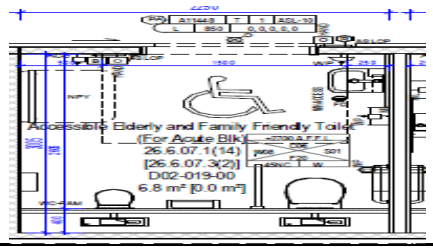
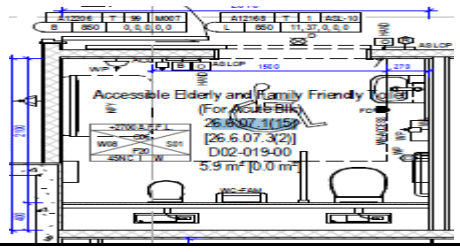
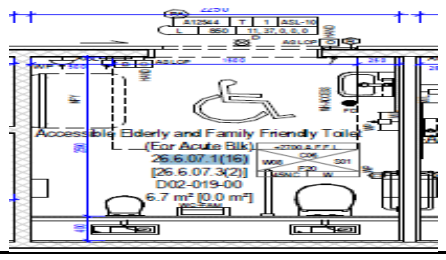
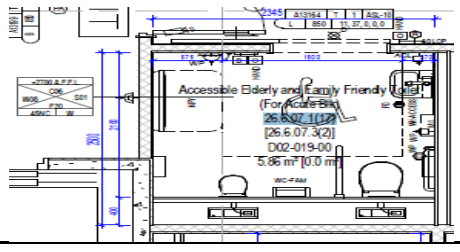
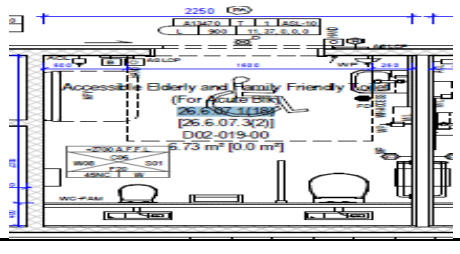
SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.04.1(17)	Accessible Toilet (For Acute Blk)	A	13	13/F (ACUTE)	N	3.96		Y
26.6.04.1(18)	Accessible Toilet (For Acute Blk)	A	13	13/F (ACUTE)	N	5.23		Y
26.6.04.1(19)	Accessible Toilet (For Acute Blk)	A	14	14/F (ACUTE)	N	3.94		Y
26.6.04.1(20)	Accessible Toilet (For Acute Blk)	A	14	14/F (ACUTE)	N	5.23		Y
26.6.04.1(21)	Accessible Toilet (For Acute Blk)	A	15	15/F (ACUTE)	N	3.96		Y
26.6.04.1(22)	Accessible Toilet (For Acute Blk)	A	15	15/F (ACUTE)	N	5.23		Y
26.6.04.1(23)	Accessible Toilet (For Acute Blk)	A	18	18/F (ACUTE)	N	3.96		Y
26.6.04.1(24)	Accessible Toilet (For Acute Blk)	A	18	18/F (ACUTE)	N	5.23		Y
26.6.04.1(25)	Accessible Toilet (For Acute Blk)	A	17	17/F (ACUTE)	N	3.96		Y
26.6.04.1(26)	Accessible Toilet (For Acute Blk)	A	17	17/F (ACUTE)	N	5.23		Y

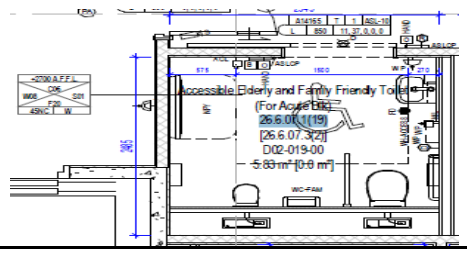
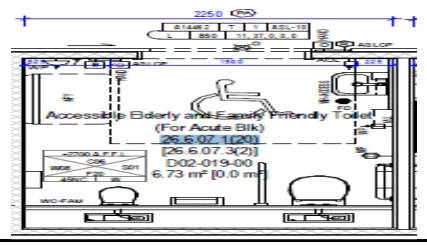
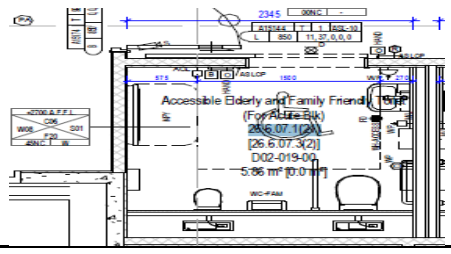
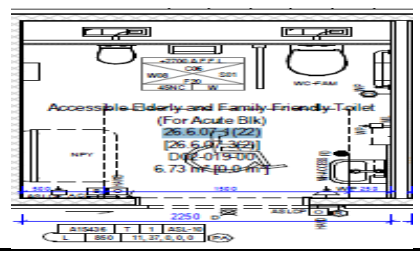
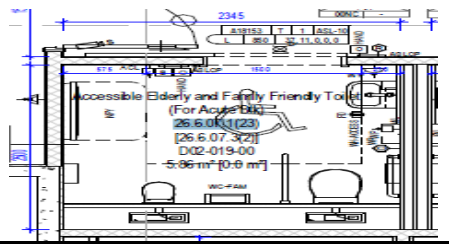
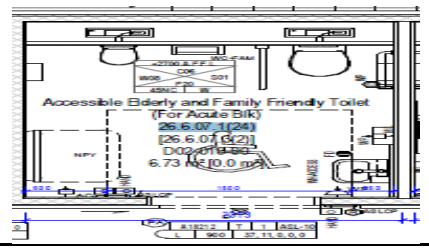
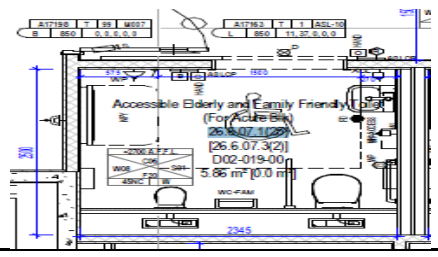
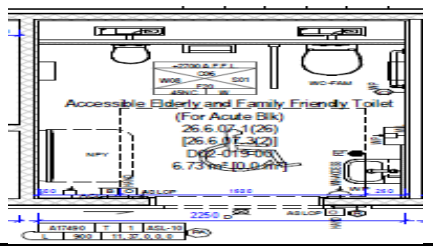
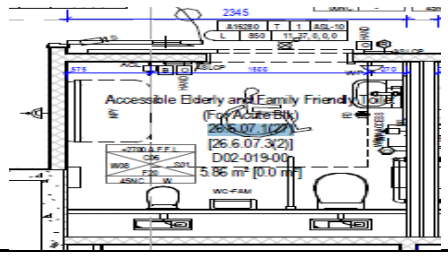
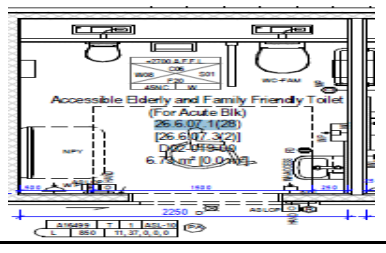
SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.04.1(27)	Accessible Toilet (For Acute Blk)	A	16	16/F (ACUTE)	N	3.96		Y
26.6.04.1(28)	Accessible Toilet (For Acute Blk)	A	16	16/F (ACUTE)	N	5.23		Y
26.6.04.1(29)	Accessible Toilet (For Acute Blk)	A	19	19/F (ACUTE)	N	4.36		Y
26.6.04.1(30)	Accessible Toilet (For Acute Blk)	A	19	19/F (ACUTE)	N	5.23		Y
26.6.04.1(31)	Accessible Toilet (For Acute Blk)	A	10	10/F (ACUTE)	N	5.60		Y
26.6.04.1(32)	Accessible Toilet (For Acute Blk)	A	9	9/F (ACUTE)	N	4.82		Y
26.6.04.1(33)	Accessible Toilet (For Acute Blk)	A	B1	B1/F (ACUTE & ADMIN)+650	N	4.92		Y
26.6.04.1(34)	Accessible Toilet (For Acute Blk)	A	M	M/F (ACUTE)	N	4.38		Y
26.6.04.1(35)	Accessible Toilet (For Acute Blk)	A	8	8/F (ACUTE)	N	4.90		Y
26.6.04.1(36)	Accessible Toilet (For Acute Blk)	A	10	10/F (ACUTE)	N	7.80		Y

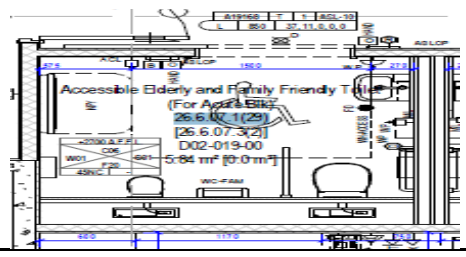
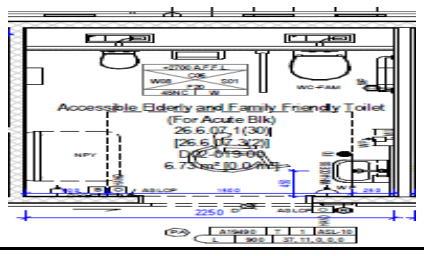
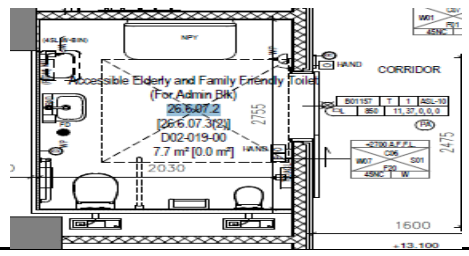
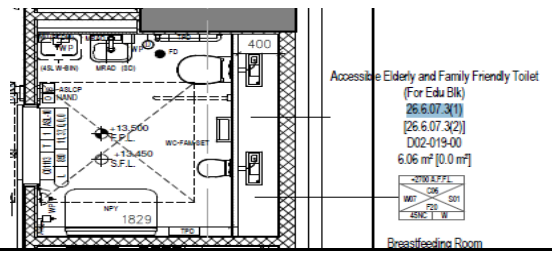
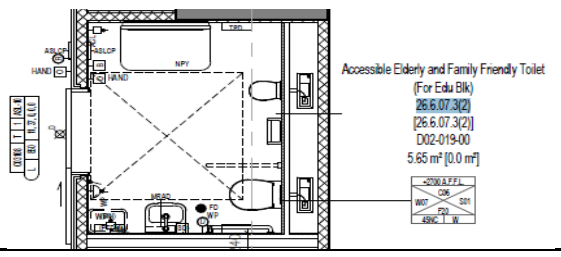
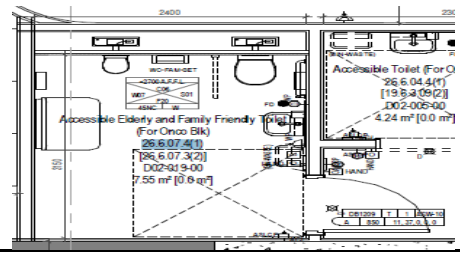
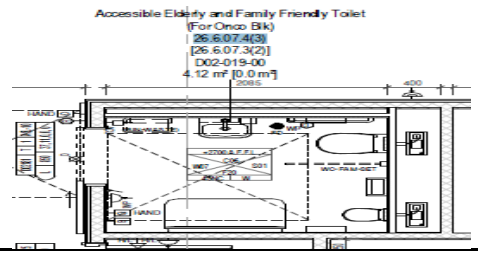
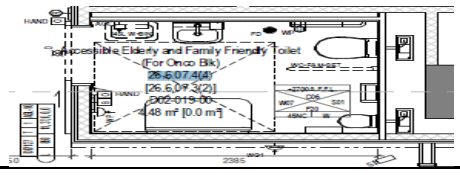
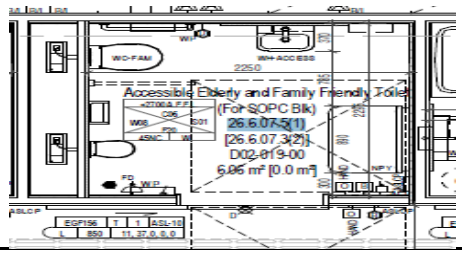
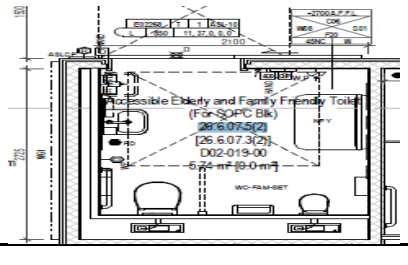
SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.04.2(1)	Accessible Toilet (For Admin Blk)	B	1	1/F (ADMIN)	N	5.50		Y
26.6.04.2(2)	Accessible Toilet (For Admin Blk)	B	2	2/F (ADMIN)	N	6.20		Y
26.6.04.2(3)	Accessible Toilet (For Admin Blk)	B	3	3/F (ADMIN)	N	6.50		Y
26.6.04.2(4)	Accessible Toilet (For Admin Blk)	B	4	4/F (ADMIN)	N	6.20		Y
26.6.04.2(5)	Accessible Toilet (For Admin Blk)	B	6	6/F (ADMIN)	N	5.40		Y
26.6.04.2(6)	Accessible Toilet (For Admin Blk)	B	7	7/F (ADMIN)	N	5.40		Y
26.6.04.2(7)	Accessible Toilet (For Admin Blk)	B	8	8/F (ADMIN)	N	5.40		Y
26.6.04.2(8).N	Accessible Toilet (For Admin Blk)	B	9	9/F (ADMIN)	N	5.70		Y
26.6.04.2(9).N	Accessible Toilet (For Admin Blk)	B	10	10/F (ADMIN)	N	5.70		Y
26.6.04.2(10).N	Accessible Toilet (For Admin Blk)	B	11	11/F (ADMIN)	N	5.40		Y

SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.04.2(11).N	Accessible Toilet (For Admin Blk)	B	12	12/F (ADMIN)	N	5.40		Y
26.6.04.2(12).N	Accessible Toilet (For Admin Blk)	B	13	13/F (ADMIN)	N	5.70		Y
26.6.04.2(13).N	Accessible Toilet (For Admin Blk)	B	14	14/F (ADMIN)	N	5.70		Y
26.6.04.2(14).N	Accessible Toilet (For Admin Blk)	B	15	15/F (ADMIN)	N	5.70		Y
26.6.04.4(1)	Accessible Toilet (For Onco Blk)	D	B1	B1/F (ONCO & SOPC)	N	4.24		Y
26.6.04.4(3)	Accessible Toilet (For Onco Blk)	D	2	2/F (ONCO)	N	4.21		Y
26.6.04.4(4)	Accessible Toilet (For Onco Blk)	D	4	4/F (ONCO)	N	4.80		Y
26.6.04.4(5)	Accessible Toilet (For Onco Blk)	D	7	7/F (ONCO)	N	4.48		Y
26.6.04.4(6)	Accessible Toilet (For Onco Blk)	D	8	8/F (ONCO)	N	5.19		Y
26.6.04.4(7)	Accessible Toilet (For Onco Blk)	D	10	10/F (ONCO)	N	4.30		Y

SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.04.5(1)	Accessible Toilet (For SOPC Blk)	E	G	G/F (SOPC)	N	5.83		Y
26.6.04.5(2)	Accessible Toilet (For SOPC Blk)	E	2	2/F (SOPC)	N	5.66		Y
26.6.07.1(1)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	G	G/F (ACUTE)	N	5.00		Y
26.6.07.1(2)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	G	G/F (ACUTE)	N	5.06		Y
26.6.07.1(3)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	1	1/F (ACUTE)	N	5.88		Y
26.6.07.1(4)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	2	2/F (ACUTE)	N	6.96		Y
26.6.07.1(5)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	4	4/F (ACUTE)	N	6.17		Y
26.6.07.1(6)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	5	5/F (ACUTE)	N	5.80		Y
26.6.07.1(7)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	6	6/F (ACUTE)	N	5.70		Y
26.6.07.1(8)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	7	7/F (ACUTE)	N	7.79		Y

SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.07.1(9)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	8	8/F (ACUTE)	N	6.13		Y
26.6.07.1(10)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	9	9/F (ACUTE)	N	5.96		Y
26.6.07.1(11)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	10	10/F (ACUTE)	N	5.90		Y
26.6.07.1(12)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	10	10/F (ACUTE)	N	6.80		Y
26.6.07.1(13)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	11	11/F (ACUTE)	N	5.90		Y
26.6.07.1(14)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	11	11/F (ACUTE)	N	6.80		Y
26.6.07.1(15)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	12	12/F (ACUTE)	N	5.90		Y
26.6.07.1(16)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	12	12/F (ACUTE)	N	6.70		Y
26.6.07.1(17)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	13	13/F (ACUTE)	N	5.83		Y
26.6.07.1(18)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	13	13/F (ACUTE)	N	6.73		Y

SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.07.1(19)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	14	14/F (ACUTE)	N	5.83		Y
26.6.07.1(20)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	14	14/F (ACUTE)	N	6.73		Y
26.6.07.1(21)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	15	15/F (ACUTE)	N	5.86		Y
26.6.07.1(22)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	15	15/F (ACUTE)	N	6.73		Y
26.6.07.1(23)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	18	18/F (ACUTE)	N	5.86		Y
26.6.07.1(24)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	18	18/F (ACUTE)	N	6.73		Y
26.6.07.1(25)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	17	17/F (ACUTE)	N	5.86		Y
26.6.07.1(26)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	17	17/F (ACUTE)	N	6.73		Y
26.6.07.1(27)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	16	16/F (ACUTE)	N	5.86		Y
26.6.07.1(28)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	16	16/F (ACUTE)	N	6.79		Y

SOA Room No	Room Name	Block	Floor	Level	Multi-Occupancy Toilet (Y / N)	Area (m2)	Floor Plan	Fall Sensor
26.6.07.1(29)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	19	19/F (ACUTE)	N	5.84		Y
26.6.07.1(30)	Accessible Elderly and Family Friendly Toilet (For Acute Blk)	A	19	19/F (ACUTE)	N	6.73		Y
26.6.07.2	Accessible Elderly and Family Friendly Toilet (For Admin Blk)	B	1	1/F (ADMIN)	N	7.70		Y
26.6.07.3(1)	Accessible Elderly and Family Friendly Toilet (For Edu Blk)	C	1	1/F (EDU)				Y
26.6.07.3(2)	Accessible Elderly and Family Friendly Toilet (For Edu Blk)	C	3	3/F (EDU)				Y
26.6.07.4(1)	Accessible Elderly and Family Friendly Toilet (For Onco Blk)	D	B1	B1/F (ONCO & SOPC)	N	7.55		Y
26.6.07.4(3)	Accessible Elderly and Family Friendly Toilet (For Onco Blk)	D	2	2/F (ONCO)	N	4.12		Y
26.6.07.4(4)	Accessible Elderly and Family Friendly Toilet (For Onco Blk)	D	7	7/F (ONCO)	N	4.48		Y
26.6.07.5(1)	Accessible Elderly and Family Friendly Toilet (For SOPC Blk)	E	G	G/F (SOPC)	N	6.06		Y
26.6.07.5(2)	Accessible Elderly and Family Friendly Toilet (For SOPC Blk)	E	2	2/F (SOPC)	N	5.74		Y

GENERAL NOTES :

1. THE BELOW "GENERAL NOTES" SHOULD BE READ IN CONJUNCTION WITH "PARTICULAR NOTES" AND REQUIREMENT SPECIFIED IN THE TENDER DOCUMENT.
2. THE EQUIPMENT SUPPLIER SHALL ADHERE TO THE CONDITIONS AS SHOWN ON THE COMPOSITE DRAWINGS / TENDER DOCUMENT INCLUDING BUT NOT LIMITED TO ROOM DIMENSIONS, BUILDER'S WORKS PROVISIONS, LOCATIONS OF SUNKEN SLAB, SUNKEN TRENCHES, MEP PROVISION, PRIMARY SUPPORTING FRAME LOCATIONS, DELIVERY ROUTE, ETC.. ANY CHANGES, IF REQUESTED BY THE EQUIPMENT SUPPLIER, SHOULD BE DOCUMENTED AND SUBMITTED WITH THE TENDER FOR HOSPITAL'S CONSIDERATION. AFTER AWARD, THE EQUIPMENT SUPPLIER SHALL CARRY OUT DETAILED COORDINATION WITH THE MAIN CONTRACTOR PRIOR TO ACTUAL INSTALLATION WORKS.
3. ALL DIMENSIONS AND SIZES SHOWN ON THE COMPOSITE DRAWINGS ARE IN MM UNLESS OTHERWISE STATED.
4. EQUIPMENT, SERVICES, FURNITURE/FITTINGS SHOWN IN DOTTED LINE AND ITEMS NAMES WITH BRACKETS ( ) SHALL BE SUPPLIED AND INSTALLED BY EQUIPMENT SUPPLIER UNLESS OTHERWISE SPECIFIED.
5. THE EQUIPMENT SUPPLIER SHALL COMPLY WITH LEGISLATIONS, RULES, REGULATIONS AND LICENSING REQUIREMENT CURRENTLY IN FORCE AND RELATED TO THEIR EQUIPMENT AND INSTALLATION WORKS.
6. THE EQUIPMENT SUPPLIER SHALL COORDINATE ON SITE WITH ALL RELEVANT PARTIES FOR THEIR INSTALLATION WORKS.
7. THE EQUIPMENT SUPPLIER SHALL PREPARE THE EQUPMENT INSTALLATION PROGRAM FOR COORDINATION WITH ALL STAKEHOLDERS INCLUDING HOSPITAL AND THE MAIN CONTRACTOR. THE EQUIPMENT SUPPLIER SHALL WELL SEQUENCE THE INSTALLATION WORKS TO MEET THE MUTUALLY AGREED MASTER PROGRAM OF THE MAIN WORKS, ESPECIALLY THE MILESTONE DATES OF OCCUPATION PERMIT/ FIRE CERTIFICATION/ DG LICENSE. THE EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE FOR ANY ABORTIVE WORKS IF THEY FAIL TO COMPLY WITH THE AGREED PROGRAM.
8. THE EQUIPMENT SUPPLIER SHALL SUBMIT SHOP DRAWINGS, LAYOUT DRAWINGS AND ALL INSTALLATION DETAILS OF THEIR OFFERED EQUIPMENT/SYSTEMS FOR APPROVAL PRIOR TO INSTALLATION.
9. EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE FOR ALL NECESSARY EQUIPMENT OR ACCESSORIES, INCLUDING CORRESPONDING SUPPORTS, CABLE CONTAINMENT, MOUNTING AND ACCESSORIES, TO COMPLETE THE INSTALLATION UNDER EQUIPMENT SUPPLIER'S CONTRACT WHETHER OR NOT THESE ITEMS ARE SHOWN IN THE COMPOSITE DRAWINGS.
10. THE DIMENSIONS OF INSTALLATION SPACE AS SHOWN IN THE COMPOSITE DRAWINGS INDICATE THE MAXIMUM SPACE AVAILABLE FOR INSTALLATION OF THE EQUIPMENT. THE EQUIPMENT SUPPLIER SHALL CHECK CAREFULLY AGAINST THE DIMENSIONS, INSTALLATION SPACE AND FUTURE MAINTENANCE SPACES OF THEIR OFFERRED EQUIPMENT AND INFORM THE HOSPITAL OF ANY PROBLEMS FOUND.
11. THE EQUIPMENT POSITIONS ARE FOR REFERENCE ONLY. THE EQUIPMENT SUPPLIER SHALL PROVIDE THEIR EQUIPMENT LAYOUT BASED ON THEIR OFFERED PRODUCT AND AVAILABLE SPACES AS SHOWN IN THE COMPOSITE DRAWINGS AND SUBMIT DETAILED DRAWINGS FOR HOSPITAL'S APPROVAL BEFORE INSTALLATION.
12. THE EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE FOR INSTALLATION OF THEIR EQUIPMENT/SYSTEM WITHIN THE ROOM/AREAS AS SHOWN IN THE COMPOSITE DRAWINGS. ANY REVISION ON THE ROOM/AREAS PROVIDED IF REQUESTED BY THE EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE BY THE EQUIPMENT SUPPLIER SUBJECT TO APPROVAL BY THE HOSPITAL..
13. ALL DIMENSIONS OF THE EQUIPMENT AND SETTING-OUT OF MEP PROVISIONS AND BUILDER'S WORKS ON THE COMPOSITE DRAWINGS ARE FOR REFERENCE ONLY. THE EQUIPMENT SUPPLIER SHALL COORDINATE WITH MAIN CONTRACTOR AND HIS SUB-CONTRACTORS, THE ARCHITECT AND CONSULTANTS AND CONFIRM THE RELEVANT REQUIREMENT AND ACTUAL LOCATION OF EQUIPMENT BEFORE COMMENCEMENT OF INSTALLATION.
14. MAIN CONTRACTOR SHALL BE RESPONSIBLE TO BUILD THE ENCLOSURE INCLUDING PARTITION WALL, BUNKER ENCLOSURE WALL, FLOOR SLAB AND ASSOCIATED SUNKEN SLAB OR TRENCHES, CEILING SLAB, WINDOW AND DOORS UNLESS OTHERWISE SPECIFIED IN THE COMPOSITE DRAWINGS AND PARTICULAR NOTES. THE MAIN CONTRACTOR SHALL ALSO RESERVE WALL/SLAB OPENINGS IF NECESSARY FOR THE INSTALLATION WORK OF THE EQUIPMENT. MAKING GOOD OF SUCH OPENINGS SHALL BE CARRIED OUT BY THE MAIN CONTRACTOR UNLESS OTHERWISE SPECIFIED. THE EQUIPMENT SUPPLIER SHALL PROVIDE SETTING OUT DRAWINGS FOR THE WALL OPENINGS TO SUIT THE AGREED MASTER PROGRAM.
15. THE EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE FOR ALL NECESSARY SUPPORT, MOUNTING FRAME, ANCHOR, BRACKET, MOUNTING PLATE, PROTECTION, AND OTHER ACCESSORIES NECESSARY FOR INSTALLATION OF THEIR EQUIPMENT. WHEN MAXIMUM ALLOWABLE LOADING IS INDICATED ON THE TENDER DOCUMENT OR COMPOSITE DRAWINGS, THE EQUIPMENT SUPPLIER SHALL COMPLY WITH THE REQUIREMENT AND PROVIDE NECESSARY ADDITIONAL SUPPORT OR STRENGTHENING TO ENSURE THE DESIGN LOADING CAPACITY WILL NOT BE EXCEEDED. THE DETAILS OF ANY ADDITIONAL SUPPORT OR STRENGTHENING WORKS FOR THEIR OFFERED EQUIPMENT/SYSTEMS SHALL BE SUBMITTED FOR APPROVAL PRIOR TO INSTALLATION.
16. DELIVERY ROUTE INCLUDING EXTERNAL WALL OPENING (IF NECESSARY TO BE TRANSPORTED FROM EXTERNAL WALL), CORRIDOR CLEAR WIDTH AND DOOR SIZES, ETC. ARE SHOWN IN THE COMPOSITE DRAWINGS.THE EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE FOR ALL NECESSARY TRANSPORTATION, HOISTING/TOOLS, TEMPORARY ANCHORAGE, TEMPORARY PROTECTION TO BUILDING FINISHING AND MANPOWER TO DELIVER THE EQUIPMENT. MAIN CONTRACTOR SHALL CARRY OUT SITE COORDINATION WITH THE EQUIPMENT SUPPLIER ON THE FINAL DELIVERY ROUTE, SITE LOGISTIC, PROGRAM AND PROVIDE ASSOCIATED ATTENDANCE AND COORDINATION.IN GENERAL, MAIN CONTRACTOR SHALL BE RESPONSIBLE FOR THE EXTERNAL WALL OPENING AND ANY TEMPORARY WALL OPENINGS ALONG THE DELIVERY ROUTE PROVIDED THAT THE EQUIPMENT COULD BE DELIVERED TO THE INSTALLATION POSITIONS BEFORE THE BUILDING OP/FSD INSPECTION AS COORDINATED WITH THE AGREED MASTER PROGRAM. HOWEVER, THE EQUIPMENT SUPPLIER IS REMINDED THAT IF THEIR EQUIPMENT WILL BE DELIVERED AFTER BUILDING OP/ FSD INSPECTION, THE EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE FOR TAKING DOWN THE EXTERNAL WALL CLADDING AND PROVIDE ANY TEMPORARY WALL OPENINGS ALONG THEIR DELIVERY ROUTE IF SO REQUIRED AND REINSTATE THE TEMPORARY WALL OPENINGS AFTER EQUIPMENT DELIVERY. THE EQUIPMENT SUPPLIER SHALL ALSO BE RESPONSIBLE FOR MAKING GOOD ANY EXISTING FLOOR/WALL/CEILING FINISHING ALONG THE DELIVERY ROUTE IF SO DAMAGED BY THE EQUIPMENT SUPPLIER.
17. IF THE EQUIPMENT SUPPLIER IS RESPONSIBLE FOR INTERIOR FITTING OUT WORK AS SPECIFIED IN THE TENDER OR COMPOSITE DRAWINGS, EQUIPMENT SUPPLIER SHALL CLOSELY COORDINATE WITH THE MAIN CONTRACTOR AND FOLLOW THE AGREED MASTER PROGRAM TO CARRY OUT THEIR WORKS BEFORE OP/FSD CERTIFICATION PROGRAM AS MENTIONED IN THE PARTICULAR NOTES. SHOULD THE EQUIPMENT SUPPLIER FAILS TO FOLLOW THE PROGRAM, EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE FOR SPEEDING UP THE RELATED WORKS AFFECTING OP/FSD CERTIFICATION OR INSTALLATION OF NECESSARY TEMPORARY WORKS (SUCH AS FALSE CEILING, AIR GRILLES, LIGHTING) TO FACILITATE THE OP/FSD CERTIFICATION AND REPLAN THEIR INSTALLATION WORKS AFTER OP/FSD CERTIFICATION.
18. THE EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE FOR CONNECTING THEIR EQUIPMENT TO THE CORRESPONDING BUILDING SERVICES INFRASTRUCTURE PROVIDED AS SHOWN IN THE COMPOSITE DRAWINGS. ANY REVISION OR ADDITION WORK ON THE INFRASTRUCTURE SERVICES PROVIDED SHALL BE RESPONSIBLE BY THE EQUIPMENT SUPPLIER SUBJECT TO APPROVAL BY THE HOSPITAL.
19. POWER CABLES AND ASSOCIATED CABLE CONTAINMENT CONNECTING FROM RESERVED POWER SUPPLY TO THE EQUIPMENT SHALL BE SUPPLIED AND INSTALLED BY THE EQUIPMENT SUPPLIER. LOCATION AND RATING OF THE RESERVED POWER SUPPLY ARE SHOWN IN THE COMPOSITE DRAWINGS. THE EQUIPMENT SUPPLIER SHALL EMPLOY REGISTERED ELECTRICAL WORKER (REW) TO CARRY OUT ALL ELECTRICAL WORKS, AND SHALL SUBMIT THE WORK COMPLETION CERTIFICATE (I.E. FORM WR1, WR1A) TO MAIN CONTRACTOR / EMSD AFTER COMPLETION OF ELECTRICAL WORKS.
20. FOR POWER OR LIGHTING SYSTEM TO BE CARRIED OUT BY THE EQUIPMENT SUPPLIER, EQUIPMENT SUPPLIER SHALL ENSURE THEIR INSTALLATION IS COMPLYING WITH BUILDING ENGERY CODE (BEC) UNDER BUILDING ENERGY EFFICIENCY ORDINANCE (BEEO) UNLESS EXEMPTION WOULD BE APPLIED BY THE EQUIPMENT SUPPLIER.
21. EQUIPMENT SUPPLIER SHALL ENSURE THEIR EQUIPMENT WILL NOT INDUCE EXCESSIVE HARMONIC TO THE BUILDING ELECTRIAL SYSTEM, OTHERWISE, SUITABLE HARMONIC FILTERING EQUIPMENT SHALL BE PROVIDED BY THE EQUIPMENT SUPPLIER.
22. EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE FOR UNITERRUPTABLE POWER SUPPLY (UPS) FOR THEIR EQUIPMENT IF NECESSARY AND SPECIFIED IN THE CONTRACT TO PROTECT THEIR SENSITIVE / CRITICAL EQUIPMENT OF OPERATION DURING POWER FAILURE OR VOLTAGE DIP.
23. THE EQUIPMENT SUPPLIER SHALL PROVIDE EARTHING CONDUCTOR/CABLE TO THE EARTH TERMINAL PROVIDED AT THE RESERVED POWER SUPPLY POINT. RELEVANT REQUIREMENT SUCH AS INSTALLATION REQUIREMENT AND CABLE SIZING SHALL BE ACCORDING TO THE LATEST EDITION OF CODE OF PRACTICE FOR ELECTRICITY (WIRING) REGULATION
24. EQUIPMENT SUPPLIER SHALL PROVIDE SUPPLEMENTARY BONDING TO MAINTAIN EQUIPOTENTIAL ZONE. RELEVANT REQUIREMENT SUCH AS INSTALLATION REQUIREMENT AND CABLE SIZING SHALL BE ACCORDING TO THE LATEST EDITION OF CODE OF PRACTICE FOR ELECTRICITY (WIRING) REGULATION
25. WATER PIPING AND ACCESSORIES CONNECTING FROM THE RESERVED WATER CONNECTION VALVES SHALL BE SUPPLIED AND INSTALLED BY EQUIPMENT SUPPLIER. LOCATION/SIZE OF THE RESERVED WATER CONNECTION VALVES AND WATER SUPPLY PRESSURE ARE SHOWN IN THE COMPOSITE DRAWINGS.
26. DRAIN PIPE AND ACCESSORIES CONNECTING FROM THE RESERVED DRAINAGE CONNECTION SHALL BE SUPPLIED AND INSTALLED BY EQUIPMENT SUPPLIER. LOCATION/SIZE OF THE RESERVED DRAINAGE CONNECTION PIPE ARE SHOWN IN THE COMPOSITE DRAWINGS.
27. THE PLUMBING INSTALLATION SHALL BE IN FULL COMPLIANCE WITH THE LATEST EDITION OF THE WATER WORKS REGULATIONS, ASD REQUIREMENT AND BUILDING (STANDARD OR SANITARY FITMENTS , DRAINAGE WORKS AND LATRINES REGULATIONS). THE EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE FOR ALL NECESSARY SUBMISSIONS AND OBTAINING APPROVAL FROM WATER AUTHORITY ACCORDING TO WATER WORKS REGULATIONS ON THEIR EQUIPMENT AND PLUMBING WORKS WHICH CONNECT TO PLUMBING SYSTEM OF THE BUILDING. ALL PLUMBING WORKS BY THE EQUIPMENT SUPPLIER SHALL BE CARRIED OUT BY FIRST CLASS LICENCE PLUMBER.
28. MEDICAL GASES OR NON-MEDICAL GASES PIPING AND ACCESSORIES CONNECTING FROM THE RESERVED MEDICAL/NON-MEDICAL GASES PIPE CONNECTION VALVES SHALL BE SUPPLIED AND INSTALLED BY THE EQUIPMENT SUPPLIER. LOCATION/SIZE OF THE RESERVED MEDICAL/NON-MEDICAL GASES CONNECTION VALVES AND SUPPLY PRESSURE ARE SHOWN IN THE COMPOSITE DRAWINGS.
29. TOWN GAS PIPING AND ACCESSORIES CONNECTING FROM THE RESERVED GAS PIPE CONNECTION VALVES SHALL BE SUPPLIED AND INSTALLED BY THE EQUIPMENT SUPPLIER. LOCATION/SIZE OF THE RESERVED GAS CONNECTION VALVES AND SUPPLY PRESSURE ARE SHOWN IN THE COMPOSITE DRAWINGS.
30. AIR SUPPLY OR EXHAUST DUCTING AND ACCESSORIES CONNECTING FROM THE RESERVED DUCTWORK CONNECTIONS SHALL BE SUPPLIED AND INSTALLED BY THE EQUIPMENT SUPPLIER. LOCATION/SIZE OF THE DUCTWORK CONNECTION AND AVAILABLE STATIC PRESSURE AT THE DUCTWORK CONNECTION ARE SHOWN IN THE COMPOSITE DRAWINGS. UNLESS OTHERWISE STATED IN THE COMPOSITE DRAWINGS, THE RESERVED AIR DUCT CONNECTION WILL BE LOCATED AT 300MM ABOVE FALSE CEILING ON TOP OF THE EQUIPMENT.
31. DATA/VOICE AND THE RELATED CONTROL AND WIRING, CABLE CONTAINMENT/ACCESSORIES SHALL BE PROVIDED AND INSTALLED BY THE EQUIPMENT SUPPLIER.
32. E-STOP, WARNING LIGHT AND RELATED INTERLOCKING CONTROL WITH ASSOCIATED WIRING, CABLE CONTAINMENT/ACCESSORIES SHALL BE PROVIDED AND INSTALLED BY THE EQUIPMENT SUPPLIER.
33. IF THE EQUIPMENT SUPPLIER WILL CARRY OUT WORKS INSIDE FALSE CEILING, THEY SHALL COORDINATE WITH THE MAIN CONTRACTOR AND FOLLOW THE AGREED MASTER PROGRAM TO CARRY OUT THEIR WORKS BEFORE MAIN CONTRACTOR'S FINAL FIXING OF FALSE CEILING INSTALLATION. SHOULD THE EQUIPMENT SUPPLIER FAIL TO FOLLOW THE MASTER PROGRAM, THEY SHALL BE RESPONSIBLE FOR TAKING DOWN THE FALSE CEILING AND MAKING GOOD AFTER THEIR WORKS.
34. FOR EQUIPMENT INVOLVING DANGEROUS GOODS UNDER THE CLASSIFICATION OF HK FIRE SERVICES DEPARTMENT (FSD), THE EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE FOR ALL NECESSARY SUBMISSIONS AND OBTAINING APPROVAL/LICENCE FROM FSD.
35. SHOULD THERE BE ANY OFFERED EQUIPMENT UNDER BOILERS AND PRESSURE VESSELS ORDINANCE (CAP 56), THE EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE FOR OBTAINING THE "CERTIFICATE OF FITNESS" FROM LABOUR DEPARTMENT.
36. EXPANSION JOINT SHOULD BE PROVIDED FOR THE PIPEWORK TO BE INSTALLED BY THE EQUIPMENT SUPPLIER PASSING THROUGH ANY BUILDING JOINT, STRUCTURE JOINT OR MOVABLE JOINTS. LOCATION OF THESE BUILDING JOINT, STRUCTURE JOINT OR MOVABLE JOINTS ARE SHOWN ON THE COMPOSITE DRAWINGS.
37. DURING THE PROGRESS OF THE WORKS, ALL OPEN ENDS OF PIPES, CONDUITS, DUCTS, ETC. SHALL BE PROPERLY CAPPED TO PREVENT PEST/RODENT FROM ENTERING.
38. THE EQUIPMENT SUPPLIER SHALL FOLLOW THE HOUSE-KEEPING AND SITE SAFETY RULES OF THE MAIN CONTRACTOR DURING THE CONSTRUCTION PERIOD.
39. EXPANSION JOINT SHOULD BE PROVIDED FOR THE PIPEWORK TO BE INSTALLED BY THE EQUIPMENT SUPPLIER PASSING THROUGH ANY BUILDING JOINT, STRUCTURE JOINT OR MOVABLE JOINTS. LOCATION OF THESE BUILDING JOINT, STRUCTURE JOINT OR MOVABLE JOINTS ARE SHOWN ON THE COMPOSITE DRAWINGS.
40. DURING PROGRESS OF THE WORKS, ALL OPEN ENDS OF PIPES, CONDUITS, DUCTS, ETC. SHALL BE SUITABLY CAPPED TO PREVENT FOREIGN MATTER.
41. THE EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE TO SUPPLY, DESIGN, DELIVER, INSTALL, TEST AND COMMISSION THE FORWARD PROCURED EQUIPMENT (FPE) AS SHOWN ON COMPOSITE DRAWINGS.
42. THE EQUIPMENT SHALL BE RESPONSIBLE FOR THE PROTECTION OF THE EQUIPMENTS AND BELONGS
43. THE EQUIPMENT SUPPLIER SHALL NOT PROCEED ANY TESTING WHICH MAY INCUR POWER DISRUPTIVE/POWER BREAKDOWN, OR DAMAGE OF ANY WATER PIPEWORKS WITHOUT ANY NOTIFICATION. THE CONSEQUENCE LOSS SHOULD REIMBURSED BY THE EQUIPMENT SUPPLIER.
44. ALL EQUIPMENT AND INSTALLATION SHALL COMPLY WITH ALL STATUTORY REQUIREMENTS, EG. BUILDING DEPARTMENT, DEPARTMENT OF HEALTH, RADIATION HEALTH UNIT, HTM, HOSPITAL LICENSING, BEC, FS INSPECTION, WWO 542, WWO 046, WR1 ETC.

LEGEND :

LIGHTING SYSTEM INSTALLATION

- 600mm x 600mm RECESSED TYPE DIRECT LUMINAIRE PANEL
- 1200mm x 600mm RECESSED TYPE DIRECT LUMINAIRE PANEL
- 1200mm x 300mm RECESSED TYPE DIRECT LUMINAIRE PANEL
  SUBSCRIPT 'X':
  C – ALL TUBES/LAMPS ARE FED FROM CENTRAL BATTERY SYSTEM (CBS)
  E – ALL TUBES/LAMPS ARE FED FROM ESSENTIAL POWER SUPPLY
  SUBSCRIPT 'Y':
  D – DIMMABLE TYPE LUMINAIRE
- RAD — RADIATION WARNING LIGHT
- X-RAY — X-RAY WARNING LIGHT

ELECTRICAL INSTALLATION

- 13A TWIN SOCKET OUTLET
- 13A TWIN SOCKET OUTLET,ESSENTIAL SUPPLY
- 13A SINGLE SOCKET OUTLET
- TPN ISOLATOR (NORMAL POWER SUPPLY)
- TPN ISOLATOR (ESSENTIAL POWER SUPPLY)
- SPN ISOLATOR (NORMAL POWER SUPPLY)
- SPN ISOLATOR (ESSENTIAL POWER SUPPLY)
- 13A FUSED SPUR UNIT,ESSENTIAL SUPPLY
- 1 WAY LIGHT SWITCH
- DIMMER CONTROL SWITCH
- RADIATION WARNING LIGHT SWITCH
- 2 WAY LIGHT SWITCH
- 20A DOUBLE POLE SWITCH
- 400MM EARTHING TERMINAL

EXTRA LOW VOLTAGE INSTALLATION

- SUBCRIPT 'X':
  "PABX" – PABX OUTLET
  "DIR" – DIRECT LINE OUTLET
  "FAX" – FAX LINE OUTLET
  "DIR-FAX" – DIRECT FAX LINE OUTLET
- SUBCRIPT 'X':
  "HOIT" – HOIT DATAPORT
  "RIS" – RIS DATAPORT
  "MNI" – MNI DATAPORT
  "C" – DATAPORT FOR EQUIPMENT SUPPLIER CONNECTION
  "PACX" – PACX DATAPORT
  "CIS" – CIS DATAPORT
  "PACS" – PACS DATAPORT
  "W-HA" – W-HA DATAPORT
  "CMS" – CMS DATAPORT
  "PHYSIO" – PHYSIO DATAPORT
  "W-V" – W-V DATAPORT
  "CAM" – CAMERA PANEL DATAPORT
  "CCTV" – CCTV PANEL DATAPORT

INTERCOM SYSTEM INSTALLATION

- MASTER INTERCOM
- SLAVE INTERCOM
- 1 TO 1 INTERCOM

PUBLIC ADDRESS SYSTEM INSTALLATION

- FLUSHED MOUNTED LOUDSPEAKER FOR LOCAL PA SYSTEM
- MICROPHONE WITH ZONE SELECTION KEYPAD FOR LOCAL PA SYSTEM

NURSE CALL SYSTEM INSTALLATION

- STAFF EMERGENCY CALL
- NURSE CALL REPEATER PANEL
- NURSE CALL INDICATOR

SECURITY SYSTEM INSTALLATION

- HAND — HAND SENSOR RELEASE BUTTON
- BREAKGLASS UNIT WITH KEY SWITCH OVERRIDE
- KICK — KICK SENSOR RELEASE BUTTON
- TOGGLE — TOGGLE SENSOR RELEASE BUTTON
- INTERLOCK — INTERLOCK SENSOR RELEASE BUTTON
- ACCESS CARD READER
- DOOR RELEASE BUTTON
- LAST MAN OUT BUTTON
- R/G — LEAD LINE DOOR CONTROL
- 3 MODE DOOR CONTROL SWITCH FOR AUTODOOR
- BY-PASS SWITCH
- EMERGENCY PUSH BUTTON
- PAP — PANIC ALARM PANEL WITH VISUAL AND AUDIO ALARM
- CAM — CAMERA CONTROL PANEL
- CAM — CCTV CAMERA
- CCTV — CCTV CONTROL PANEL
- PA — PANIC ALARM BUTTON

MVAC INSTALLATION

- P(XX) — 600mm x 600mm PERFORATED DIFFUSER
  SUBSCRIPT 'X':
  S – SUPPLY
  R– RETURN
- T — VAV THERMOSTAT
- CHWS — ø32MM CHILLED WATER SUPPLY PIPE WITH 50 MM INSULATION TERMINATED WITH GATE VALVE
- CHWR — ø32MM CHILLED WATER RETURN PIPE WITH 50 MM INSULATION TERMINATED WITH REGULATING VALVE
- XX(Y) — LINEAR SLOT DIFFUSER
  SUBSCRIPT 'XX':
  S1 – 2 SLOT
  S2 – 4 SLOT
  S3 – 6 SLOT
  SUBSCRIPT 'Y':
  S – SUPPLY
  R– RETURN

PLUMBING & DRAINAGE INSTALLATION

- EQUIPMENT DRAIN
- HMW — HAEMODIALYSIS WATER POINT
- MECW — MEDICAL EQUIPMENT COLD WATER SUPPLY
- MEHW — MEDICAL EQUIPMENT HOT WATER SUPPLY
- MEHWR — MEDICAL EQUIPMENT HOT WATER RETURN

MEDICAL GAS INSTALLATION

- ANAESTHETIC GASES SCAVENGING SYSTEM TERMINAL UNIT
- MEDICAL VACUMN TERMINAL UNIT
- MEDICAL COMPRESSED AIR TERMINAL UNIT (4 BAR)
- NITROUS OXIDE TERMINAL UNIT
- OXYGEN TERMINAL UNIT
- NMA7 — NON-MEDICAL COMPRESSED AIR (7 BAR) FOR EQUIPMENT C/W BALL VALVE & PLUG
- NMA4 — NON-MEDICAL COMPRESSED (4 BAR) FOR EQUIPMENT C/W BALL VALVE & PLUG
- V — V-BRACKET
- AA — AREA ALARM WARNING PANEL
- AGS — AGSS PANEL

FIRE SERVICE INSTALLATION

- S — MULTI SENSOR SMOKE DETECTOR
- CEILING MOUNTED REMOTE INDICATOR LAMP FOR DETECTORS
- FD — FAST RESPONSE DRY PENDANT TYPE SPRINKLER HEAD
- FR — FAST RESPONSE SPRINKLER HEAD
- BREAK GLASS UNIT
- FS — FIRE SERVICE INDICATING PANEL
- ALARM BELL
- F — VISUAL FIRE ALARM

DEMARCATION

- _____ BY MAIN CONTRACTOR
- _____ BY EQUIPMENT SUPPLIER

WALL TYPE

CORE WALL

- THICK RC WALL (WT1A)
- THICK RC WALL (WT1B)
- THICK BLOCK WALL (WT2A)

DRYWALL AND FURRING SYSTEM

- 125mm THICK DRYWALL SYSTEM (WT3A) (150mm THICK AT B1/F)
- PAINT / TILES FINISH (15mm ON BLOCK / DRYWALL) (25mm ON RC WALL)
- 50mm FURRING
- 75mm FURRING
- 100mm FURRING

SPECIAL WALL

- 5mm LEAD — LEAD LINED DRYWALL
- CLEAN ROOM WALL PARTITION
- COLD ROOM INSULATION

REMARKS:
FOR DETAIL WORK DEMARCATION, PLEASE REFER TO DEMARCATION TABLE AND COMPOSITE DRAWING LAYOUT PLAN.

CLIENT : 醫院管理局 HOSPITAL AUTHORITY

H.A. REF:

F.S.D. REF:

D.L.O. REF:

NOTE:
DO NOT SCALE DRAWINGS, FIGURE DIMENSIONS ARE TO BE FOLLOWED.

DRAWING IS CHECKED BY :

TRADE	NAME	SIGNED
CSHK		
MVAC		
EL		
FS		
DR&PL		
MG		

FOR INDICATIVE ONLY

NUMBER	DESCRIPTION	DATE
00	FIRST SUBMISSION	JUL. 2024

Project Management Consultant: ARUP

Architectural Consultant: WONG TUNG & PARTNERS LIMITED ARCHITECTS & PLANNERS 王董建築師事務有限公司

Structural, Civil & Geotechnical Engineer: MEINHARDT

Building Services Engineer: wsp

Quantity Surveying Consultant: RLB Rider Levett Bucknall

Main Contractor: 中國建築 CHINA STATE CONSTRUCTION

E&M Specialist Contractor: 中國建築機電工程有限公司 CHINA STATE MECHANICAL & ELECTRICAL ENGINEERING LTD

Project:
MAIN WORKS FOR
NEW ACUTE HOSPITAL AT
KAITAK DEVELOPMENT AREA (SITE A)

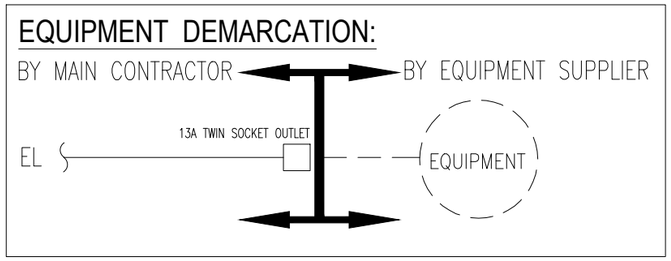
Drawing Title:
COMPOSITE DRAWING FOR FPE EQUIPMENT- SMART TOILET AND SAFETY SENSOR SYSTEM - GENERAL NOTES

FILENAME:

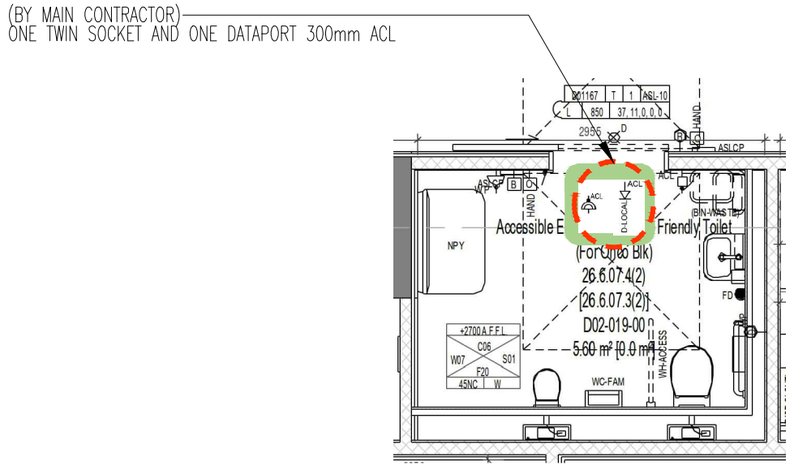
CHECKED BY:		DRAWN BY:	CS
SCALE:	N.T.S	DATE:	JUL. 2024
JOB NO.:	8110109026	DRAWING REFERENCE:	
DRAWING NO.:	NAH-A/CS/FPE/DET/T028-01	REV:	00

The MEP Provisions for Smart Toilet (Site A and Site B):

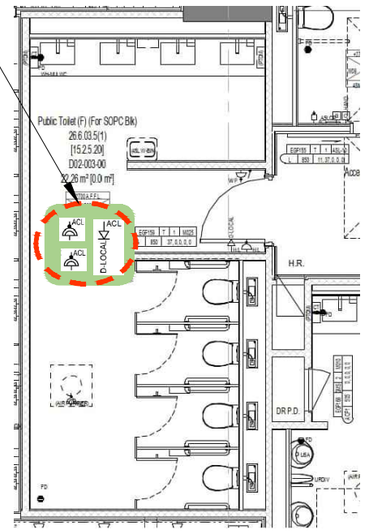
. For the toilet with WC cubicles of 2 or below : one twin socket outlet and one dataport
. For the toilet with WC cubicles more than 2 : two twin socket outlet and one dataport



NOTE:
1. THE EQUIPMENT SUPPLIER SHALL REFER TO THE TENDER DOCUMENT ON THE LOCATIONS OF TOILETS TO BE PROVIDED WITH THE SAFETY SENSOR SYSTEM.
2. THE EQUIPMENT SUPPLIER SHALL REFER TO THE TENDER DOCUMENT ON THE NUMBER OF TOILET CUBICLES.



BS Provisions for small Toilet
(with 2 or less WC cubicles)



BS Provisions for large Toilet
(with more than 2 WC cubicles)

FOR INDICATIVE ONLY

NUMBER	DESCRIPTION	DATE
00	FIRST SUBMISSION	JUL. 2024

TRADE	NAME	SIGNED
CSHK		
MVAC		
EL		
FS		
DR&PL		
MG		

CLIENT: HOSPITAL AUTHORITY 醫院管理局

H.A. REF:

F.S.D. REF:

D.L.O. REF:

NOTE:
DO NOT SCALE DRAWINGS, FIGURE DIMENSIONS ARE TO BE FOLLOWED.

DRAWING IS CHECKED BY:

Project Management Consultant: ARUP

Architectural Consultant: WONG TUNG & PARTNERS LIMITED ARCHITECTS & PLANNERS 王董建築師事務有限公司

Structural, Civil & Geotechnical Engineer: MEINHARDT

Building Services Engineer: wsp

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E&M Specialist Contractor: CSCEC 中國建築機電工程有限公司 CHINA STATE MECHANICAL & ELECTRICAL ENGINEERING LTD

Project:
MAIN WORKS FOR
NEW ACUTE HOSPITAL AT
KAITAK DEVELOPMENT AREA (SITE A)

Drawing Title:
COMPOSITE DRAWING FOR FPE EQUIPMENT- SMART TOILET AND SAFETY SENSOR SYSTEM - 4

FILENAME:

CHECKED BY:	DRAWN BY: CS
SCALE: N.T.S	DATE: JUL. 2024
JOB NO.: 8110109026	DRAWING REFERENCE:

DRAWING NO.: NAH-A/CS/FPE/DET/T028-04
REV: 00

IT Security Requirements for Quotation / Tender - Procurement of "non-IT" System/Equipment

Version	Effective Date
15.0	06/03/2025

Document Number	HAHO-ITD-PD-ISP-007-v15
Author	William WONG, HOIT&HI SM(ISO)1
Custodian	William WONG, HOIT&HI SM(ISO)1
Approved/ Endorsed By	ITD
Approval Date	06/03/2025
Distribution List	All HA HOIT&HI Staff / Cluster IT Staff

Amendment History

Version No.	Date of Amendment	Prepared by	Description
1.0	7/09/2017	Dale Johnstone First draft	ALL
2.0	7/11/2017	Dale Johnstone	Add Appendix C&D
3.0	28/12/2017	Dale Johnstone	Add Appendix E
4.0	13/04/2018	John Tse	Update A.16.3 & A.16.4 in Appendix A
5.0	07/12/2018	William Wong	- Re-format document - Change A.4 Availability in Appendix A - Replace diagram in Appendix B - Add "Privacy Control" in Appendix E
6.0	15/03/2019	William Wong	- Change name in Further Information
7.0	16/12/2019	William Wong	- Update document link "Guidelines on Connecting Medical System Networks (Information Technology Circular 1/2019)" in Reference - Add Note i) & ii) in Appendix A - Add A19.9 in Appendix A
8.0	09/10/2020	John Tse	- Change Medical System networks to External network - Update A.19 in Appendix A - Update Appendix B to "External Network Architecture - Remove Appendix C and Appendix D - Change Appendix E to Appendix C
9.0	09/12/2020	John Tse	- Update the External Network architecture to indicate building switch is L3 switch - Correct the link for "Guidelines for Cabling System and Network Setup in External Network"
10.0	15/12/2020	John Tse	- Correct the numbering for section 3 - Remove point c) from section 4 (ie. appendix for "Guidelines for Cabling System and Network setup in External network")
11.0	29/12/2020	William Wong	- Update distribution list
12.0	12/7/2021	John Tse	- Restore version 7 until the latest guideline for cabling and network setup is ready
13.0	13/07/2022	Yorky Wong	- Update Reference

			- Update Further Information contacts - Update A.12.2 and A.20.1 in Appendix A
14.0	15/08/2022	John Tse	- Add the link for “Guidelines for Cabling System and Network Setup in External Network” in References - Update A.19 to align with “One Network for All” strategy - Update Appendix B to “External Network Architecture” - Combine Appendix C and D to Appendix C - Change Appendix E to Appendix D
15.0	21/02/2025	ISO1	- Update Reference - Update clause 5 - Update clause 6 Further Information - Add A.10.7 for logging sensitive data - Update A.11.2 for role-based access control - Update A.13.2 for patch management - Update A.15.1 for network segregation - Update A.18.3 for security compliance - Update A.20.1 for data exchange - Add A.21 for public cloud service - Update A9.1, A9.2, A11.5, A19.4 and A19.9 (a) for reference document viewing arrangement - Consolidate Appendix as Part A, B, C and D with updated checklist
		N5	- Update A.19, Appendix Part B and C for the Layer 2 switch

IT Security Requirements for Quotation / Tender –

Procurement of "non-IT" System/Equipment

THE TERMS AND DEFINITIONS BELOW ARE GENERAL REQUIREMENTS WHICH APPLY TO THE ACQUISITION AND INSTALLATION OF "NON-IT SYSTEMS" (SYSTEM)/EQUIPMENT WITH HA.

"NON-IT SYSTEMS"/EQUIPMENT IS TECHNOLOGY BEING ACQUIRED BY HA THAT MAINTAINS IT COMPONENTS BUT WHICH IS NOT NORMALLY PROCURED BY HA INFORMATION TECHNOLOGY AND HEALTH INFORMATICS DIVISION (IT&HID).

THERE MAY ADDITIONALLY BE PROJECT SPECIFIC REQUIREMENTS.

SUBJECT OFFICERS OF INDIVIDUAL PROJECTS ARE ADVISED TO CONSULT HA IT&HID DURING THE TENDER SPECIFICATION PREPARATION STAGE.

SUBJECT OFFICERS SHOULD NOTE THAT PROJECTS HAVE TO RESERVE FUNDING FOR SETTING UP AND ESTABLISHING ANY NETWORK CONNECTIVITY THAT WILL BE PERFORMED BY HA IT&HID.

Table of Contents

1. Purpose

The purpose of this document is to provide model IT security related terms and definitions clauses to be used by HA when preparing and evaluating "Requests for Quotations" and "Requests for Tender" for the procurement of non-IT Systems ("Systems")/Equipment.

2. References

(a) Guidelines for Windows Server Hardening
http://it.home/doc/HAHO-ITD-GL-T03-010.aspx

(b) Guidelines for Connecting External Network in HA (Information Technology Circular 1/2019)
http://ha.home/circular2/IT-2019-01.pdf

(c) Guidelines for Connecting External Network in HA
http://it.home/doc/HAHO-ITD-GL-N02-001.aspx

(d) Guidelines for Host Security Hardening
http://it.home/doc/HAHO-ITD-GL-T02-001.aspx

(e) OWASP Top 10 Vulnerabilities
https://www.owasp.org/index.php/Category:OWASP_Top_Ten_Project

(f) Malicious Code Protection Requirements for Medical Equipment Maintenance
(IT Circular 2/2018)
http://ha.home/circular2/IT-2018-02.pdf

(g) Guidelines for Application Security
http://it.home/doc/HAHO-ITD-GL-ISO-005.aspx

(h) Adopting Security Specifications Standard
http://it.home/doc/HAHO-ITD-SD-ISO-001.aspx

(i) Guidelines for Mobile Device Security
http://it.home/doc/HAHO-ITD-GL-ISO-003.aspx

(j) Guidelines for IoT Security
http://it.home/doc/HAHO-ITD-GL-ISO-008.aspx

(k) Guidelines for Cabling System and Network Setup in External Network
http://it.home/doc/HAHO-ITD-GL-N05-001.aspx

(l) Cloud Security Standard
http://it.home/doc/HAHO-ITD-SD-ISO-004.aspx

(m) Guidelines for Vulnerability Management Process
http://it.home/doc/HAHO-ITD-GL-ISO-001.aspx

(n) Guidelines for Security Patch Management
http://it.home/doc/HAHO-ITD-GL-ISO-013.aspx

(o) Guidelines for Security Requirements for HA PCs and Notebooks
http://it.home/doc/HAHO-ITD-GL-ISO-009.aspx

3. Introduction

Tenderer are reminded that:

(a) the procurement process shall be considering risks that could be introduced to HA as a result of the selection of a System/Equipment;

(b) details shall be described in the respective Schedule(s) pertaining to "Statement of Compliance" as to how the System/Equipment proposes to implement security requirements, including product names, product specifications and interconnection diagrams;

(c) an alternative security solution able to achieve the same or better security protection, shall be proposed where any System/Equipment security requirements are unable to be fulfilled due to product design limitations;

(d) where an alternative security solution is being proposed details shall be included which describe the alternative security solution in an Appendix to the "Statement of Compliance";

(e) the security requirements outlined in Clause 5 are critical.

4. Overview

4.1 Scope

The scope of these IT security requirements are applicable to all "Requests for Quotations" and "Requests for Tender" for the procurement of non-IT Systems ("Systems")/Equipment in HA.

4.2 Objective

The scope of this document cover security requirements with terms and definitions for procurement of non-IT Systems ("Systems")/Equipment in HA, including data security, application security, network security, server security, client/desktop security, security incident reporting and vendor maintenance and etc.

5. IT Security Requirements

The IT security requirements for all "Requests for Quotations" and "Requests for Tender" within HA with a view to:

(a) providing "Terms and Definitions" please refer detail noted in Appendix Part A;

(b) providing “Network Connection between Vendor Network and HA Network”, please refer detail noted in Appendix Part B;

(c) providing “Failure and Recovery Scenarios in Hospitals for vendor managed L3 network switches”, please refer detail noted in Appendix Part C;

(d) providing “External Network Security Compliance Report (Sample)”, please refer detail noted in Appendix Part D (The form can be downloaded from https://hateams.home/~rndKs)

Note: Appendix is a clean standalone version that can be directly incorporated into tendering document for procurement process. All clauses stated are required whenever applicable.

6. Further Information

Further information and details concerning IT Security Requirements for Quotation / Tender - Procurement of “non-IT” System/Equipment can be obtained by contacting:

- William Wong, SM(ISO)1, 3906 3577, wongwwl@ha.org.hk
- Jackson Lam, SM(N)5, 3969 3123, jackson.lam@ha.org.hk

Appendix Details of IT Security Requirements

A. Terms and Definitions

These terms and definitions apply to any System/Equipment requiring access to the HA IT network. Additional terms and definitions appear below in "Connectivity of Vendor Managed Network to HA" (A.19) for System/Equipment operated by the Tenderer on a separate self-contained "vendor" network.

Note:

i) An alternative security solution able to achieve the same or better security protection, shall be proposed where any System/Equipment security requirements are unable to be fulfilled due to product design limitations;

ii) where an alternative security solution is being proposed details shall be included which describe the alternative security solution

Reference Document:

(a) Guidelines for Windows Server Hardening
http://it.home/doc/HAHO-ITD-GL-T03-010.aspx

(b) Guidelines on Connecting External Network in HA (Information Technology Circular 1/2019)
http://ha.home/circular2/IT-2019-01.pdf

(c) Guidelines for Connecting External Network in HA
http://it.home/doc/HAHO-ITD-GL-N02-001.aspx

(d) Guidelines for Host Security Hardening
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(e) OWASP Top 10 Vulnerabilities
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(f) Malicious Code Protection Requirements for Medical Equipment Maintenance (IT Circular 2/2018)
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(j) Guidelines for IoT Security
http://it.home/doc/HAHO-ITD-GL-ISO-008.aspx

(k) *Guidelines for Cabling System and Network Setup in External Network*
http://it.home/doc/HAHO-ITD-GL-N05-001.aspx

(l) *Cloud Security Standard*
http://it.home/doc/HAHO-ITD-SD-ISO-004.aspx

(m) *Guidelines for Vulnerability Management Process*
http://it.home/doc/HAHO-ITD-GL-ISO-001.aspx

(n) *Guidelines for Security Patch Management*
http://it.home/doc/HAHO-ITD-GL-ISO-013.aspx

(o) *Guidelines for Security Requirements for HA PCs and Notebooks*
http://it.home/doc/HAHO-ITD-GL-ISO-009.aspx

A.1 Safety

A.1.1 Tenderer shall ensure the System/Equipment remains secure and malicious code free in accordance with the terms and conditions of the relevant contract.

A.1.2 Tenderer shall ensure the System/Equipment when being used for healthcare related patient outcomes does not cause danger, risk, harm, injury, or loss to the safety of an individual.

A.1.3 Tenderer shall ensure the System/Equipment is protected from being used in a manner relied upon by other System/Equipment that could result in danger, risk, harm, injury, or loss to the safety of an individual.

A.1.4 Tenderer shall ensure the System/Equipment does not create any non-compliance with regulatory or legal frameworks.

A.2 Confidentiality and Privacy

A.2.1 Tenderer shall ensure the System/Equipment does not capture, store or process sensitive data and/or any data related to any individual, including personal health information, in a manner that allows the data to be made available or disclosed in an unauthorized manner.

A.2.2 Tenderer shall ensure the System/Equipment provides appropriate authentication controls on privacy control when allowing any user, protocol or other form of connection.

A.3 Integrity

A.3.1 Tenderer shall ensure the System/Equipment preserves the accuracy and completeness (i.e. integrity) of data and the methods used to process and manage this data.

A.3.2 Tenderer shall ensure the System/Equipment minimises any potential to cause business disruption if the System/Equipment does not operate as expected/planned.

A.3.3 Tenderer shall ensure the System/Equipment can be accurately relied upon as a result of its function.

A.3.4 Tenderer shall provide evidence to HA that any source code associated with the System/Equipment is free of common "OWASP Top 10 Vulnerabilities" [Reference Document (e)].

A.4 Availability

A.4.1 Tenderer shall ensure the System/Equipment will be accessible and usable when needed.

Tenderer shall ensure the System/Equipment achieves an overall level of availability with reference to the requirement of Uptime under warranty and maintenance support related clause in the Tender Specifications.

A.4.2 Tenderer shall ensure any System/Equipment interruption with reference to the requirement of Corrective Maintenance under warranty and maintenance support related clause in the Tender Specifications.

A.4.3 Tenderer shall ensure the System/Equipment provides adequate System/Equipment resilience facilities, including and not limited to redundant hardware components, enabling any faulty components to be switched over to redundant components if applicable.

A.4.4 Tenderer shall ensure the System/Equipment is supported by uninterruptable power supply (UPS) for maintaining the committed level of System/Equipment availability if applicable.

A.4.5 Tenderer shall ensure the System/Equipment minimises any disruption if not performing as expected/planned.

A.5 Compatibility

A.5.1 Tenderer shall ensure the System/Equipment is able to effectively function together with other System/Equipment.

A.5.2 Tenderer shall ensure the System/Equipment does not adversely interfere with the effective operation of any other System/Equipment.

A.5.3 Tenderer shall ensure the System/Equipment continues to function correctly following any System hardening and security specification requirements imposed by HA.

A.6 Longevity

A.6.1 Tenderer shall ensure the length of effective service of the System/Equipment (i.e. many years) and all of its components will be sufficient to meet the needs of HA.

A.6.2 Tenderer shall ensure the System/Equipment continues to operate beyond the period of time expected by HA.

A.6.3 Tenderer shall ensure updates for patching of vulnerabilities are maintained throughout the System/Equipment's lifetime expected by HA.

A.7 Technological Substitution

A.7.1 Tenderer shall ensure that within the warranty period/maintenance service contract period (if applicable), System/Equipment upgrades are performed, if there is any, without any charge within the contract period.

A.8 Data Sovereignty

A.8.1 Tenderer shall ensure the data processed or stored by the System/Equipment resides in Hong Kong.

A.8.2 Tenderer shall ensure the System/Equipment does not process or store data outside of Hong Kong.

A.8.3 Tenderer shall ensure the System/Equipment is governed by the laws of Hong Kong.

A.9 System Hardening

A.9.1 Tenderer shall ensure the System/Equipment, where using the Microsoft Windows Operating System, hardens all its components and functionality according to "Guidelines for Windows Server Hardening" [Reference document (a), which is available for viewing after signing a non-disclosure agreement with hospital].

A.9.2 Tenderer shall ensure the System/Equipment where using the non-Windows solutions are secured according to "Guidelines for Host Security Hardening" [Reference document (d), which is available for viewing after signing a non-disclosure agreement with hospital].

A.9.3 Tenderer shall ensure the System/Equipment avoids the presence of hard-coded authentication credentials.

A.10 Data Security

A.10.1 Tenderer shall ensure sensitive data downloaded from the System/Equipment to end-user devices is protected by a reasonable level of encryption.

Note: Sensitive data refers to data including but not limited to identifiable patient information.

A.10.2 Tenderer shall ensure sensitive data stored within the System/Equipment is preferably encrypted.

A.10.3 Tenderer shall ensure sensitive data stored in backup storage is encrypted.

A.10.4 Tenderer shall ensure all important data (knowledge, System/Equipment configuration parameters) stored in the System/Equipment is safeguarded and preserved through an effective backup mechanism.

A.10.5 Tenderer shall ensure sensitive data shall NOT be exported for any usage unless prior authorisation has been obtained from HA.

A.10.6 Tenderer shall ensure where there is a requirement to copy or move data from the System/Equipment to the HA network using portable media (i.e. USB Drive or CD), then this media is scanned for malicious code on a HA PC before being uploaded to the HA network.

A.10.7 Tenderer shall ensure sensitive or personal data is not logged as much as possible; if there is operational need to log such data, ensure it is encrypted or secured with restricted access control.

A.11 Application Security

A.11.1 Tenderer shall ensure the System/Equipment employs prevalent authentication and authorisation mechanisms at reasonable safety level.

A.11.2 Tenderer shall ensure the System/Equipment supports role-based access control. For example, general user shall be restricted from system administration and setting function, which shall only be performed by authorized users.

A.11.3 Tenderer shall ensure the System/Equipment applies network level encryption.

A.11.4 Tenderer shall ensure the System/Equipment provides comprehensive version control and configuration management mechanisms.

A.11.5 Tenderer shall ensure the System/Equipment conforms to "Guideline for Application Security" [Reference document (g), which is available for viewing after signing a non-disclosure agreement with hospital].

A.12 Malicious Code Protection

A.12.1 Tenderer shall ensure the System/Equipment is protected with the installation of a reputable Anti-Virus program in all servers, PC and Workstation components.

A.12.2 Tenderer shall ensure the System/Equipment is protected with regular updates of the latest virus definitions.

Note: It is highly preferred that Tenderer shall use the same product as HA to have virus definition update automatically.

A.12.3 Tenderer shall be responsible for the on-going support and for keeping the virus definitions and related software up-to-date in all Servers, PCs and workstations.

A.12.4 Tenderer shall ensure virus definitions are updated within 24 hours from the date of release.

A.12.5 Tenderer shall be responsible for the regular scanning of all Servers and PCs in the System/Equipment every three months to ensure that they are not infected by virus, worms and spyware including the on-going support of scheduling and verifying the results of the virus scan.

A.13 Vulnerability / Patch Management

A.13.1 Tenderer shall maintain ongoing System/Equipment support, including the installation of the latest security patches for the Operating Systems and related software in all System servers, PCs and workstations.

A.13.2 Tenderer shall ensure critically affected security patches are updated as soon as practically possible; for non-critical ones, within twelve months from the date of release.

A.14 Restricted External Access

A.14.1 Tenderer shall ensure that there are no non-HA (external) network connections to the System/Equipment unless supported by prior authorization and knowledge of HA.

A.14.2 Tenderer shall ensure that the System/Equipment does not automatically establish any wireless connections without prior authorisation and knowledge of HA.

A.14.3 Tenderer shall ensure that the System/Equipment does not establish any wired connections without prior authorisation and knowledge of HA.

A.15 HA Network Connectivity

A.15.1 Tenderer shall be responsible, where operational reasons exist, for a System/Equipment residing within HA premises to connect to the HA network for information exchange with HA IT systems, for implementing such network connection in accordance with HA requirements and to ensure all security requirements are strictly adhered to (e.g. network segregation by firewall to ensure security attacks due to the System/Equipment would not directly impact HA).

A.15.2 Tenderer shall ensure any network connection for a System/Equipment to the HA network is endorsed by HA and implemented and operated according to HA policies, procedures and guidelines.

A.15.3 Tenderer shall ensure connectivity of the System/Equipment to the HA network adheres to the network diagram as depicted in **Part B**.

A.16 Maintenance Support

A.16.1 Tenderer shall ensure that when maintenance is performed on the System/Equipment or when accessing the System/Equipment in any remote manner that the tools and software have been confirmed to be free of malicious code.

A.16.2 Tenderer shall ensure that where maintenance on the System/Equipment needs to be performed, that HA is provided with a level of assurance that the vendor has undertaken proactive actions to ensure their connecting media or device (USB stick, portable media, laptops, iPads, etc.) has been scanned for malicious code before and after every time that portable media is used to apply changes/updates to the System/Equipment.

A.16.3 Tenderer shall bring with them a mobile computer (i.e. laptop) which contains the latest version of anti-virus software, complete with up-to-date virus signatures to confirm onsite within HA premises that their media to be connected (i.e. USB) is free of malicious code.

A.16.4 Tenderer shall ensure portable media (USB stick, CD/DVD, etc.) is scanned (in addition to clause A.16.3) on a HA PC to ensure that the media is not infected by virus, worms and spyware before being used to apply changes/updates to the System/Equipment.

A.16.5 Tenderer shall ensure the vendor provides HA a completed attestation of compliance to confirm the media or device to be connected to the System/Equipment has been scanned for viruses and found to be free of malicious code.

A.16.6 Tenderer shall perform technical support on-site unless appropriate remote support arrangement is endorsed.

A.16.7 Tenderer shall erase the sensitive data in the storage devices of the System/Equipment before taking away the equipment for repairing or disposal.

A.16.8 Tenderer shall sign and fully comply with a non-disclosure confidentiality agreement during on-site and remote support.

A.16.9 Tenderer should use different portable media (i.e. USB sticks), which have been scanned for malicious code, for each item of medical equipment they need to apply an update to.

A.16.10 Tenderer shall where not able to use different individual portable media (i.e. USB sticks) for applying changes/updates to multiple items of medical equipment (see clause A.16.10), repeat Clauses A.16.3 and A.16.4 before proceeding to attach/apply the portable media to the second and subsequent items of medical equipment.

A.17 Decommissioning Support

A.17.1 Tenderer shall ensure that upon decommissioning of the System/Equipment, data exports and data definitions (sometimes known as data dictionary) are provided for all clinical data, and other data as appropriate, in a data structure and format as required by Hospital Authority.

A.17.2 Tenderer shall provide assistance, as required, for the successful migration of any data to a new replacement System/Equipment(s) as adopted by Hospital Authority.

A.18 Security Incident Reporting and Compliance

A.18.1 Tenderer shall ensure the System/Equipment provides health-checking and audit logging capabilities.

A.18.2 Tenderer shall immediately report to the Hospital management and the HA ITS Call Centre any security incident relating to the System/Equipment.

A.18.3 Tenderer shall monitor its security compliance and comply with HA's regular review process with respect to the requirements stipulated in this document. **Part D** provides a sample of a "External Network Security Compliance Report" which should be used.

A.19 Connectivity of Vendor Managed Network to HA

A.19.1 For Medical Systems, HA will install External Network data ports next to the equipment for connection with the HA Network, or HA will install External Network Wireless LAN for the equipment that supports Wi-Fi for connection with the HA Network.

(Note: Tenderers shall confirm with HA if External Network data ports can be provided)

A.19.2 The External Network data ports are based on the Institute of Electrical and Electronics Engineers (IEEE) 802.3 standards and support 10BASE-T at 10 Mbit/s (IEEE 802.3i), 100BASE-TX Fast Ethernet at 100 Mbit/s (IEEE 802.3u) and 1000BASE-T Ethernet at 1 Gbit/s (IEEE 802.3ab) connections.

A.19.3 The External Network is an Internet Protocol (IPv4) routable network. It supports the following communication protocols, including Internet Protocol (IP), Address Resolution Protocol (ARP), Internet Control Message Protocol (ICMP), Transmission Control Protocol (TCP) and User Datagram Protocol (UDP). The IP address will be assigned by HA.

A.19.4 In case the tenderer cannot use HA-provided External Network data ports, the tenderer shall set up the network and implement the cabling system according to the "Guidelines for Cabling System and Network Setup in External Network" [Reference Document (k) , which is available for viewing after signing a non-disclosure agreement with hospital].

A.19.5 Other than the provision by HA IT&HI as specified in the tender document, if the tenderer considered the HA IT&HI provision not sufficient/applicable to its proprietary Medical Systems, the tenderer may propose additional installation (in such case the additional installation works shall be carried out by the tenderer according to the "Guidelines for Cabling System and Network Setup in External Network" at its own cost [Reference Document (k)]). HA will not bear any additional charges, and the tenderer shall bear all such related costs which shall have been included in the tender price submitted by the tenderer.

A.19.6 Tenderer shall put their servers in Hospital Data Center as far as possible.

A.19.7 Tenderer shall provide the network diagram to illustrate the network architecture if the tenderer follows A19.4. **Part B.1** illustrates the architecture of External Network for Medical Systems.

A.19.8 Tenderer shall ensure the System/Equipment connecting to the External Network Wireless LAN comply with the following requirements and specifications:

(a) Tenderer shall comply with the HA Wi-Fi infrastructure and standard guidelines

(b) The end devices provided by the tenderer shall support IEEE 802.11a/g/n/ac/ax.

For the end devices which support IEEE 802.11ax, they shall be compatible with IEEE 802.11a/g/n/ac

(c) The end devices provided by the tenderer shall support 2.4GHz channel 1-13 and/or 5GHz channel under U-NII-1, U-NII-2A, U-NII-2C and U-NII-3

(d) The end devices provided by the tenderer shall support WPA2 with AES encryption and PSK authentication

(e) The end devices provided by the tenderer shall support DHCP/static IP configuration

(f) The end devices provided by the tenderer shall support roaming across access points without session drop

(g) Tenderer shall provide MAC addresses of the end devices for registration and PSK authentication in order to access Wi-Fi network

(h) Tenderer shall arrange a Wi-Fi connectivity test with users and Hospital/HA IT&HI before the production rollout

(i) Only 1 common SSID will be provided by HA for all non-IT systems

(j) Non-IT systems shall use IP addresses as assigned by HA

(k) IP routable network will be provided for Wi-Fi and wired equipment

A.19.9 For Non-Medical Systems such as Operational Technology (OT), the tenderer shall comply with the following requirements and specifications:

(a) Tenderer shall set up the network and implement the cabling system according to the "Guidelines for Cabling System and Network Setup in External Network" [Reference Document (k) , which is available for viewing by appointment at hospital venue after signing a non-disclosure agreement with hospital].

(b) Refer to the "Guidelines for Cabling System and Network Setup in External Network" [Reference Document (k), tenderer shall install at least one Layer 2 switch or with resilient when HA requires at the tenderer's cabinet and shall cater for different auto network failover and recovery scenarios according to the network diagrams illustrated in **Part C.1 and C.2**. If Layer 3 switch installation is required, the tenderer shall contact HA IT&HI in advance for consideration.

(c) Tenderer shall provide the network diagram to illustrate the network architecture. **Part B.2** illustrates the architecture of External Network for Non-Medical Systems.

(d) HA shall arrange HA Authorized Cabling Contractor to install the backbone cablings and HA Equipment Vendor to install the Gigabit Interface Converters (GBICS) at HA switch in Building Closets for the network connection to the tenderer's switch.

(e) HA will not bear any installation and maintenance related charges (except for backbone cabling, i.e. B.4 in **Part B.2**), and the tenderer shall bear all such related

costs which shall have been included in the tender price submitted by the tenderer

A.20 Clinical Data Exchange

A.20.1 Tenderer shall ensure seamless electronic data exchange with Hospital Authority corporate systems, complying with Health Level Seven (HL7) version 2.3.1 and above, including support for the HL7 FHIR (Fast Healthcare Interoperability Resources) standard. The data transfer protocols should include MLLP with native HL7, SOAP, or RESTful-based web services with HL7XML, as well as FHIR API interfaces. Additionally, the Clinical Information System (CIS) must have the capability to receive events from and publish events to hospital systems in a timely manner to ensure real-time or near real-time data availability and synchronization. Furthermore, the file server storing clinical report files to be downloaded by the Hospital Authority system must support the SFTP protocol.

A.20.2 Tenderer shall ensure the implementation of electronic data exchange with Hospital Authority corporate systems complies Hospital Authority HL7 Guidelines.

A.20.3 Tenderer shall ensure any electronic message exchange with the Hospital Authority includes reference keys supplied by Hospital Authority corporate systems such as:

(a) HKID
(b) Name
(c) Date of birth
(d) Sex
(e) HA case number
(f) HA system unique patient key

Note: Electronic message exchange is important to ensure high integrity associated with patient identification and automatic mapping to patient records within the Hospital Authority.

A.20.4 Tenderer shall ensure the System/Equipment maintains the existing exchange of patient data with Hospital Authority corporate systems and provides exchange for other data including but not limited to:

(a) Admit, discharge & transfer, and patient demographics
(b) Allergy, Adverse Drug Reaction and Alert information
(c) Clinical order, observations and results
(d) Multimedia and imagery data

A.20.5 Tenderer shall ensure the System/Equipment automatically updates patient's demographic data upon reception of ADT message.

A.20.6 Tenderer shall ensure ADT information exchanged is in compliance with the latest Hospital Authority HL7 Implementation Guidance.

A.20.7 Tenderer shall ensure audit logging is provided for all ADT (Admit, Discharge and Transfer) interactions.

A.20.8 Tenderer shall ensure the System/Equipment adopts the preferred Hospital Authority date format.

(a) For the display of date in frontend screen: DD-MMM-YYYY (e.g. 01-JAN-2014)

(b) For the display of date-time in frontend screen: DD-MMM-YYYY hh:mm:ss in either 12hr/24hr mode (e.g. 01-Jan-2014 15:30:45)

(c) For the transfer of date information to HA system: YYYYMMDD (e.g. 20140101)

(d) For the transfer of date-time information to HA system: YYYYMMDDhhmmss in 24hr mode (e.g. 20140101153045).

Note: This enables user friendliness and system interoperability to be achieved.

A.20.9 Tenderer shall ensure the System/Equipment sends update or delete messages, if necessary, to perform corresponding actions with Hospital Authority corporate systems, with proper authorization mechanism from supervisor and audit trail.

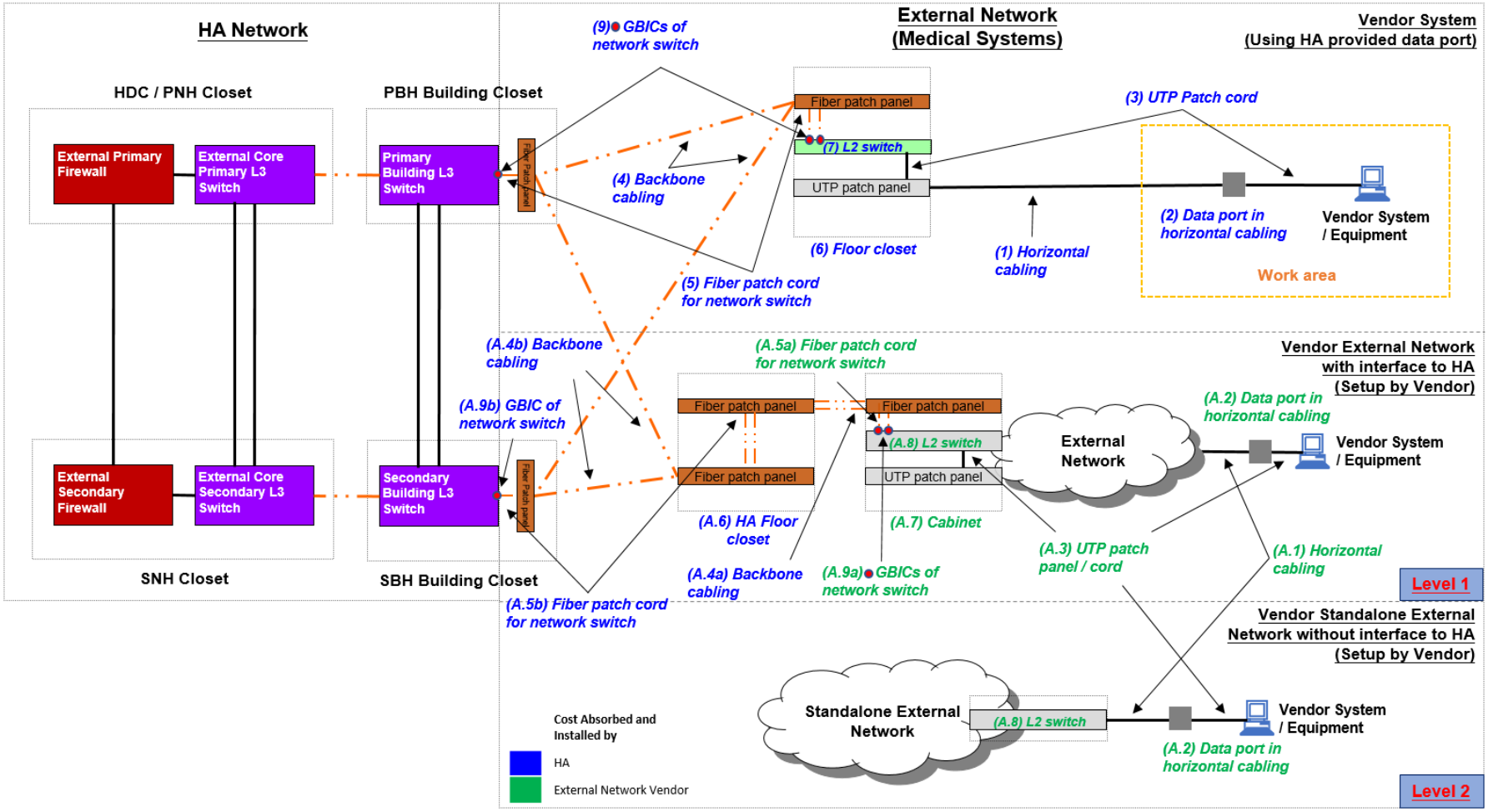
A.20.10 Tenderer shall ensure the System/Equipment provides appropriate feedback to users to indicate the successfulness of message exchange with Hospital Authority corporate systems. (e.g. dashboard system, system alert to users).

A.21 Public Cloud Service

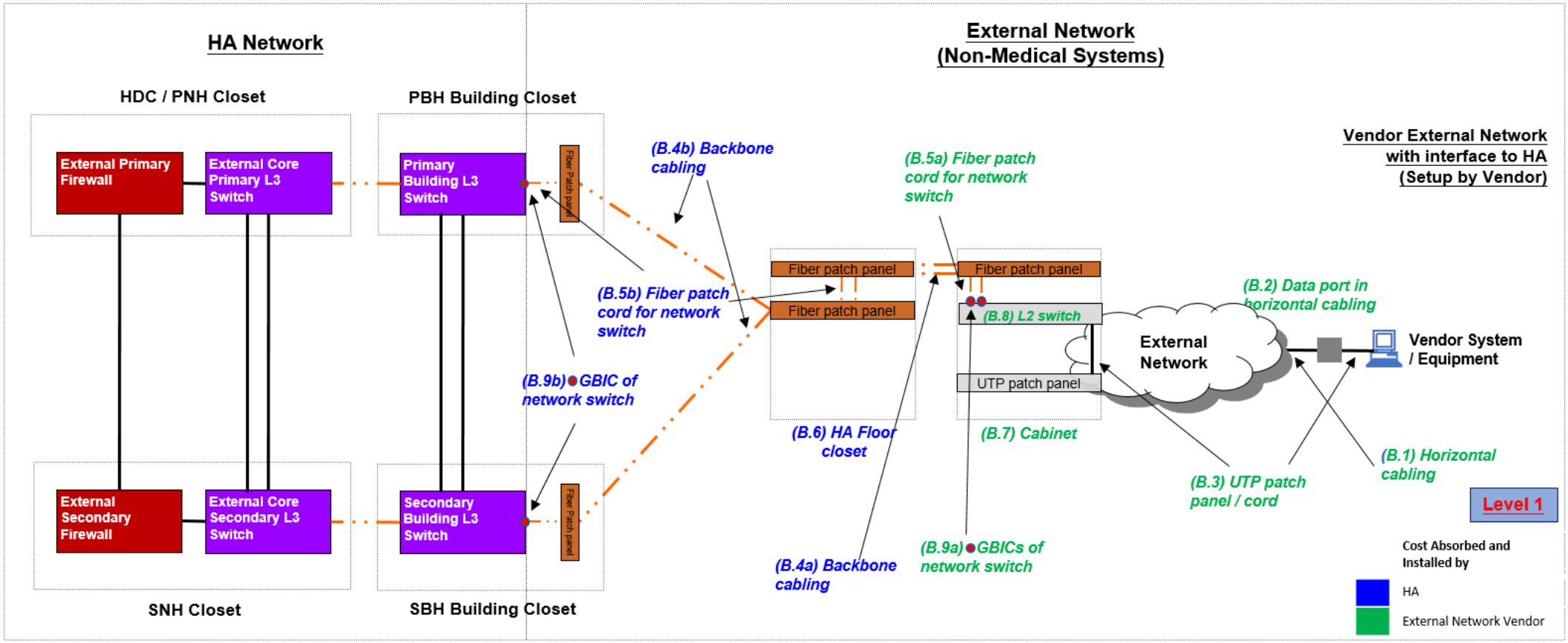
A.21.1 Tenderer shall ensure the System/Equipment, where using public cloud service (e.g. Software as a Service/SaaS), conforms to "Cloud Security Standard" [Reference document (l), which is available for viewing after signing a non-disclosure agreement with hospital].

B. External Network Architecture

1) Below diagram illustrates the External Network Architecture for Medical Systems



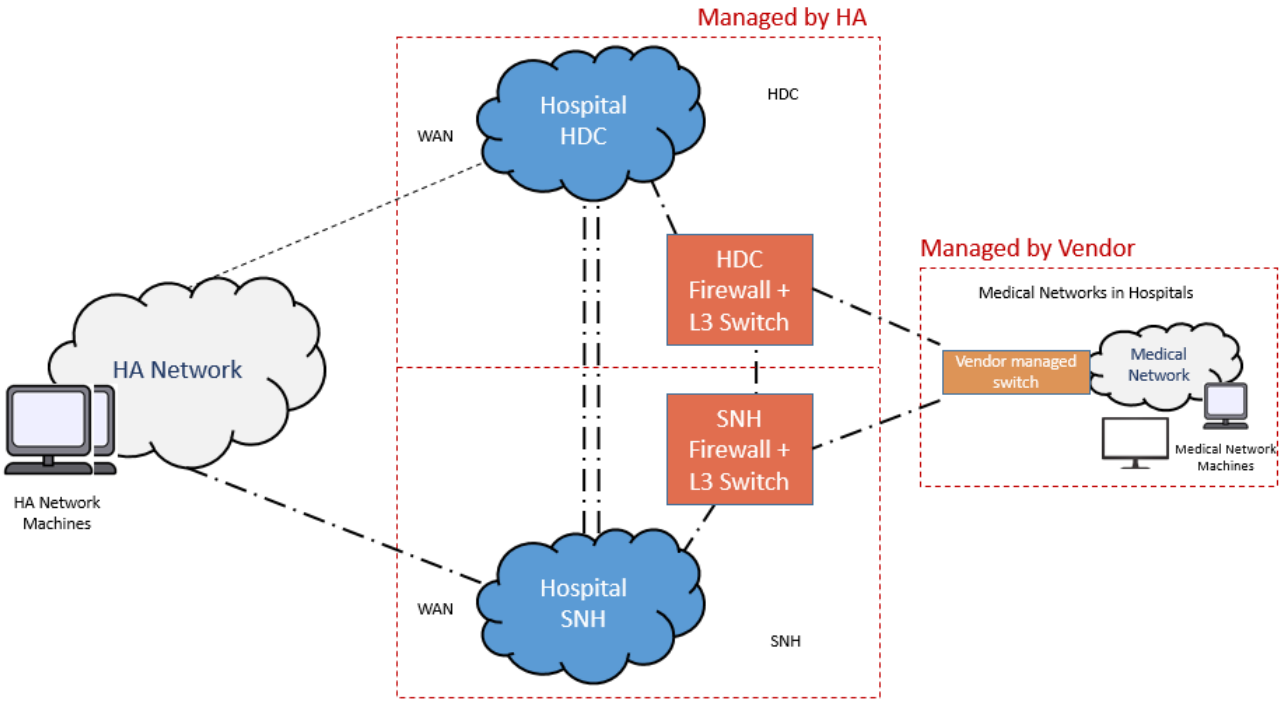
2) Below diagram illustrates the External Network Architecture for Non-Medical Systems



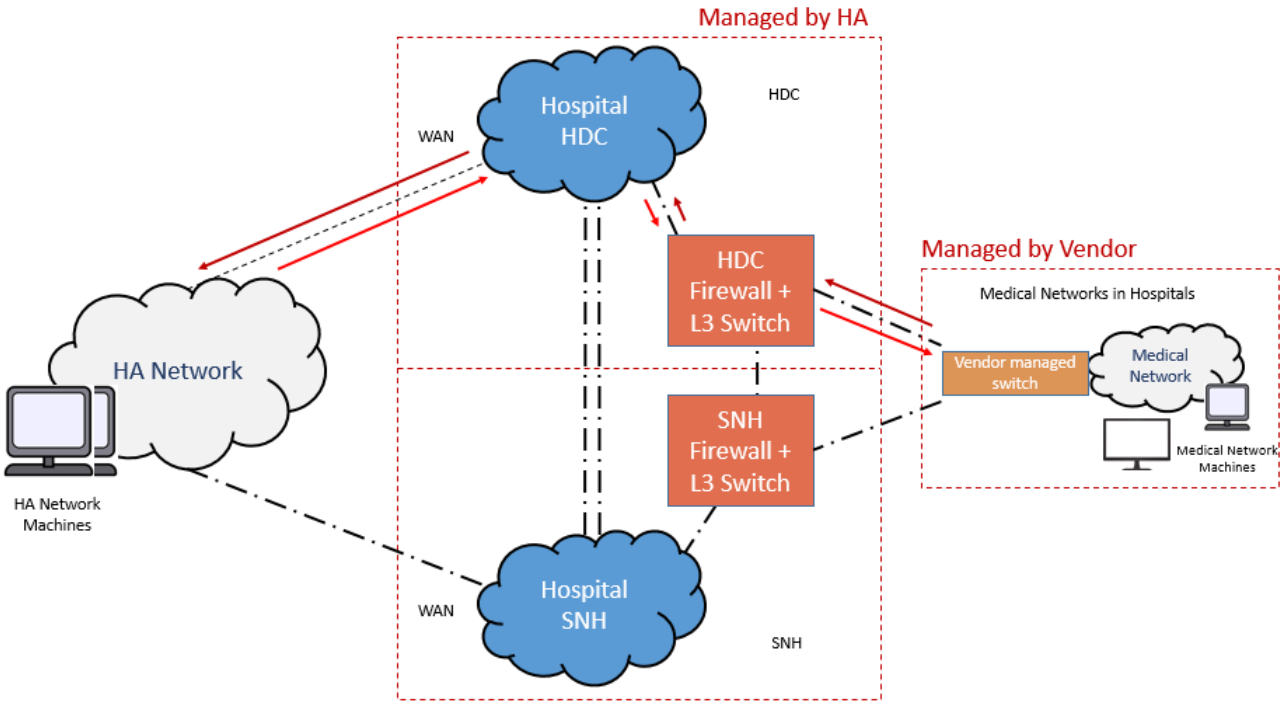
C. Failure and Recovery Scenarios in Hospitals for Vendor Managed Network Switches

C.1 Model A (Single Vendor Managed Layer 2 Switch)

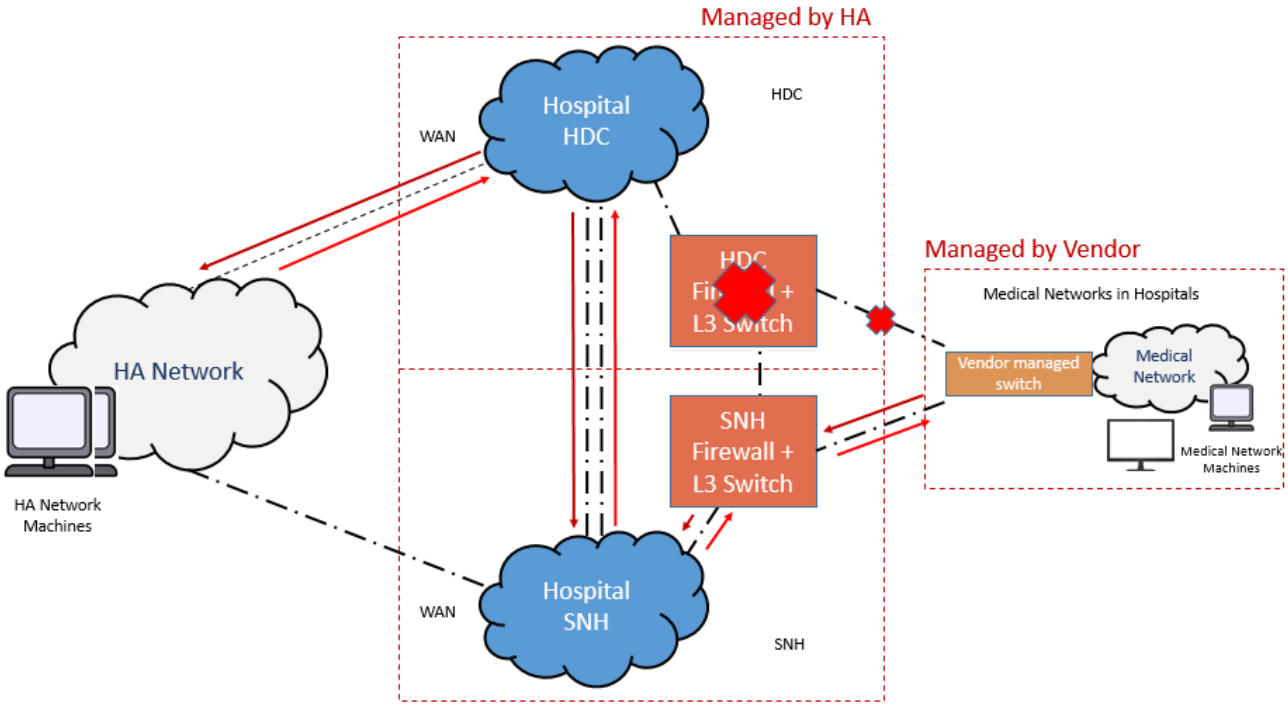
C.1.1 Network Diagram



C.1.2 Normal Network Path

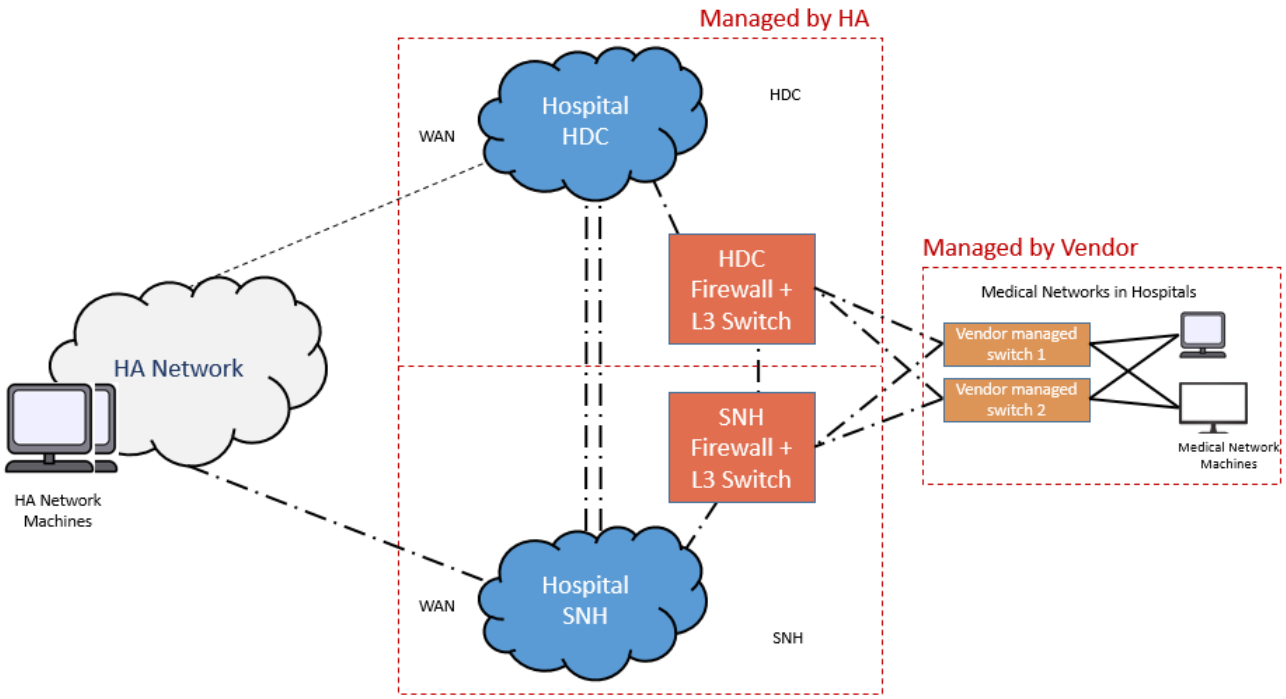


C.1.3 Failure Scenario

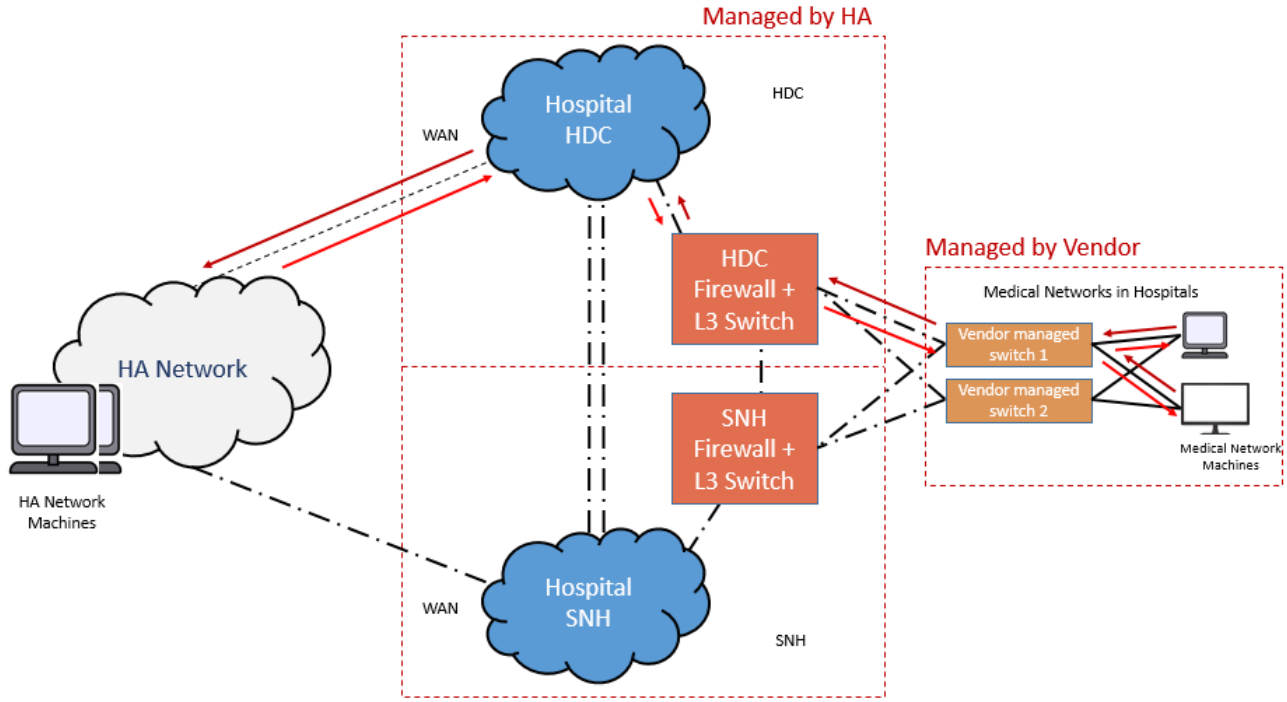


C.2 Model B (Resilient Vendor Managed Layer 2 Switches)

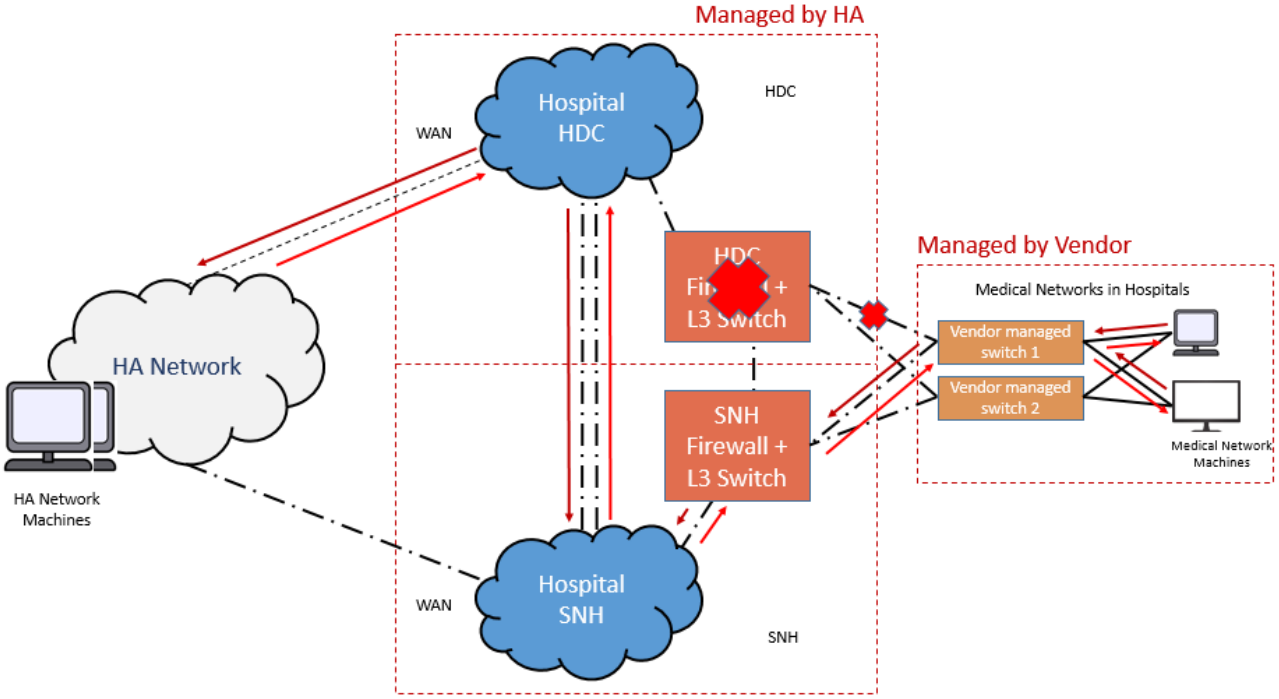
C.2.1 Network Diagram



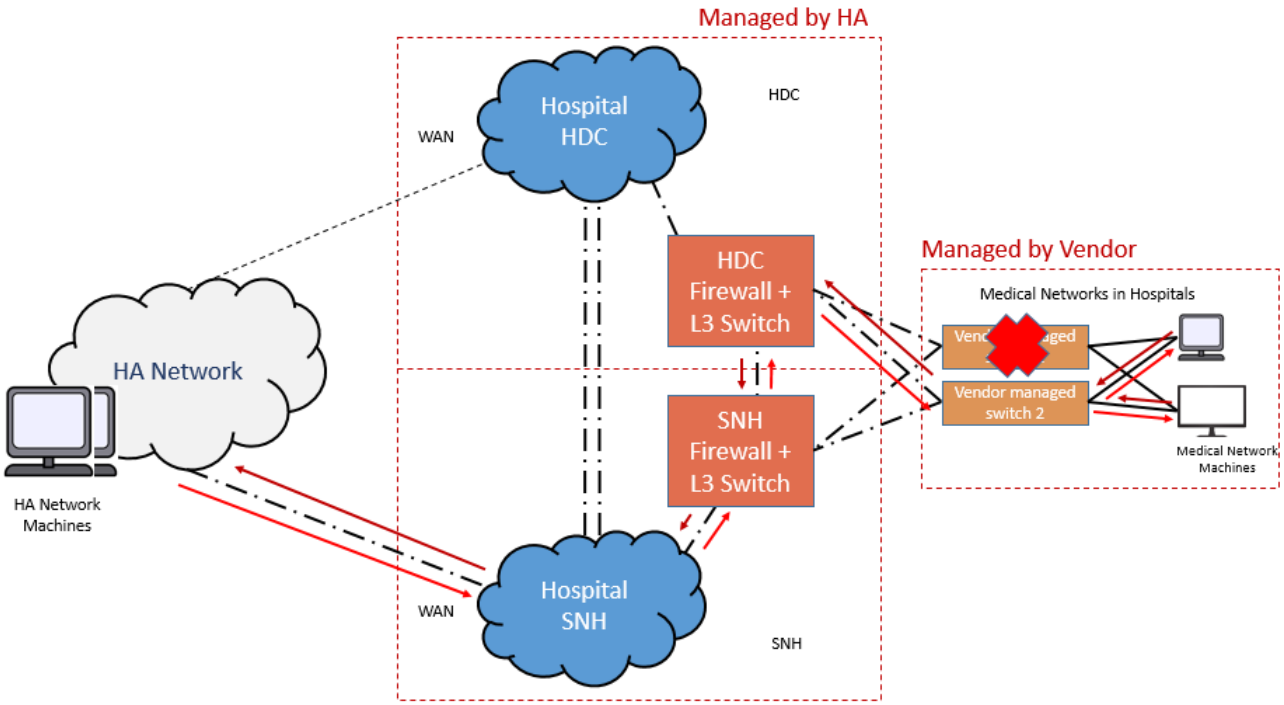
C.2.2 Normal Network Path



C.2.3 Failure Scenario B1



C.2.4 Failure Scenario B2



D. External Network Security Compliance Report (Sample)

Hospital: _____ **Name of External Network:** _____
Location: _____ **IP Subnet:** _____
Reviewer: _____ **Post of Reviewer:** _____
Date: _____

Security Requirements for Vendor System/Equipment Installed in HA

Items for Verification with Vendor		Comply (Y/N)	Remark
A.	**Data Security (Review in regular basis)**		
A1	Confidential data downloaded from the System/Equipment to end-user devices should be encrypted		
A2	Confidential data transferring between the System/Equipment and other HA IT systems should "preferably" be encrypted		
A3	Confidential data stored within the System/Equipment should "preferably" be encrypted		
A4	Confidential data stored in backup storage should be encrypted		
A5	Confidential data must not be exported for any usage other than clinical care in HA		
A6	Is the confidential data in System/Equipment and backup being protected from unauthorized access / leakage, including physical security controls? Please specify the controls in “Remark”		
B.	**Application Security (Review in regular basis)**		
B1	The application should support role-based access control		
B2	The application should employ prevalent authentication mechanism at reasonable safety level		
B3	The application should apply network level encryption		
B4	The application should provide health-checking information		
B5	The application should keep audit logs		
B6	Conformance to HA's Guidelines for Application Security		
C.	**Network Security (Review in regular basis)**		
C1	The System/Equipment should not have any network connection to external parties and should not have any unauthorized network connections		

Items for Verification with Vendor		Comply (Y/N)	Remark
C2	The System/Equipment network should connect to the network port provided by HA		
C3	The System/Equipment network should use IP addresses as assigned by HA		
C4	Only the authorised network traffic is permitted between the System/Equipment network and HA network		
C5	Formal change request and endorsement process for defining and implementing the network firewall policies		
D.	**Server Security (Review in regular basis)**		
D1	Vendor should implement the server security as described in the Guidelines for Windows Server Hardening and the Guidelines for Host Security Hardening		
D2	Vendor should install into the servers an anti-virus program running with the latest virus definitions		
D3	Vendor should install the latest security patches in the servers		
D4	Vendor should perform a regular scanning in the servers		
E.	**Client / Desktop Security (Review in regular basis)**		
E1	Vendor should implement the security controls at the PCs of the System/Equipment as described in the Guidelines for Security Requirements for HA PCs and Notebooks		
F.	**Security Incident Reporting (On-going exercise)**		
F1	Vendor should immediately report security incidents to Cluster/Hospital management		
G.	**Vendor Maintenance (Review in regular basis)**		
G1	Vendor should erase the data in storage devices before taking away the equipment for repair		
G2	Vendor should perform technical support on-site unless appropriate remote support arrangement is endorsed		
G3	Vendor support staff should sign the non-disclosure confidentiality agreement		
G4	When equipment is required to be taken away for offsite repair, are there ways to remove / erase / protect the confidential data in the equipment form leakage? Please specify the controls in “Remark”		

Items for Verification with Vendor		Comply (Y/N)	Remark
H.	**Privacy Control (Review in regular basis)**		
H1	Are there any user authentication controls present in the System/Equipment?		
H2	Is unique user ID being assigned to every user?		
H3	Does the System/Equipment allow setting of complex password such as upper / lower case, alpha, numeric and special characters?		
H4	Does the System/Equipment provide audit trails of user accesses? Please specify the controls in “Remark”.		
H5	Is there any means to synchronize System/Equipment time with a trustworthy time server such as HA time server for accurate system record?		

Assumptions

1. in-direct offline storage should not be used

Guidelines for Cabling System and Network Setup in External Network

Version	Effective Date
5.0	29/11/2022

Document Number	HAHO-ITD-GL-N05-001-v05
Author	Will NG, HOIT&HI SA(N5)3
Custodian	C K HUNG, HOIT&HI SSM(N)
Approved/ Endorsed By	ITD
Approval Date	29/11/2022
Distribution List	All HA HOIT&HI Staff / Cluster IT Staff

Amendment History

Version No.	Date of Amendment	Prepared by	Description
1.0	09/10/2020	John Tse	First version
2.0	09/12/2020	John Tse	Update the External Network Architecture Diagram in section 4 to indicate the building switch is a L3 switch
3.0	20/07/2021	John Tse	Update the cabling system and L2 switch guidelines and specifications
4.0	15/8/2022	John Tse	Update Section: 4. Guidelines to Setup External Network 5. External Network Architecture 6. Roles & Responsibilities 7. Network Cabling System & Network Equipment 8. Network Cabling in External Network 9. External Network Setup by Vendor 10. L2 Switch Specification Requirements 11. L2 Switch Configuration 12. Acceptance to Checklist 13. Appendix A and Appendix B
5.0	25/11/2022	Will Ng	Update words in section 7

Table of Contents

1. Purpose

The purpose of this document is to provide guidelines for External Network Vendor to perform cabling work and network setup for External Network System.

2. Reference

N/A

3. Overview

3.1 Objectives

The objectives of this Guidelines includes:

(a) To provide the External Network architecture for Vendors to follow;

(b) To provide the cabling / network equipment specification requirements for Vendors to follow;

(c) To provide the guideline for network cabling in External Network;

(d) To provide the guideline for network switch configuration.

3.2 Scope

The scope of this IT guidelines is applicable to all External Network systems.

3.3 Background

(a) Previously there is no standard for External Network Vendors to implement cabling system and network;

(b) Cabling system and/or network equipment cannot be reused when the External Network end of support;

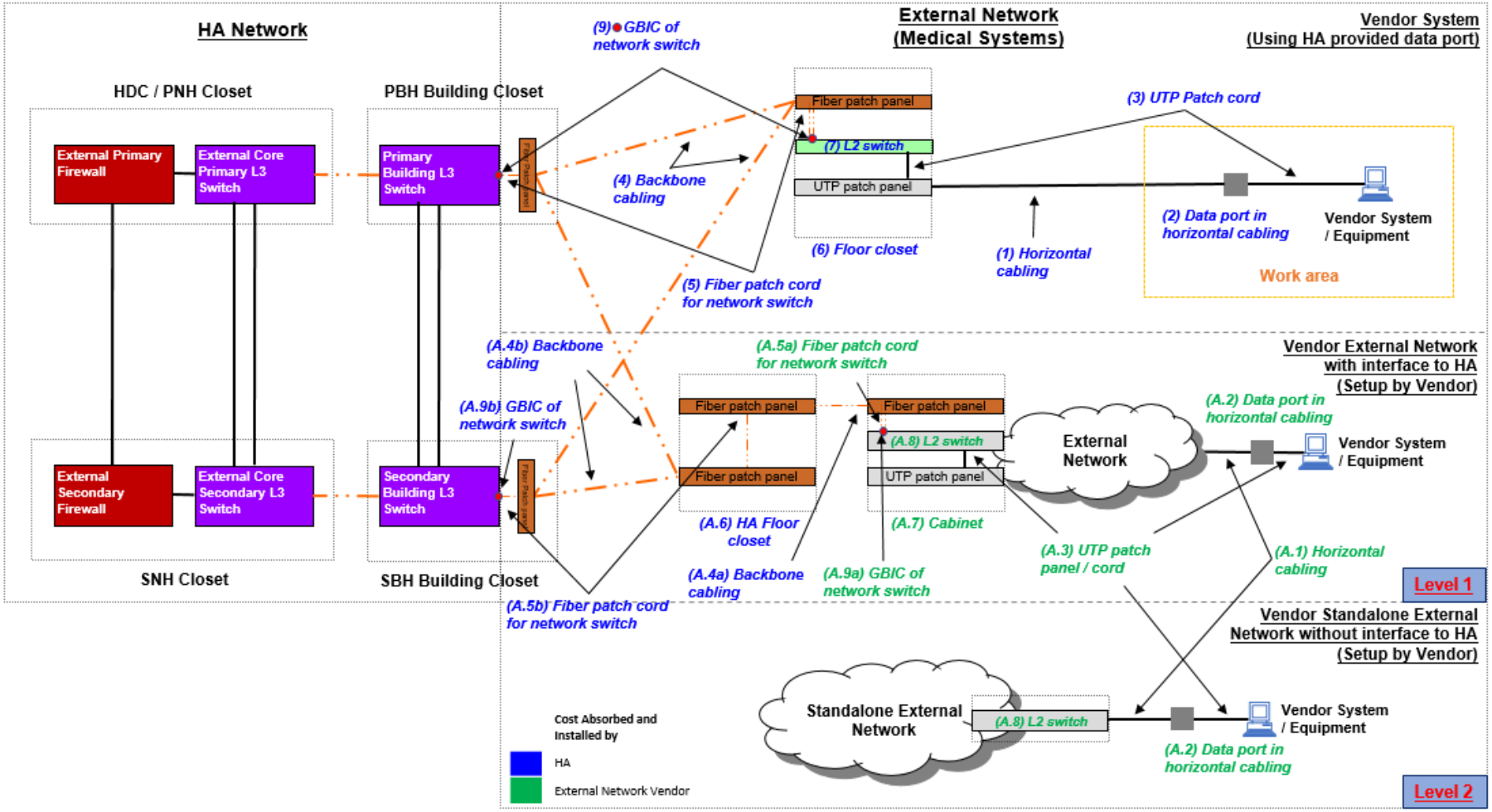
(c) A guideline shall be developed to maintain the standards of cabling system implementation and network setup in External Network.

4. Guidelines to Setup External Network

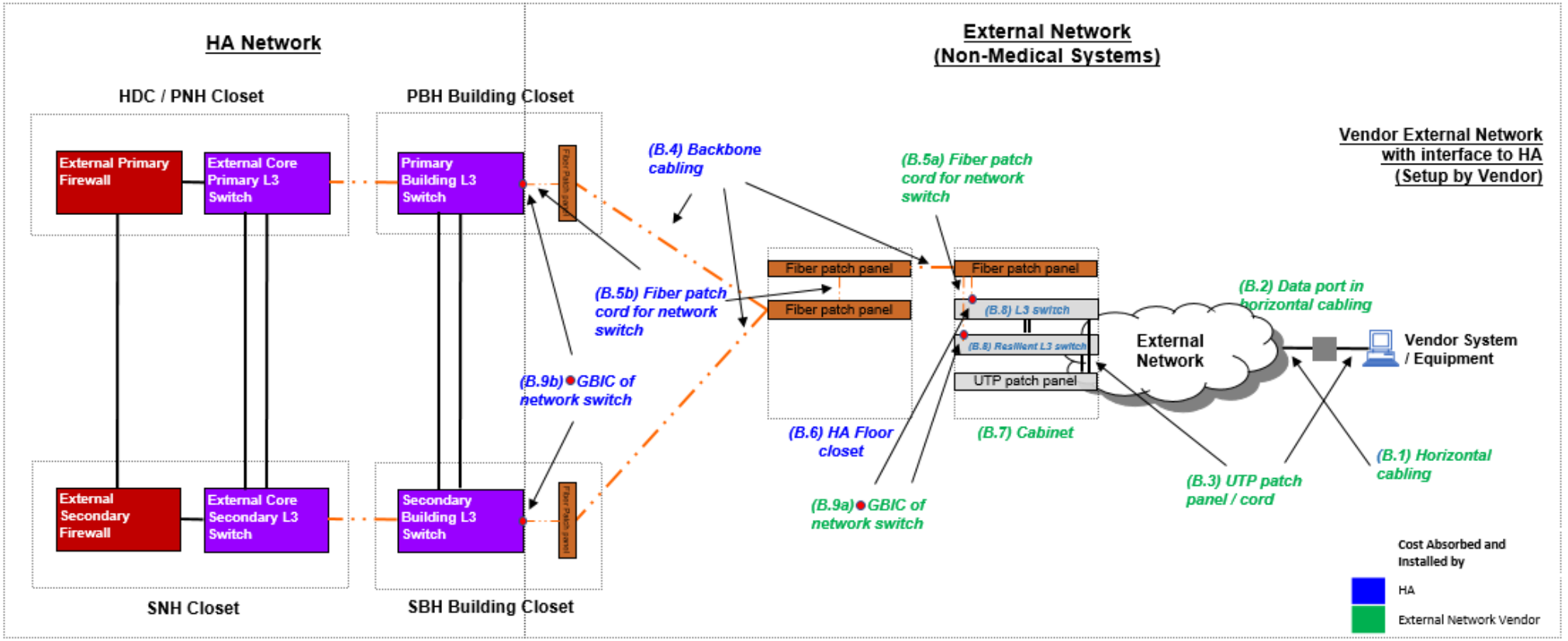
Level	Type	Standards and Guidelines	Cabling	Network Equipment	Criteria
1	Vendor External Network with interface to HA	Follow: 1. IT Security Requirements for Quotation / Tender – Procurement of "non-IT" System/Equipment 2. This guideline for cabling system and network setup	Vendor can use their own cabling contractor (Except backbone cabling to be done by HA cabling contractor)	Vendor can use their own L2 switch that meet the specification in this guideline	Vendor shall provide the Cabling System and Network Setup Checklist for record purpose
2	Vendor Standalone External Network without interface to HA		Vendor can use their own cabling contractor	Vendor can use their own L2 switch	

5. External Network Architecture

Below diagram illustrates the External Network Architecture for Medical Systems



Below diagram illustrates the External Network Architecture for Non-Medical Systems



6. Roles & Responsibilities

Level	External Network	Component	Cost Absorbed and Installed by
1	Vendor External Network with interface to HA	(A.1) Horizontal cabling (Between Data port and vendor cabinet)	External Network Vendor
		(A.2) Data port (in horizontal cabling)	
		(A.3) UTP patch panel / cord for data port and in vendor cabinet	
		(A.4a) Horizontal Backbone cabling	HA
		(A.4b) Vertical Backbone cabling	
		(A.5b) Fiber patch cord for network switch	
		(A.6) HA Floor closet	
		(A.7) Cabinet	External Network Vendor
		(A.8) L2 Switch	
		(A.9a) GBIC of Network switch at vendor cabinet	
		(A.9b) GBIC of Network switch at PBH / SBH building closets	HA Network Equipment Vendor
2	Vendor Standalone External Network without interface to HA	(A.1) Horizontal cabling (Between Data port and vendor cabinet)	External Network Vendor
		(A.2) Data port (in horizontal cabling)	
		(A.3) UTP patch cord for data port and in vendor cabinet	
		(A.5a) Fiber patch cord for network switch	
		(A.8) L2 Switch	

7. Network Cabling System & Network Equipment

External Network	Usage	Product Description
Network cabling system	(A.1) Horizontal cabling (A.2) Data port (in Horizontal cabling)	Cat6 / Cat6A cable, LSZH rated
		Faceplate with modular Jack, angled outlet with shutter/latch or rack-mounted RJ45 patch panel with modular jacks, 24-port, 1U, straight, each modular jack shall be separately replaceable
	(A.3) UTP Patch panel / cord for Data port and in vendor cabinet	1-metre Cat6 / Cat6A slim patch cord with RJ45 connectors at both ends, straight, LSZH rated, factory-terminated
		2-metre Cat6 / Cat6A slim patch cord with RJ45 connectors at both ends, straight, LSZH rated, factory-terminated
		3-metre Cat6 / Cat6A patch cord with RJ45 connectors at both ends, straight, LSZH rated, factory-terminated
		Rack-mounted RJ45 patch panel with modular jacks, 24-port, 1U, straight, each modular jack shall be separately replaceable
	(A.4a) Horizontal Backbone cabling (A.4b) Vertical Backbone cabling	Indoor / outdoor 12-core, 9/125mm OS2 single-mode optical fiber, LSZH rated, with duplex LC connector at both ends
		Rack-mounted single-mode fiber patch panel with 24 duplex LC couplers/adapters, 48 cores, 1U
	(A.5a) Fiber patch cord for network switch (A.5b) Fiber patch cord for network switch	2-metre / 3-metre, single-mode OS2 fiber patch cord, LSZH rated, with duplex LC connector at both ends, factory terminated
	(A.6) Cabinet	Communication equipment cabinet (Floor-standing, steel, at least 1000kg load capacity, fully perforated front door, fully perforated middle-split rear door, all doors equipped with key locks, heavy duty casters with feet): 1. 42U racking space (Dimension: height 2050mm x width 800mm x depth 1100mm) or 2. 42U racking space (Dimension: height 2050mm x width 800mm x depth 870mm) or 3. 42U racking space (Dimension: height 2050mm x width 600mm x depth 1100mm) or 4. 42U racking space (Dimension: height 2050mm x width 600mm x depth 870mm) or

		5. 37U racking space (Dimension: height 1800mm x width 600mm x depth 870mm) or 6. 27U racking space (Dimension: height 1400mm x width 600mm x depth 870mm) In Hospital Data Centre (HDC): Communication equipment cabinet (Same as the above requirements): 1. 42U racking space (Dimension: height 2050mm x width 600mm x depth 1200mm) Server cabinet (Same as the above requirements except the load capacity is 1500kg): 1. 42U racking space (Dimension: height 2050mm x width 600mm x depth 1200mm) or 2. 47U racking space (Dimension: height 2250mm x width 600mm x depth 1200mm) The cabinet size is subject to actual site environment.
Network equipment	(A.8) L2 switch	1. For Vendor External Network with interface to HA (Level 1): - Vendor can use other L2 switch according to the L2 Switch Specification Requirements and L2 Switch Configuration specified in section 10 and 11 respectively 2. For Vendor Standalone External Network without interface to HA (Level 2): - Vendor can use their own L2 switch
	(A.9a) GBIC of network switch at Building closet	1000BASE-LX/LH SFP transceiver module MMF/SMF 1310nm.
	(A.9b) GBIC of network switch at vendor cabinet	1000BASE-LX/LH SFP transceiver module MMF/SMF 1310nm

8. Network Cabling In External Network

8.1 Cabling System Structure In Hospital

The elements of the cabling system structure in hospital are:

a. Backbone cabling;

b. Horizontal cabling;

c. Data port (in Horizontal cabling);

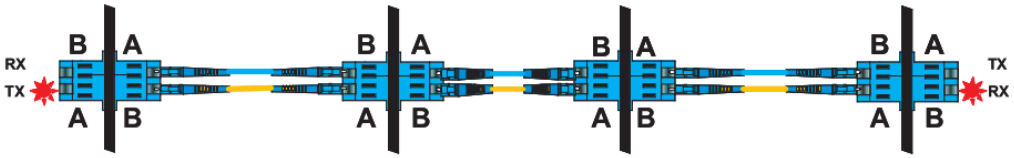
d. Floor closet.

8.2 Backbone Cabling

a. The function of the backbone cabling is to provide interconnections between Floor closet of External Network and Building closets of HA Network.

b. Backbone cabling consists of the backbone cables, intermediate and main cross-connects mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection. Backbone cabling also includes cabling between buildings.

c. For fiber backbone cable, fiber patch cord, the fiber polarity shall be pair-flipped (A-to-B and B-to-A connection) to ensure transmit-to-receive connectivity.



d. Recognized cables

Below type of cable is recognized and recommended for use in the backbone cabling system in HA network:

- 9/125 µm OS2 single mode optical fiber.

Recognized cables, associated connecting hardware, patch cords and equipment cords shall meet all applicable requirements specified in ANSI/TIA/EIA-568-B.3.

8.3 Horizontal Cabling

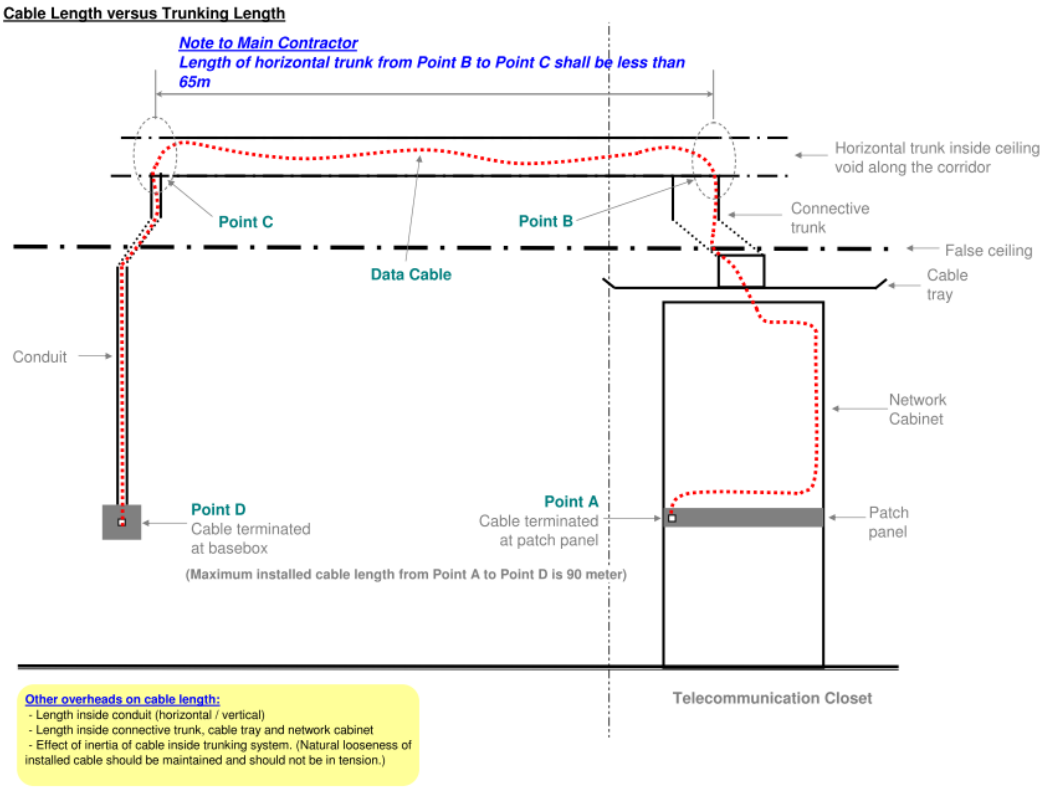
a. The horizontal cabling is the portion of the telecommunication cabling system that extends from the Data port in work area to the Floor closet. In HA environment, that also means the linkage between user Data port and patch panel in network closet;

b. The horizontal cabling includes horizontal cables, Data port in the work area, mechanical terminations and patch cords or jumpers located in the Floor closet;

c. The term "horizontal" is used since typically the cable in this part of the cabling system runs horizontally along the floor of a building;

d. Horizontal distances:

The horizontal distance is the cable length from the mechanical termination of the media at the horizontal cross-connect in the Floor closet to the Data port in the work area. The maximum horizontal distance for copper cabling shall be 90m and the cable inside ceiling trunking shall not exceed 65m length;



For each horizontal channel, the total length allowed for cords in the work area plus patch cords or jumpers plus equipment cables or cords in the Floor closet shall not exceed 10 m (33 ft). An allowance was made for 5 m (16 ft) from the telecommunications outlet to the work station.

e. Recognized cables

Two types of cables are recommended for use in the horizontal cabling system in HA network, as designated by HA:

- Four-pair 100-ohm foiled/unshielded twisted-pair (F/UTP). Cat.6a cable or;
- Four-pair 100-ohm unshielded twisted-pair (UTP). Cat.6 cable.

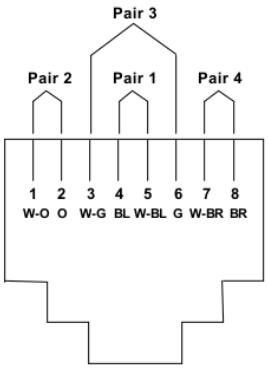
Recognized cables, associated connecting hardware, jumpers, patch cords, equipment cords, and work area cords shall meet all applicable requirements specified in ANSI/TIA/EIA-568-B.2.

8.4 Data Port (In Horizontal Cabling)

a. The work area components extend from the Data port to the Medical work station;

b. The Data port for 100-ohm UTP cable shall meet the requirements of ANSI/TIA/EIA-568-B.2;

c. T568B wiring scheme shall be used for termination of copper cabling system in HA;

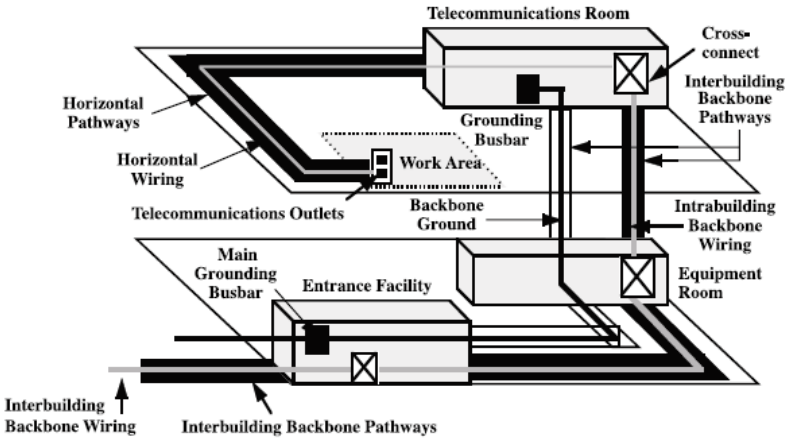


Eight-position jack pin/pair assignment (T568B)

d. Patch cords used in the work area shall meet or exceed the performance requirements in ANSI/TIA/EIA-568-B.2. Therefore, allowed maximum length of work area cord is 5m and 3m cord is for generic used;

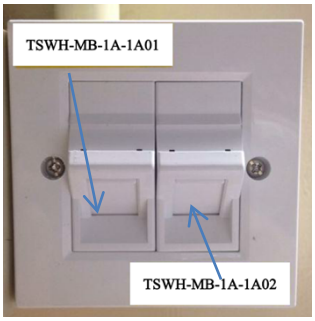
e. Labelling of Data port:

HA follows ANSI/TIA/EIA-606-A for labelling of Data ports;



Scope of ANSI/TIA/EIA-606-A

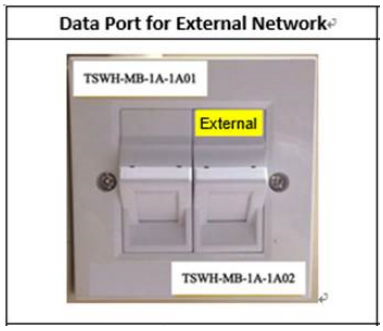
Data port's ID shall be printed on white label with black ink. The ID of left-hand side outlet shall be affixed on the upper left-hand corner and the right-hand side outlet shall be on the lower right-hand corner of the faceplate as below:



Labelling of Data port's usage:

- Labels shall be printed in black word on yellow label in 2cm x 1cm size as below:

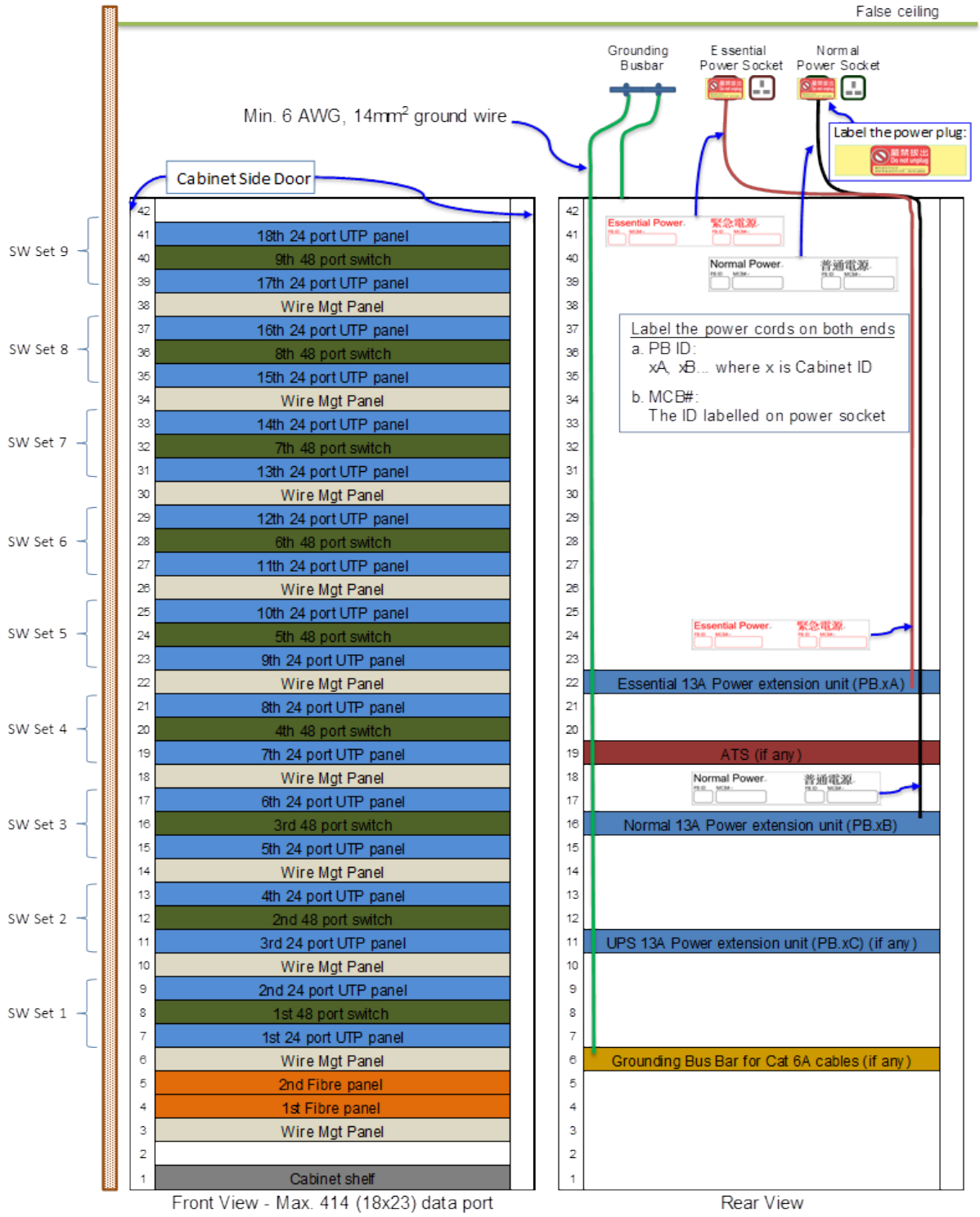
External Network Data port: Yellow label



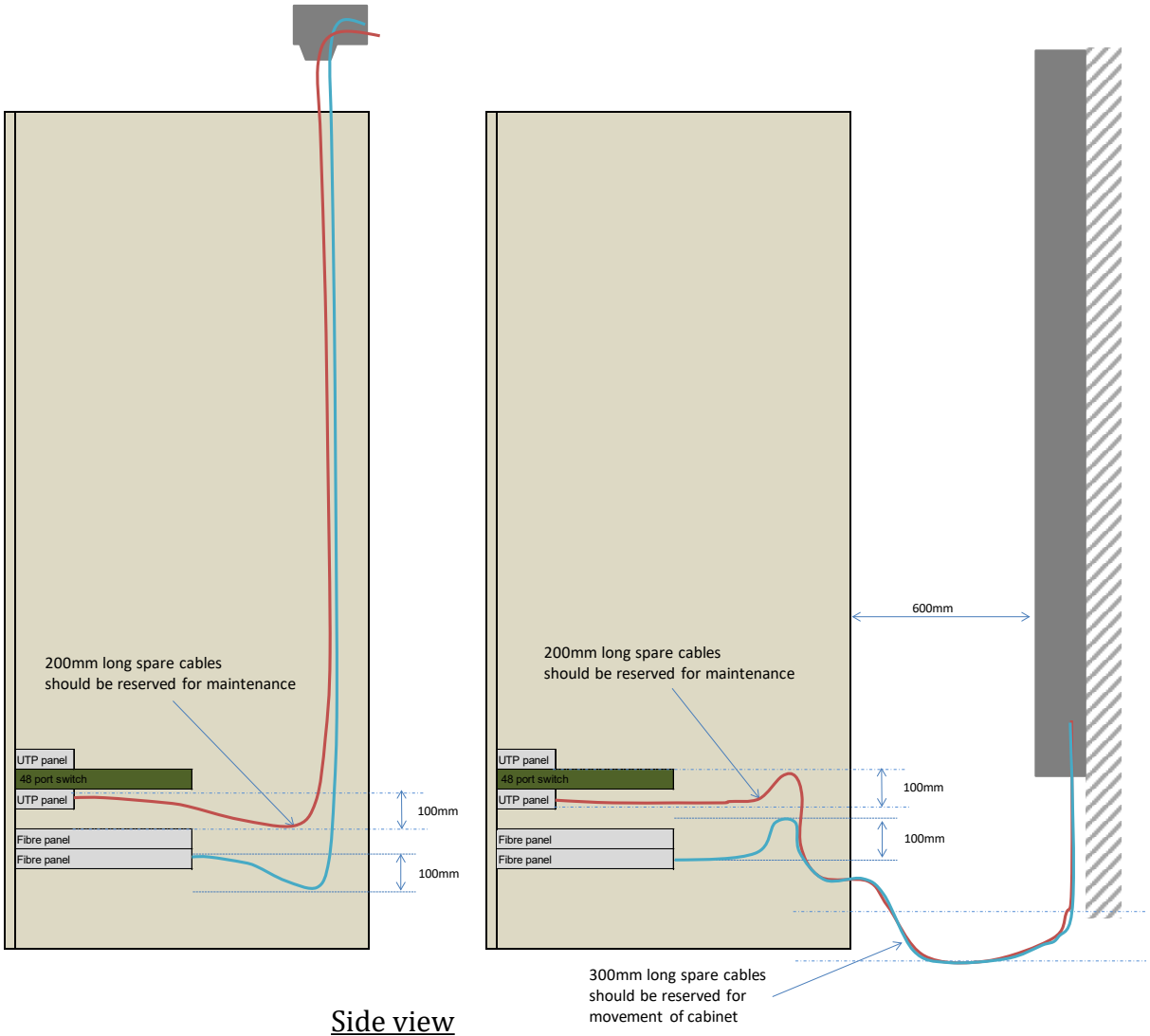
8.5 Floor Closet Setup

a. Floor-stand cabinet:

Cabinet space assignment:



Termination of network cables for floor-stand cabinet:



Side view

9. External Network Setup by Vendor

For Vendor External Network with interface to HA (Level 1) and Vendor Standalone External Network without interface to HA (Level 2), External Network Vendor shall follow below guidelines to setup the External Network:

9.1 Shall setup the Local Area Network (LAN) of Vendor External Network (Level 1) and (Level 2) regarding the roles and responsibilities in section 6.

9.2 Horizontal cabling for Vendor External Network (Level 1) and (Level 2):

a. Recognized cables:

Two types of cables are recommended for use in the horizontal cabling system in HA network, as designated by HA:

- Four-pair 100-ohm foiled/unshielded twisted-pair (F/UTP). Cat.6a cable or;

- Four-pair 100-ohm unshielded twisted-pair (UTP). Cat.6 cable;

Recognized cables, associated connecting hardware, jumpers, patch cords, equipment cords, and work area cords shall meet all applicable requirements specified in ANSI/TIA/EIA-568-B.2.

b. Most of hospitals have been adopted Cat. 6 cable that the External Network Vendor shall use Cat.6 cable by default.

c. The External Network Vendor shall install Cat.6a cabling standard in those hospital buildings that Cat.6a cabling systems are installed. (Please refer to Appendix A for the list of new hospital or building).

d. The type of horizontal cabling to be adopted is subject to the confirmation by HA.

9.3 For Vendor External Network (Level 1) setup, the backbone cables (Two orange long dash dotted lines from Building closets to HA Floor closet and one orange long dash dotted lines from vendor cabinet to HA Floor closet) and GBICs at Building closets (the red dots at Primary & Secondary Building L3 switches of HA Network) in the diagram of section 5 “External Network Architecture” shall be installed by HA.

9.4 Backbone cable of Vendor External Network (Level 1) to HA Network:

a. Backbone cabling consists of the backbone cables, intermediate and main cross-connects mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection. Backbone cabling also includes cabling between buildings;

b. Recognized cables:

Below type of cable is recognized and recommended for use in the backbone cabling system in HA network:

- 9/125 µm OS2 single mode optical fiber.

Recognized cables, associated connecting hardware, patch cords and equipment cords shall meet all applicable requirements specified in ANSI/TIA/EIA-568-B.3.

9.5 HA shall arrange HA Authorized Cabling Contractor to install these backbone cablings and HA Equipment Vendor to install the GBICs at Building closets.

9.6 External Network Vendor shall install the GBICs in the switch at vendor cabinet.

9.7 At least one L2 switch or with resilient when HA requires and shall cater for different auto network failover and recovery scenarios.

9.8 The External Network Vendor shall coordinate with hospital end user to install floor-standing cabinet for accommodation of network and cabling equipment. Detail of floor-standing cabinet could be referred to section 8.5 “Floor closet setup”.

9.9 All network connections and corresponding network diagrams shall be well documented.

10. L2 Switch Specification Requirements

10.1 For Vendor External Network with interface to HA (Level 1) setup, External Network Vendor is required to supply, deliver, install and maintain the Layer-2 Ethernet switch and related hardware, software and services to support the network requirements of the External Network.

10.2 The configuration of the proposed switch shall support:

10.2.1 24 numbers or above of wire-speed full duplex auto-sensing 100/1000Baase-T Ethernet ports plus at least 4 numbers of wire-speed full duplex auto-sensing pluggable transceiver Ethernet ports support 1Gbps and 10Gbps;

10.2.2 Shall support bridging and at least 16,000 MAC address table size;

10.2.3 Shall provide Layer-2 switching capacity of at least 64Gbps bandwidth in full duplex (that is, 128Gbps bandwidth for transmit and receive simultaneously);

10.2.4 Shall support Resilience link assigned to any pair of ports without using Spanning Tree Protocol (STP). Only one link is in transmission mode and the other one is in standby/backup mode;

10.2.5 Shall support Link Aggregation Control Protocol (LACP);

10.2.6 Shall support IEEE 802.1Q VLANs. The VLANS shall be grouped by ports within a single switch;

10.2.7 All ports shall be able to be assigned to both tagged and untagged VLANs at the same time;

10.2.8 Shall support packet classification and filtering by user-defined criteria based on TCP/UDP ports and/or Source/Destination IP addresses without Layer-3 routing protocol enabled;

10.2.9 Shall support IPv4 and IPv6 protocols;

10.2.10 Shall support IGMP V1/v2 and Snooping;

10.2.11 Shall support RFC 2138 RADIUS Authentication;

10.2.12 Shall support RFC 2139 RADIUS Accounting;

10.2.13 Shall support the authentication through the RADIUS. At least two RADIUS servers (Primary and Backup/Secondary) can be defined;

10.2.14 Shall support NTP or SNTP with at least two time servers;

10.2.15 Shall support IEEE802,1x EAP Authentication;

10.2.16 Shall support 802.1x MAC-based mechanisms network login;

10.2.17 Shall support syslog remote logging to at least two servers;

10.2.18 Shall support the following network management features:

10.2.19 local and remote management including but not limited to changing configuration, upload/download configuration files to management server, download firmware from management server, resetting switch port and reboot with following connectivity:

(i) at least one out-of-band 100-BaseT or 1000-BaseT management port for remote management over SSHv2 (RFC4251 and associated RFCs);

(ii) REST based or equivalent API for remote management;

(iii) Console port for local management.

10.2.20 Mirror port for attachment of network analyzer;

10.2.21 SNMP V2c/V3 and RFC1213 MIBII;

10.2.22 Shall support Access Control Lists (ACLs);

10.2.23 Shall support not be greater than 1U (45mm);

10.2.24 Shall come with power cord meeting the following specifications subject to HA instruction:

(i) 2 meter IEC320 C14 to IEC320 C13 or IEC320 C15 (10A / 15A rating, straight / L-Shape as per request) power cord with both side lockable; or

(ii) 2 meter BS1363 plug to IEC320 C13 or IEC320 C15 lockable connector (10A / 15A rating, straight / L-Shape as per request) power cord.

10.2.25 Shall support dual hot-swappable power supply;

10.2.26 The depth of the Layer-2 switch shall not be greater than 420mm; and

10.2.27 To ensure the compatibility with HA network, the vendor L2 switch shall compatible with the following HA network switch at Building including but not limited to:

(i) Cisco Nexus Series Layer-3 switches;

(ii) Extreme Networks Layer-3 switches; and

(iii) Huawei CloudEngine Layer-3 switches.

11. L2 Switch Configuration

11.1 For Vendor External Network with interface to HA (Level 1) setup, Vendor is required to configuration the Layer-2 Ethernet switch to support the network requirements of the External Network.

11.2 The L2 switch shall have two 1000BASE-LX SFP uplink port such as:

a. Port 51 is Primary uplink to Primary Building Switch in HA Network.

b. Port 52 is Resilience uplink to Secondary Building Switch in HA Network.

11.3 The switch port status shall be shutdown if NO connection. The switch is required to be enabled when the Vendor system / equipment to be connected to the switch.

11.4 VLANs are required to be created for Vendor system / equipment in configuration:

a. VLAN ID to be provided by Hospital Authority when project to be implemented.

11.5 For switch port of Primary uplink and Resilience uplink such as:

a. The port status of Port 51 (Primary uplink) is required to be enabled. The port mode is “mode trunk”. Backup port is Port 52 (Resilience uplink).

b. The port status of Port 52 (Resilience uplink) is required to be enabled. The port mode is "mode trunk". No backup port is needed.

11.6 For other configuration of switch port such as 1 to 48, Port mode is "mode access". Port security shall be enabled. Port security violation mode to be restricted. Port logging to be enabled. No MDIX is required.

11.7 The network switches shall connect to the end device directly.

11.8 No daisy-chaining or cascading of network switches are allowed.

11.9 Additional configuration according to HA request.

Below is the Cisco Catalyst L2 switch basic configuration. The proposed L2 switch shall implement the same or equivalent feature / status and shall be fully compatible with the existing HA environment:

Switch Port	**Feature / Status**	**Switch Configuration**
Port 1 - 48	Port Status	shutdown (refer to 11.3)
	Port Mode	mode access
	Port VLAN ID	VLAN xxx (refer to 11.4)
	Port security	Enable
	Port security violation mode	restrict
	Port logging	disable
	MDIX	No
Port 51 (Primary Uplink)	Port Status	no shutdown
	Port Mode	mode trunk
	Active Port	rep segment xxx edge no-neighbor primary
Port 52 (Resilience Uplink)	Port Status	no shutdown
	Port Mode	mode trunk
	Backup Port	rep segment xxx edge no-neighbor preferred

12. Checklist

12.1 External Network Vendor shall submit the "Cabling System and Network Setup Checklist" with respective to the requirements stipulated in this guideline for record purpose. (Please refer to Appendix B for the sample checklist)

12.2 The completed "Cabling System and Network Setup Checklist" shall return to Head Office Information Technology (HOIT) by email to "n5.extnet@ha.org.hk" within 3 months after the installation / network setup.

12.3 For any general enquiries relating to Cabling System and Network Setup, please contact HOIT by email to "n5.extnet@ha.org.hk".

13. Further Information

Further information and details can be obtained by contacting:

- Will Ng, HO IT&HI SA(N5)3, 35426027, nwt404@ha.org.hk
- HO IT&HI N5 External Network, n5.extnet@ha.org.hk
- C K HUNG, HO IT&HI SSM(N), 2300 6602, ck.hung@ha.org.hk

Appendix A: List of Hospital Adopting Cat. 6a cable

List of new hospital buildings installed with Cat.6a cabling systems

No.	Hospital Name
1	H K Red Cross Blood Transfusion Service (BTS) - New Annex Building
2	Haven of Hope Hospital (HHH) - Trinity Block
3	Hong Kong Children's Hospital (HKCH) – all blocks
4	Multi-service Centre (MSC) – all blocks
5	Shatin Hospital (SH) - Block D
6	Tune Mun Hospital (TMH) – OT Block Extension
7	Kwong Wah Hospital – New Block

Appendix B: Cabling System and Network Setup Checklist

Hospital: _____ Name of External Network: _____
Location: _____ IP Subnet: _____
Reviewer: _____ Post Reviewer: _____
Date: _____

Cabling System and Network Setup Checklist

No.	Description	(Y/N)	Remark
A	**Cabling System**		
A1	All cables passed with soft copy of test report submitted		
A2	All cables for use in the horizontal cabling system are: - Four-pair 100-ohm unshielded twisted-pair (UTP). Cat.6 cable or; - Four-pair 100-ohm foiled/unshielded twisted-pair (F/UTP). Cat.6a for using in new building / hospital		
A3	All cables, associated connecting hardware, jumpers, patch cords, equipment cords, and work area cords shall meet all applicable requirements specified in ANSI/TIA/EIA-568-B.2		
A4	The data ports for 100-ohm UTP cable shall meet the requirements of ANSI/TIA/EIA-568-B.2 and T568B wiring scheme shall be used for termination of copper cabling system		
A5	Patch cords used in the work area shall meet or exceed the performance requirements in ANSI/TIA/EIA-568-B.2		
A6	All fiber cables, associated connecting hardware, jumpers, patch cords, equipment cords shall meet all applicable requirements specified in ANSI/TIA/EIA-568-B.3		
A7	Follow HA standards in the labelling of data ports		
A8	Follow HA standards to install floor-stand cabinet and cabinet space assignment		
B	**Network Switch**		
B1	Provide the brand and model of the network switch: _____		
B2	Provide the configuration of the network switch		
B3	The network switch port shall be shutdown if NO connection		
B4	There is no daisy-chaining or cascading of network switches		
B5	The network switch port to connect end device shall enable with port security and port security violation mode restrict.		
B6	All network connections and corresponding network diagram shall be well documented		
B7	Drill test shall be performed regularly to ensure the entire application / system and network failover is working as expected		
C	**Network Switch Interface to HA Network**		
C1	The network switch shall have two uplink ports connect to Primary and Secondary building switches in HA Network respectively		
C2	The uplink ports shall have two 1000BASE-LX Small form-factor pluggable (SFP) transceiver		
C3	The resilience link assigned to any pair of uplink ports without using spanning tree protocol (STP) and only one link is in transmission mode and the other one is in standby/backup mode		

C4	The port mode has been configured as "mode trunk" in the primary and resilience uplinks of the network switch		
C5	The VLAN ID provided by HA has been created in the network switch		

"Passed" Cabling Test Report Sample

Cable ID: QMH.J.4.WARD.AP.04 — **Test Summary: PASS**

Test Limit: TIA Cat 6 Channel
Limits Version: V7.5
Date / Time: 05/25/2021 05:10:29 PM
Headroom 0.9 dB (NEXT 3,6-4,5)
Cable Type: Cat 6 U/UTP
NVP: 69.0%

Main: Versiv
S/N: 1938426
Software Version: V6.5 Build 5
Calibration Date: 02/20/2020
Adapter: DSX-8000 (DSX-CHA804)
S/N: 19253617

Remote: Versiv
S/N: 1938425
Software Version: V6.5 Build 5
Calibration Date: 02/20/2020
Adapter: DSX-8000R (DSX-CHA804)
S/N: 19253584

Length (m), Limit 100.0	[Pair 4,5]	75.7
Prop. Delay (ns), Limit 555	[Pair 1,2]	390
Delay Skew (ns), Limit 50	[Pair 1,2]	24
Resistance (ohms)	[Pair 7,8]	19.11
Insertion Loss Margin (dB)	[Pair 1,2]	12.7
Frequency (MHz)	[Pair 1,2]	250.0
Limit (dB)	[Pair 1,2]	35.9

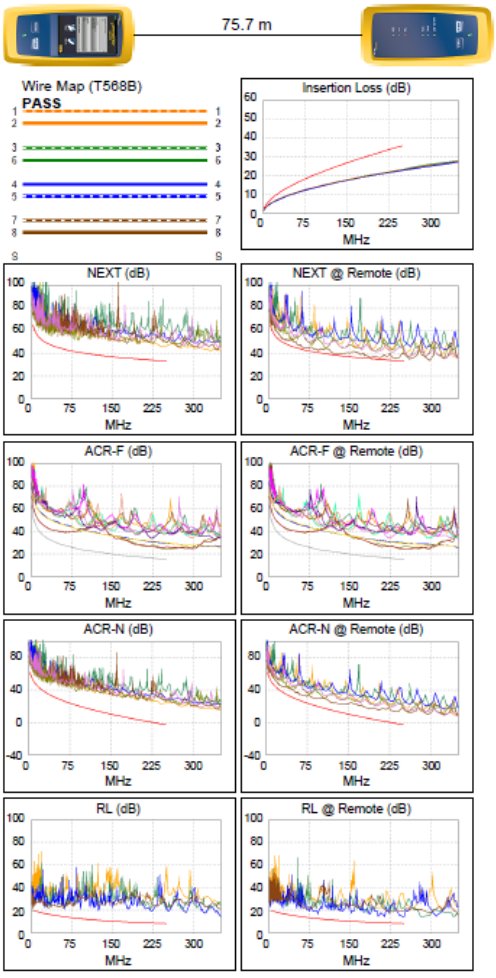
	Worst Case Margin		Worst Case Value	
PASS	MAIN	SR	MAIN	SR
Worst Pair	3,6-4,5	3,6-4,5	1,2-3,6	3,6-4,5
NEXT (dB)	7.9	0.9	12.3	1.5
Freq. (MHz)	2.6	123.5	240.0	233.5
Limit (dB)	65.0	38.4	33.4	33.6
Worst Pair	3,6	3,6	3,6	3,6
PS NEXT (dB)	10.0	2.6	12.6	3.5
Freq. (MHz)	9.4	188.0	248.5	229.5
Limit (dB)	54.5	32.3	30.2	30.8

PASS	MAIN	SR	MAIN	SR
Worst Pair	3,6-4,5	4,5-3,6	3,6-4,5	4,5-3,6
ACR-F (dB)	7.7	7.7	9.2	8.9
Freq. (MHz)	1.4	1.4	247.0	247.0
Limit (dB)	60.5	60.5	15.4	15.4
Worst Pair	3,6	4,5	4,5	3,6
PS ACR-F (dB)	10.4	10.3	11.9	11.8
Freq. (MHz)	1.3	1.3	247.0	247.0
Limit (dB)	58.3	58.3	12.4	12.4

N/A	MAIN	SR	MAIN	SR
Worst Pair	3,6-4,5	3,6-4,5	1,2-3,6	3,6-4,5
ACR-N (dB)	9.0	4.7	24.8	14.1
Freq. (MHz)	2.6	2.6	240.0	233.5
Limit (dB)	61.7	61.7	-1.7	-0.9
Worst Pair	3,6	3,6	3,6	3,6
PS ACR-N (dB)	11.3	7.3	25.3	16.1
Freq. (MHz)	2.5	2.6	248.5	233.0
Limit (dB)	58.8	58.7	-5.6	-3.8

PASS	MAIN	SR	MAIN	SR
Worst Pair	7,8	4,5	4,5	4,5
RL (dB)	5.6	4.1	10.6	5.5
Freq. (MHz)	32.8	90.0	222.5	244.5
Limit (dB)	16.4	12.5	8.5	8.1

Compliant Network Standards:
10BASE-T, 100BASE-TX, 100BASE-T4
1000BASE-T, 2.5GBASE-T, 5GBASE-T
ATM-25, ATM-51, ATM-155
100VG-AnyLan, TR-4, TR-16 Active
TR-16 Passive



EMSD GWIN General Gateway Installation Requirements

Version 1

1. General Requirements for Gateway Installation

1.1 Introduction

1.1.1. LoRa gateway is the core infrastructure in Government Wide Internet-of-Thing Network (GWIN) which serves to provide wireless signal coverage for the sensor devices installed on site as stipulated in Annex 1.

1.1.2. 1 no. LoRa gateway can typically provide up to 3-5 km line of sight outdoor signal coverage for the communication with up to 100 numbers of sensor devices depending on the actual data traffic required for the sensor applications.

1.1.3. In general, site survey would be required to determine the optimised locations of indoor and outdoor gateways to serve the target sensor applications.

1.2 Gateway Installation Requirements

1.2.1. For better outdoor coverage, the location of outdoor gateway is preferred to be at high location. (i.e. building rooftop). There are two typical installation locations for outdoor gateways.

(a) Metal enclosure housing gateway and associated accessories (approximate 400mm W x 500mm L x 200mm D) being wall-mounted inside plant room area while the outdoor antenna (approximately 1000mm L) to be extended for mounting at outdoor locations using coaxial cables with cable distance not exceeding 10m.

(b) Metal enclosure and outdoor antenna being wall-mounted at building rooftop

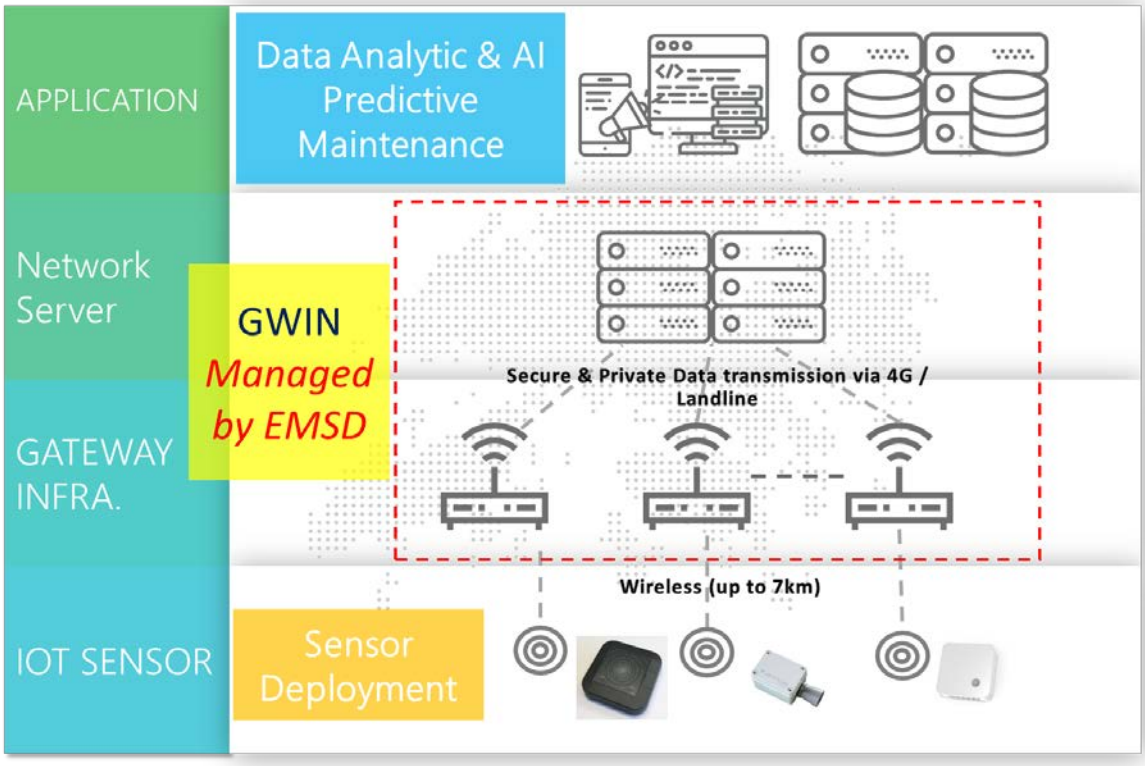
1.2.2. The metal enclosure shall be located to accessible location for maintenance. The mounting details of the equipment for each mounting scenarios shall be certified by the Registered Structural Engineer (RSE). A protective conductor shall be provided for the metal enclosure.

1.2.3. 220V 13A single phase fuse spur unit shall be provided by the project main contractor for each outdoor gateway locations.

1.2.4. Lightning protection shall be provided by the project main contractor for the outdoor gateway and antenna.

1.2.5. Landline shall be provided by the project main contractor for each gateway location if a mobile network by local telecommunication company is not available.

Annex 1 – System Hierarchy



Annex 2 – Outdoor Gateway Installation

1.1 Specifications of LoRaWAN Gateway

1.1.1 LoRaWAN Gateway (Outdoor)

LoRaWAN Gateway to be supplied and installed shall fully comply with the minimum requirements specified in the technical specification below:-

Gateway (Outdoor)	
Cellular	4G-LTE Category 4, with HSPA+ 42/GPRS fallback; Global frequency band suitable for use in Hong Kong including 4G: 1800(B3)/2600(B7); 3G: 900(B8)/2100(B1); and 2G: 900/1800
Processor & Memory	ARM9 processor with 32-Bit ARM & 16-Bit Thumb instruction sets 400 MHz, 16K Data Cache, 256 MB Flash Memory, 16K Instruction Cache, 128X16M DDR RAM
Packet Data	Up to 100 Mbps downlink, Up to 50 Mbps uplink
Radio Frequency LoRa	Compatible with AS 923MHz
Radio Frequency Wi-Fi & BT/BLE	802.11 a/b/n/g 2.4 GHz and 5 GHz & BT Classic BLE 4.1
Storage	Micro SD
Input Voltage	Power over Ethernet (PoE) 48VDC 25W compliant to IEEE802.3at
Local Ethernet internet	IEEE802.3 10/100 Base T compliant
Ethernet Connector	1 x RJ-45 Ethernet 10/100 port
USB Connector	2 x USB Ports: USB Host (Type-A), USB Device (Micro-B)
Serial Connector	1 x Debug Serial: USB Micro-B
Antenna	Equipped with 2 nos. of at least 3dBi antenna for 4G LTE; 1 no. of at least 3dBi antenna for LoRa; & 1 no. of GPS antenna
SIM Connector	Micro SIM (3FF)
Accessories	Equipped with all necessary accessories, including antennas and mounting kit
Weight	Less than 3kg
Chassis Type	IP67 Rated, Aluminium
Environmental ratings	Operation temperature : 0^{O}C to +55^{O}C or better; Relative humidity : 20% - 90% or better, non-condensing;
Certification	Electromagnetic compatibility: EN 55022 Class B, EN 55024 compliant;

Gateway (Outdoor)	
	Safety: IEC 60950-1 2nd Ed compliant; and Radio: EN 300 220 compliant.
Software Requirement	Enhanced and embedded Linux platform or equivalent; LoRa packet forwarder; WAN Connection; Cellular PPP, Dynamic DNS, DHCP Server/Client; WAN connection via Ethernet or cellular; LAN/WAN Security; Secure firewall with NAT and port forwarding; Static routing; Node-RED integration; Built-in Node-RED application development environment; Language Support; C, C++, Python, Javascript, node.js, bash; Router/Modem management; Graphical web interface for configuration and management; Remote Access; Configuration backup & restore; and Easy firmware upgrade through web interface

1.1.2 LoRaWAN Gateway (Indoor)

LoRaWAN Gateway to be supplied and installed shall fully comply with the minimum requirements specified in the technical specification below:-

Gateway (Indoor)	
Cellular	4G-LTE Category 4, with HSPA+ 42/GPRS fallback; Global frequency band suitable for use in Hong Kong including 4G: 1800(B3)/2600(B7); 3G: 900(B8)/2100(B1); and 2G: 900/1800
Processor & Memory	ARM9 processor with 32-Bit ARM & 16-Bit Thumb instruction sets 400 MHz, 16K Data Cache, 256 MB Flash Memory, 16K Instruction

Gateway (Indoor)	
	Cache, 128X16M DDR RAM
Packet Data	Up to 100 Mbps downlink, Up to 50 Mbps uplink
Radio Frequency LoRa	Compatible with AS 923MHz
Radio Frequency Wi-Fi & BT/BLE	802.11 a/b/n/g 2.4 GHz and 5 GHz & BT Classic BLE 4.1
Storage	Micro SD max size 32GB (HSMCI)
Input Voltage	9V to 32VDC
Local Ethernet internet	IEEE802.3 10/100 Base T compliant
Ethernet Connector	1 x RJ-45 Ethernet 10/100 port
USB Connector	2 x USB Ports: USB Host (Type-A), USB Device (Micro-B)
Serial Connector	1 x Debug Serial: USB Micro-B
Antenna	Female SMA; Equipped with 2 nos. of 2dBi antenna for 4G LTE; 1 no. of GPS antenna; and 1 no. of WiFi/BT antenna
SIM Connector	SIM/USIM (2FF)
Accessories	Equipped with LoRa module and at least 3dbi RP-SMA antenna for LoRa, power supply/adaptor and mounting kit, etc.
Weight	Less than 1kg
Environmental ratings	Operation temperature : 0^{O}C to +55^{O}C or better; Relative humidity : 20% - 90% or better, non-condensing;
Certification	Electromagnetic compatibility: EN 55022 Class B compliant; Safety: IEC 60950-1 2nd Ed compliant; and Radio: FCC Part 22, 24, 27 compliant

Gateway (Indoor)	
Software Requirement	Enhanced and embedded Linux platform or equivalent; LoRa packet forwarder; WAN Connection; Cellular PPP, Dynamic DNS, DHCP Server/Client; WAN connection via Ethernet or cellular; LAN/WAN Security; Secure firewall with NAT and port forwarding; Static routing; Node-RED integration; Built-in Node-RED application development environment; RS-232, RS-485; Language support; C, C++, Python, Javascript, node.js, bash; Router/Modem management; Graphical web interface for configuration and management; Remote Access; Configuration backup & restore; and Easy firmware upgrade through web interface

1.1.3 LTE Router

LTE Router to be supplied and installed shall fully comply with the minimum requirements specified in the technical specification below:-

LTE Router	
Bands	LTE bands 1, 3, 7, 8, 20 (800(B20), 900(B8), 1800(B3), 2100(B1), and 2600(B7) MHz
Download (DL)/ Upload (UP) speeds	100 Mbps (DL) and 50 Mbps (UP)
Features	(a) Auto-switch fallover between primary and backup link; (b) Multichannel-interface-processor (MIP) profile configuration; (c) CDMA Data Retry; (d) 3G MIB with 3G MIB extension and traps; (e) Remotely initiated data callback using voice; (f) Remotely initiated data callback using Short Message Service (SMS); (g) Remote firmware upgrade over 4G LTE; (h) Virtual diagnostic monitoring; (i) Mobile Equipment Personalization (MEP) lock and unlock capabilities; (j) SIM lock and unlock capabilities.
SIM slot	Dual SIM support, hardware-ready, high reliability, and cellular multi-homing support for Dual SIM card socket compliant with ISO-7816-2 (SIM mechanical)
SMS and Global Positioning System (GPS)	(a) GPS antenna: SMA connector; (b) Send and receive SMS (maximum 160 characters); (c) Standalone GPS; (d) Separate active GPS with SMA; (e) Configure multiple profile.
MIBs	(a) Enhanced 3G MIB with 4G MIB extension; (b) Entity MIB; (c) IF MIB; (d) 3G WWAN MIB persistence.

LTE Router	
4G LTE network management and diagnostics	(a) In-band and out-of-band management using Telnet and SNMP, including MIB II and other extensions; (b) Industry-standard 4G LTE diagnostics and monitoring tools (QUALCOMM CDMA Air interface Tester (CAIT) and Spirent Universal Diagnostic Monitor (UDM))
Modem	Modem form factor: Embedded Peripheral Component Interconnect (PCI) minicard
Wireless technologies	LTE 800MHz (band 20), 900MHz (band 8), 1800MHz (band 3), 2100MHz (band 1), and 2600MHz (band 7); Backward compatible with UMTS and HSPA+: 900 and 2100MHz, and DC-HSPA+, Tri-band EDGE, GPRS, and GSM.
Accessories	Accessories including Two multiband dipole antennae and one extender.

1.1.4 Supply / Installation / Relocation of Gateway and necessary accessories

The Contractor shall supply designated gateways, install, relocate (if necessary) the gateways and accessories, with supply and installation of other associated accessories and services including but not limited to supply and installation of antenna, coaxial cable, signal cable, power supply, charger, power cable, power point, power meter, surge arrestor, electrical devices, waterproof cabinet / housing (at IP66 or better rating), SIM card, dismantle of necessary equipment and accessories (for relocation of gateways), configuration and registration for the gateways supplied and / or installed under this Contract such that the gateways and other equipment operate normally as a completed system in the designated location and environment. The specification of the system components shall comply with the requirements stipulated in other clauses of this specification. The Contractor shall submit the proposed system design and material submission for approval by the Engineer's Representative(s).

1.1.5 Supply and installation of additional Lightning Protection

The Contractor shall supply and install appropriate lightning protection rods, conductors and all necessary fittings and accessories in accordance with BS EN 62305 to provide lightning protection for the installed Gateway and associated antenna system. The Contractor shall submit proposed mounting method and shall be responsible for verification and proposing the mounting height and location such that the lightning protection system can fully cover and protect the installed Gateway and associated antenna system. All connections and joints shall be mechanically and electrically connected to the

existing lightning protection system installed at the relevant venues, and shall be protected from corrosion by the operating environment.

1.1.5.1 Lightning Arrestor / Surge Protector

- LAN interface: Dual RJ-45 10/100/1000
- 802.3at Power-Over-Ethernet Plus (PoE+) compatible
- RoHS compliant
- Ground Lug: 10 AWG Max.
- DC spark-over voltage: 75V +-25%
- Impulse spark-over voltage at 100V/us <=500V, at 1kV/us <=600V
- Operation temperature: 0°C~ +55°C

1.1.6 Supply and installation of LTE Router and necessary accessories

The Contractor shall supply and install a separate LTE router and other associated accessories and services including but not limited to the supply and installation of power supply, charger, cablings, antenna, surge arrestor, waterproof cabinet/ housing (at IP 66 or better rating) for the gateways supplied and / or installed under this Contract such that the gateways, injectors and other equipment operate normally as a completed system in the designated location and environment. The specification of the system components shall comply with the requirements stipulated in other clauses of this specification.

1.1.7 Supply and installation of PoE+ injector and necessary accessories

The Contractor shall supply and install a Power-Over-Ethernet Plus (PoE+) injector and other associated accessories and services including but not limited to the supply and installation of power supply, charger, cablings, waterproof cabinet/ housing (at IP66 or better rating) for the gateways supplied and / or installed under this Contract such that the gateways, routers, other equipment operate normally as a completed system in the designated location and environment.

The PoE+ injector shall support sufficient output power (e.g. supporting 30W output power or other output power) for the gateway installed and support IEEE 802.3at with power supply for use in Hong Kong.

1.1.8 Supply and installation of cabinet for gateway

The Contractor shall supply and install a waterproof cabinet (at IP66 or better rating) with a mechanical lock with key for housing each gateway, associated antennae, Ethernet and power cables supplied and / or installed under this Contract. The cabinets supplied and installed shall be tailor-made (including all necessary materials and works inside the cabinet, e.g. cables, holes, openings, screws, connectors, cable glands, etc.) to fit each individual gateway, antennae, lightning arrestors / surge protectors (upon requested by the engineer's representative) and the associated accessories. The material of the cabinets shall

be of stainless steel or plastic enclosure or other materials as approved by Engineer's Representative(s). The Contractor shall submit the final design of the cabinet for each installation scenario to the Engineer's Representative(s) for approval.

1.1.9 Supply and installation of additional 3dBi antenna for indoor gateway with accessories

The Contractor shall supply and install an external 3dBi antenna of omni-directional type or directional type for indoor use as approved by the Engineer's Representative(s) with associated accessories and services including coaxial cable, signal cable, connector, mounting bracket, mounting pole, cabinet, etc., in additional to or in replacing the existing antenna of the gateway. The Contractor shall be responsible for antenna mounting design service.

1.1.10 Supply and installation of additional 6dBi or 9dBi antenna for outdoor gateway with accessories

The Contractor shall supply and install an external 6dBi or 9dBi antenna of omni-directional type or directional type for outdoor use as approved by the Engineer's Representative(s) with associated accessories and services including coaxial cable, signal cable, connector, mounting bracket, mounting pole, cabinet, etc., in additional to or in replacing the existing antenna of the gateway. The Contractor shall be responsible for antenna mounting design service.

1.1.11 Cables and conduit

1.1.11.1 Power cables shall be 3-core PVC insulated, non-armoured, multi-strand with each copper conductors of not less than 2.5 mm^2 to BS6004 and with an overall protective sheath of PVC.

1.1.11.2 The non-armoured control cables used shall satisfy the following minimum characteristics and with an overall protective sheath of PVC:

(i) at least 7 strands per conductor;

(ii) strand diameter not to be less than 0.2 mm;

(iii) conductor resistance to be less than 90 Ohm/km;

(iv) insulation resistance to be better than 20 M Ohm/km measured between cores or between core and screen;

1.1.11.3 All class of cables installed in underground trenches shall be steel wire armoured.

1.1.11.4 Starting from 1 July 2007, a new Cable Colour System will be implemented for all fixed electrical installation in Hong Kong SAR. Contractor shall be fully aware of the

requirements under the new system and conduct their work accordingly. The information about the new cable colour system is available under the internet homepage of EMSD at www.emsd.gov.hk.

1.1.11.5 The Contractor shall supply and install the cable including CAT6 STP cable, antenna cable and / or power supply cable with GI conduit, adaptable box of various sizes and appropriate types, and necessary accessories included as stipulated in the Schedule of Rates. All the cables supplied shall be of appropriate shielding and protective coating for usage at outdoor / semi-outdoor environment and subject to the approval of the Engineer's Representative(s).

1.1.12 Engineering service for venues

The Contractor shall be responsible for all necessary works related to the supply and installation of gateways, sensors and other equipment and accessories under this specification for **each venue location** including **structural design and calculation**, Builder's and building services works (including power cables, antenna cables, CAT6 STP cables and conduits), coordination among works' related parties, **safety measures**, **working platforms/ scaffoldings for work at heights**, equipment configuration, documentation, maintenance within guarantee period.

The Contractor shall submit structural design and calculation for all mounting design of mounting brackets and or mounting poles for gateways, sensors, injectors, routes, antennae and associated accessories. The structural design and calculation for **each mounting scenario** unless previously or otherwise approved by the Engineer's Representative(s) shall be **certified by a Registered Structural Engineer (RSE)** for all the mounting details of the equipment installed under this specification.

The Builder's and building services works including provision of power points and electrical devices, lightning / surge protection devices for equipment, dismantle of and replacing existing cables of other systems for using existing conduits.

The Contractor shall perform the civil works to facilitate installation of gateway and sensor equipment, including but not limited to, underground utility detection, existing utility protection, statutory submission for temporary traffic arrangement, excavation and reinstatement works.

The Contractor shall perform configuration for all devices and equipment including gateways, PoE+ injectors, LTE routers, sensors, internet services (if applicable) and all 4G mobile data subscription for each LoRaWAN gateway to ensure its connection to the Internet.

The Contractor shall be responsible for appointing the required Prescribed Building Professionals (PBP) and Prescribed Registered Contractor (PRC) as stipulated in Buildings

Ordinance and Buildings Department's requirements for any building works subjected to Buildings Department's regulation.

1.1.13 4G mobile service subscription (each for 24 months)

1.1.13.1 The Contractor shall provide 4G LTE local mobile data subscription for 24-month of quantity as stipulated in the Schedule of Rates. Each data subscription shall come with a public fixed IP address for unlimited local LTE mobile data at an uplink speed not lower than 10Mbps. The activation of the all LTE mobile data subscription shall not be earlier than the delivery of all LoRaWAN gateways, and shall be agreed with the EMSD.

1.1.13.2 In addition to above requirements, the Contractor shall provide High Priority 4G LTE local mobile data subscription for selected / critical gateways as per instruction of Engineer's Representative(s), i.e. reliable, high speed with high Quality of Service (QoS) as compared with the data plan services for general commercial customers.

General Requirements of EMSD GWIN Sensor Devices

Version 3

1. General Requirements for LoRaWAN equipment

1.1 Technical Requirements

1.1.1. The LoRaWAN equipment shall comply with the following requirements, as a minimum:-

(a) Radio Equipment Specifications (HKCA 1078) - Performance Specification for Radio Equipment Operating in the 920 – 925 MHz Band for the Provision of Public Telecommunications Services issued by Office of the Communications Authority (OFCA), HKSARG; and

(b) LoRaWAN specification v1.0.2 or latest version issued by LoRa Alliance™.

1.1.2. This supply and installation of low power wireless network system shall base on LoRaWAN specification v1.0.2 or latest version issued by LoRa Alliance™ for the Government in Hong Kong Special Administrative Region (HKSAR).

1.1.3. The LoRaWAN sensor devices shall be manufactured and configured to support and capable of communicating with the existing LoRaWAN compatible equipment in LoRaWAN specification v1.0.2 or latest.

1.1.4. All equipment that emits radiowaves shall have been type-approved by the Office of the Communications Authority (OFCA) or shall fall within the licensing exemption(s) provided for by legislation, including (but not be limited to) the Telecommunications (Telecommunications Apparatus) (Exemption from Licensing) Order (Cap 106Z).

1.1.5. The LoRaWAN equipment shall comply with LoRaWAN specification v1.0.2 or latest standard, Chapter 106 of the Telecommunications Ordinance, HKCA 1078, and other subsidiary legislations of Hong Kong.

1.1.6. All LoRaWAN equipment shall operate with the parameters as specified below:

(a) Frequency range: 920MHz – 925MHz;
(b) Regulation: Radio Equipment Specifications (HKCA 1078) issued by OFCA; and
(c) Standard: Compliant with LoRaWAN specification v1.0.2 or latest version issued by LoRa Alliance™.

1.1.7. All LoRaWAN sensor devices shall comply with the requirements below as a minimum:

(a) Over-the-Air Activation (OTAA) activation mode;
(b) Support Adaptive Data Rate (ADR);
(c) Support random LoRaWAN frequency channel selection;
(d) With battery level in payload, if applicable; and
(e) Support heartbeat message at least once a day.

1.1.8. The use of frequency bands and transmission powers shall comply with the requirements set by OFCA and LoRa Alliance on LoRaWAN equipment and applications.

1.1.9. The LoRaWAN equipment shall be capable of operating in the full band of the frequency range as mentioned in Clause 1.1.6. Exact operating frequencies in the aforementioned frequency band may be altered and finalized after the contract award.

1.1.10. In case downlink command and/or confirmed uplink function will be adopted, the proposed LoRaWAN sensor devices shall support a reasonable receiver sensitivity by-design for ensuring the stable connection with EMSD's LoRa network.

1.1.11. The maximum transmission duty cycle of LoRaWAN sensor devices shall be 1%, and the maximum dwell time per frequency channel shall be 400 millisecond, unless otherwise approved by Engineers' Representative(s).

1.1.12. For battery-powered LoRaWAN sensor devices, its battery shall be able to last for at least one year without battery replacement under normal operation condition and with the data transmission frequency of at least one uplink message per hour, unless otherwise approved by Engineers' Representative(s). The Contractor shall provide supporting calculation and/or test report regarding the battery life of the proposed LoRaWAN sensor devices upon requested by Engineers' Representative(s).

1.1.13. The LoRaWAN equipment shall be interoperable with major LoRaWAN network servers in the market such as Actility, ChirpStack, Loriot, The Things Network, Orbiwise, etc.

1.1.14. Unless otherwise approved by Engineers' Representative(s), data and/or signals from deployed equipment, including sensors, actuators and convertors shall be transmitted to the EMSD's GWIN Server through EMSD designated gateways and shall be able to be decoded to human-interpretable content without intervention of any third-party proprietary system.

1.2 Contractor's Responsibilities

1.2.1. The Contractor shall be responsible for the registration, decoding and configuration for sensor devices supplied under this Contract to EMSD designated LNS as well as the associated testing and troubleshooting works.

1.2.2. The Contractor shall liaise with the Engineer's Representative(s) to obtain the user manual, login ID and password for the use of EMSD's LNS web-based platform after contract award.

1.2.3. The Contractor shall provide competent and experienced personnel for the satisfactory completion of sensor device registration, decoding and configuration to EMSD's LNS as well as the associated testing and troubleshooting works.

1.2.4. The Contractor shall follow the instructions for sensor device registration (i.e. join request & accept using OTAA) and decoding standard, if applicable which will be provided by the Engineer's Representative(s) after the contract award.

1.2.5. The Contractor shall make his own arrangement to visit the below websites of major LNSs in the market to obtain the user manuals and / or guidelines for his own reference purpose to complete his work satisfactorily.

(a) Actility (resources available after free registration): https://partners.thingpark.com/;
(b) ChirpStack: https://www.chirpstack.io/guides/first-gateway-device/;
(c) Loriot: https://docs.loriot.io/; and
(d) The Things Network: https://www.thethingsnetwork.org/docs/.

1.2.6. Upon the request by the Engineer's Representative, the Contractor shall co-operate and co-ordinate with EMSD's team and relevant contractors for the smooth progress and satisfactory completion of his work.

1.2.7. As an interim solution, the Contractor is allowed to install his own gateway connecting to EMSD's LNS to test and fine tune the system as a turn-key solution. The Contractor shall remove the gateway upon successful migration to the EMSD-owned production gateway as an ultimate deliverable upon Engineer Representative's request. The migration should demonstrate the required features without performance deterioration. The Contractor shall, at his own cost, to perform necessary on-site troubleshooting and configuration services, including but not limited to, re-joining of sensor devices, sensor device parameters updates, sensor device parts replacement and firmware updates, to ensure the connectivity to EMSD's LoRa network and proper configuration of deployed sensor devices so that the equipment can function normally under the requested scope of works.

1.2.8. The Contractor shall ensure the firmware of the LoRaWAN equipment to be the latest version available in the market. The Contractor shall be responsible to update and provide patches to all software and / or firmware so that the equipment can function normally under the requested scope of works.

1.2.9. The Contractor shall submit the material submission for approval by the Engineer's Representative(s). In case the proposed LoRaWAN equipment is not compatible with EMSD's LoRa network, the Contractor shall provide alternative proposals or substitutions on the material submission at his own cost and obtain in writing an explicit approval from the Engineer's Representative(s).

1.2.10. Upon request of the Engineer's Representative(s), the Contractor shall implement a payload decoder, on EMSD's LNS in JSON or other protocols to be agreed by EMSD, to decode the sensor payload to a meaningful human comprehensible format, and no mapping table,

data dictionary nor codebook shall be required to interpret the meaning of the decoded payload.

1.2.11. The Contractor shall take lead to resolve any technical issues and ensure all the required works as stipulated under Section 1.2 are completed on time, regardless of the root cause(s) without any additional cost to the Employer.

1.2.12. The Contractor shall provide all technical documents including the payload format and configuration specification for LoRaWAN equipment supplied under this Contract.

1.2.13. The Contractor may be required to arrange samples of equipment and conduct bench test with EMSD's LoRa network before the approval of material submission. The Contractor shall, at his own cost, arrange the required sensor device samples, necessary gateways, tools and accessories and complete the test within 1 week at the request of the Engineer's Representative(s).

1.2.14. The Contractor may be required to submit samples of equipment for the Engineer's Representative's evaluation during the course of the Contract if they elect to offer equipment which has not been approved by the Engineer's Representative(s) due to equipment offered becoming obsolete or due to other causes. The Contractor shall, at his own cost, submit the required samples for evaluation within 1 week at the request of the Engineer's Representative(s).

1.2.15. During the Nursing Period and Defect Liability Period, the Contractor is responsible for remote monitoring the health status of the sensor devices deployed under this contract through system provided as stipulated in Clause 1.2.2. Upon request by the Engineer's Representative(s), the Contractor shall submit regular health reports or on-demand of the sensor devices to keep-track of the wellbeing and rectification progress of the end-devices.

1.3 Testing and Commissioning

1.3.1 The Contractor shall submit the Site Acceptance Test (SAT) plan, schedule, procedures, forms and testing methodology to the Engineer's Representative(s) for prior approval before the tests.

1.3.2 Unless otherwise specified, any test instrument or field tester for the tests should be provided by the Contractor. Should any transportation of these equipment to test site be required, the Contractor is also responsible for the delivery.

1.3.3 The Contractor shall ensure the sensor device installation and documentation to meet the following minimum pre-requisite before the commencement of SAT.

(a) Sensor's baseline information should be recorded in the test form, i.e. brand, model, serial number, device ID, device name, device EUI, installed location with geospatial data;

(b) Sensor's baseline configuration should be recorded in the test form, i.e.

heartbeat, frequency, reporting interval, triggering event;

(c) The parameters for test environment should be recorded including but not limited to the RSSI, package loss rate taken on site with field tester as the reference value for the sensor under test;

(d) The latest activity for the sensor from the LNS should be recorded i.e. the sensor activity for last 7 days before the SAT; and

(e) The sensor device should be alive for at least 7 days before the SAT.

1.3.4 The Contractor shall perform signal test for the sensor devices under this Contract during the SAT recording the parameters including, but limited to uplink Received Signal Strength Indicator (RSSI), uplink Signal to Noise Ratio (SNR), Spreading Factor (SF), Data Rate (DR) of acceptable level as stipulated in the approved test plan.

1.3.5 Upon the completion of SAT, the Contractor shall submit the sensor device inventory list recording the information including, but not limited to brand, model, serial number, device ID, device name, device EUI, installed location with geospatial data based on the template as required by the Engineer's Representative(s).

2. Application Interfacing Requirements with EMSD's LoRaWAN Network Server (LNS)

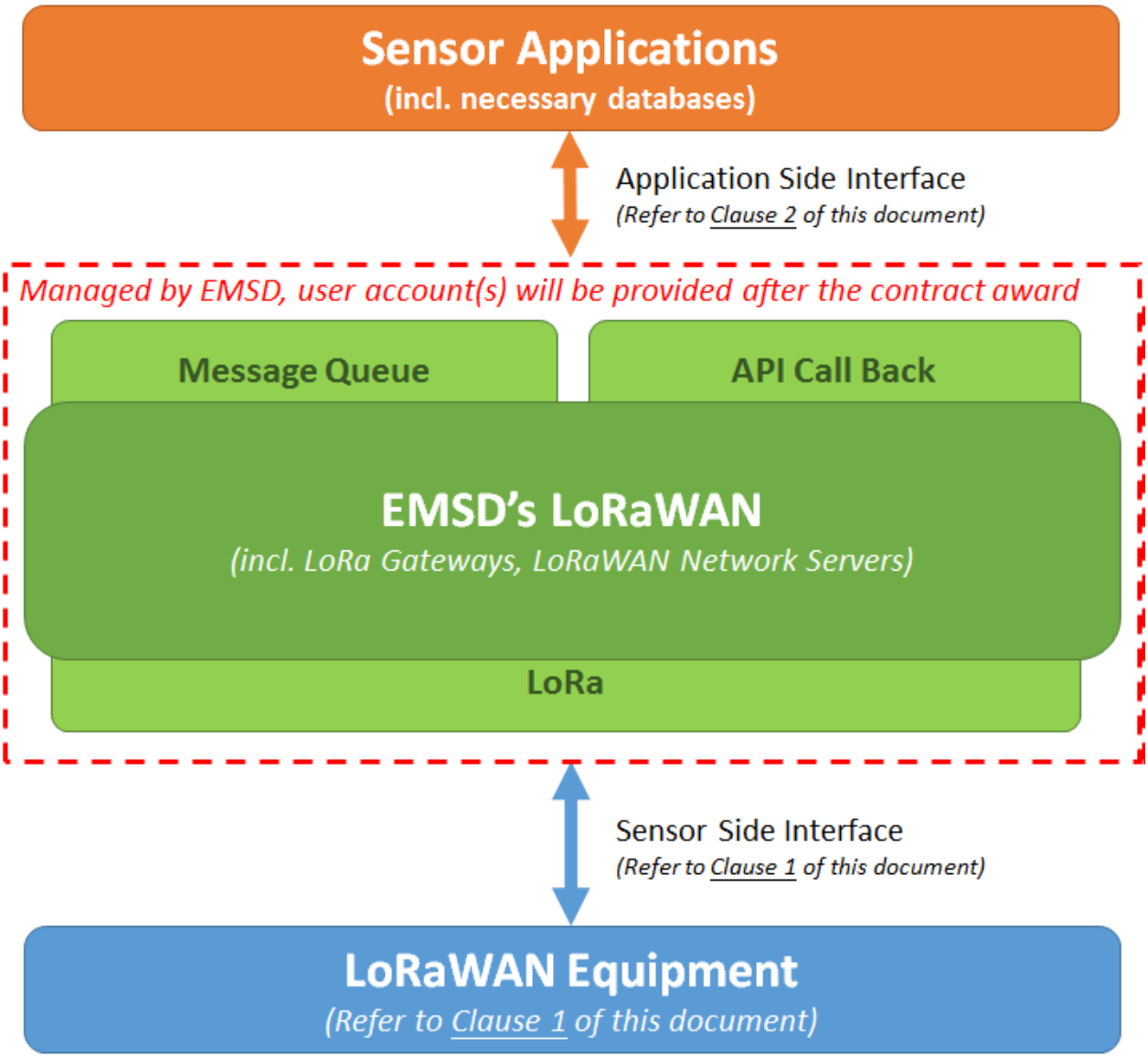
2.1.1 The Contractor shall develop interfaces on the system applications or data platform for data exchange with API (i.e. via MQTT and/or HTTP call-back with SSL) with the EMSD's LNS in accordance to the associated EMSD standards which will be provided by the Engineer's Representative(s) after the contract award.

2.1.2 The Contractor shall, at his own cost, retain data collected by sensor devices deployed under this Contract to meet the system functional requirements under the requested scope of works. Data exchange methods stipulated in 2.1.1 shall be means of data transfer between EMSD's LNS and the systems and/or applications deployed by the Contractor under this Contract. EMSD's LoRa network is not obligated to retain any data collected by the sensor devices and/or applications deployed under this Contract.

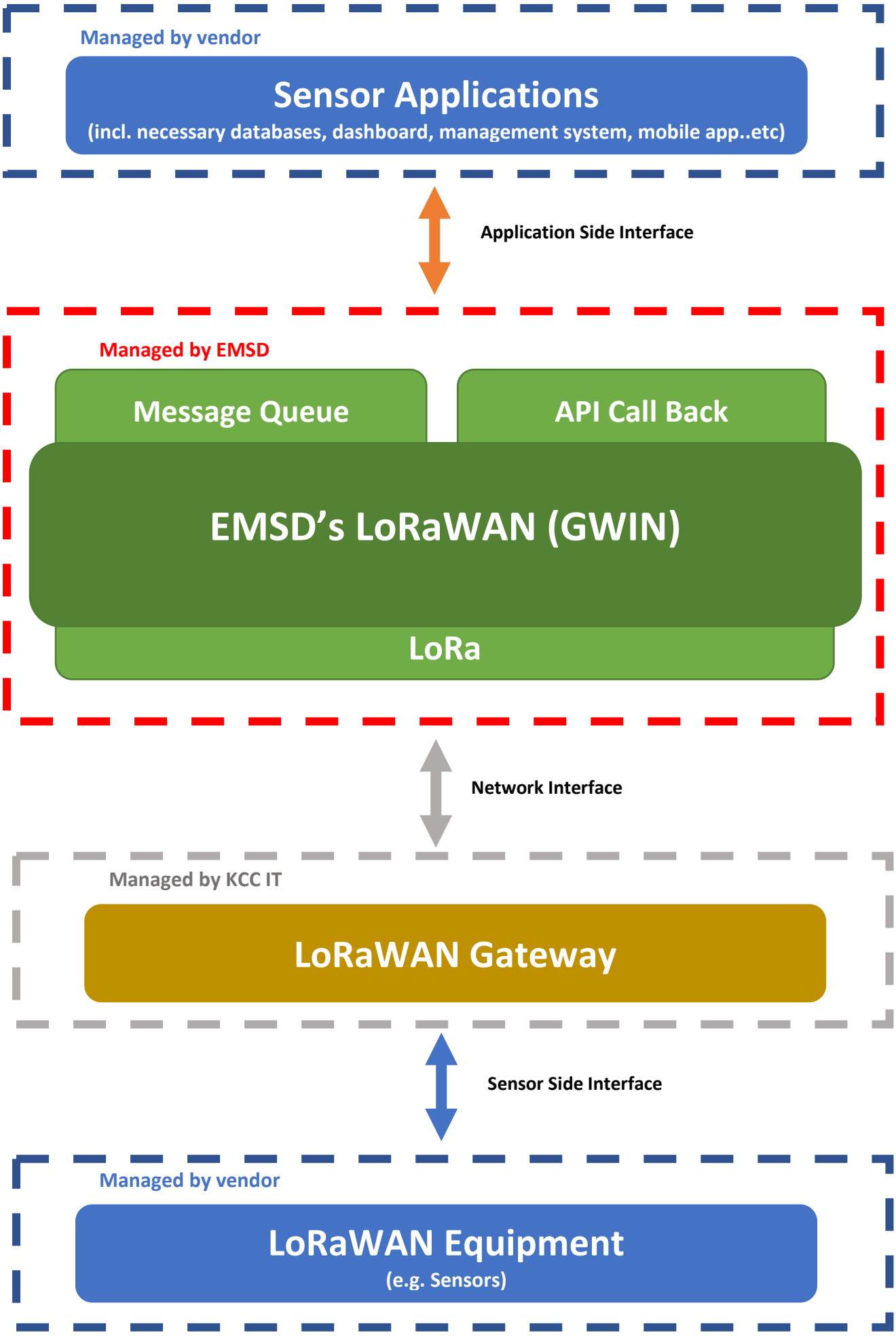
2.1.3 The Contractor shall liaise with the Engineer's Representative(s) to obtain the user manual, login ID and password for the use of EMSD's LNS web-based platform after the contract award.

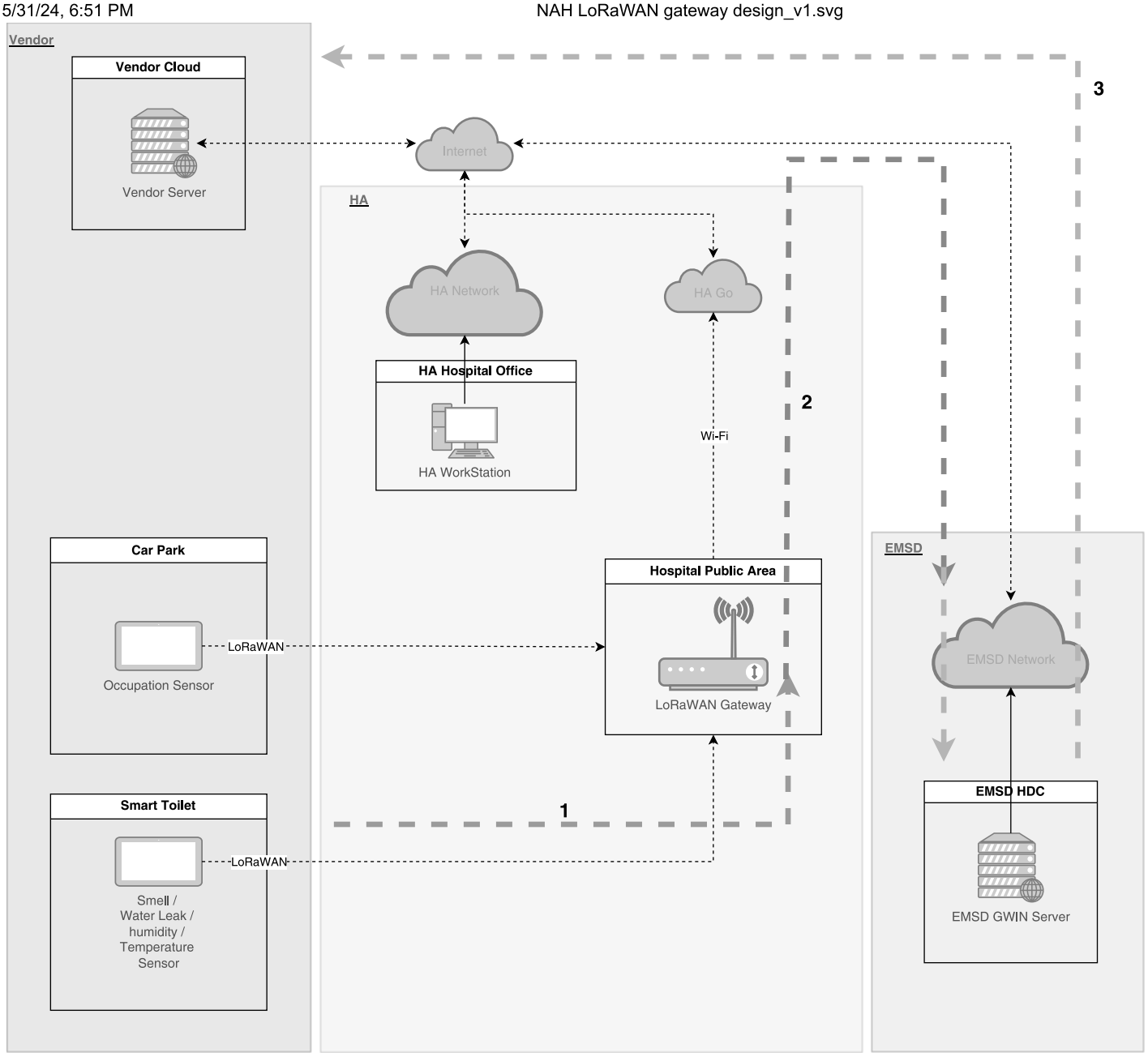
2.1.4 The Contractor shall be responsible for the provision, upkeep and troubleshoot of servers, applications and/or connectivity that integrate with the data exchange methods.

Annex 1 – System Hierarchy



KCC LoRaWAN System Hierarchy





1. Sensors send data via LoRa to the LoRaWAN gateway
2. The LoRaWAN gateway is connected to HA Go Wi-Fi and sends data to GWIN's serv
3. The vendor's server retrieves data from GWIN's server

PARTICULAR SPECIFICATION PS.G04

SITE SAFETY

Particular Specification for Site Safety

CONTENTS

PART 1 - PARTICULAR SPECIFICATION ON SITE SAFETY

Note : Particular Specification clauses hereinafter referred to in this Annex shall mean the Particular Specification clauses under this Annex.

1 General

(1) The Contractor shall ensure as a priority in all activities connected with the Works, the safety and health of all persons on or adjacent to the Site.

(2) The Contractor shall provide and employ on the Site only such personnel who have received adequate training including safety and health training relevant to their tasks and adopt safe working practices at all times and shall ensure his sub-contractors comply with this requirement.

(3) The Contractor shall not allow any person to work on the Site who has repeatedly breached safety requirements. A notice of such sanction shall be displayed at a prominent place on the Site.

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2 Legislation, Regulations and/or Codes of Practice

(1) The Contractor shall keep one set each of the following legislation, regulations and/or codes of practice on the Site including, but not limited to :-

Legislation

- the Factories and Industrial Undertakings Ordinance
- the Construction Sites (Safety) Regulations
- the Factories and Industrial Undertakings (Safety Officers and Safety Supervisors) Regulations
- the Factories and Industrial Undertakings (Lifting Appliances and Lifting Gear) Regulations
- the Factories and Industrial Undertakings (Woodworking Machinery) Regulations
- the Factories and Industrial Undertakings (Abrasive Wheels) Regulations
- the Factories and Industrial Undertakings (Confined Spaces) Regulations
- the Factories and Industrial Undertakings (Dangerous Substances) Regulations
- the Factories and Industrial Undertakings (Protection of Eyes) Regulations
- the Factories and Industrial Undertakings (Cartridge-Operated Fixing Tools) Regulations
- the Factories and Industrial Undertakings (Electricity) Regulations
- the Factories and Industrial Undertakings (Suspended Working Platforms) Regulations
- the Factories and Industrial Undertakings (Noise at Work) Regulations
- the Dangerous Goods Ordinance (Section 6)
- the Electricity Ordinance (Part VII)
- the Electricity (Wiring) Regulations
- the Builders' Lifts and Tower Working Platforms (Safety) Ordinance
- the Occupational Safety and Health Ordinance
- the Occupational Safety and Health Regulations
- the Boiler and Pressure Vessel Ordinance
- Electricity Supply Lines (Protection) Regulations

Codes of Practice, Guides and others

- "Code of Practice for Bamboo Scaffolding Safety", published by the Labour Department, where applicable

- "Code of Practice for Metal Scaffolding Safety", published by the Labour Department, where applicable

- "Code of Practice for Safe Use of Mobile Cranes", published by the Labour Department, where applicable

- "Code of Practice for Safe Use of Tower Cranes", published by the Labour Department, where applicable

- "Code of Practice on Safety and Health at Work for Industrial Diving", published by the Labour Department, where applicable

- "Code of Practice on Safety at Work (Lift and Escalator)", published by the Labour Department, where applicable

- "Code of Practice for Safety and Health at Work in Confined Spaces"

- "A Guide to the Factories and Industrial Undertakings Ordinance (Section 6A & 6B) - Know Your General Duties" published by the Labour Department

- "A Guide to the Construction Sites (Safety) Regulations" published by the Labour Department

- "Code of Practice on Safety Management" published by the Labour Department

- "Guidance Notes for the Electrical Products (Safety) Regulation" published by the Electrical and Mechanical Services Department

- "Guidelines on Safe Use of Lifting Frames and Launching Girders for Bridge Construction" published by the Labour Department

- "Guidelines on Safety of Vehicles and Mobile Plant on Construction Site" published by the Construction Industry Council

- "Guidelines on Work-Above-Ground Safety" published by the Construction Industry Council

- "Guidelines on Planking Arrangement for Providing Working Platforms on Bamboo Scaffolds " published by the Construction Industry Council

- "Construction Site Safety Manual", published by the Development Bureau

- other safety and health related legislations, codes of practice and guides relevant to the execution of the Works.

(2) The Contractor shall display advisory and warning signs, labels and/or posters for the promotion and enhancement of safety and health and notices concerning the availability of the legislations and documents stated above at prominent locations around the Site including site offices, workshops and rest areas.

(3) All legislations and documents referred to in this Clause shall be kept in both Chinese and English insofar as available.

3 Safety Plan

The Contractor shall in accordance with SCC 49 prepare and submit to the Architect six copies of the Safety Plan signed by a senior management representative from the Contractor's headquarters, the site agent and the Safety Officer. For the purposes of signing the Safety Plan and attending the Site Safety Committee and the Site Safety Management Committee as specified hereinafter, the qualification requirements of the Contractor's senior management representative shall not be lower than the specified qualification requirement for the Technical Staff as stipulated in the Contractor Management Handbook – Appendix 2C for the Building Category. The Safety Plan shall contain details of the following 14 key elements of a safety management system:-

- safety policy
- safety organisation
- safety and health training
- safety rules and regulations
- safety committees
- safety and health inspections
- job hazard analysis
- personal protective equipment
- accident/incident investigation
- emergency preparedness
- safety promotion
- health assurance programme
- evaluation, selection and control of sub-contractors
- process control programme

Details shall contain, without limitation, the following:-

(1) Safety Policy

A policy statement setting down in clear and unambiguous terms the management's approach and commitment to communicate, implement and maintain health and safety for those involved in the Works and others who may be affected by the Works; it shall:

(a) be signed by the managing director of the Contractor, or the managing directors of companies of the consortium partnership or joint venture comprising the Contractor,

(b) declare that safety and health are given priority in all aspects of the Works and in discharging its contractual obligations,

(c) state the Contractor's commitment to comply with relevant statutory and contractual obligations regarding safety and health and the means by which the Contractor will supervise, monitor and audit the safety assurance system to achieve due compliance,

(d) identify the key senior personnel for overall co-ordination and implementation of the policy,

(e) state the general responsibilities and duties of the Contractors employees and sub-contractors in upkeeping safety and health,

(f) state the safety targets to be achieved,

(g) be communicated to all levels of persons involved in the Works, and

(h) be dated, reviewed periodically and revised.

(2) Safety Organisation

The safety organisational structure and the manpower resources to implement the management's commitments; it shall:

(a) define clearly the safety and health responsibilities of staff at all levels including those of sub-contractors,

(b) describe the arrangements for a regular communication and reporting system on safety and health amongst all levels from top management down to labour force and vice versa,

(c) list the names and telephone numbers of the senior management representative, site agent, Safety Officer and Safety Supervisors administering and ensuring compliance with the Safety Plan, together with their disciplines and the geographical area of the Works under the supervision of each Safety Supervisor, revised and re-issued at any time necessary to reflect accurately the current arrangement for safety supervision,

(d) state the powers vested in the safety staff which would enable them to take urgent and appropriate action to make safe the Site and the Works and to prevent unsafe working practices or other infringements of the Safety Plan or statutory regulations,

(e) state the name of the personnel responsible for updating the Safety Plan, and

(f) maintain and upkeep a register of first aiders, competent persons and examiners required under the relevant legislations and persons responsible for conducting different levels of safety training.

(3) Safety and Health Training

Procedures established to ensure that all staff working on the Site, and in particular those joining the Site to work for the first time or staff transferred to new assignments are given proper general safety and health training as well as job-specific training relevant to their duties; a programme shall be developed to identify and review the training need which shall contain the frequency, coverage and application of training ranging from safety management training to tool box talks and to check that the knowledge covered in the safety trainings are applied by the Contractor's staff.

(4) Safety Rules and Regulations

(a) Arrangements for safety rules and regulations including those specific rules laid down by the Employer / clients to be documented, reviewed, amended and communicated to all appropriate levels of staff working on the Site including means and disciplinary action to ensure that they are implemented and enforced,

(b) Arrangements for method statements and permit-to-work systems to be implemented for high risk activities carried out on Site including the provision of details such as persons identified by job titles who will be authorising the issue of permits. These activities should include, but not limited to hot work, electrical work, slope works, confined spaces work, release of flammable/toxic liquid or gas etc.,

(c) Specific rules and regulations laid down by Employer / the client for Works to be carried out within premises that are occupied, partially occupied and/or controlled by Employer / the client, and

(d) Rules and regulations to protect authorised visitors and prevent entry of unauthorised persons to the Site.

(5) Safety Committees

The objectives, powers, functions, terms of reference, membership, frequency of meetings, agenda and distribution of minutes of meetings of the safety committee.

(6) Safety and Health Inspections

Arrangements to establish procedures for the identification, recording and reporting of hazardous conditions and their rectification; they shall include:

(a) planning and review of the frequency, coverage and extent of inspections conducted by safety staff, supervisory staff and senior management,

(b) developing a comprehensive safety inspection checklist for use in safety inspections to record irregularities or hazards identified and a scheme for them to be reported and prompt corrective actions to be taken by the appropriate staff, and

(c) developing a preventive maintenance programme for the workplace, electrical installations and equipment, plants (fixed and mobile) and equipment (including emergency equipment), in particular lifting plant and equipment to ensure that statutory tests, examinations, and inspections are carried out at required intervals and for such records to be made available for inspection by the Architect.

(7) Job Hazard Analysis

Arrangements for identification of potential hazards and assessment of health and safety risks associated with Works are carried out by trained safety personnel for the development of safe working procedures and method statements to ensure the satisfactory elimination, reduction or control of such risks before work starts; they shall include:

(a) procedures for the recording and regular review of the risk assessments and the developed safe working procedures and method statements to ensure that the risk control measures contained therein are suitable and relevant to the Works being undertaken; these should include those prepared by sub-contractors, and

(b) means to ensure that the risk control measures contained in the risks assessments, safe working procedures and method statements are clearly written down and communicated to those supervising and carrying out the Works and that their implementation are being regularly monitored.

(8) Personal Protective Equipment

Procedures for the identification and selection of suitable personal protective equipment and their issue, including the means and frequency by which personal protective equipment will be inspected, tested and maintained and records kept and the standard below which the equipment will be removed from the Site and replaced; they shall include:

(a) means to ensure that proper and, where appropriate, mandatory use by all persons on the Site,

(b) arrangement to ensure that information, instruction and training in the safe use, storage and maintenance of such equipment are provided, and

(c) arrangement to ensure adequate supply and for replacement.

(9) Accident/Incident Investigation

Procedures for the prompt reporting, recording and investigation of accidents/incidents including dangerous occurrences occurred on Site or related to the Works; they shall include:

(a) the keeping of accidents statistics and their analysis with a view to identifying causes / trends and developing measures for prompt implementation against recurrences, and

(b) means to communicate accident statistics, recommendations against recurrences and lessons learnt from previous accidents to all persons working on the Site.

(10) Emergency Preparedness

Arrangements for the establishment of procedures to deal with emergency situations on the Site (e.g. any situation requiring rescue) prior to arrival of the Police, the Fire Services Department or Marine Department and procedures during tropical cyclones, thunderstorm warnings, rain alert warnings, flooding warnings, landslip warnings and heavy rainstorm warnings, outbreak of a fire, etc., they shall include:

(a) means to communicate the emergency procedures to all personnel on the Site and to promote their emergency awareness,

(b) the organisation and training of emergency and/or rescue teams,

(c) checklists on steps to be taken during emergency,

(d) means of receiving and communicating adverse weather information to site staff,

(e) emergency equipment to be provided and their locations,

(f) drills and exercises to test the preparedness for emergency actions which shall be carried out at not less than 6 months intervals or as stated in the Contract,

(g) the first aid personnel and facilities, including arrangements for transporting the injured,

(h) arrangements for the review and regular updating of emergency procedures and telephone list; and

(i) detailing the site arrangements of continuing, suspending and resuming the outdoor confined space works under different adverse weather conditions and warning signals.

(11) Safety Promotion

Methods of promoting and maintaining safety awareness and developing a safety and health culture amongst all persons on the Site; they shall include:

(a) the display of the company safety policy, accident statistics, safety signs and posters and the showing of safety videos and films,

(b) procedure for the selection of appropriate safety promotion items for displaying on Site,

(c) the conduct of talks and campaigns and distribution of safety bulletins or newsletters drawing attention to particular special safety issues and emergency procedures, and

(d) procedure to recognize and commend those site personnel, teams, sections or sub-contractors with good safety performance.

(12) Health Assurance Programme

The programme shall contain:

(a) arrangements for pre-job and regular medical examinations of workers exposed to health hazards,

(b) arrangements for the identification, assessment, regular monitoring of health hazards and the reduction of exposure through technological and administrative control measures; they shall include:

(i) arrangement to ensure that all persons at the Site are aware of the health risks associated with their work and those in their vicinity and are fully informed of the necessary precautions in controlling the risks,

(ii) procedures for the selection, provision, training and supervision on the use of suitable personal protective equipment to supervisors and workers, in particular to those working in an environment potentially hazardous to health,

(iii) the seeking of outside specialist assistance for assessment and monitoring of health hazards where necessary, and

(iv) the provision of welfare facilities on the Site.

(13) Evaluation, Selection and Control of Sub-contractors

Arrangements for the evaluation, selection and control of sub-contractors working on the Site; they shall include:

(a) provision to each sub-contractor with a copy of the Safety Plan and the list of safety obligations and requirements which must be met for incorporation into the sub-contract agreement before works commence for ensuring compliance,

(b) means to ensure that only sub-contractors with satisfactory safety performance will be employed and procedures for evaluating the safety performance of sub-contractors employed on the Site at regular intervals,

(c) the timely provision of adequate safety and health information to suppliers of materials to the Site for their compliance,

(d) means by which safety procedures and method statements proposed by sub-contractors, whether directly employed or not, will be reviewed for compliance with the Safety Plan and the statutory regulations,

(e) arrangements to ensure that machinery and other plants used on Site by sub-contractors are appropriate to the nature of the task and that they are properly operated and maintained,

(f) the safety co-ordination system established to liaise between various sub-contractors, and

(g) ensure that sub-contractors' workers have received proper training appropriate and relevant to the type and level of work to be undertaken.

(14) Process Control Programme

The programme shall contain:

(a) The formulation of policy on the review of accident control and hazards elimination measures during the conception and design stages, the setting of parameters for processes and materials to take into account of any changes in site conditions and the development of a regular monitoring mechanism, and

(b) Arrangements and means for the effective implementation of accident control and hazards elimination measures described in the Safety Plan to ensure safety and health in the execution of the work processes, they shall include safety rules, regulations safe working procedures, and in particular method statements and permit-to-work systems incorporating the findings of risk assessments conducted for identified high risk processes including, but not limited to the following :-

- Working in ceiling voids
- Wet trade works near energized installations
- Housekeeping
- Traffic control and transportation
- Fire prevention measures and fire fighting equipment
- Excavation
- Working in confined spaces
- Hand dug caissons
- Diving
- Hot work
- Electrical equipment and installations
- Welding/cutting operations
- Personal protective equipment
- Conveyance, handling and use (blasting) of explosives
- Lifting operations involving cranes and hoists etc.
- Manual handling
- Scaffolding and working platforms
- Ladders and accesses
- Hand tools and portable power driven tools
- Use and storage of hazardous substances including chemicals
- Working over water or adjacent to water
- Working at height
- Structural steel erection
- Floor and wall openings and stairways
- Lighting
- Protection against falling objects
- Protection against lightning
- Demolition
- Tunnelling
- Operation of launching girders and/or lifting frames

(c) The risk assessment should also identify whether there are works that cannot be done safely by a person working alone. In general, a co-worker system shall be put in place in the following situations:-

(i) Temporary access equipment for working at height, including portable ladders or trestles that cannot be safely handled by one person.

(ii) The plant, substances and goods cannot be safely handled by one person.

(iii) Working near or over water, or electrical work at or near exposed live conductors.

(iv) There is a risk of violence.

4 Safety Organisation

The Contractor shall provide to the Architect's Representative at monthly intervals an updated safety organisation chart containing a complete list of all sub-contractors, whether directly employed by the Contractor or not, on the Site and the Works and the name of the Safety Supervisor for each such sub-contractor, insofar as the employment of a Safety Supervisor is expressly set out in the Contract or in the absence of such requirement then by any enactment or statutory requirement. The list shall also include the names of the Safety Officer and Safety Supervisors, and the names of Safety Representatives and the respective labour groups or teams they belong. Telephone numbers of these safety staff shall also be shown on the chart.

5 Safety Officer

(1) "Safety Officer" means a person registered as a safety officer in accordance with the Factories and Industrial Undertakings (Safety Officers and Safety Supervisors) Regulations (FIU(SO&SS)R) and employed by the Contractor to carry out the duties of a Safety Officer as specified in the Contract and duties specified in the FIU(SO&SS)R.

(2) The Contractor shall employ at least one Safety Officer who shall be approved by the Architect. The Safety Officer shall have been qualified and registered as required under clause (1) above for at least 4 years and during which has gained the relevant experience in site safety administration of the Contract.

If the total number of workers employed on the Works or in connection with the Contract whether in the employ of the Contractor or his sub-contractor is less than 50, the Safety Officer may be engaged part time for this Contract but with sufficient presence on the Site to perform the duties of a Safety Officer. The time thus spent on Site shall be not less than 12 hours per week excluding attendance of progress meetings, the Site Safety Management Committee (SSMC) meetings and the Site Safety Committee meetings.

Where the number of workers thus employed is equal to or more than 50, then the number of approved full-time Safety Officers to be provided shall be:

Total no. of workers	Minimum no. of full-time Safety Officer
50 to 200	1 (shall be a safety officer who has been qualified and registered as required under clause (1) above for at least 4 years and during which has gained the relevant experience in site safety administration of the Contract)
201 to 700	2 (at least 1 of them shall be a safety officer who has been qualified and registered as required under clause (1) above for at least 4 years and during which has gained the relevant experience in site safety administration of the Contract)
701 to 1200	3 (at least 2 of them shall be safety officers who have been qualified and registered as required under clause (1) above for at least 4 years and during which have gained the relevant experience in site safety administration of the Contract)
1201 and above	4 (at least 2 of them shall be safety officers who have been qualified and registered as required under clause (1) above for at least 4 years and during which have gained the relevant experience in site safety administration of the Contract)

(3) The Contractor shall not commence any construction work on the Site without the appointment and attendance of the required number of Safety Officer(s) unless expressly permitted by the Architect in writing.

(4) The duties of the Safety Officer shall be solely directed towards safety and health matters. In addition to the duties stipulated in the Factories and Industrial Undertakings (Safety Officers and Safety Supervisors) Regulations, the Safety Officer shall:

(a) carry out safety inspections and prepare inspection reports,

(b) supervise and monitor implementation of the Safety Plan,

(c) ensure that sub-contractors and all persons working on the Site are made aware of and comply with the Safety Plan, and

(d) carry out internal safety audits for the Safety Plan at intervals of not less than once every six months, which format, scope and programme are to be proposed and agreed with the Architect. In this respect, the internal safety audits can be carried out either by the Safety Officer or a Registered Safety Auditor (RSA).

(e) carry out duties as required under the Contract.

(5) The Safety Officer shall maintain a safety diary which shall record all matters related to safety and health, including Safety Supervisors' reports, details of safety inspections and audits, accidents, dangerous occurrences, safety related incidents, etc. The Safety Officer shall check to ensure that all unsafe situations are promptly rectified and the dates of their completion duly recorded in the safety diary. The safety diary shall be made available for inspection by the Architect upon request and copy thereof shall be submitted to the Architect upon request.

(6) The Contractor shall empower the Safety Officer to order any person working on the Site to suspend any unsafe operation or to take urgent action to make safe the Site or the Works or to disallow any practice which may infringe the Safety Plan or any statutory safety requirement.

(7) The Safety Officer shall carry out comprehensive safety inspections on all activities on the Site at weekly intervals. The safety inspection shall identify any unsafe operation or potential hazards using a check-list agreed by the Architect's Representative. The Safety Officer shall give prior notice to the Architect's Representative of the date and time of the weekly inspection and shall allow the Architect's Representative to attend the inspection.

(8) If the Safety Officer is unable to perform his duties for any reason, the Safety Officer shall be replaced as soon as practicable but in any case within 14 days. The Safety Officer shall not be replaced without consent by the Architect.

(9) The Safety Officer shall be clearly identified on the Site by wearing an armband or a safety helmet appropriately marked in Chinese and English.

(10) (Not used)

6 Safety Supervisors

(1) "Safety Supervisor" means a person employed by the Contractor or sub-contractors of all tiers on the Site to carry out the duties of a Safety Supervisor as stipulated in the Factories and Industrial Undertakings (Safety Officers and Safety Supervisors) Regulations. The Safety Supervisor shall carry out safety inspections on all active parts of the Site for which he is responsible at least at daily intervals using an appropriate comprehensive checklist agreed by the Architect. All completed safety checklist shall be signed by the Safety Officer to ensure prompt follow-up actions have been taken on unsafe situations.

(2) The Contractor shall employ at least one Safety Supervisor to be present full time on Site. Where the number of workers employed on the Works or in connection with the Contract whether in the employ of the Contractor or by his sub-contractor exceeds 50, the number of Safety Supervisors to be provided shall be increased by one for every additional 50 workers.

(3) Notwithstanding the requirements stated in sub-clause no. 6(2) above, each sub-contractor of the first tier (directly employed by the Contractor) engaging 20 persons or more in the activities for which he is responsible shall provide at least one full-time Safety Supervisor to oversee the safety of his own activities.

(4) Safety Supervisor shall have at least three years' experience on construction work and have completed a min. 40-hour safety supervisor training organized by Occupational Safety & Health Council (OSHC) / Construction Industry Council (CIC) / other recognized safety organizations in recent 5 years.

(5) Safety Supervisors shall be clearly identified on the Site by wearing an armband or a safety helmet appropriately marked in Chinese and English.

7 Safety Representatives

(1) In addition to the Safety Officer and Safety Supervisors, the Contractor shall appoint the foreman or ganger of each labour group or team working on the Site to act as Safety Representative. The Safety Representative shall be responsible for ensuring that the directives from the Contractor, the Safety Officer and Safety Supervisors on safety and health matters are duly carried out, safety practices are adopted and protective clothing and equipment are used by the work force at all times on the Site. Normally, each gang of workers shall have one Safety Representative. He shall be made aware of his responsibilities and the group of workers on the Site whose activities he is required to supervise. Every worker working on the Site shall be made aware of the roles of the Safety Representatives and from which Safety Representative he may seek advice or receive instructions on safety and health matters.

(2) Safety Representatives shall be clearly identified on the Site by wearing an armband or a safety helmet appropriately marked in Chinese and English.

8 Safety Training

(1) The Contractor shall regularly review the training needs of all persons employed on the Works or in connection with the Contract and prepare a long-term training programme. Each month the Contractor shall submit a proposed training programme to be provided in the next month for the Architect's approval. It shall contain the topics, dates, venues, the target participants of the proposed training and the names and qualifications of the trainers.

(2) All persons carrying out construction work including general workers, skilled workers, foremen, gangers, drivers and plant operators, who are employed on the Works or in connection with the Contract whether in the employ of the Contractor or sub-contractors in all tiers must have completed the mandatory basic safety training course for the construction industry under the Factories and Industrial Undertakings (Amendment) Ordinance 1999 and hold the relevant valid certificate which shall be referred to hereafter as the Labour Department Recognised Green Card (LDRGC).

(2)(A)(i) In addition to clause 8(2) above, skilled workers of specific trades set out below in this sub-clause who are employed on the Works or in connection with the Contract whether in the employ of the Contractor or sub-contractors of all tiers shall attend the relevant Safety Training Course for Construction Workers of Specified Trades (also known as the Silver Card course) organised by the Construction Industry Council (CIC) :

- painter and decorator
- carpenter
- demolition worker (building)
- plumber
- bar bender and fixer
- plasterer and tiler
- bamboo scaffolder and metal scaffolder
- curtain wall installer
- construction materials rigger
- lift mechanic (installation and maintenance)
- tower crane worker (erecting, dismantling, telescoping & climbing)
- tunnel worker

Any other recognized courses as notified by the Architect.

(2)(A)(ii) If the Contractor intends to employ or permit the employment of any skilled workers of trades specified in sub-clause (i) but do not possess the Silver Card that is relevant to the trade and work in which he/she is working on the Site for the execution of the Works, he shall arrange within 2 working days of such skilled workers commencing work on the Site to attend the course specific to the trade and work in which he/she is employed under the Contract. A skilled worker who passes the test at the end of the course will be awarded with a Construction Industry Silver Card (Silver Card). For the purpose of this Contract, this course shall be referred to hereafter as the "trade specific advanced safety training" course.

(3) The Contractor shall also ensure that all card holders will carry their LDRGC and Silver Card, or their Construction Workers Registration Cards with record of valid LDRGC and/or Silver Cards information as equivalent document of the LDRGC and/or Silver Card as applicable, whilst working on the Site.

(4) The Contractor shall pay a token allowance as specified in relevant item in the Bills of Quantities to each skilled worker of a specific trade set out in clause 8(2)(A)(i) above after he or she has successfully completed a Silver Card Course and received a Silver Card. If a skilled worker of a specific trade set out in clause 8(2)(A)(i) above has completed a revalidation course and received a revalidated Silver Card, the Contractor shall pay a token allowance as specified in relevant item in the Bills of Quantities to the skilled worker. The skilled worker is responsible for the payment of the course fee. However, the token allowance will not be paid if the course is attended:

(i) before the skilled worker starts works on the Site; or
(ii) after the skilled worker has left the Site.

At the end of each month, the Contractor shall prepare and submit a certified monthly statement of workers who have successfully completed the trade specific advanced safety training course to the Architect using the proforma attached in Part 2 of this Particular Specification. Copies of the Silver Card, the original receipts signed by the workers for the receipt of the token allowance and a certified payroll record indicating the trades and salaries of the workers shall be made available for inspection if requested by the Architect.

(5) The Contractor shall only arrange skilled workers to attend the trade specific advanced safety training course that is relevant to the trades and works in which he/she is employed under the Contract. The Architect has a right to disapprove the payment on the trade specific advanced safety training to a skilled worker if he/she is found on the Site and not working for the trades and works in which he/she has received the training.

(6) (a) All persons employed on the Works or in connection with the Contract whether in the employ of the Contractor or sub-contractors in all tiers shall receive "site specific induction training".

(b) Site specific induction training and its refresher shall take the form of an one-hour talk conducted by the Safety Officer in accordance with sub-clause 6(e) below.

(c) The talk should be conducted as follows:

(i)	Safety Policy	10 mins.
(ii)	General particulars of the Site	10 mins.
(iii)	Special characteristics of the Works and inherent hazards on the Site, highlights of particular safety measures and use of personal protective equipment	15 mins.
(iv)	Emergency procedures and first-aid facilities	10 mins.
(v)	Reporting of accidents and injury compensation procedures	5 mins.
(vi)	Questions and answers	10 mins.
	total	60 mins.

(d) The Safety Officer shall prepare the talk based on Part II of the "Site Safety & Health Induction Training Manual" published by the Hong Kong Construction Association Ltd (HKCA).

(e) An outline of the talk and every update of it shall be provided to the Architect's Representative for approval. The talk shall be carried out within 2 working days of any such employee commencing work on the Site. Thereafter, he/she shall be given refresher talks at intervals of 6 months depending on the amount of changes to the site condition.

(f) The Contractor shall ensure that "site specific induction training" talks are carried out by Safety Officers who are competent trainers and have received training on safety training techniques organised by the HKCA, CIC, Occupational Safety and Health Council (OSHC) or other approved training organisations.

(7) (a) The Contractor shall provide tool box talks at a frequency of one talk per worker on Site every two weeks commencing from the date of commencement of the Works subject otherwise to any change in frequency as may be approved by the Architect. The Contractor shall also ensure that the topic of every talk given to a worker is relevant to his/her trade and the work that he/she will perform under the Contract and a worker shall attend no more than one talk on the same topic in any two-month period.

(b) The Contractor shall propose the topics of the tool box talks at a frequency specified in sub-clause (a) having regard to the activities of the Site and the prevailing safety concern at that time. They shall be submitted with the proposed monthly training programme to the Architect for his approval. The Architect has the right to disapprove the training programme when the proposed topic is considered not relevant to the trade of the workers or the prevailing work activities. Moreover, the Architect can request the Contractor to review the topics to cater for special safety concern. For workers undertaking scaffolding work including truss-out bamboo scaffolds, demolition work and works in confined spaces, they should be provided with suitable tool box talks prior to the commencement of these works. Workers not having attended the concerned tool box talks shall not be allowed to undertake these works. For workers carrying out road works, they should be provided with specific tool-box talks, and be arranged to attend training course "Safety at Road Works" by OSHC or other equivalent training course by other approved training organisations, prior to the commencement of these works. Workers not having attended the relevant training shall not be allowed to carry out any road works with risk of exposing to the potential hazards of live vehicular traffic.

(c) The content of the tool box talks shall be based on training kits published by the HKCA. Where such a proposed topic is not amongst one of those in the training kits published by the HKCA, the Contractor shall develop training kits to a similar standard for approval by the Architect's Representative.

(d) The Contractor shall ensure that "tool-box talks" are conducted by Safety Officers or Safety Supervisors or gangers who are competent trainers and have received training on safety training techniques organised by the HKCA, CIC, OSHC or other approved training organisations.

(e) Payment for this item shall be made monthly provided that the Architect is satisfied that the talks have been conducted in accordance with this clause.

(8) (Not used)

(9) (Not used)

(10) The Contractor shall prepare attendance records on site specific induction training and tool box talks which shall include the topics and dates of the talks, the names of the trainers, names and trades of the persons receiving the talks and their signatures.

(11) The Contractor's site agent or Safety Officer shall certify the accuracy of attendance records on site specific induction training and tool box talks before they are submitted to the Architect for payment. If requested by the Architect, the Contractor shall give at least 24-hour notification on the time and venue of each tool box talk to be held, so that the Architect could arrange his/her staff to take attendance record for measurement.

(12) The Contractor shall ensure that all site management and supervisory staff, who are employed on the Works whether employed by the Contractor or sub-contractors of all tiers, shall attend, if they have not done so, and complete the basic training commensurate with their duties, as follows:-

(a) The term "site management staff" means persons engaged in the senior or managerial posts such as project managers, site agents, sub-agents, superintendents and site engineers. The basic training required to be attended by site management staff shall include :–

(i) Appropriate training course such as the Safety Training Course for Site Management Staff run by OSHC/CIC or other approved training organizations; or the corresponding revalidation course as appropriate. The course should cover amongst others: safety legislation and safety management techniques, risk assessment, and safety inspection, accident investigation and accident prevention, Construction and Design Management (rename as Design for Safety since 2016), work safe behaviour and safety climate index.

(b) The term "supervisory staff" means gangers and foremen. The basic training required to be attended by supervisory staff shall include:-

(i) Appropriate training course such as the Safety and Health Supervisor (Construction) Course run by OSHC or the Construction Safety Supervisor Course run by CIC or other approved training organizations.; or the corresponding revalidation course as appropriate, such as the Enhancement Course for Safety Supervisors (Construction) run by OSHC or the Construction Safety Supervisor Enhancement Course run by CIC. The course should cover amongst others: safety legislation, safety management & training techniques, principle of accident prevention, safety at work and safety inspection techniques on construction sites.

(13) The Contractor shall keep on Site records of all safety training received by his staff including those on refresher training and make them available for inspection by the Architect's Representative upon request.

8A Risk Assessment

The Contractor shall carry out, review and submit to the Architect risk assessments for works scheduled to start at least for the next two months. The works shall be broken down into jobs/tasks for hazard identification and evaluation of the level of risk by competent persons. The documentation shall contain the hazards identified, the likelihood and consequence of the hazards occurring, the level of risk thus evaluated, the proposed risk mitigation/control measures and the anticipated residual risks, and identify the respective risk controller. The results of such risk assessments and documentation shall be endorsed by the Safety Officer and the site agent. In addition, they shall be incorporated into the Safety Plan or relevant safety working procedures or method statements. In addition, the Contractor shall also maintain an updated register of all risk assessments carried out, and update the relevant safety checklist based on the safety measures recommended in each new risk assessment.

9 Site Safety Committee

(1) The Contractor shall establish a Site Safety Committee which shall be responsible for ensuring the implementation of the Safety Plan, reviewing and monitoring the effectiveness of the safety and health measures taken and seeking the co-operation and commitment of staff at all levels. The Contractor may combine the committees in relation to safety and environmental matters (if necessary) for efficient monitoring.

(2) The Site Safety Committee shall be chaired by the site agent with members comprising a representative at senior management level from the Contractor's headquarters or the project manager, the Safety Officer, all Safety Supervisors, selected Safety Representatives and other staff of the Contractor or sub-contractors as may be considered necessary. It shall meet at monthly or more frequent intervals discussing all matters relating to the implementation of the Safety Plan. The first meeting shall be held no later than 30 days after the date for commencement of Works. The Contractor may invite any other party such as the Labour Department, Marine Department, Fire Services Department, Police or representatives of utility undertakers to attend the meeting and provide advice as necessary.

(3) The Contractor shall give an advance notice of every Site Safety Committee meeting to the Architect's Representative who will attend the meeting in person or nominate a representative to attend the meeting as an observer.

(4) The following items shall, amongst others, be discussed at the Site Safety Committee meeting :

(a) Review of the Safety Plan

- update risk assessment for the work scheduled at least for the next two months,
- review and establish safety and health provisions, safe working procedures and method working procedures and method statements,
- update the emergency and rescue procedures,
- discuss and reconcile any discrepancies between the Safety Plan prepared by the Specialist Contractor and that of the Contractor.

(b) Update of the safety organisation chart and review of the adequacy of safety personnel,

(c) Review of the safety performance of sub-contractors,

(d) Any unsafe practices and conditions identified during safety inspections/audits and any follow up action,

(e) Advisory/warning letters issued by Marine Department and Labour Department and any Improvement/Suspension Notices received,

(f) Review of accident frequency rates and statistics of the Contractor and sub-contractors and identification of trends,

(g) Details of the Contractor's accident and dangerous occurrence experience,

(h) Safety and health training undertaken in the previous month and the proposed training programme for the following month,

(i) Details of safety promotional activities,

(j) Safety co-ordination between various sub-contractors working in close proximity to each other~~.~~, and

(k) Monitoring of the follow-up action on defects and deficiencies identified.

(5) Minutes of the Site Safety Committee meeting shall be prepared by the Contractor and copied to the Architect's Representative within 10 working days of the meeting. One copy of the minutes in Chinese and English if necessary, shall be posted at a prominent place on the Site.

10 Site Safety Management Committee

(1) The Architect shall establish a Site Safety Management Committee (SSMC) to monitor the adequacy of the Safety Plan and ensure its implementation on Site by the Contractor, and to enhance communication between the Architect and the Contractor on safety and health matters. The SSMC shall be chaired by the Architect or his Representative and shall meet monthly or more frequent intervals. The first meeting shall be held no later than 30 days after the date for commencement of Works. The Architect may combine the management committees in relation to safety and environmental matters (if necessary) for efficient monitoring.

(2) The Contractor shall provide all necessary assistance required for the proper functioning of the SSMC and shall be represented on the Committee by a representative at senior management level from the Contractor's headquarters or the project manager, the site agent, the Safety Officer and Safety Supervisors. The Contractor shall act without delay upon the decisions or recommendations made by the Committee on matters of safety and health. The above arrangements are entirely without prejudice to and do not relieve the Contractor from any contractual or legal obligation with respect to safety and health. Where a Specialist Contractor is directly employed, a representative at senior management level from the Specialist Contractors' headquarters or his project manager, site agent, Safety Officer and Safety Supervisors shall also attend this meeting.

(3) Prior to every meeting of the SSMC, the Contractor shall arrange an inspection of the Site by those who are to attend the meeting and/or any other members nominated by the Architect. This inspection shall be taken as one of the weekly safety walk.

(4) The following items shall, amongst others, be included in the agenda of each SSMC meeting:-

(a) Review of the Safety Plan

- update risk assessment for the work scheduled at least for the next 2 months
- review and establish safe working provisions, safe working procedures and method statements,
- update the emergency and rescue procedures
- discuss and reconcile any discrepancies between the Safety Plan prepared by the Specialist Contractor and that of the Contractor,

(b) Update of the safety organisation chart and review of the adequacy of safety personnel,

(c) Review of safety performance of sub-contractors,

(d) Any unsafe practices and conditions identified during safety inspections/audits and any follow up action,

(e) Advisory/warning letters issued by Marine Department and Labour Department and Improvement/Suspension Notices,

(f) Public concern/complaint,

(g) Review of accident frequency rates and statistics of the Contractor and sub-contractors and identification of trends,

(h) Details of the Contractor's accident and dangerous occurrence experience,

(i) Monitoring of the follow-up action on defects and deficiencies identified,

(j) Safety and health training undertaken in the previous month and the proposed training programme for the following month,

(k) Details of safety promotional activities,

(l) Contractor's monthly safety report,

(m) Safety co-ordination between various sub-contractors including Specialist Contractor working in close proximity to each other and,

(n) Reports on safety audits conducted by internal or external safety auditors and action plans prepared by the Contractor.

(5) The Architect may invite any other parties, such as Labour Department, Marine Department, Fire Services Department, Police, representatives from utility undertakers and the departmental Safety and Environmental Advisory Unit to attend the SSMC meeting and provide advice as necessary.

(6) The Architect or his Representative shall prepare the minutes of the SSMC meeting for distribution to all attending parties within 10 working days of the meeting. The minutes of each meeting shall be signed by the Architect or his representative and the site agent.

11 Weekly Safety Walk

(1) The Contractor should arrange a weekly safety walk attended by the Contractor's Safety Officer and site agent or his delegate and the Architect's nominated site representative to inspect the Site checking that safety and health conditions are being maintained on the Site. It shall include, but not be limited to:-

(a) Checking scaffolding in current use to be in compliance with the approved "Codes of Practice for Bamboo and Metal Scaffolding Safety" issued by the Commissioner of Labour,

(b) Checking that the temporary lighting and electrically powered hand-held tools and equipment are all rated at 110V CTE (centre-tapped to earth) in compliance with this Particular Specification clause no. 15(13), and

(c) Checking that site tidiness and cleanliness are conducive to avoiding accidents and mosquito breeding.

Weekly safety walks conducted under this clause are entirely without prejudice to and do not relieve any of the Contractor's responsibility to carry out regular inspections to upkeeping safety and health conditions on Site required by the Factories and Industrial Undertakings (Safety Officers and Safety Supervisors) Regulations.

(2) The Contractor shall prepare and agree with the Architect's Representative a comprehensive check-list for use during safety walk and site inspections. It shall contain a table listing out the deficiencies identified during the walk/inspection with the proposed rectification measures, the names of the persons responsible for taking any necessary rectification measures and the corresponding completion dates. More than one comprehensive checklist may need to be prepared by the Contractor to suit the variety of works at various portions of the Site.

(3) Immediately after the safety walk, the comprehensive checklist shall be agreed and signed by the Safety Officer and the Architect's nominated site representative and a copy kept by the Architect's Representative. The Contractor shall take prompt action to rectify those deficiencies identified during the walk and shall report the status of actions taken at the forthcoming SSMC meeting.

12 Sub-contractors

(1) The Contractor shall provide each sub-contractor with sets of site rules and regulations, safe working procedures and safety obligations to ensure compliance.

(2) The Contractor shall, for contracts where more than two contractors are working in close proximity, establish a safety co-ordination system to liaise amongst the sub-contractors and to maintain a safe working environment.

13 Reporting

(1) In addition to the requirements of the General Conditions of Contract clause no. 27, the Contractor shall complete any other forms as the Commissioner for Labour may require including, but not limited to, forms requesting supplementary information used by the Labour Department for the purpose of accident analysis. Copies of such forms should be made available for inspection by the Architect upon request.

(2) Further to sub-clause (1) above, the Contractor shall notify the Architect immediately of any accident/incident occurring on the Site or related to the Works involving dangerous occurrence or death or serious personal injury or with worker(s) admitted to the hospital. The initial notification may be made verbally. A written notification with details shall be made within 24 hours of the occurrence of the accident. If the accident results in death or total or partial incapacity of the injured person(s) for a period exceeding 3 days, the Contractor shall also submit the duly completed "Injury Report Form" as per Appendix VI of Chapter 9 of the Construction Site Safety Manual to the Architect's Representative within 7 calendar days of the accident.

(3) The Contractor shall then investigate the incident/accident and complete any further report as may be required by the Architect on the detailed cause of the accident or dangerous occurrences, measures to prevent recurrence and complete standard forms provided by the Architect to enable the Employer to prepare an up-to-date database on site accident statistics.

(4) The Contractor shall submit a monthly report for consideration at the meeting of the SSMC. It shall be prepared by the Safety Officer and duly endorsed by the site agent, to the Architect containing the following information:

(a) all accidents involving dangerous occurrence, death, personal injury irrespective of severity or damages to properties in or adjacent to the Site,

(b) results of any Labour Department's inspections, advice, warning, Improvement/Suspension Notices and prosecutions,

(c) proposed training programme for the next month and training carried out in the previous month,

(d) a list of all competent persons and a summary record of all examination and test certificates required by any legislation or the Contract, and

(e) Safety Officer's inspection reports, reports on follow up action taken on irregularities identified during safety inspections and weekly safety walks, and safety audit reports on the implementation of the Safety Plan.

(5) Within 14 days from the request of the Architect, the Contractor shall submit a written report to explain the high accident rates and to propose measures to improve the safety performance of the Site.

(6) The Contractor shall maintain on the Site a register of all accidents occurring on the Site including dangerous occurrences, near misses and accidents with or without personal injury. The register shall be made available for inspection by the Architect's Representative upon request.

(7) Further to sub-clause (2) above regarding incident/accident with hospitalization of worker(s), the Contractor shall notify the Architect's representative immediately when the injured worker(s) has been discharged from the hospital, by provision of the relevant medical certificate or report with declaration detailed in paragraph 9.3.5 of Chapter 9 of the Construction Site Safety Manual.

14 Further Safety Measures

(1) Safety, rescue and health matters shall be given a high degree of publicity on the Site. The Contractor's safety policy statement, emergency procedures and any rescue organisation shall be made known to all persons on the Site. Such information shall include an emergency telephone list including the names and contact telephone numbers (such as mobile phone number and pager number) of at least two key members of the Contractor's emergency organisation, and the telephone numbers of the appropriate divisional police, fire and ambulance stations, utility undertakers, Labour Department's Operation Division and Marine Department. Copies of the above information and safety posters, in Chinese and English languages, shall be displayed at prominent places on the Site. A notice board shall be erected near the entrance of the site for the display of safety posters, up-to-date accident records and the names of the Safety Officer and the site agent.

(2) The Contractor shall ensure that all tools, plant, equipment and temporary facilities and all other items used in carrying out the Works how-so-ever provided are in a safe, sound and good condition, are capable of performing the functions for which they are intended, and where required by the law or by the relevant codes of practice, are licensed and/or have been issued with the necessary permits for use.

(3) The Contractor shall establish, implement, maintain and regularly review the safety system of work for working in lift shaft including, but not limited, to the following:-

- Provision of a structurally sound temporary full height metal gate with lock and key, where key is required for opening the gate from outside of the lift shaft and can be opened from the inside of the lift shaft at any time without the need of key to facilitate emergency escape. In addition, any opening on the gate shall not be greater than 50mm x 50mm in size;

- Using the lift shaft as storage space is strictly prohibited at any time; and

- Using the lift shaft for transportation of materials or refuse is strictly prohibited unless the lift installation works are certified by authority as completed for use and exemption is granted from the Architect for such activity to be carried out.

(4) Metal scaffold system including falsework and working platform, shall be designed by professional engineer who shall be a corporate member of Hong Kong Institution of Engineers in structural or civil discipline or equivalent with adequate training and experience. The Contractor shall provide the method statement, design drawings, specifications and structural calculations for the metal scaffold system when required by the Architect.

(4a) All metal scaffold system shall not be used unless it has been inspected by a competent person with statutory Form 5 according to Regulation 38F of Construction Site (Safety) Regulations. The Contractor shall appoint the competent person in writing and inform the Architect's Representative of the name, qualifications and experience of his appointed competent person. The Contractor shall also ensure the appointed competent person is, by reason of substantial training and practical experience, competent to perform the duty.

(4b) For bamboo Scaffold System with working platforms laying on every lift as per Section 4.4.1(c)(i)(1) of the Code of Practice for Bamboo Scaffolding Safety issued by Labour Department, the following requirements shall also apply:-

Notwithstanding Clause 1.39.4(ii) of General Specification for Building (GS), the bamboo Scaffold System shall be designed and endorsed by a Registered Professional Engineer who shall have adequate relevant experience. Working drawings for the bamboo Scaffold System shall be prepared, checked and endorsed by the Registered Professional Engineer before submission to the Architect. The vertical spacing of the steel brackets for supporting the bamboo Scaffold System, or other form of support, shall not exceed 10m.

(5) Fences and/or nets of adequate strength shall be provided along all edges where workers may be liable to fall into water. If it is not possible to provide such fences and nets, persons working over or immediate adjacent to water shall wear a life jacket or a suitable buoyancy aid or a personal fall arrestor (as is appropriate) when so working. If there is a risk of the personnel becoming unconscious after falling into water, the life jacket shall be a self-inflatable type of the appropriate buoyance.

(6) If required by the Contract, the Contractor shall provide a suitably equipped and dedicated rescue launch, manned and available whenever work is being carried out on or over water. Adequate rescue equipment and personal protection equipment (PPE) shall be provided and maintained according to the manufacturer's specifications and recommendations.

(7) Alcoholic drinks and other substances which may impair judgement shall be prohibited from the Site. The Contractors shall remove any person under the influence of such substances from the Site immediately.

(8) Personal protective equipment provided by the Contractor for use in confined spaces and for protection against falling from height shall be full-body type safety harnesses with suitable lanyards. Safety belts shall not be permitted except for use as a means of positioning to restrict horizontal movement. The Contractor shall also provide secure anchorages for the attachment of safety harnesses/safety belts.

(9) Permit-to-work systems shall be implemented to control access to hazardous areas or the carrying out of any hazardous operations including, but not limited to, hot work, electrical work, work in confined space, maintenance of material hoist, area or operation liable to release of flammable or toxic liquid or gas, work in lift shaft, etc.

(10) All lifting gear including slings, shackles and such like equipment shall be colour coded for identifying lifting gear which require re-inspection or disposal. Details of the colour coding system are given in Part 3 of this Particular Specification.

(11) All material hoists installed shall be fitted with fail-safe interlocking hoistway gates such that the driving mechanism is operable only when all gates are closed and latched; and hoists shall not be operated manually when one gate is opened. A single channel communication from the user to the operator of the hoist shall also be provided.

(12) All persons engaged in works with risks of receiving foot injuries including but not limited to pneumatic drilling work and manual handling work shall be provided with safety boots when they are engaged in such works. The cost of provision of safety boots shall be deemed to have been allowed in the Contract Rates. Safety boots shall comply with BS EN ISO 20345 with protection properties to Category S3 or equivalent standards.

(13) Further to the requirements under the Factories and Industrial Undertakings (Noise at Work) Regulations, the Contractor shall provide approved ear protectors to all persons working on the Site who are exposed to noise level of 90 dB(A) or above.

(14) The Contractor shall keep a register of all dangerous substances including those hazardous to health which are delivered to and stored for use on the Works. The register shall include information on:

(a) their physical and chemical properties,

(b) hazards,

(c) safe handling and storage,

(d) precautionary measures to be taken, and

(e) first aid measures,

extracted from the manufacturers' material safety data sheets.

(15) Receptacles with full containment on four sides to prevent the falling out of materials shall be used for the lifting and transportation of reinforcement links, stirrups, short pieces of splice or reinforcement U-bars, couplers and the like. The safe working load shall be marked on the receptacle after being tested by a competent examiner. The colour coding system for lifting gear shall also apply to these receptacles.

(16) The lifting of reinforcement bars shall be by the use of wire slings. No cradles shall be used for the lifting of reinforcement bars unless they are properly designed and with their safe working load certified.

(17) Roads and footways below suspended precast concrete/steel segments or the like, shall be closed until such time the segments are secured in their permanent locations unless measures are taken to the Architect's satisfaction to prevent the segments from falling in the event of the failure of the equipment used to suspend the segments. The Contractor shall seek approval from the relevant authorities for the closure of the concerned sections of roads and footways. Adequate measures including the use of barricades and warnings shall be provided to ensure that no person shall inadvertently enter the area below any suspended segments.

(18) Construction vehicles and plant used on Site shall be equipped with audible signals on reversing. Other form of warning signals and/or banksman shall be provided as necessary to guide such reversing movements if audible signals are causing nuisance to nearby residents particularly at night. For quarry operations, no person shall operate or drive any mechanical equipment at or near the edge of any face, side, tip or embankment in a quarry unless a banksman is in attendance.

(19) Where there are more than one tower cranes operating within the Site and there is a possibility of overlapping crane movements, the Contractor shall develop, implement and maintain a safe system of work to prevent the overlapping of tower cranes lifting operation. The system shall include, but not limited to, the following:

- the provision of a warning system in the form of light and/or sound to alert the crane operator of the approach of cranes in the overlapping area;

- the appointment of Overlapping Area Lapping Supervisor (OALS) to co-ordinate and control the lifting operation in the overlapping area or the provision of an automatic control device to prevent the occurrence of overlapping situation;

- the provision of adequate buffer zone on both sides to slow down the slewing movement of cranes so as to prevent a sudden stop which might induce an inertia to the moving load; and

- regular inspection and maintenance of the warning system and automatic control device.

Appropriate measures shall also be implemented to address the possible overlapping crane movement for a mobile crane movement and a tower crane operating within the Site.

(20) The Contractor shall actively organise safety promotional activities to promote and enhance the standards of health and safety on the Site. In addition, the Contractor shall also participate in other territory-wide safety promotional campaigns as instructed by the Architect.

(21) The Contractor shall implement a Permit to Move and Operate System for Mobile Cranes and Piling Rigs operating or moving on the Site in accordance with Part 4 of this Particular Specification, which shall be prepared by the Contractor with proper risk assessment to suit the prevailing site conditions. The Contractor shall also implement additional safety control measures as necessary in case of special circumstances or high risk conditions. The requirement under this Sub-clause shall not reduce or absolve the Contractor's obligations or liabilities in respect of any permit to work system applicable to cranes and piling rigs imposed elsewhere under the Contract or by any enactment, regulations, bye-laws or rules, e.g. the permit system imposed on construction site within the protection zone of MTRCL.

(22) The Contractor shall implement defibrillation measures on the Site as first aid measures against sudden cardiac attack which shall include:-

(a) The provision and manning of one functional set of automated external defibrillator (AED) and the required accessories with technical requirements as per Part 6 of this Particular Specification. The AED shall be placed at a prominent and easily accessible place on the Site as agreed by the Architect. The Contractor should ensure that the AED is properly maintained in functional condition.

(b) The provision of person(s) trained both in use of AED and application of cardiopulmonary resuscitation (CPR) to be present on site during working hours is shown below:-

Total no. of persons on the Site	Minimum no. of person(s) trained both in use of AED and application of CPR to be present on site during working hours
Less than 100	1
100 or more	2

The person trained in use of AED shall mean a person who holds a current certificate on use of AED issued by the Auxiliary Medical Services (AMS) or other approved equivalent institution. The person trained in the application of CPR shall hold a current certification on CPR course issued by AMS or other approved equivalent institution.

(23) Protection to protruding steel reinforcements

The Contractor shall provide protection to protruding steel reinforcements which may cause impalement injury. The protection can be by means of reinforcement caps; dowel bar sleeves; covering of the protruding steel reinforcement by wooden or metal troughs, steel planks and angles; or other means as agreed by the Architect. Depending on the actual conditions of the site works, protection to the protruding steel reinforcements locating at the areas non-accessible to the workers may not be required subject to the approval of the Architect's Representative.

(24) Wearing of chin straps attached to safety helmets

The Contractor shall ensure all persons on site to fasten the chin straps attached to their safety helmets when performing works to avoid accidental detachment of the safety helmets. Safety helmets shall comply with the "Guidance Notes on the Selection, Use and Maintenance of Safety Helmets" published by the Labour Department.

15 Electrical Safety

(1) A Registered Electrical Worker (REW) of the appropriate grade under the Electricity Ordinance (EO) shall be employed by the Contractor throughout the Contract to handle the entire temporary electrical systems and installations on the Site.

(2) Upon completion of the temporary electrical system (TES) and after each alteration/repair to the existing TES, the Contractor shall arrange his REW/Registered Electrical Contractor (REC) under the EO to complete an individual Work Completion Certificate (WR1) as required by the Code of Practice for the Electricity (Wiring) Regulations (COP) issued by the Electrical and Mechanical Services Department. If a REC is not employed, the Contractor shall then assume the responsibilities of a REC and sign on the WR1 together with the REW employed by the Contractor as per Code No. 19B(d) of the COP. Each of such Certificates shall include a circuit diagram clearly indicating which portion(s) of the TES is/are covered, and, where appropriate, other necessary supporting documents.

(3) Temporary electrical installations, such as lighting fittings, distribution boards, socket outlets, plugs and cable couplers in outdoor or damp environment shall be of splash-proof type to IP 54 or above.

(4) The sheath of all electric portable cables shall be of heavy-duty type or otherwise adequately protected against mechanical damage if laid on ground. They shall be hung overhead as far as possible. Ordinary PVC cables, if employed, shall be enclosed in metallic conduits or trunkings and properly maintained.

(5) The Contractor shall develop checklists for carrying out regular routine inspections and checking and monthly comprehensive checking of the TES. The checklists shall be developed by the Contractor and agreed by the Architect's Representative. Comprehensive checking shall include, but not be limited to, checking of temporary generators, functional test of earth leakage circuit breakers, integrity of cables and connections, measurement of earthing resistance and those items listed in Checklists Nos. 3 and 4 of the COP where appropriate. The checklist should be signed by the REW after each inspection and/or checking.

(6) Adequate precautionary measures shall be adopted to ensure safety during inspection, repair and maintenance of the temporary electrical installations including the use of permit-to-work system and/or lock-off system. The Contractor shall establish and review regularly the maintenance programme and logging system for the TES.

(7) The Contractor shall keep and maintain updated circuit diagrams, WR1 (complete with supporting documents) and records of inspection and checking of the TES by REW/REC in a dedicated file for inspection by the Architect's site supervisory staff upon request.

(8) During weekly safety walks and when requested by the Architect's site supervisory staff, the Contractor shall open the cover plates of temporary electricity distribution boards for inspection of the conditions of the internal wiring and/or carry out testing immediately. Updated schematic circuit diagram shall also be affixed inside the cover of the temporary distribution boards.

(9) All temporary electrical distribution boards shall be kept locked and accessible only by authorized persons appointed by the Contractor, e.g. REW and/or general foreman. Legible warning notices (Danger - Electricity) in both Chinese and English, names and telephone numbers of such authorized persons shall be posted on the temporary distribution boards.

(10) For work carried out in occupied buildings, unless prior approval has been obtained and proper and safe arrangement has been made, the Contractor shall not connect his fixed electric equipment directly to any existing permanent distribution boards. Such connection shall only be made through temporary distribution boards equipped with proper protective devices.

(11) All arc welding machines and electrode holders shall comply with BS 638 : Part 7, IEC 60974 - 1 (or BS EN60974 - 1) and BS EN 60974 - 11 or equivalent standards. The welding machines should be fitted with no-load voltage reducing device for protection against electric shock at the output side. Welding machines shall be enclosed and the metal casing shall be effectively connected to earth. Cable terminals of the welding machines shall be effectively insulated.

(12) All hand-held electrical tools and portable equipment (e.g. submersible pumps), whether they belong to the Contractor or sub-contractors of all tiers, Nominated Sub-contractor or Specialist Contractors under domestic sub-contract, shall be examined by the REW before they are used on Site. The examination shall include visual inspection for the general conditions of the tools and equipment and also tests for checking the functional, protective conductor continuity, polarity and insulation aspects. After passing the examination, all hand-held tools and equipment shall be registered and recorded. Identification labels showing the registration number, type of the tool, name of the owner and date of examination stamped with the Contractor's company chop shall be affixed to these tools and equipment. Re-examination of the registered hand-held tools shall be carried out at 3-month intervals or each time after repairs to damages.

(13) Voltage in excess of 110V shall only be used for heavy equipment such as hoists, tower cranes, etc. with an earth leakage circuit breaker installed and in proper function. Portable and hand-held tools and temporary site lighting shall be operated at a voltage of 110V or less supplied from a step-down transformer with its output winding centre-tapped to earth and comply with BS EN 61558-1 and BS EN 61558-2-23 or equivalent. All cables shall be terminated within the transformer enclosure of Class I and IP 55 and the outgoing circuit shall be provided with short circuit protection. In confined and damp environment, the voltage of temporary lighting and hand-held tools shall not exceed 25V.

(14) For works to be carried out inside ceiling void or at high level, temporary lighting (at 110V or below) shall be used. Lighting fittings using 220V electricity supply shall not be deployed even if available unless adequate safety arrangement has been made and prior approval of the Architect has been obtained.

(15) The Contractor shall implement a Permit-to-work System after Energisation of Permanent Power Supply in accordance with Part 5 of this Particular Specification.

16 Site Safety Cycle

The Contractor shall practise "Site Safety Cycle" (SSC) to improve and promote the safety and health of the Site. Site Safety Cycle shall begin when there are workers working on the Site, and shall cease by the date of substantial completion of the Works, or at a date proposed by the Contractor and approved by the Architect. The activities for Site Safety Cycle for one day, one week and one month are referred to as the "Daily Cycle", "Weekly Cycle" and "Monthly Cycle" respectively. Details of the activities and the provisions for holding the activities are described below. For simplicity, the Pre-work Exercise and Safety (PES) meeting, Hazard Identification Activity (HIA) meeting and Pre-work Safety Checks of the Daily Cycle are collectively referred to as the "Pre-work Activities".

The Contractor shall arrange Pre-work Activities to be held for attendance by persons employed on the Works (excluding clerical and administrative staff in site office), irrespective of whether they are in the employment of the Contractor or his sub-contractors. For the avoidance of doubt, persons employed on the Works are those persons whose number of man-hours worked on the Site are to be included in the number of man-hours worked for the Contract. The Contractor is encouraged to arrange Pre-work Activities to be held daily, but in any case the frequency of Pre-work Activities for attendance by each person employed on the Works shall be not less than once in a week (commencing on Monday). Where necessary, the Contractor can arrange more than one session of Pre-work Activities to be held in a day in order to suit the large workforce or the different times of arrival of workers at the Site. The Pre-work Activities shall be carried out prior to any work carried out by the persons attending the Pre-work Activities on that day. Furthermore, the number of persons attending the Pre-work Activities in a session shall be governed by the hard-paved area which shall be sized based on the rate for a person specified in sub-clause 5 below.

(1) Daily Cycle

1.1 PES Meeting

1.1.1 The Contractor shall arrange and hold PES meetings each about 10 to 15 minutes for all the persons employed on the Works.

1.1.2 The PES meeting shall be led by the Site Agent or a senior staff of site management of the Contractor, who has attended the training course on SSC or the Safe Working Cycle of the OSHC or CIC, or other relevant training courses notified by the Architect.

1.1.3 The first few minutes of PES meeting shall start with a physical exercise set by the Contractor. After that, the leader of the PES meeting shall address the attendees on the prevailing safety and health matters related to the Site, such as common hazards and control measures, general fire and safety precautions, specific safety concerns, general defects and irregularities observed in inspections, accidents or near misses etc.. Besides, the Contractor shall also make use of the PES meetings to announce common safety matters in execution and co-ordination of the Works on the Site among sub-contractors and workers, or presenting awards to workers and/or sub-contractors in recognition of their good safety performance.

1.1.4 The Contractor shall maintain a brief record of the run-down programme and a register of the persons attended for each PES meeting, or keeping photo records showing the attendance. The Architect's Representative and/or his/her staff shall attend the PES meetings regularly to ensure their quality for certifying payment.

1.2 HIA Meeting

1.2.1 The Contractor shall arrange and hold HIA meeting of about 10 minutes for the attendees immediately after the PES meeting.

1.2.2 To strengthen the communication on the Site, the Contractor shall arrange persons on the Site to take turn to lead the HIA meeting. Such person can be either a foreman, ganger, Safety Officer, Safety Supervisor or Safety Representative who has attended, in addition to the SSC course as mentioned in sub-clause 1.1.2 above, the presentation skill course such as the Occupational Safety and Health Trainer Course of OSHC or the Safety Training Techniques of CIC or other relevant courses notified by the Architect. The Contractor shall ensure that sufficient persons on the Site have received the training to lead the HIA meetings as soon as the Contract commences.

1.2.3 The leader of each HIA meeting shall prepare the training materials before conduction, which shall include, but is not limited to, hazards and control measures specific to the works or trades, special safety concerns, assurance of safety requirements and measures, reprimand of repeated irregularities and malpractice etc.. Besides, the leaders of the HIA meetings shall also encourage workers to give their views in the HIA meetings. Where necessary, Site Agent, Safety Officer and/or Safety Supervisors who are more experienced in provision of training shall provide guidance and assistance to the leaders of HIA meeting before conducting the meeting. The training materials prepared for and the discussion during the HIA meeting shall be recorded in a HIA table, a sample of which is shown in Annex A of this part. The HIA Table shall be kept in the Contractor's site office for ready inspection by the Architect's Representative or his/her staff upon request.

1.2.4 Subject to the agreement of the Architect's Representative, the Contractor can alternatively arrange the HIA meetings to be held in small groups according to the trades, work teams or works areas set out by the Contractor for the Site. If so, the Contractor shall ensure that the assigned persons are competent to lead the HIA meetings, whose names and curriculum vitae shall be submitted to the Architect's Representative for approval. The Architect's Representative or his/her staff shall attend the HIA meetings regularly to ensure their quality for certifying payment. The Architect's Representative shall not certify payment for the number of persons who have attended the HIA meeting in a group if the Architect's Representative is dissatisfied with the content and/or the arrangement of the HIA meeting for that group.

1.2.5 The Contractor can use the register or photo records for the PES meeting for taking attendance of the HIA meeting if the attendees have not split up into small groups. Furthermore, the Contractor shall complete one HIA table for each HIA meeting held for individual groups pursuant to sub-clause 1.2.4 above.

1.3 Pre-work Safety Checks

1.3.1 The Contractor shall arrange and hold Pre-work Safety Checks for the attendees immediately after the HIA meeting. The Pre-work Safety Checks shall be carried out by foremen, gangers, Safety Supervisors or Safety Representatives of the attendees according to the trades, work teams or works areas set out by the Contractor for the Site. The Pre-work Safety Checks shall include the checking of personal protective equipment worn by attendees before they start working on that day such as safety helmet, reflective vest, ear protectors, eye protectors, safety harness, safety footwear etc.. The Architect's Representative or his/her staff shall attend the Pre-work Safety Checks regularly to ensure the proper checking by the Contractor for certifying payment.

1.3.2 The Contractor shall assign persons who are competent with the relevant knowledge, experience and training to check and ascertain the safety conditions of facilities, machinery, plant and equipment and materials before commencing work on that day. The Contractor shall propose a list of facilities, machinery, plant and equipment to be checked and develop relevant checklists for such checking for the approval of the Architect's Representative. The assigned persons shall use the checklists for Pre-work Safety Checks of facilities, machinery, plant and equipment, and the completed checklists shall be kept at the Contractor's site office for ready inspection by the Architect's Representative or his/her staff upon request.

1.4 Safety Inspection by the Site Agent or his Representative

1.4.1 The Contractor shall arrange the Site Agent or his/her representative to carry out safety inspection of the Site daily, particularly for those areas identified for improvements in weekly safety co-ordination meetings, Weekly Safety Walks, SSMC meetings or Site Safety Committee meetings pursuant to sub-clause 2.1, 2.2, 3.1 and 3.2 respectively. The Site Agent or his/her representative shall check and ensure that the safety instructions given in PES meetings or HIA meetings have been observed and carried out.

1.4.2 Any unsafe act or unsafe conditions observed during inspections shall be recorded in a diary maintained by the Site Agent, who shall promptly communicate the irregularity to the respective party concerned for follow-up actions. The Site Agent shall check and ensure that the unsafe acts or unsafe conditions are rectified promptly, and the date is duly recorded in the diary after completion. The safety diary shall be made available for inspection by the Architect's Representative and copying thereof upon request.

1.5 Guidance and Supervision during Work

The Contractor shall assign sufficient supervisory staff to be responsible for the safety and health of workers on the Site. The names of the assigned supervisory staff shall be shown in the site safety organization chart posted up in the safety bulletin board pursuant to sub-clause 4.2 below. The assigned supervisory staff shall provide guidance and supervision for the workers under his/her control, and rectify any irregularities, unsafe acts or unsafe conditions for the works on the Site. Guidance and supervision provided shall also include the implementation of safety instructions given in PES or HIA meetings.

1.6 Safety Co-ordination Meeting

The Contractor shall arrange and hold safety co-ordination meeting each day to coordinate safety and health work to be carried out on the Site on the following day. The meeting shall be chaired by the Site Agent or a senior staff of site management of the Contractor, and attended by assigned supervisory staff pursuant to sub-clause 1.5 above where necessary. The meeting shall be used to discuss the findings in safety inspections and/or the matters to be announced in the next PES or HIA meeting. It can also be used for discussion and co-ordination of site safety matters, such as sequence of works, usage times for shared machinery and equipment and works areas, phasing of works at various interfaces, delivery and storage of materials and equipment to the Site etc.

1.7 Daily Cleaning and Tidying up of the Site

Detailed requirements are specified in PS.G05 – Particular Specification for Daily Cleaning and Weekly Tidying.

1.8 Checking of the Site after Each Day's Work

The Contractor shall assign designated person to check the safety of the Site after each day's work including, but is not limited to, the following:

i. all flames and heat sources have been extinguished (particularly for welding and hot-work operations);
ii. keys have been removed from construction machinery and plant and kept in a safe place;
iii. all construction plant are parked properly on level and stable ground;
iv. all machinery and power sources have been turned off;
v. all openings are properly covered and all edges are provided with fall protection measures;
vi. all nailed timber, planks and/or sheets are piled and put aside away from main accesses;
vii. excavated surfaces on soil slopes are provided with temporary protection;
viii. all temporary works are properly maintained;
ix. signing, lighting and guarding are provided in accordance with the approved temporary traffic management scheme;
x. hoarding and/or covered walkways along the periphery of the Site are maintained in proper condition; and
xi. the Site has been fenced and guarded against unauthorized entry.

The designated person shall, after completion of checking, notify the Site Agent any unsafe conditions or imminent danger that require immediate follow-up actions. The designated person shall also draw the attention of the Site Agent about the minor irregularities to arrange rectification on the following day.

(2) Weekly Cycle

2.1 Weekly Safety Walk

Detailed requirements are specified in Clause No. 11 of Part 1 of this Particular Specification.

2.2 Weekly Safety Co-ordination Meeting

The Contractor shall arrange the Site Agent or a senior staff of the site management of the Contractor together with the Safety Officer, Safety Supervisor and/or supervisory staff of sub-contractors to attend the weekly safety co-ordination meeting chaired by the Architect's Representative. The meeting shall discuss or coordinate safety and health matters including, but is not limited to, safety performance, housekeeping and tidiness of the Site, together with the specific areas of concern, defects and deficiencies observed in Weekly Safety Walks, accidents and near misses occurred on the Site, etc. A brief notes of the meetings shall be prepared by the Contractor and endorsed by the Architect's Representative after the Meeting.

2.3 Weekly Overall Cleaning and Tidying up of the Site

Detailed requirements are specified in PS.G05 – Particular Specification for Daily Cleaning and Weekly Tidying.

(3) Monthly Cycle

3.1 Site Safety Management Committee Meetings

Detailed requirements are specified in Clause No. 10 of Part 1 of this Particular Specification.

3.2 Site Safety Committee Meetings

Detailed requirements are specified in Clause No. 9 of Part 1 of this Particular Specification.

(4) Safety Bulletin Board

4.1 The Contractor shall provide a safety bulletin board at the location where Pre-work Activities pursuant to sub-clauses 1.1 to 1.3 shall be held. Subject to the approval of the Architect, additional safety bulletin board can be provided where Pre-work Activities have to be held at more than one location of the Site.

4.2 The safety bulletin board shall be made of recycled materials with a size approximately 6m x 1.5m which can be varied to suit the site condition subject to the approval by the Architect's Representative. The board shall contain, but is not limited to, the following information:

i. the design by the Contractor on promotion of Site Safety Cycle;

ii. a chart with names and contact telephone numbers showing the site safety organizational structure from senior site management down to sub-contractors, gangers, foremen, Safety Officer, Safety Supervisors and Safety Representatives according to works trades, work gangs or works areas, together with the emergency teams, first aid personnel etc.;

iii. accident statistics with breakdown to sub-contractors; and

iv. a figure showing a worker wearing all the personal protective equipment plus a mirror to cover the full view of the person when standing in front.

The safety bulletin board may contain other safety information related to the Site such as Site plan, safety policies, in-house safety rules and regulations, slogans, colour coding systems for lifting gears, important safety and health issues etc..

4.3 The Contractor shall propose the location for the erection of the safety bulletin board and the hard-paved area pursuant to sub-clause 5 where Pre-work Activities will be held for the approval of the Architect's Representative.

(5) Hard-paved area

5.1 The Contractor shall arrange and provide a hard-paved area on the Site for holding Pre-work Activities pursuant to sub-clauses 1.1 to 1.3 above under GS Clause 1.28 "Site accommodation for contractor" in the Bill No. 1 – Preliminaries. The hard-paved area shall be sized based on a rate of 1.5 m^2 per person multiplied by the maximum number of persons to be arranged for one session of Pre-work Activities. The hard-paved area shall be designed to be able to sustain the load at that area throughout the Contract. Details of construction of the hard-paved area shall be submitted to the Architect's Representative for approval.

5.2 Subject to the agreement of the Architect's Representative, the Contractor can arrange Pre-work Activities to be held at more than one location, and the hard-paved areas at each venue shall be sized separately based on the specified requirement given in sub-clause 5.1 above. The hard-paved area can be an open area in front of the site office, or an area inside building structure under construction, or at the main works areas in case of roadworks or mains laying contracts, or near shaft opening for a tunnelling contract, whichever is appropriate. The Contractor shall submit the proposed location and its area for holding Pre-work Activities for the approval of the Architect's Representative within 14 days from the date of commencement of the Works on the Site.

5.3 If the proposed location for holding of Pre-work Activities is outdoors, consideration shall be given to provide a cover for the hard-paved area unless otherwise approved by the Architect's Representative that the provision is not necessary. Details of construction of the cover shall be submitted to the Architect's Representative for approval.

5.4 The Contractor shall maintain the hard-paved area and the cover throughout the Contract, and shall demolish and reinstate the area to the satisfaction of the Architect's Representative prior to completion of the Works unless otherwise agreed by the Architect.

17 Welfare Facilities for Workers

Immediately after the award of the Contract, the Contractor shall arrange to provide welfare facilities specified below for workers employed on the Works, irrespective of whether they are in the employment of the Contractor or his sub-contractors. The Contractor shall maintain the welfare facilities provided on the Site throughout the Contract, and shall remove the facilities and reinstate the areas after removal of the facility or upon completion of the Works where necessary. The costs for the provisions shall be priced in the Bill No. 1 – Preliminaries under GS Clause 1.28 "Site accommodation for contractor". The sufficiency of provision for the welfare facilities shall be monitored and reviewed in the SSMC meetings. The Contractor shall replenish the insufficiency of provision to meet the specified requirements and shall not be entitled to claim the cost of such replenishment after commencement of the Works.

(1) Storage Compartments

The Contractor shall provide storage compartments for use by workers. The storage compartment shall be placed at a location close to the Site entrance to facilitate workers to obtain/place their personal protective equipment such as safety helmet, reflective vest, eye protectors, safety harness etc. when they enter/leave the Site.

The Contractor shall ensure adequate provision of storage compartments taking into account the fluctuation in labour workforce. The Contractor shall determine the dimensions of the storage compartments. To facilitate monitoring and control, each storage compartment shall be designed for use by not more than five persons unless otherwise approved by the Architect's Representative. The Contractor shall propose the number, location and layout arrangement for the placement of storage compartments on the Site for the approval of the Architect's Representative within 14 days from the date of commencement of the Works on the Site. The Architect's Representative shall review regularly the adequate provision of storage compartments on the Site for use by workers throughout the Contract.

(2) Drinking Water Facilities

The Contractor shall provide free drinking water facilities for workers working on the Site throughout the Contract to minimize waste plastic bottles. The drinking water facility can be in the form of a water pot with a cover at the top for water refilling and a tap at the bottom for drawing water, a distilled water drinking fountain or any other form that the Contractor considers appropriate. The drinking water facilities shall be provided indoors and each of which shall have a storage capacity of not less than 20 litres.

The Contractor shall be responsible for maintaining the drinking water facilities in clean and hygienic condition and refilling drinking water to the facilities when empty. The number of drinking water facilities provided on the Site shall be at a ratio of not less than one for every (20) workers [figure tentatively set and to be determined by the Architect]. The Contractor shall propose the number, location of placement and the refilling frequency for drinking water facilities provided on the Site for the approval of the Architect's Representative within 14 days from the date of commencement of the Works on the Site. The Architect's Representative shall review regularly the adequacy of drinking water facilities provided by the Contractor throughout the Contract.

(3) Toilet Facilities

The Contractor shall provide toilet facilities for workers working on the Site throughout the Contract, unless otherwise approved by the Architect's Representative that the provision is not necessary. The toilet facilities shall be suitable for use bisexually and placed at convenient locations close to workers' workplace. The toilet facilities shall be either one of the following types:

(i) wet type with flushing water supply and the toilet waste properly collected and discharged into a sewerage system, septic tank, soakaway system, or in-situ sewage treatment facilities proposed by the Contractor and approved by the Architect's Representative;

(ii) chemical type complete with containers for regularly cleaning and removal by specialist contractor.

For connection to a public sewerage system, the Contractor shall obtain approval from the Drainage Services Department prior to making the connection. If a soakaway system is adopted, the Contractor shall carry out in-situ percolation test to prove that the soil shall have sufficient absorption capacity to treat the toilet waste flow. The test results shall be submitted to the Architect's Representative for recording before discharging. If in-situ sewage treatment facility is adopted, the plant shall be equipped with disinfection unit to sterilize the treated effluent before discharging.

The number of toilet facilities provided on the Site shall be at a ratio of not less than one for every (30) workers [figure tentatively set and to be determined by the Architect]. The Contractor shall propose the toilet type, number and their locations of placement for the approval of the Architect's Representative within 14 days from the date of commencement of the Works on the Site. The Contractor shall maintain the toilet facilities in clean and hygienic condition. The Architect's Representative shall review regularly the adequacy of toilet facilities provided by the Contractor on the Site and the cleanliness and hygienic conditions of these toilets throughout the Contract.

(4) Hand-wash Facilities

The Contractor shall provide hand-wash facilities in the form of water points and sinks for workers working on the Site throughout the Contract, unless otherwise approved by the Architect's Representative that the provision is not necessary. The number of hand-wash facilities provided on the Site shall be at a ratio of not less than one for every (20) workers [figure tentatively set and to be determined by the Architect]. The discharge from hand-wash facilities shall be collected to prevent spillage on the floor, and discharged to a water reception tank or flushing water supply tank for recycling/reusing as appropriate. The Contractor shall propose the number of hand-wash facilities, their locations and the system of how to collect the discharge from the wash-water basin for reuse/recycle on the Site for the approval of the Architect's Representative within 14 days from the date of commencement of the Works on the Site. The Architect's Representative shall review regularly the adequacy of hand-wash facilities provided by the Contractor on the Site and the effectiveness of the discharge collection system throughout the Contract.

(5) Showering Facilities

When the number of workers working on the Site will likely be exceeding (100) [figure tentatively set and to be determined by the Architect] in a day for a continuous period of twelve months or more during the Contract, the Contractor shall, in addition to the provision of hand-wash facilities pursuant to clause (4) above, provide showering facilities on the Site unless otherwise approved by the Architect that the provision is not appropriate. The showering facilities shall be provided indoors or inside containers with appropriate drainage connections. The number of showering points provided on the Site shall be at a ratio of not less than two for the first (100) workers [the same figure as determined above by the Architect], and an additional one for every additional (50) workers [figure tentatively set and to be determined by the Architect].

The Contractor shall provide showering facilities at different locations/rooms for use by male or female workers separately. Each showering point shall be furnished with hot and cold water supply. The Contractor shall be responsible for the water and electricity charges for providing the facilities. Details of installation of the facilities shall be submitted for the approval of the Architect's Representative within 30 days after the commencement of the Works on the Site.

(6) Rubbish Bins

The Contractor shall provide sufficient rubbish bins with covers at strategic locations on the Site for collection and disposal of general wastes generated by workers throughout the Contract. The rubbish bins shall be provided in pairs, one for aluminium cans and plastic bottles and the other for general refuses. The locations for the rubbish bins in pairs shall be placed at convenient locations close to the workers' workplace to facilitate use. The number of paired rubbish bins in pairs provided on the Site shall be at a ratio of not less than one pair for every (20) workers [figure tentatively set and to be determined by the Architect]. The size of the rubbish containers shall be of minimum 1 m high and have an opening of at least 0.28 m^2 at the top for collecting wastes.

The Contractor shall maintain the cleanliness of rubbish bins, and arrange collection and disposal of general waste inside the rubbish bins regularly, but in any case shall be not less than once in every three days. The Contractor shall also make arrangement for collecting papers and packaging on the Site to reduce disposal of wastes to landfills. The Contractor shall propose the number and the location of placement of rubbish bins provided on the Site together with the arrangement for on-site sorting of aluminium cans, plastic bottles and papers for the approval of the Architect's Representative within 14 days from the date of commencement of the Works on the Site. The Architect's Representative shall review regularly the adequacy of rubbish bins provided on the Site by the Contractor and the effectiveness of on-site sorting of general wastes throughout the Contract. The Contractor shall include this requirement to form part of his waste management plan if appropriate.

18 Workplace Sheltered Rest Area

(1) The Contractor shall provide workplace sheltered rest areas for use by workers irrespective whether they are employed by the Contractor or his sub-contractors. The sheltered rest areas shall be able to provide sun shade and wind screen for the workers.

(2) Workplace sheltered rest areas shall be located at convenient locations close to working places of workers for them to take rest break or meal break. The rest areas should be provided with seats and tables, hand-wash facilities, rubbish bins, drinking facilities and with proper ventilation. The Contractor shall be responsible for maintaining cleanliness and hygiene of the rest areas.

(3) The Contractor shall provide adequate number of workplace sheltered rest areas taking into account the number of workers and their locations on the Site. The Contractor shall submit the proposal for these rest areas including their sizes, locations, layout, facilities to be provided for approval of the Architect’s Representative. The approved workplace sheltered rest areas proposal shall be reviewed and updated by the Contractor as required by the Architect’s Representative.

19 Measures for Working in Hot Weather

(1) The Contractor shall set up a hot weather safety and health system for workers in accordance with the latest version of the "Guidelines on Site Safety Measures for Working in Hot Weather" issued by the Construction Industry Council (Version 2 published in April 2013). The hot weather safety and health system shall be included in the Contractor's Safety Plan.

20 Report on Safety Performance and Payment for Performance-tied Payment Items

(Not used)

21 Safety Measures of Trenches and Excavation

(1) The Contractor shall observe and comply with the relevant requirements under the Construction Sites (Safety) Regulations (Cap. 59I) and the Electricity Supply Lines (Protection) Regulation (Cap. 406H) when the works activities are carried out in the vicinity of electricity supply lines. He shall follow the practical guidance detailed in the Code of Practice which has been prepared by the Electrical and Mechanical Services Department (EMSD). Further to the requirements under the Electricity Supply Lines (Protection) Regulation, the Contractor shall comply in particular with the following safety measures with regard to trench and other excavation works:

(a) Before the commencement of any excavation work, sufficient information shall be obtained from the utility undertakings and by inspection pits or, if agreed by the Architect, by other means including referring to the investigation data obtained from the Architect to verify the locations of underground installations.

(b) A competent person approved by the Electrical and Mechanical Services Department shall be appointed to locate the alignment and depth profile of all underground cables in the areas irrespective of the excavation depth.

(c) Ensure that any underground cable alignment and depth profile as identified by the competent person in the area are clearly marked on the ground.

(d) Excavation shall be carried out by trained and experienced workers who shall be fully informed of the possible dangers and safety precautions, before work is commenced.

(e) Hand digging method shall always be employed as part of trench / open cut excavation where there are utilities adjacent to or within the trench / open cut excavation works. Portable mechanical tools may be used but shall be restricted to the breaking of the pavement surface. Due care shall be exercised to prevent damage to the underground cables, water pipes, gas pipes or other utility installations. The Contractor shall adopt his own working method to overcome the obstruction by utilities is encountered in trench / open cut excavation, including but not limited to the excavation by hand digging. The Contractor shall adopt hand digging or other method in trench excavation instead of awaiting diversion of utilities unless the obstruction is substantial which covers more than half width of a trench and extends more than 10 metres. Adequate utility support works shall be carried out so that safety of working underneath utilities can be achieved and the damage or disruption to utilities can be avoided. Safety measures shall be adopted for the hand digging work.

(f) Exposed utility installations shall be adequately supported and protected from accidental damage. The requirement /recommendations by Joint Utilities Policy Group (JUPG) shall be followed. "Detailed Requirements on Support of Utility Services" published by JUPG shall be complied with. The Contractor shall be responsible for liaising with and seeking approval from the relevant utility undertakings in relation to the handling or supporting of utilities. The Contractor shall liaise and seek approval from relevant utility undertaking if any requirements are proposed to be relaxed or waived for the construction. The Contractor shall be entitled to no claim for extension of time or payment in any form for complying with such requirement / recommendation and/or delaying in making liaison or seeking approval.

(g) Smoking and use of naked flames shall be prohibited if gas pipes are present.

(h) The side of an excavation shall be properly shored and adequately supported so as to avoid dangers arising from dislodgement of earth or other materials and instability of adjacent buildings/structures/services.

(i) Every excavation shall be examined by a competent person daily who shall submit to the Architect's Representation a report, in the format to be agreed by the Architect, stating the safety and stability conditions of every excavation and its supporting structures. Work in the excavation shall not be carried out unless the written report of the examination shows that the excavation and its supporting structures are safe and secure.

(j) No materials, plant or other loads shall be placed or stacked close to the edges of an excavation.

(k) Ready means of evacuation shall be provided for the workers to escape from an excavation in the event of emergency.

(l) Suitable barriers shall be provided to the edges of an excavation.

(m) When temporary covers/decking to the trenches and barriers at the edges of excavation are being installed, the Contractor shall ensure that they are safely and securely installed at all times, especially during adverse weather conditions, and shall be flush and continuous with the surrounding carriageway and pavement.

(n) The site with excavated trenches or pits should be securely fenced off with notices posted to warn on danger and against trespassing. Should there be any possibility of ponding of water, life saving rings should be placed at the edge of excavation for emergency use.

22 Site Traffic Safety Management Plan

(1) The Contractor shall prepare, update and submit to the Architect the Site Traffic Safety Management Plan (STSMP) for the Works under the Contract. The STSMP shall be submitted within 42 days after the commencement of the Contract. They shall be updated monthly and whenever there are significant changes to the conditions of the Site. The STSMP shall be discussed in the Pre-work Exercise and Safety meetings, daily/weekly safety coordination meetings, where appropriate. The STSMP shall include the following:

(a) risk assessment associated with the site traffic;

(b) safe working procedures;

(c) safety training for site personnel;

(d) site traffic layout design and safety measures with due consideration to planning of traffic routes such as designing routes of traffic and ingress and egress points for vehicles; minimizing the movements of vehicles and mobile plant, and reversing movements of vehicles; designating loading and unloading areas; providing facilities such as segregation of pedestrian and vehicular traffic and pedestrian crossing points to facilitate safe movement of personnel within the Site; and imposing speed control measures;

(e) site traffic layout plans which provides traffic layouts for the Site and related haul roads;

(f) an assessment on feasibility of installation of reversing video devices or other reversing safety devices, and preparation of implementation plan; and

(g) an inventory of vehicles and mobile plant which lists out the type, model and statutory certificates of the vehicles and plant being used in the Contract.

(2) The Contractor shall display the site traffic layout and the safety measures on the safety bulletin board at the location where the Pre-work activities pursuant to clauses 16(1.1) to 16(1.3) under the PS Clause of “Site Safety Cycle” shall be held.

(3) The Contractor shall take note of the “Publication No. 3 – Guidelines on Safety of Vehicles and Mobile Plant on Construction Site” published by the CIC in preparing the STSMP.

PARTICULAR SPECIFICATION PS.G04

Annex 1.A

PART 1

PARTICULAR SPECIFICATION PS.G04

Annex 1.A

Record of Hazard Identification Activity (HIA) Meeting

Contract No: *[pre-printed]* Name of Contractor: *[------ pre-printed --------]*

Contract Title: Main Works Package 1- Demolition, Foundation and Associated Works for Redevelopment of Grantham Hospital (Phase 1)

Team Reference *(if appropriate)*:	
Date:	Time:

Potential Hazards/ Irregularities/ Unsafe Acts or Unsafe Conditions	Safety Precautionary Measures/ Rectification Actions/ Improvement Actions

Name of Leader:	
Signature:	Position:

(Please complete one sheet for one HIA Meeting)

Annex 1.B

(Not used)

PARTICULAR SPECIFICATION PS.G04

PART 2 - MONTHLY STATEMENT OF TRADE SPECIFIC ADVANCED SAFETY TRAINING FOR SKILLED WORKERS (SILVERCARD)

(for the month of _____)

Department : _____
Contract Number : _____
Contract Title : Main Works Package 1- Demolition, Foundation and Associated Works for Redevelopment of Grantham Hospital (Phase 1)
Contractor : _____

Name of Worker			Silver Card		Remarks
in English	in Chinese	Trade of Worker	Serial No.	Date of Issue	

Prepared by : _____ (Name of Safety Officer)
Signature : _____
Date : _____

Checked by : _____ (Name of Site Agent)
Signature : _____
Date : _____

PART 3 - COLOUR CODING OF LIFTING GEAR

1. General

1.1 This procedure applies to all slings, shackles and such-like equipment that are required by regulation to be certified.

1.2 This procedure will be distributed and shall apply to all contractors who are working on the Site.

1.3 This procedure will be distributed to Suppliers. It shall become a condition of purchase that all Suppliers use only certified lifting equipment on the Site. Such equipment will not feature on the Site Lifting Gear Register (the Register) if it is only present on a temporary basis during loading/unloading of plant, equipment or materials.

2. Arrival on the Site

2.1 Upon arrival on the Site, all contractors shall ensure that their lifting equipment is properly certified and identifiable (i.e. any stamping is legible). If it is not certified or the stamping is not legible then the equipment shall be quarantined and not used until such time as it is tested and certificates can be provided.

2.2 Sub-contractors shall report to the Contractor's Safety Officer (SO) who shall ensure that the certification and stamping are satisfactory, before entering the equipment in the Register and painting the equipment with the appropriate colour (see para. 3.1 below). The Register shall include the due date for re-examination of the equipment.

3. Routine Monitoring

3.1 A colour coding system will be in use for months as noted below :-

Jan	-	Feb	-	Mar	Blue
Apr	-	May	-	Jun	Yellow
Jul	-	Aug	-	Sept	Green
Oct	-	Nov	-	Dec	Orange

To be removed from the Site Equipment under quarantine in Main Contractor's Central Yard	Red White

3.2 The Contractor and sub-contractors' foremen are to familiarise themselves with the colour for that month and ensure that personnel in their charge use only equipment painted in the appropriate colour.

3.3 On the last working day of each month (except as noted in para. 3.5) the Safety Officer of the Contractor (SO) will issue copies of the updated register to site foremen. The foreman will then check all equipment on their batch for compatibility with the Register. The foremen shall particularly ensure that stamping is still legible and the colouring is appropriate. Any equipment in doubt shall be removed from the working area and delivered to the Contractor's central yard whereupon sub-contractors will be required to have it quarantined, re-certified or scrapped accordingly. The equipment under quarantine shall be painted white by the SO. The SO or Safety Supervisors will supervise this operation and be responsible for it.

3.4 During day-to-day operations, it is the responsibility of all concerned to ensure that proper lifting equipment is used. Any irregularity shall be immediately reported to the SO who shall take action as necessary.

3.5 On the following days, or as soon thereafter as practical but in any event within 14 days, all lifting equipment shall be inspected by the SO who shall also check the validity of the certificates as stipulated in the FIU (Lifting Appliances & Lifting Gear) Regulations.

The days are	31st	March
	30th	June
	30th	September
	31st	December

Upon satisfactory inspection and certification, SO shall paint the said equipment with the new colour as noted in para. 3.1 and enter in the Register accordingly.

3.6 The Contractor's Safety Officer shall be responsible for ensuring that all equipments are painted with the appropriate colour and an updated register of such equipment kept. If routine monitoring (re. paras. 3.3 & 3.4) reveals faults with colour coding then sub-contractors shall inform the Safety Officer who will take the appropriate action. If equipment is obviously faulty then it shall be painted red and the sub-contractor be advised to remove it from the Site immediately.

3.7 The colour coding does not evade the Contractor's duty under the Factories & Industrial Undertakings (Lifting Appliances and Lifting Gears) Regulations in examining them every six months by Registered Professional.

4. Completion/Removal from the Site

4.1 From time to time, or upon completion of his work, a sub-contractor may require to remove equipment from the Site. Such removal shall be notified to the SO for updating the Register.

4.2 Once removed from the Site, if the equipment is then brought back, then it shall be treated as per para.2 above.

PART 4 – PERMIT TO MOVE AND OPERATE SYSTEM FOR MOBILE CRANES AND PILING RIGS

1 Planning stage

(1) The Contractor shall appoint the authorized agent under General Conditions of Contract Clause 17 or a designated person (collectively referred to in this Part as the Contractor's Mobile Crane ("MC") Representative) to establish, implement and exercise overall control of the Permit to Move and Operate System for Mobile Cranes and Piling Rigs (the "Permit System") to ensure the safe use and associated operations of mobile cranes and piling rigs on Site. The designated person shall be of senior site management rank, who shall have at least 5 years of site management working experience and shall have a qualification equivalent to Technical Competent Person of grade T4 or above as defined in the "Technical Memorandum for Supervision Plans 2009" issued by Buildings Department.

(2) The mobile cranes referred to in this Part shall also include all types of piling rigs. All requirements in this Part including the statutory requirements, Codes of Practice, etc. for mobile cranes shall be applicable to piling rigs as appropriate.

(3) Prior to carrying out any site operation using mobile cranes, detailed consideration by the Contractor's MC Representative shall be made and documented in an operation plan. Such operation plan shall include the selection, provision and use of Lifting Appliances and Lifting Gear (LALG) as defined in the Factories and Industrial Undertakings (Lifting Appliances and Lifting Gear) Regulations; method statements and risk assessment; planning of fabrication and dismantling of the mobile cranes; managing maintenance, examination and testing of mobile cranes, emergency preparedness and other safety related issues.

(4) If mobile cranes are used for duties other than lifting, such as piling operations, grabbing, etc., the Contractor's MC Representative shall critically assess the safety impacts, such as dynamic loads on the LALG by referring to the Code of Practice for Safe Use of Mobile Cranes issued by Labour Department and the manufacturer's specifications, instructions and manuals which specify the limitations and conditions of the operation.

(5) In case that lifting operation is to be conducted within the Railway Protection Area, the Contractor shall comply with all requirements stipulated in the Development Bureau Technical Circular (Works) No. 1/2019 - Railway Protection and by the MTR Corporation Limited. Special attention shall be given to:

(i) Avoiding slewing the loads over or close to the railway zone with overhead high-tension electricity power lines.
(ii) Consulting MRTCL on the lifting operation plan and seeking consent from MTRCL and the Architect's Representatives prior to conducting the lifting operation there.
(iii) Allowing adequate safe working distance between the lifting zone and the overhead power lines of the railway as per the legislative requirements of EMSD. Additional distance shall also be allowed for lateral swinging force caused by wind effect.
(iv) Providing sufficient railway safety briefing to all lifting personnel prior to mobile crane operation or lifting work.

(6) Procedures for the Permit System shall be established and implemented under the overall control of the Contractor's MC Representative. A permit to move certificate or a permit to operate certificate shall be obtained before a mobile crane is allowed to move or operate respectively. Samples of the permit to move and the permit to operate certificates for mobile cranes are attached in Annex 4.A and 4.B of this Part.

(7) Lorry mounted cranes lifting a load not exceeding 2.5 tonnes within a distance of 2.5 metres from the edge of such crane may be exempted from the requirement to obtain the permit to move and the permit to operate certificates as mentioned in sub-clause (6) above. Such exemption shall only be given if the requirements in sub-clauses (1) to (5) above are properly established and followed including:-

(i) the provision of a designated loading and unloading bay and the implementation of safety control measures stipulated in the risk assessment for the use of such cranes; and
(ii) the conducting of risk re-assessment after every occurrence of adverse weather or change of site condition.

2 Operational stage

(1) Before the mobile cranes are delivered to Site for fabrication, the Contractor shall appoint a Registered Professional Engineer ("RPE") of Mechanical Engineering or Navel Architecture and Marine Discipline to conduct pre-fabrication examination and certify that the mobile cranes are safe for use in accordance with the manufacturer's specifications.

(2) Each permit to move or permit to operate certificate shall be signed by the crane operator and the appointed site foreman, endorsed by the Contractor's MC Representative and submitted to the Architect's Representatives each time before a mobile crane is allowed to move or operate respectively on Site. The Contractor's MC Representative shall check the adequacy of (i) the ground condition for the safe maneuvering and operating the mobile crane and (ii) the safe working loads of the mobile crane to lift the load at front, back and side quadrants, and the Safety Officer and a site foreman shall conduct a last minute risk assessment and review the site situation with a checklist which shall be prepared according to the Contractor's own risk assessment, prior to each certification of the permit. The site foreman shall be a Technically Competent Person of grade T1 or above as defined in the "Technical Memorandum for Supervision Plans 2009" issued by Buildings Department and has completed the Construction Materials Riggers Silver Card training course organized by the Construction Industry Council (CIC). This last minute risk assessment shall include due consideration of aspects including positioning and stability of the mobile crane, safety at the proximity area, maintenance of safe access, weather condition of the operation, etc.

(3) A copy of the permit to move certificate appended with a designated mobile crane routing plan permitted by the Contractor's MC Representatives or a permit to operate certificate shall be displayed prominently on the mobile crane. Such permit certificate shall be valid for a maximum of 3 days (including the date of issuance of the permit) and expire (i) when the validity period terminates, or (ii) upon occurrence of adverse weather e.g. yellow rainstorm, red rainstorm, typhoon, etc, or (iii) upon change of site conditions, whichever is the earliest. Expired permits shall be kept on Site for at least 3 months. The crane operator shall familiarize himself with the above conditions causing expiration of the permit and avoid moving or operating the mobile crane once any of these conditions arise. Such conditions causing expiration of the permit to move or the permit to operate certificates shall be monitored by the site foreman, the Safety Officer or the lifting supervisor. The lifting supervisor shall have completed the Construction Materials Riggers Silver Card training course organized by the CIC and have at least 5 years relevant working experience of lifting operation.

(4) The lifting supervisor, the site foreman, or the Safety Officer shall be present full time on Site during the carrying out of the lifting work to review the overall site situation with checklist prepared according to the Contractor's own risk assessment.

(5) The Architect's Representative shall be notified to monitor the lifting work. For extra high risk activities, e.g. erection of bridge deck, large steel structure, etc., the Architect shall also be notified.

(6) Wherever necessary, the Contractor shall appoint additional lifting supervisors to work in various work fronts of the Site where mobile cranes are in operation. They shall ensure proper implementation of the Permit System during the carrying out of the lifting works.

(7) The crane operators, slingers and signalers shall have completed the Construction Materials Riggers Silver Card training course organized by CIC before carrying out the lifting work on Site.

(8) Briefing sessions on safe use of mobile cranes and lifting operations shall be arranged and conducted by the Safety Officer with assistance from the site foreman and lifting supervisor(s) at least bi-weekly to crane operators, slingers and signalers to ensure their conversance of all proper procedures, plant efficiency and safety measures in operating the mobile cranes. Risk assessment report and safety rules shall be presented to them.

(9) The safety rules and load chart of the mobile crane (in both Chinese and English) and any other restrictions, such as safe working loads of the mobile crane to lift the load at front, back and side quadrants, after the checking in sub-clause (2) above shall be posted up inside the mobile crane cabinet for easy reference such that they shall be followed strictly by the operators. Operating the mobile crane at specified radii with the load exceeding 90% of the safe working load of the mobile crane as tabulated in the statutory LALG forms certified by the RPE shall be prohibited unless such use is under the direct supervision of the site foreman.

(10) Applying the mobile crane for load dragging purpose shall not be allowed. Applying free fall mode of the mobile crane in all sorts of construction activities shall generally not be allowed. When free fall mode is required for operations such as chiseling in construction of large diameter bored piles, specific risk assessment shall be conducted and adequate safety precautions and procedures shall be made. The Contractor shall in any case implement safety measures to avoid unintentional activation of free fall mode.

(11) All out-riggers of the mobile crane shall be fully extended as far as practicable to ensure sound stability. In exceptional or unexpected situation where the out-riggers are only partially extended due to congested site condition, site risk re-assessment and review shall be made by the site foreman and the Safety Officer to ensure safe operation by taking account of factors such as reduction in lifting capacity of the crane. In such case, the related permit to move and permit to operate certificates shall address the particular site condition.

(12) In case of multiple mobile cranes being employed for lifting operation on Site, the site foreman shall ensure that crane operators, slingers and signalers concerned have established effective communication among themselves at work using radio telecommunication tool to prevent any conflict or incident during lifting.

3 Inspection, examination and maintenance stage

The Contractor shall arrange routine maintenance, examination and testing of the mobile cranes by a RPE, including the automatic safe load indicator, all safety devices, mechanical and structural elements to ascertain their compliance with the requirements stated in the 'Code of Practice for Safe Use of Mobile Cranes' and 'Guidance Notes on Inspection, Thorough Examination on Testing of Lifting Appliances and Lifting Gear' issued by the Labour Department. All valid certificates of testing and examination and maintenance log book with history records of the mobile cranes shall be properly maintained on Site and ready for verification.

ANNEX 4.A

PERMIT TO MOVE FOR LIFTING APPLIANCE (Tick ☑ in the appropriate box)

I. Description — Separate Permit to Operate Certificate is required to operate the Lifting Appliance

Contract No: _____

In force until: _____ (Maximum 3 days validity period including the day of issue) This permit shall be voided upon change of site conditions listed in Section II or occurrence of adverse weather.

Date of Movement from: _____ to _____

Time of Movement from: _____ to _____

Move from: _____ to: _____

Type: ☐ Crawler ☐ Hydraulic ☐ Piling Rig ☐ Other: _____ Serial No.: _____

Name of Operator: _____ License No.: _____ Name of Signaler: _____

II. Hazards identified in the area

☐ Excavations	☐ Public areas	☐ Other cranes
☐ Slopes	☐ Roads	☐ Culverts
☐ Soft areas of ground	☐ Railways	☐ Other work in the vicinity
☐ Uneven ground	☐ Schools	☐ Other: _____
☐ Overhead lines	☐ Public footpaths	☐ Other: _____
☐ Underground services	☐ Buildings	☐ Other: _____

III. Safety precautions to be implemented before the move

☐ Maintain safe distance from the hazards	☐ A designated routing plan permitted by the Contractor's Mobile Crane Representative is displayed on the lifting appliance
☐ Identify, sign or barrier off the hazards	
☐ Lay steel plate over the hazards	☐ The routing of the appliance can avoid the hazards
☐ Erect goal post on each side of the overhead cable	☐ Other: _____

IV. Additional safety precautions to be implemented before the move (This Section is not applicable to piling rigs)

☐ Secure the hook block	☐ Retract and park the telescopic jib in the parking position
☐ Lower the loads as close to the ground as possible	☐ Other: _____
☐ Retract the jib or mast as close as possible to the plant	☐ Other: _____

V. Appointed Foreman

I have assessed the hazards in the area in which the lifting appliance is to be moved and the designated routing plan. I am satisfied that the area is safe for the movement of the lifting appliance.

Appointed Foreman: _____ (Name) _____ (Signature) _____ (Date)

VI. Operator

I am aware that as the operator, I am responsible for the safe movement of the lifting appliance. I am aware of the hazards in the area and the designated routing plan and I am satisfied that the necessary safety precautions have been taken. I am satisfied that the lifting appliance is safe to move.

Operator: _____ (Name) _____ (Signature) _____ (Date)

VII. Permit is given to move the lifting appliance according to the designated routing plan displayed on the appliance

I have checked and confirmed that the ground condition is suitable for the safe moving and operating the lifting appliance according to the designated routing plan. I have also communicated with the appointed foreman to display this designated routing plan on the lifting appliance.

Contractor's Mobile Crane Representative: _____ (Name) _____ (Signature) _____ (Date)

ANNEX 4.A

起重機械移動許可證 (在適當空格內填上剔號)

I. 基本資料 操作起重機械須另持有操作許可證

合約編號：_____ 起重機移動日期：由 _____ 到 _____

有效期至： 有效期最長三天(包括簽發日), 在此期間如第二部份所載潛在危險的地方有所變化或遇惡劣天氣則此許可證即告無效 起重機移動時間：由 _____ 到 _____

由：_____ 移動至：_____

種類： ☐ 履帶式 ☐ 液壓式 ☐ 打樁式 ☐ 其它：_____ 編號：_____

操作員姓名：_____ 執照編號：_____ 訊號員姓名：_____

II. 潛在危險的地方

☐ 挖掘工程	☐ 公眾地方	☐ 其它起重機
☐ 斜坡	☐ 道路	☐ 暗渠
☐ 地面軟土	☐ 鐵路	☐ 鄰近的其他工程
☐ 凹凸不平的地面	☐ 學校	☐ 其它: _____
☐ 架空電纜	☐ 公眾行人徑	☐ 其它: _____
☐ 地底設施	☐ 樓宇	☐ 其它: _____

III. 移動起重機械前須實施的安全預防措施

☐ 與有潛在危險的地方，保持安全距離	☐ 在該起重機械上張貼經承建商的流動式起重機代表審批的指定路徑圖
☐ 辨識、標示或圍封有潛在危險的地方	
☐ 在有潛在危險的地方鋪蓋鋼板	☐ 機械的移動路線可以避開有潛在危險的方
☐ 在架空電纜兩邊豎立龍門架	☐ 其它: _____

IV. 其它移動起重機械前須實施的安全預防措施 (此部不適用於打樁式機械)

☐ 穩固吊鈎	☐ 把可伸縮的吊臂收起，放置在停泊的位置
☐ 盡量把負載物的高度調低至最接近地面	☐ 其它: _____
☐ 把吊臂或桅桿收起使其最接近機身	☐ 其它: _____

V. 委任管工

經評估起重機械移動範圍內的潛在危險及指定路徑圖，本人認爲該範圍內安全，適宜移動起重機械。

委任管工：_____ _____ _____

姓名 簽署 日期

VI. 操作員

本人明悉，作為操作員，本人必須對起重機械移動時的安全負責，同時亦明悉移動範圍內的潛在危險及指定路徑圖。本人滿意已採取所需的安全預防措施，並認為起重機械能安全地移動。

操作員：_____ _____ _____

姓名 簽署 日期

VII. 准予根據起重機械的指定路徑圖移動有關機械

本人已檢查及確認地面狀況適合該起重機械按指定路徑圖移動和運作, 並已通知委任管工在該起重機械上張貼此指定路徑圖。

承建商流動式起重機代表：_____ _____ _____

姓名 簽署 日期

ANNEX 4.B

PERMIT TO OPERATE FOR LIFTING APPLIANCE (Tick ☑ in the appropriate box)

I. Description — Separate Permit to Move Certificate is required to move the Lifting Appliance

Contract No: _____ Date of Operation from: _____ to _____

In force until: (Maximum 3 days validity period including the day of issue) This permit shall be voided upon change of site conditions listed in Section II or occurrence of adverse weather.

Time of Operation from: _____ to _____

Location: _____ Description of works： _____

Type: ☐ Crawler ☐ Hydraulic ☐ Piling Rig ☐ Other: _____ Serial No.: _____

II. Hazards in the area to be taken into account

☐ Excavations	☐ Public areas	☐ Other cranes
☐ Slopes	☐ Roads	☐ Culverts
☐ Soft areas of ground	☐ Railways	☐ Other work in the vicinity
☐ Uneven ground	☐ Schools	☐ Other: _____
☐ Overhead lines	☐ Public footpaths	☐ Other: _____
☐ Underground services	☐ Buildings	☐ Other: _____

III. Load to be lifted (This Section is not applicable to piling rigs)

-	Is the lifting appliance capable of lifting the load	☐ Yes	☐ No	

IV. Checklist

-	Check the statutory certificates of the lifting appliance (form 1 and 5)	☐ Yes	☐ No	
-	Check the setting up of the lifting appliance including ground conditions	☐ Yes	☐ No	
-	Check that the outriggers are fully extended	☐ Yes	☐ No	
-	Check that the free fall mode of the lifting appliance is off and measures are in place to avoid unintentional activation of free fall mode	☐ Yes	☐ No	
-	Check that measures are in place (e.g. barriers and warning signs) to prevent workers from entering into the manoeuvring area of the lifting appliance	☐ Yes	☐ No	
-	_____	☐ Yes	☐ No	

V. Additional Checklist (This Section not applicable to piling rigs)

-	Check the statutory certificate of the lifting appliance (form 3)	☐ Yes	☐ No	
-	Check the license of the operator	☐ Yes	☐ No	
-	Check the colour coding and capability of the lifting gear	☐ Yes	☐ No	
-	_____	☐ Yes	☐ No	

VI. Appointed Foreman

I have assessed the hazards in the area of the operation. I am satisfied that the safe working loads of the lifting appliance are sufficient for lifting the load at the * *front / back / side / all* quadrant(s) and addressing the needs of the operation. I am satisfied that the lifting appliance can complete the operation safely.

Appointed Foreman: _____ (Name) _____ (Signature) _____ (Date)

VII. Operator

I am aware that as the operator, I am responsible for the operation of the lifting appliance and I am aware of the hazards in the area of the operation and that the safe working loads of the lifting appliance are sufficient to lift the load at the * *front / back / side / all* quadrant(s) and that all safety measures have been implemented. I am satisfied that the lifting appliance can complete the operation safely.

Operator: _____ (Name) _____ (Signature) _____ (Date)

VIII. Permit is given to operate the lifting appliance

I have checked and confirmed that the safe working loads of the lifting appliance are sufficient for lifting the load at the * *front / back / side / all* quadrant(s). I have also communicated with the appointed foreman the permitted lifting quadrants.

Contractor's Mobile Crane Representative _____ (Name) _____ (Signature) _____ (Date)

* delete as appropriate

ANNEX 4.B

起重機械操作許可證 (在適當空格內填上剔號)

I. 基本資料 移動起重機械須另持有移動許可證

合約編號：_____ 起重機操作日期：由 _____ 到 _____

有效期至： 有效期最長三天(包括簽發日), 在此期間如第二部份所載潛在危險的地方有所變化或遇惡劣天氣則此許可證即告無效 起重機操作時間：由 _____ 到 _____

位置：_____ 有關工程的說明：_____

種類： ☐ 履帶式 ☐ 液壓式 ☐ 打樁式 ☐ 其它：_____ 編號：_____

II. 須顧及的潛在危險的地方

☐ 挖掘工程	☐ 公眾地方	☐ 其它起重機
☐ 斜坡	☐ 道路	☐ 暗渠
☐ 地面軟土	☐ 鐵路	☐ 鄰近的其他工程
☐ 凹凸不平的地面	☐ 學校	☐ 其它: _____
☐ 架空電纜	☐ 公眾行人徑	☐ 其它: _____
☐ 地底設施	☐ 樓宇	☐ 其它: _____

III. 負載物 (此部不適用於打樁式機械)

-	起重機械能否起吊負載物	☐	能	☐ 否

IV. 檢查項目

-	檢查起重機械的法定合格證書 (表格 1 和 5)	☐	妥當	☐	不妥當
-	檢查起重機械是否架設妥當 (包括檢查地面情況)	☐	妥當	☐	不妥當
-	檢查支撐腳撐是否完全撐開	☐	妥當	☐	不妥當
-	檢查是否已關閉起重機械的自由落鉤模式及已設立措施防止該模式在不經意間被啟動	☐	妥當	☐	不妥當
-	檢查是否已設立措施(例如圍欄和警告標誌)防止工人進入起重機械運作範圍	☐	妥當	☐	不妥當
-	其它 _____	☐	妥當	☐	不妥當

V. 其它檢查項目 (此部不適用於打樁式機械)

-	檢查起重機械的法定合格證書 (表格 3)	☐	妥當	☐	不妥當
-	檢查操作員的執照	☐	妥當	☐	不妥當
-	檢查起重設備的顏色識標誌及負載量	☐	妥當	☐	不妥當
-	其它 _____	☐	妥當	☐	不妥當

VI. 委任管工

本人已評估作業範圍內的潛在危險，認為這起重機械的安全操作負荷足以應付在*_前面／後面／側面／所有方位_的吊運工作和作業需要。本人認為這起重機械能夠安全地完成有關作業。

委任管工：

姓名	簽署	日期
_____	_____	_____

VII. 操作員

本人明白，本人作為操作員，須對這起重機械的操作事宜負責。本人知悉作業範圍內的潛在危險；這起重機械的安全操作負荷足以應付在*前面/後面/側面/所有方位的吊運工作；以及所有安全措施均已落實。本人認為這起重機械能夠安全地完成有關作業。

操作員：

姓名	簽署	日期
_____	_____	_____

VIII. 准予操作

本人已檢查並確認這起重機械的安全操作負荷足以應付在*_前面／後面／側面／所有方位_的吊運工作，並已通知委任管工已獲批准的吊運方位。

承建商流動式起重機代表：

姓名	簽署	日期
_____	_____	_____

*刪去不適用者

PART 5 – PERMIT-TO-WORK SYSTEM AFTER ENERGISATION OF PERMANENT POWER SUPPLY

1. Planning stage

(1) Upon the energisation of the permanent electricity supply in full or partially, all electrical and other works with potential electrical hazards or chances of coming into contact with live electrical parts ("Electrical and Other Works") shall be subject to a permit-to-work system as described in this Part.

(2) The Contractor shall establish a permit-to-work system for Electrical and Other Works and obtain the approval of the Architect's Representative before implementation. The permit-to-work system shall include the permit application procedures, submission checklist and issue of permit-to-work certificate for each type of Electrical and Other Works to be carried out. The Contractor shall be responsible for the overall control of the permit-to-work system. The Contractor shall employ Registered Electrical Worker(s) (REW) of the appropriate grade under the Electricity Ordinance for the implementation of this permit-to-work system. The Contractor shall inform and update the Architect's Representative of the names of his appointed REW.

(3) Prior to energisation of permanent electricity supply in full or partially, the Contractor shall conduct a comprehensive risk assessment for identification of the types of Electrical and Other Works to be carried out in the Contract and evaluation of the risks associated with each type of Electrical and Other Works identified, and recommendation of necessary safety precautionary measures. The types of Electrical and Other Works shall include, but not limited to the following:

(a) Works inside ceiling void with energised installations / equipment;
(b) Wet trade works near energised installations / equipment;
(c) Electrical works in wet environment;
(d) Works in area where it is uncertain that there is no live conductor / electrical installation / equipment nearby.

(3a) For works inside ceiling void of existing buildings or premises with energized installations / equipment, prior to the commencement of the works, the Supervising Perion of the work shall arrange the appointed REW, with appropriate personal protective equipment including electrician's gloves being worn, to conduct a survey on the existing electrical installations and equipment inside ceiling void or fixed under ceiling within the works area, and provide a report on the survey findings, with layout and schematic diagram, as appropriate, for the conduction of risk assessment and recommendation of necessary safety precautionary measures for any electrical hazards. Electrical hazards due to failure to isolate the power supply source as planned such as turning off the wrong switch or working on the wrong circuit, unaware of any electrical energy storage device in an electric circuit etc. should be avoided. Where necessary, the Contractor should liaise with the maintenance agent / building owner to obtain relevant information, e.g. as-fitted drawing, operation and maintenance manual, etc., for the existing electrical installations and equipment as reference for conducting the survey. The report on the survey findings shall be copied to the Architect's Representative for record before commencing the works, when required. The Supervising Perion of the work concerned shall communicate the survey findings and the recommended safety precautionary measures to the workers concerned.

(4) The findings and recommendations of the risk assessment shall be included as appropriate in the permit-to-work certificate. A sample permit-to-work certificate for works inside ceiling void after energisation of the permanent electricity supply is attached in Annex 5.A of this Part for the Contractor's reference only. The Contractor shall prepare their form of permit–to-work certificate, which forms part of their permit-to-work system

(5) The Supervising Perion of the work concerned shall obtain the permit-to-work certificate approved by the REW and the Safety Officer before commencing the Electrical and Other Works. No Electrical and Other Works shall be commenced without a properly signed and issued permit-to-work certificate. The Supervising Perion of the work shall have minimum 5 years relevant working experience and shall be either the Site Agent under the Contract or the engineer for the works involved or equivalent, and shall be approved by the Architect's Representative.

(6) The REW and the Safety Officer shall check that the required safety precautionary measures are in place and satisfy themselves of the safety of the Electrical and Other Works to be carried out before approving any permit-to-work.

(7) If live work is unavoidable as assessed by the REW and the Safety Officer, the conditions and safety precautions for live work and the issue of permit-to-work in accordance with Clause 4G(1)(d) & (e) of the Code of Practice for the Electricity (Wiring) Regulations shall be followed.

2. Operation Stage

(1) Each permit-to-work certificate shall be completed by the Supervising Perion of the work concerned and approved by the REW and the Safety Officer.

(2) Such permit-to-work certificate shall be copied to the Architect's Representative for record before commencing the related Electrical and Other Works.

ANNEX 5.A
PERMIT-TO-WORK CERTIFICATE
FOR WORKS INSIDE CEILING VOID WITH ENERGISED INSTALLATIONS (see Note 1)
工作許可証 (在裝有帶電設備的假天花內工作) (請參閱註 1)

PART 1: WORK DETAILS (To be completed by Supervising Perion of the work approved by the Maintenance Surveyor's/ Supervising Officer's Representative (see Note 2))
第一部份: 工作細節 (由獲監督人員批准的工程主管(請參閱註 2)填寫)

Contract No. /W.O. No. 合約編號/工作通知單編號		Subcontractor 分判商	
Location of Work 工作位置		Description of Work 工作內容	
Date & Time of Work 工作日期及時間		Duration of Work 工作持續時間	

Workers Assigned (Input trade of work. For REW, input registration no. & grade)
工人姓名 (須填寫工種。如是註冊電工，須填寫註冊號碼及級別)

1.		3.	
2.		4.	

Name of Supervising Person of the work (Post) (see Note 2) 工程主管姓名(職位) (請參閱註 2) _____ ( )	Signature 簽署 _____	Date & Time 日期和時間 _____

PART 2: ASSESSMENT (To be completed by Registered Electrical Worker and Safety Officer)
第二部份: 評估 (由安全主任及註冊電工填寫)

1.	The work is necessary and at the right place 已確定該位置正確及需要進行工作	☐ Yes 是 ☐ No 否
2.	Safety Officer has checked that the facilities for working-at-height is appropriate 安全主任已檢查高處工作的設備為合適	☐ Yes 是 ☐ No 否
3.	Safety Officer has checked that the personal protective equipment is appropriate 安全主任已檢查個人防護裝備為合適	☐ Yes 是 ☐ No 否
4.	Safety Officer has checked that the working place and ceiling void have adequate lights and temporary lighting/ electric tool is operated at 110V (centre-tapped to earth) or below (see Note 3) 安全主任已檢查工作地點與假天花內有充足的光線, 及臨時照明/電動工具操作電壓不超逾 110V (中心抽頭接地) (請參閱註 3)	☐ Yes 是 ☐ No 否
5.	REW has checked that the testing instrument is working in order 註冊電工已查證測試儀器正常運作	☐ Yes 是 ☐ No 否
6.	REW has checked that the risk of worker inadvertent contacting with live conductor/ live part of energized installation in the vicinity of work (say 1.5m) has been eliminated and confirm that there is no electrical hazard 註冊電工已查證工人在有關工作範圍附近(如 1.5 米)意外接觸到帶電導體/帶電設備的帶電部份的風險已被消除，並確定沒有電力危害	☐ Yes 是 ☐ No 否
7.	For works inside ceiling void of existing buildings or premises, REW has conducted a survey of the existing electrical installations and equipment, and the recommended safety precautionary measures have been implemented and informed the workers concerned (see Note 5) 在現有建築物或處所假天花內進行的工程，註冊電工已勘察假天花內的電力裝置及器具，並已採取相應安全預防措施及通知有關工人(請參閱註 5)	☐ Yes 是 ☐ No 否 ☐ NA 不適用
8.	The following safety measures have been implemented if there is any live conductor/energized installation at the working area:- 如工作範圍有任何帶電導體/帶電設備，已採取以下安全措施: ☐ The concerned power supply has been switched off & locked up and warning sign displayed; or 已關掉有關電源、把電掣上鎖及展示警告牌; 或 ☐ The safety requirements in Clause 4G(1)(d) & (e) of the Code of Practice for the Electricity (Wiring) Regulations have been complied with (see Note 4) 已符合《電力(線路)規例工作守則》內條款 4G(1)(d)及(e) 的安全要求(請參閱註 4)	☐ Yes 是 ☐ No 否

Based on the assessment above, permit-to-work application is: ☐ Approved 獲批准 ☐ Not approved 不獲批准
根據上述評估，工作許可証申請

Name of Safety Officer (Registration no.) 安全主任姓名 (註冊號碼) _____ ( )	Signature 簽署 _____	Date & Time 日期和時間 _____
Name of Registered Electrical Worker (Registration no. & Grade) 註冊電工姓名 (註冊號碼及級別) _____ ( )	Signature 簽署 _____	Date & Time 日期和時間 _____

PART 3: UNDERTAKING (To be completed by Supervising Perion of the work approved by the Maintenance Surveyor's/ Supervising Officer's Representative (see Note 2))
第三部份: 承擔 (由獲監督人員批准的工程主管填寫(請參閱註 2))

I acknowledge receipt of this permit-to-work certificate. I certify that the requirements in Part 2 have been followed and adequate safety preventative measures have been implemented for the work.
本人確認收到此工作許可証，並證實是項工作已符合上述第二部份的要求，及已採取足夠的安全措施。

Name of Supervising Person of the work (Post) (see Note 2) 工程主管姓名(職位) (請參閱註 2) _____ ( )	Signature 簽署 _____	Date & Time 日期和時間 _____

☐ *Please tick(✓) the appropriate box(es)請於合適選項格內加上(✓)*

Note 1: The permit-to-work shall be displayed on spot for checking, and copied to the **Maintenance Surveyor's/ Supervising Officer's Representative* for record before commencing the work.

註 1: 許可証須展示於工作地方以供查閱，並在施工前向監督人員提交許可証副本作記錄用途。

Note 2: Supervising Person of the work shall have minimum 5 years relevant working experience and shall be:-

**- for works contracts, either the Site Agent under the Contract or the engineer for the work involved or equivalent, /*

- for term contracts, either the Contract Manager under the Contract or the engineer or the site foreman for the works involved or equivalent,

and shall be approved by the **Maintenance Surveyor's/Supervising Officer's Representative.*

註 2: 工程主管須具有至少 5 年有關工作經驗及必須為:-

**- 於工務工程合約，本合約的工地代表或本工程項目的工程師或同等人士，/*

- 於定期合約，本合約的合約經理或本工程項目的工程師或管工或同等人士，

並且得到監督人員的批准。

Note 3: If temporary lighting is to be used, it should be operated at 110V or below. Lighting fittings using 220V electricity supply shall not be deployed unless adequate safety arrangement has been made and prior approval of the Supervising Officer has been obtained.

註 3: 如使用臨時照明，操作電壓不得超逾 110V。除非已得到監管人員准許及已採取適當的安全措施，不可使用 220V 的照明工具。

Note 4: If live work is unavoidable as assessed by the REW and the Safety Officer, the conditions and safety precautions for live work and the issue of permit-to-work in accordance with Clause 4G(1)(d) & (e) of the Code of Practice for the Electricity (Wiring) Regulations shall be followed.

The safety requirements in Clause 4G(1)(d) & (e) of the Code of Practice for the Electricity (Wiring) Regulations include but not limited to:-

1. Live work should not be performed unless:
   (i) it is necessary in the interests of safety, whether or not electrical safety, for the work to be performed while the electrical equipment is energized (e.g. work on hospital equipment); or
   (ii) a supply of electricity is essential for the proper performance of the electrical measurement (e.g. testing and fault finding); or
   (iii) there is no reasonable alternative to perform the electrical work by live work (e.g. widespread outages of a building would occur if live work is not allowed); or
   (iv) it is justified and approved by the registered electrical worker, registered electrical contractor and owner of the installation (e.g. serious public inconvenience would arise from isolating the circuits).
2. Where live work is unavoidable, adequate precautions should be taken to avoid danger for work involving the handling of energized parts of or working within touchable distance, direct or indirect, of energized parts at low voltage. The following precautions are to be taken:
   (i) work on energized low voltage electrical equipment should be done only by registered electrical workers who are by virtue of knowledge and training competent to be allowed to carry out live work;
   (ii) electrical safety assessment should be carried out by responsible assessor on the performance of the live work;
   (iii) personal protective equipment (including insulating gloves, safety shoes and insulating mat) and testing equipment appropriate to the performance of the live work should be properly used by the person performing the electrical work;
   (iv) screen or other means to avoid danger from inadvertent contact with energized conductor should be provided;
   (v) fixing of warning notices for repair, barriers and screens;
   (vi) the duration and the extent of the live work should be minimized as far as practicable; and
   (vii) the isolation point of the electricity supply for the subject electrical equipment has been clearly identified.
3. Where danger cannot be avoided for work on energized equipment, the electrical equipment should be isolated and verified dead with a voltage indicator; a permit-to-work should be issued.

註 4: 如果經註冊電業工程人員及安全主任的評估不能避免"帶電工作"，則須根據《工作守則》內條款 4G(1)(d)及(e) 實施有關帶電工作的條件、安全預防措施及簽發工程許可證。

《電力(線路)規例工作守則》內條款 4G(1)(d)及(e) 的安全要求包括但不限於:-

1. 不應進行帶電工作，除非:
   (i) 從安全的角度(不論是否從電力安全的角度)來看，有需要在電力器具帶電時進行工作(例如就醫院設備進行電力工作);或
   (ii) 有必要提供電力，以便適當地進行電力量度(例如進行測試及故障探測);或
   (iii) 除了在器具帶電的情況下進行電力工作外，沒有其他切實可行的選擇(例如不獲准進行帶電工作，樓宇會出現廣泛停電);或
   (iv) 註冊電業工程人員、註冊電業承辦商及電力裝置擁有人均認為進行這類工作理由充份(例如隔離電路會為公眾帶來嚴重不便)，並批准進行這類工作。
2. 若帶電工作不可避免，則在帶電部分工作或在可直接或間接觸及低壓帶電部分的範圍工作時，應採取足夠的預防措施以免生危險。預防措施如下:
   (i) 對帶電低壓器具進行的工作，應由具備知識及訓練的註冊電業工程人員進行;
   (ii) 應由負責評估員就進行帶電工作一事預先進行電力安全評估;
   (iii) 適合進行帶電工作的個人防護裝備(包括絕緣手套、安全鞋及絕緣蓆) 及測試設備由進行電力工作的人妥為使用;
   (iv) 必須設置屏障或其他設備，以防任何人無意觸及帶電導體而引起危險;
   (v) 豎立修理警告告示、障礙物及屏障;
   (vi) 應盡量減少帶電工作的時間及範圍;及
   (vii) 有關電力器具的供電隔離點已清楚識別。
3. 如在帶電部份進行工作難以避免產生危險，便須隔離電力器具，並使用認可電壓顯示器確定器具已不帶電，以及發出工程許可證。

Note 5: For works inside ceiling void of existing buildings or premises with energized installations / equipment, prior to the commencement of the works, the Supervising Person shall arrange the appointed REW to conduct a survey of the existing electrical installations and equipment inside ceiling void or fixed under ceiling within the works area, and provide a report on the survey findings, with layout and schematic diagram, as appropriate, for the conduction of risk assessment and recommendation of necessary safety precautionary measures for any electrical hazard. The Supervising Person of the work concerned shall communicate the survey findings and the recommended safety precautionary measures to the workers concerned.

註 5: 在裝有帶電設備/器具的現有建築物或處所假天花內進行工程，工程主管須於工程進行前安排註冊電業工程人員勘察工地中安裝在假天花內或天花底的電力裝置及器具，並呈交勘察報告及附上所需的佈局和電路圖，以進行風險評估及擬訂預防電力危害的安全措施。工程主管須通知有關工人勘察結果及相應的安全預防措施。

PART 6 - AUTOMATED EXTERNAL DEFIBRILLATORTECHNICAL REQUIREMENTS

1. Functional Set of Automated External Defibrillator (AED)

(1) General

(a) The AED shall be:-

- approved by the Food and Drug Administration of the United States or European Resuscitation Council;
- CE marked;
- in compliance with electrical safety requirement of IEC 60601-1 and IEC 60601-2-4;
- registered under the Medical Device Administrative Control System (MDACS);
- configured in compliance with the latest guidelines for resuscitation of the American Heart Association or European Resuscitation Council;
- accurate, fully automatic and ease to use by layperson;
- portable and lightweight with weight no more than 5kg (battery and pads included);
- suitable for use on patient of any age, including children;
- isolated electrically for all patient connections;
- battery operated with battery level indicator and automated self-tests to ensure readiness;
- able to deliver a variable energy levels for a broad range of patient impedances (between 150 – 350 joules);
- able to detect a pacemaker and remove the pacemaker signal for rhythm analysis; and
- able to automatically analyze the patient's heart rhythm and recognize a rhythm that requires a shock and advise rescuer if and when shock is required.

(b) The AED shall permit minimum 20 minutes of electrocardiography (ECG) storage time for the current patient.

(2) Operation

The operation of the AED shall provide the following functions:-

(a) Voice prompt in Cantonese is available to guide the rescuer step by step throughout the resuscitation procedure. The voice prompt should be in compliance with the latest guidelines for resuscitation of the American Heart Association or European Resuscitation Council.

(b) The AED can automatically analyze patient ECG and signal quality to determine if a shock is appropriate and alert the rescuer of the condition accordingly.

(c) The defibrillator shall deliver therapy using a Truncated Exponential Biphasic waveform and the waveform parameters will be automatically adjusted as a function of the patient impedance during delivery of each waveform.

(3) Self Tests

(a) The AED shall perform daily automatic self-tests including circuitry tests, waveform delivery system self-test, checking of battery capacity and confirming the connection and functionality of electrode pads.

(b) The AED shall warn user with audible alert and visual signal if the system fails any of the automated self-tests and is not ready for use.

(4) Electrodes Pad

(a) Electrodes shall be supplied in a sealed package that contains one pair of self-adhesive electrodes with attached cables and a connector.

(b) Electrode placement is not restricted to any specific side of the body, as specified on the package and the electrode.

(c) Electrode pad shall be disposable.

2. Accessories

The following accessories shall be provided with the functional set of AED:-

(1) Two spare adult electrode pads.

(2) One pediatric electrode pad.

(3) One carrying case.

(4) One ready kit includes nitrile gloves, razor, scissors, 4" gauze, antiseptic wipes, one-way filter mask.

(5) One resuscitator.

PART 7 - PARTICULAR SPECIFICATION ON INDEPENDENT SAFETY AUDIT SCHEME

(1) The Contractor's Site Agent and the Safety Officer shall accompany the Safety Auditor or Safety Audit Assistant during the Safety Audit in order to take such immediate action which may be called for and to understand the underlying problems of any non-compliances identified by the Safety Auditor.

(2) Each Safety Audit report prepared by the Safety Auditor and the action plan prepared by the Contractor shall be discussed in the next Site Safety Management Committee meeting with all identified non-compliances discussed and remedial actions reviewed.

(3) If the Safety Auditor or Safety Audit Assistant identifies and points out during the site audit any situation of imminent danger to the Contractor and the Architect's Representative, the Contractor shall take immediate action to rectify the situation.

(4) The Contractor shall keep the Architect's Representative informed of the changes that might render safety implications such as design, construction methods, plant and materials to be used. The Architect's Representative shall consider whether an additional audit specifically for the concerned changes under SCC50(6) would be required taking into account factors such as whether the changes are planned, systemic, prevalence, scale and interface involved and implication to safe execution of Works.

(5) Upon Architect's Representative's confirmation, the Contractor shall ask the Safety Auditor to copy the Safety Audit report to the Occupational Safety and Health Council for the purpose of fine-tuning the safety auditing system of the Independent Safety Audit Scheme.

九龍中醫院聯網
Kowloon Central Cluster

Kowloon Central Cluster
Hospital Authority

INFECTION CONTROL REQUIREMENTS IN PREPARATION FOR HOSPITAL CONSTRUCTION AND RENOVATION

Document No.	**KCC/KC/ASD/ASD/WI/0001**		
Department	**Administrative Services Division**		
Type of document	**Work Instruction**	**Version**	**Aug 2019**
Risk Rating	**Medium**		
First Issue Date	**01/05/2010**	**Document Owner: Susanna KO, KCC CGM(AS)**	
Last Review Date	**06/08/2019**	**Signature:**	
Effective Date	**01/02/2020**	**Approval Officer: Dr Albert LO, KCC CCE**	
Next Review Date	**01/08/2022**	**Signature:**	

Who should read?

☐CCE/HCE ☐CGM/GM ☐CCOS/COS ☐DOM ☐DM ☐WM

☐Medical Staff ☐Nursing Staff ☐Allied Health Staff ☐Administrative Staff ☐Supporting Staff ☑Others

(please specify in table as below):

Department	Rank	Name
Infection Control Team		
Facilities Management		
EMSTF		

Revision History

Reviewe Date:

Version	Effective Date	Summary of Changes
MAY10	01/05/2010	
JUL14	18/07/2014	
SEP16	01/10/2016	-Updated according to new controlled document format -"Form 4" is included.
AUG19	01/02/2020	-Reviewed high to highest risk areas. -Redefine risk categorization on construction project type in order to accommodate slightly different practices among cluster hospitals. -Amended 1:49 sodium hypochlorite solution, on page 5 of 14.

The purpose of this plan is to standardize the management of all construction and renovation activities to prevent transmission of infection to patient that may be caused by micro-organisms from dust and debris released during construction and renovation.

STEP 1- CONSTRUCTION ACTIVITY TYPE

Construction activity type is defined by the amount of dust generated, the duration of the activity and any impact on the Central Air Conditioning systems

Using the following table, identify the type of Construction Project Type (A-D)

Type A	**Inspection and non-invasive Activities** Visual inspection or activities which do not generate dust or require cutting of walls or access to ceilings e.g. removal of ceiling tiles for inspection, painting (but not sanding), wall-covering, electrical trim work and minor plumbing
Type B	**Small scale, short duration activities which create minimal dust** e.g. -cutting of walls or ceilings where dust migration can be controlled -installation of telephone and computer cabling, and access to chase spaces
Type C	**Work that produces a moderate to high level of dust / needs demolition / removal of any fixed building components or assemblies** e.g.- Sanding of walls for painting or wall covering - Remove of floor coverings, ceiling tiles, pipe work and case work - New wall construction - Minor duct work or electrical work above ceilings - Major cabling activity - Any activity which cannot be finished within a single work shift
Type D	**Major demolition and construction projects** Activities which need consecutive work shifts e.g.- Requires heavy demolition or removal of a complete cabling system - New construction

STEP 2- DETERMINE RISK CATEGORY FOR THE AREA OR ADJACENT AREAS TO THE RENOVATION AND CONSTRUCTION SITE

The risk category is defined by the project location.

Using the following table, identify the risk category. If more than one area will be affected, select the higher risk category.

Low Risk	Medium Risk	High Risk	Highest Risk
- Office areas - Non clinical areas	- Endoscopy / Lithotripsy - Nuclear Medicine - Radiology - MRI - Psychiatric Unit - Outpatient areas - Physiotherapy / Occupational Therapy / P&O / Podiatry - Custodial - Echocardiography - Dietary - Respiratory Therapy	- A&E Dept - Laboratories - Pharmacy - General wards - Haemodialysis Unit - Cardiac Catheterization Laboratory - Labor & Delivery	- Wards for immunocompromised patients (Haematology / Transplantation / Oncology) - Burns Unit - ICU / HDU / CCU areas - CSSD - Operating Theatres - Bronchoscopy Centre - Pharmacy Admixture –clean room

**Please note that the hospital areas listed in the table above are not exhaustive, and additional areas may subsequently be added upon the discretion of the respective hospital's infection control officer.*

STEP 3

Match the Risk Category (low, medium, high, highest) with the planned **Construction Project Type** (A, B, C, D) to determine the **Class of Barrier Precautions** required (1, 2, 3, 4).

Patient Risk Group	CONSTRUCTION PROJECT TYPE			
	Type A	Type B	Type C	Type D
LOW	1	2	2	3 or 4
MEDIUM	1	2	2 or 3	4
HIGH	1	2	3 or 4	4
HIGHEST	1 or 2	3 or 4	3 or 4	4

STEP 4

Determine the class of barrier precautions.

CLASS	Construction Project
1	• Work in a manner to reduce dust generation. • Reinstate all fixtures and clean work area immediately after work e.g. disinfect work area with 1:49 sodium hypochlorite solution
2	• Use barriers and controlled measures while at work to prevent dust and debris from dispersing into air e.g. (a) Water mist work surfaces to control dust while cutting (b) Seal adjacent unused doors with masking tape* • Block off and seal air vents* • Place walk-off mats at entrance and exit of work area* • Alteration/ isolation of HVAC system in work areas* • construction waste in covered containers before transportation • Wet mop and wipe horizontal surfacesbefore leaving Disinfect work area with 1:49 sodium hypochlorie solution and reintegrate HVAC system upon completion of project
3	• Alteration / isolation of the HVAC system* • Complete all critical barriers (i.e. sheetrock, plywood, plastic) to seal area from non-work area before construction begins* e.g. put up an interim plastic dust barrier just after entry with not less than 2 feet overlapping flaps and which must be sealed at full ceiling height* • Place walk-off mats at entrance and exit of the dust barrier* • Maintain negative air pressure within work site; use HEPA equipped air filtration units if necessary • Contain construction waste and use designated route and lift for transportation at the time of agreement • Wet mop the lift and transportation route every time after use and as needed • Do not remove barrier from work area until completed project is inspected and thoroughly cleaned • Remove barrier materials carefully to minimize spreading of dirt and debris created by construction • Wet mop and wipe horizontal surfaces before leaving • Disinfect work area with 1:49 sodium hypochlorite solution and reintegrate HVAC system upon completion of project
4	• Alteration / isolation of the HVAC air handling system* • Close the entrance of construction area with drywall barrier* • Seal holes, pipes, conduits and punctures appropriately* • Construct anteroom and require all personnel to pass through this room, or they can wear cloth or paper coveralls that are removed each time they leave work site* • Place walk-off mats at entrance and at exit of the dust barrier* • Maintain negative air pressure within work site; use HEPA equipped air filtration units if necessary • Contain construction waste in covered containers and use designated route and lift for transportation at the time of agreement • Wet mop the lift and transportation route every time after use and as needed • Do not remove barrier from work area until completed project is inspected and thoroughly cleaned • Remove barrier materials carefully to minimize spreading of dirt and debris created by construction • Wet mop and wipe horizontal surfaces before leaving

Kowloon Central Cluster		
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	• Disinfect work area with 1:49 sodium hypochlorite solution and reintegrate HVAC system upon completion of project

**** Complete all critical items before work begins***

REFERENCES

1. Guideline for Environmental Infection Control in Health-Care Facilities, 2003. Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC).
2. APIC State-of the Art Report: The role of infection control during construction in health care facilities. AJIC 2000; 28(2).
3. Guideline Title: Construction, renovation and Maintenance, 2007. Bayside health Melbourne, Australia.
4. Construction and Renovation Risk Assessment (HKWC), QMH ICN Aug 08.

Process Steps
- Construction and Renovation Project

Commissioning

Commissioning Office: Include 'Construction & Renovation Risk Assessment' into Tendering Specification
Consult Infection Control Nurse (ICN) for 'Risk Assessment'

Planning (Form 1)

Commissioning Office & ICN: Determine 'Barrier Precaution Class' by matching 'Risk Area Category' with 'Construction Activity Type'

Implementation (Form 1)

Contractor: Execute the determined barrier precautions
FM team & Works Agent: Perform initial assessment
ICN: Conduct final checking before project begins

Evaluation (Form 2)

Contractor: Perform daily review
FM Team & Works Agent: Conduct continuous review
ICN: Audit periodically

KCC _____
Form 1: Infection Control Risk Assessment for Construction and Renovation Activity

Project Title			
Project Start Date		Expected Completion Date	
Location of Project		Estimated Duration	
Project Coordinator		Tel. No.	
Contractor		Tel. No.	
Site Supervisor		Tel. No.	

Risk Category Matching (refer page 2 for details and tick ☑ as appropriate)

		CONSTRUCTION PROJECT TYPE			
		TYPE A Inspection, non-invasive (not generate dust)	**TYPE B** Small scale short duration (minimal dust)	**TYPE C** Demolition, removal of fixture (high level of dust)	**TYPE D** Major demolition & construction (consecutive work shifts)
Works Agent		○ 1	○ 2	○ 3	○ 4
Patient Risk Group					
Assessed by ICT	○ Low	☐ 1	☐ 2	☐ 2	☐ 3 or ☐ 4
	○ Medium	☐ 1	☐ 2	☐ 2	☐ 4
	○ High	☐ 1	☐ 2	☐ 3 or ☐ 4	☐ 4
	○ Highest	☐ 1	☐ 3 or ☐ 4	☐ 3 or ☐ 4	☐ 4

Class	**Barrier Precautions to be taken by Contractor/FM team/work agents**	Action confirmed date
☐ Class 1	Work in a manner to reduce dust generation	
	Reinstate all fixtures and clean work area immediately after work	
☐ Class 2	Use barriers and controlled measures while at work to prevent dust and debris from dispersing into air *	
	Seal adjacent unused doors with masking tape*	
	Block off and seal air vents*	
	Alteration/ isolation of HVAC system in work areas*	
	Place walk-off mats at entrance and exit of work area*	
	Contain construction waste in covered containers before transportation	
	Wet mop and wipe horizontal surfaces before leaving	
☐ Class 3	Complete all critical barriers (i.e. sheetrock, plywood, plastic) to seal area from non-work area before construction begins* e.g. put up an interim plastic dust barrier just after entry with not less than 2 feet overlapping flaps and which must be sealed at full ceiling height	
	Alteration/isolation of the HVAC system in work area*	
	Place walk-off mats at entrance and exit of work area*	
	Maintain negative air pressure within work site; use HEPA equipped air filtration units if necessary	
	Remove barrier materials carefully to minimize spreading of dirt and debris created by construction	
	Contain construction waste in covered containers and use designated route and lift for transportation at the time of agreement	
	Wet mop the lift and transportation route every time after use and as needed	

	Wet mop and wipe horizontal surfaces before leaving	
☐ Class 4 (Plus all items in **Class 3**)	Seal holes, pipes, conduits and punctures appropriately*	
	Construct anteroom and require all personnel to pass through this room*	

Risk Category Matching by ICN		Follow-up Assessment by Contractors/FM team/Work Agent		Final assessment by ICN	
Signature		Signature		Signature	
Date		Date		Date	

Remarks: Complete all critical items* before work begins.

Risk Category Matching

Risk Categories for the area or adjacent areas to the renovation and construction site.

- The risk category is defined by the project location.
- Using the following table, identify the risk category. If more than one area will be affected, select the higher risk category.

Low Risk	Medium Risk	High Risk	Highest Risk
- Office areas - Non clinical areas	- Endoscopy / Lithotripsy - Nuclear Medicine - Radiology - MRI - Psychiatric Unit - Outpatient areas - Physiotherapy / Occupational Therapy / P&O / Podiatry - Custodial - Echocardiography - Dietary - Respiratory Therapy	- A&E Dept - Laboratories - Pharmacy - General wards - Haemodialysis Unit - Cardiac Catheterization Laboratory - Labor & Delivery	- Wards for immunocompromised patients (Haematology / Transplantation / Oncology) - Burns Unit - ICU / HDU / CCU areas - CSSD - Operating Theatres - Bronchoscopy Centre - Pharmacy Admixture – clean room

KCC _____
Form 2: Environment Monitoring Compliance Checklist

Project Title			
Project Start Date		Expected Completion Date	
Location of Project		Estimated Duration	
Project Coordinator		Tel. No.	
Contractor		Tel. No.	
Site Supervisor		Tel. No.	

1. CONSTRUCTION BARRIER/ SITE

	YES	NO	NA
• Dust tight barricades sealed, no penetration	☐	☐	☐
• Walk off mats	☐	☐	☐
• Doors closed and sealed properly	☐	☐	☐
• All access doors are closed to public	☐	☐	☐
• Signs posted cautioning to keep door closed	☐	☐	☐
• Keep clean and dry	☐	☐	☐
• Free from pest harbouring	☐	☐	☐
• All window closed behind barrier	☐	☐	☐
• Alterate / isolate HVAC	☐	☐	☐
• Negative air pressure maintained	☐	☐	☐
• HEPA filter machines	☐	☐	☐
• Others	☐	☐	☐

COMMENTS _____

_____

2. ADJACENT AREAS WITH STAFF/PATIENT ACCESS AFFECTED BY CONSTRUCTION

	YES	NO	NA
• Free from migration of dust (Ceiling, walls & floor)	☐	☐	☐
• Free from water seepage	☐	☐	☐
• Free from pest infestation	☐	☐	☐

COMMENTS _____

_____

3. TRAFFIC FLOW

	YES	NO	NA
• Waste covered and contained prior to removal	☐	☐	☐
• Route and timing of waste removal as per agreement	☐	☐	☐

- All entrances and exits free of debris
- Restrict to construction workers and necessary staff only

COMMENTS _____

_____

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Reviewed by Contractor / Facility Team / Works Agent / ICN :

Name: _____ **Contact No:** _____

Date: _____ **Signature:** _____

Flow Chart

Submission for Comments by ICT on Construction/Renovation Works, Layout Plans and Materials

The objective of this scheme is to ensure that the proposed construction/renovation works and materials to be used are complying with the latest infection control standards in KCC.

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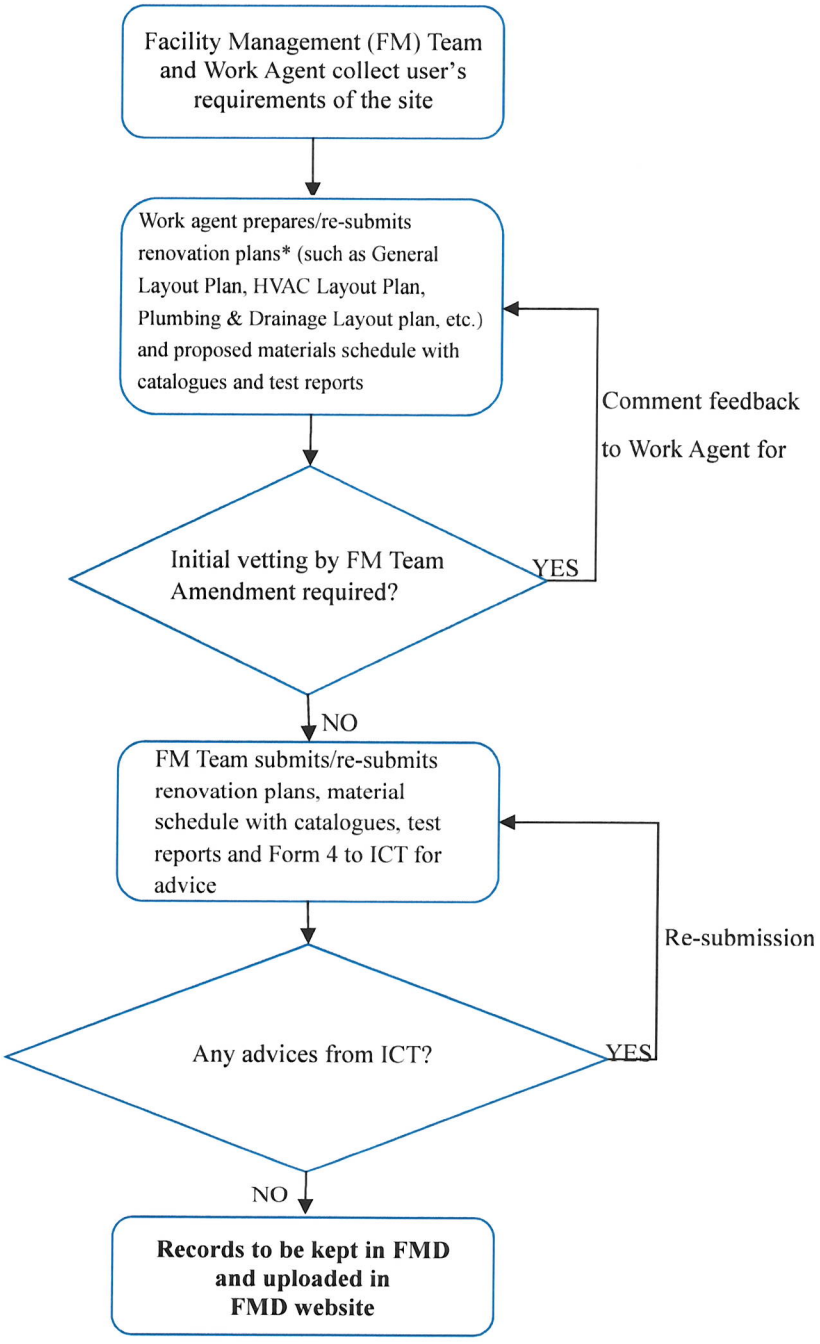


* Electrical, Fire Services Layout Plans or concealed materials are exempted

Submission for Comments by ICT on Construction/Renovation Works, Layout Plans and Materials

FORM 4

REF. NO. :

HOSPITAL :

FROM :

TO :

PROJECT TITLE :

Subject : Submission of Renovation Plans

Submitted By: _____ Date : _____

To Be Completed By ICT

I refer to your above submission and would like to inform you that:-

☐ **No comment for the above submission in relation to infection control aspect.**

☐ **Attention should be drawn to the advice below in relation to infection control aspect:-**

1. _____
2. _____
3. _____
4. _____

Signature : _____

Name/Title of ICT : _____/_____

Date : _____

Works completed and final inspected by ICT on _____.

Name/Title of ICT : _____

REMARKS : Please return the signed Form 4 with attachment(s) to FMD.

Data Interface Procedures and Requirements

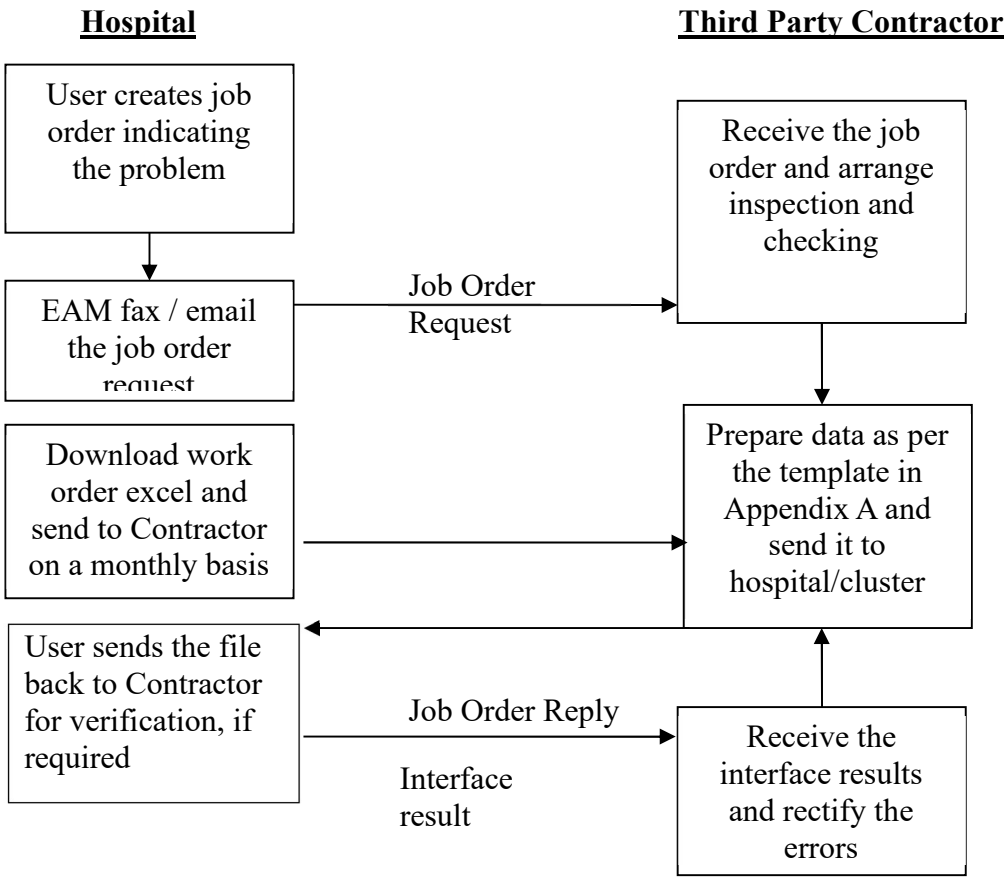
Background

In Hospital Authority (HA), the maintenance data of equipment is maintained by the corporate Enterprise Asset Management System (EAM). When equipment has broken down, HA user will initiate a maintenance job order (CORRECTIVE) through the EAM. Periodic preventive check (PREVENTIVE) is scheduled and arranged mainly by third party maintenance contractors. Preventive check can also be initiated online by EAM user where they think it is necessary depending on the condition of the equipment. EAM will then determine the maintenance contract and the maintenance body who looks after the piece of equipment. The maintenance job order will be faxed or emailed or sent via GS1 gateway to the maintenance body requesting them to come and service the equipment.

After the actual maintenance job order work is performed, the maintenance data in EAM should be updated to reflect e.g. the re-instatement date and time, the diagnostics, the parts that have been replaced, the cost of the materials …etc. There are two types of data interface mechanisms.

(I) Excel Upload

Maintenance data can be uploaded in bulk and processed into EAM through a batch interface process called ***EAM Third Party Maintenance Data Interface***. Hospitals upload the interface data sent by third party contractor via e-mail. The provided data will be verified and fed into EAM. At the end, the interface results will be sent back to the third party contractor through email. The process is summarized in the diagram below.


Hospital
Third Party Contractor
User creates job order indicating the problem
EAM fax / email the job order request
Job Order Request
Receive the job order and arrange inspection and checking
Download work order excel and send to Contractor on a monthly basis
Prepare data as per the template in Appendix A and send it to hospital/cluster
User sends the file back to Contractor for verification, if required
Job Order Reply
Interface result
Receive the interface results and rectify the errors

(II) Web or Gateway Interface

The Contractor shall install and use the GS1 Hong Kong's (a new name of Hong Kong Article Numbering Association) Web-based EZ*TRADE or the Gateway Solution to receive and return Job Order details. All the fees mentioned below are for reference only.

Details of GS1 Hong Kong's Web-based EZ*TRADE and the Gateway Solution are as follows:- The Web-based EZ*TRADE enables contractors to conduct EDI transactions by using a web browser on the Internet without involving additional set-up costs or special technical skills. The Gateway Solution, which requires communications software, internal IT support, an alignment of underlying processes and is for products which required Vendor Managed Inventory (VMI) with sophisticated transaction details. Implementation checklist for GS1 Hong Kong's Web-based EZ*TRADE and the Gateway Solution:

1. **Join GS1 Hong Kong as member**
   Membership Fee : HK$3,440.00 for Entrance Fee (one off charge); and
   HK$3,440.00 for Annual Fee
   (Please contact GS1 HK for payment procedure and updated charges)

   GS1 HONG KONG will assign mailbox ID, user ID and password to member for using Web EZ*TRADE Service.

2. **Internal IT Consideration and System Installation Preparation**
   - Based on the tender requirement to determine the required solution to be implemented.
   - Details please consult GS1 Hong Kong.

3. **Inform Hospital Authority about the readiness of the system**

4. **Conduct testing with Hospital Authority**

5. **Align with Hospital Authority to agree on the Start Date**

6. **Monthly Charges to be paid (Please contact GS1 HK for payment procedure and updated monthly charges)**

	Documents per month	Monthly Charges
Level 1 End Users	0 – 10	HK$50.00
Level 2 End Users	11 – 50	HK$100.00
Level 3 End Users	51 – 300	HK$200.00
	301 or above	HK$0.80/doc

Interface Data Requirement for Job Order Replies

Below table describes the vendors must make use of the columns to reply the work order completion information in excel template format against the expected data format.

Column Name	Length	Format	Descriptions	CM	PM	Remarks	Data Sample
Asset Number	10	varchar	EAM Asset Number	Read-Only	Read-Only		*645484*
Asset Owner	50	varchar	Asset owner From HA asset attribute	Read-Only	Read-Only	From HA asset attribute	*PYC-DR-MD*
Asset Group	50	varchar	Asset group From HA asset attribute	Read-Only	Read-Only		*HAASSET (NON-IT)*
Asset description	150	varchar	Asset description From HA asset attribute	Read-Only	Read-Only	From HA asset attribute	*SCANNING SYSTEMS, COMPUTED TOMOGRAPHY, SPIRAL*
Owning Department	50	varchar	Owning Department From HA asset attribute	Read-Only	Read-Only	From HA asset attribute	*PY-CS-SUR*
Asset location	50	varchar	Location Institution + block/floor/room	Read-Only	Read-Only	From HA asset attribute	KH-AB-G-FLOOR
Work Order Number	10	varchar	Maintenance Work Order Number	Read-Only	Read-Only		*1220254*
Work order Type	10	varchar	Work order Type	Read-Only	Read-Only	'Corrective' for CM. 'Preventive' for PM.	*Corrective*
Work order Status	10	varchar	Work order Status	Read-Only	Read-Only	Should be “Released” when HA send work order to supplier	*Released*
WO Default Contact Method	50	varchar	Contact Method of vendor to received Work Order	Read-Only	Read-Only	‘Email-YES’,’Fax-YES’,’Phone-NO’,’XML or Portal-YES’	*Email-YES*

Column Name	Length	Format	Descriptions	CM	PM	Remarks	Data Sample
Scheduled Datetime	datetime	datetime	Original date schedule for Preventive Maintenance	Read-Only	Read-Only	The datetime format should be DD/MM/YYYY HH:MM	04/07/2016 15:22
Maintenance Body	50	varchar	Vendor Name of Work Order	Read-Only	Read-Only		*ABC H.K Ltd*
Remarks	150	varchar	Remarks of the work order	Read-Only	Read-Only		It is Urgent Maintenance
Break Down Date	datetime	datetime	Equipment breakdown date for Corrective Maintenance. It is the date time that user discovered the problem of the equipment.	Read-Only	Read-Only	Data field from work request The datetime format should be DD/MM/YYYY HH:MM	04/07/2016 15:22
Manufacturer	150	varchar	Asset Manufacturer Name From HA asset attribute	Read-Only	Read-Only	From HA asset attribute	*TOSHIBA*
Brand Name	150	varchar	Asset Brand Name From HA asset attribute	Read-Only	Read-Only	From HA asset attribute	*TOSHIBA*
Model	150	varchar	Asset Model From HA asset attribute	Read-Only	Read-Only	From HA asset attribute	*AQUILION CX*
Serial Number	50	varchar	Asset serial Number From HA asset attribute	Read-Only	Read-Only	From HA asset attribute	*NCA10X2245*
Disinfection Status	20	varchar	disinfection status	Read-Only	Read-Only	Either 'COMPLETED', 'NOT PRACTICABLE' or 'NOT	*NOT PRACTICABLE*

Column Name	Length	Format	Descriptions	CM	PM	Remarks	Data Sample
						NECESSARY'.	
Work Request description	150	varchar	Description of the work request	Read-Only	Read-Only	Further describe the work request	*equipment cannot print*
Maintenance Contract Number	10	varchar	Maintenance Contract number of the asset	Read-Only	Read-Only		*8110007666*
Supplier Agreement No	150	varchar	Supplier Agreement No. from maintenance contract header	Read-Only	Read-Only	For vender reference	*C8110007666*
Work Order Status (*&)	10	varchar	Work order Status	Mandatory	Mandatory	'Complete' status filled by vendors	*Complete*
HA contact person (with phone no) (*)	50	varchar	The HA person who contact supplier and request for a repair and the corresponding phone number	Mandatory	Mandatory		*Mr. Lee (26326470)*
PM Scheduled Datetime (DD/MM/YYYY HH:MM)	datetime	datetime	Original date schedule for Preventive Maintenance	Blank	Mandatory	The datetime format should be DD/MM/YYYY HH:MM	04/07/2016 15:22
[CM] Call Received Datetime (DD/MM/YYYY HH:MM)	Datetime	datetime	Date and time when vendor receive the call for repair.	Mandatory	Optional	The datetime format should be DD/MM/YYYY HH:MM	04/07/2016 15:22
Equipment Received DateTime (DD/MM/YYY	Datetime	datetime	Date and time when vendor receive the equipment that	Optional	Optional	The datetime format should be DD/MM/YYYY HH:MM	04/07/2016 15:22

Column Name	Length	Format	Descriptions	CM	PM	Remarks	Data Sample
Y HH:MM)			was sent by HA for repair.				
[CM/PM] Attendance DateTime (DD/MM/YYYY HH:MM)	datetime	datetime	Date and time that vendor went to HA to perform the repair	Mandatory if WORK_ORDER_STATUS is "Complete"	Mandatory if WORK_ORDER_STATUS is "Complete"	The datetime format should be DD/MM/YYYY HH:MM	04/07/2016 16:22
[PM] Completion DateTime (DD/MM/YYYY HH:MM)	Datetime	datetime	Completion date for Preventive Maintenance	Blank	Mandatory if WORK_ORDER_STATUS is 'Complete'	The datetime format should be DD/MM/YYYY HH:MM	04/07/2016 17:22
[CM] Reinstatement DateTime (DD/MM/YYYY HH:MM)	datetime	datetime	Reinstatement date for Corrective Maintenance	Mandatory if WORK_ORDER_STATUS is 'Complete'	Blank	The datetime format should be DD/MM/YYYY HH:MM	04/07/2016 17:22
[CM] Failure Cause Code (&)	150	varchar	cause determined by the repairman	Mandatory if WORK_ORDER_STATUS is 'Complete'	Optional	It should be within the complete list of Cause Code in Appendix.	*OTHERS*
[CM] Failure Symptom Code (&)	150	varchar	Fault Symptom	Mandatory if WORK_ORDER_STATUS is 'Complete'	Optional	It should be within the complete list of Failure Set in Appendix.	*Others*
[CM] Repair Resolution Code (&)	150	varchar	Code that indicate which task was done during	Mandatory if WORK_ORDER_STATUS is	Optional	It should be within the complete list of Resolution Code in Appendix.	*REPAIR*

Column Name	Length	Format	Descriptions	CM	PM	Remarks	Data Sample
			maintenance	'Complete'			
[CM] Equipment Condition (&)	150	varchar	Indicate whether the equipment is ‘Breakdown’ or ‘Fault’ or "Misoperation"	Mandatory if WORK_ORDER_STATUS is "Complete"	Optional	‘Breakdown’ or ‘Fault’ or "MISOPERATION". It should be within the complete list of Equipment Condition in Appendix	*BREAKDOWN*
[CM/PM] Work Order Completed by	40	varchar	Indicate Work Order Completed by vendor's staff for data entry	Mandatory	Mandatory		*Mr. Chan Tai Man*
Result and Action Taken (*CM)	150	varchar	Indicate the detail result and action taken	Mandatory	Optional	Describe the actions taken by vendor	*Repair the engine*
[CM/PM] Service Report Reference	50	varchar	Indicate service report reference	Mandatory if WORK_ORDER_STATUS is 'Complete'	Mandatory if WORK_ORDER_STATUS is 'Complete'	Describe the service report provided by vendor	*EX-123456*
Labor Cost(#)	18	numeric	Labor Cost with max 2 d.p.	Optional	Optional	E.g. 250.00 or 1500.25	*5000*
Spare Part Cost(#)	18	numeric	Material Cost with max 2 d.p.	Optional	Optional		*500*
Spare Part Description(#)	150	varchar	Material description	Optional	Optional		*Parts A*

Column Name	Length	Format	Descriptions	CM	PM	Remarks	Data Sample
Additional Labor Cost(#)	18	numeric	Additional labor cost with max 2 d.p.	Optional	Optional		*120*
Additional Material Cost(#)	18	numeric	Additional material cost with max 2 d.p.	Optional	Optional		*650*
Additional Material Description(#)	150	varchar	Additional material description	Optional	Optional		*Parts B*
Technician Name(#)	40	varchar	Technician Name	Mandatory if WORK_ORDER_STATUS is "Complete"	Mandatory if WORK_ORDER_STATUS is "Complete"		*LI CHOR HIN*
Vendor Reference Number(#&)	15	varchar	Vendor's reference number that each vendor can identify each interface message in case of any error data for correction required	Mandatory if WORK_ORDER_STATUS is "Complete"	Mandatory if WORK_ORDER_STATUS is "Complete"	A number that can uniquely identify vendor's work order update / create interface record. (Same functionality as the contractor_ref_noof the XML upload in current AMS)	*43384485-10*
Disinfection Status	20	varchar	Disinfection status	Optional	Optional	It should be within the complete list of Disinfection status in Appendix. Default to 'NOT PRACTICABLE' if not specified.	NOT PRACTICABLE

Notes for both CM and PM work order reply:

1. The column of CM and PM work order reply are equal. Read-Only are for data information only

2. Fields marked with * are mandatory.
3. Fields marked with # are optional.
4. Fields marked with & will be validated in system with the List of Value of the data field with case sensitive (Refer to Appendix – List of Value)
5. Fields marked with "[PM]" are required for Preventive Maintenance when Work Order Status is 'Complete'
6. Fields marked with "[CM]" are required for Corrective Maintenance when Work Order Status is 'Complete'

7. Fields marked with "[CM/PM]" are required when Work Order Status is 'Complete'
8. Fields marked with "*CM" are required for Corrective Maintenance
9. No Urgent order in excel template
10. For work order maintenance has any pending situation, e.g. waiting for parts, vendors should use ‘On Hold’ for WORK ORDER STATUS and provide detail situation in Action And Result Taken.

Work Order Excel Upload Validation (HA Version 5.0)

HA users and maintenance vendors shall also aware of such validation rules when they input data via excel template.

Interface Code	Interface Message
E0002F	Asset number %1% not found
E0004F	Attendance datetime %1% should not be earlier than call received datetime %2% for CORRECTIVE work order
E0005F	Attendance datetime %1% should not be earlier than equipment received datetime %2% for CORRECTIVE work order
E0006F	Attendance datetime %1% should not be earlier than the break down datetime %2% for CORRECTIVE work order
E0007F	Attendance datetime should not be blank for work order status is 'Complete' or 'Complete – No Charges'
E0011F	Call received datetime %1% should not be earlier than break down datetime %2% for CORRECTIVE work order
E0012F	Call received datetime %1% should not be later than equipment received datetime %2% for CORRECTIVE work order
E0013F	Call received datetime should not be blank for CORRECTIVE work order
E0014F	Completion datetime %1% must not be later than current datetime for PREVENTIVE work order
E0016F	Completion datetime should not be blank when work order status is COMPLETE and PREVENTIVE work order
E0017F	Equipment received datetime %1% should not be earlier than break down datetime %2%
E0018F	disinfection status should be match with List of Values in database
E0019F	Invalid work order status: %1% (It should be either 'Released', 'Complete','Cancelled','Complete – No Charges')
E0023F	Work order number not found: %1%
E0024F	Reinstatement datetime %1% should not be earlier than attendance datetime %2% for CORRECTIVE work order
E0025F	Reinstatement datetime %1% should not be earlier than call received datetime %2% for CORRECTIVE work order
E0026F	Reinstatement datetime %1% should not be earlier than equipment received datetime %2% for CORRECTIVE work order
E0030F	Vendor reference no should not be blank for work order status is Complete or Complete - No Charges;
E0032F	Preventive maintenance event already exists on the other work order number with same schedule date (%1%) by asset number
E0033F	Equipment condition should match with List of Values in database for CORRECTIVE work order.
E0035F	Cause Code should match with List of Values in database
E0036F	Resolution Code should match with List of Values in database
E0037F	Failure Code should match with List of Values in database
E0039F	Work Order update is rejected due to the Work Order is in 'Closed'
E0044F	Invalid data type of labour cost %1%'
E0045F	Invalid data type of material cost %1%'
E0046F	Invalid data type of additional labour cost %1%'
E0047F	Invalid data type of additional material cost %1%'
E0048F	Cause Code should not be blank for work order status is COMPLETE and CORRECTIVE work order
E0049F	Resolution Code should not be blank for work order status is COMPLETE and CORRECTIVE work order
E0050F	Failure Code should not be blank for work order status is COMPLETE and CORRECTIVE work order

Appendix – List of Value

MESSAGE_SUB TYPE
Work Order
Work Order Reply
Urgent Order

WORK ORDER TYPE
Corrective
Preventive

WORK ORDER STATUS
On Hold
Complete
Rejected

DISINFECTION STATUS
COMPLETED
NOT PRACTICABLE
NOT NECESSARY

Equipment Condition
BREAKDOWN
FAULT
MISOPERATION

CAUSE CODE
ACCESSORIES
ALARM BATTERY
ALIGNMENT
BATTERY
CALIBRATION
CLEANLINESS
COMPONENTS
COMPUTER HARDWARE
DISPLAY
LAMP/INDICATOR
MECHANICAL PARTS
NORMAL WEAR & TEAR
OPERATION MATTER
OPTICS
OTHERS
RESUME NORMAL
SOFTWARE
WIRE DAMAGE

RESOLUTION CODE
CLEAN AND CHECK
OPERATION REFRESH TRAINING
PENDING FOR REPLACEMENT
RECOMMENDED FOR CONDEMNATION
RELOAD
REPAIR
REPLACE
RESET
RESET / CALIBRATION

FAILURE CODE
ALARM MALFUNCTION
ALARM MESSAGE / ERROR INDICATION
CANNOT SWITCH ON / OFF
ELECTRICAL SHOCK / LEAKAGE
EQUIPMENT MALFUNCTION
EQUIPMENT OVERHEAT
INTERMITTENT ERROR
MECHANICAL / PHYSICAL DAMAGE
OTHERS
READING / IMAGE INACCURATE
SEND FOR INVESTIGATION
UNINTENDED SHUT DOWN