

Transport for London – Lane Rental Scheme Schedule of Lane Rental Locations April 2018

USRN	NSG STREET NAME	LANE RENTAL SEGMENT		TIDAL	LONDON BOROUGH	LANE RENTAL OPERATIONAL HOURS		DAILY CHARGE DESCRIPTION
		EXTENT	ROAD					
21900502	EFFRA ROAD	COLDHARBOUR LANE TO SALTOUN ROAD	ROAD	NO	LAMBETH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500	
21900615	GLENEAGLE ROAD	JUNCTION OF GLENEAGLE ROAD AND STREATHAM HIGH ROAD TO JUNCTION OF GLENEAGLE ROAD AND AMBLESIDE AVENUE	ROAD	NO	LAMBETH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500	
21900667	HARDEL RISE	WHOLE ROAD	ROAD	NO	LAMBETH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800	
21900672	HARLEYFORD ROAD	DURHAM STREET TO SOUTH LAMBETH ROAD	ROAD	NO	LAMBETH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500	
21900672	HARLEYFORD ROAD	KENNINGTON OVAL TO DURHAM STREET	ROAD	NO	LAMBETH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800	
21900673	HARLEYFORD STREET	KENNINGTON PARK ROAD TO KENNINGTON OVAL	ROAD	NO	LAMBETH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800	
21900787	KENNINGTON LANE	SOUTH LAMBETH ROAD TO DURHAM STREET	ROAD	NO	LAMBETH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500	
21900787	KENNINGTON LANE	DURHAM STREET TO NEWINGTON BUTTS	ROAD	NO	LAMBETH	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800	
21900788	KENNINGTON OVAL	HARLEYFORD ROAD TO HARLEYFORD STREET	ROAD	NO	LAMBETH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800	
21900792	KENNINGTON PARK ROAD	MAGEE STREET TO KENNINGTON PARK PLACE	ROAD	NO	LAMBETH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500	
21900792	KENNINGTON PARK	MAGEE STREET TO	ROAD	NO	LAMBETH	06:30-10:00 & 15:30-19:00	LOW CHARGE	



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		EXTENT	EXTENT				
	ROAD	CLAPHAM ROAD				WEEKDAYS + 12:00-18:00 WEEKENDS	£800
21900793	KENNINGTON ROAD	KENNINGTON PARK ROAD TO CLAYTON STREET		NO	LAMBETH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
21900793	KENNINGTON ROAD	CLAYTON STREET TO SILK MEWS		NO	LAMBETH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
21900793	KENNINGTON ROAD	KENNINGTON LANE TO SILK MEWS		NO	LAMBETH	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
21900829	LAMBETH PALACE ROAD	WHOLE ROAD		NO	LAMBETH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
21900889	LONG ROAD	CLAPHAM COMMON SOUTH SIDE TO ROOKERY ROAD		NO	LAMBETH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
21900969	MITCHAM LANE	AMBLESIDE AVENUE TO STREATHAM HIGH ROAD		NO	LAMBETH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
21901022	NINE ELMS LANE	WHOLE ROAD		NO	LAMBETH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
21901036	NORWOOD ROAD	THURLOW PARK ROAD TO CHRISTCHURCH ROAD		NO	LAMBETH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
21901071	PARRY STREET	WHOLE ROAD		NO	LAMBETH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
21901112	POYNDERS ROAD	SLIP ROAD LEADING FROM ATKINS ROAD TO POYNDERS ROAD TO KINGS AVENUE		NO	LAMBETH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
21901247	SOUTH LAMBETH PLACE	WHOLE ROAD		NO	LAMBETH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500



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21901248	SOUTH LAMBETH ROAD	KENNINGTON LANE TO 30M SOUTH OF LAWN LANE	NO	LAMBETH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
21901248	SOUTH LAMBETH ROAD	STOCKWELL TERRACE TO BINFIELD ROAD	NO	LAMBETH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
21901292	STAMFORD STREET	WHOLE ROAD	NO	LAMBETH	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
21901315	STOCKWELL PARK WALK	WHOLE ROAD	NO	LAMBETH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
21901316	STOCKWELL ROAD	CLAPHAM ROAD TO SWAN MEWS	NO	LAMBETH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
21901316	STOCKWELL ROAD	BRIXTON ROAD TO SWAN MEWS	NO	LAMBETH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
21901326	STREATHAM HIGH ROAD	PRENTIS ROAD TO STATION APPROACH	NO	LAMBETH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
21901326	STREATHAM HIGH ROAD	HEATHDENE ROAD TO HERMITAGE LANE	NO	LAMBETH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
21901326	STREATHAM HIGH ROAD	STERNHOLD AVENUE TO PRENTIS ROAD	YES	LAMBETH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS (NORTHBOUND AM + SOUTHBOUND PM)	LOW CHARGE £800
21901326	STREATHAM HIGH ROAD	NATAL ROAD TO WESTWELL ROAD APPROACH	NO	LAMBETH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
21901327	STREATHAM HILL	STREATHAM PLACE TO CLAREMONT WEST ESTATE INTERNAL ROADS	NO	LAMBETH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
21901327	STREATHAM HILL	CLAREMONT WEST ESTATE INTERNAL ROADS TO STERNHOLD AVENUE	YES	LAMBETH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS (NORTHBOUND)	LOW CHARGE £800



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					AM + SOUTHBOUND (PM)		
21901328	STREATHAM PLACE	BRIXTON HILL TO MONTRELL ROAD	NO	LAMBETH	06:30-20:00	WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
21901356	THE AVENUE	WHOLE ROAD	NO	LAMBETH	06:30-20:00	WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
21901360	THE PAVEMENT	O/S 17 THE PAVEMENT TO CLAPHAM PARK ROAD	NO	LAMBETH	06:30-20:00	WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
21901381	THURLOW PARK ROAD	CROXTED ROAD TO LINCOLN MEWS	NO	LAMBETH	06:30-20:00	WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
21901381	THURLOW PARK ROAD	O/S N.7 THURLOW PARK ROAD TO NORWOOD ROAD	NO	LAMBETH	06:30-10:00 & 15:30-19:00	WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
21901390	TOOTING BEC GARDENS	JUNCTION OF TOOTING BEC GARDENS AND MITCHAM LANE TO JUNCTION OF TOOTING BEC GARDENS AND AMBLESIDE AVENUE	NO	LAMBETH	06:30-22:00	WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
21901391	TOOTING BEC ROAD	AMBLESIDE AVENUE TO TOOTING BEC GARDENS	NO	LAMBETH	06:30-22:00	WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
21901408	TULSE HILL	NORWOOD ROAD TO HARDEL RISE	NO	LAMBETH	06:30-10:00 & 15:30-19:00	WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
21901460	WANDSWORTH ROAD	KENNINGTON LANE TO NINE ELMS LANE	NO	LAMBETH	06:30-22:00	WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
21901466	WATERLOO ROAD	EXTON STREET TO SUBWAY RUNNING UNDER WATERLOO ROAD O/S WHITEHOUSE APARTMENTS	NO	LAMBETH	06:30-10:00 & 15:30-19:00	WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
21901482	WESTMINSTER BRIDGE ROAD	YORK ROAD TO THE QUEENS WALK	NO	LAMBETH	06:30-22:00	WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500



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21901482	WESTMINSTER BRIDGE ROAD	STATION APPROACH ROAD TO YORK ROAD	NO	LAMBETH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
21901539	YORK ROAD	WHOLE ROAD	NO	LAMBETH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
21901566	VAUXHALL BRIDGE	WHOLE ROAD	NO	LAMBETH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
21901569	WESTMINSTER BRIDGE	WHOLE ROAD	NO	LAMBETH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
21902078	NEWINGTON BUTTS	KENNINGTON PARK ROAD TO KENNINGTON LANE	NO	LAMBETH	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
21902166	BRIDGEFOOT	WANDSWORTH ROAD TO 65M EAST OF WANDSWORTH ROAD	NO	LAMBETH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
21902166	BRIDGEFOOT	VAUXHALL BRIDGE TO 50M EAST OF WANDSWORTH ROAD	NO	LAMBETH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
21903024	SLIP ROAD LEADING FROM ATKINS ROAD TO POYNDERS ROAD	WHOLE ROAD	NO	LAMBETH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
21903026	SLIP ROAD LEADING FROM SOUTH LAMBETH ROAD TO CLAPHAM ROAD	WHOLE ROAD	NO	LAMBETH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
21903500	SLIP ROAD LEADING FROM KENNINGTON ROAD NORTHBOUND TO KENNINGTON	WHOLE ROAD	NO	LAMBETH	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800



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	LANE WESTBOUND					
22000035	AMERSHAM ROAD	NEW CROSS ROAD TO PARKFIELD ROAD	NO	LEWISHAM	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22000325	DEPTFORD BROADWAY	WHOLE ROAD	NO	LEWISHAM	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22000623	LEWISHAM WAY	NEW CROSS ROAD TO PARKFIELD ROAD	NO	LEWISHAM	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22000637	LOAMPIT VALE	JERRARD STREET TO STATION ROAD	NO	LEWISHAM	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22000790	PARKFIELD ROAD	WHOLE ROAD	NO	LEWISHAM	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22001806	PLASSY ROAD	WHOLE ROAD	NO	LEWISHAM	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22002003	WALDRAM CRESCENT	WALDRAM PARK ROAD TO WALDRAM PLACE	NO	LEWISHAM	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22002004	WALDRAM PARK ROAD	WALDRAM CRESENT TO MONTROSE WAY	NO	LEWISHAM	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22004078	STANSTEAD ROAD	COLFE ROAD TO KILMORIE ROAD	NO	LEWISHAM	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22004078	STANSTEAD ROAD	CATFORD HILL TO ST DUNSTAN'S COLLEGE EAST ENTRANCE	NO	LEWISHAM	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22004177	LEWISHAM HIGH STREET	MOLESWORTH STREET TO 20M SOUTH OF	NO	LEWISHAM	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500



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		EXTENT	O/S				
		MOLESWORTH STREET	N.205				
22004177	LEWISHAM HIGH STREET	RENNEL STREET TO BELMONT HILL		NO	LEWISHAM	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22004181	MOLESWORTH STREET	RENNEL STREET TO LEWISHAM HIGH STREET		NO	LEWISHAM	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22004211	RUSHEY GREEN	SANGLEY ROAD TO RINGSTEAD ROAD		NO	LEWISHAM	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22004387	DEPTFORD BRIDGE	WHOLE ROAD		NO	LEWISHAM	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22004516	BROMLEY ROAD	BROMLEY ROAD NW SERVICE ROAD O/S N.446 TO DOWNHAM LANE		NO	LEWISHAM	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22004516	BROMLEY ROAD	BECKENHAM HILL ROAD TO WATERMEAD ROAD		NO	LEWISHAM	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22004535	BROWN HILL ROAD	RUSHEY GREEN TO PLASSY ROAD		NO	LEWISHAM	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22005070	ELTHAM ROAD	WHOLE ROAD		YES	LEWISHAM	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS (WESTBOUND AM + EASTBOUND PM)	LOW CHARGE £800
22005220	SANGLEY ROAD	RUSHEY GREEN TO PLASSY ROAD		NO	LEWISHAM	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22005521	NEW CROSS ROAD	AMERSHAM ROAD TO NEW CROSS GATE		NO	LEWISHAM	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800



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						SATURDAYS	
22005521	NEW CROSS ROAD	AMERSHAM ROAD TO TANNER'S HILL	NO	LEWISHAM	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS		LOW CHARGE £800
22005615	SHOOTERS HILL ROAD	WHOLE ROAD	NO	LEWISHAM	06:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS		HIGH CHARGE £2500
22005976	CATFORD HILL	STANSTEAD ROAD TO CATFORD ROAD	NO	LEWISHAM	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS		LOW CHARGE £800
22005979	CATFORD ROAD	WHOLE ROAD	NO	LEWISHAM	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS		LOW CHARGE £800
22100600	BEVERLEY WAY	SHANNON CORNER ROUNDABOUT TO BODNANT GARDENS SOUTH	NO	MERTON	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS		HIGH CHARGE £2500
22100600	BEVERLEY WAY	120M SOUTH OF CAMBRIDGE AVENUE TO BODNANT GARDENS SOUTH	YES	MERTON	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS (NORTHBOUND AM + SOUTHBOUND PM)		LOW CHARGE £800
22100963	BUSHEY ROAD	A3 SLIP ROAD TO O TO S APEX HOUSE	NO	MERTON	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS		HIGH CHARGE £2500
22101770	CROWN LANE	LONDON ROAD TO CROWN ROAD	NO	MERTON	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS		HIGH CHARGE £2500
22103303	HIGH STREET COLLIER'S WOOD	CHRISTCHURCH ROAD TO MERTON HIGH STREET	NO	MERTON	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS		HIGH CHARGE £2500
22103999	LONDON ROAD	MORDEN COURT TO O/S N.46 LONDON ROAD	NO	MERTON	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS		HIGH CHARGE £2500
22104146	MALDEN WAY	COBHAM AVENUE TO BURLINGTON ROAD ROUNDABOUT	NO	MERTON	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS		HIGH CHARGE £2500



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22104146	MALDEN WAY	30M EAST OF ALBERT ROAD TO COBHAM AVENUE	NO	MERTON	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22104147	MALDEN WAY (KINGSTON BY PASS)	COBHAM AVENUE TO BURLINGTON ROAD ROUNDABOUT	NO	MERTON	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22104147	MALDEN WAY (KINGSTON BY PASS)	30M EAST OF ALBERT ROAD TO COBHAM AVENUE	NO	MERTON	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22105193	PRIORY ROAD	WHOLE ROAD	NO	MERTON	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22105806	SHANNON CORNER ROUNDABOUT	WHOLE ROAD	NO	MERTON	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22202013	NORTH CIRCULAR ROAD	415M SOUTH OF ROMFORD ROAD TO 300M NORTH OF BARKING ROAD	NO	NEWHAM	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22202013	NORTH CIRCULAR ROAD	JENKINS LANE TO 250M NORTH OF LONDON ROAD	YES	NEWHAM	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS (SOUTHBOUND AM + NORTHBOUND PM)	LOW CHARGE £800
22301531	NORTH CIRCULAR ROAD	250M SOUTH OF EASTERN AVENUE TO 750M NORTH OF EASTERN AVENUE	NO	REDBRIDGE	06:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22301531	NORTH CIRCULAR ROAD	250M SOUTH OF EASTERN AVENUE TO 415M SOUTH OF ROMFORD ROAD	NO	REDBRIDGE	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22301531	NORTH CIRCULAR ROAD	SOUTHEND ROAD TO 750M NORTH OF EASTERN AVENUE	NO	REDBRIDGE	06:30-10:00 & 15:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800



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22302011	EASTERN AVENUE	CRANLEY DRIVE TO CAMBRIDGE PARK ROAD	NO	REDBRIDGE	06:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22302011	EASTERN AVENUE	CRANLEY DRIVE TO BARLEY LANE	NO	REDBRIDGE	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22306447	EASTERN AVENUE WEST	WHOLE ROAD	NO	REDBRIDGE	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22303402	WOODFORD AVENUE	EASTERN AVENUE TO AVERY GARDENS	NO	REDBRIDGE	06:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22303402	WOODFORD AVENUE	85M SOUTH OF RODING LANE SOUTH TO AVERY GARDENS	NO	REDBRIDGE	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22305320	SOUTHEND ROAD	50M EAST OF CHARLIE BROWNS ROUNDABOUT TO M11 SLIP ROADS	NO	REDBRIDGE	06:30-22:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22305320	SOUTHEND ROAD	WATERWORKS ROUNDABOUT TO M11 SLIP ROADS	NO	REDBRIDGE	06:30-10:00 & 15:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22305320	SOUTHEND ROAD	50M EAST OF CHARLIE BROWNS ROUNDABOUT TO 90M EAST OF RODING LANE NORTH	NO	REDBRIDGE	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22306105	HARRIER AVENUE	CAMBRIDGE PARK TO MANSFIELD ROAD	NO	REDBRIDGE	06:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22306122	CHARLIE BROWN'S ROUNDABOUT	WHOLE ROAD	NO	REDBRIDGE	06:30-22:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22405471	CLIFFORD AVENUE	LANGDALE CLOSE TO UPPER RICHMOND ROAD WEST	NO	RICHMOND UPON THAMES	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22406036	UPPER RICHMOND	CLIFFORD AVENUE TO	NO	RICHMOND UPON	06:30-20:00 WEEKDAYS +	HIGH CHARGE



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USRN	NSG STREET NAME	LANE RENTAL SEGMENT EXTENT	TIDAL	LONDON BOROUGH	LANE RENTAL OPERATIONAL HOURS	DAILY CHARGE DESCRIPTION
22406768	ROAD WEST UPPER RICHMOND ROAD	GRAEMESDYKE AVENUE DUNGARVAN AVENUE TO O/S N.470 UPPER RICHMOND ROAD	NO	THAMES RICHMOND UPON THAMES	12:00-18:00 SATURDAYS 06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	£2500 HIGH CHARGE £2500
22500000	ROTHERHITHE TUNNEL	WHOLE ROAD	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22500218	BERMONDSEY STREET	TOOLEY STREET TO ST THOMAS STREET	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22500218	BERMONDSEY STREET	TOWER BRIDGE ROAD TO DECIMA STREET	NO	SOUTHWARK	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22500249	BLACKFRIARS ROAD	BLACKFRIARS BRIDGE TO 50M SOUTH OF UPPER GROUND	NO	SOUTHWARK	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22500249	BLACKFRIARS ROAD	ST GEORGES CIRCUS TO 50M SOUTH OF UPPER GROUND	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22500284	BOROUGH HIGH STREET	TOOLEY STREET TO TABBARD STREET	NO	SOUTHWARK	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22500671	CRUCIFIX LANE	WHOLE ROAD	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22500807	DRUID STREET	TOOLEY STREET TO TANNER STREET	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22500817	DUKE STREET HILL	WHOLE ROAD	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00	LOW CHARGE £800



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USRN	NSG STREET NAME	LANE RENTAL SEGMENT EXTENT	TIDAL	LONDON BOROUGH	LANE RENTAL OPERATIONAL HOURS		DAILY CHARGE DESCRIPTION
						SATURDAYS	
22500818	DULWICH COMMON	LORDSHIP LANE TO ACCESS TO LORDSHIP LANE ESTATE	NO	SOUTHWARK	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS		HIGH CHARGE £2500
22500886	ELEPHANT AND CASTLE	40M SOUTH OF ST GEORGES ROAD TO NEWINGTON BUTTS	NO	SOUTHWARK	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS		HIGH CHARGE £2500
22500886	ELEPHANT AND CASTLE	NEW KENT ROAD TO 40M SOUTH OF ST GEORGES ROAD	NO	SOUTHWARK	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS		LOW CHARGE £800
22501118	GREAT DOVER STREET	BRICKLAYERS ARMS ROUNDABOUT TO BARTHOLOMEW STREET	NO	SOUTHWARK	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS		HIGH CHARGE £2500
22501346	JAMAICA ROAD	WHOLE ROAD	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS		LOW CHARGE £800
22501388	KENNINGTON PARK ROAD	AT JUNCTION WITH KENNINGTON LANE AND NEWINGTON BUTTS	NO	SOUTHWARK	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS		LOW CHARGE £800
22501544	LONDON ROAD	50M NORTH OF ELEPHANT AND CASTLE TO ST GEORGES CIRCUS	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS		LOW CHARGE £800
22501544	LONDON ROAD	ELEPHANT AND CASTLE TO 50M NORTH OF ELEPHANT AND CASTLE	NO	SOUTHWARK	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS		LOW CHARGE £800
22501557	LORDSHIP LANE	DULWICH COMMON TO UNDERHILL ROAD	NO	SOUTHWARK	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS		HIGH CHARGE £2500
22501783	NEW KENT ROAD	BRICKLAYERS ARMS ROUNDABOUT TO SEARLES ROAD	NO	SOUTHWARK	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS		HIGH CHARGE £2500



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USRN	NSG STREET NAME	LANE RENTAL SEGMENT EXTENT	TIDAL	LONDON BOROUGH	LANE RENTAL OPERATIONAL HOURS	DAILY CHARGE DESCRIPTION
22501783	NEW KENT ROAD	SEARLES ROAD TO ELEPHANT AND CASTLE	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22501795	NEWINGTON BUTTS	ELEPHANT AND CASTLE ROUNDABOUT TO O/S N.109-117 NEWINGTON BUTTS	NO	SOUTHWARK	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22501795	NEWINGTON BUTTS	KENNINGTON PARK ROAD TO O/S N.109-117 NEWINGTON BUTTS	NO	SOUTHWARK	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22501843	OLD KENT ROAD	BRICKLAYERS ARMS ROUNDABOUT TO LEROY STREET	NO	SOUTHWARK	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22502025	QUEEN ELIZABETH STREET	HORSLEYDOWNE LANE TO TOOLEY STREET	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22502304	SOUTHWARK STREET	BOROUGH HIGH STREET GYRATORY	NO	SOUTHWARK	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22502304	SOUTHWARK STREET	BOROUGH HIGH STREET TO BLACKFRIARS ROAD	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22502326	ST GEORGES ROAD	WHOLE ROAD	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22502335	ST GEORGES CIRCUS	WHOLE ROAD	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22502357	ST THOMAS STREET	FENNING STREET TO BERMONDSEY STREET	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800



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USRN	NSG STREET NAME	LANE RENTAL SEGMENT EXTENT	TIDAL	LONDON BOROUGH	LANE RENTAL OPERATIONAL HOURS	DAILY CHARGE DESCRIPTION
22502365	STAMFORD STREET	BLACKFRIARS ROAD TO HATFIELDS	NO	SOUTHWARK	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22502466	TANNER STREET	JAMAICA ROAD TO DRUID STREET	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22502504	THURLOW PARK ROAD	CROXTED ROAD TO 100M EAST OF CROXTED ROAD JUNCTION BY WEST DULWICH RAILWAY	NO	SOUTHWARK	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22502518	TOOLEY STREET	TANNER STREET TO WESTERN EXTENT OF 15 TOOLEY STREET	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22502529	TOWER BRIDGE ROAD	BRICKLAYERS ARMS ROUNDABOUT TO ABERDOUR STREET	NO	SOUTHWARK	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22502529	TOWER BRIDGE ROAD	SWAN MEAD TO O/S N.212 TOWER BRIDGE ROAD	NO	SOUTHWARK	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22502529	TOWER BRIDGE ROAD	TOWER BRIDGE APPROACH TO O/S N.212 TOWER BRIDGE ROAD	NO	SOUTHWARK	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22502642	WALWORTH ROAD	WESTERN EXTENT OF RAILWAY BRIDGE TO WALWORTH ROAD AND NEWINGTON BUTTS JUNCTION	NO	SOUTHWARK	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22502685	WESTMINSTER BRIDGE ROAD	WHOLE ROAD	NO	SOUTHWARK	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22502911	BRICKLAYERS ARMS	WHOLE ROAD	NO	SOUTHWARK	06:30-20:00 WEEKDAYS +	HIGH CHARGE



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USRN	NSG STREET NAME	LANE RENTAL SEGMENT		TIDAL	LONDON BOROUGH	LANE RENTAL OPERATIONAL HOURS		DAILY CHARGE DESCRIPTION
		EXTENT						
	ROUNDABOUT					12:00-18:00	SATURDAYS	£2500
22503052	LONDON BRIDGE	WHOLE ROAD		NO	SOUTHWARK	06:30-20:00 12:00-18:00	WEEKDAYS + WEEKENDS	HIGH CHARGE £2500
22602649	SUTTON COURT ROAD	HIGH STREET TO CHALK PIT WAY		NO	SUTTON	06:30-10:00 12:00-18:00	& 15:30-19:00 WEEKDAYS + WEEKENDS	LOW CHARGE £800
22602652	SUTTON PARK ROAD	WHOLE ROAD		NO	SUTTON	06:30-10:00 12:00-18:00	& 15:30-19:00 WEEKDAYS + WEEKENDS	LOW CHARGE £800
22605431	CHALK PIT WAY	WHOLE ROAD		NO	SUTTON	06:30-10:00 12:00-18:00	& 15:30-19:00 WEEKDAYS + WEEKENDS	LOW CHARGE £800
22605568	GROVE ROAD	HIGH STREET TO SUTTON PARK ROAD		NO	SUTTON	06:30-10:00 12:00-18:00	& 15:30-19:00 WEEKDAYS + WEEKENDS	LOW CHARGE £800
22605669	CARSHALTON ROAD	HIGH STREET TO MANOR PARK ROAD		NO	SUTTON	06:30-10:00 12:00-18:00	& 15:30-19:00 WEEKDAYS + WEEKENDS	LOW CHARGE £800
22605671	CHEAM ROAD	HIGH STREET TO SUTTON PARK ROAD		NO	SUTTON	06:30-10:00 12:00-18:00	& 15:30-19:00 WEEKDAYS + WEEKENDS	LOW CHARGE £800
22700159	BISHOPSGATE	WHOLE ROAD		NO	TOWER HAMLETS	06:30-10:00 12:00-18:00	& 15:30-20:00 WEEKDAYS + WEEKENDS	LOW CHARGE £800
22700161	BLACKWALL TUNNEL APPROACH	WHOLE ROAD		NO	TOWER HAMLETS	06:30-20:00 12:00-18:00	WEEKDAYS + WEEKENDS	HIGH CHARGE £2500
22700162	BLACKWALL TUNNEL NORTHERN APPROACH	WHOLE ROAD		NO	TOWER HAMLETS	06:30-20:00 12:00-18:00	WEEKDAYS + WEEKENDS	HIGH CHARGE £2500
22700175	BOW ROAD	WHOLE ROAD		NO	TOWER HAMLETS	06:30-10:00 16:00-20:00	&	LOW CHARGE



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22700215	BRUNSWICK ROAD	WHOLE ROAD	NO	TOWER HAMLETS	WEEKDAYS + 12:00-18:00 SATURDAYS	£800
22700226	BURDETT ROAD	WHOLE ROAD EXCLUDING SIDE ROAD SECTION AT SOUTHERN END OF BURDETT ROAD AND EAST INDIA DOCK ROAD	NO	TOWER HAMLETS	06:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22700234	BUTCHER ROW	WHOLE ROAD	NO	TOWER HAMLETS	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22700346	COMMERCIAL ROAD	BROMLEY STREET TO BUTCHER ROW	NO	TOWER HAMLETS	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22700347	COMMERCIAL STREET	QUAKER STREET TO POMELL WAY	NO	TOWER HAMLETS	06:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22700347	COMMERCIAL STREET	POMELL WAY TO WHITECHAPEL HIGH STREET	NO	TOWER HAMLETS	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22700443	EAST CROSS ROUTE	200M NORTH OF TREDEGAR ROAD TO 300M SOUTH OF TREDEGAR ROAD	NO	TOWER HAMLETS	06:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22700443	EAST CROSS ROUTE	EASTWAY TO 300M NORTH OF TREDEGAR ROAD	YES	TOWER HAMLETS	06:30-10:00 & 15:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS (WESTBOUND AM + EASTBOUND PM)	LOW CHARGE £800
22700449	EAST SMITHFIELD	WHOLE ROAD	NO	TOWER HAMLETS	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22700731	LEMAN STREET	BRAHAM STREET TO PRESCOT STREET	NO	TOWER HAMLETS	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22700731	LEMAN STREET	WHITECHAPEL HIGH STREET	NO	TOWER HAMLETS	06:30-20:00 WEEKDAYS +	HIGH CHARGE



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		EXTENT	TO			OPERATIONAL HOURS	OPERATIONAL HOURS	
22700778	MANSELL STREET	TO BRAHAM STREET	BRAHAM STREET TO WHITECHAPEL HIGH STREET	NO	TOWER HAMLETS	12:00-18:00	SATURDAYS	£2500
22700778	MANSELL STREET	PRESCOT STREET TO BRAHAM STREET	PRESCOT STREET TO EAST BRAHAM STREET	NO	TOWER HAMLETS	06:30-10:00 & 16:00-20:00	WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22700778	MANSELL STREET	PRESCOT STREET TO EAST SMITHFIELD	PRESCOT STREET TO EAST SMITHFIELD	NO	TOWER HAMLETS	06:30-20:00	WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22700818	MILE END ROAD	CAMBRIDGE HEATH ROAD TO O/S N.27A	CAMBRIDGE HEATH ROAD TO O/S N.27A	NO	TOWER HAMLETS	06:30-20:00	WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22700818	MILE END ROAD	BOW ROAD TO 100M EAST OF CAMBRIDGE HEATH ROAD	BOW ROAD TO 100M EAST OF CAMBRIDGE HEATH ROAD	NO	TOWER HAMLETS	06:30-10:00 & 16:00-20:00	WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22700970	PRESCOT STREET	WHOLE ROAD	WHOLE ROAD	NO	TOWER HAMLETS	06:30-10:00 & 16:00-20:00	WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22701024	ROBIN HOOD LANE	EAST INDIA DOCK ROAD TO ASHTON STREET	EAST INDIA DOCK ROAD TO ASHTON STREET	NO	TOWER HAMLETS	06:30-20:00	WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22701096	SHOREDITCH HIGH STREET	WORSHIP STREET TO 20M SOUTH OF PLOUGH YARD	WORSHIP STREET TO 20M SOUTH OF PLOUGH YARD	NO	TOWER HAMLETS	06:30-10:00 & 15:30-20:00	WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22701097	SHORTER STREET	WHOLE ROAD	WHOLE ROAD	NO	TOWER HAMLETS	06:30-20:00	WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22701140	ST LEONARDS ROAD	SLIP ROAD BETWEEN A13 EASTBOUND AND A102 NORTHBOUND	SLIP ROAD BETWEEN A13 EASTBOUND AND A102 NORTHBOUND	NO	TOWER HAMLETS	06:30-20:00	WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22701200	THE HIGHWAY	WHOLE ROAD	WHOLE ROAD	NO	TOWER HAMLETS	06:30-22:00	WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22701227	TOWER BRIDGE	WHOLE ROAD	WHOLE ROAD	NO	TOWER HAMLETS	06:30-10:00 & 16:00-20:00	WEEKDAYS + 12:00-18:00	LOW CHARGE



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					WEEKENDS	WEEKDAYS + WEEKENDS	
	APPROACH				WEEKENDS		£800
22701228	TOWER HILL	BYWARD STREET TO TOWER HILL CYCLE HIRE STATION	NO	TOWER HAMLETS	06:30-22:00	WEEKDAYS + WEEKENDS	HIGH CHARGE £2500
22701228	TOWER HILL	O/S CYCLE HIRE STATION TO EAST SMITHFIELD	NO	TOWER HAMLETS	06:30-20:00	WEEKDAYS + SATURDAYS	HIGH CHARGE £2500
22701338	WHITECHAPEL HIGH STREET	O/S N.84 WHITECHAPEL HIGH STREET TO MANSELL STREET	NO	TOWER HAMLETS	06:30-20:00	WEEKDAYS + SATURDAYS	HIGH CHARGE £2500
22701338	WHITECHAPEL HIGH STREET	O/S N.84 WHITECHAPEL HIGH STREET TO CAVELL STREET	NO	TOWER HAMLETS	06:30-10:00 & 16:00-20:00	WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22701339	WHITECHAPEL ROAD	MAPLES PLACE TO SYDNEY STREET	NO	TOWER HAMLETS	06:30-20:00	WEEKDAYS + SATURDAYS	HIGH CHARGE £2500
22701339	WHITECHAPEL ROAD	O/S N.84 WHITECHAPEL HIGH STREET TO CAVELL STREET	NO	TOWER HAMLETS	06:30-10:00 & 16:00-20:00	WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22701995	NORTON FOLGATE	WHOLE ROAD	NO	TOWER HAMLETS	06:30-10:00 & 15:30-20:00	WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22702300	ROTHERHITHE TUNNEL	WHOLE ROAD	NO	TOWER HAMLETS	06:30-10:00 & 15:30-19:00	WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22702328	TOWER BRIDGE	WHOLE ROAD	NO	TOWER HAMLETS	06:30-10:00 & 16:00-20:00	WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22702361	ROTHERHITHE TUNNEL APPROACH	WHOLE ROAD	NO	TOWER HAMLETS	06:30-10:00 & 15:30-19:00	WEEKDAYS + 12:00-18:00 SATURDAYS	LOW CHARGE £800
22702364	BLACKWALL TUNNEL	WHOLE ROAD	NO	TOWER HAMLETS	06:30-20:00	WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500



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22805042	SOUTHEND ROAD	BILLET ROUNDABOUT TO WATERWORKS ROUNDABOUT	NO	WALTHAM FOREST	06:30-10:00 & 15:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22841880	HACKNEY TO M11 LINK ROAD	CAMBRIDGE PARK ROAD TO CATHALL ROAD	NO	WALTHAM FOREST	06:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22841880	HACKNEY TO M11 LINK ROAD	TEMPLE MILLS ROAD TO CATHALL ROAD	YES	WALTHAM FOREST	06:30-10:00 & 15:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS (WESTBOUND AM + EASTBOUND PM)	LOW CHARGE £800
22861850	SOUTHEND ROAD	100M EAST OF ANGEL ROAD TO BILLET ROUNDABOUT	NO	WALTHAM FOREST	06:30-10:00 & 15:30-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22900238	BALHAM HILL	GASKARTH ROAD TO NIGHTINGALE LANE	NO	WANDSWORTH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22900305	BATTERSEA BRIDGE ROAD	WHOLE ROAD	NO	WANDSWORTH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22900337	BATTERSEA PARK ROAD	WHOLE ROAD	NO	WANDSWORTH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22900771	CAMBRIDGE ROAD	FROM J/W ALBERT BRIDGE ROAD TO J/W BATTERSEA BRIDGE ROAD	NO	WANDSWORTH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22901361	EAST HILL	WHOLE ROAD	NO	WANDSWORTH	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22901582	FAIRFIELD STREET	WHOLE ROAD	NO	WANDSWORTH	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800



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22902688	KINGSTON ROAD	TIBBET'S CORNER ROUNDABOUT TO NORSTEAD PLACE	NO	WANDSWORTH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22903538	NINE ELMS LANE	WANDSWORTH ROAD TO 40M WEST OF WANDSWORTH ROAD	NO	WANDSWORTH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22903679	OLD YORK ROAD	RAM STREET TO FAIRFIELD STREET	NO	WANDSWORTH	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22903956	PRINCE OF WALES DRIVE	BATTERSEA BRIDGE ROAD TO ALBERT BRIDGE ROAD	NO	WANDSWORTH	06:30-10:00 & 15:30-19:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22904018	PUTNEY BRIDGE ROAD	WEST HILL TO ARMOURY WAY	NO	WANDSWORTH	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22904169	RAM STREET	WHOLE ROAD	NO	WANDSWORTH	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22904379	ROEHAMPTON LANE	WANBOROUGH DRIVE TO KINGSTON ROAD	NO	WANDSWORTH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22904379	ROEHAMPTON LANE	O/S N.1 ROEHAMPTON LANE TO UPPER RICHMOND ROAD	NO	WANDSWORTH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22904403	ROEHAMPTON VALE	BEVERLEY BROOK TO KINGSTON ROAD	NO	WANDSWORTH	06:30-22:00 WEEKDAYS + 12:00-18:00 WEEKENDS	HIGH CHARGE £2500
22905154	SWANDON WAY	WANDSWORTH BRIDGE RDBT TO OLD YORK ROAD	NO	WANDSWORTH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22905154	SWANDON WAY	OLD YORK ROAD TO 50M NORTH OF OLD YORK ROAD	NO	WANDSWORTH	06:30-10:00 & 16:00-20:00 WEEKDAYS + 12:00-18:00 WEEKENDS	LOW CHARGE £800
22905450	TOOTING BEC ROAD	AMBLESIDE AVENUE TO	NO	WANDSWORTH	06:30-22:00 WEEKDAYS +	HIGH CHARGE



Transport for London – Lane Rental Scheme Schedule of Lane Rental Locations April 2018

USRN	NSG STREET NAME	LANE RENTAL SEGMENT		TIDAL	LONDON BOROUGH	LANE RENTAL OPERATIONAL HOURS		DAILY CHARGE DESCRIPTION
		EXTENT					WEEKENDS	
22905667	UPPER RICHMOND ROAD	TOOTING BEC GARDENS	DUNGARVAN AVENUE TO O/S N.470 UPPER RICHMOND ROAD	NO	WANDSWORTH	06:30-20:00 12:00-18:00	WEEKDAYS + SATURDAYS	HIGH CHARGE £2500
22905667	UPPER RICHMOND ROAD	20M EAST OF CHARLWOOD ROAD TO O/S N.1 TO 3 UPPER RICHMOND ROAD		NO	WANDSWORTH	06:30-10:00 12:00-18:00	WEEKDAYS + WEEKENDS	LOW CHARGE £800
22905667	UPPER RICHMOND ROAD	WEST HILL TO O/S N.1 TO 3 UPPER RICHMOND ROAD		NO	WANDSWORTH	06:30-10:00 12:00-18:00	WEEKDAYS + WEEKENDS	LOW CHARGE £800
22905902	WANDSWORTH HIGH STREET	WHOLE ROAD		NO	WANDSWORTH	06:30-10:00 12:00-18:00	WEEKDAYS + WEEKENDS	LOW CHARGE £800
22905914	WANDSWORTH PLAIN	WHOLE ROAD		NO	WANDSWORTH	06:30-10:00 12:00-18:00	WEEKDAYS + WEEKENDS	LOW CHARGE £800
22906045	WEST HILL	TIBBETS CORNER TO UPPER RICHMOND ROAD		NO	WANDSWORTH	06:30-22:00 12:00-18:00	WEEKDAYS + WEEKENDS	HIGH CHARGE £2500
22906045	WEST HILL	WANDSWORTH HIGH STREET TO UPPER RICHMOND ROAD		NO	WANDSWORTH	06:30-10:00 12:00-18:00	WEEKDAYS + WEEKENDS	LOW CHARGE £800
22906413	ARMOURY WAY	WHOLE ROAD		NO	WANDSWORTH	06:30-10:00 12:00-18:00	WEEKDAYS + WEEKENDS	LOW CHARGE £800
22906419	BATTERSEA BRIDGE	WHOLE ROAD		NO	WANDSWORTH	06:30-10:00 12:00-18:00	WEEKDAYS + WEEKENDS	LOW CHARGE £800
22906604	TRINITY ROAD	60M SOUTH OF BELLEVIEW ROAD TO UPPER TOOTING PARK		NO	WANDSWORTH	06:30-20:00 12:00-18:00	WEEKDAYS + WEEKENDS	HIGH CHARGE £2500



Transport for London – Lane Rental Scheme Schedule of Lane Rental Locations April 2018

USRN	NSG STREET NAME	LANE RENTAL SEGMENT EXTENT	TIDAL	LONDON BOROUGH	LANE RENTAL OPERATIONAL HOURS	DAILY CHARGE DESCRIPTION
22906604	TRINITY ROAD	YORK ROAD TO PODMORE ROAD	NO	WANDSWORTH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22906622	YORK ROAD	SWANDON WAY TO PETERGATE	NO	WANDSWORTH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500
22906829	WANDSWORTH BRIDGE ROUNDABOUT	WHOLE ROAD	NO	WANDSWORTH	06:30-20:00 WEEKDAYS + 12:00-18:00 SATURDAYS	HIGH CHARGE £2500



SCOPE

APPENDIX U Mayor's Code of Conduct for Roadworks

Mayor's Code of Conduct for Road Works 2012

Introduction/Background

Road works are undertaken by utilities and by TfL and the 33 London Boroughs as highway authorities and by others such as The Royal Parks. They are a vital part of delivering essential utility services and also facilitating much needed development and improvements to the public realm to ensure that it remains in a fit and proper state of repair. However, road works also cause significant delay and disruption to the road network and frustration to all road users.

There are almost 10 million car trips, over half a million cycle trips, and around six million bus passenger journeys on London's roads every day. Almost all freight is carried on the roads. Overall, four out of every five journeys in London depend entirely on the smooth operation of its road network. The average daily traffic flow in London is 40 per cent higher than average flows in other urban areas of England (e.g. Tyne & Wear, Greater Manchester, Merseyside, etc).

There are also large numbers of pedestrians who use London's roads. For example in the City of Westminster alone its daytime population is over 1.1million people and up to 40,000 pedestrians use Oxford Circus in the peak period.

The 34 Highway Authorities in London manage around 13,000 km of road. In addition, there are approximately 71 utilities and a number of smaller licensed operators currently undertaking road works.

Since the Mayor of London was elected in May 2008, a significant number of measures and initiatives have been delivered across London to help tackle the problem of road works within London.

In April 2009, and revised a year later, the Mayor launched the first Code of Conduct for Road works. This Code is currently signed up to by the six major utility companies operating in London (BT Openreach, UK Power Networks, National Grid Gas, Southern Gas Networks, Thames Water and Virgin Media), TfL and London's 33 Borough highway authorities (represented by London Councils). The Code is supported by the National Joint Utilities Group Ltd (NJUG), who themselves launched a similar national code of practice, in the Summer of 2010, based on the Mayor of London's model.

The London Permit Scheme was introduced on the 11 January 2010 by TfL and 16 other highway authorities with two further authorities joined in April of the same year. A total of 27 boroughs and TfL have now joined the Permit scheme, with the remaining 6 boroughs expected to operate the scheme from Autumn 2012.

The London Permit Scheme and the Mayor's Code of Conduct for Road Works have helped to reduce the amount of disruption on London's roads caused by road works. These initiatives have resulted in:

- An increase of 147 per cent in the number of recorded days of disruption saved through joint working and collaboration
- A 25% reduction in the hours of serious and severe congestion caused by planned road works in 2010/11 compared to 2009/10 across London
- A reduction in the total number of works undertaken by utilities of 17% within permitting authorities as compared to only 7% in non-permitting authorities, saving approximately 149,136 days of streetworks within those authorities.

In September 2011 the Mayor announced further measures to tackle disruptive road works on London's streets, building on the achievements in tackling this issue made over the previous three years.

The Mayor issued a pledge to clearly outline to Londoners the standards they should expect to see from road works sites and also called on borough highway authorities to do the same and hold all works promoters working on their streets fully to account.

The Mayor's pledge is that all road works on London's streets should:

- **Be tidy and safe** with a clutter-free site so it is safe for pedestrians, cyclists and other road users.
- **Always explain what's happening** through detailed, clear and consistent signage.
- **Always have activity on site** or, if not, explain why (for example if concrete is drying).
- **Take up as little road / pavement space as possible** with a compact working area and eliminating the unnecessary use of cones, safety barriers and storage of materials.
- **Help keep London moving** by working outside peak hours, re-opening the road to traffic at peak times and, where this is not possible, working 24/7 or extended hours to complete works as quickly as possible. Diversion routes should be clearly signed.

Those organisations involved in the management and execution of road works have taken on board the Mayor's Pledge. This revision of the Code of Conduct reflects the developing nature of the partnership between the various parties involved, seeking to collectively raise the standard of road works undertaken across London and reduce their impact on the travelling public, in terms of traffic disruption and other impacts. This includes the environmental impact of the works and all signatories are encouraged to ensure that their contractors do not allow vehicle engines to be left idling unnecessarily. The revised Code applies to all those involved in road works including works promoters and traffic authorities and specifically identifies the actions and/or commitments each of the parties signed up to it are now undertaking, and the specific performance measures and/or targets that will demonstrate overall progress in our collective efforts to reduce unnecessary disruption from road works. Those signing

up to this Code also sign up to the provision of information relating to the measures so far as reasonably practicable

More information about the new Code of Conduct and how this fits into the Mayor’s pledge is set out below.

Tidy and Safe

First impressions of work sites are important and even the best managed sites can be let down by the presence of damaged or dirty signs and barriers. Signatories to the Mayor’s Code will therefore use signs, barriers and cones that are in good condition and undamaged and will not be obscured or partially obscured by any other plant or material that may be on site.

Plant, equipment and material within the work site will be stored in a neat, tidy and safe manner at all times. At the end of each day works promoters are encouraged to sweep the site of excess debris so that it is left in a tidy manner and to cover any deep excavations so far as reasonably practicable or make them secure with adequate edge protection.

Where they are used, works promoters will ensure that barriers are locked together and do not take up more room than necessary. All spoil will be kept within the barriers, removed regularly and kept to a minimum. Locking barriers is a simple and effective way to ensure that a work site is kept tidy and secure and especially during periods of inclement weather when barriers can easily become dislodged and cause a safety hazard as well as looking unsightly.

All sites will meet the minimum standards set out by the Government’s Code of Practice- Safety at Street Works and Road Works. The measures for this pledge are set out in table 1 below:

Pledge 1 - Tidy and Safe			
Actions	Measures	Current performance	Target
Keep all sites tidy and safe	Reduction in number of Report It complaints regarding untidy sites	926 pro rata for first year	834 (10% reduction)
Adherence to safety code of practice on road works	Number of failed inspections as a % of sample A inspections undertaken	TLRN 13.3 % *Borough13.4%	10% failure rate
Increase in number of contractors adopting blind spot warning systems to protect pedestrians and cyclists	Number of contractors adopting the equipment as reported by the works promoter	Current No to be advised by works promoters	Target to be agreed

* Data from first year permit report from the initial 19 LoPS Authorities

Table 1

Explain what’s happening

The signatories to this Code recognise the importance of adequate signage at all works and the value of providing clear and concise information to the public including details of the works, who is carrying out the works with relevant contact details, and their likely completion date. The Mayor’s Code of Conduct will ensure that works promoters will provide this information to the public together with an update on the progress of works. This is particularly important for sites that are to be unattended for any length of time. The Mayor has already ensured that members of the public can find out what works are taking place on London’s Roads and the public can access this information at <http://public.londonworks.gov.uk/roadworks>

Works promoters will ensure adequate information boards are placed on site. Depending upon the size of the site this may mean more than one will need to be present. For example if a works promoter was working across a four way junction it would make sense to erect four information boards on each of the approaches.

The type of information contained on the information board is critical to helping improve the image of street works and road works. There is a balance to be struck in terms of information overload and adequate information. It is therefore important that we aim to highlight just the key areas of interest.

A good example of an information board should include:

- The works promoter’s name
- The contractor’s name
- The associated permit number that the works are being carried out under
- A plain English description of the works that are being carried out
- The expected completion date of the works
- Contact numbers – for both non urgent and urgent enquires
- The working hours

The measures for this pledge are set out in table 2 below

Pledge 2 - Always Explain what’s happening			
Actions	Measures	Current performance	Target
Promoting/explaining what’s happening on road works by providing information to stakeholders.	Number of signatories signing up to the use of enhanced information boards	6 utilities plus TfL on major and standard works	All signatories to provide enhanced information boards for all planned works
Always Explain what is happening on site.	Reduction in number of Report It complaints regarding lack of signage	1231 pro rata for first year	1108 (10% reduction)

Table 2

Always have activity on site

It is vital that works are completed in a prompt and timely manner to enable road space to be returned to public use in the shortest possible time. However, a common complaint from the public is an apparent lack of activity on site leaving the impression that the road is occupied for longer than is absolutely necessary. Often this apparent lack of activity is for a valid reason, for example, when concrete or asphalt has been laid and time is needed for it to harden. There are also times during the day when noisy works are not allowed due to local environmental health constraints.

It is therefore important to always have work on-going during permitted working hours where practicable or, if for any reason this is not possible (e.g. concrete curing etc.), having clear information signs explaining why.

The signatories to this Code will ensure that the impact of those works is minimised. In particular, on major routes or on locations where their works have a high impact and will ensure that works take place for as long as possible during the day and that works are not left unattended unnecessarily and sign up to:

- Work extended hours to complete works as quickly as possible (subject to noise constraints imposed by Borough EHO in consideration of local residents).
- Explain any inactivity during permitted working hours with on site signage.
- Plan works and resources effectively to ensure there are no unnecessary delays in reopening road space to users (including general traffic, buses cyclists and pedestrians).

The measures for this pledge are set out in table 3 below.

Pledge 3 - Always have activity on site			
Actions	Measures	Current performance	Target
Reducing work durations	Average duration of work types	TLRN – Major – 25.1 Standard – 5.8 Minor -1.7 Immediate- 2 *LoPS Authorities Major – 42.1 Standard – 8.4 Minor -2.7 Immediate- 3.5	TLRN: 23.8 (5% reduction) 5.5 (3% reduction) 1.6 (3% reduction) 1.9 (3% reduction) LoPS Authorities 40 (5% reduction) 8.1 (3% reduction) 2.6 (3% reduction) 3.4 (3% reduction)
Always having activity on site or an explanation of why work is not taking place.	Reduction in number of Report It complaints regarding sites being left unattended and materials remaining	3177 pro rata for first year	2860 (10% reduction)
Customer Satisfaction with the speed with which essential road works are carried out	Satisfaction measure in annual Streets Management Customer Satisfaction Survey Report	26% satisfied (Streets Management CSS 2011)	28% satisfied

* Data from first year permit report from the initial 19 LoPS Authorities

Table 3

Take up as little road/pavement space as possible

As set out above it is important that works sites are tidy and well signed. However, notwithstanding this requirement, it is still possible that works are unnecessarily disruptive because too much road space has been taken up. It is important that safety standards are adhered to. However, it is also important that works promoters plan, manage and implement works on site in a way that minimises the amount of carriageway and footway space taken by road works at all times.

At the works planning stage works promoters should look into the possibility of storing some materials off site until such time as they are required on site. For example large sections of pipe or ducting may not all be required from the beginning of the excavation phase. Instead they may be able to be delivered to site on a daily or weekly basis thus reducing the amount of space taken up by such plant.

It is important that works promoters:

- Plan, manage and implement works on site in a way that minimises the amount of carriageway and footway space taken for road works at all times
- Do not use unnecessary cones and barriers
- Remove barriers during peak times where this is possible
- Use technology such as road plates free up road space during peak hours and when there is inactivity on site to help both pedestrians and drivers gain use of the footways and carriageways.
- Where practicable, promote the use of non excavation techniques, such as thrust boring, pipe insertion, use of existing and or new main or service subway, trench sharing etc.

The measures for this pledge are set out in table 4 below

Pledge 4 - Take up as little road/pavement space as possible			
Actions	Measures	Current performance	Target
Promoters to provide clear traffic management plans designed to minimise disruption and Authorities to provide clear feedback on the quality of the information provided.	Number of permit refusals due to lack of clear traffic management plan provision	TLRN – 1560 (refusal codes 13 and 17) Boroughs Codes not yet used	TLRN -1482 (5% reduction) Boroughs Introduce standard refusal codes
Minimising Number of Report It complaints on disrupting traffic	Reduction in number of Report It complaints regarding unnecessary coning off	3010 pro rata for first year	2710 (10% reduction)
Customer satisfaction - with how often they encounter street works that require road closures.	Surveys on road works	36% are satisfied	38% satisfied

Table 4

Help keep London moving

Finally, it is imperative that Authorities and works promoters work together to help keep London moving.

Measures that will help to keep London moving include:

- Promoters working outside of peak hours, re-opening the road to traffic at peak times.
- A reduction in the number of road works and the duration of those works
- An increase in the number of works taking place collaboratively in the same road space
- Providing better pedestrian diversion signs based upon the Legible London way-finding signs.

The measures for this pledge are set out in table 5 below

Pledge 5 - Help keep London Moving			
Actions	Measures	Current Performance	Target
Minimising the number of road works	Number of works starting	TLRN – 42038 Boroughs Figures not yet collated	TLRN- 39937 (5% reduction) Boroughs Introduce measure for Principal Route Network
Reduce serious and severe disruption London Wide caused by planned works	Serious and severe disruption	575 (2010/11 figure)	546 (5% reduction)
Promoting/Co-ordinating more joint working	No of days disruption avoided through collaborative works and early engagement	TLRN - 1315 *Boroughs – 739 (cumulative)	TLRN - 4000 Boroughs - 1500
Using innovative technology to reduce disruption	Number sites where innovative technology has been used (provided by works promoter) on footways and carriageways e.g road plates, core and vac	Figures not yet collated	Works promoters to sign up to providing information to Highway authorities about the use of innovative technology
Undertake more works out of hours	Number of works with out of hours tick box	TLRN 6221 Boroughs Figures not yet collated	TLRN 6843 (10% increase) Boroughs – Sign up to collating information
Ensuring the quality & timelines of advance notifications and sharing long term plans	Number of forward planning EToNs and transactions to LondonWorks	TfL -921 Other promoters 68 as at Dec 11	TfL – 1015 Other promoters 136

*Data from first year permit report from the initial 19 LoPS Authorities

Table 5

Customer Satisfaction

The Mayor strongly believes that the adoption of his pledge will help to keep London Moving. However, it is important to ensure that the public are happy with the progress being made and so the final measures will be based on customer satisfaction.

To help Londoners report disruptive or badly managed road works that don't meet this criteria, the Mayor and TfL have updated and improved the 'Report It' system on the TfL website, to allow people to identify and report issues quicker. By visiting www.tfl.gov.uk/roadworks, or by tweeting @report It with the hashtag #roadworks, complaints can be sent directly to the highway authority responsible, ensuring that direct and swift action can be taken. All road works on the TfL Road Network (TLRN) will be monitored on a daily basis.

The Report IT web-site also contains a section on customer satisfaction where the public can provide feedback and this will be used as a means to monitor customer satisfaction.

Customer Satisfaction			
Actions	Measures	Current Performance	Target
Management of customer enquiries through Report IT and ensuring the quality of replies to improve satisfaction	Report IT response levels	TLRN – 100% Borough 45%	TLRN – 100% Boroughs - 95%
Customer Satisfaction with the way that essential road works are managed.	Customer satisfaction recorded in annual Streets Management Customer Satisfaction Survey	28% are satisfied	30% satisfied

Table 6

May 2012

SIGNED BY:

Isabel Dedring, Deputy Mayor for Transport

Garrett Emmerson, Transport for London

Nick Lester, London Councils

Mike Galvin, Openreach (a BT Group Company)

Ed Syson, National Grid Gas

Malcolm Russell, Southern Gas Networks

Patrick Clarke, UK Power Networks

Nick Harris, Thames Water

Paul Buttery, Virgin Media

SCOPE

APPENDIX V

Cyber Security Management Schedule

CYBER SECURITY MANAGEMENT SCHEDULE

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1. DEFINITIONS

“Cloud”	A type of internet-based computing service where organisation can have aspects of their IT infrastructure managed by external providers, normally as a Software as a Service (SaaS), Platform as a Service (PaaS) or Infrastructure as a Service (IaaS) basis
“Cyber Essentials Scheme”	is a UK government scheme encouraging organisations to adopt good practice in information security, focussing mainly on technical controls rather than governance, risk, and policy
“Cyber Security Policy / Policies”	The high level Cyber Security requirements for all IT and Operational technology and data owned by TfL or operated and supported by third parties for on behalf of TfL.
“Cyber Security Standard(s)”	The technical detail behind the implementation of the high level cyber security requirements as set out in the Cyber Security Policies.
“Data”	means data created, generated or collected, during Providing the Services (or any part thereof), including Personal Data and data supplied to TfL and members of the TfL Group.
“Good Industry Practice”	means the exercise of that degree of skill, diligence, prudence and foresight which would reasonably and ordinarily be expected from a skilled and experienced operator engaged in the same type of undertaking under the same or similar circumstances.
HMG Information Security Assurance Standards	the meaning and definition as well as relevant policy documents and standards can be found at https://www.gov.uk/government/collections/government-security or any updated link;
“Information Asset Register”	means a register of all information assets relating to the <i>services</i> as detailed in paragraph 3.2(c)
“Information Security Management System” or “ISMS”	a framework of governance models, policies and procedures, based on a business risk approach to establish, implement, operate, monitor, review, maintain and improve information security in accordance with the requirements of Paragraph 15

ISO/IEC 27001	is an information security standard specification for an information security management system (ISMS), with an emphasis on measuring and evaluating how well an organisation's ISMS is performing.
“IT Services”	means the IT services that support the delivery of the Services;
“Malicious Software”	means any software that brings harm to a computer system. Commonly known as malware can be in the form of worms, viruses, trojans, spyware, and adware which steal protected data, delete documents or add software not approved by a user.
“Operational Technology”	means any hardware or software which monitors and/or operates a physical process.
“Outline Security Management Plan”	means the security plan provided by the <i>Contractor</i> as part of their tender submission
“Removable Media”	any type of storage device that can be removed from a computer while the system is running. Examples of removable media include CDs, DVDs and Blu-Ray disks, as well as diskettes and USB drives
“Security Incident”	a potential or actual event or attempted breach of security affecting the confidentiality, integrity or availability of the Services, IT Services or Networks which process or hold Data
“Security Management Plan”	means the <i>Contractor's</i> security plan developed and revised pursuant to Paragraph 14
“Security Policy”	means any TfL security policies as amended by TfL from time to time;
“Security Risk”	meaning all Risks associated with the security of the Services which may have a negative impact upon the agreed security posture, including information security and any risks identified pursuant to the Security Management Schedule.
“Security Risk Register”	means a register of Security Risks produced and maintained as detailed in paragraph 3.2(b)
“Service	means all information technology assets and rights

Assets”	including all physical assets, Software, IPR, as well as spares and components whether in storage, repair or on sites, used by the <i>Contractor</i> to Provide the Services.
“The Contractor’s people”	means all employees, agents, consultants and contractors of the <i>Contractor</i> or of any Sub-Contractor
“Contractor Premises”	means any land or building where the <i>Contractor</i> carries out any part of this contract
“TfL Information Security Controls Framework”	means a hierarchy of IT security documents consisting of the high level Information Management Security Policy and ten security principles (Information Security Controls Framework).
“TfL Network(s)”	means the network infrastructure and services owned or used by TfL to support the delivery of the IT Services.
“TfL Personnel”	means all employees, agents, consultants and contractors of TfL
“TfL Restricted”	as defined in the TfL Information Security Classification Standard (listed in Annex 5)
“TfL Sites”	means all TfL premises where the services are delivered

2. **PURPOSE**

2.1 The purpose of this appendix to the Scope is to set out:

- (a) the principles of protective security to be applied by the *Contractor* in Providing the Service;
- (b) the *Contractor's* wider security obligations relating to Providing the Service;
- (c) the *Contractor's* requirements to test and audit Providing the Service including any Information Security Management System paragraph 3, to ensure compliance with the security requirements set out in this appendix to the Scope;
- (d) the *Contractor's* obligations in the event of a Security Incident;
- (e) the principles for the *Contractor's* development, implementation, operation, maintenance and continual improvement of the Security Management Plan;

-
- (f) the principles for the *Contractor's* development, implementation, operation, maintenance and continual improvement of the Information Security Management System;
 - (g) any obligations for certification against Providing the Service including but not limited to ISO/IEC 27001, the Cyber Essentials Scheme or HMG Information Security Assurance Standards;
 - (h) any requirements to Provide the Service in accordance with the CESG Commercial Product Assurance (CPA) Scheme
 - (i) the requirements on the *Contractor* when Providing the Service, which are aligned with the 10 Steps to Cyber security set out by the Government (see Annex 5) and
 - (j) the *Contractor's* obligation to comply with the Operations Technology Cyber Security Standards (see Annex 5).

3. SECURITY PRINCIPLES

- 3.1 The *Contractor* acknowledges that security, data protection and confidentiality are of fundamental importance in relation to its provision of the service and TfL's ability to retain public confidence. The *Contractor* shall at all times comply with the security principles set out in Paragraph 3 in Providing the Service.
- 3.2 In recognition of the importance that the *Client* places on security, data protection and confidentiality, the *Contractor* shall ensure that a director or relevant individual, as agreed by the *Service Manager*, is made aware of the risks set out in the Security Management Plan and is assigned overall responsibility for ensuring that:
 - (a) appropriate members of the *Contractor* people take responsibility for managing the different levels of security risk and promote a risk management culture;
 - (b) a Security Risk Register is produced and maintained and that all Security Risks are documented in an appropriate manner and is included in any contract risk register if one is in place. This Security Risk Register must be available for audit when reasonably required by TfL as set out in Clause 7 of this Schedule.
 - (c) an Information Asset Register is produced and maintained and that all information technology assets are documented in an appropriate manner in the Information Asset Register and shall identify the criticality of the relevant Service Assets in the delivery of the Services. This register must be available for audit when reasonably required by TfL as stated in Paragraph 7 of this Schedule and when a Security Incident occurs.

-
- (d) supporting policies are implemented (where relevant) and communicated with the *Contractor's* people.

3.3 The *Contractor* shall, at all times ensure that:

- (a) security threats to the service are minimised and mitigated;
- (b) delivery of the service shall fully comply at all times with:
 - (i) any security requirements set out in Annex 3;
 - (ii) the agreed Outline Risk Management Processes and approach set out in Annex 2; and
 - (iii) Good Industry Practice.

3.4 The *Contractor* must notify TfL of any instances where software, applications, services or processes are hosted or run from the cloud that are not part of Providing the Service, and that host, process or connect with any of TfL Operational or IT technology, Data and Networks or handle TfL Data. The *Contractor* is responsible for ensuring that any such cloud services comply with this Cyber Security Management Schedule.

4. ACCESS CONTROLS AND SECURE CONFIGURATION OF SYSTEMS

4.1 The *Contractor* shall comply with all obligations relating to the patching and configuration management of Service Assets as set out in Annex 4 in addition to any specific obligations set out in Annex 4, the *Contractor* shall ensure that:

- (a) security patches are applied to Service Assets as soon as possible in line with vendor recommendations in accordance with overall risk management;
- (b) account management and configuration control processes are implemented to ensure that access to Service Assets by the *Contractor's* people is limited to the extent required for them to fulfil their roles in supporting of Providing the Service.
- (c) when the *Contractor's* people change roles or no longer support Providing the service, access rights are revoked or reviewed;
- (d) any system administration functionality is strictly controlled and restricted to those people who need to have access to such functionality and that the ability of the *Contractor's* people to change the configuration of the Service Assets is appropriately limited and fully auditable;
- (e) *The Contractor's* people are informed of what constitutes acceptable access of operational or IT technology, Data and Networks and the consequences of non-compliance;

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- (f) any preconfigured passwords delivered with any Service Assets are changed prior to their implementation for use in Providing the Service;
 - (g) the Service Assets have appropriate devices, tools or applications in place to filter traffic or separate connections, such as industry standard firewalls and malicious software protection, to all public or private networks which are not controlled by or on behalf of TfL;
 - (h) all wireless functionality is secure; and
 - (i) software upgrades and patching must be managed appropriately and access to any software shall be granted using the principle of least privilege.

5. THE CONTRACTOR'S PEOPLE

- 5.1 The *Contractor* shall, appoint a member of the *Contractor's* people to be the security manager who shall be responsible for the development, monitoring, enforcement, maintenance and enhancement of all security measures set out in this appendix to the Scope (the "**Security Manager**").
- 5.2 The *Contractor* shall ensure that all of *it's* people are security screened or vetted and shall provide TfL within five (5) working days of the *starting* date, and every twelve (12) months thereafter, written confirmation that this obligation has been complied with.
- 5.3 The *Contractor* shall immediately notify the *Service Manager* if it becomes aware of any security clearance issues in relation to the *it's* people and the *Contractor* shall undertake any action requested by the *Service Manager* in relation to mitigating the impact of any such security clearance issues.

6. TRAINING

- 6.1 The *Contractor* shall ensure that all of the *Contractor's* people have undergone suitable security awareness training prior to their deployment and such security awareness training shall cover, as a minimum; account usage, malicious software, home and mobile working, use of removable media, audit and inspection and Security Incident reporting and data handling. The *Contractor* shall implement an up-to-date on-going programme of security awareness training for the *Contractor's* people throughout the *service period*.
- 6.2 The *Contractor* shall provide additional training to its people, which may be required following a Security Incident, the application of a patch or update, or any relevant change to the Scope.
- 6.3 The *Contractor* shall ensure that all of *it's* people are familiar with their responsibilities under applicable law and policies including, as a minimum, the Data Protection Legislation, the Security Policies set out in Paragraph 1 of this appendix to the Scope and policies in relation to the handling of protectively marked materials both during their employment and following the termination of or change to the terms of their employment.

7. **TESTING & AUDIT**

- 7.1 The *Contractor* shall conduct regular automated vulnerability scans the Service Assets, as agreed in the Risk Management Process and ensure that any identified vulnerabilities are appropriately mitigated or patched in line with the TfL Security Patching Standard (Annex 5), taking into consideration the risk posed to the Client and Providing the Service.
- 7.2 The Contractor shall conduct security tests, including ethical hacking and penetration tests, to assure compliance with the Security Incident Management Process, the security provisions in this appendix to the Scope, the Security Management Plan. The Contractor shall conduct security testing in accordance with the Security Management Plan. The Contractor shall conduct such security tests, as a minimum, every twelve (12) months from the starting date and shall include security penetration testing of the Service Assets and the associated technical infrastructure. Wherever the Service Assets are accessible from the internet or other such public network, the Contractor shall carry out security penetration tests from the internet or the public network.
- 7.3 The Contractor shall, within one (1) week of completion of the security provide a report to the *Service Manager* setting out the outcome of such security tests including all identified vulnerabilities and it's plans to remedy each such identified vulnerability as soon as possible, provided that any such remediation must be implemented in accordance with this appendix to the Scope.
- 7.4 The *Contractor* shall implement its plans to each identified vulnerability in accordance with the report delivered pursuant to Paragraph 7.2 save to the extent directed by the *Service Manager* in writing.
- 7.5 The *Contractor* shall, upon request by TfL, following a Security Incident, carry out such additional security testing over and above the obligations set out in Paragraph 7.2.
- 7.6 The *Client* shall be entitled to send a representative to witness the conduct of any audit or security tests carried out by or on behalf of the *Contractor*. The *Contractor* shall provide the *Service Manager* with the results of such audits (in a form agreed in advance) as soon as practicable after the completion of each audit or test.
- 7.7 In addition to complying with this document, PCI DSS where applicable and other relevant industry standards and Good Industry Practice, the *Contractor* shall at least once during each twelve (12) month period starting from the Service Commencement Date, engage an appropriately skilled third party to conduct a formal audit of the Service Assets against the then current versions of the:
- (a) security controls, processes and procedures required pursuant to this appendix to the Scope;

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- (b) Data Protection Legislation (using BS10012 or another standard as agreed with TfL), where applicable; and
 - (c) Security Management Plan.

The *Contractor* shall inform the *Service Manager* of actual or potential security issues which impact or could impact Providing the Service within five (5) days of becoming aware of them and shall keep the *Service Manager* up to date as the it investigates the nature and impact of such issue. Within five (5) days of the finalisation of audit findings, the *Contractor* shall provide the *Service Manager* a copy of all such findings which are relevant.

- 7.8 Without prejudice to any other right of audit or access granted to the Client pursuant to this appendix to the Scope or at law, the *Service Manager* or other representatives of the *Client* may carry out such audits in relation to security matters as are reasonably required to assess the *Contractor's* compliance with the Information Security Management System and the Security Management Plan.
- 7.9 If any test or audit carried out reveals any non-compliance with this appendix to the Scope or vulnerability (and, in the case of a TfL audit, TfL has informed the *Contractor* thereof), the *Contractor* shall, as soon as reasonably practicable, provide TfL with a written plan to remedy each such identified vulnerability as soon as possible, provided that any such remediation must be implemented in accordance with this appendix to the Scope. The *Contractor* shall implement its plans to remedy each identified vulnerability in accordance with such report save to the extent directed by the *Service Manager*.

8. SECURITY INCIDENT MANAGEMENT PROCESS

- 8.1 The *Contractor* shall:
 - (a) establish, document and provide to the *Service Manager* a process to identify and respond to Security Incidents and mitigate the impact of such Security Incidents on Providing the Service, including assigning clearly defined roles and responsibilities to specific *Contractor* people;
 - (b) record each Security Incident and corresponding severity level in the *Contractor's* ISMS; and
 - (c) without limitation to the other provisions of this appendix to the Scope, follow TfL's reasonable instructions in relation to the identification and resolution of any Security Incident.
- 8.2 The *Contractor* shall notify and ensure that the *Service Manager* is aware as soon as possible and in any event no later than within one (1) hour, upon becoming aware of any Security Incident or of any potential Security Incident.
- 8.3 The *Contractor* will additionally provide notification with all relevant details reasonably available of any actual or suspected breach of security in relation

to any *Client* personal data including unauthorised or unlawful access or processing of, or accidental loss, destruction or damage.

8.4 If a Security Incident occurs, the *Contractor* shall:

- (a) immediately take steps to assess the extent of the Data compromised or affected including, but not limited to, the amount of affected;
- (b) immediately take the steps necessary to remedy or protect the integrity of the Service Assets against any such Security Incident;
- (c) securely collect and preserve evidence, including logs, to support the Security Incident Management Process and share with the *Service Manager* such evidence;
- (d) handle any information pertaining to the Security Incident according to the handling requirements for TfL RESTRICTED information defined in TfL's Information Security Classification Standard;
- (e) promptly escalate the Security Incident to the Service Manager;
- (f) when requested by TfL:
 - a. provide such information in relation to the Security Incident (including, if necessary, by collating such information from its and its Sub-contractors' systems and the *Contractor* Personnel);
 - b. provide the *Client's* representative with supervised access (or, if the Parties agree, direct access) to any relevant systems, *Contractor* Premises and people in order to investigate the Security Incident; and
 - c. follow the *Client's* directions in relation to the steps necessary or desirable to remedy or protect the integrity of the Service Assets; and
- (g) as soon as reasonably practicable develop and provide TfL with a copy of its remediation plan for the Security Incident which sets out full details of the steps taken and to be taken by the *Contractor* to:
 - a. correct, make good, reinstate, replace and remediate all deficiencies and vulnerabilities, loss and/or damage to the Service Assets, Data, and/or Services in connection with the Security Incident; and
 - b. perform or re-perform any security tests or alternative tests relating to the security of the Service Assets and/or Services as appropriate and within the timescales specified by TfL, to assure TfL that the Security Incident has been addressed and its effects mitigated,

provided that any such remediation must be implemented in accordance with this appendix to the Scope. The *Contractor* shall fully implement and comply with any such remediation plan unless otherwise instructed by the Service Manager.

- 8.5 The *Contractor* shall provide a detailed report to TfL within two (2) days of the resolution of the Security Incident, a report to detail:
- (a) the nature of the Security Incident;
 - (b) the causes and consequences of the Security Incident;
 - (c) the actions undertaken and length of time taken by the *Contractor* to resolve the Security Incident; and
 - (d) the actions undertaken by the *Contractor* to prevent recurrence of the Security Incident.
- 8.6 If there is a suspected security event up to and including a Security Incident, the *Contractor* shall to the extent requested by the TfL CISO (or any duly authorised delegate):
- (a) provide information in relation to the Services which is relevant collating, if necessary, relevant information from Sub-contractors' systems and the *Contractor* Personnel;
 - (b) provide relevant TfL Personnel with supervised access (or, if the Parties agree, direct access) to any relevant systems, *Contractor* Sites and *Contractor* Personnel in order to investigate the security incident; and
 - (c) follow TfL's directions in relation to the steps necessary or desirable to remedy or protect the integrity of the Services; and
 - (d) work with TfL to identify any lessons learnt which could mitigate any gaps in process, policy or controls.

and TfL shall reimburse the *Contractor's* reasonable, demonstrable costs and expenses in relation to the *Contractor's* compliance with such request.

9. SECURITY LOGGING AND MONITORING

- 9.1 The *Contractor* shall ensure that the Security Management Plan sets out its monitoring strategy to monitor its own performance of its obligations under this appendix to the Scope. The *Contractor* shall update its monitoring strategy as necessary throughout the *service period* in response to:
- (a) changes to applicable laws, regulations and standards;
 - (b) changes to Good Industry Practice;
 - (c) any relevant change to the Scope or this appendix to the Scope;

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- (d) any Security Incident; and
 - (e) any instruction by the Service Manager.
- 9.2 The monitoring strategy should include, as a minimum, processes for monitoring and logging (as appropriate):
- (a) networks and host systems to detect attacks originating both on an internal private network or from public networks (e.g. internet);
 - (b) instances of misuse of the Service Assets, *Contractor* systems used in Providing the Services and data by the Parties people, including attempts at such misuse;
 - (c) wireless access points to ensure that all wireless networks are secure and no unauthorised access points are available;
 - (d) malicious software on the *Contractor* systems used in Providing the Services and the Service Assets;
 - (e) access to and movement of Data, including internal access to such Data; and
 - (f) traffic for unusual or malicious incoming and outgoing activity that could be indicative of an attempt or actual attack.
- 9.3 The *Contractor* shall ensure that access to system logs and monitoring information is strictly restricted to those people who need to access these to Provide the Service and protect the integrity of the Service Assets.
- 9.4 The *Contractor* shall ensure that any monitoring process complies with the monitoring strategy developed in accordance with Paragraphs 9.1 and 9.2 and all of its legal and regulatory obligations pursuant to applicable law.
- 9.5 The *Contractor* shall maintain a log of:
- (a) all instances of the *Contractor's* people accessing Data;
 - (b) all Service Recipient, TfL people and *Contractor* people logon attempts, successful and failed, to the Service Assets or any elements of the *Contractor* Solution requiring authentication;
 - (c) all actions taken by Service Recipients, TfL people or *Contractor* people with administrative privileges;
 - (d) all instances of accounts being created for Service Recipients, TfL people or *Contractor* people and their relevant privileges;
 - (e) all records of formal staff induction or certification required by *Contractor* people to operate systems and handle TFL RESTRICTED Data (where required);

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- (f) all instances of accounts for Service Recipients, TfL people, or *Contractor* Personnel being deleted;
 - (g) *Contractor* people system access group memberships in relation to relevant Service Assets;
 - (h) Service Recipient and group privilege changes against each of the system resources;
 - (i) unauthorised use of input and output devices and removable media; and
 - (j) all access to log files and audit systems.
- 9.6 The logs required must be raw logs, which are provided in a structured text format and the schema for such logs will need to be provided.
- 9.7 The *Contractor* shall implement recording mechanisms to identify the Parties people and their actions when cases of misuse are being investigated and shall ensure that any such recording mechanisms are protected against manipulation and disruption.
- 9.8 The *Contractor* shall regularly review logs to identify anomalies, suspicious activity and suspected Security Incidents. The *Contractor* shall notify the Service Manager of such findings in accordance with Paragraph 8.2.
- 9.9 The *Contractor* shall provide copies of any log data collected by the *Contractor* whilst Providing the Service (system audit log data) at the *Service Manager's* request in a human readable electronic format such as comma-separated value or Microsoft Excel.

10. MALICIOUS SOFTWARE

- 10.1 The *Contractor* shall throughout the Term, use the latest versions of anti-malware solutions and software available from an industry accepted vendor (unless otherwise agreed by the Service Manager) to check for, contain the spread of, and minimise the impact of Malicious Software in the IT Services.
- 10.2 Notwithstanding Clause 10.1, if Malicious Software is detected within services provided by the *Contractor*, the *Contractor* shall ensure the effect of the Malicious Software is mitigated and, particularly if Malicious Software causes loss of operational efficiency or loss or corruption of Data, restore the Service Assets to their desired operating efficiency.
- 10.3 Any cost arising out of the actions of the Parties taken in compliance with the provisions of Clause 10.2 shall be borne by the Parties as follows:
- (a) by the *Contractor* if the Malicious Software originates from the *Contractor* Software, the Third Party Software supplied by the *Contractor* (except where TfL has waived the obligation set out in Clause 10.11) or TfL Data (whilst TfL Data was under the control of the *Contractor*) unless the *Contractor* can demonstrate that such Malicious

Software was present and not quarantined or otherwise identified by TfL when provided to the *Contractor*, and

- (b) otherwise by TfL.

11. REMOVABLE MEDIA

- 11.1 The *Contractor* may only use Removable Media to support Providing the Service if it has obtained prior written consent of the Service Manager and has implemented appropriate controls to ensure that the use of any input or output devices and removable media is restricted strictly to that needed to supply and support Providing the Service.
- 11.2 If Removable Media is approved for use by the Service Manager, the *Contractor* shall ensure that it deploys suitable anti-virus and anti-malware checking solutions to actively scan for the introduction of Malware onto systems and networks through all Data imports and exports from removable media and that the removable media is encrypted to a suitable standard agreed in advance with the Service Manager.
- 11.3 The *Contractor* shall report any loss or interception of Data as a result of the use of removable media to TfL in accordance with Section 8 of this appendix to the Scope. The *Client* reserves the right in such instances to rescind its approval in relation to the *Contractor's* continued use of Removable Media.

12. MOBILE AND HOME WORKING

- 12.1 The *Contractor* may only use offer mobile and home working to support Providing the Service if it has obtained prior written consent of.
- 12.2 If such consent is granted but the *Contractor* does not have a home and mobile policy for *it's* people, TfL's Home and Mobile Working Cyber Security Policy shall apply to the *Contractor* and its people.
- 12.3 If the Contractor has a home and mobile working policy in relation to the *it's* people, the Contractor shall ensure through this policy that:
- (a) data is protected and suitably encrypted in line with Cyber Security Policy (see Annex 5), when stored outside of the *service areas*;
 - (b) data is protected when accessed, imported or exported through a connection other than one which is accessed at the *service areas*; and
 - (c) Security Incident management plans acknowledge the increased risk posed by home and mobile working such as theft or loss of Data and/or devices.
- 12.4 The *Contractor* shall report any loss or interception of Data as a result of home or mobile working to the *Service Manager* in accordance with Clause 8.

13. DISPOSALS

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- 13.1 The *Contractor* shall not reuse any Service Asset or Removable Media used in Providing the Service unless such items have been wiped securely in accordance with a standard approved by the *Service Manager*.
- 13.2 The *Contractor* shall securely dispose of and delete Data from Service Assets used for Providing the Service to a standard approved by the Service Manager upon the termination or expiry of the contract or when such Service Assets are no longer required, whichever is sooner, and shall document the disposal and deletion accordingly.
- 13.3 The *Contractor* shall ensure that the disposal of any Service Asset is accurately reflected in the Information Asset Register.

14. SECURITY MANAGEMENT PLAN

- 14.1 The Outline Security Management Plan as at the *starting date* is set out at Annex 1 (*Outline Security Management Plan*).
- 14.2 The *Contractor* shall within fifteen (15) days of the *starting date* submit to the Service Manager for approval, a draft Security Management Plan which at minimum will:
- (a) set out the security measures to be implemented and maintained by the *Contractor* in relation to all aspects of the Service Assets and all processes associated with Providing the Service and shall at all times comply with and specify security measures and procedures which are sufficient to ensure the Service Assets comply with this appendix to the Scope;
 - (b) reference and comply with the security requirements set out in Annex 3;
 - (c) state any other cyber security industry standards over and above those set out in this appendix to the Scope which are applicable to the Service Assets or Providing the Service;
 - (d) state all applicable law which relates to the security of the Service Assets; and
 - (e) set out how the *Contractor* will comply with any other security requirements the *Client* may reasonably request from time to time.

When the Security Management Plan is approved by the *Service Manager* the approved plan will replace the Outline Security Management Plan in Annex 1.

- 14.3 The *Contractor* shall review and update the Security Management Plan at least annually and as required in response to:
- (a) changes to the Cyber Security Standards;
 - (b) emerging changes in Good Industry Practice;

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- (c) any relevant change to the Scope;
 - (d) any new perceived or changed security threats; and
 - (e) an instruction by the Service Manager.
- 14.4 The *Contractor* shall submit any amendments to the Security Management Plan to the Service Manager for approval.

15. INFORMATION SECURITY MANAGEMENT SYSTEM

- 15.1 The *Contractor* shall develop, implement, operate, maintain the ISMS and shall within fifteen (15) Working Days of the Effective Date submit a draft ISMS to TfL to assure. The *Contractor* shall ensure that the ISMS includes the Security Incident Management Process, dealing with, among other matters, Security Incident management.
- 15.2 The ISMS shall, unless otherwise specified by TfL in writing, be designed to protect all aspects of:
- (a) the Services;
 - (b) all processes associated with the delivery of the Services; and
 - (c) TfL Sites, the *Contractor* Solution and any information and Data (including TfL Confidential Information and TfL Data) to the extent used by TfL or the *Contractor* in connection with this Agreement.
- 15.3 The *Contractor* shall make any document referenced in the ISMS available to TfL upon request.
- 15.4 If the investigation of a Security Incident reveals weaknesses or flaws in the ISMS, then any change to the ISMS to remedy the weakness or flaw shall be submitted to TfL for approval in accordance with the Variation procedure set out in this Agreement for the avoidance of doubt, if a change needs to be made to the ISMS to address an instance of non-compliance with the Security Management Plan or security requirements, the change to the ISMS shall be at no cost to TfL.
- 15.5 The ISMS will be fully reviewed in accordance with ISO/IEC 27001 by the *Contractor* at least annually, or from time to time as agreed with TfL, in response to:
- (a) changes to Good Industry Practice;
 - (b) any relevant Operational Changes or Variations or proposed Operational Changes or Variations to the Services and/or associated processes;
 - (c) any new perceived or changed security threats; and
 - (d) any reasonable request by TfL.

15.6 The *Contractor* shall provide the results of such reviews to TfL (together with such related information as TfL may reasonably request) as soon as reasonably practicable after their completion. The results of the review should include, without limitation:

- (a) suggested improvements to the effectiveness of the ISMS;
- (b) updates to the risk assessments;
- (c) proposed modifications to the procedures and controls that affect the ability to respond to events that may impact on the ISMS; and
- (d) suggested improvements in measuring the effectiveness of controls.

16. COMPLIANCE WITH ISO/IEC 27001

16.1 The *Contractor* shall obtain certification from a UKAS registered organisation of the ISMS to ISO/IEC 27001 for any aspects of the business that is necessary to support the Services. The *Contractor* shall obtain such certification within twelve (12) months of the Effective Date and shall maintain such certification throughout the Term.

16.2 If certain parts of the ISMS do not conform to Good Industry Practice, or controls as described in ISO/IEC 27001 and Schedule 2.3 (*Standards*) the *Contractor* shall promptly notify TfL of this.

16.3 Without prejudice to any other audit rights set out in this Agreement TfL may carry out, or appoint an independent auditor to carry out, such regular security audits as may be required in accordance with Good Industry Practice in order to ensure that the ISMS maintains compliance with the principles and practices of ISO/IEC27001.

16.4 If on the basis of evidence provided by such audits, TfL, acting reasonably, considers that compliance with the principles and practices of ISO/IEC 27001 is not being achieved by the *Contractor*, then TfL shall notify the *Contractor* of the same and the *Contractor* shall, as soon as reasonably practicable, provide TfL with a written plan to remedy each such non-compliance as soon as possible, provided that any such remediation must be implemented in accordance with this Agreement.

17. APPROVED PRODUCTS

17.1 The *Contractor* shall ensure that all Service Assets providing security enforcing functionality are certified under the CESG Commercial Product Assurance (CPA) Scheme, to the appropriate grade, as defined with Annex 3 "Security Requirements", provided that relevant certified products are available in the market.

17.2 If a product is not assured under the CPA scheme, TfL reserves the right to require bespoke assurance of that product under a recognised scheme such as CESG Tailored Assurance Service (CTAS).

**ANNEX 1 – OUTLINE SECURITY MANAGEMENT PLAN/SECURITY
MANAGEMENT PLAN**

[Not used]

ANNEX 2 – OUTLINE RISK MANAGEMENT PROCESS

[Not used]

ANNEX 3 – SECURITY REQUIREMENTS

[Not used]

ANNEX 4 – CONFIGURATION MANAGEMENT OF SERVICE ASSETS

[Not used]

ANNEX 5 – LIST OF RELEVANT POLICIES

- **Network Security Policy** defines the requirements for securing TfL networks as well as the information and network specific devices on them.
- **System Access Control Policy** defines the requirements for managing user and system account access to applications and technology such as allowing them to sign in to OneLondon or SAP.
- **Cyber Security Incident Management Policy** defines how we will handle cyber security incidents and the requirements for reporting and managing those incidents.
- **Malware Prevention Policy** defines the requirements for helping to prevent malware (malicious software e.g. computer viruses) from infecting our systems and networks.
- **Security Logging, Monitoring and Audit Policy** details the requirements for security logging and monitoring of access to our technology and data and the audit capabilities.
- **Removable Media Policy** details the requirements for using removable media such as USBs, CDs or portable hard drives.
- **Home and Mobile Working Cyber Security Policy** details the requirements for allowing and supporting secure home and mobile working.
- **Third Party Cyber Security Policy** defines the rules governing how the security of third party custodians of TfL information, technology and third party connections to TfL systems will be ensured.
- **TfL Information Security Classification Standard** details the information security classification scheme covering information and records, in all formats, and the minimum requirements for managing such information
- **10 Steps to Cyber Security** can be found at <https://www.gov.uk/government/publications/cyber-risk-management-a-board-level-responsibility/10-steps-summary>
- **Cyber Essentials Scheme** can be found at <https://www.gov.uk/government/publications/cyber-essentials-scheme-overview>
- **Security Patching Standard** details the requirements for applying security-related updates ('security patches') in order to help secure TfL systems and applications in line with the secure builds and configurations policy.
- **Operations Technology Cyber Security Standard** describes the cyber security requirements for operational technology assets throughout their lifecycle.

Transport for London

London Highway Maintenance and
Projects Framework

Technical Specification

Parts 1 and 2

North Area

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Technical Specification - Part 1

1 The Technical Specification

- 1.1 The Technical Specification is the “Specification for Highway Works” (published by the Stationary Office as Volume 1 of the Manual of Contract Documents for Highway Works (MCHW)) together with “Highway Construction Details” (Volume 3 of MCHW), as at the dates given below and all as modified and extended by the Local Amendments in Part 2. The National Alterations of the Overseeing Organisations of Scotland, Wales and Northern Ireland do not apply.
- 1.2 The applicable date of each specification series is set out in table 0/1 of the “Specification for Highway Works” in May 2018.
- 1.3 The applicable date of MCHW Volume 3, “Highway Construction Details” is November 2008.
- 1.4 Insofar as any of the Numbered Appendices may conflict, or be inconsistent with, any provision of the “Specification for Highway Works”, the Numbered Appendices shall always prevail.
- 1.5 Any reference in the contract to a clause number shall be deemed to refer to the corresponding Substitute Clause number to be found in Part 2, where this exists.
- 1.6 Where a clause is altered, any original table or figure referred to in the clause shall continue to apply unless the table or figure itself is also altered. Where a table or figure is altered, any reference in a clause to the original table or figure shall apply to the altered table or figure.
- 1.7 Where a clause in the Specification relates to work, goods or materials which are not required for the works it shall be deemed not to apply.
- 1.8 Other than where references to the Overseeing Organisation are made in the context of the Overseeing Organisation granting statutory or type approvals, the roles and functions of the Overseeing Organisation shall be undertaken by the *Client* to the contract or to such person to whom such roles and functions may be delegated by the *Client*. Where the Specification requires the provision of documentation to the Overseeing Organisation for statutory or type approval, such documentation shall be provided to the *Client* to the contract or to such person to whom such roles and functions may be delegated by the *Client*.

Technical Specification Part 2

LOCAL AMENDMENTS TO THE SPECIFICATION FOR HIGHWAY WORKS

This part contains all Additional, Cancelled, Modified and Substitute specification clauses.

In this part any clause indicated by a suffix:-

- a) 'AR' is a contract specific Additional Clause.
- b) 'CR' is a contract specific Cancelled Clause.
- c) 'MR' is a contract specific Modified Clause
- d) 'SR' is a contract specific Substitute Clause.

Additional, Cancelled, Modified & Substitute Clauses

Series 0100 Preliminaries

101MR	Temporary Accommodation and Equipment for the <i>Client</i>
104MR	Standards, Quality Management and Acceptance
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116MR	Privately and Publicly Owned Services or Supplies
117MR	Traffic Safety and Management
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123SR	Maintenance Arrangements during construction
127AR	Temporary Works

101MR Temporary Accommodation and Equipment for the *Client*

Delete sub-clause 1 and replace with:

1. When instructed by the *Client*, the *Contractor* shall provide, maintain service and remove the accommodation and equipment for the use of the *Client* described in Appendix 1/1.

Delete sub-clauses 5 and replace with:

5. All accommodation shall be kept in a good state of repair and shall be cleaned at the end of each working day for so long as it is in use, and suitable arrangements shall be made for the disposal of any waste arising from use of the accommodation.

104MR Standards, Quality Management and Acceptance

Delete sub-Clauses 4 and 5 and replace with:

4. Unless otherwise required in the contract, the *Contractor* shall institute a quality management system complying with BS EN ISO 9001 and shall prepare a quality plan. The *Contractor* shall demonstrate compliance with the requirement to institute a quality management system to the *Client*, one acceptable method for this demonstration is to evidence registration to BS EN ISO 9001. *Contractor*
5. The *Contractor's* quality plan shall incorporate the requirements of the quality management schemes listed in Volume 1 Appendix A of the Specification for Highway Works applicable to works in accordance with sub-Clause 8 of this clause.

Where any work, goods or materials to be used in the works are the subject of the quality management schemes listed in Volume 1 Appendix A of the Specification for Highway Works, the *Contractor* shall require the supplier of such items to prepare a quality plan and the *Contractor* shall submit it to the *Client*. Such quality plans shall comply with the individual requirements of the relevant Sector Scheme Documents for Quality Management in Highway Works, see sub-Clause 8"

106SR Design of Works by the *Contractor*

General

1. Unless otherwise instructed by the *Client*, the *Contractor*, in undertaking design shall:
 - a) Employ value engineering techniques to deliver the optimum design solution, continually looking for opportunities to reduce costs.
 - b) Prepare and submit designs based as far as practicable on the items and materials contained in the schedule of rates, including all relevant and necessary engineering drawings, calculations, product specifications, priced bills of quantities and method statements.
 - c) Submit design proposals to the *Client* for acceptance, incorporating such hold points into the design process as may be necessary to enable the *Client's* comments to be incorporated.
 - d) Consult and attend meetings with all relevant authorities, stakeholders and other interested parties (including others within the *Client's* organisation).

- e) Advise the *Client* of others' requirements and incorporate them into the design, as appropriate.
- f) Liaise closely with statutory undertakers, including the detailed coordination of work programmes.
- g) Make provision in the programme for the *Client* to raise the necessary authorisations and payments to statutory bodies.
- h) Regularly provide updated cost estimates, employing appropriate risk management techniques and allowances.
- i) Provide supporting information to enable the *Client* to liaise with the media and manage any publicity in relation to the design.
- j) Arrange for all necessary checks to be carried out in accordance with all relevant standards, including independent design checks where appropriate.

2. Unless otherwise instructed by the *Client*, the *Contractor's* design shall comply with the requirements of:

- a) Any Task Order that may be given;
- b) The standards in the Technical Approval Schedule (TAS);
- c) Any further documentation provided by the *Client* in the *Client's* Scope
- d) The requirements of this Specification;
- e) The Design Standards for Signal Schemes in London
- f) The TfL Streets Toolkit suite of documents, and
- g) The Design Manual for Roads and Bridges (DMRB).

In the event of conflict between them, they shall be construed in the order of precedence set out above. (For the avoidance of doubt, inclusion of DMRB in the TAS does not raise its ranking in the above priority order).

3. For design works relating to highway structures, proposals shall be submitted to the *Client* in accordance with the following:

- a) BD2 – Technical Approval of Highway Structures;
- b) IAN 124/11 – Use of Eurocodes for Design of Highway Structures; and
- c) the *Client's* own specific design requirements, if any, as set out in the *Client's* Scope.

4. Road lighting designs shall comply with the relevant parts of BS 5489 and BS EN 13201 and all electrical designs shall comply with BS 7671 and adhere to recognised codes of best practice such as those issued by the Institution of Lighting Professionals (e.g. Guidance Notes for the Reduction of Obtrusive Light; Code of Practice for Electrical Safety in Highway Electrical Operations).

5. Temporary works designs shall follow a similar technical approval procedure as for permanent works and shall be accompanied by design and check certificates appropriately signed. The *Contractor* shall discuss the requirements for the design with the *Client* and shall allow at least 28 calendar days within the programme for approval of each submission. Several iterations of the same submission may be required before approval is obtained.

6. Where works require access to, or have the potential to affect, operational railways, the approval process for the specific track operator shall be followed in addition to the *Client's* requirements. The *Contractor* shall make suitable allowance within the programme for obtaining these approvals.
7. Where works affect, or have the potential to affect, listed structures or statutory undertakers' equipment, the *Contractor* shall follow the approval process required by the statutory consultee. The *Contractor* shall make suitable allowance within the programme for obtaining these approvals.
8. When the *Contractor* carries out a design and subsequently implements it, then the *Contractor* shall be responsible for the production and provision of as-built drawings. These shall be provided to the *Client* in both .pdf and .dxf formats.
9. As-built drawings shall reflect all changes made in the specifications and working drawings during the construction process, and show the exact dimensions, geometry, and location of all elements of the work completed.
10. See Appendix 1/60 for details of the grades of design and supervisory staff to be available through this contract, together with requirements for associated qualifications and experience.

Design Stages

11. The *Contractor* may be required to undertake Feasibility, Concept, or Detailed Design work, and / or design review.
12. **Feasibility Design** shall be the production of a single option solution to address the requirements and constraints of the Task Order. A completed feasibility design shall include:
 - a) Annotated engineering drawings including key dimensions, to an appropriate scale showing proposed geometrical and operational changes to any affected assets, all in accordance with any BIM requirements detailed in the *Client's* Scope.
 - b) An Issues Register (or equivalent document) listing maintenance, operational, buildability, and any other issues that have, or may arise as a result of implementation of the design and how it is proposed they will be addressed.
 - c) A Decisions Log (or equivalent document) listing all key design decisions, principles, assumptions and constraints and the reasons for making any key decisions
 - d) A construction cost estimate for the single option solution
 - e) An Options Development Report summarising the key information of the various options considered, and the justification for recommending the preferred option
 - f) For projects affecting the highway:
 - i. Traffic modelling audited and approved by the *Client* in accordance with TfL's Model Audit Process (MAP) at Appendix 1/10.a)
 - ii. Swept path analysis if considered necessary by the *Client*
 - iii. A summary of how the project is expected to impact the operation and resilience of the highway network locally and strategically

- j) For projects affecting structures, the processes detailed in the Client's Scope shall be followed.
 - k) For projects affecting Traffic Signals, a Traffic Signal Safety and Quality Check (see Appendix 1/10.b) shall be completed by the designer and approved by the *Client*.
 - l) Relevant CDM documentation
14. **Detailed Design** shall be the completion of all design activities, to the satisfaction of the *Client*, adequate for construction purposes.
15. **Design Review**
- a) The *Contractor* shall review the design of works produced by *Others* to become satisfied that it is adequate for construction purposes, then accepting design liability. Should the *Contractor* fail to be satisfied of the adequacy of any design, then the Client will either commission a rework of the elements brought into question such that the *Contractor* becomes satisfied with it, aborts the project or seeks an alternative means of delivery.
 - b) The *Contractor* shall accept design liability for all designs produced by the *Contractor*, its sub-*contractors*, parent or subsidiary companies, or by a consortium partner to the *Contractor* during a previous contract with the *Client*.

107MR Site Extent and Limitations on Use

The content of this Clause is deleted in its entirety and any references to this Clause elsewhere in the specification shall refer to 'the Scope.'

108MR Operatives for the *Client*

Delete sub-Clause 1 and replace with:

- 1. "When required, the *Contractor* shall provide the *Client* with, and maintain continuity of, operatives capable of performing the duties and with the skills outlined in the Task Order."

Re-number sub-Clause 4 as sub-Clause 5

Insert new sub-Clause 4 as follows

- 4 "For highway safety inspections, operatives shall be included in the Highway Inspectors Register, maintained by the Institute of Highway Engineers."

In the renumbered sub-Clause 5 delete "under sub-Clauses 2 and 3" and replace with "under sub-Clauses 2, 3 and 4".

109MR Control of Noise and Vibration

The content of this Clause is deleted in its entirety and any references to this Clause elsewhere in the specification shall refer to 'the Scope.'

110SR Information Boards and Publicity

1. The *Contractor* shall provide and erect information boards at the locations and to the specification given below. The boards shall be to the approval of the *Client* and shall be placed in positions which do not impede or obstruct the passage or progress of vehicular or pedestrian traffic. The *Contractor* shall erect, clean, maintain and remove such boards upon completion.

The *Contractor's* Compounds

2. Contract information boards shall be erected by the *Contractor* at the entrances to the *Contractor's* Compounds to a size and layout approved by the *Client*.

Project / Works Information Boards

3. Project / Works Information Boards shall be supplied by the *Contractor* as instructed by the *Client*. The boards shall be in accordance with TSRGD 2016 diagram No 7008.
4. All signs shall be removed upon completion of the works or as agreed with the *Client*.

General Information Boards

5. The following General Information Boards shall be displayed as directed by the *Client* or as required by Project-specific drawings:
 - a) Traffic Signs Regulations diagram 7003.1
 - b) Traffic Signs Regulations diagram 7006
 - c) Traffic Signs Regulations diagram 7007.1.

General

6. Other than as provided for above, the *Contractors name shall not be* displayed.
7. No photograph, advertisement or publicity of any kind relating to the works may be used without the express approval of the *Client*. If such photographs, advertisements or publicity are approved by the *Client*, they shall contain acknowledgement as shall be prescribed by the *Client* in writing.

111CR Existing Ground Levels - Clause Cancelled

112SR Setting Out

1. The *Contractor* shall be responsible for setting out the works, and for the correctness of the positions, levels and dimensions of the works. In setting out the works, it shall be the *Contractor's* responsibility to ensure that any dimensions, sizes and levels given are correct and, should any be queried, written notice to the *Client* shall be given before commencing the works.

2. If at any time during the progress of the works any error shall appear or arise in the positions, levels or dimensions of the works, the *Contractor* shall remove and amend the work to the satisfaction of the *Client*, and shall become liable for any costs associated with any delay caused to the works due to such error.
3. The *Contractor* shall, within 3 weeks following the commencement of the works, carry out a check of the co-ordinates and levels of all relevant permanent ground markers and permanent bench marks and shall supply the *Client*, if requested, with their position and level in order that they may be checked and revised, if necessary.
4. The *Contractor* shall keep updated schedules and drawings of all bench marks (which shall be based on Ordnance Datum at Newlyn) used in the setting out and shall make these available to the *Client* when required.
5. The *Contractor* shall undertake such checks to become satisfied that any information provided relating to existing ground levels is correct. Should the *Contractor* dispute any levels a schedule of the position of the levels considered to be in error and a set of revised levels shall be submit to the *Client*. The existing ground relevant to the disputed levels shall not be disturbed before the correct levels are determined.
6. The *Contractor* shall ensure that, where necessary, in order to maintain the programme, lines and levels are set out in such time as to enable Statutory Undertakers' plant and other publicly or privately owned services or supplies to be installed, altered or removed.
7. The *Contractor* shall provide every assistance required by the *Client* for checking the setting out or for measuring up the works, at such times as may be suitable to the *Client*. The *Contractor* shall rectify any errors arising from inaccurate setting out unless the *Client* shall decide to the contrary.

113MR Programmes of Works

The content of this Clause is deleted in its entirety and any references to this Clause elsewhere in the specification shall refer to 'the Contract.'

114SR Payment Applications

The content of this Clause is deleted in its entirety and any references to this Clause elsewhere in the specification shall refer to 'the Contract.'

115CR Accommodation Works- Clause Cancelled

116MR Privately and Publicly Owned Services or Supplies

Delete sub-Clause 1 and replace with

1. "The *Contractor* shall undertake such enquiries as are necessary to identify the approximate position of known Statutory Undertakers and other publicly and privately owned services or supplies affected by the works and subsequently determine their exact position within the site by electro-location and hand digging as necessary."

Delete sub-Clause 3 and replace with

3. “Where privately or publicly owned services or supplies affected by the works are subject to alteration, removal or diversion, the *Contractor* shall be responsible for all arrangements with the owners and/or their agents for the execution and phasing of such works in accordance with the programme”.

Delete sub-Clause 4 and replace with

4. “Should any unrecorded services or supplies be exposed during the works, the *Contractor* shall notify the *Client* and seek to identify and notify the owner concerned, then protect the apparatus according to the requirements of the owner. Should any leakages or damage be discovered, the *Contractor* shall at once notify the *Client* and the Statutory Undertaker or owner concerned and the *Contractor* shall afford every facility for the repair or replacement of the affected services or supplies.”

After sub-Clause 6 add

7. The *Client* shall, where appropriate, issue instructions for any permanent diversion or protection of existing private services required in the works
8. The *Contractor* shall make arrangements with Statutory Undertakers and others concerned for the co-ordination of any work which needs to be done by them or their *Contractors* concurrently with the works. The *Contractor* shall ascertain and comply with the period of notice to be given in each and every instance.
9. Services to individual properties are not generally shown on record drawings. The *Contractor* shall make arrangements with Statutory Undertakers and others concerned for locating, protecting and/or undertaking disconnection or diversion of services or supplies necessitated by the works.
10. The *Contractor* shall report to the *Client* any damage done to any privately or publicly owned services or supplies, plant, equipment, apparatus or works and where so instructed by the *Client*, and without cost to the *Client*, the *Contractor* shall effect immediate repairs. Should the owner of the damaged plant, equipment, apparatus or works carry out the repair, the *Contractor* shall supply any facilities or assistance necessary. Repairs to Statutory Undertakers' plant and services damaged by the *Contractor* during the course of the works shall be paid for by the *Contractor*.
11. The *Contractor* shall ensure that all Statutory Undertakers' manholes, boxes, inspection chambers, fire hydrants and the like, within the limits of the site, are kept completely unobstructed at all times and provide free access for the Undertaker concerned.
12. The use of Water drawn from hydrants in London is based on a licensing system and the *Contractor* shall obtain an appropriate licence for the use of such hydrants before drawing water from them.
13. The names, addresses and telephone numbers of the major Statutory Undertakers and utility companies shall be supplied by the *Client* on request.

117MR Traffic Safety and Management

Delete Sub-clauses 1 and replace with

1. “The *Contractor* shall plan, design, programme, provide, implement, maintain and remove all traffic safety and management measures necessary for the completion of the works. This shall include undertaking all necessary liaison with the police and the highway and traffic authority responsible for each highway affected by the works, both before commencement and throughout the duration of the works. The traffic safety and management measures shall be in accordance with Appendix 1/17.:

The *Contractor* shall inform the *Client* of any details the *Contractor* has agreed with the police and/or the highway authority.”

Delete Sub-clause 3 and 4 and replace with

- “3. The *Contractor* shall, after consultation with any statutory, Police or other authority concerned, prepare and submit traffic safety and management proposals for the approval of the *Client*. These shall show the proposed traffic safety and management measures, including provision of safety zones, which are proposed for carrying out the works.
4. The *Contractor* shall submit a formal application to the appropriate authority for any statutory traffic orders required to be made or notices required to be published in connection with traffic safety and management proposals”

At the end of Sub Clause 5 add “The *Contractor* shall keep traffic signs clean, secure and legible”

In sub-clause 14 delete “Traffic Officer” and replace with “officer authorised by the *Client*”.

In sub-Clause 16 delete “Unless otherwise stated in contract specific Appendix 1/17” and replace with “When required by the *Client*”.

Delete sub-Clauses 20 to 47, insert New sub-Clauses 20 to 26 as follows

20. “If an accident or breakdown occurs on a carriageway or hard shoulder open to traffic within or in the vicinity of the site, the *Contractor* and operators of recovery vehicles provided in accordance with Clause 120SU shall act as requested by Police Officers acting under their statutory powers.”
21. Signs erected over the footway shall provide clear headroom of not less than 2.1metres. Signs erected above cycle lanes or cycle tracks shall have clear headroom of not less than 2.3 metres. All signs shall have a minimum of 450mm between the edge of sign and edge of carriageway.
22. Signs whose messages no longer apply shall be covered or removed as soon as the hazard to which they refer no longer exists.
23. The *Client* shall be given 48 hours notice of the *Contractor’s* intention to switch traffic phases, and no diversions shall be implemented until the measures associated with the previous phase of work have been fully removed.
24. Stocks of materials or equipment, temporary buildings, plant, parked vehicles and the like shall on no account be permitted to obstruct sight lines.

Pelican, Puffin and Toucan controlled crossings

25. If any works are proposed that affect the operation of a pelican, toucan, puffin or zebra crossing, this shall be brought to the attention of the *Client*. Upon instruction from the *Client*, the *Contractor* shall provide traffic management for Others to take the crossing out of service before works commence, and for recommissioning the crossing on completion of the works..

Optimising the use of Road Space

26. The *Contractor* shall wherever practicable seek to optimise the use of road-space, both by accommodating the work of Others within the *Contractors* Traffic Management and/or by seeking to programme works so that they are delivered under the shadow of Traffic Management installed by other *Contractors*.

118SR Temporary Diversions for Traffic

1. The provisions of this Clause apply to the construction of temporary highway for use by traffic, they do not apply to any temporary access or accommodation works which the *Contractor* may construct for sole use in the execution of the works.
2. Each temporary diversion for traffic shall be made operative in advance of any interference with the existing arrangements and shall be maintained in accordance with sub-Clause 6 below. The *Contractor* shall minimise the duration of, remove and reinstate each temporary diversion for traffic as soon as it is no longer required.
3. If the *Contractor* proposes to construct a temporary diversion for traffic as part of the intended traffic safety and management measures, the agreement of the traffic authority shall be obtained prior to its implementation.
4. The *Contractor* shall submit a formal application to the appropriate authority for any statutory orders required to be made or notices required to be published through the *Client*, allowing such time for due processes to be followed, for the orders to be made and notices to be published. The minimum period required for traffic Orders being 12 weeks.
5. The standard and siting of every temporary diversion for traffic shall be suitable in all respects for the class or classes of traffic using it, and its width shall be not less than that of the existing street.
6. Pedestrian access to public transport services and adequate facilities for bus queues shall be provided and maintained at all times. Temporary routes for pedestrians through the works shall be clearly defined and free from hazards or obstructions. The surfaces shall be firm, clean and even. Routes shall be of the shortest practicable length having regard to the circumstances and the unobstructed width shall be appropriate to the volumes of pedestrians using it, but in no circumstances less than 1.2 metres. Temporary changes of level for pedestrians shall be effected by ramps of a gradient preferably not steeper than 1 in 20 from the horizontal, but over very short distances may be 1 in 10 at the extreme.
7. Wherever changes of level occur between temporary and permanent carriageways they shall be made by ramps of gradient not steeper than 1 in 5.

119MR Routeing of Vehicles

The content of this Clause is deleted in its entirety and any references to this Clause elsewhere in the specification shall refer to 'the Scope.'

120MR Recovery Vehicles for Breakdowns

Delete Sub-clauses 1 and replace with

- 1 When required by the *Client*, the *Contractor* shall provide and operate a vehicle breakdown, recovery and removal service, including storage. This service shall recover broken down or accident damaged vehicles or vehicles that have been abandoned on the highway. The service shall be provided in accordance with the requirements of this Clause and Appendix 1/20.

Delete Sub-clauses 18 to 23 and replace with

18. The recovery service is to be provided between where instructed by the *Client*.
19. The *Contractor* shall ensure that the recovery vehicles are only used to remove vehicles that are stationary due to mechanical breakdown, accident damage or abandoned on the highway, or as instructed by the *Client*.
20. The *Contractor* shall ensure that the recovery vehicle operatives comply with the provisions in connection with this service, subject to specific requests from police officers and uniformed traffic officers acting under their statutory powers.
21. The recovery vehicles shall be based as agreed with the *Client*.
22. The *Contractor* shall ensure that broken-down, accident damaged or abandoned vehicles are removed to the location(s) agreed with the *Client*, unless some other location has been agreed with a police officer or uniformed traffic officer acting under their statutory powers.
23. The *Contractor* shall ensure that, after depositing a broken-down, accident damaged or abandoned vehicle at one of the designated locations, the recovery vehicle returns immediately to its base. The *Contractor* shall ensure that recovery vehicle operatives at no time attempt to repair vehicles that have broken down.

Delete Sub-clauses 25 and replace with

- 25 The *Contractor* shall ensure that before the tow commences, the recovery vehicle operatives issue leaflets agreed by the *Client*, to the drivers of vehicles requiring assistance.

In Sub-clause 26 replace the final sentence with

"These shall be provided by the *Contractor* in a format agreed by the *Client*."

Delete Sub-clause 37

122SR Progress Photographs

1. The *Contractor* shall take colour photographs of all sites, works and features associated with the works before, during and subsequent to completion of the works. When working adjacent to private property, the composition of the photographs shall include all private

- frontages, all front hardstandings, all crossovers, all highway boundary walls and fences, and any other relevant features.
2. The *Contractor* shall take colour photographs to record all defects or damage identified and all subsequent works or repairs carried out under the contract.
 3. Where work is to be covered up on completion, the *Contractor* shall take photographs of the works before it is covered up in order to adequately demonstrate that the work has been completed in accordance with the *Client's* requirements and meets the necessary quality criteria.
 4. Wherever practicable photographs shall be taken so as to avoid the capture of personal data which is not relevant to the purposes of the photograph.
 5. The *Contractor* shall ensure that, before leaving site, the photographs are clear and legible. Any blurred or otherwise defective photographs shall be retaken.
 6. All photographs shall be electronic Jpeg format and recorded in the *Client's* Asset Management Information System against the associated asset.
 7. All photographs shall display the date and time, marked with a unique identification reference number and brief description of the work or features, including location and direction of view. For bridges and other highway structures, the unique reference shall be the Structure Number and Structure Name.
 8. The copyright of all photographs shall be vested in the *Client*. The photographs shall not be used for any purpose whatsoever without the *Client's* approval.

123SR Maintenance Arrangements during construction

Notwithstanding the *Client's* routine highway maintenance arrangements the Principal *Contractor* as defined in the CDM Regulations, for any highway works shall maintain those areas of the highway within the site which are accessible to the public to the *Client's* normal standards. The Principal *Contractor's* presence on the site shall be used to identify and rectify defects, providing the *Client* with records of any defects identified and rectified. The *Client's* arrangements for routine and reactive safety inspections shall remain in place and any defects identified within the Site during the Construction Phase shall be passed to the Principal *Contractor* for rectification and a record of the defect made on the *Client's* management system. The Principal *Contractor* shall make safe the defect or repair as appropriate within the timescales instructed in the 'defect notification' and pass a date stamped photograph of the repair to the *Client's* inspectorate for record purposes. The inspector shall file the record of repair in the *Client's* management system.

127AR Temporary Works

1. The *Contractor* shall submit to the *Client* for checking and approval detailed drawings and calculations for all temporary works sufficiently in advance of the commencement of any such works. The *Contractor's* proposals shall be subject to any amendments required by the *Client*, who's consent may not be given before the expiry of 14 calendar days from the receipt of such drawings and calculations. Erection of any part of the temporary works shall not be commenced until the *Client's* consent for that part has been given. All temporary works shall

- be properly designed to carry all imposed loads. No agreement given or implied by the *Client* shall relieve the *Contractor* of any responsibilities under the Conditions of Contract.
2. For temporary works relating to highway structures, proposals shall be submitted to the *Client* in accordance with BD2. Temporary works designs shall follow a similar technical approval procedure as for permanent works and shall be accompanied by temporary works design and check certificates signed by the *Contractor's* Representative. The *Contractor* shall discuss the requirements for temporary works with the *Client* and shall allow at least 28 calendar days within the programme for approval of each submission. Several iterations of the same submission may be required before approval is obtained.
 3. Where temporary works require access to, or have the potential to affect, operational railways, the approval process for the specific track operator shall be followed. The *Contractor* shall make suitable allowance within the programme for obtaining these approvals.
 4. Where temporary works affect, or have the potential to affect, listed structures or statutory undertakers' equipment, the *Contractor* shall follow the approval process required by the statutory consultee. The *Contractor* shall make suitable allowance within the programme for obtaining these approvals.
 5. The erection of scaffolding and other temporary works shall comply with the Construction Regulations and on completion shall be checked and examined by the *Contractor's* competent appointed person (Safety Officer) as required by law. Thereafter, checks shall be made by the *Contractor* to ensure that all safety provisions are being maintained.

Temporary Damming of Water Courses and Water Flow Management

6. Where works are to be carried out adjacent to or over watercourses requiring the flow of water to be temporarily abated or accommodated, the *Contractor* shall be responsible for all necessary measures. These measures shall include the design, provision, establishment, maintenance and removal of all temporary damming, earthworks, pumping, pipework, hoses, filters, linings, revetments and other associated items. The *Contractor* shall notify the *Client* in writing 14 calendar days in advance of any intention to start a part of the works affecting a watercourse and shall ensure that written approval for all proposed measures is obtained from the Environment Agency. The *Contractor* shall obtain all necessary permits, consents, wayleaves, licenses and agreements to enable the works to proceed and allow sufficient time within the programme.
7. The *Contractor's* obligations with respect to the protection of watercourses, particularly against the effects of pollution, remain unaltered by the above Clause.
8. Flow in existing sewers shall be maintained at all times. Any proposals involving a sewer connection or the diversion of flow in sewers, and any proposed measures to maintain the flow in sewers shall, under all circumstances, be subject to the approval of the appropriate authority.
9. The *Contractor* shall restore and make good any existing field drains, house drains or other drains, pipes, sewers or other existing sewerage facilities interfered with and which are not to be abandoned.

Additional, Cancelled, Modified & Substitute Clauses

Series 0200 Site Clearance

0201MR	Clearing
0202SR	Existing Trees and other Green Estate
0203SR	Explosives and Blasting
0204SR	Hazardous Materials
0205AR	Transfer of Waste
0206AR	Boundary Walls of Demolition Sites
0207AR	Removal of Sign Posts
0208AR	Removal of Safety Fences
0209AR	Removal of Existing Electrical Equipment
0210AR	Removal of Street Furniture
0211AR	Protected Species

0201MR Clearing

In sub-Clause 1, delete 'contract specific Appendix 2/1' and replace with 'the Task Order', delete 'on the Drawings' and replace with 'in the Task Order'.

In sub-Clause 2, delete 'unless otherwise described in contract specific Appendix 2/1'.

In sub-Clause 3, delete 'contract specific Appendix 2/1' and replace with 'the Task Order'.

In sub-Clause 4, delete 'unless otherwise described in contract specific Appendix 2/2'.

In sub-Clause 6, 1st paragraph, delete 'and not included in contract specific Appendix 2/3'.

In sub-Clause 6, 2nd paragraph, delete 'included in contract specific Appendix 2/3' and replace with 'suitable for re-use' and delete 'as described in contract specific Appendix 2/3'.

In sub-Clause 6, 3rd paragraph, delete 'When required in contract specific Appendix 2/3'.

In sub-Clause 8, delete 'in accordance with the requirements of contract specific Appendix 2/3'.

Insert new sub-clause 10 as follows

10. All demolition work shall be carried out in a proper, safe, clean and efficient manner in accordance with BS 6187.

0202SR Existing Trees and other Green Estate

1. Before commencing the work, the *Contractor* shall clearly mark any trees or other green estate to be removed for approval by the *Client*. All other trees and green estate within the site boundary shall be protected in accordance with BS 5837.
2. All protection methods, ground protection, tree protection plans etc. shall be prepared by the *Contractor* and submitted to the *Client* for approval 14 days prior to the works commencing. No excavation or storage of materials shall take place within the root protection area of any tree unless previously agreed by the *Client*.
3. Any pruning of trees or other green estate which the *Contractor* considers necessary to facilitate the works shall be subject to the approval of the *Client* and undertaken in accordance with BS 3998.
4. The removal of trees shall be undertaken in accordance with BS 3998 and only after permission is granted from the Client.
5. The Contractor shall ensure that due consideration is given to ecology and biodiversity in line with current legislation and applicable strategies and plans, including, but not limited to:
 - a) the London Plan
 - b) the London Environment Strategy
 - c) the Mayor's Transport Strategy
 - d) the local borough plans

0203SR Explosives and Blasting

- 1 Blasting for site clearance shall not be employed

0204SR Hazardous Materials

1. The treatment of hazardous materials encountered in site clearance shall comply with relevant legislation and any other health and safety measures.

0205AR Transfer of Waste

1. The *Contractor* shall be registered as a waste carrier (and hold the correct licence) with the Environment Agency and shall provide evidence of registration and licence.
2. The *Contractor* shall maintain all records that are required to be maintained under Applicable Laws throughout the term of the Contract and make available these records for review by the *Client* within three (3) Working Days of a request for the same. Such records shall include:
 - a) consignment notes (to accompany hazardous waste to disposal)
 - b) despatch notes
 - c) waste transfer notes (to accompany general waste to disposal)
3. The *Contractor* shall be responsible for the management and removal of all waste arisings as soon as practicably possible and in accordance with Technical Guidance WM3 – *Guidance on the classification and assessment of waste* produced by the Environment Agency

0206AR Boundary Walls of Demolition Sites

1. The *Contractor* shall provide all hoardings, fences, fans, staging or other measures which may be necessary, or which the *Client* may require, for the protection of the public and adjoining property until the completion of the works. The *Contractor* shall be responsible for the making safe by shoring, or other means, any buildings which adjoin other buildings to be demolished.
2. Subject to the specific requirements of the *Client*, where walls of buildings to be demolished could serve as boundary walls, they shall be left standing to a height of 1.8m until no longer required.

0207AR Removal of Sign Posts

1. The *Contractor* shall, prior to excavating around the post/pole/bollard, carefully remove to the *Contractor's* store any reusable items of materials.
2. The *Contractor* shall carefully excavate by hand down to the cable entry slot and, using extreme caution, expose the electricity supply cable. The supply cable shall then be made safe by one of the following methods:-
 - a) PRIVATE CABLES - private cables shall be traced and made safe by disconnection at the point of supply by the *Contractor*.

- b) DISTRIBUTION NETWORK OPERATOR CABLES - the *Contractor* shall place an order for the disconnection of the mains supply and shall only commence work on receipt of notification of disconnection.
3. The *Contractor* shall then carefully excavate around the post/pole/bollard until it can safely be removed without damage to the post/pole/bollard or to its protection system.
4. When the pole/post/sign/bollard is to be taken into store, it shall be cleaned on site and carefully transported to store.
5. The *Contractor* shall then backfill and compact the excavation in accordance with New Roads and Street Works Code of Practice for Reinstatement of Openings in Highways.
6. Sign posts without concrete foundation shall be completely removed. Those with foundations may, by agreement with the *Client*, be cut off just below surface level and the surface reinstated to match the surrounding area.

0208AR Removal of Safety Fences

1. Removal of safety fences shall include the entire assembly, including all attachments, adjuster assemblies, fixings, closure pieces and stiffeners as well as footings and anchorages.
2. On removal of footings and anchorages, holes shall be backfilled and compacted with material similar to, and to the profile of, the adjacent ground.

0209AR Removal of Existing Electrical Equipment

1. No equipment fed by electricity supply shall be removed without the supply having been first made safe.
2. No street lighting shall be switched off, dismantled or removed without prior approval of the *Client*. If the *Contractor* requires removal of existing lighting from any area still open to vehicular or pedestrian traffic, the *Contractor* shall provide adequate temporary lighting to the satisfaction of the *Client*.
3. The *Contractor* shall comply with all the Electricity Company's requirements.
4. The *Contractor* shall carefully excavate around and dismantle any existing equipment to be removed and shall permanently re-instate the excavation. The equipment shall be taken to store or tip as instructed by the *Client*.
5. When an item of equipment is taken up to take to store, it shall be thoroughly cleaned before transportation and delivery to store.

0210AR Removal of Street Furniture

1. Existing street furniture to be removed which has subsurface foundations may, by agreement with the *Client*, be cut off level with the top surface of the concrete foundation and the surface reinstated to match the surrounding area.
2. If there is no foundation, the item of street furniture shall be completely removed and the surface reinstated to match the surrounding area.

3. Any item of street furniture which is attached to something else, e.g. a wall or a lighting column, shall be completely removed and the surface of the host returned to match existing.

0211AR Protected Species

1. In the event that protected species are discovered on site during the works, the *Contractor* shall stop any work that has the potential to affect the species or its habitat. The *Contractor* shall seek advice from an appropriately competent Ecologist and only resume works after suitable mitigation has been put in place or after any necessary permits/approvals have been received from the relevant statutory authority (e.g. Natural England, Environment Agency).
2. The *Contractor* shall ensure that only appropriately licensed ecologists handle protected species.
3. The *Contractor* shall ensure that the *Client* is informed of the presence of protected species on site and the proposals for managing the issue prior to recommencing works.

Additional, Cancelled, Modified & Substitute Clauses
Series 0300 Fencing

0302MR	Requirements for Temporary and Permanent Fences
0303MR	Temporary Fencing
0304MR	Timber Quality
0305MR	Fittings
0306MR	Permanent Fencing
0307MR	Permanent Fencing for Accommodation Works
0308MR	Gates and Stiles
0309MR	Removing and Re-erecting Existing Fences and Gates
0311MR	Preservation of Timber
0312MR	Painting of Timber Fences, Gates, Stiles and Posts
0313AR	Foundations for Permanent Fencing
0314AR	Repairs to and Renewal of Existing Fencing

0302MR Requirements for Temporary and Permanent Fences

Throughout clause 0302 delete 'in Appendix 3/1' and replace with 'in the Task Order'.

0303MR Temporary Fencing

Throughout clause 303 delete 'in Appendix 3/1' and replace with 'in the Task Order'.

0304MR Timber Quality

In sub-Clause 3 delete 'in Appendix 3/1' and replace with 'in the Task Order'.

0305MR Fittings

Delete 'in Appendix 3/1' and replace with 'in the Task Order'.

0306MR Permanent Fencing

After the first sentence, delete each occurrence of 'Appendix 3/1' and replace with 'the Task Order'.

0307MR Permanent Fencing for Accommodation Works

Delete 'in Appendix 1/15 and replace with 'in the Task Order'.

0308MR Gates and Stiles

Throughout clause 308 delete 'in Appendix 3/1' and replace with 'in the Task Order'

0309MR Removing and Re-erecting Existing Fences and Gates

In sub-Clause 1, delete 'in Appendix 2/3' and replace with 'in the Task Order'.

0311MR Preservation of Timber

In sub-Clause 2(i) delete 'in Appendix 3/1' and replace with 'in the Task Order'.

0312MR Painting of Timber Fences, Gates, Stiles and Posts

In sub-Clause 4, delete 'Appendix 3/1' and replace with 'the Task Order'.

In sub-Clause 5, delete 'Appendix 3/1' and replace with 'the Task Order'

In sub-Clause 6, delete 'Appendix 3/1' and replace with 'the Task Order'

0313AR Foundations for Permanent Fencing

1. All foundations for fencing shall be ST3(C12/15) concrete or above of minimum size 400 x 400 by 600mm deep.
2. Break out of hard surfaces and excavation for post holes shall be kept to the minimum practicable surface area, and the existing finished surface edges around post holes shall be cut to form a neat square to receive concrete surround. A permanent reinstatement to any posthole shall have all traces of concrete removed from grass surfaces, subsoil/topsoil (min. topsoil 150mm) compacted in the hole and the finish shall match the surrounding surface, making good with existing surfaces.

0314AR Repairs to and Renewal of Existing Fencing

1. Repairs to and renewal of existing fences shall comply with the appropriate Clauses in Series 200 and 300. If any posts, rails or lengths of fencing are removed to facilitate repairs or renewal of existing fences they shall be reinstated as soon as possible and in the meantime the gap in the fencing shall be patrolled or closed with temporary fencing so that there is no unauthorised entry or escape of stock to or from the adjoining land.

Additional, Cancelled, Modified & Substitute Clauses
Series 0400 Road Restraint Systems (Vehicle and Pedestrian)

Throughout Series 0400

- 0404MR Site Testing
- 0405MR Temporary Safety Barriers
- 0413AR Posts for Steel VRS
- 0414AR Foundations for Posts
- 0415AR Pedestrian and Motorbike Rub Rails
- 0416AR Declaration of Performance / Conformity – CE Marking

Throughout Series 0400

Delete "BS 5080-1" and replace with "BS 8539"

0404MR Site Testing

Delete sub-Clause 1(iv) and replace with:

- iv) The frequency of testing shall be instructed by the *Client*.

0405MR Temporary Safety Barriers

Throughout Clause 0405 delete "contract specific Appendix 4/1" and replace with "the Task Order".

0413AR Posts for Steel VRS

- 1 Standard posts for steel VRS shall be of length ≤ 1700 mm.
- 2 Other posts that are allowable in this specification are:
 - a) Long posts > 1700 mm and ≤ 1900 mm;
 - b) Extra Long Posts > 1900 mm;
 - c) Intermediate Posts ≤ 1200 mm.
- 3 The *Contractor* shall compile scheme specific Appendix 4/3 highlighting which of the posts in 0413.1 and 0413.2 have been utilised across the site.
- 4 All posts shall include the use of plastic caps or base caps for pedestrian areas to minimise water ingress.

0414AR Foundations for Posts

- 1 The acceptable foundation types for posts are:
 - a) Driven;
 - b) Socketed concrete foundations;
 - c) Surface Mounted with Detachable Fixings; or
 - d) Surface Mounted with Studded Fixings.
- 2 Socketed concrete foundations shall be 600 mm x 600 mm x 600 mm conforming to BS EN 206 and BS 8500 unless the *Client* approves the *Contractor's* alternative proposals as detailed in an installation manual.
- 3 The *Contractor* shall compile scheme specific Appendix 4/3 highlighting which of the foundations in 0414.1 and 0414.2 have been utilised across the site.

0415AR Pedestrian and Motorbike Rub Rails

- 1 Pedestrian and motorbike rub rails where required shall be attached to steel VRS without affecting their compliance with BS EN 1317 or the declared performance for legacy systems specified in Clause 0402.

Use of such systems must be stated in the scheme-specific Appendix 4/1 and shown in scheme-specific Appendix 4/2.

0416AR Declaration of Performance / Conformity – CE Marking

- 1 For the purposes of compliance with Clause 0104.3, for materials specified in Series 0400 the *Contractor* shall submit to the *Client* CE Markings and Declaration of Performance showing compliance with:

- a) Containment Level;
- b) Working Width Class;
- c) Impact Severity Level Class;
- d) Performance Class ;
- e) Re-direction Class (Directive Class or Non-Directive);
- f) Permanent Lateral Displacement Zone Class (D.x.y or D); and
- g) Exit Box Class (Z).

The *Contractor* shall also supply:

- f) Manufacturer's Installation Manual including installation details and installation procedures;
- g) Testing videos; and
- h) Still photographs of testing.

Additional, Cancelled, Modified & Substitute Clauses

Series 450 Road Restraint Systems (Vehicle and Pedestrian) Maintenance

- 450AR Repairs to Road Restraint Systems
- 451AR Repairs and Maintenance of Tensioned Corrugated Beam (TCB) Road Restraint System
- 452AR Repairs to Metal Parapets
- 453AR Repairs to Pedestrian Guardrail
- 454AR Painting of Pedestrian Guardrails and Handrails
- 455AR Site Welding of Damaged Guardrails and Handrails
- 456AR Maintenance of VRS Crossovers

450AR Repairs to Road Restraint Systems

1. Work shall comprise removing parts or sections of damaged road restraint system and the erection in their place of new parts or sections of road restraint systems in order to effect a repair.
2. The *Contractor* shall carry out works to road restraint systems of different types and shall comply with the relevant Clauses of Series 200, 400 and TD19/06 – Requirements for Road Restraint Systems.
3. The *Contractor* shall repair all accident damage using the same type of road restraint system and the same type of post to that needing repair.
4. Posts shall not be driven into a spot where a damaged post has been withdrawn, but the nearest suitable adjacent position used. (This requirement is likely to incorporate an additional post into the repair.)
5. Where posts have been withdrawn and not replaced, the disturbed ground shall be properly reinstated to match existing.
6. Where existing posts and concrete are removed and new posts and concrete footings are installed in the same location, any remaining voids shall be over-filled with concrete. Concrete shall be Grade C25/30 in accordance with the relevant Clauses of Series 1100.
7. Recovered bolts, nuts and washers shall not be re-used in the repair.
8. When the repair involves metal posts set in concrete, beams shall be fixed in position and temporarily supported for a minimum of 48 hours and a maximum of 7 days after pouring the concrete.
9. Where holding down bolts are to be renewed and rotary coring is instructed by the *Client*, the replacement anchor bolt shall be in accordance with Clause 403.
10. Any displaced filter drain media shall be reinstated and the area in the vicinity of the repair generally made good.

451AR Repairs and Maintenance of Tensioned Corrugated Beam (TCB) Road Restraint System

1. The length of road restraint system to be de-tensioned and re-tensioned shall be either:
 - a) The defective length to the nearest undamaged adjuster assembly or anchorage on either side, or
 - b) The planned length defined in the cyclic maintenance programme to the nearest adjuster assembly or anchorage
2. The following procedure shall be used to de-tension a road restraint system section which is to be repaired:
 - a) on double sided installations, slacken off connecting strap screws and nuts;
 - b) slacken off post screws and nuts;
 - c) slacken each adjuster assembly or anchorage assembly either side of the damaged length;
 - d) carry out repair.

3. TCB road restraint system shall be re-tensioned in accordance with BS 7669: Part 3, Section 2.1 or equivalent.
4. Tensioning between any two limits shall not proceed until each limit has been anchored sufficiently securely to resist the load effects due to tensioning.
5. On completion of tensioning of TCB, the centre of each screw securing beams to posts shall be not closer than $25\text{mm} \pm 2\text{mm}$ to the end of the slotted hole in the beam.

452AR Repairs to Metal Parapets

1. Repair work shall comprise removing parts or sections of defective parapets and the erection in their place of new parts or sections in order to effect a repair.
2. Prior to any works to replace or repair parapets, adequate protective measures including lighting and control of ambient conditions to progress the works shall be installed. A mobile "shield" which does not protrude below the soffit of the structure and is fitted with adequate kentledge for stability shall be used over live carriageways subject to the agreement of the *Client* and the Police. The protective measures shall prevent 'Weld Flash'.
3. Repairs to parapets shall comply with the appropriate clauses in Series 400, 1800 and the following:-
 - a) Any defective sections or elements of parapets shall be replaced with sections of similar but serviceable materials which shall be welded in situ with full strength butt welds. All structural steel replacement sections shall be galvanised in accordance with Clause 1909 prior to erection. All welded repairs shall be carried out to comply with the requirements of the relevant standards.
 - b) Existing mesh shall be removed by unbolting or drilling out existing fixings. Existing undamaged cover strips shall be retained. The new mesh shall be fixed using stainless steel self tapping screws at existing fixing points in the rails. All new mesh shall be stainless steel or galvanised as instructed, with a mesh grid of 50mm and a minimum gauge of 6 S.W.G.
 - c) When new steel sections are to be installed they shall be galvanised in accordance with Clause 1909.
 - d) Where a metal coating has been damaged, the affected area shall be rubbed down to remove excessive roughness and shall be cleaned and made good by the application of an accepted zinc rich primer to a minimum dry film thickness of $100\mu\text{m}$.
 - e) Existing expanding type anchors which are to be replaced shall be removed by diamond core drilling to a diameter of 48mm and a minimum depth of 250mm. The sides of the cored hole shall be roughened or ground and then thoroughly cleaned of all debris.
 - f) The replacement anchor shall be a resin anchored stainless steel socket and the resin used shall have a suitably large filler to take account of the additional gap to be filled and limit the potential for creep.
4. Aluminium parapets shall not be painted unless otherwise specified.

453AR Repairs to Pedestrian Guardrail

1. Repairs to pedestrian guardrail shall comply with Clause 411 and the following:
 - a) Work will comprise the taking down of parts or sections of damaged pedestrian guardrail and the erection in their place of new parts or sections in order to effect a repair .
 - b) Pedestrian guardrail shall comply with the requirements of BS 7818 and match the design of the guard rail being repaired.
 - c) Where existing posts and concrete footings are removed and new posts and concrete footings are installed in the same location, any remaining voids shall be filled with ST2 concrete to Clause 2602.
 - d) Recovered bolts, nuts and washers shall not be re-used in the repair.
 - e) Pedestrian guardrail shall be erected in accordance with the recommendations of the manufacturer.

454AR Painting of Pedestrian Guardrails and Handrails

1. Where required painting shall be carried out in accordance with Series5000.

455AR Site Welding of Damaged Guardrails and Handrails

1. Site welding of damaged pedestrian guardrail and handrail shall be in accordance with clause 402.

456AR Maintenance of VRS Crossovers

1. As an integral part of each use crossovers shall be serviced in accordance with the manufacturers' recommendations, as a minimum checking the satisfactory operation of locking mechanisms, freeing and greasing all moving parts including winding mechanisms, jacks and rollers. Should there be no planned use of the crossover during a period of twelve months, then the maintenance activity shall be undertaken during each maintenance closure.

Additional, Cancelled, Modified & Substitute Clauses

Series 0500 Drainage and Service Ducts

0501MR	Pipes for Drainage and Service Ducts
0503MR	Bedding, Laying and Surrounding of Pipes
0504MR	Jointing of Pipes
0505MR	Backfilling of Trenches and Filter Drains
0506MR	Connecting to Existing Drains Chambers and Channels
0507MR	Chambers
0508MR	Gullies and Pipe Junctions
0509MR	Testing and Cleaning
0510MR	Surface Water Channels and Drainage Channel Blocks
0511MR	Land Drains
0516MR	Combined Drainage and Kerb Systems
0517MR	Linear Drainage Channel Systems
0520MR	The Cleaning of Existing Drainage Systems
0521MR	Low-Pressure High-Volume Jetting of Drainage Systems
0522AR	High-Pressure Water Jetting / Vacuum Suction
0523AR	Renovation of pressure and non-pressure drainage with cured-in-place systems
0524AR	Adjustment of line and level of existing ducts and services

0501MR Pipes for Drainage and Service Ducts

In Table 5/2, in the column headed "Particular Requirements", delete "Class to be as specified in Appendix 5/2".

In Table 5/2, in the column headed "Particular Requirements", delete "Appendix 5/2 shall state the resistance to bending requirements" (twice).

Insert new sub clauses 9 as follows:

9. Ducts for traffic signal cables shall be 100 mm diameter thick walled (5 mm) low or medium density polyethylene, coloured orange, with the words "TRAFFIC SIGNALS" printed in white along the length at intervals not exceeding 1 m. When laid, the wording shall be uppermost.

0503MR Bedding, Laying and Surrounding of Pipes

In the first paragraph of sub-Clause 1, delete "The pipes shall be laid at the level and gradients shown on the Drawings and schedules" and replace with "The pipes shall be laid to the line, level and gradients shown on the Drawings and schedules"

Between the first and second paragraphs of sub-Clause 1 insert

"Wherever practicable ducts shall be laid in straight lines, change in direction being achieved by straight chords with drawpits at their intersections. Where a bend in the line is unavoidable, it shall be achieved by insertion of a single 'long radius bend' of no more than 35°."

In sub-Clause 3, insert at the end of the Clause:

"Installed pipes shall be capable of withstanding jetting pressures of 4000 psi without damage."

Add sub clause 8 as follows

- 8 Laying of Cable Ducts
 - a) Ducts installed in the carriageway shall have Type Z bedding in accordance with Highways Construction Detail F1, and have a minimum of 600mm of cover unless otherwise instructed by the Client,
 - b) Ducts installed in areas outside of the carriageway shall have Type T bedding in accordance with Highways Construction Detail F1, and have a minimum of 450mm of cover unless otherwise instructed by the Client,
 - c) Under-kerb ducts shall extend a minimum of 50 mm beyond the bed of the kerb and a suitable marking pin shall be inserted in the footway or carriageway to mark the duct position without causing a hazard to road users.

0504MR Jointing of Pipes

In sub-Clause 2, delete "as described in Appendix 5/1".

Delete sub-Clause 4 and replace with:

- 4 Partially watertight joints are not permitted.

0505MR Backfilling of Trenches and Filter Drains

In sub-Clause 9, delete "as described in Appendix 5/2".

0506MR Connecting to Existing Drains Chambers and Channels

In sub-Clause 1, delete "as described in Appendix 5/1".

In sub-Clause 3, delete "as required by Appendix 5/1".

0507MR Chambers

At the end of sub-Clause 2 add:

Drainage shall be provided through the base of draw pits via a vertical 150 mm plastic duct 400 mm long, filled to 150mm from the top with 4/10 mm aggregate to BSEN 13242, and fitted with a 200mm recessed drain and removable circular or square grating.

At the end of sub-Clause 4 add:

Preformed drawpits/chambers for traffic signal installations shall comply with the following:

- a) Shall be a modular twin wall stacking system of pre-formed recycled thermoplastic, with a minimum depth of 200mm, extending in increments of 150 mm and having a min 40 tonne loading when tested to BS EN 124 D400.
- b) Shall accept a minimum of 12 x 110 mm ducts, increasing by addition of optional stacking sections.
- c) The base of the chamber shall be 150 mm Class ST2 concrete over a 150 mm compacted layer of Clause 803 Type 1 unbound mixture.

In sub-Clause 8 delete "and where required in Appendix 5/1".

Delete sub-Clause 9 and replace with:

9 Chamber covers, gratings and frames shall:

- a) be made of non-malleable spheroidal graphite cast iron (ductile iron) grade 500-7 in accordance with BS EN 1563;
- b) be one of the designations listed in Appendix 5/1;
- c) have product conformity certificates to BS EN 124 that are issued by a UKAS accredited certification body (e.g. BSI Kite Marked);
- d) be tested by a UKAS accredited or UKAS accepted third-party organisation that has BS EN 124 within its scope;
- e) bear visible, durable and integral markings required by BS EN 124 as defined in Chapter 9 Marking; Covers to traffic signal chambers shall be marked "TRAFFIC SIGNALS".
- f) The access cover and frame shall achieve silence in operation by means of a double triangular cover system based on the three-point suspension principle;

- g) The depth of the seating from the top of the frame shall not be less than 50 mm or the depth of engagement not less than 80 mm;
- h) The frames for gully grate tops and chamber tops should be a minimum of 150 mm deep;
- i) The bedding flange should have a minimum thickness of 5 mm at any point along its horizontal surface;
- j) Vertical frame stiffening webs/gussets shall be provided and shall be located adjacent to seating;
- k) To improve the durability of the installation the frame should feature an increased flange width by the load bearing seating areas (load distribution system) on all four corners to assist with the distribution of stress into the bedding mortar;
- l) For systems that do not have the load distribution system described in (k), the nominal bearing pressure in relation to the test load described in BS EN 124 should not exceed 1.3 N/mm² when assuming a D400 load. The bearing pressure in relation to the test load described in BS EN 124 for systems with the load distribution system described in (k) must not exceed 1.9 N/mm²;
- m) As an addition to Clause 0507.9 (l), the bearing pressure is to be calculated with the assumption that the chamber is 610 x 610 mm;
- n) The upper surface of the covers shall have a defined raised pattern comprising a surface area of no less than 10% of the total surface area of the combined covers. The raised pattern must be no less than 4 mm above the surface and should have an independently tested and verified PSRV ≥ 45 when tested in accordance with BS 9124;
- o) Where specified, a layer of Cold Applied High Friction Surfacing shall be applied during factory production to the surface to achieve a PSRV70 > 70 when tested and third-party verified in accordance with the method described in BS 9124. This shall achieve a minimum tensile adhesion to the substrate of 5 MPa as per the requirements of Series 1900. Site applied high friction surfacing is not permitted;
- p) Where a water ingress sealed unit is required, the cover and frame shall be compliant with Class 3 of the Thames Water leak tightness test. Evidence is required to show that infiltration rate does not exceed 0.4 L/m² per 30 min.

Delete sub-Clause 10 and replace with:

- 10 D400 and E600 units and above shall incorporate a permanent non-rock feature by employing the triangular three-point suspension system.

Delete sub-Clause 14 and replace with:

- 14 Gratings for catchpit chambers shall have a minimum waterway area as described in BS 7903.

Delete sub-Clause 16 and replace with:

- 16 Frames for chamber covers and gratings shall be set in cement mortar designation (i) complying with Clause 2404. Packing materials shall not be used in the bedding of chamber tops and gully tops. Where specified quick setting mortar to carriageway, chamber tops and gully tops shall be bedded in material which complies with the following:
- a. non-shrinkable;
 - b. a minimum workable life of 15 minutes;
 - c. a compression strength that exceeds 30N/mm² within 1 hour of placing; and,
 - d. a tensile strength that exceeds 5N/mm² within three hours of placing.

At the end of sub-Clause 17 add

All ducts shall enter chambers perpendicular to the external wall, extend 10mm into the chamber, and be finished with mortar designation (i). Multiple duct entries shall be at a minimum spacing of 35mm in all directions.

Where two or more ducts enter a chamber in a horizontal configuration, a precast concrete lintel shall be installed over the ducts extending to include a minimum bearing on adjacent brickwork of 100 mm on each side.

Insert new sub-Clause 19, as follows:

- 19 Circular covers shall be used when instructed by the *Client* and they shall meet or better the requirements for bearing pressure set above. The cover shall have a minimum opening of 600 mm and shall have a square seating.

Insert new sub-Clause 20, as follows:

- 20 "The Contractor shall rectify defective carriageway chamber tops and gully tops using quick setting materials specified at sub clause 0507.16 and guarantee the installation for the period ending five years from the date of installation".

Insert new sub-Clause 21, as follows:

- 21 Recessed covers may only be used in footway environment. When installed, a generous coating of petroleum jelly shall be applied between the cover and frame to prevent sand ingress and future jamming.

0508MR Gullies and Pipe Junctions

At the end of sub-Clause 1 add "chute gullies shall not be used unless instructed by the *Client*"

In sub-Clause 5, delete the 3rd sentence.

0509MR Testing and Cleaning

In sub-Clause 5, delete the 2nd paragraph and replace with the following:

"All carrier and foul drains shall be surveyed by Closed Circuit Television (CCTV) as specified in Series 9000."

0510MR Surface Water Channels and Drainage Channel Blocks

Insert new sub-Clause 4, as follows:

“Subway drainage channels shall be constructed as described in Appendix 5/3.”

0511MR Land Drains

In sub-Clause 1, delete “listed in Appendix 1/11”

In sub-Clause 4, delete “or as otherwise described in Appendix 5/1”.

0516MR Combined Drainage and Kerb Systems

In sub-Clause 1, delete “listed in Appendix 11/1”.

In sub-Clause 2, delete “and as stated in Appendix 5/1”.

In sub-Clause 3, delete “given in Appendix 5/5”.

In sub-Clause 6, delete “and shall be as stated in Appendix 5/5”.

In sub-Clause 10, delete “and shall be as described in Appendix 5/5”.

0517MR Linear Drainage Channel Systems

In sub-Clause 1, delete “listed in Appendix 1/11”.

In sub-Clause 3, delete “given in Appendix 5/6”.

Delete sub-Clause 7.

In sub-Clause 10, delete “and shall be as described in Appendix 5/6”.

In sub-Clause 11, delete the last sentence.

0520MR The Cleaning of Existing Drainage Systems

In sub-Clause 1 delete ‘Appendix 5/1’ and replace with ‘the *Client*’s Scope’.

At the end of sub-Clause 1 add “Subject to any constraints imposed elsewhere in the contract, in residential areas the *Contractor* shall attempt to clean existing drainage systems during Core Working Hours.”

In sub-Clause 4 delete “Appendix 5/1” and replace with “to clear a blockage”

At the end of sub-Clause 5 add “Prior to closure of gratings or covers, a spot of paint shall be sprayed onto the underside. The colour of the paint shall differ for each cycle of cleaning.”

In sub-Clause 6 delete “minimum 5455 litres capacity” and replace with “minimum 3600 litres capacity”.

At the end of sub-Clause 6 add “Where sediments are chemically bound, such as cementitious concrete or bituminous material, they shall be removed manually, by jetting, vacuum suction or cut by carbide cutting into manageable pieces. Any sediment that cannot be cleared shall be reported to the *Client*.”

At the start of sub-Clause 7 add “Any blocked pipe within one metre of the gully trap shall be rodded clear, pressure jetted and flushed during gully cleaning operations. In the event that the *Contractor* cannot clear a gully connection, or where the connection remains blocked after rodding and jetting, the *Contractor* shall report the location of the gully to the *Client* using the *Client’s* Asset Management Information System or as instructed by the *Client*.”

In sub-Clause 8 delete “Oil separators” and replace with “Oil and Petrol separators”.

In sub-Clause 11, delete “using the Routine Maintenance Management System (RMMS) referencing system in Part 3, Chapter 3.7”.

At the end of sub-Clause 12 add “Where jammed gully covers are encountered, the *Contractor* shall use mechanical and/or hydraulic equipment to free them. The lifting apparatus shall be capable of applying a force of 180 kg”.

At the start of sub-Clause 13 add “Before leaving the location the *Contractor* shall check that water escapes freely from the outlet and where water stands above any outgoing pipe invert the details shall be reported to the *Client*.”.

0521MR Low-Pressure High-Volume Jetting of Drainage Systems

In sub-Clause 1 delete “Where stated in Appendix 5/1”.

In sub-Clause 2 delete “Appendix 5/1” and replace with “*Client’s* Scope”.

0522AR High-Pressure Water Jetting / Vacuum Suction

- 1 High-pressure water jetting shall use cold water complying with BS EN 1008, with no antifreeze agents or other chemicals added.
- 2 High-pressure water jetting shall be carried out by a pump capable of producing a minimum of 150 kg/cm² at 250 L/min. Minimum clean water capacity shall be 5500 L. Jetting hoses shall be a minimum of 25 mm diameter.
- 3 In combination with the jetting requirements above, a suction facility shall be provided by a liquid ring exhauster capable of displacing a minimum of 21 m³/min of air.
- 4 A specialist airflow vacuum system shall have the ability to remove material from depths of up to 9.0 m with a suction facility capable of displacing 55 m³/min of air at 95% vacuum. The sludge tank capacity shall be 13500 L.

0523AR Renovation of pressure and non-pressure drainage with cured-in-place systems

- 1 Cured-in-place Linings shall comply with the requirements of BS EN 11296-4 for non-pressure drainage and BS EN 11297-4 for pressure drainage and are specified in Appendix 5/10.
- 2 Resin used for cured-in-place systems shall be styrene free and brought to site in original unopened containers.
- 3 Cured-in-place lining for non-pressure drainage shall comply with Table 5/14 and declaration of performance must be submitted to the *Client* prior to utilisation of any cured-in-place systems.

Table 5/14: Performance of Cured-in-place lining

Property	Minimum Requirement
Short-term flexural modulus (E_0)	2200 MPa
Flexural strain at first break (ϵ_f)	1%
Flexural stress at first break (σ_f)	25 MPa
50-year flexural modulus (E_{50})	400 MPa
50-year failure stress	20 MPa

- 4 The mean wall thickness of the composite liner shall not be less than the design thickness, and the minimum wall thickness shall not be less than 80% of the design thickness. The minimum thickness requirement does not apply to points where local wall thickness reduction is caused by irregularity in the host pipe.
- 5 Post installation *the Contractor* shall carry out a CCTV survey as specified in Series 9000 to ascertain compliance and this shall be submitted to the *Client*.

0524AR Adjustment of line and level of existing ducts and services

1. Where instructed, the *Contractor* shall adjust the line / level of existing ducts and services by hand excavation / undercutting of the bed to the revised alignment. The work shall progress such that the integrity of the line is not compromised by the opening of joints in the ductwork or stresses being applied to cable joints. Adjustment shall progress in increments of no more than 150 mm unless specifically authorised by the *Client*.
2. Prior to the final stage of the adjustment being undertaken the revised trench alignment a bed shall be laid in accordance with Clause 503, and the duct / services subsequently surrounded in accordance with that clause.

Additional, Cancelled, Modified & Substitute Clauses

Series 550 Drainage Maintenance

- 550AR Cleaning and Renewal of Filter Drains
- 551AR Cleaning of Culverts and Open Surface Water Systems

550AR Cleaning and Renewal of Filter Drains

1. Cleaning Filter Media

- a) The filter material shall be loosened by harrow to a depth of 250mm over the full width of the drain so as to minimise retention of water and all weed growth removed in accordance with Clause 3002.
- b) Weed control to the surface of the filter drain shall be undertaken in accordance with Clause 3002.
- c) Any detritus between the edge of the carriageway and the filter drain shall be removed.

2. Renewal of Filter Media

- a) Filter drains shall be renewed either by replacing the filter media only, or by renewing the complete drain to its full depth as instructed by the *Client*.
- b) Where the filter media only is to be replaced, all or part of the existing material within the trench shall be removed to the depth directed by the *Client*.
- c) Where possible, the *Contractor* shall recycle the filter material using machinery capable of lifting and returning the graded and cleaned material to the drain from which it came. The fines not suitable for backfill shall be removed from site. Where this is not possible, material removed from trenches shall be taken to tip and the trench shall be back-filled in layers up to ground level with Type B material, Table 5/5, Clause 505.
- d) Where the complete drain is to be replaced, all existing filter media, the pipe and pipe bedding shall be removed down to the base of the original trench. The drain shall then be reconstructed and back-filled up to ground level with Type B material, Table 5/5, Clause 505.

551AR Cleaning of Culverts and Open Surface Water Systems

1. The *Contractor* shall clean the culvert and open surface water drainage systems including headwalls, aprons, spillways and channels of all silt, sediment, debris and polluted water and ensure that the ends of culverts, including any ancillary drainage items, such as trash screens, watergates, grills and sluices, are free of vegetation and other obstructions, including any material disturbed during cleaning.
2. Where the invert of any culvert at intake and outfall points is below the invert of an adjacent watercourse, the watercourse invert shall be excavated to the invert level of the culvert to facilitate flow.
3. All collected sediment debris and polluted water shall be disposed of to a licensed Special Waste Management Facility, in accordance with the requirements of the Environment Agency, unless otherwise agreed with the Environment Agency.
4. Polluted water shall not be used to dislodge compacted materials.

Additional, Cancelled, Modified & Substitute Clauses

Series 0600 Earthworks

- 0605SR Special Requirements for Class 3 Material
- 0607SR Explosives and Blasting for Excavation
- 0631MR Earthworks Materials Tests
- 0645AR Lightweight Aggregate

0605SR Special Requirements for Class 3 Material

- 1 Class 3 material is not permissible for use.

0607SR Explosives and Blasting for Excavation

- 1 Blasting for excavation shall not be employed.

0631MR Earthworks Materials Tests

Add sub-Clause 2 as follows

- 2 “The *Contractor* shall not bring soils or fill materials onto the site unless they have been tested and proven to be uncontaminated and present no risks to human health, property or the environment. Documentary evidence to confirm the origin of all imported soils and fill materials, supported by appropriate chemical analysis test results, shall be maintained by the *Contractor*.”

0645AR Lightweight Aggregate

- 1 The use of lightweight aggregate is permissible. Lightweight aggregate shall comply with the requirements set in BS EN 13055. A declaration of performance shall be submitted to *the Client* prior to use. The declaration of performance shall include all items in the relevant Table ZA of BS EN 13055 according to the end use of lightweight aggregate.
- 2 Lightweight aggregate shall have a loose bulk density measured in accordance BS EN 1097-3 $\leq 1000 \text{ kg/m}^3$.

Additional, Cancelled, Modified & Substitute Clauses

Series 0700 Road Pavements - General

0702SR	Horizontal Alignments, Surface Levels and Surface Regularity of Pavement Courses
0706SR	Excavation, Trimming and Reinstatement of Existing Surfaces
0707SR	Breaking up or Perforation and Disposal of Redundant Pavement
0709MR	Cold-milling (Planing) of Bituminous Bound Flexible Pavement
0711SR	Overband and Inlaid Crack Sealing Systems
0720AR	Delivery Tickets and Weighing
0721AR	Declaration of Performance / Conformity – CE Marking

0702SR Horizontal Alignments, Surface Levels and Surface Regularity of Pavement Courses

- 1 Horizontal alignments shall be determined from one edge of the pavement surface as shown on the design drawings. The edge of the pavement as constructed, and all other parallel alignments shall be correct within a tolerance of 25 mm therefrom, except for kerbs and channel blocks which shall be laid with a smooth alignment within a tolerance of ± 13 mm. Longitudinal road markings lateral tolerance shall be in accordance with sub-Clause 1212.20.

Surface Levels of Pavement Courses

- 2 The design levels of pavement courses shall be calculated from the vertical profile, crossfalls and the pavement course thicknesses described on the design drawings. The level of any point on the constructed surface of the pavement courses shall be the design level subject to the appropriate tolerances stated in Table 7/1.

TABLE 7/1: Tolerances in Surface Levels of Pavement Courses

Road Surfaces	
General	± 6 mm
Adjacent to a surface water channel *	+ 10 – 0 mm
Binder course *	± 6 mm
Base *	± 15 mm
Subbase under concrete pavement surface slabs laid full thickness in one operation by machines with surface compaction	± 10 mm
Subbases other than above	+ 10 – 30 mm
* - Where a surface water channel is laid before the adjacent road pavement layer the top of that layer, measured from the top of the adjacent edge of the surface water channel, shall be to the tolerances given in Table 7/1.	

- 3 Notwithstanding the tolerances permitted in surface levels of pavement courses, the cumulative tolerance shall not result in a reduction in thickness of the pavement, excluding the subbase, by more than 15 mm from the specified thickness nor a reduction in the thickness of the bituminous surface course by more than 5 mm from that specified.
- 4 For checking compliance with sub-Clause 2 of this Clause, measurements of the surface levels of all courses will be taken on a grid of points as described in the design drawings. In any length of pavement, compliance shall be deemed to be met for all surfaces, other than the final road surface, when not more than one of ten consecutive measurements taken longitudinally or one in any transverse line, exceeds the tolerances permitted in Table 7/1, provided that this one measurement shall not exceed by more than 5 mm the tolerance for the course concerned. For the final road surface, the tolerance given in Table 7/1 shall apply to any point on that surface.

Surface Regularity for Roads (Carriageways)

- 5 The longitudinal regularity of the surfaces of surface courses, binder courses and concrete slabs shall be such that the number of surface irregularities is within the relevant limits stated in Table 7/2.

An irregularity is a variation of not less than 4 mm or not less than 7 mm of the profile of the road surface as measured by the rolling straight-edge set at 4 mm or 7 mm as appropriate, or equivalent apparatus capable of measuring irregularities within the same magnitudes over a 3 m length. No irregularity exceeding 10 mm shall be permitted.

- 6 Prior to checking any final road surface, binder course or top surface of base in pavements without binder course for level, regularity or macrotexture depth, it shall be cleaned of loose or extraneous materials. These operations shall be carried out without damaging the surface of the pavement, as soon as possible and within 3 days of the construction of the pavement.
- 7 Compliance with Table 7/2 shall be checked by the rolling straight-edge along any line or lines parallel to the edge of pavement on sections of 300 m at regular intervals as described in the design, whether or not it is constructed in shorter lengths. Sections shorter than 300 m forming part of a longer pavement shall be assessed using the number of irregularities for a 300 m length pro-rata to the nearest whole number.

Where the total length of pavement is less than 300 m, the measurements shall be taken on 75 m lengths.

TABLE 7/2: Maximum Permitted Number of Surface Irregularities for Carriageways

	Surfaces of each lane of carriageway, each hard strip and each hard shoulder for each irregularity limit				Surfaces of each lane of bituminous binder courses for carriageway, hard strip and hard shoulder for each irregularity limit				Surfaces of lay-bys, service areas, and associated bituminous binder courses for each irregularity limit			
	4 mm		7 mm		4 mm		7 mm		4 mm		7 mm	
Irregularity Limits												
Length (m)	300	75	300	75	300	75	300	75	300	75	300	75
Category A* Roads	20	9	2	1	40	18	4	2	40	18	4	2
Category B* Roads	40	18	4	2	60	27	6	3	60	27	6	3

* - The Category of each section of road is described in scheme-specific Appendix 7/1.

- 8 Pavements shall be measured transversely for irregularities at regular intervals, by a 3 m long straight-edge in accordance with BS 8420 placed at right angles to the centre line of the road. The maximum allowable difference between the pavement surface and the straight-edge shall be 3 mm.
- 9 A straight-edge, 3 metres long, shall be used to check longitudinal surface regularity in the following cases:
- For lengths of less than 75 m of surface course, binder course and concrete slabs;
 - Where usage of the rolling straight-edge or equivalent apparatus is impracticable; and
 - For all lengths of subbase under concrete pavement slabs laid full thickness in one operation by machine with surface compaction.

The maximum allowable difference between the surface and the underside of the straight-edge, when placed parallel with, or at right angles to, the centre line of the road shall be:

- 3 mm for pavement surfaces;
 - 6 mm for binder courses; or
 - 10 mm for subbases under concrete pavements (as in c) above.
- 10 Alternatively, the *Contractor* can utilise a laser straight edge to measure surface regularity as long as calibration of the equipment is achieved to other methods specified in this Clause.

11 Where any pavement area does not comply with the specification for regularity, surface tolerance, thickness, macrotexture depth, material properties or compaction, the full extent of the area which does not comply with the specification shall be made good and the surface of the pavement course shall be rectified in the manner described below:

a) Unbound and Hydraulically Bound Materials

The top 75 mm shall be scarified, reshaped with material added or removed as necessary, and re-compacted. The area treated shall be not less than 20 m long and 2 m wide. For hydraulically bound materials, all rectification shall be completed within 48 hours of the binder being added to the material.

b) Cement-bound Subbases and Bases

The method of correction will depend on the period which has elapsed between detection of the error and the time of mixing of the material. If this is less than 4 hours, the surface shall be scarified to a depth of not less than 50 mm, surplus material removed, or freshly mixed material added as necessary, and re-compacted in accordance with the specification. If the period is 4 hours or more the full depth of the layer shall be removed from the pavement and replaced with material in accordance with the specification. In either case, the area treated shall be at least 5 m long and the full width of the paving laid in one operation. If the *Contractor* proposes rectification within 7 days of laying, they shall comply with Clause 1048. Alternatively, for subbases under concrete pavements, the *Contractor* may make up low areas to a level within the tolerances of this Clause with a 1:4 cement and sand mortar or with an AC4 fine surface course complying with Clause 0914.

c) Bituminous Bases

With coated macadam or asphalt bases, the full depth of the top layer as laid shall be removed and be replaced with fresh material laid and compacted in accordance with the specification. Any area so treated shall be at least 5 m long and the full width of the paving laid in one operation. Alternatively, for low areas in bituminous bases, the *Contractor* may make up the level with additional binder course material.

d) Surface Courses and Binder Courses

These shall have the full depth of the course removed and replaced with fresh material laid and compacted in accordance with the specification.

The area rectified shall be the full width of the paving laid in one operation, and at least 5 m long if binder course or 15 m if surface course.

Where the number of surface irregularities exceeds the limits in Table 7/2, the area to be rectified shall be 300 m or 75 m long as appropriate and the full width of the lanes affected, or such lesser length as necessary to make the number of surface irregularities conform with the limits and shall be the full width of the lanes affected.

Checking of the surface course for compliance with this Clause shall be carried out as soon as possible after completion of the surfacing and remedial works completed before the road is opened to traffic.

Where the macrotexture depth requirement is not met for:

i) a section 250 m in lane length;

- ii) the full lane length of a section less than 250 m long as the balance of a complete scheme; or
- iii) the full lane length of a scheme less than 250 m long.

then sufficient 50 m lengths shall be replaced, starting with that length having the least macrotexture depth until the average requirement for the section length is complied with.

A minimum length of 50 m and the full lane width shall be removed and replaced either:

- i) to the full depth of the surface course; or
- ii) to a depth of 20 mm when replaced by the repave method process in compliance with Clause 0926.

Areas to be removed shall be delineated both longitudinally and transversely by saw cutting prior to the material being removed. Joints shall be formed either by coating the exposed sawn face with hot bitumen or heating by a suitable heater. The heater shall raise the temperature of the full depth of the course immediately before laying the new material to a figure within the range of minimum rolling temperature and maximum temperature at any stage specified for the material and for a width of not less than 75 mm.

e) Concrete slabs

Concrete slabs shall be rectified by planing, grinding or bump cutting. Large depressions, which cannot be dealt with in this way, shall be rectified by cutting out the surface and replacing by a thin bonded surface repair complying with Clause 1032.

Retexturing of hardened concrete shall be carried out by sawing grooves in accordance with the specification. Texturing of replaced surfaces shall be by brushing in accordance with the specification. Where the slab cannot be rectified as above, the full depth of slab shall be removed and replaced with a slab constructed in compliance with Clause 1033 to the extent required to obtain compliance with the specification. Remedial works involving the placing of fresh concrete shall be completed in sufficient time for the concrete strength to have developed as required in Clause 1048, before that section of pavement is opened to traffic.

Surface Regularity for Footways and Cycleways

- 12 All cycleways and shared use footways shall comply with the requirements of this Clause.
- 13 The requirements of this clause shall not apply to other footways, unless specifically instructed by the *Client*, in which case they shall be considered to be shared use footways.
- 14 The longitudinal regularity of footway or cycleway surface shall be such that the maximum number of surface irregularities do not exceed the limits given in table 7/3 and as follows:

TABLE 7/3: Maximum Permitted Number of Surface Irregularities for Footways and Cycleways

Irregularity Limits	Surfaces of each footway or cycleway			
	4 mm		6 mm	
Length (m)	300	75	300	75
Cycleways and Footways	60	20	6	2

- a) No irregularities of 10 mm anywhere;
 - b) No more than 5 irregularities in any consecutive 5 metres.
- 15 An irregularity is a variation of not less than 4 mm or not less than 7 mm of a profile of the footway or cycleway surface as measured by a 3 m rolling straight-edge, or equivalent apparatus capable of measuring irregularities with the same magnitudes over a 3 m length. No irregularity equal to or exceeding 10 mm shall be permitted.
- 16 Prior to checking any final footway or cycleway surface, it shall be cleaned of loose or extraneous materials. These operations shall be carried out without damaging the surface, as soon as possible and within 28 days of construction or the footway or cycleway and must be submitted to *the Client*.
- 17 Compliance shall be checked by the rolling straight-edge along any line or lines parallel to the edge on sections of 300 m, whether or not it is constructed in shorter lengths. Sections shorter than 300 m forming part of a longer footway or cycleway shall be assessed using the number of irregularities for a 300 m length pro-rata to the nearest whole number.
- 18 Where any section of the footway or cycleway does not comply with the Specification for regularity, surface tolerance, material properties or compaction, the full extent of the area that does not comply with the Specification shall be made good by having the full depth of the structural layer and any surface treatment removed and replaced with fresh material laid and compacted in accordance with the specification.

0706SR Excavation, Trimming and Reinstatement of Existing Surfaces

General

- 1 The *Contractor* shall not excavate pits, trenches or other openings in paved areas which have been constructed as part of the permanent works in order to construct other parts of the works, including Statutory Undertakers and other service works, except with the prior approval of the Overseeing Organisation.
- 2 Where excavation and trimming of existing paved areas and highways not constructed as part of the permanent works are required, they shall be carried out and reinstated in compliance with this Clause. Excavations shall be carried out to the dimensions shown on the design drawings, or, if not shown, to the minimum dimensions, subject to sub-Clause 3 of this Clause, necessary to carry out the work.

Excavations

- 3 Excavations in existing pavements and other paved areas, except those described in sub-Clause 4 of this Clause, including surfacing, base and subbase, shall be cut to neat lines to dimensions at least 75 mm greater on each side than the dimensions of any further excavation below formation level. Excavations in capping shall be taken at least 75 mm outside the dimensions of any excavation below. Road surfacing of bituminous material shall be cut back

by sawing or planing to a further 75 mm on each side. Planing shall be carried out in accordance with Clause 0709. Concrete surfacing and concrete bases, except CBM, shall be cut back by sawing by at least 300 mm on each side to the level of any reinforcement in reinforced slabs and to the full depth of the slab in unreinforced slabs.

If excavations are required to inspect the condition of lower layers, each layer shall be excavated separately and cleaned of debris to permit inspection.

- 4 Concrete blocks, clay pavers, precast concrete flags, stone slabs and setts, kerbs and channels shall be lifted without cutting, to the nearest joint satisfying sub-Clause 3 of this Clause and carefully stored for re-use. In situ kerbs and channels shall be broken out to at least 150 mm beyond the excavation.

Reinstatement of Paved Areas

- 5 Reinstatements of openings in highways shall comply with the 'Specification for the Reinstatement of Openings in Highways' issued by the Highway Authorities and Utilities Committee.
- 6 Where foamed concrete is used for the reinstatement of openings in roads, the requirements of the foamed concrete shall comply with Clause 1043.
- 7 Immediately before bituminous layers are reinstated, the edges of the existing material shall be cleaned of all loose material and be coated with an appropriate hot bituminous binder, or equivalent treatment. Where joints in concrete slabs are affected by the excavation they shall be reinstated by cutting back to at least 0.5 m on each side of a transverse joint and forming an expansion joint on one side of the excavation and a contraction joint on the other and provide longitudinal joints where necessary in the same line before reinstatement in compliance with Series 1000 to match the existing construction.

Reinstatement of Other Areas

- 8 Where the excavation affects grassed areas, unpaved footpaths, footways, verges and bridleways they shall be reinstated to match the existing surface, after backfilling with acceptable material to a depth of not less than 150 mm below the finished surface.

Junctions Between New Pavement Construction and Existing Pavement or Other Paved Areas

- 9 Where new pavement construction abuts an existing bituminous pavement which has to be reduced in level or overlaid to match alignment and levels, the existing surface shall be trimmed by the minimum amount of cold-milling (planing) to a depth which will allow the specified thickness of new construction to be laid, the edge being trimmed and treated in compliance with this Clause. Where the difference in level makes it necessary, a regulating course as specified in Appendix 7/1 and Clause 0907 shall be provided.

Compressed Air

- 10 When compressed air is used to clean dust, dirt and debris from prepared faces of existing concrete or bituminous pavements which are otherwise ready for reinstatement, only oil-free compressed air shall be used and this shall be at a pressure of not less than 0.5 N/mm².

0707SR Breaking up or Perforation and Disposal of Redundant Pavement

- 1 Pavements as defined by this Clause is all materials used in the past construction of a highway, and includes engineering materials in current, superseded or withdrawn British Standards, European Standards and Series 0700, 0800, 0900, 1000 and 1100 of the current or superseded UK Specification for Highway Works, together with the relevant series of its predecessor the Specification for Road and Bridge Works.
- 2 When classifying waste generated from the perforation, breaking up, excavation and disposal of redundant pavement the *Contractor* shall comply with the recommendations of "Technical Guidance WM3: Waste Classification - Guidance on the classification and assessment of waste" v1.1, published by the Environment Agency. For example; macadam containing less than 50 mg/kg of tar shall be classified as 17 03 02, or if it contains 50 mg/kg or more of tar as 17 03 01*.
- 3 Waste generated from the perforation, breaking up, excavation and disposal of redundant pavement shall be disposed of in accordance with the Waste Acceptance Criteria of the Landfill Regulations.

0709MR Cold-milling (Planing) of Bituminous Bound Flexible Pavement

In sub-Clause 1, delete "to the requirements specified in Appendix 7/9".

Replace sub-Clause 5 with:

- "5 Where milling is carried out on a carriageway open to traffic, temporary ramping to ensure the safe passage of vehicles shall be provided at an incline not exceeding 1:5."

In sub-Clause 9, delete "unless otherwise described in contract specific Appendix 2/3".

In sub-Clause 11, delete "When specified in Appendix 7/9".

Add sub-Clause 12 and 13 as follows:

- 12 "Following any carriageway planing/milling works adjacent to dropped crossings the *Contractor* shall install temporary ramps with a gradient of no more than 1:10 from the horizontal.
- 13 The provisions of sub-Clauses 0707.2 and 0707.3 shall apply equally to planing/milling works as they do to other forms of excavation."

0711SR Overband and Inlaid Crack Sealing Systems

- 1 Overbanding and inlaid crack sealing systems shall have current HAPAS Roads and Bridges Certificates or equivalent. If no HAPAS or equivalent certificates have been issued, then in the interim, only overbanding and inlaid crack sealing systems approved by the *Client* shall be used.
- 2 A crack sealing system with a current HAPAS or equivalent certificate shall only be installed by a *Contractor* approved by the Certificate Holder as an Approved Installer for that system.

Overbanding Crack Sealing Systems

- 3 The installed width and nominal thickness of overbanding sealants applied on the road surface shall not exceed 40 mm and 3 mm respectively and shall comply to the specifications in Appendix 7/11.

Inlaid Crack Sealing Systems

- 4 The inlaid crack sealing system HAPAS Grade Classification or equivalent, required for each location shall be as specified in Appendix 7/11.

Chippings

- 5 The minimum polished stone value of the source aggregate for chippings applied to the surface of overbanding and inlaid crack sealing systems, determined in accordance with BS EN 1097-8, shall be 70.

Installation and Quality Control Procedures

- 6 The installation and quality control procedures for overbanding and inlaid crack sealing systems shall be in accordance with the HAPAS or equivalent Certificate for each system and the current Method Statement. The results of all quality control checks carried out on site by the *Contractor* and quality assurance information compiled in accordance with the requirements of the HAPAS Certificate, including results from surveillance visits shall be made available to the *Client* on request.

Initial Skid Resistance

- 7 The minimum wet Skid Resistance value of overbanding and inlaid crack sealing systems when newly installed shall not be less than 60 when determined using the portable skid resistance tester (pendulum) in accordance with BS EN 13036-4, except that for sealant widths less than 75 mm, the narrow slider shall be used over the full 126 mm sliding length utilising the normal slider scale C.

0720AR Delivery Tickets and Weighing

- 1 The *Contractor* shall submit to *the Client* all weight tickets for material delivered to and used in the works and shall if required, supply *the Client* with one copy of each ticket.

0721AR Declaration of Performance / Conformity – CE Marking

- 1 For the purposes of compliance with Clause 0104.3, for materials specified in Series 0700, 0800, 0900 and 1000 the *Contractor* shall submit to the *Client* CE Markings and Declaration of Performance showing compliance with the relevant specifications.

Additional, Cancelled, Modified & Substitute Clauses

Series 0800 Road Pavements – Unbound, Cement and Other Hydraulically Bound Mixtures

0801SR	General Requirements for Unbound Mixtures
0804SR	Type 2 Unbound Mixtures
0806SR	Category B (close graded) Unbound Mixtures
0808AR	SuDS (Sustainable Drainage Systems) Unbound Mixtures
0820SR	Aggregates

0801SR General Requirements for Unbound Mixtures

- 1 Unbound mixtures shall be made and constructed to conform to BS EN 13285, the requirement categories in Table 8/1 and Clauses 0802 to 0803, 0805, 0807, and 0808. The permitted alternatives for each part of the permanent works shall be as described in the design.

Table 8/1: Requirement Categories for Unbound Mixtures

Unbound mixture	Type 1	Type 3 (open graded)	Type 4 (asphalt arising)	4/40 SuDS Mixture	4/20 SuDS Mixture
Clause	0803	0805	0807	0808	0808
Standard	BS EN 13285 Categories for unbound mixture properties				
Mixture requirement category					
Designation	0/31,5	0/40	0/31,5	4/40	2/20
Maximum fines	UF ₉	UF ₅	UF ₉	BS7533-13	BS7533-13
Oversize	OC ₇₅	OC ₈₀	OC ₇₅	BS7533-13	BS7533-13
Grading requirement category					
Overall grading	GP	GO	GP	BS7533-13	BS7533-13

- 2 Unbound mixtures placed within 500 mm, or any other distances described in the design, of concrete, cement bound materials, other cementitious mixtures or stabilised capping forming part of the permanent works shall conform to requirements a) and b) below:

- a) Mixtures shall conform to the following two criteria:
- i) Water-soluble sulfate (WS) content determined in accordance with BS EN 1744-1 Clause 10 shall not exceed 1500 mg of sulfate (as SO₄) per litre;
 - ii) Total sulfur (TS) content determined in accordance with BS EN 1744-1 Clause 11 expressed as (S) shall not exceed 1% for aggregates other than air-cooled blast furnace slag or 2% for air-cooled blast furnace slag.
- b) Mixtures shall conform to at least one of the following two options:
- i) When described in accordance with BS EN 932-3 and BS EN 13242 Annex A, limestone, dolomite, blast furnace slag, steel slag or crushed concrete shall be predominant; or
 - ii) The sulfide content of the mixture determined in accordance with BS EN 1744-1 Clause 13 shall be less than 0.5% (as SO₄).

When determining WS, TS or sulfide content, at least five samples of each material shall be tested. The mean of the highest two values shall be used for comparison with the limiting values. This also applies if six to nine results are available. If ten or more results are available, the mean of the highest 20% of the results shall be used for comparison with the limiting values. The pH of the mixture shall be reported.

- 3 Unbound mixtures placed within 500 mm or any other distances described in the design, of metallic structural elements forming part of the permanent works shall conform to requirements a) and b) below.
- a) Mixtures shall conform to the following two criteria:
 - i) Water-soluble sulfate (WS) content determined in accordance with BS EN 1744-1 Clause 10 shall not exceed 300 mg of sulfate (as SO₄) per litre;
 - ii) Total sulfur (TS) content determined in accordance with BS EN 1744-1 Clause 11 expressed as (S) shall not exceed 1% for aggregates other than air-cooled blast furnace slag or 2% for air-cooled blast furnace slag.
 - b) Mixtures shall conform to at least one of the following two options:
 - i) When described in accordance with BS EN 932-3 and BS EN 13242 Annex A, limestone, dolomite, blast furnace slag, steel slag or crushed concrete shall be predominant; or
 - ii) The sulfide content of the mixture determined in accordance with BS EN 1744-1 Clause 13 shall be less than 0.06% (as SO₄).

When determining WS, TS or sulfide content, at least five samples of each material shall be tested. The mean of the highest two values shall be used for comparison with the limiting values. This also applies if six to nine results are available. If ten or more results are available, the mean of the highest 20% of the results shall be used for comparison with the limiting values. The pH of the mixture shall be reported.

The requirements in a) or b), i) and ii) above shall not apply to metallic items protected by concrete and ancillary metallic items such as the tops of chambers and gullies.

- 4 The properties of aggregates used in unbound mixtures shall comply with the selected requirements of BS EN 13242 listed in Table 8/2.

TABLE 8/2: Requirements for Aggregates Used in Unbound Mixtures

Unbound mixture	Type 1	Type 3 (open graded)	Type 4 (asphalt arising)	4/40 SUDS Mixture	4/20 SUDS Mixture
Clause	0803	0805	0807	0808	0808
Standard	BS EN 13242 Categories for aggregate properties				
Crushed, or broken and totally rounded particles crushed rock, crushed manufactured and crushed recycled aggregates - see Note 1 - crushed gravel	$C_{90/3}$	$C_{90/3}$	$C_{90/3}$	$C_{90/3}$	$C_{90/3}$
	$C_{50/10}$ - see Note 2	Not permitted	Not permitted	Not permitted	Not permitted
Resistance to fragmentation - Los Angeles test	LA_{50}	LA_{30}	LA_{50}	LA_{30}	LA_{30}
Resistance to wear - micro-Deval test	$M_{DE}NR$ (no requirement). The supplier shall state the value for the aggregate used.				
Resistance to freezing and thawing - magnesium sulfate soundness	MS_{35}			MS_{18}	
Water absorption	$WA_{24}NR$ (no requirement). The supplier shall state the value for the aggregate used.				
Volume stability of blast furnace slags	Free from dicalcium silicate and iron disintegration.				
Volume stability of steel (BOF and EAF) slags	V_5	Not permitted	V_5		
All other BS EN 13242 aggregate requirements	Category NR (no requirement).				

Notes:

1. BS EN 13242 assumes that crushed rock aggregates comply with category $C_{90/3}$ without further testing.
 2. Where permitted by the design.
- 5 Where recycled coarse aggregate or recycled concrete aggregate is used in unbound mixtures in accordance with Clauses 0802 to 0803, 0805, 0807, and 0808 it shall have been tested and comply in accordance with Clause 0710. Recycled coarse aggregate and recycled concrete aggregate used in unbound mixtures in accordance with Clauses 0803 and 0807 shall also comply with the additional requirements of Table 8/3. Factory Production Control must be submitted to the *Client* to ensure recycled aggregates do not contain the Chemical Determinands set in Series 0600.

TABLE 8/3: Additional Requirements for Recycled Coarse Aggregate and Recycled Concrete Aggregate Used in Type 1 and Type 4 Unbound Mixtures

Unbound Mixture	Type 1	Type 2	Type 4 (asphalt arisings)
Component Identified by Clause 0710	Maximum Permitted Content (% by mass)		
Asphalt (Class Ra)	50	50	100
Glass (Class Rg)	25		
Other materials (Class X), including wood, plastic and metal	1		

- 6 Clauses 0803 and 0807 as appropriate, the unbound mixture shall satisfy the minimum CBR requirement of Appendix 7/1 when tested in accordance with Clause 7 of BS 1377-4, with surcharge discs. The specimens shall be tested in a soaked condition. The mixture shall be tested at the density and moisture content likely to develop in equilibrium field conditions which shall be taken as being the density relating to the uniform air voids content of 5% and the value of optimum water content declared when tested as required by BS EN 13285.

Frost Heave

- 7 Subject to the tolerances given in Table 7/1 material used within 350 mm of the surface shall not be frost susceptible.
- 8 Material shall be determined as being not frost susceptible by tests in BS 812-124. Comparator specimens in accordance with Annex B of BS 812-124 shall be used.

0804SR Type 2 Unbound Mixtures

- 1 Type 2 Unbound Mixtures are not specified for use

0806SR Category B (close graded) Unbound Mixtures

- 1 Category B (close graded) Unbound Mixtures are not specified for use

0808AR SuDS (Sustainable Drainage Systems) Unbound Mixtures

4/20 SuDS Unbound Mixtures

- 1 4/20 SuDS Mixtures shall comply with the requirements set in BS 7533-13 and this Specification.

4/40 SuDS Unbound Mixtures

- 2 4/40 SUDS Mixtures shall comply with the requirements set in BS 7533-13 and this Specification.

0820SR Aggregates

- 1 The aggregates used in HBM shall comply with BS EN 13242 and the selected requirements listed in Table 8/12. Where recycled coarse aggregate or recycled concrete aggregate is used in HBM, it shall also be tested in accordance with Clause 0710 and comply with the additional requirements for the proportion of the components listed in Table 8/12.
- 2 When required by scheme-specific Appendix 7/1, an existing pavement layer that is to be used to produce HBM shall be tested to confirm compliance with sub-Clause 0820.1.

TABLE 8/12: Aggregate Requirements for HBM

Clause reference	0821	0822	0830	0831	0832	0835
HBM designation	CBGM A	CBGM B	FABM 1 HRBBM 1	SBM B2, FABM 2 HRBBM 2	SBM B3, FABM 3 HRBBM 3	SBM B1-1, B1-2, B1-3 & B1-4
Categories for aggregate properties, BS EN 13242						
Crushed or broken particles and totally rounded particles in coarse aggregate	C _{NR} (Note 1)	C _{NR} unless otherwise specified in the design	C _{90/3} or C _{50/30} , as specified in scheme-specific Appendix 7/1 (Note 2)		C _{NR} (Note 1)	C _{90/3} or C _{50/30} as specified in scheme-specific Appendix 7/1
Resistance to fragmentation of coarse aggregate	L _{ANR}	L _{A50} or L _{A60} as specified in scheme-specific Appendix 7/1	L _{A50} or L _{A60} as specified in scheme-specific Appendix 7/1	L _{A50}	L _{ANR}	L _{A50}
Acid-soluble sulfate content (Note 3)	Air-cooled blast-furnace slag - AS _{1,0}					
	Aggregates other than Air-cooled blast-furnace slag - AS _{0,8}					
Total sulfur content (Note 3)	Air-cooled blast-furnace slag - S ₂					
	Other aggregates - S ₁					
Other requirements, BS 1377-2						
Fines quality (Note 4)	NR (Note 1)	<i>Non-plastic</i>			NR (Note 1)	<i>Non-plastic</i>
Proportion of components, Clause 0710						
Maximum glass content (Class RgG)	40	40	40	40	40	40
Maximum impurities content (Class X)	5	3	3	3	5	3

Notes to Table 8/12:

1. The suffix NR denotes that the 'No requirement' category applies.
2. CNR if FABM 1 contains at least 3% CEM 1 cement by dry mass of the mixture and trafficking is prevented for 7 days.
3. Where the *Contractor* is able to provide evidence of mixture stability over an extended period then the Overseeing Organisation may consider the use of higher limits.
4. Where required, the size fraction of the aggregate passing the 0.425 mm size test sieve shall be non-plastic as defined by and tested in compliance with BS 1377-2

0823SR Cement Bound Granular Mixtures C (CBGM C)

Cement Bound Granular Mixtures C (CBGM C) are not specified for use.

Additional, Cancelled, Modified & Substitute Clauses

Series 0900 Road Pavements – Bituminous Bound Materials

0902SR	Reclaimed Asphalt
0903MR	Placing and Compaction of Bituminous Mixtures
0918SR	Slurry Surfacing Incorporating Microsurfacing
0920MR	Bond Coats, Tack Coats and Other Bituminous Sprays
0921SR	Surface Macrotexture of Bituminous Surface Courses
0922SR	Surface Dressing: Design, Application and End Product Performance
0924SR	High Friction Surfaces
0942SR	Thin Surface Course Systems
0959AR	Coloured Cold Applied Surface Treatments
0960AR	Composite Geosynthetic for Asphalt Overlay
0961AR	Self-Adhesive Geosynthetic for Trench Repair or Widening
0962AR	Warm Mix Asphalt
0963AR	Cold Mix Asphalt
0964AR	Additional Reclaimed Asphalt (Enviro Asphalt)
0965AR	Grouted Macadam Surface Course
0966AR	Bituminous Stress Absorbing Membrane Interlayers (SAMI)
0967AR	Performance Classes of Asphalts
0968AR	Stone Mastic Asphalt Surface Course
0969AR	EME Surface Course
0970AR	Surfacing Integrity – Performance Guarantee for all Surface Courses (excluding Clause 0918 and Clause 0921)

0902SR Reclaimed Asphalt

- 1 The requirements of this clause apply to all bituminous mixtures containing reclaimed asphalt.
- 2 Reclaimed asphalt may be used in the production of bituminous surface course, binder course, regulating course and base. Unless otherwise shown to comply Clause 0964, the use of reclaimed asphalt shall be in accordance with:
 - a) Clause 0942 for surface course mixtures;
 - b) BSI PD 6691, B.2.4.4 for Asphalt Concrete mixtures (macadams);
 - c) BSI PD 6691, C.2.3.4 for Hot Rolled Asphalt mixtures; and
 - d) BSI PD 6691, D.2.2.3 for Stone Mastic Asphalt mixtures.

Other recycled materials shall only be used in bituminous mixtures with the approval of the *Client*.

Reclaimed Feedstock

- 3 All reclaimed material shall be pre-treated before usage such that it is homogeneously mixed, and the maximum particle size does not exceed 32 mm.

Properties of Binder

- 4 The fresh bitumen added to the mixture shall not be more than two grades softer than the nominal grade for the mixture given in Table 12 of BSI PD 6691. Checks on the penetration of the binder recovered from the reclaimed asphalt, together with a calculation of the properties of the combined binder, shall be carried out in accordance with the relevant parts of BS EN 13108. When more than 10% of reclaimed asphalt is incorporated in a mixture, tests on binder recovered from the mixture shall be carried out following the example in BSI PD 6691 13.3.6.2. The results shall be within the limits set out in BSI PD 6691 13.3.6.2.

Mixed materials containing more than 25% reclaimed asphalt

- 5 When more than 25% of reclaimed asphalt is incorporated in a designed base or binder course mixture, cores taken to assess compliance with Clause 0929.12 or Clause 0930.14 shall also be tested for stiffness in accordance with BS EN 12697-26 (ITSM method 20°C). The frequency and method of testing shall be agreed with the *Client* prior to the commencement of works.
- 6 The stiffness of the mixture shall comply with the appropriate category from Table 9/1.

Table 9/1: Stiffness Categories for Designed Base and Binder Course Mixtures Incorporating Greater than 25% Reclaimed Asphalt

Nominal binder grade of mixture	Stiffness category (Smin)
10/20	5500
15/25	5500
30/45	2800
40/60	1800

0903MR Placing and Compaction of Bituminous Mixtures

Insert new sub-Clause 27(iii):

- (iii) Where a new bituminous layer other than the surface course is to be opened to highway traffic as a temporary running surface for more than 3 calendar days the aggregate shall have a minimum PSV of 55.

Insert new sub-Clause 29:

Placing of Bituminous Mixtures, Site Testing and Records

29 The *Contractor* shall record asphalt placement information for each load of mix delivered, including but not limited to:

- (i) Air temperature;
- (ii) Load quantity;
- (iii) Load placement location and time;
- (iv) Asphalt temperature prior to paving;
- (v) Asphalt temperature recorded at mid-depth prior to rolling commencing;
- (vi) The in situ void content using non-destructive methods after rolling;
- (vii) The surface course texture depth measured in accordance with BS EN 13036-1 or through automated methods if correlation can be shown and the method is approved by the *Client*.

The *Client* shall inform the *Contractor* of any BIM requirements for the scheme such as:

- (viii) Spatial information showing the number of roller passes mapped; or.
- (ix) Spatial information showing temperatures at the back of screed using infrared thermal imagery mapped.

0918SR Slurry Surfacing Incorporating Microsurfacing

1 The *Contractor* shall be responsible for the design of the Slurry Surfacing, choice of materials, techniques and processes based on site and traffic data and present it to the *Client* for approval.

2 The *Contractor* shall:

- a) Provide a Design Proposal to achieve the performance requirements in terms of texture, maximum levels of defects and longevity as set out in this Clause ensuring that the Slurry Surfacing has an initial stability such that it is capable of withstanding the normal traffic for the site when first opened;
- b) State the Estimated Design Life of the Slurry Surfacing in the Design Proposal;
- c) Provide a Quality Plan;
- d) Carry out the Slurry Surfacing in accordance with the manufacturer's installation instructions and the Design Proposal to the stated thickness and tolerances.

3 The *Contractor* shall guarantee the design, materials and workmanship against defects and against failure to meet the end performance requirements for a period of two years, from the

date of completion of the work. The *Contractor* shall rectify any defects identified during the guarantee period.

The System

- 4 The proposed Slurry Surfacing shall comply with BS EN 12273 and it shall be CE marked. The *Contractor* shall provide the declaration of performance and installation information as required by Clause 0104.3, this Clause and Appendix 7/7.

Aggregates

- 5 The aggregate shall be crushed rock, slag, gravel or calcined bauxite, complying with this specification. The coarse aggregate shall have a minimum declared PSV and a maximum AAV as specified by the *Client* and the design. In the Design Proposal, the *Contractor* shall provide the declaration of performance for the aggregate which shall demonstrate that the aggregate shall meet the requirements of the specification including the properties detailed by the *Client* and the design. The grading and binder content shall not differ from the proposed target values by more than the tolerances detailed in the Design Proposal.

Binder

- 6 The *Contractor* shall provide, with the Design Proposal, the declaration of performance for the binder which shall demonstrate that the binder shall meet the requirements of the specification including the properties detailed in Appendix 7/7.

Contract compliance testing shall be carried out by the *Contractor* as detailed in scheme specific Appendix 1/5. The recovery of the binder shall be carried out in accordance with Clause 0955. The test to determine Vialit Pendulum Cohesion shall be carried out in accordance with BS EN 13588. The *Contractor* shall provide rheological product identification data for modified binders in accordance with BS EN 14770.

Coloured Materials

- 7 Where required by the *Client* a coloured slurry surfacing shall be provided. All coloured slurry surfacings shall be approved by the *Client* and conform in all respects with the requirements of this Clause.

Equipment

- 8 The mixing machine shall be capable of uniform application and the provision of a continuous surface without ridges or segregation.

Preparation

- 9 Any necessary remedial works to the road surface and structure shall be completed by the *Contractor* and agreed as acceptable by the *Client* and the *Contractor* before Slurry Surfacing commences.
- 10 A bond coat complying with Clause 0920 shall be applied prior to the Slurry Surfacing with or without grit or chippings in order to seal the existing substrate and to enhance the bond to the existing road surface unless the *Contractor* can demonstrate that sufficient bond will be developed without its use. This treatment shall be in accordance with the *Contractor's* method statement contained within the Design Proposal.

Mixing

- 11 The Slurry Surfacing shall be mixed in a continuous flow mixing machine and discharged directly into the spreader box. Where the material is to be hand laid the Slurry Surfacing may

be mixed in a batch mixer or supplied to site pre-mixed in suitable containers. The Quality Plan shall detail the precautions to be taken to achieve a homogeneous mixture.

Application

- 12 Spreading shall not be undertaken when the temperature falls below 4°C or when standing water is present on the surface. In warm dry weather, the surface immediately ahead of spreading, shall be slightly damped by mist water spray applied mechanically, or for hand laying by a hand operated pressure sprayer.
- 13 Transverse joints shall be formed with spreading starting and finishing on a protective strip not less than 100 mm wide at each end of the lane length or area being treated to produce an equivalent standard. Transverse joints shall be formed such that there shall be no ridges or bare strips.
- 14 Longitudinal joints, where the material is laid on a carriageway, shall coincide with lane markings. Longitudinal joints shall be formed such that there shall be no ridges or bare strips.
- 15 Footways and other confined areas may be spread by hand using squeegees and brooms. Footways shall be finished by dragging a dampened broom transversely over the footway under its own weight or other method producing a similar macrotexture.
- 16 The finished Slurry Surfacing shall have a uniform surface macrotexture throughout the work, without variations of macrotexture within the lane width, or from area to area. All voids, cracks and surface irregularities shall be completely filled.
- 17 The finished surface shall be free from blow holes and surface irregularities due to scraping, scabbing, score marks, dragging, droppings, excess overlapping or badly aligned longitudinal or transverse joints, damage by rain or frost, or other defects which remain 24 hours after laying. Slurry Surfacing which does not comply with this Clause or is non-uniform in surface macrotexture or colour, 24 hours after laying shall be rectified by removal and replacement, or superimposed if this is impractical, with fresh material in compliance with this Clause. Areas so treated shall be not less than 5 m long and not less than one lane wide (or the full width if less than a lane wide). All areas being worked on shall be kept free of traffic until the material has set sufficiently to carry the traffic.
- 18 The *Contractor* shall record the amount of Slurry Surfacing used and the area covered for each run or section completed.
- 19 The *Contractor* shall facilitate duplicate or joint testing by the *Client* if required.

Aftercare

- 20 The *Contractor* shall remove surplus aggregate from the treated areas using a method stated in the Quality Plan. The *Contractor* shall monitor the Slurry Surfacing closely for a minimum period of 2 hours and if necessary, the lane shall be swept again. The monitoring shall continue until the Slurry Surfacing has reached sufficient stability to carry unrestricted traffic. If there are signs of distress, the *Contractor* shall reinstate traffic management or other such remedial action where necessary in order to prevent further damage.
- 21 Further operations to remove subsequently loosened aggregate shall be carried out over the next 48 hours. The areas treated, and adjacent side roads, footways and paved areas shall be kept substantially free of loose aggregate for a period of 30 days after completion of the work.

Site Records

- 22 The *Contractor* shall provide site records including all contract compliance test results, volumes of Slurry Surfacing used, and areas covered with calculated thickness, record of traffic control carried out, and weather information.

Performance Standards for Slurry Surfacing During the Guarantee Period

Surface Macrotexture

- 23 The *Contractor* is responsible for maintaining the surface macrotexture requirements throughout the guarantee period.

The definitive test is the volumetric patch technique measured in accordance with BS EN 13036-1 except that 10 individual measurements shall be made on the nearside (inside) wheel-track of the most heavily trafficked lane or for low traffic category sites the track carrying the most stress. The average macrotexture depth of each lane kilometre, or the complete carriageway lane where this is less than 1000 metres, shall be as specified by the *Client* and the design. The average of each set of 10 individual measurements shall be not less than 80% of the minimum permitted.

Surface Profile

- 24 The surface profile of the slurry surfacing, when measured in accordance with Series 0700, shall meet the requirements specified in series 0700 both transverse and longitudinal profile.

Performance Threshold

- 25 When the extent of area and linear defects are monitored using the visual method of assessment in accordance with BS EN 12274-8, the Slurry Surfacing shall have less than the permitted maximum level of defects.
- 26 Coloured materials shall retain their colour throughout the guarantee period.

0920MR Bond Coats, Tack Coats and Other Bituminous Sprays

At the end of sub-Clause 2 Insert:

“Bond coats shall be used underneath all asphalt layers. Bond coats shall conform to the requirements outlined in BS 594987 Clause 5.”

Delete sub-Clause 3 and Replace with:

- “3 Tack coats are not permitted for use.”

In sub-Clause 6, delete the first sentence.

In sub-Clause 6, delete “When specified in contract specific Appendix 7/4”.

0921SR Surface Macrotexture of Bituminous Surface Courses

- 1 Surface macrotexture of bituminous surface courses other than those covered by Clause 0942, shall be in accordance with this Clause. Initial surface macrotexture for bituminous surface courses shall be measured using the volumetric patch method described in BS EN 13036-1.

- 2 Texture depth shall be measured by 10 individual measurements taken at approximately 5 m spacing along a diagonal line across the lane width. At least one set of 10 measurements shall be made for each 250 m section of carriageway lane. The average texture depth for each set of 10 individual measurements and the average texture depth of each 1000 m section (or complete carriageway lane where this is less than 1000 m) shall not be less than the appropriate values shown in Table 9/3. Average minimum texture depth shall be 1.0 mm or less where High Friction Surfacing to Clause 0924 is to be laid immediately on new bituminous surface course.

Table 9/3: Requirements for Initial Texture Depth for Materials Other Than Those Covered by Clause 0942

Road Type	Surfacing Type	Average per 1000 m section, mm		Average for a set of 10 Measurements, mm (minimum)
		Minimum	Maximum	
High-speed roads Posted speed limit \geq 50 miles/hr and \leq 70miles/hr	All other Asphalts (not Clause 0942)	1.1	1.5	1.1
	Chipped hot rolled asphalt	1.5	2.0	1.2
Lower speed roads Posted speed limit \leq 40 miles/hr	All other Asphalts (not Clause 0942)	0.8	1.3	0.8
	Chipped hot rolled asphalt	1.2	1.7	1.0
Roundabouts on high-speed roads Posted speed limit \geq 50 miles/hr and \leq 70miles/hr	All other Asphalts (not Clause 0942)	1.0	1.5	1.0
	Chipped hot rolled asphalt	1.2	1.7	1.0
Roundabouts on lower speed roads Posted speed limit \leq 40 miles/hr	All other Asphalts (not Clause 0942)	0.8	1.3	0.8
	Chipped hot rolled asphalt	1.0	1.5	0.9

0922SR Surface Dressing: Design, Application and End Product Performance

1. The *Contractor* shall be responsible for the design of the Surface Dressing, choice of materials, techniques and processes based on site and traffic data and present it to the *Client* for approval.
2. The *Contractor* shall:
 - a) Provide a Design Proposal to achieve the performance requirements in terms of macrotexture and maximum levels of defects as set out in this Clause and in Appendix 7/3 ensuring that the Surface Dressing has an initial stability such that it is capable of withstanding the normal traffic for the site when first opened.
 - b) State the Estimated Design Life of the Surface Dressing in the Design Proposal.

- c) Provide a Quality Plan.
 - d) Carry out the Surface Dressing in accordance with BS EN 12271 and the Design Proposal to the tolerances specified.
- 3 The *Contractor* shall guarantee the design, materials and workmanship against defects and against failure to meet the end product performance requirements for a period of two years from the date of completion of the work. The *Contractor* shall rectify any defects identified during the guarantee period.

The System

- 4 The proposed Surface Dressing shall comply with BS EN 12271 and it shall be CE marked. The *Contractor* shall provide the declaration of performance and installation information as required in Clause 104(3), this Clause and Appendix 7/3.

Materials and Equipment – Binder

- 5 The binder shall be bitumen emulsion complying with BS EN 13808 and be CE marked and comply with requirements stated in Appendix 7/3.
- 6 The *Contractor* shall provide, with the Design Proposal, the declaration of performance for the binder which shall demonstrate that the binder shall meet the requirements of the specification including the properties detailed in Appendix 7/3.

Contract compliance testing shall be carried out as detailed in scheme-specific Appendix 1/5. The recovery of the binder shall be carried out in accordance with Clause 0955. The test to determine Vialit Pendulum Cohesion shall be carried out in accordance with BS EN 13588. The *Contractor* shall provide rheological product identification data for modified binders in accordance with BS EN 14770. The data provided shall be not more than 6 months old and obtained on samples of binder representative of binder manufactured and supplied using the same source and processes as the proposed binder. Health and Safety information and a safe handling guide from the manufacturer shall be provided together with details of any weather restrictions placed upon use of the binder.

- 7 The binder application shall be uniform and shall be of sufficient width to allow a full lane to be dressed in a single pass. Before spraying begins, the *Contractor* shall provide the *Client* with a test certificate showing test results for rate of spread and accuracy of spread of binder carried out in accordance with the test methods in BS EN 12272-1 and issued by, an appropriate organisation, accredited in accordance with sub-Clause 0105.4 for those tests, demonstrating that the binder sprayer has been tested, using the binder to be used in the Contract, not more than six weeks before the commencement of the work, and that it complies with the requirements set.

Materials and Equipment – Chippings

- 8 The chippings shall be crushed rock, slag, calcined bauxite complying with the general requirements of BS EN 13043. The aggregate shall have a minimum declared PSV and a maximum AAV as specified by the *Client* and the design.
- 9 Chipping spreaders shall have controlled metering and be capable of variable or fixed width application to match the binder sprayer. Before a spreader is used, the *Contractor* shall provide the *Client* with a test certificate showing test results for rate of spread and accuracy of spread of chippings carried out in accordance with the test methods in BS EN 12272-1, and issued by an appropriate organisation, accredited in accordance with sub-Clause 0105.4 for

those tests, demonstrating that the chipping spreader has been tested, using chippings similar to those to be used in the Contract, not more than six weeks before the commencement of the work, and that it complies with the requirements set.

Preparation

- 10 Any necessary remedial works to the road surface and structure shall be completed prior to or as part of the contract and agreed as acceptable by the *Client* and the *Contractor* before Surface Dressing commences.

Application

- 11 Application shall not be undertaken when the temperature falls below 4°C or when standing water is present on the surface. Transverse joints shall be formed with spraying starting and finishing on a protective strip not less than 1 metre wide at each end of the lane length being treated. Transverse joints shall be of binder overlap only and not wider than 100 mm. There shall be no ridges or bare strips. Longitudinal joints shall coincide with lane markings. Longitudinal joints shall be of binder overlap only, while ensuring that the proposed rate of spread is achieved across the joint, for quartering (using a part of the spray bar) the overlap may be extended to a maximum of 300 mm. There shall be no ridges or bare strips.
- 12 The *Contractor* shall carry out the tests for rates of spread and accuracy of application of binder and chippings in accordance with the test methods in BS EN 12272-1 at the frequency specified in by the *Client* and the design and report the results verbally to the *Client* within twenty-four hours of carrying out the test and confirm in writing within seven days. The *Contractor* shall facilitate duplicate testing by the *Client* if required.

Aftercare

- 13 The time period before unrestricted traffic may use the Surface Dressing shall not exceed that specified by the manufacturer. The *Contractor* shall remove surplus chippings from the road by suction sweeping before it is opened to unrestricted traffic.
- 14 The *Contractor* shall monitor the Surface Dressing closely for a minimum period of 2 hours after the road is opened to traffic. The *Contractor* shall reinstate traffic safety and management procedures or institute other such remedial action where necessary, such as dusting, if there are signs of distress, such as turning of the chippings, in order to prevent further damage to the Surface Dressing.
- 15 Further operations to remove subsequently loosened chippings shall be carried out over the next 48 hours. The road, and adjacent side roads, footways and paved areas, shall be kept substantially free of loose chippings for a period of 30 days after completion of the work.

Site Records

- 18 The *Contractor* shall provide site records including all contract compliance test results, weights of aggregate used, volumes of emulsion used, record of traffic control carried out, and weather information.

Performance Standards During the Guarantee Period

Surface Macrotexture

- 19 The *Contractor* is responsible for maintaining the surface macrotexture requirements throughout the guarantee period.

The definitive test is the volumetric patch technique measured in accordance with BS EN 13036-1 except that 10 individual measurements shall be made on the nearside (inside) wheel-track of the most heavily trafficked lane. The average macrotexture depth of each lane kilometre, or the complete carriageway lane where this is less than 1000 metres, shall be as specified in Appendix 7/3. The average of each set of 10 individual measurements shall be not less than 80% of the minimum permitted.

The *Client* will use the suitable equipment to determine the Sensor Measured Texture Depth (SMTD). Measurements of SMTD shall be made in the nearside and offside wheel-tracks of all lanes. For other roads where road closure is less critical the volumetric patch technique or other measuring devices such as the Mini Texture Meter may be used.

The SMTD or results from other devices shall be calibrated for the particular Surface Dressing product design and condition against volumetric patch values to provide the Volumetric Patch Equivalent value. The macrotexture depths will be measured after 11 months and before 13 months and additionally for two-year guarantee period contracts after 22 months and before 24 months unless otherwise instructed by the *Client*. When required, the *Contractor* shall design the Surface Dressing to limit the maximum macrotexture after four weeks trafficking to that specified by the *Client* and the design and the macrotexture depths will be measured, for this purpose, between three weeks and five weeks after completion of the Works.

Defects

- 20 The extent of chipping loss or other defects will be monitored using a visual method of assessment. The performance standard is that any section of the works shall be deemed as having failed if the areas of defects do not comply with the classes specified in Appendix 7/3. If there is a failed section, the *Contractor* shall agree on remedial measures with the *Client* and undertake the remedial measures.

In the event that the *Contractor* and *Client* are unable to reach agreement on whether a section has failed by qualitative visual assessment described in BS EN 12272-2, the level of defects shall be determined in accordance with the quantitative test methods in BS EN 12272-2. Any section failing to meet the required standard as specified shall be subject to remedial action by the *Contractor* after agreement of the *Client*.

0924SR High Friction Surfaces

- 1 High friction surfacing systems shall have current HAPAS certificate or equivalent product acceptance scheme certification as described in sub-Clauses 0104.15 and 0104.16.
- 2 High friction surfacing shall be installed in accordance with the requirements of the HAPAS or equivalent product acceptance scheme certification.
- 3 The high friction surfacing system HAPAS or equivalent product acceptance scheme certification shall have a Type 1 classification.
- 4 The high friction surfacing system shall be cold applied and shall achieve a minimum tensile adhesion of 1.0 MPa as specified in Appendix 7/1 when tested in accordance with TRL Report 176 Laboratory Tests on High-Friction Surfaces for Highways Appendix J. Hot applied high friction surfacing systems are not permitted for use.

Aggregate

- 5 Aggregate used in high friction surfacing systems shall have the minimum declared PSV category specified in Appendix 7/1 in accordance with BS EN 13043, clause 4.2.3. The resistance to abrasion of coarse aggregate shall have the maximum AAV specified in Appendix 7/1 in accordance with BS EN 13043, clause 4.2.4. The *Contractor* shall provide before work commences, the declaration of performance for the aggregate to the *Client*. The declaration of performance shall demonstrate that the aggregate shall meet the requirements of the specification.
- 6 Where the surfacing treatment requires to be coloured, the aggregate shall be of a colour as stated by the *Client*. A sample shall be submitted to the *Client* for acceptance 14 calendar days prior to work commencing on site.

Installation and Quality Control Procedures

- 7 The installation and quality control procedures shall be in accordance with the HAPAS or equivalent product acceptance scheme certification for each system and the current method statement. The results of all quality control checks carried out on site by the *Contractor* and quality management information compiled in accordance with the requirements of the Certificate, including results from surveillance visits, shall be made available to the *Client* on request.

System Coverage

- 8 For each location where high friction surfacing is applied, the total quantities of each system component used, the measured area of the surface treated and the calculated coverage rate in kg/m² shall be reported to the *Client* within three days of completion at that location. For systems in which aggregate is broadcast over a film of binder applied to the surface, the calculated coverage rate shall be that of the binder film and shall not include the mass of the aggregate.

Site Records

- 9 The *Contractor* shall supply all site records including but not limited to the air temperature, humidity, surface temperature, binder volume, aggregate weight and tensile adhesion tests locations and results to the *Client* to ensure compliance with the requirements of this Clause.

Guarantee

- 10 Prior to commencement of the work the *Contractor* shall inspect the site to become satisfied that the existing road surface is satisfactory for the proposed treatment and shall notify the *Client* of the findings.
- 11 The *Contractor* shall guarantee the high friction surfacing materials and workmanship for a period of two years from the date of opening the surfacing to traffic. This guarantee shall cover failure to meet the minimum requirements set out in Table 4 of the HAPAS document 'Guideline Document for the Assessment and Certification of High Friction Surfaces for Highways'.

0942SR Thin Surface Course Systems

General

- 1 Thin surface course systems (TSCS) shall be provided and installed in accordance with the requirements stated in this Clause and those given in Appendix 7/1.
- 2 Thin surface course systems specified under this Clause shall be between 20 mm and 50 mm thick.

Overall Performance Requirements

- 3 The *Contractor* shall guarantee the installed thin surface course for a period of five years from the date of opening to traffic. For the period of the guarantee, the thin surface course shall meet the performance requirements stated in this Clause and Appendix 7/1. The guarantee shall exclude defects arising from accidental damage or damage caused by settlement, subsidence or failure of the underlying carriageway on which the surfacing material has been laid. Replacement of the surfacing or other remedial measures agreed with the *Client* shall be executed if the surfacing is in a "Suspect", "Poor" or "Bad" condition as defined in Appendix A of TRL Report TRL674 – "Durability of thin surfacing systems, Part 4, Final report after nine years monitoring, TRL report 674".
- 4 The *Contractor* shall demonstrate that the 'as installed' thin surface course system can meet the requirements of the specification. This shall be demonstrated by the system meeting the stated material requirements and by having undergone a System Installation Performance Trial (SIPT) to cover the aspects of the installation not covered by the material's declaration of performance. The SIPT shall comply with the requirements of sub-Clauses 23 to 43 of this Clause. An acceptable approach for the SIPT would be to use a scheme in accordance with sub-Clause 0104.16. The *Contractor* shall submit details of the SIPT for the systems to be used in the contract as required in sub-Clause 28 to the *Client* for acceptance.

Material Requirements

- 5 The thin surface course mixture shall comply with BS EN 13108-1, BS EN 13108-2 or BS EN 13108-5. It shall be CE marked and the *Contractor* shall submit the declaration of performance for the material to the *Client*. The declaration of performance shall demonstrate that the material meets the requirements of the specification.
- 6 The coarse aggregate shall be crushed rock or steel slag complying with Clause 0901 and BS EN 13043:2002. The *Contractor* shall submit the declaration of performance for the aggregate to the *Client*. The declaration of performance shall demonstrate that the aggregate meets the requirements of the specification. The resistance to polishing and abrasion, PSV and AAV, shall be as specified in Appendix 7/1.

The aggregate resistance to fragmentation and flakiness Index shall be as follows:

- a) Resistance to fragmentation: Los Angeles Coefficient (LA) – not greater than LA30.
- b) Flakiness Index (FI) – not greater than FI20.

The maximum aggregate size shall be as given in Table 9/9.

Table 9/9: Maximum Aggregate Size

Site Definition	Maximum Aggregate Size
Roundabouts	10 mm
Bends < 250 m radius	10 mm
Signalised junctions and junctions where turning radius movements < 250 m	10 mm
All other sites	10 mm / 14 mm

- 7 The minimum target design binder contents shall be in accordance with Table 9/10 and Appendix 7/1.

Table 9/10: Minimum design binder content

Maximum aggregate size (D)	Minimum target design binder content (B_{min}) (Binder complying with BS EN 14023 or BS EN 12591)	
	Mixture types: EN13108, Part 1	Mixture types: EN 13108 Part 5
14	5.2	6.0
10	5.5	6.2
6	5.8	Not used

- 8 The resistance to permanent deformation shall be as specified in Appendix 7/1. The resistance to permanent deformation of mixtures conforming to BS EN 13108 Parts 1 and 5 shall be in accordance with the appropriate class selected from Table B.4 or D.2 respectively of PD 6691.
- 9 The water sensitivity shall be as specified in Appendix 7/1. The water sensitivity of mixtures conforming to BS EN 13108 Parts 1, 2 and 5 shall conform to, at least, category ITSR_{min}90.
- 10 The design void content shall be $V_{min}2$ to $V_{max}5\%$.
- 11 Contract compliance testing of the mixture shall be carried out as required in Appendix 1/5 and samples supplied as detailed in Task specific Appendix 1/6.

Installation Requirements: General

- 12 The *Contractor* shall provide an Installation Method Statement to the *Client*. It shall include the SIPT method statement as described in sub-Clause 26 of this Clause, all installation instructions relevant to the system being used, details as specified in this Clause and details to meet the requirements of Clause 0903.
- 13 The design thickness of the thin surface course system shall be as specified in Appendix 7/1 within the minimum and maximum design thickness permitted in Table 9/11. The installed layer thickness must not be less than the permitted minimum thickness, nor greater than the permitted maximum thickness, stated in the Installation Method Statement.

Table 9/11: Design Target Layer Thickness.

Nominal Aggregate size, mm	Design target thickness, mm	
	Minimum	Maximum
6	20	30
10	25	40
14	35	50

- 14 Where required in the Installation Method Statement or the design, to achieve final pavement levels and/or thicknesses the existing substrate surface shall be strengthened or regulated in accordance with Clause 0907.
- 15 Where the existing substrate surface is regulated in accordance with Clause 0907, evidence that the deformation resistance of the regulating material will meet the specification shall be submitted by the *Contractor* to the *Client*. Where the combined thickness of the regulating material and the thin surface course is more than 20 mm, evidence of the deformation resistance of the combined layers shall be provided.
- 16 Surface preparation including the removal of road markings, cleaning and drying, resetting of ironwork and road studs shall be in accordance with BS 594987 and the Installation Method Statement.
- 17 A bond coat shall be applied. It shall be in accordance with the Installation Method Statement. Unless otherwise stated in the Installation Method Statement is shall also comply with Clause 0920 and BS 594987. A calibrated mechanised method of application shall be used unless otherwise agreed with the *Client*.
- 18 Transportation of the thin surface course material shall be in accordance with the System Installation Method Statement and Clause 0903.

Installation Requirements: Surface Macrotexture – Untrafficked

- 19 The surface macrotexture depth of the thin surface course system shall be measured in accordance with BS EN 13036-1. The macrotexture of the installed surfacing shall comply with the relevant section of Table 9/13.

Table 9/13: Requirements for Initial Texture Depth for Thin Surface Course Systems

Road Class	Posted traffic speed	Average per 1000 m section, mm		Average for a set of 10 measurements mm (minimum)
		Minimum Initial (mm)	Maximum Initial (mm)	
A	≥ 50 mph	1.1	1.5	1.1
A	All other traffic speeds	0.8	1.3	0.8
B, C, U	All traffic speeds	0.8	1.3	0.8

- 20 For a period of two years from the date of opening to traffic the average macrotexture, measured using the volumetric patch technique in accordance with BS EN 13036-1, will be maintained above the levels given Table 9/14. The measurements shall be in the most heavily trafficked lane at 10 m intervals along the centre of the most heavily worn wheel-track.

Table 9/14: Retained Surface Macrotexture Requirements

Surfacing Type	Average texture depth per 1000 m section, mm*
Systems with all aggregate sizes laid on non-trunk low-speed A, and all B, C and U classification roads	0.6

* or the complete carriageway lane where this is less than 1,000 m.

Installation Requirements: Torque Bond

- 21 The bond strength between a thin surfacing system and its substrate shall be ≥ 400 kPa, measured in accordance with Clause 0951.

Installation Requirements: Noise

- 22 The thin surface course system shall have the road/tyre noise characteristics Level 2 as given in Table 9/17.

System Installation Performance Trial (SIPT) Requirements

- 23 The thin surface course used in the SIPT shall meet the performance requirements of the thin surface course to be supplied under the contract. This shall be demonstrated by the assessments and testing undertaken for the SIPT.
- 24 The installed thin surface course system shall be assessed, tested and certified by a Certification Body using one or more trial areas of surfacing. The Certification Body shall be accredited to BS EN 45011 by UKAS or equivalent European Accreditation organisation which is party to a multilateral agreement (MLA) with UKAS or any equivalent International Accreditation Forum MLA signatory with a scope that includes relevant standard(s) or scheme(s).
- 25 The area of surfacing for the SIPT shall be a minimum of 200 m in length and 3.5 m in width.
- 26 A SIPT method statement shall be prepared. The SIPT shall demonstrate, and enable verification of, the installation procedures given in the SIPT method statement. This will include the correct application rates of the bond (or tack) coat, application method of bond coat, paving speed of mixed material, joint formation, laying temperatures, methods of verification to be used on site, maintenance and repair techniques, aftercare, and frequency of testing and acceptable variations within the specified limits.
- 27 A SIPT inspection protocol shall be prepared. It shall demonstrate qualitatively and quantitatively the applicability of the SIPT for the system in order to satisfy the performance requirements.
- 28 The SIPT method statement, SIPT inspection protocols, all inspection and testing results and the SIPT certification shall be submitted to the *Client* along with the Installation Method Statement.
- 29 The SIPT shall include the following to be undertaken by the Certification Body:
- a) verification that the system installation trial has been undertaken in accordance with the SIPT method statement and the stated protocols;
 - b) assessment of the visual condition of the completed system at the times stated in sub-Clause 30;
 - c) assessment of the data from the site performance tests detailed in sub-Clause 30.

The assessments shall be undertaken by an assessment team that includes a lead assessor with experience in pavement inspections and a minimum of two additional suitably experienced persons to comprise an inspection panel for the visual condition of the SIPT installation and interim inspections.

- 30 The installed performance characteristics of the trial area shall meet the criteria stated in Table 9/15 at the times and intervals stated.

Table 9/15: Installed Performance characteristics

Characteristic	Performance Requirements	Time(s) at which the performance characteristic shall be determined or measured
Visual inspection As defined in sub-Clause 32	Good or Excellent	At opening to traffic.
	Good or Excellent	12 months after opening to traffic.
	Good or Excellent	24 months after opening to traffic
Surface macrotexture depth (BS EN 13036-1)	Appendix 7/1 or Table 9/13	At opening to traffic.
	Appendix 7/1 and Table 9/14	12 months after opening to traffic.
	Appendix 7/1 and Table 9/14	24 months after opening to traffic
Torque Bond	≥ 400 kPa	Between 28 and 56 days after installation.
Road/Tyre Noise level	Table 9/17	Between 12 and 24 months after opening to traffic.
Void Content (Voluntary assessment and declaration)	Sub-Clause 34	Between 0 and 24 months after opening to traffic.

- 31 Defects identified during the visual inspections shall be recorded. The defects to be recorded are those described in TRL 674. The assessment of defects shall be summarised as a Performance Band as listed in Table 9/16.

Table 9/16: Site Installation Performance Trial visual inspection requirement

Performance Band	Description
Excellent	No discernible fault
Good	No significant fault
Moderate	Some defects but insufficient for serious problem
Acceptable	Several defects but would usually be just acceptable
Suspect	Seriously defective but still serviceable in the short term
Poor	Requires remedial treatment
Bad	Requires immediate remedial treatment

- 32 The torque bond strength between the thin surface course and its substrate shall be established in accordance with Clause 0951. This shall be established between 28 and 56 days after the SIPT is installed.
- 33 The void content of the proposed mixture, when evaluated for the SIPT, shall be $V_{min}2$ to $V_{max}5\%$ from the average of 6 cores.

Noise

- 34 Where noise characteristics for the thin surface course systems are specified in Appendix 7/1 the SIPT shall include the assessment and measurement of noise characteristics as described in sub-Clauses 34 to 43 of this Clause. The declared level shall be 0 to 3 or 'NR' as given in Table 9/17.

Table 9/17: Road/Tyre Noise Levels

Level	Equivalence to Traditional Surfacing Materials	Road Surface Influence RSI
3	Very quiet surfacing material	-3.5 dB(A)
2	Quieter than HRA surfacing materials	-2.5 dB(A)
1	Equivalent to HRA surfacing materials	-0.5 dB(A)
0	Noisier than HRA Surfacing Materials	+1.2 dB(A)
NR	No requirement	No requirement

- 35 The influence of the road surface on traffic noise using the statistical pass-by method shall be established at the SIPT site between 12 and 24 months after opening to traffic in accordance with BS EN ISO 11819-1, Sections 7 and 8.
- 36 Acoustic measurements shall only be carried out when the road surface is dry, and the meteorological condition specified in BS EN ISO 11819-1, Section 11 are met.
- 37 The air and surface temperatures shall be monitored in accordance with the procedure described in BS EN ISO 11819-1, clause 8.5. The road surface temperature, $T_{surface}$, must be within 5°C to 50°C during acoustic measurements. The air temperature, T_{air} , must be within 5°C to 30°C.
- 38 The test location road speed category shall be classified as either Medium or High as defined in BS EN ISO 11819-1, clause 3.3. Not less than two test locations shall be selected for each road speed category, which may be at the same site, provided the locations are at least 100 m apart or on different carriageways.
- Each test location shall be represented in terms of road speed category and traffic level. Each of the test sites selected must meet the requirements of BS EN ISO 11819-1, Section 6 and BS EN ISO 11819-2. The road must be essentially straight or bends with a radius of curvature greater than 500 m for medium-speed, and 1000 m for high-speed road categories. The crossfall of the test lane at the test site must not exceed 4%.
- 39 The apparatus described in BS EN ISO 11819-1 Section 5 are used. The frequency range of between 100 and 5000 Hz (centre frequencies of the one-third octave bands) should be covered.
- 40 The macrotexture of the road surface used for the noise assessment shall be measured in the nearside wheel-track along the whole length of test material in accordance BS EN 13036-

1. The macrotexture depth of the nearside wheel-track in front of a test location must be within 10% of the average macrotexture measured along the site.
- 41 The microphone location at each measurement site shall be recorded accurately and marked with appropriate methods such that the position can be readily identified for a period of at least two years.
- 42 When sufficient vehicle pass-bys' have been measured, a linear regression analysis shall be performed in accordance with BS EN ISO 11819-1, clause 9.1. In the case of the high-speed road category, measurements must not be taken of vehicles travelling at speeds of less than 60 km/h in accordance with AFNOR Standard S31-119.
- 43 For each category of vehicle defined in Table 9/18, the Vehicle Sound Level, L_{veh} , shall be calculated as the ordinate sound level of the regression line at the reference speed for the category of road. All levels shall be calculated to two decimal places and rounded to one decimal place.

0959AR Coloured Cold Applied Surface Treatments

- 1 This Clause applies to Coloured Cold Applied Surface Treatments (CCAST) used on the highway but not to provide High Friction Surfacing.
- 2 CCAST shall be encapsulated aggregate in resins and shall be treated as one system and shall have a thickness of $3 \text{ mm} \pm 1 \text{ mm}$.
- 3 CCAST shall cure and be open to traffic within one hour of application. Other requirements are as follows:
 - a) Skid Resistance Value (SRV) ≥ 70 (TRL Report 176, Appendix E)
 - b) Skid Resistance SCRIM (SFC) – Clause 0959AR sub-Clauses 5 to 10
 - c) Tensile Adhesion $\geq 1.5 \text{ MPa}$ (TRL Report 176, Appendix J)
 - d) Texture depth after installation – To be declared
 - e) Colour – To be declared in RAL Colour Standard
 - f) Colour Ageing – $\Delta E < 7$ following 2000hrs (TRL Report 176, Appendix)
 - g) Aggregate Type – Calcined Bauxite
 - h) Aggregate Size $\leq 2 \text{ mm}$
 - i) PSV (Polished Stone Value) – Appendix 7/1
 - j) AAV (Aggregate Abrasion Value) – Appendix 7/1

Application

- 4 The material shall be assessed visually on application. The material shall not contain:
 - a) Ripples and unevenness;
 - b) Uneven distribution of aggregate (variations in texture depth larger than 0.4 mm above or below the declared texture depth);
 - c) Uneven colouring – Colour unevenness may be assessed using photographic analysis and ΔE will be measured.; or
 - d) De-laminations.

Skid Resistance

- 5 Sideway-force Coefficient Routine Investigation Machine (SCRIM) or Griptest as described in HD28/15 is the only accepted test method for skid resistance. The test shall be carried out as follows:
 - a) The testing results will be corrected for the factors mentioned below:
 - i) Speed (50 kph)
 - ii) Temperature (Although the influence of temperature is not significant, no SCRIM testing shall be carried out below 5 °C)
 - b) The testing results shall not be corrected for any other factors other than the ones mentioned above.
- 6 Sideways Force Coefficient (SFC) is the required reading and shall be collected at 1 m intervals.
- 7 The SCRIM SFC results shall be geographically positioned (Spatially positioned) for interpretation of different materials applied i.e. differentiation between HFS, asphalts and other surface applied materials.
- 8 SCRIM SFC results shall be supplied in:
 - a) HMDIF file format or
 - b) EXCEL file format
- 9 The applied material in segregated cycle lanes shall receive a PASS only if the works tested achieve an SFC of 0.45 and above for no less than 85% of the tested area.
- 10 The applied material in non-segregated sections shall receive a PASS only if the works tested achieve an SFC equivalent to the requirement of the road geometry and above for no less than 85% of the tested area.

0960AR Composite Geosynthetic for Asphalt Overlay

- 1 The geosynthetic shall be a composite combining geotextile fabric with a weight not less than 130 g with either glass fibre strands knitted or glue bonded to it. The tensile strength of the system must be of either 50, 100 or 200 kN and it must have been manufactured to the requirements of BS EN 15381 and carry a CE mark and a declaration of performance.

Paving Grade Bond Coat

- 2 The minimum requirement for the bond coat used to secure the composite geosynthetic in place is 160/220 pen grade bitumen sprayed at 1.1 L/m². Bitumen emulsions used as bond coats for composite geosynthetic shall not be permitted.

Heavier rates of spread of polymer modified hot sprayed bitumens as bond coats for composite geosynthetic may be permitted.

All bond coats for geosynthetic must be applied by a calibrated binder distributor tested annually for conformity to BS 1707. The evenness and overall rate of bond coat should be regularly checked on site by carpet tile testing in accordance with BS EN 12272-1.

Polymer Modified Bond coat (PMB)

- 3 Polymer modified bond coats shall be used when instructed by *the Client and the design*. Concrete surfaces may need to be treated with a suitable emulsion prior to the application of the hot sprayable polymer modified bitumen type. The polymer modified bond coat shall comply with the requirements of BS EN 14023 and shall be sprayed at 0.9 kg/m² minimum.

The binder properties shall be:

- a) Softening point: R&B (EN1427): > 45 °C
- b) Fraass breaking point (EN 12593): < -20 °C
- c) Elastic recovery at 25 °C (EN13398): > 90%
- d) Elastic recovery at 5 °C (EN 13398): > 70%
- e) Force-ductility at 5 °C: > 2 J/cm²

Surface Preparation

- 4 The surface on which the binder is laid shall be flat and free of loose parts. If sprayed to a milled surface, striations must be no more than ± 5 mm from peak to trough. If necessary, holes and other irregularities on the underlying surface shall be repaired beforehand.

Site Testing and Records

- 5 The installation *Contractor* of the geosynthetic system must have a quality management system that is BSI 9001 accredited and be registered with a certification body for the installation of geosynthetics. The geosynthetic installer must be registered to National Highway Sector Scheme 13.

On-site, it will be necessary to demonstrate that the installed composite or self-adhesive geosynthetic is bonded to the substrate by means of an adhesion to base layer test, specified in sub-Clause 6 which will achieve 9 kg/m². The frequency of the test should be one per every installed 1000 m² and the result should be recorded and supplied to the *Client*.

- 6 The test involves the insertion of a hook off a spring balance under the centre of the pavement composite grid. The spring balance shall be pulled up until the sample just starts to pull loose and a record of the gauge reading shall be noted. In the event that 9 kg or more of force is required to pull the sample up from the road surface, sufficient adhesion has taken place and the paving operation may begin.

0961AR Self-Adhesive Geosynthetic for Trench Repair or Widening

- 1 The self-adhesive geosynthetic shall be knitted self-adhesive glass fibre strands coated with an elastomeric polymer coating which coats all filaments within the strand. The tensile strength of the system must be 100 kN and it must have been manufactured to the requirements of BS 15381 and carry a CE mark and a declaration of performance. The self-adhesive reinforcement system must always be installed to a fresh bituminous layer and never to milled or concrete surfaces.
- 2 Bond coats are not required to secure the self-adhesive reinforcement to the regulated surface. Bond coats may be specified to achieve bond between surfacing layers reinforced with a self-adhesive geosynthetic and if an emulsion bond coat is specified between surfacing layers it must have fully 'broken' before overlaying commences.

0962AR Warm Mix Asphalt

- 1 Warm Mix Asphalt (WMA) is the generic term used to describe the reduction in production, paving and compaction temperatures achieved through the application of one of several WMA technologies. The producer shall submit a mix design for Warm Mix Asphalt production showing compliance with all other clauses of Series 0900 and associated appendices.
- 2 Warm Mix Asphalt may be produced by one or a combination of several technologies involving hot mix asphalt plant foaming processes and equipment or organic chemicals that allow the reduction of asphalt laying temperatures by 30° C or more.
- 3 All requirements for bituminous bound mixtures set in this specification apply to WMA.
- 4 The *Contractor* shall identify the technology to be used and shall comply with the manufacturer's recommendations for incorporating additives and WMA technology into the mix.
- 5 The *Contractor* shall comply with the manufacturer's recommendations regarding receiving, storage, and delivery of chemical additives if this is the technology chosen.
- 6 WMA (Organic Chemical Additive): For warm mix asphalt using additives, the design shall be performed using the additive. Each WMA design shall specify the production temperatures recommended by the warm mix asphalt additive manufacturer to be used in the production of warm mix asphalt.
- 7 WMA (Foaming): For warm mix asphalt using foamed asphalt technology, a design may be developed using conventional hot mix asphalt temperatures.
- 8 The *Contractor* shall submit a declaration of performance of the WMA to the *Client* prior to commencing any work.

0963AR Cold Mix Asphalt

- 1 Cold Mix Asphalt (CMA) complying with this Clause, Clause 0947 and Clause 0948 is the generic term used to describe the reduction in production, paving and compaction temperatures achieved through the application of one of several CMA technologies. The producer shall submit a mix design for Cold Mix Asphalt production showing compliance with all other clauses of Series 0900 and associated appendices.
- 2 CMA may be produced by one or a combination of several technologies involving foaming or emulsion processes and equipment or organic chemicals that allow the mix production, paving and compaction to be carried out at ambient temperature.
- 3 This specification applies to both in-situ and ex-situ CMA.
- 4 All requirements for bituminous bound mixtures set in this specification apply to CMA.
- 5 CMA shall contain more than 85% Reclaimed Asphalt (RAP) or 85% Recycled Aggregate and shall only contain Ordinary Portland Cement (OPC) or Lime as shown in TRL Report 611 "A guide to the use and specification of cold recycled materials for the maintenance of road pavements" and shall comply with Quick Visco-Elastic (QVE) and Slow Visco-Elastic (SVE) Family Classes.
- 6 The *Contractor* shall identify the technology to be used and shall comply with the manufacturer's recommendations for incorporating additives into CMA technology into the mix.

- 7 The *Contractor* shall submit a declaration of performance of the CMA to the *Client* prior to commencing any work showing all testing as shown in TRL 611 and all other BS EN 13108 and BS EN 12697 parameters required to show conformity with all other requirements of this specification.

0964AR Additional Reclaimed Asphalt (Enviro Asphalt)

- 1 The requirements of this clause apply to all Hot and Warm bituminous mixtures containing a proportion of reclaimed asphalt larger than those specified in Clause 0902. For the purpose of this specification, these asphalts shall be referred to as “Enviro asphalt”.
- 2 Additional recycled materials shall only be used in bituminous mixtures with the formal approval of the *Client*. The mixed material shall comply with the requirements of all the relevant Clauses in this Series.

Formal Approval

- 3 The *Client* shall give the written approval shown in Appendix 9/64 to the *Contractor* when demonstrable evidence is given to show that the requirements of this Clause and all other Clauses in this specification are met. This will allow the *Contractor* to supply the *Client* with Enviro asphalt to one of the proportional limits set in Appendix 9/64 and as agreed in the written formal approval.

Quality Management System

- 4 In order for the *Contractor* to supply additional reclaimed asphalt, the *Contractor* shall submit to the *Client* the Quality Management System (QMS) and Waste and Resources Action Programme (WRAP) Quality Protocols for the following RAP elements:
- a) RAP Production including grading, segregation to avoid contamination and storage.
 - b) RAP aggregate testing; shall include Polishing (PSV), Abrasion (AAV), Shape (FI) for use in asphalts to BS EN 13043.
 - c) RAP binder testing; shall include binder penetration and softening points to BS EN 12591.
 - d) Testing Frequencies and Testing Logs.
 - e) Declaration of Performance of all asphalt mixtures produced to this Clause to BS EN 13108 and as required by this specification.

Properties of Binder

- 5 The fresh bitumen added to the mixture shall be declared to BS EN 12591 or BS EN 14023 as appropriate.
- 6 The *Contractor* shall declare the performance of the produced binder to BS EN 12591 or BS EN 14023. If the fresh binder complies to BS EN 14023 then the produced binder shall be declared to BS EN 14023.

Asphalt Designation

- 7 Enviro Asphalts shall be declared as Clause 0964 asphalts as well as the clause for the standard asphalt mixture, such as Clause 0942, and must meet all the requirements set in this specification and Appendix 7/1.

0965AR Grouted Macadam Surface Course

- 1 Grouted Macadam surface courses, for the purpose of this specification, are defined as asphalts. They are manufactured using a 2-part process comprising an open-graded asphalt that is flooded with a high strength cementitious mortar.
- 2 Grouted macadam surfacing shall meet the following requirements:
 - a) Grout compressive strength > 60 N/mm²
 - b) Grout flexural strength at 28 days > 5N/ mm²
 - c) Resistant to aviation fuel, diesel and petrol (BS EN 12697-43)
 - d) Wheel Tracking Rate <= 0.5 µm/cycle (BS EN 12697-22)
 - e) Skid Resistance (pendulum test) > 60 (BS EN 13036-4)
 - f) Must be able to be open to Traffic after 24 hours

0966AR Bituminous Stress Absorbing Membrane Interlayers (SAMI)

SAMI Membrane

- 1 SAMI Membrane refers to thick bond coat seals applied to a milled surface prior to the placement of asphalts for the purposes of providing increased flexibility and crack retardation.
- 2 SAMI Membrane shall comprise of a spray applied polymer modified binder to BS EN 14023 with a HAPAS approval or similar.
- 3 The binder shall be installed in accordance with the manufacturer's instructions. The spray rate for a binder shall be > 2 kg/m² to achieve a 3 mm thick membrane. A micro asphalt to Clause 0918 shall be installed above to protect the SAMI membrane from damage.

SAMI Asphalt

- 1 SAMI Asphalt refers to 0/6 mixtures containing more than 8% bitumen (B_{act}%) and a maximum of 11% fine aggregate (< 0.063 mm) content and applied to a milled surface prior to the placement of asphalts for the purposes of providing increased flexibility and crack retardation.
- 2 SAMI Asphalt shall include a polymer modified binder to BS EN 14023 and as specified in Appendix 7/1 PMB3.
- 3 The SAMI Asphalt shall be laid 25 mm thick (± 3mm) and shall perform to Category A as specified in Clause 0967.

0967AR Performance Classes of Asphalts

- 1 For the purpose of this specification, all asphalts other than grouted macadam to Clause 0965 shall be classified into one of the following performance classes and as required in Appendix 7/1:
- a) Category A - Performance complying with Wheel Tracking Rate Class of 1 as specified in PD6691 Table B.4 for Asphalt Concretes to BS EN 13108-1, C.3 for Hot-Rolled Asphalts to BS EN 13108-4 and Table D.2 for Stone Mastic Asphalts to BS EN 13108-5.
 - b) Category B – Performance complying with Wheel Tracking Rate Class of 2 as specified in PD6691 Table B.4 for Asphalt Concretes to BS EN 13108-1, C.3 for Hot-Rolled Asphalts to BS EN 13108-4 and Table D.2 for Stone Mastic Asphalts to BS EN 13108-5.
 - c) Category C – Performance complying with Wheel Tracking Slope (mm/1000 cycles) of $WTS_{AIR} \max < 0.6$ tested at 60 °C as specified in BS EN 12697-22 small device for mixtures for asphalts complying with BS EN 13108-1 and BS EN 13108-5. Hot Rolled Asphalt to BS EN 13108-4 shall not be required to comply with this Category.

Performance of the bitumen to be elastic and meeting the requirements of BS EN 14023 as specified in Appendix 7/1 for PMB 1.
 - d) Category D – Performance complying with Wheel Tracking Rate Class of 2 as specified in PD6691 Table B.4 for Asphalt Concretes to BS EN 13108-1, C.3 for Hot-Rolled Asphalts to BS EN 13108-4 and Table D.2 for Stone Mastic Asphalts to BS EN 13108-5.

Performance of the bitumen to be elastic and meeting the requirements of BS EN 14023 as specified in Appendix 7/1 for PMB 2.
 - e) Category E – Performance complying with Wheel Tracking Rate Class of 2 as specified in PD6691 Table B.4 for Asphalt Concretes to BS EN 13108-1, C.3 for Hot-Rolled Asphalts to BS EN 13108-4 and Table D.2 for Stone Mastic Asphalts to BS EN 13108-5.

Performance of the bitumen to be elastic and meeting the requirements of BS EN 14023 as specified in Appendix 7/1 for PMB 3.

0968AR Stone Mastic Asphalt Surface Course

General

- 1 Stone Mastic Asphalt (SMA) surface course shall conform to BS EN 13108-5, the requirements of this Clause and those specified in Appendix 7/1. The mixture designation shall be one of the following:
- a) SMA 10 surf
 - b) SMA 14 surf
- 2 SMA surface course shall comply with the grading shown in Table 9/33 and shall be defined as Standard (SD) or Heavy Duty (HD) by the minimum binder content shown in Table 9/33.

Table 9/33 Grading Levels of SMA Surface Course

D (mm)	10	14
Sieve	Proportion passing sieve (% by mass)	
20	–	100
14	100	93 – 100
10	93 – 100	35 – 60
6.3	35 – 52	22 – 36
4	–	–
2	20 – 32	16 – 30
0.5 ^{a)}	–	–
0.25 ^{a)}	–	–
0.063	8 – 12	8 – 12
Standard Minimum target binder content B _{act} (% by mass) (SD)	6.4	6.0
Heavy Duty Minimum target binder content B _{act} (% by mass) (HD)	6.7	6.3
^{a)} - The limits are applied to the 0.5 mm and 0.25 mm sieves shall be established by the producer to ensure consistency and the values obtained shall be recorded within the quality control system		

- 3 SMA mixtures shall have a minimum fibre content of 0.3% and a maximum binder drainage of D0.3
- 4 The water sensitivity shall be as specified in Appendix 7/1. The water sensitivity of mixtures conforming to BS EN 13108 Parts 1, 2 and 5 shall conform to, at least, category ITSR_{min}90.
- 5 The design void content shall be V_{min}1.5 to V_{max}5%.
- 6 The thickness of the system shall be as stated in Table 9/34 below:

Table 9/34: SMA Surface Thickness

Material description	Nominal target layer thickness (mm)	Minimum compacted thickness at any point (mm)
SMA 10 surf	50 – 60	40
SMA 14 surf	60 – 80	50

- 7 SMA surface course shall achieve a minimum Noise Level 2.
- 8 Caution must be taken when laying these materials with regards to longitudinal joints, ride quality and compaction.

0969AR EME Surface Course

General

- 1 Enrobe a Module Élevé (EME) surface course shall conform to BS EN13108-1, the requirements of this Clause and those specified in Appendix 7/1. The mixture designation shall be one of the following:
 - a) AC EME10 surf
 - b) AC EME14 surf
 - c) AC EME20 surf
- 2 EME surface course shall have a minimum binder content shown of $B_{act}5.5\%$ for EME10 surf, $B_{act}5.3\%$ for EME14 surf and $B_{act}5.1\%$ for EME20 surf.
- 3 The water sensitivity shall be as specified in Appendix 7/1. The water sensitivity of mixtures conforming to BS EN 13108 Parts 1, 2 and 5 shall conform to, at least, category $ITSR_{min}90$.
- 4 The design void content shall be $V_{min}2$ to $V_{max}6\%$.
- 5 The thickness of the system shall be as stated in Table 9/35 below:

Table 9/35: EME Surface Thickness

Material description	Nominal target layer thickness (mm)	Minimum compacted thickness at any point (mm)
EME10 surf	40 – 60	35
EME14 surf	500 – 80	40
EME20 surf	70 – 110	60

- 6 EME surface course shall achieve a minimum Noise Level 2.
- 7 Caution must be taken when laying these materials with regards to longitudinal joints, ride quality and compaction .

0970AR Surfacing Integrity – Performance Guarantee for all Surface Courses (excluding Clause 0918 and Clause 0921)

- 1 Unless specified differently elsewhere, a guarantee shall be provided for the integrity of all surface courses and the workmanship for a period of five years from the date of opening to traffic.
- 2 The guarantee shall include for defects such as fretting, ravelling, stripping and loss of chippings. Replacement of the surfacing or other remedial measures agreed with the *Client* shall be executed if the surfacing is in a “Suspect”, “Poor” or “Bad” condition as defined in Appendix A of TRL Report TRL674 – “Durability of thin surfacing systems, Part 4, Final report after nine years monitoring, TRL report 674 which shall be used for all surface courses. The guarantee shall exclude defects arising from accidental damage or damage caused by settlement, subsidence or failure of the underlying carriageway on which the surfacing material has been laid.

Additional, Cancelled, Modified & Substitute Clauses

Series 0980 Carriageway – Repairs

- 0981AR Patching
- 0982AR Pothole Cold Repair Systems

0981AR Patching

- 1 The minimum size of a carriageway patch repair shall be 0.5m².
- 2 Areas above 10 m² shall be repaired with materials installed using self-propelled paving machinery which shall comply in all respects to Series 0700. The use of self-propelled paving machinery is not required for areas where one of the primary patch dimensions does not exceed 600mm, i.e. a trench 600mm wide and 20m long.
- 3 The edges of the repair shall be saw-cut or planed in a neat rhombus or circular shape in sound surfacing at a distance of at least 0.25 m beyond the defective area. The saw-cut opening shall have vertical straight edges and extend for the full depth of the defect as appropriate and may be removed by the use of a mechanical breaker.
- 4 All existing material within the saw-cut perimeter of the repair area shall be removed and the base and sides of the cavity thoroughly cleansed of all loose material and moisture to provide clean and dry surfaces throughout.
- 5 The prepared vertical joints and the base of the cavity shall be treated in accordance with sub-Clause 0903.22.
- 6 Patching materials shall comply with the requirements of Series 0900 and Appendix 7/1.

0982AR Pothole Cold Repair Systems

- 1 Pothole Cold Repair Systems shall only be used on areas of less than 1m² and shall be specified for use on Type 1 Roads as set out in the Specification for Reinstatement of Openings in Highways (SROH).
- 2 The material shall have a minimum PSV of 55.
- 3 The material shall be capable of being mixed and spread by hand in thickness from 20 mm to 100 mm in one or more lifts.
- 4 It shall cure to a strength such that it is capable of being trafficked by heavy vehicles without damage within 30 minutes of installation when laid on a dry or damp road surface at temperatures between -10 °C and 40 °C.
- 5 The *Contractor* shall guarantee the performance of Pothole Cold Repair Systems for a minimum of 3 months and within this period the material shall not exhibit fretting, fatting or delamination.

Additional, Cancelled, Modified & Substitute Clauses
Series 1000 Road Pavements – Concrete Materials

1008MR	Steel Reinforcement
1009MR	Transverse Joints
1017MR	Joint Seals
1028MR	Trial Lengths
1033MR	Full Depth Repairs and Reinstatements
1044MR	Pavements with an Exposed Aggregate Concrete Surface
1049AR	Rapid Strength Concrete
1050AR	Early Drying Concrete

1008MR Steel Reinforcement

In sub-Clause 9, delete “described in contract specific Appendix 7/1” and replace with “specified by the *Client*”.

1009MR Transverse Joints

In sub-Clause 1, delete “described in contract specific Appendix 7/1” and replace with “specified by the *Client*”.

1017MR Joint Seals

In sub-Clause 1, delete the second sentence.

In sub-Clause 2, delete “as stated in contract specific Appendix 7/1, and”.

1028MR Trial Lengths

In sub-Clause 5(iv), delete “in contract specific Appendix 7/1” and replace with “by the *Client*”.

1033MR Full Depth Repairs and Reinstatements

In sub-Clause 13, delete “as described in contract specific Appendix 7/2”.

In sub-Clause 15, delete “where directed in contract specific Appendix 7/2”.

In sub-Clause 16, delete “where directed in contract specific Appendix 7/2”.

1044MR Pavements with an Exposed Aggregate Concrete Surface

Delete sub-Clause 27 and replace with:

- 27 The texture depth of the surface of the concrete shall be measured using a volumetric patch technique described in BS EN 13036-1. The average macrotexture depth of each 1000 m section of carriageway lane, or each carriageway lane where less than 1000 m, shall be ≥ 1.3 mm and ≤ 2.0 mm. Any individual result shall be neither greater than the maximum, nor be less than the minimum value of macrotexture depth stated. The noise level as stated in Clause 0942 shall be Noise Level 3 or less.

1049AR Rapid Strength Concrete

- 1 Rapid strength concrete is defined as concrete having an early strength gain in accordance with Table 12 of BS EN 206:2013+A1:2016 of $f_{cm,j} / f_{cm,28} \geq 0.5$ (where j is the number of days for the concrete to achieve at least half of the 28-day mean compressive strength). Rapid strength concretes shall comply with the strength designations set in BS8500-1 and BS EN 13877-1 and BS EN 206.
- 2 Rapid strength concrete shall comply with all other relevant clauses of this series.

1050AR Early Drying Concrete

- 1 Early drying concrete shall be defined as concrete that is specifically designed to dry to obtain “75% relative humidity” in the time scales stated in Appendix 7/1 and that complies to all other requirements set in BS EN 206, BS 8500 and the clauses of this series.

- 2 Early drying concrete shall comply with the criteria set for silica fume concrete in BS 8500 and BS EN 206.
- 3 Early drying concrete shall be specified by the time it takes to achieve 75% relative humidity at 10°C and referred to as the “relative humidity index” as shown in Appendix 7/1.

Additional, Cancelled, Modified & Substitute Clauses

Series 1100 Kerbs Footways and Paved Areas

1104CR	Clause Cancelled - replaced with Clauses 1112AR to 1118AR.
1111AR	Tolerances
1112AR	Natural Stone for Slabs, Setts, Kerbs, Channels, Edgings and Quadrants
1113AR	Concrete Flags
1114AR	Modular Surface
1115AR	Laying Kerbs, Channels, Edgings and Quadrants
1116AR	Laying Course - for Unbound Modular Surface (Concrete Flags, Natural Stone Slabs, Concrete Blocks or Clay Pavers)
1117AR	Laying Course - for Bound Modular Surface (Concrete Flags, Natural Stone Slabs, Natural Stone Setts, Concrete Blocks or Clay Pavers)
1118AR	Jointing Mortars for Bound Modular Surface (Concrete Flags, Natural Stone Slabs, Natural Stone Setts, Concrete Blocks and Clay Pavers).
1119AR	Imprinted Thermoplastic Surfacing
1120AR	Resin Bound Mixtures
1121AR	Resin Bonded Surfacing
1122AR	Resin Bound Tree Pit Mixtures
1123AR	Slurry Surfacing and Microsurfacing
1124AR	Mastic Asphalt Surfacing
1125AR	Granolithic Concrete Surfacing
1126AR	Re-using Material
1127AR	Geo-Cellular Units for the Replacement of Sub-base
1128AR	Filter Fabric
1129AR	Light Reflectance Value
1130AR	Oleophobic Surface Sealers
1131AR	Precast Concrete High Containment Kerb
1132AR	Bus Stop Boarder Kerbs

1104CR Clause Cancelled - replaced with Clauses 1112AR to 1118AR.

1111AR Tolerances

- 1 The *Contractor* shall ensure compliance with the tolerances in table 11/2 when constructing a paved area. Tolerances for bituminous and concrete construction in footways and other pedestrian areas are given in Clause 0702.

Table 11/2: Tolerances for Bituminous and Concrete Pavements in Footways

Parameter	Tolerances
Formation level / Sub-grade level	After completion of any drainage and immediately before laying sub-base the subgrade surface shall be within +10 mm and –30 mm of its design level.
Sub-base level	Where segmental surfacing is used the sub-base shall be within ± 10 mm of its design level. For other surfaces, the compacted sub-base surface shall be within +10 mm and – 20 mm of its design level.
Sub-base thickness	The compacted sub-base shall be within ± 10 mm of its specified thickness.
Bituminous binder course	The compacted binder course level shall be within ± 10 mm of the design level.
Surface course and modular surfaces	Where adjacent to a kerb, edging strip or any ironwork the surface course level shall be within +5 mm and –0 mm of its design level.
Bituminous thickness	The total thickness of bituminous bound materials shall not be less than 5 mm of the specified thicknesses.
Laying course sand	The compacted laying course sand level shall be within ± 5 mm of the design level and the layer shall not be less than 40 mm thick.
Kerbs, channels and edging strips	The surface level shall be within ± 6 mm of the design level.
Joints between flags and pavers	Joints should be no less than 2 mm and no more than 5 mm wide. For pedestrian-only footways, flags can be laid with wide (6 - 10 mm) joints filled with mortar.
Slurry Jointing Mortar (Recessed Joints)	Recessed mortar joints shall be within 2 mm \pm 1 mm of the finished surface level.
Surface regularity of modular surfaces (adjacent paving units including kerbs)	The maximum deviation of the footway surface under a 3 m straight edge shall not exceed 3 mm.
Surface regularity of modular surfaces (adjacent to a drainage channel or gully)	The maximum deviation of the footway surface under a 3 m straight edge shall not exceed +10 mm and -0 mm.
Surface regularity of modular surfaces (adjacent to a lateral restraint)	The maximum deviation of the footway surface under a 3 m straight edge shall not exceed ± 6 mm.
Horizontal alignment accuracy of bituminous and concrete surfaces	Horizontal alignments of bituminous of concrete surfaces shall comply with clause 0702.
Surface regularity of bituminous and concrete surfaces	Surface regularity of bituminous of concrete surfaces shall comply with clause 0702.

1112AR Natural Stone for Slabs, Setts, Kerbs, Channels, Edgings and Quadrants

- 1 Natural Stone for slabs, setts, kerbs, channels, edgings and quadrants shall comply with the requirements of this series and be from one of the following rock classifications:
 - a) Granite – an igneous rock formed by the cooling and hardening of magma or molten lava.
 - b) Sandstone – a sedimentary rock formed by the deposition and subsequent cementation of that material close to the Earth's surface and/or within bodies of water. Sedimentation being the collective name for processes that cause mineral or organic particles (detritus) to settle in place.
- 2 Natural Stone Slabs shall comply with the requirements of BS EN 1341 and their dimensions, type designations, performances and classes shall be as described Appendix 11/1.
- 3 Natural Stone Setts shall comply with the requirements of BS EN 1342 and their dimensions, type designations, performances and classes shall be as described Appendix 11/1.
- 4 Natural Stone Kerbs, Channels, Edgings and Quadrants shall comply with the requirements of BS EN 1343 and their dimensions, type designations, performances and classes shall be as described in Appendix 11/1.

1113AR Concrete Flags

- 1 Concrete Flags shall comply with the requirements of BS EN 1339 and their dimensions, type designations, performances and classes shall be as described in Appendix 11/1.

1114AR Modular Surface

- 1 For this specification, the term “modular surface” refers to Concrete Flags, Stone Slabs, Stone Setts, Concrete Blocks and Clay Pavers.

1115AR Laying Kerbs, Channels, Edgings and Quadrants

- 1 Kerbs, channels, edgings and quadrants shall be laid and bedded in accordance with BS 7533-6 using a C6/8, Gen0 or ST1 in accordance with BS 8500 and Series 1000. The mortar bed may be omitted if units are bedded onto a concrete slab or foundation that is still plastic. All units laid on a mortar bed or bedded onto plastic concrete shall be backed with a strength class C6/8 or Gen0 or ST1 concrete in accordance with BS 8500 and Series 1000.
- 2 Joints shall be provided in kerbs, channels, edgings and backing, which are laid on or adjacent to a concrete pavement to coincide with the pavement transverse contraction, warping and expansion joints. The joints shall be the same width as the joint sealing grooves of the pavement and shall be caulked and sealed as described in Clauses 1016 and 1017. Concrete foundations to kerbs, channels and edgings laid adjacent to a concrete pavement shall be provided with joint filler board complying with Clause 1015 placed vertically through the full extent of the concrete foundation at positions coinciding with the pavement joints. At expansion joints in bridge decks, the kerb joints shall be as described in scheme specific Appendix 11/1. Where the details of bridge expansion joints are proposed by the *Contractor*, such details shall include the intended treatment at kerbs and footways.

1116AR Laying Course - for Unbound Modular Surface (Concrete Flags, Natural Stone Slabs, Concrete Blocks or Clay Pavers)

- When the footway surface is modular as described in Clause 1114, and the surface is unbound the *Contractor* shall lay a minimum of 30mm and a maximum of 40 mm thick bed of sand or crushed glass complying with BS EN 12620 Gf85 0/4 (MP) and to the grading in Table 11/3.

Table 11/3: Grading for Gf85 0/4 (MP)

Sieve size	% passing by mass
8 mm	100
6.3 mm	95 - 100
4 mm	85 - 99
0.5 mm	30 - 70
63 µm	0 - 3

- For paving units requiring a bedding layer depth greater than 40 mm, a blended 0-6 mm crushed rock grading as shown in Table 11/4.

Table 11/4: Grading for 0/6 Blended Laying Course

Sieve size	% passing by mass
8 mm	100
6.3 mm	90 - 100
2 mm	30 - 75
1 mm	20 - 60
500 µm	10 - 50
125 µm	5 - 30
63 µm	2 - 9

- Every unbound modular element shall be bedded for its full area on the laying course and shall be flush with adjoining paving.
- Joints in unbound modular paving shall be butt joints or close joints and shall be filled with a kiln-dried sand complying with Gf85 0/1 (FP) as shown in Table 11/5.

Table 11/5: Grading for Gf85 0/1 (FP)

Sieve size	% passing by mass
2 mm	100
1 mm	85 - 100
0.5 mm	55 - 100
63 µm	0 - 2

- 5 Concrete Flags and Natural Stone Slabs shall be carefully cut where necessary to allow for surface boxes, lamp columns, telegraph poles, trees, vehicular crossings, irregular boundary walls, laying to radius closers as required.
- 6 No frozen material shall be used in any works, nor shall material be laid on frozen or frost covered sub-bases or bedding materials.
- 7 Stockpiled materials shall be protected at all times. Saturated sand shall not be used in the work.

SuDS (Sustainable Drainage Systems)

- 8 When the footway surface is modular as described in Clause 1114, and the surface is unbound with requirements for SuDS as instructed by the *Client* or the design, the *Contractor* shall use a minimum of 50 mm of a 0-6 mm crushed rock coarse grading as shown in Table 11/6 and shall use the same material for jointing.

Table 11/6: Grading for 0/6 Coarse Graded Laying Course and Jointing

Sieve size	% passing by mass
14 mm	100
10 mm	98–100
6.3 mm	80–99
2 mm	0–20
1 mm	0–5

1117AR Laying Course - for Bound Modular Surface (Concrete Flags, Natural Stone Slabs, Natural Stone Setts, Concrete Blocks or Clay Pavers)

- 1 When the footway surface is modular as described in Clause 1114, and the surface is bound the *Contractor* shall use a minimum of 30 mm thick 3:1 sand:cement mortar complying with BS EN 998-2, Table 1, designation M12 using sand or crushed glass complying with BS EN 12620 Gf 85 0/4 (MP).
- 2 The modular surface shall be laid on a full mortar bed.
- 3 Where instructed by the *Client*, the *Contractor* shall use a mortar complying with Table 11/7.

Table 11/7: Bedding Mortar

Requirement	Value
Minimum compressive strength when measured in accordance with BS EN 1015-11	35 N/mm ²
Flexural strength	4.5 N/mm ² (A)
Minimum adhesive strength when measured in accordance with BS EN 1015-12	2.0 N/mm ²
Modulus of elasticity when measured in accordance with BS EN 13421	(18 000 ± 3 500) N/mm ²
Maximum shrinkage when measured in accordance with BS EN 445	not greater than 0.10%
(A) - Includes the use of slurry primer.	

- 4 When required for sub-surface drainage and the design, permeability of the mortar shall be in excess of 2×10^{-3} m/s when measured in accordance with the test method specified in BS EN 12697-19.
- 5 Every bound modular element shall be bedded for its full area on the laying course and shall be flush with adjoining paving.
- 6 Whenever natural stone slabs are to be laid on a bedding mortar with compressive strength of ≥ 35 MPa, a bonding primer shall be used. A Bonding slurry primer shall be a blend of cementitious binder and fine aggregate; it shall not contain chemical admixtures which reduce the water permeability of the cured bonding layer. It shall be applied as a liquid slurry having a thick creamy consistency to the underside of the stone slab.

1118AR Jointing Mortars for Bound Modular Surface (Concrete Flags, Natural Stone Slabs, Natural Stone Setts, Concrete Blocks and Clay Pavers).

- 1 Joints in bound modular paving shall be between 6 mm and 10 mm as instructed by the *Client*.
- 2 Joints shall either be hand pointed using a 3:1 sand:cement mortar complying with BS EN 998-2, Table 1, designation M12 using sand or crushed glass complying with BS EN 12620 Gf 85 0/4 (MP); or shall be slurry grouts complying with the specification set in Table 11/8.

Table 11/8: Jointing Mortar for Bound Modular Surface

Requirement	Value
Min. compressive strength ^(A)	40 N/mm ²
Min. flexural strength ^(A)	6 N/mm ²
Min. adhesive strength ^(B)	1.5 N/mm ²
Modulus of elasticity ^(C)	(20000 \pm 4000) N/mm ²
Min. density ^(A)	2000 kg/m ³
Max. shrinkage ^(D)	not greater than 0.10%
^(A) - Measured in accordance with BS EN 1015-11 ^(B) - Measured in accordance with BS EN 1015-12 ^(C) - Measured in accordance with BS EN 13421 ^(D) - Measured in accordance with BS EN 445	

1119AR Imprinted Thermoplastic Surfacing

- 1 Imprinted Thermoplastic Surfacing, for this specification, is defined as a single homogenous surfacing material. The material is of a thermoplastic nature which is mouldable when hot allowing a pattern to be impressed into the surface.
- 2 Imprinted Thermoplastic Surfacing shall achieve a minimum indentation hardness of 40 when measured as per the requirements of BS EN 12697-21.
- 3 Imprinted Thermoplastic Surfacing shall use an aggregate that is ≥ 6 mm and has a minimum Polished Stone Value (PSV) of 60 and a maximum Aggregate Abrasion Value (AAV) of 5.
- 4 Imprinted Thermoplastic Surfacing shall achieve a minimum Skid Resistance Value (SRV) of 60.
- 5 Imprinted Thermoplastic Surfacing shall comply with the requirements of Appendix 11/1.

1120AR Resin Bound Mixtures

- 1 All resin bound surfacing shall be installed using UV stable resin. The surface course system will comprise of a two-component, cold-applied binder, and fine and coarse 2 mm and 6 mm sized kiln dried aggregates with a glass grit surface finish.
- 2 Every site batch produced is to be consistently replicated during application according to the manufacturer's recommendation.
- 3 The specific blend as stated by the manufacturer is to be followed and measured on application.
 - a) Using a Tensometer held on a three-point bending test rig, the resin system must meet the requirements of Table 11/9.

Table 11/9: Tensile Strength Requirements

Parameter	Resin Bound
Min Strength	≥ 300 kPa

- b) Using the BS EN 13036-4 method of testing. The initial skid resistance (prior to trafficking) measured in accordance with TRL Report 176, Appendix E (pendulum test using sliders applicable to both vehicular and foot traffic), indicates that initial measurements of greater than 45 can be achieved as shown in Table 11/10.

Table 11/10: SRV values for Resin Bound Surface Mixtures

Parameter	Resin Bound
Dry Conditions	≥ 85
Wet Conditions	≥ 45

- c) Vertical permeability testing is performed following LPU STM 208 which is based on BS EN 12697-19. The required range for vertical permeability is as stated in Table 11/11.

Table 11/11: Vertical Permeability of Resin Bound Mixtures

Nominal Blend Size	Parameter	Flow rate (litres/m ² /second)
6 mm / 10 mm Resin Bound	Minimum	22
6 mm / 10 mm Resin Bound	Maximum	30
3 mm Resin Bound	Minimum	16
3 mm Resin Bound	Maximum	19

- i) Erosion Index for scuffing at 45° C to be ≥3
 - ii) Good resistance to being installed on typical exterior surfaces, such as paths, car parks etc, in accordance to BS 5284
 - iii) UV Resistance – colour stable during and after UV exposure 400 mJm² @ 50° C (10 years equivalent)
- 4 The resin shall be applied to a consistent finish and to a depth no lower than the minimum shown in Table 11/12.

Table 11/12: Minimum Depth of Installation for Resin Bound Mixtures

Max stone size	Min blend depth
3 mm	12 mm
6 mm	16 mm
10 mm	25 mm

- 5 Resin Bound surfacing shall be an aggregate compliant with BS EN 13242 and graded to BS EN 12620.

1121AR Resin Bonded Surfacing

- 1 Resin Bonded Surfacing system is a non-permeable two-component, cold-applied binder, with fine and coarse, 3 mm to 5 mm sized kiln-dried aggregates (washed and dried).
- 2 The resin bonded system is to be applied to pre-sealed asphalt surface or a primed smooth concrete surface. Resin bonded surfacing is not permitted on brand new asphalts or concretes.
- 3 The binder coverage thickness shall in no way fall below or exceed one third ($\pm 3\%$) of the largest aggregate.
- 4 Resin bond test measures:
- a) The tensile strength is to be no less than 0.5 MPa
 - b) Adhesion to substrate of 1.5 MPa
 - c) Erosion Index for scuffing at 45°C to be ≥ 3
 - d) Resistance:
 - i) Skid ≥ 65
 - ii) Freeze-thaw
 - iii) Diesel
 - iv) Thermal Movement compatible

1122AR Resin Bound Tree Pit Mixtures

- 1 All resin bound surfacing shall be installed using UV stable resin. The surface course system will comprise of a two-component, cold-applied binder, and fine and coarse 2 mm and 6 mm sized kiln-dried aggregates with a glass grit surface finish.
- 2 Every site batch produced is to be consistently replicated during application according to the manufacturer's recommendation.
- 3 The specific blend as stated by the manufacturer is to be followed and measured on application.
- a) Using a Tensometer held on a three-point bending test rig, the resin system must meet the requirements of Table 11/9.
 - b) Using the BS EN 13036-4 method of testing. The initial skid resistance (prior to trafficking) measured in accordance with TRL Report 176, Appendix E (pendulum test

using sliders applicable to both vehicular and foot traffic), indicates that initial measurements of greater than 45 can be achieved as shown in Table 11/10.

- c) Vertical permeability testing is performed following LPU STM 208 which is based on BS EN 12697-19. The required range for vertical permeability is as shown in Table 11/13.

Table 11/13: Vertical Permeability of Tree Pit Resin Bound Mixtures

Parameter	Vertical Permeability (m/s)
Minimum	0.5 x 10 ⁻³
Maximum	5.0 x 10 ⁻³

- d) Erosion Index for scuffing at 45°C to be no higher than 3.
- e) Good resistance to typical exterior surfaces, such as paths, car parks etc, in accordance to BS 5284.

- 4 The resin shall be applied to a consistent finish and to a depth no lower than the minimum shown in Table 11/14.

Table 11/14: Minimum Depth of Installation for Resin Bound Tree-pit Mixtures

Max stone size	Min blend depth
10 mm	30 mm

- 5 Resin Bound surfacing shall be an aggregate compliant with BS EN 13242 and graded to BS EN 12620.

1123AR Slurry Surfacing and Microsurfacing

- 1 Slurry Surfacing and Microsurfacing shall comply with the requirements of BS EN 12273 as specified in Clause 0918. The material shall comply with the requirements of Appendix 7/7.

1124AR Mastic Asphalt Surfacing

- 1 Mastic asphalt paving shall conform to BS 13108-6. The types and grades shall be:
 - a) Type B Grade S;
 - b) Type T50 Grade S for roads, footways, rooftop car parks and similar;
 - c) Type T50 Grade H for bus stops, loading bays and areas subject to very high stresses; and
 - d) Polymer Modified when high-performance grades are required.
- 2 Mastic asphalt shall be laid in accordance with BS 8204-5, in two coats with an overall finished thickness of not less than 25 mm:
 - a) 1st Coat - minimum thickness 10 mm.
 - b) 2nd Coat - minimum thickness 15 mm with additional grit.

1125AR Granolithic Concrete Surfacing

- 1 The granolithic mix shall be 2 parts OPC (Ordinary Portland Cement) with 5 parts granite chippings (6 mm with dust with only 20% passing a 76 x 76 mm sieve) compliant with BS EN 206:2013+A1:2016 and BS 8500-1.
- 2 Surfacing shall be laid with a thickness of 40 mm and in alternate bays of up to 3.5 x 3.5 m.
- 3 The surface shall be finished with an indent roller and edged with a steel trowel just prior to the mix hardening.
- 4 The finished surface shall be cured with a spray applied curing membrane.

1126AR Re-using Material

- 1 When instructed by the *Client* or the design, kerbs or paving units shall be reused and supplemented by reclaimed or new components as instructed. Re-used materials must be undamaged and shall be cleaned on all faces before being re-laid.

1127AR Geo-Cellular Units for the Replacement of Sub-base

- 1 Geo-cellular units used in footways shall comply with the requirements set in Table 11/15.

Table 11/15: Properties of Geo-cellular Units

Element	Value
Compressive strength	
Vertical	700 kN/m ²
Lateral	150 kN/m ²
Deflection	
Vertical	1 mm per 126 kN/m ²
Lateral	1 mm per 15 kN/m ²
Ultimate tensile strength of a single joint	2.25 kN
Tensile strength of a single joint at 1% secant modulus	1 kN
Bending resistance of unit	0.7 kNm
Bending resistance of single joint	0.16 kNm
Minimum void ratio	95%

1128AR Filter Fabric

- 1 Filter fabric used in footways shall comply with the requirements set in Table 11/16 below.

Table 11/16: Filter Fabric

Characteristics	Standard	Woven filter	Non-woven filter
Weight	BS EN 965	H 200 g/m ²	H 400 g/m ²
Ultimate tensile strength Longitudinal Transverse	BS EN ISO 10319	H 30 kN/m H 30 kN/m	H 15 kN/m H 15 kN/m
Strain at norm tensile strength Longitudinal Transverse	BS EN ISO 10319	G 25% G 25%	— H 70%
CBR puncture	BS EN ISO 12236	H 2 000 N	H 3 000 N
Opening size	BS EN ISO 12956	H 0.2 mm	H 0.1 mm
Water permeability	BS EN ISO 11058	H 200 × 10 ⁻³ m/s	H 6 × 10 ⁻³ m/s

1129AR Light Reflectance Value

- 1 The *Contractor* shall supply the Light Reflectance Value (LRV) measured in accordance with BS 8493 to the *Client* for every surface product in Series 1100. The LRV shall be supplied for dry and wet surfaces.
- 2 The LRV measurement for wet surfaces shall be taken immediately after submerging the surface in water for 5 minutes, and following the removal of excess water.

1130AR Oleophobic Surface Sealers

- 1 Oleophobic sealants have the ability to repel oil which means they will protect the paving from oils, fats and greases from cooking, from fuel or engine leaks, and to some extent, from some paints, and chewing gum. Oleophobic sealants shall be tested. Sealants shall be based on silanes or alkoxy silanes.
- 2 The *Contractor* shall test the sealant by using the test method in BS EN 16301 for the items in Table 11/17 on sealed and unsealed Silver-Grey Granite and Blue/Grey, Lancashire/Yorkshire Sandstone [natural stone specified in Appendix 11/1]. Both sealed and unsealed samples shall then be rated on a scale of 1 – 4 as shown in BS EN 16301 and the sealant must show an improvement of at least 1 point on all of the six staining agents shown in Table 11/17.

Table 11/17: Staining Agents for testing Stone Sealants

Staining Agent	Detail
Red wine	> 80% Cabernet Sauvignon, pH 3.0 – 4.0
Cooking oil	100% olive-oil without any colourants.
Instant Coffee	Brewed and freeze-dried coffee powder 4 g is solved in 100 ml hot (> 80 °C) deionised water. Let cool down to about 23 °C before use.
Ketchup	pH 3 – 4
Cola	“Regular Coke”, not light or with modified taste pH 2
Citric acid	Dilute for 1.5 – 1.8

1131AR Precast Concrete High Containment Kerb

- 1 A high containment kerb is a kerb designed to redirect vehicles on to their intended path and prevent the overrun of vulnerable areas adjacent to the carriageway. High containment kerbs may be used as vehicle restraint systems only if they are tested to BS EN 1317, in which case they must comply with all requirements set in Series 0400.

1132AR Bus Stop Boarder Kerbs

- 1 Bus boarder kerbs shall allow improved bus docking by providing a reduced gap between pavement and the bus platform, resulting in safer, faster and easier passenger, wheelchair and pushchair access, and providing a more efficient and accessible community transport service.

Additional, Cancelled, Modified & Substitute Clauses

Series 1200 Traffic Signs

1201MR	Regulations, Sign Classification and Standards
1202SR	General Requirements for Permanent Traffic Signs
1203SR	Foundations for Permanent Traffic Signs and Signals
1204SR	Posts for Permanent Traffic Signs
1205MR	Sign Plates for Permanent Traffic Signs
1206MR	Faces for Permanent Traffic Signs
1207MR	Construction and Assembly of Permanent Traffic Signs
1208MR	Location and Erection of Permanent Traffic Signs
1209MR	Covering of Permanent Traffic Signs
1210SR	Permanent Traffic Bollards
1211SR	Permanent Marker Posts
1212SR	Road Markings
1213MR	Road Studs
1214MR	Traffic Cones, Traffic Cylinders, Flat Traffic Delineators and Other Traffic Delineators
1216MR	Temporary Traffic Signs
1217MR	Traffic Signals and Box Signs
1219MR	Controlled and Uncontrolled Crossings
1220MR	Traffic Signs on Gantries
1221MR	Preparation and Finish of Metal and Other Surfaces
1222AR	Portable Traffic Signals and Stop / Go boards

1201MR Regulations, Sign Classification and Standards

Replace sub-Clause 1 with the following:

- 1 Subject to paragraphs 2 and 3 below, all traffic signs used (including retroreflecting road studs and road markings), whether permanent or temporary, shall be of the size, shape, colour and type prescribed for that use in The Traffic Signs Regulations and General Directions 2016 (Statutory Instrument 2016 No. 362), subsequently referred to as TSRGD, and any subsequent amending Regulations.

Replace sub-Clause 4(ii) with the following:

- 4 “(ii) Prescribed temporary traffic signs. Any of the traffic signs defined in the Regulations, or specially authorised by the Secretary of State, or any part thereof, which comply with the requirements of a permanent traffic sign but which will not remain in position at the completion of the permanent works;”.

1202SR General Requirements for Permanent Traffic Signs

- 1 Materials for permanent traffic signs and their construction, assembly, location and erection shall comply with this Series and Series 1400. The manufacture and installation of traffic signs shall be in accordance with the quality management scheme described in Appendix A of MCHW Volume 1.
- 2 Each complete traffic sign or part thereof shall comply with, and be capable of passing the tests of BS EN 12899-1.
- 3 Before the commencement of fabrication of any Type 2 traffic sign described in Appendix 12/1, the *Contractor* shall submit fabrication drawings for the *Client's* approval.
- 4 The backs of traffic signs shall be black when installed in the City of Westminster and the City of London, and shall be grey when installed elsewhere.
- 5 All signs shall be permanently marked on the reverse with the name or code of the manufacturer together with the month and year of manufacture. The markings shall be discrete but clearly visible upon inspection, and comply with the requirements of the Traffic Signs Regulations and General Directions.
- 6 Traffic signs shall be carefully handled to prevent damage, and transported and stored in accordance with the sign face manufacturer's instructions.
- 7 All signs shall be covered by a minimum manufacturer's guarantee of 12 years.
- 8 All equipment used by the *Contractor* to illuminate traffic signs, bollards or to operate traffic signals, if powered by unmetered electrical supply must be tested against the criteria set out in “Balancing and Settlement Code - BSCP520”, the manufacturer supplied with a valid Charge Code and that Charge Code and a related Switch Regime entered by the *Contractor* into the *Client's* Asset Management Information System, for energy settlement purposes.
- 9 Transilluminated traffic signs shall comply with BSEN 12899-1, and meet Class L2 and Class U3 of that standard.

1203SR Foundations for Permanent Traffic Signs and Signals

- 1 Foundations for permanent traffic signs and signals shall be as described in Appendix 12/1 and unless otherwise stated, in compliance with this Clause.

- 2 All excavations for foundations shall be in compliance with Clause 604.
- 3 Grade ST2 concrete shall be placed in the bottom of the post hole until the planting depth in accordance with Appendix 12/1 is reached. The post shall be set vertically in the centre of the hole to the correct planting depth and the void filled to within 150mm of ground level with grade ST2 concrete in accordance with Clause 2602.
- 4 All backfilling of foundations shall comply with Clause 611, except that where ducts or buried cables are installed compliance shall be with Clauses 505 and 1421 respectively. Reinstatement of existing surfaces above foundations shall comply with Clause 706.
- 5 Posts shall be supported as required to ensure that the traffic sign post remains vertical during concrete curing.
- 6 For traffic signals and illuminated traffic signs, provision shall be made for cable entry through the foundation by means of 100mm diameter UPVC street lighting duct of 5mm wall thickness.
- 7 Where pockets are formed in concrete foundations, their plan dimensions shall be sufficiently larger than those of the post to allow for positioning and bedding of the post and backfilling of the pocket.
- 8 All posts and base plates shall be provided with the additional protection of a bitumen coating both internally and externally below ground level.

1204SR Posts for Permanent Traffic Signs

- 1 Posts for permanent traffic signs shall comply with BS EN 12899-1 and meet one of the following designations:
 - i) steel posts shall be tubular or rectangular hollow sections complying with BS EN 10210 and shall be manufactured from steel complying with grade S275 JO or S275 J2
 - ii) aluminium posts shall be tubular or rectangular hollow sections
 - iii) passively safe posts shall be as agreed with *the Client*
- 2 All posts shall be fitted with a base plate and plastic end caps. The size of the base plate shall be sufficient to prevent rotation in the ground or foundation.
- 3 Posts shall not protrude above the top of the sign unless supporting an external luminaire, in which case the protrusion shall be kept to a minimum.
- 4 All electrical equipment shall be enclosed in a large base housing. Access to the interior shall be by means of a weatherproof door having tamper-resistant locks. The lower edge of the door shall be positioned so that when installed it is no less than 300mm above ground level and orientated to oppose oncoming traffic. In the case of signs supported by more than one post such compartment shall be on the post furthest from the carriageway.
- 5 Large base lock types shall be kept to a minimum and replicate as close as practicable the *Client's* existing assets.
- 6 All holes cut in posts to provide a route for internal wiring shall be bushed to prevent chafing of any wiring and suitably protected using a zinc rich material specifically designed to provide a rust inhibiting coating.
- 7 A suitable earthing stud, complete with two brass washers, a brass nut and lock nut, shall be provided on metal sign doors.

- 8 Internal baseboards shall be manufactured from marine plywood or other substantially non-hygroscopic and rot resistant material, minimum thickness 15mm, and shall be securely fixed to the back of the compartment on which the electrical equipment will be mounted. A separate suitable earthing stud, complete with two brass washers, a brass nut and locknut shall be provided on the housing in a suitable and easily accessible position. The distance from the face of the baseboard to the inside of the front of the housing shall be at least 100mm.
- 9 Posts shall be protected against corrosion in accordance with Clause 1221. All posts and base plates shall be provided with the additional protection of a bitumen coating both internally and externally below ground level.
- 10 Post types and brackets shall be as described in Appendix 12/1.

1205MR Sign Plates for Permanent Traffic Signs

Replace sub-Clause 1 with the following:

- 1 "All permanent sign plates shall comply with this Clause and the recommendations set in the UK National Annex of BS EN 12899-1."

In sub-Clause 5 delete "in Appendix 12/1,".

Insert new sub-Clauses 7 and 8 as follows:

- 7 All brackets, clips and butting plates used in sign assemblies shall be manufactured from stainless steel. All screws, bolts, nuts and washers shall be stainless steel, but where these are in contact with materials which may be damaged by overtightening or electrolytic action, protective washers of nylon or other approved material shall be inserted.
- 8 Different sign types are illustrated in Appendix 12/1

1206MR Faces for Permanent Traffic Signs

Replace sub-Clause 1 with the following:

- 1 "All permanent sign plates shall comply with the recommendations set in the UK National Annex of BS EN 12899-1 and this clause."

1207MR Construction and Assembly of Permanent Traffic Signs

In sub-Clause 1, delete "BS 873: Part 6" and replace with "BS EN 12899-1".

In sub-Clause 8, delete from "and they and their anchorages" to the end.

1208MR Location and Erection of Permanent Traffic Signs

Replace sub-Clause 1 with the following

- 1 The location and erection of signs and posts shall be as stated in *the design*. Records shall be provided in accordance with the requirements of Clause 1402.

In sub-Clause 3 delete "unless otherwise described in Appendix 12/1"

In sub-Clause 4 delete "unless otherwise described in Appendix 12/1"

Delete sub-Clause 6 and 7.

1209MR Covering of Permanent Traffic Signs

Replace the first sentence of sub-Clause 1 with the following:

“Where it is required that permanent traffic signs be blanked-out or have an alternative message, the method to be adopted shall comply with the following unless otherwise directed by the *Client*.”

In sub-Clause 7, delete “Irrespective of any requirement in Appendix 12/1 to cover signs,”

1210SR Permanent Traffic Bollards

- 1 Permanent traffic bollards shall incorporate a prescribed traffic sign. Bollards not incorporating a traffic sign are covered in Series 4000.
- 2 Traffic Bollards shall be Type A retroreflective self-righting bollards (RSRB's) as specified in BS 8442 unless instructed by *the Client*
- 3 Retroreflective fluorescent yellow conspicuity panels shall be installed only on the front and side faces of Traffic Bollards unless instructed by the *Client*.
- 4 All faces of Traffic Bollards which are not signs or conspicuity panels shall be coloured black
- 5 Internally illuminated bollards, when instructed by *the Client*, shall comply with BS EN 12899-2 and be of the uplighter variety. They shall be vertically installed, assembled, correctly orientated, connected and left in good working order, strictly in accordance with the manufacturer's instructions. Uplighters shall be securely fixed with rag bolts in their correct positions.
- 6 Passive safe hooped traffic bollards, where instructed by the *Client*, shall achieve a BS EN 12767 rating of 70:NE:4, have a 40kph Head Injury Criteria (HIC) test rating of 560 HIC or below, and have a chest impact simulation test results demonstrating “no serious injury”.

Passive safe hooped traffic bollards shall operate within a -20°C to 60°C temperature range, returning to an upright position after a minimum of 100 impacts to 90° in the same direction, and withstand 300kg of horizontal pressure before they fold to 90 degrees.

Passive safe hooped traffic bollards shall incorporate one or more traffic signs or alternatively a plain white borderless roundel conforming to 13.2 of BS 8442

The height of a passive safe hooped traffic bollard shall be between 900mm and 1200mm above the ground line.

1211SR Permanent Marker Posts

Hazard Marker Posts

- 1 Hazard marker posts shall be Type D3 or D4 to BS EN 12899-3, and comply with the classes recommended in the National Annex to that standard. .
- 2 The reflectors shall be Type R1, Class 3 and comply with Diagram 560 of the Traffic Signs and General Directions. The retroreflective sheeting shall be protected from damage from overrunning vehicles by raised edges or other acceptable methods.
- 3 The hazard marker post shall be installed so that its top is between 750mm and 1000mm above ground level, unless otherwise required by the *Client*, and it shall present a projected width of not less than 100mm.

Distance Marker Posts

- 4 Distance marker posts shall be made from hard-wearing polymer and shall be supplied and installed with a ground socket or mounted on a safety fence in compliance with the distance marker post manufacturer's instructions.

1212SR Road Markings

General

- 1 Insofar as BS EN 1436 refers only to white, yellow and black materials, for the purposes of this Specification, all references to yellow material in BS EN 1436 shall be deemed to apply equally to red material with the exception of chromaticity. Road markings shall be white, yellow or red complying with BS EN 1436 Table 6, as appropriate.
- 2 The markings shall consist of continuous or intermittent lines, letters, figures, arrows or symbols.

Permanent Road Markings

- 3 All permanent road markings shall be formed from thermoplastic material in accordance with BS EN 1871 unless otherwise stated in the design drawings or instructed by the *Client*. Alternative materials are described in Appendix 12/3. All white road markings shall be tested in road trials to the Roll-over class P5 in accordance with the procedure stated in BS EN 1824 to demonstrate compliance with the performance requirements as stated in sub-Clause 4 below. The test report shall give particulars of the quality and quantity of the material, including drop on glass beads laid at the test site for future reference and comparison purposes should such a need arise. The report shall be appended with the results of laboratory testing of the material to BS EN 12802 for inorganic constituents, organic constituents, titanium dioxide content, glass bead content, and identification of solvents if applicable.
- 4 Road markings shall have the minimum road performance given in table 12/4 of Appendix 12/3 as defined in BS EN 1436 for the period of the functional life starting from the date of application or when the road is trafficked, whichever is later. Road markings shall be type SR as defined in Table 12/4 of Appendix 12/3, unless otherwise stated in the design drawings or instructed by the *Client*. The materials to be used shall be to the same mix, material quality, quantity and rate of application as used on the test site.
- 5 Unless specified all white markings shall be reflectorised in accordance with BS EN 1423 and BS EN 1424 by incorporation (apart from preformed markings) into the roadmarking mixture and to the wet surface of the marking. Glass beads shall not have more than 1000ppm of arsenic trioxide, 200ppm of lead and 1000ppm of antimony. The *Contractor* shall supply test certificates showing compliance with these requirements.
- 6 The surface shall be prepared in accordance with the following:
 - a) Where the marking is to be applied on a concrete carriageway, the transverse texturing shall be freed from all traces of curing compound by wire brushing or other approved means. Prior to the application of the thermoplastic material a tack coat compatible with the road surface and the marking material shall be applied in accordance with the manufacturer's instructions.
 - b) On surface dressed carriageways, all loose chippings where the marking is to be applied shall be removed prior to application.

- c) Where the marking is to be applied to clay, concrete, or stone, the surface is to be suitably primed according to the manufacturer's recommendation prior to application of Cold plastic or Paint only. Thermoplastic is not permitted on these surfaces.

7 Application of permanent road markings shall be in accordance with the Sector Scheme described in Appendix A. Road marking materials shall only be applied to surfaces which are clean and dry. Markings shall be free from raggedness at their edges and shall be uniform and free from streaks. Longitudinal road markings shall be laid to a regular alignment.

Raised Rib Road Markings

8 Raised rib road markings shall only be used on roads (both single and dual carriageway) with at least 1 metre wide hard verges, or where instructed by the *Client*. They shall comply with all sub-Clauses above, and be in accordance with The Traffic Signs Regulations and General Directions diagram 1012.3.

9 Raised rib road markings shall be continuous white lines, except where gaps need to be provided for drainage purposes.

Preformed Thermoplastic Road Markings

10 Preformed road markings shall be used for TSRGD diagrams 1057, 1057.1, 1068 and 1069 as detailed in Appendix 12/3.

11 Preformed Road Markings shall comply with BS EN 1436 standard: S3, R2, Q3 and have a thickness of 3mm (+/- 1mm). They shall demonstrate the required properties after 12 months in service when tested to roll-over class P5 of Table 3 BS EN 1824.

Temporary Road Markings

12 Temporary road markings shall only be used with the prior approval of the *Client*. They shall comply with Sub-Clauses 1 to 7 above and be constructed from either:

- a) a proprietary preformed road marking material complying with BS EN 1790 and assessed as removable under that standard, or
- b) paint to BS EN 1871.

13 When temporary road markings are used on surfaces that will continue to be used by public traffic after their removal, any shadow trace remaining after their removal shall be permanently obliterated. Preformed materials shall not be used for this obliteration. Upon removal they shall be disposed of off site and if any making good is necessary to the road surface it shall be satisfactorily carried out before the road is opened to traffic.

14 Temporary road markings constructed from a preformed road marking material or paint shall only be applied to surfaces that are clean and dry. The marking material shall be new and, together with any primer, shall be stored and installed in accordance with the manufacturer's instructions and within the recommended shelf life.

Masking of Existing Road Markings

15 The *Contractor's* proposed method of masking existing road markings shall be agreed with the *Client*.

16 When black masking materials are required to cover existing permanent road markings, they shall comply with BS 7962 other than for specular gloss where they shall have an initial value for specular gloss of no greater than 3, and a retained value following exposure to traffic of no greater than 3. The total thickness of original and masking materials shall not exceed 6mm.

Road Markings on Porous Asphalt Surfacing

- 17 Thermoplastic, Cold plastic or Paint applied by machine screed, spray or extrusion or preformed road markings shall be used for carriageway markings on porous asphalt surfacing. Manual screeding shall not be permitted except for directional arrows and other symbols.

Removal of Road Markings

- 18 The removal of road markings on surfaces that will continue to be used by traffic shall be undertaken in a manner that will minimise damage to the surface.
- 19 The *Contractor* shall adopt best practical means to limit environmental impact of the work. Sufficient protection shall be provided such that users of the highway and adjacent properties are not exposed to debris, spray, excessive noise, or any other nuisance caused by any road marking removal.
- 20 Waste material arising from the erasure of permanent road markings shall be carefully removed using a mechanical (road) sweeper or suction so that the surface is clean and free from dust. Handsweeping and collection of arisings shall only be used with the approval of the *Client*.
- 21 Unless otherwise agreed by the *Client*, the removal/replacement shall be carried out as a combined operation such that the new markings are applied on the same shift that the old markings are removed.
- 22 Where existing road markings are to be removed and not replaced, the thermoplastic material shall be removed to its full depth. Any residual marking, abrasion, or damage to the surface shall be obscured/repared using suitable crack seal products complying with Clause 711SR and Appendix 7/11 unless within a high friction surfacing or CCAST, where the area shall be covered with high friction surfacing or CCAST in accordance with the requirements of Clause 924 or Clause 959 accordingly.

1213MR Road Studs

Replace sub-Clause 1 with the following:

- 1 “Statutory requirements controlling retroreflecting road studs (both permanent and temporary) shall apply, as detailed in the Traffic Signs Regulations and General Directions 2016 (Statutory Instrument 2016 No.362) together with any subsequent amending Regulations and General Directions.”

In sub-Clause 3 substitute “the Traffic Signs Regulations and General Directions 2016 (Statutory Instrument 2016 No.362)” for “the Traffic Signs Regulations and General Directions 2002 (Statutory Instrument 2002 No. 3113)”

Replace sub-Clause 5 with the following:

Permanent Retroreflecting Road Studs

- “5 Permanent retroreflecting road studs shall be installed at the locations shown in the design drawings, or as instructed by the *Client*. Permanent road studs shall be tested to BS EN 1463-2, and achieve a performance rating of S1, R1, and DV1.. Permanent retroreflecting road studs shall be Type A (non-depressible) of BS EN 1463-1, and be one of the types described

in Appendix 12/3. Permanent retroreflecting road studs shall comply with performance classes PRP1, NCR1, and DCR1 and all other requirements of that standard..”

Replace sub-Clause 7 with the following:

Non Retroreflecting Road Studs

“7 Non retroreflecting road studs are not permissible for use in the works”

Replace sub-Clause 8 with the following:

Retroreflecting Road Studs on Porous Asphalt Surfacing

“8 Road studs shall not be applied if there is evidence of moisture present on the surface of porous asphalt”.

1214MR Traffic Cones, Traffic Cylinders, Flat Traffic Delineators and Other Traffic Delineators

In sub-clause 1, delete “Cones shall be to Category A”.

In sub-clause 1, delete “shall comply with Designation 1 or Designation 2” and replace with “shall be to Category B”

In sub-Clause 4, delete “as stated in Appendix 12/4” and delete “TSRGD 2002 or the Traffic Signs Regulations (Northern Ireland) 1997 as appropriate” and replace with “TSRGD 2016”.

In sub-Clause 8, delete “TSRGD 2002 or the Traffic Signs Regulations (Northern Ireland) 1997 as appropriate” and replace with “TSRGD 2016”

In sub-Clause 9, delete “BS 873: Part 6” and replace with “BSEN 12899 part 3”.

In sub-Clause 10, delete “BS 873: Part 1” and replace with “BSEN 12899 part 1”.

In sub-Clause 11, delete “Class 1 or Class 2” and replace with “class RA2” , and delete “BS 873: Part 6” and replace with “BSEN 12899 part 3”.

Delete sub-Clause 18.

In sub-Clause 20, delete “in Appendix 1/5” and delete “as given in Appendix 1/5”.

In sub-Clause 20, delete “56” and insert “55”.

Delete sub-Clause 56

1216MR Temporary Traffic Signs

In sub-Clause 1, delete “117” and insert “117SR”.

In sub-Clause 1, substitute “TSRGD 2016” for “TSRGD 2002”

In sub-Clause 2(i)(a), delete “BS 873 : Part 6” and replace with “BS EN 12899”.

In sub-Clause 2(i)(b), delete “Appendix 12/1” and insert “the *Client*”.

In sub-Clause 2(i)(b), delete “BS 873 : Part 2” and replace with “BS EN 12899”.

In sub-Clause 2(i)(c), delete “Appendix 12/1” and insert “the *Client*”.

In sub-Clause 2(iv), delete “1212” and insert “1212SR”.

In sub-Clause 2(v), delete “1217” and insert “1217SR”.

In sub-Clause 3(ii)(a), delete “BS 873 : Part 1” and replace with “BS EN 12899”.

In sub-Clause 3(ii)(e), delete "BS 873 : Part 6" and replace with "BS EN 12899".

In sub-Clause 4, delete "1208" and insert "1208SR".

In sub-Clause 5, delete "Appendix 12/3" and insert "Clause 1212SR and 1213".

Add sub clause 8 as follows

- 8 Temporary Variable Message Signs (VMS) shall comply with Appendix 12/8.

1217MR Traffic Signals and Box Signs

For Sub Clause 1 substitute

- 1 "Traffic Signals and Box Signs shall comprise road junction signals, puffin, toucan and Pegasus crossing signals, wig-wag signals, variable message and over-height vehicle box signs and shall be as described in Appendix 12/5."

Throughout the remainder of sub-Clause 1217 substitute "Traffic Signals and Box Signs", for "Traffic Signals"

1219MR Controlled and Uncontrolled Crossings

For Sub Clause 1 substitute

- 1 "The location of controlled crossings shall be as described in The *Client's* Scope."

1220MR Traffic Signs on Gantries

Replace sub-Clause 2 with:

- 2 Fabricated steel gantries shall be constructed to the requirements described in the Task Order.

1221MR Preparation and Finish of Metal and Other Surfaces

Throughout Clause 1221 substitute "BS EN 12899" for "BS 773: Part x", where x is variable.

In sub-Clause 1, delete "where specified in Appendix 12/1".

In sub-Clause 3, delete "and be as described in Appendix 12/1".

In sub-Clause 4, delete "and be as described in Appendix 19/2".

In sub-Clause 5, delete "in Appendix 19/2" and insert "by the *Client*".

In sub-Clause 6(ii), delete "and colour as described in Appendix 19/2".

In sub-Clause 7, delete "in Appendix 14/4" and insert "by the *Client*".

In sub-Clause 8, delete "in Appendix 19/2" and insert "by the *Client*".

In sub-Clause 9, delete "as described in Appendix 19/2"

In sub-Clause 9, delete "in Appendix 19/2" and insert "by the *Client*"

1222AR Portable Traffic Signals and Stop / Go boards

- 1 The use and positioning of portable traffic signals shall be agreed with the *Client* prior to their installation.

- 2 Portable traffic signals shall comply with TOPAS 2502B, TOPAS 2504A, TOPAS 2537A, and TOPAS 2538A as applicable, and be installed and used in accordance with:
 - a) Chapter 8 of the Traffic Signs Manual;
 - b) Department for Transport Guidance TAL 2/11 and TAL 3/11; "An Introduction to the Use of Vehicle Actuated Portable Traffic Signals"
 - c) Transport for London's "Temporary Traffic Management handbook"
- 3 Portable signals must have the capability to operate as per the following methods as requested by the *Client*:
 - a) UTC Control – Be compatible to interface with the *Client's* UTC system providing the ability to control the signals remotely and override deployed plans where required.
 - b) Indirect Control – Downloadable plans, signal timing plans and timetables that can be sent to and operated by the Portable Traffic Signal Controller
 - c) Standalone – Be controlled locally through vehicle actuation.
- 4 Any portable generator used as a power supply shall be a sound reduced model and be properly silenced and maintained in accordance with the manufacturer's instructions and operated in accordance with BS 5228. Further requirements relating to noise control are set out in Clause 109SR.
- 5 Cables for the traffic signals which cross a carriageway which is open to vehicles shall be contained in a Cable Crossing Protector designed to prevent damage to the cable and to permit traffic, particularly two wheeled vehicles, to cross safely. Drivers shall be warned of the presence of the Cable Crossing Protector by means of "RAMP" signs.
- 6 The *Contractor* shall provide all operatives using temporary traffic signals with a copy of and training in the Department for Transport booklet "An Introduction to the Use of Vehicle Actuated Portable Traffic Signals" published by HMSO, edition of 2016 or any subsequent amendment.
- 7 When using Portable Traffic Signals, the *Contractor* shall provide the necessary advance warning signs and shall have STOP/GO signs available for immediate use in case of electrical or mechanical breakdown.
- 8 The maximum distance between the two signal heads, when using portable traffic signals, shall not exceed 150 metres unless otherwise agreed with the *Client*.

Manual STOP/GO sign control

- 9 For some short duration works, when agreed with the *Client*, the *Contractor* may use manual STOP/GO sign traffic control. All operators of STOP/GO signs shall be suitably experienced and certificated for this type of work.
- 10 Where the length of the works necessitates the use of two STOP/GO signs, then their operators shall ensure that they are clearly visible to each other at all times. Where this is not possible, two way radio communications may be used with contingency plans in place for battery failure.

Additional, Cancelled, Modified & Substitute Clauses
Series 1250 – Traffic Sign and Road Marking Maintenance

1251AR Maintenance of Sign Lighting Units

1252AR Fault Repair of Sign Lighting Units, Refuge Beacons and Bollards

1253AR Realignment of Traffic Signs and Posts

1254AR Renumbering of Traffic Signs

1255AR Remarking of Road Markings

1256AR Replacement of Road Studs

1257AR Condition Assessment of Road Markings

1251AR Maintenance of Sign Lighting Units

1. The *Contractor* shall undertake the maintenance of sign lighting units in the manner described in Clause 1450AR for the Maintenance of Electrical Equipment for Road Lighting Units.

1252AR Fault Repair of Sign Lighting Units, Refuge Beacons and Bollards

1. The *Contractor* shall undertake fault repair of sign lighting units, refuge beacons and bollards in the manner specified in Clause 1451AR for road lighting units.
2. In the repair of internally illuminated bollards, damaged and removed shells shall be recycled for use where possible.

1253AR Realignment of Traffic Signs and Posts

1. The *Contractor* shall realign traffic sign posts as described in clause 1352AD Realignment of Lighting Columns and Posts
2. Misaligned traffic sign faces shall be realigned such that the sign face is properly aligned to face oncoming traffic, or is parallel to the kerb face for parking restriction signs as appropriate.

1254AR Renumbering of Traffic Signs

1. The *Contractor* shall undertake renumbering of traffic signs such that the number shall be located on the sign pole/post, approximately 2.5m from ground level to the bottom of the number. Where the length of the sign pole will not accommodate the 2.5m then numbering shall be located on the back of the sign.
2. The number shall be positioned facing the carriageway, or where there is no adjoining carriageway facing the footway/footpath.

1255AR Remarking of Road Markings

1. Where the *Contractor* overlays road markings the combined thickness of new and old marking material shall not exceed 6mm.

1256AR Replacement of Road Studs

1. The Contractor shall replace missing or defective road studs with materials of the same colour and similar physical characteristics to those which they replace.

1257AR Condition Assessment of Road Markings

The condition of road markings shall be rated in accordance with Annex E of TD 26/17 (The Design Manual for Roads and Bridges) and as table 125.1.

Table 125.1

Condition rating	TD26/17 Condition Score	TD26/17 - Annex E illustrations
Prime	50	Figure E1 to E3
Good	40	Figure E4 and E5
Fair	30	Figure E6 and E7
Just serviceable	20	Figure E8 to E10
Poor	10	Figure E11 and E12
Bad	0	Figure E13 and E14

Additional, Cancelled, Modified & Substitute Clauses

Series 1300 Road Lighting Columns and Brackets, CCTV Masts and Cantilever Masts

1301SR	General
1302MR	Design of Lighting Columns, Brackets, CCTV Masts, Cantilever Masts, Foundations, Anchorages and Attachment Systems
1303MR	Data Sheets
1305MR	Installation of Foundations, Anchorages and Attachment Systems
1306MR	Site Tests on Anchorages in Drilled Holes
1307SR	Materials and Surface Finishes
1308SR	Handling, Transport and Erection
1309CR	Amendments and Additions to BS 5649-2: 1978 – Clause Cancelled
1313SR	Laminated Glass Fibre Reinforced Plastic (GFRP) Lighting Columns
1314CR	Brackets for Laminated GFRP Lighting Columns - Clause Cancelled
1316AR	Loading Design
1317AR	Fold Down (Raising and Lowering or Mid-hinged) Columns
1318AR	Passively Safe Columns
1319AR	Retention Sockets
1320AR	Uprightness
1321AR	Declaration of Performance / Conformity – CE Marking

1301SR General

- 1 This Series shall apply to the design, supply and installation of lighting columns and brackets and CCTV masts and cantilever masts for traffic signals and/or speed cameras (hereafter called cantilever masts) within the following dimensional limitations:
- a) For steel and aluminium lighting columns:
 - i) post top columns not exceeding 20 m nominal height;
 - ii) columns with brackets not exceeding 18 m nominal height;
 - iii) bracket projections not exceeding 0.25 x nominal height or 3 m whichever is the lesser.
 - b) For steel CCTV masts:
 - i) post top masts not exceeding 25 m nominal height.
 - c) For steel cantilever masts:
 - i) nominal height not exceeding 8.5 m;
 - ii) cantilever projection not exceeding 8.5 m.

Where nominal height is taken as either the distance from the highest point of the mast to the underside of a flange plate, or ground level for planted/socketed columns.

Glass fibre reinforced plastic lighting columns are not permitted for use.

Concrete columns are not permitted for use.

Passively safe columns shall comply with the requirements of Clause 1318.

Cranked Root columns of any type are not permitted for use.

- 2 The *Contractor* shall propose lighting columns and brackets, CCTV masts and cantilever masts which have been designed by the manufacturer. The manufacture, supply and verification of lighting columns and bracket arms shall comply with the quality management system.

The *Contractor* shall design foundations for planted/socketed lighting columns and cantilever masts in accordance with BD 26 Chapter 8 (DMRB 2.2.1) or of BD 88/03 Chapter 8 (DMRB 2.2.13) using the soil type information as described in scheme specific Appendices 13/1 and 13/7 by the *Contractor*.

The *Contractor* shall, where required, design:

- a) anchorages and attachment systems for columns and masts with flange plates to foundation or bridge deck.
- b) foundations for columns and masts with flange plates.
- c) foundations with retention socket in situations where lighting columns need to be located in vulnerable positions where columns can be hit by high sided vehicles or foundation difficulties are encountered.

as described in scheme specific Appendices 13/1, 13/4 and 13/7.

- 3 Lighting columns and brackets, CCTV masts and cantilever masts shall be supplied and installed in compliance with the relevant requirements of BS EN 40-1, BS EN 40-2, BS EN 40-3-1, BS EN 40-3-2, BS EN 40-3-3, BS EN 40-4, BS EN 40-5, BS EN 40-6 and, BS 5649-5 together with the amendments and additions stated in Clauses 1310 and 1311 and all the other requirements of this Series.

Lighting Columns shall be:

- a) conical as instructed by the *Client*;
 - b) Stepped tubular in all other areas:
 - i) Steel columns shall be manufactured by roll forming (BS EN 40-5:2002) and be seamless or welded.
 - ii) Aluminium columns shall be manufactured using single piece extrusion (BS EN 40-6:2002).
 - c) supplied with male fitted column spigots; and
 - d) designed for an expected life of 50 years as per the requirements of Annex A of BS EN 40-3-1.
- 4 Brackets for lighting columns shall include wall mounted brackets and fixtures.
- 5 Temporary lighting on temporary diversions for traffic and crossovers shall comply with this Series.
- 6 Where lighting columns, CCTV masts and cantilever masts are to be in the vicinity of overhead power lines the *Contractor* shall ensure that the appropriate Electricity Authorities are notified and give written agreement to the specific clearances to be provided and that warning notices are permanently fixed to these columns prior to erection.
- 7 Headroom over the carriageway for cantilever mast shall be in accordance with the requirements of paragraph 3.2 of Standard BD 88 (DMRB 2.2.13).

1302MR Design of Lighting Columns, Brackets, CCTV Masts, Cantilever Masts, Foundations, Anchorages and Attachment Systems

Delete sub-Clause 1 and replace with the following:

- 1 “CCTV masts, cantilever masts, the foundations of both planted/socketed columns and columns and masts with flange plates, and the anchorages and attachment systems for columns and masts with flange plates shall be designed to comply with the requirements of Standards BD 26 (DMRB 2.2.1), BD 83 (DMRB 2.2.11), BD 88 (DMRB 2.2.13) and the technical approval scheme adopted by the *Client*. Street Lighting columns shall be designed to comply with the requirements of Appendix 13/1.

The *Contractor* shall submit to the Overseeing Organisation a copy of the design and check certificates for lighting columns, brackets, CCTV masts, cantilever masts and foundations. The design of the foundations shall be appropriate to the soil types encountered on site as per Clause 1303”

1303MR Data Sheets

Delete sub-Clause 1 and replace with the following:

- 1 "The *Contractor* shall complete Data Sheets in accordance with the instructions given in Appendix 13/2. The *Contractor* shall provide the *Client* with a copy of the completed Data Sheets for each type of column and bracket, CCTV mast and cantilever mast in PDF format."

In sub-Clause 2, delete "or erected".

1305MR Installation of Foundations, Anchorages and Attachment Systems

In sub-Clause 3(i) delete "and glass fibre reinforced plastic" and delete "or other material described in Appendix 13/1".

Delete sub-Clause 3(ii).

In sub-Clause 3(iii), delete "or other material described in Appendix 13/7".

In sub-Clause 5, delete "unless otherwise described in Appendices 13/1 and 13/7".

In sub-Clause 8, delete "as described in Appendices 13/1, 13/4 and 13/7".

In sub-Clause 8, insert new second sentence, as follows:

"For CCTV masts, two 75mm diameter cable ducts shall be provided."

Delete sub-Clause 9 and replace with the following:

- 9 "Design and fabrication requirements for attachments are given in Appendix 13/1."

In sub-Clause 10, delete "unless otherwise described in Appendices 13/1, 13/4 or 13/7".

Add sub-Clause 16 & 17 as follows:

- 16 The flange plate/foundation shall be vented and drained so that no accumulation of moisture forms in the base of the column, potentially accelerating corrosive action.
- 17 Foundations for retention sockets shall be as per the manufacturer's requirements.

1306MR Site Tests on Anchorages in Drilled Holes

In sub-Clause 1, replace "BS 5080-1" with "BS 8539".

In sub-Clause 3, delete "in accordance with Appendix 1/5" and replace with "as agreed with the *Client*".

1307SR Materials and Surface Finishes

- 1 All steel fixings including doors, door hinges, chains and locks shall be stainless steel to BS EN 10029, BS EN ISO 3506-1 and BS EN ISO 3506-2 as appropriate or steel to BS EN 10025-1, BS EN 10025-2 or BS EN 40-5 and BS EN 40-6 as amended in Clause 1310, galvanized in compliance with Series 1900.
- 2 Where different metals are in contact, consideration shall be given to the necessary measures to avoid galvanic(bi-metallic) corrosion.
- 3 The surface preparation and protection of steel lighting columns, brackets and wall mountings, steel CCTV masts and steel cantilever masts, mountings and housings shall comply with the relevant Clauses in Series 1900.

- 4 The exterior and interior surfaces of the intended planted/socketed depth of an aluminium alloy lighting column shaft and a length of 250 mm above the ground level shall be coated with a non-porous electrically insulating bitumen with a minimum layer thickness 250 µm. The coating shall only be applied after degreasing and after an approved preliminary treatment in order to ensure adhesion.
- 5 The underside of an aluminium alloy flange plate shall be treated before erection with bituminous paint complying with BS 3416 or BS 6949.
- 6 Steel columns shall be coloured unless otherwise specified as the following:
 - a) Black (RAL 9005);
 - b) Signal Grey (RAL 7004); or
 - c) Galvanised.Aluminium columns shall be left bare or anodised where specified by the *Client*:
 - a) Black (RAL 9005); or
 - b) Signal Grey (RAL 7004).
- 7 Lighting columns shall be painted/coated or anodised before leaving the manufacturer to the required standard. It is the *Contractor's* responsibility during transit and installation to ensure that the columns remain preserved. Where damage occurs, irrespective of severity, the *Contractor* shall make good the coating matching the factory type and colour of paint to ensure compatibility.
- 8 All paints and coatings shall achieve a minimum adhesion of 750 psi and a minimum coating of 250 µm as specified in Clause 1912.

1308SR Handling, Transport and Erection

- 1 Lighting columns and brackets, CCTV masts and cantilever masts shall be handled, transported and stored in such a way as to avoid any structural damage or damage to the surface protection system. Any damage incurred shall be made good in such a way that the structural performance and durability of the item shall be in no way reduced.
- 2 Lighting columns and brackets, CCTV masts and cantilever masts shall be stored clear of the ground in such a way that contact with cement, groundwater, soil or ash or other deleterious material is prevented, and that water does not accumulate on any surfaces or inside sections. Suitable packings shall be placed between the columns/masts to allow a free passage of air and dispersion of water.
- 3 All rivets, bolts, nuts, washers, screws, small plates and small articles generally shall be suitably packed and identified. All such items shall be stored under cover.
- 4 Columns and masts shall be installed true to the vertical and in accordance with the manufacturer's recommendations. The door shall face the direction described in Clause 1315AR.
- 5 Wall mounted lighting brackets and fixtures shall be fixed as described in Appendix 13/1.

1309CR Amendments and Additions to BS 5649-2: 1978 – Clause Cancelled

1313SR Laminated Glass Fibre Reinforced Plastic (GFRP) Lighting Columns

- 1 Laminated Glass Fibre Reinforced Plastic (GFRP) Lighting Columns are not specified for use.

1314CR Brackets for Laminated GFRP Lighting Columns - Clause Cancelled

1315AR Door/Aperture Requirement for Lighting Columns

- 1 Lighting Columns shall:

- a) be supplied with single or double flush-fitting doors.
- b) comply with the requirements of BS EN 40-2 and shall have a minimum opening of:
 - i) Lower aperture and single doors:
500 x 120 mm for 5 and 6 m columns.
600 x 120 mm for 8, 10 and 12 m columns.
 - ii) Upper aperture with double doors:
800 x 120 mm for 8, 10 and 12 m columns.

They shall have:

- c) Twin clamp fixing arrangement (top and bottom) ;
- d) Welded weather-strips to the internal surface of the door aperture, and.
- e) Door openings shall be free from irregularities and burrs.

Other requirements include:

- f) All doors shall have a suitable earth lug on their internal face;
- g) The bottom of the door opening shall not be less than 400 mm above ground level;
- h) Minimum Ingress Protection required from foreign objects and water, door apertures should be rated as:
 - i) IP34 up to 2.5 m above ground level.
 - ii) IP2X more than 2.5 m above ground level.
- i) Doors shall conform to an impact protection category of IK08;
- j) The door shall be pre-assembled at the factory;
- k) The earth cable shall be lugged and double crimped at both ends and attached to the door and column with M8 brass earth bolt, 2 nuts and 2 washers;
- l) The earth cable shall be of a length which allows the door to seat easily on the ground without exerting stress on the cable and terminations;
- m) Columns mounted on bridge parapets or in any locations where if the door could cause harm or be lost if dropped are to be fitted with a door-retaining device. Any steel wire or chain shall be galvanised;
- n) All door locks to have a retaining nut to prevent the loss of locking mechanism and resist un-authorised entry;

- o) Locking mechanism is to be greased immediately following installation and prior to commission;
- p) Columns identified as requiring additional security to the compartment shall be specified by the *Client*;
- q) Underground cable entry slots will be 150 x 75 mm;
- r) For the attachment of additional equipment, all holes should be planned at design stage and pre-drilled during factory production before delivery of the column, and
- s) Holes should not be drilled in new steel columns following the galvanising and protected coating processes.

1316AR Loading Design

- 1 Columns providing an 8 m or greater mounting height shall be designed to accept:
 - a) a banner:
 - i) windage no greater than 2.0 x 0.8 m; and
 - ii) shape coefficient of 1.8.
 - b) festive decorations shall have:
 - i) a maximum solidity of 30% and shape coefficient of 1.2;
 - ii) a maximum windage of 1.0 m²;
 - iii) a weight of 20 kg located at a height of 7 m above ground level (centre of decoration); and
 - iv) a maximum outreach (centre of column to middle of decoration) of 0.5 m.
 - c) double hanging basket:
 - i) each of 0.65 m diameter at 0.525 m offset of 0.3 m² windage;
 - ii) providing a clearance of 2.5 m above ground level; and
 - iii) each of weight 70 kg.
 - d) CCTV unit:
 - i) of maximum windage of 0.3 m²;
 - ii) weight of 5 kg;
 - iii) located at a height of up to 7 m above ground level;
 - iv) with a maximum offset of 0.3 m;
 - v) for crime prevention a horizontal deviation of + or – 10 mm at the camera position under a wind pressure resulting from a 45 km/h wind speed; and
 - vi) for traffic management the horizontal deviation can be ± 100 mm.
 - e) Wi-Fi Equipment:
 - i) with a Wi-Fi container, of maximum windage of 0.2 m², weight of 3 kg mounted up to 7 m above ground level, allowing for a 20 mm hole in the column shaft to facilitate provision of electrical power.

- f) signs:
 - i) of maximum windage 0.5 m²;
 - ii) where eccentricity from the centre line of the column to the centre of area of the sign shall be taken as 300 mm; and
 - iii) where the height above ground level at the column to the centre of area of the sign shall be taken as 2500 mm.

Note: Banners and Hanging Baskets above may be installed concurrently; Festive Decorations shall not be installed when Banners and Hanging Baskets are in place.

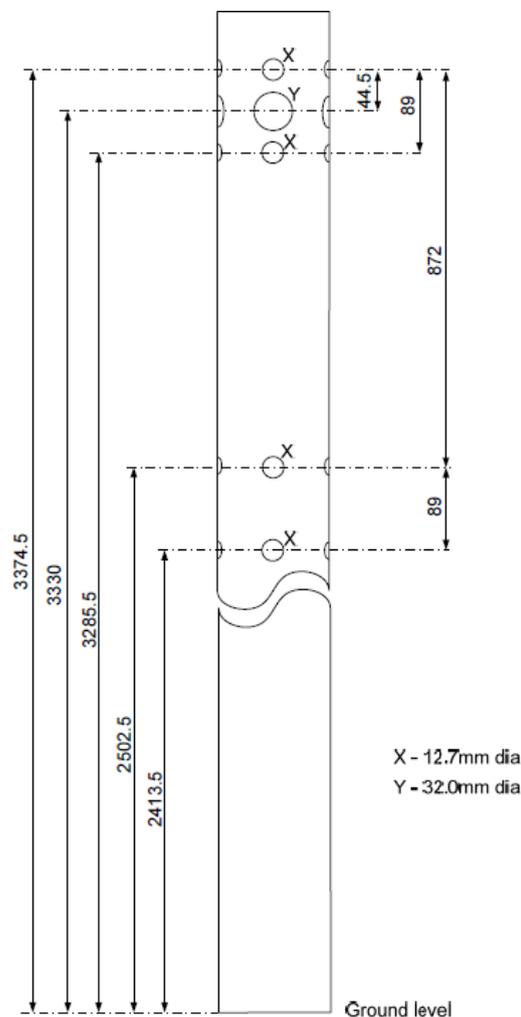
2 Columns providing a 6 m or lower mounting height shall be designed to accept:

- a) a banner:
 - i) windage no greater than 1.4 x 0.4 m; and
 - ii) shape coefficient of 1.8.
- b) a double hanging basket each of:
 - i) 0.45 m diameter at 0.45 m offset of 0.35 m²;
 - ii) weight of 24 kg; and
 - iii) where the height above ground level at the column to the centre of area of the sign shall be taken as 2500 mm.
- c) signs:
 - i) of maximum windage 0.5 m²;
 - ii) where eccentricity from the centre line of the column to the centre of area of the sign shall be taken as 300 mm; and
 - iii) where the height above ground level at the column to the centre of area of the sign shall be taken as 2500 mm.
- d) CCTV unit:
 - i) of maximum windage of 0.3 m²;
 - ii) weight of 5 kg;
 - iii) located at a height of up to 7 m above ground level;
 - iv) with a maximum offset of 0.3;
 - v) for crime prevention a horizontal deviation of ± 10 mm at the camera position under a wind pressure resulting from a 45 km/h wind speed; and
 - vi) for traffic management, the horizontal deviation can be ± 50 mm.
- e) column mounted ultra-low vehicle charging units:
 - i) with maximum weight of charging unit of 40 kg;
 - ii) located at a maximum height of 1.2 m above ground level;
 - iii) not to be located within 75 mm of the spigot; and
 - iv) to be clamped to the column without damage to the surface paint.

Combined Columns Shared with Traffic Signals Requirements

- 3 Columns designed to be shared with traffic signals shall be designed to accept:
- in addition to the combined weight of dual luminaires, a maximum additional weight of 80 kg;
 - mounting at a minimum height of 2.1 m above ground level, which includes a signals-supporting 'D-Bracket' of length 900 mm outreach; and
 - each circuit having its own electrical isolation fused cut-out.
- 4 Heights and positions of the holes for mounting traffic signals are critical therefore must correspond to required heights in Traffic Signs Regulations and General Directions 2016. All designs shall be submitted to the *Client* for review prior to ordering. Drilling heights and dimensions for mounting holes ensure that traffic signal heads are mounted at the same height as a standard 4.0 m traffic signal pole. Typical arrangement drawing is shown in figure 13/1:

Figure 13/1: Typical Arrangement Drawing of Traffic Signal Pole



- 5 Clamping shall comply with BS EN 12899-1:2007 as follows:
- Clamping shall be suitable to support the weight of the equipment under stress from the load and windage;

- b) Fixings shall fit column so that they prevent sliding on or rotation around the column and enable conformance to BS EN 12899 when the specified vertical or horizontal load is applied;
- c) Clamping methodology must not damage/infringe the column surface;
- d) Clamps must be in keeping with the colour palette as the column and
- e) Bi-metallic corrosion avoidance must be observed. The extent to which bimetallic corrosion is likely to occur and the selection of counter-measures should be considered at the design stage.

1317AR Fold Down (Raising and Lowering or Mid-hinged) Columns

- 1 When fold down columns are required, they shall be:
 - a) capable of being operated by a single operative;
 - b) tool-free Mid-Hinged;
 - c) fitted with a door and base compartment that is accessible without requiring the column to be folded down;
 - d) maintained without the need to hire lifting platforms; and
 - e) of a consistent profile and appearance to enable it to be incorporated into locations where standard columns are used.
- 2 The fold down column shall be fitted with a:
 - a) standard tri-head lock;
 - b) internal drop latch lock for hinge mechanism; and
 - c) captive length of flexible conduit should protect the internal wiring cables from accidental pinching between the column base and shaft sections.

1318AR Passively Safe Columns

- 1 Passively safe columns shall comply with the requirements set in all Series 1300 clauses and shall meet class 100:NE:1-3 in accordance with EN 12767.

1319AR Retention Sockets

- 1 Retention Sockets shall be capable of supporting plain tubular lighting columns, conical lighting columns, traffic signal poles and traffic sign posts of varying diameter. They shall be constructed from cast steel to GS240 or ductile iron Grade 500-7 to BS EN 1563 and be capable of withstanding high-speed vehicle impact forces to steel posts with a wall thickness of 6 mm. All sockets shall be 3rd party independently impact tested with certification to substantiate claims for both socket and foundations.
- 2 Retention sockets shall be tested to withstand vehicular impacts from 300 mm to 900 mm planting depths.
- 3 Where required, standard 90° bend retention sockets shall be supplied with a bottom cable entry bend that can swivel 360 degrees in the horizontal plane.

- 4 The bend of retention sockets shall have the ability to utilise the full bore of 50 mm or 100 mm duct diameters for easy cable entry. The bend shall be compact, allowing the post to rest no further than 150 mm above the foundation base. Ducts shall be able to be inserted a min of 75 mm into the bend and be mechanically fixed to ensure no displacement occurs during backfill.
- 5 All retention sockets shall be able to withstand a turning moment of 3.4 kNm through a load of 230 kg at 1.5 m from the surface (applied to an installed post) without rotation.
- 6 All fixings which secure posts in place shall be securely housed below ground
- 7 All retention sockets shall be supplied with surface mounted pedestrian plugs & side chambers with EN 124 - B125 (12.5 Tonnes) loading. Suppliers of retention sockets shall supply BS EN 40 & BD94/17 foundation design calculations for all sizes and depths of retention sockets supplied. In the event of an impact to a retention socket that has been installed according to the manufacturer's instructions, the retention socket shall be warranted against failure.

1320AR Uprightness

- 1 Columns shall be installed true to the vertical.

1321AR Declaration of Performance / Conformity – CE Marking

- 1 For the purposes of compliance with Clause 0104.3, for materials specified in Series 1300, the *Contractor* shall submit to the Client CE Markings and Declaration of Performance showing compliance with the relevant specifications.

Additional, Cancelled, Modified & Substitute Clauses

Series 1350 Road Lighting Columns and Brackets, CCTV Masts and Cantilever Mast Maintenance

- 1350AR Routine Maintenance of Lighting Columns
- 1351AR Routine Maintenance of Feeder Pillars, Intake Boxes and Cabinets
- 1352AR Realignment of Lighting Columns and Posts

1350AR Routine Maintenance of Lighting Columns

1. The Routine Maintenance of Lighting Columns shall be carried out by Operatives qualified in accordance with sub-Clause 104MR and competent for the various tasks assigned to them.
2. The routine maintenance operation shall include the following:
 - a) Visual inspection of the unit and preparation of report on any defects in line with appendix 13/50.
 - b) Opening base compartment doors, greasing, lubrication and operation of toggles, wing nuts, hinges, door locks; and raising and lowering column hinge mechanisms.
 - c) Ensuring correct alignment of all components with respect to the carriageway, the luminaire and brackets.
 - d) Checking and setting all grub screws locking devices and fixing screws to the torques advised by the manufacturers, including bracket arms, luminaire fixings and fixture of the back-board to the column and electrical components to the back-board. Insecure back-boards shall be re-fixed to the column.
 - e) Seal or reseal joints to prevent ingress of moisture on embellishment kits, extended base compartments, shaft collars or ladder bars, etc.
 - f) Repair of any damaged grouting around flange plate bases to prevent the ingress of moisture.
 - g) Detailed examination of visible conduit; and all fixings.
 - h) Supply and replacement of any faulty component found during the maintenance operation.
 - i) Cleaning, internally and externally
 - j) Removal of all debris arising from maintenance operations.
 - k) Updating the Client's asset inventory management system to record the maintenance activity, all faults/repairs undertaken including mechanical damage, misalignment, missing identification numbers or warning labels (e.g. for non-standard root columns).
 - l) Review the asset against its record within the *Clients* asset inventory management system and make appropriate update or amendment as necessary.
3. Hinged columns shall be raised and lowered by means of a hydraulically, mechanically or winch operated system in accordance with the manufacturer's instructions. The *Contractor* shall not support hinged lighting columns by means of a lift vehicle (e.g. mobile elevating work platform) except in an emergency (normally confined to accidental damage) unless specifically agreed by the *Client*. Visually inspect the cable for any signs of stress or damage before the column is raised.

Cleaning Methods and Materials

4. The internal base compartment and associated equipment shall be expected to contain Electrical Equipment so an appropriate cleaning method shall be applied. This may be by means of a non-metallic dry brush with bristles sufficiently stiff so as to clean effectively but not excessively so as to cause damage to equipment, components or surfaces. Any debris

such as infestations (insects and spider webs etc.) and flora (roots and leaves, etc.) shall be removed. Any obvious debris in the base compartment or root shall be removed.

5. Cleaning of external surface warning signs and numbering labels shall be carried out using an anti-static water-based alkaline cleaner/degreaser.
6. The cleaner/degreaser solution shall be applied by appropriate means so as to clean effectively but not so as to cause damage to any surfaces.
8. The cleaning equipment itself shall be frequently cleaned or changed to ensure that no scouring or abrasive action damages the surfaces.
9. The attention of the *Contractor* is drawn to the potential dangers which may arise from the dropping of quantities of water or cleaner/degreaser solution or other cleaning equipment on to people or vehicles passing below or adjacent to the cleaning operation.

1351AR Routine Maintenance of Feeder Pillars, Intake Boxes and Cabinets

1. All Routine Maintenance of Feeder Pillars, Intake Boxes and Cabinets shall be undertaken in accordance with Clause 1350AD with the addition of :-
 - a) Holding and keeping safe access keys, locks and associated records.
 - b) Where electricity meters are present, record the reading, photograph each meter to show the meter number and reading, transferring the results in a data format capable of storage in the *Client's* asset management system and upload the 'customer reading' into the energy suppliers web based system.

1352AR Realignment of Lighting Columns and Posts

1. Columns shall be considered to be misaligned if measured 20mm or more from true vertical over a vertical distance of 1m, measured just above the base compartment.
2. The *Contractor* shall provide temporary support to the column and carefully excavate by hand around the column/post taking extreme caution not to damage the electricity supply cable or any other cables in the vicinity of the column. Should the excavation reveal damage to the electricity supply, or any other cables which would make the column/post unsafe after realignment, the *Contractor* shall report the need for replacement to the *Client*.
3. The excavation shall be kept free from water and loose materials while the column/post is restored to the vertical and if practicable the door realigned so as to oppose oncoming traffic prior to backfilling.
4. The *Contractor* shall sleeve any exposed cable and backfill the excavation with ST1 concrete to Clause 2602, ensuring that any void between the concrete foundation and the surrounding ground has been filled.
5. The *Contractor* shall be responsible for making good any damage to the column/post or its protective system caused by the *Contractor* during this operation.

Additional, Cancelled, Modified & Substitute Clauses
Series 1400 Electrical Work for Road Lighting and Traffic Signs

1401MR	General
1407SR	Luminaires
1408SR	Lamps

1401MR General

Delete sub-Clause 2(i) and replace with the following:

- i) Road Lighting Units shall consist of the following: column, bracket, wall mounting, Electrical Equipment as defined in (iv) below and wiring excluding electrical supply cable.

Delete sub-Clause 2(ii) and replace with the following:

- ii) Lit Sign Units shall consist of a traffic sign, refuge beacon, Belisha beacon, illuminated centre island post, illuminated permanent bollard, illuminated guard post, school crossing warning lights and river navigation lights requiring an electricity supply and Electrical Equipment and wiring as in sub-Clause 2(i) above.

Delete sub-Clause 2(iv) and replace with the following:

- iv) Electrical Equipment for Lighting Units shall consist of the following: luminaires, photo-electric control units (PECUs), Central Management System (CMS) Control Devices, shorting plugs, lamps, time switches, ballasts, ignitors, starters, capacitors, cut-outs, fuses, fuse holders, flasher units, lamp holders and miniature circuit breakers (MCBs).

1407SR Luminaires

1 The General Requirements of a Luminaire are as stated below:

- a) The supplier shall guarantee the luminaire and its internal components including the LED driver for at least 10 years.
- b) The luminaire shall have an Elexon charge code.

2 Luminaires for road lighting shall:

- a) comply with BS EN 60598-2-3;
- b) be fitted in accordance with manufacturers' instructions with no gap between the luminaire and the shoulder of any bracket arm;
- c) for the luminaire optical system (lamp housing), have a degree of protection rating IP 66 to BS EN 60529;
- d) for the luminaire control gear housing, have a degree of protection rating IP 66 to BS EN 60529
- e) not have the IP rating compromised due to cable connections. The *Contractor* shall provide glands to maintain the IP rating of the fitting during installation. This shall include glands for both single and multicore cables;
- f) have an IK08 rating to BS EN 62262;
- g) be fitted with a 7 pin NEMA socket located in the canopy;
- h) have a modular design so that components are replaceable upon failure, when life expired or redundant. For example, as below:
 - i) Drivers
 - ii) Lamp (LED or otherwise) panel/module

- iii) Diffuser
 - iv) Reflectors/Refractors
 - v) Surge Protection
 - i) be designed to maintain the International Protection (IP) rating throughout their lifecycle and not degrade due to maintenance and periodic testing;
 - j) have adaptable mounting options side-entry or post top adjustable in 5° C increments between + 10° C and -10° C;
 - k) have terminals that are large enough to accommodate two conductors of 4 mm² cross-sectional area;
 - l) have a suitable control device with a switching of 35/18 Lux;
 - m) have provision for additional fixings through the use of chains or lanyards where lids are removable;
 - n) have captive fittings for diffusers and lids; and
 - o) be in Black (RAL9005) or Signal Grey (RAL 7004) or Galvanised.
- 3 Luminares for Traffic Signs shall comply with BS EN 12899-1, Appendix 12/1, and the following:
- a) External lighting luminaires shall be correctly positioned to meet the luminance requirements of the sign and;
 - b) Mean sign luminance shall be as required in the UK National Annex to BS EN 12899-1 unless otherwise stated in Appendix 12/1.
- 4 The Electrical Requirements Luminaires are as follows:
- a) The primary nominal supply voltage (U_o) shall be 230 V AC. The *Contractor* shall state the range in voltage that the luminaire can operate under;
 - b) Leakage currents must comply with BS EN 60598-1 Section 10;
 - c) The power factor shall be greater than or equal to 0.9;
 - d) The supplier shall state the total power consumption in watts;
 - e) Must employ a Constant Light Output (CLO) driver;
 - f) The luminaire and all associated internal components shall be protected from electrical faults and surges without causing disruption to other luminaires on the same circuit;
 - g) The luminaire shall conform to Class B requirements for Conducted and Radiated Emissions in compliance with BS EN 55011;
 - h) The luminaire shall be resilient to fast transient bursts with the following characteristics and in accordance with BS EN 61000-4-4:
 - i) Peak Voltage ± 4 kV
 - ii) Rise time 5 ns
 - iii) Pulse width 50 ns
 - i) The luminaire shall be resilient to electrical surges with the following characteristics and in accordance with BS EN 61000-4-5:

- i) ± 4 kV Common Mode
 - ii) ± 2 kV Differential Mode
 - iii) Rise time 1.2 μ s
 - iv) Pulse width 50 μ s
 - j) The luminaire shall be resilient to electrostatic discharges with the following characteristics and in accordance with BS EN 61000-4-2:
 - i) ± 6 kV Contact Discharge
 - ii) ± 8 kV Air Discharge
 - k) Surge Protection shall be 8 kV Common. Mode and 6 kV Differential. Mode to IEC 61000-4-5; 10 kV Single Pulse.
- 5 The Luminaire's declaration of performance shall include:
- a) Luminaire manufacturer;
 - b) Model type/reference;
 - c) Housing material;
 - d) Fixing type (e.g. post-top or side-entry);
 - e) Fixing angle of inclination;
 - f) Optic type;
 - g) Optic distribution setting/matrix reference;
 - h) Diffuser type (e.g. full cut-off flat glass polycarbonate bowl);
 - i) Control gear type (e.g. electronic);
 - j) Control gear housing (e.g. integral or remote);
 - k) Control gear compartment IP (Ingress Protection) rating;
 - l) Lamp compartment IP (Ingress Protection) rating;
 - m) Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK) rating;
 - n) Luminaire weight;
 - o) Luminaire windage area; and
 - p) Lighting control fitting (e.g. photocell NEMA socket mini-photo cell CMS node).

1408SR Lamps

- 1 Lamps shall be compatible with the luminaires used.
- 2 The initial luminous flux of a lamp multiplied by the lamp flux maintenance factor for the projected lamp life shall be taken as its light output for road lighting design.
- 3 Lamps shall be specified in Scheme-Specific Appendix 14/4.

Lamps for Road Lighting

- 4 Low pressure and high-pressure sodium vapour lamps shall comply with BS EN 62035.

5 LED lamps shall comply with BS EN 62504.

Photometry of LED Lamps

6 LED Lamps must be suitable for achieving the requirements set in BS EN 13201-2 and the design and instruction by the *Client*.

7 The light output shall have a minimum Colour Rendering Index (CRI) of 70.

8 The colour temperature range shall be between 3000 K and 4000 K.

9 The initial and maintained chromaticity coordinate values shall not exceed a 3-step MacAdam ellipse.

10 The *Contractor* shall use Type C Goniophotometer measurement to provide IES/LDT files for lighting design.

11 The *Contractor* shall be able to provide luminaire data (IES/LDT) files for importing into lighting design software packages such as, but not limited to Lighting Reality, DIALux and RELUX used by the *Client*.

12 The S/P ratio shall not be less than 1.

13 The Luminaire's luminous intensity class (glare rating) must be a G6 in accordance with Annex A of BS EN 13201-2. So preferably the luminaire shall be classified as being of the 'Full Cut-off' type (as defined by the Illuminating Engineering Society of North America (IESNA)).

Performance of LED Lamps

14 The luminous output shall be calculated by taking the total amount of light emitted from the whole unit including any optical components.

15 The electrical power of the luminaire shall be taken as power consumption of the entire luminaire including the control unit.

16 The minimum luminous efficacy shall be no less than 120 lumens per circuit watt using the definitions of lumens and electrical power stipulated in sub-Clauses 14 and 15 above.

17 The luminaire shall have a light output ratio greater than or equal to 0.9 over the life of the product.

18 Testing of efficacy, minimum light output power factor and standby power must be conducted on the complete product (e.g. solid-state LED device(s) luminaire and associated electronic control gear) and under normal operating conditions.

Environmental Performance of LED Lamps

19 The luminaire shall be designed to operate at ambient temperatures of -10°C to 50°C.

20 Provide optical thermal management between optics and control gear.

Reliability of LED Lamps

21 The Abrupt Failure Value (AFV) of the luminaire at 50000 hours shall be less than or equal to 10%.

22 All components including the driver shall have a minimum rated life of 100000 hours.

23 A failure fraction B30 or 70% shall be used for all lumen maintenance values reported.

24 All lumen maintenance values shall be given in respect to L90.

- 25 The luminaire shall provide a minimum of 100000 hours of L90 performance verified by demonstrating to a 90% level of confidence that the 100000-hour success probability is 0.5 or 50% when subjected to a maximum operating temperature of 50° C and mean operating current.

Programmable Control Gear LED Luminaires

- 26 The LED control driver must be programmable and dimmable.
- 27 The LED driver circuits shall be thermally separated from the LED modules.

Additional, Cancelled, Modified & Substitute Clauses

Series 1450 Electrical Maintenance

1450AR Maintenance of Electrical Equipment

1451AR Rectification of lighting and other electrical faults

1452AR Procedures for Isolation, Energising and Making Safe of Existing Power Supplies and Cables

1453AR Bulk Lamp Change

1454AR Lamp Disposal/Recycling

1455AR Cyclic Maintenance of Feeder Pillars, Intake Boxes and Cabinets

1456AR Reports

1457AR LED Driver replacement

1458AR Central Management System (CMS) Fault Repair

1450AR Maintenance of Electrical Equipment

1. All Routine Maintenance of Electrical Equipment shall be carried out by Operatives qualified in accordance with sub-Clause 104MR and competent for the various tasks assigned to them
2. The *Contractor* shall undertake routine maintenance operations comprising the following:
 - a) Electrical Testing to clause 1424.
 - b) Check protective device type and rating and the replace the protective device if either rating or type is incorrect.
 - c) Examine protective conduit, protective sheathing, insulation, electrical connections, including the isolation cut-out, operation of the control device (photo-electric cell, CMS control unit or time switch), all electrical fixings and lamp holder spring pins for sticking and (porcelain) insulation for tracking.
 - d) Replace any faulty component found during the maintenance operation;
 - e) Check and tighten as necessary all electrical connections, including earthing;
 - f) Clean all components including the exterior surface of the luminaire and control device, the luminaire control gear compartment, cut-out and fuse holders, all in accordance with the manufacturer's instructions.
 - g) Report supply faults to the Distribution Network Operator and *Client*;
 - h) Report private cable supply faults to the *Client*;
 - i) Update the Client's asset management information system to record the maintenance activity.
 - j) Review the asset against its record within the Client's asset management information system, particularly the UMSUG Charge code for the equipment and the control device and update or amend as appropriate.
 - k) Removal of all maintenance operation debris from the site.

Luminaire Cleaning Methods and Materials

3. The internal compartments of luminaires with IP ratings of IP 65 and above shall not be cleaned as an element of routine maintenance activity. The internal compartments of luminaires with IP ratings below IP 65 shall be cleaned with a dry, lint free cloth
4. The external surfaces of luminaires and the control device are to be cleaned by means of an anti-static water-based alkaline cleaner/degreaser acceptable to the Client.
5. The cleaner/degreaser shall be diluted in clean uncontaminated water in accordance with the manufacturer's instructions and applied so as to clean effectively without causing damage to any surfaces.
6. The cleaning equipment itself shall be frequently cleaned or changed to ensure that no scouring or abrasive action damages equipment surfaces.
7. After the use of the cleaner/degreaser solution, all surfaces treated shall be wiped with a clean dry lint-free cloth and left dry.

1451AR Rectification of lighting and other electrical faults

1. The *Contractor* shall repair all faults, howsoever caused, including the following:
 - a) Operating faults;
 - b) Vandalism; and
 - c) Accident damage.
2. The rectification of faults shall comprise the following:
 - a) Fault Repair Visits; and
 - b) Repair of all faults to Road Lighting Units and Lit Sign Units.
3. The rectification works shall include the following:
 - a) Location and identification and repair of private cable and general wiring faults;
 - b) Identification and reporting of Distribution Network Operator (DNO) supply faults;
 - c) Checking of lighting controls, including photo electric control unit (PECU), time switch settings, Central Management System (CMS) and operation of any other control system type;
 - d) Provide and fit damaged or missing base compartment doors, including the provision of temporary doors while permanent replacement doors are sourced. Temporary doors shall be considered to be a temporary repair and the Contractor shall effect a permanent repair within 28 calendar days.
 - e) Replace all faulty components and provision of sundry materials;
 - f) Clean internal surfaces exposed during the repair and;
 - g) Record the repair in the Client's asset management information system.
4. The *Contractor* shall carry out Rectification of Lighting faults on the following types of equipment:
 - a) Road Lighting Units and Lit Sign Units (i.e. including illuminated bollards);
 - b) catenary lighting;
 - c) subway lighting;
 - d) river navigation lights
 - e) underground electrical cable systems;
 - f) feeder pillars and associated switchgear;
 - g) all associated control systems;
 - h) any other related electrical and lighting equipment;
 - i) high mast lighting;
 - j) decorative lighting and;
 - k) lighting in compounds and depots
5. All repair works and materials shall comply with the relevant provisions of Series 1400 and for the avoidance of doubt replacement luminaires shall comply with Clause 1407.

1452AR Procedures for Isolation, Energising and Making Safe of Existing Power Supplies and Cables

1. Isolation, energising and making safe works shall be carried out in accordance with the Energy Networks Association Engineering Recommendation G39/1 and a recognised Permit to Work system to ensure compliance with the Electricity at Work Regulations 1989. Where appropriate the work shall follow HSE Guidance HSG85 "Electricity at Work – Safe Working Practices and the Institution of Lighting Professional's GP03: Code of Practice for Electrical Safety in Highway Electrical Operations.
2. Any person authorised to undertake the isolation, energising and/or making safe of electrical power supplies and cables shall demonstrate competency to the appropriate Category.
3. For isolation, energising and making safe of private power supplies and cables the following shall apply:
 - a) Isolation or making safe shall require no authorisation from the *Client* for Emergency and Performance Activity or Cyclic Maintenance Activity works.
 - b) A record of all private cables the *Contractor* proposes to isolate, energise and/or make safe shall be completed on a daily basis by the *Contractor*. The records shall be kept on the asset inventory management system to ensure wherever possible only one operation is being carried out on any part of the Framework Area, or as agreed with the *Client*.
 - c) The name of the Operative responsible for isolation shall be displayed on the switchgear in the feeder pillar/supply position on a clear weatherproof notice board. Where more than one person requires a cable isolated or energised, each person involved shall display a notice. On completion of testing or works the sign(s) shall be removed.
 - d) When Cyclic or other Maintenance Operations are undertaken, the number of feeder pillars de-energised at any one time shall be kept to a minimum.
 - e) Isolation shall include the disconnection from the incoming electricity supply of all live conductors (including the neutral conductors).
4. For isolation, energising and making safe of Distribution Network Operator (DNO) power mains supplies the following shall apply:
 - a) Where supplies to the *Client's* own equipment are to be isolated by means of a secondary isolator above the DNO's cut-out, only competent persons may isolate the supply.
 - b) Where there is no means of secondary isolation, and so supplies to the *Client's* own equipment requires removal of the DNO's cut-out to isolate the supply, the *Client* shall be informed and the *Contractor* shall then liaise with the appropriate DNO before any work commences.
 - c) A temporary shroud shall be inserted as soon as the fuse carrier is removed. The temporary shroud shall then be removed prior to re-insertion of the fuse carrier.
5. Before vacating site the *Contractor* shall ensure all exposed cables, cut-outs and all other equipment is rendered safe are suitably protected and so present no hazard or danger.
6. Where works are proceeding on any cable distribution systems under a Task Order, but for whatever reason need to be temporarily halted, the associated circuits must first be made

safe by causing the conductors to be rendered dead by isolating at all appropriate points and, where practicable, the means of isolation shall be locked to avoid any circuits inadvertently being made live. The works shall be guarded by means of appropriate barriers. Warning notices shall be displayed and, where necessary, the works shall be illuminated, all as required by the New Roads and Street Works Act 1991.

1453AR Bulk Lamp Change

1. Bulk Lamp changes for all road lighting units, including those in subways, traffic signs and bollards shall be at frequencies stated in the Client's Scope. The *Contractor* shall indelibly mark the end cap of each lamp with the date of installation.

1454AR Lamp Disposal/Recycling

1. Wherever practicable, the *Contractor* shall recycle lamps rather than dispose of them.
2. The *Contractor* shall carry all necessary certificates of authorisation necessary to undertake Lamp Disposal/Recycling or, where this activity is undertaken by a Subcontractor, then the Subcontractor shall carry all necessary certificates to the satisfaction of the *Client*.
3. The *Contractor* shall supply, for acceptance of the *Client*, completed Transfer Notes detailing the movement of waste material as detailed in and as required by the Environmental Protection Act 1990.

1455AR Cyclic Maintenance of Feeder Pillars, Intake Boxes and Cabinets

1. The *Contractor* shall undertake maintenance of feeder pillars, intake boxes and cabinets as Clause 1450AR sub-Clauses 1 and 2.
2. Where electricity meters are present the *Contractor* shall record energy consumption and update the energy supplier's portal with the readings.
3. Maintenance shall be undertaken at the frequencies stated in the Client's Scope.

1456AR Reports

1. The *Contractor* shall present all reports, inspection records and test certificates in a format agreed with the *Client* (e.g. digital or hard-copy). Inspection reports and test certificates shall be signed by the electrician carrying out the inspection / test and authorised by the *Contractor's* supervisor.
2. Energy settlement for electrical street furniture is predominantly processed by unmetered supply arrangements, introducing direct financial implications for any errors. The *Contractor* shall ensure that records of lighting assets are maintained accurately and that updates, particularly relating to unmetered charge codes and switch regimes are processed within 7 days of any change being made, or error being identified.
3. Emergency call out and lighting fault reports shall be in accordance with the *Client's* requirements.

1457AR LED Driver replacement

1. The *Contractor* shall replace LED drivers using components with the same performance and size characteristics to that being replaced. Replacement drivers shall be physically secured to the luminaire housing and wiring shall be connected in the same manner as the original installation.

1458AR Central Management System (CMS) Fault Repair

The *Contractor* shall rectify faults with CMS switching units by

- a) Checking that the switching unit is configured in accordance with the manufacturers instructions
- b) Replacing the switching unit and configuring it in accordance with the manufacturers instructions

Additional, Cancelled, Modified & Substitute Clauses
Series 1900 Protection of Steelwork Against Corrosion

1901MR	Introduction
1902MR	Surface Preparation – General Requirements
1910MR	Testing of Thermally Sprayed Aluminium Metal Coatings
1911MR	Paint and Similar Protective Coatings
1914MR	Application of Paint

1901MR Introduction

In sub-Clause 2, delete "Appendix 19/1", and replace with "scheme specific Appendix 19/1", and delete "Appendix 19/2" and replace with "scheme specific Appendix 19/2.

In sub-Clause 4, delete "Appendix 19/5" and replace with "in the Task Order or in scheme specific Appendix 19/5".

1902MR Surface Preparation – General Requirements

In sub-Clauses 1 and 10 delete "Appendix 19/5" and replace with "Appendix 19/1".

1910MR Testing of Thermally Sprayed Aluminium Metal Coatings

In sub-Clause 1, delete "Appendix 1/5" and replace with "scheme specific Appendix 1/5".

1911MR Paint and Similar Protective Coatings

In sub-Clause 5, delete "Appendix 19/1" and replace with "scheme specific Appendix 19/1".

1914MR Application of Paint

In sub-Clauses 7(iii) and 13 delete "Appendix 19/1" and replace with "scheme specific Appendix 19/1".

Additional, Cancelled, Modified & Substitute Clauses
Series 2000 Waterproofing for Concrete Structures

2004SR	Materials for Waterproofing Below Ground Concrete Surfaces
2008SR	Repair and Replacement of Bridge Deck Waterproofing
2010AR	Waterproofing with Spray Applied Systems
2011AR	Waterproofing Below Ground Concrete
2012AR	Testing Requirements for Spray-Applied Waterproofing Systems

2004SR Materials for Waterproofing Below Ground Concrete Surfaces

Primer for Tar and Bitumen

- 1 Primer for sealing concrete surfaces prior to waterproofing shall be compatible with the selected tar or bitumen waterproofing material. The viscosity of the primer shall be such that it penetrates the concrete without forming a skin.

Tar

- 2 Tar is not permitted.

Cut Back Bitumen

- 3 Cut back bitumen shall comply with BS 3690-1:1989+A2:2008 (Class 4 to BS EN 15322) of viscosity grade 50 seconds.

Proprietary Materials

- 4 Subject to any restrictions specified in Appendix 20/1, proprietary materials shall be used on concrete structures.

2008SR Repair and Replacement of Bridge Deck Waterproofing

- 1 Existing bituminous bound flexible surfacing shall be removed by cold-milling (planing) in accordance with Clause 0709.
- 2 Concrete and other materials shall be removed by methods accepted by the *Client*. The work shall be carried out in a manner which does not damage or disturb any part of the existing structure that is to remain on completion of the waterproofing.
- 3 The existing waterproofing system shall be stripped by hand or mechanical means. The use of heat or solvents shall only be allowed with the approval of the *Client*. The existing primer shall be removed by mechanical means. All horizontal concrete surfaces shall then be cleaned using recoverable abrasive blasting cleaning such as by Vacuum Blasting, not open blasting. Open blasting shall only be used on areas unsuitable for recoverable abrasive blasting cleaning and shall be agreed by the *Client*.
- 4 All replacement waterproofing systems shall be compatible with the existing system with which they will be in contact. Written guarantees shall be sought by the *Contractor* to confirm the compatibility of new waterproofing membranes with existing for acceptance by the *Client*.
- 5 Concrete surfaces which are to receive the replacement waterproofing system shall be cleaned of all oil, bitumen, contaminants and all elements of any previous waterproofing membrane and/or primer. Surfaces contaminated with lichens and vegetative growths shall be treated with a fungicidal wash of a type accepted by the *Client* and rinsed with clean water to remove any residual traces of fungicide. Cement laitance shall be removed. It shall be noted that sub-Clause 2001.1 states the requirements for new structures. The *Contractor* shall not expect the concrete surface finish of the existing deck to be the same standard as for new structures or a U4 finish, but rather an unsmooth, non-uniform finish with defects and blemishes. Where a spray applied waterproofing system is to be used for the repairs, surfaces may require further preparation and/or additional material over the amount specified in the BBA Board and Bridges Agrément Certificate or equivalent to ensure that a minimum of 2 mm

- coverage of spray applied waterproofing membrane is achieved. Final preparation of all surfaces shall be by recoverable abrasive blasting cleaning.
- 6 Prior to the application of the new waterproofing, the deck concrete will be examined by the *Client* who may instruct concrete repairs in accordance with Series 5700.
 - 7 Immediately before the application of the primer or laying of the waterproofing system or protective layer, the concrete surface or primed surface shall be clean, dry and free from ice, frost, loose aggregate, dust and other debris. Written guarantees shall be sought by the *Contractor* to confirm the suitability of substrate with the waterproofing membrane and asphalt for acceptance by the *Client*.
 - 8 The waterproofing membrane, primer and bonding agents including tack coat shall be compatible with each other.
 - 9 The use of ventilating layers, partial bonding or bond breakers with the waterproofing system is not permitted.
 - 10 The replacement waterproofing system shall be a proprietary system complying with Clauses 2002, 2003, 2005 and 2007 or, where specified by the *Client* or the design, a spray applied system in accordance with Clause 2010AR.
 - 11 Where the existing waterproofing is a spray applied system, for repair areas of less than 2 m² at any one location, an accepted hand-applied system equivalent to and compatible with the existing may be used, subject to acceptance by the *Client*.

2010AR Waterproofing with Spray Applied Systems

- 1 Testing of spray applied waterproofing systems shall be as detailed in Clause 2012.
- 2 Waterproofing of bridge decks and fixed bridge joints using a proprietary spray applied membrane system shall be carried out strictly in accordance with the manufacturer's instructions.
- 3 The *Contractor* shall furnish the *Client* with 3 copies of the Permitted Waterproofing System Data Sheet, at least two weeks prior to the application for acceptance by the *Client*
- 4 Joints in the membrane shall be formed with laps and the use of adhesion promoters as recommended by the manufacturer in accordance with the BBA certificate or equivalent.
- 5 Except where the waterproofing membrane is to receive protective coating against ultraviolet light, a tack coat shall be applied as required by the manufacturer of the waterproofing membrane to bond it to the protective layer.
- 6 The strength of the bond shall be sufficient to prevent a shear failure, due to horizontal forces, from occurring along the interface of the waterproofing and the protective layer.
- 7 Where detailed in the Task Order, the waterproofing membrane shall have a protective coating, recommended by the manufacturer of the membrane, to protect it against ultraviolet light.
- 8 Waterproofing shall be applied only when the ambient temperature is 4° C and rising or above 4° C.

2011AR Waterproofing Below Ground Concrete

- 1 Waterproofing material shall be at least two coats single part bitumen latex emulsion applied in accordance with the manufacturer's instructions.
- 2 The waterproofing system, in accordance with Clause 2004, shall be applied to:
 - a) the buried rear surfaces of the structure down to a level 150 mm below the construction joint;
 - b) the buried rear surfaces of end diaphragms of integral decks down to a level 200 mm below the soffit of the deck slab or construction joint, whichever is lower; and
 - c) other areas as shown on any structure-specific and general detail drawings.

2012AR Testing Requirements for Spray-Applied Waterproofing Systems

- 1 Following deck preparation and before application of the primer, tests shall be carried out on random areas agreed with the Designer, to assess the adhesive strength of the cured primer and membrane to the deck. A minimum of 2 pull off tests shall be carried out on the waterproofing system per structure per visit.
- 2 The *Contractor* shall provide with each batch of material delivered to the site, a certificate showing that the material complies with the details given on the PWS data sheet.
- 3 Two samples of size at least 20 x 200 x 2 mm minimum thickness from material sprayed on to open moulds shall be provided and tested for tensile strength and elongation at break to BS 903 Part A2, and tear strength to BS 903 Part A3 method C. The *Contractor* shall supply the *Client* with copies of the test results.
- 4 The coverage rate of material used shall be monitored continuously and the *Client* shall be provided with daily sheets showing the weight of material used and the area covered for each period of spray operation.
- 5 The wet film thickness shall be monitored continuously using a comb type thickness gauge or pin gauge, and the *Client* shall be provided with daily sheets showing the wet film thicknesses measured and their location. Where directed by the *Client*, pieces of the fully cured membrane of size not less than 50 x 50 mm shall be cut out, to establish the dry film thickness and given to the *Client* labelled with their location of origin.
- 6 The adhesion of the fully cured membrane to the deck shall be measured by two tests for each 100 m² of finished membrane or part thereof, or one test per spraying session if the sprayed area during the session is less than 50 m², at locations chosen by the *Client*. Tests shall be carried out by a method accepted by the *Client* and the apparatus used shall have a current certificate of calibration. The *Client* shall be provided with the test results labelled with the location of the test site. Test values falling below 1.0 N/mm² shall require spraying operations to be suspended while further investigation is undertaken. Areas deemed not to meet this figure shall be removed and resprayed to the satisfaction of the *Client* at the *Contractor's* cost.
- 7 The finished membrane shall be tested by the *Contractor* for pin holes and discontinuities and any imperfections detected shall be rectified in accordance with the BBA certificate or equivalent to the satisfaction of the *Client* by the *Contractor*.
- 8 Testing shall be carried out using a high voltage direct current detector. In addition to the manufacturer's instructions for use, the following requirements and conditions shall apply:

- a) The instrument is to be operated above 13.5 kV.
 - b) The earth lead is not to be more than 10 m long.
 - c) Movement/expansion joints shall not be crossed when testing.
 - d) Earthing with screws set into substrate or exposed reinforcement shall be used.
 - e) When a leakage path has been found its position is to be marked with a permanent marker pen on the membrane.
 - f) The instrument is not to be used on wet or damp surfaces.
 - g) The equipment is to have a current certificate of compliance/calibration.
- 9 All areas of membrane destroyed by testing shall be made good by a method accepted by the *Client*.

Additional, Cancelled, Modified & Substitute Clauses

Series 2300 Bridge Expansion Joints and Sealing of Gaps

2301MR General

2302MR Installation of Bridge Deck Expansion Joints

2301MR General

For sub-Clause 2 substitute the following

- 2 Only bridge deck expansion joints which have been approved by the *Client* shall be incorporated into the Works.

2302MR Installation of Bridge Deck Expansion Joints

In sub-Clause 5, delete "Appendix 23/1" and replace with "scheme specific Appendix 23/1"

For sub-Clause 8 substitute the following

- 8 Where required in scheme specific Appendix 23/1, subsurface and below-joint drainage systems shall be designed, provided and installed in accordance with the requirements therein, and the joint manufacturer's recommendations. The complete drainage system shall be accessible for cleaning and on completion of the joint the drainage system shall be checked and cleared of any obstructions by the *Contractor*.

Additional, Cancelled, Modified & Substitute Clauses
Series 2400 Brickwork, Blockwork and Stonework

2404MR	Mortar
2417MR	Unreinforced Masonry Arch Bridges
2418AR	Re-Pointing

2404MR Mortar

Insert new sub-Clause 7, as follows:

- 7 "The *Contractor* shall ensure that all constituent materials for the mortar are stored in an appropriate manner that will offer protection from adverse weather conditions."

2417MR Unreinforced Masonry Arch Bridges

In sub-Clause 28, delete "Appendix 24/1" and replace with "scheme specific Appendix 24/1"

2418AR Re-Pointing

1. Joints to be re-pointed shall be raked out to a minimum depth of 20 mm to provide an adequate key. If unsound mortar exists beyond this depth it shall also be raked out until sound material is encountered. Apparatus used for grinding out shall be fitted with a depth gauge to allow control of rake out depth. Injection techniques shall be used for re-pointing. The stability of the structure shall be maintained at all times.
2. All lichen, moss and other deposits shall be removed without damage to the exposed faces.
3. All dust and debris left in the joints after raking out shall be removed by low pressure water jetting. All arisings from re-pointing shall be taken to a licensed tip.
4. A trial panel of defective brickwork or stonework, minimum area 1.0 m², shall be re-pointed employing the labour, materials and equipment to be used for the work. Further re-pointing shall not proceed until the satisfactory completion of the trial panel, which shall be used for comparative purposes.
5. When re-pointing, the brickwork or stonework shall be in a damp condition achieved by wetting the raked-out joints with clean water. The brickwork or stonework shall not be soaked.
6. The sequence of re-pointing shall ensure that previous re-pointing is not damaged by the work in hand.

Additional, Cancelled, Modified & Substitute Clauses
Series 2850 Winter Service

2851AR	Introduction
2852AR	Pre-Planning
2853AR	Winter Service Season
2854AR	Labour
2855AR	Vehicles, Plant and Equipment
2856AR	De-Icing Materials
2857AR	Treatment Instruction and Response
2858AR	Principal Treatment Routes
2859AR	Treatment Operations
2860AR	Principal Treatments
2861AR	Routine Reporting
2862AR	Road Weather Information Stations (RWIS)
2863AR	Salt Bins

2851AR Introduction

1. The *Contractor* shall provide the Winter Service as described in this specification.
2. Section 41(1A) of the Highways Act 1980 establishes the Client's duty "to ensure, so far as is reasonably practicable, that safe passage along a highway is not endangered by snow or ice" and Section 150(1) "to remove any obstruction from an accumulation of snow". The *Contractor* shall support the *Client* in the delivery of those duties and to enable the *Client's* Winter Service Policy to be met. The *Contractor* shall become fully acquainted with the relevant statutory provisions, prevailing good practice relating to the service and the works needed to be undertaken as outlined in this specification. The *Contractor* shall, in particular be familiar with and implement the provisions of the following publications, as may be modified from time to time:-
 - a) 'Well-managed Highway Infrastructure', a Code of Practice (published by [UKRLG](#)) in particular sections A4.4, A6, B2.3 and B.7
 - b) The suite of Practice Guidance Documents published by the National Winter Service Research Group ([NWSRG](#))
 - c) "Keep London Moving: through severe winter weather" ([London Winter Service Working Group](#))
 - d) Keep London Moving: practical steps for London highway authorities ([LoTAG LWSPG](#))

2852AR Pre-Planning

General

1. The *Contractor* shall prepare by 31st August each year, a detailed Winter Service Operational Plan for approval of the *Client*. The plan shall follow the recommendations contained in paragraph B.7.5.34 of the UKRLG Code of Practice for Well-Managed Highway Infrastructure.
2. Winter Service shall involve treating the highway in order to:
 - a) Inhibit the formation of frost or ice - "precautionary treatment", and
 - b) Prevent an accumulation of snow developing.
3. The *Client's* network of treatment routes can be found in the *Client's* Scope and takes account of both strategic and local needs as follows:

Principal Treatments Routes for Carriageways

- a) Strategic and Principal Roads
- b) Local Distributor Roads
- c) Bus routes and emergency service priority routes
- d) Key bus infrastructure i.e. bus stations, stands, garages and access routes not treat by other highway authorities.
- e) Other locations with specific access problems, such as those with steep gradients.

Treatment Routes for Footways

- a) Major town centres
- b) Footways close to Post Offices, Schools, Hospitals and Medical Centres, Day Centres, residential homes for the elderly
- c) Local shopping areas
- d) Other locations with specific access problems, such as those with steep gradients.

Treatment Routes for Cycling facilities

- a) High Cycle Flow routes
 - b) Segregated cycleways not treated concurrent with carriageways or footways
4. The *Client* has developed its element of The London Road Resilience Network which describes the minimum roads within the Greater London Authority boundary that are required to be continuously kept open in severe winter weather to allow essential services to operate reliably and safely and to keep London moving. The network includes the roads to be treated, even in exceptional weather, when salt storage supplies are scarce, including those for which either TfL or the Boroughs are responsible, together with those in private ownership. It ensures continuity across Borough boundaries, access to the strategic road network, both within and outside London and allows London buses to operate a minimum service. The London Road Resilience Network includes all classified "A" roads, roads required to access essential services and bus routes with frequent bus services. Details can be found at:- <https://www.lotag.co.uk/wspg>

2853AR Winter Service Season

Operational Periods

1. The Winter Service Season shall run annually from the 15th October until the 15th April. The *Client* shall advance, defer, extend or curtail the season if weather forecasts indicate that it would be appropriate to do so. The season shall comprise periods of high or low risk as detailed in table 28.1

Table 28.1

Risk	Likely Conditions
High	Adverse or Severe – likely
Low	Adverse or Severe – possible

The High Risk Period shall operate from 1st November through until 31st March the following year. Low Risk Periods shall operate at all other times during the Winter Service Season.

Preparations

2. In September each year, all key staff shall be briefed by the *Client* on policy and operational aspects of the Winter Service Operational Plan. This shall be followed by a briefing of all Winter Service Duty Officers and *Contractors*. The *Contractor* shall ensure that a state of readiness exists in accordance with this plan by 15th October each year and specifically: -
 - a) During High Risk Periods the *Contractor* shall ensure that three trained drivers are available for each operational vehicle. Each of these drivers shall be familiar with the Principal Treatment Routes. The *Contractor* shall also provide a reserve pool of

trained driver/operators, equal to 25% of those employed in the *Contractor's* operation of Winter Service plant and equipment.

- b) During High Risk periods the *Contractor* shall meet the response times specified at Clause 2857AR.
- c) During Low Risk Periods the *Contractor* shall undertake treatments promptly, as and when available resources permit.
- d) The *Contractor* shall establish and maintain during the course of the contract, a schedule detailing the *Contractor's* Winter Service operational personnel. The schedule shall provide the information by inclusion in the *Contractor's* Winter Service Operational Plan.
- e) The *Contractor* shall ensure that vehicle repairs, servicing and calibration are completed so that vehicles are fully operational by 15th October each year and that they remain operational for the duration of the Winter Season.

2854AR Labour

General

- 1. The *Contractor* shall at all times during the Winter Service Season employ sufficient numbers of persons of sufficient abilities and skills to manage, supervise and undertake Winter Service operations.
- 2. The *Contractor* shall be responsible for all arrangements necessary to ensure the availability of supervisors and operatives to meet the specified response times.

Winter Service Supervisor

- 3. Throughout the Winter Service Season the *Contractor* shall provide a Duty Supervisor who shall be contactable by telephone at all times.
- 4. The *Contractor* shall ensure that the Supervisor is authorised and competent to receive instructions from the *Client*, to communicate them effectively to the *Contractor's* workforce and to provide the *Client* with progress reports regarding the Winter Service operation.
- 5. The *Contractor's* Duty Supervisor's telephone number shall not (except in case of emergency and then only after notification to the *Client*) change during the Winter Service Season.

Drivers and Operators

- 6. All drivers and operators engaged on Winter Service operations shall be trained and assessed and meet the standards of the City and Guilds Winter Service Operatives Assessment Scheme 6159 or equivalent recognised qualification awarded by a state of the European Economic Area. Drivers shall be instructed by the *Contractor* to take all possible precautions to protect their own safety and that of other road users at all times.
- 7. Drivers of spreaders/snow ploughing vehicles shall hold an appropriate and valid Large Goods Vehicle (LGV Category C or European Communities Heavy Goods Vehicle) driving licence in accordance with the Motor Vehicles (Driving Licences) Regulations 1999. Drivers operating trailed spreaders shall hold the appropriate Trailer entitlement(s) on their licences.

8. Prior to the start of each season, the *Contractor* shall provide familiarisation training for all operatives in the use of loading equipment, spreaders and other equipment, as appropriate, including route familiarisation training for drivers.
9. During routine Winter Service treatment operations all spreaders shall be driver operated, but during severe weather when snow-clearing operations need to take place, or when dense fog persists, a driver's mate shall assist with navigation and operation of equipment.
10. Shovel drivers shall be capable of using the *Contractor's* loading shovel located at any operational compound or depot and of loading the bulk spreaders. Shovel drivers shall be available 24/7 in the event of continuous severe weather. The operators of loading shovels shall hold a Certificate of Training Achievement issued by the CITB/ City & Guilds. Shovel drivers shall not be either a Supervisor or driver who is at that time also on Standby.
11. The *Contractor* shall provide and train sufficient personnel to enable all vehicles, including those held in reserve, to be capable of simultaneous operation throughout any period of severe weather, if necessary for 24-hour continuous operations over an extended period of time. The *Contractor* shall supply copies of certificates for each of the operative to be deployed on this Service by 31st August in each year of the contract.
12. The *Contractor* shall, when instructed by the *Client*, supply mobile gangs to undertake snow clearing operations.
13. The *Client* reserves the right to test the competence of any of the *Contractor's* operatives, whether accredited or not, to achieve the Winter Service. The *Client* reserves the right to inspect and require copies of licences and other documentation for all drivers at any time during the Winter Service Season

2855AR Vehicles, Plant and Equipment

Introduction

1. Any *Client* owned vehicles, plant or equipment which may be made available for use by the Contractor will be scheduled in the Client's Scope,
2. The *Contractor* shall assess and provide all other Winter Service vehicles, plant and equipment required to fulfil the obligations of the contract. All vehicles, plant and equipment shall be fit for the purpose of carrying out the specified Winter Service activities.

Vehicles

3. Spreading machines for Winter Service shall be designed and maintained so as to be capable of performing to a minimum standard compliant with BS 1622, Class A1 and shall comply in all other respects to the requirements of the Scope.
4. Salt spreading vehicles shall be fitted with a certificated tachograph recorder. The *Contractor* shall maintain, and continue to maintain, the serviceability and certification of the tachograph at such times that it is used to provide the Winter Service.
5. The *Contractor* shall provide and maintain an inventory of vehicles, plant and equipment provided by the *Contractor* for the purpose of carrying out Winter Service. A copy of the inventory shall be provided to the *Client* for approval prior to the Starting Date and thereafter included in the Winter Service Operational Plan. The *Client* may additionally request an updated copy at any time during the contract.

6. The *Contractor* shall provide and maintain a means of telecommunications between the *Contractor's* supervisory staff and all Winter Service vehicles during the Winter Service Season.
7. At, or prior to, the commencement of the Winter Season and again in December and February, the *Contractor* shall fill each spreading vehicle to normal operational capacity and check for full operational use, including calibration of rates of spread and spread patterns. The results shall be reported to the *Client* for approval. Upon completion, the *Contractor* shall wash down the vehicles and loading areas and replace the salt.
8. The fleet shall be fitted with GPS tracking devices. Each GPS tracking device shall transmit data in real time to a web-based reporting system which maps and records the location of each vehicle together with details of the rates of treatments being applied over time.
9. The web-based reporting system shall be capable of reporting the treatments that were applied at any given location together with details of the vehicle applying it and whether a snow plough was fitted. Access to the web-based reporting system is to be made available to the *Client*.
10. The *Contractor* shall maintain an electronic GPS-based tachograph record for each spreading vehicle, detailing its deployment, location over time, together with rates of treatment applied and whether or not ploughs are in use. For manual treatments such as stairs, footbridges, subways etc. the *Contractor* shall make an equivalent record of the treatment undertaken, its location, start and completion time, de-icer employed and quantity used. The *Contractor* shall make such data available to the *Client* on request and on completion shall pass the whole to the *Client*.

11. **Additional Requirements**

- a) All spreading machines shall be painted in Golden Yellow to BS 4800.
- b) Two additional headlamps shall be fitted to permit forward visibility when the snowplough is fitted. These shall be located below the windscreen.
- c) Three rotating amber beacons shall be fitted to the vehicle, 2 on the roof of the cab and 1 at the rear of the salt hopper.
- d) The vehicle shall also be fitted with a sign board reading 'SPREADING' fitted to the back of the salt hopper. The lettering shall be 175mm 'x' height taken from Schedule 17 Part 2 of the Traffic Signs, Regulations and General 2016 S1 2002 No. 362, on a Class 1 reflective yellow background.
- e) The vehicle shall be fitted with a passenger seat to permit the carriage of a driver's mate during snowploughing or other severe weather.
- f) Snow ploughs shall be fitted with mechanisms to minimise damage to road surfaces.

2856AR De-Icing Materials

General

1. Unless otherwise directed by the *Client*, the de-icing material used to treat the Area shall be fine rock salt to BS3247 Storing Quality treated with sodium ferrocyanide as an anti-caking agent.

2. Pre-wet de-icer shall combine 70% of dry salt with 30% by weight of brine solution having a 23% concentration of sodium chloride.
3. The *Client* may also instruct the use of a liquid de-icer on cycle routes, bridges, other structures or other parts of the Network

Provision

4. During the winter season the *Contractor* shall provide and maintain salt stockpiles dedicated for use on the contract, located within an hour road journey time of the contract area and at a level as indicated in the *Client's* Scope. The *Contractor* shall satisfy the *Client* that the location of salt stockpiles will be effective in servicing the treatment of the *Client's* road network.

Stock Management

5. The *Contractor* shall make arrangements for plant and equipment to be available for loading and handling salt to achieve the specified response times.
6. The *Contractor* shall ensure that salt or any alternative de-icing agent is stored such that its moisture content falls within the optimum range for the material, as stated in NWSRG Salt Storage Practical Guide. Moisture content shall be checked in September, December and February, prior to spreader calibration, and where necessary action shall be taken to bring the stock to within the optimal moisture content range.
7. Salt or other de-icing agents shall be stored so as to fully comply with the requirements of the Environment Agency or any other regulatory body. In particular, the *Contractor* shall ensure that the method of storage does not result in watercourses, surrounding vegetation or other adjacent sections of ground becoming contaminated.
8. The *Contractor* shall store salt in such a manner and location to meet all environmental and other statutory requirements, as agreed with the *Client*.

Stock Records

9. The *Contractor* shall supervise the receipt and inspection of salt and other de-icing agents and shall maintain an accurate inventory of materials delivered and used in treatments. This information shall be routinely provided to the *Client* who will in turn provide reports via the government's Salt Portal.

Alternative De-icing Materials

10. The use of de-icing materials to treat the Area other than those stated in sub-Clause 1 to 3 above shall require approval in writing by the *Client*.

2857AR Treatment Instruction and Response

Instructions

1. During the Winter Season the *Client* receives daily weather forecasts specific to the Contract Area by 0800, 1300 and 1900 hrs. From these forecasts the *Client* will issue instructions to the *Contractor* giving notice to stand up/down the High Risk service and if appropriate to also issue treatment instructions.

Pre-planned Treatments

2. Instructions relating to pre-planned precautionary treatment shall normally be passed to the *Contractor* by 1500hrs and if appropriate again at 2000hrs on the day that treatment is required.
3. The *Client* shall issue treatment instructions to the *Contractor* utilising email and telephone. The *Contractor* shall confirm treatment action upon receipt of instructions.
4. The decision relating to treatment may take one of several forms:-
 - a) Confirmed treatment of all or parts of routes where drivers and operators are to be instructed on details of timings, rates of spread or snow clearing arrangements.
 - b) Confirmed state of readiness for a possible treatment of routes at a later time.
 - c) To remain instantly available at operational compounds or depots for duties as required by the *Client*.
 - d) No action required.
5. During High Risk Periods
 - a) pre-planned treatments for Principal Treatment Routes shall commence at the time given in the *Client's* instruction and be completed within two hours. (For the avoidance of doubt, a minimum of one hours notice for pre-planned treatments shall be given).
 - b) for routes other than the *Client's* Principal Treatment Routes, the *Contractor* shall undertake treatments promptly, as and when available resources permit.
6. Post treatment and spot treatment instructions may be issued to treat ice and snow that has already formed on carriageways. These instructions may be given by the *Client's* Duty Winter Service Officer at any time.

Responsive Treatments

7. During High Risk Periods
 - a) responsive treatments to the *Client's* Principal Treatments Routes shall achieve a maximum Response Time of one hour and a maximum Treatment Time of two hours.
 - b) for routes other than the *Client's* Principal Treatment Routes, the *Contractor* shall undertake treatments promptly, as and when available resources permit.
8. Response Time is defined as the time from the *Client's* instruction to undertake a treatment until vehicles are loaded, manned and ready to operate. This applies to carriageway, footway and cycleway treatments and also in and outside core working hours.
9. Treatment Time is defined as the time from the end of the Response Time through to completion of the treatment. The time shall include for any traveling from the compound / loading point to the start of the treatment route.

Footway and Cycleway treatments

10. During High Risk Periods the *Contractor* shall achieve the treatment times for footways and cycleways given in Table 28.2. See table 33.1 for network hierarchy

Footways (and any adjoining Cycleway)	Treatment time
High Pedestrian Density	4 hours
Medium Pedestrian Density	24 hours
Low Pedestrian Density	48 hours

Cycling Facilities	
High Cycle Flow (Cycle facility)	4 hours

During Low Risk Periods the Contractor shall undertake treatments promptly, as and when available resources permit.

Winter emergencies

11. In the event of extreme weather conditions, the Client will escalate its management activities and may declare a Winter Service Emergency or activate a 24/7 “Severe Weather Desk”. In these circumstances, the *Contractor* shall co-operate with the *Client*, the Police and other organisations to provide the best possible service for the public with the resources available, under the direction of the *Client*. Plans shall be prepared by the *Client* for such an event and may involve the use of the *Contractor's* staff, provision of offices for the *Client*, and any other resources as may be required. In these circumstances, the *Contractor* shall be reimbursed for all reasonable expenses not covered elsewhere in the contract.

2858AR Principal Treatment Routes

Planning

1. The *Contractor* shall propose the detailed routing of vehicles so as to facilitate the treatment of the *Client's* Network of Principal Treatment Routes within the times set out in Clause 2807D.
2. The *Contractor* shall liaise closely with other contractors and Highway or Local Authorities concerning those points where treatment responsibility passes from the *Contractor* to others. In particular the Contractor shall ensure that by operating in partnership with neighbouring authorities, no short sections of road remain untreated because of administrative boundaries. When proposing treatment routes, the *Contractor* shall ensure that all sections of the route, including slip roads and service roads, are covered by Winter Service treatments. The *Contractor* shall inform, and keep informed, adjacent contractors and Highway or Local Authorities of any changes to routes that may affect complete route coverage.
3. Failure to agree responsibilities for treatment coverage at interface points shall be referred to the *Client*.

Route Plans and Schedules

4. The *Contractor* shall prepare and submit operational plans detailing treatment routes to the *Client* for consent 28 calendar days prior to the Starting Date. The *Client* shall have the right to withhold consent to any proposed treatment route with reasonable justification. The routes shall be marked on an Area plan and shall indicate the start and end points, direction of travel, lengths of treatment and lengths of dead running and shall be to a scale suitable to clearly detail road junctions, slips and the interface points between treatment routes.
5. The *Contractor* shall prepare route schedules to accompany each Route Plan and shall use route cards to provide driver/operators with instructions concerning specific treatment routes. Copies of the relevant route card(s) shall be provided and maintained by the *Contractor* in each spreading/ploughing vehicle.

Route Change

6. The *Client* shall have the right to temporarily or permanently amend principal treatment routes at any time. The resultant addition or reduction of the treatment route length (kilometres) shall be set by the *Client*.

2859AR Treatment Operations

Carriageway Treatments

1. The *Client* shall instruct the *Contractor* as to the type of treatment to be applied by specifying the Principal Treatment Number as Table 28.3 or if liquid de-icer is to be used.

Footway / Cycleway Treatments

2. Where practicable footway / cycleway treatment shall be by motorised spreading vehicles, designed to comply with the "Vehicles (Conditions of Use on Footpaths) Regulations" and calibrated to treat a 2 metre wide path.

Snow Clearing and Treatment of Footways, Footbridges and Subway Ramps.

3. When instructed by the *Client*, the *Contractor* shall provide teams of labour, transport and equipment to undertake salt treatment and/or snow clearing of footways, footbridges, pedestrian areas and subway ramps by non-mechanical operations.
4. Each team shall comprise of a minimum of three operatives, a driver and two others, one medium duty flat bed truck, 2 tonne of dry salt, 2 x hand propelled mechanical salt spreaders (30kg min capacity), shovels, brushes and ancillary equipment.
5. The *Client* shall instruct the treatment procedures to be followed but, in any event, the *Contractor* shall ensure that treatments are carried out effectively and that spread rates of de-icing agents minimise any adverse effects on trees, plants or other features of the soft estate and the environment.

2860AR Principal Treatments

- The Principal Treatments to be instructed by the *Client* are shown below, where spread rates will depend upon the state of calibration of the equipment applying the treatment.

Spreader Calibration state

- Spreader calibration shall be undertaken as described in NWSRG Spreader Calibration Guidance. Calibration shall be undertaken in September, December and February, or more frequently if instructed by the Client. Calibration uniformity ratings will be valid for nine weeks, then downgraded from good to fair, or fair to poor until recalibrated. Spreaders with a 'poor' uniformity rating shall not be used.

Table 28.3 -Spread Rates

Treatment using dry salt			Treatment using pre-wet		
Treatment No	Calibration / spread rate		Treatment No	Calibration / spread rate	
	Good g/m ²	Fair g/m ²		Good g/m ²	Fair g/m ²
D8	8	11	PW8	8	10
D9	9	12	PW9	9	11
D11	11	14	PW11	11	14
D13	13	17	PW12	12	16
D15	15	20	PW15	15	19
D17	17	23	PW17	17	21
D20	20	27	PW21	21	27

Note – Spread rates for pre-wetted salt are the combined weights of dry salt and a 23% brine concentration, combined in the proportion of 70:30 by weight.

- Principle route treatments may be supplemented by “spot gritting” either by spreaders or hand treating.
- The *Contractor* shall also note that, where specified in the *Client's* Scope, the *Client* may instruct the use of liquid de-icer on cycle super highways, bridges, other structures and footways.

2861AR Routine Reporting

Daily Returns

- The *Contractor* shall complete a “Winter Service Operational Situation” report, to summarise activity over the previous 24 hours, specifically detailing the salt used and the stock levels remaining. During the High Winter Season the report shall be submitted to the *Client* daily by 09:00 and as may be instructed at other times.

Weekly Returns

- The *Contractor* shall provide the *Client* with an accurate report of stock movement at weekly intervals (or daily if requested by the *Client* at times of severe weather) during the Winter Service Season in line with the Operational Plan.

2862AR Road Weather Information Stations (RWIS)

General

1. The *Client* obtains weather forecasts from its forecast service and site specific forecasting provided by RWIS Outstations. During the winter service period the bureau service automatically receives outstation data faults on the RWIS Outstations which are reported to the *Client* for "Front Line" maintenance.

Front Line Maintenance

2. On notification of a data fault at any of the *Client's* RWIS outstations, the *Client* shall instruct the *Contractor* to carry out a site visit to establish any obvious cause of the fault and report back to the *Client* within 1 hour of the instruction.
3. Front Line maintenance shall consist of the resetting of the modem and testing of the BT landline within the RWIS cabinet. Training shall be arranged for all staff undertaking this duty by the manufacturer of the RWIS outstation.

2863AR Salt Bins

1. Salt storage bins for the use by the general public shall be deployed by the *Contractor* at locations and to the requirements of the *Client*.
2. The *Contractor* shall fill each bin at the commencement of the winter period and refill the bins as necessary during the winter period to maintain the level of salt to at least 50% of the bin's capacity. The *Contractor* shall notify the *Client* of any damage found to bins during filling operations or at any other time. During filling operations, all rubbish/debris shall be removed from the bins and from the site, salt bins that have been moved from their original positions shall be replaced, and encrusted salt within the bin shall be forked over.
3. In the event of a Winter Service Emergency, the *Contractor* shall provide and deploy 'Jumbo' bags each containing 1 Tonne of salt to supplement salt bins as instructed by the *Client*.
4. The *Contractor* shall provide and distribute 10kg bags of dry salt to the *Client's* premises for treatments to be applied directly by the *Client*, or other contractors employed by the *Client*.

Additional, Cancelled, Modified & Substitute Clauses
Series 3000 Landscape and Ecology

3001MR	General
3002MR	Weed Control
3004MR	Ground Preparation
3005MR	Grass Seeding, Wildflower Seeding and Turfing
3006MR	Planting
3007MR	Grass, Bulbs Wildflower Maintenance
3008MR	Watering
3009MR	Establishment Maintenance for Planting
3010MR	Maintenance of Established Trees and Shrubs
3011MR	Management of Waterbodies
3013AR	Bedding Plant Areas
3014AR	Herbaceous perennials and ornamental grasses
3015AR	Control of Brown Tailed Moth
3016AR	Control of Oak Processionary Moth

3001MR General

In the first paragraph of sub-Clause 2 delete “If required in Appendix 30/1” and “or other operations stated in Appendix 30/1”.

In sub-Clause 2(x) delete “stated in Appendix 30/1”.

In the final paragraph of sub-Clause 2 delete “If required in Appendix 30/1”

Throughout the remainder of Clause 3001 delete “Appendix 30/1”. And replace with “the Task Order”.

In sub-Clause 13 delete “detailed in Appendix 30/1” and replace with “agreed with the *Client*” and delete “at intervals to be stated in Appendix 30/1” and replace with “once every three months”.

Delete existing sub-Clause 14 and replace with the following:

Bird Nesting Season

- 14 “In respect of protected habitats and species of flora and fauna including bats, badgers and nesting birds the *Contractor* shall provide all services in accordance with current legislation and guidance issued by Natural England. Directly prior to undertaking any landscape works, a bird nesting and protected species risk assessment shall be undertaken with mitigation carried out in agreement with the *Client*. For the purpose of this Specification, the bird nesting season shall be 1 March to 31 July in each year. If clearance or other works with the potential to disturb nesting birds is required during the bird nesting season, the *Contractor* shall engage a suitably qualified ecologist prior to the works to check for nesting birds. If nesting birds are found, the area shall be left until the birds have fledged.”

3002MR Weed Control

At the end of sub-Clause 2 add “.

Where areas of new injurious weed growth are identified, the *Contractor* shall inform the *Client* of the type of injurious weed, the co-ordinates, the estimated square metre area, and then undertake the weed control measures in accordance with this Clause. Where injurious weeds are present on adjacent land, the *Contractor* shall take all reasonable measures to liaise with the adjoining land owner in order to undertake a co-ordinated programme of weed control

The *Contractor* shall develop and implement a Non-Native Invasive Species (NNIS) Control Plan and Programme, which should be submitted within 3 months of appointment, maintained throughout the duration of the contract, and resubmitted every November

Within the NNIS Control Plan the *Contractor* shall set out how they will ensure that:

- a) All NNIS treatments are recorded in the *Clients* AMIS in a format agreed with the *Client*
- b) All identified NNIS species are easily identifiable on site – e.g. by erecting fencing and/or signage around them.
- c) How all staff responsible for the management and or control of NNIS will be suitably trained, experienced and competent, to undertake their work.

Delete existing sub-Clauses 3 to 7 and replace with the following:

- 3 Structures, hardstandings, channels footways, laybys and other paved areas, kerbs, structures, filter drains and gravel areas (including but not limited to central reservations) shall be treated with herbicides approved for total weed control applied in accordance with the manufacturer's instructions at the locations stated in the *Client's Scope*. Growth within a distance of 2m from structural piers, abutments, wing walls, ramps, stairs and bridge decks shall be cleared and disposed of using appropriate means which preserve the integrity and do not damage the structure or its protective systems.
- 4 For site preparation, on topsoil heaps and in planted beds, a herbicide approved for total weed control shall be applied in accordance with the manufacturer's instructions.
- 5 In open ditches, lagoons, filter drains and watercourses a herbicide approved for use in or near water shall be applied in accordance with the manufacturer's instructions.

Selective Weed Control in Grass

- 6 "The *Contractor* shall control weeds by use of a selective herbicide in the areas identified in the *Client's Scope* as high frequency and medium frequency grass cutting areas. The herbicide shall be applied between 1 April and 1 September during periods of active growth and in accordance with the manufacturer's instructions. Applications shall not be applied at intervals of less than 28 days.

Weed Control in Established Hedges

- 7 The *Contractor* shall control weeds by use of a selective herbicide or hand weeding for the areas identified in the *Client's Scope* as hedge, including an area of 300mm on either side of the hedge. Hand weeding or application of selective herbicide shall be undertaken between 1 April and 1 September during periods of active growth and in accordance with the manufacturer's instructions. Treatment shall not be undertaken at intervals of less than 28 days."

Delete existing sub-Clause 10 and replace with the following:

- 10 All arisings from weed operations shall be removed from site and disposed of at a licensed disposal facility. Controlled waste including Ragwort and Japanese Knotweed shall be placed in waterproof bags and sealed before removing from site to a licensed disposal facility. Records of deposits to disposal facilities shall be presented to the *Client* on request.

Insert new sub-Clause 11:

Growth Retardant

- 11 Where instructed, growth retardant shall be applied, in accordance with the manufacturer's instructions. Application shall achieve a retardation of grass growth for at least two months following treatment. The use of growth retardant will typically be required in areas of grass and other non woody vegetation, where access for grass cutting machinery is restricted.

3004MR Ground Preparation

Throughout Clause 3004 delete "Appendix 30/4" and replace with "the Task Order".

Delete existing sub-Clause 1 and replace with the following:

Vegetation Clearance

- 1 "Where instructed in the Task Order all grass and other vegetation shall be cut to a height of between 50 mm and 75 mm and the arisings removed off site. Vegetation clearance shall include woody shrubs and their stumps where present. Herbicide shall be applied to all areas of vegetation clearance unless otherwise instructed by the *Client*."

Delete existing sub-Clause 7 and replace with the following:

- 7 The requirements of sub-Clauses 3004.8 to 3004.11 shall apply to subsoil used for wildflower seeding, or topsoil for all areas of grass seeding, wildflower seeding, turfing, and planting under the Contract.

Soil Contaminated During the Contract

In sub-Clause 12 delete "removed" and replace with "disposed" and add "Where contaminated soil is removed within the root protection zone of trees and/or shrubs the method of removal and any required remediation measures shall be agreed with the *Client* in advance so as to avoid causing harm to the plants."

- 12 Where the *Contractor* has contaminated the ground with cement slurry, oil, tar or any material harmful to plant life, soil shall be excavated to a depth of 1.0m and removed off site and disposed of in accordance with current legislation. Uncontaminated subsoil and topsoil shall be used for backfilling, to the finished profiles required under the contract.

3005MR Grass Seeding, Wildflower Seeding and Turfing

Season

In sub-Clause 1 delete "Appendix 30/5" and replace with "the Task Order".

Delete existing sub-Clauses 2 and 3 and replace with the following:

Final Cultivations

- 2 Where required by the Task Order the area shall be forked and cultivated by manual or mechanical means to a minimum depth of 150 mm and graded, levelled and raked to a fine and true seed bed. General Purpose Grade Topsoil to BS3882 "Specification for Topsoil" shall be used to make up levels. Immediately prior to sowing, hydraulic seeding or turf laying the upper 50 mm of soil shall be reduced to a fine tilth.
- 3 Where instructed in the Task Order granular fertiliser with nutrient status N6: P9: K6 shall be evenly incorporated into the upper 50 mm of soil during the final cultivations at a rate of 20 g/m²."

In sub-Clause 10 delete "Appendix 30/5" and replace with "the Task Order".

At the end of sub-Clause 27 add "The *Contractor* shall ensure that the turfed area is watered frequently and sufficiently to ensure the proper establishment of the grass."

3006MR Planting

Plants

In sub-Clause 3 delete "Appendix 30/6" and replace with "the design".

At the end of sub-Clause 3 add "The *Contractor* shall source trees and plant material only from nurseries who guarantee that their trees, shrubs or bedding plants are UK-grown or – if imported – have undergone a quarantine period appropriate to the species prior to being supplied."

In sub-Clause 4 delete "Appendix 30/6" and replace with "the approved design".

Delete existing sub-Clauses 5 and replace with the following

- 5 Mycorrhiza shall be supplied as a root dip for bare root plants unless instructed by the *Client*.

In sub-Clause 6, delete "using the Provenance Certificate pro-forma in Appendix 30/6" and delete "Plant material shall comply with any other special provenance requirements stated in Appendix 30/6" and replace with "Provenance requirements may be instructed by the *Client*, particularly where planted near designated wildlife conservation sites."

In sub-Clause 7 delete "If required in Appendix 30/6".

Delete existing sub-Clause 12 and replace with the following

- 12 "Imported top soil for tree pits shall be General Purpose Grade conforming to BS3882. The planting medium shall comprise 80% of topsoil and 20% compost for tree pits."

In sub-Clause 13 delete "Where stated in Appendix 30/6," and replace with "To achieve a planting medium that is 80% topsoil and 20% compost"

In sub-Clause 14 delete "as required in Appendix 30/6" and replace with "between 4.5 and 7.0 with a conductivity of up to 900 microsiemens / cm".

In sub-Clause 15 delete "Where specified in Appendix 30/6," and replace with "where instructed in the Task Order".

In sub-Clause 23 delete "in Appendix 30/6," and replace with "in the Task Order".

In sub-Clause 24 delete "If required in Appendix 30/6". Delete "as directed in Appendix 30/6" and replace with "at the *Contractors* Tip".

Delete Table 30/1: and replace with

Table 30/1: Planting Pits, Beds and Trenches

Plant Size	Excavation Dimensions (W x W x D) mm	Notes
Semi-Mature Tree 18+ cm girth	Dimensions shall comply with BS4428 or rootball plus 400mm in each direction as agreed by the <i>Client</i>	80% imported Topsoil, 20% compost.
Extra Heavy and Advanced Heavy Standard Tree	1200 x 1200 x 750	80% imported Topsoil, 20% compost.
Select Standard and Heavy Standard Tree	1000 x 1000 x 600	80% imported Topsoil, 20% compost.
Rootball whips, feathered trees, transplants or shrubs 1.2-2.1 m high	700 x 700 x 600	80% imported Topsoil, 20% compost.
Bare root whips, feathered trees, transplants or shrubs 1.2-2.1 m high	500 x 500 x 450	80% imported Topsoil, 20% compost..
Rootball transplant, bare root transplant, whip or shrubs 0.3-1.2 m high	300 x 300 x 300	Re-use existing excavated material unless otherwise instructed.
Reeds, Marginal Plants	Cultivate 300 mm deep or 150 mm greater than W and D of root ball/plug as agreed by the <i>Client</i>	80% imported Topsoil, 20% compost..
Wildflower Plants	150 mm greater than W and D of root-plug	Soil as found
** Single Hedge Trench	* x 300 x 300	Topsoil 80% compost 20%.
** Double Hedge Trench	* x 600 x 300	Topsoil 80% compost 20%.
Ornamental beds and cell grown plants	Cultivate 300 mm deep or 150 greater than W and D of root ball/plug as agreed by the <i>Client</i>	Incorporate 20% compost Bark Mulch after planting.
* - length of hedging	** - Unless otherwise instructed by the <i>Client</i> , hedge trenches shall not be within 1m of the highway boundary, fence, wall, ditch or other structure.	

Note – Where planting of trees is undertaken in paved areas, unless otherwise instructed by the *Client*, the tree pit opening at surface level shall be 1000 x 1000 mm when planting is complete, regardless of tree size. River washed gravel shall be used in the bottom of all pits for trees with a girth of 10cm or greater,

In sub-Clause 28 delete “Where required in Appendix 30/6”

In sub-Clause 29 delete “Where required in Appendix 30/6”

In sub-Clause 30 delete “If required in Appendix 30/6”

In sub-Clause 33 delete “Where required in Appendix 30/6”

At the end of sub-Clause 36 add, “Stakes shall be supplied from a certified sustainable source and shall have the top 75mm indelibly stained. Different stain colours shall be used for different planting seasons to identify when trees were planted.

In sub-Clause 38 delete “in Appendix 30/6,” and “Appendix 30/6 and” .:

Delete existing sub-Clause 45 and replace with:

- 45 Semi mature trees shall be planted using the same techniques as extra heavy and heavy standards.

Delete existing sub-Clauses 50 and 51 replace with:

- 50 All trees planted of a size 100 mm girth or greater shall be planted with a 77 mm or 80mm diameter perforated flexible plastic irrigation pipe. The irrigation pipe shall have a

minimum of 1 'T' piece connection for watering and an aeration cap. The aeration cap shall be located next to one of the tree stakes and secured to the stake with a nail to prevent it being dislodged or damaged. The pipe shall be inserted around the rootball during planting, at a depth of 150 mm below the ground surface and shall be of sufficient length to coil completely around the root system or rootball.

51 Not used

In sub-Clause 52 delete "In the locations stated in Appendix 30/6" In

sub-Clause 53 delete "Where required in Appendix 30/6"

In sub-Clause 54 delete "stated in Appendix 30/6," and replace with "instructed in the Task Order".

In sub-Clause 58 delete "stated in Appendix 30/6" and replace with "required in the Task Order" and delete "the material specified in Appendix 30/6" and replace with "a biodegradable material such as jute or hessian".

In sub-Clause 60 delete "as directed in Appendix 30/6"

In sub-Clause 68 delete "it is stated in Appendix 30/6 that"

In sub-Clause 73 delete "stated in Appendix 30/6," and replace with "instructed in the Task Order".

Delete existing sub-Clause 86 and replace with:

86 "The *Contractor* shall maintain all planting undertaken under the contract in accordance with Clauses 3007, 3008 and 3009 for a post-planting period of 36 months"

In sub clause 92 delete "the duration of the period stated in Appendix 30/6" and replace with "a period of 36 months".

3007MR Grass, Bulbs Wildflower Maintenance

General Grass Maintenance

In sub-Clause 1 delete "Appendix 30/7" and replace with "the *Client's* Scope".

In sub-Clause 5 delete "the distance from individual plants given in Appendix 30/7" and replace with "300 mm. Grass maintenance within 300 mm of individual plants shall be by the use of mulch to prevent growth, or herbicide to control growth."

Grass Cutting: High Frequency

In sub-Clause 9 delete "Appendix 30/7" and replace with "the *Client's* Scope".

Delete sub-Clauses 9(ii) and replace with the following:

9(ii) "Subsequent cuts. Between 1 April and 31 September each year the areas shall be cut to a height of 25–30 mm with the cuttings evenly dispersed to give a neat uniform appearance. The number of additional cuts shall be as stated in the *Client's* Scope with the interval between cuts depending on the rate of growth and as agreed by the *Client*."

In sub-Clause 10 delete the first sentence and replace with "The edges of high frequency grass cut areas adjoining planted areas, ornamental bedding, kerbs, hard surfaces and

structures shall be trimmed with edging shears or a mechanical equivalent at the frequency Stated in the *Client's* Scope during the growing season.”

In sub-Clause 11 delete the first sentence and replace with “The edges of high frequency grass cut areas adjoining planted areas, kerbs, hard surfaces or structures shall be re-formed with a half moon edging iron or a mechanical equivalent, with the first operation at the start of the growing season, to produce clean straight or curved lines as determined by the original shape and dimension of the grass area.”

Delete sub-Clauses 12 and replace with the following:

- 12 Where edges abut kerbs, hard surfaces and structures re-forming shall include the removal of any soil or vegetation growing on or through the kerbs, hard surface and structure.”

Grass Cutting: Medium Frequency

In sub-Clause 13 delete “Appendix 30/7” and replace with “the *Client's* Scope”.

Delete existing sub-Clauses 13(ii) and replace with the following:

- 13(ii) “Subsequent cuts. Between 1 April and 31 September each year the areas shall be cut to a height of 50-60 mm with the cuttings evenly dispersed to give a neat uniform appearance. The number of additional cuts shall be as stated in the *Client's* Scope with the interval between cuts depending on the rate of growth and as agreed by the *Client*.”

In sub-Clause 14 delete the first sentence and replace with “The edges of medium frequency grass cut areas adjoining planted areas, ornamental bedding, kerbs, hard surfaces and structures shall be trimmed with edging shears or a mechanical equivalent at the frequency stated in the *Client's* Scope year during the growing season”.

Delete existing sub-Clauses 15 and 16 and replace with the following:

- 15 The edges of medium frequency grass cut areas adjoining planted areas, kerbs, hard surfaces or structures shall be re-formed with a half moon edging iron or a mechanical equivalent at the start of the growing season to produce clean straight or curved lines as determined by the original shape and dimension of the grass area. Where edges abut planted areas, re-forming shall include drawing back the soil from the edges so that edging shears can be used.
- 16 Where edges abut kerbs, hard surfaces and structures re-forming shall include the removal of any soil or vegetation growing on or through the kerbs, hard surface and structure.”

Grass Cutting: Low Frequency

In sub-Clause 17 delete “Appendix 30/7” and replace with “the *Client's* Scope”.

Delete existing sub-Clause 17(ii) and replace with the following:

- 17(ii) “Subsequent cuts. Between 1 April and 31 September each year the areas shall be cut to a height of 50-75 mm with the cuttings evenly dispersed to give a neat uniform appearance. The number of additional cuts shall be as stated in the *Client's* Scope with the interval between cuts depending on the rate of growth and as agreed by the *Client*.”

Grass Cutting: Minimal Frequency

Delete sub-Clauses 18 and 19 and replace with the following:

- 18 "In the locations stated in the *Client's* Scope the areas shall be cut on swathe cuts, visibility areas and other areas. The cut shall be to a height not exceeding 100mm and the cuttings evenly dispersed to leave a neat uniform appearance. The timing of cutting shall be as instructed by the *Client*. Where the areas contain injurious weeds as listed in sub-Clause 3002.1, the cut shall be undertaken prior to weeds flowering. Additional selective cuts shall be undertaken within these areas as instructed by the *Client*. The cut shall include for the cutting of material such as tree and shrub seedlings and bramble.
- 19 A cut of 1.8m width from the edge of the carriageway, footway, cycleway, paved areas, back of safety fence, bus stops, laybys, parking areas and hard shoulder shall be undertaken at the locations and frequencies stated in the *Client's* Scope. Additional full width cuts shall be undertaken within sight lines, at hazardous bends junctions, roundabouts, some central reservations, major accesses, bus stops and laybys and any other areas as required or instructed by the *Client*."

Delete the first paragraph of sub-Clause 26 and replace with the following:

- 26 "Where the *Client's* Scope identifies areas where the cutting of wildflower areas or areas of nature conservation value is required, one or more of the following operations, or any other operations, shall be carried out, as indicated in the *Client's* Scope.:

In sub-Clause 27 delete "Appendix 30/7" and replace with "the *Client's* Scope".

In sub-Clause 31 delete "If required in Appendix 30/7".

In sub-Clause 32 delete "where required in Appendix 30/7".

3008MR Watering

Delete existing sub-Clause 7 and replace with the following:

Additional Watering

- 7 "Where required, during periods of abnormally dry weather additional watering shall be instructed by the *Client*. When instructed, water shall be applied at the following rates:
- a) Grassed area: water shall be applied at the rate of 15 l/m² using low pressure hose sprinkler or spray evenly over the entire area.
 - b) Shrubs, hedges and ornamental beds: water shall be applied at the rate of 25 l/m² to shrub beds and 25 litres per linear metre to hedgerows by low pressure hose sprinkler or spray evenly over the entire area. Careful forking of sealed or compacted surfaces shall be carried out prior to watering to facilitate percolation.
 - c) Trees: Every 7 calendar days between the first week of April and the second week of October a minimum quantity of 75 litres of water shall be applied by low pressure hose to each tree. 25 litres shall be applied directly to the root area through the irrigation/aeration pipe and 50 litres through the irrigation bag, or if an irrigation bag is not available, the whole shall be applied slowly and directly to the soil within 600mm of

the stem/trunk so as to prevent runoff. Before the first application of water and after any break of more than four weeks, to facilitate percolation, careful forking of sealed or compacted surfaces around the tree for a radius of 500mm shall be carried out.”

3009MR Establishment Maintenance for Planting

Delete existing sub-Clause 1 and replace with the following:

- 1 “New plants and planting areas shall be maintained in accordance with this Clause for an Establishment Period of 36 months following certification by the *Client* that planting is complete. The Establishment Period shall be deemed to have started only when the *Contractor* has submitted to the *Client* a notice to confirm planting work is complete and the *Client* has agreed it. At the end of the Establishment Period, the *Contractor* shall arrange to review the works with the *Client* before termination of the Establishment Period and any defective planting shall be replaced with stock of the same specification and provenance and to the *Client*’s approval. For the avoidance of doubt wherever plants have been replaced under the provisions of this clause the Establishment Period of 36 months shall recommence at the time of replanting.”

Weed Control: Young Trees and Shrubs in Grass Plots

In existing sub-Clause 10 and 11 delete “At the locations and frequency stated in Appendix 30/9, where mulch mats are not used ” and replace with “At locations where the *Contractor* has planted trees and where mulch mats are not used, once every 28 calendar days”.

In existing sub-Clause 12 and 13 delete “Where directed in Appendix 30/9”

Delete existing sub-Clause 14 and replace with the following:

- 14 “36 months after planting, any non-biodegradable mulch mats, any pegs and non-biodegradable tree shelters/guards and stakes shall be removed off site and the soil surface made good.”

Delete existing sub-Clause 16 and replace with the following:

- 16 From March to October planting areas shall be visited every 28 days to carry out specified weed control operations. Any grass and weed growth within the planted beds shall be removed by hand or chemical means. Herbicides shall be used in accordance with Clause 3001. The roots and foliage of weeds and grass shall be removed off Site once die back is complete

In existing sub-Clause 19 delete “Where required in Appendix 30/9”

Weed Control: Hedges

In existing sub-Clause 20 delete “Where required in Appendix 30/9”

Individual Trees

Delete existing sub-Clause 25 and replace with the following:

- 25 “Individual trees, planted as light standard or larger whether as an individual or as part of a group shall be inspected annually during the growing season and maintained by the *Contractor* as follows:

- a) irrigate as Clause 3008 through out the growing season and maintain the irrigation system in working order repairing if necessary;

- b) remove all weeds from around the base of the tree to a radius of 500mm in grass areas or the whole tree pit area if in a hard surface area. Removal shall be by hand and/or chemical means. When using herbicide the requirements of Clauses 3001 and 3002 shall apply;
- c) where the base of the tree is mulched, top-up mulch to weed-free circle to maintain depth of 75 mm of mulch;
- d) inspect and adjust tree supports, stakes and ties;
- e) inspect and adjust guards and grilles;
- f) make up level of aggregate, mulch and/or soil in tree pits to the same level as the surrounding surface;
- g) remove stakes and ties when trees can stand unsupported. Where stakes are removed, the void shall be filled with consolidated topsoil;
- h) adjust underground guying;
- i) undertake formative pruning in accordance with Clause 3010 including removal of epicormic shoots, deadwood, crossing branches, competing secondary leader shoots and closely spaced, duplicated branches with potentially weak or tight forks;
- j) replace dead/defective trees, where initial planting was undertaken by the *Contractor* as per Clause 3006; and
- k) report to the *Client* any defects requiring further action.”

Insert the following after sub-Clause 25:

Fertiliser

- 26 “Where instructed by the *Client*, slow release fertiliser shall be applied to the surface around tree and/or shrubs. The fertiliser shall be evenly distributed around the base of the plant within 400mm of the stem and shall be lightly raked.”

3010MR Maintenance of Established Trees and Shrubs

Weed Control: Trees and Shrubs in Cultivated Beds

In Sub-Clause 2 delete “as required in Appendix 30/10”

At the end of sub-Clause 2 insert

“Weed control shall include the removal of self set trees such as sycamore and ash, among others. The soil surface of shrub beds shall be cultivated using a hoe and/or light rake to create a fine to medium tilth, evenly graded, without damage to plants or roots. Bed edges shall be edged-up with a spade, to form a ‘V’ against the kerb, grass or other edge feature. This work shall be carried out with weed control treatments.”

Arisings from Pruning, Cutting or Felling of Woody Plants

Delete sub-Clause 4(viii), and replace with the following:

- “(viii) Where directed arisings from thinning, coppicing and pruning shall be left as habitat piles. Typically, habitat piles shall consist of unchipped branches and stems stacked to a height of up to 500 mm and covering a maximum area of 1 m².”

In sub-Clause 4(ix) delete “in Appendix 30/10”

Delete existing sub-Clause 6 and 7 and replace with the following:

Shrub Pruning

6 "Pruning shall be undertaken in accordance with good horticultural practice using secateurs and handsaws. Mechanical hedgecutters may only be used on compact small-leaved species which have dense foliage. Pruning shall be undertaken to promote flowering and fruiting in accordance with the species and age of the plant. Shrubs shall be pruned to the natural form of the species and where necessary stems shall be removed so as to retain the natural appearance of the individual plant species. The *Contractor* shall not trim or clip plants to produce smooth plane or curved surfaces unless instructed by the *Client*.

7 All broken and badly damaged branches shall be pruned from the plants. During the pruning operation all litter and debris within the planted area shall be removed off site".

In sub-Clause 8(vii) delete "Where stated in Appendix 30/10"

In sub-Clause 9 delete "shrubs" and replace with "plants" and at the end add "All groundcover shall be cut back to 150 mm from the edge of any paved surface."

In sub-Clause 22 delete "as required in Appendix 30/10"

Arboriculture: General

Delete existing sub-Clause 36 and replace with the following:

36 "The *Contractor* shall comply with the current industry best practice and follow the recommendations and guidance given by the Health and Safety Executive's Arboriculture and Forestry Advisory Group (AFAG) in relation to all aspects of arboricultural works."

At the end of sub-Clause 39 add:

"Live wood shall not be pruned from Acer and Betula from January to May, Prunus from September to May and Juglans from October to April, all unless otherwise agreed with the *Client*."

Tree Surgery

In sub-Clause 51 delete "where specified in Appendix 30/10"

Delete existing sub-Clause 52 and replace with the following:

52 "Pruning cuts shall be made in accordance with BS3998 with natural target pruning undertaken to keep wounds small and help reduce the risk of decay and infection. Final pruning cuts shall be made so that both the branch/stem, branch bark ridge and branch collar remain intact."

At the end of sub clause 53(i) add "shall be undertaken annually in mid-June with further removal in October where new shoots have grown to 150mm or more in length"

Tree Felling

Delete existing sub-Clause 62 and replace with the following:

62 "Where instructed, the complete root, including buttress and surface roots arising from near the base shall be removed by either stump grinding or grubbing (by means of excavation and winch) and shall include:

- a) all necessary precautions to avoid underground utilities which may include a trial hole 400mm deep near to where utilities are likely to be located or expected;
- b) removal of all roots within 250mm of the outer edge of the stump (measured at ground level) to a depth to enable a replacement tree planting;
- c) removal of all visible surface roots greater than 20mm and roots disturbing the surface;
- d) stumps ground to a minimum depth of 300mm below ground level; and
- e) reinstatement of deformed surrounding surface around the stump.

Where a tree – or part of a tree – has failed and the *Contractor* is required to make the situation safe, a sample of the tree/tree part shall be retained by the *Contractor* for inspection by the *Client* or any third party nominated by the *Client*. The part to be retained should be determined by a suitably competent individual and will depend on the nature of the suspected cause of the failure, so may be a section of stem, branch, foliage or root. The sample shall be sealed in airtight wrapping, clearly labelled with the location from which it was obtained and the date that it was obtained and then stored at the *Contractor's* premises for a minimum of 28 days and thereafter until the *Client* agrees that it can be disposed of. The *Contractors* shall provide all facilities for inspection of the sample by the *Client* or an arboricultural specialist nominated by the *Client*. For the purposes of this clause suitably competent persons will be those approved for the purpose by the *Client*.”

Thinning and Coppicing

At the end of sub-Clause 64 add: “Coppicing shall normally be carried out between November and February. Unless instructed by the *Client*, no coppicing shall be carried out during the bird-nesting season. “

In sub-Clause 65 delete the first sentence and replace with “Thinning shall be undertaken throughout the planted areas instructed by the *Client*, when the species and percentage of coppicing shall be instructed on a plot-by-plot basis.”

At the end of sub-Clause 65 add “The *Contractor* shall first remove plants that are dead, diseased, dying or dangerous. Retained conifers shall, unless otherwise instructed, be brashed-up to 2 m except where within 4 m of the plot edge. All stumps from thinning operations shall be treated within 24 hours of felling by furrowing 50% of the stump and bark and applying herbicide containing an accepted vegetable die to clearly indicate the stumps which have been treated. Conifer stumps shall be treated with urea immediately after felling. The *Contractor* shall revisit the plot in the July or August following the initial stump treatment and treat all regrowth with an accepted herbicide.”

Scrub Control in Grass

Delete existing sub-Clause 71 and replace with the following:

- 71 “Where instructed, the *Contractor* shall cut the areas to between 50 and 100mm above ground level using a brush cutter. Tree and shrubs to be controlled shall have a stem diameter up to 75mm and maximum height of 2.5m.

For stumps of sufficient diameter, the *Contractor* shall furrow or frill girth 50% of the stump and bark and apply with a weed wipe or low volume knapsack sprayer a herbicide, as accepted by the *Client*, to the stumps. The *Contractor* shall apply an accepted vegetable dye incorporated with the herbicide to clearly indicate that the stumps have been treated. The *Contractor* shall apply a translocated herbicide to new growth in the first year after cutting during a period of active growth. Unless otherwise instructed by the *Client*, the *Contractor* shall process arisings from scrub control operations as follows:

- a) On rock and scree, all arisings shall be removed from site.
- b) Where scrub cover is less than 15% of the area, arisings over 5mm diameter shall be chipped and spread thinly over the area, to a maximum of 25mm depth to avoid suppression of grass and herb cover.
- c) Where scrub cover is greater than 15% of the overall area, the *Contractor* shall remove any arisings from the site to a licensed disposal facility, unless chipping and spreading would result in no more than 20% of the area being covered with chippings to a depth of more than 25 mm. Bramble cuttings may remain insitu if finely chopped. Within areas containing desirable broadleaved wildflower species, the *Contractor* shall not spread arisings in a manner that would, in the opinion of the *Client*, be detrimental to the wildflower habitat.
- d) All arisings from gorse and broom cutting shall be removed from site to a licensed disposal facility. Where specifically instructed by the *Client*, the *Contractor* shall chop arisings finely and spread to a maximum depth of 25mm.”

After sub-Clause 71 insert:

“Cleaning Through Tree and Shrub Plots

- 72 When instructed by the *Client*, the *Contractor* shall cut down the vegetation between plants within planted plots or areas of regeneration to a height of 60-80mm. The *Contractor* shall only use trimmers with guarded cutting heads.
- 73 In areas where weed control has not been previously instructed, the *Contractor* shall hand-pull any grass or weeds between the cut area and the plant stems.
- 74 Where the planting stations are 1.5m or less apart, the *Contractor* shall remove the arisings from the area to a licensed disposal facility. Otherwise, arisings shall be left within the planted area, but not closer than 500mm to individual plants.
- 75 The *Contractor* shall ensure that no damage is caused to the existing plants to be retained. Any plants that, in the opinion of the *Client*, have been damaged by the *Contractor's* operations shall be replaced and/or made good entirely at the *Contractor's* expense in the planting season immediately following the damage, and maintained in accordance with Clause 3006 until established 36 months after planting.
- 76 Where instructed to clean through planted areas, the *Contractor* shall remove all deadwood within 4m of the ground from trees and prune all broken and badly damaged branches from the plants. Cuts shall be made as set out in sub-Clause 3010.52.”

3011MR Management of Waterbodies

In sub-Clause 1 delete "Appendix 30/11" and replace with "the *Client's Scope*"

In sub-Clause 3 delete "as detailed in Appendix 30/11"

In sub-Clause 4 delete "Appendix 30/11" and replace with "sub-Clause 3002(1)"

In sub-Clause 6 delete "where required in Appendix 30/11"

Delete sub-Clause 8 delete and replace with:-

- 8 "At the frequency stipulated in the *Client's Scope* and subject to any constraints imposed from the results of ecological surveys, the *Contractor* shall remove silt and any overlying rubbish or debris to within 100mm of the substratum and after drying out shall dispose of it at an authorised tip"

In sub-Clause 9 delete "where required in Appendix 30/11"

3013AR Bedding Plant Areas

1. Where instructed, the *Contractor* shall plant and maintain bedding.
2. Where instructed, bedding rotations shall be carried out each year in spring and autumn.
3. At the end of each rotation the *Contractor* shall clear the bedding area of all plants (including bulbs) from the previous rotation. The soil shall be cultivated to a depth of 300mm in order to prepare a fine tilth suitable for planting. Where instructed by the *Client*, the *Contractor* shall incorporate additional topsoil or compost as part of the ground preparation.
4. All planting shall be carried out in accordance with sub-Clauses 3006.1 to 3006.11. The *Contractor* shall supply and plant seasonal bedding and bulbs to the layout and design specified by the *Client*.
5. All plants shall be watered to field capacity immediately prior to planting.
6. The *Contractor* shall water in accordance with sub-Clauses 3008.1 to 5 and at the frequencies necessary to ensure establishment and good health of the bedding plants. The *Contractor* shall water all planting undertaken under the contract for a period of 6 months to ensure establishment and survival.
7. The *Contractor* shall undertake maintenance visits throughout the year with a minimum of one visit every 28 calendar days. At each visit the *Contractor* shall:
 - a) Lightly cultivate the entire bed area using a hoe and/or light rake to create a fine to medium tilth, evenly graded, without damage to plants or roots forming the bedding and bulb display;
 - b) Remove any grass and weed growth by hand means. The roots and foliage of weeds and grass shall be removed off site; and
 - c) Make a record of any plants which have failed or been irreparably damaged and submit this record to the *Client*.

3014AR Herbaceous perennials and ornamental grasses

1. Weed control within areas of herbaceous perennials and ornamental grasses shall be as sub-Clause 3010.2. Any weed growth that cannot effectively be controlled by chemical means without risk of damage to herbaceous perennial plants and ornamental grasses shall be hand-weeded.
2. When the planted area is visited for any maintenance 'dead heading' of herbaceous perennial plants shall be carried out to encourage repeat blooming.
3. Herbaceous perennial plants and ornamental grasses shall be cut back to remove dead flower heads (dead heading) and untidy growth at the end of the growing season, unless directed by the *Client* to leave seed heads for winter interest. Arisings shall be removed off site, unless directed by the *Client*.
4. When instructed by the *Client*, herbaceous perennial plants and clumps of grasses shall be divided. The older plant material shall be removed off site and the healthiest and actively growing plant material shall be replanted to maintain the vibrancy/longevity of the plants. As part of this operation, healthy and actively growing plant material may be used to fill any gaps between plants to reduce the amount of bare soil so reducing potential for development of a seed bed for weed species.
5. Herbaceous perennials and ornamental grasses shall be divided in spring unless they are in flower, in which case they shall be divided in autumn. Plants shall be divided with a sharp knife and planted with compost incorporated with the planting medium.

3015AR Control of Brown Tailed Moth

1. The *Contractor* shall immediately notify the *Client* when he becomes aware of a Brown Tailed Moth outbreak.
2. Where instructed to control infestations of Brown Tailed Moth, the *Contractor* shall control the infestation by one of the following means:
 - a) Minor infestations shall be cut out and all arisings shall be removed from site and disposed of in accordance with current legislation and guidance; or
 - b) Major infestations shall be treated with pesticide, strictly in accordance with the manufacturer's instructions and sub-Clauses 3001.4 to 13.

3016AR Control of Oak Processionary Moth

1. The *Contractor* shall immediately notify the *Client* when he becomes aware of an Oak Processionary Moth outbreak.
2. Where instructed to control infestations of Oak Processionary Moth, the *Contractor* shall control the infestation following current legislation and guidance by one of the following means:
 - a) Early stage control shall be made with the application to the infected plant with a pesticide applied in accordance with the manufacturer's instructions and sub-Clauses 3001.4 to 13; or
 - b) Nests of late stage infestations, after instar three, shall be fully removed from the tree in sealed units and incinerated at a disposal facility agreed with the *Client*.
3. In any area affected by Oak Processionary Moth, tree arisings shall be treated in accordance with the plant health guidance, processed and removed as agreed by the *Client*.

Additional, Cancelled, Modified & Substitute Clauses

Series 3150 Street Cleaning

3150AR	Street Sweeping
3151AR	Cyclic Cleaning of Pedestrian Subways, and Footbridges
3152AR	Removal of Animal Carcasses
3153AR	Fly Tipping
3154AR	Removal of Graffiti, Unauthorised Signage and the Like
3155AR	Specialist Cleaning
3156AR	High Pressure Water Jetting / Vacuum Suction
3157AR	Mechanical Washing
3158AR	Cleaning of Traffic Signs and Traffic Bollards
3159AR	Clean Weepholes
3160AR	Clean Bearing Shelves and Bearings
3161AR	Clean Surface Mounted Expansion Joints
3162AR	Remove Bird Droppings / Check Protection Measures
3163AR	Cleansing Vehicles

3150AR Street Sweeping

1. The *Contractor* shall meet the standards of cleanliness for the type of land as defined in the Code of Practice on Litter and Refuse published by the Department of Environment, Food and Rural Affairs (Defra), with the removal of individual objects being assessed as a safety concern in accordance with Clause 3301AR.
2. All High Speed Strategic Routes (50, 60 and 70mph) shall be considered, for the purposes of establishing appropriate cleansing zones, to be "Areas with special circumstances (situations where issues of health and safety and reasonableness and practicability are dominant considerations when undertaking environmental maintenance work)" such that they will be cleaned to Grade A under planned maintenance closures or, where appropriate under a Task Order. The *Client* will allocate other places to High, Medium or Low "intensity of use zones" and cleansing operations shall be undertaken appropriately to meet the provisions of the Defra Code of Practice.
3. The *Contractor* shall provide all necessary labour, plant, materials and equipment required for sweeping, clearing and picking up single objects from the street, including channels, hard shoulders, paved areas, verges, central reserves, laybys, bus stops, bridges, flyovers and other network based highway structures.
4. Vehicles engaged in street sweeping shall only travel in the same direction of flow as general traffic, unless undertaken during a full closure of the highway. Where detritus and other roadside matter has become consolidated such that it cannot be removed by a mechanical sweeper, the *Contractor* shall break up and remove all such material by hand or other appropriate means and the works shall be carried out within 24 hrs of the initial sweeping operation.
5. When instructed by the *Client*, a total weed control complying with Clause 3002 shall be applied to the swept channel at its juncture with the kerb. The width of the treatment shall not be less than 300mm and shall not extend beyond the rear of the kerb by more than 75mm. If within one month of application the treatment fails, the failed lengths shall be re treated within one month of the reported failure.
6. Before any sweeping operations on roads with a speed limit exceeding 30mph, the *Contractor* shall submit to the *Client* for approval the proposals for traffic management.

3151AR Cyclic Cleaning of Pedestrian Subways, and Footbridges

1. In addition to the requirements of clause 3150AD the annual cleansing of pedestrian subways and footbridges on the *Client's* Network shall include.
 - a) Cleaning of all footway surfaces, concrete, brickwork, sills, ledges, tiled or painted surfaces and adjoining stairs, ramps and wing walls;
 - b) Cleaning of all light fittings;
 - c) Cleaning of ceilings in subways;
 - d) Cleaning of subway pump room doors;
 - e) Cleaning of polycarbonate mirrors;
 - f) Cleaning of hand rails;

- g) Cleaning of drainage runs, channels, gullies, sumps and gratings.
2. Cleaning, shall be by means of medium pressure water-jetting equipment with or without detergent additives, to the acceptance of the *Client*

3152AR Removal of Animal Carcasses

1. The *Contractor* shall remove the carcasses of dead cats, dogs, foxes, badgers and other animals of similar or larger size. The following procedure shall be adopted:
- a) The *Contractor* shall make all reasonable efforts to identify the owner of any domestic animal carcasses, including use of a microchip reader and by reference to the databases listed at <https://www.gov.uk/get-your-dog-microchipped>.
 - b) If so identified the *Contractor* shall attempt to make direct contact with owners, inviting them to collect the carcass within 48 hours.
 - c) Should the owner opt to collect or at times when accepted licensed tips are closed, the *Contractor* shall store carcasses at the *Contractor's* Compound until it is collected, or disposal can take place at an accepted licensed tip.
 - d) Remove the carcass to the nearest accepted licensed tip;
 - e) The *Contractor* shall report to the *Client* on any removed carcasses. The report shall include:
 - i) Date, time and location of collection.
 - ii) Type of animal collected and a brief description.
 - iii) Details of any identification information obtained and summary of efforts made to contact owner(s).
 - iv) Time of delivery to, and location of, disposal site.
 - v) Photograph for later identification purposes.
2. At each compound / depot at which animal carcasses are to be stored the contractor shall provide suitable refrigerated storage, microchip reader and software enabling owner identification to take place.

3153AR Fly Tipping

1. The *Contractor* shall, as reactive works, clear any fly tipped waste material from the Network and take to a licensed tip.
2. The *Contractor* shall make a report on the location, quantity and content of the waste material collected and shall submit this report to the Client. Should the waste material contain any evidence of the origin of the waste, photographs shall be taken of the content and included in the report.

3154AR Removal of Graffiti, Unauthorised Signage and the Like

1. The *Contractor* shall remove graffiti, illegal advertising, stickers and fly-posters within 28 calendar days of them being noticed by or when the *Contractor* is notified, unless of a racist, religiously bigoted, inflammatory, sexually explicit or obscene nature, in which case removal shall take place within 24 hours
2. The *Contractor* shall remove any unauthorised sign including, where relevant, its fixing arrangements within 28 calendar days of them being noticed by or when reported to the *Contractor*. Unauthorised signs will include those of a personal nature (e.g. Happy Birthday Mum) as well as those of a commercial nature, such as signs advertising sales, entertainment events, services etc. Where there is doubt over the legitimacy of any sign the *Contractor* shall seek the approval of the *Client* before removal.
3. After removal, all unauthorised signs shall be stored by the *Contractor* for a period of 28 calendar days, during which time they may be reclaimed by their owner. Unclaimed signs shall be removed to tip by the *Contractor*.

3155AR Specialist Cleaning

- 1 The *Contractor* shall remove graffiti, posters and encrusted deposits where necessary by high pressure water jetting, chemical washing, light grit blasting or over painting of pre-painted surfaces, to the acceptance of the *Client*.
- 2 Light grit blasting shall be carried out sufficiently to remove paintwork, without damaging the surface treatment of any concrete. The *Contractor* shall demonstrate to the *Client* the adequacy of the equipment and the competency of the operatives by means of a trial on a structure selected by the *Client* prior to acceptance being granted.
- 3 Over painting shall be in a colour and material to match the existing. The *Contractor* shall seek approval from the *Client* before applying over painting material.
- 4 The *Contractor* shall ensure that all electrical equipment, fixtures and fittings are fully protected during cleaning.
- 5 The *Contractor* shall submit proposals for protection of the general public to the *Client* for acceptance prior to commencing the work.
- 6 The *Contractor* shall submit proposals for dealing with any water, grit or debris arising from the works to the *Client* for acceptance prior to commencing the work.
- 7 Where an existing anti-graffiti coating system is of the type that requires grit blasting and the use of chemical cleaning agents likely to affect the substrata, then these methods shall only be used as and when specifically accepted by the *Client*.

3156AR High Pressure Water Jetting / Vacuum Suction

1. The *Contractor* shall undertake High Pressure Water Jetting / Vacuum Suction for the cleaning of structures and other areas as specified at Clause 0522AR.

3157AR Mechanical Washing

1. The Contractor shall undertake mechanical washing of retaining walls, abutments, wing walls and concrete/brick parapets to a maximum height of 8 metres. If access is not possible to allow for mechanical washing, pressure washing to the full height of abutments and wing walls shall be used as an alternative (this is to be agreed in advance with the *Client*).
2. Mechanical washing shall be pressure jetting to 2000PSI with brush agitation to the height of 8m. The *Contractor* shall clean the wall by pressure washing with clean water via foam nozzles immediately followed by brushing, together with pressure washing rinsing with clean water. The brushing shall be by mechanical brushing only. Pressure washing shall use clean water. Any detergent used shall conform to current legislation and be of an environmentally friendly type. The cleaning operation shall use the minimum amount of water as possible which shall be obtained from a bowser provided by the *Contractor* or from a hydrant with a metered standpipe.
3. The cleaning operation shall leave the surfaces with an even appearance with no streaks or marks. The original surface colour and appearance shall be clearly visible throughout. The cleaning operation shall not scratch or damage the existing / adjacent surfaces. Care shall be taken where bearings shelves have pigeon deterrent measures or other fixings are in place.

3158AR Cleaning of Traffic Signs and Traffic Bollards

1. The *Contractor* shall clean traffic signs and bollards without damage to the sign faces by use of soft bristled brushes, cloths or mops, hoses, clean water and detergents. The *Contractor* shall not use stiff bristle brushes or abrasive tools or cleaners on sign faces.
2. Any special cleaning measures required to remove tar, oil, bituminous material, pollen or fungus, paint, crayon and the like shall be as agreed with the *Client*.

3159AR Clean Weepholes

1. The *Contractor* shall clean weepholes in structures by rodding, removal of surplus material and checked for satisfactory operation.

3160AR Clean Bearing Shelves and Bearings

1. The *Contractor* shall clean bearing shelves in accordance with sub-Clauses 520.19 through to 520.21. All arisings from the cleaning operations shall be taken to appropriately licensed tips.
2. Bearings shall be cleared of debris and encrustations, greased and lubricated, where appropriate.

3161AR Clean Surface Mounted Expansion Joints

1. The *Contractor* shall clean and remove all debris from surface mounted expansion joints. For large movement joints with provision for access from below the deck, the *Contractor* shall use low pressure water jetting to clean the joint. The condition of joint sealant shall be checked, where applicable.
2. Sub-deck drainage systems shall be cleaned, where appropriate.
3. Gaskets shall be replaced where appropriate.

3162AR Remove Bird Droppings / Check Protection Measures

1. The Contractor shall clean areas of structures affected by bird droppings using stiff bristle brushes, clean water and suitable detergents or any other method that complies with HSE guidance but is not harmful to operatives, the public or the structure.
2. Any existing bird protection measures, such as netting or spikes, shall be cleaned, and any missing or faulty elements reported to the *Client*.

3163AR Cleansing Vehicles

Introduction

1. The Contractor shall assess and provide all vehicles, plant and equipment required to fulfil all obligations under the contract. All vehicles, plant and equipment shall be fit for the purpose of carrying out the specified cleansing activities.

2. Vehicles

All vehicles shall comply with the requirements of the Scope.

Street Sweeping Vehicles

3. Mechanical street sweepers shall comply with BS EN 15429, be of air suction type and operated by a suitably trained and qualified driver following safe working practices.
4. The sweeper shall be fitted with the following attachments:
 - a) power thrust hydraulic ram system or equivalent attached to the channel brush;
 - b) weed sprayer;
 - c) A sign to diagram 7404 reading 'HIGHWAY MAINTENANCE' fitted to the rear with 140mm 'x' height, on a Class RA2 retroreflective yellow background;
 - d) Class RA2 diagram 610 Arrow which may be angled to either side and which may be securely obscured or removed during travel to and from or between sites; and
 - e) amber beacons at the front and rear of the vehicle and safety markings clearly displayed at the rear of the vehicle in accordance with Chapter 8 of the Traffic Signs Manual.

3164AR Cleaning of Drinking Fountains

1. Cleaning of drinking fountains shall be undertaken at a frequency to align with that for the safety inspection of the location as Appendix 33/1A, table 33.1. The activity shall consist of a visual inspection, removal of any detritus from the bowl and wiping down all surfaces with a disinfectant wipe.
2. Deep Cleaning of drinking fountains shall be undertaken on a six monthly cycle. The operation shall include thoroughly scouring and disinfecting the bowl, spout and 'tap', clearance of any detritus from the waste outlet and rinsing the whole with clean water on completion. Any malfunction or excessively worn or pitted components shall be reported to the Client who will prioritise repairs and issue instructions. Where present, the maintenance activity shall include backwashing the filter, checking the levels of the chemical vessels and topping up as necessary (Bromine, ph Minus).

Additional, Cancelled, Modified & Substitute Clauses

Series 3250 Provision of Emergency Service

3250AR	Emergency Service General Requirement
3251AR	Notification Sources
3252AR	Assessment of Risk
3253AR	Nature of Response
3254AR	Communications
3255AR	First Response Vehicles
3256AR	Specialist Work
3257AR	Storage of Removed Items
3258AR	Local Incidents
3259AR	Major Incidents
3260AR	Reporting
3261AR	Retrieval of Personal Possessions from Road Gullies

3250AR Emergency Service General Requirement

1. The *Contractor* shall:
 - a) Provide and operate a 24-hour dedicated call handling service able to receive reports of incidents and defects on the Network or adjacent networks and instruct an appropriate response.
 - b) Provide and operate an emergency call out service 24 hours per day, every day from the Starting Date throughout the duration of the contract. The required response time shall be as stated in the Client's Scope, within which the Contractor shall attend the defect, assess the situation and take appropriate action. Appropriate action shall be the immediate commencement of a permanent repair, a temporary repair or making safe the defect.
 - c) Provide experienced Emergency Service Managers available on a 24-hour basis to identify and manage the appropriate response to reports of incidents and defects on the Network.
 - d) Use the *Client's* Asset Management Information System, recording and reporting all incidents and defects together with details of all remedial actions taken.
 - e) Provide First Response Vehicles, equipped as indicated in sub-Clause 3255AR and capable of meeting the required response times set out above.
 - f) Use intelligence to resource and prepare to respond appropriately to occurrences of severe weather, planned events, evolving emergency situations and the like.
 - g) Establish and maintain regular communication with the Police and the Client's Network Management Control Centre (including attending regular meetings, if required) to establish good working relations and to ensure early notification of incidents.
 - h) Respond within two hours to the sites of any defective traffic signals within the contract area to deploy appropriate traffic signs and / or traffic management.
2. The Nature of the Response is as set out in Clause 3253AR.
3. Subject to retaining capability to fulfil the requirements for emergency call out set out in sub-Clause 1, the *Contractor* may deploy resources and facilities to other work in connection with the contract.
4. The *Contractor* shall become familiar with the Road Death Investigation Manual 2007, published on behalf of the Association of Chief Police Officers, which aims to standardise the way in which Police Services investigate road deaths and serious injury collisions. This is of particular importance with regard to improving communication and creating a greater understanding of the role of the Police in order to enable effective incident management. The *Contractor* shall also be familiar with relevant *Client* incident management protocols.
5. If, in the opinion of the *Client*, the *Contractor* at any time fails to take appropriate action to deal with any matter which presents an immediate risk to the highway or the safety of the public, or which causes an obstruction to traffic, the *Client* may instruct the necessary action to be undertaken by another party and deduct costs and expenses from the amounts otherwise due to the *Contractor* under the contract.

3251AR Notification Sources

1. Incidents and defects will be reported to the *Contractor* from a number of sources, including but not limited to:
 - a) safety and service inspections;
 - b) the *Contractor's* personnel operating on the Network;
 - c) the *Client*;
 - d) the Police or other emergency services;
 - e) the *Client's* Traffic Control Centre;
 - f) other highway authorities, agencies and other bodies;
 - g) members of the public.
2. The *Contractor* shall assess all reports received by the 24-hour call handling service to determine the nature of the response required for the reported situation. A risk assessment shall be carried out in accordance with Appendix 33/1C. If it is deemed necessary the *Contractor* shall dispatch a First Response Vehicle, or other appropriate resources, to meet the response time at the reported incident to deal with the defect or incident or to provide details of the incident to enable the *Contractor* to take the appropriate action. If the *Contractor* is unable to determine the nature of the response required from the information provided, it shall be assumed that an urgent response is necessary and a First Response Vehicle or other appropriate resources shall be dispatched in order to carry out an on-site assessment.
3. The call handling service shall respond to every telephone call within five rings and close down 90% within five minutes of the call being connected. Details of all calls shall be electronically recorded at the time the call is closed, when the response time shall commence.

3252AR Assessment of Risk

1. Risk shall be assessed in accordance with Appendix 33/1C

3253AR Nature of Response

1. The nature of the emergency response to be provided by the *Contractor* shall include, but not be limited to:
 - a) Investigation of reports of hazardous circumstances, including attending the site within the Response Time to undertake an on-site assessment to inform an appropriate response.
 - b) Making safe any defects which represent an immediate hazard to road users by providing barriers, coning or traffic management or other measures in order to secure the area from public access.
 - c) Removal and disposal of animal carcasses, hazardous, clinical, human or other waste matter to licensed facilities.
 - d) General assistance to the emergency services following traffic accidents or incidents.

- e) Removal and disposal of debris arising from road traffic accidents or vehicle fires, removal of shed loads, removal of spillage from surfaces and drains, emptying and flushing down drains with clean water in cooperation with the emergency services.
 - f) Provision and installation of filled sandbags to prevent flooding of properties or other parts of the Network or to prevent spillage entering the drainage system.
 - g) Provision, installation, maintenance and operation of artificial lighting as required.
 - h) Provision, installation, maintenance and operation of traffic control via means of stop/go boards or portable traffic signals in consultation with the Police.
 - i) Clearing debris and silt, replacement of dislodged inspection chamber covers and gully gratings, and other storm-related works.
 - j) Sweeping and cleaning of the highway.
 - k) Removal and disposal of abandoned vehicles or other obstructions causing an immediate or imminent hazard to road users or an immediate or imminent risk of significant traffic disruption.
 - l) Temporary or permanent repair of any defect which represents an immediate hazard to road users, such as dangerous carriageway, footway or cycle track surfaces, structures or equipment on or adjacent to the highway, or damaged or failed electrical equipment, traffic signs, safety fences, barriers, and the like.
 - m) Removal of blockages from gullies, grips, drainage channels, slot drains, highway drainage, footway drainage, culverts. Removal of flooding and surface water by gully emptying equipment, pumps, or such means as required.
 - n) Temporary or permanent repair of failed drainage inspection chamber covers or frames, gully gratings, or other chambers or cellars.
 - o) Taking all practicable measures to determine ownership of failed covers, frames or chambers which are the property of utility companies and statutory undertakers. Permanent repair of such assets shall only be undertaken on direct instruction of the *Client*.
 - p) Attending to dangerous trees and clearing branches.
 - q) Deployment of a vehicle fitted with a crash cushion, when requested, to provide protection to workmen or emergency service personnel attending to an accident or incident in the highway.
2. In circumstances where the First Response Vehicle is unable to undertake the actions outlined in sub-Clause 1 above, it shall, as a minimum, take sufficient measures to safeguard the public.
 3. Where required the *Contractor* shall provide the emergency service within Road Tunnels. The *Contractor* shall have appropriately skilled and qualified operatives, plant and equipment permanently available to respond to incidents in the Road Tunnels and the response times for them as detailed in the *Client's* Scope.

3254AR Communications

1. The *Contractor* shall provide an effective means of 24-hour communication by telephone, email or other means authorised by the *Client* to receive instructions, defect reports, notifications of emergencies and to communicate with the *Client*, the emergency services and other relevant authorities. The *Contractor* shall provide one telephone number and one email address to which reports can be transmitted. The telephone and email address shall be continuously monitored by a person able to communicate effectively with the *Contractor's* workforce. The *Contractor* shall operate contingency arrangements to cater for any loss of service from the normal communication service provider.
2. The *Contractor* shall provide the *Client* with a rota of operatives and supervisory personnel who will operate, manage and supervise the Emergency Call Out Service. The rota shall include mobile telephone numbers. The rota shall be produced for periods of not less than three months and submitted to the *Client* two weeks before the rota is due to commence. Where, due to unforeseen circumstances, the *Contractor* finds it necessary to amend any details of the rota, the *Client* shall be informed immediately the circumstances become known.
3. Four weeks prior to the Starting Date, and annually thereafter, or as and when requested by the *Client*, the *Contractor* shall submit to the *Client* a method statement detailing the arrangements for responding to emergencies for the following period.
4. Any incidents causing, or likely to cause, significant traffic disruption shall be immediately notified to the *Client's* Network Management Control Centre with regular updated reports until such time as traffic flows return to normal.

3255AR First Response Vehicles

1. First Response Vehicles shall be suitably equipped with the labour, plant and materials to meet the eventualities set out in Clause 3253AR. The *Contractor* shall provide and maintain stocks of consumable materials in order to ensure these vehicles remain suitably equipped. Examples of the materials to be available for use in an emergency are given at Appendix 1/12. Detail of any vehicles and plant required to be available at each tunnel on the Network is set out in the *Client's* Service Information.
2. The *Contractor's* arrangements for training and supervision shall ensure that all operatives are familiar with the types of incident that can be expected, how to communicate with the *Client* and emergency services, including any special arrangements necessary during the hours of darkness.

3256AR Specialist Work

1. The *Contractor* shall have arrangements in place for the removal and disposal of any hazardous, clinical and human waste materials, and other waste matter arising from accidents or any other cause, together with trained personnel to undertake this work in an appropriate and sensitive manner. The *Contractor* shall attend the incident within two hours of the instruction being issued.
2. The *Contractor* shall have arrangements in place for the provision and operation of cranes or other suitable lifting equipment to remove damaged vehicles or other heavy items placed or

fallen on the highway or adjoining land. The *Contractor* shall also have arrangements in place for the provision and operation of hoists to facilitate inspection of damaged bridges, buildings and other structures, and to facilitate repairs.

3. The *Contractor* shall have contingency arrangements in place for the provision of specialist plant and services that may be needed to attend to emergencies as and when they arise.

3257AR Storage of Removed Items

1. On occasions, it may be necessary for materials or items that have been removed from the highway to be placed in temporary storage rather than taken for disposal. The *Contractor* shall adopt methods of loading, transporting, unloading and storage which do not cause damage or deterioration to such materials or items and which comply with the Environmental Protection Act 1990, the DEFRA Waste Duty of Care Code of Practice dated 2016 and the Pollution Prevention and Control Act 1999.
2. Wherever practicable, the *Contractor* shall provide storage space at operational compounds or depots. The *Contractor* shall keep detailed records and provide to the *Client* a weekly summary sheet giving details of all materials and items held in temporary storage on each day of the week.

3258AR Local Incidents

In response to incidents the *Client* shall from time to time instruct the *Contractor* to provide supervisory staff to co-locate to the *Client's* incident control centre. The *Contractor's* incident supervisor(s) shall attend within two hours of the instruction to mobilise being given. Supervisors shall be sufficiently equipped, experienced and competent to coordinate the deployment of the *Contractor's* resources in liaison with the *Client's* staff, the emergency services and the staff of other supporting contractors. The *Contractor* shall provide sufficient trained supervisory staff to maintain a presence in the incident control room for an undefined period until the instruction to stand down is given.

3259AR Major Incidents

1. A Major Incident is as defined in the London Emergency Services Liaison Panel (LESPL) Major Incident Procedure Manual. It is any incident that requires the implementation of special arrangements by one or all of the emergency services. It will generally include the involvement, either directly or indirectly, of large numbers of people and potentially the rescue, transportation and care of large numbers of casualties.
2. A Major Incident can be declared by any member of one of the emergency services or, in exceptional circumstances by a local authority. All the emergency services will attend with an appropriate pre-determined response. The *Client* will act in a support role in any Major Incident in accordance with the London Resilience Strategic Emergency Plan. When appropriate the *Client* shall instruct the *Contractor* to support the work of the emergency services through the provision of personnel, plant and machinery throughout the Incident and the recovery stage thereafter.
3. The *Contractor* shall develop procedures for escalating levels of service. For example, the next level of service beyond the deployment of a First Response Vehicle would be the

mobilisation of all the *Contractor's* available resources. Beyond that, the *Contractor* shall be prepared to request (or authorise) support from (or to) other contractors. The general philosophy shall be that the *Contractor* is able to immediately mobilise and clear an incident as soon as the Police request it.

4. The *Contractor* shall be prepared to provide qualified and experienced personnel on a 24-hours-a-day basis to act as the first point of contact and to receive instructions from the emergency services. The *Contractor* shall provide contingency arrangements to ensure that these individuals can manage and deploy the resources required to carry out the instructions. The *Contractor* shall provide the *Client* with a contact list of all those individuals who are to be contacted in the event of a Major Incident; this contact list is to be kept up to date throughout the contract. The *Contractor* shall set out proposed arrangements for Major Incident response in the Quality Plan.

3260AR Reporting

1. The Contractor shall provide a weekly report giving details of all emergencies attended, including details of originator, date and time of call, date and time of response, precise location, nature of emergency, material used and works undertaken, including photographic evidence. A nil return is required for days on which there were no emergency occurrence. Where the Contractor is called out to attend locations where flooding has occurred, a supplementary report providing details shall be submitted within 48 hours of attendance to the Lead Local Flood Authority.
2. Where the *Contractor* is called out to make safe hazards which can be attributed to other parties, e.g. builder's skips, building materials, vehicles involved in road traffic accidents, the *Contractor* shall, as well as making the highway safe, record information about the other parties and include it in the daily report.

3261AR Retrieval of Personal Possessions from Road Gullies

The Contractor shall provide a service for the retrieval of personal possessions from road gullies in response to requests from the Client or the Police. Response times shall be within 2 hours during core working hours and 4 hours at all other times.

Additional, Cancelled, Modified & Substitute Clauses
Series 3300 Inspections & Surveys

- 3301AR Intrusive Testing
- 3302AR Rotary Coring in Carriageways
- 3303AR Trial Pits
- 3304AR Dynamic Cone Penetrometer (DCP)
- 3305AR Topographical Surveys

3301AR Intrusive Testing

- 1 Intrusive testing covers coring, trial pits, and Dynamic Cone Penetrometer (DCP) testing. The general requirements for intrusive testing are set out in this clause.
- 2 The locations of cores, trial pits, and DCP tests shall be referenced as per the requirements in the relevant clause. A chainage system shall be used to lay out the intrusive investigation locations referenced against known highways asset or street furniture.
- 3 The locations shall be recorded to an accuracy of ± 1.0 m longitudinally and ± 100 mm transversely from the kerb edge or lane edge.
- 4 GPS co-ordinates where recorded shall be using a device capable of sub-metre accuracy.
- 5 The outputs of intrusive testing shall be submitted to the *Client* within 2 weeks of the site testing being completed.

3302AR Rotary Coring in Carriageways

General

- 1 Cores shall be undertaken in accordance with BS EN12697-27 and as set out below.
- 2 The pavement shall be reinstated in accordance with Clause 9.4.1.2 of BSEN 594987.
- 3 Cores taken for the purpose of laboratory testing (as described in the Task Order) shall be 150 mm nominal diameter.
- 4 Cores taken purely for the purpose of determining layer thickness shall be a minimum of 100 mm diameter.
- 5 Cores shall be extracted to the full depth of the bound layers.
- 6 Where pavement material has disintegrated during coring and there is only partial recovery of material, the layer thicknesses should be determined from the core hole.
- 7 On-site photographs shall be date and time stamped, and record:
 - a) the pavement surface before coring and after reinstatement;
 - b) the core hole showing the bottom of the core and a ruler showing the full depth of the core hole;
 - c) the core after it has been extracted.
- 8 The cores shall be handled carefully to prevent damage and shall be delivered to the *Client* if requested. They shall be indelibly marked to indicate the location and date of coring and they shall be stored for a period of up to three months following issue of the core log to the *Client*.
- 9 PAK marker test shall be carried out on the asphalt layers of cores to detect possible presence of TAR. Further details on PAK testing is given in Managing Reclaimed Asphalt – Highways & Pavements (ADEPT, 2016)

Core Logs

- 10 For each core, a full record of the core details shall be made in the form of a core log.
- 11 The core log shall include a good quality colour photograph showing the side of the core with a

- scale strip and the core reference clearly visible, and a photograph of the top (surface) of the core showing the orientation of the core in the road. A good quality photograph will be in focus, evenly lit, taken with a high resolution camera (> 8 MP) so that the detail of the aggregate and defects can be clearly seen. Natural lighting usually produces the best detail in the photographs.
- 12 Where a defect is apparent in the core (for example cracking), the face with the defect shall be shown in the photograph.
- 13 If the defect obscures other details of the core then an additional photograph taken of another side of the core should be included.
- 14 Where a layer is missing from a core because it had disintegrated, the photograph shall show the intact layers of the core with a gap left for the missing layer. The gap shall represent the depth of the disintegrated layer.
- 15 A photograph showing the material from any disintegrated layer shall be included.
- 16 The core log shall include the photographs referenced in sub-clause 6.
- 17 The following reference information shall be included on the log sheet for each core:
- a) unique core reference
 - b) chainage
 - c) GPS coordinates
 - d) traffic direction
 - e) lane and offset (and datum used e.g. nearside lane edge)
 - f) coring date and time
 - g) pavement condition at core location (including presence of cracks and their orientation and rut depth)
 - h) the reason why the core was extracted
 - i) if the core is moved, the reason for change of position and reference to the new position should clearly be made
- 18 The following details shall be included on the log sheet for each core:
- a) thickness of each bound layer
 - b) thickness of any disintegrated layers
 - c) for each layer
 - i) type of material
 - ii) possible presence of tar bound layers (from PAK test)
 - iii) condition of the material, e.g. sound, cracked, friable etc
 - iv) stripping of binder from the aggregate (if present)
 - v) condition of the bonding between layers
 - vi) presence of detritus where there is a lack of bond between layers
 - vii) voiding and segregation (if present)
 - viii) crack depth and severity
 - ix) soft or otherwise deleterious aggregate
 - x) bleeding and any other peculiarities (if present)

- d) the total depth of cracking (if present)
 - e) the nature of the material at the bottom of the core hole, e.g. crushed stone, gravel, concrete, or further bound material.
- 19 The Core Log shall be of a format similar to Figure 7.1 of HD 29/08 “*Data for Pavement Assessment*”
- 20 The Core logs shall be submitted to the *Client* within 2 weeks of site investigation.

3303AR Trial Pits

- 1 The *Contractor* shall excavate trial pits by hand or machine to permit inspection or sampling of unbound or bitumen bound materials.
- 2 For each trial pit, a full record of the trial pit shall be made in the form of a trial pit log. The trial pit log shall follow the template given in Appendix 33/2
- 3 The following reference information shall be included on the trial pit log:
 - a) unique trial pit reference
 - b) section reference (if applicable) and chainage
 - c) GPS coordinates if available
 - d) traffic direction
 - e) for carriageway trial pits:
 - i) lane number (starting from the leftmost lane in direction of travel)
 - ii) offset from kerb or lane line (and confirmation of datum used)
 - f) date and time of excavation and reinstatement
 - g) pavement/footway condition at trial pit location
 - h) clear, well lit photographs showing trial pit excavation, layer details and any utility services. Measurements should be legible. Refer to trial pit log template for guidance
 - i) the reason why the trial pit was excavated.
- 4 The following details shall be included on the trial pit log:
 - a) for each bound layer:
 - i) thickness of layer
 - ii) type of material
 - iii) condition of the material, e.g. sound, cracked, friable etc
 - iv) condition of the bonding between layers
 - v) possible presence of tar bound layers (From PAK marker Test)
 - b) the nature of the unbound material and its thickness:
- 5 Trial pits in slabbed or modular paving shall be permanently reinstated in accordance with the Specification for Reinstatement of Openings in Highways (Approved by the Secretary of State).
- 6 Trial pits in non-slabbed areas shall be reinstated:
 - a) to the top of sub-base level with granular Type 1 sub-base material; then

- b) to within 25mm of the surface with dense bitumen macadam base to Clause 903; then
 - c) to the surface with a material complying with the requirements of Series 0900 and Appendix 7/1.
- 7 Upon completion of compaction, all material shall be at the same level as the adjacent surface.

3304ARDynamic Cone Penetrometer (DCP)

- 1 Dynamic Cone Penetrometer tests shall be carried out as described in TRL Overseas Road Note 18.
- 2 The depth of penetration shall be recorded at approximately 10mm increments, together with the number of blows to achieve this. The number of blows between readings will vary depending on the strength of the layer being penetrated.
- 3 If there is less than 2mm measurable penetration after 20 consecutive blows it should be assumed that the DCP will not penetrate the material and the test terminated.
- 4 The results (blows against depth) shall be recorded on a DCP test log similar to Figure F2 of Overseas Road Note 18.
- 5 The DCP test log shall include the following reference information:
 - a) unique DCP reference number linked to core hole or trial pit if applicable
 - b) the depth at start of DCP test (generally the bottom of core hole/trial pit)
 - c) location reference and chainage
 - d) date and time of test

3305ARTopographical Surveys

- 1 The Contractor shall provide a method statement describing how the topographical survey is proposed to be undertaken. Any lane closures required for the survey shall be subject to the agreement of the Client, and any other affected Highway Authority.
- 2 The topographical survey shall accurately record the site including the following features:
 - a) Boundaries
All physical boundaries shall be indicated on the survey drawings, including building lines, boundary walls, doorways, fences, fire escapes, gates, ramps, steps, thresholds etc.
 - b) Chambers and covers
Covers to utility service and other chambers shall be recorded on the survey drawings with size, orientation and a spot level of the cover, indicating the owner if marked on the cover.
 - c) Kerbs, Channels and gullies:
 - i) Every kerb observation shall have a corresponding channel observation (i.e. top and bottom of kerb).
 - ii) Every channel shall have a corresponding kerb observation except where a channel does not have a corresponding kerb.

- iii) Drainage channels within landscaped areas shall be recorded on the survey drawings with levels at the channel invert and at either side of the ditch
 - iv) Road gullies shall be recorded on the survey drawings together with a spot level of the cover
 - v) Each kerb (or channel) radius shall be defined by at least three points.
- d) Landscape areas
- i) The boundary of grassed, planted and woodland areas shall be separately recorded areas
 - ii) Hedges shall be recorded with current height and depth
 - iii) Water features, balancing ponds, lagoons etc shall be shown on the survey drawings, together with physical obvious boundaries, fencing and life preserving equipment.
- e) Pavements and Surfacing:
- i) Changes to paving materials shall be recorded, e.g. setts, slabs, macadam etc. including the material where identifiable. The extent, type and colour of any surfacing treatment shall be indicated, e.g. skid resistant (repairs / scars excluded). All tactile paving shall be recorded.
 - ii) Covers, flaps or lights to cellars shall be recorded.
- f) Pedestrian and Vehicle Restraint Systems (PGR & VRS)
- Pedestrian and Vehicle restraint systems shall be recorded indicating the general categorisation and type of restraint system, i.e. for VRS, wire rope or corrugated, single or double sided system.
- g) Road Markings:
- The survey drawings shall show road markings indicating line types and colour, i.e. double/single and red/yellow/white line. Road studs, centre line & lane markings, stop lines etc. shall be shown indicating line type and dimensions. Text, numeral and arrow road markings shall be shown on the survey drawings.
- h) Traffic Signs and traffic bollards:
- Traffic Signs (including Traffic Signals) and traffic bollards shall be recorded on the survey drawings indicating the relevant diagram number of the sign(s) from the Traffic Signs Regulations, together with the number and diameter of the posts on which the sign(s) is(are) mounted and if it is with / without a sign lighting unit. Directional signs faces shall be photographed and included in Jpeg format in a separate layer of the AutoCAD survey drawing. Road name plates and wall-mounted traffic signs shall be shown on the survey drawings.
- i) Street Furniture:
- All street furniture within the survey boundary shall be recorded on the survey drawings (benches, bollards, bus stop flags and shelters, cycle stands, CCTV cameras, controller boxes, electricity supply poles, lighting columns, litter bins, life preservers, parking meters, planters, post boxes, telegraph poles, telephone boxes, etc.)

j) Structures:

Structures over or under the survey area (bridges, pedestrian subways etc.) shall be recorded on the survey drawings including invert and soffit levels, together with oversailing buildings, any supports and remaining headroom.

k) Trees:

Tree locations shall be recorded on the survey drawings with text to indicate the diameter of the trunk measured 1.0m above ground level, tree height and crown spread shall also be shown. Size of tree pits in paved areas shall be indicated, together with material used, i.e. gravel, tree grid.

3 Levels:

- a) Surface levels shall be recorded at 5m sections.
- b) At each section levels shall be recorded at back of footway, top of kerb, channel, centre of carriageway and carriageway quarter points.
- c) Levels shall be shown on the survey drawings together with spot levels of gullies, inspection chamber covers, cellar flaps, pavement lights, thresholds, top and bottom of stairs and landings;
- d) Additional spot levels shall accurately reflect the nature of the survey area where there are any changes in profile, central reserve or traffic islands, road humps or where there is a large area of carriageway or paved area.
- e) Levels shall be shown on the plans in metric measure relative to Ordnance Datum (Newlyn) to two decimal places and also provided as 3D strings for all survey areas. Level values shall be assigned to the Z axis for AutoCAD 3D.
- f) If the footway is over 5m wide or has a drainage channel incorporated as part of its construction, then an additional longitudinal line of levels shall be provided on the centreline of the footway or the drainage channel as appropriate. If the footway is 12m wide or over, levels shall be provided on a 5m grid.
- g) On landscaped areas levels shall be provided on a 10m grid.

4 Accuracy:

The survey shall be produced to an accuracy of +/- 8mm

5 Survey Drawings:

- a) The Survey shall be provided in AutoCAD dwg format in both 2D and 3D format. It shall include contours for every 200mm vertical change in level in the 3D model.
- b) Survey drawings shall be A0 size and illustrated at a scale of 1:200 using the Client's drawing templates and defined layers.
- c) All plan data surveyed shall be gathered and related to the Ordnance Survey National Grid. The supplied survey drawing shall be capable of being inserted in the relevant OS tile in the correct orientation with no rotating or aligning required (with an insertion point of 0, 0, 0). An indicative north arrow shall be shown on the drawings.

- d) If the topographical survey is an extension of a previous survey, link the new survey to the original.
- e) Format:
 - i) The 2D model file must not include any 3D entities / objects.
 - ii) The 3D model file must not include any 2D entities / objects except for labelling where necessary.
 - iii) 2D and 3D polylines shall be used and splines shall not be used.
 - iv) Kerbs and other vertical faces shall be created using two strings with the top string offset by 10mm.
 - v) 3D and 2D strings/points (with null or zero levels) must not be mixed on the same layer.
- f) Drawing layers:
 - i) Drawing layers shall be defined in accordance with the BS ISO 12006-2 Uniclass 2015 classification system.
 - ii) A spreadsheet of the common layer types can be provided on request. The classification codes can be found on the NBS BIM Toolkit website accessed from:- <https://toolkit.thenbs.com/>

Additional, Cancelled, Modified & Substitute Clauses

Series 3350 Inspections & Surveys

- 3351AR Safety Inspections
- 3352AR Service Inspection of Traffic Signs
- 3353AR Night Scouting
- 3354AR Tree Defect Surveys
- 3355AR Tree Condition Surveys

3351AR Safety Inspections

1. General

The *Contractor* shall undertake safety inspections employing a systematic approach to the identification and recording of defects, and a risk-based approach to dealing with them.

The *Contractor* shall carry out ad hoc safety inspections in response to concerns expressed by the *Contractor's* own staff, the *Client*, the Police and members of the public.

Safety inspections shall identify all defects likely to create danger or serious inconvenience to users of the *Affected Property* or the wider community.

2. Safety Inspectors

Safety inspections shall be undertaken by suitably trained and accredited staff, holding City & Guilds 6033 – Unit 311 and be included in the national Register of Highway Inspectors.

3. Safety Inspection Activity

The Contractor shall carry out safety inspections at the frequencies shown in Appendix 33/1A. The *Contractor* shall also exercise a general duty of care when within the *Affected Property* by recording hazards and taking appropriate action, as and when they are identified.

On high speed routes (50/ 60/ 70 mph), on roads where there is no footway, or roads where the carriageway is too wide to identify defects from the footway, safety inspections shall be carried out by two operatives in a slow-moving vehicle, during off-peak hours. All other safety inspections shall be undertaken on foot at times of day which enable the inspection to be carried out thoroughly and safely.

Where network features intersect (e.g. at a zebra or a toucan crossing), the feature with the greatest frequency shall be applied.

At specific locations where more frequent inspections than those set out in Appendix 33/1A are required, such as at accesses to schools, hospitals, etc. or on routes which host special events or ceremonies, such requirement will be set out in the *Client's* Scope.

4. Identification of defects

When carrying out a safety inspection, guidance for the identification of defects is provided in Appendix 33/1B:

In addition to the defects identified in Appendix 33/1B, the inspector shall record anything else which is deemed to be creating, or is likely to create, a hazard or serious inconvenience to users of the *Affected Property*. The inspector shall also identify and record any requirement for reactive works associated with, for example, graffiti, animal carcasses, fly tipping or street lights burning during the day.

Where a defect or hazard is observed, time and date-stamped photographs (to illustrate both the defect and its setting so as to clearly identify the location from the photographs) shall be taken to accompany the inspection record.

5. Assessment of Risk

During safety inspections, all observed defects that create a risk to users shall be assessed by the inspector and the level of response determined taking into account the particular circumstances of the location. The response shall be determined by the safety inspector's risk assessment, which shall be undertaken in accordance with Appendix 33/1C.

6. Records

The *Contractor* shall operate an electronic management system to record and report on all safety inspections carried out, all defects found and details of all remedial actions taken. This system shall also be used to record incidents and defects reported to the *Contractor* from other sources, including the *Client*, the Police and the general public.

3352AR Service Inspection of Traffic Signs

General

1. This Clause relates to service inspection of :
 - a) Traffic Signs (including wayfinding signs);
 - b) Road Markings and studs;
2. The *Client* is the Traffic Authority for those sections of highway detailed in the *Client's* Scope.
3. The *Client* has obligations for the provision and maintenance of certain traffic signs beyond the *Client's* Traffic Authority boundary, the type and location of those signs are detailed in the *Client's* Scope.
4. The Contractor shall inspect the locations identified in the *Client's* Scope for missing, misaligned, obscured or otherwise ineffective traffic signs and markings taking action as required by this Specification.

Inspection

5. Signs (including posts and mounting brackets) and road markings shall be inspected for any significant damage, obscuration or missing elements. Sight lines on the immediate approaches to signs shall be checked to confirm that they are free from tree foliage or other obscuration. Inspection frequencies shall be as stated in the *Client's* Scope.

Reporting

6. An Inspection Report shall be provided following each scheduled inspection. The Report will confirm that each sign and road marking has been inspected and either confirm satisfactory service standards, or give details of defects where identified. Confirmation of the presence of signs and markings shall be made by the inspector even where there is no specific defect to report. The report shall identify the date and time of the inspection (am / pm), Inspector's name and signature shall be clearly identified on the pages for which he/she is responsible.
7. Where a defect is observed, a defect report shall be produced. This shall contain details of the location of the sign or marking, a detailed description of the defect, time and date-stamped photographs (to illustrate both the defect and the setting so as to clearly identify the location from the photographs) and a description of the work required to correct the defect. If

the defect is considered to constitute a significant safety hazard it shall be actioned in accordance with other provisions of this Specification.

Repairs

8. On receipt of the Contractor's Inspection Report, the *Client* will assess priority for repair of any defects not covered by other provisions of the Specification and where appropriate instruct the repair by Task Order.
9. The Contractor shall repair defects to signs and markings associated with the ULEZ, LEZ, Safer HGV Zone and CCZ entry points within 7 calendar days. Repair of other signs and marking shall be undertaken within 28 calendar days, unless a shorter response is required by reference to the inspectors risk assessment. The Contractor shall maintain stock levels, or have other arrangements in place, to meet these requirements.
10. Following repair, a date-stamped photograph(s) shall be loaded onto the Client's Asset Management Information System.

3353AR Night Scouting

During the hours of darkness the *Contractor* shall carry out an inspection of all road, subway, footway, river navigation and sign lighting units to check for satisfactory illumination. The required inspection frequency is given in the Client's Scope.

Reporting

The *Contractor* shall maintain an accurate record of the date and time of inspection, the defects identified and the actions taken. Inspection records shall be uploaded into the *Client's* Asset Management Information System.

3354AR Tree Defect Surveys

General

- 1 Annual tree surveys shall identify any tree growing within, or within falling distance of the highway boundary, which exhibits any defect that may endanger highway users, or develop to endanger highway users before the next scheduled survey.

2 Definitions

a) Tree

For the purpose of this survey, any self-supporting woody vegetation that one would normally regard as a tree including self-sown trees over one metre in height.

b) Defect Tree

A tree with significant, or potentially significant, defects that could cause harm or damage to people or property. Significant defects include, among others, fungal fruiting bodies, bulges, ivy and other climbers, dead bark, slimes and fluxes, deadwood, dieback in crowns, cavities, cracks and splits, root severance, low vegetation that may obstruct roads or footpaths, stumps in non-woodland areas, empty tree pits and stakes and ties on young trees which require removal or adjustment.

c) Falling Distance

A horizontal distance which is approximately 2 times the height of tree. This distance allows for the tree shattering and parts being thrown further than the height of the tree.

d) Woodland

For the purpose of this survey, a woodland is group of trees for which individual tree recording is not appropriate because the trees are managed as a group and not individuals. Typically, it will be an area of trees containing a mix of species which may contain varying ages, usually planted to provide a screening, amenity and/or biodiversity function as mitigation for previous highway improvement programmes. The size and structure of woodlands and copses varies significantly and during the tree survey the Surveyor shall agree with the *Client* which areas shall be recorded as woodland and which trees shall be individually recorded.

e) Surveyor

The person(s) undertaking the inspections of trees and recording tree data.

f) AMIS (Asset Management Information System)

The *Client's* system used to record data relating to the presence and condition of assets.

Surveyors

3 All Surveyors shall have arboricultural experience and be approved by the *Client* in writing in advance of the survey. Abbreviated curriculum vitae shall be supplied to the *Client* and all Surveyors shall have:

- a) professional tree inspection qualification (LANTRA Awards);
- b) minimum NQF Level 3 arboricultural qualification; and
- c) recent appropriate experience in carrying out tree surveys and inspections.

Structure of the survey – overview

- 4. The *Client* shall provide base inventory data for trees on the highway. The Contractor shall ensure that locations are accurately recorded in a format compatible with AMIS for both existing and previously unrecorded trees and that all trees within falling distance of the highway are surveyed even if not in the supplied data.
- 5. There are two steps to the survey and these shall be undertaken concurrently by the Contractor. In the first step, all trees, including those within woodlands, shall be inspected to a Level 1 Basic Tree Survey and Inspection (LANTRA) standard. Defect trees highlighted from the Level 1 inspection shall then be subject to the second step which is a Level 2 Professional Tree Inspection (LANTRA) standard where details of the tree, the defects and recommendations for remedial works, if required, are recorded.

Methodology for the survey

- 6. All trees on, and within falling distance of, the highway shall be inspected. The inspection of trees shall be undertaken from ground level and the method used shall be a Visual Tree Assessment (VTA). The use of simple diagnostic tools such as a probe and rubber mallet is shall be used to establish the extent of any cracks, cavities, decay or other structural

- defects. Trees shall be assessed from all sides (360 degrees) where practicable and safe to do so from the highway or other publically accessible land.
7. Where traffic management is required to ensure safe access to inspect trees, this shall be provided by the *Contractor*.
 8. A structured programme is required such that every tree within a highway section is surveyed, before the survey team moves on to the next location.
 9. On sections of the highway where there are no trees on, or no trees within falling distance of, the highway, no survey is required if agreed in writing by the *Client*.
 10. A record of when each tree and woodland was inspected to the Level 1 standard, and name of the Surveyor, shall be recorded in AMIS with the other data fields highlighted at Appendix 33/7 for Level 1 surveying of existing trees and woodlands.
 11. Where a tree or woodland is not already recorded within AMIS, the location of that tree shall be plotted accurately in AMIS. Data fields that shall be recorded for new trees are as listed at Appendix 33/7.
 12. Where a tree is shown in the AMIS data but is not actually present on site, then this shall be removed from the inventory with the reason for removal being "data error".
 13. Within the woodland areas, all defect trees shall be recorded individually as tree assets in AMIS. The defect tree shall be located as accurately as is possible to aid relocation and marked, if necessary. All asset attributes for new trees in AMIS shall be recorded as listed at Appendix 33/7.
 14. When a defect tree is found during the Level 1 survey, the defects associated with the tree and work recommendations, if made, shall be recorded and updated in AMIS. A summary list of AMIS data fields to be updated for all defect trees is at Appendix 33/7.
 15. The Surveyor shall make work recommendations based on current and sound arboricultural practice. If, during the inspection of a tree, it is not possible to gather sufficient information from the VTA to establish, for example, the extent of decay, then it may be appropriate to recommend further investigations. Where further investigation is recommended, it shall be stated clearly what is required. Examples include 'decay mapping with Picus tomogram at ground level' or 'climbing inspection of cable bracing'. Generic recommendations such as 'decay detection' are not acceptable. The recommendation of additional inspections is not expected to be the norm.
 16. Where work to trees is recommended by the Surveyor, the *Contractor* shall raise a defect. The defect shall be recorded against the specific tree within the AMIS inventory. New trees not already existing in the inventory shall be loaded prior to the defect being associated. The Surveyor shall enter appropriate data which shall include:
 - a) Global Position,
 - b) Location description, using road name and nearby property number or landmark (e.g. a landscape or streetscape feature);
 - c) Description of the work required;
 - d) SoR items and quantities for the work; and
 - e) Timescale priority for the work.

17. In some locations it will be appropriate to mark trees to aid identification. This shall not be the norm and is required only in areas of woodland or where there are many trees and identifying the specific tree requiring work may be problematic. Any mark shall be discrete but easy to locate and made in accordance with a consistent method of marking agreed with the *Client* in advance.
18. Survey data shall be entered into AMIS and Task Orders shall be raised in accordance with contract requirements.
19. If, during the course of the survey, any tree is discovered to require immediate remedial work, then the *Contractor* shall act in accordance with the contract requirements, making the *Client* aware at the earliest opportunity. A record of all works shall be entered into AMIS.

Trees within falling distance of the highway

20. Assessment of trees, hedges or shrubs within falling distance of the highway shall be made having regard to the provisions of section 154(2) of the Highways Act 1980. The Surveyor shall identify and record within AMIS all trees that are considered to cause a danger to highway users, together with the address of the land on which the tree is located recorded within the 'Note' field of AMIS, accompanied by the action required of the owner, be it to cut or fell the tree, in order to remove the danger.
21. The assessment of such trees shall be undertaken only from the highway or other publicly accessible land. A detailed survey of 'third party' trees is not required. Where a defect tree is noted, the location of the tree shall be recorded as accurately as possible, and the tree noted as requiring further action.
22. Where trees within falling distance of the highway cannot be adequately inspected from the highway or other publicly accessible space, but there is reason to believe that the tree may be defective, then a defect shall be noted and the 'Note' field of AMIS shall contain 'Exercise of Highways Act s289 Power of Entry is required for the purposes of adequate survey'. The Surveyor shall undertake a repeat visit to complete the survey once Power of Entry has been provided.
23. Where a previously recorded 'third party' tree is recorded in AMIS, the tree shall be inspected and, if it no longer presents a danger to the highway users, it shall be End Dated with the reason recorded as "Data error".

Outputs from the survey

24. Outputs from the survey shall be:
 - a) Record of inspections for all trees and woodlands to be recorded in AMIS.
 - b) Asset attributes in Appendix 33/7 updated within AMIS for all defect trees and asset locations correctly plotted in AMIS.
 - c) Task Orders in AMIS with defects associated to trees requiring work raised.
 - d) Section 154(2) Notices to remove the danger of tree defects within falling distance of the highway issued where appropriate.
 - e) The asset inventory updates to AMIS updated.

Guidance for the Surveyor

25. Tree Defects are described in Appendix 33/7. For all trees and woodlands, the data fields presented at Appendix 33/7 shall be updated in AMIS as outlined in the above survey details unless otherwise agreed by the *Client* in advance in writing.
26. With regard to Task Orders, care shall be given to ensure that there is sufficient information to enable any person to subsequently relocate the tree or part of tree with reasonable ease. Location details shall therefore be based on site features as described above.

Guidance on some specific parts of the data fields to be recorded:

- a) Tree species to be recorded based on the list used in AMIS. Only if the tree species is not on the AMIS list of options shall 'Other' be used with the species given in the Notes field.
- b) Tree size shall be calculated using Appendix 30/10 based on species branch density and height and crown spread of the tree.

Physiological condition shall be recorded as:

Good biologically fully functionality with average vitality, e.g. normal bud development, normal fruit and flower development, shoot extension, leaf size, crown density and wound closure;

Fair biologically fully functionality showing below average vitality, e.g. reduced bud development, reduced fruit and flower development, short shoot extension, smaller leaves and lower crown density;

Poor biologically limited functionality showing significantly below average vitality, e.g. limited bud growth, small and chlorotic leaves and low crown density; or

Dead dead.

Structural condition recorded as:

Good no significant structural defects;

Fair structural defects which could be remedied through tree surgery or management practices;

Poor structural defects which cannot be remedied through tree surgery or management practices without being of significant detriment to the health or character of the tree; or

Dead dead.

3355AR Tree Condition Surveys

General

1. A condition survey of all trees growing within the highway boundary shall be undertaken to a five-yearly cycle, supplementing annual tree survey records with a full inventory update of CAVAT value, condition, height, size, category, as appendix 33/8, to inform the programmed maintenance of trees.

Definitions

2. CAVAT - Capital Asset Value for Amenity Trees - a method of applying a monetary value to trees, developed by the London Tree Officers Association. Further information about the method can be obtained from the London Tree Officers Association (www.ltoa.org.uk).

The Survey

3. The survey shall be undertaken in accordance with Clause 3354AR but restricted to trees within highway limits.

Outputs

4. Records of inspections for all trees and woodlands shall be recorded in AMIS.
5. Asset attributes shall be updated and recorded in AMIS as Appendix 33/8.

Additional, Cancelled, Modified & Substitute Clauses
Series 4000 Installation of Street Furniture

4001AR	General
4002AR	Supply
4003AR	Installation

4001AR General

1. Street Furniture covered by this Series includes Bench Seats, Bollards (not traffic bollards), Bus Shelters, Cycle Stands, Dog Bins, Litter Bins, Notice Boards, Pay and Display Machines, Pedestrian Wayfinding Signs, Safety Mirrors, Speed Cushions, Street Name Plates, Tree Grills and Guards.
2. Street Furniture covered elsewhere in this Specification includes :
Series 400 Road Restraint Systems
Series 1200 Traffic Signs - CCTV masts and cameras
Series 1300 Road Lighting Columns and Brackets, CCTV Masts and Cantilever Masts
Series 2800 Salt Bins
3. Street Furniture not covered by this contract includes items not owned by the *Client*, such as telephone boxes, utility company cabinets and advertising panels.

4002AR Supply

1. The type of street furniture required by the *Client* will follow the principles established in Streetscape Guidance for London.
2. Streetscape Guidance forms part of a package of reference documents which can be downloaded from :-
<https://tfl.gov.uk/corporate/publications-and-reports/streets-toolkit#on-this-page-0>

4003AR Installation

1. Where street furniture as listed in sub-Clause 4001.1 is required to be provided for works under this contract, the *Contractor* shall determine details from the *Client's* Scope, the Task Order, or by reference to existing street furniture in the vicinity.
2. Generic installation details for items of street furniture listed in sub-Clause 4001.1 are shown in Appendix 40/1

Additional, Cancelled, Modified & Substitute Clauses
Series 5000 Maintenance Painting of Steelwork

5001MR Introduction

5002MR Surface Preparation – General Requirements

5003MR Surface Preparation – Materials and Methods

5016AR Anti-Graffiti Coatings

5001MR Introduction

In sub-Clause 3, delete “described in Appendix 50/5” and insert “required by the *Client* or described in scheme specific Appendix 50/5”.

5002MR Surface Preparation – General Requirements

In sub-Clause 1, delete “Contract are specified in Appendix 50/1” and insert “works will be detailed in the Task Order or described in scheme specific Appendix 50/1”.

5003MR Surface Preparation – Materials and Methods

In sub-Clauses 5, 6, 7 and 25, delete all occurrences of “specified in Appendix 50/1”.

5016AR Anti-Graffiti Coatings

1. Prior to application, the surface shall be cleaned of all loose material, oil, grease, dirt and existing graffiti. The surface shall be clean and dry before lightly abrading. Care shall be taken to feather back the edges of all loose or flaking paint work to a second edge. A suitable sealer/primer, as recommended by the manufacturer, shall be applied to bare areas and areas of graffiti which resist cleaning and may present a problem with “pigment bleed”.
2. The anti-graffiti coating shall be of the sacrificial type and shall be capable of being cleaned a minimum of twice before re-coating is necessary.
3. The coating shall be applied strictly in accordance with the manufacturer’s recommendations.
4. The application of the coating system shall not change the appearance or colour of the substrata, unless agreed otherwise with the *Client*.
5. The *Contractor* shall submit proposals for protection of the general public during the application to the *Client* for acceptance prior to commencing the work.
6. The subsequent cleaning of the coating and/or removal of graffiti, posters and encrusted deposits shall not have any detrimental effect on the substrate. Grit blasting and the use of chemical cleaning agents likely to cause long term effects on the substrata will not be acceptable.

Additional, Cancelled, Modified & Substitute Clauses

Series 5700 Concrete Repairs

5701AR	Concrete Repair – Introduction
5702AR	Concrete Repair Work– General Requirements
5703AR	Products and Systems for Repair of Concrete Structures – General
5704AR	BS EN 1504 Part 3 Products for Concrete Repair
5705AR	Supply and Storage of Proprietary Repair Products and Other Materials
5706AR	<i>Contractor</i> Investigation
5707AR	Pre-Construction Concrete Repair Execution Trials
5708AR	Quality Control of Repair Work
5709AR	Concrete Removal
5710AR	Substrate Preparation
5711AR	Reinforcement
5712AR	Galvanic Anodes for Control of Incipient Anode Effect
5713AR	Falsework and Formwork
5714AR	Site Mixing, Placing and Curing
5715AR	Flowable Concrete or Mortar
5716AR	Repair Concrete or Mortar
5717AR	Sprayed Concrete or Mortar
5718AR	Repairs to Structures to Receive Impressed Current Cathodic Protection
5719AR	Repairs to Structures using Galvanic Anodes for Control of Incipient Anode Effect
5720AR	Concrete Injection
5721AR	Contract Compliance Testing on Completed Repairs
5722AR	Wall Tiles (Glazed and Mosaic)

5701AR Concrete Repair – Introduction

Specification of Concrete Repairs

- 1 This Series is part of the Specification for Highway Works. Whilst this Series is particularly relevant to the subject matter in its title, it shall be read in conjunction with the general requirements in Series 000 and 100 and with all other Series relevant for the particular works to be undertaken.
- 2 This Series gives requirements for rehabilitation, repair or partial reconstruction of existing highway structures, and open drainage channels that are wholly or partially constructed of reinforced, pre-stressed, post-tensioned or plain concrete.

Aspects Excluded from the Specification

- 3 Surface protection systems for concrete and structural bonding are not covered by this Series
- 4 Designed mix sprayed concrete and designed mix flowable concrete for repair are not covered by this Series.
- 5 Repairs to concrete pavements are not covered by this Series.
- 6 Lightweight repair concretes and mortars are not covered by this Series.

Concrete Repair Methods

- 7 This Series covers the application of BS EN 1504 Part 9, Table 1 repair methods 1.5, 3.1, 3.2, 3.3, 4.1, 4.2, 4.4, 4.5, 4.6, 5.3, 6.3, 7.1, 7.2, 10.1 and 11.1.

BS EN 1504 Terms and Definitions

- 8 Terms and definitions applicable to this Series are given in BS EN 1504 Parts 1, 3, 5, 6, 7, 8, 9 and 10.

5702AR Concrete Repair Work– General Requirements

BS EN 1504 Part 9 Methods of Repair

- 1 The repair methods listed in BS EN 1504 Part 9, Table 1 required for each construction activity and each structural element to be repaired shall be as stated in Task specific Appendix 57/1 for concrete repairs, and Task specific Appendix 57/5 for concrete injection.

The specified BS EN 1504 Part 9 methods of concrete repair shall be executed in accordance with this Series and BS EN 1504 Part 10, Section 5 General Requirements.

Quality Management

- 2 Concrete repair work shall be undertaken by organisations operating a quality management system as required in sub-Clause 104.4 which includes processes and procedures for concrete repair work required for the works within its scope.

Technical Approval

- 3 Where temporary works associated with concrete repairs are required, technical approval procedures specified in Clause 106 shall be followed. Particular requirements including site specific constraints are stated in Task specific Appendix 1/11. Work shall not commence until technical approval procedures are complete.

Safe Working Certification

- 4 The *Contractor* shall supply to the *Client* copies of permit to load certification for temporary supports and temporary access platforms before commencing concrete repair work. The certification shall confirm that temporary supports and temporary access structures are safe for their intended use.

Protection of Vulnerable Elements

- 5 All cabling, suspended drainage, ducts, adjacent structural steelwork, structural bearings, electrical boxes and any other parts of the existing structure including existing cathodic protection systems, shall be protected against damage during the concrete repair work.

Method Statements

- 6 The *Contractor* shall submit detailed construction method statements as described in Task specific Appendix 1/24.
- 7 Detailed construction method statements shall comply with the constraints listed in Task specific Appendices 1/13 and 57/3 and also include at least the following:
- (i) erection, maintenance and removal of temporary access and protection work;
 - (ii) removal of defective concrete, preparation of substrate, treatment of reinforcement;
 - (iii) technical data sheets and COSHH sheets for repair products and other proprietary products proposed for the permanent works;
 - (iv) disposal of arisings e.g. hazardous materials, water, concrete;
 - (v) erection, maintenance and removal of formwork;
 - (vi) application of repair products and other proprietary products;
 - (vii) curing and protection of repairs; and / or
 - (viii) testing for contract compliance.

5703AR Products and Systems for Repair of Concrete Structures – General

Assessment and Verification of Consistency of Performance

- 1 The system of Assessment and Verification of Consistency of Performance (or Attestation of Conformity) for all Products or Systems used for concrete repair work shall be 2+ in accordance with Annex ZA.2 of BS EN 1504 Parts 3, 5, 6 or 7.

Suitability of Construction Products

- 2 The *Contractor* shall select construction products that are suitable for their intended use. The selected products shall satisfy the following requirements:
- (i) Clause 5704AR for concrete repair, and Task specific Appendix 57/1 for the class of repair product required;
 - (ii) Clause 5711AR and Task specific Appendix 57/2 for reinforcement corrosion protection and anchoring of reinforcing steel bar;
 - (iii) Clause 5720AR for concrete injection, and Task specific Appendix 57/5, for the function of injection product required.

- 3 When selecting repair products associated with cathodic protection, the *Contractor* shall comply with the performance required of completed repairs, the restrictions specified in Clauses 5718 and 5719, and take account of the published recommendations of the Corrosion Prevention Association for the following applications:
- (i) concrete repairs incorporating galvanic anodes tied to reinforcement within a repair patch;
 - (ii) concrete repairs executed before, and located beneath impressed current anode or galvanic anode embedded within a cementitious layer to be installed later, or as required by Task specific Appendix 57/3.

Repair Product Statement

- 4 The *Contractor* shall prepare and submit a statement to the *Client*, including a list of proposed repair products or systems, and where these will be used in the works. The repair product statement shall be submitted prior to repair work commencing on site, and no later than the time period specified for construction method statements in Appendix 1/24.
- 5 The repair product statement shall include at least the following:
- (i) a general description of the contract repairs, including name of structure or structures and which structural elements to be repaired, with reference to Task specific Appendix 57/1;
 - (ii) a list of construction products proposed for repair work, and the proposed application of them, including the extent and type of repair for which a product would typically be used;
 - (iii) the Declaration of Performance for each product or system in accordance with Clause 104;
 - (iv) the manufacturer's instructions for use, technical data sheets; and
 - (v) manufacturer's health and safety information, including COSHH data as necessary.

Product Declaration of Performance

- 6 The Declaration of Performance for each repair product shall demonstrate that it meets the specification requirements.

5704AR BS EN 1504 Part 3 Products for Concrete Repair

- 1 The performance characteristics of Products and Systems in accordance with BS EN 1504 Part 3 shall comply with the minimum requirements stated in Table 57/1.
- 2 The BS EN 1504 Part 3 class or classes of repair product required for the repair work shall be as specified in Task specific Appendix 57/1 for each structural element to be repaired. If no class is specified in Task specific Appendix 57/1, the required class shall be R4.
- 3 Class R1 products shall not be permitted. Class R2 products shall only be permitted for repair material types shown in Table 57/1.
- 4 The *Contractor* shall comply with Task specific constraints on the location, extent or depth of application for types of repair material stated in Task specific Appendix 57/3.

Table 57/1 – Minimum Performance Requirements for BS EN 1504 Part 3 Structural and non-Structural Repair Products and Systems

Essential characteristic	Type of repair material (see Note i)	Level(s) or class(es)/BS EN 1504 Part 3 requirement/Task specific		
		Class R4	Class R3	Class R2
Compressive strength (at age of 28 days)	F, N, S	≥ 45 MPa, Appendix 57/1 *	≥ 25 MPa	N/A
	M, R	≥ 45 MPa, Appendix 57/1 *	≥ 25 MPa	≥ 15 MPa
Chloride ion content	All	≤ 0.05 %		
Adhesive bond	F, N, S	≥ 2.0 MPa	≥ 1.5 MPa	N/A
	M, R	≥ 2.0 MPa	≥ 1.5 MPa	≥ 0.8 MPa
Restrained shrinkage / expansion (dimensional stability). [Not required if thermal cycling data available.] [Not required for sprayed concrete or mortar.]	F, N	≥ 2.0 MPa	≥ 1.5 MPa	N/A
	M, R	≥ 2.0 MPa	≥ 1.5 MPa	≥ 0.8 MPa
Carbonation resistance (For durability of corrosion protection or inhibition)	All	Pass	Pass	Pass
Elastic modulus	All	≥ 20 GPa	≥ 15 GPa	N/A
Thermal compatibility. Part 1, Freeze-thaw	All	≥ 2.0 MPa	≥ 1.5 MPa	≥ 0.8 MPa
Thermal compatibility. Part 2, Thunder shower [not requ'd if compliant with Pt 1]	All	≥ 2.0 MPa	1.5 MPa	≥ 0.8 MPa
Thermal compatibility. Part 4, Dry cycling [not requ'd if compliant with Pt 1]	All	≥ 2.0 MPa	1.5 MPa	≥ 0.8 MPa
Skid resistance	F, N, M, R	Class III : > 55 units wet tested		
Coefficient of thermal expansion. [Not required if thermal compatibility testing is carried out.]	R	8x10 ⁻⁶ /K < α > 12x10 ⁻⁶ /K		N/A
Capillary Absorption	All	≤0.5 kg m ⁻² h ^{-0.5}		
Reaction to fire	All	Appendix 57/1	Appendix 57/1	Appendix 57/1
Dangerous substances	All	Comply with BS EN 1504-3 clause 5.4	Comply with BS EN 1504-3 clause 5.4	Comply with BS EN 1504-3 clause 5.4

General notes for Table 57/1

- (i) Codes for types of repair material are F = high flow (defined in BS EN 1504 Part 3); M = repair mortar (BS EN 1504 Part 1 type CC or PCC); S = sprayed; N = normal flow (see Clause 5715); R= resin mortar (BS EN 1504 Part 1 type PC). Chemical classification types CC, PCC and PC are defined in BS EN 1504 Part 1
- (ii) See also Clause 5711 for required performance characteristics when reinforcement corrosion protection products and anchoring of reinforcement are specified.

- (iii) See also Clause 5720 for required performance characteristics when concrete injection products are specified.

* Subject to higher minimum compressive strength specified in Task specific Appendix 57/1.

5705AR Supply and Storage of Proprietary Repair Products and Other Materials

Delivery Data

- 1 Delivery of galvanic anodes and reference electrodes shall be accompanied by a delivery note, COSHH data sheets and a certificate of conformity affirming that the product and associated system components comply with Clause 5712.

Marking and Labelling of Products

- 2 Marking and labelling on individual containers of repair product shall comply with Clause 6 of BS EN 1504 Part 8. Bulk consignments of repair product delivered to site shall be accompanied by written confirmation of the information indicated in Clause 6 of BS EN 1504 Part 8.
- 3 The following information shall also be supplied for cement-based/cementitious products if not indicated elsewhere:
- a) Quantity of water to be added for the various applications.
- 4 All product container markings shall be examined upon delivery to site to ensure the contents are within the manufacturer's stated use-by dates, and that they will continue to be useable during the contract.

Storage

- 5 Repair products and other materials shall be stored on site in a controlled environment in accordance with the manufacturer's instructions, and where applicable BS EN 1504 Part 10.

5706AR Contractor Investigation

Contractor Investigation and Reporting

- 1 The *Contractor* shall investigate the condition of existing concrete, at the locations and to the extent described in Task specific Appendix 57/6.
- 2 Where a concrete investigation is required, the *Contractor* shall supply the *Client* with a copy of a report on concrete condition for each structure, the format and contents of the report shall comply with BA 35. The report may be subdivided to reflect phases of investigation
- 3 The report shall be submitted to the *Client* at least the time period specified in Appendix 1/13 before commencement of concrete removal for each phase of investigation. If no time period is specified, the following shall apply:
- a) 2 working days for investigation of a single or multi-span bridge deck, up to 60m in length between abutment bearings;
- b) working days for investigation of a multi-span bridge deck, 60m or more in length.

5707AR Pre-Construction Concrete Repair Execution Trials

Trial of *Contractor's* Proposed Method of Repair

- 1 Where required under the contract, a trial of the *Contractor's* proposed method of executing repairs shall be undertaken to the requirements described in Task specific Appendix 57/3.
- 2 The *Contractor* shall give the *Client* at least 2 days notice of executing the trial and provide access for witnessing the trial or later inspection of the completed trial repair.

5708AR Quality Control of Repair Work

Routine Testing by the *Contractor*

- 1 Quality control of concrete repair work shall be undertaken by the *Contractor* in accordance with Table 5 of BS EN 1504 Part 10.
- 2 Routine testing or observation of the characteristics of substrate conditions, and measurement of ambient weather conditions and precipitation shall be carried out in accordance with the tests or observations marked "for all intended uses" in Table 5 of BS EN 1504 Part 10 for the relevant repair methods specified in Task specific Appendix 57/1, and in accordance with Appendix 1/5.
- 3 The *Contractor* shall carry out routine sampling and testing of fresh repair material and routine testing of hardened repair material in accordance with Appendix 1/5.
- 4 Records of the method used and results of all routine observations, measurements, sampling and testing shall be prepared and kept by the *Contractor*. Copies of these shall be made available to the *Client* upon request.

Independent Testing - Immediately Before and/or During Placement of Material

Samples for Independent Testing of Concrete Consistency

- 5 Where required in Task specific Appendix 1/6, the *Contractor* shall provide samples of fresh repair material for independent testing of flowability and/or air content.

Making of Cube Specimens for Independent Testing of Compressive Strength

- 6 Where required by contract specific Appendix 1/6, the *Contractor* shall make cube specimens for monitoring strength gain of repair concrete or mortar, and supply them to the *Client*. The cube specimens shall be made by the *Contractor* as described below.
- 7 Cube specimens for repair concrete shall consist of a minimum of six 100mm cubes made in accordance with BS EN 12390-1 and BS EN 12390-2. Flowable mixes shall not be compacted in the cube moulds.

Cube specimens for repair mortar shall consist of a minimum of six 40mm cubes made in accordance with BS EN 12190.

Cube specimens of repair concrete and mortar shall be cured for 24 hours in the moulds with the top surfaces covered by polythene sheets. After 24 hours the specimens shall be stripped and placed in sealed polythene bags for a further 48 hours. The specimens shall then be removed from the bags and continue to be stored alongside repaired areas at ambient temperatures until required for testing.

Other Samples

- 8 Samples of repair products and other materials shall be provided to the *Client* as required in Task specific Appendix 1/6.

5709AR Concrete Removal

General

- 1 The extent of existing concrete to be removed, area and depth, is shown on the contract drawings or described in Task specific Appendix 57/3.
- 2 Concrete shall be removed in accordance with the general methods given in BS EN 1504 Part 10 and the particular requirements stated in this clause.
- 3 Protection measures shall be designed and installed to avoid damage to areas of the structure or structural elements outside the repair area, and to avoid damage to reinforcement within the repair area. Requirements for protective measures are given in Task specific Appendix 57/3.
- 4 Concrete removal shall not commence until technical approval procedures in accordance with Clause 5702 are complete, temporary supports associated with it are fully in place, loading has been transferred and a copy of permit to load certification for temporary supports and temporary access platforms has been supplied to the *Client*.
- 5 Temporary support systems shall be maintained in place in accordance with BS EN 1504 Part 10 to ensure safety and structural stability until repairs have achieved the full strength class required by the contract, or any minimum interim strength specified in Task specific Appendix 57/3.
- 6 The *Contractor* shall comply with any special requirements listed in Appendix 1/23 for handling, disposal or monitoring of hazardous materials that are known or suspected to be present in structural elements.
- 7 Work areas including the working platform, shall be kept clean and free of any standing water and concrete debris arising from concrete removal activities.

Pre-Breakout Survey (*Contractor*)

- 8 Prior to the repair works commencing, the current extent of concrete delamination in all exposed structural elements specified for repair, shall be identified and marked by the *Contractor* using a hammer-sounding survey, BS EN 1504 Part 10, Table 5, Test No. 1.

Where specified in Appendix 57/3, the electrical resistivity of old repairs exceeding the acceptable limits, and detrimental metal objects as defined in Clause 5718, shall be identified and marked.

- 9 The *Client* shall be notified at least 2 working days in advance of the pre-breakout survey and be given the opportunity to be present during the survey.

If the pre-breakout survey identifies significantly increased areas of existing concrete to be removed, details shall be referred to the *Client*.

Procedure for Concrete Removal

- 10 Repair of concrete shall be undertaken in accordance with general procedures stated in Task specific Appendix 57/3, including any hold points for inspection and certification by the *Contractor* or the *Client*.

- 11 Principles to be followed for treatment of superficial defects on the surface of unformed concrete e.g. bridge decks shall be as stated in Task specific Appendix 57/3.

Sequencing of Concrete Removal

- 12 Removal of concrete in stages shall be undertaken in accordance with sequencing restrictions indicated on the drawings or specified in Task specific Appendix 57/3.

Where stages of repair are specified, the second and subsequent stages of repair in a restricted sequence shall not be commenced until the previously repaired concrete has gained the minimum strength specified in Task specific Appendix 57/3, and adequate integrity of the newly completed repairs have been confirmed by concrete sounding (hammer tapping).

If not stated in Task specific Appendix 57/3, the required minimum strength shall be the characteristic compressive strength of the BS EN 1504 Part 3 Strength Class as required by Task specific Appendix 57/1.

Particular Requirements of Concrete Removal

- 13 Existing concrete to be retained adjacent to, or beneath the specified repair areas shall not be damaged, except when existing reinforcement is corroded at the perimeter of the specified breakout area, when further concrete shall be removed until a continuous length of not less than 100mm of un-corroded bar is exposed. The limit of allowable corrosion is defined by rust grade A in BS EN ISO 8501 Part 1.
- 14 Existing steel reinforcement being retained in the works shall not be damaged during removal of concrete, or prior to concrete reinstatement.
- 15 The edges of each repair patch shall be trimmed back to a regular shape comprising straight lines, e.g. a square, rectangular or rectilinear polygon. The perimeter of each repair area shall be prepared to prevent feather edging or overbreak. Concrete shall be removed at the perimeter to a depth of 15mm or more, but no closer to the existing reinforcement than 10mm.
- 16 All defective concrete shall be removed to the specified depth. No significant localised peaks shall remain in the substrate, and the concrete shall be removed to an accuracy of between + 5mm, profile peak to - 15mm, profile trough.

Post-Breakout Substrate Inspection

- 17 When defective concrete has been removed in a repair area to the depth and extent required by the contract, the entire substrate in the repair area shall be hammer sounded in accordance with BS EN 1504 Part 10, Table 5, Test No. 1.

Where there are additional areas of hollow sounding or loose concrete beneath the substrate, they shall be marked out. The *Client* shall be informed of additional defects, and at least 2 working days notice of an intention to proceed to the next stage of repair.

Unless instructed otherwise by the *Client*, hollow or loose concrete beneath the substrate shall be treated by removal of defective concrete and replacement with repair products complying with Clause 5704.

Methods of Removing Defective Concrete

General

- 18 The following methods of concrete removal are permitted except when working around and adjacent to tensioned structural components, as described in sub-Clause 5709.19:

- (i) high-pressure or ultra high-pressure water jetting (hydro-demolition);
 - (ii) lightweight electric or lightweight pneumatic demolition breaker (mechanical breakout);
 - (iii) Hand tools (manual breakout)
- 19 Concrete around pre-stressing strand and post-tensioning tendons and anchorages shall be removed by high-pressure water jetting. A lightweight electric demolition hammer or hand tools may be used for final trimming of the area broken out. Removal of concrete around tensioned strand and strand anchorages shall strictly comply with any specified sequencing stated in Task specific Appendix 57/3.

High Pressure Water Jetting

- 20 The *Contractor* shall provide written evidence to the *Client* demonstrating that:
- (i) proposed operatives are appropriately trained and qualified to undertake hydro-demolition, and have recent experience of removing concrete using high pressure water jetting.
 - (ii) a suitable and sufficient risk assessment of the concrete removal has been completed, and there is a safe system of work in place.
- 21 Water used for high pressure water jetting shall not contaminate the repair surface, and the water shall be clean, fresh, and potable complying with BS EN 1008. The *Contractor* shall not add anti-freeze or any other chemical to water used for water jetting.

Manual or Mechanical Breakout

- 22 The *Contractor* shall provide the *Client* with written evidence of suitable qualifications, training and experience of operatives proposed for this activity prior to commencing concrete breakout.

Disposal of Waste

- 23 Solid waste material removed from the structure shall not be reused for repairing the existing concrete. The waste material must be disposed in accordance with relevant waste management legislation and regulations.

Water arising from high pressure water jetting operations shall be assumed to be contaminated. It shall be collected and contained near the working area and processed in a manner which ensures that pollution of the environment does not occur.

The contaminated water must not be allowed to drain away into the ground, surface water sewers (including highway drains), hidden voids in the existing structure, watercourses or the sea. Disposal of contaminated water shall be in accordance with relevant waste management legislation and regulations.

The *Contractor* shall consult with appropriate environmental authorities and make and keep records of consultations, agreement and permissions relating to disposal of solid and liquid arisings from high pressure water jetting activities. Copies of these records shall be supplied to the *Client* when requested.

5710AR Substrate Preparation

- 1 The existing concrete substrate within a repair area, including any smooth cut edges round the perimeter, shall be prepared in accordance with the repair product manufacturer's instructions, or if this is not given to concrete surface profile grade CSP6 or higher in accordance with Technical Guideline 310.2R (formerly no. 03732) *Selecting and Specifying Concrete Surface*

Preparation for Sealers, Coatings, Polymer Overlays and Concrete Repair, published by the International Concrete Repair Institute.

- 2 Where there is a risk that the profile of the prepared concrete substrate at the formwork could allow air to be trapped during concreting, the concrete substrate for soffit breakout areas shall be additionally profiled to encourage repair material to flow freely into all voids and be continuously in contact with the existing concrete.
- 3 The concrete substrate exposed by mechanical percussive breaking in sub-Clause 5709.18 (ii) and 5709.18 (iii) shall be further prepared as described in sub-Clause 5710.1.
- 4 Immediately before mixing and placing repair material, the *Contractor* shall carry out a final hammer sounding check of the existing concrete substrate within the repair area and the existing unbroken concrete immediately surrounding the repair area to detect any remaining loose, or hollow sounding concrete which has occurred since the main concrete breakout activities. Any defective concrete shall be removed in accordance with Clause 5709.
- 5 The surface of the prepared concrete substrate in the repair area shall then be checked for cleanliness in accordance with BS EN 1504 Part 10, Table 5, Test No. 2. Dust or contaminants shall be removed.
- 6 Where BS EN 1504 Part 1 chemical type CC and PCC products are proposed, and also when pre-wetting of the substrate is recommended by the manufacturer for BS EN 1504 Part 1 PC chemical product types, the prepared substrate shall be continuously wetted with potable water for a minimum period of four hours, or some shorter wetting period recommended by the repair product manufacturer's instructions. Any surface water remaining on the concrete breakout surface or reinforcement shall be removed prior to placement of the repair material.
- 7 A bonding primer shall only be permitted for use on the prepared concrete substrate when recommended by the manufacturer's instructions. A bonding primer shall be applied strictly in accordance with manufacturer's instructions.

5711AR Reinforcement

Treatment of Existing Reinforcement

- 1 The exposed steel reinforcement within the breakout area shall be cleaned of all corrosion products and contamination (e.g. chlorides) on the surface and from within pits. The whole exposed surface of each bar shall be prepared to standard Sa 2 ½ in accordance with BS EN ISO 8501 Part 1.
- 2 Immediately prior to application of the repair material, the treated surface of exposed steel reinforcement shall be clean with only light flash-rusting permitted.
- 3 Primers or barrier coatings shall not be used on the prepared reinforcement or structural steelwork except where specified in Task specific Appendix 57/2 or where shown on the drawings.

Reinforcement coatings where required by Task specific Appendix 57/2, shall comply with BS EN 1504 Part 7, and the performance requirements in Table 57/2.

Table 57/2 – Minimum Performance Requirements of BS EN 1504 Part 7 Products for Reinforcement Corrosion Protection

Essential characteristic	Performance requirement (reference BS EN 1504 Part 7)
Corrosion protection	Pass
Release of dangerous substances	Comply with BS EN 1504-7, Section 5.3

Additional or Replacement Reinforcing Bars

- 4 Where existing reinforcement exposed within a breakout area is excessively corroded as defined in Task specific Appendix 57/2, the *Contractor* shall restore the original cross sectional area of reinforcement lost to corrosion using new steel reinforcement bars.
- 5 Replacement reinforcement and additional reinforcement bars or mesh shall be carbon steel and comply with Clause 1712. The *Contractor* shall maintain on site a stock of new reinforcement comprising at least the bars or mesh detailed in Task specific Appendix 57/2.

Reinforcement Dowels

- 6 Reinforcement dowels shall be stainless steel and comply with Clause 1726.

Reinforcement Couplers

- 7 Reinforcement couplers shall be carbon steel and comply with Clause 1716, BS 8597 and requirements stated in Task specific Appendix 57/2.
 Couplers shall be installed in accordance with the manufacturer’s instructions.

Splicing Replacement or Additional Reinforcing Bars

- 8 Lapping and mechanical coupling of bars are permitted methods of splicing new reinforcing bars to existing reinforcing bars.
 Additional or replacement reinforcement shall be positioned to achieve at least the same concrete cover as the adjacent existing bars.

New reinforcement shall be lapped in accordance with Task specific Appendix 57/2 and secured using tying wire. Existing and new bars shall be fixed at all bar intersections visible within the broken out repair area using new tying wire. Tying wire shall be stainless or soft annealed iron wire and shall comply with Clause 1714.

- 9 New reinforcement bars shall not be fixed by welding, unless permitted in Task specific Appendix 57/2. Where permitted by the contract, welding of reinforcement shall comply with the requirements in Clause 1717, BS EN 13670 and Task specific Appendix 57/2.

Welded joints between existing and new bars shall be deemed to be load bearing. Welding shall be carried out in accordance with BS EN ISO 17660-1 and be subject to the demonstration of the satisfactory performance of trial joints.

Testing of welded joints shall comply with requirements specified in Appendix 1/5.

- 10 *Contractor* alternative proposals for welded reinforcement shall demonstrate that at each location the fatigue life, durability and other properties of the member will not be adversely affected by the welding proposal. Any proposal shall comply with Clause 1717 and Clause 3.2.5 of BS EN 1992-1-1, and shall be subject to the approval of the *Client* through its Departure from Standard process

Anchoring of Reinforcing Bars and Dowels

- 11 Reinforcing bars and dowels anchored into existing concrete shall be fixed using an anchoring product which complies with the minimum performance requirements listed below in Table 57/3, and the requirements specified in Task specific Appendix 57/2.

Reinforcement anchoring products shall be mixed and used in accordance with the manufacturer's instructions.

Table 57/3 – Minimum Performance Requirements of BS EN 1504 Part 6 Anchoring Product for Anchoring of Reinforcing Steel Bar or Dowel

Essential characteristic	Performance requirement (reference BS EN 1504 Part 6, Table 3)
Pull out strength	Displacement ≤ 0.6mm at 75KN
Chloride ion content	≤ 0.05%
Glass transition temperature	≥ 60° C
Reaction to Fire	Appendix 57/2
Durability/ creep under tensile load	≤ 0.6mm after continuous loading of 50KN after 3 months
Dangerous substances	Comply with BS EN 1504-6 Section 5.3

5712AR Galvanic Anodes for Control of Incipient Anode Effect

General

- 1 This Clause refers to proprietary galvanic anodes and anode systems connected to existing steel reinforcement and located within a concrete repair area. The following anode types shall be permitted:
- a) Type 1A – tied directly to the existing reinforcement and embedded within the proposed concrete repair.
 - b) Type 1B - installed in holes drilled into the existing concrete substrate within the repair area and connected to the existing reinforcement.
- 2 The Clause also applies to permanent proprietary reference electrodes when monitoring of galvanic anodes is specified
- 3 The Clause does not cover galvanic anodes installed in areas of existing concrete which are contaminated but otherwise not affected by delamination.
- 4 The Clause covers galvanic anodes with a core consisting of pure zinc or zinc with limited alloying additions. Proposals for galvanic anodes consisting of other types of sacrificial material shall be subject to the approval of the *Client* through its Departure from Standard process.

Performance Requirements

- 5 Galvanic anodes shall have a declared maintenance-free service life of at least 10 years when used to protect steel reinforcement cast within concrete, which is subjected to ambient weather conditions experienced in the UK or a similar climate elsewhere.
- 6 The galvanic anode system, including the galvanic metal element, the activating agent and the backfill where needed, shall not present a corrosion risk to the reinforcing steel throughout the service life of the system.

The chemical reaction products of a galvanic anode shall not expand and cause cracking or spalling of the concrete cover.

- 7 Reference electrodes embedded in concrete shall have a declared maintenance-free serviceable life of at least 20 years and the reference electrical potential shall remain thermodynamically stable during that time.

Acceptance of Products

- 8 Galvanic anodes and reference electrodes shall have a proven successful performance in service of at least five years on similar structures, with comparable environmental exposure. The *Contractor* shall provide examples of installations where proposed anode has performed satisfactorily in service to achieve the minimum life required by the contract without evidence of reinforcement corrosion within the intact concrete adjacent to the repair.

The *Contractor* shall, for each type of proposed anode or reference electrode, provide the *Client* with evidence of the quality of the anode manufacturing process, and Appendix H, Quality Records Category C in accordance with sub-Clause 104.7.

Galvanic anodes and reference electrodes shall be delivered to the site with the above Category C certificates certifying conformity with Clause 5712 and the providing the following additional information

- a) manufacturer of products;
- b) data sheet including technical specifications, and installation instructions;
- c) health & safety and COSHH data;

Contractor Design

- 9 Where required by Task specific Appendix 1/10, the *Contractor* shall design the galvanic anode system in accordance with this Clause and Task specific Appendix 57/7.
- 10 Unless otherwise stated in Task specific Appendix 57/7, galvanic anodes used within repair patches shall be designed to protect, for a minimum of 10 years, the existing reinforcement located within unrepaired concrete up to 300mm away from the repaired area.
- 11 Reference electrodes required for monitoring of the galvanic anode system shall comply with the requirements stated in Task specific Appendix 57/7.
- 12 Galvanic anodes and reference electrodes shall be compatible with each other, and all ancillary components that make up the galvanic anode system.
- 13 The designer of a galvanic anode system shall be qualified and certified to BS EN ISO 15257 Level 4 in reinforced concrete structures.

Products and Materials

Galvanic Anodes

- 14 Galvanic anodes and anode systems shall be supplied with sufficient galvanic metal and activating agent to deliver reinforcement protection for the duration of the specified service life of the anode system, so that further repairs to existing concrete surrounding the repair patch are not necessary during this period.
- 15 Galvanic anodes shall have a core of primary zinc, colour coded yellow, in compliance with Z2 grade zinc to BS EN 1179 Zinc and zinc alloys – Primary zinc, or Special High Grade zinc to ASTM B418 Standard Specification for Cast and Wrought Galvanic Zinc Anodes. Alternatively

the anode shall be made from Special High Grade zinc to ASTM B6 with suitable alloying additions conforming to the limits in ASTM B418 Table 1.

- 16 One or more corrosion resistant wires shall be attached to the zinc core and shall extend to the outside of the anode. The wires shall be long enough to form an effective electrical connection between the anode the existing steel reinforcement.

Reference Electrodes

- 17 Reference electrodes for monitoring of a galvanic anode installation shall be permanently embedded in the concrete or shall be portable and shall comply with BS EN ISO 12696. Reference electrodes shall comply with the requirements given in Task specific Appendix 57/7.

Installation of Galvanic Anodes and Reference Electrodes

Cathodic Protection Operatives

- 18 Cathodic Protection operatives installing the anodes or reference electrodes shall be qualified and certified to at least BS EN ISO 15257 Level 3 in reinforced concrete structures.
- 19 Cathodic Protection operatives testing the anodes or reference electrodes or undertaking the electrical potential survey shall be qualified and certified to at least BS EN ISO 15257 Level 2 in reinforced concrete structures.

Electrical Continuity of Reinforcement

- 20 Prior to installation of the galvanic anode system, electrical continuity of the steel reinforcement shall be tested by the *Contractor* at all intersections of reinforcement within the repair patch in accordance with BS EN ISO 12696.

Electrical continuity shall not be tested until reinforcement has been cleaned in accordance with Clause 5711. If discontinuities are found, the reinforcement intersections shall be continuity bonded in accordance with BS EN ISO 12696.

Electrical Potential Survey

- 21 A survey of electrical potential shall be undertaken on the surface of the existing concrete outside the repair area. Survey points shall be located 250mm outside the perimeter of the repair area, and shall be spaced 500mm apart. The electrical potential survey shall be done after removal of defective concrete, but before galvanic anodes are attached to the reinforcement. The method of survey shall comply with ASTM C876.

The electrical potential survey shall be repeated after completion of the repair using the same potential survey instrument with readings taken at the same survey grid points. The repair concrete should be at least 28 days old.

Fitting of Anodes and Electrodes

- 22 The spacing of galvanic anodes shall be as specified in Task specific Appendix 57/7 or as shown on the drawings.
- 23 Preparation and installation of galvanic anodes and reference electrodes shall comply with BS EN ISO 12696 and product manufacturer's instructions.

Installation shall be as soon as possible following preparation and cleaning of existing steel reinforcement, but not more than 3 hours afterwards.

Galvanic anodes shall be located around the perimeter and close to the edge of the broken out repair zone. Each anode unit shall be electrically connected to the steel reinforcement at least

25 mm inside the broken out area, using conductive wire attachments.

- 24 Galvanic anodes shall be fixed to reinforcement so that concrete cover is not reduced. Where this is not possible, concrete cover from the external surface of the repair patch to the galvanic anode shall not be less than 20mm for deck repairs or 15mm for vertical and overhead repairs.

Electrical Connection with Reinforcement

- 25 Electrical connection between the anode or reference electrode wire attachments and the reinforcement bar shall be confirmed by the *Contractor* in accordance with BS EN ISO 12696.

Junction Boxes

- 26 Where permanent monitoring of anodes is required, junction boxes shall be provided and installed as described in Task specific Appendix 57/7.

Electrical connection from anodes to reinforcement shall be routed via a junction box. Electrical connection shall be made directly from reference electrodes to a junction box.

Junction boxes for monitoring shall contain terminations for wires to permit measurement and disconnection of either individual anodes or a group of anodes as specified.

Particular Requirements for Type 1A Galvanic Anodes

- 27 Type 1A anodes shall be positioned to ensure all round contact with the reinstatement material and be attached using integral wires or tying wire complying with Clause 1714. Tie wires shall be tightened so that no free movement is possible, to ensure good electrical continuity

Concrete repair products for repair areas which include Type 1 galvanic anodes shall comply with Clause 5719.

Particular Requirements for Type 1B Galvanic Anodes

- 28 The backfill material used for bedding and surrounding the Type 1B anodes placed within drilled holes shall be conductive, surround each anode unit and completely fill the annular void, uniformly connecting each anode with existing concrete to ensure continuous operation of the anode for the duration of the anode service life.

The backfill material shall facilitate anode activation, accommodate anode corrosion products and have high alkalinity (greater than a pH of 11) to absorb, buffer or resist acids generated at the anode/concrete interface during the service life of each anode.

Each Type 1B galvanic anode shall be connected separately to the existing reinforcement, located within the repair area.

Particular Requirements for Reference Electrodes

- 29 Permanently embedded reference electrodes shall be located within existing concrete at positions indicated on the drawings or in Task specific Appendix 57/7 and at least 0.5m away from the nearest concrete repair patch.

The backfill material used for bedding and surrounding reference electrodes placed within drilled holes shall be conductive, surround the electrode units and completely fill the annular void, uniformly connecting the reference electrode with existing concrete and ensuring continuous operation of the electrode for the duration of the electrode service life.

The backfill material shall facilitate electrode activation and have high alkalinity, greater than a pH of 11, to absorb, buffer or resist acids generated at the anode/concrete interface during the service life of each electrode.

Record of Survey and Installation

- 30 The *Contractor* shall keep records of all electrical potential surveys undertaken, and galvanic anodes, wires, monitoring junction boxes or reference electrodes installed.

Results of the electrical potential survey shall be shown on annotated drawings with the location of survey points referenced to each repair area, and the location of repair areas containing galvanic anodes referenced to the structural element. The results should indicate the make and type of instrument used for the survey.

As-built drawings shall be prepared by the *Contractor* and shall show the positions and type of all components.

As-built record drawings shall be supplied to the *Client* in accordance with the requirements of Clause 105 and BD 62 (DMRB 3.2.1). Copies of survey record drawings shall be supplied to the *Client* within 7 working days of the final survey.

5713AR Falsework and Formwork

- 1 Temporary falsework support or temporary formwork necessary as part of concrete repairs work shall be in accordance with Clause 106 and the constraints and details stated in Task specific Appendix 1/11.
- 2 Formwork shall comply with the requirements of Clause 1710, BS EN 1504 Part 10 and BS EN 13670. Formwork shall impart an F2 surface finish in accordance with Clause 1708 unless specified otherwise in Task specific Appendix 57/3.
- 3 Where there is a risk that the profile of the prepared concrete substrate at the formwork could allow air to be trapped during concreting encouraging voids to form in the hardened repair concrete, the means for venting air from these areas shall be provided within the formwork arrangement.

5714AR Site Mixing, Placing and Curing

General

- 1 Management of work quality shall be in accordance with the product manufacturer's instructions and BS EN 1504 Part 10, BS EN 13670 Execution Class 2, unless specified otherwise in Task specific Appendix 57/3.

Repair products shall be checked by the *Contractor* to ensure compliance with BS EN 1504 before being used in the works.

A record of all products and materials incorporated into the works shall be made and kept in accordance with Clause 105.

Mixing

- 2 Only full containers of repair products shall be mixed for use. On-site proportioning shall not be permitted.
- 3 Water used for mixing with BS EN 1504 Part 1 type CC and PCC products shall be potable and comply with BS EN 1008.

No other materials except water shall be added to BS EN 1504 Part 1 type CC or PCC repair products before application, unless permitted and certified by the product manufacturer.

- 4 Site mixing of all repair products shall be carried out in accordance with the requirements of the product or system manufacturer's instructions and any relevant guidelines in BS EN 1504 Part 10.
- 5 More water shall not be added to repair material of BS EN 1504 Part 1 type CC and PCC products after the original mixing.

Placing and Compaction of Repair Material

- 6 Placement of repair material shall commence before the substrate dries out after pre-wetting as required in Clause 5710, and not more than one hour after completion of wetting.

All repair materials shall be placed and compacted in accordance with BS EN 1504 Part 10, BS EN 13670 and the manufacturer's instructions. The repair material shall be placed so it completely fills the repair area without voids.

Flowable repair material should not be dropped into place from above the limiting height specified by the product manufacturer, nor from a height exceeding 500mm where there are no manufacturer guidelines.

Measuring Ambient Conditions and Limiting Conditions for Placement

- 7 The *Contractor* shall during and throughout each day of material placement, take measurements and keep written records of the concrete surface temperatures, shade air temperature, relative humidity, precipitation, wind strength and dew point, as described in BS EN 1504 Part 10, Table 5, Test Nos. 10, 21, 22, 23, 24 and 25.
- 8 Repair material shall not be placed or continue to be placed if any of the ambient physical conditions shown in Table 57/4 apply. The temperature of the repair material when deposited shall not be lower than 5°C and not higher than 30°C. Measurements of physical conditions shall be taken for each batch of repair material from completion of mixing, and at intervals of 20 minutes during application. Measurement records shall be kept by the contract and a copy made available to the *Client* upon request.

Table 57/4 Limiting Conditions for Ceasing Placement of Repair Material

Physical condition	Location	Criteria for ceasing placement
Surface temperature of the existing concrete substrate [reference BS EN 1504 Part 10, Table 5, Test No. 10]	Within the repair void	Is less than the higher value of the manufacturer's minimum recommended temperature or +5°C. Is greater than the lower value of the manufacturer's maximum recommended temperature or +30°C
Shade air temperature [reference BS EN 1504 Part 10, Table 5, Test No. 21]	Immediate environment of the repair	Is less than the higher value of the manufacturer's minimum recommended temperature or +4°C
Wind strength [reference BS EN 1504 Part 10, Table 5, Test No. 24]	Immediate environment of the repair	Is 8 m/s or stronger
Dew point [reference BS EN 1504 Part 10, Table 5, Test No. 25]	Immediate environment of the repair	Ambient temperature is less than 3 °C above dew point temperature

Construction Joints

- 9 Where fresh repair material is to be placed against hardened repair concrete, a construction joint shall be formed as described by the manufacturer's instructions or in the absence of those, as described in sub-Clause 1710.1.

Repair material shall be deemed to be hardened when it has been in position for longer than the maximum workable time declared by the product manufacturer or 30 minutes whichever is the shorter period.

Surface Profile and Finish

- 10 The surface profile of a completed repair shall be the same as the existing concrete it replaces unless specified otherwise in Task specific Appendix 57/3.

The allowable tolerance on a finished surface and edges shall comply with Figure G.5a of Annex G in BS EN 13670.

- 11 The surface finish on a concrete repair shall comply with the required Clause 1708 standard described in Task specific Appendix 57/3 for a formed or unformed finish.

Where a formed surface finish to repairs is required, this is specified in Task specific Appendix 57/3.

- 12 Surface profile and finish of sprayed concrete is specified in Clause 5717.

Protection of a Completed Repair

- 13 Surface temperature of the repair and the immediately surrounding existing concrete shall not be allowed to fall below the minimum temperature specified in the manufacturer's instructions or 2° C, whichever is the higher temperature until the material has cured.

Immediately after placing and for the following 14 days, the completed repair shall be protected from contact with contaminants e.g. chlorides, oil, acids.

Curing of a Completed Repair

- 14 The required BS EN 13670 curing class shall be as specified in Task specific Appendix 57/3 for each element to be repaired. See Clause 5717 for sprayed concrete curing class.

Curing and protection of a completed repair shall be in accordance with BS EN 1504 Part 10 and with the manufacturer's instructions.

The use of curing liquids shall comply with Clause 1710 and instructions of the curing liquid manufacturer.

5715AR Flowable Concrete or Mortar

- 1 Flowable concrete or mortar products shall be chemical Type CC or PCC as defined in BS EN 1504 Part 1, and shall comply with the requirements of Clauses 5703 and 5704.

- 2 For the purposes of measuring consistency of fresh 'flowable' material before and during placement, the minimum "flowability" of high flow material shall be 750mm, and the minimum "flowability" of normal flow material shall be 450mm when measured in accordance with BS EN 13395-3.

- 3 When making test samples in accordance with BS EN 12190 for the determination of compressive strength of flowable concrete or mortar, no compaction shall be applied.

- 4 Repair material shall flow freely into the repair void to be filled and shall not be compacted using internal mechanical vibration. Formwork may be tapped lightly with a hammer to expel trapped air.
- 5 Contract compliance testing detailed in Appendix 1/5 shall be undertaken in accordance with Clause 5721.

5716AR Repair Concrete or Mortar

- 1 Repair concrete or mortar products shall be chemical Type CC, PCC or PC as defined in BS EN 1504 Part 1, and shall comply with requirements of Clauses 5703 and 5704.
- 2 Chemical type PC proprietary repair products shall only be used for small and superficial concrete repairs as defined in Task specific Appendix 57/3. Type PC products shall not be used where carbon steel reinforcement is exposed in the prepared repair void, nor where sub-Clauses 5718.2 and 5719.2 apply.
- 3 Where the product manufacturer's instructions permit repair mortar to be applied in more than one layer, the recommendation on maximum layer thickness shall not be exceeded. The exposed surface of underlying layers shall be prepared in accordance with the manufacturer's instructions. Locations where repair mortar shall be placed in a single layer are given in Task specific Appendix 57/3.
- 4 Finish on the completed surface of a repair patch using repair concrete or mortar shall be U2 or better in accordance with Clause 1708, unless stated otherwise in Task specific Appendix 57/3.
- 5 Contract compliance testing detailed in Appendix 1/5 shall be undertaken in accordance with Clause 5721.

Treatment of Areas with Low Cover to Reinforcement

- 6 The surface profile of reinstated concrete in repair areas which require an increased cover to reinforcement shall be as shown on the drawings or as specified in Task specific Appendix 57/3.

Areas requiring treatment for low cover to reinforcement shall be treated as follows:

- a) The perimeter of the treatment area shall be prepared in accordance with sub-Clause 5709.15.
 - b) The whole surface, including the perimeter of the area to be built up, shall be prepared in accordance with Clause 5710.
 - c) The prepared area shall then be filled with repair material to achieve the required minimum cover and profile specified.
- 7 BS EN 1504 Part 1, chemical types CC or PCC shall be used for low cover repairs. Chemical type PC products shall not be used.

5717AR Sprayed Concrete or Mortar

General Requirements

- 1 Sprayed concrete or mortar shall be a proprietary repair product type CC or PCC as defined in BS EN 1504 Part 1 and shall comply with Clauses 5703 and 5704.

- 2 The nominal maximum aggregate size shall be 8mm for sprayed concrete, and 3mm for sprayed mortar.
- 3 Either a dry-spray or a wet-spray application processes is permissible unless a single application process is specified in Task specific Appendix 57/4. A sprayed product used shall be formulated for the chosen or specified application process. Dry and wet application processes shall not be used together in the same repair.
- 4 Designed mix sprayed concrete is not covered by this Series. Proposals for a designed mix shall be subject to the approval of the *Client* through its Departure from Standard process.

Compressive Strength

- 5 BS EN 1504 Part 3 compressive strength class, shall be as specified in Task specific Appendix 57/1.

Consistence

- 6 Where a wet-mix sprayed concrete is specified, the required consistence of fresh material prior to application is given in Task specific Appendix 57/4.

Pre-Construction Quality Control

- 7 The *Contractor* shall ensure and provide written evidence to the *Client* to demonstrate that:
 - a) proposed operatives are appropriately trained and qualified to undertake sprayed concrete activities, and have recent experience of spraying concrete/mortar.
 - b) a suitable and sufficient risk assessment of the concrete spraying has been completed, and there is a safe system of work in place.
- 8 Where required by Appendix 1/5, the *Contractor* shall demonstrate by procedure trials, the materials, equipment and method of working; the competence of each proposed sprayed concrete nozzle operator; and test the properties of the sprayed concrete when placed.

Procedure Trials - Construction of Test Panels

- 9 Before concrete repairs commence on site, the *Contractor* shall prepare sprayed concrete test panels.

Sprayed concrete test panels shall be constructed in timber moulds using the same sprayed concrete product, mixing, spray equipment and spraying method proposed for use in the permanent works. Minimum dimensions of moulds shall be 750mm x 750mm x 150 mm deep unless stated otherwise in Task specific Appendix 57/4. The moulds shall not be coated with release agent.

Two test panels shall be produced for each proposed sprayed concrete product or mix and at each inclination described in Task specific Appendix 57/4 by each spray-gun operator the *Contractor* proposes for the work. At least three sprayed concrete test panels shall be made for each contract where sprayed concrete test panels are specified in Appendix 1/5.

The same requirements for test panels shall apply if a robotic concrete spraying machine is proposed.

Categories of inclination shall be as follows:

- a) Horizontal soffit (inclination to horizontal, 0° C – 5° C)
- b) Horizontal upper surface (inclination to horizontal, 0° C – 5° C)

- c) Vertical (inclination to horizontal, 80° C – 90° C)
- d) Inclined (inclination to horizontal, 5° C – 80° C)

One or more test panels shall contain steel reinforcement bars of similar diameter, spacing and orientation to a typical section of an existing reinforced concrete element intended for repair.

Studs or screws shall be used to measure shrinkage cracking in the concrete test panels. Monitoring points at an equal spacing of 200 mm shall be installed immediately after spraying at three places in a triangular arrangement on three of the test panels. The test panels shall be kept for 56 days.

Stainless steel pins shall be inserted into plain concrete test panels when the concrete is still fresh after spraying where measurements of electrical resistivity are required in Appendix 1/5.

Sprayed test panels shall not be moved until the concrete is at least 36 hours old.

The concrete shall be cured for 7 days, using the same curing method proposed for the permanent works.

Test panels and samples shall be protected to prevent damage or moisture loss during transportation to a testing laboratory

Samples to be Removed from Test Panels

- 10 Samples to be removed from the test panels are specified in contact specific Appendix 57/4 and Appendix 1/5.

Samples shall be removed from test panels in accordance with BS EN 12504 Part 1, and shall not include any concrete within 125mm of the edge. Samples shall be removed when the concrete is old enough to resist stresses from cutting or coring equipment without damage or reduction in strength properties.

Samples for determining electrical resistivity of the sprayed concrete shall be 150mm cubes removed from a plain concrete test panel and include stainless steel pins. Alternatively, the samples with stainless steel pins may be left in the test panel.

Samples Remaining in Test Panels

- 11 Samples of sprayed concrete for measuring shrinkage shall be left in the concrete remaining in the test panel after removal of other specimens for destructive testing.

Samples of sprayed concrete testing for measuring electrical resistivity may be left in the concrete test panel.

Sampling, Inspection and Testing of Concrete Samples from Panels

- 12 Testing and performance requirements for samples from panels are given in Table 57/5.
- 13 All core samples taken from the test panels and the bores in the remaining concrete shall be inspected for integrity. Photographic records shall be taken and retained for reference. Inspection and recording shall be completed prior to samples being destructively tested.
- 14 Concrete samples or concrete remaining in the test panel, shall be delivered for testing to an accredited testing laboratory as required by sub-Clause 105.4. Sprayed test panels shall not be transported until the concrete is at least 36 hours old.
- 15 Tests specified in Appendix 1/5 shall be carried out on samples or on the sprayed panel itself.

Measurements of shrinkage and readings of air temperature and surface temperature of the concrete shall be taken and recorded at casting, and then at regular intervals to monitor movement in the concrete until the concrete is 28 days old. One additional measurement shall be taken and recorded when the concrete is 56 days old.

The percentage of shrinkage in the concrete shall be calculated from these readings.

Measurements of electrical resistivity shall be carried out on the cubes removed from the test panel or on concrete remaining in the test panel.

Table 57/5 Performance Requirements for Samples taken from Sprayed-Concrete Test Panels or on the panels.

Type of sample	Performance characteristic	Test or sampling method	BS EN 1504 Part 3 class/performance requirement	
			Class R4	Class R3
Core (50mm or 100mm dia.)	28-day compressive strength	(BS EN 12504-1) (BS EN 14488-1) BS EN 12390-3	Appendix 57/1	Appendix 57/1
Core (50mm or 100mm dia.)	28-day elastic modulus (secant)	BS EN 12390-13	Appendix 57/1, subject to min. 20 GPa	Appendix 57/1, subject to min. 15 GPa
Core through reinforcement (100mm dia.)	Integrity - containing minimal defects	BS EN 12504-1, National Annex - inspection	No defect, laminations, voiding etc. (3% max. voidage)	
Test panel including Studs or screws	Percentage shrinkage at 28 days	Measurement in accordance with Sub-Clause 5717.14	≤ 0.07% At 28 days for spray gun method Additionally at 56 days	≤ 0.07% At 28 days for spray gun method Additionally at 56 days
150mm cube cut from test panels or remaining concrete in panel	Electrical resistivity at 28 days	4-pin Wenner test	Sub-Clause 5718.10 or 5719.6 (subject to testing being required - see Appendix 57/1)	

Test Result Acceptability Criteria

- 16 The 28 day minimum compressive strength, as stated in Task specific Appendix 57/1, and elastic modulus requirements are satisfied if, for each panel, the average of the measured values is greater than the specified threshold value and the difference between the lowest and highest values is not more than 20% of their average.

The competence of the sprayed concrete operative shall be deemed to be acceptable for shrinkage, if measured shrinkage at 28 days is less than the Table 57/5 performance requirement.

Where the permanent works includes galvanic anodes within repair areas (see Task specific Appendix 57/1) or a surface applied cathodic protection system is part of the contract or planned later (see Task specific Appendix 57/3), the electrical resistivity of sprayed concrete shall comply with Clause 5718 or 5719 as appropriate.

Cores taken from test panels shall not reveal significant voids or laminations. Inspection of cores from reinforced panels shall identify any shadowing behind bars. Total voidage permitted is up to 3%.

Test Results Report

- 17 The *Contractor* shall prepare a report on tests carried out on sprayed concrete test panels and for core integrity, and submit a copy to the *Client* before sprayed concrete construction commences on site. The test report shall comply with BS EN 12504 Part 1 and additionally include for each specimen, apparent density, voidage, age and curing conditions, test results, and performance threshold values.

Quality Control - Assessment of Conformity

Production Control

- 18 Sprayed concrete production in the main works shall not commence until procedure trials have been demonstrated to be satisfactory.
- 19 Production control of the sprayed concrete material during the works shall comply with Clause 5708. Where a wet-spray application process is specified or proposed, the consistency of the wet mix shall be as stated in Task specific Appendix 57/4, for monitoring and control of quality on site.
- 20 The inspection category for sprayed concrete repairs to concrete highways structures shall be Category 3 in accordance with BS EN 14487 Part 1, unless otherwise specified in Task specific Appendix 57/4.

Execution of Sprayed Concrete

- 21 Application of sprayed concrete or mortar shall be in accordance with the manufacturer's instructions for use, and BS EN 1504 Part 10.
- 22 The *Contractor* shall on completion of the sprayed concrete activities, remove all remaining oversprayed material from structural elements and other elements of the highway adjacent to the working areas.

Construction Joints

- 23 Unless otherwise described in Task specific Appendix 57/4, construction joints in a sprayed area shall be sloped back at approximately 120° C to the substrate, or cut back square to the reinforcement and then sloped back at 120° C to the substrate. The construction joint shall be thoroughly cleaned, all laitance and loose material removed and the surface pre-wetted as required in Clause 5710 prior to the placement of more sprayed concrete.

Curing

- 24 Repair areas constructed using sprayed concrete or mortar shall be cured and protected in accordance with BS EN 14487 Part 2, sub-Clause 9.3, or in accordance with the time period indicated in the manufacturer's instructions whichever is the longer period. BS EN 13670 curing class 4 shall apply.

Surface Finishes

- 25 The surface finish of sprayed concrete shall be in accordance with BS EN 14487 Part 2, sub-Clause 9.2 and shall be left as-sprayed from the nozzle, unless specified otherwise in Task specific Appendix 57/4.

Surface Profile

- 26 Surface profile of a completed repair shall be the same as the existing unless specified otherwise in Task specific Appendix 57/3.

Geometric surface tolerance for an as-sprayed concrete surface shall be in accordance with BS EN 13670, Annex G, Figure G.5a (non-moulded surface).

Contract Compliance Tests

- 27 Contract compliance testing of performance for the completed sprayed concrete repairs is detailed in Appendix 1/5 and shall be undertaken in accordance with Clause 5721.

5718AR Repairs to Structures to Receive Impressed Current Cathodic Protection

General

- 1 This clause applies where the contract includes repairs to reinforced concrete and a cathodic protection system within an overlay, or where a cathodic protection system within an overlay is planned at a later date as indicated in Task specific Appendix 57/3.
- 2 Where embedded metal objects are visible at the concrete surface, and are not specified for connection to the cathodic protection system, the *Contractor* shall identify, mark and prepare a survey report of the objects if they are likely to cause an electrical short circuit between the system negative and the cathodic protection anode in accordance with BS EN ISO 12696. A copy of the survey report shall be submitted to the *Client*.
- 3 Cement-based or cementitious products, BS EN 1504 Part 1 Type CC or PCC, shall be used. Polymer-based repair products (type PC) or cementitious repair products containing conductive fibres or electrically conducting additives shall not be used.

Removal of Detrimental Objects and Old Repairs

- 4 Where indicated in Task specific Appendix 57/3, detrimental metal objects and surrounding existing concrete shall be removed and the concrete surface shall be reinstated to its former profile using acceptable repair products in accordance with this Series
- 5 Where indicated in Task specific Appendix 57/3, previously executed concrete repairs with a resistivity greater than 100 kΩ•cm shall be removed and the concrete surface shall be reinstated to its former profile using acceptable repair products in accordance with this Series.

Treatment of Areas with Low Cover to Reinforcement

- 6 Where low concrete cover to existing reinforcement is required to be increased before installing a cathodic protection system contained within an overlay, the areas shall be treated in accordance with Clause 5716.

Treatment of Steel Reinforcement

- 7 Existing steel reinforcement exposed within a repair patch shall be tested for continuity as described in BS EN ISO 12696. Any reinforcement failing the test shall be made continuous prior to applying repair material. Tying wire used to restore continuity of reinforcement shall comply with Clause 1714.

Testing of Completed Repairs

- 8 The conductivity of completed repairs shall be measured to demonstrate that electrical resistivity is within permitted limits. Concrete in the repair patch shall be at least 28 days old.

- 9 The electrical resistivity of completed repairs shall be measured using BS EN 1504 Part 10, Test No. 15 or an equivalent method acceptable to the *Client*.
- 10 The electrical resistivity shall be within 50% to 200% of the electrical resistivity of the parent concrete, but shall not exceed 100 kΩ•cm. The electrical resistivity of the parent concrete shall be as stated in Task specific Appendix 57/1.

5719AR Repairs to Structures using Galvanic Anodes for Control of Incipient Anode Effect

General

- 1 This clause applies for concrete repairs to structures which include galvanic anodes complying with Clause 5712 and located within the repair patch.
- 2 Cement-based or cementitious products shall be used, BS EN 1504 Part 1 Type CC or PCC. Polymer-based repair products, type PC, or repair materials containing conductive fibres or electrically conductive additives shall not be permitted.

Treatment of Steel Reinforcement

- 3 Steel reinforcement exposed within a repair patch shall be tested for continuity as described in BS EN ISO 12696. Any reinforcement failing the test shall be made continuous prior to applying repair material. Tying wire used to restore continuity of reinforcement shall comply with Clause 1714.

Testing of Completed Repairs

- 4 The conductivity of completed repairs shall be measured to demonstrate that electrical resistivity is within permitted limits. Concrete in the repair patch shall be at least 28 days old.
- 5 The electrical resistivity of completed repairs shall be measured using BS EN 1504 Part 10, Test No. 15 or an equivalent method acceptable to the *Client*.
- 6 The electrical resistivity shall be not less than 5 kΩ•cm and not greater than 15 kΩ•cm. Concrete in the repair patch shall be at least 28 days old.
- 7 Electrical resistivity of proposed repair product which is greater than 15 kΩ•cm, will be acceptable if a bridging conductive material has been provided locally around each anode after it is attached to reinforcement. Evidence of this shall be supplied to the *Client* on request.

5720AR Concrete Injection

Introduction

- 1 This Clause covers injecting and filling of cracks in concrete satisfying Principles 1 and 4 of BS EN 1504 Part 9, Table 1.
- 2 This Clause does not cover the following applications of concrete injection described in BS EN 1504 Part 5:
 - (a) highly specialised applications in extreme environmental conditions or specialised circumstances (reference Clause 1 of BS EN 1504 Part 5).
 - (b) test methods and performance requirements for special applications (reference sub-Clause 5.3 of BS EN 1504 Part 5)

Where such applications are proposed they shall be subject to the approval of the *Client* through its Departure from Standards process.

General Requirements

- 3 The location and dimensions of cracks requiring treatment, and the function concrete injection products shall perform are stated in Task specific Appendix 57/5.

Requirements for BS EN 1504 Part 5 Products for Concrete Injection

- 4 The *Contractor* shall supply the evidence required in Clause 5703 to the *Client* including the Declaration of Performance for the proposed materials to demonstrate compliance with BS EN 1504 Part 5, and the specification.

Products selected for crack filling/injection shall be suitable for their intended use and shall meet at least the minimum performance requirements given in Tables 57/7, 57/8 or 57/9 as appropriate to the function the products shall perform, and the requirements stated in Task specific Appendix 57/5

Table 57/6 Performance Requirements for BS EN 1504 Part 5 Concrete Injection Products - Force Transmitting Filling of Cracks (F)

BS EN 1504 Part 5 Essential characteristic	Description of performance characteristic	Type of binder used in product	Performance requirement (reference tables in BS EN 1504 Part 5)
Adhesion by tensile bond strength f_{ct}	Adhesion by tensile bond strength	H, P	Following BS EN 1504 Part 9, Principle 4 F1: $f_{ct} \geq 3.0 \text{ N/mm}^2$ F2: $f_{ct} \geq 2.0 \text{ N/mm}^2$ as stated in Task specific Appendix 57/5 for required F bond strength
Compressive strength	Compressive strength	H	$f_{ct} > 20 \text{ N/mm}^2$ after 7 days
Shrinkage	Bleeding	H	Bleeding <1% of the initial volume after 3 hours
	Volume change	H	-1% < volume change < +5% of the initial volume
	Non-volatile matter	P	>95%
Workability	Injectability into dry medium	H, P	Table 6 (9), Task specific Appendix 57/5 for minimum thickness of crack
Workability	Injectability into non-dry medium	H, P	Table 6 (10), Task specific Appendix 57/5 for minimum thickness of crack
Durability	Adhesion by tensile bond strength after thermal and wet-drying cycles	P	F1: $f_{ct} \geq 3.0 \text{ N/mm}^2$ F2: $f_{ct} \geq 2.0 \text{ N/mm}^2$ Task specific Appendix 57/5 for required F bond strength
Release of dangerous substances	BS EN 1504 Part 5, Section 5.4	H, P	Comply

General notes for Table 57/6.

- (i) BS EN 1504, Part 5 codes for type of binder are H = hydraulic, P = polymer
- (ii) Number in parentheses after BS EN 1504 Part 5 table number denotes item no.
- (iii) Function classification of injection product shall be as specified in Task specific Appendix 57/5.

**Table 57/7 Performance requirements for BS EN 1504 Part 5 Concrete Injection Products -
 Ductile Filling of Cracks (D)**

BS EN 1504 Part 5 Essential characteristic	Description of performance characteristic	Type of binder used in product	Performance requirement (reference tables in BS EN 1504 Part 5)
Adhesion and elongation capacity	Adhesion and elongation capacity of ductile injection products	P	Adhesion: as stated in Task specific Appendix 57/5 Elongation: > 10%
Workability	Injectability into dry medium	P	Table 7 (4), Task specific Appendix 57/5 for minimum thickness of crack
Workability	Injectability into non-dry medium	P	Table 7 (5), Task specific Appendix 57/5 for minimum thickness of crack
Durability	Compatibility with concrete	P	Table 7 (8)
Release of dangerous substances	BS EN 1504 Part 5, Section 5.4	P	Comply

General notes for Table 57/7.

- (i) BS EN 1504, Part 5 codes for type of binder are P = polymer
- (ii) Number in parentheses after BS EN 1504 Part 5 table number denotes item no.
- (iii) Function classification of product shall be as specified in Task specific Appendix 57/5.

**Table 57/8 Performance Requirements for BS EN 1504 Part 5 Concrete Injection Products -
 Swelling Fitted Filling of Cracks (S)**

BS EN 1504 Part 5 Essential characteristic	Description of performance characteristic	Type of binder used in product	Performance requirement (reference tables in BS EN 1504 Part 5)
Watertightness	Watertightness	P	Watertight at 2×10^5 Pa
Workability	Viscosity	P	≤ 60 mPa s Percentage of crack filled >95%
Expansion ratio and rate by water storage.	Weight changes by air drying and water storage	P	as stated in Task specific Appendix 57/5
Durability	Sensitivity to water	P	Table 8 (6)
Durability	Sensitivity to drying-wet cycles	P	Table 8 (7)
Durability	Compatibility with concrete	P	Table 8 (8)
Release of dangerous substances	BS EN 1504 Part 5, Section 5.4	P	Comply

General notes for Table 57/8.

- (i) BS EN 1504, Part 5 codes for type of binder are P = polymer
- (ii) Number in parentheses after BS EN 1504 Part 5 table number denotes item no.
- (iii) Function classification of product shall be as specified in Task specific Appendix 57/5.

Inspection to Identify Cracks for Treatment

- 5 Where a survey of cracks is specified in Task specific Appendix 57/5, the *Contractor* shall provide access to enable an inspection of the structure to be undertaken with the *Client* to confirm which cracks require treatment. Cleaning of the concrete surface to expose the cracks shall be carried out prior to the inspection.

Quality Control Tests

- 6 The *Contractor* shall carry out routine quality control works tests as described in Clause 5708. Additional quality control test for concrete injection construction activities shall be undertaken as required in Appendix 1/5.

Preparation of Cracks

- 7 Debris lodged within the cracks and surface contamination of the crack sides, BS EN 1504 Part 10, observation No. 14, shall be removed before injection or filling.

Where moisture within the crack or soaked into the sides of the concrete, BS EN 1504 Part 10, Observation No. 9, is greater than recommended by the manufacturer of proposed injection product, it shall be removed prior to crack injection or filling. Details of the proposed process of moisture removal shall be described in the construction method statement.

Execution of Concrete Injection

- 8 The mixing and application of all concrete injection products for filling or injection of cracks in concrete shall be in accordance with BS EN 1504 Part 10 and the manufacturer's recommendations for the proposed method of injection.

The procedure for concrete injection shall ensure all cracks and voids interconnected with surface cracks within the structural member are completely filled.

Injection products spilled onto adjacent surfaces of the structure shall be removed.

Contract Compliance Tests

- 9 Testing shall be undertaken in accordance with Appendix 1/5 and Clause 5721.

5721AR Contract Compliance Testing on Completed Repairs

General

- 1 The *Contractor* is responsible for demonstrating that repairs have been carried out in accordance with the contract. The *Client* shall be notified in advance of a repair integrity survey or removal of test samples and be given the opportunity to be present during the work.

Repair Sounding – Integrity of Repair

- 2 The soundness/integrity of all completed repairs shall be demonstrated by hammer sounding. Hollow sounding areas shall be removed and the repairs re-executed as agreed with the *Client*.

Electrical Resistivity Measurement, Conductivity of Repair

- 3 Where the work includes galvanic anodes within repair areas as indicated in Task specific Appendix 57/1, or impressed current cathodic protection as required by Task specific Appendix 57/3, the conductivity of completed repairs shall be confirmed by demonstrating that electrical resistivity is within permitted limits as required by Clause 5718 or 5719 as appropriate.

Cores – general

- 4 Indicative core positions shall be located where shown on contract drawings, indicated in Appendix 57/3 or as directed by the *Client*. The exact position of each core shall be chosen on site by the *Contractor* to avoid damage to reinforcement.

Drilling shall be stopped immediately if a reinforcing bar is encountered and the *Contractor* shall determine an alternative location for the core as close as possible to the specified location.

Cores – Integrity of Repair

When stated in Appendix 1/5, the integrity of repair work shall be demonstrated by drilling cores through completed repairs. Cores shall be drilled in accordance with BS EN 12504-1. The frequency and distribution of cores shall be as specified in Appendices 1/5 and 57/3 respectively.

The drilling of cores to demonstrate integrity in each repaired area shall be carried out as soon as practicable after the removal of formwork (if used), but not until the repair concrete strength is estimated to exceed 15 MPa.

Cores – Adhesion to Substrate

- 5 When stated in Appendix 1/5, the *Contractor* shall demonstrate that repaired areas have adequate adhesion to the substrate by drilling cores through completed repairs. The frequency and distribution of cores shall be as specified in Appendices 1/5 and 57/3 respectively.

Cores to determine adhesion in each repaired area shall not be removed and tested until the repair is estimated to have attained its characteristic compressive strength required by the Class specified in Task specific Appendix 57/1. In the absence of compressive test results, the testing of cores for adhesion shall be at least 28 days after placement of repair material.

Cores shall be drilled in accordance with BS EN 12504 Part 1, with reference to BS EN 14488 Part 4 for depth of bore.

Cores – Compressive Strength

- 6 When stated in Appendix 1/5, the *Contractor* shall demonstrate repaired areas have adequate strength by drilling cores through completed repairs. The frequency and distribution of cores shall be as specified in Appendices 1/5 and 57/3 respectively.

Cores shall be drilled in accordance with BS EN 12504 Part 1, with reference to BS EN 14488 Part 4 for depth of bore.

Cores – Injection/Filling of Cracks

- 7 When stated in Appendix 1/5, the *Contractor* shall demonstrate the extent of crack filling by drilling cores through injected/filled cracks. The frequency and distribution of cores shall be as specified in Appendices 1/5 and 57/5 respectively.

Cores shall be drilled in accordance with BS EN 12504 Part 1, but shall be 50mm diameter x 100mm long, however the *Contractor* shall allow for taking 25mm diameter x 100mm long cores in place of the 50mm diameter cores where directed by the *Client*.

Inspection of bores

- 8 The *Contractor* shall provide access for the *Client* to carry out an examination of the core holes, provide 2 working days notice it is available and shall allow a period of 4 hours for such inspection. The *Contractor* shall also make the concrete cores available for inspection.

Repair Integrity

- 9 The *Contractor* shall compare all exposed surfaces of bores and cores removed with photographs in NA.4 of BS EN 12504 Part 1 and measure the total area of voids visible on the exposed faces. Total voidage shall not exceed 3 % of the exposed surface area of the core or the corresponding surface area of the bore hole.

Adhesion to Substrate

- 10 Core testing for adhesion of repair to substrate shall comply with BS EN 14488-4 for sprayed concrete or BS EN 1542 for high flow concrete or repair mortar.

Target adhesion strength shall be in accordance with Task specific Appendix 57/3. Any tested cores where failure is fully within the concrete substrate and the adhesion strength is less than 1 N/mm² shall not count as part of the results from which the average is calculated. Additional cores and tests shall be undertaken until a satisfactory set of results has been obtained.

Compressive Strength

- 11 The compressive strength of cores measured in accordance with BS EN 12390 Part 3, shall be consistent with the Class of repair material specified in Task specific Appendix 57/1.

Filling or Injecting of Cracks

- 12 Core samples shall be inspected to confirm that the penetration requirements are met. The percentage extent of crack filling shall be at least 80% or other higher value specified in Task specific Appendix 57/5. If the minimum percentage is not achieved, the crack filling shall be declared to be provisionally unsatisfactory. The cores shall then be loaded under compression to destruction. If no fracture occurs on a glue line, the core is acceptable.

If following compression loading, the break occurs on a glue line, the core is acceptable if the calculated bond strength between hardened injection material and existing substrate is not less than 1 N/mm² when tested in accordance with BS EN 1542.

In the event of non-compliance with this sub-clause, the *Contractor* shall be required to provide further remedial proposals.

Reporting of Test Results

- 13 The *Contractor* shall prepare a report on tests for core integrity, filling of cracks, repair adhesion and compressive strength in accordance with BS EN 12504-1, BS EN 14488-4 and BS EN 12390-3 and submit a copy to the *Client* in accordance with Clause 105. Total voidage of each bore and each core shall also be reported.

Repair Completion and Reinstatement of Cores

- 14 The *Contractor* shall maintain any temporary support and access systems in place until at least 2 working days after the above testing report has been submitted to the *Client* confirming that the concrete repairs are satisfactory. If the repairs do not comply, temporary support and access shall be maintained until remedial work is confirmed as compliant with the specification.

When the repairs are confirmed as satisfactory, the *Contractor* shall remove all dust and debris from each test hole, roughen and pre-wet the bore, and then fill the holes with Repair Mortar complying with the requirements of Clause 57/16, and product manufacturer's instructions. Filling of core holes shall be done as soon as reasonably practical after completion of the core sampling.

5722AR Wall Tiles (Glazed and Mosaic)

1. All damaged or defective tiles, adhesive, mortar, loose concrete, grout and the like shall be broken out and taken to a licensed Tip. Any areas of the underlying concrete surface which have been damaged shall be made good as detailed in this series. Repair materials shall be compatible with the new adhesive to be used. The edges of retained existing tiles shall be clean and free from any grout.
2. Unless otherwise instructed, replacement tiles shall be glazed ceramic, of a colour, size and pattern to match existing tiles. They shall be installed to a line and level to match existing tiling, with the joints grouted to match the existing grout colour and pattern. Adhesive and grout shall be polymer modified cement based. New tiling shall be cleaned of excess grout when the grout to the joints has hardened.
3. Where a mural or other new tile pattern is instructed to replace the existing, the *Contractor* shall produce final working drawings from sketches provided by the *Client*. Mural tile patterns shall be constructed from tiles of area approximately 225cm², cut as required.
4. All materials shall have BBA certification and be for external use. Grout and adhesive shall comply with BS EN 12004 and workmanship with BS 8000 Part 11.

Additional, Cancelled, Modified & Substitute Clauses
Series 9000 Drainage CCTV

9002SR	Information
9003MR	Definitions
9004SR	General Requirements
9005SR	Survey Reporting
9006MR	Quality
9008SR	Coding of Survey Information

This Series varies the Manual of Contract Documents for Highways Works, Volume 5, Section 9, Part 2.

Throughout this series:

Replace "Survey Contractor" with "*Contractor*"

Replace "Overseeing Organisation" and "Overseeing Organisation's Representative" with "*Client*"

9002SR Information

General

- 1 The Approved Code of Practice (ACOP) on safe work in confined spaces (confined space regulations 2014) as issued by the Health and Safety Executive (HSE) recommends that "*people should not normally enter sewers of dimensions smaller than 0.9 m high by 0.6 m wide. Even this 'minimum size' may in certain circumstances be too small for reliance on a safe system of work alone*". All sewer/drain pipelines and associated manholes and access chambers are classified as confined spaces.
- 2 Access shall generally be avoided if other appropriate means can be employed. With pan and tilt camera, correct lighting and calibration, pipes up to 2000mm diameter and distances in excess of 300m can be inspected using CCTV without the need for human entry. Large culvert surveys can be undertaken using floating camera systems.

9003MR Definitions

In sub-Clause 1:

In the definition for 'Catchpit', insert "(sump)" after "chamber base"

Replace the definition of 'Confined Space' with "A confined space is a place which is substantially enclosed (though not always entirely), and where serious injury can occur from hazardous substances or conditions within the space or nearby (e.g. lack of oxygen)."

Add new definition: "**Drain:** Pipeline, usually underground, designed to carry wastewater and/or surface water from a source to a sewer."

Delete the definition of 'Overseeing Organisation's Representative'

Replace the definition of 'Node' with "Manhole, inspection chamber, outfall, rodding eye or other significant intermediate point"

Replace the definition of 'Site' with "The location or locations of the survey or surveys as detailed in the Task Order"

Replace the definition of 'Surveyor' with "An appropriately qualified person who will be undertaking the CCTV Inspections and for whom evidence of qualification to OS19X and OS21X has been provided."

Delete the definition of 'Survey Contractor'

9004SR General Requirements

General

- 1 CCTV Inspections shall be carried out on buried pipework and other buried drainage conduits (unless it is impossible to do so by virtue of the asset's cross section or alignment) and shall comply with the requirements of the WRc Model Contract Document for Sewer Condition Inspection, and be analysed in accordance with the current edition of the WRc Manual of Sewer Condition Classification (MSCC) except where modified by this specification.
- 2 Personnel undertaking the CCTV inspections, shall hold the appropriate qualification from an accredited training provider in the survey procedure, the interpretation of CCTV images of drains and in defect coding & classification.
- 3 The survey shall be carried out as indicated on the Task Order.
- 4 The location of the survey shall be as detailed in the Task Order.
- 5 The *Contractor* shall provide sufficient vehicles and equipment, including stand-by units, to complete the survey as instructed.
- 6 Pre-cleansing of the drains shall be carried out where specified in the Task Order.
- 7 The survey team shall be equipped with a suitable working means of being able to immediately contact or be contacted by the *Client* for the duration of the survey.

Traffic Management

- 8 The Contractor shall provide the traffic management for the duration of the survey. This includes the provision of any Orders, suspensions, permits, or any other processes and enforcement required to ensure free access to the site.

Hazards

- 9 If as a result of inspection (or any other activity), any usage or defect which might cause risk, has been identified; it shall be made safe, recorded, and brought to the immediate attention of the *Client*
- 10 Should an access chamber cover or gully grating be damaged during the survey, the *Contractor* shall provide immediate temporary protection to the chamber and arrange for a permanent repair. The position shall be recorded in the *Client's* Asset Management Information System.

Flows and blockages

- 11 The *Contractor* shall be responsible for dealing with the flow by means of temporary stoppers for limited periods, insofar as this can be achieved without causing flooding or pollution of receiving waters. The *Contractor* should allow for flow diversion or over-pumping if required and there is sufficient capacity in the branch system.
- 12 Where there is a temporary increase in the flow rate in the drain, the *Contractor* shall either move to another survey location, or suspend operations until the flow has abated. The *Contractor* shall allow for costs associated with temporary flow increases resulting from natural causes.
- 13 Where a blockage is discovered in the drain, the *Contractor* shall inform the *Client*. The *Contractor* shall proceed to the next length to be surveyed.

9005SR Survey Reporting

General

- 1 The content and format of the survey report shall be as described in this clause.
- 2 A separate report shall be provided for each drain length, in accordance with sub-Clause 9008.6.
- 3 Where the section of drain between consecutive access points is surveyed from each end due to obstruction, then two separate reports shall be provided.
- 4 On completion of the survey the *Contractor* shall supply to the *Client* one clean set of legible digital A3 plans showing all nodes with numbers that coincide with the reports and video footage for the inspection. The plans shall be annotated to show any grade 3 defects and above noted during the survey, as well as the location of any aborted surveys. Any numbers associated to assets shall be as shown in the *Client's* Asset Management Information System where they exist.
- 5 If a survey is abandoned, the *Contractor* must state the cause and provide suitable evidence.

Video recording

- 6 All CCTV surveys shall be recorded in MPEG format and supplied on CD, DVD, USB, and/or via the Common Data Environment.

Coding of survey

- 7 The information from the survey shall be coded in accordance with sub-Clause 9008.8.
- 8 Site coding sheets shall be completed as specified in sub-Clauses 9005.1 and 9008.7 by the Surveyor at the time of the survey. Direct entry of survey data into an on-site computer recording system in accordance with the current edition of the WRc Manual of Sewer Condition Classification (MSCC) is acceptable.
- 9 At the commencement of the survey of every length of drain between consecutive access points, the surveyor shall complete a new inspection sheet.
- 10 Sub-Clause 9008.5 gives details of the information that is to be recorded on the inspection sheet.
- 11 CCTV Inspection video footage shall be included in the Inspection Report as coded inspection data in accordance with the current edition of the WRc Manual of Sewer Condition Classification
- 12 A copy of the coded data shall be supplied in a digital format that can be readily interrogated by commercial software available from more than one supplier.

9006MR Quality

Delete sub-Clause 1, and replace with :-

- 1 "The *Contractor* shall ensure that the personnel undertaking the survey hold an appropriate qualification in the interpretations of CCTV images of drains, in defect coding and classification and shall verify that any certificates supplied are genuinely held by the individual. The *Contractor* shall supply details and copies of certificates when requested."

Delete sub-Clauses 9-11, and replace with new sub-clause 9:

"Survey Equipment

- 9 The camera shall be capable of producing high quality colour imagery and provide complete inspections and view of all laterals and defects
 - a) The camera shall be a "Pan & Tilt" type having the capability of panning the pipe at 360 degrees and tilt capability of 270 degrees
 - b) The live picture is to be visible with no interference.
 - c) The camera is to be waterproof with a self-contained lighting system capable of being remotely adjusted. Lights shall provide an even distribution of light around the pipeline perimeter without the loss of contrast or flare out or picture shadowing.
 - d) The camera lens is to remain free of grease or other detritus matter for the duration of the survey to ensure optimal clarity.
 - e) Steaming and fogging encountered during the survey shall be eliminated by introducing forced air flow by means of fan.
 - f) Set zero chainage at face of every manhole, or on entrance into pipe or start of pipe culvert."

9008SR Coding of Survey Information

General

- 1 The coding system for highway drains shall be in accordance with the current edition of the WRc Manual of Sewer Condition Classification (MSCC). The information shall be presented in a coded inspection report which details the individual defect scores, computed structural and serviceability grade and internal condition grade for each section of drain.
- 2 All codes applicable to highway drainage are listed and defined the WRc Manual of Sewer Condition Classification.
- 3 Should there be no appropriate code for a particular defect then the remark code (REM) shall be used and a brief description inserted into the associated remarks column.

Header information

- 4 The following header data shall be completed for the survey of each section of drain between defined node points. Where a new (unchartered) node is located during the survey, the survey contractor shall allocate an arbitrary number for the purpose of the survey. The survey

contractor shall ensure that this number is consistent throughout and clearly marked on the plans (see sub-clause 9005.4).

5 The following header information shall be completed on every inspection sheet:

- a) Pipe reference and Start and Finish node references
- b) Description of the location (e.g. name of road/street, traffic direction)
- c) Coding system used
- d) Length of drain
- e) Method of inspection
- f) Pre-cleansing
- g) Location type
- h) Shape
- i) Dimensions
- j) Material
- k) Year of construction (where known)
- l) Name of the surveyor
- m) London Borough
- n) Route number
- o) Pre-cleaning
- p) Date surveyed

Survey report

6 A separate inspection report shall be completed for the survey of each section of drain between defined node points. The general structure shall be in two parts; the header information (9008.5) and the observations during the survey. An example of the coded inspection report format is included in Appendix 90/1.

7 Where different observation types occur at the same position, each defect or feature shall be coded separately.

8 The defects, features, and the general condition shall be coded in accordance with the current edition of the MSCC and shall be recorded on an appropriate digital format (see sub-Clause 9005.5) and shall be supported by a coded inspection report (see sub-clause 9008.1).

9009MR Drain Inspection Condition

In sub-Clause 1, delete "Unless separately specified in Appendix 90/1"

In sub-Clause 9, delete "EN 13508-2:2001" and replace with "BS EN 13508-2:2003+A1:2011"

In sub-Clause 16, delete "header sheet" and replace with "inspection report"

Transport for London

London Highway Maintenance and
Projects Framework

Technical Specification Part 3

Numbered Appendices

North Area

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Series 0100 Preliminaries

Appendix

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1/2	Vehicles for the <i>Client</i>
1/5	Testing of Materials
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1/60	Design Staff

Appendix 1/1 – Temporary Office and Equipment for the *Client*

Accommodation Type A: Portable Offices for the *Client*

1. The portable office shall measure 4.5m x 2.5m on plan (clear floor area) and shall include 2 No. windows (total 2 sq m minimum, 1 sq m minimum to open).
2. The offices shall be lined throughout.
3. A lock with four keys shall be provided for the entrance door.
4. Each office shall be fitted with electric heating and lighting which shall be powered from a suitable sized generator or an Electricity Board supply as appropriate.
5. Heating and general requirements shall be in accordance with the Offices, Shops and Railway Premises Act 1963 and any relevant subsequent legislation.
6. All windows shall be fitted with external close boarded shutters capable of being fastened and secured.
7. Boot cleaning facilities shall be provided outside the door.
8. Hardstanding car parking to be provided for 2 vehicles.
9. Portable office to be located as agreed with the *Client*.
10. The following furniture and equipment shall be provided for each portable office:
 - a) Office desk (1.4 x 0.8 m) lockable 2 No.
 - b) Chairs 2 No.
 - c) 4 drawer filing cabinet 1 No.
 - d) Wi-Fi Printer / copier
 - e) Wastepaper basket 2 No.
 - f) Portable wash basin, soap and towels 1 No.
 - g) Sanitary hut with flushing toilet 1 No.
 - h) First aid kit (size 1-10 persons) 1 No.
 - i) Fire extinguisher (general purpose type AFF) 1 No.
 - j) 225mm x 25mm shelving 5m
 - k) Hat and coat hooks 3 No.
 - l) 5 Gallon water container 1 No.
 - m) refrigerator
 - n) Kettle – 4 pint 1 No.
 - o) Teapot – 3 pint 1 No.
 - p) Tea service comprising jugs, bowls, mugs, saucers, plates, spoons for 4 persons

Accommodation Type B: Offices for the *Client*

1. Accommodation shall measure 9m x 2.5m on plan (clear floor area) and shall include a minimum of 2 offices, each office having 2 No. windows (total 2m² minimum, 1m² minimum to open). Separate water closet and washbasin shall be provided.
2. The offices shall be lined throughout.
3. A lock with four keys shall be provided for the entrance door.
4. Each office shall be fitted with electric heating and lighting which shall be powered from a suitable sized generator or an Electricity Board supply as appropriate.
5. Heating and general requirements shall be in accordance with the Offices, Shops and Railway Premises Act 1963 and any relevant subsequent legislation. The office shall be connected to a mains water supply.
6. All windows shall be fitted with external close boarded shutters capable of being fastened and secured.
7. Boot cleaning facilities shall be provided outside the door.
8. Hardstanding car parking to be provided for 4 vehicles.
9. Accommodation to be located as agreed with the *Client*.
10. The following furniture and equipment shall be provided for each portable office:
 - a) Office desk (1.4 x 0.8 m) lockable 4 No.
 - b) Chairs 4 No.
 - c) 4 drawer filing cabinet 2 No.
 - d) Wi-Fi Printer / copier
 - e) Wastepaper basket 2 No.
 - f) Portable wash basin, soap and towels 1 No.
 - g) Water Closet with flushing toilet 1 No.
 - h) First aid kit (size 1-10 persons) 1 No.
 - i) Fire extinguisher (general purpose type AFF) 2 No.
 - j) 225mm x 25mm shelving 10m
 - k) Hat and coat hooks 6 No.
 - l) 5 Gallon water container 1 No.
 - m) refrigerator
 - n) Kettle – 4 pint 1 No.
 - o) Teapot – 3 pint 1No.
 - p) Tea service comprising jugs, bowls, mugs, saucers, plates, spoons for 8 persons.

Appendix 1/2 – Vehicles for the *Client*

1. Cars for the sole use of the Client are to be as specified in Appendix P and shall be replaced with new every 4 years. Cars for sole use by the Client shall meet the following Specification:
 - a) White 4/5 door saloon or hatch
 - b) Fully powered by electricity with 200-mile minimum range
 - c) Flashing orange light bar installed
 - d) Emergency breakdown and recovery service
 - e) GPS tracking system fitted
 - f) Fire extinguisher fitted
 - g) First aid kit fitted
 - h) Provision of road tax, fully comprehensive insurance for all *Client* staff and servicing to be provided by the *Contractor*
 - i) Fuel card to service all fuel expenses
 - j) Valeting undertaken inside and outside every two months.

3. When instructed, the *Contractor* shall provide the following vehicles together with a driver.
 - a) Van mounted hydraulic telescopic aerial access platform. Cage able to accommodate 2 people. Working height 10 metres, maximum outreach 8 metres. Full 360° rotation. Stabilizing jacks to operate within overall width of vehicle.
 - b) Impact Protection Vehicle (Crash Cushion). 18t fully approved to NCHRP350 level 3 and the 3-51 UK test at 110kph (70mph). Vertical lift LED light arrow board fitted with 2 x LED work lights and 2 x beacons. Markings compliant with TSRGD 2016.
 - c) 7.5 tonne mounted hydraulic telescopic aerial access platform. Cage able to accommodate 3 people. Working height 18 metres, outreach 13 metres centre-line of plant at heights between 0 and 9 metres. Full 360° rotation. Stabilizing system to allow either left or right outriggers only to be extended independently if work is limited to that side of vehicle. Working cage to have full 180° sideways rotation. Intercom link between cage and base. Full dual controls on base and cage. Silenced alternative power system to be mounted on base to enable operation in noise sensitive areas.
 - d) Truck mounted hydraulic telescopic aerial access platform. Cage able to accommodate 3 people. Working height 29 metres, outreach 23 metres centre-line of plant at heights between 0 and 13metres. Full 360° rotation. Stabilizing system to allow either left or right outriggers only to be extended independently if work is limited to that side of vehicle. Working cage to have full 180° sideways rotation. Intercom link between cage and base. Full dual controls on base and cage. Silenced alternative power system to be mounted on base to enable operation in noise sensitive areas.
 - e) Truck mounted hydraulic telescopic aerial access platform. Cage able to accommodate 3 people. Working height 42 metres outreach 23 metres centre-line of

plant at heights between 0 and 32 metres. Full 360° rotation. Stabilizing system to allow either left or right outriggers only to be extended independently if work is limited to that side of vehicle. Working cage to have full 180° sideways rotation. Intercom link between cage and base. Full dual controls on base and cage. Silenced alternative power system to be mounted on base to enable operation in noise sensitive areas.

- f) Underbridge Inspection Unit. Platform to provide minimum 6 metres access length under bridge with vehicle on bridge deck surface. Platform to be able to operate at up to 8 metres depth below carriageway level. Vehicle to be able to move along bridge deck with cage below. Cage able to accommodate 3 people.

Appendix 1/5 – Testing of Materials

1. The *Contractor* shall comply with all Quality Management and Product Certification schemes indicated in Table NG1/1 of Notes for Guidance on the Specification for Highway Works and shall provide certificates of compliance as required by the *Client*.
2. The Contractor shall carry out testing to prove compliance with the Specification. The testing regime shall be as shown in Appendix 1/5, Table 1.5.
3. Testing of bridge expansion joints shall be undertaken by the *Contractor* in accordance with Clause 2306AR and APPENDIX 23/1 – BRIDGE DECK EXPANSION JOINT.

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 400					
403	Anchorage and Attachment Systems for use in Drilled Holes	Ultimate tensile load (Manufacturer's tests)		Required	To provide well attested and documented evidence
404	Anchorage in Drilled Holes	Loading test on site	As per the manufacturers installation manual	Required	
	Post Foundations				Manufacturer's Specification
406	Vehicle Parapets			Required	Quality management scheme applies - applicable only to legacy systems not falling under the Construction Products Regulation (CPR)
407	Anchorage and Attachment Systems for use in Drilled Holes	Ultimate tensile load (Manufacturer's tests)		Required	To provide well attested and documented evidence for legacy systems not falling under the CPR
409	Vehicle Parapets (General)			Required	In accordance with manufacturer's installation manual
410	Anchorage in Drilled Holes	On-site tensile load test	As required in Appendix 4/1	Required	
411	Pedestrian Parapets and Guardrails	Manufacturer's tests: yield/proof strength of material, ultimate strength and the extension at break			

Series 500					
Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
503	Pipe Bedding	Grading and fines content	1 per 500 tonnes (minimum of 3 tests)	BS 1377-2:1990	Minimum to allow for natural variability of sulfur compounds
		Water Soluble Sulfate (WS) content	5 per source	BS 1377-3:2018	
		Oxidisable sulfides (OS) content and total potential sulphate (TPS) content	5 per source	BS 1377-3:2018	
		Resistance to fragmentation	1 per source	BS EN 1097-2:2010	
505	Filter Medium Backfill	Plastic Index	1 per source	BS EN ISO 17892-12:2018	Minimum to allow for natural variability of sulfur compounds
		Grading and fines content	1 per 500 tonnes	BS 1377-2:1990	
		Water Soluble Sulfate (WS) content	5 per source	BS 1377-3:2018	
		Oxidisable sulfides (OS) content and total potential sulphate (TPS) content	5 per source	BS 1377-3:2018	
		Resistance to fragmentation	1 per source	BS EN 1097-2:2010	
		Permeability Index	1 per source	BS 1377-5:1990	
507	Precast Concrete Chambers			BS EN 1917:2002 / BS 5911-3:2010	Product certification scheme or equivalent applies
	Covers, Grates and Frames			BS EN 124-1:2015	
508	Precast Concrete Gullies			BS EN 1917:2002 / BS 5911-3:2010	Product certification scheme or equivalent applies
	Ductile Iron Pipes			BS EN 598:2007+A1:2009	
	Vitrified Clay Pipes			BS EN 295-3:2012	
509	Water Tightness of Joints	Air Test	All pipelines with watertight joints	ASTM C828 - 11(2016)	Published by ASTM International, American Society for Testing and Materials
512	Backfill of Pipe Bays	Grading and fines content	1 per 50 Tonnes (minimum of 3 tests)	BS 1377-2:1990	Minimum to allow for natural variability of sulfur compounds
		Water Soluble Sulfate (WS) content	5 per source	BS 1377-3:2018	
		Oxidisable sulfides (OS) content and total potential sulphate (TPS) content	5 per source	BS 1377-3:2018	

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
515	Narrow Filter Drains - Geotextiles, Pipes and Fittings	Manufacturer's Test		Required	Product certification scheme or equivalent applies
	Granular Fill	Plastic Index	1 per source	BS EN ISO 17892-12:2018	
		Grading and fines content	1 per 200 tonnes (minimum of 3 tests)	BS 1377-2:1990	
		Water Soluble Sulfate (WS) content	5 per source	BS 1377-3:2018	Minimum to allow for natural variability of sulfur compounds
		Oxidisable sulfides (OS) content and total potential sulphate (TPS) content	5 per source	BS 1377-3:2018	
		Resistance to fragmentation	1 per source	BS EN 1097-2:2010	
		Permeability Index	1 per source	BS 1377-5:1990	
516	Combined Drainage and Kerb Systems	Load Test	A minimum of 1 test and not less than 1 test per 1000m for each type and source	Required	Certification that the system comply with Clause 516 is required Kitemark certificate or equivalent applies
517	Linear Drainage Systems	Load Test	A minimum of 1 test and not less than 1 test per 1000m for each type and source	Required	Certification that the system comply with Clause 517 is required Kitemark certificate or equivalent applies
518	Lining of Sewage Pipes (Cured in Place Pipes)			BS EN ISO 11296-1:2018	BBA certification or equivalent applies

Series 600					
601, 631 to 637, 640	Material Acceptability				
	Class 1 - General Granular Fill	Grading / Uniformity Coefficient	1 per 500m ³	BS 1377-2:1990	
		mc / MCV	2 per 1000m ³ (maximum 5 per day)	BS 1377-2:1990, BS 1377-4:1900	
		SMC of Chalk	1 per source	BS 1377-2:1990	
		Resistance to fragmentation	1 per source	BS EN 1097-2:2010	For 1C only
	Class 2E - General Cohesive Fill	Grading	1 per 500m ³	BS 1377-2:1990	
		Bulk density (pfa) / Nuclear Density Tests	2 per 1000m ³ (maximum 5 per day)	BS 1377-2:1990	
	Class 4A - Landscape Fill	Grading	1 per 500m ³	BS 1377-2:1990	
		mc / MCV	1 per 500m ³	BS 1377-2:1990, BS 1377-4:1900	
	Class 5A - Topsoil	Grading	1 per 500m ³	Clause 618	
	Class 5B - Imported Topsoil	Source Approval		BS 3882:2015	
	Class 6B - Selected Course Granular Fill	Grading / Uniformity Coefficient	1 per 400T	BS 1377-2:1990 (On-site); BS EN 933-2:1996 (Imported onto site)	
		mc / MCV	1 per 400T	BS 1377-2:1990	
		Resistance to fragmentation	1 per source	BS EN 1097-2:2010	
		SMC of Chalk	1 per source	BS 1377-2:1990	
		Plastic Index	1 per 400T	BS EN ISO 17892-12:2018	
	Class 6C - Selected Uniformly Granular Fill	Grading / Uniformity Coefficient	1 per 400T	BS 1377-2:1990 (On-site); BS EN 933-2:1996 (Imported onto site)	
		mc / MCV	1 per 400T	BS 1377-2:1990	
		Resistance to fragmentation	1 per source	BS EN 1097-2:2010	
		SMC of Chalk	1 per source	BS 1377-2:1990	
		Plastic Index	1 per 400T	BS EN ISO 17892-12:2018	
	Class 6D - Selected Uniformly Granular Fill	Grading / Uniformity Coefficient	1 per 400T	BS 1377-2:1990 (On-site); BS EN 933-2:1996 (Imported onto site)	
		mc	1 per 400T	BS 1377-2:1990	
		MCV	10 per source	BS 1377-4:1990	Hand Vane

601, 631 to 637, 640		Resistance to fragmentation	1 per source	BS EN 1097-2:2010	
		SMC of Chalk	1 per source	BS 1377-2:1990	
		Plastic Index	1 per 400T	BS EN ISO 17892-12:2018	
	Class 6F1 - Selected Granular Fill (Fine Grading)	Grading	1 per 250T	BS 1377-2:1990	On site materials only
		Optimum mc	1 per week per source	BS 1377-4:1990	Vibrating hammer method
		mc	1 per 250T	BS 1377-2:1990	
		Class Ra	1 per week per source	BS EN 933-11:2009	
		Bitumen Content	1 per week per source	BS EN 12697-1:2012	
		Resistance to fragmentation	1 per 250T	BS EN 1097-2:2010	
	Class 6F2 - Selected Granular Fill (Course Grading)	Grading	1 per 250T	BS 1377-2:1990	On site materials only
		Optimum mc	1 per week per source	BS 1377-4:1990	Vibrating hammer method
		mc	1 per 250T	BS 1377-2:1990	
		Resistance to fragmentation	1 per 250T	BS EN 1097-2:2010	
		Class Ra	1 per week per source	BS EN 933-11:2009	
		Bitumen Content	1 per week per source	BS EN 12697-1:2012	
		10% Fines Value	1 per week per source	BS 812-111:1990	
	Class 6F3 - Selected Granular Fill	Grading	1 per 250T	BS 1377-2:1990 (On-site) BS EN 933-2:1996 (Imported onto site)	
		Optimum mc	1 per week per source	BS 1377-4:1990	
		mc	1 per 250T	BS 1377-2:1990	
		Class Ra	1 per week per source	BS EN 933-11:2009	
		Bitumen content	1 per week per source	BS EN 12697-1:2012	
	Class 6F4 - Selected Granular Fill (Fine Grading - Imported)	Grading / Size	1 per 250T	BS EN 13285:2018 - 0/31.5 and G _E	
		Max fines		BS EN 13285:2018 - UF ₁₅	
Oversize		BS EN 13285:2018 - OC ₇₅			
Resistance to fragmentation		BS EN 1097-2:2010 - LA ₆₀			
Volume Stability BOF & EAF slag		BS EN 13242:2002+A1:2007 - V ₅			
Lab dry density		BS EN 13285:2018, Clause 5.3 - declared values			

601, 631 to 637, 640	Class 6F4 - Selected Granular Fill (Fine Grading - Imported)	Water content	1 per 250T	BS EN 1097-5:2008	
		Class Ra		BS EN 933-11:2009	
		Bitumen content		BS EN 12697-1:2012	
	Class 6F5 - Selected Granular Fill (Course Grading - Imported)	Grading /Size	1 per 250T	BS EN 13285:2018 - 0/80 and G _E	
		Max fines		BS EN 13285:2018 - UF ₁₂	
		Oversize		BS EN 13285:2018 - OC ₇₅	
		Resistance to fragmentation		BS EN 1097-2:2010 - LA ₅₀	
		Volume Stability BOF & EAF slag		BS EN 13242:2002+ A1:2007 - V ₅	
		Lab dry density		BS EN 13285:2018, Clause 5.3 - declared values	
		Water content		BS EN 1097-5:2008	
		Class Ra		BS EN 933-11:2009	
		Bitumen content		BS EN 12697-1:2012	
	Class 6N & 6P - Structural Fill to Structures	Grading / Uniformity Coefficient	1 per 250T	BS 1377-2:1990 (On-site); BS EN 933-2:1996 (Imported onto site)	
		Resistance to fragmentation		BS EN 1097-2:2010	
		SMC of Chalk		BS 1377-2:1990	For 6P Only
		Undrained Shear Parameters	1 per source*	Clause 633	
		Effective angle of friction		Clause 636	
		Effective cohesion		Clause 636	
		Permeability		Clause 640	
		Water soluble sulfate (WS) content		BS 1377-3:2018	
pH Value		BS 1377-3:2018			
Resistivity & Redox Potential		Clause 637 and Clause 638			
mc		1 per 250T	BS 1377-2:1990		
MCV			BS 1377-4:1990		
Slope Stability		As required by Client	Clause 610		

601, 631 to 637, 640	Class 6Q - Structural Fill to Structures	Grading / Uniformity Coefficient	1 per source	BS 1377-2:1990	
		Resistance to fragmentation		BS EN 1097-2:2010	
		SMC of Chalk		BS 1377-2:1990	
		Water soluble sulfate (WS) content		BS 1377-3:2018	
		Oxidisable Sulfate (OS) content		BS 1377-3:2018	
		pH Value		BS 1377-3:2018	
		Chloride Ion Content		BS 1377-3:2018	
		mc		BS 1377-2:1990	
		sulphide & hydrogen sulfide		Qualitative inorganic analysis - Rapid blackening of lead acetate paper	Contractor to provide certification
	Class 6S - Structural Fill to Structures - Filter Layer	Grading	1 per 250T	BS 1377-2:1990 (On-site); BS EN 933-2:1996 (Imported onto site)	
Plastic Index		BS EN ISO 17892-12:2018			
Class 9A - Structural Fill to Structures - Filter Layer	Pulverisation	1 per 400T	BS EN 13286-48:2005		
	Bearing ratio		BS EN 13286-47:2012		
	mc		BS EN 13286-2:2010		
602	Earthworks material beneath roads or paved central reserve (i) offsite source (ii) onsite source	Frost Heave	1 per source	BS 812-124:2009	
609, 621	Geo-textiles	Tensile load	1 per source	BS EN ISO 10319	
		Elongation		BS EN ISO 10319	
		Dynamic Perforation		BS EN ISO 13433	
		Characteristic opening size		BS EN ISO 12956:2010	
		Permeability		BS EN ISO 10776:2012	

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
612	Method Compaction	Field Dry Density	1 every 25 longitudinal metres of carriageway & 1 per material type / source / compacted layer	BS EN ISO 11272:2017	
	End Product Compaction	Optimum mc	Each class and sub class of material	BS 1377-4:1990	2.5kg rammer / vibrating hammer method
		Field Dry Density	1 per 200T	BS EN ISO 11272:2017	
614	Cement Stabilisation to form capping	Rate of spread of cement	1 per 250m ² of cement spread		
615, 641, 643	Lime Stabilisation to form capping	Rate of spread of lime	1 per 250m ² of lime spread		
Series 700					
702	Surface levels of pavement courses	Tolerance	Following placement of each layer		
	Surface regularity	Rolling & Transverse straight edge			
710	Constituent materials in recycled aggregate	Quality Control	As required by 'Quality Protocol for the production of aggregates from inert waste		

Series 800					
Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
801, 803, 805	General requirements for Unbound sub-base material (other than slag) adjacent to cement bound materials, concrete pavements, structures and products	Water Soluble Sulfate (WS) content	1 per 400T	BS 1377-3:2018	Minimum to allow for natural variability of sulfur compounds
		Oxidisable sulfides (OS) content and total potential sulphate (TPS) content	1 per 400T	BS 1377-3:2018	
	Unbound mixtures beneath surface of a road or paved central reserve	Frost Heave	1 per source	BS 812-124:2009	
		Grading and Fines	1 per 250T	BS 1377-2:1990	
		Plastic Index		BS EN ISO 17892-12:2018	
		Resistance to fragmentation	1 per source	BS EN 1097-2:2010 - LA ₅₀	
		Resistance to wear - micro-Deval test		BS EN 1097-1:2011	
		Resistance to Freezing and thawing (magnesium sulfate soundness)		BS EN 13242:2002+A1:2007	
		Volume Stability BOF & EAF slag		BS EN 13242:2002+A1:2007	
		Optimum mc	1 per week per source	BS 1377-4:1990	
		mc	1 per 250T	BS 1377-2:1990	
		Water Absorption	1 per source	BS EN 1097-6:2013	
	Density	BS EN 1097-6:2013			
821, 822, 823, 830, 831, 832, 834, 835, 840	Cement and other Hydraulically Bound Mixtures (HBM)	Test for control of HBM	As specified in Table 8/14 and Table 8/15	Table 8/14 and table 8/15	
		Coefficient of linear expansion	As required by Client	Clause 871	
		Tests for laboratory mixture design		Clause 880	

Series 900					
Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
901, 925	Aggregates for Bituminous Mixtures	Resistance to Fragmentation	1 per source	BS EN 1097-2:2010	
		Resistance to Freezing and Thawing (magnesium sulfate soundness)		BS EN 1367-2:2009	
		Water Absorption		BS EN 1097-6:2013	
		Flakiness Index		BS EN 933-3:2012	
		Polished Stone Value		BS EN 1097-8:2009	Only for Surface Course
		Aggregate Abrasion Value		BS EN 1097-8:2009	Only for Surface Course
		Affinity to bituminous binders		BS EN 12697-11:2012	
		Bulk Density		BS EN 1097-3:1998	
		Volume Stability		BS EN 1744-1:2009+A1:2012	Only for Steel Slag
	Binders for Bituminous Mixtures	Penetration at 25C	1 per source	BS EN 1426:2015	
		Ring & Ball Softening Point		BS EN 1427:2015	
		RTFOT Retained penetration		BS EN 12607-1:2014	
		RTFOT Increase in Softening Point		BS EN 12607-1:2014	
		RTFOT Change in mass		BS EN 12607-1:2014	
		Flash point		BS EN ISO 2592:2017	
		Fraass breaking point		BS EN 12593:2015	
		Dangerous substances		BS EN 12591:2009	
		Cohesion		BS EN 14023:2010	
		Elastic recovery		BS EN 13398:2017	Only for PMB
Rheometry (DSR): G* and δ	BS EN 14770:2012				

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
903 to 907, 909 to 912, 914, 916, 925, 929, 930, 937, 942, 943	Bituminous Mixtures	Delivery Temperature	Every load	BS EN 12697-13:2017	In situ temperature measurements
		Rolling Temperature	15 minutes interval	BS EN 12697-13:2017	
		Grading	1 per source	BS EN 12697-2:2015	CE Marking
		Binder Content		BS EN 12697-1:2012	
		Resistance to Deformation - Wheel Tracking Test (insitu)		BS EN 12697-22:2003	Declared value to be provided by supplier as part of CE Marking Note the different procedure and parameters for HRA for insitu analysis
		Resistance to Deformation - Wheel Tracking Test (design)		BS EN 12697-22:2003	Declared value to be provided by supplier as part of CE Marking
		Void Content	1 per source	BS EN 12697-8:2018	CE Marking
		Voids filled with bitumen		BS EN 12697-8:2018	
		Voids in mineral aggregate		BS EN 12697-8:2018	
		Void content at 10 gyrations		BS EN 12697-31:2007	
		Maximum Theoretical density		BS EN 12697-5:2018	
		Bulk density		BS EN 12697-6:2012	
		In situ air void content	Density gauge readings required	BS EN 12697-8:2018	Base and binder course only
		Resistance to Fatigue	1 per source	BS EN 12697-24:2018	Only for Clause 930 (EME2) and Grouted Macadams
		Stiffness		BS EN 12697-26:2018	
Water sensitivity	1 per source	BS EN 12697-12:2018	Only for Surface Course		

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
920	Bond Coats and Bituminous Sprays	Product Identification	1 per product per source		
		Vialit Cohesion			
		Penetration at 25 degrees C and at 5 degrees C		BS EN 1426:2015	
		Accuracy of Spread	1 for each binder and sprayer per month	BS EN 12272-1:2002	
		Rate of Spread	1 per week	BS EN 12272-1:2002	Modified binders shall have a BBA HAPAS Roads and Bridges Certificate (or equivalent)
915	Pre-coated chippings for Hot Rolled Asphalt surfacings	Grading	To be declared at source	BS EN 933-1:2012	
		Binder Content		BS EN 12697-1:2012	
		Flakiness Index		BS EN 933-3:2012	
		Polished Stone Value		BS EN 1097-8:2009	
		Aggregate Abrasion Value		BS EN 1097-8:2009	
		Rate of Spread	As stated in the Technical Specification	BS 598-1:2011	Thermal imagery is an acceptable way to measure rate of spread
921	Surface Macrotecture	Measurement of pavement surface macrotecture depth using a volumetric patch technique	As stated in the Technical Specification	BS EN 13036-1:2010	

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
924	High Friction Surface	Quality Control	Daily	Clause 924.5	
		Adhesion Test	5 tests per day	TRL Report 176 Appendix J	
		System Coverage	1 per source	Clause 924.6	
		Polished Stone Value	1 per source	Clause 915.2	
959	Coloured Cold Applied Surface Treatments	Skid Resistance	As specified in Clause 959AR	Clause 959AR	
Series 1000					
1002, 1003, 1004, 1044	Pavement Concrete	Air content test	As specified in Table 10/12	BS EN 13250-7:2009	Product certification scheme or equivalent applies
		Density		BS EN 13877-2:2013	
		Strength		BS EN 13877-2:2013	
1005	Consistence (workability)	Degree of Compactability (Compaction Index)	As specified in Table 10/12	BS EN 13250-4:2009	For concrete class C16/20 or below
		Vebe		BS EN 13250-3:2009	
		Slump		BS EN 13250-2:2009	
1011, 1012	Dowel Bars	Load tests	1 per arrangement	BS 4449:2005+A3:2016 BS EN ISO 9227:2017	Product certification scheme or equivalent applies See also sub-Clauses 1011.5-7
	Sheathed dowel bars	Bond Stress	4 bars		
	Cranked tie bars (coated)	Bend test			
		Salt fog cabinet			
1026, 1044	Surface Macrotexture	Measurement of pavement surface macrotexture depth using a volumetric patch technique	10 measurements at 5m spacing on diagonal line across lane. Repeated on not less than 1/3 of the site	BS EN 13036-1:2010	
1027	Aluminised curing compound	Efficiency Index	1 per source	BS 7542:1992	
1030	Wet Lean Concrete	Density	As specified in Table 10/12	BS EN 13877-2:2013	
1043	Foamed Concrete	Cube Strength	2 cubes per 12m ³	Clause 1043	

Series 1100					
Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
1101	Precast concrete kerbs, channels, edgings, quadrants and combined kerb and drainage units	Breaking Strength – Flexural strength	1 per source per product	BS EN 1340:2003	
		Freeze/thaw (durability of strength)		BS EN 12371:2010	
		Freeze/thaw (durability of strength) with de-icing salts		BS EN 1340:2003	
		Abrasion resistance		BS EN 1340:2003	
		Slip resistance		BS EN 1340:2003	
		Surface finish			Declared in line with TfL Streetscape Guidance 2016
		Water absorption		BS EN 1340:2003	
		Durability of slip/skid resistance		PD CEN/TS 12633:2014	
		Apparent density		BS EN 1936:2006	Only for Stone
		Open porosity		BS EN 1936:2006	Only for Stone
		Petrographic description		BS EN 12407:2007	Only for Stone
		Sensitivity to accidental staining		BS EN 16301:2013	Only for Stone
		1112 to 1118		Footways and Paved Areas (Precast Concrete Flags and Natural Stone Slabs)	Breaking Strength – Flexural strength
Freeze/thaw (durability of strength)	BS EN 12371:2010				
Freeze/thaw (durability of strength) with de-icing salts	BS EN 1339:2003				
Abrasion resistance	BS EN 1339:2003				
Slip resistance	BS EN 1339:2003				
Surface finish			Declared in line with TfL Streetscape Guidance 2016		
Water absorption	BS EN 1339:2003				
Durability of slip/skid resistance	PD CEN/TS 12633:2014				
Apparent density	BS EN 1936:2006		Only for Stone		
Open porosity	BS EN 1936:2006		Only for Stone		
Petrographic description	BS EN 12407:2007		Only for Stone		
Sensitivity to accidental staining	BS EN 16301:2013		Only for Stone		
Mortar					Appropriate tests to be carried out under other Clauses (e.g. 803)
Granular Material					

Series 1200					
Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
1202	Permanent Traffic Signs	-	One per generic type	Required	Certification (provision of CE Marking) to BS EN 12899-1:2007
1204	Posts for permanent traffic signs	-	One per generic type	Required	Certification (provision of CE Marking) to BS EN 12899-1:2007
1207	Anchorage in drilled holes to support traffic sign	Loading test	One per generic type		
1210	Retro Reflective Self Righting Bollards	Tests specified in BS 8442:2015	One per generic type	Required	
1212	Road markings	Tests specified in BS EN 1824:2011 & BS EN 1436:2018	One per generic type	Required	Certification that performance requirements are met after P5 road trials
1214	Permanent or temporary traffic cones and cylinders	As described in BS EN 13422:2004+A1:2009	One per generic type	Required	Evidence of conformity to the standard
Series 1300					
1305	Anchorage for use in drilled holes	Manufacturer's Tensile Load Test	1 per source per product	Required	To provide well attested and documented evidence
1306	Anchorage for use in drilled holes to columns and masts with flange plates	Loading Test	1 per source per product		
1310	Welding	Manufacturer's Welding Procedures	Every 7 years		Quality management scheme applies
		Manufacturer's Welding Qualifications	sub-Clause 1310.1 and sub-Clause 1310.2		
		Manufacturer's Production testing			
	Welded Joints	Destructive Testing			

Series 1400					
Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
1421	Cable	Tests in accordance with BS5467:2016	1 per source per product	Required	Produce certification scheme or similar applies
1424	Lighting Units	Tests specified in Clause 1424	Each Unit	Required	Certification that the installation complies with BS 7671:2018 is required

Appendix 1/10

The TfL Modelling and Auditing Process Overview is detailed at Appendix 1/10 a)

The Traffic Signal Safety and Quality Check List (1 and 2) is included at Appendix 1/10 b).