

## CONTRACT 5: INTELLIGENT TRANSPORTATION SYSTEM (ITS) CONSULTANCY SERVICES

Project ID: IA 10/11 D 027 G

**SCADA Specimen  
Plant Numbering System**  
31st March 2016

EXAMPLE

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R1	Contract 5 Task 1.6 ITS Master Plan and Action Plan	V0.5	
R2	Contract 5 Task 1.3 User Needs Report	V1.0	
R3	Contract 5 Task 1.11 Phase 2 & 2a Scope of Work	V1.0	
R4	Contract 5 Task 1.10 ITS Impacts and Benefit	V1.0	
R5	Contract 5 Task 1.5 International Best Practice	V1.0	

## Glossary of acronyms

Term	Definition
AID	Automatic Incident Detection
ATC	Adaptive Traffic Control
BI	Business Intelligence
CCTV	Closed Circuit Television
ConOps	Concept of Operations
CPO	Central Planning Office
DIA	Doha International Airport
DMS	Dynamic Message Signs
DR	Disaster Recovery
GUI	Graphical User Interface
GIS	Geographical Information System
HIA	Hamad International Airport
HAZMAT	Hazardous Material
IDS	Intelligent Decision Support
ISF	Internal Security Force
ITS	Intelligent Transportation System
KPI	Key Performance Indicators
LCS	Lane Control Signs
LPR	License Plate Reader
LRT	Light Rail Transit
MMUP	Ministry of Municipality and Urban Planning
MOI	Ministry of Interior
NPP	New Port Project
NCC	National Command Centre
NTMC	National Transportation Management Centre
OVDS	Overheight Vehicle Detection System
PEO	Private Engineering Office
QA	Qatar Airways
QR	Qatar Rail
RAARTCR	Ras Abu Aboud Road Tunnel Control Room
RAID	Risk, Assumptions, Issues and Dependence
RBTM	Risk Based Transportation Management
SCADA	Supervisory Control And Data Acquisition
SCATS	Sydney Coordinated Adaptive Traffic System
SCH	Supreme Council of Health
SEP	System Engineering Process
SLA	Service Level Agreement
TMC	Traffic Management Centre
TSCR	Traffic Signal Control Room
UAT	User Acceptance Testing
UML	Unified Modelling Language
VIP	Very Important Person
VVIP	Very Very Important Person
WIM	Weigh-In-Motion

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EXAMPLE

## Executive Summary

A proposal for a plant numbering scheme is required to support the design, specification, installation, operation and maintenance of the various devices, sub-systems and their supporting telecommunication facilities that make up a Tunnel Management System (TMS).

The plant numbering scheme is to be applicable to every item that supports tunnel operation in any of the tunnel locations. Items to be numbered under this document requirements are those whose modification or removal does not imply a total or partial modification of a higher level component (e.g. DMS, LCS, enclosure, transformer, pump, etc.).

Component parts will be identified based on the tunnel documentation received from Ashghal or its authorised representative, formerly the Construction Manager (CM) and, where indicated by CM, the Principal Contractor (PC).

This procedure proposes a numbering scheme based on the following four descriptors:

EQUIPMENT TYPE / EQUIPMENT No / LOCATION /CHAINAGE

(A similar procedure is proposed for equipment located in the buildings – see para 2.4 Buildings and structures).

When developing this scheme, it is necessary to provide a precise and unambiguous identification which conveys the necessary level of information without being cumbersome. Other related schemes, such as cable numbering, signal tagging and mimic labelling, are also addressed within this procedure.

It is envisaged that equipment would be identified mainly by location (i.e. chainage) on the tunnels and on a room basis in buildings.

The above “Equipment No.” is to be used when there is more than one identical piece of plant/equipment at a given location. This descriptor can be 1, 2, etc. or A, B etc.

Please note that the plant numbering schedule is purely for Mechanical, Electrical and Plumbing Plant usage and may differ from the civil drawings.

## 1. Introduction

### 1.1 Introduction

There is a need for a clear and unambiguous identification to support a safe scheme of work for the various design, maintenance tasks and operational activities. Such a scheme should be easy to understand, flexible enough to be expanded and as concise as possible. Any numbering scheme should if possible translate into other related schemes.

The numbering of all plant and equipment will play an important role in the operation and maintenance of the ITS and MEP works throughout the tunnel. As the plant-numbering scheme allows an easy identification of all equipment it will play a key role in:

- Scheduling maintenance
- Identifying faulty/problematic components
- Identifying problematic locations
- Compiling statistics
- Allowing cost effective repair/maintenance
- Avoiding confusion

The scheme will allow data relating to failures, faults and incidents to be easily retrieved.

An efficient method of location marking at appropriate distances, will aid equipment identification.

To make the most efficient use of the system, marker posts would ideally be placed at approximately every 100m. In the tunnel itself, these marker posts can be achieved by using labels or painted legends on the walls.

Although specific items of plant and/or equipment will need to be identified during the course of an emergency incident it is the operational zones (assigned to areas of plant and equipment) that are significant. The assignment of these zones is not a subject for this procedure.

## 2. Proposed numbering scheme

### 2.1 Plant and Equipment

All items of plant and equipment are to be assigned an identification code as shown below. The coding pattern being as follows:

AAA/NNN/BBB/CCC/CH	
AAA	EQUIPMENT TYPE
NNN	EQUIPMENT No
BBB	LOCATION (tunnel or building)
CCC / CH	LOCATION (side, lane or room) / CHAINAGE (in meters)

Table 1, Plant and Equipment proposed numbering scheme

Some typical examples are:

A LCS in Tunnel E West carriageway, lane 2 at chainage 600 meters could be shown as;

LCS / 01 / EIW / 000600

Or, a Fire Hose Reel in a Fire-Fighting Cabinet at chainage 123456 in the E Tunnel East Carriageway left side could be:

FHR / 01 / EIE / 123456

Or, a PTZ camera in the Underpass K at chainage 123456

PTZ / 01 / KU- / 123456

The list of descriptors given in the appendices shall not be considered as exhaustive and care is needed in adding additional descriptors so that any items share the same code.

Location codes are listed in Appendix A for reference only. *Because locations are project specific it is expected that the designers and/or contractors prepare a list of 3 digit codes for their scope of work locations and submit these to Ashghal for approval. The approved codes shall be incorporated to the project specific PNS.*

The PNS is not intended to apply to internal wiring of control enclosures for programmable logic controllers or remote I/O units. (SMRIOU).

## 2.2 Cabling

### 2.2.1 Cables

Cables (either single or multi-core) can be assigned one of eleven categories (all 3 characters) due to the need for segregating and identifying types of signal, these are proposed as:

MVA	Power Medium Voltage Alternating current >1000V
LVA	Power Low Voltage Alternating current, <1000V
LVD	Power Low Voltage Direct Current
DIG	Digital signal;
ANA	Analogue signal;
SIG	Combined I/O signals (analogue, digital signals or any combination thereof);
DAT	Communications data cable (excluding f.o.)
FOS	Fibre Optic Single mode
FOM	Fibre optic Multimode
LFD	Leaky feeder cable
COX	Coaxial cable
LHD	Linear Heat Detection Cable

Cable identification can therefore use a numerical sequence of numbers with a prefix relevant to the signal type such as:



Description	Code
Power cable AC>1000V number 1234	MVA1234
Power cable AC<1000V number 1234 (Range 0001-4999 reserved for Comms)	LVA1234
Power cable DC<1000V number 1234 (Range 4999-9999 reserved for P+L)	LVD1234
Digital cable number 1234	DIG1234
Analogue cable number 1234	ANA1234
Combined I/O signals cable number 1234	SIG1234
Communications data cable number 1234	DAT1234
Fibre optic Single mode cable number 1234	FOS1234
Fibre optic cable Multimode number 1234	FOM1234
Leaky feeder cable 1234	LFD1234
Coaxial cable 1234	COX1234
Linear Heat Detection Cable 1234	LHD1234

Table 2, Pipelines proposed numbering scheme

### 2.2.2 Core identification

The use of multi-core cables of any type shall use the manufactured colour for identification. The following is an example of a 2 pair analogue cable and a six-strand multimode fibre cable;

Cable number	Pair	Core	Colour Code
ANA1234	1	1	TBA
		2	TBA
	2	3	TBA
		4	TBA
FOM1234		1	TBA
		2	TBA
		3	TBA
		4	TBA
		5	TBA
		6	TBA

Table 3, Cable Cores proposed numbering scheme

Cables shall be labelled in each draw pit and at both ends. The origin and destination of each cable must be clearly found in the cable schedule for each particular system.

The designer/contractor shall ensure that core identification is compliant with the requirements set on the current version of Ashghal’s Telecommunication Strategy.

### 2.3 Pipelines

Pipelines can be assigned one of the given categories (all 3 characters) due to the need for segregating and identifying types of fluid carried, these are proposed as:

FRW	Fire Water
FOW	Foul Sewer Water
DRW	Drainage Water

DOW	Domestic Water
HWS	Hot Water Supply
HWR	Hot Water Return
CWS	Chilled Water Supply
CWR	Chilled Water Return
DRW	Drinking Water
SUM	Sump Water
GAS	Natural Gas
CO2	Carbon Dioxide
NIT	Nitrogen
FOM	Foam
OIL	Diesel Oil
FMT	FM200

Pipelines shall be identified in a similar way as cables by assigning a line number.

Description	Code
Fire Water	FRW 1234
Foul Sewer Water	FOW 1234
Drainage Water	DRW 1234
Domestic Water	DOW 1234
Hot Water Supply	HWS1234
Hot Water Return	HWR1234
Chilled Water Supply	CWS1234
Chilled Water Return	CWR1234
Drinking Water	DRW1234
Sump Water	SUM1234
Natural Gas	GAS1234
Carbon Dioxide	CO21234
Nitrogen	NIT1234
Foam	FOM1234
Diesel Oil	OIL1234
FM200	FMT1234

**Table 4, Pipelines proposed numbering scheme**

## 2.4 Buildings and structures

It is recognised that in addition to plant and equipment there is a need to identify buildings, doors and rooms. The plant numbering arrangement described above can be adapted to suit these needs.

### 2.4.1 Buildings

The following system is proposed for equipment located in buildings:

AAA/NN/BBB/CCC/	
AAA	EQUIPMENT TYPE
NN	EQUIPMENT No
BBB	LOCATION BUILDING NAME (Note: Previously tagged 2 letter identifiers for buildings shown as TC, ST, NO, SO will now be tagged as described by 3 letter identifiers from this revision onwards.)
CCC	LOCATION (ROOM No)

Table 5, Building proposed numbering scheme

Typical examples are:

A 10KV/0.4KV Transformer feeding a supply distribution point. If this transformer is located in room E06 inside the Tunnel E Services Compound Building, the PNS code could be shown as;

TRA / 02 / ESC / E06

### 2.4.2 Rooms

Rooms should be identified in association with the building. Room numbers are listed in 7 Appendix D: Room Location

## 3. Other associated schemes

### 3.1 Signal tags

Signal tagging is the term used in association with the Supervisory Control and Data Acquisition (SCADA). These tags shall be assigned specific addresses as required by the Original Equipment Manufacturer (OEM). The required cross-referencing and identification shall be provided by means of and input/output (I/O) schedule.

### 3.2 Mimic label's

Symbols displayed on mimics for the purpose of graphic display to the operator require limited information as more details can be obtained by additional operator functions.

The primary identification of symbols on mimics shall therefore consist of a similar format to that of plant and equipment coding .The proposed format is:

AAA/NN/BB/(CCC/CH)
--------------------

AAA	EQUIPMENT TYPE
NN	EQUIPMENT No
BBB	LOCATION - Tunnel or Building
CCC	LOCATION – Specific tunnel location or Building room location
CH	CHAINAGE

Table 6, Mimic labels proposed numbering scheme

An Emergency Telephone handset in the East carriageway of Tunnel E chainage 1000:

EMT /01/ EIE / 1000

The list of descriptors given in appendices shall not be considered as complete and care is needed in adding additional descriptors so that no two codes are the same.

### 3.3 Schedules

The following key schedules shall be set up during the design stages of the project and maintained throughout the project life cycle. These shall provide source reference information for future identification and shall support the provision of the necessary sequential codes and numbering to maintain a viable scheme. Proposed schedules are:

Equipment schedule;

Cable schedule;

Pipe schedule;

SCADA I/O schedule.

#### 4. Appendix A: ALPHA ORDER by Equipment Name

EQUIPMENT TYPE	CODE
Battery	BAT
Bell	BEL
Camera, Assembly	CAM
Camera, Coder/Decoder	IPS
Camera, Fisheye Unit	VCF
Camera, Fixed Unit	VCT
Camera, Other Unit	VCO
Camera, Pan/Tilt/Zoom Unit	PTZ
Circuit Breaker	CBR
Communications, Amplifier	AMP
Communications, Analogue Phone Converter	ANC
Communications, Audio and data converter	ADC
Communications, Band Selective Cell Enhancer	BCE
Communications, Communications Cabinet	COM
Communications, Fibre Optic	FO-
Communications, Fibre Optic Repeater	FOR
Communications, FM Antenna	FMA
Communications, FM Repeater	FMR
Communications, Hub	HUB
Communications, Intercom	INT
Communications, Intercom interface relay	IIR
Communications, Interface Converter	IFC
Communications, IP Telephone Socket	ITS
Communications, Loudspeaker, Ceiling	CLS
Communications, Loudspeaker, Other	LSP
Communications, Low gain amplifier	LGA
Communications, Maintenance Telephone	MAT
Communications, Master Intercom	ITM
Communications, Modem	MOD
Communications, Multiplexer	MUX
Communications, Network Controller	NWC
Communications, Power Over Ethernet Patch Panel	POE
Communications, Power supply intercom	PWI
Communications, Public Address	PA-
Communications, Public address equipment	PAE
Communications, Public Address Speaker	PAS
Communications, Public Re-Broadcast Network	BCT
Communications, Radio Base station	RBS
Communications, Radio cabinet	RCA
Communications, Radio Cell Enhancer/Repeater	RCE
Communications, Radio Receiver equipment	RRE
Communications, Radio transmission equipment	RTE
Communications, Radios	RAD

EQUIPMENT TYPE	CODE
Communications, RF Combining System	RFC
Communications, Speaker	SPR
Communications, Switch, Fast Ethernet	SWF
Communications, Switch, Gigabit	SWG
Communications, Switch, Other Communications	SW-
Communications, Tetra Antenna	TTA
Communications, Tetra Repeater	TTR
Communications, Transponder	TRN
Communications, UHF Antenna	UHA
Communications, UHF Repeater	UHR
Communications, VHF Antenna	VHA
Communications, VHF Repeater	VHR
Computer, Terminal	PC-
Computer, Terminal for CCTV system	PCV
Computer, Terminal for Emergency Roadside Telephone system	PCE
Computer, Terminal for Public Address	PCA
Computer, Terminal For SCADA System	PCS
Computer, Terminal For TTMS System	PCT
Contact converter	CTC
Contactoer	CON
Control Panel	CP-
Controller	CTL
Crane	CRN
Data Point	DPS
Detector	DTR
Dimmer	DIM
Distribution Board	DB-
Door	DOR
Draw Pit	DPT
Duty Standby Vertical Risers	DVR
Earth Fault Passage Indicator	EFP
Electronic Surge Protection	ESP
Emergency Override Panel	EOP
Equipment Rack Cabinet	ECR
Fire Alarm Control Panel	FCP
Fire Blanket Pressurized Water	FB-
Fire Damper	FDR
Fire Detection Unit	FDU
Fire Extinguisher (Automatic)	FEA
Fire Extinguisher (Manual)	FEM
Fire Fighting Cabinet	FFC
Fire Fighting Foam	FFF
Fire FM-200 BOTTLES	FMB
Fire Hose Reel	FHR
Fire Hydrant	FHY

EQUIPMENT TYPE	CODE
Fire Pump	FP-
Fire Water Tank	BTK
Fire, Breeching Inlet	BRI
Fire, Control Panel for Gas Suppression System	CPG
Fire, Dual Smoke and Heat Detector	SHD
Fire, Electronic Sounder	ESU
Fire, Fixed Point Heat Detector	FHD
Fire, Flashing Beacon	FBE
Fire, Foam Generator	FGN
Fire, Foam Inductor	FIN
Fire, Foam Tank	FTK
Fire, Heat Detector	HD-
Fire, Interconnecting Hose	IHO
Fire, Ionisation Smoke Detector	ISD
Fire, Ionisation Smoke Detector in Ceiling Void	ISC
Fire, Ionisation Smoke Detector in False Floor	ISF
Fire, Jockey Pump	JP-
Fire Man Switch	FMS
Fire, Manual Break Glass Unit	MBG
Fire, N2 Bottle	NBO
Fire, N2 Discharge Hose	DHO
Fire, Optical Smoke Detector	SDR
Fire, Optical Smoke Detector Ceiling Void	SDC
Fire, Optical Smoke Detector False Floor	SDF
Fire, Rate of Rise Heat Detector	RHD
Fire, Sensor (generic)	FSG
Fire, Underground Fire Hydrant	UHY
Fire, VESDA Panel	VDA
Fixed Gas Sampling Collection Box	FGS
Float Switch	FSW
Floating Gas Sampling Collection Box	FCB
Flow Switch	FS-
Gas Detection Junction Box	GJB
Gas Detector	GD-
Gas Sampling Panel	GSA
Generator	GEN
Hardware Interlock	HIL
Heater	HTR
Horn	HON
Intruder Detector	IND
Isolator	ISO
ITS, Automatic Incident Detection	AID
ITS, Detection Zones, Access Point	DZA
ITS, Detection Zones, Magnetometer	DZM
ITS, Dynamic Message Signs	DMS

EQUIPMENT TYPE	CODE
ITS, Ground Mounted Enclosure	GME
ITS, Lane Control Signs	LCS
ITS, License Plate Reader	LPR
ITS, Overheight Vehicle Detection System, Audio Visual Alarm	OVA
ITS, Overheight Vehicle Detection System, Master Unit	OVM
ITS, Overheight Vehicle Detection System, Remote Unit	OVR
ITS, Road Weather Information System	RWI
ITS, Wall Mounted Enclosure	WME
ITS, Weigh-In-Motion	WIM
ITS, Automatic Barrier	ABR
ITS, Emergency Roadside Telephone	EMT
ITS, Emergency Roadside Telephone Console	EPC
ITS, Emergency Roadside Telephone Line Adapter	ELA
ITS, Flashing Warning Amber Light	FWL
ITS, Incident Detection Loop	IDL
ITS, Lane Control	LCS
ITS, Lay-by Detector Emitter	LBE
ITS, Lay-by Detector Receiver	LBR
ITS, Remote Unit Controller	TRU
ITS, Traffic Light	TSL
Junction Box	JB-
Junction Box Coaxial	JBX
Junction Box Multi-pair Cables	JBC
Junction Box Optical Fibre	JBF
Junction Box Power	JBP
Junction Box Public Address	JBA
Level Alarm	LAL
Level Element	LEL
Level Indicator	LID
Level Switch	LSW
Light Liquids Removals	LLR
Lighting Fitting Emergency	LEM
Loud Ringer	LRA
Luminaire Type A	LFA
Luminaire Type B	LFB
Luminaire Type C	LFC
Luminaire Type D	LFD
Luminaire Type E	LFE
Luminaire Type F	LFF
Luminaire Type G	LFG
Luminaire Type H	LFH
Luminaire Type J	LFJ
Luminaire Type K	LFK
Luminaire Type L	LFL
Main distribution frame	MDF



EQUIPMENT TYPE	CODE
Manhole	MH-
Mechanical Interlock	MIL
Meter, Ammeter	AM-
Meter, Anemometer	ANM
Meter, Anemometer Evaluation Unit	ANE
Meter, Carbon Dioxide	CO2
Meter, Carbon Monoxide	CO1
Meter, External photometer	EPH
Meter, Flow Indicator	FID
Meter, Flow Sensor	FLS
Meter, Internal photometer	IPH
Meter, Nitrogen Dioxide Measure Device	NO2
Meter, Nitrogen Oxide Measuring device	Nox
Meter, Optical Measuring Device	OPT
Meter, Pressure Indicator	PID
Meter, Pressure Transmitter	PIT
Meter, Temperature	TM-
Meter, Visibility Detector	OPC
Meter, Visibility Detector Evaluation Unit	OPE
Meter, Voltage	VM-
Monitors	MON
Motion Sensor	MOS
Motor Control Centre	MCC
Oil Separator	OLS
Orifice	ORF
Pen Stock	PN-
Poles & Masts	POL
Power amplifier	PAM
Power Factor Correction/Harmonic Filtration Equipment	PFC
Printer	PTR
Programmable Logic Controller	PLC
Protection Relay	PR-
Pump, Control Panel	PCP
Pump, Other Unit	POT
Pump, Storm Water Unit	PSW
Recording	VCR
Remote Indicator LED	RIL
Remote IO Unit	RIO
Reservoir	RES
Sample Lines Test Box	SLB
SCADA Control Remote Unit Controller	SRU
SCADA I/O Interface	SIO
Sensor	SEN
Sensor Control Unit	SCU
Server	SVR

EQUIPMENT TYPE	CODE
Sign, No passing	NPS
Signal, Analogue	ANS
Signal, Digital (Including Alarms)	DTL
Software Interlock	SIL
Solenoid	SOL
Splitter	SPT
Starter	STR
Sump	SMP
Surface Water Drainage	SWD
Surge Arrester	SA-
Switch, Door	DSW
Switch, Pressure	PS-
Switch, Selector	SWS
Switch, Supervisory Switch	SSW
Trace Heating Junction Box	TJB
Trace Heating Temperature Controller	TTC
Transducer	TRD
Transformer, Current	CT-
Transformer, Power	TRA
Trap	TRP
Uninterruptible Power Supply	UPS
UPS Equipment Bypass Control Panel	BPC
Valve	VAL
Valve, Air Release	ARV
Valve, Ball	BVL
Valve, Cylinder	CVL
Valve, Isolation	IVL
Valve, Manually Operated	MVL
Valve, Non Return	NRV
Valve, Pressure Regulating	PVL
Valve, Pressure Relief	PRV
Variable gain amplifier	VGA
Vent	VEN
Ventilation, Air conditioning	AC-
Ventilation, Air Operated Damper	AOD
Ventilation, Automatic Air Vent	AAV
Ventilation, Control Panel	VCP
Ventilation, Other Fan	OFN
Ventilation, Pressurization Fan	PFN
Ventilation, Tunnel Fan	FAN
Vessel, Other	VES
Vessel, Pressure	PVS
Vessel, Water	WVS
Video Display Unit	VDU
Video Equipment Rack	VER

EQUIPMENT TYPE	CODE
Video Network Recorder	VNR
Video server proxy	VSP
Volume Control Damper	VCD
Workstation	WB-

Table 7, Codes in alphabetical order by equipment name

EXAMPLE

## 5. Appendix B: ALPHA ORDER by Abbreviation

EQUIPMENT TYPE	CODE
Ventilation, Automatic Air Vent	AAV
ITS, Automatic Barrier	ABR
Ventilation, Air conditioning	AC-
Communications, Audio and data converter	ADC
ITS, Automatic Incident Detection	AID
Meter, Ammeter	AM-
Communications, Amplifier	AMP
Communications, Analogue Phone Converter	ANC
Meter, Anemometer Evaluation Unit	ANE
Meter, Anemometer	ANM
Signal, Analogue	ANS
Ventilation, Air Operated Damper	AOD
Valve, Air Release	ARV
Battery	BAT
Communications, Band Selective Cell Enhancer	BCE
Communications, Public Re-Broadcast Network	BCT
Bell	BEL
UPS Equipment Bypass Control Panel	BPC
Fire, Breeching Inlet	BRI
Fire Water Tank	BTK
Valve, Ball	BVL
Camera, Assembly	CAM
Circuit Breaker	CBR
Communications, Loudspeaker, Ceiling	CLS
Meter, Carbon Monoxide	CO1
Meter, Carbon Dioxide	CO2
Communications, Communications Cabinet	COM
Contactactor	CON
Crane	CRN
Control Panel	CP-
Fire, Control Panel for Gas Suppression System	CPG
Transformer, Current	CT-
Contact converter	CTC
Controller	CTL
Valve, Cylinder	CVL
Distribution Board	DB-
Fire, N2 Discharge Hose	DHO
Dimmer	DIM
ITS, Dynamic Message Signs	DMS
Door	DOR
Data Point	DPS
Draw Pit	DPT

EQUIPMENT TYPE	CODE
Switch, Door	DSW
Signal, Digital (Including Alarms)	DTL
Detector	DTR
Duty Standby Vertical Risers	DVR
ITS, Detection Zones, Access Point	DZA
ITS, Detection Zones, Magnetometer	DZM
Equipment Rack Cabinet	ECR
Earth Fault Passage Indicator	EFP
ITS, Emergency Roadside Telephone Line Adapter	ELA
ITS, Emergency Roadside Telephone	EMT
Emergency Override Panel	EOP
ITS, Emergency Roadside Telephone Console	EPC
Meter, External photometer	EPH
Electronic Surge Protection	ESP
Fire, Electronic Sounder	ESU
Ventilation, Tunnel Fan	FAN
Fire Blanket Pressurized Water	FB-
Fire, Flashing Beacon	FBE
Floating Gas Sampling Collection Box	FCB
Fire Alarm Control Panel	FCP
Fire Damper	FDR
Fire Detection Unit	FDU
Fire Extinguisher (Automatic)	FEA
Fire Extinguisher (Manual)	FEM
Fire Fighting Cabinet	FFC
Fire Fighting Foam	FFF
Fire, Foam Generator	FGN
Fixed Gas Sampling Collection Box	FGS
Fire, Fixed Point Heat Detector	FHD
Fire Hose Reel	FHR
Fire Hydrant	FHY
Meter, Flow Indicator	FID
Fire, Foam Inductor	FIN
Meter, Flow Sensor	FLS
Communications, FM Antenna	FMA
Fire FM-200 BOTTLES	FMB
Communications, FM Repeater	FMR
Fire Man Switch	FMS
Communications, Fibre Optic	FO-
Communications, Fibre Optic Repeater	FOR
Fire Pump	FP-
Flow Switch	FS-
Fire, Sensor (generic)	FSG
Float Switch	FSW
Fire, Foam Tank	FTK
ITS, Flashing Warning Amber Light	FWL

EQUIPMENT TYPE	CODE
Gas Detector	GD-
Generator	GEN
Gas Detection Junction Box	GJB
ITS, Ground Mounted Enclosure	GME
Gas Sampling Panel	GSA
Fire, Heat Detector	HD-
Hardware Interlock	HIL
Horn	HON
Heater	HTR
Communications, Hub	HUB
ITS, Incident Detection Loop	IDL
Communications, Interface Converter	IFC
Fire, Interconnecting Hose	IHO
Communications, Intercom interface relay	IIR
Intruder Detector	IND
Communications, Intercom	INT
Meter, Internal photometer	IPH
Camera, Coder/Decoder	IPS
Fire, Ionisation Smoke Detector in Ceiling Void	ISC
Fire, Ionisation Smoke Detector	ISD
Fire, Ionisation Smoke Detector in False Floor	ISF
Isolator	ISO
Communications, Master Intercom	ITM
Communications, IP Telephone Socket	ITS
Valve, Isolation	IVL
Junction Box	JB-
Junction Box Public Address	JBA
Junction Box Multi-pair Cables	JBC
Junction Box Optical Fibre	JBF
Junction Box Power	JBP
Junction Box Coaxial	JBX
Fire, Jockey Pump	JP-
Level Alarm	LAL
ITS, Lay-by Detector Emitter	LBE
ITS, Lay-by Detector Receiver	LBR
ITS, Lane Control Signs	LCS
ITS, Lane Control	LCS
Level Element	LEL
Lighting Fitting Emergency	LEM
Luminaire Type A	LFA
Luminaire Type B	LFB
Luminaire Type C	LFC
Luminaire Type D	LFD
Luminaire Type E	LFE
Luminaire Type F	LFF

EQUIPMENT TYPE	CODE
Luminaire Type G	LFG
Luminaire Type H	LFH
Luminaire Type J	LFJ
Luminaire Type K	LFK
Luminaire Type L	LFL
Communications, Low gain amplifier	LGA
Level Indicator	LID
Light Liquids Removals	LLR
ITS, License Plate Reader	LPR
Loud Ringer	LRA
Communications, Loudspeaker, Other	LSP
Level Switch	LSW
Communications, Maintenance Telephone	MAT
Fire, Manual Break Glass Unit	MBG
Motor Control Centre	MCC
Main distribution frame	MDF
Manhole	MH-
Mechanical Interlock	MIL
Communications, Modem	MOD
Monitors	MON
Motion Sensor	MOS
Communications, Multiplexer	MUX
Valve, Manually Operated	MVL
Fire, N2 Bottle	NBO
Meter, Nitrogen Dioxide Measure Device	NO2
Meter, Nitrogen Oxide Measuring device	Nox
Sign, No passing	NPS
Valve, Non Return	NRV
Communications, Network Controller	NWC
Ventilation, Other Fan	OFN
Oil Separator	OLS
Meter, Visibility Detector	OPC
Meter, Visibility Detector Evaluation Unit	OPE
Meter, Optical Measuring Device	OPT
Orifice	ORF
ITS, Overheight Vehicle Detection System, Audio Visual Alarm	OVA
ITS, Overheight Vehicle Detection System, Master Unit	OVM
ITS, Overheight Vehicle Detection System, Remote Unit	OVR
Communications, Public Address	PA-
Communications, Public address equipment	PAE
Power amplifier	PAM
Communications, Public Address Speaker	PAS
Computer, Terminal	PC-
Computer, Terminal for Public Address	PCA
Computer, Terminal for Emergency Roadside Telephone system	PCE
Pump, Control Panel	PCP

EQUIPMENT TYPE	CODE
Computer, Terminal For SCADA System	PCS
Computer, Terminal For TTMS System	PCT
Computer, Terminal for CCTV system	PCV
Power Factor Correction/Harmonic Filtration Equipment	PFC
Ventilation, Pressurization Fan	PFN
Meter, Pressure Indicator	PID
Meter, Pressure Transmitter	PIT
Programmable Logic Controller	PLC
Pen Stock	PN-
Communications, Power Over Ethernet Patch Panel	POE
Poles & Masts	POL
Pump, Other Unit	POT
Protection Relay	PR-
Valve, Pressure Relief	PRV
Switch, Pressure	PS-
Pump, Storm Water Unit	PSW
Printer	PTR
Camera, Pan/Tilt/Zoom Unit	PTZ
Valve, Pressure Regulating	PVL
Vessel, Pressure	PVS
Communications, Power supply intercom	PWI
Communications, Radios	RAD
Communications, Radio Base station	RBS
Communications, Radio cabinet	RCA
Communications, Radio Cell Enhancer/Repeater	RCE
Reservoir	RES
Communications, RF Combining System	RFC
Fire, Rate of Rise Heat Detector	RHD
Remote Indicator LED	RIL
Remote IO Unit	RIO
Communications, Radio Receiver equipment	RRE
Communications, Radio transmission equipment	RTE
ITS, Road Weather Information System	RWI
Surge Arrester	SA-
Sensor Control Unit	SCU
Fire, Optical Smoke Detector Ceiling Void	SDC
Fire, Optical Smoke Detector False Floor	SDF
Fire, Optical Smoke Detector	SDR
Sensor	SEN
Fire, Dual Smoke and Heat Detector	SHD
Software Interlock	SIL
SCADA I/O Interface	SIO
Sample Lines Test Box	SLB
Sump	SMP
Solenoid	SOL
Communications, Speaker	SPR



EQUIPMENT TYPE	CODE
Splitter	SPT
SCADA Control Remote Unit Controller	SRU
Switch, Supervisory Switch	SSW
Starter	STR
Server	SVR
Communications, Switch, Other Communications	SW-
Surface Water Drainage	SWD
Communications, Switch, Fast Ethernet	SWF
Communications, Switch, Gigabit	SWG
Switch, Selector	SWS
Trace Heating Junction Box	TJB
Meter, Temperature	TM-
Transformer, Power	TRA
Transducer	TRD
Communications, Transponder	TRN
Trap	TRP
ITS, Remote Unit Controller	TRU
ITS, Traffic Light	TSL
Communications, Tetra Antenna	TTA
Trace Heating Temperature Controller	TTC
Communications, Tetra Repeater	TTR
Communications, UHF Antenna	UHA
Communications, UHF Repeater	UHR
Fire, Underground Fire Hydrant	UHY
Uninterruptible Power Supply	UPS
Valve	VAL
Volume Control Damper	VCD
Camera, Fisheye Unit	VCF
Camera, Other Unit	VCO
Ventilation, Control Panel	VCP
Recording	VCR
Camera, Fixed Unit	VCT
Fire, VESDA Panel	VDA
Video Display Unit	VDU
Vent	VEN
Video Equipment Rack	VER
Vessel, Other	VES
Variable gain amplifier	VGA
Communications, VHF Antenna	VHA
Communications, VHF Repeater	VHR
Meter, Voltage	VM-
Video Network Recorder	VNR
Video server proxy	VSP
Workstation	WB-
ITS, Weigh-In-Motion	WIM
ITS, Wall Mounted Enclosure	WME

EQUIPMENT TYPE	CODE
Vessel, Water	WVS

Table 8, Codes in alphabetical order by code

EXAMPLE

## 6. Appendix C: Building Location<sup>1</sup>

LOCATION	CODE
Tunnel E	EI-
Tunnel E East Carriageway	EIE
Tunnel E West Carriageway	EIW
Tunnel E Services Compound	ESC
K Underpass	KU-
K Underpass North Carriageway	KUN
K Underpass South Carriageway	KUS
K Underpass Services Compound	KSC
Tunnel E EFA Pump Station	EFA

Table 9, Codes for buildings and structures

<sup>1</sup> The codes provided are for reference only, actual codes specific to the project will be provided by the organization in charge of preparing the TMS design. The proposed codes shall be approved by Ashghal.

## 7. Appendix D: Room Location<sup>2</sup>

LOCATION		CODE
ESC	Generator Room	E01
ESC	Control Room	E02
ESC	LV Room	E03
ESC	Transformer Room	E04
ESC	HV Room	E05
ESC	Fire Pump Room	E06
ESC	Store Room	E07
ESC	Equipment Room	E08
ESC	ITS Room	E09
ESC	Conference Room	E10
ESC	Toilet	E11
ESC	Pantry	E12
ESC	Passage lower level	E13
ESC	Passage O&M access	E14
ESC	Passage Kahramaa access	E15
ESC	Fire Water Tank 1	E16
ESC	Fire Water Tank 2	E17
ESC	Electrical Room	E18
EI-	Tunnel E storm water pump room	E19
ESC	Diesel Oil Day Tank	E20
ESC	Diesel Oil Storage Tank	E21
ESC	Substation Compound Roof	E22
KU-	K Underpass storm water pump room	K01
KSC	Passage 1	K02
KSC	Passage 2	K03
KSC	HV Room	K04
KSC	Transformer Room	K05
KSC	MV Room	K06
KSC	Substation Compound Roof	K07
EFA	Tunnel E EFA pump room	F01

Table 10, Codes for rooms in buildings and structures

<sup>2</sup> The codes provided are for reference only, actual codes specific to the project will be provided by the organization in charge of preparing the TMS design. The proposed codes shall be approved by Ashghal.

## 8. Appendix E: ALPHA ORDER by item name (Miscellaneous)

LOCATION	CODE
Location, Carriageway	CW-
Location, Lane (number)	LN(n) add number
Location, Left Side	LFT
Location, Right Side	RHT
Location, Centre	CTR
Magnitude, Air speed	ASM
Magnitude, Current Flow	A--
Magnitude, Temperature	T--
Magnitude, Time	TME
Magnitude, Voltage	V--
Magnitude, Wind Speed	WSP
Major	MAJ
Minor	MNR
Power AC; <1 kV	LV-
Power AC; >1 kV	MV-
Power DC; <1 kV	DC-
Standby/Backup	STB

Table 11, Codes (Miscellaneous) in alphabetical order by name

## 9. Appendix F: ALPHA ORDER by code (Miscellaneous)

LOCATION	CODE
Magnitude, Current Flow	A--
Magnitude, Air speed	ASM
Location, Centre	CTR
Location, Carriageway	CW-
Power DC; <1 kV	DC-
Location, Left Side	LFT
Location, Lane (number)	LN(n) add number
Power AC; <1 kV	LV-
Major	MAJ
Minor	MNR
Power AC; >1 kV	MV-
Location, Right Side	RHT
Standby/Backup	STB
Magnitude, Temperature	T--
Magnitude, Time	TME
Magnitude, Voltage	V--
Magnitude, Wind Speed	WSP

Table 12, Codes (Miscellaneous) in alphabetical order by code