Electrical & Mechanical (E&M) Technical Proposal Submission Requirements For Developments Integrated With Rapid Transit System (RTS) Stations

PREFACE

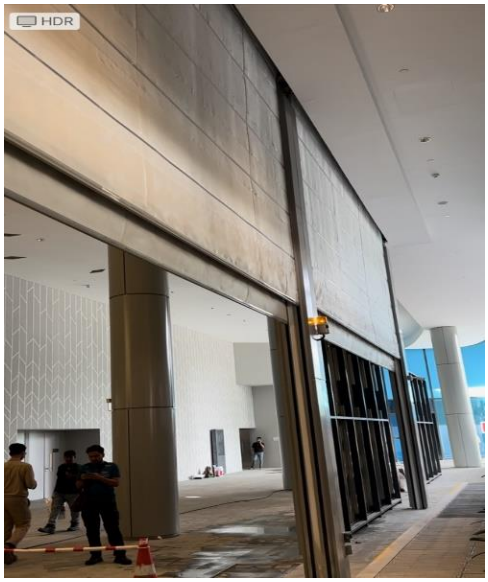
This quick guide outlines LTA's requirements for E&M system technical proposal submissions on works in relation to providing direct access to RTS stations from adjoining development parcels to improve precinct connectivity and integration with the development. Developers are encouraged to initiate proposals with LTA and seek LTA's approval prior to initiating the modification application to modify the impacted E&M systems with the Public Transport Operator (PTO).

The case studies in this guide series aim to offer guidance on the essential E&M design requirements to be included in the Developer's E&M systems technical proposal for:

1. Underground connection to RTS station concourse level or other levels via existing knock-out panel (KOP)
2. At-grade or above-ground connection to RTS station entrance of either an RTS underground or elevated station

(1)

(2)



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E&M REQUIREMENTS

Below are some examples of the E&M provisions that should be submitted with the modification application for review and approval.

1. Interface Terminal Box (ITB) provision for interface of fire and security shutters with Integrated Supervisory Control System (ISCS)/Supervisory Control System (SCS)
2. Interface Terminal Box (ITB) provision for interface of fire shutter with Fire Protection System
3. Electrical provision for security shutter
4. Lighting provision
5. Video Surveillance System (VSS) camera provision
6. Station Travel Information System (STIS) display provision
7. Maintenance Management System (MMS)

It is important for the Developer to arrange with PTO to carry out site surveys for the actual site conditions against the as-built drawings to ascertain the scope of modifications to the respective systems.

Documents that are required to be furnished for technical review and modification application include but not limited to the following:

a) Method statement showing sequence of works/installation details
b) Single line diagram, schematics and calculations
c) Test plans and test procedures for individual system's site test and integrated test
d) Technical brochures/specifications, test reports and certificates for equipment and materials
e) Layout/Sectional plans of the proposed modification work
f) Cable routing
g) Layout/drawings reflecting the changes/amendments to existing as-built drawings

E&M REQUIREMENTS

Interface Terminal Box (ITB) provisions for interface of fire and security shutters with Integrated Supervisory Control System (ISCS)/Supervisory Control System (SCS)

Fire and security shutters provided at the vicinity of the knock-out panel are required for fire compartmentation and demarcating the operational and maintenance boundary between the operating transit station and the proposed development. The operating status of these shutters shall be monitored, via the ITBs from the operating transit station's Passenger Service Centre (PSC) and the line's Operation Control Centre (OCC).

Typically, 2 ITBs (ISCS/SCS) will be provided within the operational boundary of the operating transit station and installed above the false ceiling, for cabling to connect from the respective shutter to the ISCS/SCS rack cabinet located in Communication Equipment (CE)/ISCS room.

ITB (ISCS)

The typical ISCS/SCS monitoring points for security and fire shutters as follows.

Status	Fire Shutter	Security Shutter
Up	X	X
Down	X	X
Trip	X	X
Remote Open		X

Cable routing drawings showing the cable connection from the ITB to CE/ISCS room shall also be submitted for review and approval.

E&M REQUIREMENTS

Interface Terminal Box (ITB) provisions for interface of fire shutter with Fire Protection System (FPS)

The alarm signal from the activated localized smoke detectors (on either side of the fire shutter) as mandated by the SCDF's Code of Practice for Fire Precaution in Rapid Transit Systems (CPFPRTS), shall be sent to the transit station's fire protection system through the ITB (FPS). The ITB(FPS) shall be located within the operational boundary of the transit station and the location shall be subjected to the concurrence of the PTO.

ITB (FPS)

Main Alarm Panel

Cable routing drawings and fire alarm schematics shall be submitted as part of technical proposal for review and approval.

The typical status of the localized detectors activation reflected in the station MAP, as follows.

This alarm signal shall not trigger the station's or building's fire alarm but only provide the status that the shutter is activated.

E&M REQUIREMENTS

Electrical provision for security shutter

An isolator shall be provided to supply power to the security shutter. The power shall be taken from the transit station's Low Voltage (LV) reticulation system.

Upon identifying the source of the power supply, the cabling routing and single-line diagrams shall be submitted for review and approval.

Electrical Isolator

Lighting provision at the knock-out connection

The need for additional lighting to meet the required illumination level at the knock-out connection should be addressed. Any plans for extra lighting, modifications to the affected single line diagram, and adjustments to cabling routes, if necessary, must be submitted for review and approval.

E&M REQUIREMENTS

Video Surveillance System (VSS) camera

The Video Surveillance System (VSS) cameras shall be provided to monitor all new non-transit connection areas leading to the operating transit station, in accordance with the specifications of the LTA Public Transport Security (PTS) Division. The layout and coverage plans for the cameras must be approved by the LTA PTS Division.

Additionally, detailed cable routing drawings connecting the VSS cameras to the relevant rack in the CE/ISCS room, updated VSS matrix, and interface with the ISCS should be included in the technical proposal for thorough review and approval.

Video Surveillance System cameras

E&M REQUIREMENTS

Station Travel Information System (STIS) Display

Station Travel Information System (STIS) displays must be installed within the transit station's premises, facing the knock-out panel for commuters to access travel-related information upon entering the station.

The placement of the STIS display should be carefully coordinated to avoid obstructing the coverage of VSS cameras and way-finding signages.

Additionally, detailed cable routing drawings connecting the STIS display to the relevant rack in the CE/ISCS room and its interface with the ISCS should be included in the technical proposal for review and approval.

Station Travel Information System Display

Registration of Assets in Maintenance Management System (MMS)

All the operating transit station's asset, added or removed from the affected operating transit station, shall be correctly reflected in the MMS database.

S/N	Parent Asset ID	Asset ID	Description	Compress/short Asset ID	Equipment Remarks (unlimited length)	Function Desc <lookup table>
1		CEPN/EMF/ROS/RS11	RS - B1M UPPER CONCOURSE INT.	EPEMFROSRS11	Located at EPN-B1M UPPER CONCOURSE INT.	Roller Shutter System
2	CEPN/EMF/ROS/RS11	CEPN/EMF/ROS/RSM11	Motor of RS21 - B1M UPPER CONCOURSE INT.	EPEMFROSRSM11	Located at EPN-B1M UPPER CONCOURSE INT.	Roller Shutter System
3		CEPN/EMF/ROS/RS12	RS - Level 1	EPEMFROSRS12	Located at EPN-Level 1	Roller Shutter System
4	CEPN/EMF/ROS/RS12	CEPN/EMF/ROS/RSM12	Motor of RS22 - Level 1	EPEMFROSRSM12	Located at EPN-Level 1	Roller Shutter System
5		CEPN/EMF/ROS/RS13	RS - Level 1	EPEMFROSRS13	Located at EPN-Level 1	Roller Shutter System
6	CEPN/EMF/ROS/RS13	CEPN/EMF/ROS/RSM13	Motor of RS23 - Level 1	EPEMFROSRSM13	Located at EPN-Level 1	Roller Shutter System

TYPE OF TESTING REQUIRED

Prior to DBC and PTO allowing the proposed opening of the KOP for commuter access, Site Testing & Commissioning (STC) and Integrated Testing & Commissioning (ITC) shall be conducted to ensure that the affected RTS systems are in working conditions.

(1) SITE TESTING & COMMISSIONING (STC)

This testing is conducted by individual system contractor to ensure that the operation of the system is in accordance with the design.

A) Electrical Works

For main and sub-main cables, the tests to be carried out are:

1) Insulation Resistance Test
2) Continuity and Voltage Test.

B) Security Shutters

Shutters to be tested for:

1) UP, DOWN & TRIP status.
2) Remote opening of security shutter.

C) Fire Shutters

Shutters to be tested for:

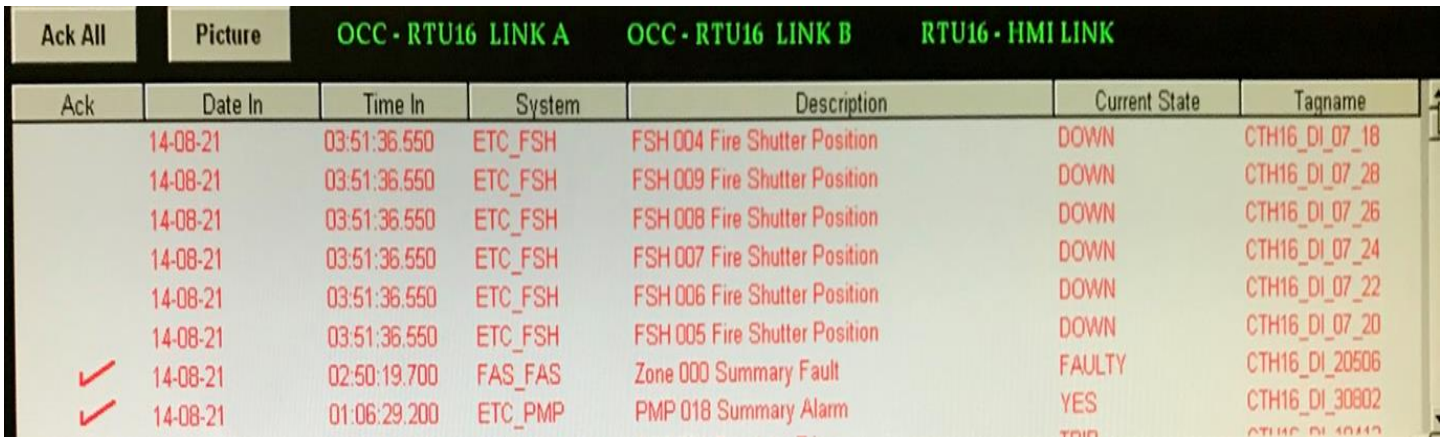
1) Activation by localized detector.
2) Activation by adjacent fire alarm signal.

Fire Shutter Activation Testing (an illustration)

S/N	Description of Test	Fire Shutter	Strobe Light & Bell	Station MAP status
1	Activate any localised smoke detector	Down Up	Yes/No	Yes/No
2	Re-set fire alarm	Down Up	Back to normal	Back to normal
3	Activate adjacent fire alarm (call point, FS, etc)	Down Up	Yes/No	Yes/No
4	Re-set fire alarm	Down Up	Back to normal	Back to normal

TYPE OF TESTING REQUIRED

Display of fire shutter activation (GUI) at PSC (an illustration)



D) STIS

To carry out system tests such as:

1) Display train arrival information
2) Backend check at station and OCC – monitor STIS status, volume control, reset, etc.
3) Send message to the new STIS

E) VSS camera

The tests to be carried out are:

1) Field of View (FOV) image to be submitted to LTA PTS division for endorsement.
2) Peak to peak signal level test.
3) Live image and recorded image .
4) Camera text.

F) Final combined ITC testing with all the various system with the ISCS and MMS at station and OCCs

Testing of ISCS shall be done at operating transit station's PSC and OCCs for:

1) Fire and security shutters activation
2) VSS camera
3) STIS display

Note that the actual test regime will vary depending on the system arrangement for the respective RTS Line.

(2) INTEGRATED TESTING & COMMISSIONING (ITC)

ITC with Security & Fire Shutters (an illustration)

Description of Test	Fire Shutter	Station MAP	Display at PSC (GUI)	Security Shutter	Display at PSC (GUI)
Position	Open	Yes/No	Yes/No	Open	Yes/No
	Close	Yes/No	Yes/No	Close	Yes/No
	Intermediate	Yes/No	Yes/No	Intermediate	Yes/No
	Inconsistent	Yes/No	Yes/No	Inconsistent	Yes/No
Trip	Trip	Yes/No	Yes/No	Trip	Yes/No
	Normal	Yes/No	Yes/No	Normal	Yes/No
Control	-	-	-	Open	Yes/No

ITC with other systems (an illustration)

S/N	SYSTEMS	TASKS	SCOPE / EQUIPMENT TYPE
1	EMF/POW	ITC	Lighting control panel
			Security Shutter
			Fire Shutter
2	COMMS & AMS	ITC	Tests consist of: 1. CCTV Cameras 2. EPAX CCTV Triggering 3. AMS CCTV Triggering 4. CCTV Alarm Triggering
	Comms	ITC	Passenger Indicator Display
			Public Announcement (PA)
3	ISCS	ITC	New ISCS PLC Cabinet
			New PLC
4	MMS	Software	MMS software deployment
5	ISCS	Software	ISCS software deployment

CONCLUSION

This Quick Guide showcases best practices and examples drawn from numerous past projects and experiences. We are committed to keeping this Quick Guide current by incorporating new experiences, initiatives, and solutions.

Additionally, LTA has created a checklist outlining the required plans and details for E&M Submissions (refer to Appendix B in the Guidebook for Carrying out Modification Work to the Rapid Transit System). This checklist applies to proposed work within the station boundary and must be submitted to LTA upon completion. You can access this Guidebook by scanning the provided QR Code.

https://go.gov.sg/lta-guidebook-modification

All publications are made available at LTA's corporate website, under Industry & Innovations > Industry Matters > Development & Construction resources.