ภาคผนวก ก-14

การตรวจสอบความสมบูรณ์แข็งแรงและประสิทธิภาพของวัสดุดูดซับเสียงใต้สถานีรถไฟฟ้า บริเวณสถานีภาวนา (YL-02) สถานีโชคชัย 4 (YL-03) สถานีลาดพร้าว 101 (YL-07) และสถานีสำโรง (YL-23)

ตารางบันทึกผล Visual check แผ่นดูดซับเสียงใต้สถานี ประจำปี 2568

Station	ม.ค.	ก.พ.	มี.ค.	เม.ย.	พ.ค.	มิ.ย.	ก.ค.	ส.ค.	ก.ย.	ต.ค.	พ.ย.	ธ.ค.
YL 02	OK	OK	OK	OK	OK	OK						
	16/01/68	11/02/68	05/03/68	03/04/68	07/05/68	05/06/68						
	[redacted]											
YL 03	OK	OK	OK	OK	OK	OK						
	16/01/68	11/02/68	05/03/68	03/04/68	07/05/68	05/06/68						
	[redacted]											
YL 07	OK	OK	OK	OK	OK	OK						
	16/01/68	11/02/68	10/03/68	09/04/68	15/05/68	05/06/68						
	[redacted]											
YL 23	OK	OK	OK	OK	OK	OK						
	30/01/68	21/02/68	14/03/68	28/04/68	21/05/68	10/06/68						
	[redacted]											

หมายเหตุ :
ok คือแผ่นดูดซับเสียง อยู่ในสภาพที่ดี ไม่มีส่วนแตกหัก
no คือ แผ่นดูดซับเสียง มีส่วนใดส่วนนึงแตกหักเสียหาย ให้ถ่ายรูปประกอบแจ้งนายสถานี เพื่อแจ้งซ่อมตามระบบ

รายงาน “การสำรวจประสิทธิภาพของแผ่นดูดซับเสียง ประจำเดือนมกราคม 2568”

โดย ส่วนคุณภาพ สายสีเหลือง

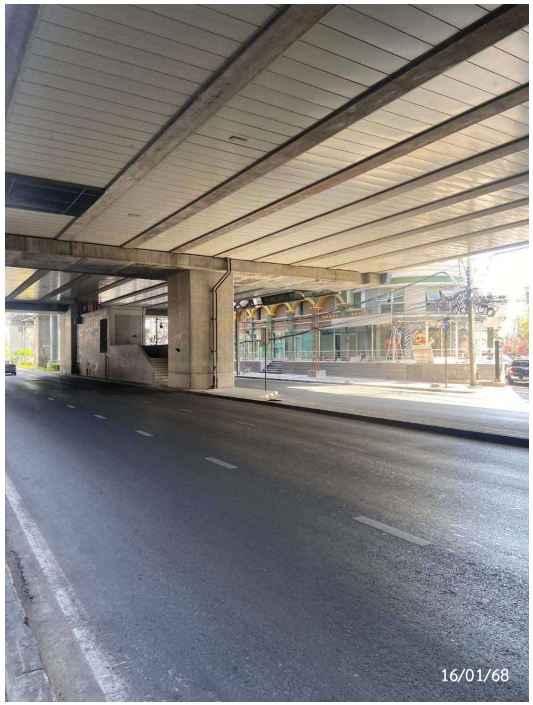
ฝ่ายความปลอดภัยและรักษาความปลอดภัยสายสีชมพูและสายสีเหลือง

บทนำ

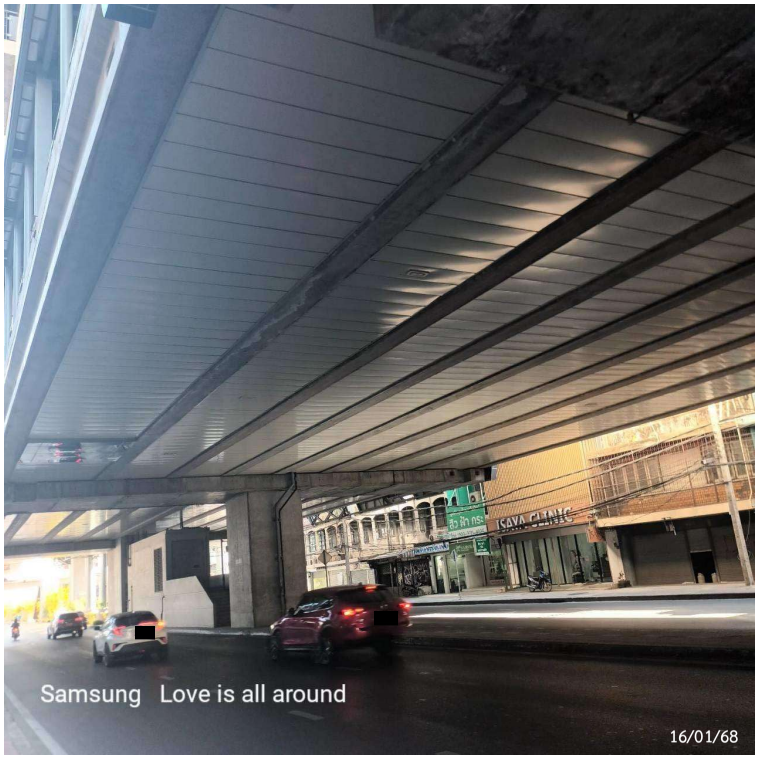
รายงานการสำรวจประสิทธิภาพของแผ่นดูดซับเสียง ประจำเดือนมกราคม 2568 ฉบับนี้จัดทำขึ้นเพื่อเป็นการตรวจสอบประสิทธิภาพความแข็งแรงของแผ่นดูดซับเสียงให้อยู่ในสภาพสมบูรณ์อยู่เสมอ ด้วยการ Visual Check ความถี่เดือนละ 1 ครั้ง โดยสถานีที่มีการติดตั้งแผ่นดูดซับเสียงมีด้วยกันทั้งหมด 4 สถานี คือ สถานีภาวนา (YL-02) สถานีโชคชัย 4 (YL-03) สถานีลาดพร้าว 101 (YL-07) และสถานีสำโรง (YL-23)

ผลการสำรวจ - เดือนมกราคม 2568

1. **สถานีภาวนา (YL-02)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก



2. **สถานีโชคชัย 4 (YL-03)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก



3. **สถานีลาดพร้าว 101 (YL-07)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก



4. **สถานีสำโรง (YL-23)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





รายงาน “การสำรวจประสิทธิภาพของแผ่นดูดซับเสียง ประจำเดือนกุมภาพันธ์ 2568”

โดย ส่วนคุณภาพ สายสีเหลือง

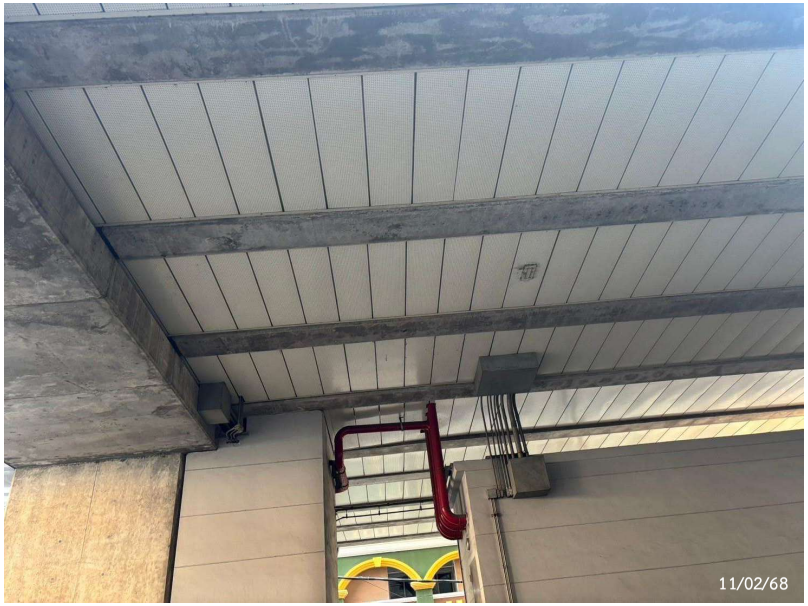
ฝ่ายความปลอดภัยและรักษาความปลอดภัยสายสีชมพูและสายสีเหลือง

บทนำ

รายงานการสำรวจประสิทธิภาพของแผ่นดูดซับเสียง ประจำเดือนกุมภาพันธ์ 2568 ฉบับนี้จัดทำขึ้นเพื่อเป็นการตรวจสอบประสิทธิภาพความแข็งแรงของแผ่นดูดซับเสียงให้อยู่ในสภาพสมบูรณ์อยู่เสมอ ด้วยการ Visual Check ความถี่เดือนละ 1 ครั้ง โดยสถานีที่มีการติดตั้งแผ่นดูดซับเสียงมีด้วยกันทั้งหมด 4 สถานี คือ สถานีภาวนา (YL-02) สถานีโชคชัย 4 (YL-03) สถานีลาดพร้าว 101 (YL-07) และสถานีสำโรง (YL-23)

ผลการสำรวจ - เดือนกุมภาพันธ์ 2568

1. **สถานีภาวนา (YL-02)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก

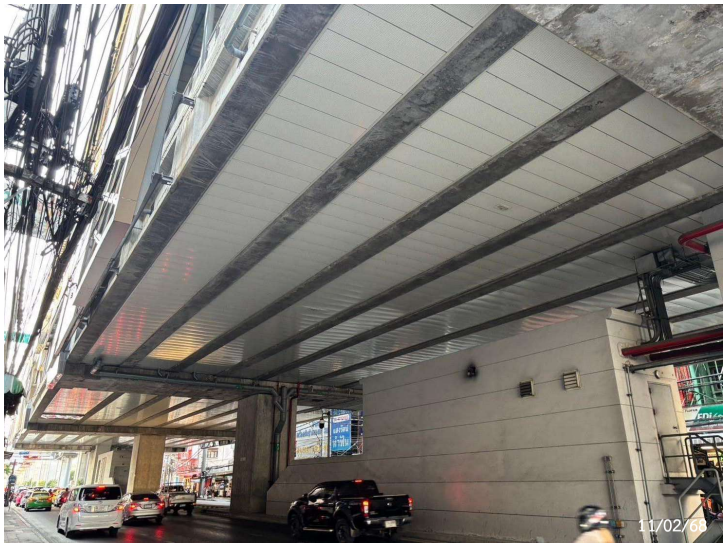


2. **สถานีโชคชัย 4 (YL-03)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





3. **สถานีลาดพร้าว 101 (YL-07)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





4. **สถานีสำโรง (YL-23)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





รายงาน “การสำรวจประสิทธิภาพของแผ่นดูดซับเสียง ประจำเดือนมีนาคม 2568”

โดย ส่วนคุณภาพ สายสีเหลือง

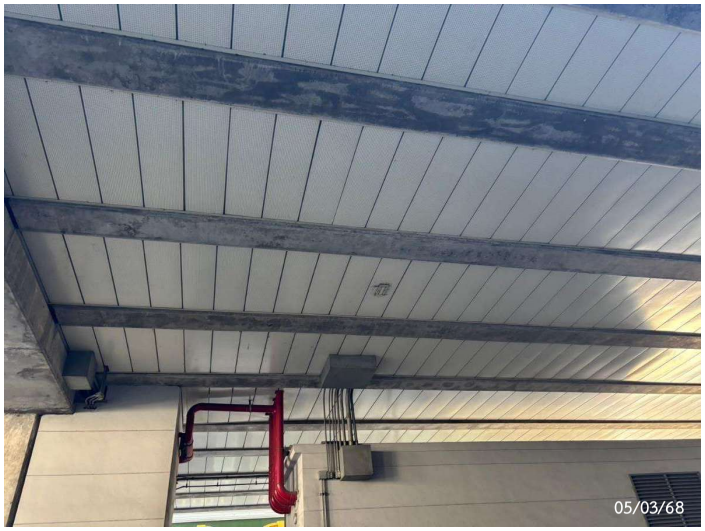
ฝ่ายความปลอดภัยและรักษาความปลอดภัยสายสีชมพูและสายสีเหลือง

บทนำ

รายงานการสำรวจประสิทธิภาพของแผ่นดูดซับเสียง ประจำเดือนมีนาคม 2568 ฉบับนี้จัดทำขึ้นเพื่อเป็นการตรวจสอบประสิทธิภาพความแข็งแรงของแผ่นดูดซับเสียงให้อยู่ในสภาพสมบูรณ์อยู่เสมอ ด้วยการ Visual Check ความถี่เดือนละ 1 ครั้ง โดยสถานีที่มีการติดตั้งแผ่นดูดซับเสียงมีด้วยกันทั้งหมด 4 สถานี คือ สถานีภาวนา (YL-02) สถานีโชคชัย 4 (YL-03) สถานีลาดพร้าว 101 (YL-07) และสถานีสำโรง (YL-23)

ผลการสำรวจ - เดือนมีนาคม 2568

1. **สถานีภาวนา (YL-02)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก



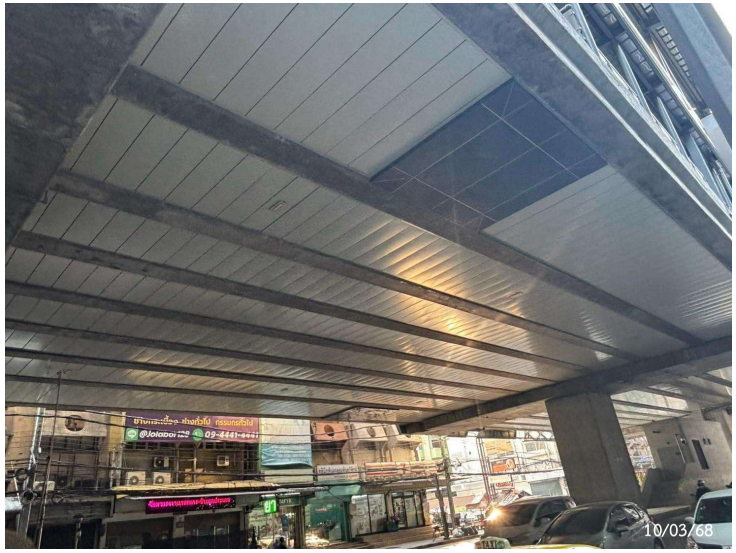
2. **สถานีโชคชัย 4 (YL-03)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





3. **สถานีลาดพร้าว 101 (YL-07)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





4. **สถานีสำโรง (YL-23)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





รายงาน “การสำรวจประสิทธิภาพของแผ่นดูดซับเสียง ประจำเดือนเมษายน 2568”

โดย ส่วนคุณภาพ สายสีเหลือง

ฝ่ายความปลอดภัยและรักษาความปลอดภัยสายสีชมพูและสายสีเหลือง

บทนำ

รายงานการสำรวจประสิทธิภาพของแผ่นดูดซับเสียง ประจำเดือนเมษายน 2568 ฉบับนี้จัดทำขึ้นเพื่อเป็นการตรวจสอบประสิทธิภาพความแข็งแรงของแผ่นดูดซับเสียงให้อยู่ในสภาพสมบูรณ์อยู่เสมอ ด้วยการ Visual Check ความถี่เดือนละ 1 ครั้ง โดยสถานีที่มีการติดตั้งแผ่นดูดซับเสียงมีด้วยกันทั้งหมด 4 สถานี คือ สถานีภาวนา (YL-02) สถานีโชคชัย 4 (YL-03) สถานีลาดพร้าว 101 (YL-07) และสถานีสำโรง (YL-23)

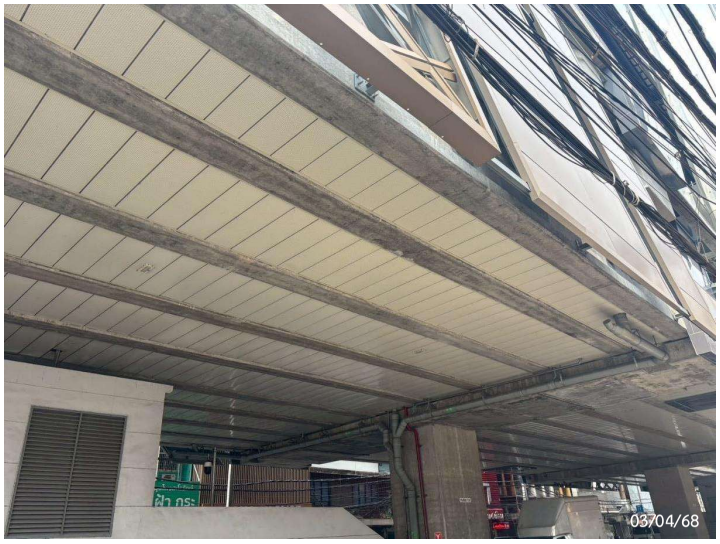
ผลการสำรวจ - เดือนเมษายน 2568

1. **สถานีภาวนา (YL-02)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก



2. **สถานีโชคชัย 4 (YL-03)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





3. **สถานีลาดพร้าว 101 (YL-07)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





4. **สถานีสำโรง (YL-23)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





รายงาน “การสำรวจประสิทธิภาพของแผ่นดูดซับเสียง ประจำเดือนพฤษภาคม 2568”

โดย ส่วนคุณภาพ สายสีเหลือง

ฝ่ายความปลอดภัยและรักษาความปลอดภัยสายสีชมพูและสายสีเหลือง

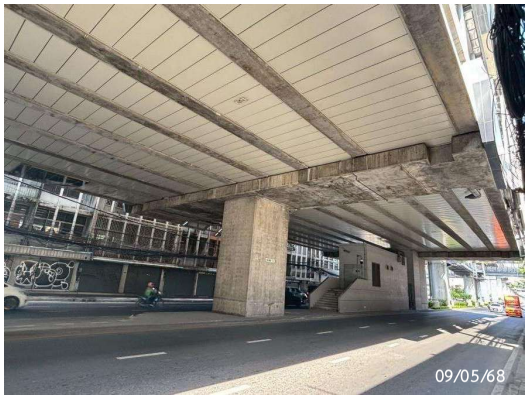
บทนำ

รายงานการสำรวจประสิทธิภาพของแผ่นดูดซับเสียง ประจำเดือนพฤษภาคม 2568 ฉบับนี้จัดทำขึ้นเพื่อเป็นการตรวจสอบประสิทธิภาพความแข็งแรงของแผ่นดูดซับเสียงให้อยู่ในสภาพสมบูรณ์อยู่เสมอ ด้วยการ Visual Check ความถี่เดือนละ 1 ครั้ง โดยสถานีที่มีการติดตั้งแผ่นดูดซับเสียงมีด้วยกันทั้งหมด 4 สถานี คือ สถานีภาวนา (YL-02) สถานีโชคชัย 4 (YL-03) สถานีลาดพร้าว 101 (YL-07) และสถานีสำโรง (YL-23)

ผลการสำรวจ - เดือนพฤษภาคม 2568

1. สถานีภาวนา (YL-02) ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





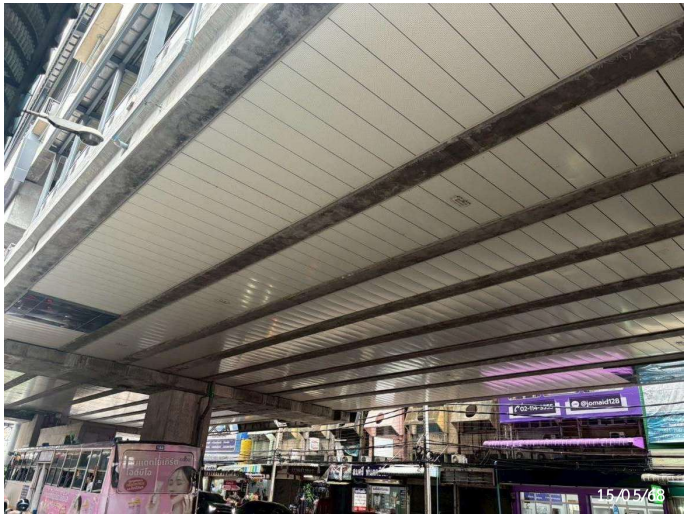
2. สถานีโชคชัย 4 (YL-03) ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





3. **สถานีลาดพร้าว 101 (YL-07)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





4. **สถานีสำโรง (YL-23)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





รายงาน “การสำรวจประสิทธิภาพของแผ่นดูดซับเสียง ประจำเดือนมิถุนายน 2568”

โดย ส่วนคุณภาพ สายสีเหลือง

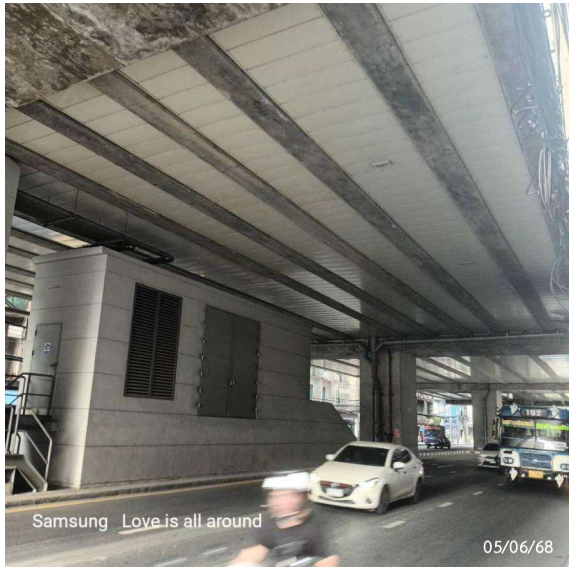
ฝ่ายความปลอดภัยและรักษาความปลอดภัยสายสีชมพูและสายสีเหลือง

บทนำ

รายงานการสำรวจประสิทธิภาพของแผ่นดูดซับเสียง ประจำเดือนมิถุนายน 2568 ฉบับนี้จัดทำขึ้นเพื่อเป็นการตรวจสอบประสิทธิภาพความแข็งแรงของแผ่นดูดซับเสียงให้อยู่ในสภาพสมบูรณ์อยู่เสมอ ด้วยการ Visual Check ความถี่เดือนละ 1 ครั้ง โดยสถานีที่มีการติดตั้งแผ่นดูดซับเสียงมีด้วยกันทั้งหมด 4 สถานี คือ สถานีภาวนา (YL-02) สถานีโชคชัย 4 (YL-03) สถานีลาดพร้าว 101 (YL-07) และสถานีสำโรง (YL-23)

ผลการสำรวจ - เดือนมิถุนายน 2568

1. **สถานีภาวนา (YL-02)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก



2. **สถานีโชคชัย 4 (YL-03)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก



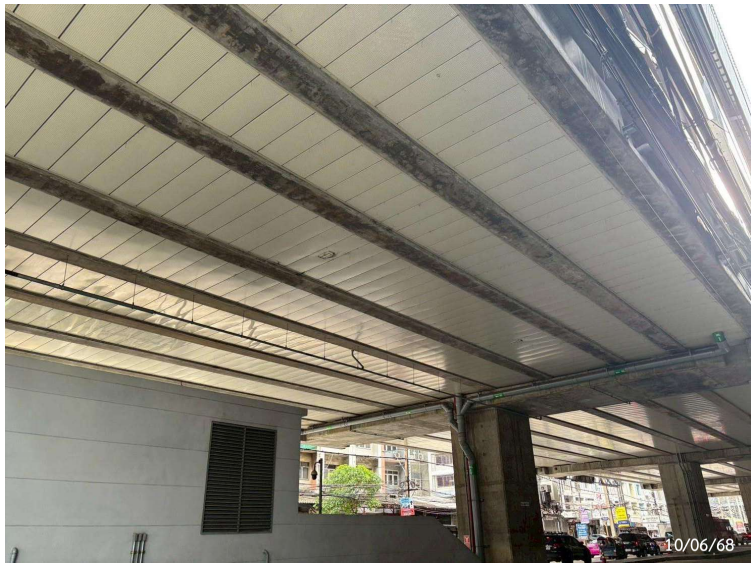


3. **สถานีลาดพร้าว 101 (YL-07)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





4. **สถานีสำโรง (YL-23)** ประสิทธิภาพสมบูรณ์ดี / ไม่พบการชำรุดหรือแตกหัก





ภาคผนวก ก-15

เอกสารข้อมูลแบบการติดตั้งของวัสดุดูดซับเสียงใต้สถานีรถไฟฟ้า บริเวณสถานีภาวนา (YL-02) สถานีโชคชัย 4 (YL-03) สถานีลาดพร้าว 101 (YL-07) และสถานีสำโรง (YL-23)

EASTERN BANGKOK MONORAIL

MATERIAL/EQUIPMENT SUBMITTAL FORM

Submittal No.						Date:
			Location	Type	No.	
STEC	YL	MAT	ALP	AR	0198	27 August 2564

Purpose for ☐ Review ☑ Approval ☐ Information ☐ Record

Project : MRT Yellow Line Project

Title : Metal Ceiling (Acoustic Ceiling) Rev.00
Supplied by Mason Acoustic Co.,Ltd.

Discipline : Architectural Work

Spec. Section/Clause : Construction Specification Book 2 Chapter 5 Section 5.2

Sub-Contractor/Supplier : Mason Acoustic Co.,Ltd.

Ref :

To: Khun Soros Temiyabutra
Co-Project Manager (PCYL)

CC: Project Manager 1 and 2
Mass Rapid Transit Authority of Thailand

Project Manager Architecture
Mass Rapid Transit Authority of Thailand

For Contractor Use		For Employer or Employer's Representative Use						
		Date Received :						
		Review Status						
Item No.	Description	No Objection	No Objection with Note	Revise & Resubmit	Objection	Acknowledged	Remarks	
1	Metal Ceiling (Acoustic Ceiling) Rev.00							
	Supplied by Mason Acoustic Co.,Ltd.							
	Note:							
	Material Sample of Metal Acoustic Ceiling 1 SET (for PCYL)							
	EXCEPTED COLOUR AND SHADE OF PANEL							
	TBC.							
		Review Comment Sheet Attached Ref.No.:						

All items submitted have been checked, reviewed and co-ordinated by the Contractor. They are in conformance with the requirements of the Contract Document, except as noted, and are approved by the Contractor for this Project.

Reviewed and Approved by: [redacted]
(Theera Trakoonngern)
Project Manager
Date : 27/08/2021

Reviewed by:
( )
Tittle :
Date :

Note:

Status Confirmed by:
( )
Tittle :
Date :

Note: Acceptance of ER does not relieve the Contractor of its Contractural Obligations

Originator : 42/kk

METAL CEILING

(ACOUSTICS CEILING)

PROJECT

MRT YELLOW LINE

MASON ACOUSTICS

CONTENT

SECTION 1 : Company Profile

SECTION 2 : Company Recognition and Reputation

SECTION 3 : Track Record / Work Experience

SECTION 4 : Quality Certification of Organization

SECTION 5 : Qualification of Installer / Fabricator

SECTION 6 : Project Related Material List

SECTION 7 : Compliance Checklist

SECTION 8 : Detailed Product Data

8.1 : Aluminum Ceiling

8.2 : ฉนวนใยแก้ว

8.3 : Screw

8.4 : สี Powder Coating

SECTION 9 : Test Reports

9.1 : JIS G3302 "Hot-dip zinc-coated steel sheet and strip"

9.2 : ASTM B209M "Specification for Aluminum and Aluminum-Alloy Sheet and Plate"

9.3 : ASTM C423 "Test Method for Sound Absorption and Sound Absorbing Coefficients By the Reverberation Room Method"

9.4 : ASTM 1730-67 "Standard Practice for Preparation of Aluminum and Aluminum-Alloy Surface for Paining"

9.5 : Transmission Loss Test

9.6 : Sound Absorption Test

SECTION 10 : Samples and Specimens

SECTION 11 : Warranty Certificate

Document Transmittal

Attn.: Dr. Chaisak Srisethanil
Eastern Bangkok Monorail Co., Ltd.

Ref.: PCYL/GEN/EBM/S-0771-2021

Subject: Metal Ceiling (Acoustic Ceiling) Rev.00 Supplied by Mason Acoustic Co.,Ltd.

Date: October 14 , 2021

- ☐ For your information/process
- ☐ For your consideration
- ☐ For your recommends
- ☐ No objection/process
- ☑ No objection with comment/process
- ☐ For your follow up
- ☐ For your report
- ☐ For your coordination with Designer
- ☐ Revised and Resubmitted
- ☐ Others.....

Attachment(s):

Reference No.	Description	Quantity
STEC-YL-MAT-ALP-AR-0198 **Dated : 27 August 2021**	Metal Ceiling (Acoustic Ceiling) Rev.00 Supplied by Mason Acoustic Co.,Ltd. (See comment as noted in your submittal)	1 Set

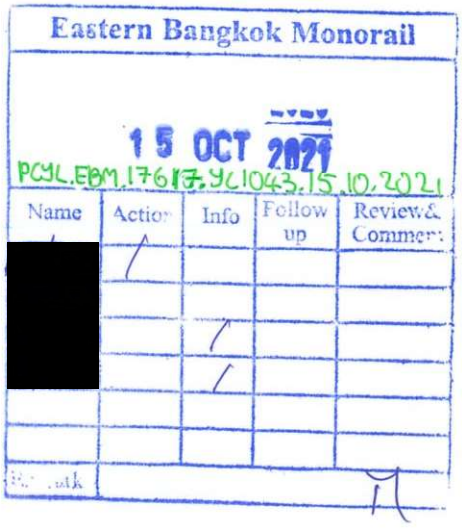
Sincerely yours,

[redacted]

Soros Temiyabutra
Project Manager PCYL

cc: - Project Manager 1 & 2 - MRTA (E-File)
- Project Manager Architecture - MRTA
- STECON Project Director

PCYL
Tel. 02-059-1660



Document Transmittal

Attn.: Dr. Chaisak Srisethanil
Eastern Bangkok Monorail Co., Ltd.

Ref.: PCYL/GEN/EBM/S-0771-2021

Subject: Metal Ceiling (Acoustic Ceiling) Rev.00 Supplied by Mason Acoustic Co.,Ltd.

Date: October 14 , 2021

- ☐ For your information/process
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- ☐ For your recommends
- ☐ No objection/process
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- ☐ For your follow up
- ☐ For your report
- ☐ For your coordination with Designer
- ☐ Revised and Resubmitted
- ☐ Others.....

Attachment(s):

Reference No.	Description	Quantity
STEC-YL-MAT-ALP-AR-0198 **Dated : 27 August 2021**	Metal Ceiling (Acoustic Ceiling) Rev.00 Supplied by Mason Acoustic Co.,Ltd. (See comment as noted in your submittal)	1 Set

Sincerely yours,

[redacted]

Soros Temiyabutra
Project Manager PCYL

cc:
- Project Manager 1 & 2 - MRTA (E-File)
- Project Manager Architecture - MRTA
- STECON Project Director

PCYL
Tel. 02-059-1660

PCYL

EASTERN BANGKOK MONORAIL

02 SEP 2021

Receiver: Time:

DCS:PCYLIC-20044

MATERIAL/EQUIPMENT SUBMITTAL FORM

Submittal No.						Date:
STEC	YL	MAT	Location: ALP	Type: AR	No.: 0198	27 August 2564

Purpose for ☐ Review ☑ Approval ☐ Information ☐ Record

Project : MRT Yellow Line Project

Title : Metal Ceiling (Acoustic Ceiling) Rev.00
Supplied by Mason Acoustic Co.,Ltd.

Discipline : Architectural Work

Spec. Section/Clause : Construction Specification Book 2 Chapter 5 Section 5.2

Sub-Contractor/Supplier : Mason Acoustic Co.,Ltd.

Ref :

To: Khun Soros Temiyabutra
Co-Project Manager (PCYL)

CC: Project Manager 1 and 2
Mass Rapid Transit Authority of Thailand

Project Manager Architecture
Mass Rapid Transit Authority of Thailand

For Contractor Use		For Employer or Employer's Representative Use					
		Date Received :					
		Review Status					
Item No.	Description	No Objection	No Objection with Note	Revise & Resubmit	Objection	Acknowledged	Remarks
1	Metal Ceiling (Acoustic Ceiling) Rev.00		✓				
	Supplied by Mason Acoustic Co.,Ltd.						
	Note:						
	Material Sample of Metal Acoustic Ceiling 1 SET (for PCYL)						
	EXCEPTED COLOUR AND SHADE OF PANEL						
	TBC.						
		Review Comment Sheet Attached Ref.No.:					

All items submitted have been checked, reviewed and co-ordinated by the Contractor. They are in conformance with the requirements of the Contract Document, except as noted, and are approved by the Contractor for this Project.

Reviewed and Approved by: [redacted]
(Theera Trakoonngern)
Project Manager
Date : 27/08/2021

Reviewed by: [redacted]
(นายสมชาย เกิดแก่นแก้ว)
Title : Material Architect
Date : 14 OCT 2021

Note:

Status Confirmed by: [redacted]
( )
Title :
Date : 14 OCT 2021

Note: Acceptance of ER does not relieve the Contractor of its Contractural Obligations

Originator : 42/kk

GEN - S - 0771.

DETAILED COMMENTS FORM (DCF)

Ref. STEC-YL-MAT-ALP-AR-0198

DCF No. AR/EBM No. 20044

Subject : Metal Ceiling (Acoustic Ceiling) Rev.00 Supplied by Mason Acoustic Co.,Ltd.

DOC :		Date : 27 August 2021

Review Status: No Objection with Comments

ID	Chapter / Section No.	Submission Item.	Comments of Employer's Representative	Specs Ref.	Review Status	Response by Concessionaire	Status
1		STEC-YL-MAT-ALP-AR-0198	ขอตัวอย่างสีจริงเพื่อพิจารณา		No Objection with Comments		
2		STEC-YL-MAT-ALP-AR-0198	ขอให้ส่งรายการคำนวณในการติดตั้ง		No Objection with Comments		
3		STEC-YL-MAT-ALP-AR-0198	ขอให้ชี้แจงผลการทดสอบ Sound Transmission Loss ในย่านความถี่ที่ได้ค่าต่ำกว่า 23 dB ว่าสอดคล้องกับข้อกำหนดในรายงาน EIA อย่างไร	รายงานการขอเปลี่ยนแปลงรายละเอียดโครงการ ในรายงานการวิเคราะห์ผลกระทบสิ่งแวดล้อม บทที่ 7 มาตรการป้องกันแก้ไข และลดผลกระทบสิ่งแวดล้อม ข้อ 7.1.6	No Objection with Comments		

Reviewed by : [redacted]
(นาย สมชาย เกิดแก่นแก้ว)
Position: Material Architect
Date: 14 OCT 2021

Status Confirmed by : [redacted]
( )
Position:
Date: 14 OCT 2021

Review Status:

No Objection means No Objection, Consessionaire could proceed with the works.
No Objection with Comments means Consessionaire may proceed the works, subject to address all open comments in future documents for approval.
Revise and Resubmit means Consessionaire to revise and resubmit the said documents with incorporation of our comments.
Objection means Document is not acceptable.
Acknowledged means The said submittal is "be informed and recognize".

ภาคผนวก ก-16

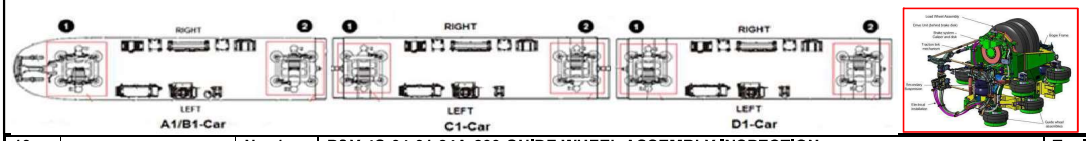
แผนการซ่อมบำรุงและตรวจสอบ รักษาระบบรถไฟฟ้า (โดยเฉพาะล้อและรางรถไฟฟ้า)

		2025											
TLA	PM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
YM01	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM01	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM01	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM01	B Exam		B			B			B			B	
YM01	C Exam		C						C				
YM01	D Exam								D				
YM01	E Exam								E				
YM01	F Exam (Year 3)								F				
YM02	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM02	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM02	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM02	B Exam		B			B			B			B	
YM02	C Exam		C						C				
YM02	D Exam		D										
YM02	E Exam		E										
YM02	F Exam (Year 3)		F										
YM03	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM03	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM03	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM03	B Exam			B			B			B			B
YM03	C Exam			C						C			
YM03	D Exam									D			
YM03	E Exam									E			
YM03	F Exam (Year 3)									F			
YM04	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM04	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM04	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM04	B Exam			B			B			B			B
YM04	C Exam			C						C			
YM04	D Exam			D									
YM04	E Exam			E									
YM04	F Exam (Year 3)			F									
YM05	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM05	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM05	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM05	B Exam		B			B			B			B	
YM05	C Exam					C						C	
YM05	D Exam											D	
YM05	E Exam											E	
YM05	F Exam (Year 3)											F	
YM06	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM06	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM06	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM06	B Exam			B			B			B			B
YM06	C Exam			C						C			
YM06	D Exam									D			
YM06	E Exam									E			
YM06	F Exam (Year 3)									F			
YM07	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM07	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM07	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM07	B Exam		B			B			B			B	
YM07	C Exam		C						C				
YM07	D Exam								D				
YM07	E Exam								E				
YM07	F Exam (Year 3)								F				
YM08	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM08	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM08	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM08	B Exam			B			B			B			B
YM08	C Exam			C						C			
YM08	D Exam									D			
YM08	E Exam									E			
YM08	F Exam (Year 3)									F			
YM09	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM09	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM09	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM09	B Exam	B			B			B			B		
YM09	C Exam				C						C		
YM09	D Exam										D		
YM09	E Exam										E		
YM09	F Exam (Year 3)										F		
YM10	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM10	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM10	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM10	B Exam			B			B			B			B
YM10	C Exam			C						C			
YM10	D Exam									D			
YM10	E Exam									E			
YM10	F Exam (Year 3)									F			
YM11	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM11	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM11	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM11	B Exam			B			B			B			B
YM11	C Exam						C						C
YM11	D Exam												D
YM11	E Exam												E
YM11	F Exam (Year 3)												F
YM12	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM12	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM12	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM12	B Exam			B			B			B			B
YM12	C Exam			C						C			
YM12	D Exam									D			
YM12	E Exam									E			
YM12	F Exam (Year 3)									F			
YM13	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D

		2025											
YM13	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM13	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM13	B Exam			B			B			B			B
YM13	C Exam			C						C			
YM13	D Exam									D			
YM13	E Exam									E			
YM13	F Exam (Year 3)									F			
YM14	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM14	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM14	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM14	B Exam	B			B			B			B		
YM14	C Exam	C						C					
YM14	D Exam	D											
YM14	E Exam	E											
YM14	F Exam (Year 3)												
YM15	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM15	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM15	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM15	B Exam			B			B			B			B
YM15	C Exam			C						C			
YM15	D Exam									D			
YM15	E Exam									E			
YM15	F Exam (Year 3)									F			
YM16	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM16	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM16	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM16	B Exam			B			B			B			B
YM16	C Exam			C						C			
YM16	D Exam			D									
YM16	E Exam			E									
YM16	F Exam (Year 3)			F									
YM17	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM17	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM17	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM17	B Exam	B			B			B			B		
YM17	C Exam	C						C					
YM17	D Exam							D					
YM17	E Exam							E					
YM17	F Exam (Year 3)							F					
YM18	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM18	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM18	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM18	B Exam	B			B			B			B		
YM18	C Exam	C						C					
YM18	D Exam	D											
YM18	E Exam	E											
YM18	F Exam (Year 3)												
YM19	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM19	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM19	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM19	B Exam	B			B			B			B		
YM19	C Exam				C						C		
YM19	D Exam										D		
YM19	E Exam										E		
YM19	F Exam (Year 3)										F		
YM20	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM20	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM20	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM20	B Exam	B			B			B			B		
YM20	C Exam				C						C		
YM20	D Exam										D		
YM20	E Exam										E		
YM20	F Exam (Year 3)										F		
YM21	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM21	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM21	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM21	B Exam		B			B			B			B	
YM21	C Exam		C						C				
YM21	D Exam		D										
YM21	E Exam		E										
YM21	F Exam (Year 3)												
YM22	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM22	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM22	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM22	B Exam			B			B			B			B
YM22	C Exam			C						C			
YM22	D Exam			D									
YM22	E Exam			E									
YM22	F Exam (Year 3)												
YM23	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM23	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM23	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM23	B Exam	B			B			B			B		
YM23	C Exam				C						C		
YM23	D Exam										D		
YM23	E Exam										E		
YM23	F Exam (Year 3)										F		
YM24	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM24	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM24	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM24	B Exam	B			B			B			B		
YM24	C Exam	C						C					
YM24	D Exam	D											
YM24	E Exam	E											
YM24	F Exam (Year 3)												
YM25	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM25	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM25	A Exam	A	A	A	A	A	A	A	A	A	A	A	A

		2025											
YM25	B Exam		B			B			B			B	
YM25	C Exam		C						C				
YM25	D Exam		D										
YM25	E Exam		E										
YM25	F Exam (Year 3)												
YM26	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM26	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM26	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM26	B Exam	B			B			B			B		
YM26	C Exam				C						C		
YM26	D Exam										D		
YM26	E Exam										E		
YM26	F Exam (Year 3)										F		
YM27	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM27	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM27	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM27	B Exam		B			B			B			B	
YM27	C Exam		C						C				
YM27	D Exam		D										
YM27	E Exam		E										
YM27	F Exam (Year 3)												
YM28	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM28	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM28	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM28	B Exam		B			B			B			B	
YM28	C Exam		C						C				
YM28	D Exam		D										
YM28	E Exam		E										
YM28	F Exam (Year 3)												
YM29	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM29	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM29	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM29	B Exam			B			B			B			B
YM29	C Exam			C						C			
YM29	D Exam			D									
YM29	E Exam			E									
YM29	F Exam (Year 3)												
YM30	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM30	15 day	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D	15D
YM30	A Exam	A	A	A	A	A	A	A	A	A	A	A	A
YM30	B Exam		B			B			B			B	
YM30	C Exam		C						C				
YM30	D Exam		D										
YM30	E Exam		E										
YM30	F Exam (Year 3)												

15 day		60	60	60	60	60	60	60	60	60	60	60	60
A Exam		30	30	30	30	30	30	30	30	30	30	30	30
B Exam		9	9	12	9	9	12	9	9	12	9	9	12
C Exam		4	8	11	5	1	1	4	8	11	5	1	1
D Exam		3	6	4	0	0	0	1	2	7	5	1	1
E Exam		3	6	4	0	0	0	1	2	7	5	1	1
F Exam (Year 3)		0	1	2	0	0	0	1	2	7	5	1	1
Total PM work		109	120	123	104	100	103	106	113	134	119	103	106

Maintenance activities to be performed				
MMIS Task ID	O&M Manual Task ID	Safety Precautions	Maintenance Task (Illustration and Detailed)	Tools or Materials Require
			BOGIE 	
10	**P&Y-4S-04-01-04A-280 GUIDE WHEEL ASSEMBLY INSPECTION**	**No. 1**	**P&Y-4S-04-01-04A-280 GUIDE WHEEL ASSEMBLY INSPECTION** **Guide Wheel Hub:** 1) Inspect guide wheel hub for signs of damage or grease leakage from seals. If you find any grease leakage, inform supervisor so corrective action be taken.  **Figure 2 Guide wheel hub**	**Tool List:** **T1-** Hand Tool Kit (Trolley) **T2 -** Torch **T3 -** Digital Vernier Calliper **Consumable List:**

Maintenance activities to be performed				
MMIS Task ID	O&M Manual Task ID	Safety Precautions	Maintenance Task (Illustration and Detailed)	Tools or Materials Require
			2) Refer to below figure, Inspect guide wheel hub for noticeable vertical displacement from guide wheel axle. The clearance of the guide hub relative to the guide axle is measured using a vernier calliper, and the clearance size is checked as (9±1) mm. (A clearance size greater than (9±1) mm indicates vertical displacement of the hub relative to the axle. CIN Checklist for Guide Wheel Inspection Checklist  **Figure 3: Guide Wheel Axle is Measured Using a Vernier Callipers** 3) Check the guide wheel all fasteners to ensure all torque marks are aligned. 4) Report any findings /issues from the inspection to supervisor so corrective work can be arranged if required.	**C1-** Rag for RST

Maintenance activities to be performed				
MMIS Task ID	O&M Manual Task ID	Safety Precautions	Maintenance Task (Illustration and Detailed)	Tools or Materials Require
			Guide Wheel External Run Flat Device: Visual check 1) For Guide Wheel Run Flat, during inspection replace the run flat plastic caps (Thermal Plastic Polyester Elastomer (TPE-E or TPEE) cover) if one of the following has occurred: a) There is a hole in the plastic cap where the aluminum or webbing can be seen. b) If there is a tear through the thickness of the cap. c) If the cap has been worn up to the wear line. d) Check that all fasteners are present and ensure all torque marks are aligned. 2) If there is a crack or tear through the entire width of the cap. For more details, For Guide Wheel Run Flat, during inspection, replace the entire guide wheel run flat if one of the following has occurred: a) The aluminum has been dented, bent, cracked, or otherwise deformed. b) If the run flat has been used during a flat tire situation.	

Maintenance activities to be performed				
MMIS Task ID	O&M Manual Task ID	Safety Precautions	Maintenance Task (Illustration and Detailed)	Tools or Materials Require
			 **Figure 4: Guide Wheel Run Flat**	
20	**P&Y-4S-04-01-01A-280 GUIDE WHEEL INSPECTION**	**No. 1**	**P&Y-4S-04-01-01A-280 GUIDE WHEEL INSPECTION** **Inspection:** 1) Inspect guide wheel tire for general condition and premature or uneven wear. 2) Inspect tread for signs of scraping, scuffing, or other tread damage. 3) Inspect sidewall and bead area for cuts or deformation, ozone cracking, or other evidence of rubber aging. 4) Check for tire wear: **Guide tire wear will be measured by VEMS. In case VEMS system is unavailable the following manual check will be conducted.**	**Tool List:** **T2-** Torch **T9 -** Tire tread depth gauge

Maintenance activities to be performed				
MMIS Task ID	O&M Manual Task ID	Safety Precautions	Maintenance Task (Illustration and Detailed)	Tools or Materials Require
			a) Using a depth gauge, measure the remaining tread depth in the main grooves around and across the tire in several locations, (Tire Tread Wear Inspection and Defects). A new guide tire has a tread depth of 6.5 mm, with an allowable tread wear of 2 mm. If the Tire measure 4.5 mm or less in any location it will require change out. Guide Tire Inspection Checklist b) If the tire measures between 4.5mm and 4.7mm at any point report to supervisor to seek engineering advice. 5) Manually check tire pressure using calibrated pressure gauge. Guide Wheel tire pressure must be within the 10 bar ±0.1 bar. Guide Tire Inspection Checklist **Note: Check the tire pressure only after the train has been stationary for at least 3 hours.** 6) Visually inspect the exterior surface of the wheel rim for signs of wear, deformation, or damage every tire change. 7) Check that all fasteners are present and ensure all torque marks are aligned. 8) Report any findings/issues from the inspection to supervisor so corrective work can be arranged if required	

Maintenance activities to be performed				
MMIS Task ID	O&M Manual Task ID	Safety Precautions	Maintenance Task (Illustration and Detailed)	Tools or Materials Require
				

Figure 5 Tire Tread Wear Inspection and Tire Defects

Maintenance activities to be performed				
MMIS Task ID	O&M Manual Task ID	Safety Precautions	Maintenance Task (Illustration and Detailed)	Tools or Materials Require
30	**P&Y-4S-04-01-03A-280 LOAD WHEEL ASSEMBLY INSPECTION**	**No. 1**	**P&Y-4S-04-01-03A-280 LOAD WHEEL ASSEMBLY INSPECTION** **Inspection:** 1) Open panel cover and removed nut for hatch at wheel well to access for measurement, please follow step below: - Bogie#2 for A and B car on END#2 - Bogie#1, 2 for C and D car on END#1, 2 And Bogie#1 for A and B car access on END#1 under frame. 2) Check that all fasteners are present and ensure all torque marks are aligned. 3) Inspect Load wheel tire for general condition and premature or uneven wear. 4) Inspect tread for signs of scraping, scuffing, or other tread damage. 4) Inspect sidewall and bead area for cuts or deformation, ozone cracking, or other evidence of rubber aging. 5) Check for tire wear: **Load tire wear will be measured by VEMS. In case VEMS system is unavailable the following manual check will be conducted.** a) Using a depth gauge, measure the remaining tread depth in the main grooves around and across the tire in several locations, Tire Tread wear inspection and tire infection.	**Tool List:** **T1-** Hand Tool Kit (Trolley) **T2-** Torch **T9 -** Tire tread depth gauge **Consumable List:** **C1-** Rag for RST

Maintenance activities to be performed				
MMIS Task ID	O&M Manual Task ID	Safety Precautions	Maintenance Task (Illustration and Detailed)	Tools or Materials Require
			b) The new load tire tread depth is 9 mm, with a total allowable tread wear of 6 mm. Once the allowable tread wear limit has been reached the load tire must be replaced. C1N Load tire Inspection Checklist 6) Manually check tire pressure using calibrated pressure gauge. Load Wheel tire pressure must be within the 11.5 bar ±0.1 bar C1N Load tire Inspection Checklist **Note: Check the tire pressure only after the train has been stationary for at least 3 hours.** 7) Check whether the anti-loosening marks of the fasteners on the load wheels are out of place. 8) Check whether the sensor on the load wheel is damaged. 9) Visually inspect the exterior surface of the wheel rim for signs of wear, deformation, or damage every tire change. 10) Re-installed nut for hatch at wheel well, apply torque 20 Nm and witness mark. 112 Report any findings /issues from the inspection to supervisor so corrective work can be arranged if required.	

Maintenance activities to be performed				
MMIS Task ID	O&M Manual Task ID	Safety Precautions	Maintenance Task (Illustration and Detailed)	Tools or Materials Require
			 **Figure 6 Tire Tread Wear Inspection and Tire Defects**	

Bi-Daily Checklist for GW Inspection Rev.2 (2nd Generation)

Release Date :8/Oct/2024

Train No: YM14 | Inspection Date: 2024/05/20 | Inspector: Ryan A. | Train mileage: 264,538 km.

Step																											
1	Visual torque mark of end cap Mounting Bolt -No misalignment of torque mark	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Visual safety wire of End Cap -Should be wired in place without any abnormality. Safety Wire is installed in the position to prevent tendency of the hub cap to loosen	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Visual Torque mark inspection of TPMS cover mounting screw(4 no.s) -No misalignment of torque mark	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Check temperature stickers -Temperature not more than 60°C	49	49	49 54	54	49 54	54	54	54 49	54	54	49	54 49	54	49 54	54 49	49	54 54	49 54	54	54	54	54	54	54	54 54	Record Temperature (Required: if inspection done more than 2 days after wave 1)
4	Grease Leak Inspection -No sign of grease leakage from end cap	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Photo taken record of grease leakage
	Conclusion : (OK/NOK)	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	OK / Not ok
	GWID	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	10	11	12	7	8	9			
	CAR	01						02						03						04								
	GWID	6	5	4	12	11	10	6	5	4	12	11	10	6	5	4	12	11	10	9	8	7	3	2	1			
1	Visual torque mark of end cap Mounting Bolt -No misalignment of torque mark	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Visual safety wire of End Cap -Should be wired in place without any abnormality. Safety Wire is installed in the position to prevent tendency of the hub cap to loosen	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Visual Torque mark inspection of TPMS cover mounting screw(4 no.s) -No misalignment of torque mark	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Check temperature stickers -Temperature not more than 60°C	49	49	54	54 54	49	54	54 54	49	54	54 49	54	54 54	54	54	54	49	49	54	54 54	49 54	49	49 54	49	49 54	Record Temperature (Required: if inspection done more than 2 days after wave 1)
4	Grease Leak Inspection -No sign of grease leakage from end cap	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Photo taken record of grease leakage
	Conclusion : (OK/NOK)	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok	OK / Not ok

Check by: _____ [redacted] _____ Date: 20/05/2025

Supervisor: _____ [redacted] _____ Date: 20/05/2025

Checklist Form No: RST.CL.002 Tread Depth and Pressure of Guide Tire

Train No. YM14 Work Order 60143007 Mileage 240,666 km.

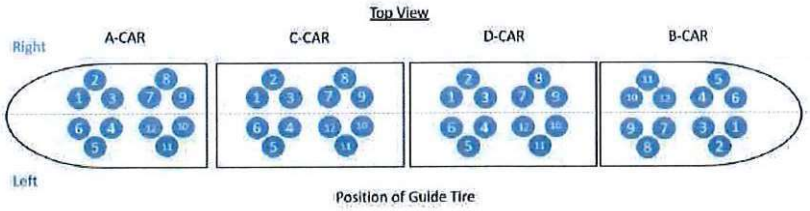
I – Tool & General Information

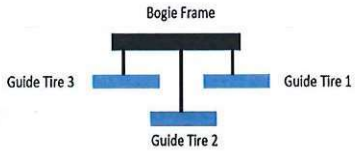
I.1 Tool / Calibration Date

Tool	Tool No.	Validity
Depth Gauge	YL-015	08/25

I.2 Safety Remark & General Information





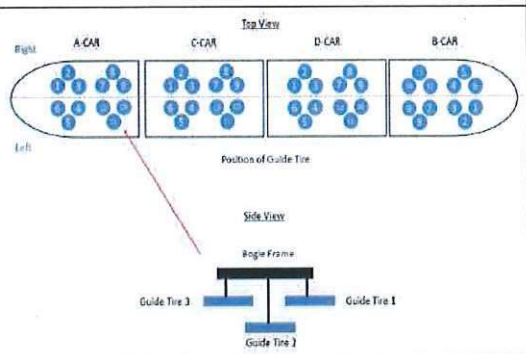


II – PRODUCTION ACTIVITIES CONTROL (SELF INSPECTION)

Item	Picture	Description	Criteria Acceptance
01		**P&Y-4S-04-03A-280 Tread Depth Guide Tire Inspection** Measurement point mark between 1 and 2 about 120°	**Tread depth** **[X ≥ 4.5 mm]** Refer to GT wear limit Doc.AT.SER.PY.ENG.TN.00001.A

A-CAR	Pos.1	Pos.2	Pos.3	Pos.4	Pos.5	Pos.6	Pos.7	Pos.8	Pos.9	Pos.10	OK	NOK	PMR No. if removed tire
Guide Tire 1	3.0	3.9	4.3	4.7	3.5	3.7	3.4	4.2	3.7	3.5	✓		
Guide Tire 2	3.1	4.0	4.3	4.2	3.1	3.0	3.9	4.6	3.7	2.9	✓		
Guide Tire 3	4.1	4.7	5.2	5.2	4.9	4.3	4.7	5.1	5.4	4.9	✓		
Guide Tire 7	2.1	2.3	3.0	3.2	3.3	1.4	2.4	3.5	2.6	2.2		✓	60116562
Guide Tire 8	4.5	4.6	4.7	4.3	4.2	4.3	4.3	4.5	4.3	4.2	✓		
Guide Tire 9	2.4	2.2	2.3	1.7	1.8	1.3	1.3	2.3	2.7	2.8		✓	60116566
Guide Tire 4	3.9	4.9	4.9	4.9	4.6	4.5	4.7	5.0	4.9	4.4	✓		
Guide Tire 5	6.3	6.4	6.2	6.2	6.2	6.0	5.9	6.4	6.3	6.2	✓		
Guide Tire 6	4.4	4.2	4.1	3.8	3.8	4.0	3.9	4.4	4.3	4.8	✓		
Guide Tire 10	6.5	6.5	6.4	6.2	6.0	6.4	6.3	6.3	6.2	6.3	✓		
Guide Tire 11	4.8	4.7	5.3	5.3	5.7	5.5	5.3	5.3	5.3	4.6	✓		
Guide Tire 12	6.3	6.4	6.3	6.3	6.4	6.3	6.3	6.2	6.3	6.4	✓		

C-CAR	Pos.1	Pos.2	Pos.3	Pos.4	Pos.5	Pos.6	Pos.7	Pos.8	Pos.9	Pos.10	OK	NOK	PMR No. if removed tire
Guide Tire 1	4.4	4.6	5.3	5.7	5.7	4.8	5.2	5.5	5.3	4.9	✓		
Guide Tire 2	5.9	6.1	6.3	5.9	5.8	6.1	5.8	6.0	6.0	5.9	✓		
Guide Tire 3	3.5	4.4	4.7	4.9	4.5	5.2	5.2	4.9	3.6	3.5	✓		
Guide Tire 7	6.6	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	✓		
Guide Tire 8	4.2	4.9	5.4	5.6	5.4	5.5	5.7	5.6	5.2	4.4	✓		
Guide Tire 9	4.6	4.5	5.1	5.5	5.6	5.0	5.2	5.2	5.2	5.0	✓		
Guide Tire 4	6.1	5.9	5.9	6.0	6.1	6.1	5.9	5.9	5.6	5.7	✓		
Guide Tire 5	4.1	4.5	4.9	4.7	3.3	3.5	4.6	5.1	4.9	4.1	✓		
Guide Tire 6	6.0	5.8	6.0	5.8	5.6	6.0	5.6	5.8	5.8	5.9	✓		
Guide Tire 10	6.1	5.9	6.3	5.9	6.2	5.9	6.0	6.3	5.9	6.1	✓		
Guide Tire 11	4.4	4.8	4.9	4.8	4.5	4.4	4.9	5.1	5.1	4.6	✓		
Guide Tire 12	5.7	5.5	5.6	5.5	6.1	6.0	5.9	5.9	5.7	6.1	✓		
D-CAR	**Pos.1**	**Pos.2**	**Pos.3**	**Pos.4**	**Pos.5**	**Pos.6**	**Pos.7**	**Pos.8**	**Pos.9**	**Pos.10**	**OK**	**NOK**	**PMR No. if removed tire**
Guide Tire 1	5.6	5.4	5.5	5.5	5.5	5.4	5.4	5.7	5.5	5.1	✓		
Guide Tire 2	6.2	6.4	6.5	6.2	6.3	6.1	6.2	6.4	6.0	6.2	✓		
Guide Tire 3	6.4	6.3	6.5	6.3	6.3	6.2	6.1	6.3	6.3	6.4	✓		
Guide Tire 7	6.2	6.1	6.1	5.9	5.7	6.2	6.0	6.2	5.8	5.7	✓		
Guide Tire 8	3.5	3.8	4.4	4.0	3.9	4.1	4.2	4.3	3.8	3.5	✓		
Guide Tire 9	6.2	6.1	6.4	6.3	5.9	6.0	6.2	6.2	6.1	6.0	✓		
Guide Tire 4	4.8	5.3	5.7	5.7	4.8	4.8	5.0	5.6	5.9	5.9	✓		
Guide Tire 5	5.3	5.7	5.8	6.7	5.8	5.6	5.7	5.8	5.7	5.4	✓		
Guide Tire 6	5.9	5.9	6.1	5.9	5.9	6.3	6.1	6.2	6.1	6.2	✓		
Guide Tire 10	5.5	5.3	5.6	5.3	5.4	5.6	5.6	5.7	5.6	5.6	✓		
# Guide Tire 11	1.7	1.6	1.8	1.6	1.2	4.1	4.7	4.8	4.3	3.6		✓	6091164568
Guide Tire 12	5.2	5.3	5.6	5.4	5.0	7.5	5.4	5.3	5.4	4.9	✓		
B-CAR	**Pos.1**	**Pos.2**	**Pos.3**	**Pos.4**	**Pos.5**	**Pos.6**	**Pos.7**	**Pos.8**	**Pos.9**	**Pos.10**	**OK**	**NOK**	**PMR No. if removed tire**
Guide Tire 1	6.3	6.1	6.4	6.3	6.4	6.3	6.3	6.4	6.4	6.1	✓		
Guide Tire 2	4.0	4.6	5.1	4.7	4.2	4.7	5.1	5.4	5.0	4.3	✓		
Guide Tire 3	2.1	3.4	4.7	4.4	3.4	2.4	3.9	4.8	4.2	4.0	✓		
Guide Tire 7	4.3	4.3	4.8	4.7	4.5	4.9	4.7	4.2	4.2	2.9	✓		
Guide Tire 8	5.6	5.5	5.9	5.5	5.4	5.6	5.5	5.9	5.6	5.4	✓		
Guide Tire 9	5.7	5.3	5.9	5.4	5.1	5.4	5.4	5.5	5.0	5.2	✓		
Guide Tire 4	6.1	6.2	6.3	6.1	6.0	5.7	6.1	6.3	5.9	6.0	✓		
Guide Tire 5	5.2	5.6	5.9	5.5	4.5	5.1	5.4	5.7	5.4	4.9	✓		
Guide Tire 6	5.9	5.6	5.7	5.7	5.2	5.7	5.7	5.8	5.8	5.4	✓		
Guide Tire 10	6.3	5.4	6.1	5.9	6.3	6.2	6.0	6.2	6.1	6.2	✓		
Guide Tire 11	6.2	6.0	6.1	5.9	6.2	5.9	6.1	6.0	6.1	6.3	✓		
Guide Tire 12	5.9	5.6	6.0	5.8	5.9	6.1	5.8	5.8	5.8	5.9	✓		

Item	Picture	Description	Criteria Acceptance
02		P&Y-4S-04-03A-280 Guide Tire Pressure Inspection	Pressure Criteria = 990 – 1010 kPa (9.9 – 10.1 bar)

Guide Tire	A-CAR		C-CAR		D-CAR		B-CAR		Remark
	Actual	Rework	Actual	Rework	Actual	Rework	Actual	Rework	
Guide Tire 1		1000		1000		990		1000	
Guide Tire 2		1000		1000		1000		1010	
Guide Tire 3		1010		1010		990		1010	
Guide Tire 7		1010		1000		990		1000	
Guide Tire 8		1000		1010		1000		1010	
Guide Tire 9		1000		1010		1010		1010	
Guide Tire 4		1010		1000		1000		1000	
Guide Tire 5		990		990		990		990	
Guide Tire 6		990		990		1000		990	
Guide Tire 10		1000		1000		1010		990	
Guide Tire 11		1010		1010		1010		1010	
Guide Tire 12		990		1000		1010		1010	

Check by: 633, 661, 662 Date: 05/04/2025

Supervisor: [redacted] Date: 2025.04.05

Checklist Form No: RST.CL.001 Tread Depth and Pressure of Load Tire

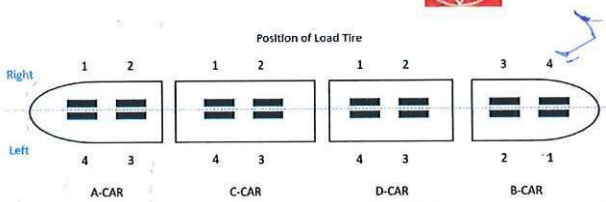
Train No. YM14 Work Order 601143 007 Mileage 240,666km.

I – Tool & General Information

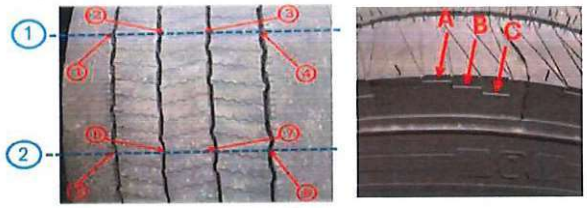
I.1 Tool / Calibration Date

Tool	Tool No.	Validity
Depth Gauge	YL-014	08/25

I.2 Safety Remark & General Information

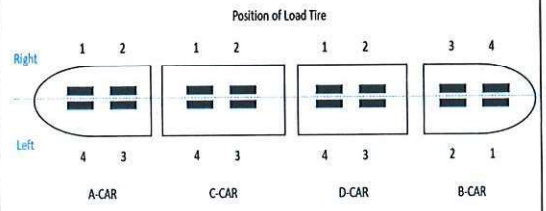


II – PRODUCTION ACTIVITIES CONTROL (SELF INSPECTION)

Item	Picture Tire depth and Shoulder	Description	Criteria Acceptance
01		P&Y-4S-04-03A-280 Tread Depth Load Tire Inspection Measurement point mark between 1 and 2 about 120°	Tread depth [X ≥ 3 mm]

A-CAR	Pos# 1	Pos# 2	Pos# 3	Pos# 4	Pos# 5	Pos# 6	Pos# 7	Pos#8	Shoulder wear	PMR No. if removed tire
Load Tire 1	7.4	8.0	8.1	7.2	7.5	8.2	8.1	7.3	A	
Load Tire 4	7.3	8.0	8.2	7.5	7.6	8.3	8.2	7.3	A	
Load Tire 2	7.4	8.0	8.0	7.6	7.6	8.1	8.0	7.5	A	
Load Tire 3	7.6	8.1	8.2	7.5	7.5	7.9	8.1	7.5	A	
C-CAR	**Pos# 1**	**Pos# 2**	**Pos# 3**	**Pos# 4**	**Pos# 5**	**Pos# 6**	**Pos# 7**	**Pos# 8**	**Shoulder wear**	**PMR No. if removed tire**
Load Tire 1	7.6	8.2	8.1	7.8	7.6	8.2	8.3	7.8	A	
Load Tire 4	7.7	8.3	8.3	7.8	7.7	8.2	8.2	7.9	A	
Load Tire 2	7.5	8.2	8.3	7.8	7.5	8.4	8.2	7.6	A	
Load Tire 3	7.6	8.0	8.0	7.6	7.5	8.2	8.0	7.6	A	
D-CAR	**Pos# 1**	**Pos# 2**	**Pos# 3**	**Pos# 4**	**Pos# 5**	**Pos# 6**	**Pos# 7**	**Pos# 8**	**Shoulder wear**	**PMR No. if removed tire**
Load Tire 1	7.5	8.3	8.0	7.8	7.6	7.9	8.0	7.5	A	
Load Tire 4	7.6	8.0	8.0	7.4	7.4	7.9	7.9	7.5	A	
Load Tire 2	7.7	8.2	8.2	7.7	7.7	8.0	8.1	7.5	A	
Load Tire 3	7.8	8.1	8.1	7.4	7.8	8.3	8.1	7.5	A	
B-CAR	**Pos# 1**	**Pos# 2**	**Pos# 3**	**Pos#4**	**Pos# 5**	**Pos# 6**	**Pos# 7**	**Pos# 8**	**Shoulder wear**	**PMR No. if removed tire**
Load Tire 1	7.6	8.4	8.1	7.8	7.8	8.6	8.4	7.7	A	
Load Tire 4	7.1	8.2	8.0	7.6	7.7	8.1	8.1	7.2	A	
Load Tire 2	6.9	7.8	7.9	7.5	7.3	8.0	8.1	7.6	A	
Load Tire 3	7.7	8.0	8.1	7.7	7.8	8.1	8.1	7.6	A	

Item	Picture	Description	Criteria Acceptance

02		P&Y-4S-04-03A-280 Load Tire Pressure Inspection	Pressure (kPa) Criteria = 1140 - 1160 kPa (11.4 – 11.6 bar)

CAR	A-CAR		C-CAR		D-CAR		B-CAR		Remark
	Actual	Rework	Actual	Rework	Actual	Rework	Actual	Rework	
Load Tire 1		1140		1150		1140		1160	
Load Tire 2		1140		1150		1150		1140	
Load Tire 3		1150		1160		1150		1160	
Load Tire 4		1150		1140		1160		1160	

Check by: 633, 660 Date: 2025-04-05

Supervisor: [redacted] Date: 2025.04.05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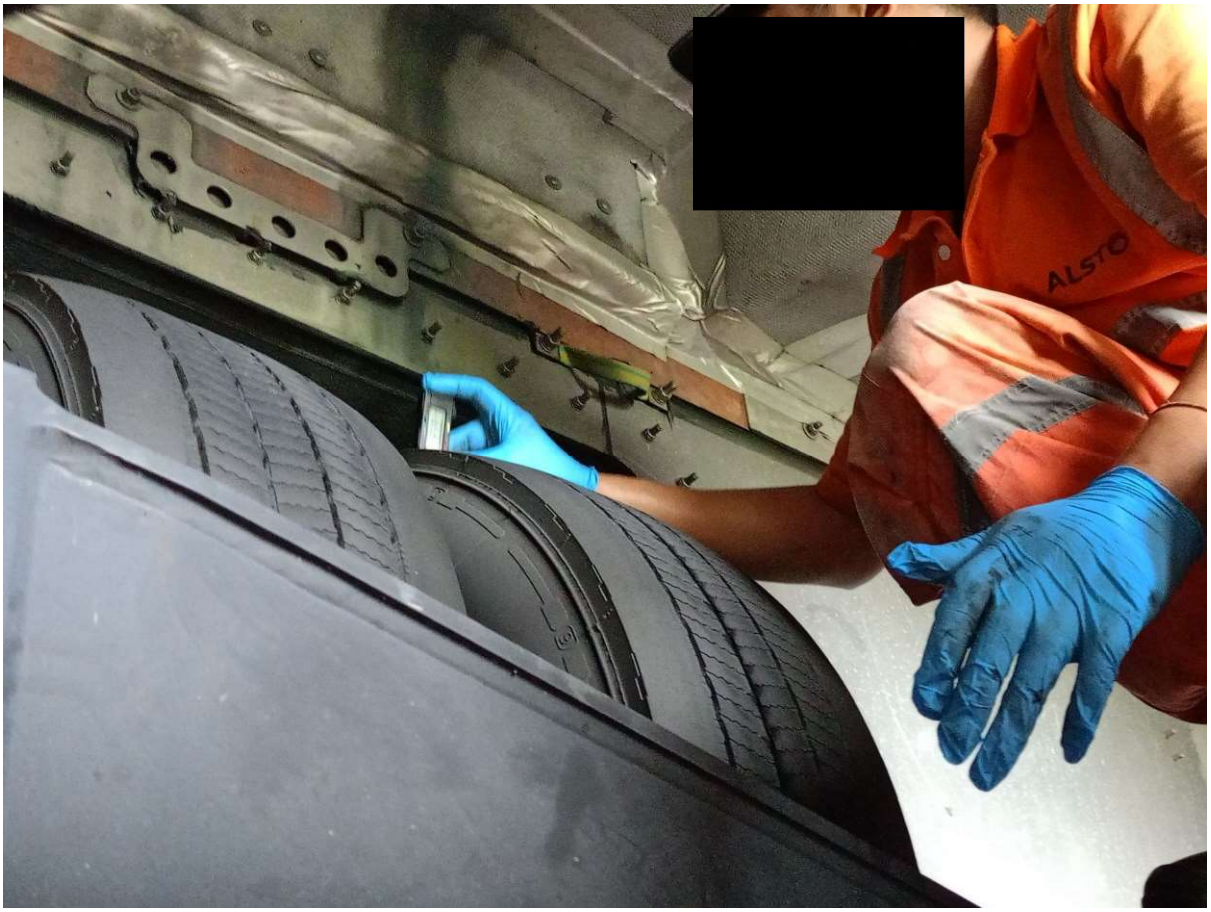
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ภาคผนวก ก-17

การออกแบบระบบล้อยาง

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EASTERN BANGKOK MONORAIL

EASTERN BANGKOK MONORAIL YELLOW LINE PROJECT LAT PHRAO – SAMRONG SECTION

ROLLING STOCK

DEFINITIVE DESIGN OF BOGIE ASSEMBLY

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EASTERN BANGKOK MONORAIL

4 System Description

4.1 Configuration

The *INNOVIA* Monorail 300 bogie is a dual tire, single axle, straddle beam design. It consists of a permanent magnet hub motor coupled to a planetary gearbox, mounted in a cantilevered arrangement to a fabricated steel bogie frame. This provides an extremely compact bogie arrangement which allows the *INNOVIA* Monorail 300 to offer a low floor height as well as an inter-car walkthrough as shown on the below side of Figure 4-1.

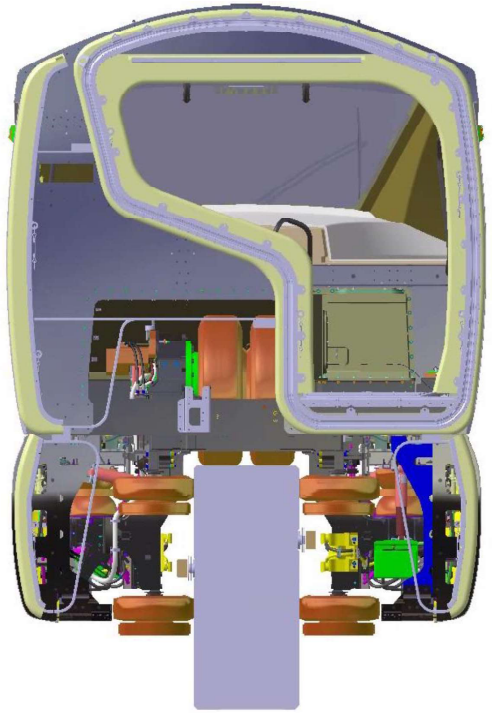

Figure 4-1: Vehicle End View at the Intercar Location

The proposed bogie is used in Sao Paulo (Sao Paulo Express Tiradentes Line) and in Saudi Arabia (King Abdullah Financial District). Some bogie frame modifications were performed to improve its manufacturability.

More details can be found regarding the load and fatigue calculation in the document Bogie Finite Element Analysis (Ref [5]).

4.2 System Components

Each bogie assembly shall consist of the following major components:

- Bogie Frame
- Drive Unit Installation
- Brake System Installation
- Load Wheel Assemblies
- Guide Wheel Assemblies
- Secondary Suspension System
- Traction Link Mechanism
- Electrical and Hydraulic Installation

General views of the bogie can be seen in Figure 4-2, and Figure 4-3 below:

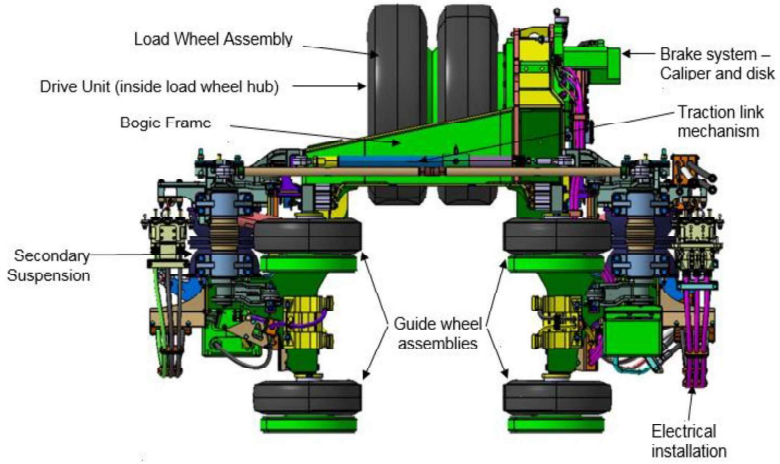

Figure 4-2: Elevation View of Bogie Assembly

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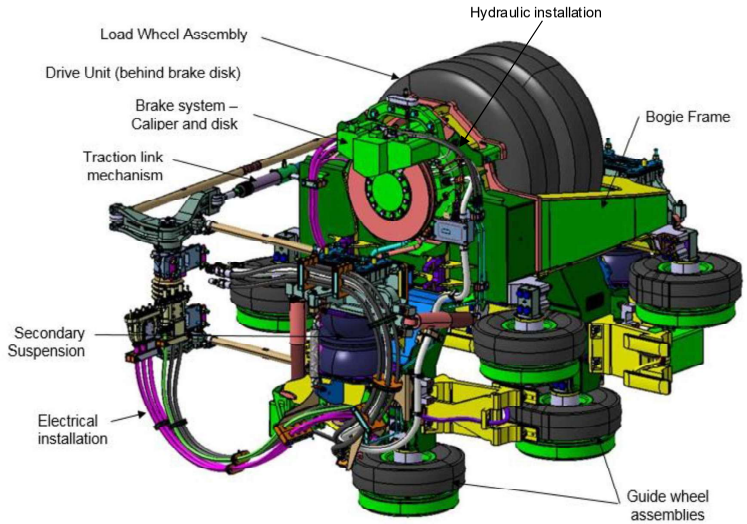

Figure 4-3: Isometric View of Bogie

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Language:	en

4.2.4 Load Wheel Assembly

The bogie has a dual load tire arrangement as shown in Figure 4-11. Load tires are equipped with tire pressure sensors to alert the operator of insufficient pressure. In the event of a single or dual loss of pressure in the load tires, each load tire is equipped with internal run flat devices which shall permit vehicle recovery at reduced speeds (max. 15km/h).

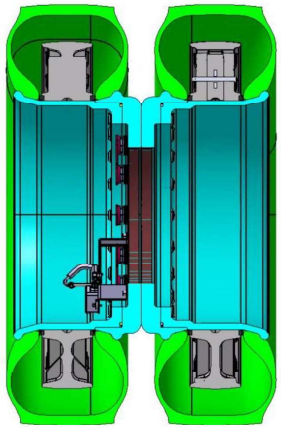

Figure 4-11: Wheel Assemblies

Table 4-3 shows the main parameters of the load wheel.

Parameter	Load Wheel
Size Designation	305/70 R22.5
Section Width (free)	287 mm
Wheel Radius(free)	500 mm
Tread Width (free)	219 mm
Rim Width	209.5 mm
Rim Diameter	571.5 mm
Run-flat Width	120 mm
Run-flat Diameter	830 mm
Radial Construction & Tubeless Type	Yes
Rolling Diameter @ AW0 load	988.03 mm

Table 4-3: Load Wheel Parameters

4.2.4.1 Load Tire

The load tire is the Michelin 305/70 R22.5 X Metro HD TL tire.

The 305/70 R22.5 X Metro HD TL tire is bidirectional and optimized for metro applications to minimize ply-steer, wear and noise.

The nitrogen charged load tires operate at a pressure of 11.5 bar. The use of dry nitrogen eliminates the possibility of internal corrosion, as well as reduces the tire pressure sensitivity to temperature change. The load tires act as primary suspension elements with a stiffness of 1.3 kN/mm at AW0.

The MICHELIN Metro HD tyre series evolves from Michelin's 70-year experience delivering and supporting urban transportation solutions, with this latest HD technology developed in 2015. The MICHELIN 305/70 R22.5 X Metro HD TL is the evolution of the MICHELIN 305/70 R22 XPMA Metro tyre, used in multiple Bombardier pneumatic Metro systems around the world.

Focusing on delivering customer satisfaction, the X Metro HD has been developed and designed to increase the mileage performance compared to previous generation; by optimizing the tread profile and introducing new belt technology to support the demanding usage of monorail operations.

4.2.4.1.1 Load Tire Loading

The Michelin 305/70 R22.5 X Metro HD TL Load tire is nominally rated to 6800kg.

The turning radius of the bogie is not a function of passenger load. All curves can be negotiated at all passenger loads.

Vehicle dynamic studies are used to determine the required speed limit in each curve to ensure tire loads are limited to acceptable levels.

4.2.4.2 Load Tire Mileage Rating

The tire mileage is dependent on several factors including guide beam construction, loading data, and routine maintenance. The service proven performance of the Michelin 305/70 R22.5 X Metro HD TL load tire will be developed with Michelin during the detailed design to demonstrate compliance to the 120,000km under specific conditions (e.g., operations under various loads from AW0-AW3 instead of continuous AW3 loading to simulate actual tire usage). This rating will also be subject to refinement once testing is concluded on the Bangkok alignment in revenue service.

A new load tire tread depth is 9.0 mm, with a total allowable tread wear of 6 mm. This criterion has been reached the load tire must be replaced (the load tire has to be replaced once 3mm tread remaining on the load tire).

4.2.4.3 Load Tire Rim

The Load Tire Rim is a two-piece aluminum rim (items 1 and 4 in Figure 4-12) that is designed to be lightweight and permits the rim to be easily disassembled for tire removal and maintenance. Tires may be replaced by simply removing the outer rim (item 4 in Figure 4-12) and sliding the tire/run flat combo on and off. The two-piece rim design minimizes the opportunities for tire damage during installation by eliminating the need to stretch the tire over a single piece rim. The rims shall be designed to provide a ten-year service life, in accordance with the SAE J1992 test standard.

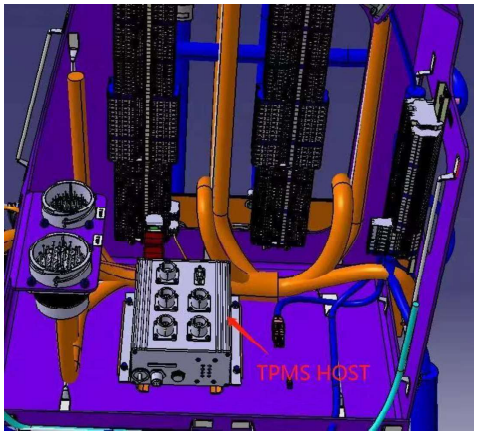

Figure 4-18: TPMS Host location

4.2.5 Guide Wheel Assembly

Each bogie has six (6) side mounted guide tires to laterally guide the car and provide the required vehicle roll control. The symmetrically arranged guide tires minimize load tire wear by optimally aligning the load wheels relative to the running direction on all track geometries. The guide wheel assemblies are equipped with external run-flats to ensure lateral guidance and roll control in the case of a guide tire failure. The external run-flat also protects the guide tire from overload conditions. The assembly is shown Figure 4-19.

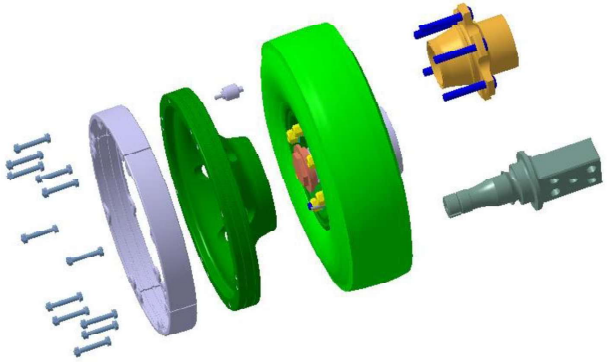

Figure 4-19: Guide Tire Wheel Assembly shown with External Run-flat

Figure 4-20 and Figure 4-21 shown the guide wheel bogie interface.

The Guide wheel axle is bolted to the bogie frame with 4xM20 screw accordingly to the bolting policy defined in section 4.2.11.

The pre-compression of the guide wheel tire is controlled in the Y-axis by the bogie frame machined plane acting as mating surface for the axle.

The parallelism of the guide wheel relative to the running surface as the X-axis position, is controlled by a vertical bogie machined surface that the axle shall mate.

The Z-axis position of the axle is controlled by a pin. The pin is acting as tooling during guide wheel manipulation to hold the guide wheel assembly during fastener tightening operation.

There is a 5mm backing plate between the guide wheel axle surface and the guide wheel mounting seat, the backing plate can be adjusted accordingly, the guide wheel can be replaced at the workshop while the bogie is connected to the train.

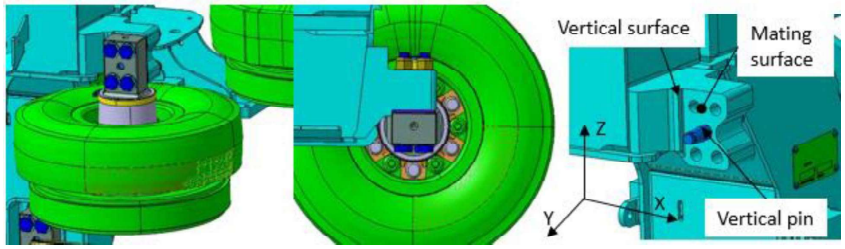

Figure 4-20: Upper Guide Wheel Bogie Frame Interface

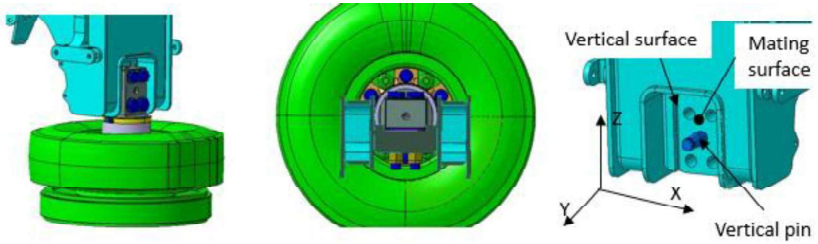

Figure 4-21: Lower Guide Wheel Bogie Frame Interface

Table 4-4 shows the main parameters of the guide wheel.

Parameter	Guide Wheel
Size Designation	6.00R9P
Section Width (free)	165 mm
Wheel Radius(free)	268.5mm
Tread Width (free)	129 mm
Rim Width	101.4 mm
Rim Diameter	228.6 mm

Parameter	Guide Wheel
Run-flat Width	60mm
Run-flat Diameter	473 mm
Radial Construction & Tubeless Type	Yes
Rolling Radius @ AW0 load	258.5 mm (Preloaded)

Table 4-4: Guide Wheel Dimensions

4.2.5.1 Guide Tire

The guide tire selected for this application is the Michelin 6.00 R9 XPM C TL tire.

The nitrogen charged guide tires operate at a pressure of 10 bar. The use of dry nitrogen eliminates the possibility of internal corrosion, as well as reduces the tire pressure sensitivity to temperature change.

The guide wheel tires Michelin 6.00 R9 XPM C TL are used on multiple Bombardier pneumatic metro systems application:

1. *INNOVIA* Monorail 300 Sao Paulo Line 15 (BR);
2. *INNOVIA* Monorail 200 Las Vegas (USA);
3. Mexico City STC MN-02 (MX);
4. APM 256 Chicago O'Hare (USA);
5. APM 256 Taipei Neihu Line(TW).

4.2.5.1.1 Guide Tire Loads

The Michelin 6.00 R9 XP C TL tire is nominally rated to 1300kg. Refer to Section 5 for Guide Tire dynamic loading analysis.

4.2.5.1.2 Guide Tire Mileage Rating

The guide tire mileage rating is dependent on several factors including guide beam construction, loading data and routine maintenance. The service proven performance of the Michelin 6.00 R9 XPC TL guide tire will be developed with Michelin during the detailed design to demonstrate compliance to 120,000 km under specific conditions. This rating will also be subject to refinement once testing is concluded on the Bangkok alignment in revenue service.

A new guide tire has a tread depth of 6.5 mm, with an allowable tread wear of 2 mm. This criterion has been reached the guide tire must be replaced (the guide tire has to be replaced when 4.5mm tread remains on the guide tire).

4.2.5.2 Guide Tire Rim

The Guide Tire Rim is a 2-piece aluminum rim for ease of tire and runflat installation/removal. The rim is designed to provide a ten-year service life in accordance with the SAE J1992 Test Standard.

In reference toFigure 4-22, each guide tire rim shall be equipped with:

1. Valve
2. Stud
3. Outer Rim
4. Ring
5. Inner Rim

ภาคผนวก ก-18

เอกสารแสดงรูปแบบฝาครอบล้อรถไฟฟ้า

EASTERN BANGKOK MONORAIL YELLOW LINE PROJECT

LAT PHRAO – SAMRONG SECTION

SYSTEM O&M TRAINING

TRAINER MANUAL FOR

ROLLING STOCK MAINTENANCE TRAINING

MODULE 1: MONORAIL TRAIN MAINTENANCE OVERVIEW

<RST-MT-01>

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YL RST 60056 A		
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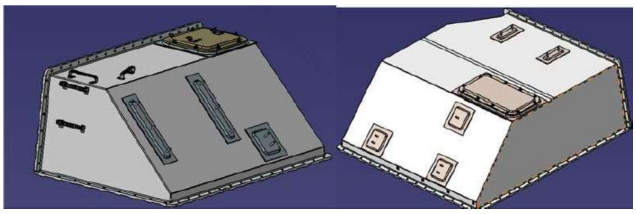
30-05-2022	en	

Wheel Well

- The wheel well will be composed of a very heavy fiberglass phenolic composite sandwich approximately 30mm thick. It will be designed to withstand tire blow-outs and will protect against fire from the undercar area, to a level prescribed by the ASTM E119 standard





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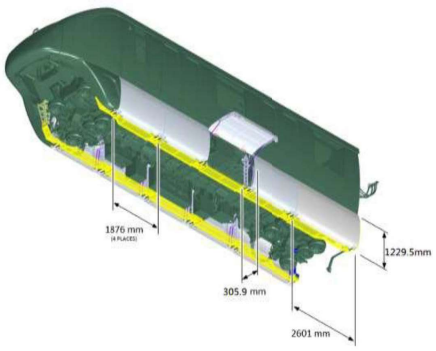
Side Skirts

- Made of Aluminum alloy and used to enhance aesthetics of the car and
- improve protection to the undercar equipment against environment exposure
- To facilitate maintenance access to the undercar equipment, the side skirts are top hinged with an integral device that can hold them open at ~97.5° and are also removable
- There are two lengths of side skirts: 1876mm and 2601mm



Side Skirts



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LAT PHRAO – SAMRONG SECTION

ROLLING STOCK

NOISE AND VIBRATION CONTROL PLAN

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Approvals

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Approved	Dr. Eng. Abdel, B Awawdeh	Project Engineering Director		08-04-2019

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1 Introduction

This document describes the Vehicle Noise and Vibration Control Plan which shall be implemented to ensure that the Bangkok monorail will meet the interior noise, the exterior noise and vibration requirements.

1.1 Purpose

The objective of this plan is to minimize vehicle noise and vibration levels and ensure that they comply with the Employer Technical Specifications. The specific aspects covered by this analysis are:

- Identifying all potential noise and vibration sources on the vehicle.
- Creating individual subsystem noise budgets.
- Providing suppliers with subsystem noise limits.
- Employing all necessary noise and vibration control measures during design.
- Performing qualification testing to ensure that all subsystems and the vehicle meet the defined requirements.

1.2 Scope

This Noise and Vibration Control Plan will be issued in several phases:

- **Phase 1** Which presents the way forward of the project noise and vibration analyses. It identifies all relevant key factors that play a role in the acoustics and vibrations of the vehicle. The whole engineering process to achieve the required noise and vibration levels, from preliminary design to the final qualification tests, is detailed.
- **Phase 2** (this issue): Which describes the vehicle noise model and the prediction results. The Noise predictions includes:
    - The exterior stationary noise levels;
    - The exterior dynamic noise levels;
    - The interior stationary noise levels;
    - The interior dynamic noise levels.

  The results of these predictions are used to assess the noise allocations that are required by the vehicle subsystem suppliers.

- **Phase 3**: The noise model will be updated using the available supplier noise test results.

After these 3 design phases, the Vehicle Qualification Tests will validate the noise and vibration performance of the monorail.

2 Abbreviations & Definitions

Definitions and abbreviations used in this document are as listed in the Project Glossary Ref [1]

Contrary to what is defined in the Project Glossary, when reference is made to the term “Project” in this document it refers to the Contractors scope of Works and when reference is made to the term “Contractor” it means the Consortium of Bombardier Transportation Signal (Thailand) Limited and Bombardier Transportation GmbH.

3 References

3.1 Project Documents

Document Number	Document Title
G0YL.PMM.11160.AEE.0001	Project Glossary Ref [1]
M&E Works ER Part 3-PS Rolling Stock 08Aug2017	Monorail Project M&E Works Employer's Requirements Part 3 Particular Specification for Rolling Stock Aug 2017 Ref [2]
Rolling Stock	Bangkok Monorail Pink & Yellow Line Proposal Ref [3]

Table 3-1: List of References ~ Contractual Documents

3.2 Standards

Document Number	Document Title
ISO 9614-2	Acoustics – Determination of sound power levels of noise sources using sound intensity – Part 2: Measurement by scanning [4]
ISO 3744	Acoustics – Determination of sound power levels and sound energy level of noise sources using sound pressure – engineering methods for essentially free field over a reflecting plane [5]
ANSI/AMCA 204	Balance Quality and Vibration Levels for Fans [6]
IEC 61373	Railway application – Rolling stock equipment – Shock and vibration tests [7]
EN ISO 3095: 2013	Railway applications – Acoustics – Measurement of noise emitted by railbound vehicles [8]
EN ISO 3381: 2011	Railway applications - Acoustics - Measurement of noise inside railbound vehicles [9]
ASCE 21-13	Automated People Mover Standards [10]
ISO 717-1	Acoustic – Rating of sound insulation in buildings and of building elements [11]

Table 3-2: List of References ~ Standards

4 Vehicle Noise and Vibration Requirements

4.1 Employer Requirements

The following section lists the Employer Technical Specification for noise and vibration related sections. The numbers in parenthesis () refer to the Employer Technical Specification section numbers.

(2.9) Noise Performance

(2.9.1) Measures shall be taken in all stages to ensure that noise levels shall be minimised and shall be in line with internationally recognised standards. Evidence of noise levels achieved on similar vehicles previously manufactured shall be submitted and these levels shall be the minimum acceptable for the Project.

Internal Noise Levels

(2.9.2) Internal noise levels shall be measured with the doors closed, the vehicle empty and all equipment operating at maximum capacity.

(2.9.3) Noise levels shall be minimised at any vehicle speed up to maximum speed when measured in the open. These noise levels shall be achieved with all auxiliary systems operating simultaneously, with the vehicle operating in any level of acceleration, deceleration or coasting.

(2.9.4) There shall be no audible pure tones or rattles. A sound pressure shall be deemed to include one or more pure tones if it contains a component or components, whose sound pressure fluctuates sinusoidally with time, leading to perceived hum, whine, buzz, whistle or squeal.

External Noise Levels

(2.9.5) External noise levels, measured with all equipment operating at maximum capacity, shall be minimised.

(2.9.6) There shall be no audible pure tones or rattles. A sound pressure shall be deemed to include one or more pure tones if it contains a component or components whose sound pressure fluctuates sinusoidally with time, leading to a perceived hum, whine, buzz, whistle or squeal.

(3.3) Mounting of Equipment

(3.3.2) All items of mechanical, electrical and electronic equipment fitted to the vehicle shall operate without damage or suffer any reduction in reliability when subjected to the shock and vibration occurring in normal service for the service life of the equipment.

4.2 Bangkok Monorail Bombardier Proposal

The following section lists the Bombardier proposal for noise and vibration related sections. The numbers in parenthesis () refer to the Bombardier Proposal section numbers.

(4.2) Acoustics

(4.2.1) Noise Requirement of Vehicles

(4.2.1.1) External noise

According to the conditions provided in Table4.2 as taken from ASCE 21-13, the results show that the exterior noise level is 76 dBA when the train passes through at the speed of 80 km/h, which meets the noise requirements in ASCE 21-13.

Condition	LAeq (dBA)	Measure standard
On the straight guidebeam in a free field, vehicle stopped or acceleration from 0 to 30km/h with all auxiliary onboard equipment in normal operation, door closed.	≤68	1.5mfromthe doorway on a line aligned to the centreline of the doorway and perpendicular to the plane of the doorway and 1.5 m above the doorway threshold.
On the straight guidebeam in a free field, moving train at the speed of 80km/h, door closed.	≤76	15m from guidebeam centreline and 1.5 m above guidebeam running surface.

(Table 4.3) Exterior Noise Limits measured according to ISO 3095.

(4.2.1.2) Internal noise

Condition	LAeq (dBA)
On the straight guidebeam in a free field, vehicle with all auxiliary onboard equipment in normal operation, door closed.	≤68
On the straight guidebeam in a free field, moving train at the speed of 80km/h, door closed.	≤78

(Table 4.4) shows Interior Noise Limits measured according to ISO 3381.

Interior noise level is 78 dBA when the train passes through at the speed of 80 km/h measured in accordance with ISO 3381, which meets the noise requirements in ASCE 21.

5 Vehicle Noise Control Plan

5.1 Subsystems Related to Noise and Vibration

The vehicle subsystem noise budgets are used to provide suppliers a maximum allowable noise level for their equipment or a noise insulation value in the case of carbody elements. These requirements are included in the General Requirements Document (GRD)/Technical Requirements Document (TRD) provided to suppliers. The subsystems considered in the noise and vibration analysis of the vehicle include:

1. Ventilation Air Conditioning (VAC) unit
2. Propulsion Control System (PCS)
3. Propulsion (traction motor & gearbox)
4. Auxiliary Power Unit (APU)

5. Electro-Hydraulic Module (EHM)
6. Rolling noise (tires)
7. Liquid Cooling System
8. Doors
9. Windows
10. Carbody Floor
11. Carbody Sidewall
12. Wheel well
13. Gangway
14. Lighting system
15. Skirt

The noise budget is calculated this way:

a. The monorail noise model is built with the sources noise levels that allow the employer requirements to be met.
b. The noise level of sources used in the noise model will be assigned to each supplier.

A requirement for the vendor to perform subsystem noise and vibration qualification tests are included in each relevant GRD/TRD.

5.2 Subsystem Noise Level Predictions

Each subsystem supplier shall predict the noise level of their subsystem by determining individual component noise levels and calculating the overall subsystem noise level from this information. This information shall be provided by each subsystem supplier as part of the proposal and design review documentation submitted to Bombardier. Bombardier shall ensure that each calculated subsystem noise level is within the subsystem allowance in the vehicle noise budget.

Acceptable noise and vibration levels shall be achieved by careful component selection, design, mounting location, and method of installation within subsystem enclosures, as well as through the use of effective noise control measures.

5.3 Subsystems Noise Level Comparison to Past Project

This section compares the subsystems used in the Bangkok Monorail to the subsystems used in the of the Sao Paolo Monorail. For some systems the supplier is not finally decided yet, it is then written TBD.

System	Same as Sao Paulo or New
VAC	New (Merak)
PCS	Same
Propulsion (traction motor & gearbox)	Same
APU	TBD
EHM	New (Knorr Brake China)
Rolling noise (tires)	Same
Liquid Cooling System	TBD
Doors	Same

System	Same as Sao Paulo or New
Windows	New (Fuyao)
Carbody Floor	New (Zhuzhou TMT)
Carbody Sidewall	New (PBTS design)
Wheel well	New (Wuxi Jinxin)
Gangway	New (Danner China)
Lighting system	New (Longjiantai)

Table 5-1- Comparison of Bangkok Monorail subsystems to Sao Paulo Monorail subsystems

All subsystems that are new compared to Sao Paulo will be fully tested for noise performance. Other systems that are carry-over from Sao Paulo monorail will not be test unless no noise test report is available.

5.4 Component Testing

Subsystem suppliers are required to obtain noise test data for components within their subsystem. This information shall be used by the supplier to validate their Subsystem Noise Level Prediction.

5.5 Noise and Vibration Control Measures

The following is a list of noise and vibration control measures that shall be implemented to ensure compliance with the employer requirements:

1. Selection of low noise components during the preliminary design phase
2. Use of sound absorbing and insulating materials in the subsystem and vehicle design.
3. Use of resilient mounts at subsystem-to-vehicle interfaces to reduce structure borne noise levels.
4. Selection of fan designs which minimize tonal qualities.
5. Use of PCS control algorithms which minimize tonal qualities where possible.
6. All fans used in subsystem shall be balanced as routine test as per ANSI/AMCA 204 to 0.001 inch peak-to-peak [6].
7. All subsystem equipment shall be tested for shock and vibration as per IEC 61373 [7].

The implementation of these measures shall be verified through all stages of the design process.

5.6 Subsystem Noise and Vibration Qualification Testing

Each subsystem supplier shall perform noise and vibration qualification tests of their complete subsystem according to the GRD/TRD.

The noise results from this qualification test shall also be used to further refine the Bombardier Railway Noise Software (BRAINS) models of the vehicle (phase 3 of the Noise and Vibration Control Plan, see section **Error! Reference source not found.**).

5.7 Vehicle Noise and Vibration Qualification Testing

The purpose of Vehicle Noise and Vibration Qualification Testing is to demonstrate that the vehicle is compliant with the Employer Specification. The following tests shall be performed:

5.7.1 Stationary Noise Testing

- Vehicle Interior-Static Noise Qualification test
- Train Static Exterior Noise Qualification test

5.7.2 Dynamic Noise and Vibration Testing

- Vehicle Interior Dynamic Noise Qualification test
- Vehicle Dynamic Exterior Noise Qualification test

The vehicle vibration test will be the ride quality test.

6 Vehicle Noise Prediction

This section presents the BRAINS model for interior and exterior noise prediction along with the noise predictions results. BRAINS is a Bombardier software developed by the Bombardier Acoustic & Vibration Center of Competence (CoC). It was extensively validated and improved for more than 15 years. The Bangkok monorail BRAINS model is based on the vehicle requirements (see section 4) and on past monorail project noise information available. The following sections present the noise data retrieved from the past Bombardier monorail projects that were used to build the BRAINS model.

6.1 BRAINS noise model

This section gives an overview of the Bangkok monorail BRAINS model. BRAINS can calculate the noise performance of the following cases:

- Stationary interior noise;
- Stationary exterior noise;
- Dynamic interior noise;
- Dynamic exterior noise.

All noise sources are considered as “monopole point source” (see Figure 6-1). A transmission loss is attributed all noise barriers (doors, windows, side wall…). Interior noise is calculating with the Statistical Energy Analysis (SEA) method and the exterior noise is calculating using a ray tracing method.

For interior noise calculation a two-car model is built (A1 and C1 cars, see Figure 6-1). The exterior noise model is built as the combination of two, two-car module (see Figure 6-2).

Note: Since BRAINS only uses Sound Power Level (Lw) values as noise source input, all sources are expressed as Lw values in the following Tables.

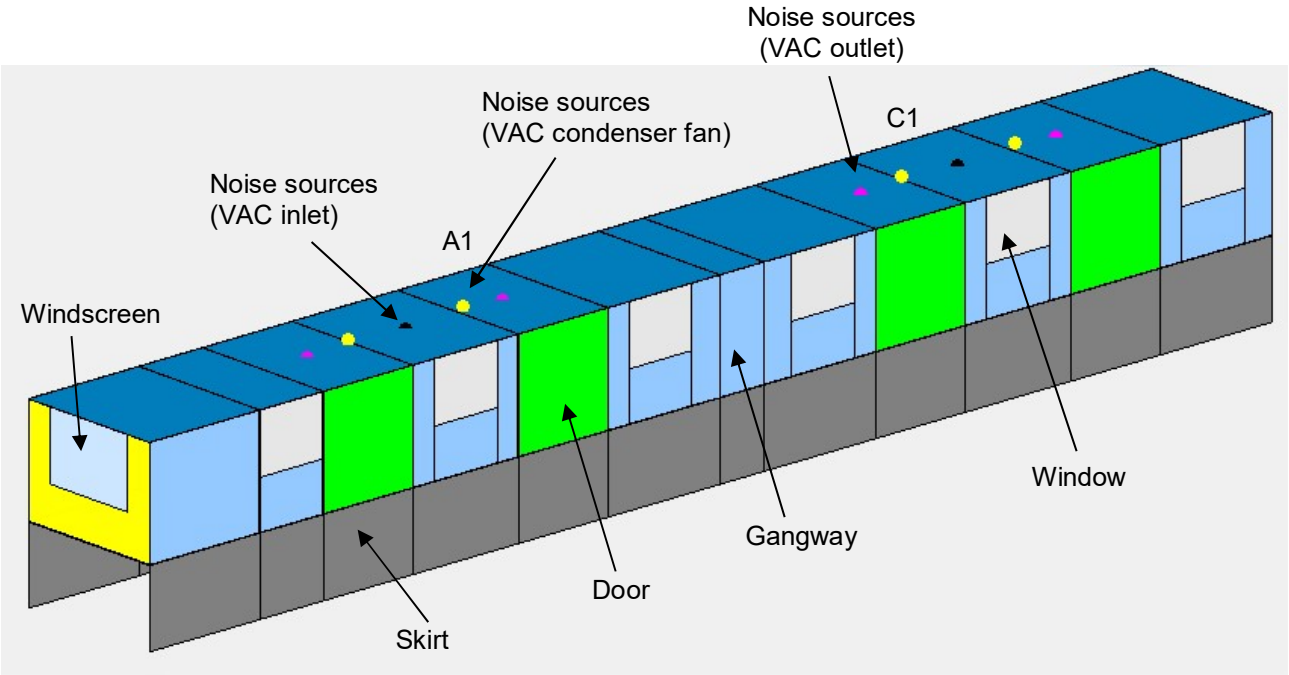


Figure 6-1 Bangkok Monorail BRAINS Model (A1-C1 modules) for Interior Noise Prediction.

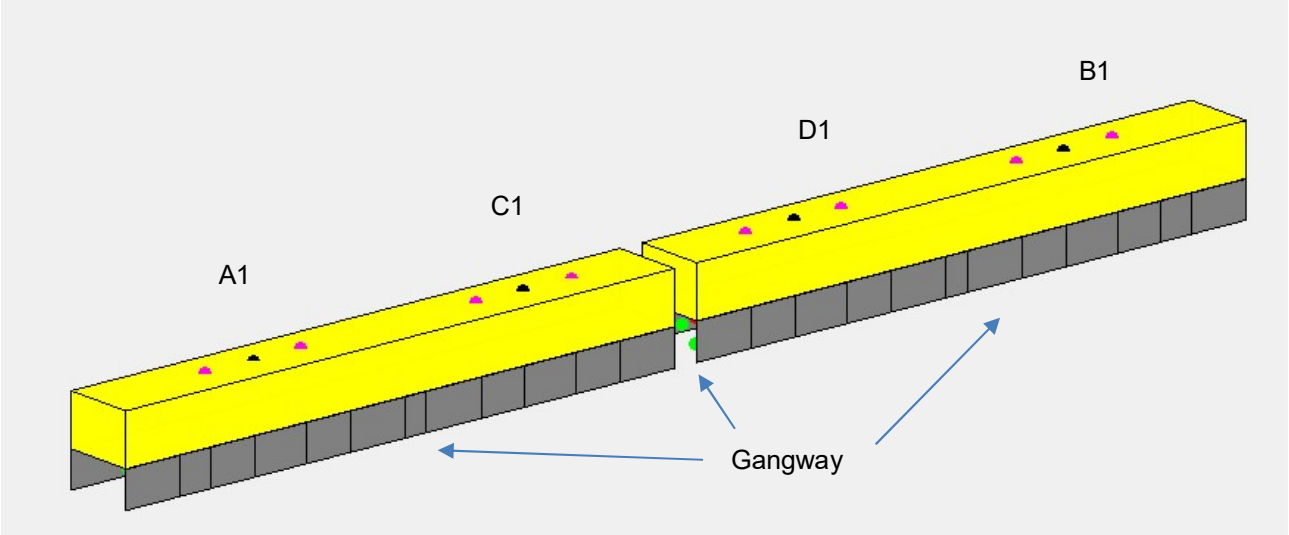


Figure 6-2 Bangkok Monorail BRAINS Model for Exterior Noise Prediction.

6.2 Interior Sources

The following noise values, based on the Sao Paulo monorail noise measurements, are used to build the BRAINS model.

Subsystem	Lw (dBA)
Lighting	Lw = 48
VAC at air diffuser outlet	Lw = 73
VAC at return air grille	Lw = 66

Table 6-1: Interior Noise Sources

6.3 Exterior Sources

The following noise values, based on the Sao Paulo monorail noise measurements, are used to build the BRAINS model.

Subsystem	Lw (dBA)
APU	Lw = 78
Brake Units	Lw = 77
VAC condenser fans	Lw = 86
PCS-Filter, Inverter	Lw = 84
Liquid Cooling System Low Speed	Lw = 84

Table 6-2: Exterior Noise Sources (Stationary)

Subsystem	Lw (dBA)
PCS-Motor/Gearbox	Lw = 103 (each motor)
Rolling Noise-Load Tires	Lw = 105 (each tire)*
Rolling Noise-Guide Tires	Lw = 100 (each tire)*
Liquid Cooling System High Speed	Lw = 100

Table 6-3: Exterior Noise Sources (Dynamic Operation)

* Assessed at 80 km/h

6.4 Carbody Elements – Sound Insulation Values

The sound insulation value of the carbody components shall meet the following values. These values are used to build the BRAINS model.

Component	R_w (dB)
Carbody Floor	35 (estimated from PBTS information)
Carbody Sidewall	35
Doors	30
Windows	30
Wheel well	34
Gangway	30
Skirt	15 (assessment based on the comparison between Sao Paulo monorail noise results and BRAINS simulations)

Table 6-4: Carbody Elements – Sound Insulation Values

6.5 Interior Stationary Noise

The following section presents the results of the Bangkok monorail noise model for the interior stationary noise.

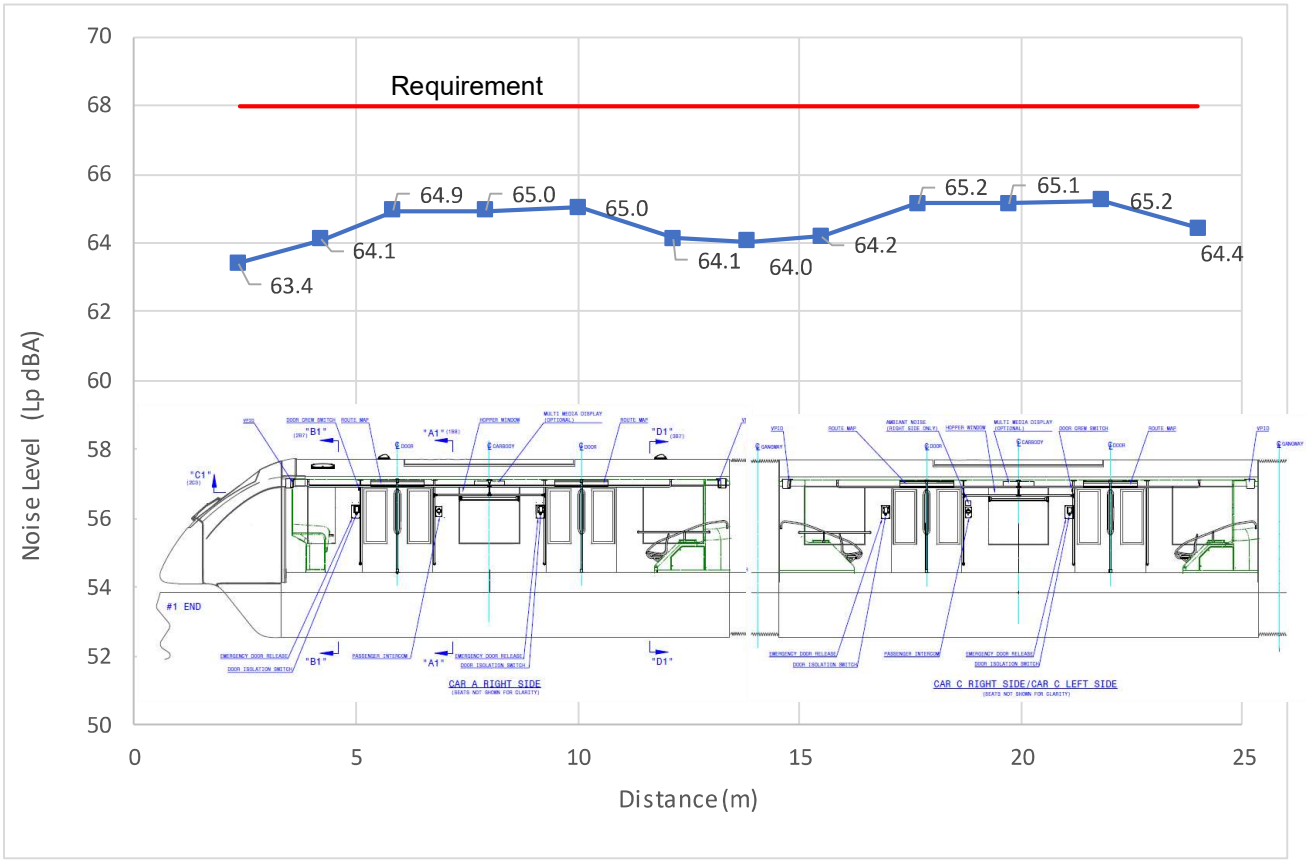


Figure 6-3 Stationary Interior Noise Simulation Results

6.6 Interior Dynamic Noise

The following section presents the results of the Bangkok monorail noise model for the interior dynamic noise calculated at 80 km/h constant speed.

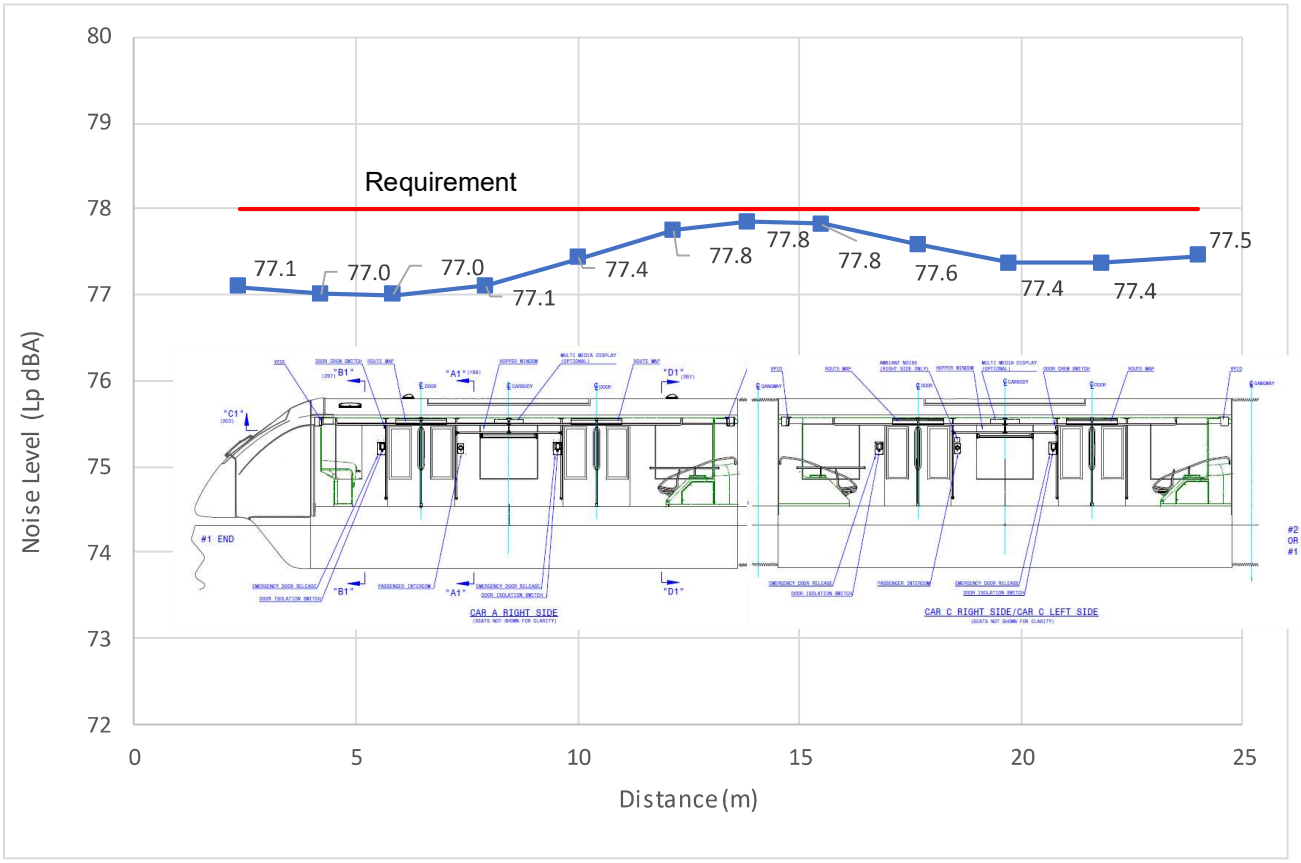


Figure 6-4 Dynamic Interior Noise Simulation Results

6.7 Exterior Stationary Noise

The following section presents the results of the Bangkok monorail noise model for the exterior stationary noise calculated at 1.5 m from the door way and 1.5 m above the doorway threshold.

The noise results are not even on right and left side because the two (2) noisier equipment (the PCS and the liquid cooling system) are both on the left side of the vehicle (see Table 6-2: Exterior Noise Sources (Stationary)Table 6-2 and Figure 6-5). The condenser fan has also a high contribution but since it is located on the center of the roof its contribution to the noise level 1.5 m above the floor is limited.

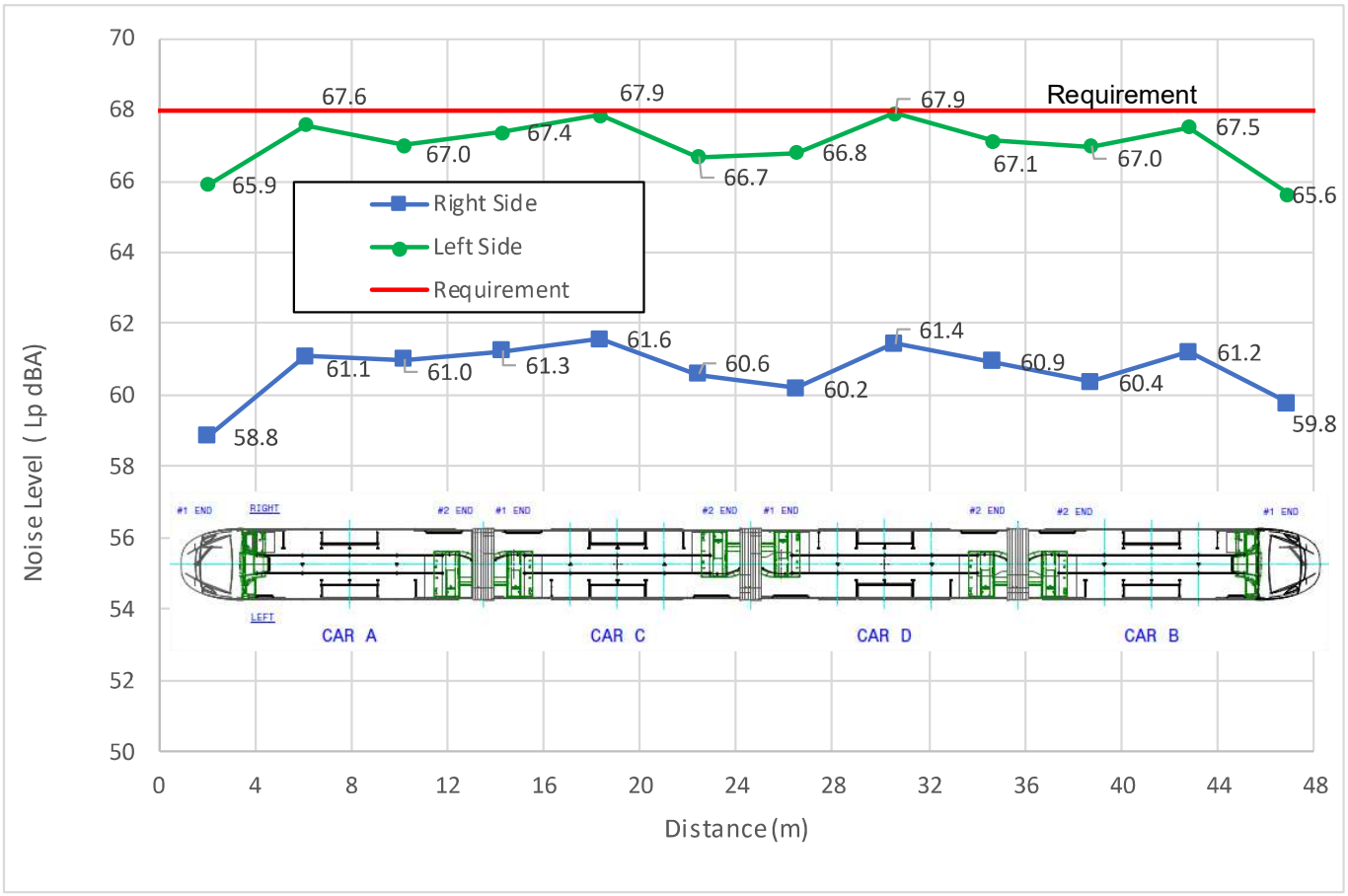


Figure 6-5 Stationary Exterior Noise.

6.8 Exterior Dynamic Noise

The following section presents the results of the Bangkok monorail noise model for the exterior dynamic noise calculated at 80 km/h constant speed at 15 m from the guidebeam center line and 1.5 m above the guidebeam running surface.

In that case again the left side support more noise than the right side, but the differences between these two sides are smaller because the major noise contributor of the dynamic noise are the tires that are evenly distributed between the right and left side.

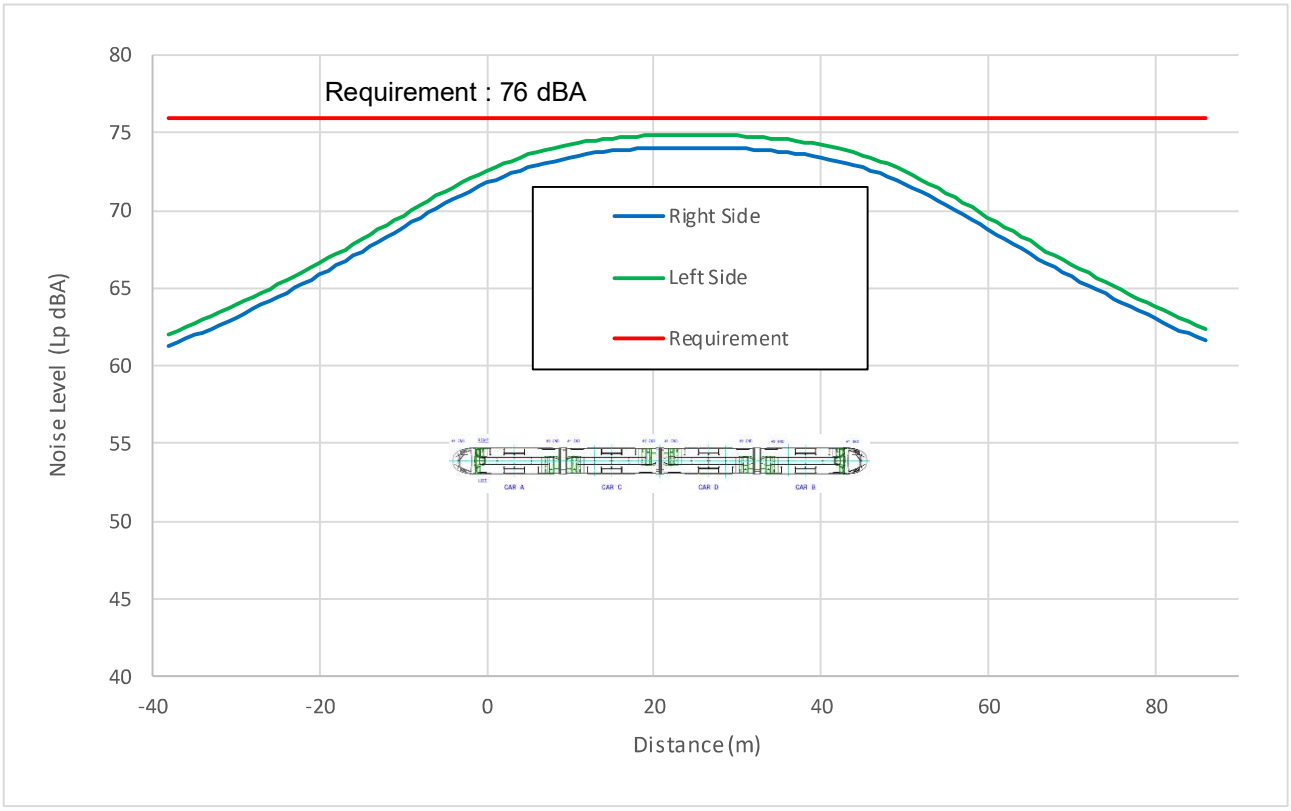


Figure 6-6 Dynamic Exterior Noise.

7 Conclusion

This document is the Phase 2 of the Noise and Vibration Control Plan, as presented in the section 1.2. The noise simulations performed in that document used the noise source levels and noise insulation values presented in the Section 6. These noise values were required as the maximum allowed noise targets to the subsystem suppliers in the TRD documents. The results presented in the section 6 demonstrated that all noise requirements were met considering these noise values. It is therefore ensured that the actual vehicle will meet the noise requirements.

The noise results presented in Section 6 are summarized in the Table below:

Condition	Maximum Predicted Value (dBA)	Requirement (dBA)
Interior stationary noise	65	68
Interior dynamic noise	78	78
Exterior stationary noise	68	68
Exterior dynamic noise	75	76

Table 7-1: Exterior Noise Sources (Dynamic Operation)

The next phase of that document will be done by replacing the target noise values, used in that document, with the actual noise values measured by the subsystem suppliers. This phase 3 document will be issued after supplier noise test data will be received.

End of Document.

ภาคผนวก ก-20

การออกแบบทางวิ่งของรถไฟฟ้า (Guide Way)

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

Team List

No.	Name -Surname
1	[redacted]

วันที่ 05-05-2025 เวลา 01.30 - 04.30 ทำการ Preventive Maintenance บริเวณอาคาร **PM Above** EJ NB หัวข้อการตรวจงานดังต่อไปนี้

ลำดับ	รายการตรวจสอบ	เกณฑ์การตรวจสอบ
1	**Guideway Beam (Concrete & Steel)**	
1.1	**Concrete (คอนกรีต)**	
1.1.1	ตรวจสอบความกว้างของรอยแตกร้าว	≤ 0.3 mm
1.1.2	ตรวจสอบขนาดการหลุดร่อนของคอนกรีต	กว้าง≤ 50 mm, ยาว≤ 50 mm ลึก≤10 mm
1.1.3	ตรวจสอบพื้นผิวเป็นหลุมหรือรู	Dia.≤ 5 mm
1.1.4	ตรวจสอบฝาปิดรูยก GWB	ไม่แตกหัก, สูญหาย
1.1.5	ตรวจสอบความเสียดทานของผิว (Skid Number)	0.35 - 0.40
1.2	**Steel (เหล็ก)**	
1.2.1	ตรวจสอบการแตกร้าวของรอยเชื่อม	ไม่มีการแตกร้าว
1.2.2	ตรวจสอบ โบลท์, น๊อต	ไม่หลุด, หลวม
1.2.3	ตรวจสอบข้อบกพร่องของวัสดุผิวเคลือบของคาน (Painting)	ไม่มีสนิม
1.2.4	ตรวจสอบความเสียดทานของผิว (Skid Number)	0.35 - 0.40

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

2	**Expansion joint and Construction joint**	
2.1	**Expansion joint**	
2.1.1	ตรวจสอบ โบลท์, น๊อต	ไม่หลุด, หลวม
2.1.2	ตรวจสอบการแตกร้าว (Finger Joint)	ไม่มีการแตกร้าว
2.1.3	ตรวจสอบการโก่งงอของแผ่นเหล็ก (Finger Joint)	≤ 1.25 mm
2.1.4	ตรวจสอบข้อบกพร่องของวัสดุผิวเคลือบบนผิว Expansion Joint	ไม่มีสนิม
2.2	**Construction joint**	
2.2.1	ตรวจสอบความกว้างของรอยแตกร้าว	≤ 0.3 mm
2.2.2	ตรวจสอบขนาดการหลุดร่อนของคอนกรีต	กว้าง≤ 50 mm, ยาว≤ 50 mm ลึก≤10 mm
2.2.3	ตรวจสอบพื้นผิวเป็นหลุมหรือรู	Dia.≤ 5 mm
3	**Walkway & Emergency Stair (Bolt, Nut, Expended Metal)**	
3.1	**Walkway**	
3.1.1	ตรวจสภาพทั่วไปของพื้นทางเดิน	ไม่มีสิ่งกีดขวาง
3.1.2	ตรวจสอบ โบลท์, น๊อต	ไม่หลุด, หลวม
3.1.3	ตรวจสอบสัญลักษณ์แถบสีสะท้อนแสง	ไม่ฉีกขาด, สูญหาย
3.1.4	ตรวจสอบข้อบกพร่องของวัสดุผิวเคลือบบนผิว	ไม่มีสนิม
3.2	**Emergency Stair**	
3.2.1	ตรวจสภาพทั่วไปของทางเดินบันไดฉุกเฉิน	ไม่มีสิ่งกีดขวาง
3.2.2	ตรวจสอบ โบลท์, น๊อต	ไม่หลุด, หลวม
3.2.3	ตรวจสอบสัญลักษณ์แถบสีสะท้อนแสง	ไม่ฉีกขาด, สูญหาย
3.2.4	ตรวจสอบข้อบกพร่องของวัสดุผิวเคลือบบนผิว	ไม่มีสนิม
4	**Chainage Damage**	

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

4.1	ตรวจเช็คตัวอักษรและสี	สีไม่หลุด, ลอก
5	**Support Guideway Beam (Concrete Plinth, Bearing)**	
5.1	**Bearing Support**	
5.1	ตรวจสอบการแตกร้าวของฐานคอนกรีต	ไม่มีการแตกร้าว
5.2	ตรวจสอบแผ่นป้องกันฝุ่น	ไม่ฉีกขาด, สูญหาย
5.3	ตรวจสอบ โบลท์, น๊อต	ไม่หลุด, หลวม
5.4	ตรวจสอบข้อบกพร่องของวัสดุผิวเคลือบบน Bearing	ไม่มีสนิม
6	**Anchorage Block**	
6.1	ตรวจสอบหัวสมอยึดลวดอัดแรง (Anchorage)	ไม่แตกหัก, สูญหาย
7	**Plants & Birdnest**	
7.1	ตรวจสอบวัชพืชที่ขึ้นตามจุดต่างๆของ โครงสร้าง	หากพบเจอรื้อถอนออกทันที
7.2	ตรวจสอบรังนกหรือสิ่งมีชีวิต	หากพบเจอรื้อถอนออกทันที

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. **Expansion joint** S1 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint S2 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint S3 	สถานะปกติ
	สถานะปกติ

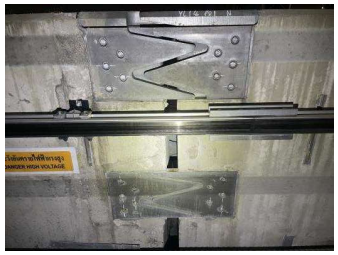
YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint S4 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P01 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P05 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P09 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P13 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P17 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P21 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P25 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P29 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P33 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P37 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P41 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P45 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

Team List

No.	Name -Surname
1	[redacted]

วันที่ 05-05-2025 เวลา 01.30 - 04.30 ทำการ Preventive Maintenance บริเวณอาคาร **PM Above** EJ SB หัวข้อการตรวจงานดังต่อไปนี้

ลำดับ	รายการตรวจสอบ	เกณฑ์การตรวจสอบ
1	**Guideway Beam (Concrete & Steel)**	
1.1	**Concrete (คอนกรีต)**	
1.1.1	ตรวจสอบความกว้างของรอยแตกร้าว	≤0.3 mm
1.1.2	ตรวจสอบขนาดการหลุดร่อนของคอนกรีต	กว้าง≤ 50 mm, ยาว≤ 50 mm ลึก ≤10 mm
1.1.3	ตรวจสอบพื้นผิวเป็นหลุมหรือรู	Dia.≤ 5 mm
1.1.4	ตรวจสอบฝาปิดรูยก GWB	ไม่แตกหัก, สูญหาย
1.1.5	ตรวจสอบความเสียดทานของผิว (Skid Number)	0.35 - 0.40
1.2	**Steel (เหล็ก)**	
1.2.1	ตรวจสอบการแตกร้าวของรอยเชื่อม	ไม่มีการแตกร้าว
1.2.2	ตรวจสอบ โบลท์, น๊อต	ไม่หลุด, หลวม
1.2.3	ตรวจสอบข้อบกพร่องของวัสดุผิวเคลือบของดาน (Painting)	ไม่มีสนิม
1.2.4	ตรวจสอบความเสียดทานของผิว (Skid Number)	0.35 - 0.40

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

2	**Expansion joint and Construction joint**	
2.1	**Expansion joint**	
2.1.1	ตรวจสอบ โบลท์, น๊อต	ไม่หลุด, หลวม
2.1.2	ตรวจสอบการแตกร้าว (Finger Joint)	ไม่มีการแตกร้าว
2.1.3	ตรวจสอบการโก่งงอของแผ่นเหล็ก (Finger Joint)	≤ 1.25 mm
2.1.4	ตรวจสอบข้อบกพร่องของวัสดุผิวเคลือบบนผิว Expansion Joint	ไม่มีสนิม
2.2	**Construction joint**	
2.2.1	ตรวจสอบความกว้างของรอยแตกร้าว	≤ 0.3 mm
2.2.2	ตรวจสอบขนาดการหลุดร่อนของคอนกรีต	กว้าง≤ 50 mm, ยาว≤ 50 mm ลึก≤10 mm
2.2.3	ตรวจสอบพื้นผิวเป็นหลุมหรือรู	Dia.≤ 5 mm
3	**Walkway & Emergency Stair (Bolt, Nut, Expended Metal)**	
3.1	**Walkway**	
3.1.1	ตรวจสภาพทั่วไปของพื้นทางเดิน	ไม่มีสิ่งกีดขวาง
3.1.2	ตรวจสอบ โบลท์, น๊อต	ไม่หลุด, หลวม
3.1.3	ตรวจสอบสัญลักษณ์แถบสีสะท้อนแสง	ไม่ฉีกขาด, สูญหาย
3.1.4	ตรวจสอบข้อบกพร่องของวัสดุผิวเคลือบบนผิว	ไม่มีสนิม
3.2	**Emergency Stair**	
3.2.1	ตรวจสภาพทั่วไปของทางเดินบันไดฉุกเฉิน	ไม่มีสิ่งกีดขวาง
3.2.2	ตรวจสอบ โบลท์, น๊อต	ไม่หลุด, หลวม
3.2.3	ตรวจสอบสัญลักษณ์แถบสีสะท้อนแสง	ไม่ฉีกขาด, สูญหาย
3.2.4	ตรวจสอบข้อบกพร่องของวัสดุผิวเคลือบบนผิว	ไม่มีสนิม
4	**Chainage Damage**	

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

4.1	ตรวจเช็คตัวอักษรและสี	สีไม่หลุด, ลอก
5	**Support Guideway Beam (Concrete Plinth, Bearing)**	
5.1	**Bearing Support**	
5.1	ตรวจสอบการแตกร้าวของฐานคอนกรีต	ไม่มีการแตกร้าว
5.2	ตรวจสอบแผ่นป้องกันฝุ่น	ไม่ฉีกขาด, สูญหาย
5.3	ตรวจสอบ โบลท์, น๊อต	ไม่หลุด, หลวม
5.4	ตรวจสอบข้อบกพร่องของวัสดุผิวเคลือบบน Bearing	ไม่มีสนิม
6	**Anchorage Block**	
6.1	ตรวจสอบหัวสมอยึดลวดอัดแรง (Anchorage)	ไม่แตกหัก, สูญหาย
7	**Plants & Birdnest**	
7.1	ตรวจสอบวัชพืชที่ขึ้นตามจุดต่างๆของโครงสร้าง	หากพบเจอรื้อถอนออกทันที
7.2	ตรวจสอบรังนกหรือสิ่งมีชีวิต	หากพบเจอรื้อถอนออกทันที

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. **Expansion joint** S1 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. **Expansion joint** S2 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint S3 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint S4 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P01 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P05 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P09 	สถานะปกติ
	สถานะปกติ

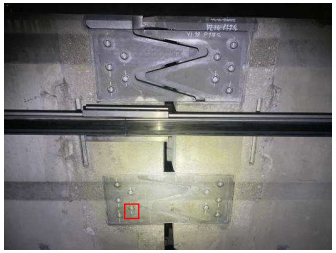
YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P13 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P17 	สถานะปกติ
	หัวน็อตเป็นสนิม

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P21 	สถานะปกติ
	สถานะปกติ

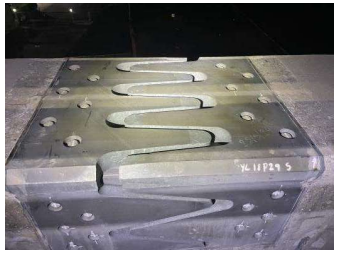
YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P25 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P29 	สถานะปกติ
	สถานะปกติ

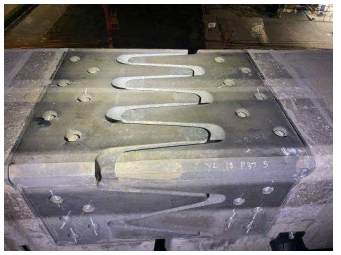
YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P33 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P37 	สถานะปกติ
	สถานะปกติ

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P41 	สถานะปกติ
	หัวน็อตเป็นสนิม

YL REPORT/PM Above

Maintenance Work: งาน Preventive Maintenance	Location: YL18-YL19
ผู้ตรวจสอบ : [redacted]	Date: 05/05/25
ผู้ควบคุม : [redacted]	Time :01.30-04.30

1. Expansion joint P45 	สถานะปกติ
	สถานะปกติ

ภาคผนวก ก-21

แผนการดูแลและบำรุงรักษาต้นไม้

ตารางงานประจำวันงานบำรุงและรักษาสวนศูนย์ซ่อมบำรุงฯสายสีเหลือง

เวลาปฏิบัติงาน	รายละเอียดการปฏิบัติงาน
07.30-07.40	รวมแถวเพื่อรับการตรวจความพร้อมในการทำงาน
07.40-09.00	รดน้ำต้นไม้บริเวณโดยรอบบริษัท
	เก็บกวาดใบไม้ และขยะ โดยรอบอาคาร OCC , MWS ถนน ลานจอดรถ
09.00-11.00	ตัดแต่งกิ่ง, ตัดหญ้าบริเวณทั่วไป
11.00-11.30	**พัก**
11.30-13.00	เก็บขยะบริเวณใต้อาคารซ่อมบำรุงหลัก , หน้าอาคารควบคุมการเดินรถ ไปถึง ด้านหน้าทางเข้า-ออกบริษัท
13.00-15.00	เช็ดกำจัดมูลนก กระจกด้านหน้า และหลังอาคารควบคุมการเดินรถ, เช็ดประตูม้วน
	เช็ดลิฟต์ภายใน และภายนอก บริเวณอาคารควบคุมการเดินรถ และ อาคารซ่อมบำรุงหลัก
15.00-16.00	ตัดเครือไม้, ตัดกิ่งไม้เลื้อย, ตัดหญ้า สังทางขึ้นอาคารซ่อมบำรุงหลัก และบริเวณโดยรอบนอกรั้วทางรถไฟ
16.00-16.30	**พัก**
16.30-17.30	รดน้ำบริเวณโดยรอบบริษัท
17.30-18.00	เก็บเช็ด-ล้างอุปกรณ์การทำงานให้ครบ

แผนการดูแลและบำรุงรักษาต้นไม้ประจำสัปดาห์

Item	TOR/Month	สถานที่	รายละเอียด		ประจำเดือน มกราคม 2568																											
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	Week	Depot YL	พรวนดิน และกำจัดวัชพืชที่เป็นอันตรายต่อต้นไม้	Plan																														
				Do	✓							✓							✓								✓						✓		
2			ตัดหญ้า และแต่งขอบแปลงให้สวยงามตามรูปทรง	Plan																														
				Do		✓							✓							✓								✓					✓		
3			ตัดแต่งรูปทรงไม้คลุมดิน และไม้พุ่ม	Plan																														
				Do							✓							✓							✓							✓			
4				Plan																														
				Do																														
5				Plan																														
				Do																														
ตรวจสอบโดย					[redacted]																												

แผนการดูแลและบำรุงรักษาต้นไม้ประจำสัปดาห์

Item	TOR/Month	สถานที่	รายละเอียด		ประจำเดือน กุมภาพันธ์ 2568																								
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1	Week	Depot YL	พรวนดิน และกำจัดวัชพืชที่เป็นอันตรายต่อต้นไม้	Plan																													
				Do				✓							✓							✓							✓				
2			ตัดหญ้า และแต่งขอบแปลงให้สวยงามตามรูปทรง	Plan																													
				Do					✓							✓							✓							✓				
3			ตัดแต่งรูปทรงไม้คลุมดิน และไม้พุ่ม	Plan																													
				Do						✓							✓							✓							✓			
4				Plan																													
				Do																													
5				Plan																													
				Do																													
ตรวจสอบโดย					[redacted]																												

แผนการดูแลและบำรุงรักษาต้นไม้ประจำสัปดาห์

Item	TOR/Month	สถานที่	รายละเอียด		ประจำเดือน มีนาคม 2568																												
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	Week	Depot YL	พรวนดิน และกำจัดวัชพืชที่เป็นอันตรายต่อต้นไม้	Plan																															
				Do				✓							✓							✓							✓						
2			ตัดหญ้า และแต่งขอบแปลงให้สวยงามตามรูปทรง	Plan																															
				Do					✓							✓							✓							✓					
3			ตัดแต่งรูปทรงไม้คลุมดิน และไม้พุ่ม	Plan																															
				Do																															
4				Plan																															
				Do																															
5				Plan																															
				Do																															
ตรวจสอบโดย					[redacted]																														

แผนการดูแลและบำรุงรักษาต้นไม้ประจำสัปดาห์

Item	TOR/Month	สถานที่	รายละเอียด		ประจำเดือน เมษายน 2568																										
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Week	Depot YL	พรวนดิน และกำจัดวัชพืชที่เป็นอันตรายต่อต้นไม้	Plan																														
				Do	✓							✓							✓							✓							✓	
2			ตัดหญ้า และแต่งขอบแปลงให้สวยงามตามรูปทรง	Plan																														
				Do		✓							✓							✓							✓							✓
3			ตัดแต่งรูปทรงไม้คลุมดิน และไม้พุ่ม	Plan																														
				Do			✓							✓							✓							✓						
4				Plan																														
				Do																														
5				Plan																														
				Do																														
ตรวจสอบโดย					[redacted]																													

แผนการดูแลและบำรุงรักษาต้นไม้ประจำสัปดาห์

Item	TOR/Month	สถานที่	รายละเอียด		ประจำเดือน พฤษภาคม 2568																													
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	Week	Depot YL	พรวนดิน และกำจัดวัชพืชที่เป็นอันตราย เหย่อต้นไม้	Plan																															
				Do						✓							✓							✓							✓				
2			ตัดหญ้า และแต่งขอบแปลงให้สวยงามตามรูปทรง	Plan																															
				Do							✓							✓							✓							✓			
3			ตัดแต่งรูปทรงไม้คลุมดิน และไม้พุ่ม	Plan																															
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4				Plan																															
				Do																															
5				Plan																															
				Do																															
ตรวจสอบโดย					[redacted]																														

8.รูปภาพการทำงานของคนสวน ขณะทำความสะอาด ตัดแต่งต้นไม้ รดน้ำต้นไม้







8.รูปภาพการทำงานของคนสวน ขณะทำความสะอาด ตัดแต่งต้นไม้ รดน้ำต้นไม้







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ด้วยรถไฟฟ้ามหานคร สายสีเหลือง

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Lat Phrao

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บางกะปิ
Bang Kapi

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แยกลำสาลี
Yaek Lam Sali

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หัวหมาก
Hua Mak

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การออกแบบและติดตั้งระบบไฟฟ้า

EASTERN BANGKOK MONORAIL
YELLOW LINE PROJECT
LAT PHRAO – SAMRONG SECTION

DEPOT AND WORKSHOP EQUIPMENT

EMC CERTIFICATION AND TEST REPORT – DEPOT AND WORKSHOP EQUIPMENT

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YELLOW LINE PROJECT
LAT PHRAO – SAMRONG SECTION

DEPOT AND WORKSHOP EQUIPMENT

EMC CERTIFICATION AND TEST REPORT – DEPOT INTERLOCKING SYSTEM

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YELLOW LINE PROJECT
LAT PHRAO – SAMRONG SECTION

DEPOT AND WORKSHOP EQUIPMENT

EMC CERTIFICATION AND TEST REPORT – VEHICLE EQUIPMENT MEASURING SYSTEM

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YELLOW LINE PROJECT
LAT PHRAO – SAMRONG SECTION

DEPOT AND WORKSHOP EQUIPMENT

EMC CERTIFICATION AND TEST REPORT – MAINTENANCE AND INSPECTION VEHICLE

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LAT PHRAO – SAMRONG SECTION

PLATFORM SCREEN DOOR SYSTEM

EMC CERTIFICATION AND TEST REPORT-PLATFORM SCREEN DOOR SYSTEM

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EASTERN BANGKOK MONORAIL YELLOW LINE PROJECT

LAT PHRAO – SAMRONG SECTION

POWER SUPPLY

EMC CERTIFICATION AND TEST REPORT – POWER SUPPLY SYSTEM

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BOMBARDIER

EASTERN BANGKOK MONORAIL

EASTERN BANGKOK MONORAIL YELLOW LINE PROJECT

LAT PHRAO – SAMRONG SECTION

POWER SUPPLY

EMC CONTROL PLAN

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LAT PHRAO – SAMRONG SECTION

POWER SUPPLY

EMC STUDY FOR FUNDAMENTAL FREQUENCY

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ROLLING STOCK

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LAT PHRAO – SAMRONG SECTION

SCADA SYSTEM

EMC CERTIFICATION AND TEST REPORT - SCADA

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LAT PHRAO – SAMRONG SECTION

SYSTEM INTEGRATION TEST PROCEDURE - EMC TEST

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LAT PHRAO – SAMRONG SECTION

ON-SITE EMC BACKGROUND MEASUREMENT REPORT

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YELLOW LINE PROJECT
LAT PHRAO – SAMRONG SECTION

SYSTEM INTEGRATION TEST REPORT – EMC TEST

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EASTERN BANGKOK MONORAIL YELLOW LINE PROJECT

LAT PHRAO – SAMRONG SECTION

FIXED COMMUNICATION SYSTEM

EMC CERTIFICATION AND TEST REPORT – FIXED COMMUNUNICATION SYSTEM

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EASTERN BANGKOK MONORAIL
YELLOW LINE PROJECT
LAT PHRAO – SAMRONG SECTION

TRACK SWITCH SYSTEM

EMC CERTIFICATION AND TEST REPORT – TRACK SWITCH SYSTEM

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ภาคผนวก ก-24

การตรวจสอบและบำรุงรักษาระบบระบายน้ำ

Work Instruction: Scheduled Maintenance Storm Water Pump
Doc. No.: WIYL-BES-M74000-CPZ-0003 Rev.00

ทบทวนเอกสาร (Document Review)		
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COO	Chief Operating Officer	N/A
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MDIPY	Maintenance Director (Pink and Yellow Line)	
SSDI	Safety and Security Director	
TTDP	Train Traffic Department (Pink Line)	
SSDP	Station Services Department (Pink Line)	
TTDY	Train Traffic Department (Yellow Line)	
SSDY	Station Services Department (Yellow Line)	
OSDPY	Operations Support Department (Pink and Yellow Line)	
IFDPY	Infrastructure Maintenance Department (Pink and Yellow Line)	
RSDPY	Rolling Stock and Workshop Maintenance Department (Pink and Yellow Line)	
SUDPY	System Utility Maintenance Department (Pink and Yellow Line)	
TCDPY	Train Control and Communication Maintenance Department (Pink and Yellow Line)	
MPDPY	Maintenance Planning and Logistics Department (Pink and Yellow Line)	
TNDPY	Training Department (Pink and Yellow Line)	
EMDPY	Electrical and Mechanical Maintenance Department (Pink and Yellow Line)	

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1. Scope

The purpose of this instruction is to describe E&M staff process to perform Scheduled Maintenance on Storm Water Pump and keep the performance for E&M maintenance to achieve required performance level.

2. Definition

EMD	=	Electrical and Mechanical Maintenance Department
M3	=	3 Monthly Inspection and Maintenance
Y1	=	1 Yearly Inspection and Maintenance
BES	=	Building Engineering Service

3. References and Forms

No.	Document No.	Description
1	FMYL-BES-M74000-VBZ-0003	Check sheet PM Storm Water Pump

4. Required Tools or Material

Tools or Material	Description	Tools or Material	Description
T1	Screwdriver set (ชุดไขควง)	M2	Cleaning cloth (ผ้าทำความสะอาด)
T2	Air blower (เครื่องเป่าลม)	M3	Lubricant oil (น้ำมันหล่อลื่น)
T3	Spanner set (ชุดประแจ)	S1	Insulation tester (เครื่องทดสอบความเป็นฉนวน)
M1	Wax, Silicone (แว็กซ์, ซิลิโคน)	S2	Low resistance ohmmeter (โอห์มมิเตอร์ความต้านทานต่ำ)

5. Precaution

5.1 Safety Precautions (คำชี้แจงด้านความปลอดภัย)

- **Correct use of tools and lifting and handling equipment.**
  ใช้เครื่องมือให้เหมาะสมกับลักษณะของงาน
- **Use of protective outfits (e.g. safety boots, safety glasses, protective overall).**
  ใช้อุปกรณ์ป้องกัน (เช่น รองเท้านิรภัย, แว่นตา ฯลฯ)
- **Observe all BTS Maintenance and Safety Procedures.**
  ปฏิบัติงานตามเอกสาร และคำนึงถึงความปลอดภัยในการทำงานอย่างเคร่งครัด

DANGER (อันตราย)



Electric Shock ไฟฟ้าช็อต

Danger of Life อันตรายต่อชีวิต

Disconnect the conductor rail, earth it and prevent its reconnection.
ตัดการเชื่อมต่อตัวนำไฟฟ้า ต่อลงกราวด์ และป้องกันการการกลับมาเชื่อมต่อทางไฟฟ้า

Turn off the main switch and avoid its reactivation.
ปิดสวิตช์หลัก และหลีกเลี่ยงการเปิด หากไม่จำเป็น

Let only the competent staff carry out the electric work.
พนักงานต้องมีความรู้ ประสบการณ์ด้านงานไฟฟ้า

Ensure the absence of power before starting work.
ตรวจสอบว่าไฟฟ้าถูกตัด และไม่มีไฟฟ้าเข้าสู่ปั้นจั่น

Do not spray water or use high-pressure in the proximity of electric subassemblies.
ห้ามฉีดน้ำ หรือใช้ลมที่มีแรงดันสูงบริเวณส่วนที่ส่วนประกอบวงจรไฟฟ้า

Uncontrolled motion of the unit. (การทำงานของส่วนที่เคลื่อนที่ได้ โดยไม่ได้ถูกควบคุม)

Danger of injury อันตรายต่อชีวิต

Turn off the main switch and prevent the reactivation.
ปิดสวิตช์หลัก และหลีกเลี่ยงการเปิดหากไม่จำเป็น

Ensure that the laws, regulations and directives applicable to the site of use are fulfilled.
ต้องแน่ใจว่า ปฏิบัติตามกฎหมาย ระเบียบข้อบังคับ และคำสั่งที่บังคับใช้กับสถานที่ใช้งาน

Ensure that the tasks are carried out with suitable tools only.
ต้องใช้เครื่องมือให้เหมาะสมกับการทำงาน

Ensure the use of adequate climbing aids and protective measures before working at height, to prevent a fall.
ต้องแน่ใจว่าได้ปฏิบัติคำแนะนำด้านความปลอดภัยของอุปกรณ์ที่นำมาใช้งาน

Ensure that the safety data sheets of the auxiliary and operating materials used are fulfilled.
ต้องแน่ใจว่าได้ปฏิบัติคำแนะนำด้านความปลอดภัยของอุปกรณ์ที่นำมาใช้งาน

Ensure the use of the personal protective equipment (helmet, non-skid safety shoes, safety goggles, ear protectors, gloves, etc.).
ต้องแน่ใจว่า ได้ใช้อุปกรณ์ป้องกันภัยส่วนบุคคล (หมวกเซฟตี้, รองเท้าเซฟตี้, แว่นตาเซฟตี้, อุปกรณ์ป้องกันเสียง, ถุงมือ และอุปกรณ์ด้านความปลอดภัยอื่นๆ ให้เหมาะสมกันลักษณะงาน)

Provide sufficient lighting.
ต้องมีแสงสว่างที่เพียงพอในการทำงาน

5.2 Environment Precautions (คำชี้แจงด้านสิ่งแวดล้อม)

- Gloves, Cleaning cloth dirtied with oil or grease from train washing plant Maintenance activity can be classified for disposal in hazardous bin.
ถุงมือ เศษผ้า ที่เปื้อนน้ำมัน หรือ จาระบี จากการซ่อมบำรุงเครื่องล้างรถไฟฟ้าให้ทำการคัดแยกจัดทิ้งใส่ลงถังขยะอันตราย

- Waste, e.g. Machine oil, Gear oil, Compressor oil, and grease, from train washing plant maintenance activity can be classified for
ของเสียประเภท น้ำมันเครื่อง น้ำมันเกียร์ น้ำมันคอมเพรสเซอร์ จาระบี จากการซ่อมบำรุง ให้ทำการคัดแยก และจัดเก็บเพื่อรอทิ้งที่ห้องจัดเก็บของสโตร์

6. Instructions

6.1 Storm Water Pump (M3, Y1)

Step	Description	Task M3	Task Y1	Tools or Material
1	Visual check Pump and piping for leaks. ตรวจสอบสภาพภายนอกทั่วไปของเครื่องสูบระบายน้ำและรอยรั่วซึมของน้ำ	•	•	
2	Check and Clean the external of motor. ตรวจสอบและทำความสะอาดภายนอกของเครื่องสูบระบายน้ำ	•	•	M1/M2
3	Check and record voltage, amperage per phase and kilowatts. ตรวจเช็คและบันทึกค่ากระแสไฟฟ้าที่จ่ายให้กับเครื่องสูบระ บายน้ำ	•	•	
4	Clean internal and external parts of control panel. ทำความสะอาดภายนอกและภายในของตู้คอนโทรล	-	•	M1/M2
5	Check and tighten electrical connections at the control panel. ตรวจสอบและกวดขันจุดต่อของสายทางไฟฟ้าและแผงควบคุมพร้อมทั้งทำความสะอาด	-	•	T1/T3
6	Insulation Resistance test between phase to ground of motor and record. ทดสอบค่าความเป็นฉน วนของมอเตอร์แต่ละเฟสเทียบกับกราวด์	-	•	S1
7	Visual check and measure ground connecting between control panel or equipment and structure earth. ตรวจสอบวัดค่าความต้านทานของการต่อสายดินระหว่างตู้ควบคุมหรืออุปกรณ์กับสายดินของโครงสร้าง	-	•	S2

Step	Description	Task M3	Task Y1	Tools or Material
8	Check and lubricate all moving part for acceptable condition. ตรวจสอบและทำการหล่อลื่นชิ้นส่วนที่มีการเคลื่อนที่ได้ ต้องอยู่ในสภาพสมบูรณ์	-	•	M3