MRT LINE 2 PROJECT
(SUNGAI BESI - SERDANG - PUTRAJAYA - SSP LINE)
– JKR TEAM EXPERIENCE

Prepared By :

JKR ICE Team

TABLE OF CONTENTS

HISTORY

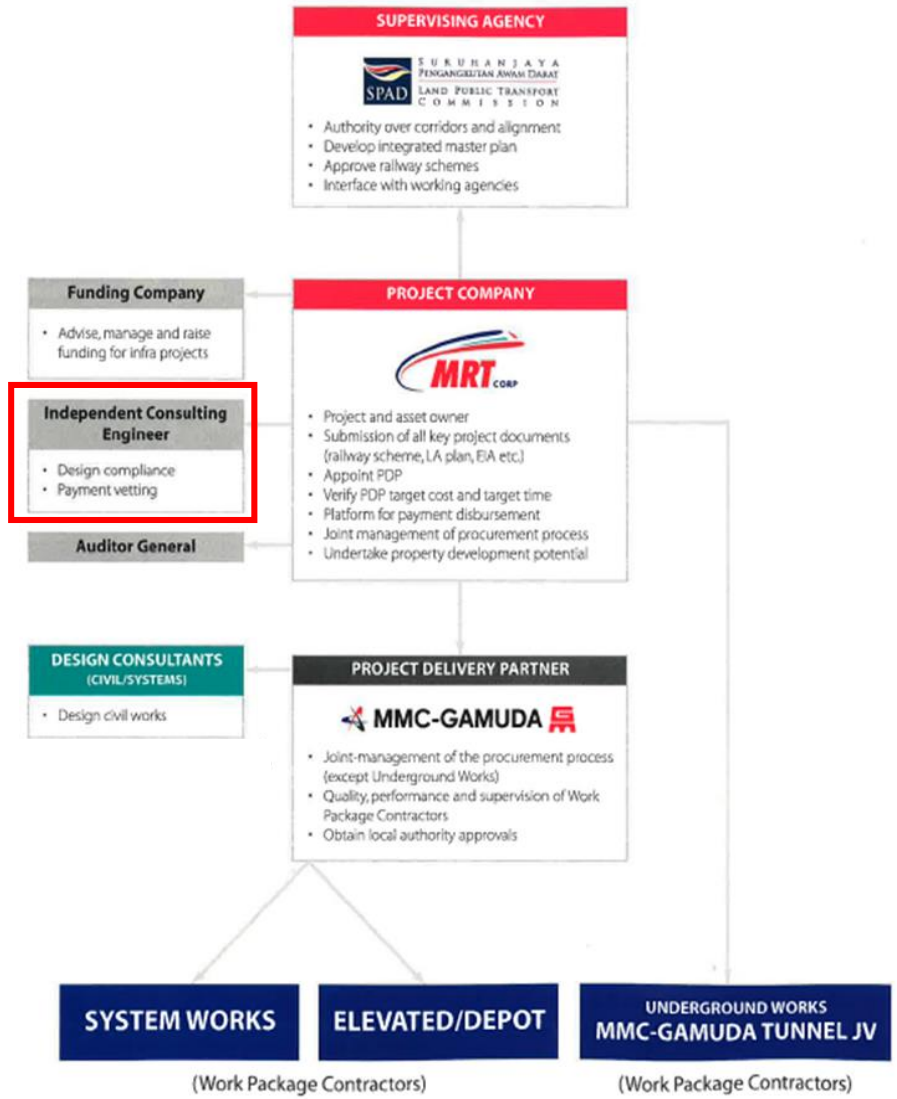
KVMRT EXCO Meeting

30 October 2014

- Chairman : KSN
- Attendees: Relevant heads of Ministries & Department (about 30pax)
- Issues discussed, among others:
  - MoF suggest JKR as ICE. JKR has necessary expertise in most of disciplines and will only engage consultant on highly specialized area
- Decisions made:
  - KPKR appointed as OSPC member for MRT Line 2
  - GoM will decide on the ICE appointment

"JKR guna kepakaran dalaman & dapatkan khidmat pakar bagi bidang kepakaran tinggi" – *YBhg KSP 30.10.2014*

Project structure



Project governance

ICE for the KVMRT SSP Line Project

HSSI has been appointed the **Independent Consultant Engineer** for the Klang Valley MRT Project.

- Oversee the implementation of the Railway Scheme for the Project – Not Project Manager!;
- Review and advise on Scope of Works, Designs and Delivery during implementation;
- Verify Work Package Contractors' progress payments;
- Overview and report on the Governance & Process for the Project;
- Member of Change Control and Project Risk Committees;
- Technical Requirements and Standards to international best practices;
- Audit Systems & Rolling Stock Designs to ensure compliance;
- Audit underground, viaduct and depot infrastructure works to ensure compliance;
- Ensure Systems Assurance, RAMS, Verification & Validation process, & Integration is compliant;
- Overview and report on the Testing & Commissioning;
- Audit that Safety & Test Cases are for compliance;
- Check to demonstrate Safety and readiness for Operations;

Scope of ICE Services – Design Stage

- Review technical specifications of systems and rolling stocks.
- Review technical specifications of main infrastructure works
- Review safety and compliance standards for systems and rolling stocks.
- Review the design briefs by PDP for system and infrastructure works.
- Review PDP's submission of the railway scheme and any submission as required.
- Review and issue a SONO for the Quality Assurance (QA) Plan proposed by the PDP.
- Review constructability of the works based on the design.
- Review functionality and practicality of the design from the operator's perspective.

Scope of ICE Services – Preconstruction & Tender Stage

- Review the Tender Document (CoC, Specifications, BoQ, tender drawings, etc) prepared by PDP for various Work Package Contracts (WPCs) to ascertain that they are suitable and generally compliance with Technical Standards & Specifications, Railway Scheme, Operational Objectives and in line with the procurement/contract strategies.
- Review the scope and responsibilities of system integration so that they are well defined and specified.
- Jointly review with MRTC/PDP the tender evaluation criteria.
- Review the project Risk Management Plan prepared by PDP
- Jointly review with MRTC/PDP, the tender returns for the underground works and identify the Best Evaluated Tender for the works

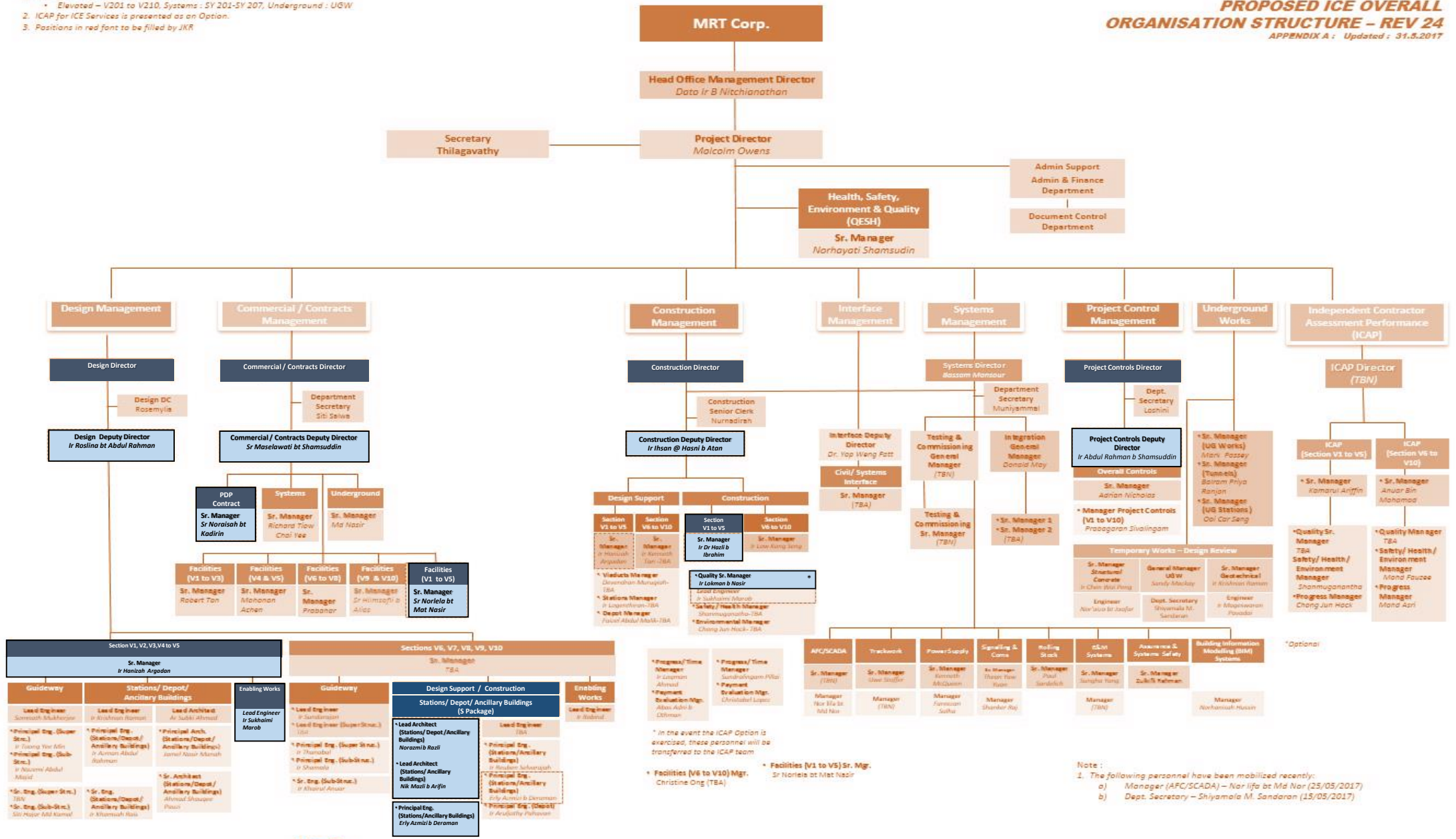
Scope of ICE Services – Construction Stage

- Verify progress payments requested and certified by the WPC's through the PDP
- Audit the viaduct and Depot infrastructure works against approved quality plans.
- Audit systems and rolling stocks for general compliances against approved quality plans.
- Review and issue SONO for the Factory Acceptance Test (FAT) / Site Acceptance Test (SAT) reports submitted by PDP.
- Monitor and audits system integration of Infrastructure/Facilities.
- Monitor and audit systems integration and testing and commissioning.
- Review plans so that individual subsystems test and integration test are included in the Testing and Commissioning (T&C) Plans.
- Check procedures to demonstrate the readiness of the completed MRT system for operation are in the System Operational Readiness Plan.
- Assist the operator to review and comment on Operational Plans and Procedures so that meet industry best practices.
- For underground works, the scope include verify progress payment certified by MMC-Gamuda through MRTC.

ICE ORGANISATION CHART

Note :
1. MRT Line 2 has been split into the following design packages:
   - Elevated – V201 to V210, Systems : SY 201-SY 207, Underground : UGW
2. ICAP for ICE Services is presented as an Option.
3. Positions in red font to be filled by JKR

MRT LINE 2
PROPOSED ICE OVERALL ORGANISATION STRUCTURE – REV 24
APPENDIX A : Updated : 31.5.2017



Note :
1. The following personnel have been mobilized recently:
   a) Manager (AFC/SCADA) – Nor lifa bt Md Nor (25/05/2017)
   b) Dept. Secretary – Shiyamala M. Sandaran (15/05/2017)

NOTE :
Placement of the JKR ICE Team is based on the Detailed Project Schedule and to be refined further.

Bilangan Pegawai JKR Dalam Pasukan ICE

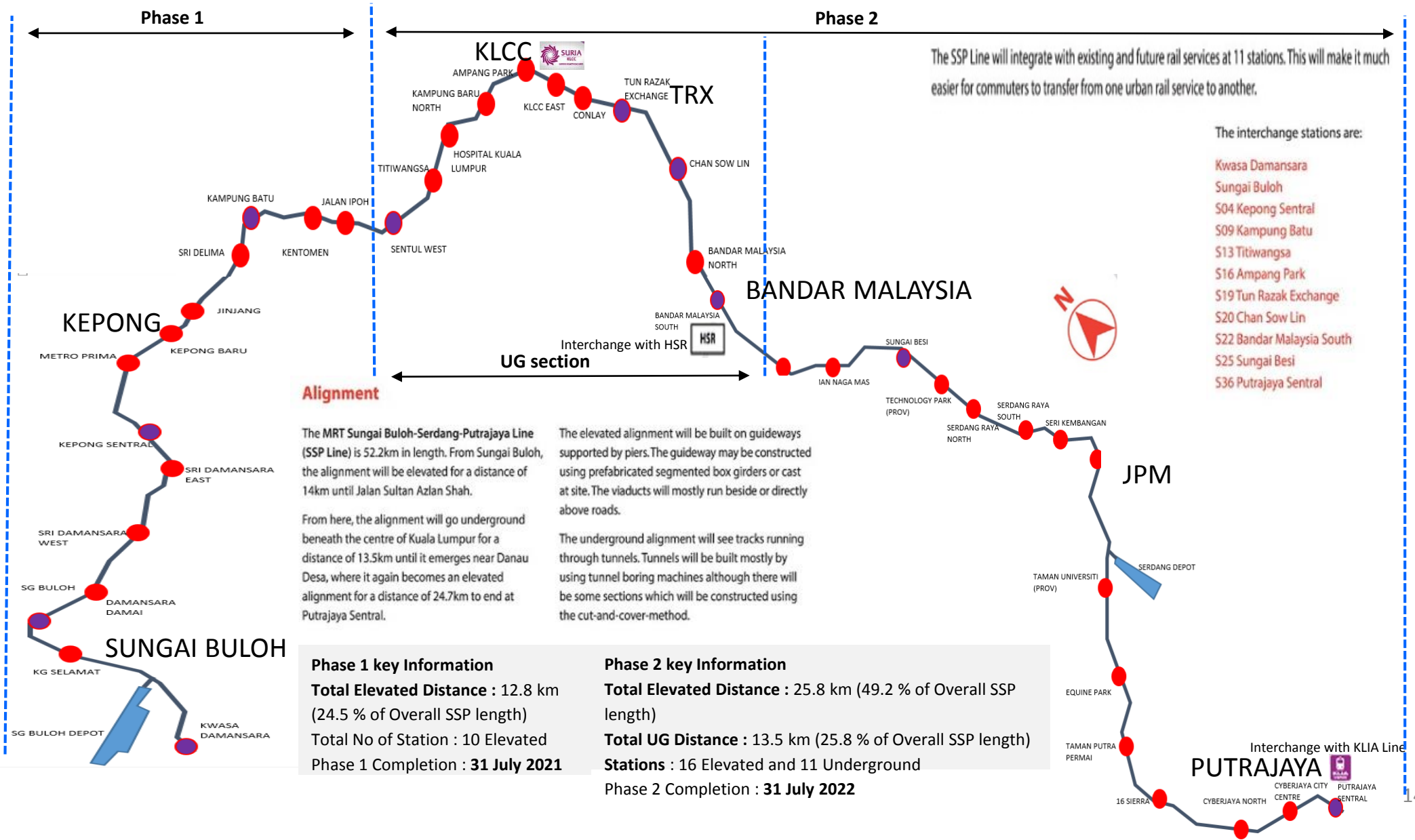
- 14 Pegawai JKR yang terlibat :-
- Jurutera Awam (7 orang)
- Jurutera Mekanikal (1 orang)
- Juruukur bahan (4 orang)
- Arkitek (2 orang)

Penempatan Pegawai JKR di HSS Integrated :

Design	- 6 Orang
Construction	- 3 orang
Contract And Commercial	- 4 orang
Project Control	- 1 orang

KVMRT LINE 2 PROJECT BACKGROUND

KVMRT – SG BULOH – SERDANG – PUTRAJAYA (SSP Line)



The SSP Line will integrate with existing and future rail services at 11 stations. This will make it much easier for commuters to transfer from one urban rail service to another.

The interchange stations are:

- Kwasa Damansara
- Sungai Buloh
- S04 Kepong Sentral
- S09 Kampung Batu
- S13 Titiwangsa
- S16 Ampang Park
- S19 Tun Razak Exchange
- S20 Chan Sow Lin
- S22 Bandar Malaysia South
- S25 Sungai Besi
- S36 Putrajaya Sentral

Alignment

The **MRT Sungai Buloh-Serdang-Putrajaya Line (SSP Line)** is 52.2km in length. From Sungai Buloh, the alignment will be elevated for a distance of 14km until Jalan Sultan Azlan Shah.

From here, the alignment will go underground beneath the centre of Kuala Lumpur for a distance of 13.5km until it emerges near Danau Desa, where it again becomes an elevated alignment for a distance of 24.7km to end at Putrajaya Sentral.

The elevated alignment will be built on guideways supported by piers. The guideway may be constructed using prefabricated segmented box girders or cast at site. The viaducts will mostly run beside or directly above roads.

The underground alignment will see tracks running through tunnels. Tunnels will be built mostly by using tunnel boring machines although there will be some sections which will be constructed using the cut-and-cover-method.

Phase 1 key Information

Total Elevated Distance : 12.8 km (24.5 % of Overall SSP length)

Total No of Station : 10 Elevated

Phase 1 Completion : **31 July 2021**

Phase 2 key Information

Total Elevated Distance : 25.8 km (49.2 % of Overall SSP length)

Total UG Distance : 13.5 km (25.8 % of Overall SSP length)

Stations : 16 Elevated and 11 Underground

Phase 2 Completion : **31 July 2022**

PROCUREMENT STRATEGY – KVMRT SSP LINE

SSP Line – 53km: - Underground, Viaduct, and System Works

1. Underground Works (Tunnels & Stations)

- 13.5km twin bore tunnel with 11 underground stations
- 1 Main Contractor (MGKT JV)
- MRTC act Project Managers and are also the Owner

2. Elevated Viaducts & Stations

- 6 Advance Works Packages (relocating/demolishing structures)
- 10 Civil Work Packages for Viaducts
- 2 Work Packages for Viaduct Segment manufacture
- 9 Station Work Packages (with nominated sub-contractors for M&E)
- 1 Depot Package (at Serdang)

Note: Project Delivery Partner (an EPC Contractor) coordinates & manages all work

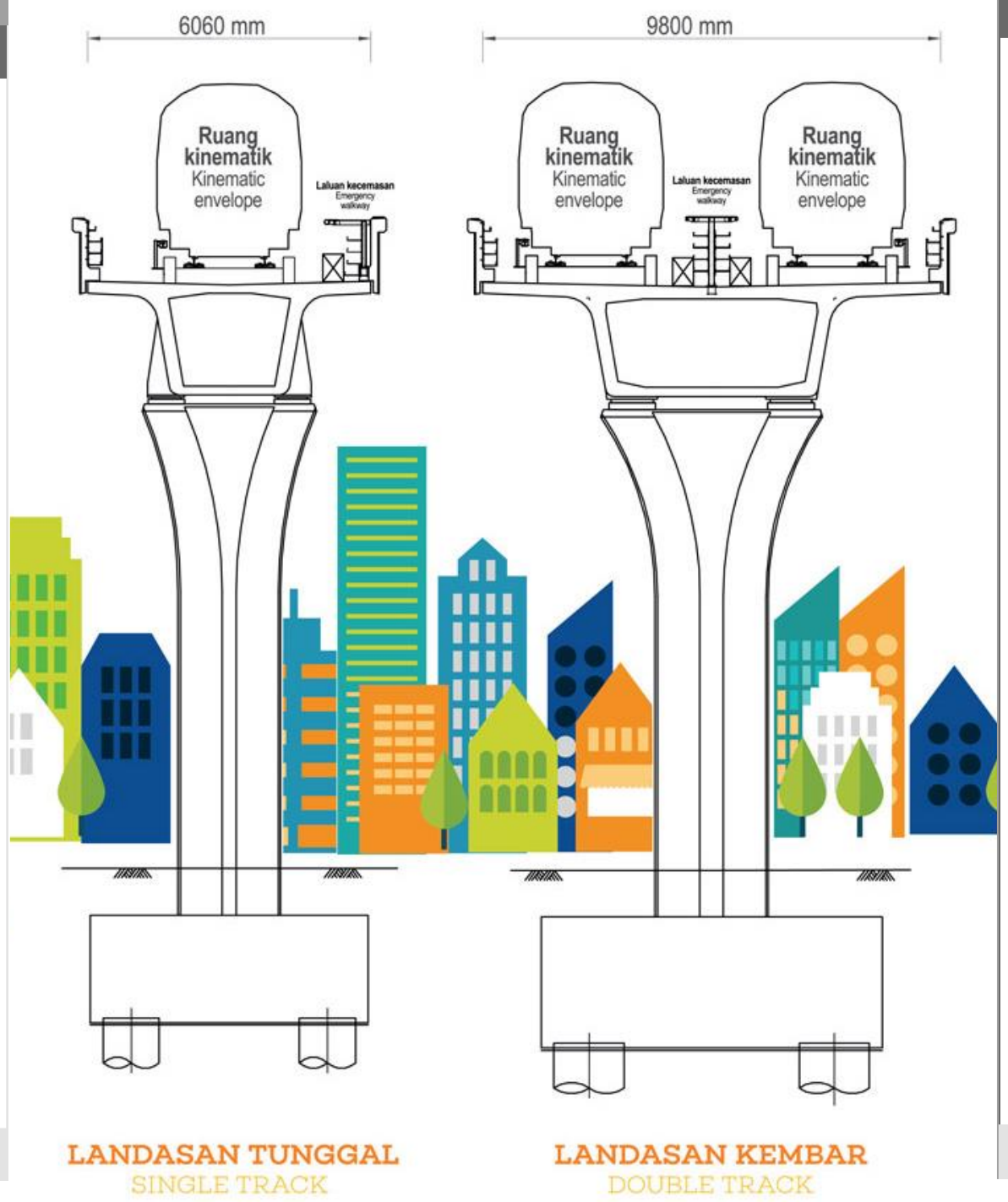
3. Railway Systems

- 7 Systems Packages

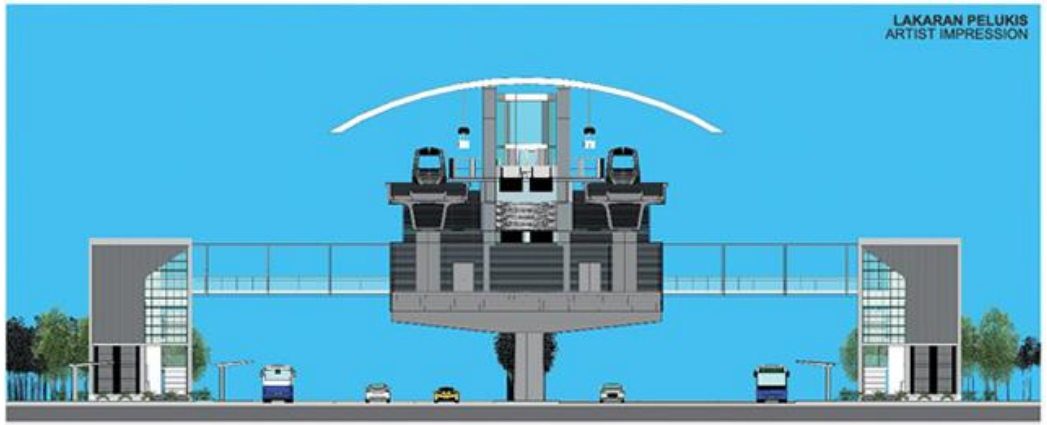
Note: Project Delivery Partner (an EPC Contractor) coordinates & manages all work

- **"EPC" means "Engineer/Procure/Construct Contractor**
  - takes responsibility for delivering the Project.
  - The name on this project is "***Project Delivery Partner"*** (PDP)
- MRTC is the **"Owner".**

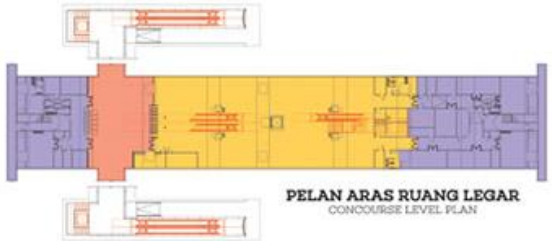
Enlarge

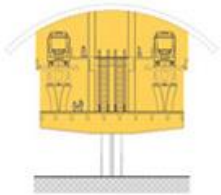


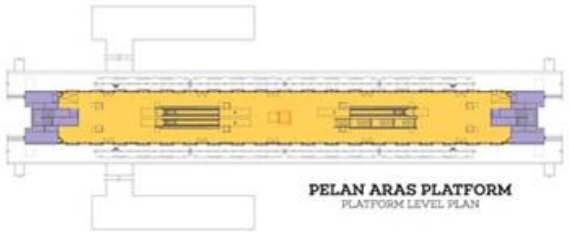
as whether it

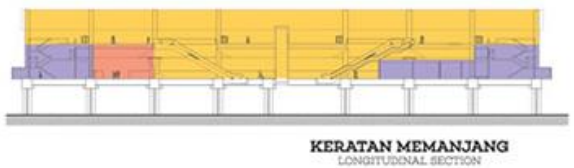


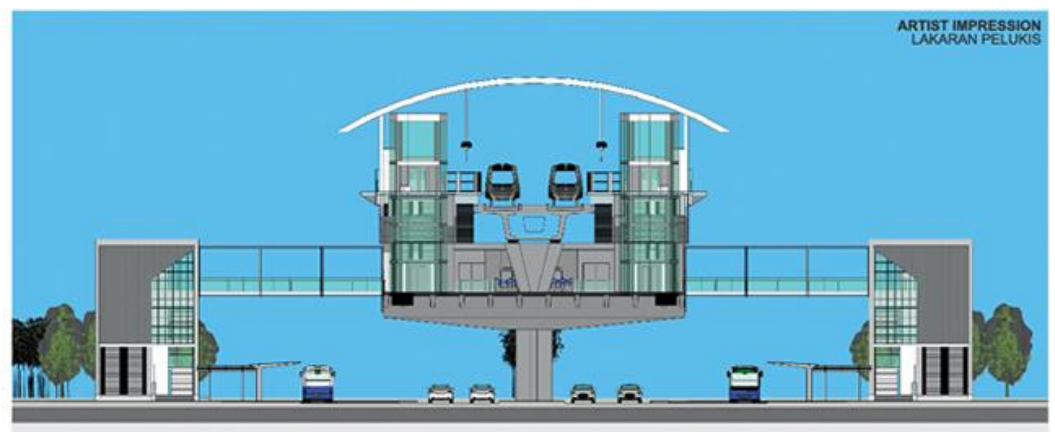
STESEN DENGAN PLATFORM TENGAH
ISLAND PLATFORM STATION



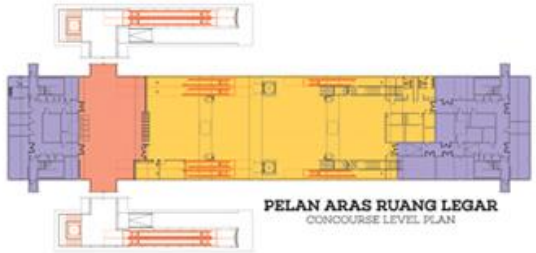


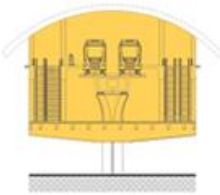


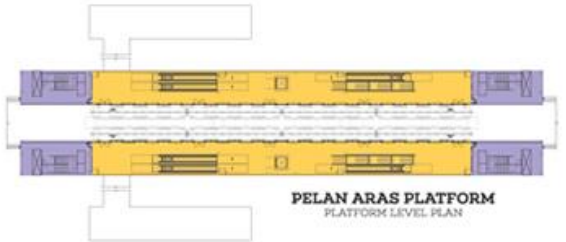


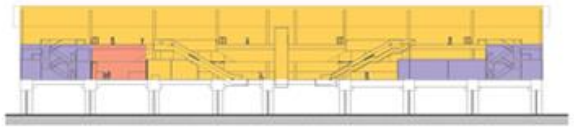


STESEN DENGAN PLATFORM SISI
SIDE PLATFORM STATION







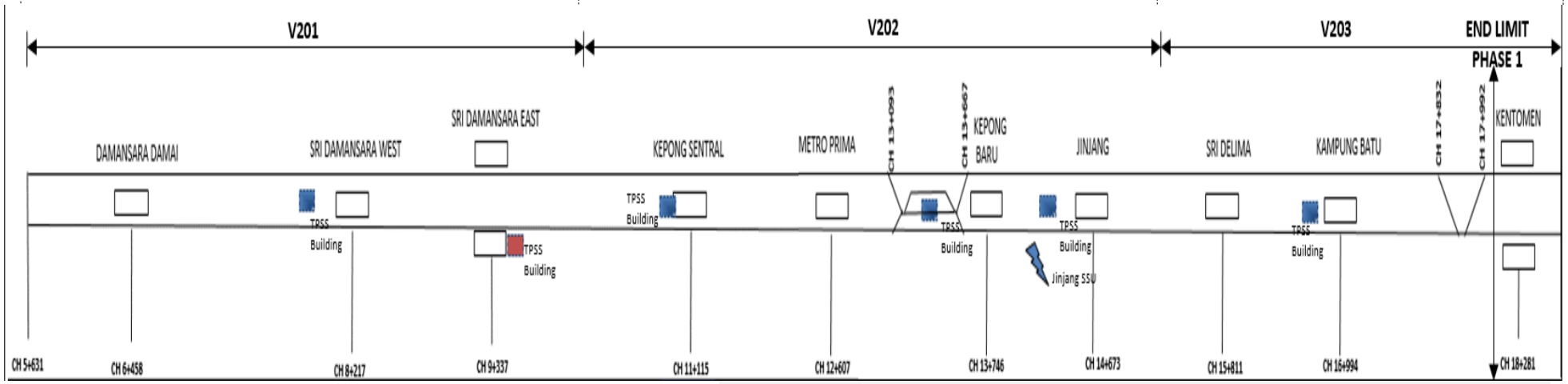


OVERVIEW OF SSP ALIGNMENT (Phase 1)

V201
Distance: 4.9 km
2 Island, 1 Side Platform Station

V202
Distance : 4.5 km
4 Island Station

V203
Distance: 3.4 km
2 Island, 1 side Station



Phase 1 key Information

Total Elevated Distance : 12.8 km (24.5 % of Overall SSP length)

Total No of Station : 10 Elevated

Phase 1 Completion : **31 July 2021**

Elevated V201 Package: Sunway Construction
Awarded: 31st March 2016
Length: 4.9km
No of Stations: 3

Elevated V202 Package: Ahmad Zaki
Awarded: 4th April 2016
Length: 4.5km
No of Station: 4

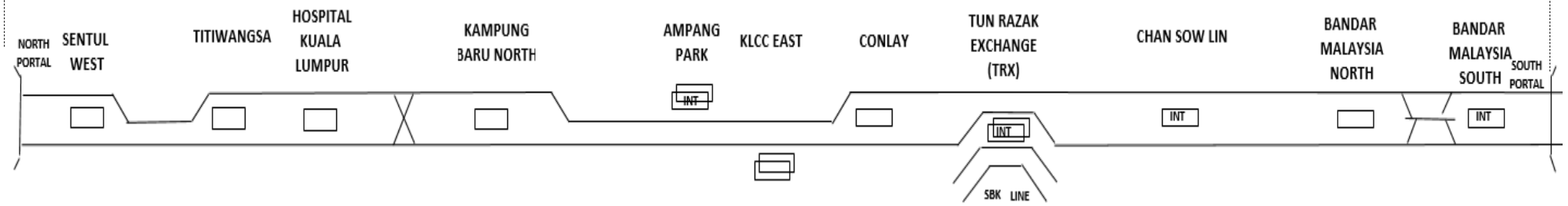
Elevated V203 Package: IJM
Awarded: 19th May 2016
Length: 3.4 km (Elevated)
1.38 km (Cut &Cover)
No of Stations: 3

OVERVIEW OF SSP ALIGNMENT (Phase 2 – Underground Work Package)

Underground Work – UGW Package: MGKT
Awarded: 31st March 2016
Length: 13.5 km
No of Station: 11

Phase 2 key Information
Total Elevated Distance : 25.8 km (49.2 % of Overall SSP length)
Total UG Distance : 13.5 km (25.8 % of Overall SSP length)
Stations : 16 Elevated and 11 Underground

UG Works
Distance 13.5 km
9 Island, 2 Stacked & 1 Double Stacked Station

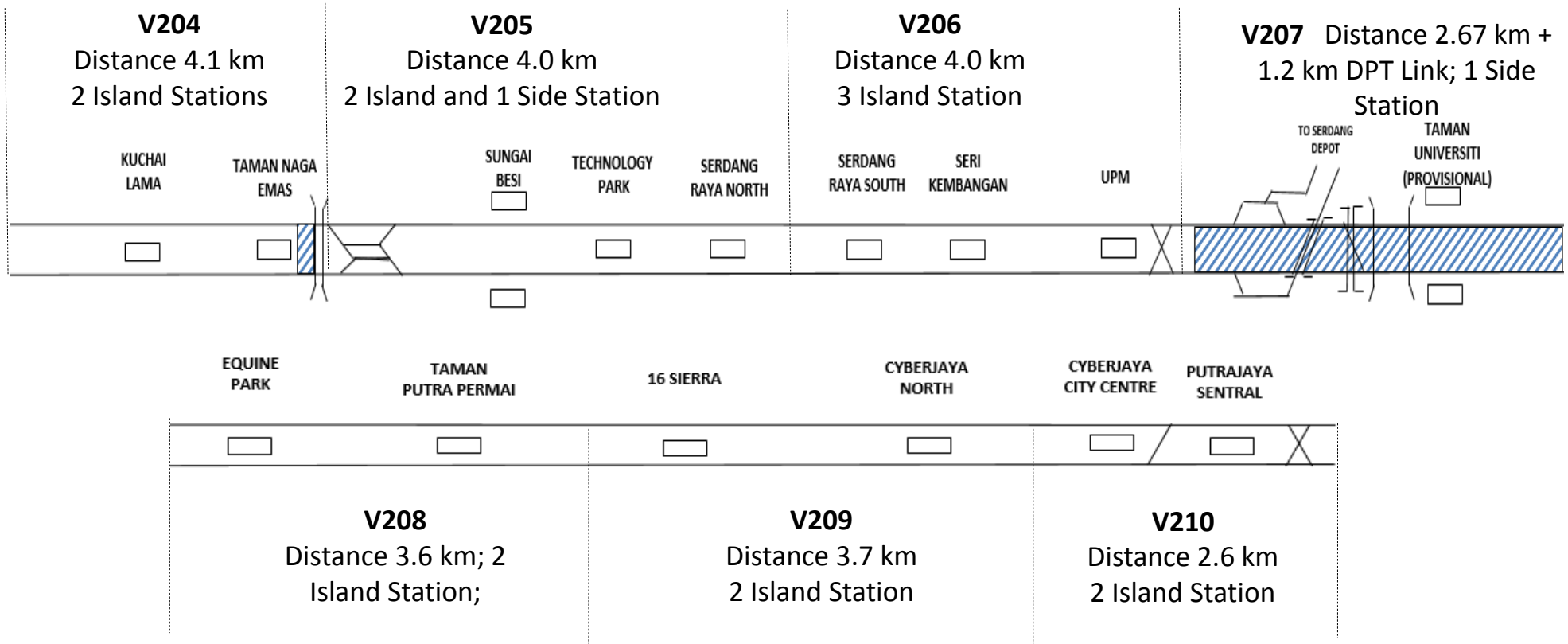


OVERVIEW OF SSP ALIGNMENT (Phase 2 – V204, V205,V206, V207, V208, V209 and V210)

Whole of the Works

Elevated Length : 38.7 km
Underground Length : 13.5 km

Elevated Stations : 28
Underground Stations 11
Project Completion : 31 July 2022



Elevated V204 Package: WCT Berhad
Awarded: 14th November 2016
Length: 4.1km
No of Stations: 2

Elevated V208 Package: MTD Construction
Awarded: 17th November 2016
Length: 3.6 km
No of Station: 2

Elevated V210 Package : MRCB
Awarded : 19th May 2016
Length : 2.6 km
No of Stations : 2

Elevated Stations Design

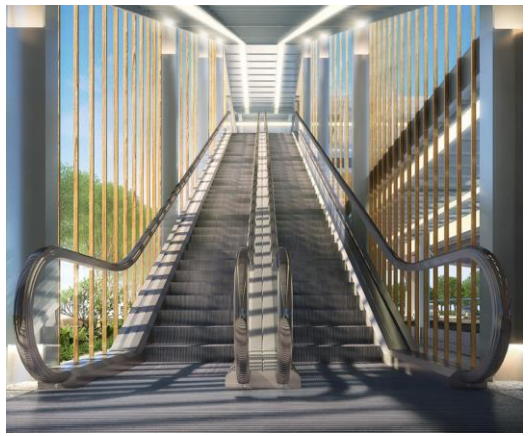
The proposed design for Sungai Buloh-Serdang-Putrajaya (SSP) Line elevated stations is based on the "Serambi" concept.

This concept is focused on inspiring interaction/ communication at a foyer/ entrance space of a house, hall,.i.e. entrance space at a "rumah kampung" or "rumah panjang".

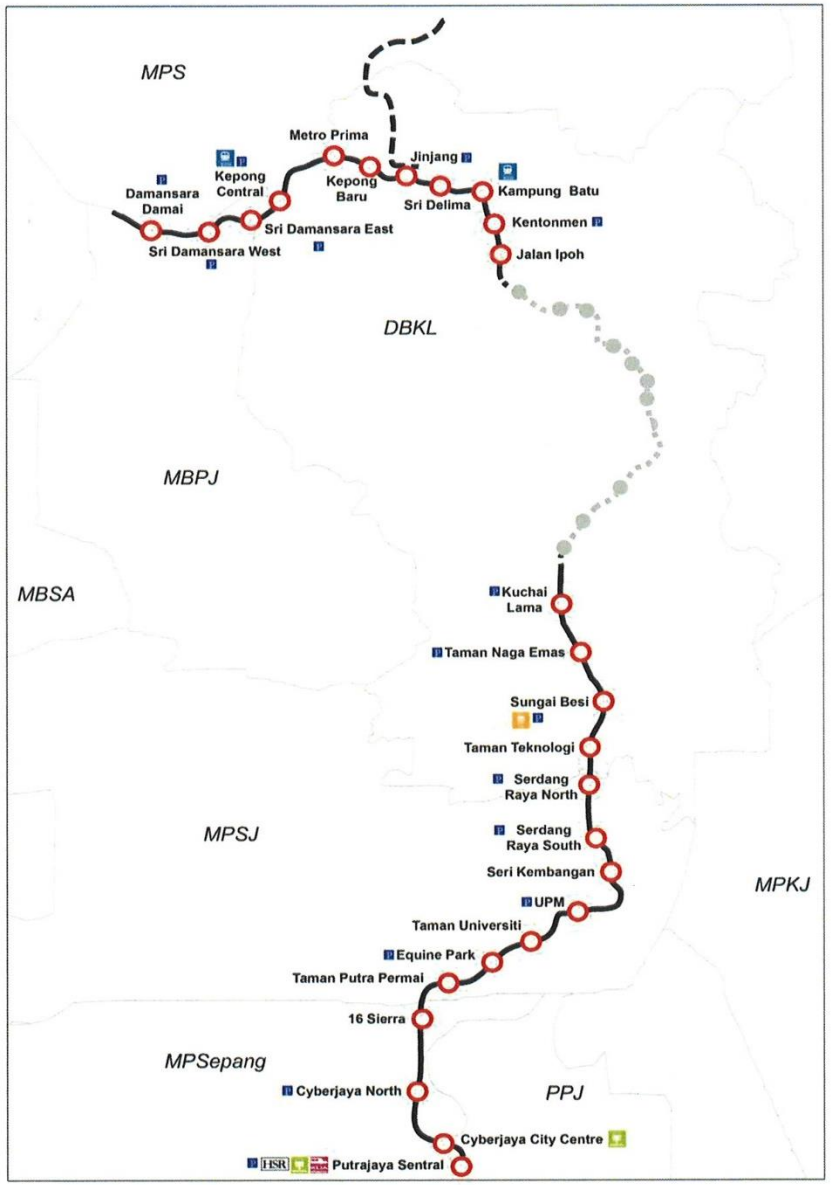
The design opted is a simple. timeless design: which is derived from various design concepts, including that of the Japanese "Zen" concept.

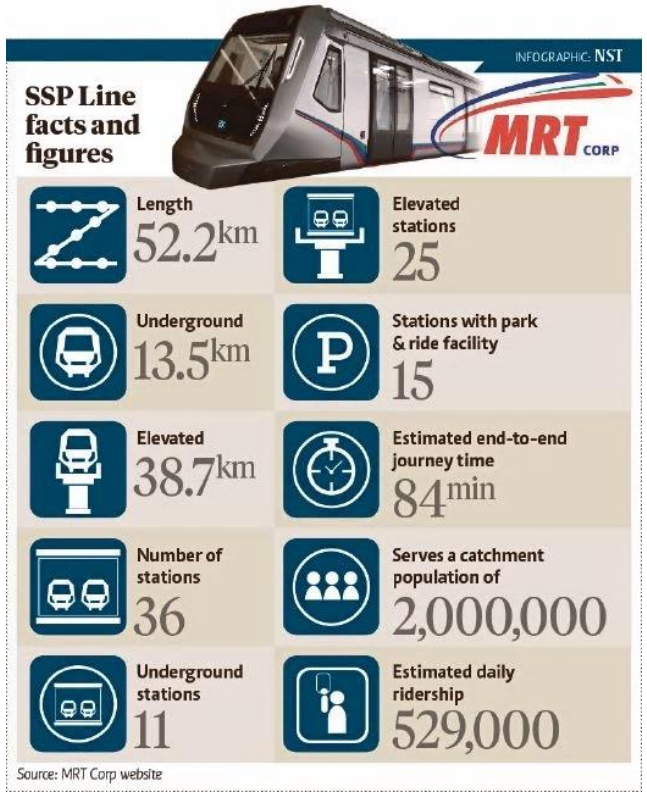
Other aspects include open space, natural lighting & ventilation, and natural visual effects via play of lighting & shadows.

Compared to the Sungai Buloh-Kajang (SBK) Line elevated station design, the columns have been pushed to the sides of the station, giving the station an open and airy feel.



1204 PASSENGERS PER TRAIN OR 301 PASSENGERS PER CAR (4 CARS EACH TRAIN)





All station types have the following typical features:

- Nominal platform length = **90m**
- Nominal overall station length = **120m**
- Island Platform width = **12m**
- Side Platform width = **8m** for each platform
- Interchange platform width = **15m** depending on the patronage data
- Regular **15m** structural grid with **30m** for viaduct standard span

Station M&E Services

Mechanical & Electrical Services

For elevated stations and underground stations , the mechanical and electrical services are Nominated Sub-Contractors to the Civil Contractor. Works include:

- Environmental Control System (ECS)
- Building Management Systems (BMS)
- Fire Protection Systems
- Cold water plumbing
- Sanitary plumbing
- Electrical and lighting systems,
- Surge protection systems
- Telephone systems
- Rain water harvesting systems
- Earthing systems
- Lightning protection systems,
- Electronic Access Control (EAC)
- Car Park Management
- Vertical Transportation Systems
- Tunnel Ventilation Systems
- Track-way Ventilation Systems
- Landing valves (fire hose connections)
- Linear Heat detection systems
- Tunnel Lighting and Auxiliary Electrical Services

Railway Systems Packages

Code	Contract Title	Work Package Contractor	Value (RM)
SY201	Signalling & Train Control, Platform Screen Doors & Auto Platform Gates	Bombardier-Global Rail Consortium	458M
SY202	Integrated Control Supervisory System & Computerised Maintenance Management System	Najcom-EVD JV	78M
SY203	Electric Trains & Depot Equipment	HAP Consortium (Hyundai Rotem)	1,621M
SY204	Trackworks, Maintenance Vehicles & Works Trains	CCCC-George Kent JV	1,007M
SY205	Power Supply & Distribution System	Colas Rail Consortium	693M
SY206	Communications, Govt Integrated Radio System, Telecom, Information Technology System	Sapura EVD Consortium	632M
SY207	Automatic Fare Collection System	Indra Sistemas & Rasma Consortium	152M
		Total for Rail Systems	**4,641M**

Railway Systems Packages

Electric Train

4-car Electric Trains will operate on the SSP Line. The trains will draw power from a 750 V DC third rail power supply system via bogie mounted current collectors.

Passenger Carrying Capacities

Maximum carrying capacity of each train is 1,000 passengers with 45 seated and 204 standing in each car. For those standing the density is 4.8 persons/m2 including space for wheel-chair passengers.

Railway Systems Packages

Trackwork

All track is Standard Gauge at 1435mm with UIC 60kg/m rail.

All Viaduct and Underground trackwork is slab track made up of concrete sleepers cast into concrete, making a uniform track with the viaduct/tunnel.

The third rail for traction power is an integral part of the trackwork.

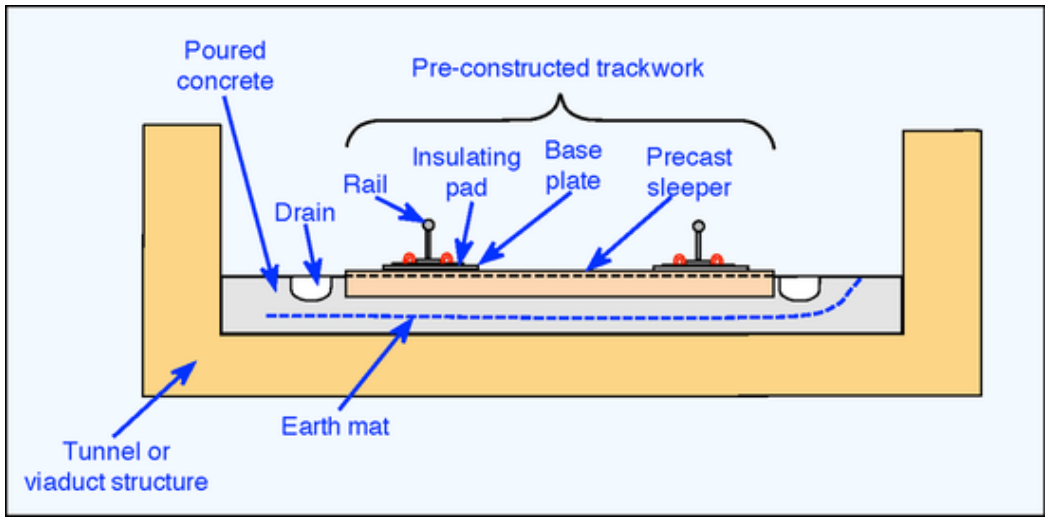
Expansion joints on the viaduct are included on long spans.

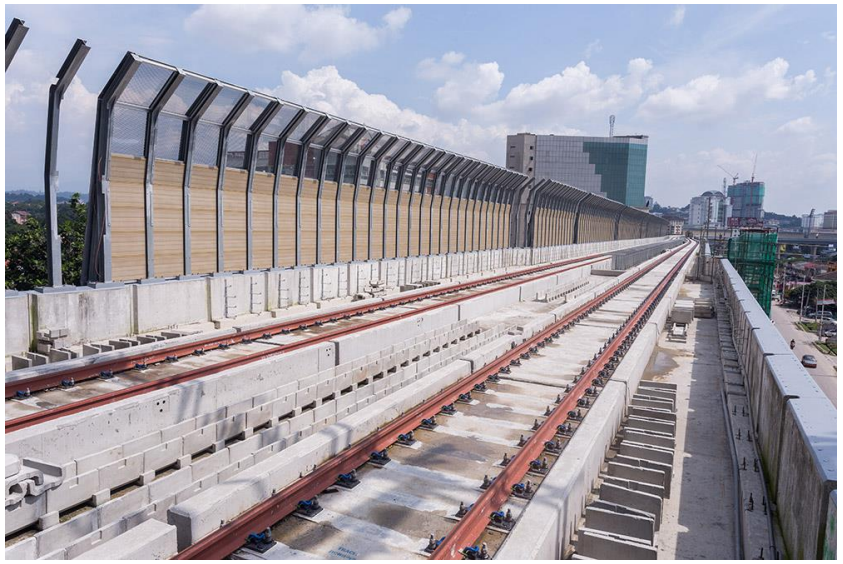
Depot Trackwork

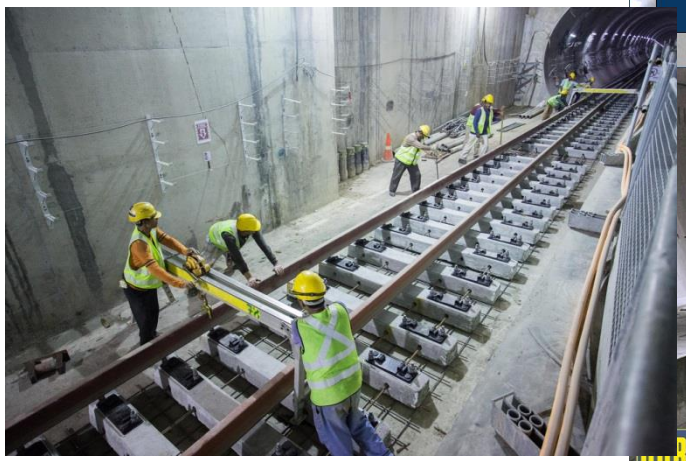
Tracks in the depot and stabling sidings are all ballasted track with concrete sleepers.

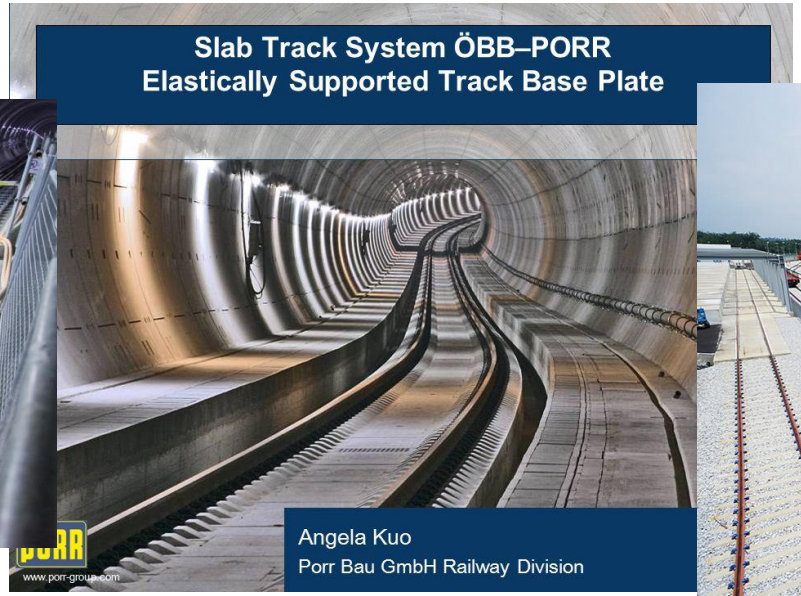
Maintenance Vehicles

Rail reshaping (grinding and milling) machine. Track tamping machine. Track mounted crane vehicle. Various vehicles for maintenance crew and specialist maintenance equipment.


Poured concrete
Pre-constructed trackwork
Insulating pad
Base plate
Precast sleeper
Rail
Drain
Earth mat
Tunnel or viaduct structure






Slab Track System ÖBB–PORR
Elastically Supported Track Base Plate
Angela Kuo
Porr Bau GmbH Railway Division

Railway Systems Packages

Signalling and Train Control

The key function of the Signalling and Train Control (S&TC) System is to control the train operation automatically, both on mainline and within depots (except maintenance areas) during normal operation in a safe and efficient manner. It is a **Communication Based Train Control** (CBTC) system.

The CBTC System will consist of an Automatic Train Control (ATC) System allowing full bi-directional automatic control of trains over each track throughout the System from the **Operations Control Centre** (OCC) located at Sg. Buloh Depot.

Depot operation will also be fully automated under OCC monitoring and control, while the depot maintenance area will be manually control under the supervision of the Depot Control Centre (DCC).


Where to dine


1511

Railway General Specifications

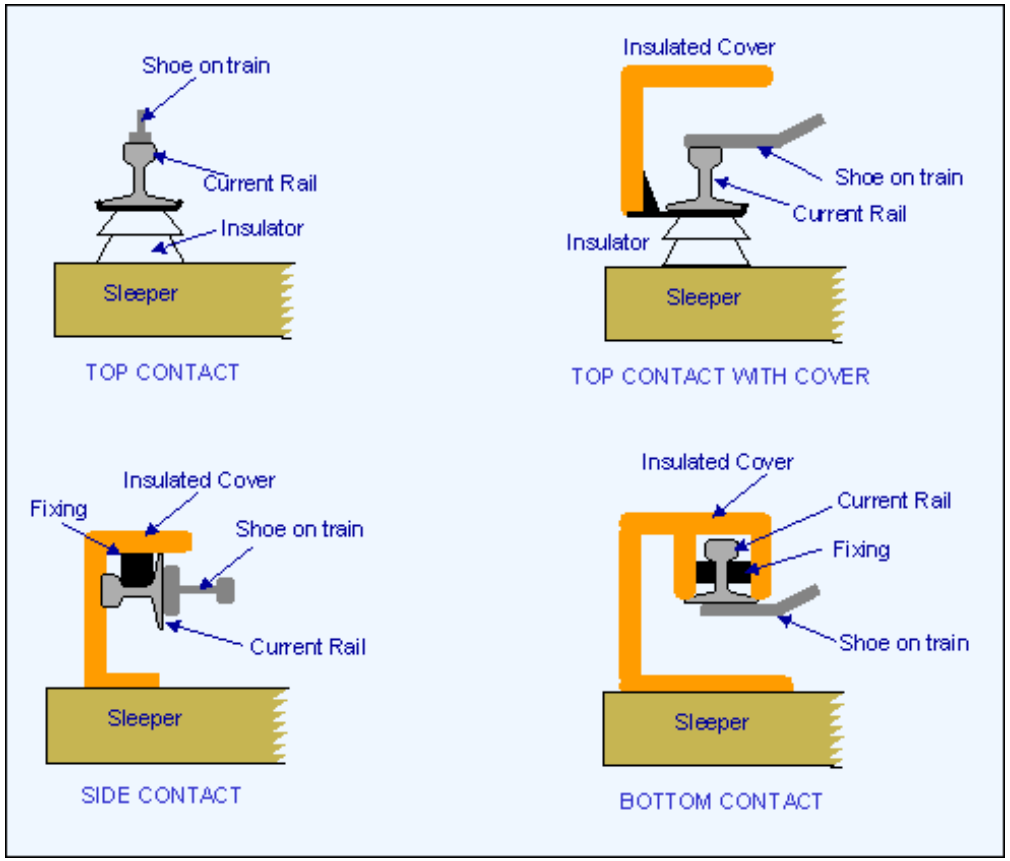
Power Supply and Distribution

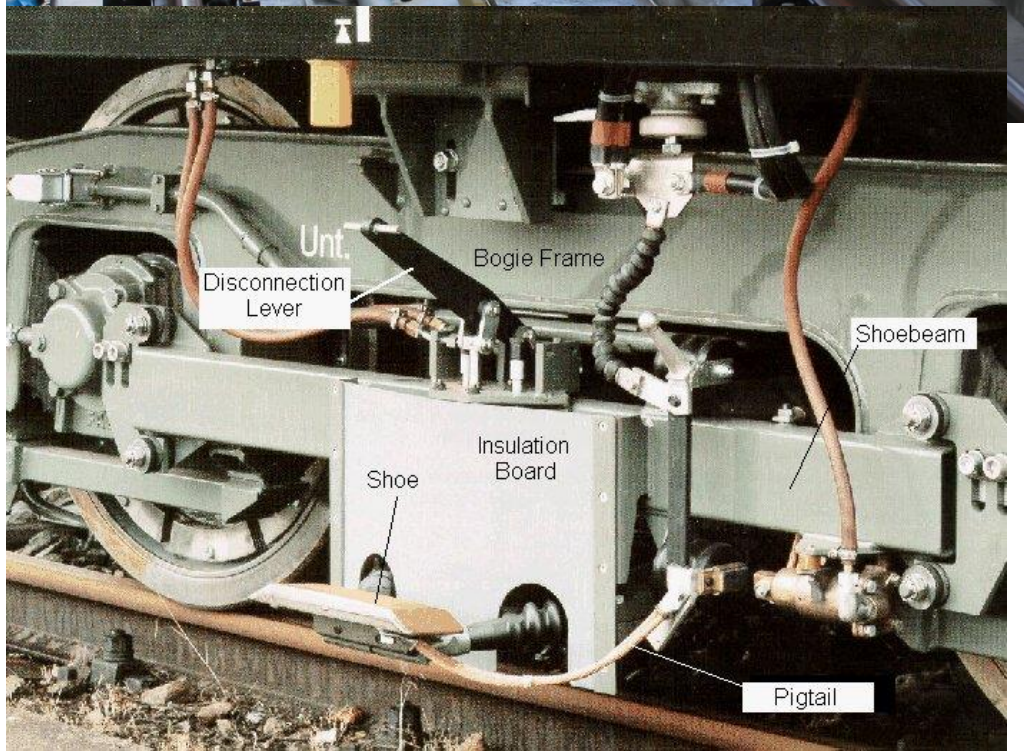
Traction Power Supply for the line will be fed from the Tenaga Nasional Berhad (TNB) at Bulk Supply Substations (BSS) at 132kV.

The High Voltage (HV) AC power supply will be converted to 33kV and connected to all of the Traction Power Sub- Stations (TPSS) and Station Power Sub-Station (SPSS) via an internal distribution 33kV network.

The Power Supply and Distribution System comprises the following:

- An Alternating Current (AC) power supply and distribution system;
- A Direct Current (DC) power supply and distribution system for traction power.


Shoe on train
Current Rail
Insulator
Sleeper
TOP CONTACT
Insulated Cover
Shoe on train
Current Rail
Insulator
Sleeper
TOP CONTACT WITH COVER
Insulated Cover
Fixing
Shoe on train
Current Rail
Sleeper
SIDE CONTACT
Insulated Cover
Current Rail
Fixing
Shoe on train
Sleeper
BOTTOM CONTACT


Disconnection Lever
Bogie Frame
Shoebeam
Insulation Board
Shoe
Pigtail

Railway General Specifications

Communications System

The Communications System will support wireless voice and data communications for railway operations and maintenance staff and BOMBA for the safe operations of the railway. In the underground stations and tunnels, the RF distribution system will comprise of leaky cables, indoor and outdoor antennas and associated RF devices and amplifiers.

The RF signals of the Communications System and BOMBA radio system (GIRN) will be distributed through a common or separate RF distribution system.

The Communications System allows PA announcements to trains from the OCC via the Radio Dispatcher or PA workstation. Communications system includes:

- Backbone Transmission Network (BTN)
- Master Clock system
- Telephone system
- Radio system
- Passenger Information Display system (PIDS)
- Closed Circuit Television (CCTV) system
- Data Communication System.
- Multiplexer
- Public Address (PA) system

UNDERGROUND WORKS

Underground Works awarded to MMC-Gamuda JV (MGKT JV) for RM15,470M

- 13.5 km in length with 11 Underground Stations
- Interchange station with SBK line at Tun Razak Exchange
- North Portal at Jalan Ipoh in vicinity of Kompleks Mutiara and South Portal at Desa Water Park
- Interface sttions with proposed MRT Line 3 and High Speed Rail (HSR) at Bandar Malaysia
- 3 Escape Shafts and 3 combined Intervention and Ventilation Shafts
- All tunnels to be bored utilizing Herrenknecht supplied Variable Density (VD) and Earth Pressure Balance (EPB) Tunnel Boring Machines (TBM's)
- 12 TBM's in total
  - 6 refurbished Variable Density (VD) machines from Line 1
  - 2 refurbished EPB machines from Line 1
  - 4 New VD machines

UNDERGROUND STATIONS

The KVMRT2 UG stations are as follows:

1) S12 – Sentul West (SW) - Top Down Construction

2) S13 – Titiwangsa (TWG) - Bottom Up Construction

3) S14 – Hospital Kuala Lumpur (HKL) - Top Down Construction

4) S15 – Kampung Baru North (K Baru) - Top Down Construction

5) S16 – Ampang Park (AP) - Top Down Construction

6) S17 – KLCC East (KLCC) - Top Down Construction

7) S18 – Conlay (Conlay) - Bottom Up Construction

8) S19 – Tun Razak Exchange (TRX) - Top Down Construction

9) S20 – Chan Sow Lin (CSL) - Bottom Up Construction

10) S21 – Bandar Malaysia North (BMN) - Bottom Up Construction

11) S22 – Bandar Malaysia South (BMS) - Bottom Up Construction

QUALITY, ENVIRONMENTAL AND SAFETY & HEALTH (QESH) POLICY

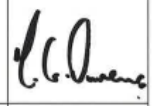
Document Title

GENERAL PROCEDURE FOR ICE INFRASTRUCTURE DESIGN REVIEW

INDEPENDENT CONSULTANT ENGINEER FOR MASS RAPID TRANSIT LINE 2 PROJECT: SUNGAI BULOH – SERDANG – PUTRAJAYA (SSP)

Document Reference No:
HSS-GP(MRTL2)-460

Revision:
00
Effective Date:
OCTOBER 2017

Prepared	Checked	Reviewed	Approved
			
Norazmi Haji Razli	**Roslina Abdul Rahman**	**Chen Wai Peng**	**Malcolm Owen**
Lead Architect, Design Department	Deputy Design Director	Design Director	Project Director

2.0 IMPLEMENTATION

3.1 Document Review Process

3.1.1 Step 1 - Distribution of Document from Department Gatekeeper (DG)

Refer to Document Control Procedure Incoming

1. The DG shall distribute to a designated coordinator and copy to the DD /DDD. The coordinator shall distribute to the relevant reviewer for the document review.

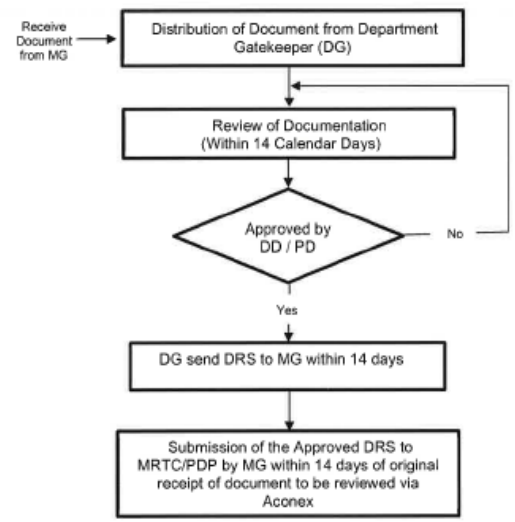
3.1.2 Step 2 - Review of Documentation

1. Upon receiving the document for review, the reviewer should review the received document within 14 Calendar Days.
2. All comments must be placed in the Design/Document Review Sheet (DRS) template. (See Attachment A)
3. All comments must assign a review Code and Status, as details below:
   i. Code 1 - Accepted: (No objection to the submittals. Status is closed.)
   ii. Code 2 - Accepted with Comment
   iii. Code 3 - Rejected: (Non-compliant and does not satisfy the Project requirements. Status is rejected.)
4. It is to be noted that there is no second review for ICE after Code 2 is submitted and the onus is for PDP to load up respond including any sketch, drawing or clarification where applicable to Aconex.
5. Once the comments are consolidated in the DRS by the responsible reviewer, the DRS should be submitted to Design Director (DD) and / or Project Director (PD) via email for approval.

3.1.3 Step 3 – Submission of the Approved DRS

1. The DRS shall be sent out to MRT/PDP via Aconex by the MG.

3.1.4 The Work Flow of the Document Review Process (as below)



JKR ICE OBSERVATIONS

PLANNING & DESIGN

1. All works are based Railway Scheme, Employer's Requirement, Design Criteria and Specifications.
2. For elevated lines, PDP is responsible to manage the whole process. Underground portion is Design & Build by MGKT JV and managed by MRT.
3. PDP appointed 4 Line Wide Design Consultants (LDC) to provide overall concept of design for guideway design, stations typology, system reference design and noise & vibration design.
4. Detail design are done by Detailed Design Consultant (DDC) who contextualized and customized design concept to suit each package.
5. All designs are to comply with Employer's Requirement, Design Criteria and other Authorities' requirement. Compliancy are monitored and controlled through the use of software **ComplyPro**.
6. **Timeline** and milestones for design activities are set in **DPS** (at program level) and three-months plan.

PLANNING & DESIGN

7. Quality of design both line wide and package are monitored and controlled by Gate Procedure as follows:-

    i. Gate 1 for preliminary design to gauge readiness for detail design;
    ii. Gate 2 for tender drawings to assess readiness for tender;
    iii. Gate 3 for approval of construction drawings to assess readiness for construction

8. Prior to each gate the design must go through 4 main meetings, namely Design Briefing (DB), Constructability Review (CR), Interface Design Review (IDR) and Single Design Review (SDR) to ensure readiness and acceptance of design.

PLANNING & DESIGN

9. At each gate meeting the following criteria must be complied and accepted for the gate to be considered passed

   i. Meeting Requirement
   ii. Design for Safety
   iii. Management of Risk
   iv. Interface Requirement Verified
   v. Constructability
   vi. Affordability
   vii. Quality

10. Gate Committee members are from PDP, MRT and ICE and based on evidence presented during gate meeting committee will decide whether the package has passed or fail the gate. Design can progress to the next stage if the gate is passed.

PLANNING & DESIGN

Tools :

DPS (Detail Project Schedule)- used as a basis to plan design program

i) **Gate Procedure –** control check points for readiness of each design stage
ii) **BIM** – used to facilitate interfacing and integration of civil works and systems and also to detect and resolve clashing
iii) **ComplyPro –**a software that captures all project requirements as a database and its compliance. Used at gate meeting as an evidence to support that a package has met all the requirements
iv) **Aconex-** communication software to manage and control documents flow
v) **KPI –** setting of performance standards for response. E.g for ICE all documents are to be reviewed within 14 calendar days.

PROCUREMENT

1. MRTC given the mandate to set the SOP for approving VOs. Regardless of the value, VOs need not be referred to MoF. In other words the control is within the organisation.
2. Payment for off-site materials facilitates the cash-flow of precast components suppliers, especially when it involves significant value e.g: Supply contract of Segmental Box Girders (SBG).
3. Multiple supply contract between Main Contractor and Supplier for supply of major components. Eg: SBG, Ironmongeries and Master Keys, Uninterruptable power supply etc.
4. For Safety & Health and Environmental Management, contractor shall price at a minimum of 2.1% of the Contract Sum excluding provisional sum.

CONSTRUCTION MANAGEMENT

A. <u>PDP setup in construction management</u>;

1. PDP HQ level setup: Planning, Design, Interface, Construction, Risk & SHE departments.

To assess and evaluate the construction management matters and issues from all packages and consolidate information for reporting purposes to the client I.e. MRT Corp. Reporting done as;

a. Monthly Construction progress meeting
b. Monthly Risk Workshop
c. Monthly Quality Meeting
d. Quarterly MRT Corp EXCO meeting

1. PDP site office

Setup to look at all aspect of construction i.e. planning, interface, SHE, risk and site work supervision (civil, structure, M+E department, QS). Monitoring is done as;

a. Weekly progress meeting chaired by SC (Supervising Consultants)
b. Monthly progress meeting chaired by PDP
c. Monthly site evaluation for IPC
d. Safety, health and environment audits

CONSTRUCTION MANAGEMENT

1. **WPCs (Works Package Contractors)**

   Site works setup follows with planning, Contracts, interface, risk and SHE departments as well as site construction team (QA&QC, ICP) for supervision and reporting to the SC/PDP/MRT. WPC is led by the Project Director assisted by Project Manager who are responsible on the overall progress of the project.

   Quality of works is governed contractually by General specification (GS), Materials &Works Specification (MWS), Particular Specification (PS) in addition to IFC (Issued For Construction) drawings. GS and MWS are standard and 'line-wide' whereas PS is specific for each works package to suit site and special conditions in order to avoid VOs. PS also incorporates findings and recommendations from Constructibility Review (CR) to ensure the best and cost-effective construction methods are utilised by each WPC. PDP and SC will also utilise the CR for monitoring and supervision of works.

CONSTRUCTION MANAGEMENT

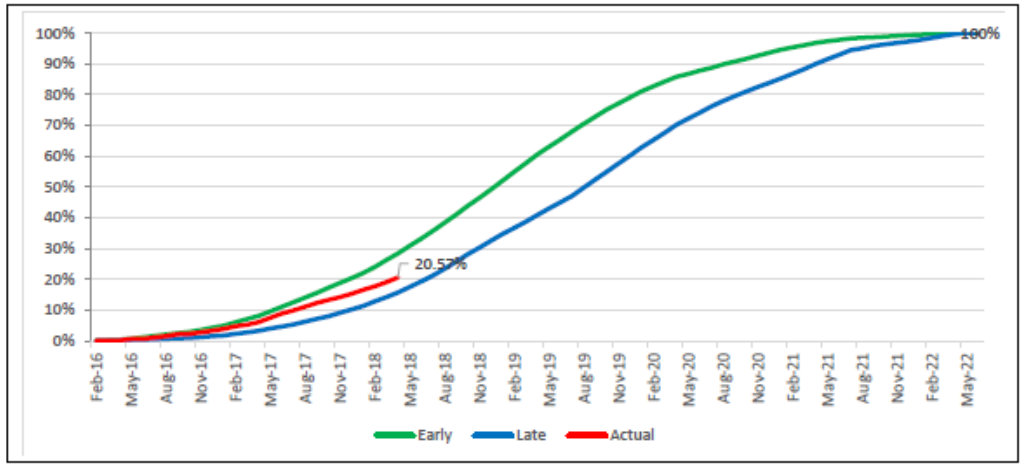
Tools :

1. Primavera P6 as planning tool with the Key Dates (KD) and Key Access Dates (KAD) that are contractual dates with LAD. Constraint dates (CD) are between interface packages without LAD.
2. Usage of Time Location Chart (TLC) derived from the work program to show detailed progress of work activities with location and time including showing each launching sequence of Standard Box Girders segments and Key Dates and Key Access Dates
3. Weekly charts **graphically** showing progress of all section of works such as piling, pile caps, piers, including available work fronts showing actual progress versus planned early finish in terms of actual quantities completed (not just percentage).
4. Audits for construction SHE risks as per required by contract. Penalties imposed if not complied

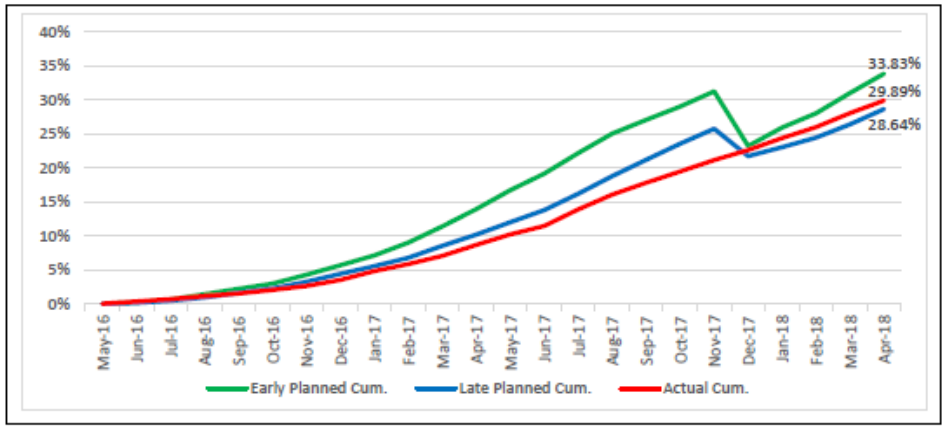
REPORTS SAMPLE AND PHOTOS FROM SITE

EXECUTIVE SUMMARY

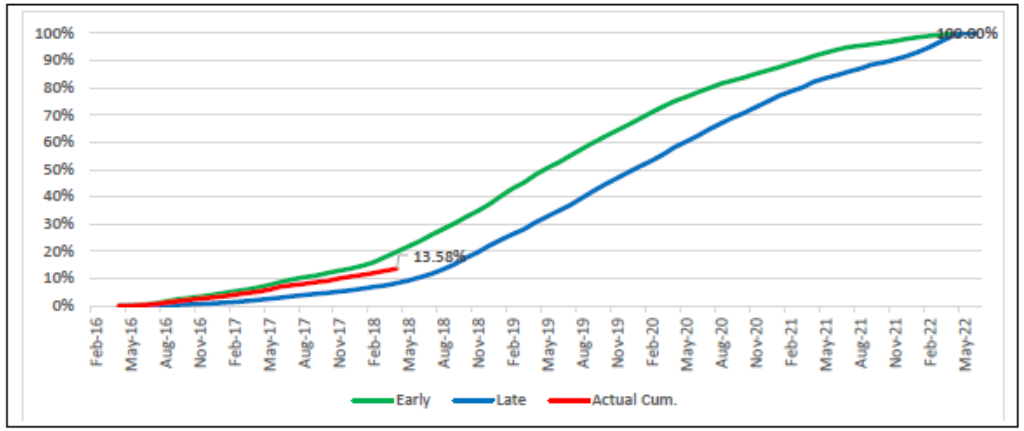
Overall Elevated Infrastructure + Systems



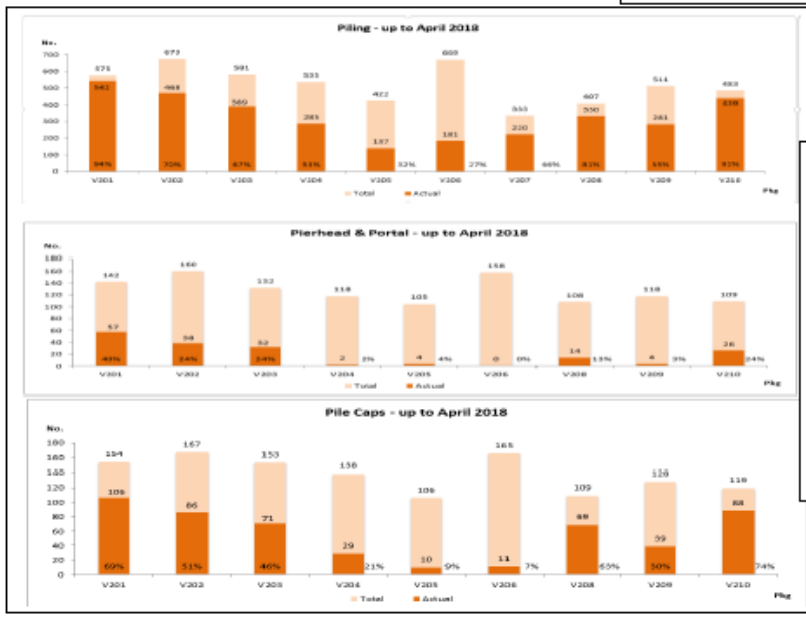
Underground (UGW)



Systems



Elevated Infrastructure



Progress of Major Civil Activities At Each Package

THIS REPORT IS BASED UPON OBSERVED FACTS AND STATUS REPORTS AVAILABLE TO ICE FOR THE REPORTING PERIOD.
TRENDS ARE PREDICTED FROM THESE INFORMATION.

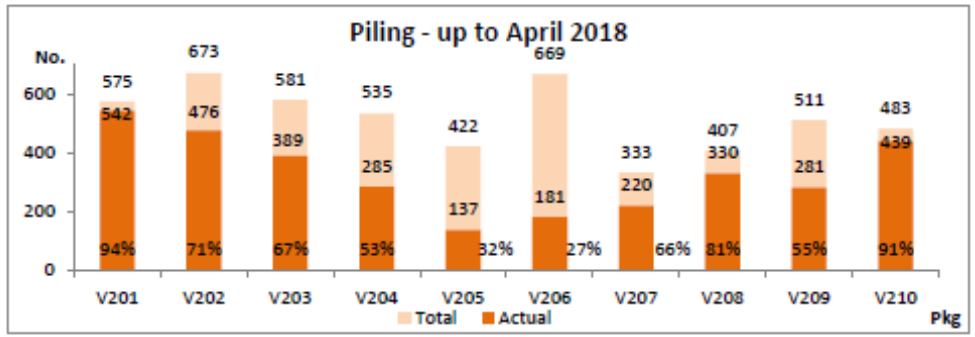
SUMMARY

Overall the project is progressing for each of the three packages in phase 1 trending downwards. This will have an impact on the Civil Handover dates for Trackwork but it is possible to meet or overrun by 1 or 2 months considering the TRA. PDP stepping in at V202, increasing of manpower resources and stepping up the construction of all the phase 1 long spans along with the repositioning of Trackwork access could be the remedy required to complete Phase 1 as per plan. The other area of concern at phase 1 is the relocation of utility at the medians at V202 and V203. The progress at phase 2 and the underground will be discussed in detail within the contents of the report.

A. Infrastructure

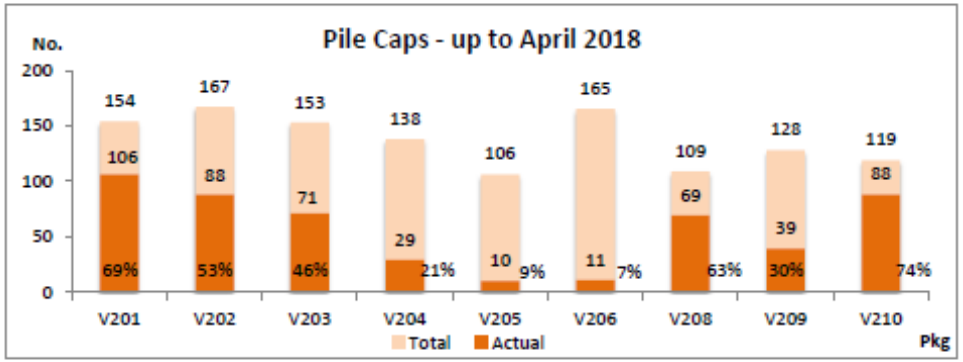
1. Land acquisition – Critical lots in Phase 1 especially in V203 and outstanding MA's to be finalised.
2. Progress – The progress on piling, pile caps and pier heads line-wide up to April 2018 is as shown below:

a) Piling



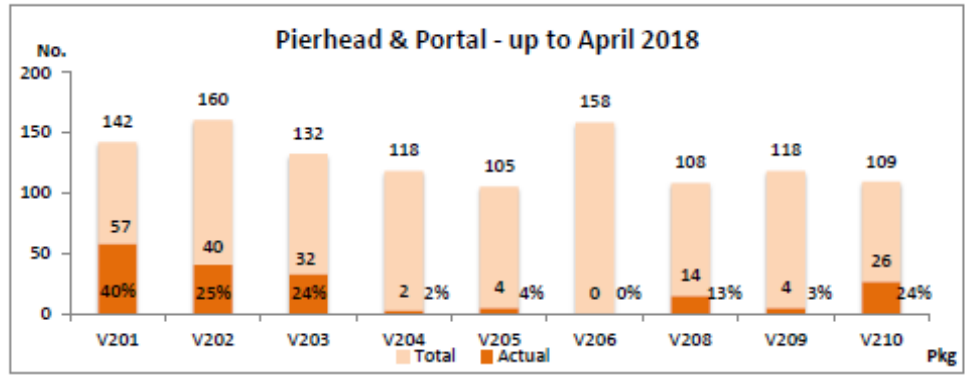
- Progress dropped in April 2018, 354 No. (March : 459). Highest recorded in V206 : 57 piles.
- Number of piling rigs has increased in April 2018 to 71 No. (March : 67)
- Further increases in piling rigs are expected in coming months, especially in packages with delays in piling, such as V202, V203, V205 & V206.
- Piling in V201 reached 94%, could be completed by June 2018.

b) Pile Caps



- Progress on pile caps in V205 & V206 are lagging behind.

c) Pier-head



- Progress on pier heads are lagging behind in V204 to V209.

3. Progress - The progress of the following packages are on a downward trend and require close monitoring and mitigations actions:
   a) V202 - Overall delays are significant. WPC's recovery programme extremely tight, and progress is continuing to slip. It is highly unlikely that the Trackworks KADs would be achieved. The potential delays could be in excess of 4 months. PDP is considering contingency measures for Trackworks in V202.
   b) V203 - Overall progress continue to slip. The situation is made worse by the LG incident early March 2018. It is likely that Trackworks KADs for Phase 1 may be delayed by about 3 to 4 months. The WPC is resourcing for additional LGs and increasing other resources to mitigate the delays.
   c) V206 - Although the progress appears to be just behind schedule against the BLP, there is very little works carried out so far. The works scheduled for the forthcoming months are unachievable, especially for pile caps and pier head works. A more realistic programme is being finalized.
   d) V207 - Tunnelling works, originally scheduled to start in September 2017, is now likely to start in May 2018 after completion of earthworks for portals. The delay to the Trackworks KAD through the tunnel could be in excess of 6 months. WPC would need to review their resources and construction methodology to mitigate the delay.
4. Manpower - WPCs struggling for sufficient manpower especially in V202. In the case of packages V203, V206, V207 & V208, for pile caps and pier construction scope they too would soon require additional manpower in order to maintain progress and mitigate delays.

B. Systems

1. Large number of design documentations are submitted in bulk to fulfil the Gate 3 due date, we suggest an improved submittal by WPCs and spreading the submittals would be helpful for all respective parties in reviewing the documents.
2. Gate 3 preparations are work in progress. There are large numbers of ISRs being issued that need to be completed before Gate 3. PDP is suggesting to be push this to Gate 4 for practical reasons. ICE have informed PDP and they are looking into this matter.
3. Method of migration the signalling from legacy to SSP line has not been agreed, this was highlighted on numerous occasions with no strategy in place.
4. Provision of design life evidence is being progressed through PDP who are currently perusing the WPC for documentary evidence of design life. It was suggested to PDP that WPCs provide BTBF, MTTR and availability figures in support of the design life.
5. BIM coordination between Civil and Systems interfaces and System-to-system VDRs require attention and prioritisation based on construction on-site.
6. Control strategy to demonstrate how the ICSS works and control the entire SSP railway is awaited.

Font Legend:
Red – Critical (Opportunity to improve)
Amber – Requires Monitoring
Green – On-track

Time Cost Quality

Key Actions priority

Issues being addressed

THIS REPORT IS BASED UPON OBSERVED FACTS AND STATUS REPORTS AVAILABLE TO ICE FOR THE REPORTING PERIOD.
TRENDS ARE PREDICTED FROM THESE INFORMATION.

Construction of piers

Construction of piers

Construction of pile and pilecap

Segmental box casting yard

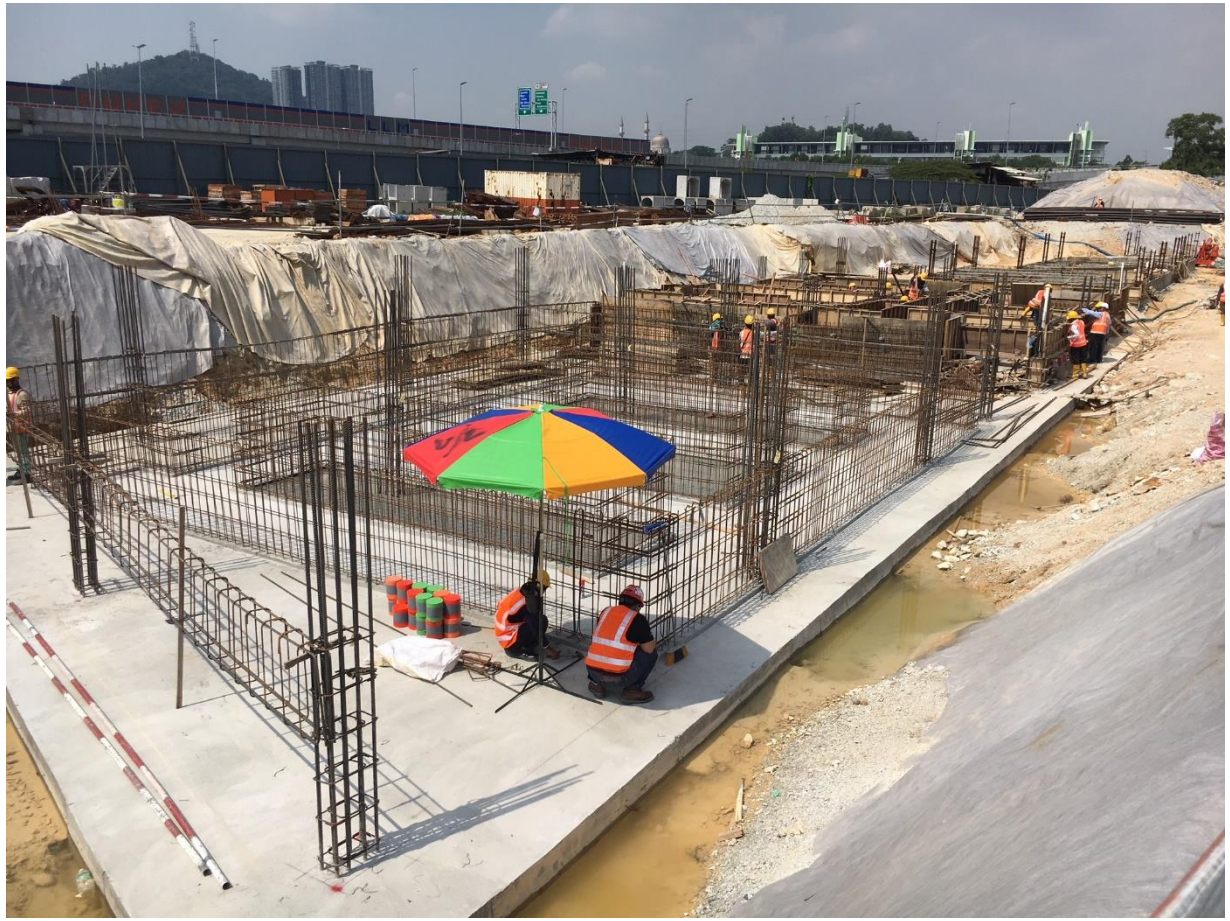
Casting Yard for Segmental Box Girder

Construction of viaduct and station

Construction of entrance

Construction of stations and viaduct

Construction of TPSS



THANK YOU