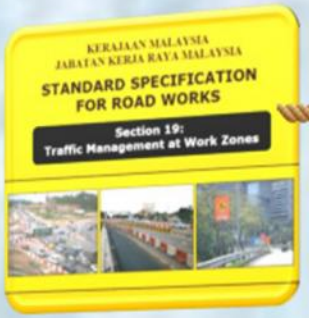
KEPERLUAN
SPJ Section 19
&
ATJ 2C/85 (Pindaan 2017)

Ir. Tengku Mohamad Shahril Bin Tengku Razman
Bahagian Audit & Program Keselamatan Jalan
Cawangan Jalan
IPJKR Malaysia

SPECIFICATIONS AND STANDARDS

STANDARD SPECIFICATION SECTION 19 : TRAFFIC MANAGEMENT AT WORK ZONES



GENERAL
THE EFFECTIVE IMPLEMENTATION OF TRAFFIC MANAGEMENT AT WORK ZONES.
TEMPORARY SIGNAGE
TEMPORARY ROAD MARKING
TRAFFIC MANAGEMENT EQUIPMENT
PLACEMENT AND REMOVAL OF TRAFFIC CONTROL DEVICES
MAINTENANCE OF TRAFFIC CONTROL ZONES

WORK ZONE CONTROL

THE NEED FOR TRAFFIC MANAGEMENT AT WORK ZONES
THE PRINCIPLES OF TRAFFIC MANAGEMENT AT WORK ZONES
STRATEGIES FOR EFFECTIVE IMPLEMENTATION OF TRAFFIC MANAGEMENT AT WORK ZONES
PLANNING OF TRAFFIC MANAGEMENT AT WORK ZONES
DESIGNING TRAFFIC MANAGEMENT AT WORK ZONES
TYPICAL LAYOUTS OF THE TRAFFIC MANAGEMENT PLAN
TAKING OFF QUANTITIES
PLACEMENT AND REMOVAL OF TRAFFIC CONTROL DEVICES
MAINTENANCE OF TRAFFIC CONTROL ZONES
REPORTS

MANUAL ON TRAFFIC CONTROL DEVICES TEMPORARY SIGNS AND WORK ZONE CONTROL PART 1

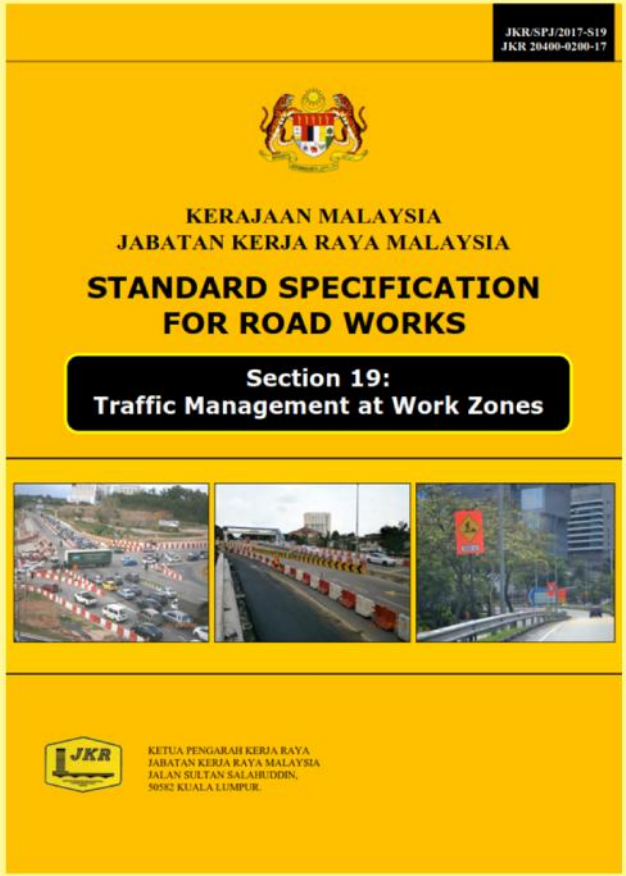
MANUAL ON TRAFFIC CONTROL DEVICES TEMPORARY SIGNS AND WORK ZONE CONTROL PART 2

TEMPORARY TRAFFIC CONTROL DEVICES

GENERAL
CATEGORY OF TRAFFIC CONTROL DEVICES.
- Temporary signages
- Temporary Road marking
- Temporary management equipment.

ROAD SPECIFICATION & BQ

Latest Specification



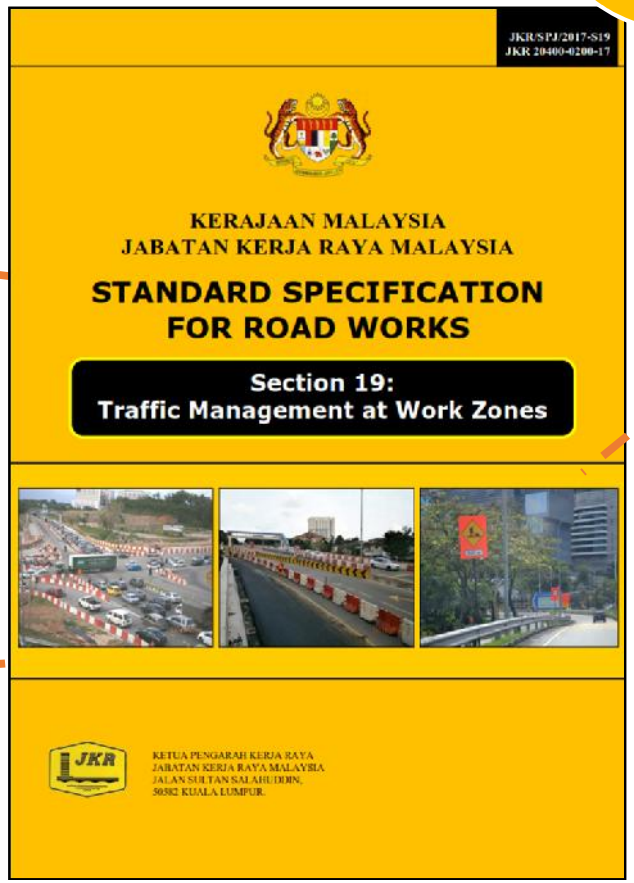
JKR/SPJ/2017-S19

19.5
TRAFFIC
MGMT
EQUIPMENT

SPJ

- MATERIALS
- SPECIFICATIONS
- METHOD OF INSTALLATION
- APPLICATION REQUIREMENT

19.4
TEMPORARY
ROAD
MARKING



19.1
GENERAL

19.3
TEMPORARY
SIGNAGE

19.2
THE EFFECTIVE
IMPLEMENTATION
OF TMWZ

JKR/SPJ/2017-S19

REQUIREMENT OF SPJ

The Contractor shall design and provide all traffic management resources as stated in the Bill of Quantity for Traffic Management and Control. He shall also comply with the specifications of all the resources as stated in this Specification and detailed drawings.

19.2.1 Implementation Strategies

19.2.1.1 Design Activities, should consider the following:

(a) Execute appropriate planning and design including Traffic Study, if required such as when there are lane closures.
(b) Carry out full field checks and inventory of existing facilities.
(c) Preparation of Traffic Management Plan (TMP) based on the Plans and Bill of Quantities provided in the Contract prior to site activities. Traffic control plans (TCP) to be provided as stipulated in the Contract or as directed by Superintending Officers/Project Director.
(d) Traffic Control Plan (TCP) must be endorsed by a qualified Professional Civil Engineer (P.E.) prior to submission to the local authority(s) for approval.
(e) Traffic Study report must be endorsed by qualified traffic consultant with Professional Civil Engineer (P.E.) status prior to submission to local authority(s) for approval.
(f) The TMP needs to be made available for Road Safety Auditing upon receiving of Construction Drawings.
(g) Design of TMPs must be endorsed by Professional Engineer (P.E.) and approved by the S.O./P.D prior to commencement of work.

19.2.1.2 During the Pre Implementation of TMP, due consideration should be given to the following:

(a) Contractor shall appoint a qualified Traffic Management Officer (TMO).

(b) TMPs must be made known to:

- Local Authorities
- Local communities
- Road users
- JKR District and JKR State.

Note: Local Authorities, Local communities, JKR District and JKR State to take whatever action deemed necessary, particularly if it may involve road/lane closure or major road diversion.

19.2.1.3 During the construction activities, the Contractor shall carry out the following:

(a) Set up Traffic Management Team (TMT), inclusive of supervisors, flagmen, placement and removal crews and maintenance personnel.
(b) Set up an Emergency Response Team (ERT) if required in the contract.
(c) Maintenance of the traffic management works.
(d) Ensure timely placement and removal of devices.
(e) Inspection and reporting of traffic management at work zone shall be carried out minimum twice daily.
(f) Inform the relevant JKR District Engineer of any road/lane closure and/or diversion well in advance as specified, at least one week, before commencement of works.

19.2.1.4 Reporting

The Contractor shall carry out the following:

(a) Preparation of Traffic Management Safety Reports (TMSRs) by the TMO as stipulated in the Contract or as required by S.O./P.D.
(b) The Contractor needs to prepare the TMSRs every 3 months or at interval required by S.O/P.D.
(c) The TMSRs need to be made readily available for Road Safety Auditing.

19.2.2 Prior Pre-Construction Activities

19.2.2.1 Proper Planning and Design

Before any planning on Traffic Management Plan (TMP) commences, the Contractor must visit the site for field check and to collect inventory of the existing facilities including existing structure, services and public facilities such as street lighting, traffic light, bus and taxi stop and road furniture that may require removal or relocation during the construction stage.

In addition, the Contractor should assess the existing road capacity, determine the existing travel and distribution patterns and identify potential problems that might arise due to temporary road diversions. The Contractor should also carry out discussions with the Local Authorities on the effect of the construction works on the existing traffic patterns and the occurrence of any local festivities, activities or upgrading programs, which might further aggravate the traffic condition and to take the necessary mitigation measures in reducing the traffic woes.

19.2.3 During Construction Activities

19.2.3.1 Dissemination of Information to Road Users

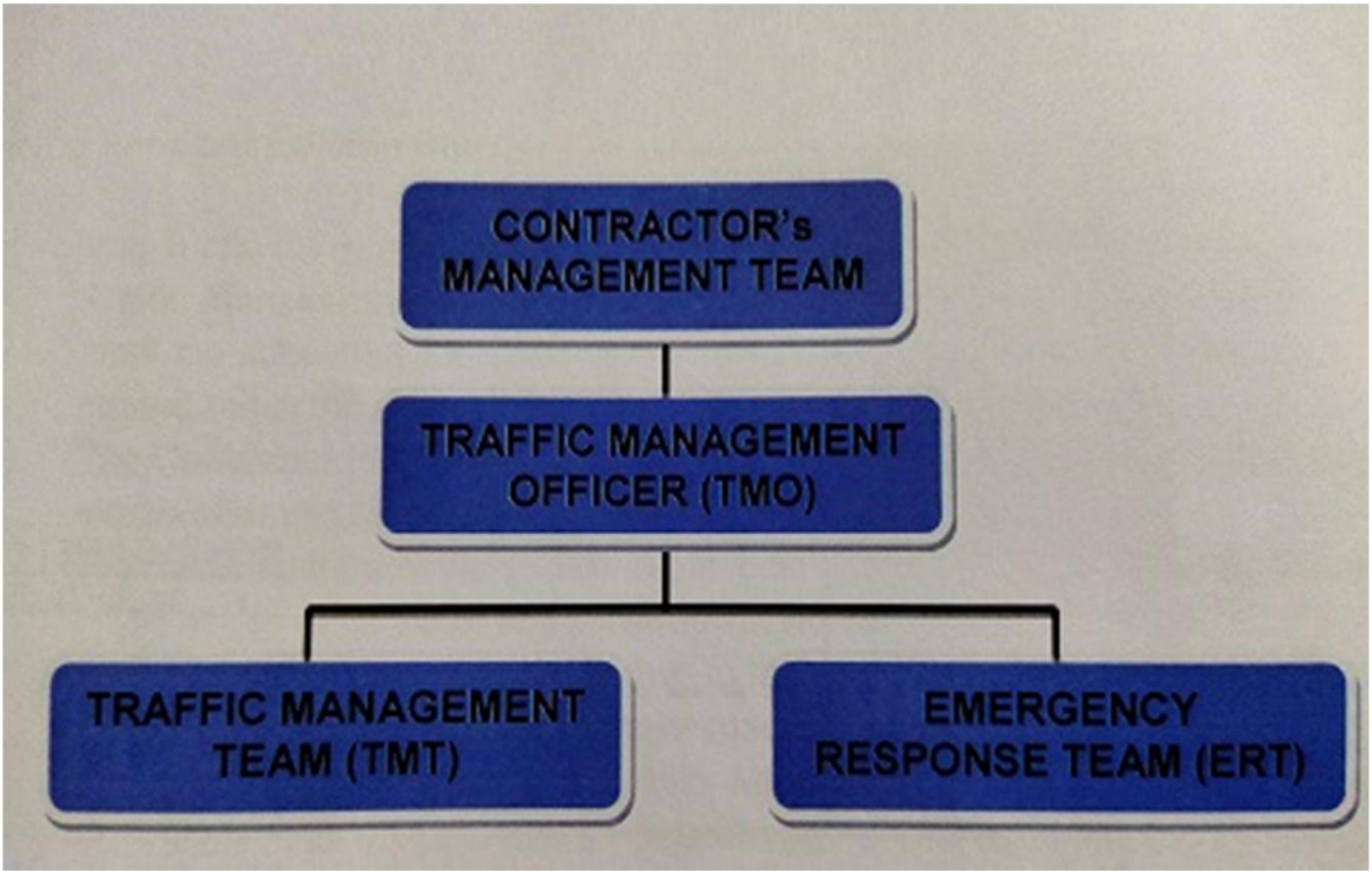
Dissemination of information to the road users by Contractor through mass media, when necessary. The public needs to be informed early in the process in order to assist them to plan for this change. Information should be channeled a week before the implementation of traffic management scheme. This is done through public announcements in newspapers, radio and television and approach signboards well before work zones, or any other method as deemed fit by the Contractor.

19.2.3.2 Obtaining Approval of Local Authorities

The Contractor shall obtain all necessary approvals from the Local Authorities prior to any construction activities, where required.

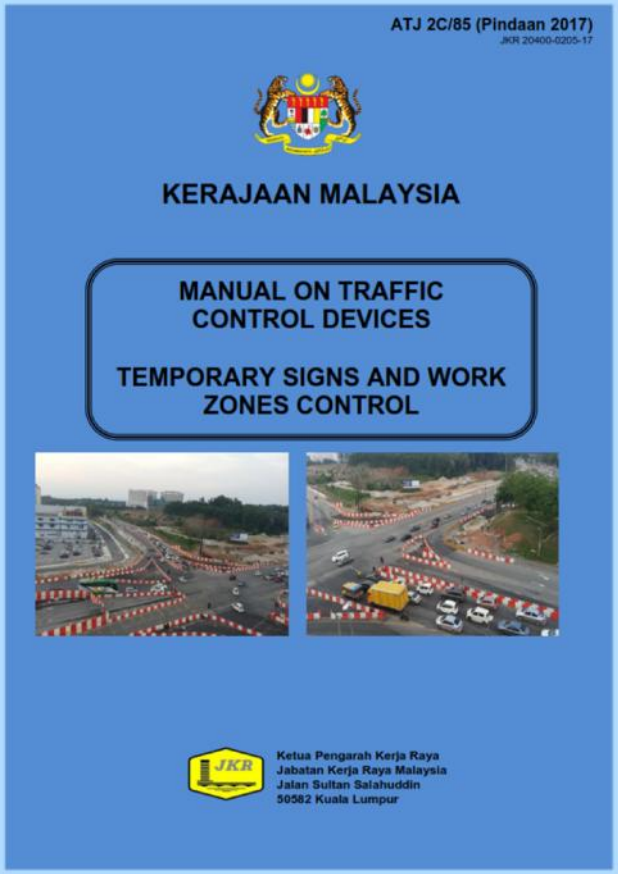
19.2.3.3 Supervision and Execution of Traffic Management Plan.

To ensure a smooth construction sequence without compromising public road safety for pedestrians and other road users, the Contractor shall set up two distinct teams, each with their unique roles and responsibilities. They are the **Traffic Management Team (TMT)** and the **Emergency Response Team (ERT)** as illustrated below:


CONTRACTOR's MANAGEMENT TEAM
TRAFFIC MANAGEMENT OFFICER (TMO)
TRAFFIC MANAGEMENT TEAM (TMT)
EMERGENCY RESPONSE TEAM (ERT)

WHAT'S NEW ?

2017



ATJ 2C/85 (Pindaan 2017)

WHAT'S NEW ?

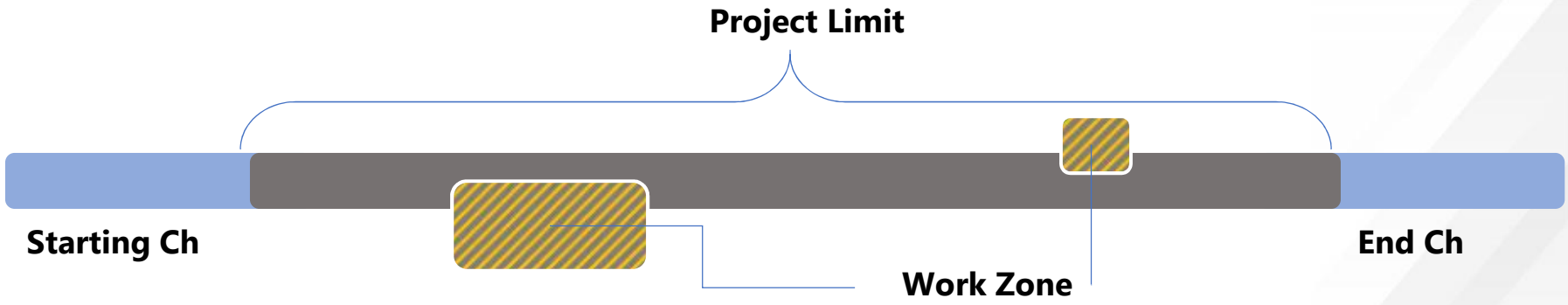
CONTENT	ATJ 2C/86 PINDAAN **2016**	ATJ 2C/86 PINDAAN **2017**
General Principles of Traffic Management at Work Zones	✓	✓
Strategies for Effective Implementation		✓
Responsibility	✓	✓✓
Planning of TMWZ	✓	✓✓
Designing Principles TMWZ		✓
Typical Layout	✓	✓
Taking Off Quantities		✓
Placement and Removal	✓	✓✓
Maintenance of Traffic Control Zones	✓	✓✓
Report Outline (TMP, TMSR)		✓
Temporary Traffic Control Devices	✓	✓✓

WHAT'S NEW?

Definition

TMWZ – Traffic Management at Work Zone

Work Zone –



WHAT'S NEW?

Definition

TMP – Traffic Management Plan

Refers to a compiled document consisting of method statement of Traffic Management, work programme, Traffic Control Plan, organization chart etc…

TMO – Traffic Management Officer

Refers to Contractor's representatives responsible for all matters related to the traffic management, safety of the travelling public and construction workers within the limits of the construction works/contract.

WHAT'S NEW?

Definition

TCP – Traffic Control Plan

Refers to the detailed drawing that shows the placement of Traffic Control Devices according to the construction sequence.

TCD – Traffic Control Devices

Traffic control devices are markers, signs, channelizing and signal devices. They are used to inform, warn, guide, or regulate traffic movement and control vehicle speeds. Traffic control devices also provide important information to users about detours and traffic delays.

WHAT'S NEW?

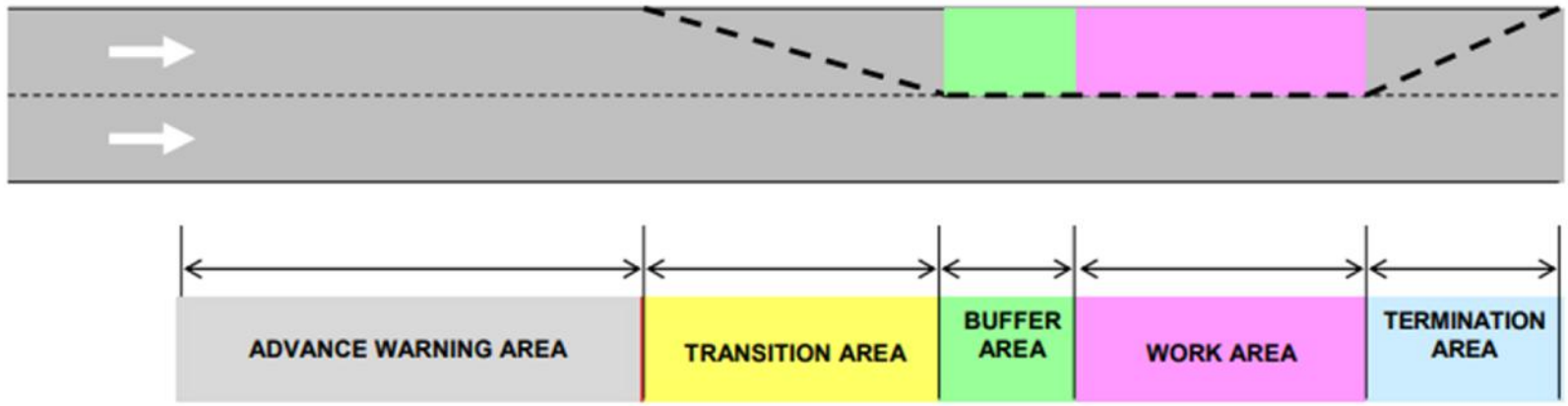
Traffic Categories

TABLE 4.2: TRAFFIC CATEGORIES

TRAFFIC CATEGORIES		
ROAD CLASSIFICATION	**SPEED PROFILE**	**SPEED**
URBAN	Low Speed	< 60 km/hr
	High Speed	> 60 km/hr
RURAL	Low Speed	< 70 km/hr
	High Speed	> 70 km/hr
EXPRESSWAY	Low Speed	< 90 km/hr
	High Speed	> 90 km/hr

WHAT'S NEW?

Traffic Categories vs Length of Areas



URBAN					
Low Speed	250m	100m	50m	varies	15m
High Speed	400m	150m	100m	varies	30m
RURAL					
Low Speed	350m	100m	110m	varies	15m
High Speed	500m	150m	150m	varies	30m
EXPRESSWAY					
Low Speed	1000m	250m	150m	varies	15m
High Speed	2000m	300m	220m	varies	30m

FIGURE 6.1A: LENGTH OF WORK ZONE (TEMPORARY LANE CLOSURE)

WHAT'S NEW?

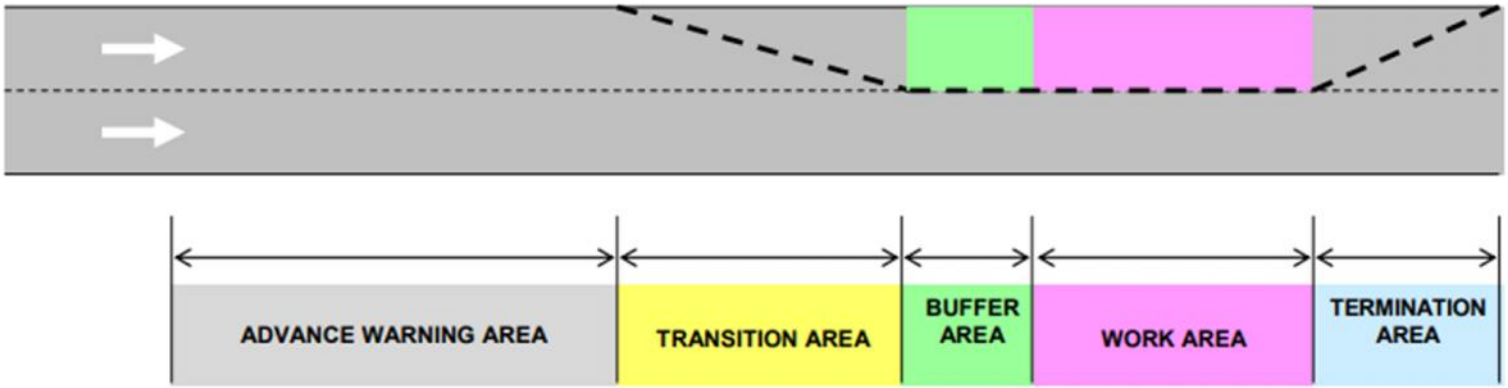
Construction Duration Categories

TABLE 6.2: THE CONSTRUCTION DURATION CATEGORIES

CONSTRUCTION DURATION CATEGORIES	
CLASSIFICATION	**DURATION**
Temporary Lane closure *Flagmen are always required during temporary lane closure	< 1 Day
Short Term Diversion	> 1 Day < 1 Month
Long Term Diversion	> 1 Month

WHAT'S NEW?

Construction Duration vs TCD (Temporary Lane Closure)

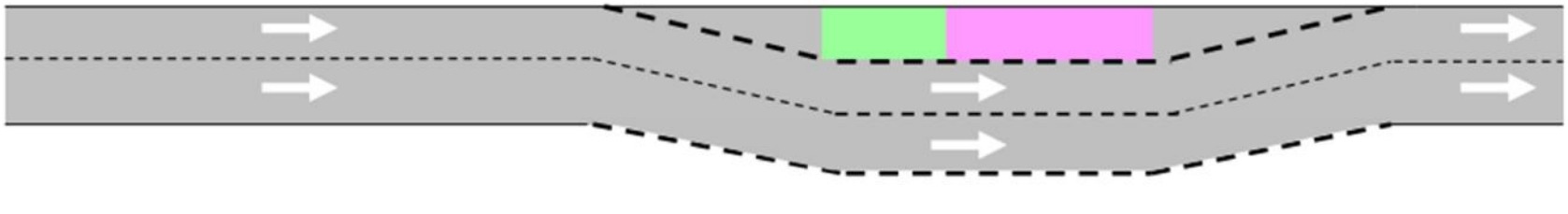


	ADVANCE WARNING AREA	TRANSITION AREA	BUFFER AREA	WORK AREA	TERMINATION AREA
Temporary Lane Closure) (< 1 day)	Full set of signages: 1. Advance warning sign 2. Road works sign 3. Speed limit signs 4. Part of lane closed to traffic sign	1. Keep left/right signs 2. Guidance cones 3. Flagman 4. Flashing arrow & blinkers (for night works)	1. Guidance cones 2. Blinkers (for night works)		1. Pembinaan Tamat sign 2. Blinkers (for night works)

*Notes: For three (3) lanes road and above , the signages to be installed on both sides

WHAT'S NEW?

Construction Duration vs TCD (Road Diversion)



	ADVANCE WARNING AREA	TRANSITION AREA	BUFFER AREA	WORK AREA	TERMINATION AREA	
SHORT TERM DIVERSION (>1 day but < 1 month)	Full set of signages: 1. Advance warning sign 2. Road works sign 3. Speed limit signs 4. Detour sign	1. Keep left/right signs 2. Plastic barriers 3. Flashing arrow & blinkers	1. Road works signs (work area) & speed signs 2. Plastic/concrete barriers 3. Blinkers	1. Chevron delineator signs 2. Plastic barriers 3. Flashing arrow	"PEMBINAAN TAMAT" sign
LONG TERM DIVERSION (> 1 month)	Full set of signages: 1. Advance warning sign 2. Road works sign 3. Speed Limit Signs 4. Detour Sign	1. Keep left/right signs 2. Plastic barriers 3. Flashing arrow & blinkers 4. Delineator on barriers/ delineator string	1. Road works signs (work area) & speed signs 2. Plastic/concrete barriers 3. Blinkers & delineator on barriers/delineator string	1. Chevron delineator signs 2. Plastic barriers 3. Flashing arrow & blinkers 4. Delineator on barriers/delinea	"PEMBINAAN TAMAT" sign

*Notes: For three (3) lanes road and above , the signages to be installed on both sides

WHAT'S NEW?

WORK ZONE LENGTH

Work zone not including surcharge area

- **Length < 5km (rural)**
- **Length < 2km (urban)**

Excavation

- **Length < 200m**
- **Nos < 4**

WHAT'S NEW?

Examples of new Temporary Traffic Signs

T.19
Information Sign

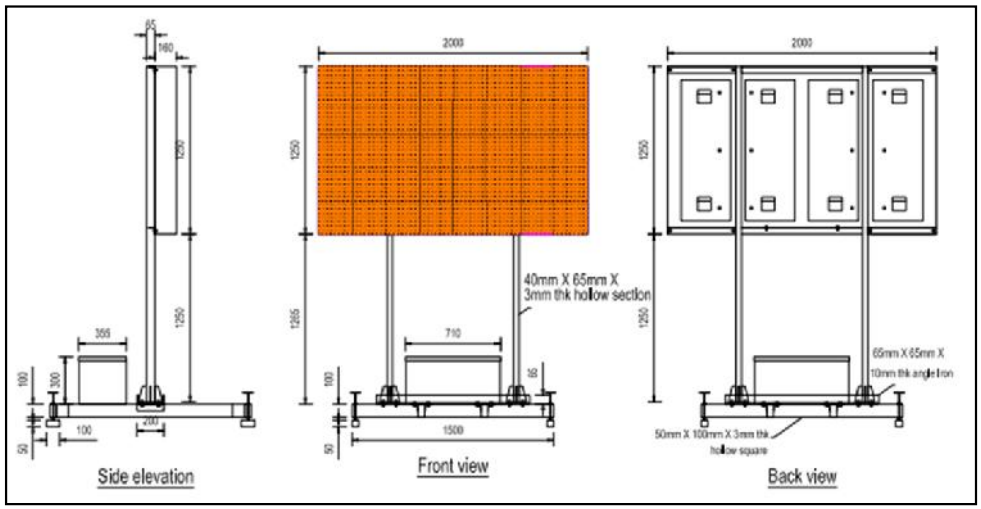
T.6a

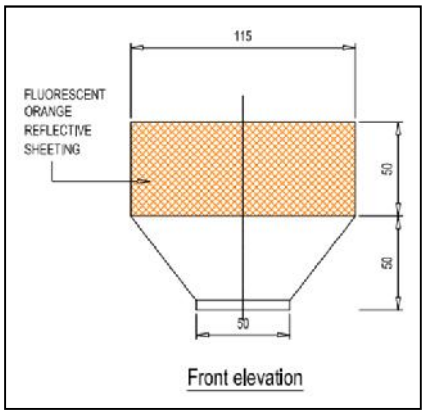
T.6b

Detour Sign

WHAT'S NEW?

Examples of new Temporary Traffic Equipment

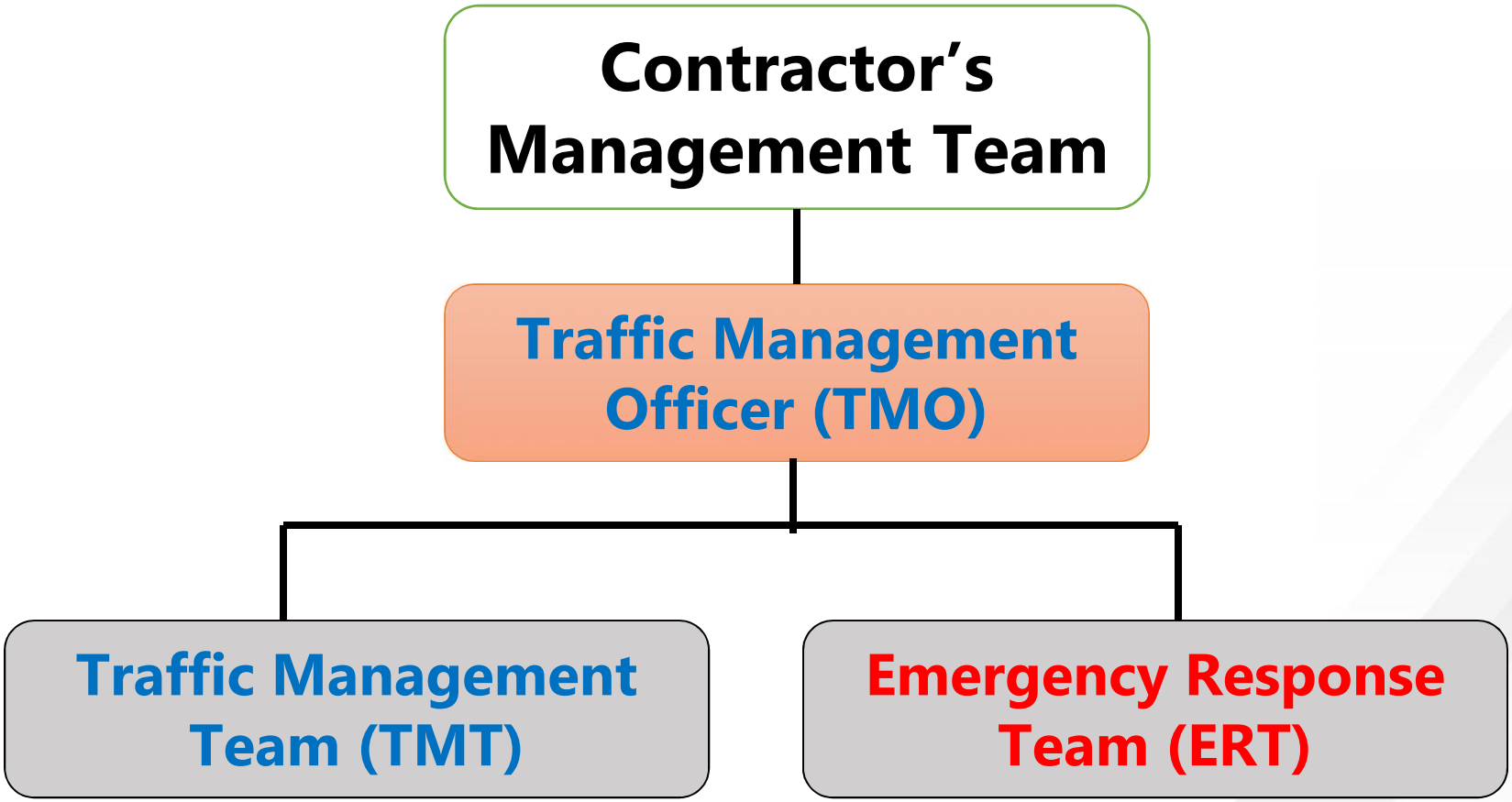




Delineators on barrier

Variable Massaging System (VMS)

WHAT'S NEW?


Contractor's Management Team
Traffic Management Officer (TMO)
Traffic Management Team (TMT)
Emergency Response Team (ERT)

WHAT'S NEW?

Traffic Management Team (TMT)

ROLE

- ✓ Ensure TCP implemented accordance to approved plan.
- ✓ Proper installation, maintenance, and cleaning of Traffic Control Devices.
- ✓ Ensure safety and smooth traffic flow.
- ✓ Ensure compliance with all traffic management procedures.

WHAT'S NEW?

Emergency Response Team (ERT)

WARRANTS

- PROTOCOL ROAD
- ACCESS TO STRATEGIC AND SECURITY LOCATION
- MAJOR ARTERIAL AND COLLECTOR
- URBAN AREA (MIN 4 LANES, >10KM)
- RURAL AREA (MAJOR COLLECTOR, >20KM)

Role

- Provide 24-hours patrol

Liaise

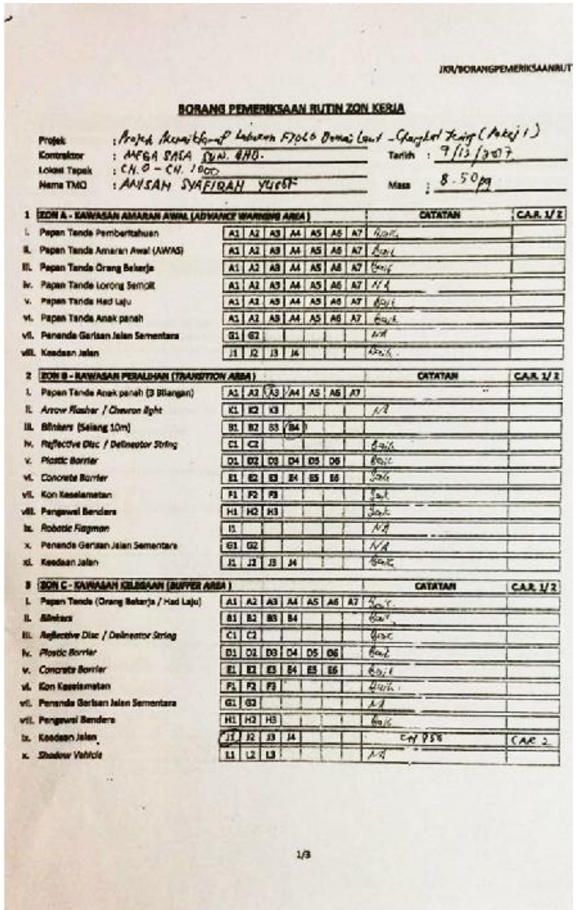
- TMT
- Contractor
- Police
- Relevant parties

Event

- Road accident
- Stalled Vehicle
- Landslides
- Flash flood

WHAT'S NEW?

Inspection procedure minimum 2 times per day.



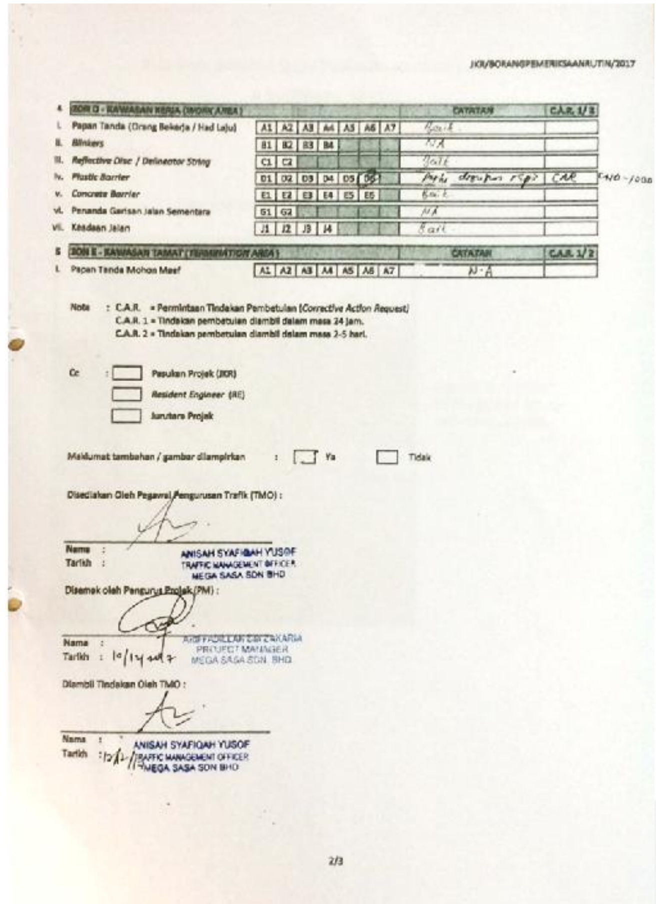
JKR/BORANGPEMERIKSAANRUT

BORANG PEMERIKSAAN RUTIN ZON KERJA

Projek : Projek Menaiktaraf Laluan F7060 Benai Laut - Changkat Tenang (Pakej 1)
Kontraktor : MEGA SASA SDN. BHD.
Lokasi Tapak : CH. 0 - CH. 1000
Nama TMO : ANISAH SYAFIQAH YUSOF
Tarikh : 9/12/2017
Masa : 8.50pm

1	ZON A - KAWASAN AMARAN AWAL (ADVANCE WARNING AREA)		CATATAN	C.A.R. 1/2
i.	Papan Tanda Pemberitahuan	A1 A2 A3 A4 A5 A6 A7	Baik	
ii.	Papan Tanda Amaran Awal (AWAS)	A1 A2 A3 A4 A5 A6 A7	Baik	
iii.	Papan Tanda Orang Bekerja	A1 A2 A3 A4 A5 A6 A7	Baik	
iv.	Papan Tanda Lorong Sempit	A1 A2 A3 A4 A5 A6 A7	N/A	
v.	Papan Tanda Had Laju	A1 A2 A3 A4 A5 A6 A7	Baik	
vi.	Papan Tanda Anak panah	A1 A2 A3 A4 A5 A6 A7	Baik	
vii.	Penanda Garisan Jalan Sementara	G1 G2	N/A	
viii.	Keadaan Jalan	J1 J2 J3 J4	Baik	
2	**ZON B - KAWASAN PERALIHAN (TRANSITION AREA)**		**CATATAN**	**C.A.R. 1/2**
i.	Papan Tanda Anak panah (3 Bilangan)	A1 A2 A3 A4 A5 A6 A7		
ii.	Arrow Flasher / Chevron light	K1 K2 K3	N/A	
iii.	Blinkers (Selang 10m)	B1 B2 B3 B4		
iv.	Reflective Disc / Delineator String	C1 C2	Baik	
v.	Plastic Barrier	D1 D2 D3 D4 D5 D6	Baik	
vi.	Concrete Barrier	E1 E2 E3 E4 E5 E6	Baik	
vii.	Kon Keselamatan	F1 F2 F3	Baik	
viii.	Pengawal Bendera	H1 H2 H3	Baik	
ix.	Robotic Flagman	I1	N/A	
x.	Penanda Garisan Jalan Sementara	G1 G2	N/A	
xi.	Keadaan Jalan	J1 J2 J3 J4	Baik	
3	**ZON C - KAWASAN KELEGAAN (BUFFER AREA)**		**CATATAN**	**C.A.R. 1/2**
i.	Papan Tanda (Orang Bekerja / Had Laju)	A1 A2 A3 A4 A5 A6 A7	Baik	
ii.	Blinkers	B1 B2 B3 B4	Baik	
iii.	Reflective Disc / Delineator String	C1 C2	Baik	
iv.	Plastic Barrier	D1 D2 D3 D4 D5 D6	Baik	
v.	Concrete Barrier	E1 E2 E3 E4 E5 E6	Baik	
vi.	Kon Keselamatan	F1 F2 F3	Baik	
vii.	Penanda Garisan Jalan Sementara	G1 G2	N/A	
viii.	Pengawal Bendera	H1 H2 H3	Baik	
ix.	Keadaan Jalan	J1 J2 J3 J4	CH 958	CAR 2
x.	Shadow Vehicle	L1 L2 L3	N/A	

1/3



JKR/BORANGPEMERIKSAANRUTIN/2017

4	ZON D - KAWASAN KERJA (WORK AREA)		CATATAN	C.A.R. 1/2
i.	Papan Tanda (Orang Bekerja / Had Laju)	A1 A2 A3 A4 A5 A6 A7	Baik	
ii.	Blinkers	B1 B2 B3 B4	N/A	
iii.	Reflective Disc / Delineator String	C1 C2	Baik	
iv.	Plastic Barrier	D1 D2 D3 D4 D5 D6	[illegible]	CAR
v.	Concrete Barrier	E1 E2 E3 E4 E5 E6	Baik	
vi.	Penanda Garisan Jalan Sementara	G1 G2	N/A	
vii.	Keadaan Jalan	J1 J2 J3 J4	Baik	
5	**ZON E - KAWASAN TAMAT (TERMINATION AREA)**		**CATATAN**	**C.A.R. 1/2**
i.	Papan Tanda Mohon Maaf	A1 A2 A3 A4 A5 A6 A7	N/A	

Nota : C.A.R. = Permintaan Tindakan Pembetulan (Corrective Action Request)
C.A.R. 1 = Tindakan pembetulan diambil dalam masa 24 jam.
C.A.R. 2 = Tindakan pembetulan diambil dalam masa 2-5 hari.

Cc : Pasukan Projek (JKR)
Resident Engineer (RE)
Jurutera Projek

Maklumat tambahan / gambar dilampirkan : Ya Tidak

Disediakan Oleh Pegawai Pengurusan Trafik (TMO) :
Nama :
Tarikh :
ANISAH SYAFIQAH YUSOF
TRAFFIC MANAGEMENT OFFICER
MEGA SASA SDN BHD

Disemak oleh Pengurus Projek (PM) :
Nama :
Tarikh : 10/12/2017
PROJECT MANAGER
MEGA SASA SDN. BHD.

Diambil Tindakan Oleh TMO :
Nama :
Tarikh :
ANISAH SYAFIQAH YUSOF
TRAFFIC MANAGEMENT OFFICER
MEGA SASA SDN BHD

2/3

Possible automation in the future?

THE NEW ATJ 2C TAKES A SERIOUS STAND IN THE IMPLEMENTATION OF THE TMP

One of the Major Aims of the Manual is to Propose Strategies for Effective Implementation of Managing Traffic at Work Zones

The Manual Recommends

Adopt a 6-Step Strategy…

For the execution of the TMPs, a six-step strategy is proposed:

STEP 1: Set up a Monitoring Framework
STEP 2: Set up Working Teams
STEP 3: Design TCPs for each Work Zone
STEP 4: Use of Standardised Approaches
STEP 5: Prepare Traffic Management Safety Reports
STEP 6: Audit of Traffic Management

See Sect 3.3.1

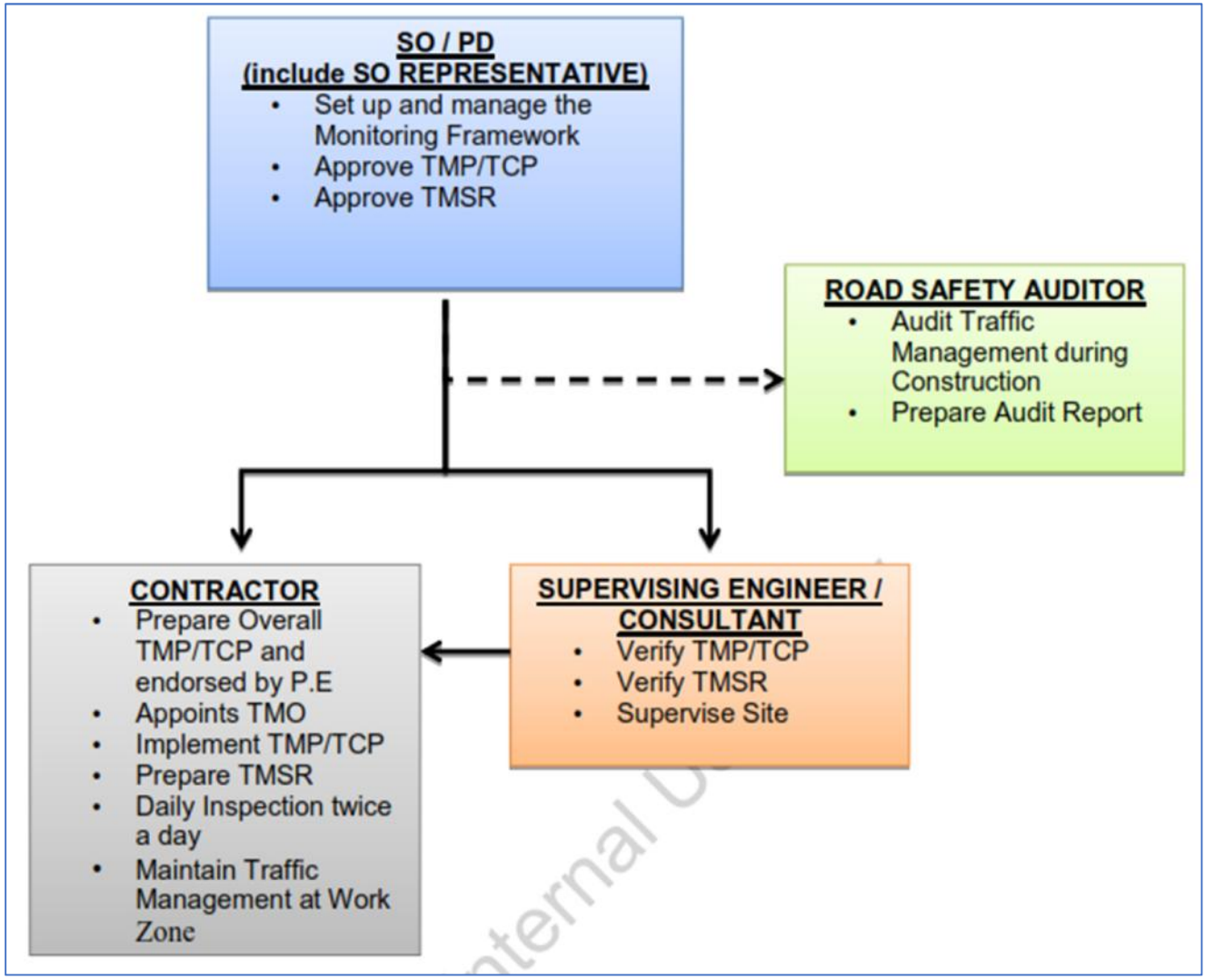
STEP 1

Set Up
Monitoring Framework

See Sect 3.3.2

STEP 1

FRAMEWORK TO MONITOR TRAFFIC MANAGEMENT AT WORK ZONE



See Figure 3.1

STEP 1

SO / PD
(include SO REPRESENTATIVE)

- Set up and manage the Monitoring Framework
- Approve TMP/TCP
- Approve TMSR

SUPERVISING ENGINEER / CONSULTANT

- Verify TMP/TCP
- Verify TMSR
- Supervise Site

CONTRACTOR

- Prepare Overall TMP/TCP and endorsed by P.E
- Appoints TMO
- Implement TMP/TCP
- Prepare TMSR
- Daily Inspection twice a day
- Maintain Traffic Management at Work Zone

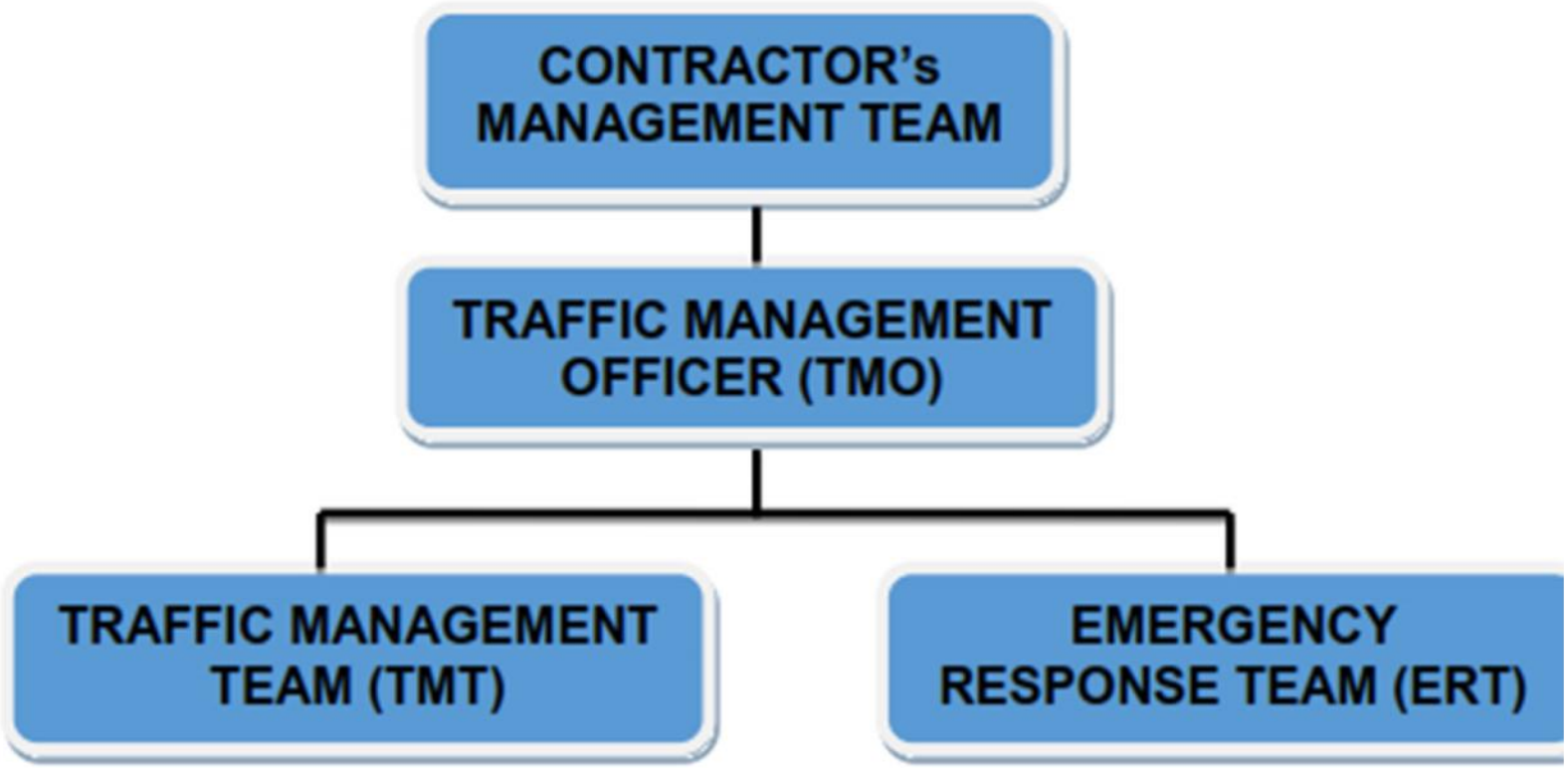
ROAD SAFETY AUDITOR

- Audit Traffic Management during Construction
- Prepare Audit Report

STEP 2

Set Up Working Teams (Contractor's Teams)

See Sect 3.3.3



See Figure 3.2

STEP 3

Design of TMPs and TCPs

See Sect 3.3.4

Design Phase

Overall TCP + BQ

(Prepared by Design Engineers)

Pre-Construction Phase

TMP Proposal

(Prepared by the Contractor)

Construction Phase

Localised TCP

(Prepared by the Contractor)

STEP 4

Use of Standardise Approaches

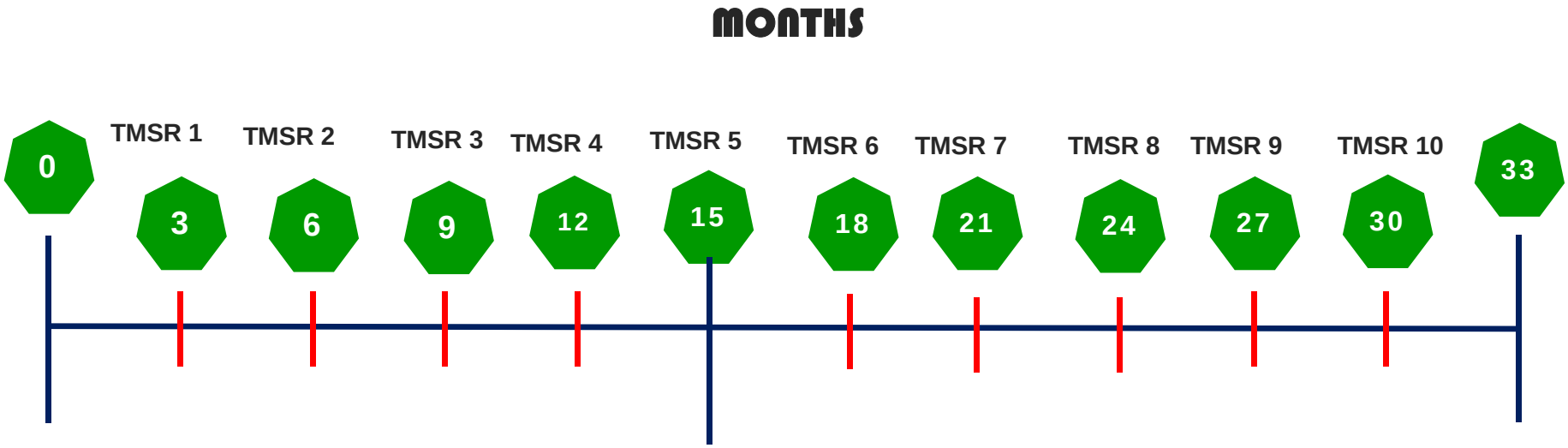
STANDARDISED APPROACH

- Work Zones
- Sign Faces
- Sign Arrangements
- Traffic Control Devices

STEP 5

Prepare Traffic Management Safety Reports (TMSRs)

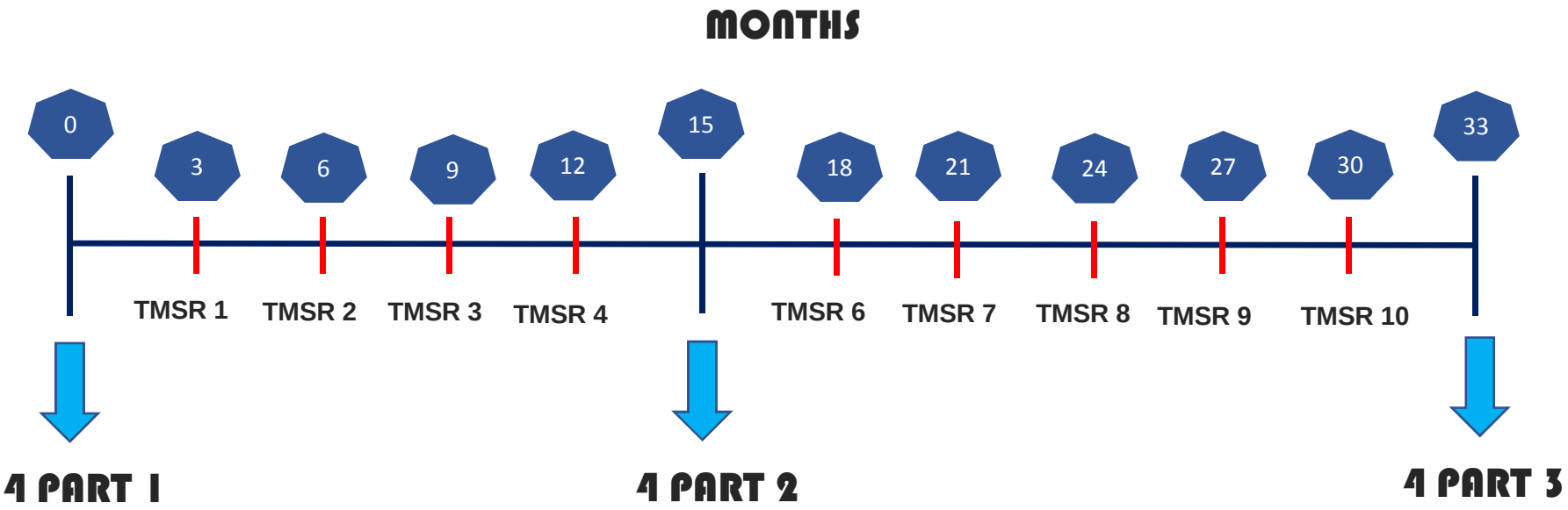
SCHEDULE OF TMSRs
- Assume Construction Period of 36 months



STEP 6

Conduct Audits, Inspection and Maintenance

SCHEDULE OF AUDITS
- Assume Construction Period of 36 months



Audit of TMSR to be carried out after production of each TMSR

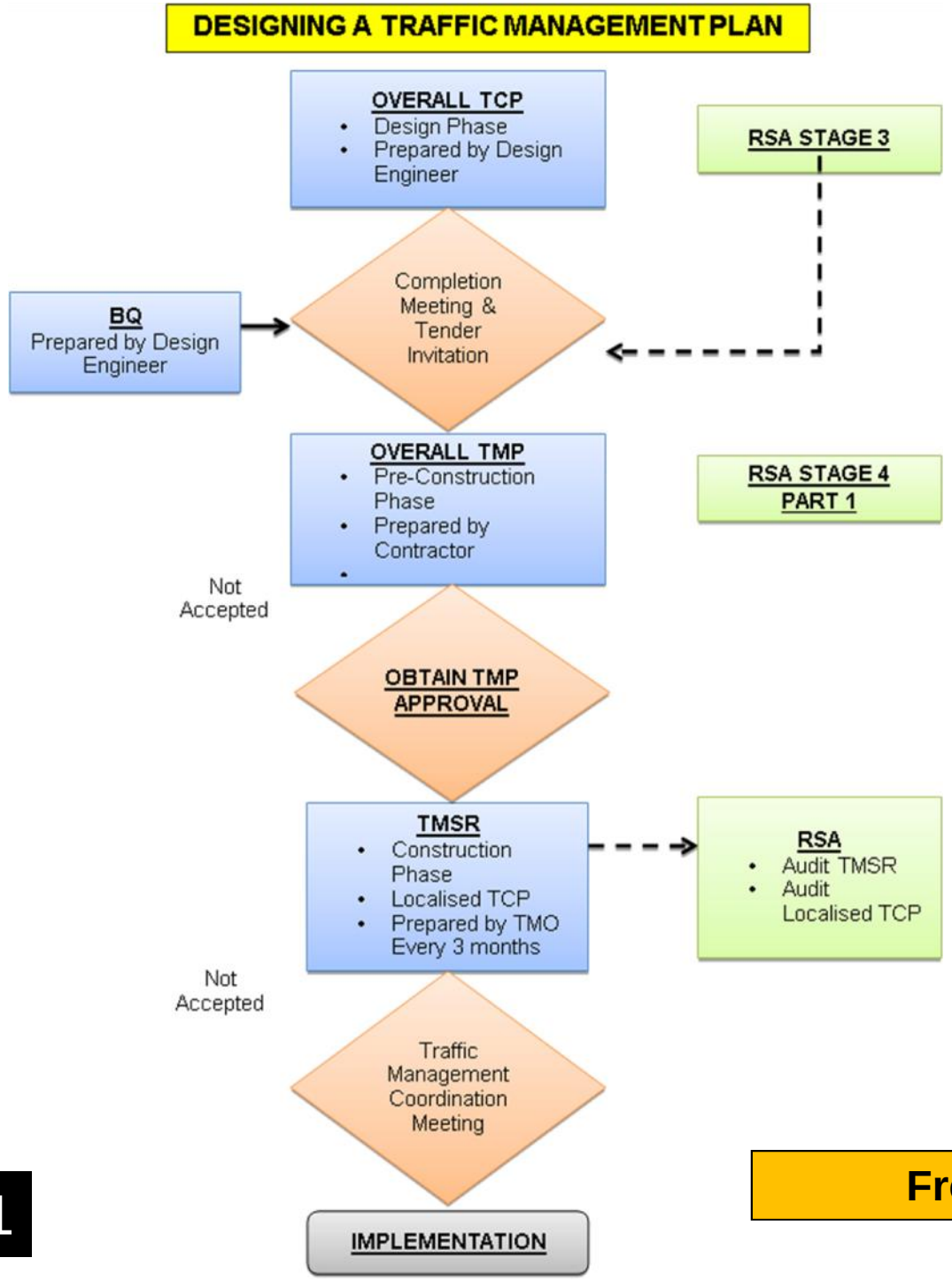
INSPECTIONS/MAINTENANCE

SPJ Specifies…

1. **TMO to inspect site TWICE a day**
2. **Maintenance to be carried out Daily**

The TMP PROCESS

The TMP works begins
as early as the design stage...

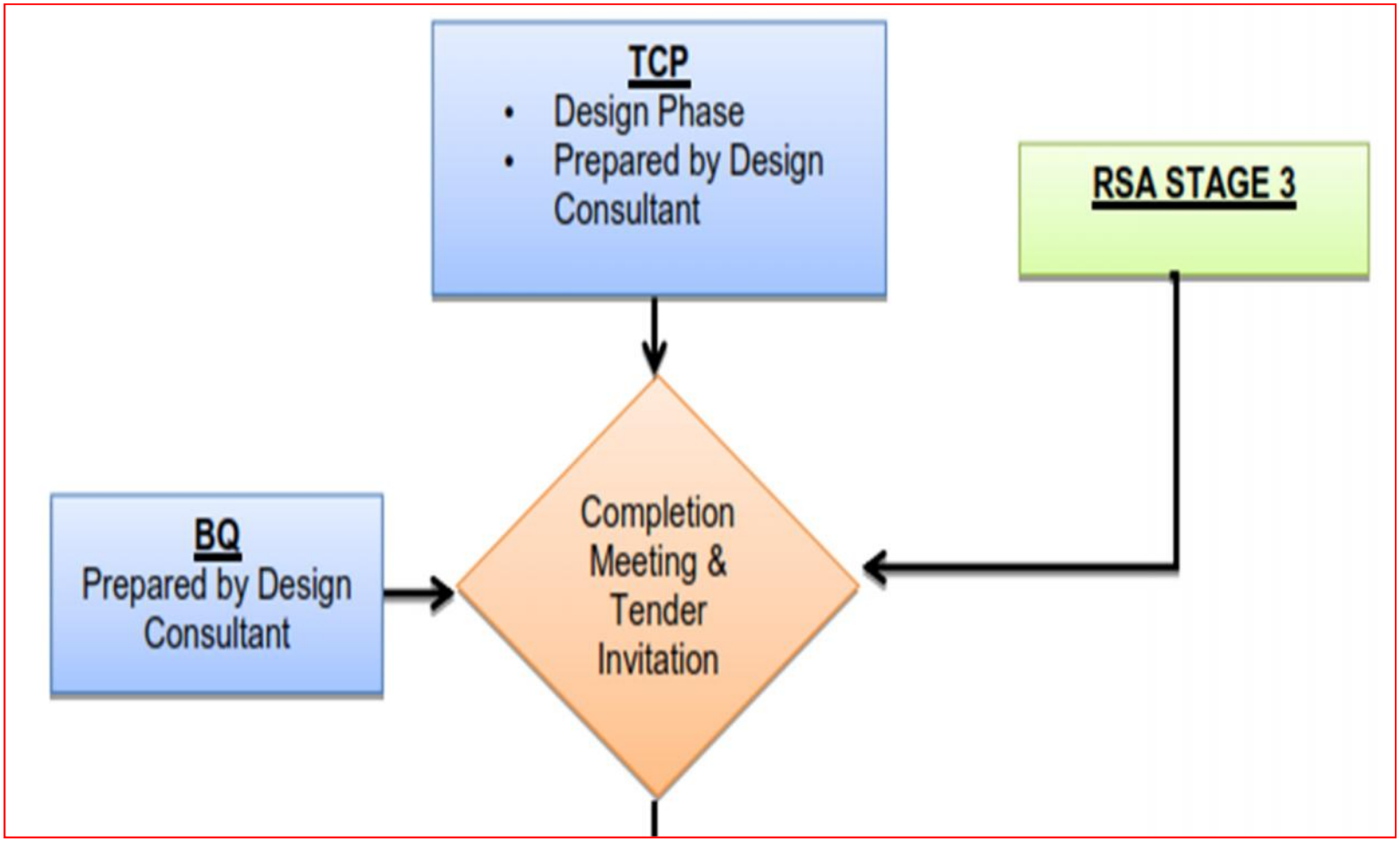


See Figure 5.1

From Manual

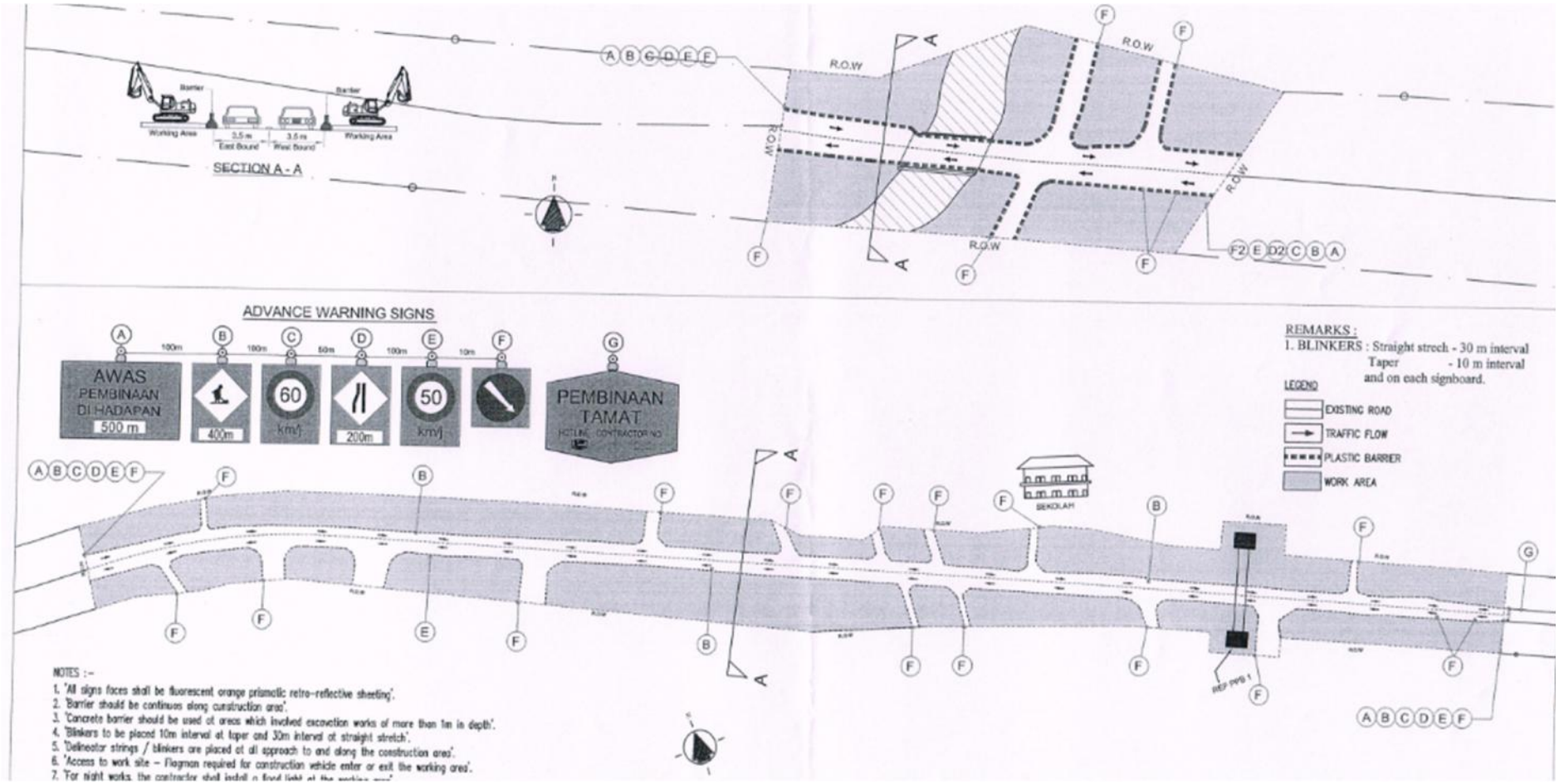
DESIGN STAGE

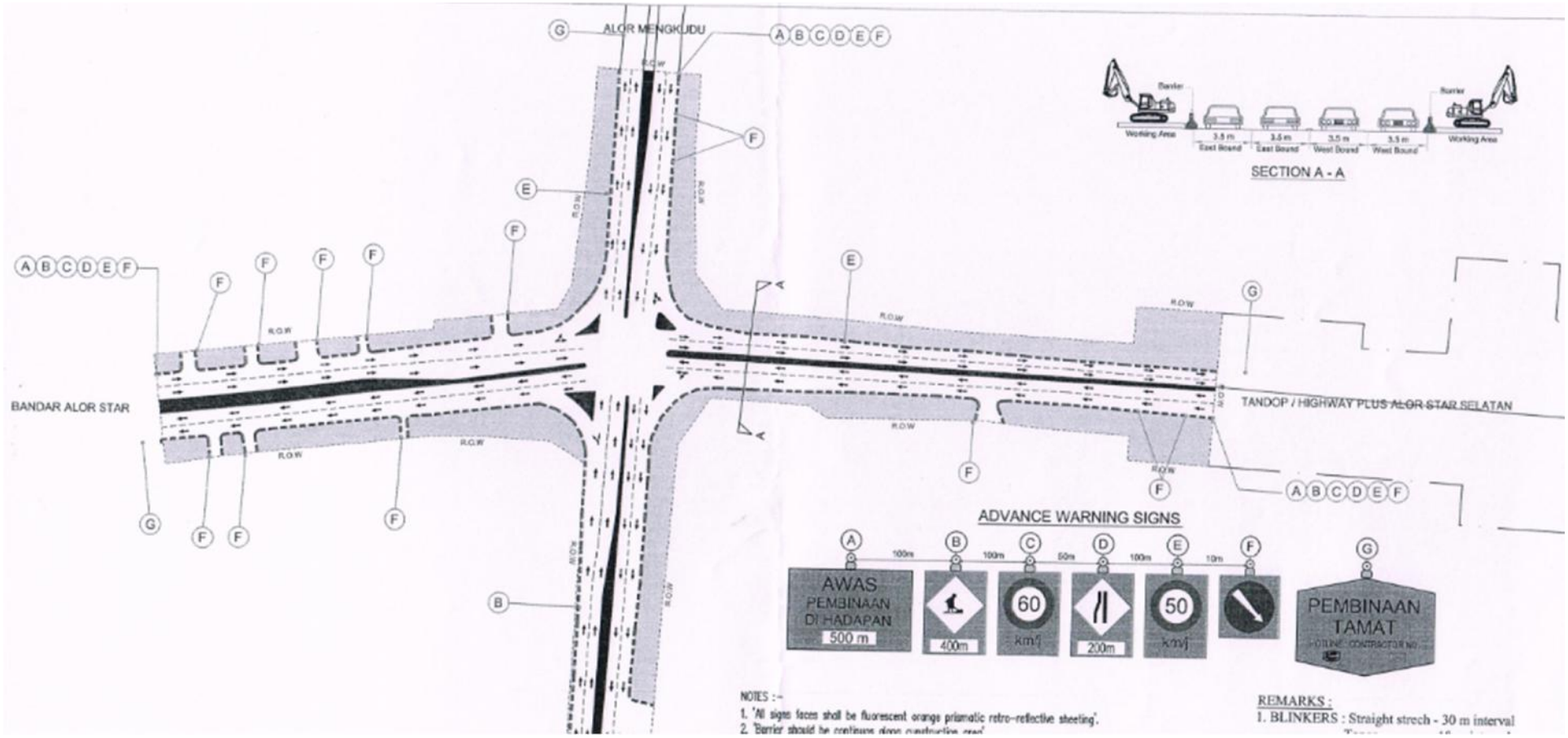
- Prepare Overall TCP design
- Prepare BQ



Overall TCP design

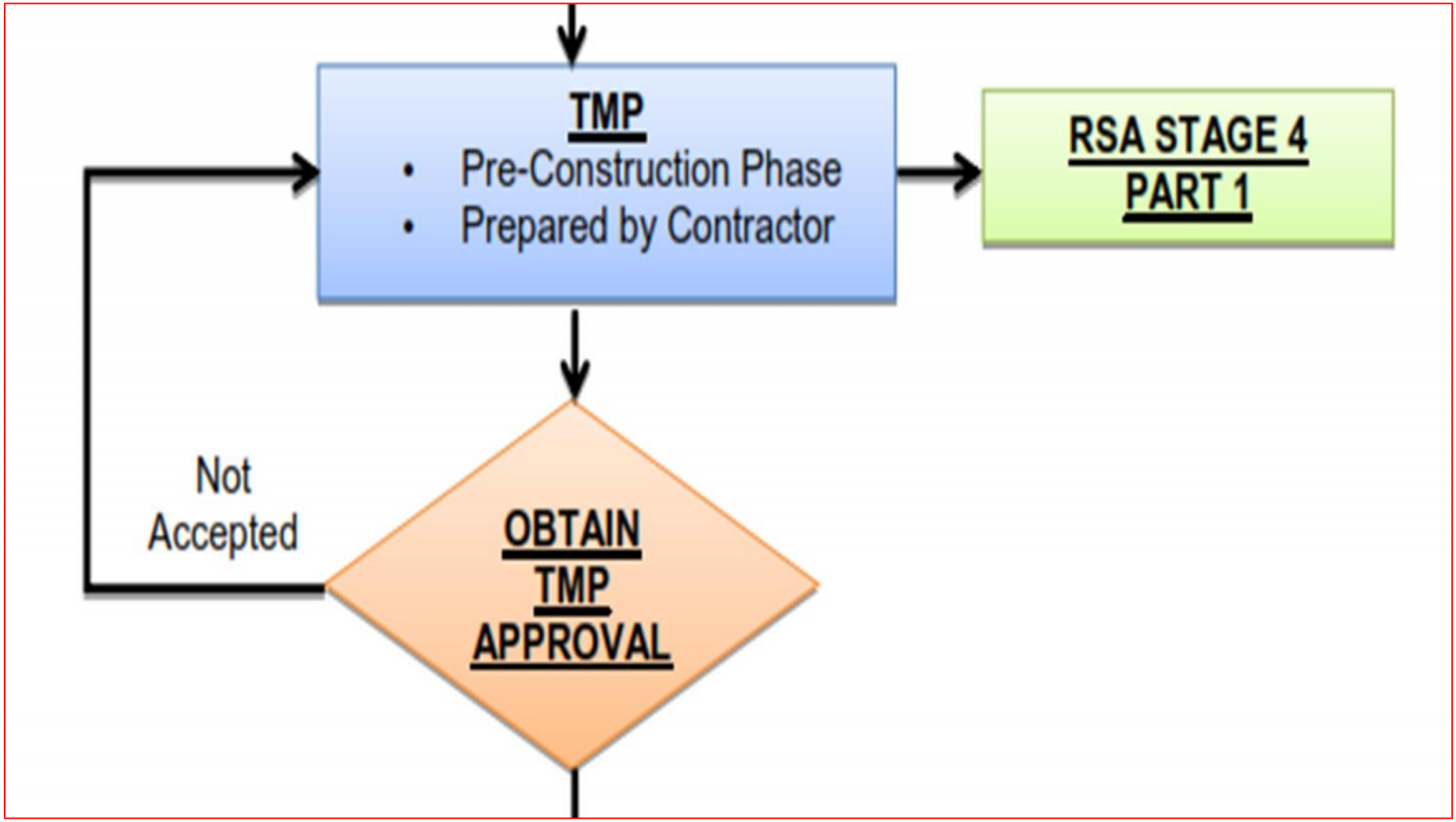
- Prepared by Design Engineers
- During Detailed Engineering Design Stage
- Must suit Construction Sequences and Methods
- To follow provisions of SPJ S19
- Followed by BQ


SECTION A - A
Barrier
Barrier
Working Area
3.5 m
East Bound
3.5 m
West Bound
Working Area
A B C D E F
R.O.W
R.O.W
R.O.W
R.O.W
F2 E D2 C B A
ADVANCE WARNING SIGNS
A
100m
B
100m
C
50m
D
100m
E
10m
F
G
AWAS
PEMBINAAN
DI HADAPAN
500 m
400m
60
km/j
200m
50
km/j
PEMBINAAN
TAMAT
HOTLINE CONTRACTOR NO
REMARKS :
1. BLINKERS : Straight strech - 30 m interval
Taper - 10 m interval
and on each signboard.
LEGEND
EXISTING ROAD
TRAFFIC FLOW
PLASTIC BARRIER
WORK AREA
SEKOLAH
A B C D E F
NOTES :-
1. 'All signs faces shall be fluorescent orange prismatic retro-reflective sheeting'.
2. 'Barrier should be continuos along curustruction area'.
3. 'Concrete barrier should be used at areas which involved excavation works of more than 1m in depth'.
4. 'Blinkers to be placed 10m interval at taper and 30m interval at straight stretch'.
5. 'Delineator strings / blinkers are placed at all approach to and along the construction area'.
6. 'Access to work site – Flagman required for construction vehicle enter or exit the working area'.
7. 'For night works, the contractor shall install a flood light at the working area'.


ALOR MENGKUDU
A B C D E F
G
F
E
R.O.W
Barrier
Working Area
3.5 m
East Bound
3.5 m
East Bound
3.5 m
West Bound
3.5 m
West Bound
Barrier
Working Area
SECTION A - A
BANDAR ALOR STAR
TANDOP / HIGHWAY PLUS ALOR STAR SELATAN
ADVANCE WARNING SIGNS
A
100m
B
100m
C
50m
D
100m
E
10m
F
G
AWAS
PEMBINAAN
DI HADAPAN
500 m
400m
60
km/j
200m
50
km/j
PEMBINAAN
TAMAT
HOTLINE CONTRACTOR NO
NOTES :-
1. 'All signs faces shall be fluorescent orange prismatic retro-reflective sheeting'.
2. 'Barrier should be continuous along construction area'
REMARKS :
1. BLINKERS : Straight stretch - 30 m interval

PRE-CONSTRUCTION STAGE

- Prepare TMP Proposal

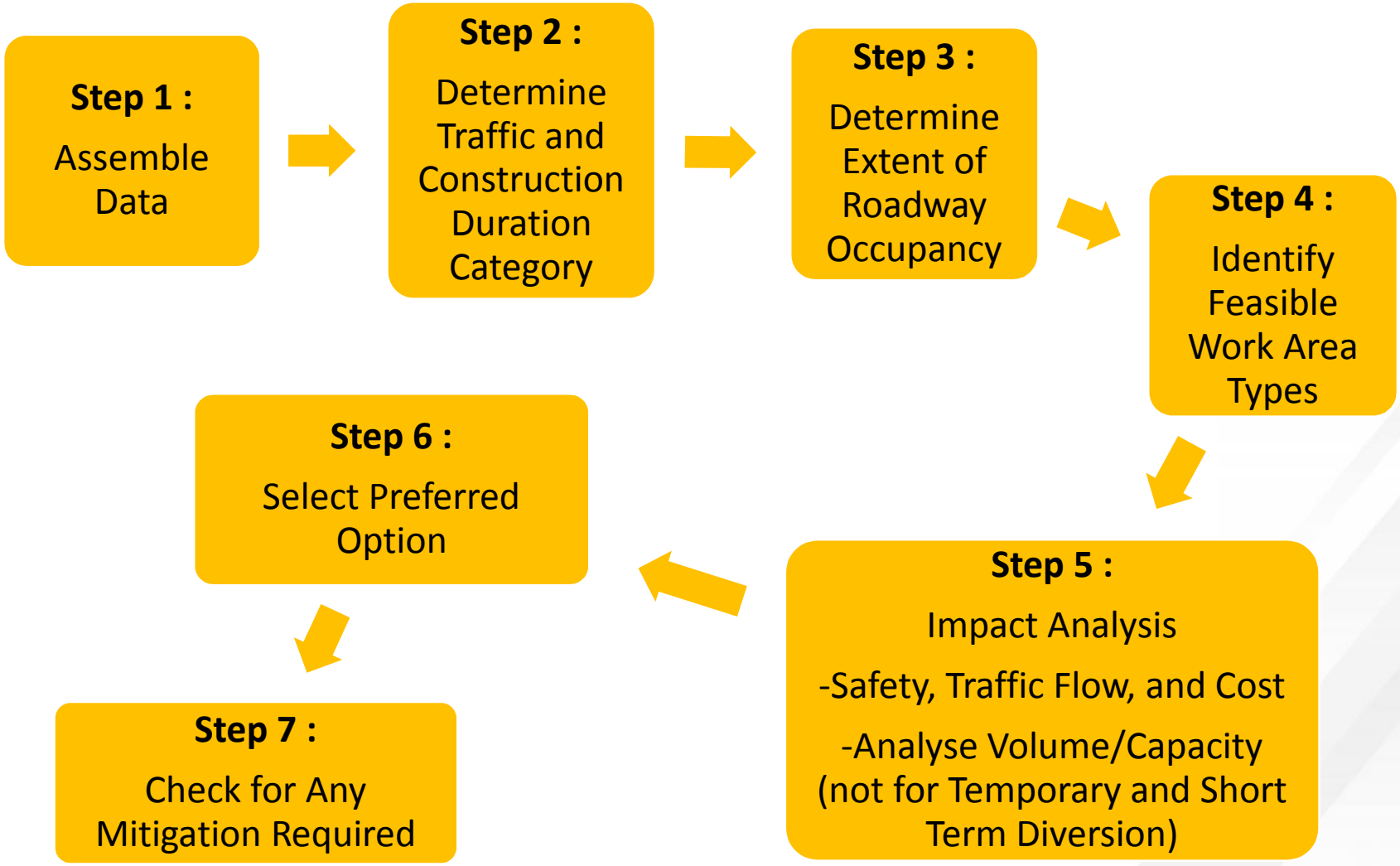


PRE-CONSTRUCTION STAGE

TMP (masterplan) Proposal

- Prepared by Contractor
- Prepared within 1 month after Site Possession
- Execute Planning Process (Chap 4)
- Record Salient Features of Existing Road (+Photos)
- Construction Sequences based of Master Programme
- Method Statement of Traffic Management stages
- Prepare Overall TCPs
- To follow provisions of SPJ S19

PLANNING


Step 1 :
Assemble Data
Step 2 :
Determine Traffic and Construction Duration Category
Step 3 :
Determine Extent of Roadway Occupancy
Step 4 :
Identify Feasible Work Area Types
Step 5 :
Impact Analysis
-Safety, Traffic Flow, and Cost
-Analyse Volume/Capacity (not for Temporary and Short Term Diversion)
Step 6 :
Select Preferred Option
Step 7 :
Check for Any Mitigation Required

Step 1: Assemble Data

1. Site visit
   i. Existing facilities – removal?
   ii. Inventory of existing features
   iii. Flow pattern
   iv. Potential problems

2. Desk study – traffic & accident data

A. Basic Information

- **Description of Construction Project**
  - Type of work
  - Roadway encroachment *should include the space required by the work activities and equipment. The safety buffer required for adequate work site protection and the physical space occupied by the barricades or other traffic control devices.*
  - Limits of work
  - Tentative work sequence and work programme
  - Estimated cost
  - Construction category

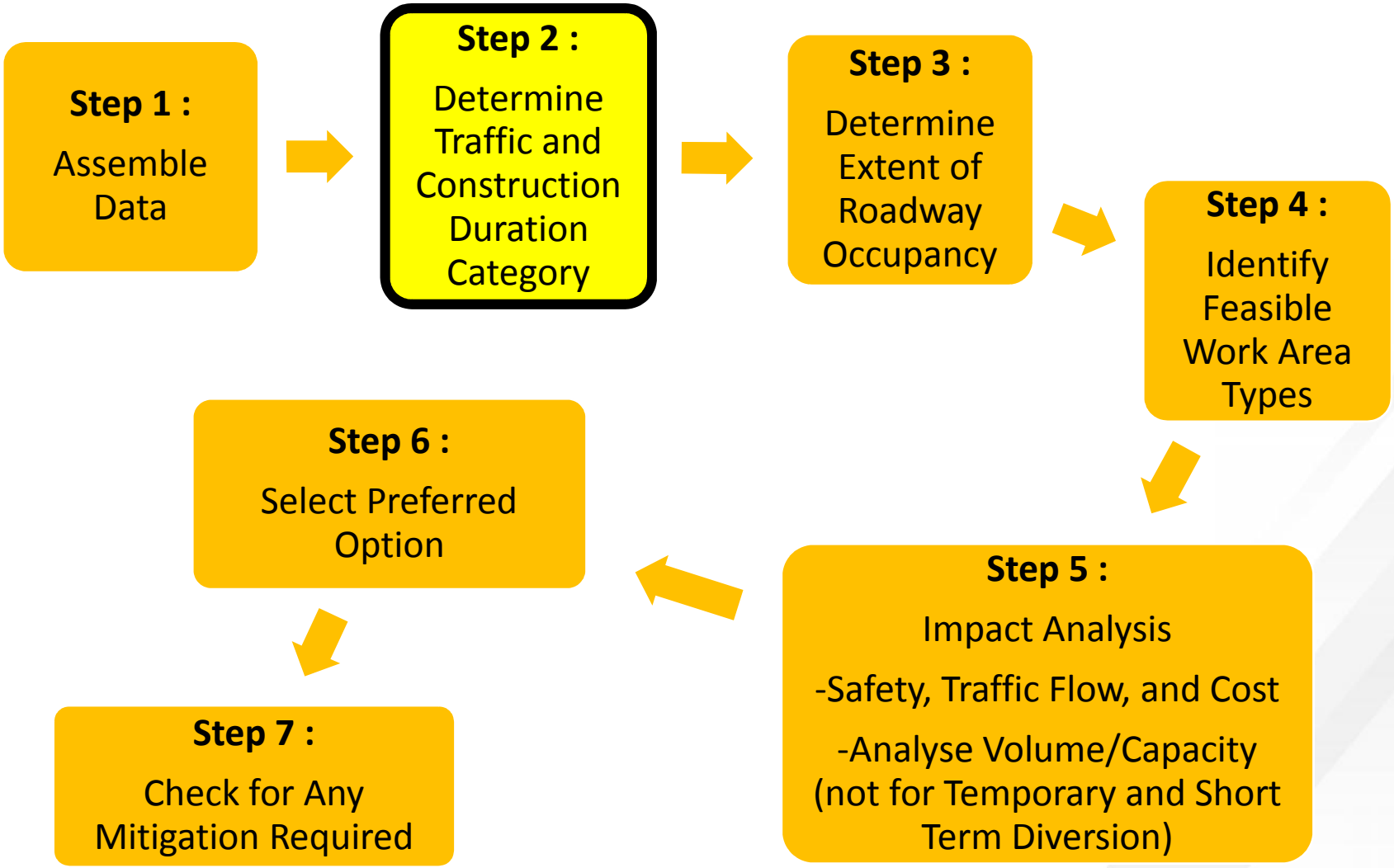
- **Traffic Data**
  - 24 hour volume counts
  - Roadways geometrics
  - Speed data
  - Description of potential detour routes

B. Additional Information

- **Roadway Data**
  - Right of way limitations
  - Horizontal and Vertical profiles
  - Type and location of traffic control devices
  - Adjacent lane use

- **Traffic Data**
  - Daily and seasonal volume variations
  - Intersection and Interchange turning movement counts
  - Volume of trucks
  - Signal timing data
  - Accident history

PLANNING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Step 6 :
Select Preferred Option
Step 7 :
Check for Any Mitigation Required

Step 2 : Determine Traffic & Construction Duration Categories

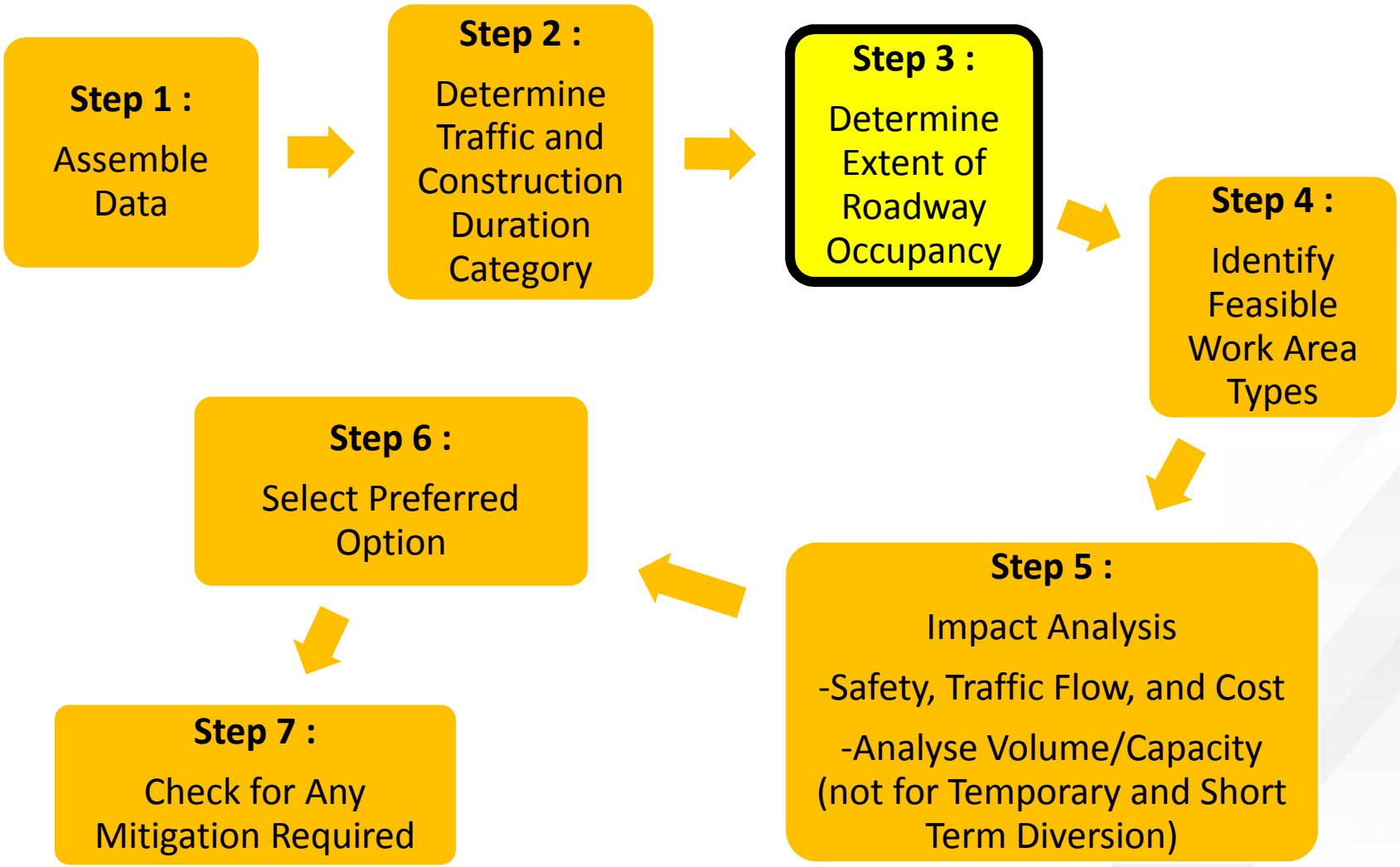
TABLE 4.2: TRAFFIC CATEGORIES

TRAFFIC CATEGORIES		
ROAD CLASSIFICATION	**SPEED PROFILE**	**SPEED**
URBAN	Low Speed	< 60 km/hr
	High Speed	> 60 km/hr
RURAL	Low Speed	< 70 km/hr
	High Speed	> 70 km/hr
EXPRESSWAY	Low Speed	< 90 km/hr
	High Speed	> 90 km/hr

TABLE 6.2: THE CONSTRUCTION DURATION CATEGORIES

CONSTRUCTION DURATION CATEGORIES	
CLASSIFICATION	**DURATION**
Temporary Lane closure *Flagmen are always required during temporary lane closure	< 1 Day
Short Term Diversion	> 1 Day < 1 Month
Long Term Diversion	> 1 Month

PLANNING


Step 1 :
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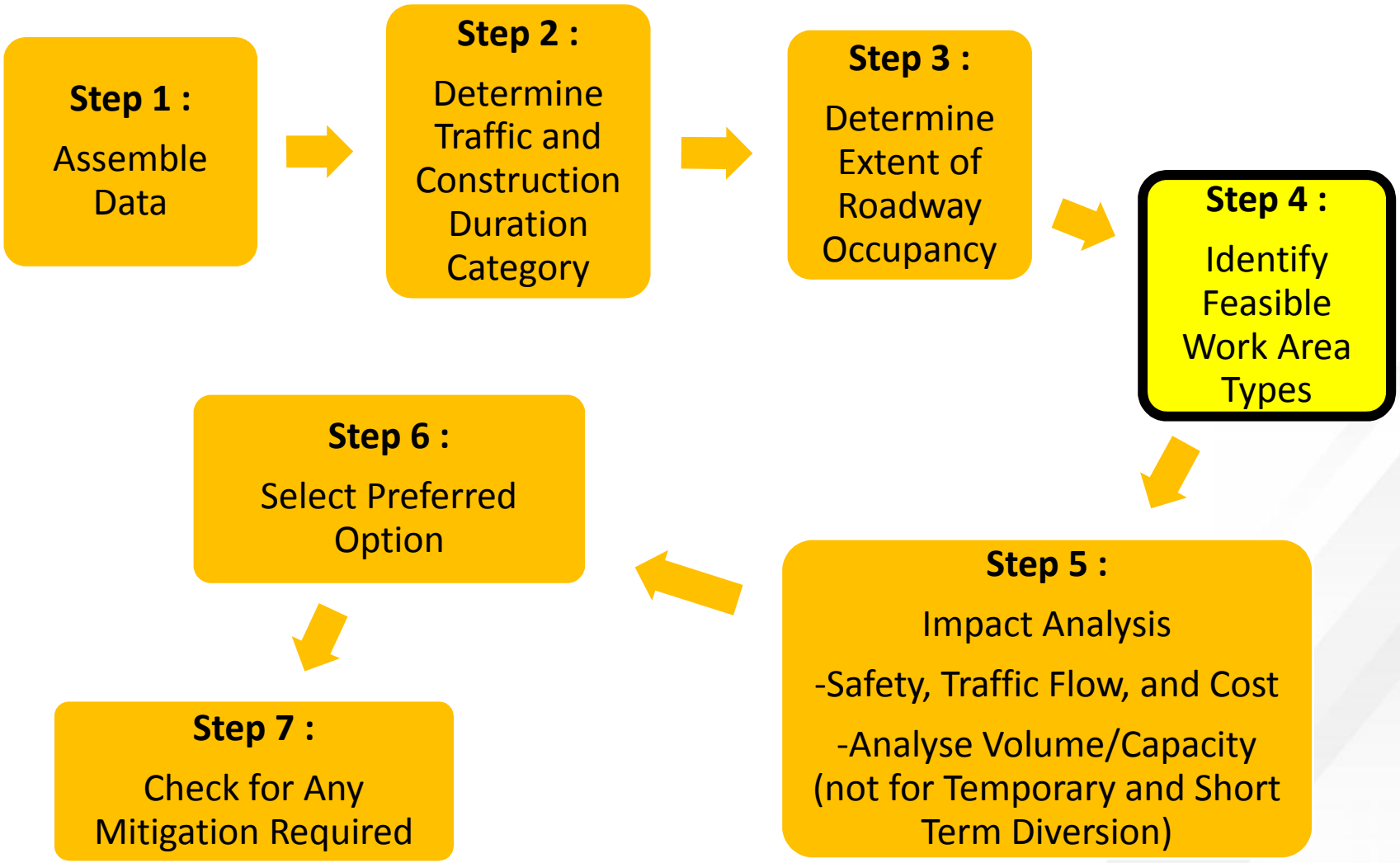
Step 5 :
Impact Analysis
-Safety, Traffic Flow, and Cost
-Analyse Volume/Capacity (not for Temporary and Short Term Diversion)
Step 6 :
Select Preferred Option
Step 7 :
Check for Any Mitigation Required

Step 3 : Determine Extent Roadways Occupancy

1. Number & width of lanes – maintain!!!

2. Factors ?
   i. Total project length
   ii. Length of occupied roadway
   iii. Portion to be closed
   iv. Number of working days
   v. Cross section
   vi. ROW

PLANNING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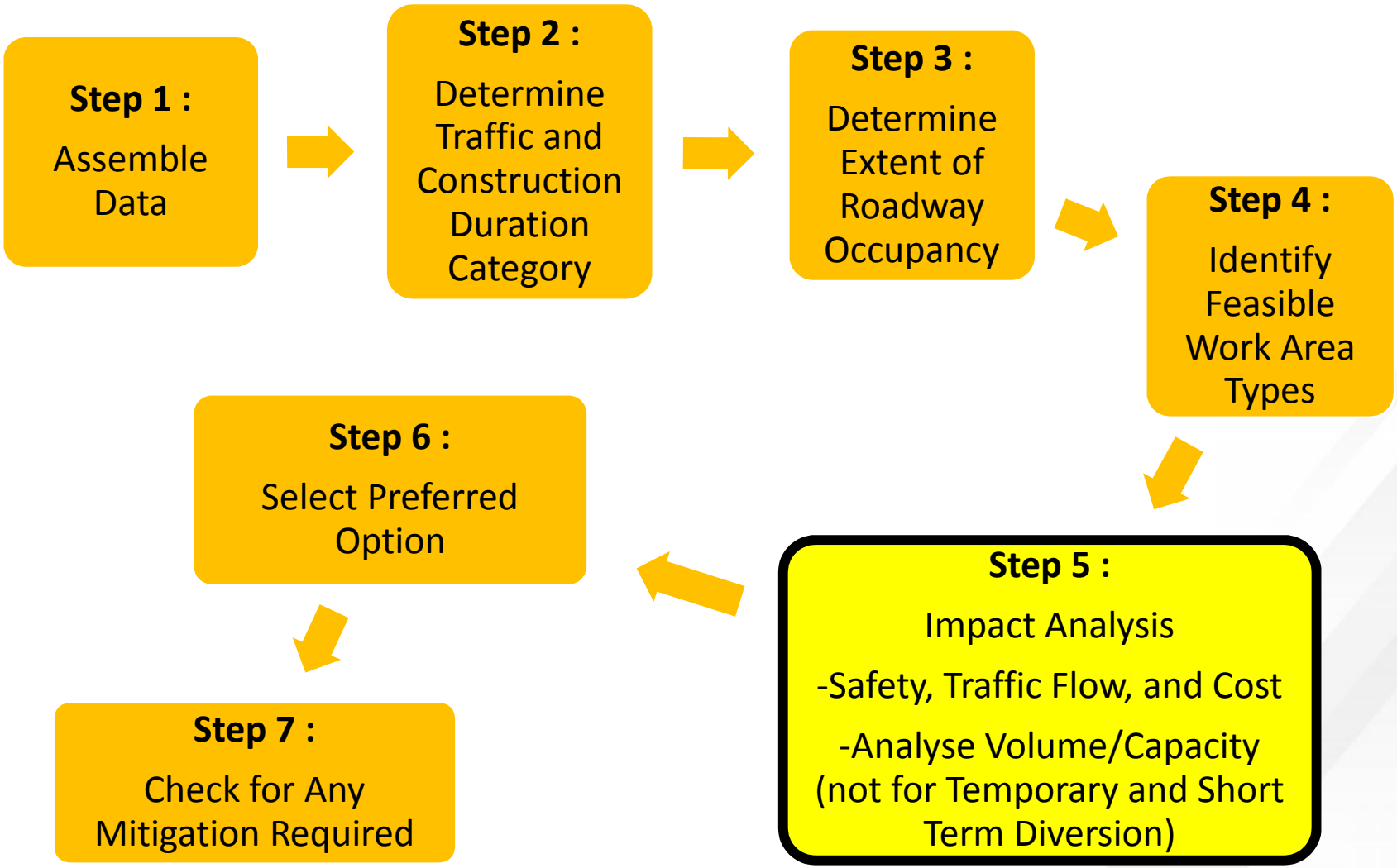
-Safety, Traffic Flow, and Cost
-Analyse Volume/Capacity (not for Temporary and Short Term Diversion)
Step 6 :
Select Preferred Option
Step 7 :
Check for Any Mitigation Required

Step 4 : Identify Feasible Work Area Types

Identify possible types…

1. Lane Narrowing
2. Lane Closure
3. Contra Flow
4. On-site or off-site Detour
5. Temporary Bypass
6. Intermittent Closure
7. Use of Shoulder or Median

PLANNING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Identify Feasible Work Area Types
Step 5 :
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-Safety, Traffic Flow, and Cost
-Analyse Volume/Capacity (not for Temporary and Short Term Diversion)
Step 6 :
Select Preferred Option
Step 7 :
Check for Any Mitigation Required

Step 5 : Impact Analysis

1. Safety
2. Traffic Flow
3. Cost
4. Volume vs Capacity (Not for temporary and short term diversion)

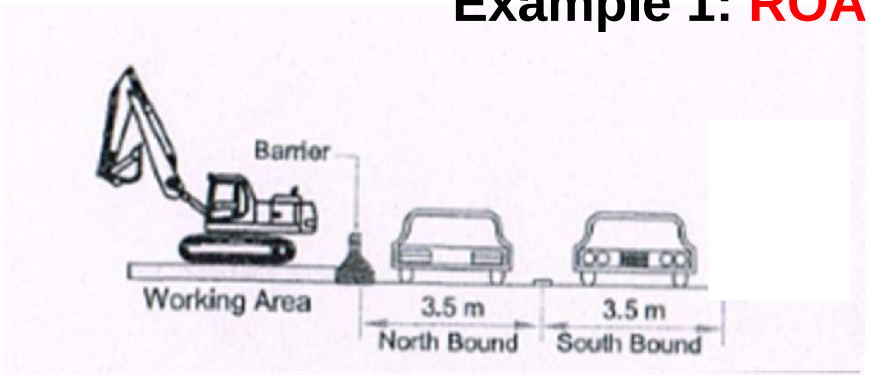
CONSTRUCTION SEQUENCES

Contractor must identify their

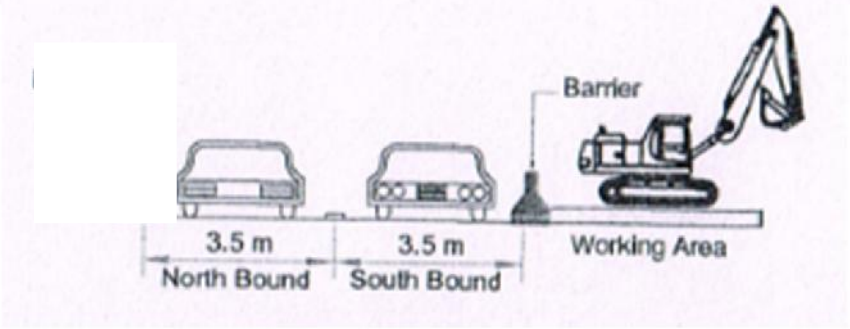
- **Construction Sequences &Traffic Management Methods**
- **Identify where and when Road Closures are required**
- **Identify Major Traffic Detours**

PRE-CONSTRUCTION STAGE

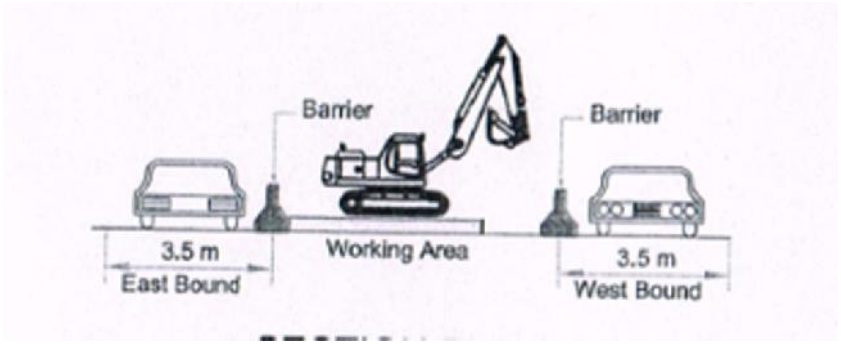
Example 1: ROAD WIDENING & UPGRADING



PHASE 1



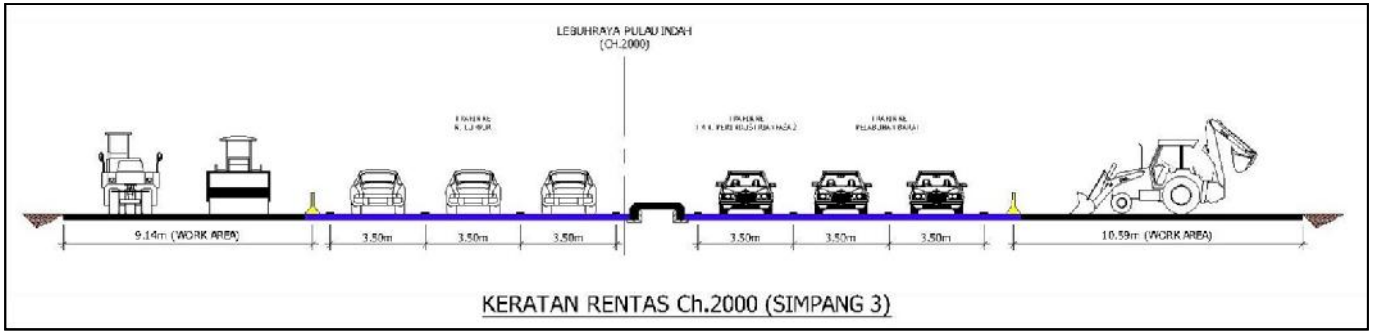
PHASE 2



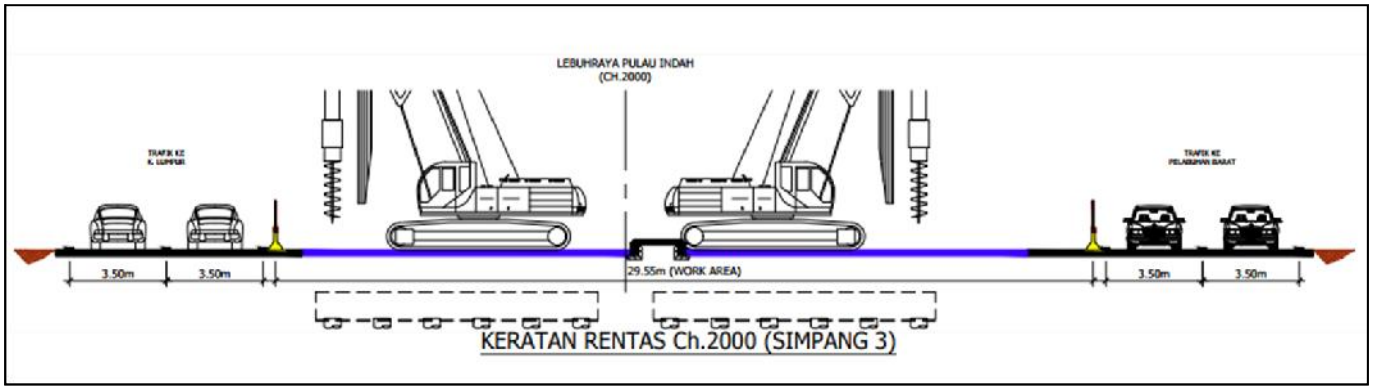
PHASE 3

Example 2: VIADUCT CONSTRUCTION

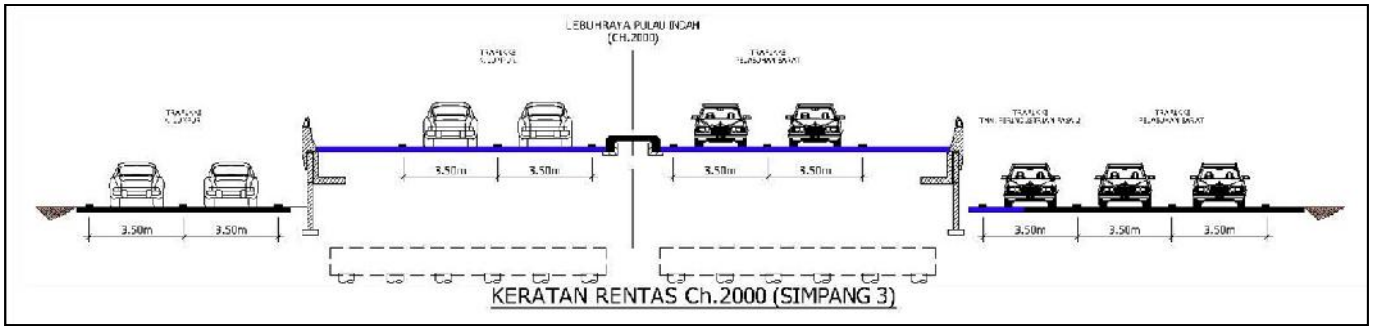
Stage 1



Stage 2

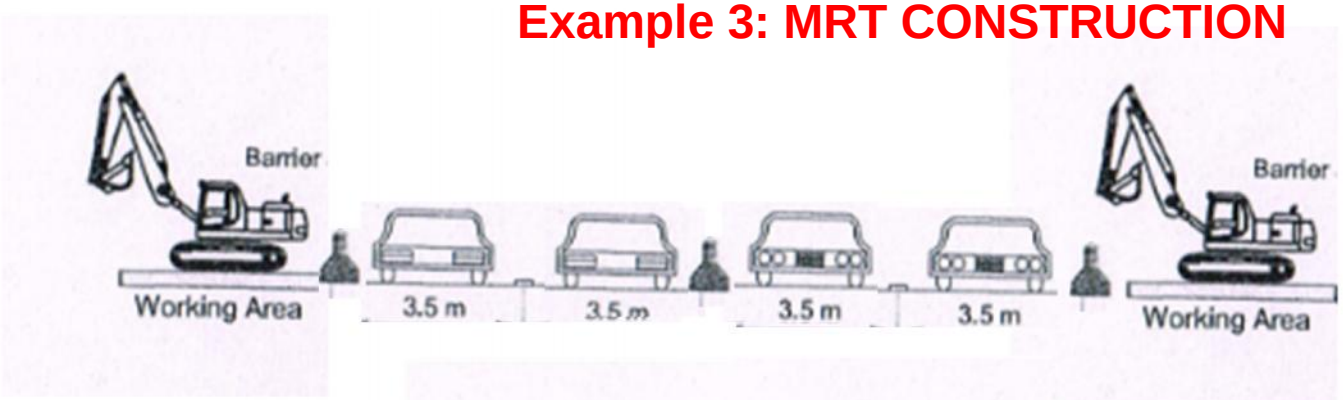


Stage 3

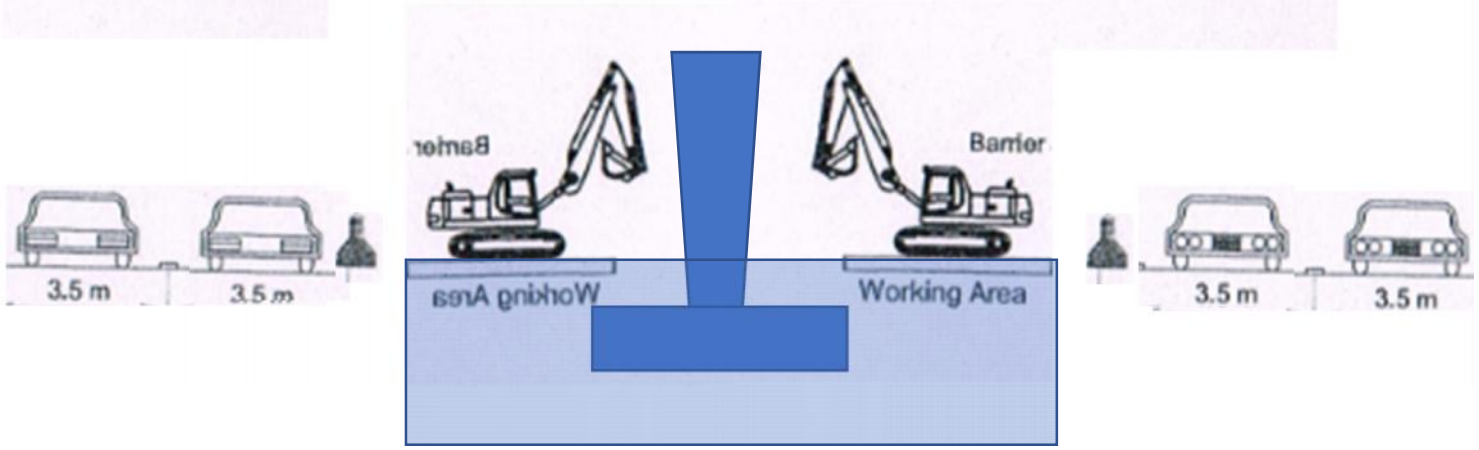


PRE-CONSTRUCTION STAGE

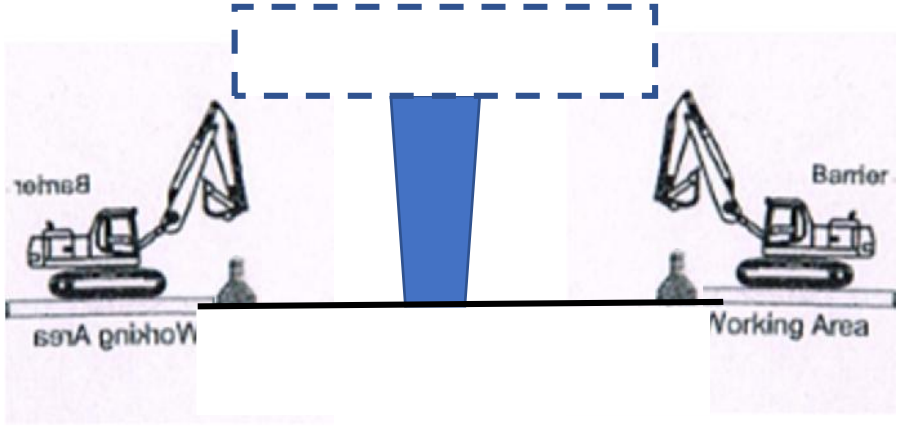
Example 3: MRT CONSTRUCTION



PHASE 1
Road widening



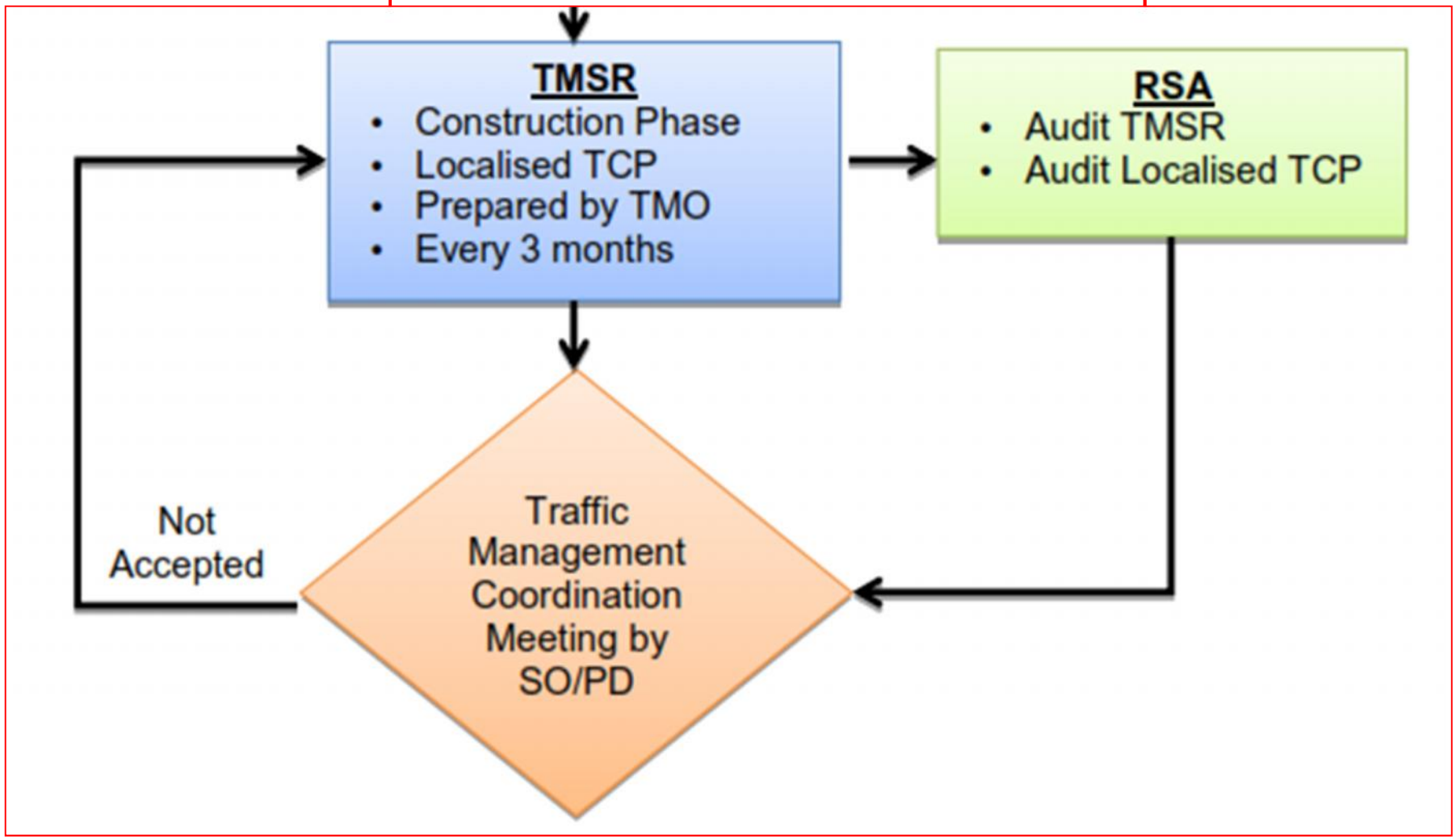
PHASE 2
Pier Construction



PHASE 3
Beam Launching

CONSTRUCTION STAGE

- Prepare Localised TCP
- Prepare TMSR

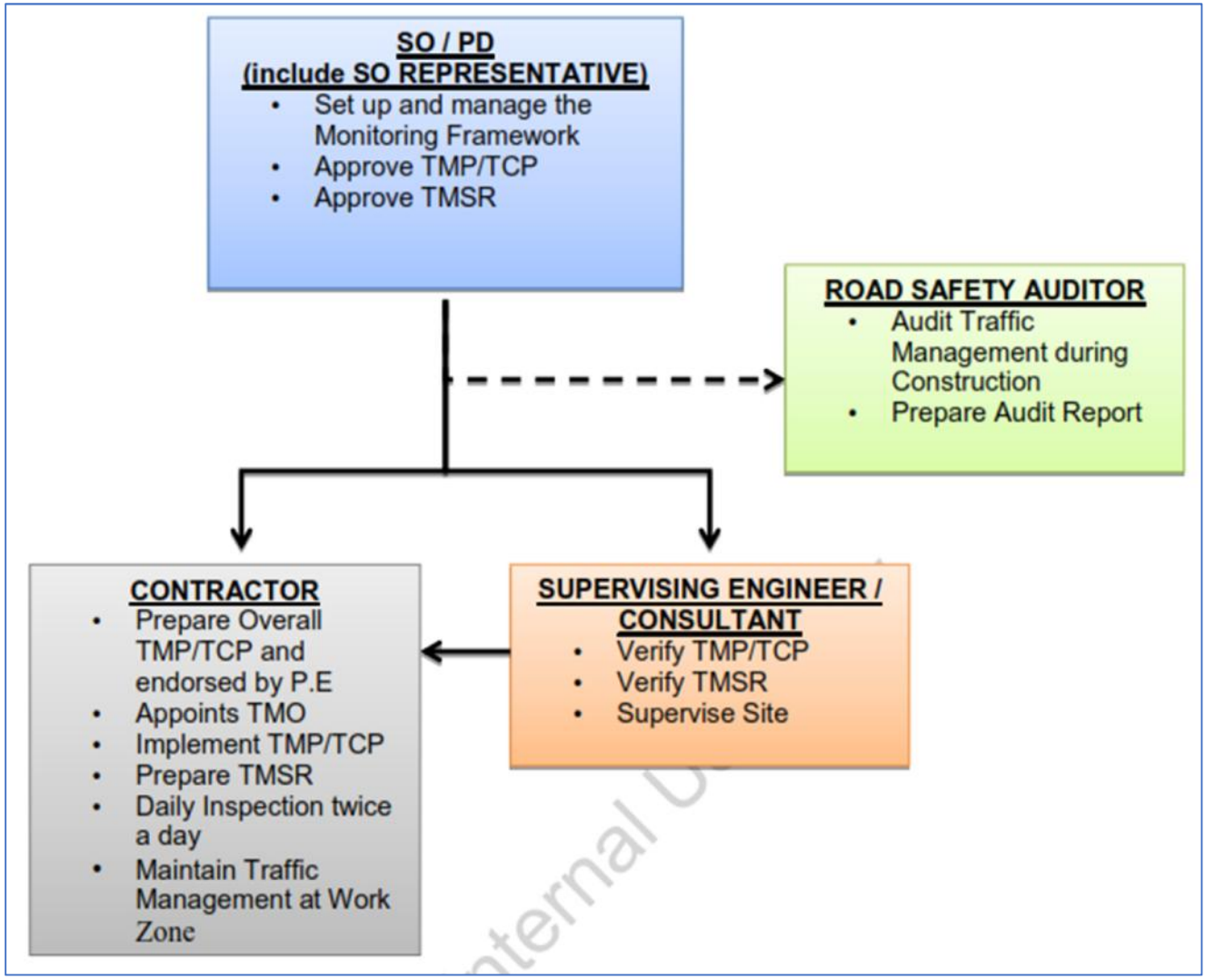


CONSTRUCTION STAGE

DURING CONSTRUCTION

- TMP Monitored by Management Framework
- Contractor sets up TMT & ERT Teams
- Contractor designs Localised TCPs
- Contractor prepares TMSR
- Site Placements/Removals
- Maintenance of Work Zones
- TMO Daily Inspections
- RSA Audit TMP/TMSR

FRAMEWORK TO MONITOR TRAFFIC MANAGEMENT AT WORK ZONE



DURING CONSTRUCTION

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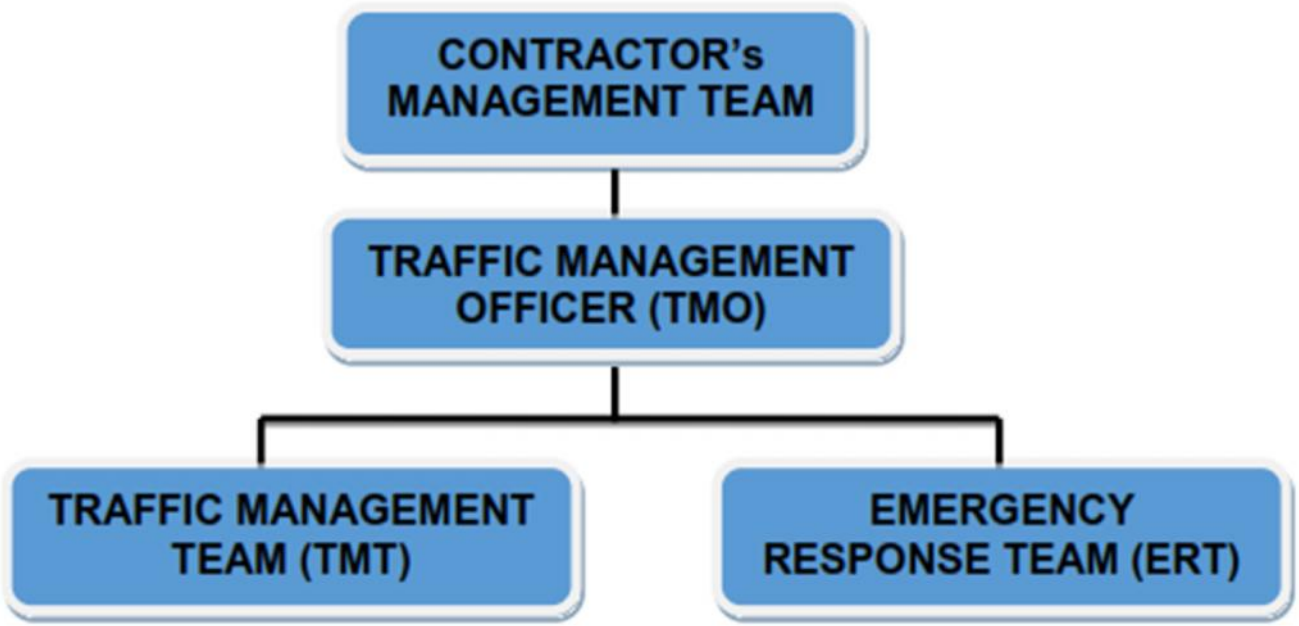
- RSA Audit TMP/TMSR

CONSTRUCTION STAGE

TMP Working Teams



CONSTRUCTION STAGE

Traffic Management Officer (TMO)

- Design Localised TCPs
- Sets up TMT & ERT Teams
- Maintain Effectiveness of Localised TCPs
- Prepares TMSR
- Daily Inspections

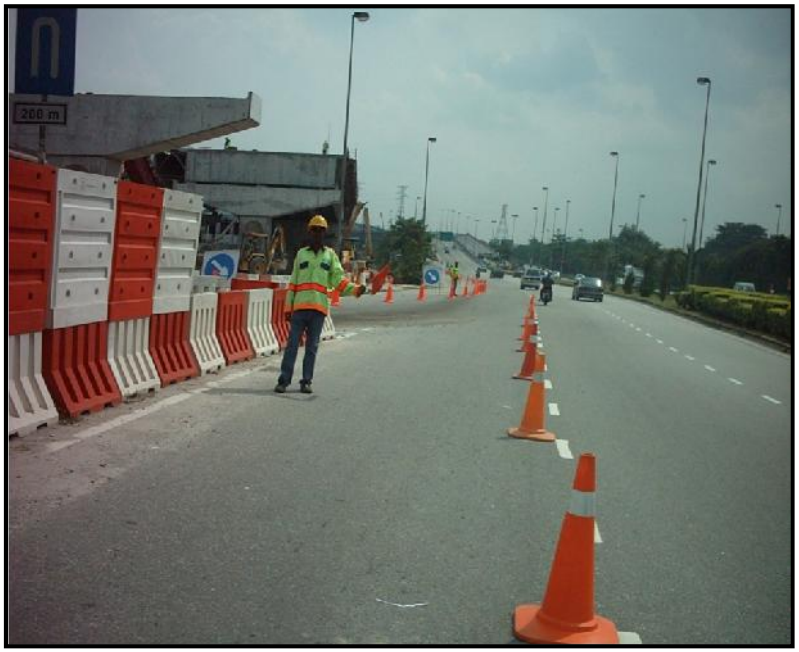
CONSTRUCTION STAGE

Traffic Management Team (TMT)

- Ensure Effective Implementation of TCPs
- Efficient Placement and Removals of TCDs
- Ensure Safety and Smooth Traffic Flows
- Maintain Effectiveness of TCDs

TMT at work

TMT at WORK



Emergency Response Team (ERT)

- Provide 24hr patrol of Work Zones
- Provide Traffic Control during emergency situations
- Implement Emergency Response Plan

ERT

USE OF FLAGMEN

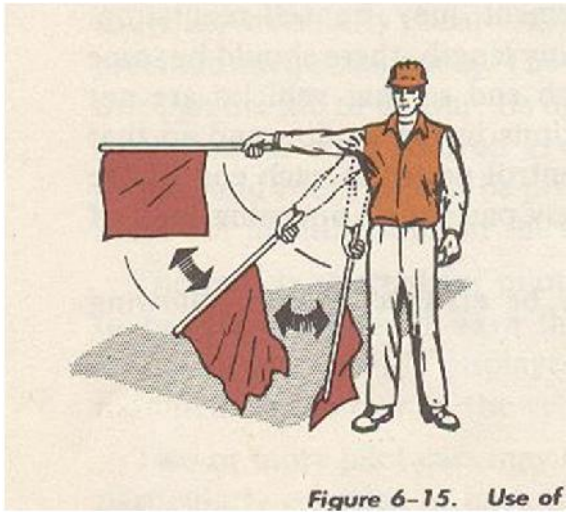
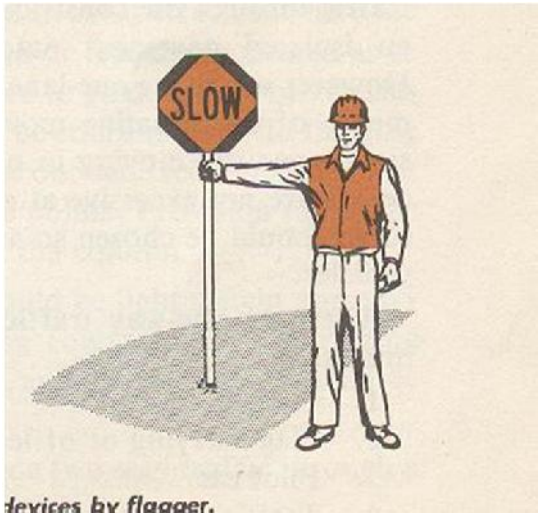


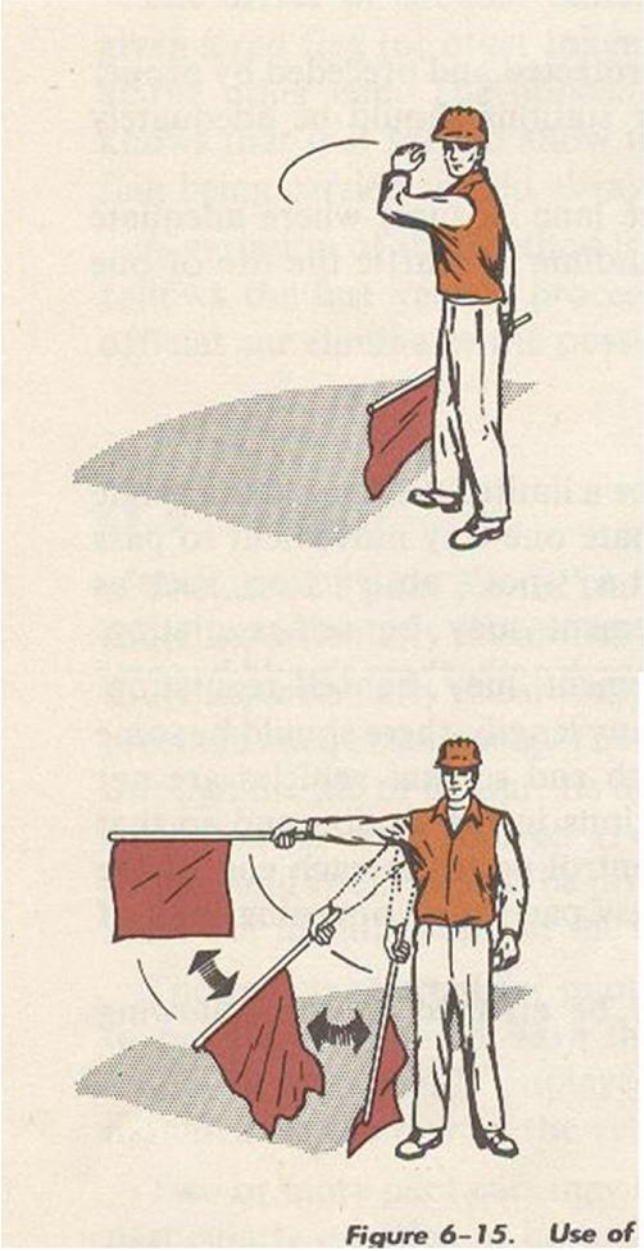
Figure 6–15. Use of



devices by flagger.

FLAGMEN

Flagmen should be properly trained and also given the right equipment



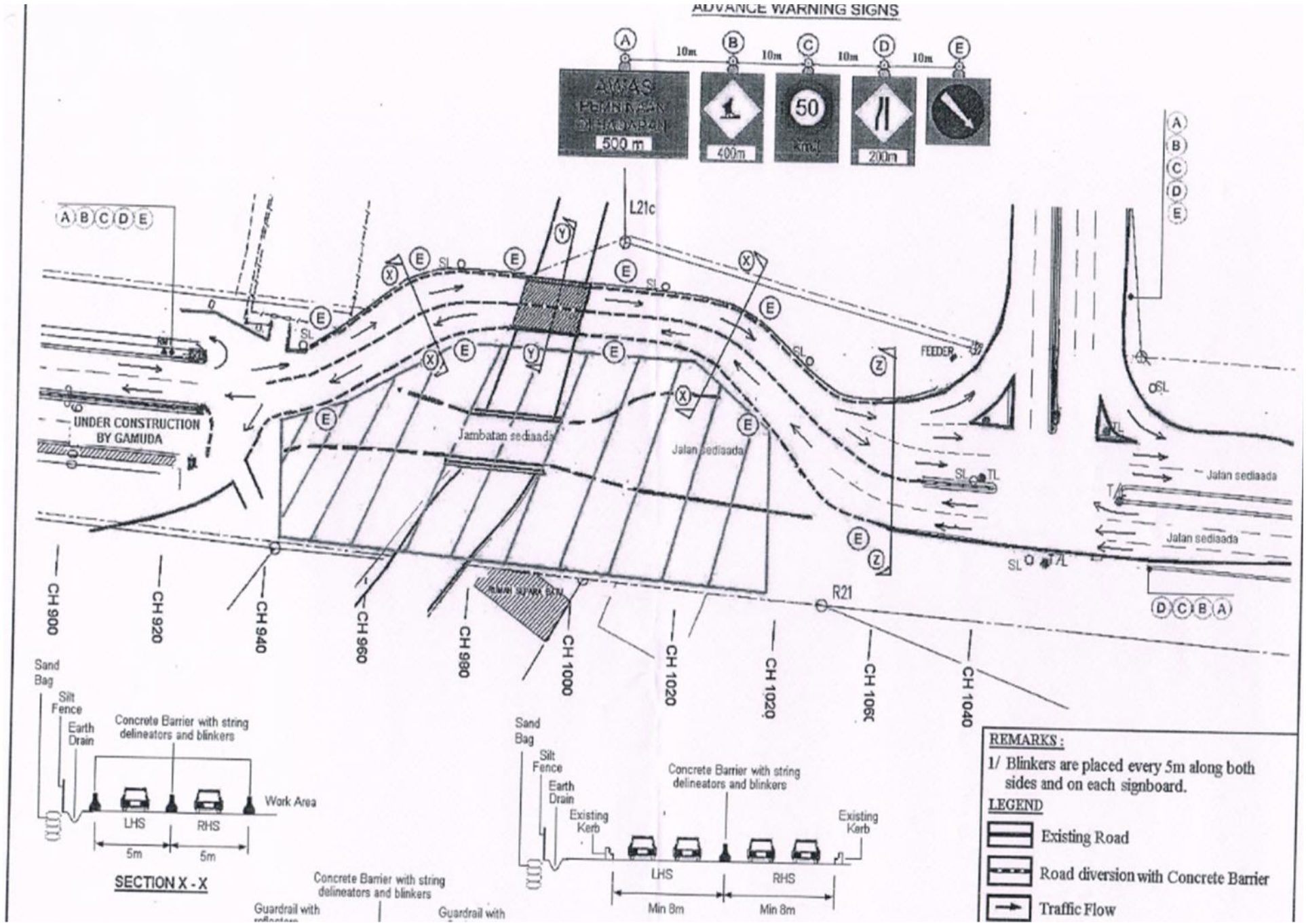
FLAGMEN

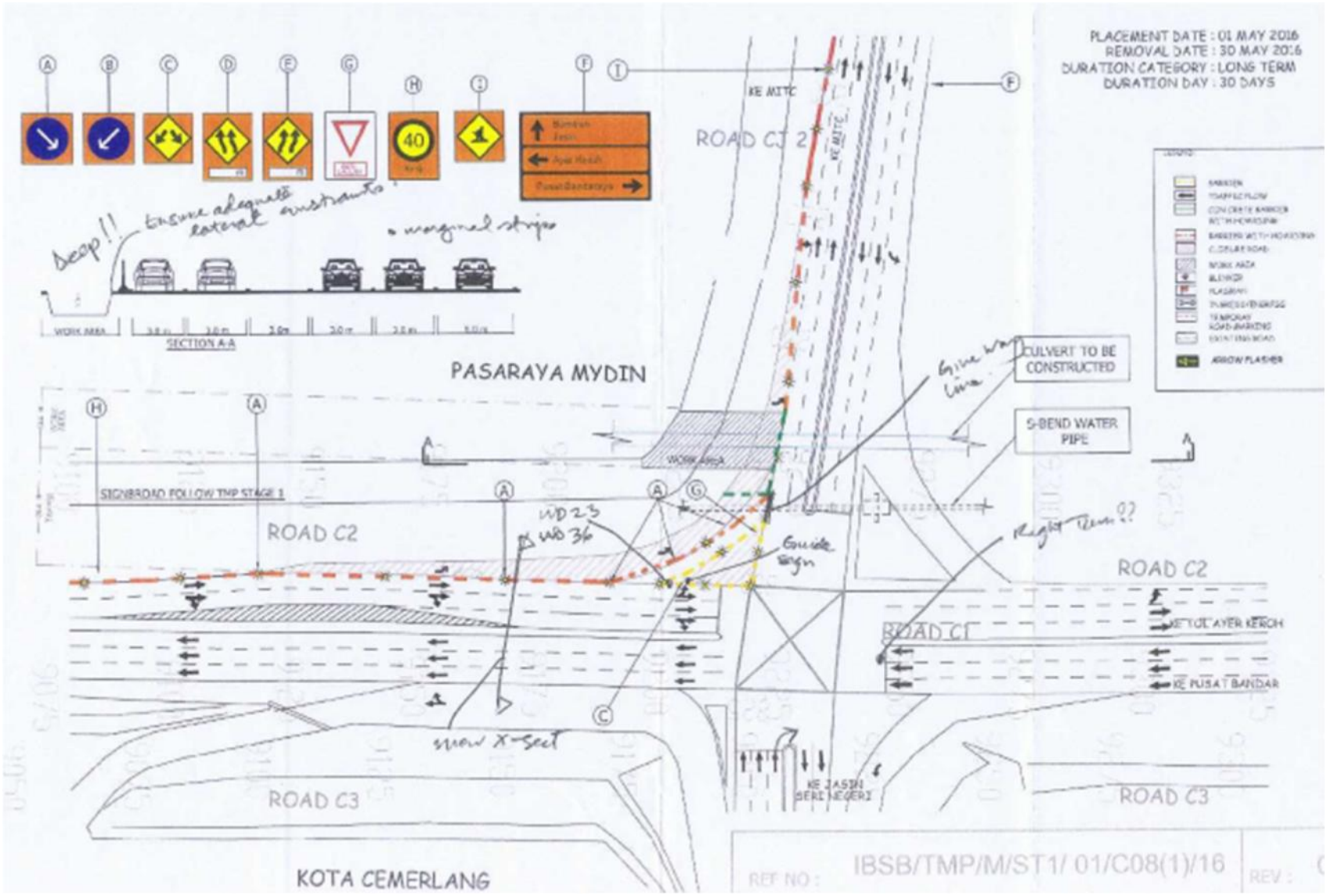
They are the hardest working guys at the site.

DURING CONSTRUCTION

- TMP Monitored by Management Framework
- Contractor sets up TMT & ERT Teams
- Contractor designs Localised TCPs
- Contractor prepares TMSR
- Site Placements/Removals
- Maintenance of Work Zones
- TMO Daily Inspections
- RSA Audit TMP/TMSR

Designing Localised TCPs


ADVANCE WARNING SIGNS
A
B
C
D
E
10m
10m
10m
10m
500 m
400m
50
Km/j
200m
L21c
FEEDER
UNDER CONSTRUCTION BY GAMUDA
Jambatan sediaada
Jalan sediaada
Jalan sediaada
Jalan sediaada
RUMAH SUARA BATU
R21
CH 900
CH 920
CH 940
CH 960
CH 980
CH 1000
CH 1020
CH 1020
CH 106(
CH 1040
Sand Bag
Silt Fence
Earth Drain
Concrete Barrier with string delineators and blinkers
Work Area
LHS
RHS
5m
5m
SECTION X - X
Concrete Barrier with string delineators and blinkers
Guardrail with
Guardrail with
Sand Bag
Silt Fence
Earth Drain
Existing Kerb
Concrete Barrier with string delineators and blinkers
Existing Kerb
LHS
RHS
Min 8m
Min 8m
REMARKS :
1/ Blinkers are placed every 5m along both sides and on each signboard.
LEGEND
Existing Road
Road diversion with Concrete Barrier
Traffic Flow


PLACEMENT DATE : 01 MAY 2016
REMOVAL DATE : 30 MAY 2016
DURATION CATEGORY : LONG TERM
DURATION DAY : 30 DAYS
PASARAYA MYDIN
ROAD C2
ROAD C1
ROAD C3
CULVERT TO BE CONSTRUCTED
S-BEND WATER PIPE
SIGNBROAD FOLLOW TMP STAGE 1
KE MITC
KE PUSAT BANDAR
KOTA CEMERLANG
REF NO : IBSB/TMP/M/ST1/ 01/C08(1)/16
REV :

DURING CONSTRUCTION

- TMP Monitored by Management Framework
- Contractor sets up TMT & ERT Teams
- Contractor designs Localised TCPs
- Contractor prepares TMSR
- Site Placements/Removals
- Maintenance of Work Zones
- TMO Daily Inspections
- RSA Audit TMP/TMSR

Preparation of TMSR

Content of TMSR

Traffic Management Safety Reports (TMSR)

The Traffic Management Safety Reports (TMSR) is an essential document in the execution of the project. These reports are to be submitted at 3 monthly intervals to the S.O., the Supervision Engineers and the Road Safety Auditor. These reports are to be prepared by the Traffic Management Officer (TMO) and shall include the following:

(a) TCPs prepared and enforced on the ground
(b) TCPs for the next three months' work
(c) Estimated duration of each TCP (Placement dates and expected Removal dates) are required.
(d) Accident occurrences and analyses.
(e) Performance Indicators

A suggested format for the TMSR is as shown below:

Content of TMSR

(a) Introduction

(i) objective of the report
(ii) objective of the Traffic Management Plans
(iii) objective of the TMSR report
(iv) photos of the site
(v) schedule of the TMSR reports for the project

(b) Background of Project

(i) Project details
(ii) Traffic data
(iii) Strip map
(iv) Construction Program
(v) The importance of the road
(vi) The conditions of the road and surrounding area

(c) Project Contractor's Site Organisation

(i) Organization chart of the project
(ii) TMT and ERT organization
(iii) List the tasks and responsibilities of each member of the TMT and ERT

(d) Work Progress and Traffic Control Plan

(i) Construction Progress and TCPs for the last 3 months
- Give detail of the work done and the TCPs
- Records of workers, traffic control devices and inventories used

(ii) Construction Schedule and TCPs for the next 3 months
- Give detail of the work to be carried out and the TCPs proposed
- Records of workers, traffic control devices and inventories to be used

(iii) Photos of site where TCPs to be applied

Content of TMSR

(e) Photos during the operation of the Traffic Control Plans
Provide photos of the TCPs for the last 3 months

(f) Methods of Assessing Performance of TCPs
The Contractor should propose suitable methods of assessment

- Acceptable methods are; Degree of Congestion, Queue Length, Travel Time, Number of Accidents, Number of Complaints, and other quantifiable items
- "Before" and "After" data should be collected

(g) Emergency Response Plan (ERP) and Emergency Response Team (ERT)

(i) Emergency Response Plan (ERP)
- Give detail of the plan and show "alternative route"

(ii) Emergency Response Team (ERT)
- Give detail of the organization chart and "Line of Communication"

(h) Records of Public Complaints
Provide records of public complaints through media, letters, newspapers, etc

(i) Damage to Vehicles
Provide records and photos of vehicles experiencing problems within the work zones

(j) Accident Analyses

(i) Provide records of Accidents within Work Zones during the last 3 months
- Give detail of dates, time, collision diagram, location, damages. Show photos.

(ii) Provide records of Accidents within the Project Work Zones from the start of project.
- Give detail of dates, time, collision diagram, location, damages. Show photos.

(k) Evaluation

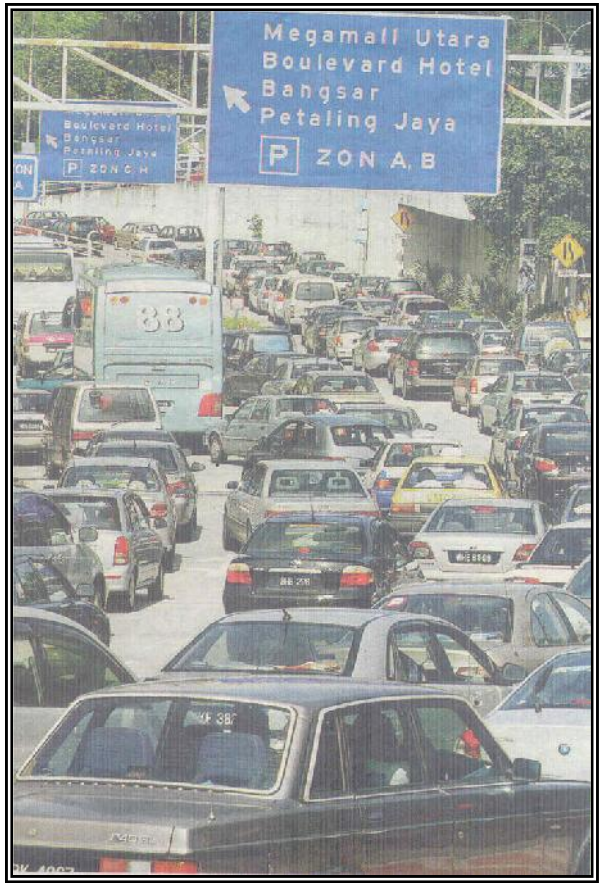
(i) Evaluate the effectiveness of the TMPs during the last 3 months
(ii) Highlight main issues for the next 3 months
(iii) Propose steps to upgrade the situations
(iv) Alert JKR on the issues which are sensitive and propose mitigations

(l) Recommendations

(i) Provide recommendations for actions to reduce accidents, public complaints.
(ii) Provide recommendations on how to improve the conditions at site.

9.0 PUBLIC COMPLAINTS

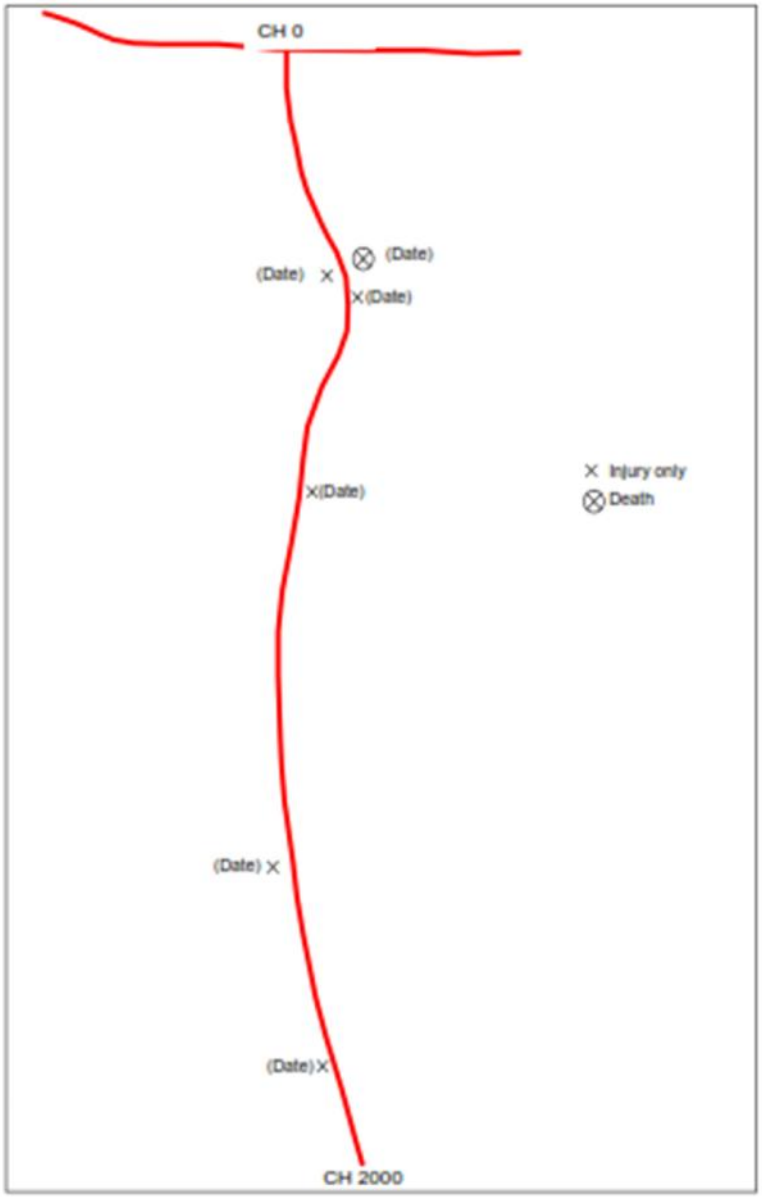
No	Categories of Report	Number of Companions	Action
1	Road closed from Shah Alam to Bandar Klang (Flyover Bulatan 100)	2	Clearly advise about the road closed for upgrading work and date the road will be open to the public
2	Duties of police traffic	2	Explain to the public that the police traffic duties every day at Bulatan 100 and PSI. Give number phone of Klang Traffic Station 03- 33722222
3	Vehicle on the No Parking area	2	Under MPK and police
4	Damage of Road	6	Maintenance of road and patching poleholes always been make time to time



11.0 ANALYSIS OF ACCIDENTS

Date/Time	Details of Accident	Location	Number of Traffic Equipment Damage and Other
9/5/2008 (Night)	Two (2) numbers of lorries grazed each other and hit the concrete barrier	Ch 1000 Ch 700	No damage was reported
20/5/2008 (Morning)	A car hit the barrier	Ch 750	Some of barrier were damage
18/6/2008 (Night)	A lorry traveling at high speed hit a motorcyclist	Ch 940	1. Motorcyclist had minor injury (broken leg) 2. Some of barrier damaged
27/6/2008 (Night)	A car hit the barrier	Ch 1150	No damage/injured was reported
29/6/2008 (Night)	A car hit the barrier	Ch 1300	No damage/injured was reported

10.4 Strip Map Kemalangan

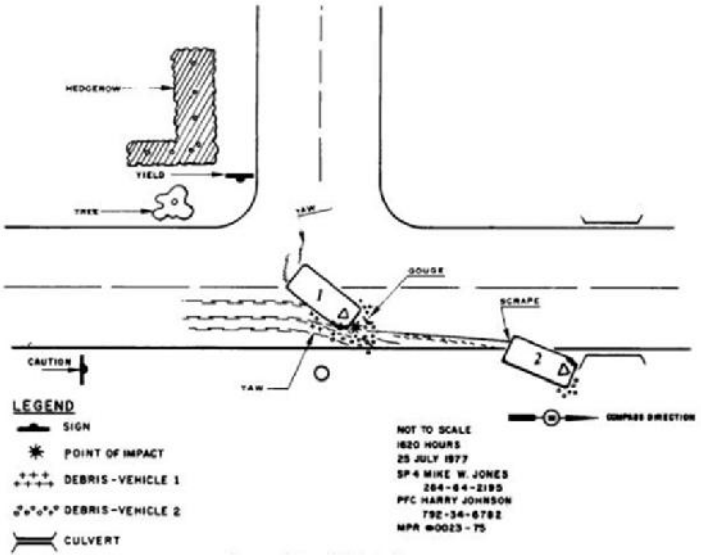


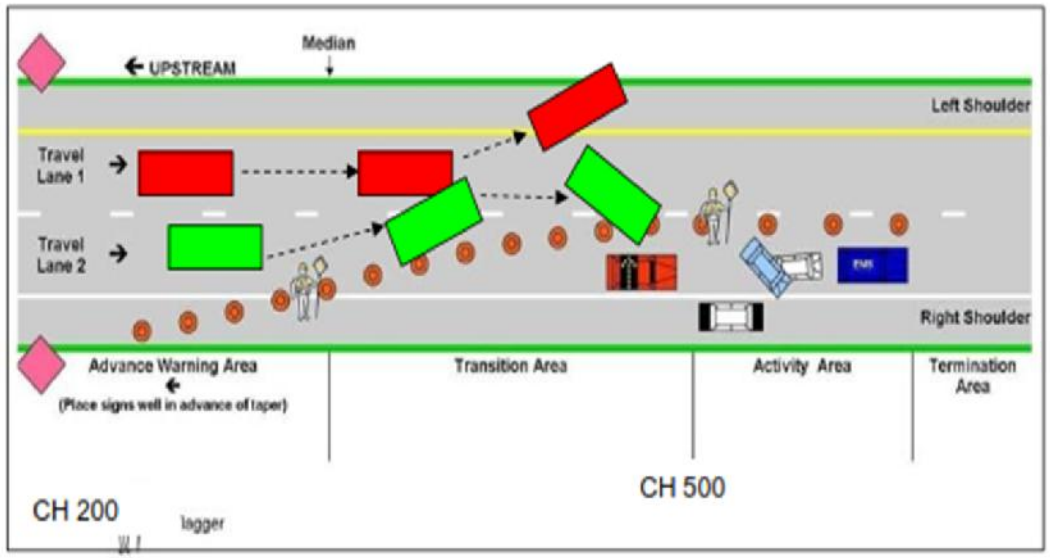
10.1 Laporan Kemalangan Kumulatif

Bil	Lokasi /Jalan	2014 01 Sep – 31 Dis	2015 01 Jan – 31 Dis	2016	Jumlah kemalangan	Kategori Kecelakaan		
						Maut	Parah	Ringan
1	A1	1	11	10	22	-	-	4
2	A2	-	1	-	1	-	-	-
3	A3	-	-	-	-	-	-	-
4	A4	-	-	1	1	-	-	-
5	A5	-	3	1	4	-	-	2
6	A6	-	1	-	1	-	-	-
7	A7	-	5	2	7	-	-	2
8	A8	-	-	-	-	-	-	-
9	A9	-	-	-	-	-	-	-
10	A10	-	-	-	-	-	-	-
11	AJ1	-	1	-	1	-	-	-
12	AJ1 (2)	-	-	-	-	-	-	-
JUMLAH KEMALANGAN SEJAK SEPTEMBER 2014 – MAC 2016				10	37			

10.2 Butiran Kemalangan

Bil	Tarikh	Butiran Kemalangan	Lokasi	Cuaca	Kecederaan
1	14/05/2016	Sebuah Motosikal Melanggar Sebuah Kereta Yang Hendak Memasuki Simpang Taman Desa Baru	A1	Baik	Motosikal Dan Kereta
2	10/05/2016	Sebuah Lori Hilang Kawalan Dan Melanggar Konkrit Barrier	A7	Baik	Lori 3 Tan
3	08/05/2016	Sebuah Kereta Melanggar Sebuah Kereta Mpv Yang Keluar Dari Shell	A4	Baik	Kereta Dan Mpv Ezora
4	26/04/2016	Sebuah Kereta Hilang Kawalan Dan Melanggar Tiang Lampu (Median)	A1	Baik	Kereta
5	15/03/2016	Sebuah Motosikal Melanggar Belakang CRV	A1	Baik	Motosikal Dan CRV





DURING CONSTRUCTION

- TMP Monitored by Management Framework
- Contractor sets up TMT & ERT Teams
- Contractor designs Localised TCPs
- Contractor prepares TMSR
- Site Placements/Removals
- Maintenance of Work Zones
- TMO Daily Inspections
- RSA Audit TMP/TMSR

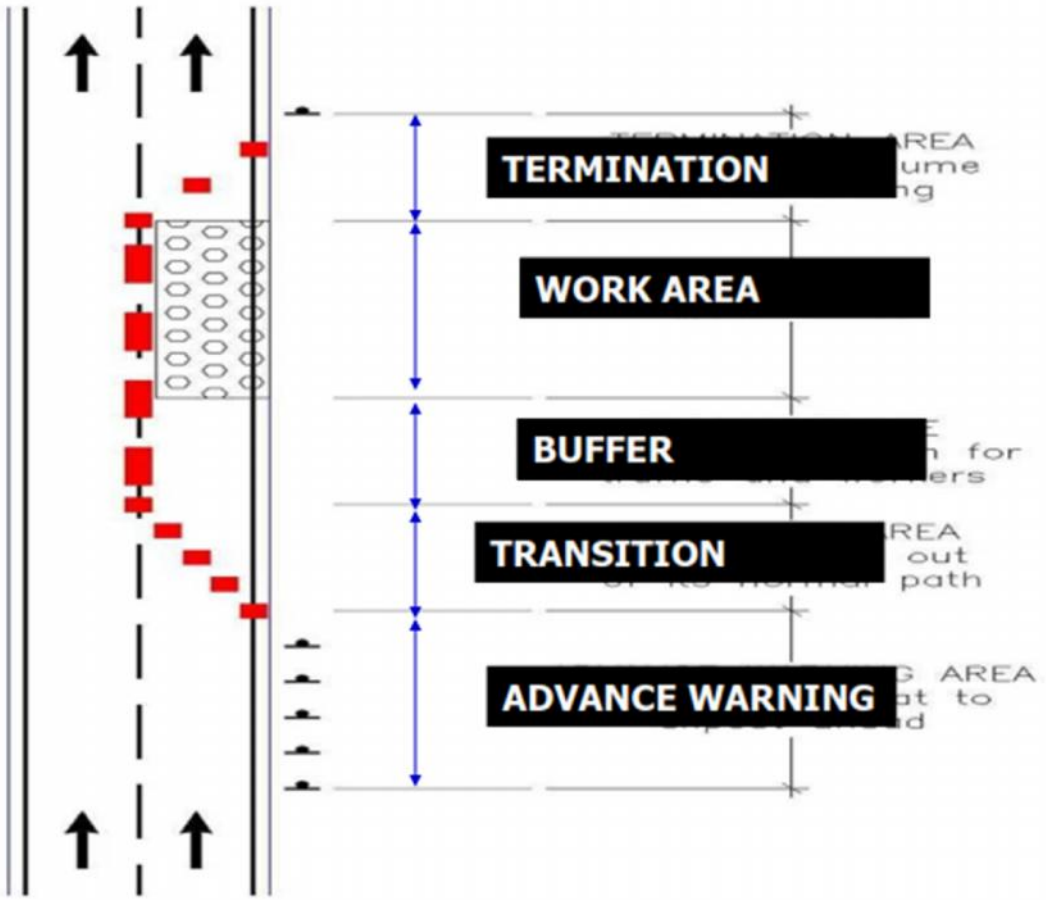
Site Placements and Removals

STANDARDISED APPROACH

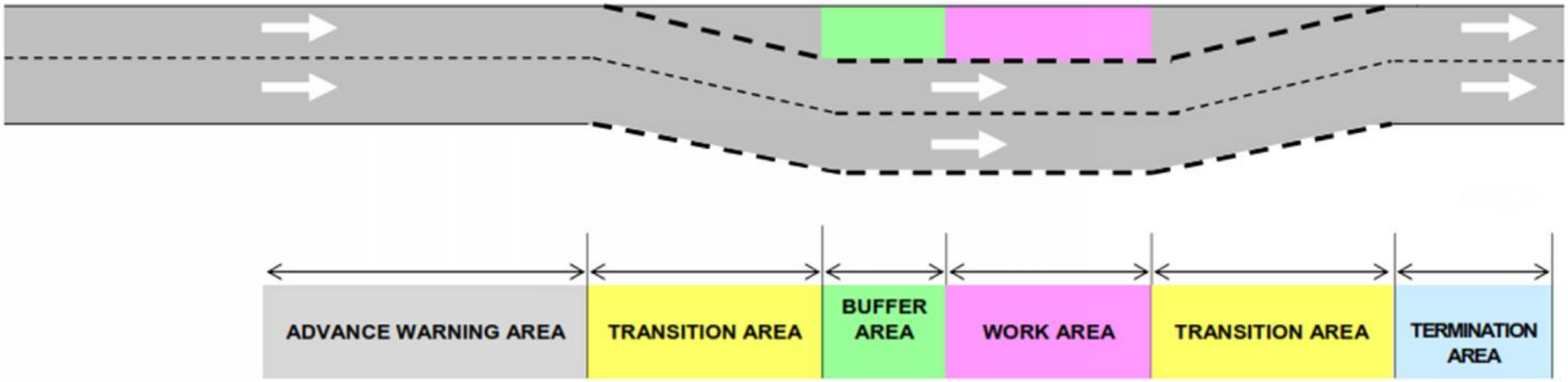
- Work Zones
- Sign Faces
- Sign Arrangements
- Traffic Control Devices

STANDARDISED APPROACH

- Work Zones
- Sign Faces
- Sign Arrangements
- Traffic Control Devices



AREAS IN A TRAFFIC CONTROL ZONE



URBAN						
Low Speed	250m	100m	50m	varies	100m	15m
High Speed	400m	150m	100m	varies	150m	30m
RURAL						
Low Speed	350m	100m	110m	varies	100m	15m
High Speed	500m	150m	150m	varies	150m	30m
HIGHWAY						
Low Speed	1000m	250m	150m	varies	250m	15m
High Speed	2000m	300m	220m	varies	300m	30m

FIGURE 6.1B: LENGTH OF WORK ZONE (ROAD DIVERSION)

Advance Warning Zone

Transition Zone

Work Area

STANDARDISED APPROACH

- Work Zones
- Sign Faces
- Sign Arrangements
- Traffic Control Devices

OLD

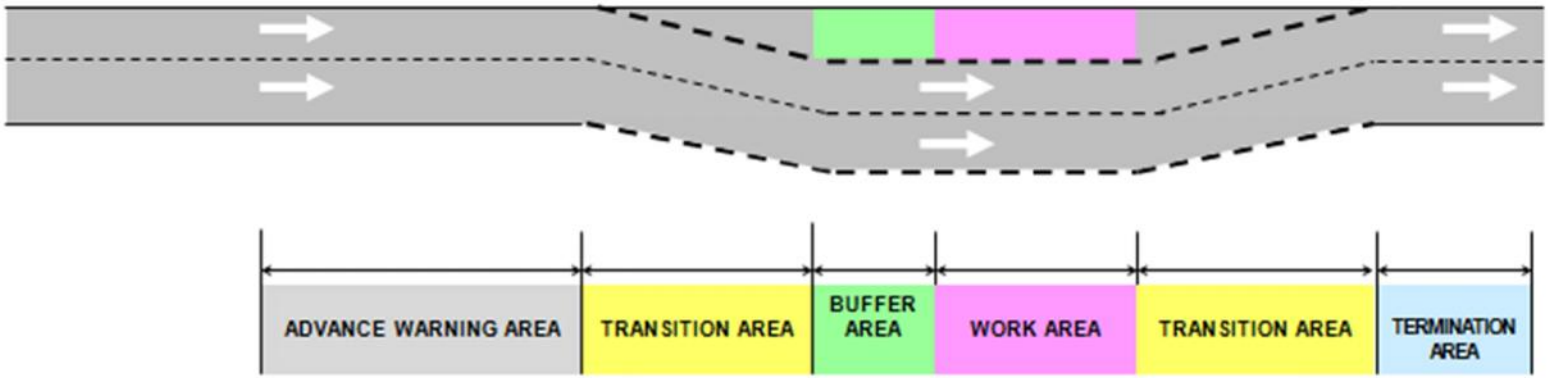
NEW

OLD

NEW

STANDARDISED APPROACH

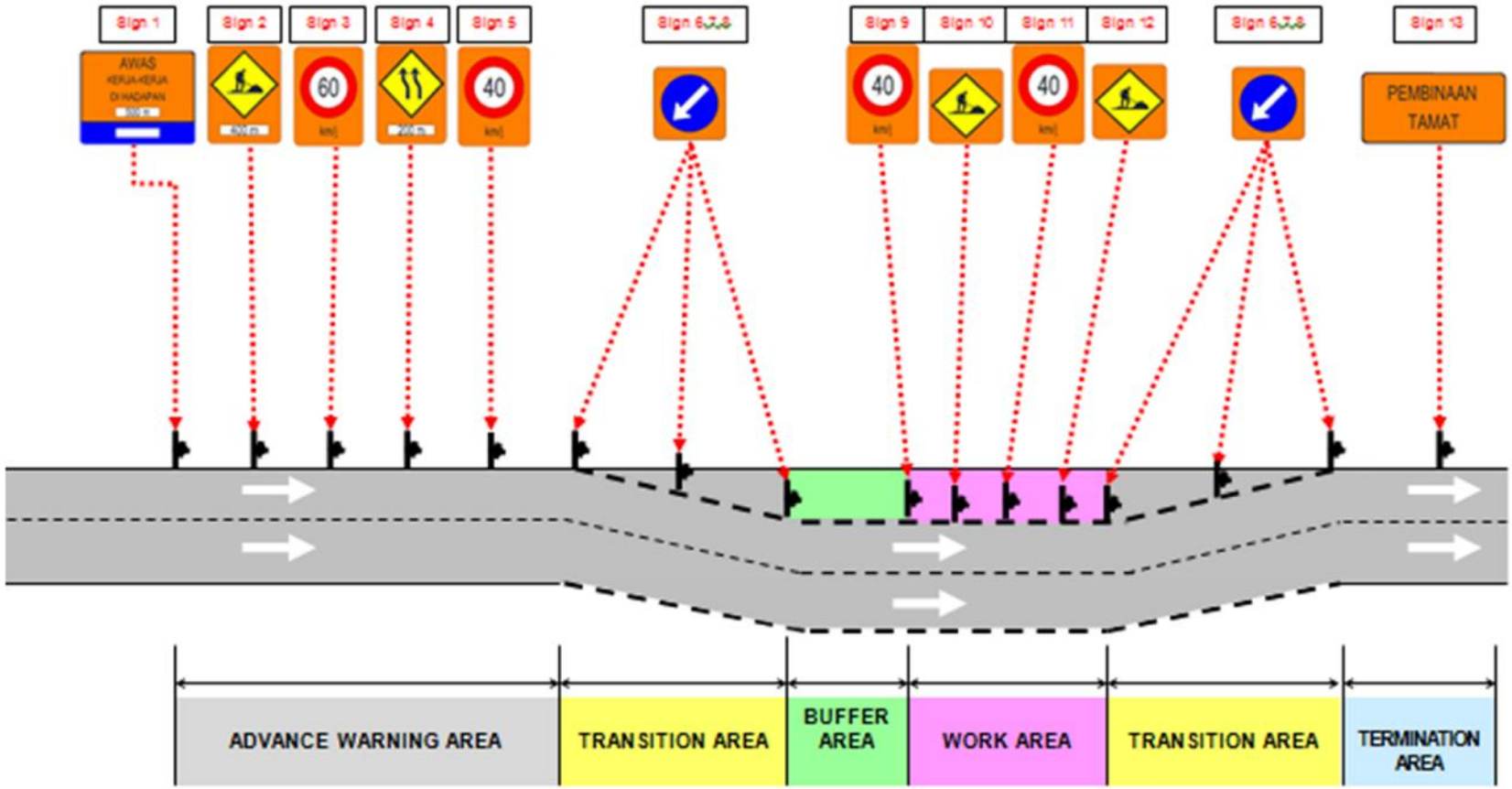
- Work Zones
- Sign Faces
- Sign Arrangements
- Traffic Control Devices



USE	USE	USE	USE	USE
1st Sign Advance Warning Sign 2nd Sign Road Works Sign 3rd Sign Speed Limit Sign 4th Sign Detour Sign 5th Sign Speed Limit Sign	Keep Left/Right Sign	Road Work Signs (Work Area) And Speed Limit Signs	Keep Left/Right Sign	'Pembinaan Tamat' Sign

*Notes: For three (3) lanes road and above , the signages to be installed on both sides

FIGURE 6.3: SIGN ARRANGEMENTS



*Notes: For three (3) lanes road and above , the signages to be installed on both sides

FIGURE 6.7: OVERALL SIGN ARRANGEMENTS FOR THE TYPICAL WORK ZONE

STANDARDISED APPROACH

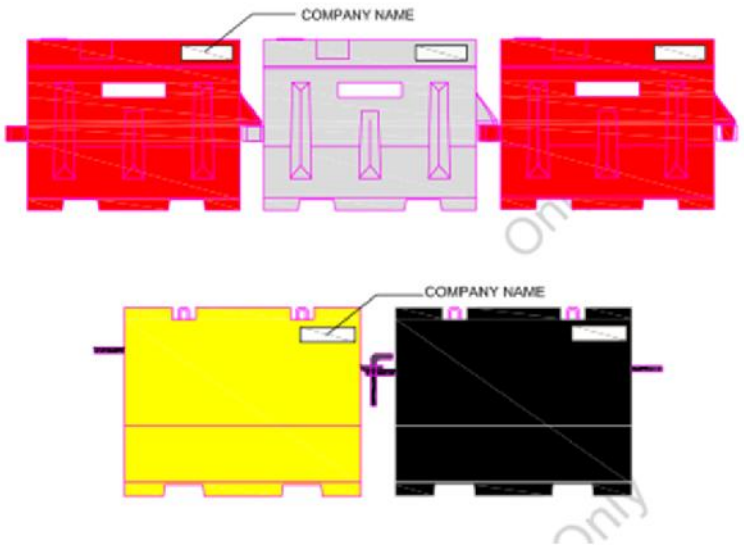
- Work Zones
- Sign Faces
- Sign Arrangements
- Traffic Control Devices

TRAFFIC CONTROL DEVICES

DURATION	
- Temporary	<1 Day
- Short Term	>1 Day<1 Month
- Long Term	>1 Month

CHANNELISATION
Vs
PROTECTION

PLASTIC
Vs
CONCRETE



Wrong use of Plastic Barriers

DURING CONSTRUCTION

- TMP Monitored by Management Framework
- Contractor sets up TMT & ERT Teams
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- Contractor prepares TMSR
- Site Placements/Removals
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- TMO Daily Inspections
- RSA Audit TMP/TMSR

MAINTENANCE & INSPECTION PROGRAM

- **Comprehensive inspection and maintenance program**
- **Inspection procedures**
- **Frequency of Inspection**
- **Documentation**
- **Record Keeping**

FACTORS THAT REQUIRED MAINTENANCE

Maintenance is needed to service the equipment due to the combination of the following factors:

NO	Factors for Requirement of Maintenance
1	Traffic Accidents
2	Devices displacement
3	Damages caused by construction activities
4	Damages caused by weather or natural disasters
5	Malfunctions or burn outs
6	Physical deterioration
7	Debris, Dust, dirt, grime or bitumen over spray
8	Vandalism or theft

Traffic Accidents

Devices Displacement

Damages Caused by Construction Activities

Before

After

Repair Temporary Warning Signboard

Realigned Concrete Barrier

DURING CONSTRUCTION

- TMP Monitored by Management Framework
- Contractor sets up TMT & ERT Teams
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Inspection Procedures

- Responsibility of Traffic Management Officer (TMO).
- To carry out routine inspection on all traffic control devices.
- Frequency of inspection depends on several factors.
- Documentation can be done through Inspection Form.
- Record Keeping can be done through Inventory Forms together with Site Diary complete with photos and brief description (date, time, location, etc)

Frequency of Inspection

Maintenance is needed to service the equipment due to the combination of the following factors:

NO	Factors in Determining the Frequency of Inspection
1	Project size and duration
2	Degree of liability
3	Severity of hazards
4	Frequency at which damage is occuring
5	Number of deficiencies observed during previous inspections
6	Traffic volumes and speed

EXAMPLE FORM FOR INSPECTION

JKR/BORANGPEMERIKSAANRUTIN/201

BORANG PEMERIKSAAN RUTIN ZON KERJA

Projek : _____

Kontraktor : _____ Tarikh : _____

Lokasi Tapak : _____

Nama TMO : _____ Masa : _____

1	ZON A - KAWASAN AMARAN AWAL (*ADVANCE WARNING AREA*)								CATATAN	C.A.R. 1/ 2
i.	Papan Tanda Pemberitahuan	A1	A2	A3	A4	A5	A6	A7		
ii.	Papan Tanda Amaran Awal (AWAS)	A1	A2	A3	A4	A5	A6	A7		
iii.	Papan Tanda Orang Bekerja	A1	A2	A3	A4	A5	A6	A7		
iv.	Papan Tanda Lorong Sempit	A1	A2	A3	A4	A5	A6	A7		
v.	Papan Tanda Had Laju	A1	A2	A3	A4	A5	A6	A7		
vi.	Papan Tanda Anak panah	A1	A2	A3	A4	A5	A6	A7		
vii.	Penanda Garisan Jalan Sementara	G1	G2							
viii.	Keadaan Jalan	J1	J2	J3	J4					

2	ZON B - KAWASAN PERALIHAN (*TRANSITION AREA*)								CATATAN	C.A.R. 1/ 2
i.	Papan Tanda Anak panah (3 Bilangan)	A1	A2	A3	A4	A5	A6	A7		
ii.	*Arrow Flasher / Chevron light*	K1	K2	K3						
iii.	*Blinkers* (Selang 10m)	B1	B2	B3	B4					
iv.	*Reflective Disc / Delineator String*	C1	C2							
v.	*Plastic Barrier*	D1	D2	D3	D4	D5	D6			
vi.	*Concrete Barrier*	E1	E2	E3	E4	E5	E6			
vii.	Kon Keselamatan	F1	F2	F3						
viii.	Pengawal Bendera	H1	H2	H3						
ix.	*Robotic Flagman*	I1								
x.	Penanda Garisan Jalan Sementara	G1	G2							
xi.	Keadaan Jalan	J1	J2	J3	J4					

DURING CONSTRUCTION

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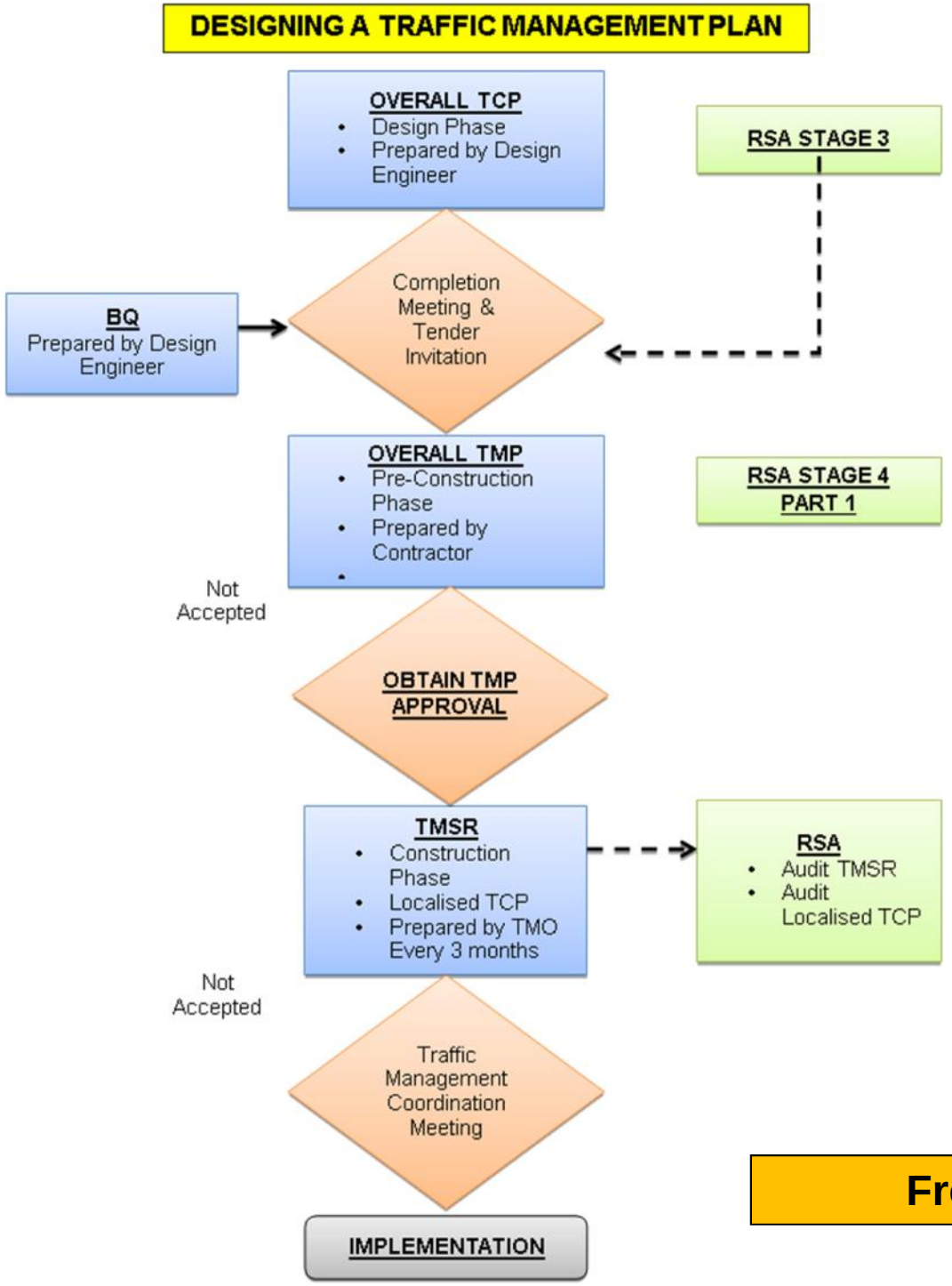

DESIGNING A TRAFFIC MANAGEMENT PLAN
OVERALL TCP
Design Phase
Prepared by Design Engineer
RSA STAGE 3
BQ
Prepared by Design Engineer
Completion Meeting & Tender Invitation
OVERALL TMP
Pre-Construction Phase
Prepared by Contractor
RSA STAGE 4 PART 1
Not Accepted
OBTAIN TMP APPROVAL
TMSR
Construction Phase
Localised TCP
Prepared by TMO Every 3 months
RSA
Audit TMSR
Audit Localised TCP
Not Accepted
Traffic Management Coordination Meeting
IMPLEMENTATION

From Manual

Responsibilities of the Road Safety Auditor

(a) Visiting the site (Preferably together with the Contractor and/or the Consultant)

(b) Auditing the TCPs at the beginning of the construction to ensure workability and suitability throughout the duration of the construction period.

(c) The TCPs will be audited as they are submitted through the TMSR.

(d) Auditing the Work Zones during the Construction Phase. This is normally carried out every three months (Subject to request by SO/PD).

(e) Preparing the Road Safety Audit reports and sending them directly to all the relevant parties (JKR, Contractor and Consultant).

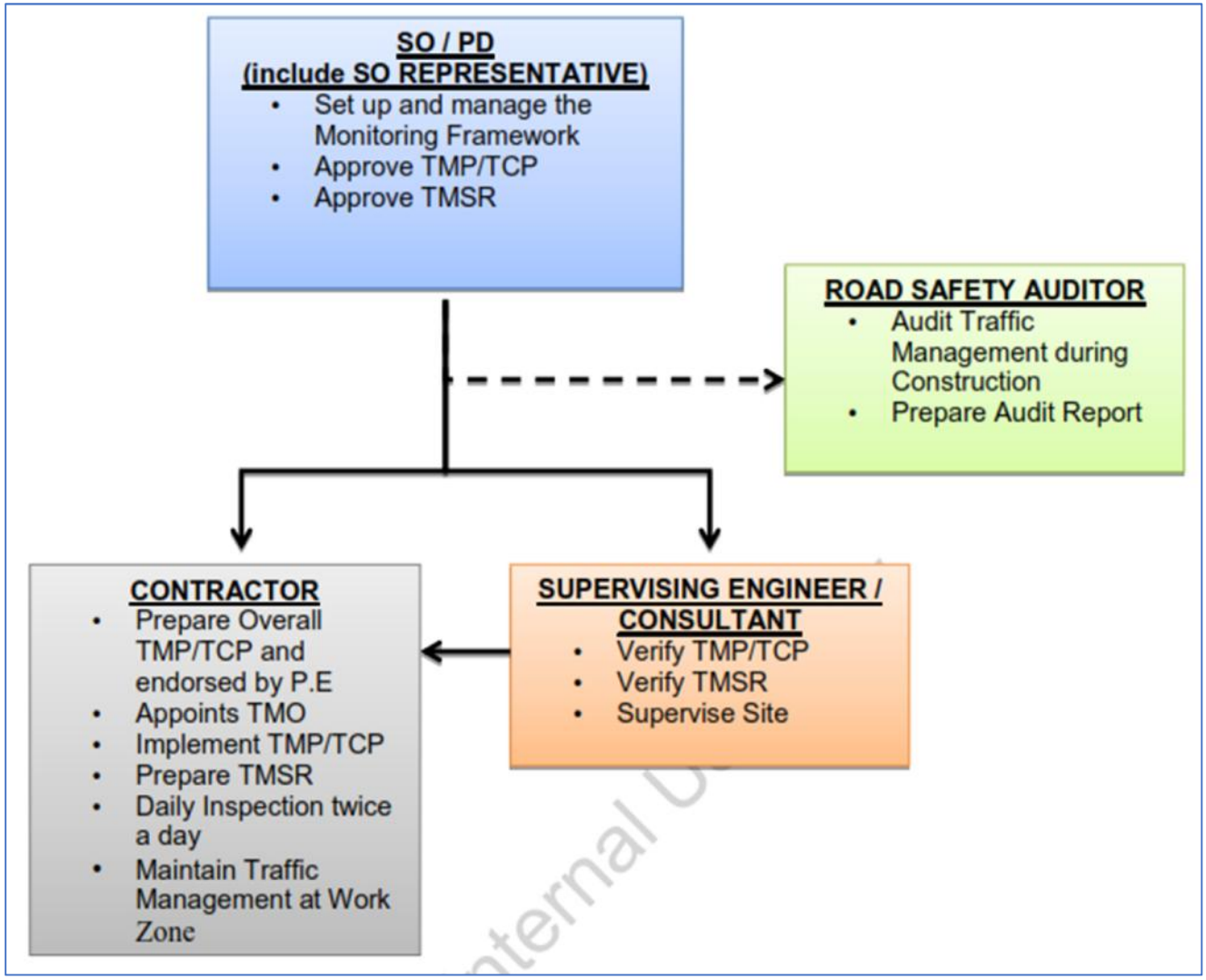
(f) Presenting the findings of the Audit report.

CONCLUDING REMARKS

The new ATJ 2C, provides definitive strategies for Effective Implementation of the TMP.

- The setting up of the Monitoring Framework for every project is the start to good TMP implementation.

FRAMEWORK TO MONITOR TRAFFIC MANAGEMENT AT WORK ZONE



THANK YOU

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