

Agreement No. TD 54/2008

West Kowloon Reclamation Development Traffic Study

Final Report



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Development Traffic Study**

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MVA Hong Kong Limited

LIST OF CONTENTS

	PAGE
1. INTRODUCTION.....	1
1.1 Background	1
1.2 Objective of Final Report.....	2
1.3 References.....	2
1.4 Details of Final Report	2
2. EXISTING TRAFFIC CONDITION	4
2.1 Existing Road Network.....	4
2.2 Public Transport Facilities	5
2.3 Pedestrian Facilities	6
3. TRAFFIC SURVEY	7
3.1 Type of Surveys	7
3.2 Classified Traffic Count Surveys	7
3.3 Queue Length Surveys.....	8
3.4 Trip Generation Surveys	8
3.5 Pedestrian Surveys.....	8
4. TRAFFIC MODELING METHODOLOGY.....	10
4.1 Study Assumptions.....	10
4.2 Traffic Model Methodology.....	10
5. MODEL VALIDATION RESULTS.....	12
5.1 Data Collection.....	12
5.2 2008 Base Year Network Validation Results	12
6. FUTURE DEVELOPMENTS AND PLANNING DATA	14
6.1 Future Developments and Planning Data	14
6.2 Network Assumptions	26
7. TRIP GENERATION RATE.....	29
7.1 Trip Generation Rate Survey	29
7.2 Survey for Residential, Retail, Office, Hotel and Service Apartment	29
7.3 Interview Survey for Performance Venue and Museum.....	30
7.4 Data from Other Sources	32
7.5 Analysis of Trip Rates	40
7.6 Trip Rates at Weekdays AM and PM Peak Periods (Residential, Retail, Office, Hotel & Service Apartment)	41

LIST OF CONTENTS (CONT'D)

	PAGE
7.7 Trip Rates at Friday, Saturday and Sunday / Public Holiday Peak Periods (Residential, Retail, Office, Hotel & Service Apartment)	43
7.8 Trip Rates for Performance Venue and Museum	45
7.9 Trip Rates for Other Uses in WKCD	48
7.10 The TD's New Trip Rates for Residential, Retail, Office and Hotel	49
7.11 Summary of Recommended Trip Rates and Future Trip Generation	52
 8. TRAFFIC IMPACT ASSESSMENT FOR EXISTING CONDITION	 55
8.1 Junction Capacity	55
8.2 Major Road Link Capacity	57
 9. IMPROVEMENT MEASURES FOR EXISTING PROBLEMATIC JUNCTIONS	 59
9.1 Proposed Short-term Improvement Schemes	59
9.2 Summary of the Performance of Improved / Affected Junctions	63
 10. FUTURE YEAR TRAFFIC CONDITION – REFERENCE CASE	 65
10.1 Design Year	65
10.2 Road Network - Reference Case	65
10.3 Traffic Generation	66
10.4 Future Traffic Characteristics	66
10.5 Traffic Impact Assessment – Reference Case	67
10.6 Problem Identification	69
 11. PROPOSED LONG TERM ROAD NETWORK	 71
11.1 Objectives of Developing Future Road Network Main Frame in the Focus Area	71
11.2 Objectives of Improvement Schemes in the Study Area	71
11.3 Opportunities and Constraints for Improvement Schemes	71
11.4 Details of the Selected Improvement Schemes	78
11.5 Details of Junction Improvement Schemes	83
11.6 Traffic Assessment for Core Schemes and Proposed Junction Improvements	89
11.7 Traffic Assessment for Additional Schemes – Schemes H, I, J, Q	92
11.8 Refresh	95
11.9 Suggestions for the Coming WKCD Study	95
 12. FUTURE PUBLIC TRANSPORT INTERCHANGE IN FOCUS AREA	 96
12.1 General	96
12.2 Existing Public Transport Services and PTIs	96
12.3 Interim Public Transport Arrangement	97
12.4 Modal Split of Public Transport Demands	97
12.5 Proposed Permanent Public Transport Arrangement	98
12.6 Suggestions for the coming WKCD Study	100

LIST OF CONTENTS (CONT'D)

	PAGE
13. FUTURE PEDESTRIAN FACILITIES	101
13.1 Objectives	101
13.2 Existing Pedestrian Facilities	101
13.3 Issues to be Considered	102
13.4 Proposed Future External Connections – Jordan	102
13.5 Proposed Future External Connections – TST	105
13.6 Proposed Internal Connections	105
13.7 Initial Capacity Checks.....	107
13.8 Suggestions for the coming WKCD Study	111
14. TRANSPORT PLAN AND IMPLEMENTATION PROGRAMME	112
14.1 Introduction	112
14.2 Summary of Selected/Preferred Traffic Scheme.....	112
14.3 Proposed Implementation Programme	115
15. INTERIM TRAFFIC CONDITION.....	117
15.1 Construction Activities	117
15.2 Design Year	119
15.3 2011 Reference Road Network.....	120
15.4 Public Transport Facilities	121
15.5 Pedestrian Facilities	122
15.6 Traffic Impact Assessment – Reference Case	122
16. TEMPORARY TRAFFIC MANAGEMENT SCHEMES.....	126
16.1 General Requirements	126
16.2 Demand for Road D1A(S)	127
16.3 Major Construction Staging.....	130
17. SUMMARY	135
APPENDIX A Responses to Comments	
APPENDIX B Model Validation Results	
APPENDIX C Local Traffic Management Improvement Schemes (Proposed By TD)	
APPENDIX D New Traffic Generation and Attraction Rates Issued by TD	
APPENDIX E Calculation Sheets	
APPENDIX F Public Expectations and Aspirations for WKCD	
APPENDIX G KUD Floor Plan	

LIST OF TABLES

TABLE NO.	DESCRIPTION	PAGE
3.1	Passenger Demand for KOW PTI and WCR Temporary PTI	8
3.2	Mode of Access/Egress for Cross Boundary Rail Travellers (%)	9
5.1	Summary of Model Validation Results.....	12
6.1	2011 Land Use Planning Data	15
6.2	2016 Land Use Planning Data	16
6.3	2021 Land Use Planning Data	17
6.4	2026 Land Use Planning Data	18
6.5	2031 Land Use Planning Data	19
6.6	Productivities of Container Terminals for Base Case (New CT will be required by 2015)	20
6.7	Productivities of Container Terminals for Base Case (New CT will be required by 2020)	20
6.8	Port Back-up Areas	20
6.9	Vehicle Fleet Sizes	21
6.10	Toll Assumptions - 2008 Dollars.....	22
6.11	GDP Growth Assumptions	23
6.12	Daily Cross Boundary (2-way) Vehicle Traffic by Vehicle Types.....	23
6.13	Airport Usage Forecasts (Excluding Transit Passengers and Transhipment Cargo)	24
6.14	Local Planning Data.....	25
6.15	Major Highway Network Assumptions	26
6.16	Rail Network Assumptions for 2011, 2016 & 2021	27
6.17	Local Traffic Management and Road Improvement Schemes	28
7.1	Selected Development Sites (excluding Performance Venue & Museum for Trip Generation Survey).....	30
7.2	Selected Museums.....	31
7.3	Modal Split of Audience of Performance Venues	31
7.4	Modal Split of Visitors of Museums	32
7.5	Vehicle Occupancy Rates for Performance Venues	32
7.6	Vehicle Occupancy Rates for Museums	32
7.7	Trip Rates for Residential (pcu/hr/flat)	33
7.8	Trip Rates for Retail (pcu/hr/100m ²)	34
7.9	Trip Rates for Office (pcu/hr/100m ²)	35

LIST OF TABLES (CONT'D)

TABLE NO.	DESCRIPTION	PAGE
7.10	Trip Rates for Hotel (pcu/hr/room)	36
7.11	Trip Rates for Service Apartment (pcu/hr/room)	37
7.12	Trip Rates for Performance Venue (pcu/hr/10-seat)	38
7.13	Trip Rates for Museum (pcu/hr/100m ² or pcu/day).....	39
7.14	Recommended Trip Rates (Weekday Commuting Peak)	43
7.15	Trip Rates for Residential on Friday, Saturday and Sunday (pcu/hr/flat)	44
7.16	Trip Rates for Retail on Friday, Saturday and Sunday (pcu/hr/100m ²)	44
7.17	Trip Rates for Office on Friday, Saturday and Sunday (pcu/hr/100m ²)	44
7.18	Trip Rates for Hotel on Friday, Saturday and Sunday (pcu/hr/room)	45
7.19	Trip Rates for Service Apartment on Friday, Saturday and Sunday (pcu/hr/room).....	45
7.20	Recommended Trip Rates for Performance Venue (pcu/hr/10-seat)	46
7.21	Recommended Trip Rates for Performance Venue on Weekdays and Weekends (pcu/hr/10-seat)	47
7.22	Recommended Trip Rates for Museum on weekdays and weekends (pcu/hr/100 m ²)	48
7.23	Trip Rates for HKCEC (pcu/hr/100 m ²)	48
7.24	Trip Rates for Community Facilities.....	49
7.25	TD's New Trip Rates for Residential (pcu/hr/flat)	50
7.26	New Trip Rates for Residential at Friday Late Evenings, Saturday and Sunday Afternoon (pcu/hr/flat)	50
7.27	Comparison on Trip Rates for Office (pcu/hr/100 m ² GFA).....	51
7.28	Comparison on Trip Rates for Hotel (pcu/hr/unit).....	51
7.29	Summary of Recommended Trip Rates	53
7.30	Summary of Future Trip Generations of Local Developments.....	54
8.1	Existing Junction Performance on Weekdays.....	55
8.2	Existing Junction Performance on Fridays, Saturdays and Sundays.....	56
8.3	Performance of Critical Junctions after Relocation of WCR PTI.....	57
8.4	Volume / Capacity Ratios of the Major Road Links	58
9.1	Performance of Junction of JOR / LCR	60
9.2	Performance of Junction of JOR / LCR with Proposed Lane Configuration	60
9.3	Performance of Improved / Affected Junctions	64
10.1	Total Traffic Generation Estimates for WKRA (pcus/hour)	66

LIST OF TABLES (CONT'D)

TABLE NO.	DESCRIPTION	PAGE
10.2	2031 Junction Performance – Reference Case	67
10.3	2031 Critical Traffic Queue – Reference Case.....	68
11.1	Analysis on “Opportunities” and “Constraints” – Main Frame of Future Network Schemes	74
11.2	2031 Junction Performance – With Core Schemes and Proposed Junction Improvements	90
11.3	2031 Critical Traffic Queue – With Core Schemes and Proposed Junction Improvements	91
11.4	2031 Junction Performance – With Core Schemes, Proposed Junction Improvements and Additional Schemes	93
11.5	2031 Critical Traffic Queue – With Core Schemes, Proposed Junction Improvements and Additional Schemes	94
12.1	Bus/GMB Routes at the Existing PTIs	96
12.2	Estimated Transport Modal Split in the Focus Area (2031 Peak Hour)	97
12.3	PTIs and Developments	99
13.1	Pedestrian Trip Generation Rates.....	108
13.2	Pedestrian Trip Generation Estimates.....	109
13.3	Summary of Pedestrian Flow Results (two-way peak hour flow): Along Road Pedestrian Traffic Move	110
13.4	Summary of Pedestrian Flow Results (two-way peak hour flow): Road Crossing Pedestrian Traffic Move	110
14.1	Proposed / Desirable Implementation Programme	115
15.1	Major Construction and Development Intake Activities within Focus Area	119
15.2	2011 Junction Performance – Reference Case	123
15.3	2011 Critical Traffic Queue – Reference Case.....	124
16.1	Minimum Width of Carriageways and Footpaths.....	126
16.2	Construction Traffic Generations by WKT	128
16.3	Construction Traffic Generations by WKCD	128
16.4	2011 Junction Performance – Without Western WCR.....	129
16.5	2011 Junction Performance – Without Western WCR and With Road D1A(S) .	130
16.6	2011 Junction Performance – Reference Case, Construction Stages 1 and 2	132
16.7	2011 Critical Traffic Queue – Reference Case, Construction Stages 1 and 2.....	133
17.1	Summary of Proposed Improvement Schemes	136

LIST OF FIGURES

FIGURE NO.	DESCRIPTION
1.1	The Study Area and Focus Area
2.1	Existing Traffic Arrangement – Key Plan
2.2	Existing Traffic Arrangement – Plan 1
2.3	Existing Traffic Arrangement – Plan 2
2.4	Existing Traffic Arrangement – Plan 3
2.5	Existing Traffic Arrangement – Plan 4
2.6	Existing Traffic Arrangement – Plan 5
2.7	Existing Traffic Arrangement – Plan 6
2.8	Existing Traffic Arrangement – Plan 7
2.9	Existing Traffic Arrangement – Plan 8
2.10	Existing Traffic Arrangement – Plan 9
2.11	Existing Traffic Arrangement – Plan 10
2.12	Existing Public Transport Facilities within Focus Area
2.13	Existing Pedestrian Facilities within Focus Area
3.1	Surveyed Junctions, Road Link and Location of Queue Length Survey
3.2	Observed 2008 Weekday Traffic Flow
3.3	Observed 2008 Friday, Saturday and Sunday Traffic Flow
3.4	Observed Queue Length
4.1	Zone Plan
6.1	Future Developments in WKR
8.1	Existing Junction Performance in AM Peak Period on Weekday
8.2	Existing Junction Performance in PM Peak Period on Weekday
8.3	Existing Junction Performance on Friday
8.4	Existing Junction Performance on Saturday
8.5	Existing Junction Performance on Sunday
8.6	Diversion Route of Franchised Bus after Relocation of Jordan Temporary PTI
8.7	Junction Performance in AM Peak Period on Weekday after Relocation of Jordan Temporary PTI
8.8	Junction Performance in PM Peak Period on Weekday after Relocation of Jordan Temporary PTI
8.9	Junction Performance on Friday after Relocation of Jordan Temporary PTI
8.10	Junction Performance on Saturday after Relocation of Jordan Temporary PTI

LIST OF FIGURES (CONT'D)

FIGURE NO.	DESCRIPTION
8.11	Junction Performance on Sunday after Relocation of Jordan Temporary PTI
9.1	Proposed Short-Term Improvement Scheme for the Junction of Nathan Road / Waterloo Road
9.2	Traffic Flows at Jordan Road EB
9.3	Modification of TD's Improvement for Jordan Road EB
9.4	Proposed Short-Term Improvement Scheme for the Junction of Jordan Road / Lin Cheung Road
9.5	Proposed Short-Term Improvement Scheme for the Junction Jordan Road / Ferry Street / Canton Road
9.6	Diversion Route for the Banned Jordan Road WB Right-Turning Movement
9.7	Diversion Route for the Banned Nathan Road SB Right-Turning Movement
9.8	Proposed Short-Term Improvement Scheme for the Junction of Nathan Road / Jordan Road
9.9	Proposed Short-Term Improvement Scheme for the Junction of Lin Cheung Road / Wui Cheung Road
9.10	Schematic Layout of Additional Austin Road West EB Carriageway
9.11	Proposed Short-Term Improvement Scheme for the Junction of Canton Road / Austin Road
9.12	Simplified MOC and Associated Layout of Junction of Nathan Road / Austin Road
9.13	Diversion Route for the Banned Austin Road EB Right-Turning Movement
9.14	Proposed Short-Term Improvement Scheme for the Junction of Canton Road / Kowloon Park Drive
10.1	2031 Reference Road Network - Key Plan
10.2	2031 Reference Road Network - Plan 1
10.3	2031 Reference Road Network - Plan 2
10.4	2031 Reference Road Network - Plan 3
10.5	2031 Reference Road Network - Plan 4
10.6	2031 Reference Road Network - Plan 5
10.7	Future Layout of Junction of Lai Cheung Road/Hoi Wang Road (J1) (For Reference Only)
10.8	Future Layout of Junction of Hoi Wang Road/Slip Road to Yau Ma Tei Interchange (J4) (For Reference Only)
10.9	Future Layout of Junction of Jordan Road (Elevated)/Hoi Po Road (J7) and Jordan Road (Elevated)/Nga Cheung Road (Elevated) (J8)

LIST OF FIGURES (CONT'D)

FIGURE NO.	DESCRIPTION
10.10	Future Layout of Junction of Jordan Road/Lin Cheung Road (J11)
10.11	Future Layout of Junction of Jordan Road/Ferry Street/Canton Road (J12)
10.12	Future Layout of Junction of Wui Cheung Road/Road D1A(S)/ Road D1 (J14)
10.13	Future Layout of Junction of Wui Cheung Road/Canton Road (J15)
10.14	Future Layout of Junction of Austin Road West/Lin Cheung Road (J17)
10.15	Future Layout of Junction of Austin Road West/Canton Road/Austin Road (J18)
10.16	Future Layout of Junction of Hoi Wang Road/Yan Cheung Road/Road D1A (J39)
10.17	Future Layout of Junction of Jordan Road/Road D1A (J40)
10.18	Future Layout of Junction of Austin Road West/Road D1 (J41)
10.19	Ingress/Egress Points of Developments within Focus Area
10.20	WKCD and KUD Ingress/Egress Routing
10.21	Sites A, C and D Ingress/Egress Routing
10.22	Estimated 2031 Local and Through Traffic Volume
10.23	Estimated 2031 Directional Split
10.24	2031 Traffic Forecast - Reference Network
10.25	2031 Assessed Junctions
10.26	2031 Junction Performance in AM Peak Period for Reference Network
10.27	2031 Junction Performance in PM Peak Period for Reference Network
10.28	2031 Traffic Queue at Critical Locations within Focus Area for Reference Network
10.29	Problems and Issues
11.1	Opportunity for Improvement Scheme
11.2	Potential Constraints
11.3	Scheme D2 – Key Plan
11.4	Scheme D2 – Plan 1
11.5	Scheme D2 – Plan 2
11.6	Scheme D2 – Plan 3
11.7	Scheme D2 – Plan 4
11.8	Scheme D2 – Plan 5
11.9	Scheme D2 – Plan 6
11.10	Scheme E
11.11	Scheme H (Part 1): Slip Road from LCR NB to WKH

LIST OF FIGURES (CONT'D)

FIGURE NO.	DESCRIPTION
11.12	Scheme H (Part 2): Widening at Nga Cheung Road (Elevated) NB
11.13	Scheme I: New Link Road from Nga Cheung Road to WHC
11.14	Scheme J: WKH SB Link to At-Grade Nga Cheung Road
11.15	Scheme Q: Local underpass along Canton Road to bypass the Junction of Canton Road/Austin Road
11.16	Widening of Canton Road
11.17	Extent of the Encroachment into WKCD
11.18	Proposed Improvement at Junction of Lai Cheung Road/Hoi Wang Road (J1)
11.19	Proposed Improvement at Junction of Waterloo Road/Nathan Road (J3) - Diversion Route for the Banned Nathan Road NB RT Movement
11.20	Proposed Improvement at Junction of Waterloo Road/Nathan Road (J3) - Junction Layout
11.21	Proposed Improvement at Junction of Yan Cheung Road/Ferry Street/Kansu Street (J5)
11.22	Alternative Layout and Method of Control at Junction of Jordan Road/Lin Cheung Road (J11)
11.23	Proposed Improvement at Junction of Jordan Road/Ferry Street/Canton Road (J12) - Diversion Route for the Banned Jordan Road WB RT Movement
11.24	Proposed Improvement at Junction of Jordan Road/Ferry Street/Canton Road (J12) - Proposed Layout
11.25	Proposed Improvement at Junction of Jordan Road/Nathan Road (J13) - Diversion Route for the Banned Movement
11.26	Proposed Improvement at Junction of Jordan Road/Nathan Road (J13) - Proposed Layout
11.27	Proposed Improvement at Junction of Austin Road/Nathan Road (J19)
11.28	Proposed Improvement at Junction of Salisbury Road/Nathan Road (J23)
11.29	Proposed Improvement at Junction of Man Cheong Street/Ferry Street/Saigon Street (J38)
11.30	Proposed Improvement at Junction of Hoi Wang Road/Yan Cheung Road/Road D1A (J39)
11.31	2031 Traffic Forecast - Core Scheme and Proposed Junction Improvement
11.32	2031 Junction Performance in AM Peak Period – Core Scheme and Proposed Junction Improvements
11.33	2031 Junction Performance in PM Peak Period – Core Scheme and Proposed Junction Improvements

LIST OF FIGURES (CONT'D)

FIGURE NO.	DESCRIPTION
11.34	2031 Traffic Queue at Critical Locations within Focus Area for Core Scheme, Proposed Junction Improvements
11.35	2031 Traffic Forecast - Core Scheme, Proposed Junction Improvements and Additional Schemes
11.36	2031 Junction Performance – Core Scheme, Proposed Junction Improvements and Additional Schemes
11.37	2031 Traffic Queue at Critical Locations within Focus Area for Core Scheme, Proposed Junction Improvements and Additional Schemes
11.38	Proposed Core and Additional Schemes
11.39	Detail Road Layout for Focus Area
12.1	Existing Public Transport Facilities within Focus Area
12.2	Bus Route Destinations
12.3	Existing KOW PTI Layout
12.4	Existing Jordan PTI Layout
12.5	Existing China Ferry Terminal PTI Layout
12.6	Rail and Bus Catchments within 30 Minutes
12.7	Permanent Jordan PTI
12.8	Permanent Bus and GMB Services in the Focus Area
13.1	Three Possible East-West Pedestrian Connections to Jordan District
13.2	Proposed Improvement to the Austin Road/Canton Road Subway System
13.3	500m Catchment Area by Station
13.4	Pedestrian Sources of WKR – Jordan Connections
13.5	Pedestrian Connection Constraints
13.6	Proposed Connection to TST
13.7	Summary of Pedestrian Facilities: within Focus Area: Existing and Proposed (Subject to Further WKT and WKCD Planning)
13.8	Proposed Connection between Western WKCD and the Cross Harbour Bus Facilities and KUD
13.9	WKCD – Inter-station/Development/Facility Movements
13.10	WKT – Inter-station/Development/Facility Movements
13.11	KOW – Inter-station/Development/Facility Movements
13.12	AUS – Inter-station/Development/Facility Movements
13.13	Potential Pedestrian Flows

LIST OF FIGURES (CONT'D)

FIGURE NO.	DESCRIPTION
13.14	Pedestrian Gateway to West Kowloon Cultural District (WKCD): the “Bi-Square Tri-Boulevard” Planning Concept
15.1	Planned Year 2031 Road Network
15.2	2011 Reference Road Network – Key Plan
15.3	2011 Reference Road Network – Plan 1
15.4	2011 Reference Road Network – Plan 2
15.5	2011 Reference Road Network – Plan 3
15.6	2011 Reference Road Network – Plan 4
15.7	2011 Public Transport Facilities
15.8	2011 Pedestrian Facilities within Focus Area
15.9	2011 Reference Traffic Flows
15.10	2011 Assessed Junctions
15.11	2011 Junction Performance in AM Peak Period for Reference Road Network
15.12	2011 Junction Performance in PM Peak Period for Reference Road Network
15.13	2011 Traffic Queue at Critical Locations within Focus Area for Reference Road Network
15.14	Improvement Scheme at Junction of Wui Cheung Road/Canton Road
16.1	Tested Diversion Route for the Through Traffic without Western Wui Cheung Road (If No New Road)
16.2	Works Area of WKT
16.3	Diversion Route for the WKT Construction Traffic without Western Wui Cheung Road
16.4	Diversion Route for the WKCD Construction Traffic without Western Wui Cheung Road
16.5	2011 Design Traffic Flows without Western Wui Cheung Road
16.6	Diversion Route for the Through Traffic without Western Wui Cheung Road & with Road D1A(S)
16.7	Diversion Route for the WKT Construction Traffic without Western Wui Cheung Road & with Road D1A(S)
16.8	Diversion Route for the WKCD Construction Traffic without Western Wui Cheung Road & with Road D1A(S)
16.9	2011 Design Traffic Flows without Western Wui Cheung Road & with Road D1A(S)
16.10	Construction Stage 1

LIST OF FIGURES (CONT'D)

FIGURE NO.	DESCRIPTION
16.11	Construction Stage 2
16.12	Construction Stage 3
16.13	WKT Construction Traffic Routings with Western Wui Cheung Road
16.14	WKCD Construction Traffic Routings with Western Wui Cheung Road
16.15	2011 Design Traffic Flows with Western Wui Cheung Road

DESCRIPTION OF ABBREVIATIONS

AEL	-	Airport Express Line
AGT	-	automated guideway transit
AM	-	Morning
APM	-	Automated People Mover
Att.	-	Attraction
AUR	-	Austin Road
AUS	-	Austin Station
BDTM	-	Base District Traffic Model
CAR	-	Canton Road
CEDD	-	Civil Engineering and Development Department
CFT	-	China Ferry Terminal
CHT	-	Cross Harbour Tunnel
CKR	-	Central Kowloon Route
CT	-	Container Terminals / Container Tractor
DR	-	Director's Representative
DR439	-	Data Record No. 439
DT	-	Spoil or Dump Truck
EB	-	Concrete Truck
EB	-	Eastbound
E-E	-	External Zone to External Zone
EHC	-	Eastern Harbour Crossing
E-I	-	External Zone to Internal Zone
Ele.	-	Elevated
EVA	-	Emergency Vehicular Access
GDP	-	Gross Domestic Product
GEH	-	A statistical indicator invented by Geoffrey E. Havers
Gen.	-	Generation
GFA	-	Gross Floor Area
GMB	-	Green Mini Bus
GV	-	Goods Vehicle
HKCEC	-	Hong Kong Convention and Exhibition Centre
HKCO	-	Hong Kong Chinese Orchestra
HKPSG	-	Hong Kong Planning Standards and Guidelines
HKSAR	-	Hong Kong Special Administrative Region
Hr	-	Hour
HSBC	-	The Hongkong and Shanghai Banking Corporation Limited
HyD	-	Highways Department
HZMB	-	Hong Kong – Zhuhai – Macao Bridge
ICC	-	International Commerce Centre
I-E	-	Internal Zone to External Zone
IFC II	-	Two International Finance Centre
I-I	-	Internal Zone to Internal Zone

DESCRIPTION OF ABBREVIATIONS (CONT'D)

J/O	-	Junction of
JOR	-	Jordan Road
KOW	-	AEL Kowloon Station
KPD	-	Kowloon Park Drive
KSL	-	Kowloon Southern Link
KUD	-	Kowloon Station and Union Square Development
LCR	-	Lin Cheung Road
LCSD	-	Leisure and Cultural Services Department
LegCo	-	Legislative Council
LGV	-	Light Goods Vehicle
LOW	-	Lo Wu
LRT	-	Lion Rock Tunnel
LTT	-	Lam Tei Tunnel and Tai Lam Chung Tunnel
ME	-	Matrix Estimation
MOC	-	Method-of-Control
MTRCL	-	MTR Corporation Limited
MVA	-	MVA Hong Kong Ltd.
MVCTS	-	MVA's Comprehensive Transport Study Model
NB	-	Northbound
NCR	-	Nga Cheung Road
NENT	-	Northeast New Territories
NEV	-	neighbourhood electric vehicle
NSB	-	Nansha Bridge
NW	-	Northwest
NWNT	-	Northwest New Territories
OD	-	Origin and Destination
PC	-	Private Car
PCF	-	Port Cargo Forecast
PCU	-	Passenger Car Unit
PCWA	-	Public Cargo Working Area
PD	-	Principal Datum
PlanD	-	Planning Department
PM	-	Afternoon
PRL	-	Port Rail Line
PTI	-	Public Transport Interchange
R3-CPS	-	Tai Lam Tunnel
RC	-	Reserve Capacity
RDO	-	Railway Development Office
RFC	-	Reserved Flow Capacity
RMB	-	Red Mini Bus
SB	-	Southbound
SENT	-	Southeast New Territories
SHPR	-	Strategic Highway Project Review

DESCRIPTION OF ABBREVIATIONS (CONT'D)

SIL	-	South Island Link
Site A TIA	-	Traffic Impact Assessment Study for the Different Land Use of Site A at West Kowloon Reclamation
STIC	-	Station & Transportation Integration Committee
SWC	-	Hong Kong Shenzhen Western Corridor
SWNT	-	Southwest New Territories
TCL	-	Tung Chung Line
TCT	-	Tate's Cairn Tunnel
TD	-	Transport Department
TEU	-	Twenty-foot Equivalent Unit
TGS 2006	-	Trip Generation Survey 2006
THB	-	Transport and Housing Bureau
TIA	-	Traffic Impact Assessment
TKO	-	Tseung Kwan O
TLB	-	Tsing Lung Bridge
TMCLKL	-	Tuen Mun – Chek Lap Kok Link
TMEB	-	Tuen Mun Eastern Bypass
TMWB	-	Tuen Mun Western Bypass
TN1	-	Technical Note 1
TPD	-	Transport Planning Division
TPDM	-	Transport Planning and Design Manual
TPEDM	-	Territorial Population and Employment Data Matrices
TPIR	-	Transport Planning Interim Report
TST	-	Tsim Sha Tsui
TTMS	-	Temporary Traffic Management Scheme
TTR	-	Through Train Rail
TWL	-	Tsuen Wan Line
TYLL	-	Tsing Yi – Lantau Link
WB	-	Westbound
WCR	-	Wui Cheung Road
WHC	-	Western Harbour Crossing
WKCD	-	West Kowloon Cultural District
WKCD TIA	-	Traffic Impact Assessment Review for West Kowloon Cultural District
WKCD A	-	West Kowloon Cultural District Authority
WKH	-	West Kowloon Highway
WKLTM	-	West Kowloon Local Traffic Model
WKN	-	West Kowloon Station
WKR	-	West Kowloon Reclamation
WKRA	-	West Kowloon Reclamation Area
WKRTM	-	West Kowloon Reclamation Traffic Model
WKT	-	XRL West Kowloon Terminus
WP	-	Working Paper
XRL	-	Express Rail Link

1. INTRODUCTION

1.1 Background

1.1.1 Prior to this Final Report (FR) for the Study “Agreement No. TD 54/2008 West Kowloon Reclamation Development Traffic Study”, the consultant has already issued the following deliverables:

- Final Technical Note 1 (TN1) issued in July 2008 to summarise the trip rates, network assumptions and planning assumptions to be adopted;
- “Final Working Paper 1 (WP1) – Development of the Transport Model” issued in October 2008 to summarise the modelling methodology, model validation results, planning data adopted, and pedestrian forecast methodology;
- “Final Working Paper 2 (WP2) – Short Term Traffic Improvement Measures for WKR” issued in February 2009 to propose some possible and straight forward improvement schemes which could be implemented within a short period of time to resolve the current traffic problems;
- “Final Working Paper 3 (WP3) – Final Transport Plan for WKR” issued in April 2009 to propose long term transport plan and junction improvement measures, recommend pedestrian facilities, as well as rationalise the public transport facilities; and
- “Final Working Paper 4 (WP4) – Interim Road Network Requirement and Traffic Improvement Measures for WKR” issued in April 2009 to identify the traffic problems in Study Area and recommend the road network requirements in the Focus Area for interim critical stage.

1.1.2 The Draft Final Report (DFR) which incorporated the finalised details presented in the above TN1, WP1, WP2, WP3 and WP4 including the modelling methodology, validation results, problem identification and recommendations of mitigation measures for short-term, long-term and interim conditions in Focus Area and Study Area (The extent of Focus Area and Study Area are shown in **Figure 1.1**) was circulated to the relevant departments for comment on 19th May 2009. Some comments have been received. Please refer to the Responses to Comments in **Appendix A**.

1.1.3 In addition to the above comments, Schemes H and I have been modified to take into account the recent comments from Major Works Division of Highways Department (HyD) on the Project Definition Statement and comments from Western Harbour Tunnel Company Ltd. during consultation.

1.1.4 This Final Report has incorporated all the major comments received and as a final deliverable of this study to record all the major findings and recommendations of the Study.

1.2 Objective of Final Report

1.2.1 According to the Study Brief, this FR should include the following:

- The major assumptions, limitations and findings as set out in the approved Working Papers;
- The findings of the traffic study for the design years;
- The recommendations on traffic schemes that are necessary to cope with the traffic conditions at three different stages of various developments and transport infrastructures in West Kowloon Reclamation Area (WKRA); and
- A Transport Plan with implementation programme for the Focus Area at the stage upon full development and operation of all planned developments and transport infrastructures in WKRA. The Plan should cover aspects of detail layout of the road network, pedestrian network in WKRA and its linkage with hinterland, and ingress/egress of planned developments and Public Transport Interchanges (PTIs).

1.3 References

1.3.1 It is known that the findings in the MTRCL's Study "NEX/2101 Express Rail Link Preliminary Design for West Kowloon Terminus (WKT)", which MVA Hong Kong Ltd. (MVA) has also participated in, are closely related to this Study. Therefore, this FR has made reference to the relevant reports of that MTRCL's Study.

1.4 Details of Final Report

1.4.1 Following this introduction, there are eighteen further chapters:

- Chapter 2 "Existing Traffic Condition" – To outline the existing traffic arrangement in the Study Area.
- Chapter 3 "Traffic Survey" – To present the details and results of different types of traffic surveys.
- Chapter 4 "Traffic Modelling Methodology" – To describe the procedure of developing future traffic forecast starting from Strategic Model (MVCTS) to finally the West Kowloon Reclamation Traffic Model (WKRTM).
- Chapter 5 "Model Validation" – To present the base-year traffic model validation results and hence to demonstrate the traffic models are accurate enough to develop future traffic forecast.
- Chapter 6 "Future Developments and Planning Data" – To summarise the planning data and road network assumptions adopted in the traffic model.
- Chapter 7 "Trip Generation Rate" – To describe the details of trip generation survey, analyse the trip rates for various land uses, and summarise the trip rates adopted in the traffic model.

- Chapter 8 “Traffic Impact Assessment for Existing Condition” – To assess the existing traffic condition in terms of traffic queue, junction capacity and road link capacity.
- Chapter 9 “Improvement Measures for Existing Problematic Junctions” – To present the short term improvement schemes for the existing problematic junctions.
- Chapter 10 “Future Year Traffic Condition – Reference Case” – To present the future year traffic condition under the Reference Case scenario, and identifies any potential future year traffic problems.
- Chapter 11 “Proposed Long Term Road Network” – To state the principles of developing the future traffic schemes, identify the practical schemes and carry out the traffic assessment.
- Chapter 12 “Future Public Transport Interchange in Focus Area” – To recommend the future PTIs in the Focus Area.
- Chapter 13 “Future Pedestrian Facilities” – To address the pedestrian planning aspects for WKRA, and recommends the future pedestrian network within WKRA and also external connection to adjacent districts.
- Chapter 14 “Transport Plan and Implementation Programme” – To summarise the proposed road scheme, pedestrian schemes and public transport arrangement; and also recommends the implementation programme.
- Chapter 15 “Interim Traffic Condition” – To outline the interim traffic condition within the Study Area.
- Chapter 16 “Temporary Traffic Management Schemes (TTMS)” – To present the requirements and changes of road network during the major construction stages.
- Chapter 17 “Summary” – To present the summary.

2. EXISTING TRAFFIC CONDITION

2.1 Existing Road Network

- 2.1.1 The existing road network in the Study Area is illustrated in **Figures 2.1 to 2.11**.
- 2.1.2 In the Focus Area, the road network is shaped by the mega-block sites of Union Square, Sites A, C and D. The road network is formed by a lattice of north-south and east-west dual-carriageway, distributor-class roads. These north-south roads include Lin Cheung Road (LCR) and Canton Road (CAR), while the east-west roads include Jordan Road (JOR), Wui Cheung Road (WCR) and Austin Road West (AURW). The characteristics of the roads within the Focus Area are described below.
- 2.1.3 West Kowloon Highway (WKH) is classified as an Urban Trunk Road. It connects to the WHC to the south and Tsing Kwai Highway to the north, and forms part of Route 3. Slip roads connecting to LCR, Ngo Cheung Road and Lai Cheung Road are provided to serve the traffic to / from Tsim Sha Tsui, Jordan and Yau Ma Tei.
- 2.1.4 LCR is a dual carriageway with two to three lanes in each direction. The section of LCR within the Focus Area is a continuation of the road from Lai Chi Kok. Two pairs of slip roads (to / from WKH, and to / from WHC) connect to LCR just north of its junction with JOR. Thus, a significant volume of cross-district traffic from Tsim Sha Tsui, Jordan and West Kowloon Reclamation district towards the western parts of Hong Kong Island, Kowloon and New Territories relies heavily on LCR. Long vehicle queues are often observed at the LCR southbound approach at its junction with JOR.
- 2.1.5 CAR is connected to JOR to the north and Salisbury Road to the south. The section within Focus Area, i.e. between JOR and Kowloon Park Drive (KPD), is a dual carriageway with three to four traffic lanes in each direction. This section of CAR is classified as primary distributor. It serves as the main corridor for traffic between Jordan / WKH / WHC and Tsim Sha Tsui. Long vehicle queues frequently occur at the CAR southbound approach at its junction with AUR (AUR). The section from KPD to Salisbury Road is a one-way southbound road with two to three lanes. Lay-bys and bus stops are provided at the eastern kerb-side of this section of CAR. Along this section, there are a number of vehicular accesses to adjacent developments.
- 2.1.6 JOR is a dual carriageway with three to four lanes in each direction. The section of JOR east of its junction with LCR is heavily trafficked due to its strategic location close to the WHC and WKH as mentioned above. Long queues are observed at the JOR eastbound approaches at its junction with CAR as well as at Nathan Road.
- 2.1.7 WCR is a dual carriageway located between LCR and CAR. It is currently a key link for traffic from WHC, WKH and more locally from the MTR Kowloon Station towards Tsim Sha Tsui, as the same traffic movement is not available via JOR (banned right-turn from JOR EB to CAR) or AUR (one-way westbound only). Therefore, vehicles always queue at the WCR eastbound approach at its junction with CAR.
- 2.1.8 AURW is connected to CAR to the east and Nga Cheung Road (NCR) to the west. The section between CAR and LCR is recently converted from a one-lane one-way westbound carriageway to single two carriageway.

- 2.1.9 Outside the Focus Area, and within the Study Area, there is mainly (i) the old Jordan and Yau Ma Tei districts to the east of CAR and north of AUR, and (ii) the Tsim Sha Tsui district to the south of AUR. The fine road grid in the old Jordan and Yau Ma Tei districts are mainly characterised by local distributors of 1 to 2 traffic lanes. In the Tsim Sha Tsui district, the road network is evenly formed by different types of roads such as primary, district and local distributors. The major roads in the said areas are briefly described as follows.
- 2.1.10 Nathan Road is a north-south dual carriageway with two to three traffic lanes in each direction. Bus stops are found on both kerb-sides. Traffic congestion always occurs along the Nathan Road due to the frequent bus weaving/merging between the bus stops.
- 2.1.11 KPD connects to CAR to the north and Salisbury Road to the south. It is a dual carriageway with two to three traffic lanes in each direction. Currently, the section between Peking Road and Salisbury Road (see Plan 10), is operating under the TTMS for the construction of KSL.
- 2.1.12 Ferry Street is a north-south dual carriageway with two to three traffic lanes in each direction. It is classified as Primary Distributor.
- 2.1.13 Waterloo Road is dual carriageway with three lanes in each direction which serves traffic in east-west direction.
- 2.1.14 AUR is classified as District Distributor. The section between CAR and Nathan Road is a dual carriageway with two to three lanes at each direction, while the section between Nathan Road and Chatham Road South is a single carriageway with two lanes at each direction.
- 2.1.15 Salisbury Road is an east-west dual carriageway with two to three traffic lanes in each direction. The section between CAR and Chatham Road South is operating under TTMS for the construction of KSL.

2.2 Public Transport Facilities

- 2.2.1 The existing road-based public transport facilities within the Focus Area are illustrated in **Figure 2.12**, these include:
- Railway – Kowloon Station (KOW), Airport Express Line (AEL) and Tung Chung Line (TCL)
 - Franchised Bus – Bus termini at KOW, WCR and China Ferry Terminal (CFT), and roadside bus stops along CAR, JOR, AURW and WHC Toll Plaza. It is understood to facilitate the construction works for the Express Rail Link (XRL), the bus terminus of the existing Jordan Temporary Public Transport Interchange), coach and motor cycle parking spaces will be relocated to To Wah Road i.e. at the northeast of LCR/JOR junction
 - GMB – GMB terminus at KOW, and roadside stops along CAR, JOR, WCR, AURW.
 - Taxi – Taxi stands at KOW, WCR PTI and CFT.

2.3 Pedestrian Facilities

- 2.3.1 The existing pedestrian facilities within the Focus Area are shown in **Figure 2.13**. Pedestrian movements along the roads within the Focus Area are adequately served by at-grade footpaths, the movements across the busier junctions of JOR / CAR and CAR / AUR are entirely served by pedestrian subways. Part of the AUR Subway is currently closed to facilitate the construction of KSL.
- 2.3.2 The pedestrian crossing facilities at the junction of JOR / LCR are in both at-grade and elevated forms. Movements across the northern arm of LCR, and the western arm of JOR are catered for the JOR footbridge, while at-grade pedestrian crossing is provided across the southern arm of LCR. On the western side, the pedestrian movements across WHC toll plaza to the bus stops alongside WKH are served by elevated walkway.
- 2.3.3 At present, pedestrian activities in the Focus Area is relatively light, a significant increase is envisaged once this area is fully developed.

3. TRAFFIC SURVEY

3.1 Type of Surveys

3.1.1 To obtain the existing traffic data in compliance with the requirements stated in the Brief for this Study, various type of surveys were conducted. The surveys included:

- Classified Traffic Count Surveys;
- Queue Length Surveys;
- Trip Generation Surveys; and
- Pedestrian Surveys.

3.1.2 The following sections describe the details and methodology of the surveys, and present the results of the surveys.

3.2 Classified Traffic Count Surveys

3.2.1 The classified traffic count surveys were conducted to record the volumes of turning vehicles at critical junctions and screenlines for different vehicle types consistent with those in the Annual Traffic Census (ATC). The surveys were conducted for at least 2 hours in the morning peak period and 2 hours in evening peak period on a normal weekday.

3.2.2 There were a total 38 junctions and 4 screenlines surveyed within the Study Area. The locations of these surveyed junctions and screenlines are shown in **Figure 3.1**.

3.2.3 By reference to the peak periods of the ATC counting stations within the Study Area, the survey periods in the morning and evening peak on a weekday are identified as follows:

- Weekday AM Period: 07:30 – 09:30
- Weekday PM Period: 17:00 – 19:00

3.2.4 In order to know if the road network peaks in weekends would be more critical than the commuting peaks on weekdays, the classified traffic count surveys were also conducted on Friday, late evening, and Saturday and Sunday, afternoon. The corresponding survey periods are listed below:

- Friday Late Evening: 19:00 – 21:00
- Saturday Afternoon: 12:00 – 15:00
- Sunday Afternoon: 13:30 – 16:30

3.2.5 As there is more concern with the junctions within the Focus Area than outside the Focus Area, it was not necessary to conduct surveys at the aforementioned 38 junctions and 4 screenlines on Friday, Saturday and Sunday. Therefore, only 8 junctions located within the Focus Area were surveyed. The locations of these junctions are also shown in **Figure 3.1**.

3.2.6 The results of the classified traffic count surveys are presented in **Figures 3.2** and **3.3**.

3.3 Queue Length Surveys

3.3.1 In accordance with the Study Brief, queue length surveys were conducted at major roads and road junctions within the Study Area. Based on the consultant's working experience in the Study Area, a total of 12 locations where vehicle queues frequently occur were identified. The locations of queue length surveys were shown previously in **Figure 3.1**.

3.3.2 In order to obtain data consistent with that of the classified traffic count surveys, the survey date and periods are the same as for the classified traffic count surveys.

3.3.3 To obtain the required data, the length of vehicle queue, in terms of meters, of a particular approach was recorded at the end of each red period. The average and maximum queue length of a particular approach refers to the mean and highest value amongst the observed data during the road network peak periods.

3.3.4 The average and maximum queue lengths of the surveyed approaches are illustrated in **Figure 3.4**.

3.4 Trip Generation Surveys

3.4.1 The details of trip generation surveys will be discussed in details in Chapter 7.

3.5 Pedestrian Surveys

3.5.1 In order to obtain the passenger demand of the KOW PTI and WCR Temporary PTI, pedestrian surveys were carried out at these two PTIs. The survey periods were 07:00 – 11:00 and 16:00 – 20:00 for AM and PM periods respectively. In the surveys, the number of passengers boarding and alighting from the bus and GMB in the PTIs were counted. The passenger demand of the PTIs at the AM and PM peak periods is listed in **Table 3.1**.

Table 3.1 Passenger Demand for KOW PTI and WCR Temporary PTI

Activity	KOW PTI		WCR Temporary PTI	
	AM (08:15 – 09:15)	PM (17:45 – 18:45)	AM (08:00 – 09:00)	PM (17:30 – 18:30)
Boarding	514	1,067	15	344
Alighting	326	228	208	51

3.5.2 Interview surveys were carried out at AEL stations, Hung Hom Station for the through train passengers (TTR) and for Lo Wu (LOW) Boundary train passengers to obtain their transport mode of access/egress. The results are presented in **Table 3.2**.

Table 3.2 Mode of Access/Egress for Cross Boundary Rail Travellers (%)

Mode	AEL⁽¹⁾	LOW⁽²⁾	TTR⁽³⁾
Rail	28	51	24
Walk	n/a	14	4
Franchised bus	4	22	21
Coach	13	0	0
Public light bus	2	8	3
Private car	3	2	8
Limo	N/A	N/A	N/A
Taxi	42	3	40
Others	9	1	1
Total	100	100	100

Note: (1) Airport Express Stations – MTRC
(2) Lo Wu passengers at TSTE/HUH/MOK/KOT Stations – MTRC
(3) Through Train passengers at Hung Hom Station – MTRC

4. TRAFFIC MODELING METHODOLOGY

4.1 Study Assumptions

Design Years

4.1.1 The design years for the traffic study at the three different stages of the implementation of the various developments and the transport infrastructure in WKRA, i.e. short-term, interim and long-term, are summarised below:

- Short-term Stage – Existing condition, i.e. year 2008, is adopted as the design year for “Short-term” stage.
- Interim Stage – Year 2011 is adopted as the design year for “Interim Stage”. Detailed discussions for selecting 2011 as design year will be provided in Section 15.2.
- Long-term Stage – All the major developments and transport infrastructures in the WKRA will be fully completed before 2031, and hence 2031 will be adopted as the design year for “Long-term” stage.

Modelling Assumptions

4.1.2 The Traffic Model has taken into account the latest (1) Planning Data, and (2) Road Network Assumptions. The detailed assumptions have been agreed with relevant departments and will be presented in Chapter 6.

4.2 Traffic Model Methodology

Strategic and Local Models

4.2.1 MVA’s in-house Strategic Model, MVCTS, was adopted to provide strategic forecast and cordoned matrices for the WKRTM. This MVCTS has been recently validated with 2006-Based Territorial Population and Employment Data Matrices (TPEDM) Planning Data, 2007 Annual Traffic Census, and 2008 survey flows.

4.2.2 The development of WKRTM was based on MVA’s in-house SATURN-based local model, “CKR K1” Model, which was developed under the current Central Kowloon Route (CKR) Project and was built up from the 2004-base BDTM K1 model. In this study, the CKR K1 Model was further refined in more details for West Kowloon Area to ensure the model could provide sufficient detailed turning movement flows for the WKR Study. The refined local model was re-validated with the latest 2008 observed flows to form the WKRTM.

4.2.3 The coverage of the WKRTM included the entire Study Area and Focus Area as shown in **Figure 1.1**. The zone plan is illustrated in **Figure 4.1**.

Modeling Procedures

- 4.2.4 For developing the 2008 base year WKRTM, growth rates for External Zone to External Zone (E-E) between year 2006 and year 2008 were obtained by comparing the relevant Origin-Destination (O-D) traffic flows of the 2006 MVCTS and 2011 MVCTS, and take into account 2007 ATC data.
- 4.2.5 By applying the aforesaid E-E growth rates and the additional trip ends to the 2006 CKR K1 model, a “Prior” 2008 WKRTM was developed.
- 4.2.6 This “Prior” 2008 WKRTM was checked and validated against the latest 2008 observed flows to ensure the base year WKRTM satisfactorily replicates the existing traffic flows and patterns before the model was used to produce future year forecast traffic. The model network was checked with the latest traffic aids drawings as well as site inventory records.
- 4.2.7 For future design years, 2011 and 2031 planning data of “2006-based TPEDM” were input to MVCTS and then produce cordon matrices for building up the 2011 & 2031 WKRTM respectively. The traffic zones of the cordon matrices were disaggregated into the level as for the WKRTM. The disaggregated factors had taken into account the development schedule of the zones, trip rates/trip ends, and the relevant factors adopted in BDTM. The O-D pattern adjustment factors (I-I, I-E, & E-I) derived from the model validation process were then applied to the future year matrices. The local trip ends of each zone in WKR were controlled by the calculated trip ends by taking into account the agreed “trip rates”.
- 4.2.8 The future road networks for the design years were updated and refined to take into account the latest network assumptions and also the refined traffic zoning.

5. MODEL VALIDATION RESULTS

5.1 Data Collection

- 5.1.1 Manual classified turning movement counts have been carried out at the key junctions and road links within the Study Area. At all the surveyed locations/junctions, the survey periods at-least covered AM and PM commuting peak hours on normal weekday. For 8 key junctions within the Focus Area, the survey periods also covered late evening peak of Friday, and peak hours of Saturday/Sunday. The details of the traffic survey and the survey results are presented in the Chapters 3 and 7.
- 5.1.2 The commuting peak hour survey flows of weekday were used for base-year model validation. The survey flows of other peaks of Friday, Saturday and Sunday would be adopted for estimating the relevant peaks (non-commuting) of future years.

5.2 2008 Base Year Network Validation Results

- 5.2.1 Based on the modelling methodology as discussed in Chapter 4, examination of the 2008 modelled flows, after “Matrix Estimation (ME)” process, against the 2008 flows at the critical junctions and key road links has indicated a satisfactory result. The model performance across the critical junctions and key road links are summarised in **Appendix B**.
- 5.2.2 The model validation results in **Appendix B** indicated that the modelled flows are within average 5% of the observed flows, which indicate that the model is capable of reproducing acceptable traffic figures which provides a robust platform to carry out traffic forecasting. In terms of “GEH” (a statistic indicator) which is a modified chi squared test, and provides a statistic for both the magnitude of the difference and the percentage difference between modelled and observed flows, it is used in preference to percentage differences which can over emphasise differences in relatively small traffic volumes. The form of GEH error statistics is as follow:

$$\sqrt{\frac{(V_2 - V_1)^2}{0.5(V_1 + V_2)}}$$

where V_1 and V_2 are the count and model flows on a specific link.

Table 5.1 Summary of Model Validation Results

	AM Peak Hour		PM Peak Hour	
	Count	% of Total	Count	% of Total
GEH < 6	203	86%	218	93%
GEH > 6 and < 7	7	3%	6	2%
GEH > 7 and < 10	25	11%	11	5%
GEH > 10	0	0%	0	0%
Number of movements	235	100%	235	100%

- 5.2.3 As indicated in **Table 5.1**, all the validated junctions and road links are within GEH value of 10 and more than 85% of the turning movements are within GEH of 6.0, it is considered satisfactory from modelling point of view.

6. FUTURE DEVELOPMENTS AND PLANNING DATA

6.1 Future Developments and Planning Data

6.1.1 This section will present the planning data of two horizons i.e. strategic and local planning data adopted in this Study. Strategic planning data are the planning figures covering the whole Hong Kong, while the local planning data mainly concentrate on the developments within the Focus Area.

Strategic planning data

6.1.2 The details of each type of data are listed below and are tabulated in **Tables 6.1 to 6.13**:

- 2011, 2016, 2021, 2026, 2031 Land Use Planning Data (2006 based TPEDM)
- Productivities of Container Terminals for Base Case
- Port Back-up Areas
- Vehicle Fleet Sizes
- Toll Assumptions - 2008 Dollars
- GDP Growth Assumptions
- Daily Cross Boundary (2-way) Vehicle Traffic by Vehicle Types
- Airport Usage Forecasts (Excluding Transit Passengers and Transshipment Cargo)

Table 6.1 2011 Land Use Planning Data

District	Design Population	Population (Usual Residents)	Population (other than Usual Residents)	Households	Resident Students	School Places	Resident Workers	Job Places
Central & Western	280,400	245,704	34,696	92,157	37,963	52,386	131,016	387,936
Wan Chai	198,751	161,444	37,307	61,973	21,739	50,775	85,719	279,351
Eastern	590,002	549,545	40,457	190,854	79,742	93,750	286,946	285,210
Southern	288,149	267,652	20,497	87,088	40,990	54,154	144,209	97,345
Yau Ma Tei	222,660	152,166	70,494	53,932	25,045	24,741	79,956	246,190
Mong Kok	144,812	127,500	17,312	48,259	18,768	19,549	67,454	119,586
Sham Shui Po	416,239	395,556	20,683	139,302	62,960	89,433	202,007	208,539
Kowloon City	393,678	354,258	39,420	123,910	55,699	138,249	183,464	181,465
Kwun Tong	644,726	612,933	31,793	220,694	97,892	96,618	318,747	332,127
Wong Tai Sin	437,200	418,075	19,125	143,984	60,553	61,607	218,866	104,079
Tsuen Wan	287,534	264,020	23,514	92,741	43,723	37,003	140,885	143,865
Kwai Chung	320,524	302,871	17,653	104,410	46,712	52,923	155,291	187,154
Tsing Yi	203,673	187,831	15,842	62,307	27,483	30,156	105,021	38,688
Tuen Mun	490,810	468,061	22,749	157,447	72,173	90,872	259,786	115,169
Yuen Long	154,497	147,128	7,369	53,932	25,217	37,213	82,734	60,592
Tin Shui Wai	306,260	291,513	14,747	93,695	61,170	56,615	161,892	34,827
Tai Po	252,114	241,085	11,029	78,340	34,371	52,740	135,072	81,761
Fanling/ Sheung Shui	258,785	247,538	11,247	82,906	42,835	49,421	137,497	59,662
Shatin	456,383	430,101	26,282	148,456	62, 518	92,137	236,141	170,983
Ma On Shan	217,567	205,706	11,861	65,917	33, 764	27,996	116,641	36,361
Tseung Kwan O	388,636	367,939	20,697	122,263	63, 447	56,996	208,286	75,295
North Lantau	105,449	90,917	14,532	32,128	19, 734	15,835	50,191	85,848
Rural NWNT	158,980	151,585	7,395	52,440	27, 291	11,684	80,983	41,705
Rural NENT	94,584	90,613	3,971	28,966	15, 313	4,185	49,619	22,761
Rural SENT	68,098	64,957	3,141	21,662	10, 932	11,634	37,230	22,020
Rural SWNT	71,783	67,586	4,197	25,612	12, 992	10,561	35,956	20,257
Territory Land Total	7,452,294	6,904,284	548,010	2,385,375	1,101,025	1,319,236	3,711,607	3,438,776

- Notes:
1. The data were based on the 2006 based Territorial Population and Employment Data Matrices (TPEDM) issued in May 2008 by the Planning Department.
 2. Design Population is the sum of Population (Usual Residents) and Population (Other than Usual Residents).
 3. Population (Other than Usual Residents) is the sum of Mobile Residents and Other Persons as at mid 2011.
 4. Figures rounded to nearest whole number and may not add up to the total.

Table 6.2 2016 Land Use Planning Data

District	Design Population	Population (Usual Residents)	Population (other than Usual Residents)	Households	Resident Students	School Places	Resident Workers	Job Places
Central & Western	288,552	249,518	39,034	93,781	40,893	55,138	125,117	385,564
Wan Chai	210,195	164,877	45,318	64,156	24,538	50,423	81,957	274,184
Eastern	585,613	543,373	42,240	192,429	75,594	93,750	273,788	295,064
Southern	301,469	264,320	37,149	89,221	35,657	55,242	140,105	107,287
Yau Ma Tei	230,982	156,744	74,238	54,109	29,643	27,602	75,890	243,344
Mong Kok	147,396	128,650	18,746	46,985	21,584	19,549	63,090	116,438
Sham Shui Po	463,342	436,720	26,622	152,492	74,494	91,657	218,664	209,586
Kowloon City	439,563	389,030	50,533	140,547	65,706	146,041	195,568	196,568
Kwun Tong	670,920	630,876	40,044	235,934	93,611	98,998	330,627	348,396
Wong Tai Sin	427,518	403,545	23,973	144,517	50,281	61,472	213,581	103,031
Tsuen Wan	285,619	259,347	26,272	92,683	41,806	37,003	133,510	140,177
Kwai Chung	315,533	295,822	19,711	107,339	39,853	52,923	154,085	194,933
Tsing Yi	197,166	181,539	15,627	61,605	23,057	30,156	99,227	38,736
Tuen Mun	520,486	496,129	24,357	171,207	69,766	90,316	269,143	119,839
Yuen Long	163,169	155,085	8,084	58,046	26,671	37,213	83,952	61,543
Tin Shui Wai	315,291	299,427	15,864	96,650	48,336	57,535	173,575	35,246
Tai Po	257,215	245,851	11,364	81,249	29,661	53,407	134,884	82,127
Fanling/ Sheung Shui	258,035	246,907	11,128	82,936	35,935	49,421	136,522	61,099
Shatin	496,441	463,345	33,096	167,065	65,620	95,567	249,459	171,762
Ma On Shan	223,556	211,392	12,164	68,775	30,565	27,996	117,202	37,352
Tseung Kwan O	426,455	403,870	22,585	137,797	63,282	59,742	228,477	78,055
North Lantau	143,045	99,515	43,530	36,288	18,381	15,835	56,149	112,594
Rural NWNT	206,684	196,976	9,708	70,994	35,337	20,132	105,825	46,082
Rural NENT	105,626	101,146	4,480	32,948	16,781	8,025	53,906	23,351
Rural SENT	78,959	73,838	5,121	25,544	12,002	14,206	41,517	23,453
Rural SWNT	76,103	70,233	5,870	27,541	13,671	11,635	35,924	23,246
Territory Land Total	7,834,935	7,168,075	666,860	2,532,838	1,082,722	1,360,987	3,791,744	3,529,057

- Notes:
1. The data are based on the updated 2006 based Territorial Population and Employment Data Matrices issued in May 2008 by the Planning Department.
 2. Design Population is the sum of Population (Usual Residents) and Population (Other than Usual Residents).
 3. Population (Other than Usual Residents) is the sum of Mobile Residents and Other Persons as at mid 2016.
 4. Figures rounded to nearest whole number and may not add up to the total.

Table 6.3 2021 Land Use Planning Data

District	Design Population	Population (Usual Residents)	Population (other than Usual Residents)	Households	Resident Students	School Places	Resident Workers	Job Places
Central & Western	277,353	247,527	29,826	94,199	42,122	56,098	119,476	380,109
Wan Chai	202,515	161,303	41,212	63,498	25,040	50,423	78,018	280,467
Eastern	581,649	537,949	43,700	193,240	75,968	93,750	255,989	288,692
Southern	316,814	268,703	48,111	92,044	33,678	55,242	140,306	104,847
Yau Ma Tei	241,427	171,431	69,995	59,486	34,571	27,602	81,280	235,600
Mong Kok	141,044	127,444	13,600	47,237	23,479	19,549	57,667	112,907
Sham Shui Po	497,963	461,425	36,538	164,306	80,099	91,657	223,649	211,116
Kowloon City	490,479	438,979	51,500	160,542	76,864	149,747	218,368	205,951
Kwun Tong	708,767	631,317	77,450	239,742	88,527	98,998	316,076	373,872
Wong Tai Sin	439,650	401,969	37,681	146,993	48,859	61,472	203,072	103,980
Tsuen Wan	283,693	256,913	26,780	92,899	41,205	37,003	124,546	143,869
Kwai Chung	336,273	294,028	42,245	107,470	36,625	52,923	147,835	210,277
Tsing Yi	197,704	178,001	19,702	61,309	23,161	30,156	89,795	38,689
Tuen Mun	572,950	538,692	34,258	189,729	80,336	93,196	276,295	118,079
Yuen Long	158,763	153,539	5,224	58,288	27,843	37,213	77,296	60,508
Tin Shui Wai	321,783	290,546	31,237	95,273	38,845	57,535	162,362	34,381
Tai Po	252,532	242,394	10,139	81,016	31,187	54,043	121,536	81,621
Fanling/ Sheung Shui	360,293	336,346	23,947	117,479	54,619	49,421	181,058	61,806
Shatin	493,268	454,826	38,443	166,138	63,687	95,567	230,912	165,139
Ma On Shan	226,657	217,089	9,568	71,709	30,761	27,996	114,030	38,298
Tseung Kwan O	449,313	427,792	21,520	149,435	66,558	59,742	232,383	83,321
North Lantau	223,705	154,436	69,269	55,819	24,158	16,795	90,487	137,000
Rural NWNT	217,582	213,534	4,048	77,853	38,697	20,132	111,688	47,145
Rural NENT	110,643	109,214	1,429	35,962	18,571	8,985	56,148	28,491
Rural SENT	80,404	77,828	2,577	27,282	12,088	14,206	43,177	24,406
Rural SWNT	76,648	72,897	3,751	28,891	14,313	11,635	35,068	22,393
Territory Land Total	8,259,874	7,466,123	793,751	2,677,837	1,131,862	1,371,089	3,788,517	3,592,963

- Notes: 1. The data are based on the updated 2006 based Territorial Population and Employment Data Matrices issued in May 2008 by the Planning Department.
2. Design Population is the sum of Population (Usual Residents) and Population (Other than Usual Residents).
3. Population (Other than Usual Residents) is the sum of Mobile Residents and Other Persons as at mid 2021.
4. Figures rounded to nearest whole number and may not add up to the total.

Table 6.4 2026 Land Use Planning Data

District	Design Population	Population (Usual Residents)	Population (other than Usual Residents)	Households	Resident Students	School Places	Resident Workers	Job Places
Central & Western	277,241	246,931	30,310	95,219	43,482	56,098	114,772	388,632
Wan Chai	203,007	161,405	41,602	64,365	25,903	50,423	76,070	275,378
Eastern	582,727	533,790	48,937	194,781	76,850	93,750	239,513	282,913
Southern	320,270	268,379	51,891	92,729	34,285	55,242	134,134	111,198
Yau Ma Tei	242,953	172,411	70,542	60,608	33,511	27,602	79,004	233,508
Mong Kok	141,707	128,000	13,707	48,232	24,340	20,185	54,796	114,423
Sham Shui Po	504,408	460,626	43,783	166,029	76,891	91,657	214,035	209,777
Kowloon City	494,130	438,318	55,811	162,393	74,584	151,019	210,366	208,959
Kwun Tong	716,163	624,248	91,915	240,560	84,991	98,998	293,624	376,058
Wong Tai Sin	442,592	396,957	45,635	147,399	48,379	61,472	184,834	105,899
Tsuen Wan	286,004	256,756	29,248	94,041	40,471	37,003	117,124	140,006
Kwai Chung	343,011	292,858	50,153	107,737	36,330	53,499	137,994	212,314
Tsing Yi	198,394	175,747	22,646	61,486	24,196	30,156	81,309	38,437
Tuen Mun	579,859	537,832	42,027	191,267	82,247	93,196	256,076	114,505
Yuen Long	160,766	154,507	6,259	59,553	28,283	37,213	73,204	61,489
Tin Shui Wai	324,890	286,680	38,210	95,604	37,871	57,535	147,521	33,714
Tai Po	254,106	241,782	12,323	81,911	34,997	54,679	109,923	79,163
Fanling/ Sheung Shui	362,590	332,811	29,779	118,167	53,507	49,421	166,780	64,784
Shatin	496,254	451,328	44,926	167,229	64,488	95,567	215,300	162,367
Ma On Shan	225,987	214,984	11,003	72,233	30,231	27,996	105,249	37,893
Tseung Kwan O	449,035	423,596	25,439	150,368	65,517	59,742	213,727	86,577
North Lantau	288,974	209,434	79,540	77,648	33,723	22,555	121,147	148,161
Rural NWNT	368,518	349,468	19,050	134,751	67,862	25,892	189,699	53,626
Rural NENT	238,326	222,379	15,947	69,694	43,286	15,705	120,366	30,949
Rural SENT	85,421	82,607	2,814	29,361	12,903	14,206	44,290	25,512
Rural SWNT	80,255	76,204	4,051	30,500	14,364	11,635	35,544	22,942
Territory Land Total	8,667,588	7,740,038	927,550	2,813,866	1,193,493	1,392,449	3,736,401	3,619,181

- Notes:
1. The data were based on the 2006 based Territorial Population and Employment Data Matrices issued in May 2008 by the Planning Department.
 2. Design Population is the sum of Population (Usual Residents) and Population (Other than Usual Residents).
 3. Population (Other than Usual Residents) is the sum of Mobile Residents and Other Persons as at mid 2026.
 4. Figures rounded to nearest whole number and may not add up to the total.

Table 6.5 2031 Land Use Planning Data

District	Design Population	Population (Usual Residents)	Population (other than Usual Residents)	Households	Resident Students	School Places	Resident Workers	Job Places
Central & Western	296,554	261,781	34,773	102,233	44,862	56,098	124,038	395,489
Wan Chai	211,804	169,698	42,107	68,174	26,054	50,423	81,902	269,372
Eastern	601,331	542,288	59,043	200,638	77,572	93,750	237,695	277,692
Southern	331,352	275,059	56,293	95,555	36,366	55,242	134,638	113,032
Yau Ma Tei	255,932	184,667	71,265	65,690	31,820	27,602	85,263	228,346
Mong Kok	151,354	137,502	13,852	52,568	24,377	20,185	59,175	111,732
Sham Shui Po	529,357	476,380	52,977	173,170	74,755	91,657	218,001	205,923
Kowloon City	511,128	449,869	61,260	168,238	71,540	151,655	213,311	205,303
Kwun Tong	739,908	629,656	110,253	245,393	85,842	98,998	282,524	383,435
Wong Tai Sin	454,435	398,730	55,705	149,815	51,213	61,472	173,369	106,213
Tsuen Wan	296,314	263,946	32,369	97,688	39,848	37,003	116,885	135,730
Kwai Chung	354,862	294,693	60,169	108,688	38,697	53,499	129,078	207,755
Tsing Yi	203,809	177,437	26,373	62,945	25,420	30,156	78,951	37,418
Tuen Mun	599,218	547,371	51,847	196,004	84,347	93,196	249,322	111,543
Yuen Long	178,846	171,236	7,610	66,635	29,605	37,213	81,071	62,698
Tin Shui Wai	332,725	285,691	47,034	96,757	41,933	57,535	134,656	33,565
Tai Po	261,945	246,875	15,070	84,658	38,189	57,223	108,245	78,174
Fanling/ Sheung Shui	371,124	333,963	37,161	120,344	54,160	49,421	160,286	62,890
Shatin	510,158	457,025	53,133	171,296	65,194	95,567	210,131	159,963
Ma On Shan	229,107	216,318	12,789	73,822	29,882	27,996	101,523	38,069
Tseung Kwan O	456,436	426,087	30,349	153,519	64,255	59,742	202,337	84,362
North Lantau	297,027	211,868	85,159	80,176	39,753	24,475	112,494	147,935
Rural NWNT	410,960	387,208	23,752	150,591	67,624	25,892	207,849	87,853
Rural NENT	262,997	243,034	19,963	77,656	43,747	15,705	127,973	37,013
Rural SENT	101,059	97,648	3,411	35,310	15,596	14,206	52,403	26,676
Rural SWNT	88,936	84,499	4,437	34,289	15,584	11,635	38,841	23,528
Territory Land Total	9,038,681	7,970,527	1,068,154	2,931,852	1,218,240	1,397,549	3,721,962	3,631,709

- Notes: 1. The data were based on the 2006 based Territorial Population and Employment Data Matrices issued in May 2008 by Planning Department
2. Design Population is the sum of Population (Usual Residents) and Population (Other than Usual Residents).
3. Population (Other than Usual Residents) is the sum of Mobile Residents and Other Persons as at mid 2031.
4. Figures rounded to nearest whole number and may not add up to the total.

Table 6.6 Productivities of Container Terminals for Base Case (New CT will be required by 2015)

Year	CTs 1-9	New CT	Total
2011	18.84	-	18.84
2016	20.29	1.32	21.61
2021	20.29	6.29	26.58
2026	20.29	9.18	29.47
2031	20.29	11.70	31.99

Notes: In million TEU's per year.

Source: "Study on Hong Kong Port Cargo Forecasts 2005/2006" which the new container berths would be required by 2015 under the Reference/Trends Capacity Scenario provided by THB on 19.6.2008. Figures for 2011, 2016, 2021, 2026 and 2031 are projected from 2010, 2015, 2020, 2025 and 2030 figures.

Table 6.7 Productivities of Container Terminals for Base Case (New CT will be required by 2020)

Year	CTs 1-9	New CT	Total
2011	18.84	-	18.84
2016	21.61	-	21.61
2021	25.15	1.43	26.58
2026	25.15	4.32	29.47
2031	25.15	6.84	31.99

Notes: In million TEU's per year.

Source: "Study on Hong Kong Port Cargo Forecasts 2005/2006" which the new container berths would be required by 2020 under the A2 Capacity Scenario provided by THB on 19.6.2008. Figures for 2011, 2016, 2021, 2026 and 2031 are projected from 2010, 2015, 2020, 2025 and 2030 figures.

Table 6.8 Port Back-up Areas

Year	Area Supply (hectares)	Area Demand (hectares)
2011	413	196
2016	418	215
2021	486	283
2026	489	315
2031	492	350

Source: Study on Hong Kong Port Cargo Forecasts 2005/2006 (PCFs 2005/2006). Final Working Paper 5 under the Reference/Trends Scenario which incorporates a quicker and more extensive build up of CT10.

Figures for 2011, 2016, 2021, 2026 and 2031 are projected from 2010, 2015, 2020 and 2030 figures.

Table 6.9 Vehicle Fleet Sizes

Year	Private Vehicles		Goods Vehicles	
	Mid-year fleet size	Average annual growth rate	Mid-year fleet size	Average annual growth rate
2005	381,500 (actual)	2.30%	110,800 (actual)	0.45%
2006	390,100 (actual)	2.50%	111,300 (actual)	-0.30%
2007	399,800 (actual)	4.30%	111,000 (actual)	-0.60%
2008	416,800 (actual)	3.50%	110,300 (actual)	0
2009	431,400	3.00%	110,300	0
2010	444,400	2.50%	110,300	0
2011	455,500	2.00%	110,300	0.50%
2016	503,000	1.50%	113,100	0.50%
2021	541,900	1.00%	116,000	0.50%
2026	569,600	1.00%	118,900	0.50%
2031	598,600	--	121,900	--

Table 6.10 Toll Assumptions - 2008 Dollars

Toll Facility	Car/Taxi	Light Van	Light Goods Vehicle	Medium Goods Vehicle	Heavy Goods Vehicle	Tractor Unit
Shing Mun Tunnel	5	5	5	5	5	5
Lion Rock Tunnel (LRT)	8	8	8	8	8	8
Tate's Cairn Tunnel (TCT)	14	21	21	25	25	43
Route 8 between Cheung Sha Wan and Sha Tin	8	8	8	8	8	8
<i>Tseung Kwan O (TKO) Tunnel</i>	<i>3</i>	<i>3</i>	<i>3</i>	<i>3</i>	<i>3</i>	<i>3</i>
TKO – Lam Tin Tunnel	3	3	3	3	3	3
Eastern Harbour Crossing (EHC)	25	38	38	50	75	100
Cross Harbour Tunnel (CHT)	20/10	10	15	20	30	40
Western Harbour Crossing (WHC)	45/40	55	55	80	110	140
Aberdeen Tunnel	5	5	5	5	5	5
Lantau Link	15	20	20	25	40	40
<i>Tsing Lung Bridge² (TLB)</i>	<i>15</i>	<i>20</i>	<i>20</i>	<i>25</i>	<i>40</i>	<i>40</i>
<i>Tuen Mun – Chek Lap Kok Link (TMCLKL)</i>	<i>15</i>	<i>20</i>	<i>20</i>	<i>25</i>	<i>40</i>	<i>40</i>
<i>Tsing Yi – Lantau Link² (TYLL)</i>	<i>15</i>	<i>20</i>	<i>20</i>	<i>25</i>	<i>40</i>	<i>40</i>
Tai Lam Tunnel (R3-CPS)	28	90	30	35	40	40
<i>Lam Tei Tunnel and Tai Lam Chung Tunnel (LTT)</i>	<i>28</i>	<i>90</i>	<i>30</i>	<i>35</i>	<i>40</i>	<i>40</i>
<i>Tuen Mun Western Bypass (TMWB)</i>	<i>28</i>	<i>90</i>	<i>30</i>	<i>35</i>	<i>40</i>	<i>40</i>
<i>Tuen Mun Eastern Bypass (TMEB)</i>	<i>28</i>	<i>90</i>	<i>30</i>	<i>35</i>	<i>40</i>	<i>40</i>

- Notes: 1. Tolls for motorcycles are assumed to be the same as private cars.
2. Proposed highway projects (including the committed ones and those under planning) are shown in *italics* as their actual toll levels could only be determined nearer the time of opening.
3. New tolls for Tai Lam Tunnel effective on 19 August 2007 and for Western Harbour Tunnel effective on 6 January 2008. Route 8 (Shatin to Cheung Sha Wan section) opens in March 2008.
4. The tolls for car/taxi/light van /LGV at future Lam Tei Tunnel /Tai Lam Chung Tunnel, TMWB and TMEB have been revised upward to tie in with the current tolls of Tai Lam Tunnel tolls.

Table 6.11 GDP Growth Assumptions

Year	SHPR 2008
2008	4.50%
2009	
2010	
2011	
2012	
2013	3.60%
2014	
2015	
2016	
2017	3.00%
2018	
2019	
2020	
2021	
2022	2.50%
2023	
2024	
2025	
2026	
2027	2.40%
2028	
2029	
2030	
2031	

Note: The above figures are based on information received by TPD/TD in July 2008

Table 6.12 Daily Cross Boundary (2-way) Vehicle Traffic by Vehicle Types

Crossing	Vehicle Type	2005	2011	2016	2021
Cross Boundary Total	Bus/Coach	3,600	4,900	8,100	9,900
	GV	15,000	25,300	32,200	35,400
	CT	12,000	24,000	33,000	35,800
	Car	9,800	37,200	50,700	65,800
	Total	40,400	91,500	124,100	146,900

- Notes: 1. The above figures are provided by PlanD in February 2006.
 2. The figures for 2011, 2016 and 2021 are forecasts for vehicle traffic on a normal weekday.
 3. Total relaxation on private car quota system is assumed from 2011 onward.
 4. Figures are rounded to the nearest hundreds and may not add up to the total.

Table 6.13 Airport Usage Forecasts (Excluding Transit Passengers and Transshipment Cargo)

Item	2006 (actual)	2011	2016	2021	2026	2031
Daily Air Passengers	79,000	95,300	109,900	126,800	146,300	168,800
Daily Cargo (Tonnes)	7,900	9,800	12,100	14,900	18,400	22,700

Notes: 1. The daily air and cargo usage forecasts are in accordance with the AA's advice provided via their e-mail and its web site in February 2008.
2. The forecasts are for the internal review of vehicular flows on major roads only.
3. All figures should be kept in strict confidence and should not be divulged to other users.

Local Planning Data

- 6.1.3 The future developments in WKR are including West Kowloon Terminus (WKCD), KOW, WKT, Austin Station (AUS), Sites A, C and D property developments as shown in **Figure 6.1**. The local planning data as stated in the Brief and collected from Planning Department (PlanD) and other parties are listed in **Table 6.14**.

Table 6.14 Local Planning Data

Development Location	Planned Land Uses			Year of Completion	Seating Capacity (no. of seats)	Area (m ²)	No. of Units (no.)	
West Kowloon Cultural District (WKCD) ⁽¹⁾	Performing Arts Venue	Phase I	Mega Performance Venue		2014-2015	15,000	--	--
			A Great Theatre			2,200	--	--
			Two Medium-sized Theatres			800 each	--	--
			Four Black box Theatres			250 each	--	--
			A Concert Hall			2,000	--	--
			A Chamber Music Hall			800	--	--
			A Xiqu Centre (戲曲中心)	Performace Venue		1,400	--	--
				Small Theatre		400	--	--
			Piazza Areas			15,000 ⁽²⁾	at least 30,000	--
		Phase II	A Great Theatre		2026	1,900	--	--
	Two Medium-sized Theatres		800 each	--		--		
	Museum Facilities and Exhibition Centre:	M+(Including Design, Moving Image, Popular Culture, Visual Arts)		2014-2015 (Phase I) 2031 (Phase II)	--	Gross Floor Area: 61,950 (On-site Area)	--	
		An Exhibition Centre		2014-2015	--	Net Operating Floor Area: 10,000	--	
	Other Arts and Cultural Uses			2014-2015	--	15,000	--	
	Communal Facilities				--	20,000	--	
Residential: Villa Houses			--		145,257	151 ⁽³⁾		
Residential: Apartments			--			1,089 ⁽³⁾		
Hotel			--		56,000	700 ⁽⁴⁾		
Office			--		107,683	--		
Retail, Dining & Entertainment			--		119,000	--		
Union Square ⁽⁵⁾	Residential		2007		--	608,003	5,809	
	Retail			--	82,417	--		
	Office		2009	--	231,474 ⁽⁶⁾	--		
	Hotel			--	167,420 ⁽⁶⁾	996 ⁽⁶⁾		
	Service Apartment			--		606 ⁽⁶⁾		
Express Rail Link (XRL)	West Kowloon Terminus (WKT)			2015	--	--	--	
Property Development in Site A ⁽⁷⁾	Retail			After 2015	--	29,419	--	
	Office				--	294,185	--	
Kowloon Southern Link (KSL)	Austin Station (AUS)			2009	--	--	--	
Property Development in Site C ⁽⁸⁾	Residential			After 2009	--	62,500	896	
	Retail				--	12,500	--	
Property Development in Site D ⁽⁸⁾	Residential			After 2009	--	77,500	900	
	Retail				--	15,500	--	

- Notes: 1. The seating capacities and the areas of the developments in WKCD are based on the information from the Brief of this Study.
2. The assumption for estimating the no. of seats refers to para. 7.8.3.
3. Ratio of villa houses to apartments is assumed to be 1:3 (see para. 7.6.4). The size of villa house and apartment are assumed to be 240 m² and 100 m² respectively.
4. The unit size for hotel is assumed to be 80 m².
5. The GFAs of the property developments and the total no. of residential flats in Union Square are based on the information from PlanD.
6. The most updated office GFA, hotel room no. and service apartment unit no. were received from PlanD on 12/12/08.
7. The data of property development of Site A is based on the most updated assumption from MTRCL's NEX/2101 Express Rail Link Preliminary Design for West Kowloon Terminus.
8. It is understood that the no. of flats for Sites C and D are still studying under the MTRCL's project "Kowloon Southern Link Property Development" (i.e. not confirmed yet). For the purpose of this study, it is necessary to make some reasonable assumptions at this stage. Since the total no. of flats of the two sites will not be comparable to the whole WKR, in term of the potential total trip ends of the two sites in comparing with the total background flows, thus the above assumptions would be acceptable for this particular study, giving that the final no. of flats will not be available in coming months.

6.2 Network Assumptions

6.2.1 The road network assumptions include the assumption of major highway network, rail network, the local traffic management and road improvement schemes, and are listed in **Tables 6.15 to 6.17**.

Table 6.15 Major Highway Network Assumptions

Year	Location	Road network assumption	Configuration
2011 (in addition to existing network)	Hong Kong	Road P1, P2 and Distributor Roads on Central Reclamation Phase III	D2
	New Territories	Route 8 (formerly Route 9) (Tsing Yi to Sha Tin)(partly completed)	D3
		Widening of Tung Chung Road	S2
2016 (in addition to 2011 network)	Kowloon	Route 6 (formerly Route 11) – Central Kowloon Route	D3
		Route 6 (formerly Route 11) – Trunk Road T2 (Kai Tak – Cha Kwo Ling Link).	D2
	New Territories	Route 6 (formerly Route 11) – Tseung Kwan O – Lam Tin Tunnel	D2
		Cross Bay Link at Tseung Kwan O	D2
		Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling (Stage 1 – Section between Island House Interchange and Tai Hang) and (Stage 2 – Section between Tai Hang and Wo Hop Shek Interchange)	D4
		Tsuen Wan Bypass, Widening of Tsuen Wan Road between Tsuen Tsing Interchange and Kwai Tsing Interchange, and Associated Junction Improvement Works	Add 2 lanes per direction
		Widening of Hiram's Highway between Clear Water Bay Road and Sai Kung Town	D2
		Hong Kong – Zhuhai – Macao Bridge Hong Kong Link Road	D3
		Sha Tin Trunk Road T4	D2
		Reconstruction and Improvement to Tuen Mun Road	D3
		Tuen Mun – Chek Lap Kok Link and Tuen Mun Western Bypass	D2
		Traffic Improvement to Tuen Mun Road (Town Centre Section)	D3
	Cross Boundary	Hong Kong – Zhuhai – Macao Bridge	D3
2021 (in addition to 2016 network)	Hong Kong	Island Eastern Corridor Improvement between Causeway Bay and North Point	D4/D5*
		Central-Wan Chai Bypass and Island Eastern Corridor Link	D3/D4*
	Kowloon	Widening of Gascoigne Road Flyover	D2
	New Territories	Link Road to Liantang/Heung Yuen Wai Cross-Boundary Control Point	D2
2026 (in addition to 2021 network)	Hong Kong	Lantau Road P1 between Sham Shui Kok and Yam O	D2

- Notes: 1. Only major highway projects have been listed in the above tables. District or local improvement projects have not been included in the above lists.
2. * The configuration of these proposed highways varies at different sections of the road.
3. Route 4 (formerly Route 7) between Kennedy Town and Aberdeen has not been assumed in the above road network tables. When assessing this project, sensitivity tests for different scenarios of SIL(E) and SIL(W) will be carried out as necessary.
4. The above network assumptions do not include the possible highway packages proposed in the NWNT Review except the TM-CLKL and TMWB. Sensitivity tests by assuming the highway packages proposed in the NWNT Review to be in place will be carried out as necessary.

Table 6.16 Rail Network Assumptions for 2011, 2016 & 2021

Year	Rail Network Assumptions
2011 (in addition to existing network)	Kowloon Southern Link (KSL)
	Tseung Kwan O South Station
2016 (in addition to 2011 network)	Kwun Tong Line Extension
	Shatin to Central Link (EWL)
	West Island Line (from Sheung Wan to Kennedy Town)
	South Island Line (East)
	Guangzhou – Shenzhen – Hong Kong Express Rail Link (Hong Kong Section)
2021 (in addition to 2016 network)	Shatin to Central Link (NSL)
	South Island Line (West)
	Northern Link
	North Hong Kong Island Line
	Hong Kong – Shenzhen Airport Rail Link (ARL)
2026 (in addition to 2021 network)	Hung Shui Kiu Station
	Tai Ho Wan Station
	Kwun Tung Station

- Notes:
1. The table is based on latest information from RDO, HyD in January 2008.
 2. ExCo has agreed to ask MTRCL to proceed with further planning and design of Guangzhou – Shenzhen – Hong Kong Express Rail Link (Hong Kong Section) in April 2008.
 3. Port Rail Line (PRL) has not been included in the list. PRL should have less effect on vehicular traffic as it is mainly intended for deep hinterland cargoes.

Table 6.17 Local Traffic Management and Road Improvement Schemes

Proposal / Figure No.	Location	Brief Description
K070046.01D ⁽¹⁾	Lin Cheung Road SB between Wui Cheung Road and Yau Ma Tei Interchange	1. Provision of additional right-turning traffic lane. 2. Conversion of central divider to carriageway. 3. Provision of additional traffic island.
K070077.01F ⁽¹⁾	Junction of Lin Cheung Road / Wui Cheung Road	1. Conversion of pavement to carriageway. 2. Provision of stagger pedestrian crossing. 3. Provision of additional traffic island. 4. Change of Method of Control. 5. Conversion of central divider to carriageway.
K080785.01A ⁽²⁾	Jordan Road EB between Lin Cheung Road and To Wah Road	1. Change of traffic lane movement. 2. Provision of additional road marking.
K070798.01A	Lin Cheung Road NB between Wui Cheung Road and Austin Road West	1. Conversion of central divider to carriageway.
K070643.01	Junction of Jordan Road / Lin Cheung Road	1. Conversion of pavement to carriageway. 2. Conversion of hatched marking to carriageway. 3. Change of traffic lane movement.
K040736.01C	Junction of Jordan Road / Nathan Road	1. Widening of Jordan Road

Note: (1) It is noted that TE/K is now discussing with concerned parties about the feasibility of implementing items 1 & 2 (i.e. proposal no. K070046.01D & K070077.01F) shortly and before WKT construction. In any case, improvement schemes at interim and long-term stages would make reference to the principle of these two schemes.

(2) Proposal No. K080785.01A is the latest design of JOR EB provided by TE/K of TD on 03/03/09 which supersedes the preceding Proposal No. K071057.01C.

(3) The details of all above schemes refer to the drawings in Appendix C.

7. TRIP GENERATION RATE

7.1 Trip Generation Rate Survey

7.1.1 In the transport model, trip generation rates for different kinds of developments are required to estimate the future trip generation (including ingress and egress traffic respectively) of developments in WKR including WKCD entertainment activities, offices, residential buildings, hotels, etc.

7.1.2 According to the Brief, trip generation surveys shall be conducted during both morning and evening peak periods on a normal weekday or in other time periods in weekdays, Saturday and Sunday whichever are more appropriate, at not less than 18 existing sites. The consultant finally has conducted survey at 19 sites. The consultant identified 19 sites as being appropriate to conduct surveys. The surveyed sites have compatible trip generation characteristics as those developments proposed for WKR including WKCD entertainment activities, prime office, and hotel, etc. The land uses selected for trip generation surveys are (i) residential, (ii) retail, (iii) office, (iv) hotel, (v) service apartment, (vi) performance venue, and (vii) museum.

7.2 Survey for Residential, Retail, Office, Hotel and Service Apartment

7.2.1 The survey periods of the trip generation survey for Residential, Retail, Office, Hotel and Service Apartment are designed to totally coincide with the survey period of junction movement count and queue length survey in order to find out the most critical period of road network in WKR. The survey periods are as follows:

- Weekday: 07:30 – 09:30, 17:00 – 19:00
- Friday: 19:00 – 21:00
- Saturday: 12:00 – 15:00
- Sunday / Public Holiday: 13:30 – 16:30

7.2.2 To select an appropriate site for survey, the major consideration is to select the sites such that the survey trip generation is contributed by only one type of land use. If the site is of mixed use (e.g. residential + retail or office + retail), it is not possible to know the exact trip rate for each type of land use. In addition, the selected sites should have similar characteristics to that in WKR, these include the location, class, number of flats / total GFA, car parking ratio and accessibility to public transport. Lastly, the selected sites should not be duplicated with the available sites in recent studies (i.e. Traffic Generation Survey 2006 by TD & WKCD Studies by CEDD). The selected sites are listed in **Table 7.1**.

Land Use	Development Site	Location
Residential	Sorrento	Jordan
	The Victoria Tower	Tsim Sha Tsui
	Island Harbourview	Tai Kok Tsui
	Hampton Place	Tai Kok Tsui
Retail	Sogo	Tsim Sha Tsui
	Elements	Jordan
Office	Dah Sing Financial Centre	Wan Chai
	Three Pacific Place	Admiralty
	Central Plaza	Wan Chai
Hotel	InterContinental Hong Kong	Tsim Sha Tsui
	Conrad Hotel Hong Kong	Admiralty
	Grand Hyatt Hong Kong	Wan Chai
Service Apartment	Pinnacle Apartment	Tsim Sha Tsui

7.3.1 It is found that most of the existing performance venues and museums do not provide car park or taxi / coach pick-up / drop-off lay-by. Visitors or audience need to park their cars at nearby car park or alight / board the taxi / coach at lay-bys in the proximity. Hence, it is difficult to use the conventional survey method, i.e. counting arrival and departure vehicles at the identified vehicular access points of the development sites, to obtain the trip generation. Instead, interview survey is utilized for capturing the trip generation data. The data such as modal choice, occupancy of vehicles and total number of visitors collected from the interview are then used to generate the trip rates of the aforementioned art venues by simple calculation.

7.3.2 To select the suitable existing performance venues for interview survey, class of venue, location, proximity to public transport, as well as the date, time, performer and ticket prices of the performance are considered. The survey period for performance venues is an hour before the start and after the end of the performance, which is believed to be the peak period arising from the performance. The details of selected venues and corresponding performances are listed below:

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- Page 30

2. Venue: Hong Kong Cultural Centre - Concert Hall
 Seating Capacity: 2,019
 Name of Performance: KOI MING-FAI & HKCO III
 蓋明暉 & HKCO III
 Date: 28/6/2008
 Time: 20:00 - 22:00
 Ticket Prices: \$300; \$220; \$160; \$100

3. Venue: Sha Tin Town Hall - Auditorium
 Seating Capacity: 1,372
 Name of Performance: Man of La Tiger
 男人之虎
 Date: 28/6/2008
 Time: 19:30 - 22:45
 Ticket Prices: \$420; \$360; \$290; \$220; \$180

- 7.3.3 For museums, the selected sites are considered attractive to the residents / tourists and the accessibility are similar to that in WKCD. Since the number of visitors is expected to be highest on Sunday / Public Holiday, the surveys are conducted during the opening hours on one Sunday. The brief information of the surveyed museums is listed in **Table 7.2**.

Table 7.2 Selected Museums

Name	Location	Opening Hours
Hong Kong Space Museum	Tsim Sha Tsui	Mon, Wed - Fri: 1300 - 2100 Sat, Sun, PH: 1000 - 2100 Tue: Closed
Hong Kong Science Museum	Tsim Sha Tsui	Mon - Wed, Fri: 1300 - 2100 Sat, Sun, PH: 1000 - 2100 Thu: Closed
Hong Kong Museum of History	Tsim Sha Tsui	Mon, Wed - Sat: 1000 - 1800 Sun, PH: 1000 - 1900 Tue: Closed

- 7.3.4 From the interview surveys, the modal split of audience of performance venues and visitors of museums, and the occupancy rates of each type of vehicle were obtained. The modal split and occupancy rates are presented in **Tables 7.3 to 7.6**.

Table 7.3 Modal Split of Audience of Performance Venues

Sites	Venues	Modes (%)					
		Private Car	Taxi	Coach	Public Transport ⁽¹⁾	Walk	Total
Hong Kong City Hall	Concert Hall	17.3	14.5	0	62.4	5.8	100.0
Hong Kong Cultural Centre	Concert Hall	1.4	2.1	0	93.9	1.8	100.0
Sha Tin Town Hall	Auditorium	16.5	3.8	0	75.2	4.5	100.0

Note: 1. Public transport includes franchised bus, GMB, RMB, railway and ferry.

Table 7.4 Modal Split of Visitors of Museums

Sites	Peak Hour	Modes (%)					
		Private Car	Taxi	Coach	Public Transport ⁽¹⁾	Walk	Total
Hong Kong Space Museum	17:00-18:00	2.3	11.4	0	79.5	6.8	100
Hong Kong Museum of History	17:45-18:45	10.4	4.2	0	58.3	27.1	100
Hong Kong Science Museum	16:30-17:30	12.8	1.3	0	55.1	30.8	100

Note: 1. Public transport includes franchised bus, GMB, RMB, railway and ferry.

Table 7.5 Vehicle Occupancy Rates for Performance Venues

Performance Venue	Occupancy Rate (No. of persons per vehicle)	
	Private Car	Taxi
Hong Kong City Hall	3.0	1.9
Hong Kong Cultural Centre	2.3	2.7
Sha Tin Town Hall	2.4	3.2

Table 7.6 Vehicle Occupancy Rates for Museums

Museum	Occupancy Rate (No. of persons per vehicle)	
	Private Car	Taxi
Hong Kong Space Museum	3.2	2.6
Hong Kong Museum of History	3.4	2.7
Hong Kong Science Museum	3.4	2.7

- 7.3.5 To obtain the trip rate of the performance venues and museums, number of audience / visitors, proportion of private mode (defined as private car and taxi), occupancy rates and PCU factors (1 for private car and taxi) are taken for calculation. The calculated trip rates will be presented in later sections.

7.4 Data from Other Sources

- 7.4.1 In addition to the above survey results, trip generation rates to be adopted in this Study would also be reference to data from other recent relevant reports. The reports are (i) Trip Generation Survey 2006 (hereinafter called "TGS 2006"), (ii) Traffic Impact Assessment Review for WKCD (hereinafter called "WKCD TIA"), and (iii) Traffic Impact Assessment Study for the Different Land Use of Site A at West Kowloon Reclamation (hereinafter called "Site A TIA").
- 7.4.2 The comparisons on the trip generation rates of different land use, which are resulted from the survey of this Study and are adopted in other reports are listed in **Tables 7.7 to 7.13**.

Table 7.7 Trip Rates for Residential (pcu/hr/flat)

Source	Data Source	Development Sites	Location	No. Flats (nos.)	Flat Sizes (m ²)			No. of Parking Spaces (nos.)	Car Parking Ratio (no. of parking spaces per flat)	AM Peak		PM Peak	
					Min.	Max.	Ave.			Gen.	Att.	Gen.	Att.
Survey of this Study	By Survey	Sorrento	Jordan	2,126	76	165	N/A	1,270	0.60	0.129	0.055	0.049	0.071
		The Victoria Tower	Tsim Sha Tsui	988	62	120	N/A	341	0.35	0.071	0.058	0.069	0.075
		Island Harbourview	Tai Kok Tsui	2,314	56	223	N/A	579	0.25	0.068	0.041	0.046	0.051
		Hampton Place	Tai Kok Tsui	880	54	62	N/A	270	0.31	0.085	0.067	0.031	0.038
TGS 2006	By Survey	Bel Air Heights	Diamond Hill	798	52	77	63	200	0.25	0.146	0.111	0.119	0.124
		Tanner Garden	North Point	849	55	94	76	160	0.19	0.060	0.039	0.019	0.032
		Villa Esplanada	Tsing Yi	2,824	51	210	79	550	0.19	0.116	0.076	0.050	0.065
WKCD TIA	For Flat size up to 100m ² GFA, by Survey	Whampoa Garden	Hung Hom	10,486	43	102	72	2,900	0.28	0.069	0.032	0.042	0.067
		Kornhill Garden	Tai Koo	6,648	N/A	N/A	N/A	N/A	N/A	0.103	0.060	0.035	0.058
		Lei King Wan	Sai Wan Ho	2,295	N/A	N/A	N/A	N/A	N/A	0.092	0.077	0.051	0.061
		Heng Fa Chuen	Heng Fa Chuen	6,563	N/A	N/A	N/A	N/A	N/A	0.059	0.047	0.056	0.066
		Telford Garden + Commercial	Kowloon Bay	4,992	N/A	N/A	N/A	N/A	N/A	0.158	0.156	0.152	0.120
		Tanner Garden	North Point	849	55	94	76	160	0.19	0.095	0.038	0.054	0.079
	For Flat size over 100m ² GFA, by DR 439	Central Reclamation Phase III - Land Traffic Impact Assessment (September 1995)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.130	0.090	0.120	0.170
Site A TIA	By Survey	Galaxia (Residential + Retail)	Diamond Hill	1,684	N/A	N/A	N/A	N/A	N/A	0.049	0.055	0.065	0.155
		Island Harbourview	Tai Kok Tsui	2,314	56	223	139	579	0.25	0.072	0.035	0.049	0.050
	Adopted Rate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.061	0.045	0.057	0.103

Legend: = Trip rate not taken into consideration

Table 7.8 Trip Rates for Retail (pcu/hr/100m²)

Source	Data Source	Development Sites	Location	GFA (m ²)	No. of Parking Spaces(nos.)			Car Parking Ratio (no. of parking spaces per 100 m ²)	AM Peak		PM Peak	
					Retail	Public	Total		Gen.	Att.	Gen.	Att.
Survey of this Study	By Survey	Sogo (Tsim Sha Tsui Branch)	Tsim Sha Tsui	10,560	N/A	N/A	N/A	N/A	0.019	0.019	0.038	0.038
		Elements	Jordan	82,417	N/A	N/A	1700	2.06	0.073	0.157	0.464	0.435
TGS 2006	By Survey	Times Square	Causeway Bay	87,567 (Retail) 92,903 (Office)	505	0	505	0.28	0.062	0.100	0.209	0.251
		Festival Walk	Kowloon Tong	91,165 (Retail) 21,573 (Office)	430	400	830	0.74	0.150	0.220	0.497	0.373
		Olympian City Phase 1	Tai Kok Tsui	18,600	163	0	163	0.88	0.350	0.473	0.301	0.280
WKCD TIA	By DR 439	Central Reclamation Phase III - Land Traffic Impact Assessment (September 1995)	N/A	N/A	N/A	N/A	N/A	N/A	0.180	0.270	0.230	0.220
Site A TIA	By Survey	Two International Finance Centre	Central	59,458 (Retail) 254,186 (Office)			1800	0.57	0.143	0.198	0.203	0.182
	Adopted Rate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.187	0.265	0.336	0.301

Legend: = Trip rate not taken into consideration

Table 7.9 Trip Rates for Office (pcu/hr/100m²)

Source	Data Source	Development Sites	Location	GFA (m2)	No. of Parking Spaces (nos.)			Car Parking Ratio (no. of parking spaces per 100 m ²)	AM Peak		PM Peak	
					Office	Public	Total		Gen.	Att.	Gen.	Att.
Survey of this Study	By Survey	Dah Sing Financial Centre	Wan Chai	37,171	N/A	N/A	164	0.44	0.264	0.274	0.118	0.113
		Three Pacific Place	Admiralty	57,742	N/A	N/A	108	0.19	0.236	0.267	0.229	0.218
		Central Plaza	Wan Chai	126,057	N/A	N/A	200	0.16	0.190	0.213	0.213	0.263
TGS 2006	By Survey	AIG Tower	Central	39,852	61	0	61	0.15	0.218	0.261	0.070	0.073
		Cheung Kong Centre	Central	113,826	246	800	1046	0.92	0.391	0.603	0.139	0.150
		Citic Tower	Wan Chai	47,308	200	0	200	0.42	0.472	0.531	0.133	0.078
		Sun Hung Kai Centre	Wan Chai	64,221	199	0	199	0.31	0.286	0.358	0.262	0.222
		HSBC Centre	Tai Kok Tsui	83,000	346	0	346	0.42	0.047	0.113	0.050	0.039
WKCD TIA	By DR 439	Central Reclamation Phase III - Land Traffic Impact Assessment (September 1995)	N/A	N/A	N/A	N/A	N/A	N/A	0.230	0.320	0.310	0.300
Site A TIA	By Survey	Two International Finance Centre	Central	254,186 (Office) 59,458 (Retail)	N/A	N/A	1800	0.57	0.143	0.198	0.203	0.182
	Adopted Rate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.179	0.289	0.148	0.137

Legend: = Trip rate not taken into consideration

Table 7.10 Trip Rates for Hotel (pcu/hr/room)

Source	Data Source	Development Sites	Location	No. Rooms (nos.)	AM Peak		PM Peak	
					Gen.	Att.	Gen.	Att.
Survey of this Study	By Survey	InterContinental HK	Tsim Sha Tsui	495	0.095	0.097	0.154	0.214
		Conrad Hotel Hong Kong	Admiralty	513	0.113	0.113	0.172	0.168
		Grand Hyatt Hong Kong	Wan Chai	549	0.158	0.169	0.217	0.209
TGS 2006	By Survey	Excelsior Hotel Hong Kong	Causeway Bay	884	0.163	0.146	0.146	0.084
		Hong Kong Peninsula Hotel	Tsim Sha Tsui	300	0.217	0.247	0.280	0.327
WKCD TIA	By DR 439	Central Reclamation Phase III - Land Traffic Impact Assessment (September 1995)	N/A	N/A	0.055	0.055	0.065	0.067
Site A TIA	By Survey	Two International Finance Centre	Central	910 (Hotel with Service Apartment)	0.091	0.100	0.188	0.204
	Adopted Rate	N/A	N/A	N/A	0.182	0.197	0.210	0.234

Legend: = Trip rate not taken into consideration

Table 7.11 Trip Rates for Service Apartment (pcu/hr/room)

Source	Data Source	Development Sites	Location	No. Rooms (nos.)	AM Peak		PM Peak	
					Gen.	Att.	Gen.	Att.
Survey of this Study	By Survey	Pinnacle Apartment	Tsim Sha Tsui	100	0.040	0.040	0.030	0.030
TGS 2006	By Survey	338 Apartment	Central	62	0.032	0.032	0	0
WKCD TIA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Site A TIA	By Survey	Two International Finance Centre	Central	910 (Hotel with Service Apartment)	0.091	0.100	0.188	0.204
	Adopted Rate	N/A	N/A	N/A	0.054	0.057	0.019	0.021

Legend: = Trip rate not taken into consideration

Table 7.12 Trip Rates for Performance Venue (pcu/hr/10-seat)

Source	Data Source	Development Sites	Location	Selected Performance for Interview Survey							PM Peak	
				No.	Date	Venue	No. of Seats	Time	Performance Name	Ticket Prices	Gen.	Att.
Survey of this Study	By Interview	Hong Kong City Hall	Central	P1	28/6/2008 (Saturday)	Concert Hall	1,434	20:00 - 21:30	Midori plays Brahms by Hong Kong Philharmonic Orchestra	\$580; \$440; \$300; \$160	1.348	1.348
		Hong Kong Cultural Centre	Tsim Sha Tsui	P2	28/6/2008 (Saturday)	Concert Hall	2,019	20:00-22:00	Koi Ming-Fai & HKCO III	\$300; \$220; \$160; \$100	0.143	0.143
		Sha Tin Town Hall	Sha Tin	P3	28/6/2008 (Saturday)	Auditorium	1,372	19:30-22:45	Man of La Tiger	\$420; \$360; \$290; \$220; \$180	0.809	0.809
TGS 2006	By Survey	Hong Kong Coliseum	Hung Hom	N/A	N/A	Arena	12,500	N/A	N/A	N/A	0.309	0.241
		Hong Kong City Hall	Central	N/A	N/A	Concert Hall	1,434	N/A	N/A	N/A	1.141	0.826
		Hong Kong Cultural Centre	Tsim Sha Tsui	N/A	N/A	Grand Theatre	1,734	N/A	N/A	N/A	1.054	1.046
WKCD TIA	By Survey	Hong Kong Cultural Centre	Tsim Sha Tsui	P4	N/A	Grand Theatre	1,734	N/A	N/A	N/A	1.054	1.046
				P5	N/A	Concert Hall	2,019	N/A	N/A	N/A	0.762	0.770
				P6	N/A	Studio Theatre	496	N/A	N/A	N/A	0.821	0.785
		Hong Kong City Hall	Central	P7	N/A	Concert Hall	1,434	N/A	N/A	N/A	1.141	0.826
		Hong Kong Coliseum	Hung Hom	P8	N/A	Arena	12,500	N/A	N/A	N/A	0.309	0.241
		Sai Wan Ho Civic Centre	Sai Wan Ho	N/A	N/A	Theatre	471	N/A	N/A	N/A	0.435	0.378
Site A TIA	Adopted Rate	All sites and trip generation rates same as that in "WKCD TIA 2005 Review Study"										

Legend: = Trip rate not taken into consideration

Table 7.13 Trip Rates for Museum (pcu/hr/100m² or pcu/day)

Source	Data Source	Development Sites	Location	Area (m ²)	PM Peak (pcu/hr/100m ²)			Whole Day (pcu/day)	
					Peak Hour	Gen.	Att.	Gen.	Att.
Survey of this Study	By Interview	Hong Kong Space Museum	Tsim Sha Tsui	8,000	1700-1800	0.580	0.549	246	171
		Hong Kong Museum of History	Tsim Sha Tsui	17,500	1745-1845	0.104	0.062	37	41
		Hong Kong Science Museum	Tsim Sha Tsui	13,500	1630-1730	0.215	0.160	90	60
TGS 2006	By Survey	Hong Kong Museum of Art	Tsim Sha Tsui	17,530	N/A	N/A	N/A	10	8
WKCD TIA	By Survey	Hong Kong Museum of Art	Tsim Sha Tsui	17,530	N/A	N/A	N/A	10	8
Site A TIA	Adopted Rate	All sites and trip generation rates same as that in "WKCD TIA 2005 Review Study"							

Legend: = Trip rate not taken into consideration

7.5 Analysis of Trip Rates

- 7.5.1 In the analysis, the development sites without the similar characteristics (i.e. class, location, no. of flat / total GFA, car parking ratio, accessibility to public transport) to that in WKRA are eliminated. Also, trip rates from mixed development sites (e.g. residential + retail) are not taken into account due to the difficulty to extract the exact trip rates for each type of land use. Then, the trip rates of the remaining site(s) is/are either taken for weighted average or exactly equal to the recommended trip rates. Moreover, the trip rates from Data Record No. 439 (DR 439), published by Transport Department, and the adopted rates in other studies had already been averaged and the details of the surveyed sites are unknown. Hence, these trip rates are not taken into account and are listed out for reference only.
- 7.5.2 The surveys of this Study were conducted at the peak periods of weekdays and weekends, while the data from other three aforementioned reports only cover the trip rates on weekdays. As a result, there are two sets of data for analysing the trip rates at peak periods of weekdays and weekends. One set of data for weekdays contain the survey result in the Study and data from other three reports. Another set of data for weekends only contain the survey result in the Study. Therefore, detailed analysis for trip rates at peak periods on weekdays and weekends are presented later in two separate sections.
- 7.5.3 In view that the trip generation pattern and available data for performance venue and museum are different from that of residential, retail, office, hotel and service apartment, the trip rates of performance venue and museum is analysed in details in separate section.
- 7.5.4 Apart from the land use mentioned above, there are other uses such as exhibition centre, communal facilities and other arts and cultural uses in WKCD. The recommended trip rates for these uses will be provided.
- 7.5.5 The following sections in this chapter are as follows:
- | | |
|---------------|--|
| Section 7.6: | Trip Rates at Weekdays AM and PM Peak Period (Residential, Retail, Office, Hotel & Service Apartment) |
| Section 7.7: | Trip Rates at Friday, Saturday and Sunday / Public Holiday Peak Periods (Residential, Retail, Office, Hotel & Service Apartment) |
| Section 7.8: | Trip Rates for Performance Venue and Museum |
| Section 7.9: | Trip Rates for Other Uses in WKCD |
| Section 7.10: | TD's New Trip Rates for Residential, Retail, Office and Hotel |
| Section 7.11: | Summary of Recommended Trip Rates and Future Trip Generation |

7.6 Trip Rates at Weekdays AM and PM Peak Periods (Residential, Retail, Office, Hotel & Service Apartment)

Residential (Refer to Table 7.7)

- 7.6.1 In WKR, the residential sites are located in the vicinity of railway stations (i.e. KOW of AEL and TCL, WKT & AUS). The surveyed sites located at a distance from railway station, such as Whampoa Garden, are not taken into account. Moreover, it is expected that the WKRA residential developments would be with higher classes, and car parking ratio is expected to be higher. Hence, the surveyed sites with low car parking ratio, i.e. < 0.5 , are not counted.
- 7.6.2 Moreover, as mentioned above, trip rates from mixed development sites in **Table 7.7** (e.g. Galaxia and Telford Garden) are not taken into account.
- 7.6.3 As a result, there is only one site remained in the list, which is Sorrento. In view that the future residential buildings in the Focus Area are similar to that of Sorrento, it is reasonable to use the trip rates of Sorrento to represent the residential buildings to forecast the future trip generation.
- 7.6.4 In WKCD, there will be a total of 145,257 m² GFA for residential development which would include villa houses and apartments. For the purpose of this Study, it is assumed that ratio of villa houses to apartments would be 1:3. For the apartments, the class would be expected to be similar to that of the residential developments above the Kowloon MTR Station. Therefore, the trip rates of the apartments in WKCD are equivalent to that of Sorrento.
- 7.6.5 The villa houses are expected to generate / attract more vehicles than the high-rise residential buildings in the vicinity. Since most of the existing large-scale villa houses are located in rural area or far from public transport, there is no suitable site which is compatible to the villa houses in WKCD. In order to estimate the trip rate of villa houses, an adjustment factor is applied on the recommended trip rates for residential buildings, i.e. trip rates of Sorrento, to take into account the difference in flat size between the residential buildings and villa houses.
- 7.6.6 According to the "Section 1: Parking Standard for Residential Developments" in Table 11 of Chapter 8 of the Hong Kong Planning Standard and Guidelines (HKPSG), published by Planning Department, Demand Adjustment Ratios (R1) for flat size of 100 – 159.9 m² GFA and larger than 159.9 m² GFA are 5 and 9 respectively. This means that more car parking spaces would be provided for the household with larger residential flat. By assuming that the car owners in Sorrento would have similar car utilisation rate as the car owners in the future WKCD villa houses, the trip rates of villa houses could roughly be estimated by taking into account the difference in car parking ratio. Since the ratio of car parking provision of Sorrento (flat sizes from 76 – 165 m² GFA) to that of the villa houses in WKCD (flat sizes expected to be larger than 159.9 m² GFA) would be around 5:9, therefore, the adjustment factor is equal to $9/5 = 1.8$. In other words it is assumed that the trip rates of villa houses in WKCD is equivalent to 1.8 x trip rates of Sorrento.

Retail (Refer to Table 7.8)

- 7.6.7 It is found from **Table 7.8** that the AM trip rates of Olympian City Phase 1 are around 0.3 – 0.4 pcu/hr/100m², which is higher than the average rates of other sites (around 0.1 – 0.2 pcu/hr/100m²). Such high AM generation and attraction rates of Olympian City Phase 1 are unreasonable since people normally do not visit shopping mall in early morning. Hence, such abnormal trip rates of Olympian City Phase 1 are excluded from trip rate estimation.
- 7.6.8 In addition, the retail in WKRA is at higher class like Elements, the trip rates are expected to be high. Therefore, the relatively low trip rates of Sogo (Tsim Sha Tsui Branch) are not taken into account.
- 7.6.9 Also, trip rates of mixed development sites, i.e. retail + office, are not included for averaging. However, for the case of Union Square which includes retail (Elements), office (International Commerce Centre) and residential, each development has its own car park and pick-up / drop-off area. Therefore, trip rates of Elements can be clearly identified.
- 7.6.10 It is known that Elements has the largest floor area and highest class within WKR. The trip rates of Elements are representative of the retails located within the Focus Area. Hence, the recommended trip rate for retail is directly equal to that of Elements.

Office (Refer to Table 7.9)

- 7.6.11 The offices within WKRA such as International Commerce Centre (ICC) or future office buildings at WKT are positioned at the upper classes, trip rates of these offices are anticipated to be higher. In **Table 7.9**, trip rate of HSBC Centre (e.g. 0.047 & 0.113 pcu/hr/100m² for generation and attraction in AM peak period respectively) is relatively lower than that of other offices (around 0.2 – 0.5 pcu/hr/100m² for generation / attraction in AM peak period). Therefore, trip rate of HSBC Centre is not used for estimation of office trip rate.
- 7.6.12 In particular, although Cheung Kong Centre and Two International Finance Centre (IFC II) are of similar classes to that in WKR, trip rates of these two sites are not taken into consideration. This is because the trips generated or attracted by these two sites are not solely contributed by office, some of the trips are contributed by the public parking spaces (Cheung Kong Centre) or by retail (IFC II).
- 7.6.13 Hence, the trip rates of the remaining sites in **Table 7.9** are the most suitable to represent the office in WKR.

Hotel (Refer to Table 7.10)

- 7.6.14 Similar to the analysis of the office trip rates, hotel trip rates which are contributed by mixed development are not considered in the estimation. For the case of IFC II, trip rates are contributed by hotel and service apartment. For Hong Kong Peninsula Hotel, it is found that there are around 6000m² UFA for retail, which is larger than the usual size of retail in other hotels, and the office of 4-storey high are also provided in the hotel. Therefore, both IFC II and Hong Kong Peninsula Hotel are not taken into account for estimation of hotel trip rate.

Service Apartment (Refer to Table 7.11)

- 7.6.15 From **Table 7.11**, the case of IFC II is the same as that mentioned in the analysis of hotel trip rate, therefore IFC II is not taken into consideration. In view that the service apartment will be residential-like, compared with the trip rates of the surveyed service apartment, the higher residential trip rates are considered more suitable to represent the service apartment. Hence, the residential trip rates, instead of surveyed trip rates as listed in **Table 7.11**, is applied on the service apartment.

Recommended Trip Rates at Weekdays AM and PM Peak Periods

- 7.6.16 From the above analysis, the recommended trip rates for Residential, Retail, Office, Hotel and Service Apartment at weekdays AM and PM peak periods are listed in **Table 7.14**.

Table 7.14 Recommended Trip Rates (Weekday Commuting Peak)

Land Use		Unit of Trip Rate	AM Peak		PM Peak	
			Gen.	Att.	Gen.	Att.
Residential	Buildings & Apartments	pcu / hr / flat	0.129	0.055	0.049	0.071
	Villa Houses	pcu / hr / house	0.232	0.099	0.088	0.128
Retail		pcu / hr / 100m ²	0.073	0.157	0.464	0.435
Office		pcu / hr / 100m ²	0.260	0.298	0.189	0.190
Hotel		pcu / hr / room	0.138	0.134	0.169	0.156
Service Apartment		pcu / hr / room	0.037	0.037	0.030	0.030

7.7 Trip Rates at Friday, Saturday and Sunday / Public Holiday Peak Periods (Residential, Retail, Office, Hotel & Service Apartment)

- 7.7.1 Based on the same analysis in previous section, the recommended trip rates for office and hotel are equivalent to the weighted average of the trip rates obtained from the survey, while the trip rates for residential, retail and service apartment are only reference to one development site. The surveyed and recommended trip rates for residential, retail, office, hotel and service apartment are presented in **Tables 7.15 to 7.19**.

Table 7.15 Trip Rates for Residential on Friday, Saturday and Sunday (pcu/hr/flat)

Day & Time	Development	Location	No. of Flats	Peak Period	
				Gen.	Att.
Friday 19:00-21:00	Sorrento ⁽¹⁾	Tsim Sha Tsui	2,124	0.059	0.077
	The Victoria Tower	Tsim Sha Tsui	988	0.039	0.039
	Island Harbourview	Tai Kok Tsui	2,314	0.045	0.048
	Hampton Place	Tai Kok Tsui	880	0.057	0.058
Saturday 12:00-15:00	Sorrento ⁽¹⁾	Tsim Sha Tsui	2,124	0.072	0.073
	The Victoria Tower	Tsim Sha Tsui	988	0.047	0.043
	Island Harbourview	Tai Kok Tsui	2,314	0.046	0.056
	Hampton Place	Tai Kok Tsui	880	0.081	0.078
Sunday 13:30-16:30	Sorrento ⁽¹⁾	Tsim Sha Tsui	2,124	0.061	0.086
	The Victoria Tower	Tsim Sha Tsui	988	0.046	0.046
	Island Harbourview	Tai Kok Tsui	2,314	0.043	0.050
	Hampton Place	Tai Kok Tsui	880	0.055	0.064

Note: 1. The recommended trip rates for residential are equal to that of Sorrento.

Table 7.16 Trip Rates for Retail on Friday, Saturday and Sunday (pcu/hr/100m²)

Day & Time	Development	Location	GFA (m ²)	Peak Period	
				Gen.	Att.
Friday 19:00-21:00	Sogo (TST)	Tsim Sha Tsui	10,560	0.066	0.057
	Elements ⁽¹⁾	Jordan	91,827	0.441	0.608
Saturday 12:00-15:00	Sogo (TST)	Tsim Sha Tsui	10,560	0.066	0.066
	Elements ⁽¹⁾	Jordan	91,827	0.417	0.570
Sunday 13:30-16:30	Sogo (TST)	Tsim Sha Tsui	10,560	0.104	0.104
	Elements ⁽¹⁾	Jordan	91,827	0.683	0.579

Note: 1. The recommended trip rates for retail are equal to that of Elements.

Table 7.17 Trip Rates for Office on Friday, Saturday and Sunday (pcu/hr/100m²)

Day & Time	Development	Location	GFA (m ²)	Peak Period	
				Gen.	Att.
Friday 19:00-21:00	Dah Sing Financial Centre	Wan Chai	37,171	0.102	0.078
	Three Pacific Place	Admiralty	57,742	0.191	0.184
	Central Plaza	Wan Chai	126,057	0.229	0.198
	Recommended (By Weighted Average)			0.198	0.174
Saturday 12:00-15:00	Dah Sing Financial Centre	Wan Chai	37,171	0.073	0.086
	Three Pacific Place	Admiralty	57,742	0.126	0.152
	Central Plaza	Wan Chai	126,057	0.136	0.132
	Recommended (By Weighted Average)			0.123	0.130

Note: 1. It is assumed that office do not generate / attract trip on Sunday.

Table 7.18 Trip Rates for Hotel on Friday, Saturday and Sunday (pcu/hr/room)

Day & Time	Development	Location	No. of Rooms	Peak Period	
				Gen.	Att.
Friday 19:00-21:00	InterContinental HK	Tsim Sha Tsui	495	0.277	0.311
	Conrad Hotel Hong Kong	Admiralty	513	0.158	0.152
	Grand Hyatt	Wan Chai	549	0.375	0.357
	Recommended (By Weighted Average)			0.272	0.275
Saturday 12:00-15:00	InterContinental HK	Tsim Sha Tsui	495	0.174	0.194
	Conrad Hotel Hong Kong	Admiralty	513	0.216	0.214
	Grand Hyatt	Wan Chai	549	0.260	0.257
	Recommended (By Weighted Average)			0.218	0.223
Sunday 13:30-16:30	InterContinental HK	Tsim Sha Tsui	495	0.244	0.192
	Conrad Hotel Hong Kong	Admiralty	513	0.242	0.234
	Grand Hyatt	Wan Chai	549	0.233	0.222
	Recommended (By Weighted Average)			0.240	0.216

Table 7.19 Trip Rates for Service Apartment on Friday, Saturday and Sunday (pcu/hr/room)

Day & Time	Development	Location	No. of Rooms	Peak Period	
				Gen.	Att.
Friday 19:00-21:00	Pinnacle Apartment	Tsim Sha Tsui	100	0.030	0.030
Saturday 12:00-15:00	Pinnacle Apartment	Tsim Sha Tsui	100	0.050	0.050
Sunday 13:30-16:30	Pinnacle Apartment	Tsim Sha Tsui	100	0.040	0.040

7.8 Trip Rates for Performance Venue and Museum

Performance Venue (Refer to Table 7.12)

- 7.8.1 In WKCD, the performance venues are expected to be at international class. Trip rates of the theatre of lower class are not considered. Hence, Sai Wan Ho Civic Centre is not considered due to its location and class.
- 7.8.2 After the elimination of the inappropriate sites, the trip rate of each theatre in WKCD are reference to the surveyed / adopted trip rates of the sites with similar range of seating capacities. For instance, trip rates of Mega Performance Venue (15,000 seats) in WKCD is matched up with that of Hong Kong Coliseum (12,500 seats); trip rates of Blackbox Theatre (max. 250 seats) in WKCD is matched up with that of the Studio Theatre of Hong Kong Cultural Centre (496 seats).

7.8.3 Apart from the theatres, there is a Piazza Area in WKCD of at least 30,000m² which is used for mega outdoor events, circus, commercial events and concerts. The trip rates of the Piazza Area are also based on the seating capacity. Taking into account the area of stage, pedestrian corridor, queuing area etc., the average area occupied by 1 seat is around 2m². Therefore, it is assumed that the 30,000m² area could provide 15,000 seats. In view that the type of performance and audience in Piazza Area is similar to that in the Mega Performance Venue, the trip rates for Mega Performance Venue will be applied on the Piazza Area.

7.8.4 According to the audience modal split for the surveyed performance venues as shown in **Table 7.3**, the private mode for Concert Hall of Hong Kong City Hall is 31.8%. It is believed that such high proportion of private mode is resulting from the high-class performance. This means that the surveyed rates are compatible to that of performance venue in WKCD. However, for conservative reason, an adjustment factor of 10% is proposed to apply on the surveyed rates in order to take into account the class difference between the surveyed sites and the future WKCD's performance venues. Recommended trip rates for each performance venue in WKCD are presented in **Table 7.20**.

Table 7.20 Recommended Trip Rates for Performance Venue (pcu/hr/10-seat)

Performing Arts Venue		Seating Capacity (no. of seats)	Trip Rate Used ⁽¹⁾	PM Peak	
				Gen. ⁽²⁾	Att. ⁽²⁾
Phase I	Mega Performance Venue	15,000	P8	0.340	0.265
	A Great Theatre	2,200	P4, P5	0.987	0.987
	Two Medium-sized Theatres	800 each	P1, P3, P7	1.214	1.097
	Four Black box Theatres	250 each	P6	0.903	0.864
	A Concert Hall	2,000	P4, P5	0.987	0.987
	A Chamber Music Hall	800	P1, P3, P7	1.214	1.097
	A Xiqu Centre (戲曲中心)	A Xiqu Centre Performance Venue	P4, P5	0.987	0.987
		Small Theatre	P6	0.903	0.864
	Piazza Area	15,000 ⁽¹⁾	P8	0.340	0.265
Phase II	A Great Theatre	1,900	P4, P5	0.987	0.987
	Two Medium-sized Theatres	800 each	P1, P3, P7	1.214	1.097

Notes: 1. The no. of seats are estimated according to the assumption stated in para. 7.8.3.

2. The recommended trip rates are calculated by weighted average of all the reference trip rates for number of reference sites more than one.

3. Peak periods of trip attraction and generation occur at an hour before the start and after the end of performance respectively.

4. The recommended rates have already incorporated the adjustment factor of 10%.

7.8.5 It is noted that inbound trip will occur before the start of performance while the outbound trip will occur after the end of show. The trip generation and attraction rates should not be used concurrently, and the trip generation rates in **Table 7.20** are listed out for reference only. In view that peak occurred before the start of show would coincide with the PM road network peak, inbound trips are considered more critical to the road network. Moreover, taxi will leave the site after dropping-off the passengers, so taxi will produce inbound and outbound trips within the peak hour. Although less people would choose taxi as transport mode as shown in **Table 7.3** above, 50% of the total trip attraction rate would be assumed for trip generation rate at the peak period before the start of performance for conservative reason.

- 7.8.6 As the trip rates for performance venue is based on the survey carried out on Saturday night, the corresponding trip rates at road network peak periods on weekdays (08:30 – 09:30 & 17:45 – 18:45), Friday (19:00 – 20:00), Saturday (14:00 – 15:00) and Sunday (14:00 – 15:00) should be adjusted accordingly. The adjustments are presented in Paragraphs 5.8.7 – 5.8.9.
- 7.8.7 With reference to the Site A TIA, a nominal total of 100 pcu/hr (IN and OUT) are assumed for AM peak period on weekdays. This assumption has taken into account the traffic demand by staff, group visit, rehearsal and setting-up of performance, and goods deliveries. For PM peak period on weekdays, since most of the performance start at 20:00, i.e. peak occur at 19:00 – 20:00, the peak arising from performance venues do not coincide with the road network peak. Even though there are some audience having dinner before the performance, this proportion would be captured by Retail trip rates. Nevertheless, to err on the high side, it is assumed that some audience would arrive at the venues during the road network peak period, and the trip attraction rate is assumed to be half of the rates presented in **Table 7.20** above.
- 7.8.8 For Friday evenings peak, it is suitable to use the attraction rates presented in **Table 7.20** since the evenings road network peak is close to the start of the performance.
- 7.8.9 On Saturdays and Sundays, performance could be held at the road network peak periods (14:00 – 15:00), and usually start at 14:30 or 15:00. Therefore, the trip attraction rates are also equal to that presented in **Table 7.20**.
- 7.8.10 The recommended trip rates for performance venue on weekdays and weekends are summarized in **Table 7.21**.

Table 7.21 Recommended Trip Rates for Performance Venue on Weekdays and Weekends (pcu/hr/10-seat)

Performing Arts Venue		Seating Capacity (no. of seats)	Weekday (17:45 – 18:45)		Friday (19:00 – 20:00)		Saturday (14:00 – 15:00)		Sunday (14:00 – 15:00)	
			Gen.	Att.	Gen.	Att.	Gen.	Att.	Gen.	Att.
Phase I	Mega Performance Venue	15,000	0.066	0.133	0.133	0.265	0.133	0.265	0.133	0.265
	A Great Theatre	2,200	0.247	0.494	0.494	0.987	0.494	0.987	0.494	0.987
	Two Medium-sized Theatres	800 each	0.274	0.548	0.548	1.097	0.548	1.097	0.548	1.097
	Four Black box Theatres	250 each	0.216	0.432	0.432	0.864	0.432	0.864	0.432	0.864
	A Concert Hall	2,000	0.247	0.494	0.494	0.987	0.494	0.987	0.494	0.987
	A Chamber Music Hall	800	0.274	0.548	0.548	1.097	0.548	1.097	0.548	1.097
	A Xiqu Centre (戲曲中心)	Performance Venue	1,400	0.247	0.494	0.494	0.987	0.494	0.987	0.494
		Small Theatre	400	0.216	0.432	0.432	0.864	0.432	0.864	0.432
	Piazza Area	15,000 ⁽¹⁾	0.066	0.133	0.133	0.265	0.133	0.265	0.133	0.265
Phase II	A Great Theatre	1,900	0.247	0.494	0.494	0.987	0.494	0.987	0.494	0.987
	Two Medium-sized Theatres	800 each	0.274	0.548	0.548	1.097	0.548	1.097	0.548	1.097

Notes: 1. The no. of seats are estimated according to the assumption stated in para. 7.8.3.

Museum (Refer to Table 7.13)

- 7.8.11 Results of previous surveys only show the PCU generated per day, which is not detail enough to estimate the impact on the road network during the peak period. As a result, only the trip rates from the survey of this Study should be considered. However, as presented in **Table 7.13**, the rates vary from around 0.1 to 0.6 pcu/hr/100m². To err on the high side, a conservative trip rate (i.e. trip rate of Hong Kong Space Museum) is recommended as that of museum in WKCD.
- 7.8.12 In order to obtain the trip rates at the peak periods on weekdays and weekends, trip rates of Hong Kong Space Museum at corresponding periods are extracted from the survey result. Similar to performance venue, an adjustment factor of 10% is proposed to apply on the extracted trip rates, and the recommended trip rates for museum are listed in **Table 7.22**.

Table 7.22 Recommended Trip Rates for Museum on weekdays and weekends (pcu/hr/100 m²)

Day	Peak Period	Generation	Attraction
Weekday	08:30 – 09:30	0.000	0.000
	17:45 – 18:45	0.256	0.298
Friday	19:00 – 20:00	0.412	0.093
Saturday	14:00 – 15:00	0.374	0.200
Sunday	14:00 – 15:00	0.374	0.200

7.9 Trip Rates for Other Uses in WKCD

Exhibition Centre

- 7.9.1 According to the Brief of this Study, there is an Exhibition Centre of total 10,000 m² net operating floor area. It is a self-finances venue with focus on arts, culture, creative industries and WKCD-related activities. The trip rates of exhibition centre are reference to the result from previous survey conducted by MVA. The surveyed site is Hong Kong Convention and Exhibition Centre (HKCEC), and the corresponding trip rates are listed in **Table 7.23**.

Table 7.23 Trip Rates for HKCEC (pcu/hr/100 m²)

Venue	Area (m ²)	Activity	Scenario	Peak Period			
				AM		PM	
				Gen.	Att.	Gen.	Att.
HKCEC	68,770	Hong Kong Electronics Fairs (Spring Edition)	Move-in	0.173	0.565	0.298	0.336
			Show	0.183	0.468	0.308	0.201
			Move-out	--	--	0.843	0.616

- 7.9.2 The recommended trip rates are the highest rates among the scenarios, i.e. rates from Move-in scenario for AM peak and rates from Move-out scenario for PM peak. For conservation and simplicity, rates from Move-out scenario are also recommended for Friday, Saturday and Sunday peak periods.

Communal Facilities

- 7.9.3 The communal facilities in WKCD include a wide range of use, e.g. fire station, pumping station etc. To determine the future traffic demand, the trip rates for Community Facilities are extracted from DR 439 as shown in **Table 7.24** and are recommended as the trip rates for Communal Facilities in WKCD on weekdays (AM & PM) and weekends (PM).

Table 7.24 Trip Rates for Community Facilities

Unit	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
pcu/hr/100 m ² GFA	0.235	0.235	0.115	0.115

Other Arts and Cultural Uses

- 7.9.4 The Other Arts and Cultural Uses contain resident companies, meeting rooms and common facilities for artists and arts groups, arts education venues, space for international arts and cultural organizations and arts and cultural information centre etc. In view that these facilities are similar to “Office Uses”, the recommended trip rates are the same of that of Office as mentioned in previous sections.

7.10 The TD’s New Trip Rates for Residential, Retail, Office and Hotel

- 7.10.1 A new set of traffic generation and attraction rates for various types of developments as shown in **Appendix D** have just been received from TD on 30th July 2008. It is noted that the DR 439 and all references to the DR 439 contained in the Appendices 1 and 2 of Chapter 3 in Volume 1 of the TPDM were superseded and replaced by the TD’s new trip rates. Therefore, it is necessary to carry out a comparison and analysis on the TD’s new trip rates and the trip rates recommended in the previous chapters. The analyses on the trip rates for each type of development in WKRA are presented in the following paragraphs.

Residential

- 7.10.2 In Table 1 – Traffic Rates for Residential Developments at 95% Confidence Level in **Appendix D**, the trip rates of the developments are categorised by the Accessibility Level A and B. Level A represent that the development is well served by public transport systems with railway station / light rail transit station / bus terminus or with no less than five bus / mini-bus routes, within 500m of the development site. In view that the residential developments in WKRA are close to the public transport facilities, trip rates of developments in “Level A” are selected for reference.
- 7.10.3 Amongst the “Level A” category, the developments are classified by average flat size. For each flat size, there are three sub-categories (upper limit, mean & lower limit), which correspond to detailed classification on class and accessibility to public transport. It is known that the residential developments in Union Square, Sites C and D are located exactly above the railway stations such as KOW of AEL/TCL and AUS of KSL, and that in WKCD are also well served by PTIs and the railway lines in the vicinity; therefore, the “Lower Limit” of the new traffic rates are used for comparison.

7.10.4 It is assumed that the villa houses in WKCD are around 240m² per house. In Table 1 of **Appendix D**, there is no such large size residential development under Accessibility Level A. To select the most suitable development for reference case of villa, the development of 240m² zoned as R(C) under Accessibility Level B is taken into consideration.

7.10.5 The TD's new trip rates for each residential development are chosen in accordance with the average flat size and are listed in **Table 7.25**.

Table 7.25 TD's New Trip Rates for Residential (pcu/hr/flat)

Location of Development	Reference Development Details			AM Peak		PM Peak	
	OZP zoning	Ave. Flat Size (m ²)	Acc. Level	Gen.	Att.	Gen.	Att.
Site C	R(A)	70	A	0.066	0.030	0.026	0.041
Site D	R(A)	80	A	0.074	0.031	0.029	0.049
Union Square	R(B)	100	A	0.157	0.067	0.061	0.086
WKCD – Apartments	R(B)	100	A	0.157	0.067	0.061	0.086
WKCD – Villa Houses	R(C)	240	B	0.250	0.154	0.163	0.252

7.10.6 Compared with the preceding recommended rates for residential, i.e. the trip rates of Sorrento, the new traffic rates listed above are considered more appropriate since the rates in **Table 7.25** cover the developments of different classes and average flat sizes. Therefore, the recommended trip rates for residential are revised and are equal to the TD's new trip rates.

7.10.7 Since TD's new trip rates at Friday late evenings, Saturday and Sunday afternoon are not provided, the trip rates are obtained by reference to the traffic pattern of Sorrento at the said periods. The corresponding trip rates at Friday late evenings, Saturday and Sunday afternoon are presented in **Table 7.26**.

Table 7.26 New Trip Rates for Residential at Friday Late Evenings, Saturday and Sunday Afternoon (pcu/hr/flat)

Location of Development	Friday (19:00 – 20:00)		Saturday (14:00 – 15:00)		Sunday (14:00 – 15:00)	
	Gen.	Att.	Gen.	Att.	Gen.	Att.
Site C	0.031	0.045	0.038	0.042	0.032	0.050
Site D	0.034	0.054	0.042	0.051	0.036	0.060
Union Square	0.073	0.094	0.089	0.089	0.075	0.105
WKCD – Apartments	0.073	0.094	0.089	0.089	0.075	0.105
WKCD – Villa Houses	0.194	0.276	0.237	0.260	0.202	0.306

Retail

- 7.10.8 From Table 2 – Traffic Rates for Non-Residential Developments at 95% Confidence Level in **Appendix D**, there is trip rates for Retail / Shopping Complex (Office +Retail), which is the mixed developments. As discussed in previous section, trip rates from mixed developments is not suitable for use / comparison. As a result, the recommended trip rates for Retail is still equivalent to that of Elements.

Office

- 7.10.9 The offices in WKRA such as ICC are positioned at the top level of Class A Office, the traffic rates at upper limit for office use in Table 2 of **Appendix D** are selected for comparison with the recommended trip rates. The trip rates recommended in previous section and the new traffic rates are listed in **Table 7.27**.

Table 7.27 Comparison on Trip Rates for Office (pcu/hr/100 m² GFA)

Item	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
Recommended Trip Rates	0.260	0.298	0.189	0.190
New Traffic Rates (Upper Limit)	0.236	0.326	0.193	0.151

- 7.10.10 It is found from **Table 7.27** that the recommended trip rates are close to new traffic rates, it means that the preceding recommended trip rates is suitable to represent the high class office and use for estimation of traffic generation of office use.

Hotel

- 7.10.11 The target customers of hotel are mainly the tourists who generally do not drive. Therefore, accessibility to public transport is the major element affecting the trip rate of hotel. As PTIs and railway stations (KOW, WKT and WKN) are in the vicinity of the hotel in Union Square and WKCD, such attractive public transport facilities would not result in the very high trip rates. Hence, the “Mean” values of the new traffic rates for hotel are used for comparison and are shown in **Table 7.28**.

Table 7.28 Comparison on Trip Rates for Hotel (pcu/hr/unit)

Item	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
Recommended Trip Rates	0.138	0.134	0.169	0.156
New Traffic Rates (Mean)	0.133	0.146	0.129	0.155

- 7.10.12 It can be concluded from **Table 7.28** that the recommended trip rates and new traffic rates are similar, it means that it is reasonable to use the preceding recommended trip rates to forecast the trip generation of hotel.

Land Uses Apart from Residential, Retail, Office and Hotel

- 7.10.13 As there is no reference rate for Service Apartment, Performance Venue, Museum, Exhibition Centre, Communal Facilities and Other Arts and Cultural Uses in the TD's new trip rates, no comparison can be made with the preceding recommended rates for these uses. As a result, the trip rates for these uses are the same as that recommended in the previous sections.

7.11 Summary of Recommended Trip Rates and Future Trip Generation

- 7.11.1 For easy reference, the aforementioned recommended trip rates for different type of land use are summarized in **Table 7.29**, and the future trips generated by each of land use are presented in **Table 7.30**. Those have been agreed in TN1 under 1st Working Group Meeting.

Table 7.29 Summary of Recommended Trip Rates

Development Location	Planned Land Uses			Seating Capacity (no. of seats)	Area (m²)	No. of Units (no.)	Units of Trip Rates	Weekday				Friday		Saturday		Sunday		
								AM (08:30 – 09:30)		PM (17:45 – 18:45)		PM (19:00 – 20:00)		PM (14:00 – 15:00)		PM (14:00 – 15:00)		
								Gen.	Att.	Gen.	Att.	Gen.	Att.	Gen.	Att.	Gen.	Att.	
West Kowloon Cultural District (WKCD) ⁽¹⁾	Performing Arts Venue	Phase I	Mega Performance Venue	15,000	--	--	pcu/hr/10-seat	--	--	0.066	0.133	0.133	0.265	0.133	0.265	0.133	0.265	
			A Great Theatre	2,200	--	--		--	--	0.247	0.494	0.494	0.987	0.494	0.987	0.494	0.987	
			Two Medium-sized Theatres	800 each	--	--		--	--	0.274	0.548	0.548	1.097	0.548	1.097	0.548	1.097	
			Four Black box Theatres	250 each	--	--		--	--	0.216	0.432	0.432	0.864	0.432	0.864	0.432	0.864	
			A Concert Hall	2,000	--	--		--	--	0.247	0.494	0.494	0.987	0.494	0.987	0.494	0.987	
			A Chamber Music Hall	800	--	--		--	--	0.274	0.548	0.548	1.097	0.548	1.097	0.548	1.097	
			A Xiqu Centre (戲曲中心)	Performance Venue	1,400	--		--	--	0.274	0.548	0.548	1.097	0.548	1.097	0.548	1.097	
				Small Theatre	400	--		--	--	0.216	0.432	0.432	0.864	0.432	0.864	0.432	0.864	
			Piazza Areas		15,000 ⁽²⁾	30,000		--	--	--	--	0.066	0.133	0.133	0.265	0.133	0.265	0.133
		Phase II	A Great Theatre	1,900	--	--		--	--	--	0.247	0.494	0.494	0.987	0.494	0.987	0.494	0.987
	Two Medium-sized Theatres		800 each	--	--	--	--	--	0.274	0.548	0.548	1.097	0.548	1.097	0.548	1.097		
	Museum Facilities and Exhibition Centre:	M+ (Including Design, Moving Image, Popular Culture, Visual Arts)			--	Gross Floor Area: 61,950 (On-site Area)	--	pcu/hr/100 m²	0	0	0.256	0.298	0.412	0.093	0.374	0.200	0.374	0.200
			An Exhibition Centre		--	Net Operating Floor Area: 10,000	--		0.173	0.565	0.843	0.616	0.843	0.616	0.843	0.616	0.843	0.616
		Other Arts and Cultural Uses			--	15,000	--		0.260	0.298	0.189	0.190	0.198	0.174	0.123	0.130	0.123	0.130
		Communal Facilities			--	20,000	--		0.235	0.235	0.115	0.115	0.115	0.115	0.115	0.115	0.115	0.115
		Residential: Villa Houses			--	145,257	151 ⁽³⁾		pcu/hr/house	0.250	0.154	0.163	0.252	0.194	0.276	0.237	0.260	0.202
		Residential: Apartments			--		1,089 ⁽³⁾	pcu/hr/flat	0.157	0.067	0.061	0.086	0.073	0.094	0.089	0.089	0.075	0.105
		Hotel			--	56,000	700 ⁽⁴⁾	pcu/hr/unit	0.138	0.134	0.169	0.156	0.272	0.275	0.218	0.223	0.240	0.216
		Office			--	107,683	--	pcu/hr/100 m²	0.260	0.298	0.189	0.190	0.198	0.174	0.123	0.130	0	0
		Retail, Dining & Entertainment			--	119,000	--	pcu/hr/100 m²	0.073	0.157	0.464	0.435	0.441	0.608	0.417	0.570	0.683	0.579
Property Development in Union Square ⁽⁵⁾		Residential			--	608,003	5,809	pcu/hr/flat	0.157	0.067	0.061	0.086	0.073	0.094	0.089	0.089	0.075	0.105
	Retail			--	82,417	--	pcu/hr/100 m²	0.073	0.157	0.464	0.435	0.441	0.608	0.417	0.570	0.683	0.579	
	Office			--	231,474 ⁽⁶⁾	--		0.260	0.298	0.189	0.190	0.198	0.174	0.123	0.130	0	0	
	Hotel			--	167,420 ⁽⁶⁾	996 ⁽⁶⁾	pcu/hr/unit	0.138	0.134	0.169	0.156	0.272	0.275	0.218	0.223	0.240	0.216	
	Service Apartment			--		606 ⁽⁶⁾		0.066	0.030	0.026	0.041	0.031	0.045	0.038	0.042	0.032	0.050	
Property Development in Site A ⁽⁷⁾	Retail			--	29,400	--	pcu/hr/100 m²	0.073	0.157	0.464	0.435	0.441	0.608	0.417	0.570	0.683	0.579	
	Office			--	264,600	--		0.260	0.298	0.189	0.190	0.198	0.174	0.123	0.130	0	0	
Property Development in Site C ⁽⁸⁾	Residential			--	62,500	896	pcu/hr/flat	0.066	0.030	0.026	0.041	0.031	0.045	0.038	0.042	0.032	0.050	
	Retail			--	12,500	--	pcu/hr/100 m²	0.073	0.157	0.464	0.435	0.441	0.608	0.417	0.570	0.683	0.579	
Property Development in Site D ⁽⁸⁾	Residential			--	77,500	900	pcu/hr/flat	0.074	0.031	0.029	0.049	0.034	0.054	0.042	0.051	0.036	0.060	
	Retail			--	15,500	--	pcu/hr/100 m²	0.073	0.157	0.464	0.435	0.441	0.608	0.417	0.570	0.683	0.579	

- Notes:
1. The seating capacities and the areas of the developments in WKCD are based on the information from the Brief of this Study.
 2. The assumption for estimating the no. of seats refers to para. 7.8.3.
 3. Ratio of villa houses to apartments is assumed to be 1:3 (see para. 7.6.4). The size of villa house and apartment are assumed to be 240 m² and 100 m² respectively
 4. The unit size for hotel is assumed to be 80 m².
 5. The GFAs of the property developments and the total no. of residential flats in Union Square are based on the information from PlanD.
 6. The most updated office GFA, hotel room no. and service apartment unit no. were received from PlanD on 12/12/08.
 7. The most updated office and retail GFA were received from PlanD on 19/01/09.
 8. It is understood that the no. of flats for Sites C and D are still studying under the MTRCL’s project “KSL Property Development” (i.e. not confirmed yet). For the purpose of this study, it is necessary to make some reasonable assumptions at this stage. Since the total no. of flats of the two sites will not be comparable to the whole WKR, in term of the potential total trip ends of the two sites in comparing with the total background flows, thus the above assumptions would be acceptable for this particular study, giving that the final no. of flats will not be available in coming months.

Table 7.30 Summary of Future Trip Generations of Local Developments

Development Location	Planned Land Uses			Seating Capacity (no. of seats)	Area (m ²)	No. of Units (no.)	Weekday				Friday		Saturday		Sunday		
							AM (08:30 – 09:30)		PM (17:45 – 18:45)		PM (19:00 – 20:00)		PM (14:00 – 15:00)		PM (14:00 – 15:00)		
							Gen.	Att.	Gen.	Att.	Gen.	Att.	Gen.	Att.	Gen.	Att.	
West Kowloon Cultural District (WKCD) ⁽¹⁾	Performing Arts Venue	Phase I	Mega Performance Venue	15,000	--	100	100	99	199	199	398	199	398	199	398		
			A Great Theatre	2,200	--			--	54	109	109	217	109	217	109	217	
			Two Medium-sized Theatres	800 each	--			--	44	88	88	175	88	175	88	175	
			Four Black box Theatres	250 each	--			--	22	43	43	86	43	86	43	86	
			A Concert Hall	2,000	--			--	49	99	99	197	99	197	99	197	
			A Chamber Music Hall	800	--			--	22	44	44	88	44	88	44	88	
			A Xiqu Centre (戲曲中心)	Performance Venue	1,400			--	--	38	77	77	154	77	154	77	154
				Small Theatre	400			--	--	9	17	17	35	17	35	17	35
			Piazza Areas	15,000 ⁽²⁾	30,000			--	--	99	199	199	398	199	398	199	398
		Phase II	A Great Theatre	1,900	--			--	47	94	94	188	94	188	94	188	
			Two Medium-sized Theatres	800 each	--			--	44	88	88	175	88	175	88	175	
	Museum Facilities and Exhibition Centre:	M+ (Including Design, Moving Image, Popular Culture, Visual Arts)	--	Gross Floor Area: 61,950 (On-site Area)	--	0	0	159	185	255	58	231	124	231	124		
		An Exhibition Centre	--	Net Operating Floor Area: 10,000	--	17	57	84	62	84	62	84	62	84	62		
	Other Arts and Cultural Uses				--	15,000	--	39	45	28	29	30	26	18	20	18	20
	Communal Facilities				--	20,000	--	47	47	23	23	23	23	23	23	23	23
	Residential: Villa Houses				--	145,257	151 ⁽³⁾	38	23	25	38	29	42	36	39	30	46
	Residential: Apartments				--		1,089 ⁽³⁾	171	72	66	94	79	103	97	97	82	114
	Hotel				--	56,000	700 ⁽⁴⁾	97	94	118	109	190	193	153	156	168	151
	Office				--	107,683	--	280	321	204	205	213	187	132	140	0	0
	Retail, Dining & Entertainment				--	119,000	--	87	187	552	518	525	724	496	678	813	689
	Sub-total							876	945	1,787	2,317	2,484	3,527	2,326	3,449	2,506	3,339
Property Development in Union Square ⁽⁵⁾	Residential			--	608,003	5,809	913	386	354	502	421	549	515	519	438	609	
	Retail			--	82,417	--	60	129	382	359	363	501	344	470	563	477	
	Office			--	231,474 ⁽⁶⁾	--	711	815	517	519	541	476	336	355	0	0	
	Hotel			--	167,420 ⁽⁶⁾	996 ⁽⁶⁾	173	168	212	196	342	345	274	280	301	271	
	Service Apartment			--		606 ⁽⁶⁾	60	27	23	37	28	41	34	38	29	45	
	Sub-total							1,917	1,526	1,489	1,613	1,695	1,912	1,503	1,662	1,331	1,403
Property Development in Site A ⁽⁷⁾	Retail			--	29,419	--	21	46	137	128	130	179	123	168	201	170	
	Office			--	264,600	--	765	877	556	559	582	512	362	382	0	0	
	Sub-total							786	923	693	687	712	691	485	550	201	170
Property Development in Site C ⁽⁸⁾	Residential			--	62,500	896	59	27	23	37	28	40	34	38	29	44	
	Retail			--	12,500	--	9	20	58	54	55	76	52	71	85	72	
	Sub-total							68	47	81	91	83	116	86	109	114	117
Property Development in Site D ⁽⁸⁾	Residential			--	77,500	900	66	27	26	44	31	48	38	46	32	54	
	Retail			--	15,500	--	11	24	72	67	68	94	65	88	106	90	
	Sub-total							78	52	98	112	99	143	103	134	138	143
Austin Station (AUS) of Kowloon Southern Link (KSL) ⁽⁹⁾							310	310	256	256	256	256	256	256	256	256	256
West Kowloon Terminus (WKT) of Express Rail Link (XRL) ⁽⁹⁾							1,652	1,652	1,363	1,363	1,363	1,363	1,363	1,363	1,363	1,363	1,363
Kowloon Station (KOW) of Airport Express Line (AEL) and Tung Chung Line (TCL) ⁽⁹⁾							500	500	500	500	500	500	500	500	500	500	500
						Total	6,187	5,955	6,266	6,938	7,193	8,507	6,622	8,024	6,409	7,291	

Notes: 1. The seating capacities and the areas of the developments in WKCD are based on the information from the Brief of this Study.
 2. The assumption for estimating the no. of seats refers to para. 7.8.3. .
 3. Ratio of villa houses to apartments is assumed to be 1:3 (see para. 7.6.4). The size of villa house and apartment are assumed to be 240 m² and 100 m² respectively.
 4. The unit size for hotel is assumed to be 80 m².
 5. The GFAs of the property developments and the total no. of residential flats in Union Square are based on the information from PlanD.
 6. The most updated office GFA, hotel room no. and service apartment unit no. were received from PlanD on 12/12/08. However, the trip generation of these three types of developments are still based on the original received / assumed numbers (i.e. office GFA = 273,364, hotel room no. = 1256 and service apartment unit no. = 910) for conservative reasons.
 7. The most updated office and retail GFA were received from PlanD on 19/01/09. However, the trip generation of the office is still based on the original received numbers, i.e. office GFA = 294,185, for conservative reason.
 8. It is understood that the no. of flats for Sites C and D are still studying under the MTRCL's project "KSL Property Development" (i.e. not confirmed yet). For the purpose of this study, it is necessary to make some reasonable assumptions at this stage. Since the total no. of flats of the two sites will not be comparable to the whole WKR, in term of the potential total trip ends of the two sites in comparing with the total background flows, thus the above assumptions would be acceptable for this particular study, giving that the final no. of flats will not be available in coming months.
 9. Data is based on the Transport Planning Final Report of MTRCL's NEX/2101 Express Rail Link Preliminary Design for West Kowloon Terminus.

8. TRAFFIC IMPACT ASSESSMENT FOR EXISTING CONDITION

8.1 Junction Capacity

Existing Condition

- 8.1.1 The existing performance of the surveyed junctions during the peak periods were assessed. In the calculation, the traffic flows were adjusted to take into account the traffic queue and saturation flows were adjusted to take into account the existing site conditions (e.g. incomplete traffic lane and TTMS etc.). The Reserve Capacities (RC) or Demand / Capacity (RFC) of the surveyed junctions on weekday, Friday, Saturday and Sunday are listed in **Tables 8.1 and 8.2**. The performances of the junctions are illustrated in **Figures 8.1 to 8.5**. The detailed calculation sheets are shown in **Appendix E**.

Table 8.1 Existing Junction Performance on Weekdays

Junction No.	Junction Name	Junction Type	Reserve Capacity (%) / RFC	
			AM	PM
J1	Hoi Wang Road / Lai Cheung Road	S	33%	37%
J2	Ferry St / Lai Cheung Road / Waterloo Road	S	60%	41%
J3	Nathan Road / Waterloo Road	S	3%	-4%
J4	Hoi Wang Road / Ngo Cheung Road	S	46%	69%
J5	Yan Cheung Road / Ferry St / Kansu St	S	75%	63%
J6	Nathan Road / Kansu St / Gascoigne Road	S	31%	20%
J7	JOR / Hoi Po Road	S	864%	1027%
J8	NCR (elevated) / JOR (elevated)	S	542%	633%
J9	NCR / JOR	R	0.190	0.213
J10	JOR / To Wah Road	P	0.139	0.136
J11	JOR / LCR	S	1%	1%
J12	JOR / Ferry Street / CAR	S	-6%	-6%
J13	Nathan Road / JOR	S	10%	4%
J14	LCR / WCR	S	-14%	-10%
J15	CAR / WCR	S	4%	15%
J16	NCR / AURW	R	0.189	0.160
J17	LCR / AURW	R	0.283	0.453
J18	CAR / AUR / AURW	S	8%	7%
J19	Nathan Road / AUR	S	8%	11%
J20	CAR / KPD	S	3%	26%
J21	Salisbury Road / CAR	S	147%	124%
J22	Salisbury Road / KPD	S	91%	68%
	Salisbury Road / Access Road to Car Park	P	0.045	0.075
J23	Salisbury Road / Nathan Road	S	10%	11%
J24	AUR / Cox's Road / Pine Tree Hill Road	S	10%	13%
J25	Nathan Road / Hill Wood Road	P	0.614	0.592
J26	JOR / Gascoigne Road	S	24%	14%
J27	CAR / Haiphong Road	S	262%	221%
J28	CAR / Peking Road	S	262%	243%
J29	Peking Road / KPD	S	88%	76%
J30	KPD / Middle Road	S	61%	51%
J31	Nathan Road / Kimberley Road	S	48%	52%
J32	Nathan Road / Granville Road	S	74%	94%

Junction No.	Junction Name	Junction Type	Reserve Capacity (%) / RFC	
			AM	PM
J33	Nathan Road / Cameron Road	F	N/A	N/A
J34	Nathan Road / Haiphong Road / Humphreys Avenue	S	71%	81%
J35	Nathan Road / Mody Road	F	N/A	N/A
J36	Nathan Road / Peking Road	S	134%	143%
J37	Nathan Road / Middle Road	P	0.312	0.420
J38	Ferry Street / Man Cheong Street / Saigon Street	S	72%	72%

Note: S – Signal-control junction

F – Free-flow junction

P – Priority junction

N/A – Not available

R – Roundabout

Table 8.2 Existing Junction Performance on Fridays, Saturdays and Sundays

Junction No.	Junction Name	Junction Type	Reserve Capacity (%) / RFC		
			Friday	Saturday	Sunday
J11	JOR / LCR	S	3%	4%	41%
J12	JOR / Ferry Street / CAR	S	2%	-8%	27%
J14	LCR / WCR	S	-10%	-16%	-1%
J15	CAR / WCR	S	12%	11%	10%
J16	NCR / AURW	R	0.172	0.211	0.209
J17	LCR / AURW	R	0.385	0.402	0.410
J18	CAR / AUR / AURW	S	0%	0%	3%
J20	CAR / KPD	S	-12%	13%	40%

Note: S – Signal-control junction

R – Roundabout

- 8.1.2 It is found from **Tables 8.1 and 8.2** that junctions J3, J11, J12, J13, J14, J15, J18, J19 and J20 are currently operating with marginal / insufficient capacities (i.e. RC less than 10%). The problems of the junctions are due to the insufficient lane capacities and inadequate discharge time for particular movements.
- 8.1.3 Apart from the lane capacities and discharge time, the problem for the junctions within the Focus Area (i.e. J11, J12, J14, J15, J18, and J20) are also caused by large amount of strategic through traffic, which is around 1,500 and 1,300 pcu/hr running along LCR, WCR and CAR at weekday AM and PM peaks, respectively. To tackle the problem arising from the strategic through traffic, substantial improvement of the road network within the Focus Area is required. Improvement schemes which involve construction of new roads or significant change of road network would not be possible for implementation in short term and are considered as long-term schemes, and will be presented in Chapter 11.
- 8.1.4 Some possible short-term improvement schemes which just involve minor modification works for the problematic junctions were developed and will be presented in Chapter 9.

Relocation of Jordan Temporary Public Transport Interchange

- 8.1.5 In order to facilitate the construction of the WKT of the XRL, the consultant of XRL project has proposed to temporarily relocate the Jordan Temporary PTI from WCR to To Wah Road in late 2009. The routing of the franchised bus would be revised (tentatively, to be confirmed with TD) as shown in **Figure 8.6**. In the light of this, further assessment is carried out to investigate the impact from the diversion bus routing, and the results are listed in **Table 8.3**. The performances of the junctions after the relocation of Jordan Temporary PTI are illustrated in **Figures 8.7 to 8.11**.

Table 8.3 Performance of Critical Junctions after Relocation of WCR PTI

Junction No.	Junction Name	Junction Type	Reserve Capacity (%) / RFC				
			Weekday		Friday	Saturday	Sunday
			AM	PM			
J9	JOR / NCR	R	0.305 (0.190)	0.322 (0.213)	N/A	N/A	N/A
J11	JOR / LCR	S	-5% (1%)	-5% (1%)	-1% (3%)	0% (4%)	27% (41%)
J12	JOR / Ferry Street / CAR	S	-10% (-6%)	-11% (-6%)	-9% (2%)	-12% (-8%)	18% (27%)
J14	LCR / WCR	S	-15% (-14%)	-11% (-10%)	-11% (-10%)	-17% (-16%)	-2% (-1%)
J15	CAR / WCR	S	17% (4%)	34% (15%)	29% (12%)	23% (11%)	28% (10%)
J16	NCR / AURW	R	0.189 (0.189)	0.160 (0.160)	0.172 (0.172)	0.226 (0.211)	0.209 (0.209)
J17	LCR / AURW	R	0.294 (0.283)	0.473 (0.453)	0.404 (0.385)	0.423 (0.402)	0.430 (0.410)
J18	CAR / AUR / AURW	S	8% (8%)	7% (7%)	0% (0%)	0% (0%)	3% (3%)

Note: S – Signal-control junction

R – Roundabout

N/A – Not available

Figures in brackets refer to the case without relocation of PTI.

- 8.1.6 From **Table 8.3**, Junctions J9, J11, J12, J14 and J17 would be worsened due to the diverted bus flows. On the other hand, the Junction of CAR / WCR would operate with ample capacity after the relocation of the Jordan Temporary PTI. This is because the original CAR SB critical right-turning traffic flows, which mainly comprise bus flows, reduce substantially after relocation of the Jordan Temporary PTI. As a result, it is not necessary to provide short term improvement to this junction as it would not have junction capacity problem in short term future once the Jordan Temporary PTI is relocated.

8.2 Major Road Link Capacity

- 8.2.1 The link volume / capacity (V/C) ratios of the major roads on weekdays are provided in **Table 8.4**.

Table 8.4 Volume / Capacity Ratios of the Major Road Links

Road Name	From	To	Direction	Capacity (pcu / hr)	Flow (pcu / hr)		V/C Ratio	
					AM	PM	AM	PM
Lin Cheung Rd	Yau Ma Tei Int.	Cherry Street Underpass	NB	6,100	1,248	1,335	0.20	0.22
	Cherry Street Underpass	Yau Ma Tei Int.	SB	6,100	1,213	917	0.20	0.15
West Kowloon Highway	Yau Ma Tei Int.	Cherry St. Underpass	NB	6,100	2,429	3,243	0.40	0.53
	Cherry St. Underpass	Yau Ma Tei Int.	SB	6,100	5,210	3,913	0.85	0.64
		Toll Plaza	NB	6,100	2,173	3,067	0.36	0.50
	Toll Plaza	WHC	SB	6,100	3,160	2,804	0.52	0.46
Ferry Street Flyover	Lai Cheung Road	Pitt Street	NB	6,100	2,560	2,793	0.42	0.46
	Pitt Street	Lai Cheung Road	SB	3,900	1,385	1,235	0.36	0.32
Gascoigne Road Flyover	Nathan Road	Ferry Street	NB	1,800	2,072	2,041	1.15	1.13
	Ferry Street	Nathan Road	SB	1,800	1,838	2,254	1.02	1.25

Note: The capacity of Gascoigne Road Flyover is assumed to be 1,800 pcu / hr.

- 8.2.2 It is found from **Table 8.4** that most of the surveyed major roads have the V/C ratios less than 1, while that of Gascoigne Road Flyover ranges from 1.02 to 1.25. As the section of Gascoigne Road Flyover between Ferry Street and JOR is a dual carriageway with only one lane in each direction, it cannot withstand such high traffic flows. Currently, a Study for investigating the feasibility of widening of Gascoigne Road Flyover is being conducted by other.

9. IMPROVEMENT MEASURES FOR EXISTING PROBLEMATIC JUNCTIONS

9.1 Proposed Short-term Improvement Schemes

9.1.1 In this Chapter, short-term improvements schemes for the existing problematic junctions (i.e. J3, J11, J12, J13, J14, J18, J19 and J20) as identified in Chapter 8 are described in details. The short-term improvement schemes are designed such that they could be implemented within a short period, i.e. within two years. These short term schemes to be presented in this chapter have been endorsed in the 2nd Working Group Meeting held on 30th September 2008.

J3 Nathan Road / Waterloo Road

9.1.2 In view of the heavy straight ahead traffic flow at Nathan Road NB, it is proposed to provide an additional lane at Nathan Road NB near the junction by setting back the kerbline alongside the southern Nathan Road and realigning the central divider as illustrated in **Figure 9.1**. The Nathan Road NB will have 2 straight ahead lanes, 1 straight ahead and right-turn share lane, and 1 right-turn lane. The pedestrian crossing across Nathan Road is proposed to be changed from staggered crossing to straight crossing. The Method-of-Control (MOC) will be revised as shown in **Figure 9.1**.

9.1.3 The reserve capacity of the junction will be increased to 12% and 9% for the weekday morning and evening peak respectively.

J11 Junction of JOR / LCR

9.1.4 Originally, the layout of junction of LCR / JOR was configured as shown in **Figure 9.2**. JOR EB approach arm previously had 1 left-turn and straight ahead share lane, 2 straight ahead lanes, and 1 straight ahead and right-turn share lane. Meanwhile there was a dot cum solid line between the 1st and 2nd traffic lanes.

9.1.5 At that time, the residents from Union Square, who travelling through NCR (elevated), JOR (elevated) and down to junction of LCR / JOR, could not make left turn to LCR NB to northwest New Territories or WHC. Complaints from the residents on this issue were received. To fulfill the needs of these residents and further improve the capacity of the heavily loaded junction of JOR / LCR, Traffic Engineering (Kowloon) Division (TE/K) of TD had proposed three improvement items for the junction as shown in **Appendix C**. The details of the improvement schemes are listed below:

- i) LCR NB (TD's Proposal No.: K070643.01): Remove the existing hatched marking at the approach to provide 1 left-turn lane and 3 straight ahead lanes. Widen the carriageway at the northern section of LCR NB to 3-lane width.
- ii) JOR EB (TD's Proposal No.: K071057.01C): Change the road markings to provide 1 left-turn lane, 1 left-turn and straight ahead share lane, 1 right-turn and straight ahead share lane, and 1 right-turn lane.
- iii) LCR SB (TD's Proposal No.: K070046.01D): Provide an additional right-turn lane and change the road markings to provide 2 left-turn lanes, 3 straight ahead lanes, and 1 right-turn lane.

9.1.6 Item ii) has been implemented on site recently.

- 9.1.7 Meanwhile, in order to facilitate the construction of WKT, it was proposed to relocate the Jordan Temporary PTI from WCR to To Wah Road recently as stated in Paragraph 8.2.5.
- 9.1.8 After the relocation of Jordan Temporary PTI, it was anticipated that more buses would travel along JOR EB at-grade road. The at-grade traffic flows would increase from round 300 to 500 pcu/hr as shown in **Figure 9.2**. The ratio of traffic flows from JOR elevated road to flows from at-grade road would be increased from 1:2 to 1:4 and 1:3 to 1:5 for the weekday morning and evening peak respectively.
- 9.1.9 Due to the above change of traffic pattern at JOR eastbound, it should review the lane configuration of JOR EB approach again. Junction analysis was conducted for the case with “original” lane configuration and the “existing” (aforesaid Item ii)) configuration. The junction performances for the two cases are listed in **Table 9.1**.

Table 9.1 Performance of Junction of JOR / LCR

Case	Reserve Capacity (RC)			
	With Items i) & iii)		Without Items i) & iii)	
	AM Peak	PM Peak	AM Peak	PM Peak
Original lane configuration	26%	23%	-5%	-5%
Existing (Item ii)) lane configuration	20%	16%	-8%	-10%

Note: with Relocation of Jordan PTI from WCR to To Wah Road

- 9.1.10 From the review as in **Table 9.1**, with the relocation of Jordan Temporary PTI, the performance of the junction with the existing lane configuration at JOR EB would in fact be worse than the original one, it is due to the heavier traffic from at-grade JOR instead of from the elevated road. Particularly for the case “without Item i) & iii)”, the junction would be overloaded. Therefore, it is proposed to modify the existing lane configuration to take into account the latest traffic flow condition and meanwhile to fulfil the needs from the residents of Union Square.
- 9.1.11 In order to achieve a balance between the said two considerations, it is recommended to revise the road marking of JOR EB approach to provide 1 left-turn lane, 1 left-turn and straight ahead share lane, 1 straight ahead lane, and 1 straight ahead and right-turn share lane as shown in **Figure 9.3**.
- 9.1.12 The RCs of the junction with the recommended improvement are shown in **Table 9.2**.

Table 9.2 Performance of Junction of JOR / LCR with Proposed Lane Configuration

Case	Reserve Capacity (RC)			
	With Items i) & iii)		Without Items i) & iii)	
	AM Peak	PM Peak	AM Peak	PM Peak
Proposed lane configuration	25%	21%	-5%	-7%

Note: with Relocation of Jordan PTI from WCR to To Wah Road

- 9.1.13 It is believed that the proposed modification is a well-balanced scheme which has taken into account (a) the needs from the residents of Union Square, and (b) the additional bus flows arising from the relocation of Jordan Temporary PTI.
- 9.1.14 As a result, the overall proposed improvement for the junction of JOR / LCR would combine TE/K's improvement for LCR NB and SB and the proposed modification of lane marking for JOR EB as shown in **Figure 9.4**. To address the concern of the public on the turning movements at the junction of JOR / LCR, the road markings at JOR EB has recently been adjusted by TD as shown in Drawing No. 080785.01A at **Appendix C**.

J12 Junction of JOR / Ferry Street / CAR

- 9.1.15 It is proposed to revise the road marking of Ferry Street SB to provide 1 left-turn and straight ahead lane, and 3 straight ahead lanes to enhance the capacity of the junction.
- 9.1.16 Further to the amendment to the road marking of Ferry Street SB approach. It is proposed to ban the right-turning movement of JOR WB in order to combine two signal stages in the MOC, and provide 1 left-turn lane and 2 straight ahead lanes as shown in **Figure 9.5**.
- 9.1.17 By the end of 2009, a new Emergency Vehicular Access (EVA) aligned at the west of Site C between JOR and WCR, will be completed to cope with the opening of AUS of KSL. It is proposed to widen the EVA to 7.3m wide and make use of it as part of the diversion route for the banned right-turning movement. The diversion route is via JOR WB, the said EVA SB, WCR EB and CAR NB. Such diversion route is known as "Q" turn and is illustrated in **Figure 9.6**.
- 9.1.18 The reserve capacity of the junction under Scheme 1 will be increased from -10% to 51% and -11% to 37% for the weekday morning and evening peak respectively.
- 9.1.19 The construction works of Road D1 and Road D1A would very likely be entrusted to XRL WKT, and the latest programme is to gazette Road D1 in 3rd or 4th Quarter of 2009 together with other surrounding road schemes around WKT. To avoid abortive work and interfacing issues, it seems more reasonable to request XRL to construct temporary SB road between JOR and WCR in early stage of WKT construction. However, the exact construction programme is subject to the WKT Detailed Design Stage and/or the future contractor's proposal. Therefore it would not be able to confirm whether the scheme could be 100% possible for being implemented within the next two years (short term) at this moment. In the light of this, the scheme is classified as a "short-term/interim scheme" subject to the final construction programme of WKT. This scheme would be a requirement for interim/construction stage.

J13 Junction of Nathan Road / JOR

- 9.1.20 TE/K of TD has recently proposed an improvement scheme (TD's Drawing No.: K040736.01C) for the junction as shown in **Appendix C**. The scheme comprised setting back the kerblines to widen the section of JOR EB east of Nathan Road. Under TD's improvement, the reserve capacity of the junction will be increased from 10% to 17% and 4% to 8% for the weekday morning and evening peak respectively.

- 9.1.21 To further improve the junction, the MOC of the junction was reviewed. It is found that with the existing numbers of turning movements and flow patterns, the existing MOC is already the most effective. Thus, “ban-turns” should be investigated.
- 9.1.22 The MOC could be simplified if the right-turn movement at Nathan Road SB approach could be banned. By considering the current traffic circulation in the vicinity, the most reasonable diversion routing for the affected traffic would be Nathan Road SB, Public Square Street WB, Shanghai Street SB and JOR EB / WB (as illustrated in **Figure 9.7**).
- 9.1.23 It is considered that the detouring of this diversion route would affect bus services. As a result, it is proposed to convert the Nathan Road SB right-turn lane to “bus only” lane. Right turning movements for franchised buses would be maintained, while other types of vehicles would need to use the diversion route as shown in **Figure 9.7**. Under this arrangement, MOC could not be simplified and would be the same as the existing condition. The proposed layout which incorporated TD’s scheme and the proposed scheme is illustrated in **Figure 9.8**.
- 9.1.24 The reserve capacity of the junction will be increased from 10% and 4% to 19% and 12% for the weekday morning and evening peak respectively.

J14 Junction of LCR / WCR

- 9.1.25 The junction of LCR / WCR would be improved in accordance with the local traffic improvement scheme proposed by TD as shown in **Appendix C**. The improvements are described as follows:
- i) LCR SB (TD’s Proposal No.: K070077.01F): Setback the kerbline, provide channelising island, change road marking and MOC to allow left-turning movement to travel for one more stage.
 - ii) LCR NB (TD’s Proposal No.: K070798.01A): Increase the length of flared section of the right-turn lane to enhance the right-turning capacity, and reduce the width of central reserve at the northern section of LCR to increase the capacity of straight ahead movement of LCR NB.
- 9.1.26 The above improvements are combined as shown in **Figure 9.9**. The reserve capacity of the junction will be increased from -15 to 14% and -11 to 25% for the weekday morning and evening peak respectively.

J18 Junction of CAR / AUR / AURW

- 9.1.27 The section of AURW between LCR and CAR has recently been changed from 1-way to 2-way operation. This change provides an additional EB approach from AURW, but only a left-turning movement to CAR NB will be allowed as shown in **Figure 9.10**.
- 9.1.28 Taking into account this change, it is proposed to provide an additional traffic lane at CAR SB by shifting the central divider westward and the southern section of CAR NB near the junction is proposed to be shifted westward accordingly to cater for the additional CAR SB straight ahead lane. Also, the northwest corner is required to set back to cater for the shifted CAR NB straight ahead movement. Since the junction with the additional AURW EB approach and CAR will operate under priority control, the MOC

of the proposed scheme would be the same as the existing one to avoid split phasing. The MOC and the said arrangement are shown in **Figure 9.11**.

- 9.1.29 The reserve capacity of the junction will be increased to 12% and 11% for the weekday morning and evening peak respectively. However, the junction would operate with marginal capacities for Friday evening (3%), Saturday PM (3%) and Sunday PM (6%).

J19 Junction of Nathan Road/AUR

- 9.1.30 If AUR EB right-turning movement could be banned, it could simplify the MOC. However, the simplified MOC could be effective only if the building at the southeast corner of the junction is redeveloped to widen the eastern AUR and provide four lanes (2 EB + 2 WB). Otherwise, the number of lanes at AUR EB approach would be reduced from 2 to 1 so as to suit for the simplified MOC as illustrated in **Figure 9.12**. As the banned AUR EB right-turning traffic would share the same lane as the straight ahead traffic, there would not be any improvement to the capacity of the junction in spite of the simplified MOC.
- 9.1.31 Furthermore, there is no reasonable diversion route unless it is possible to introduce a new right turn at AUR EB to Pine Tree Hill Road. Then the diversion route would be AUR EB, Pine Tree Hill Road SB, Hillwood Road WB and Nathan Road SB as shown in **Figure 9.13**. However, the junction of AUR / Cox's Road / Pine Tree Hill Road would operate with insufficient capacity with the additional 400 pcu/hr flows (i.e. AUR EB right-turning movement flows).
- 9.1.32 Apart from the "ban turn" scheme, the junction could be improved by widening of Nathan Road SB carriageway. With the widening scheme, an additional lane could be provided at Nathan Road SB, and the junction capacity could be enhanced. To facilitate the road widening, setting back of eastern kerblines and removal of the trees on the eastern footpath would be required.
- 9.1.33 Taking into consideration that (i) there is currently no schedule for redeveloping the building at the southeast corner of the junction, (ii) the junction of AUR/Pine Tree Hill Road would be overloaded due to the new right turn, and (iii) it is not possible to remove the trees due to environmental reasons, the aforementioned schemes could not be implemented in short period.

J20 Junction of CAR / KPD

- 9.1.34 It is found from the junction analysis that the CAR SB straight ahead movement to KPD is the most critical movement of that approach. Therefore, it is proposed to provide an additional MOC stage to increase the effective green time for the SB straight ahead movement. The junction would be operated under a 4-stage MOC as presented in **Figure 9.14**. The reserve capacity of the junction will be increased to 27% and 26% for the weekday morning and evening peak respectively.

9.2 Summary of the Performance of Improved / Affected Junctions

- 9.2.1 The summary of the performance of the improved junctions is listed in **Table 9.3**. Due to the diversion route of the banned right-turning movement of JOR WB in the improvement scheme for J12, additional traffic flows will be imposed on the left-turning

movement of WCR EB (J15). Therefore, junction analysis for J15 is also conducted and the results are listed in **Table 9.3**. Moreover, it is noted that short-term improvement scheme for J19 is currently not available, thus J19 is not listed in **Table 9.3**. The detailed calculation sheets are shown in **Appendix E**.

Table 9.3 Performance of Improved / Affected Junctions

Junction No.	Junction Name		Reserve Capacity (%)				
			Weekday		Friday	Saturday	Sunday
			AM	PM			
J3	Nathan Road / Waterloo Road	After PTI Relocation	3	-4	N/A	N/A	N/A
		Improved	12	9	N/A	N/A	N/A
J11	JOR / LCR	Existing Lane Configuration	-8	-10	-6	-2	17
		Proposed Lane Configuration and TD's Improvement Schemes	25	21	26	15	24
J12	JOR / Ferry Street / CAR	After PTI Relocation	-10	-11	-9	-12	18
		Improved ⁽¹⁾	51	37	48	38	59
J13	Nathan Road / JOR	After PTI Relocation	10	4	N/A	N/A	N/A
		TD's Scheme	17	8	N/A	N/A	N/A
		Combined Scheme	19	12	N/A	N/A	N/A
J14	LCR / WCR	After PTI Relocation	-15	-11	-11	-17	-2
		Improved	14	25	27	10	36
J15 ⁽¹⁾	CAR / WCR	After PTI Relocation	17	34	29	23	28
		Affected by J12 Improvement Scheme	17	34	29	23	28
J18	CAR / AUR / AURW	After PTI Relocation	8	7	0	0	3
		Improved	12	11	3	3	6
J20	CAR / KPD	After PTI Relocation	3	26	-12	13	40
		Improved	27	26	14	50	37

Notes: (1) Improvement scheme at J12 is classified as a "short-term/interim scheme".

(2) RC of J15 is affected by the diverted traffic flows arising from J12 improvement scheme. The revised RCs are the same for both schemes.

(3) N/A – Not available

9.2.2 It can be concluded from **Table 9.3** that the RC of the problematic junctions would all be improved and all junctions would operate with sufficient capacities (except that at J18 during Friday evening, Saturday PM and Sunday PM), and J15 would not be affected by the proposed improvement schemes at J12. Therefore, the proposed improvement schemes are feasible from the traffic engineering point of view (Improvement Scheme at J12 will subject to the actual construction programme of WKT).

10. FUTURE YEAR TRAFFIC CONDITION – REFERENCE CASE

10.1 Design Year

- 10.1.1 It is anticipated that all the major developments and infrastructures in WKRA would be fully completed before year 2031. Furthermore, year 2031 is the furthest future year with available planning data provided in 2006-Based Territorial Population and Employment Data Matrices (TPEDM). Thus, 2031 was agreed as the design year for the Long-Term Stage of this Study.

10.2 Road Network - Reference Case

- 10.2.1 The road network for the WKRA (the Focus Area) was originally planned in the late 1980s. Land uses were only indicative at that time and railway network plans only tentative.
- 10.2.2 Plans for the Airport Railway were subsequently firmed up and the AEL/ TCL opened in 1998. West Rail was completed to Nam Cheong Station in 2002 and the KSL is scheduled for opening in 2009. The station locations and associated airspace development have shaped the transport network development.
- 10.2.3 The road network plans have been adjusted in recent years following the abandonment of plans for further reclamation at Kowloon Point. It was originally envisaged as the principal north-south route; LCR would be extended to join Salisbury Road running through the future Kowloon Point Reclamation. This scheme is no longer feasible.
- 10.2.4 Previous road network planning (Civil Engineering and Development Department's (CEDD) WKRA Network) was based on a largely at-grade network of major roads with high capacity signalised intersections, plus two infrastructure schemes:
- LCR Underpass: North-south underpass along LCR beneath JOR is a committed scheme.
 - Scheme 6: D12 Extension (Scheme 6) – extension of AURW over the WHC toll plaza to connect to a new link to the WKCD and to the north (via Hoi Po Road). (this Scheme is abandoned now)
- 10.2.5 The short term improvement schemes for the junctions, which are located outside the CEDD's WKRA Network, as mentioned in Chapter 9 were assumed to be completed within two year time from now and had been taken into account in the road network in year 2031. These short term improvement schemes consist of:
- J3 - Junction of Nathan Road / Waterloo Road
 - J13 - Junction of Nathan Road / JOR
 - J20 - Junction of CAR / KPD
- 10.2.6 **Figures 10.1 to 10.6** illustrate the 2031 Reference Road Network which include the CEDD's WKRA Network and CKR Network. Whereas, the detailed junction layouts for those new junctions or the junctions with different layout/configuration to the existing, are shown in **Figures 10.7 to 10.18**.

10.2.7 The access arrangements for the various sites within WKRA as recommended by CEDD's Study are shown in **Figure 10.19** and summarised as follows:

- WKCD – at (a) CAR south of AUR, (b) Road D1/AURW junction, (c) LCR/AURW junction, (d) AURW mid-block between NCR and LCR, (e) NCR/AURW junction, (f) elevated NCR/AURW junction; and (g) West of WHC portal. <According to the recommendations from previous WKCD studies>
- WKT – at (a) LCR (various access points); and (b) Road D1 (various access points) <According to the recent TPIR of WKT>
- Site C – at WCR
- Site D – at WCR
- Permanent re-provisioned Jordan (WCR) PTI – at Road D1A <According to the recent TPIR of WKT>

10.2.8 According to the reference network, the major ingress/egress routings of each major development in WKRA are presented in **Figures 10.20 to 10.21**.

10.2.9 As shown most of the major ingress/egress routings of the local traffic would co-exist with the through traffic along some major corridors such as LCR - AUR and LCR-JOR.

10.3 Traffic Generation

10.3.1 Traffic generated from the major developments in WKRA have already been discussed in Chapter 7 and are reiterated in **Table 10.1** and **Figure 10.22**.

Table 10.1 Total Traffic Generation Estimates for WKRA (pcus/hour)

Site Unit	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
West Kowloon Terminus (WKT) *	2438	2575	2056	2050
Kowloon Station Development (KUD) *	2417	2026	1989	2113
Austin Station (AUS)*	455	407	433	457
West Kowloon Culture District (WKCD)	876	945	1787	2317
Total	6186	5953	6256	6937

Note: (*) Development Traffic plus Station Traffic

10.4 Future Traffic Characteristics

“Local Traffic” vs “Through Traffic” – Focus Area

10.4.1 According to the, the local development traffic would grow from 2250 pcu (both AM and PM) of today to 12100 pcu (AM) & 13200 pcu (PM) of 2031. While the through traffic passing through the Focus Area would grow from 3800 pcu (AM) and 4100 pcu (PM) of today to 5000 pcu (AM) and 6400 pcu (PM) of 2031. The overall traffic growth

of the Focus Area would be about 5% per annum. The traffic flows are also presented in **Figure 10.22** diagrammatically.

Directional Split

10.4.2 According to the WKRTM, the general directional split of the developments in WKRA is presented in **Figure 10.23**.

Traffic Flows

10.4.3 The 2031 reference traffic flows are presented in **Figure 10.24**.

10.5 Traffic Impact Assessment – Reference Case

10.5.1 The junction capacity of the key junctions within the Study Area were assessed by using the 2031 traffic flows (reference case) as presented in Para. 12.4.3. The key plan of the assessed junction is shown in **Figure 10.25**. The assessment results are summarised in **Table 10.2** and illustrated in **Figures 10.26 and 10.27**. For 2031 reference junction layouts could refer to **Figures 10.1 to 10.18**. The signal calculation sheets are attached in **Appendix E**.

Table 10.2 2031 Junction Performance – Reference Case

Junction No.	Junction Name	Junction Type	Reserve Capacity (%) / RFC	
			AM	PM
J1	Hoi Wang Road / Lai Cheung Road	S	-4%	9%
J2	Ferry St / Lai Cheung Road / Waterloo Road	S	10%	15%
J3	Nathan Road / Waterloo Road	S	-5%	-4%
J4	Hoi Wang Road / NCR	S	40%	29%
J5	Yan Cheung Road / Ferry St / Kansu St	S	-29%	-36%
J6	Nathan Road / Kansu St / Gascoigne Road	S	14%	5%
J7	JOR / Hoi Po Road	S	20%	11%
J8	NCR (elevated) / JOR (elevated)	S	47%	33%
J9	NCR / JOR	R	0.424	0.380
J10	JOR / To Wah Road	P	0.198	0.209
J11	JOR / LCR	S	-5%	-4%
J12	JOR / Ferry Street / CAR	S	-27%	-30%
J13	Nathan Road / JOR	S	16%	14%
J14	Road D1A(S) / WCR / Road D1	S	1%	-6%
J15	CAR / WCR	S	11%	13%
J16	NCR / AURW	R	0.373	0.325
J17	LCR / AURW	S	-7%	-16%
J18	CAR / AUR / AURW	S	-3%	-7%
J19	Nathan Road / AUR	S	3%	31%
J20	CAR / KPD	S	7%	34%
J21	Salisbury Road / CAR	S	87%	98%
J22	Salisbury Road / KPD	S	36%	40%
J23	Salisbury Road / Nathan Road	S	15%	6%
J24	AUR / Cox's Road / Pine Tree Hill Road	S	-7%	-3%
J25	Nathan Road / Hill Wood Road	P	0.408	0.684
J26	JOR / Gascoigne Road	S	47%	3%
J27	CAR / Haiphong Road	S	56%	143%

Junction No.	Junction Name	Junction Type	Reserve Capacity (%) / RFC	
			AM	PM
J28	CAR / Peking Road	S	157%	368%
J29	Peking Road / KPD	S	57%	54%
J30	KPD / Middle Road	S	65%	81%
J31	Nathan Road / Kimberley Road	S	97%	77%
J32	Nathan Road / Granville Road	S	99%	107%
J33	Nathan Road / Cameron Road	F	N/A	N/A
J34	Nathan Road / Haiphong Road / Humphreys Avenue	S	56%	67%
J35	Nathan Road / Mody Road	F	N/A	N/A
J36	Nathan Road / Peking Road	S	170%	125%
J37	Nathan Road / Middle Road	P	0.512	0.848
J38	Ferry Street / Man Cheong Street / Saigon Street	S	-6%	25%
J39	Yan Cheung Road / Hoi Wang Road / Road D1A(N)	S	24%	-1%
J40	Road D1A(N) / JOR / Road D1A(S)	S	29%	-8%
J41	AURW / Road D1	S	-37%	-37%

Note: S – Signal-control junction
P – Priority junction
R – Roundabout
F – Free-flow junction
N/A – Not available

10.5.2 The traffic queue at critical locations within the Focus Area were also calculated according to the methodology as stipulated in the Volume 4 of Transport Planning and Design Manual (TPDM). The results are summarised in **Table 10.3** and illustrated in **Figure 10.28**.

Table 10.3 2031 Critical Traffic Queue – Reference Case

Junction No.	Junction	Approach	Capacity (m)	Average Queue Length (m)		Within Capacity	
				AM	PM	AM	PM
J11	LCR / JOR	JOR EB	120	75	70	Yes	Yes
		LCR SB	240	85	75	Yes	Yes
		JOR WB	70	70	75	Yes	No
		LCR NB	380	25	25	Yes	Yes
J12	JOR / Ferry Street / CAR	JOR EB	150	315	405	No	No
		Ferry Street SB	210	410	135	No	Yes
		JOR WB	190	305	420	No	No
		Ferry Street NB	90	155	585	No	No
J14	Road D1A(S) / WCR / Road D1	Road D1A(S) SB	170	55	40	Yes	Yes
		WCR WB	100	55	70	Yes	Yes
		Road D1 NB	120	70	115	Yes	Yes
J15	WCR / CAR	WCR EB	100	55	45	Yes	Yes
		CAR SB	90	60	55	Yes	Yes
		CAR NB	180	65	65	Yes	Yes
J17	LCR / AURW	AURW EB	180	70	100	Yes	Yes
		LCR SB	80	75	125	Yes	No
		AURW WB	240	105	195	Yes	Yes
J18	CAR / AURW	AURW EB	110	75	65	Yes	Yes
		CAR SB	180	85	50	Yes	Yes
		AUR WB	90	65	80	Yes	Yes

Junction No.	Junction	Approach	Capacity (m)	Average Queue Length (m)		Within Capacity	
				AM	PM	AM	PM
J20	CAR / KPD	CAR NB	130	70	110	Yes	Yes
		CAR SB	280	35	25	Yes	Yes
		KPD NB	130	35	40	Yes	Yes
J40	Road D1A(N) / JOR / Road D1A(S)	JOR EB	70	55	75	Yes	No
		Road D1A(N) SB	260	20	90	Yes	Yes
		JOR WB	150	25	80	Yes	Yes
		Road D1A(S) NB	170	45	70	Yes	Yes
J41	AURW / Road D1	Austin Rd West EB	230	715	590	No	No
		Road D1 SB	120	250	305	No	No
		AURW WB	110	470	565	No	No

10.6 Problem Identification

10.6.1 As shown in **Table 10.2**, the follow junctions would be overloaded in year 2031:

- J1 - Hoi Wang Road / Lai Cheung Road
- J3 - Nathan Road / Waterloo Road
- J5 - Yan Cheung Road / Ferry St / Kansu St
- J6 - Nathan Road / Kansu St / Gascoigne Road
- J11 - JOR / LCR
- J12 - JOR / Ferry Street / CAR
- J14 - Road D1A(S) / WCR / Road D1
- J17 - LCR / AURW
- J18 - CAR / AUR / AURW
- J19 - Nathan Road / AUR
- J20 - CAR / KPD
- J23 - Salisbury Road / Nathan Road
- J24 - AUR / Cox's Road / Pine Tree Hill Road
- J26 - JOR / Gascoigne Road
- J38 - Ferry Street / Man Cheong Street / Saigon Street
- J39 - Yan Cheung Road / Hoi Wang Road / Road D1A(N)
- J40 - Road D1A(N) / JOR / Road D1A(S)
- J41 - AURW / Road D1

10.6.2 Most of the above problematic junctions in Focus Area are laying along the ingress/egress routings to/from the major developments in WKR. Thus, the overloaded junction would affect the accessibilities of these developments including the time sensitive visitor/travellers to WKCD and WKT.

10.6.3 Some long traffic queue as shown in **Table 10.3**, would block back the upstream junctions. These problematic traffic queues would happen at:

- J11 - JOR / LCR – EB and WB approaches
- J12 - JOR / Ferry Street / CAR – all approaches
- J17 - LCR / AURW – SB approaches
- J18 - CAR / AUR / AURW –WB approaches
- J40 - Road D1A(N) / JOR / Road D1A(S) – EB approaches

10.6.4 Taking a more strategic perspective, the aforementioned junction capacity and queuing problems (as summarised in **Figure 10.29**) can be attributed to the significant constraints in the WKRA road network structure, including:

- Bottleneck for traffic to Tsim Sha Tsui (TST)— Development mass and mix at TST generate considerable traffic demands at various times of the day, and also on both weekdays and weekends. The junctions of CAR with AUR and KPD respectively are particularly under stress as they essentially handle all TST-bound traffic from the western part of the Hong Kong Special Administrative Region (HKSAR).
- Insufficient road capacity for East-West traffic movements - Upon the planned closure of the section of WCR between LCR and Road D1A, all the east-west traffic movements from the strategic roads of WHC, WKH and LCR upstream are handled by JOR and AUR only, and their throughput capacities are constrained by the intermittent junctions.
- Mixture of through traffic and local development traffic - There is a high volume of strategic through traffic and local development traffic at most of the roads within the area. LCR, JOR, CAR and AURW form the routes of strategic traffic between southern Kowloon (including TST, Jordan, Hung Hom) and WKH, WHC, and the future CKR, but at the same time these roads would also provide the immediate access to KUD, AUS, WKT, and the future property development at Sites A, C, and D.

11. PROPOSED LONG TERM ROAD NETWORK

11.1 Objectives of Developing Future Road Network Main Frame in the Focus Area

11.1.1 The key objectives for the road network structure and circulation strategy for the Focus Area are summarised as follows:

1. Land Use Transport

- Provide a sustainable multi-modal transport network to support the existing and planned development and activities in West Kowloon.
- Cater for the specific requirements of the special land uses such as WKCD, WKT, KOW and other mixed uses.

2. Separate the Principal Traffic Movements

- Through traffic between WHC / WKH / CKR / LCR / Road D1 / Ferry Street / JOR and AUR / CAR.
- WKT / AUS
- WKCD
- KOW / KUD

3. Queue Management

- Ensure queues for different traffic movements do not impact on each other.
- Ensure egress traffic can leave the area freely and not block ingress traffic.
- Identify queue management locations.

11.2 Objectives of Improvement Schemes in the Study Area

11.2.1 The key objectives for road improvement schemes to the Study Area are summarised as follows:

1. Improve road capacity to TST
2. Improve east-west movements
3. Improve individual problem junctions
4. Segregate through traffic from local development traffic

11.3 Opportunities and Constraints for Improvement Schemes

General

11.3.1 Sections 11.3 and 11.4 cover the “opportunities” and “constraints” for main frame of road network and the improvement schemes which may involve more significant engineering works. Whereas the local junction improvements which may involve some

local widening or alternation of signal method of control, will be discussed in Section 11.5 for each identified problematic junction.

Opportunities

- 11.3.2 According to the “problems” (Section 10.6) and “objectives” (Sections 11.1 & 11.2), initial concepts for developing improvement schemes were developed as shown in **Figure 11.1** diagrammatically. Based on these “concepts”, a set of possible conceptual improvement schemes were considered and are tabulated in **Table 11.1**.
- 11.3.3 The developed concepts are derived based on three sectors of the WKRA road network, as follows:
- Focus area structured by north-south roads of LCR-Road D1A-CAR
 - The WKH-WHC corridor and land currently occupies by the Public Cargo Working Area (PCWA)
 - Eastern hinterland area of the older, built-up Jordan district
- 11.3.4 The three sectors offer various degrees of opportunities for achieving the objectives.
- 11.3.5 The WKH-WHC corridor and the PCWA area present opportunities for the most effective schemes by channelizing WKRA traffic directly to/from strategic roads and bypassing the local road network.
- 11.3.6 The eastern hinterland area is mostly built-up with private landholding and offers very limited scope for new road infrastructure. Improvement concepts would mostly be confined to traffic management schemes using the existing road infrastructure.
- 11.3.7 The scope for improvement within the focus area is somewhat in between the WKH-WHC corridor and the eastern hinterland, in that there are committed property and transport developments and constrains the feasibility of new infrastructure. There is still flexibility through the use of wide road reserves and the WKCD site where the development road network is yet to be developed.

Constraints

- 11.3.8 Meanwhile, the constraints which may potentially affect the opportunities of developing traffic improvement schemes were also identified as shown in **Figure 11.2**.
- 11.3.9 The type of constraints also correlates to the three sectors. In the WKH-WHC corridor, most of the constraints are concerned with the close interface and proximity with WHC and configuration of the new road connections. In the eastern hinterland, the constraints are mostly concerned with limited area for road enhancement, accessibility to local developments and established public transport services. In the focus area, the constraints are a combination of the some of the above.

Screening of Possible Conceptual Schemes

- 11.3.10 The aforesaid “opportunities”/“constraints” and other considerations were analysed and the findings are summarised in **Table 11.1**.

Table 11.1 Analysis on “Opportunities” and “Constraints” – Main Frame of Future Network Schemes

Scheme ID	Possible Schemes	Options	Constraints	Remark	To be further considered?
A	Grade-separated corridor for through traffic between WHC/WKH and TST, to relieve the road network in the Focus Area	LCR-Salisbury Road	• Tunnel of MTR KSL • May require reclamation • Run directly through the centre of WKCD • Public reaction and sensitivity towards potential tunnel portal at existing TST Ferry Pier bus terminus	Highly constrained in engineering, public reception, and political terms	× ×
B		LCR-JOR-CAR	• Track and tunnel of MTR XRL and KSL (underpass option) • Pedestrian subway at JOR/CAR/Ferry Street junction (underpass option) • Road curvature constrained by adjacent lots under private landholding • Visual impact for surrounding sites (flyover option) • Limited land availability for ramp landing	Highly constrained in engineering terms	× ×
C		LCR-AURW-CAR or LCR-AURW- AUR	• Tunnel of MTR KSL • Existing pedestrian subway at junction of AUR/CAR • Existing flyover from KPD to CAR • Limited land availability for ramp landing	Highly constrained in engineering terms	× ×
D1		LCR-AURW Underpass (At-Grade LCR/AURW Junction)	• Encroachment of new roads into WKCD	Feasible in engineering terms. No major constraints for connection up to CAR, more constraints beyond CAR	✓✓
D2		LCR-AURW Underpass (Depressed LCR/AURW Junction)			
E	Direct connection from WHC to relieve the traffic loading at Northern LCR (north of JOR)	KOWScheme 4 (i.e. road link from WHC NB to JOR)	• Possible public concerns during consultation period	Feasible in engineering terms. Scheme already gazetted	✓✓
F	Direct connection to WKH to relieve the traffic loading at LCR	CEDD Scheme 6 (i.e. road link from AURW to WKH NB)	• May induce additional traffic volumes along elevated AURW and adverse environmental impacts on WKCD • Possible future waterfront promenade • Require a large area of land resumption • Mixture of WKRA inbound and outbound traffic at the WHC off-slip to JOR • Not entirely compatible with the gazetted Scheme E	No major constraints in engineering terms, some constraints from planned land use of PCWA, no major traffic benefits	× ×

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Scheme ID	Possible Schemes	Options	Constraints	Remark	To be further considered?
G	Direct connection to/from WKH to relieve the traffic loading at LCR	Two-way viaduct between WKCD and WKH along PCWA	- Impact on the existing PCWA operation - Impact on the possible future waterfront promenade - Require a large area of land resumption	No major constraints in engineering terms, some constraints from planned future land use of PCWA. Similar function of Schemes H and J.	×
H	Direct connection to WKH relieve the traffic loading at Northern LCR (north of JOR)	Connection via elevated JOR and Hoi Po Road	- Headroom and gradient concerns for new road link and other existing slip roads in the surroundings - Merging length at WKH	Some constraints in engineering terms, possibly resolved by modifications to adjacent slip roads	✓
I	Direct connection to WHC to relieve the traffic loading at Northern LCR (north of JOR)	New link road from elevated NCR	- Proximity of toll plaza - Slip road with tight curvature and gradient - Large vehicle is restricted to use this slip road due to the curvature and gradient	Some constraints in engineering terms. Traffic benefit is subject to WKCD's access location.	✓
J	Direct connection from WKH to relieve the traffic loading at LCR	WKH SB link to at grade NCR	Headroom and gradient concerns for new road link	No major constraints in engineering terms	✓
K	Direct connection to/from WKH to relieve traffic loading at LCR	Two-way underpass between WKCD western exit and WKH	- Headroom and gradient concerns for new road link - Only vehicles generated from WKCD could be served by this scheme - Occupation of the central portion of WHC and may seriously affect their operation	No major constraints in engineering terms. Availability of this scheme is solely subject to WKCD's access arrangement.	×
L	Direct connection to WKH to relieve traffic loading at Northern LCR (north of JOR)	NCR underpass to WKH NB	- Major box culvert underground - Limited space at NCR for rampdown section of underpass	Highly constrained in engineering terms	× ×
M	Direct connection to WHC to relieve traffic loading at Northern LCR (north of JOR)	NCR underpass to WHC	- Major box culvert underground - Limited space at NCR for rampdown section of underpass - Underpass with tight curvature	Highly constrained in engineering terms	× ×
N	Direct connection from WHC to relieve traffic at LCR	New at-grade U-turn link at WHC toll plaza NB	- Interface with gazetted Scheme E - Affect the waterfront promenade - Only vehicles generated from WKCD could be served by this scheme	No major constraints in engineering terms. Availability of this scheme is solely subject to WKCD's access arrangement.	×

Scheme ID	Possible Schemes	Options	Constraints	Remark	To be further considered?
O	Direct connection to WHC to relieve traffic at Northern LCR (north of JOR)	Open the existing bus-only down-ramp to WHC for general traffic	- Require modifications of cross-harbour bus stop - Slight worsening of entering manoeuvres for buses from WKH - The U-turn from Elevated NCR NB to the WHC is tight.	No major constraints in engineering terms, but need major modifications to bus stop to resolve traffic weaving issue. Similar function of Scheme I.	×
P	Local flyover or underpass along CAR to bypass AUR junction to improve the junction capacity of CAR/AUR/AURW	Flyover	- Visual impact to surrounding developments, e.g. Victoria Towers - Existing flyover from KPD to CAR - Limited land availability for ramp landing	Highly constrained in engineering and public reception terms.	× ×
Q		Underpass	- Tunnel of MTR KSL - Existing pedestrian subway at junction of AUR/CAR/AURW - Require encroachment into WKCD for re-aligned CAR	Some constraints in engineering terms.	✓
R	Local flyover or underpass from JOR EB to CAR SB to relieve the heavy right turn from AUR EB or WCR EB to CAR SB.	Flyover	- Road curvature constrained by adjacent lots under private landholding - Visual impact for surrounding sites - Limited land availability for ramp landing - Require resumption of King George V Memorial Park for flyover landing	Some constraints in engineering and public reception terms	× ×
		Underpass	- Pedestrian subway at JOR/CAR/Ferry Street junction - Road curvature constrained by adjacent lots under private landholding - Require resumption of King George V Memorial Park for flyover landing	Highly constrained in engineering terms	× ×
S	Road D1 Link to LCR SB		- Potential cross-weaving of traffic from WHC, WKH, CKR and Road D1 Link towards LCR SB and JOR WB - Conflict with future re-provisioned WCR PTI located between Road D1A and LCR - For full effectiveness of scheme, also needs connection from Gascoigne Road flyover to Yan Cheung Road	Major constraints in land use and traffic terms.	× ×
T	Gyratory system for East - West corridors	AUR as one-way WB and Bowring Street as one-way EB	- Severance of the King George V Memorial Park into two parts - Need to stop pedestrianization scheme at Bowring Street and relocate existing street stalls - Need to open up new signalized junction at Nathan Road	No major constraints in engineering terms, but major constraints in public reception terms.	× ×

Scheme ID	Possible Schemes	Options	Constraints	Remark	To be further considered?
U		AUR as one-way WB and part of JOR as one-way WB with contra-flow bus lane	- For full effectiveness, need flyover from JOR EB to CAR SB (i.e. Scheme R) - Cox's Road, Parkes Street and Nanking Street converted from local roads to part of the gyratory system with additional traffic volumes - Substantial changes of traffic movements in a large road network	No major constraints in engineering terms, but major concerns on public reception terms.	× ×
V		Shifting of residential coach lay-by southward to Haiphong Road Temporary market at KPD, allowing two full lanes for straight-ahead movements from KPD SB, modification of signal method-of-control	- Possible public concerns on the relocation of residential coach lay-by - Require redevelopment of Haiphong Road Temporary market	No major constraints in engineering and traffic terms, but subject to redevelopment of Haiphong Road Temporary market	×
W	Improvement to junction of KPD/CAR	Extension of KPD flyover to just before junction of CAR/AUR, conversion of the at-grade NB CAR carriageway section outside CFT to SB	- Visual impacts to surrounding sites (e.g. Victoria Towers) - Headroom and gradient issues with extended ramp from KPD	Some constraints in engineering and public reception terms	× ×
X		Relocation of CFT's bus terminus and private car/taxi pick-up/drop-off to the vacated fire station site, simplify at-grade junction arrangements	- Land use concern with the future vacated fire station site - Interface with CFT and possibly need incentives for private land ownership to implement scheme	No major constraints in engineering terms, but concerns with future land use and interface with private land ownership	× ×

Note:

- ✓✓ - Practical and recommended schemes which are likely feasible and without engineering difficulties
- ✓ - Practical and recommended schemes which may need further engineering feasibility studies
- × - Useful schemes but subject to conditions and are not recommended
- × × - Non-practical schemes

11.3.11 After the above screening exercise, the following Core and Additional Schemes (as shown in **Figures 11.3 to 11.16**) were selected for further assessment in this Study, and would be further discussed in the coming Section 11.4:

Core Schemes – Likely feasible; without engineering difficulties or preliminary engineering feasibility has already been done by others:

- Scheme D2 – LCR/AUR underpass up to west of the junction of CAR/AUR
- Scheme E – KOW Scheme 4, i.e. new road link and widening of the existing bus-only ramp from WHC NB to elevated JOR EB to allow all vehicles quicker access from WHC to WKR

Additional Schemes - provide further improvement to the Core Schemes but need further engineering feasibility study:

- Scheme H – Upgrading NCR plus new connection from Hoi Po Road to WKH NB
- Scheme I - New link road from elevated NCR to WHC
- Scheme J – WKH SB link to at grade NCR
- Scheme Q - CAR Underpass to bypass the junction of CAR/AUR/AURW

11.4 Details of the Selected Improvement Schemes

Scheme D2 – LCR-AURW Underpass (with Depress J/O LCR/AURW)

11.4.1 The LCR-AURW Corridor is the critical route serving through traffic and WKRA traffic. The primary objectives for the corridor are to provide following:

- 1) WKT-WKCD pedestrian deck and potentially traffic free connection between WKT-KUD-WKCD;
- 2) Convenient and direct pedestrian connections between WKT/KUD/WKCD and surrounding areas;
- 3) Through route for WHC/WKH/CKR – AUR/CAR;
- 4) Direct access to WKT, WKCD, KUD;
- 5) Relieve Road D1 from through traffic to take up planned role as District distributor and serve frontages.
- 6) Separation of traffic circulation for the main movements.

11.4.2 LCR forms the principal entry/exit and through route of the WKR. Traffic from the WHC, WKH, CKR and LCR (northern) converge on the corridor. In the original planning anticipated further reclamation at Kowloon Point, the LCR was to be extended to connect with Salisbury Road to form a continuous urban trunk or primary distributor road. The Kowloon Point Reclamation has been cancelled which now requires a

reorientation of the plans for LCR. Current CEDD's planning retains the proposed North-South LCR underpass at the JOR junction.

- 11.4.3 LCR-AURW underpass is intended to separate the substantial through traffic to CAR and AUR from the local traffic of WKCD, WKT and KOW. The scheme extends the depressed LCR to interconnect with AURW to provide a complete grade separated route for through traffic. In conjunction, separate access/egress is provided to WKT and WKCD.
- 11.4.4 The LCR/AURW intersection is depressed to -2mPD in order to permit an at-grade traffic free pedestrian connection between WKT and KUD. The intersection of LCR/AURW would be signal controlled and could include an arm to serve WKCD. The LCR-AURW through link is lowered to the lowest at about -11mPD to pass under the depressed LCR/AURW junction. The layout of the underpass and the junctions in the vicinity are shown in **Figures 11.3 to 11.9**.
- 11.4.5 A minimum 63m turning radius and 70m sight line is provided for the LCR-AURW through link. The maximum gradient of the through link is 7.5%, and the sections with this gradient are less than 100m long and are all located near the portal of the underpass and far from the turning corner underneath the LCR/AURW junction.
- 11.4.6 An at-grade pedestrian deck to interconnect WKCD, WKT and KUD could be provided to cover the depressed LCR/AURW junction and a section of depressed AURW and leaving an opening for providing natural light and ventilation for the depressed junction. The at-grade pedestrian connections among WKCD, WKT and KUD will be traffic free.
- 11.4.7 Major signalised junctions permitting all turning movements are provided at JOR, AURW and CAR. Surface U-turns are provided along LCR for circulation to/from WKT. Traffic exiting WKT SB on LCR must weave across to 'U' turn NB. These 'U' turns at ground level can be free flow and pass over the depressed LCR.
- 11.4.8 The Road D1/AURW junction is left-in/left-out only because the underpass blocks the formation of a cross junction. Also in traffic operational terms it is considered that a "full movements" junction of Road D1/AURW would be too close to the critical AURW/CAR/AUR intersection, and hence the potential traffic queue at AURW WB would block back to AURW/CAR/AUR intersection.
- 11.4.9 A left-in/left-out junction, which is opposite to the Road D1/AURW junction, can also be provided on AUR WB to serve the WKCD.
- 11.4.10 A ground level road is located along the eastern edge of the pedestrian deck over the depressed AURW. The link can provide access between AURW EB and Road D1 NB, permit 'U' and 'Q' turns for traffic at the AURW/CAR/AUR intersection and thereby reduce right turning movements, and provides egress from WKCD to the north and east.
- 11.4.11 Another at-grade U-turn is provided to the west of the LCR/AURW junction to serve the egress vehicles from access points of KUD located along AURW.
- 11.4.12 To maximise the utilisation of the LCR-AURW underpass, the northern end of the underpass is assumed to have connections to all strategic roads e.g. WHC, WKH, and

CKR, except from CKR to underpass SB. A possible layout of the northern end is illustrated in **Figure 11.4**.

- 11.4.13 Along the NB carriageway, the egress of LCR-AURW underpass would be placed at the middle of the carriageway. The at-grade LCR NB would be split into two carriageways after its junction with JOR. One would merge with the underpass egress in the left (leading to WHC) and the other one would merge with the underpass egress in the right (leading to WKH). Such arrangement could minimise the weaving problem.
- 11.4.14 Since the slip road from CKR to LCR SB is situated far east from the north portal of the underpass, weaving problem would be resulted if the slip road could interconnect the underpass SB. As a result, the north portal of the underpass is proposed to have connections to WHC, WKH and northern LCR only, but not CKR. To further reduce the conflict between the weaving flows from WHC/WKH/northern LCR to the underpass/southern LCR, a dedicated carriageway is provided for serving the traffic from WKH/northern LCR travelling through JOR/LCR junction straight ahead to WHT.
- 11.4.15 In order to accommodate the underpass south portal, approaches to the depressed junction of LCR/AURW and the at-grade U-turn link along AURW, it is required to setback the original southern kerbline along AURW as planned in the CEDD's WKRA Network. In this regard, encroachment into WKCD would be resulted and the extent of encroachment will be discussed in later Sections.

Scheme E – Road Link and Widening of Existing Bus-Only Ramp from WKH NB to Elevated JOR EB for Direct Connection from WHC NB to WKRA (Figure 11.10)

- 11.4.16 This scheme was previously proposed as an accessibility enhancement scheme for the KUD, and was known as "Scheme 4" at the time. In this study, it is named "Scheme E" to avoid confusion.
- 11.4.17 Currently, the first off-slip after the WHC NB portal is a bus-only link to the elevated JOR EB, which offers the quickest way from WKH NB to WKRA and TST.
- 11.4.18 General traffic from WHC NB intending for these two districts, however, are not allowed to use the ramp because of the potential weaving issue with buses leaving the cross-harbour bus stop towards the outer lanes of WKH NB (for Northwest Kowloon and Northwest New Territories). Such traffic has to use the next off-slip towards LCR SB, but via a long loop section with an additional travel distance of more than 1km compared to the off-slip to JOR. Aside from the increased travel time, this also contributes to the heavy traffic volumes and long vehicle queues frequently observed at LCR SB approach to the junction with JOR.
- 11.4.19 To enhance the accessibility from WKH to WKRA and TST, Scheme E is put forward for offering a much quicker alternate route. The scheme comprises a new at-grade road connection from the WHC NB toll plaza west of the existing bus stop by using the PCWA by shifting the existing NB bus stops at the toll plaza to reserve a "left hand side" passageway for the general traffic going to the on-ramp. This new link can bring general traffic to the JOR off-slip without interfering with the bus exit movements towards the outer lanes of WKH NB. The bus-only restriction at the off-slip ramp towards JOR would be dropped.

- 11.4.20 The scheme also comprises a short road deck at the junction of the elevated JOR/NCR for enabling right-turns towards the property portion of the KUD, and also further downstream onto AURW.
- 11.4.21 Upon the committed widening and conversion into two-way of the existing WB-only AURW between LCR and CAR, the entire Scheme E can offer a quick route for traffic from WHC to TST bypassing the busy junctions of LCR/JOR and WCR/CAR.

Scheme H - Upgrading NCR plus new connection from Hoi Po Road to WKH NB

- 11.4.22 This scheme could provide an alternative for local traffic from WKRA (particularly for KUD and WKCD) to NWNT, and hence relieve the traffic loading along LCR. The new road link was previously proposed to be located opposite to Olympic City 2, to connect with LCR NB and WKH NB, but after drawing the detailed setting out, it was found infeasible due to the site constraint (i.e. in conflict with the column of the footbridge connecting Olympic City 1 and Olympic Station of MTR TCL). Therefore, the proposed layout of the new road link has been revised as shown in **Figure 11.11**. The new road link from Hoi Po Road would connect to the slip road towards WKH NB outside Charming Gardens.
- 11.4.23 Due to the increased traffic along NCR NB, the scheme would include road widening on the elevated structure of the junction of NCR/JOR (Scheme H (Part 2)) as illustrated in **Figure 11.12**. In view that the additional columns for supporting the widened elevated structure along Elevated NCR NB would sit on WKH SB near side traffic lane, a section of WKH SB carriageway, from JOR to 150m south of JOR, is required to reduce from 6 lanes to 5 lanes for accommodating the said arrangement.
- 11.4.24 It is anticipated that the volume / capacity (v/c) ratio of the concerned 5-lane wide WHC SB carriageway in 2031 would be still below 1, i.e. the link capacity of that road segment would be able to cope with the future traffic flows with the 5-lane configuration. Hence, the proposed improvement scheme would not induce any capacity constraint to WHC from traffic point of view, but could improve WKRA's accessibility and the capacity of Scheme E (as new right turn would be introduced at the junction of elevated JOR/elevated NCR).
- 11.4.25 Furthermore, in order to suit for the revised lane configuration of the said road segment, the lane configuration and road markings of WKH and the associated slip roads to the north of JOR are required to be modified. The revised road markings are illustrated in **Figures 11.13**. Regarding the above widened elevated structure and the associated modification along WHC SB, WHC has been consulted and in-principle no objection for the proposed arrangement has been received.
- 11.4.26 With the framework of Scheme D2, i.e. the LCR-AURW underpass, it is believed that the through traffic would keep using the LCR-AURW underpass and would not divert to Scheme H and hence would not overload the section of AURW west of LCR.

Scheme I – New link road from elevated NCR to WHC

- 11.4.27 The original routing for the traffic from WKRA to WHC would be travelling along LCR NB until passed through JOR junction and then U-turn at Yau Ma Tei Interchange.

Scheme I could provide a short cut for KOW and WKCD's traffic to use elevated NCR NB and the new SB link to WHC. The layout of the link road is shown in **Figure 11.12**.

- 11.4.28 Scheme I can allow quick and direct dispersion of traffic from WKCD at the end of the performance events. Also, the scheme could relieve the traffic loading at LCR. Giving that Scheme D is in-placed, the Scheme I would not attract any through traffic (non WKCD nor KOW traffic) as the through traffic would use LCR-AURW underpass and Yau Ma Tei Interchange (YMT Int.) (original route) to WHC. Therefore, the Scheme I would not induce any significant traffic along AURW and NCR.
- 11.4.29 Similar to the Scheme H (Part 2), the down ramp and the landing of the U-turn slip road would occupy one WKH SB far side traffic lane, a section of WKH SB carriageway in the vicinity of the new link road is also required to reduce from 6 lanes to 5 lanes (as illustrated in **Figure 11.12**).
- 11.4.30 Moreover, in order to allow the vehicles travelling along the proposed slip road to use "Auto Toll" lane, it is proposed to revise the road marking to the north of the toll booths. The revised road markings are presented in **Figures 11.12**. The aforementioned arrangement coupled with the Scheme H (Part 2) has already been reviewed by WHC, and it is acceptable to them.

Scheme J – WKH SB link to at-grade NCR

- 11.4.31 This Scheme could provide a more direct connection from WKH SB to NCR where would have two level of links connecting to the at-grade roundabout at JOR/NCR (for KOW AEL and TCL, WKT, and Jordan) or to the elevated NCR (for KUD, and TST). The scheme would relieve the traffic loading at LCR. Since the original alignment of the link road as presented in Final WP3 was in conflict with the ventilation building of CKR, the link road has been realigned to suit the site condition and it is acceptable to the consultant of CKR for the revised alignment. The revised layout is shown in **Figure 11.14**.

Scheme Q - CAR Underpass to bypass the junction of CAR/AUR/AURW

- 11.4.32 This scheme comprises the following (refer to **Figure 11.15**):
- Construction of a underpass along CAR in North-South direction to bypass the junction of CAR/AUR/AURW;
 - Modification of the lane configuration of the SB and NB approaches at CAR/AUR/AURW junction, and that of the NB approach at CAR/WCR junction; and
 - Setback of eastern kerblines along CAR between WCR and AURW, and western kerblines of the same road between AURW and China Hong Kong City.
- 11.4.33 This scheme could allow free flow movement for CAR NB and SB traffic, so the delay for N-S traffic could be reduced and N-S capacity could be increased. As a result, the overall junction capacity could be enhanced.

- 11.4.34 However, due to the site constraints, it is very tight to fit the scheme in the available road space, but would be still feasible. According to the preliminary estimation, it may necessary to adopt absolute maximum gradient of 8% to maintain minimum separations between the two ends of the underpass and the two adjacent junctions on CAR, i.e. WCR junction and KPD down ramp merging point. To achieve better alignment for the northbound traffic, it is necessary to modify the abutment of KPD northern end. Moreover, the re-provision of the pedestrian subway across junction of CAR/AUR/AURW would be a concern. These civil engineering related issues should be investigated in more details under detailed design stage.
- 11.4.35 In case the underpass was found infeasible in later stage e.g. feasibility study, further widening of the at-grade junction as shown in **Figure 11.16** would be a fallback option for further investigation. However, free flow movement for N-S traffic would not be provided, and the corresponding delay would be increased in widening scheme.
- 11.4.36 This study only provides the conceptual schemes. Details of all the aforementioned Schemes D2, H, I, J & Q should be subject to further engineering feasibility investigation.

Encroachment into WKCD

- 11.4.37 As mentioned in Paragraphs 11.4.15 and 11.4.27, the kerblines to the north (along AURW) and east (along Canton Road) of WKCD are required to be setback to cater for Schemes D2 and Q. The extent of encroachments into WKCD by these two schemes is presented in **Figure 11.17**. The difference between the proposed kerbline and that planned in CEDD's WKRA Network range from 10m to 25m.

11.5 Details of Junction Improvement Schemes

J1 – Hoi Wang Road/Lai Cheung Road

- 11.5.1 The junction would be operating with marginal capacity under the 2031 reference case as shown in **Table 10.2**. The junction would be modified from its existing layout under the CKR project, in which the roads within proximity of the western CKR portal would be modified accordingly.
- 11.5.2 An improvement scheme by widening the WB approach of Lai Cheung Road to three lanes is proposed. The resulting reserve capacity would be acceptable. **Figure 11.18** illustrates the scheme.

J2 – Ferry Street/Lai Cheung Road

- 11.5.3 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J3 – Nathan Road/Waterloo Road

- 11.5.4 The junction will be operating above capacity in 2031. The junction is surrounded by densely built-up area with no scope for even local junction widening. Therefore, the only possible improvement is by banning the right-turn from Nathan Road NB to Waterloo Road EB. The turning movement would be re-provisioned by diverting the traffic via Hamilton Street, Portland Street and back to Waterloo Road EB. **Figure 11.19**

illustrates the diversion route, and **Figure 11.20** illustrates the resulting junction layout and signal method-of-control.

- 11.5.5 However, by considering that reversing of traffic direction and detouring of bus routes via local streets are controversial and unlikely be accepted by general public, this junction improvement scheme is not put forward for further consideration.

J4 – Hoi Wang Road/slip roads to WHC and WKH

- 11.5.6 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J5 – Kansu Street/Ferry Street/Yan Cheung Road

- 11.5.7 The junction would be operating above capacity in 2031. The proposed improvement scheme is by means of realigning the Yan Cheung Road NB and Ferry Street NB approaches towards Ferry Street to enhance the discharge capacity. **Figure 11.21** shows the improvement scheme.

J6 – Nathan Road/Gascoigne Road/Kansu Street

- 11.5.8 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J7 – Elevated JOR/Hoi Po Road

- 11.5.9 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J8 – Elevated JOR/NCR and J9 – At-grade JOR/NCR

- 11.5.10 Both of these junctions would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J10 – JOR/To Wah Road

- 11.5.11 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J11 – LCR/JOR

- 11.5.12 Under the reference CEDD road network, the junction would operate above capacity in 2031. Scheme D2 as identified earlier in the report has been developed with the objective of resolving the capacity issue at this junction. The underpass would carry a considerable portion of traffic away from the at-grade junction in a free-flow manner. Details of the junction arrangement could be referred to **Figure 11.5**.

- 11.5.13 In the proposed junction layout, the LCR SB right-turn movement would be banned (which in fact is the original planning of WKRA network) so as to simplify the MOC and increase the junction capacity. However, it is anticipated that the resident of KUD

would have reservation for such ban turn scheme because of the detouring of their ingress routing. In the light of this, there is an alternative scheme (as a fallback plan) which includes provision of (i) 2 SB right-turn lanes by utilizing the central divider and (ii) 1 additional NB lane by setting back the western kerblane of LCR NB carriageway. Details of the alternative junction arrangement are illustrated in **Figure 11.22**.

J12 – CAR/JOR/Ferry Street

- 11.5.14 The junction would operate above capacity in 2031. An improvement scheme by means of banning the right-turn from JOR WB to Ferry Street NB is proposed. The movement can be re-provisioned through the diversion route via Road D1A(S), WCR, and CAR. **Figure 11.23** shows the diversion route. In addition, it is proposed to widen the eastbound exit arm from 2-lane width to 3-lane width. This widening would require modification of the existing pedestrian subway entrance/exit. **Figure 11.24** shows the resulting junction layout and signal method-of-control.

J13 – Nathan Road/JOR

- 11.5.15 The junction would operate above capacity in 2031. Similar to other junctions along Nathan Road, the surroundings of the junction are heavily built up with no scope for junction widening. The only possible improvement scheme is by means of banning (a) the left-turn from JOR WB to Nathan Road NB, (b) the left turn from JOR EB to Nathan Road SB; and (c) the right-turn from Nathan Road SB to JOR WB. The only remaining turning movement at the junction is the right-turn from Nathan Road SB to JOR WB retained for buses only. The diversion routes for the banned turns make use of Parkes Street and Nanking Street for banned turn (a), Tak Hing Street and Tak Shing Street for banned turn (b), and Public Square Street and Shanghai Street for banned turn (c). Nanking Street and part of Tak Shing Street has to reverse the existing traffic direction in this regard. The JOR WB-Nathan Road NB bus route would also have one existing stop relocated to Nanking Street.
- 11.5.16 Nevertheless, the diversion routes for the banned movements through the local roads are found to be controversial and may encounter public objection. Hence, the scheme is not recommended for further consideration.
- 11.5.17 **Figure 11.25** illustrates the diversion routes, and **Figure 11.26** illustrates the resulting junction layout and MOC.

J14 – Road D1A(S)/WCR/Road D1

- 11.5.18 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J15 – CAR/WCR

- 11.5.19 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required. Nevertheless, in order to increase the stacking length of the WCR EB left-turn lane, it is proposed to shift the stop line to the east as illustrated in **Figure 11.8**.

J16 – AURW/NCR

- 11.5.20 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J17 – LCR/AURW

- 11.5.21 Under the reference CEDD road network, the junction would operate above capacity in 2031. Scheme D2 as identified earlier in the report has been developed with the objective of resolving the capacity issue at this junction. The underpass would carry a considerable portion of traffic away from the at-grade junction in a free-flow manner. Details of the junction arrangement could be referred to in **Figure 11.6**.

J18 – CAR/AUR/AURW

- 11.5.22 Under the reference CEDD road network, the junction would operate above capacity in 2031. The proposed improvement scheme for the junction (Scheme Q) was discussed earlier in the report. Details of the junction arrangement could be referred to in **Figure 11.15 and 11.16**.

J19 – Nathan Road/AUR

- 11.5.23 The junction would operate close to capacity in 2031. Under the proposed gyratory system of Schemes T and U as mentioned in **Table 11.1**, the junction could be improved to operate with spare capacity. However, these two schemes are not recommended due to substantial detouring and expected public objection. To improve the junction, the most probable way is to set-back the existing kerbline upon re-development of the existing building at the southeast corner of the junction so as to widen the eastern carriageway and provide four traffic lanes (see **Figure 11.27**). At the same time, the right-turn from AUR EB to Nathan Road SB is banned and the MOC is simplified to 2 stages, therefore the junction capacity could be enhanced. Nonetheless, there is currently no planned schedule for re-development of that building, so this scheme is not recommended for further consideration.

J20 – CAR/KPD

- 11.5.24 The junction would operate close to capacity in 2031. Since the improvement proposals of Schemes V, W and X are not recommended as discussed in **Table 11.1**. As a result, this junction would not have any further improvement scheme on top of the short term improvement as described in paragraph 9.1.34.

J21 – CAR/Salisbury Road

- 11.5.25 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J22 –KPD/Salisbury Road

- 11.5.26 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J23 – Nathan Road/Salisbury Road

- 11.5.27 The junction would operate close to capacity in 2031. As Salisbury Road is already at the southernmost of Kowloon, there is no possible diversion route for the right-turn from Salisbury Road WB to Nathan Road NB without adding another right-turn else where. The only possible improvement scheme is by means of removing the existing pedestrian crossing across the Nathan Road junction arm, and enabling the increase of the discharge of Nathan Road SB traffic by modifying the signal method-of-control accordingly. **Figure 11.28** shows the resulting junction layout and signal method-of-control.
- 11.5.28 Under the above scheme, persons with disabilities are required to detour to Nathan Road/Peking Road junction to cross Nathan Road. As the diversion route may not be desirable, this improvement scheme is not pursued.

J24 – AUR/Cox's Road

- 11.5.29 The junction would operate above capacity in 2031. The surroundings of the junction are heavily built up, so there is no scope for junction widening. Also, the proposed gyratory system of Schemes T and U, which could improve the junction, are not recommended for further consideration as discussed in **Table 11.1**. As a result, this junction would not have any improvement scheme. As this is a minor junction, congestion thereat would not affect the operation of other junctions.

J25 – Nathan Road/Hillwood Road

- 11.5.30 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J26 – JOR/Gascoigne Road

- 11.5.31 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J27 – CAR/Haiphong Road

- 11.5.32 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J28 – CAR/Peking Road

- 11.5.33 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J29 – KPD/Peking Road

- 11.5.34 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J30 – KPD/Middle Road

- 11.5.35 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J31 – Nathan Road/Kimberley Road

- 11.5.36 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J32 – Nathan Road/Granville Road

- 11.5.37 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J33 – Nathan Road/Cameron Road

- 11.5.38 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J34 – Nathan Road/Haiphong Road/Humphreys Avenue

- 11.5.39 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J35 – Nathan Road/Mody Road

- 11.5.40 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J36 – Nathan Road/Peking Road

- 11.5.41 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J37 – Nathan Road/Middle Road

- 11.5.42 The junction would have spare capacity in 2031. Therefore, no junction improvement scheme is required.

J38 – Ferry Street/Man Cheong Street/Saigon Street

- 11.5.43 The junction would operate above capacity in 2031. The improvement scheme comprises banning the right-turn from Ferry Street NB to Saigon Street. The turning movement would be re-provisioned by diverting the traffic via Man Wai Street, Man Cheong Street NB and Man Cheong Street EB. The pedestrian crossing across Ferry Street would be relocated to the northern section of the junction to enhance the efficiency of the signal method-of-control. **Figure 11.29** shows the modified junction layout and the signal method-of-control.

J39 – Road D1A(N)/Yan Cheung Road/Hoi Wang Road

- 11.5.44 The junction also serves the egress of the future re-provisioned WCR PTI, as shown in **Figure 11.30**. It would operate with spare capacity in 2031.

J40 – Road D1A(N)/JOR/Road D1A(S)

- 11.5.45 The junction would operate above capacity in 2031 under the reference CEDD road network. With the Core Schemes as proposed in this study, this junction would be improved to operate with marginal capacity in 2031. In addition, the junction would be further improved to operate with spare capacity with implementation of both Core and Additional Schemes.

J41 – AURW/Road D1

- 11.5.46 Under the reference CEDD road network, the junction would be a signalized T-junction. With the preferred Scheme D2 as proposed in this study, this junction would be a left-in/left-out T-junction. The junction would operate with spare capacity in 2031 (See **Figure 11.8**).

11.6 Traffic Assessment for Core Schemes and Proposed Junction Improvements

- 11.6.1 The traffic flows for core schemes are presented in **Figure 11.31**. The junction capacities of the key junctions within the Study Area were assessed under the case - 2031 with Core Schemes (Schemes D2 and E) with the proposed junction improvements (except the Scheme Q for J18) discussed in Section 11.5. The assessment results are summarised in **Table 11.2** and illustrated in **Figure 11.32** and **11.33**. The signal calculation sheets are attached in **Appendix E**.

Table 11.2 2031 Junction Performance – With Core Schemes and Proposed Junction Improvements

Junction No.	Junction Name		Junction Type	Reserve Capacity (%) / RFC	
				AM	PM
J1	Hoi Wang Road / Lai Cheung Road		S	24%	47%
J2	Ferry St / Lai Cheung Road / Waterloo Road		S	10%	14%
J3	Nathan Road / Waterloo Road		S	-5%	-4%
J4	Hoi Wang Road / NCR		S	41%	31%
J5	Yan Cheung Road / Ferry St / Kansu St		S	0%	1%
J6	Nathan Road / Kansu St / Gascoigne Road		S	14%	10%
J7	JOR / Hoi Po Road		S	57%	57%
J8	NCR (elevated) / JOR (elevated)		S	37%	38%
J9	NCR / JOR		R	0.674	0.513
J10	JOR / To Wah Road		P	0.197	0.222
J11	JOR / LCR	With LCR SB Right-turn Banned	S	8%	-5%
		With LCR SB Right-turn & Further Road Widening	S	10%	-3%
J12	JOR / Ferry Street / CAR		S	9%	5%
J13	Nathan Road / JOR		S	12%	11%
J14	Road D1(S) / WCR / Road D1		S	18%	22%
J15	CAR / WCR		S	8%	23%
J16	NCR / AURW		R	0.235	0.321
J17	LCR / AURW		S	56%	33%
J18*	CAR / AUR / AURW		S	4%	0%
J19	Nathan Road / AUR		S	4%	26%
J20	CAR / KPD		S	7%	27%
J21	Salisbury Road / CAR		S	97%	79%
J22	Salisbury Road / KPD		S	38%	28%
J23	Salisbury Road / Nathan Road		S	26%	20%
J24	AUR / Cox's Road / Pine Tree Hill Road		S	-7%	-3%
J25	Nathan Road / Hill Wood Road		P	0.397	0.686
J26	JOR / Gascoigne Road		S	47%	13%
J27	CAR / Haiphong Road		S	50%	108%
J28	CAR / Peking Road		S	164%	313%
J29	Peking Road / KPD		S	57%	50%
J30	KPD / Middle Road		S	65%	95%
J31	Nathan Road / Kimberley Road		S	95%	75%
J32	Nathan Road / Granville Road		S	97%	103%
J33	Nathan Road / Cameron Road		F	N/A	N/A
J34	Nathan Road / Haiphong Road / Humphreys Avenue		S	57%	67%
J35	Nathan Road / Mody Road		F	N/A	N/A
J36	Nathan Road / Peking Road		S	169%	128%
J37	Nathan Road / Middle Road		P	0.512	0.859
J38	Ferry Street / Man Cheong Street / Saigon Street		S	55%	19%
J39	Yan Cheung Road / Hoi Wang Road / Road D1A(N)		S	28%	10%
J40	Road D1A(N) / JOR / Road D1A(S)		S	12%	0%
J41	AURW / Road D1		F	N/A	N/A

Note: S – Signal-control junction F – Free-flow junction
P – Priority junction N/A – Not available
R – Roundabout * – No Scheme Q

11.6.2 The traffic queue at critical locations within the Focus Area were also calculated according to the methodology as stipulated in the Volume 4 of TPDM. The results are summarised in **Table 11.3** and illustrated in **Figure 11.34**.

Table 11.3 2031 Critical Traffic Queue - With Core Schemes and Proposed Junction Improvements

Junction No.	Junction	Approach	Capacity (m)	Average Queue Length (m)		Within Capacity	
				AM	PM	AM	PM
J11	Lin Cheung Rd / JOR (With LCR SB Right-Turn Banned)	JOR EB	120	55	75	Yes	Yes
		LCR SB	100	65	65	Yes	Yes
		JOR WB	70	55	70	Yes	Yes
		LCR NB	170	45	85	Yes	Yes
	Lin Cheung Rd / JOR (With LCR SB Right-Turn & Further Road Widening)	JOR EB	120	75	75	Yes	Yes
		LCR SB	100	70	80	Yes	Yes
		JOR WB	70	60	70	Yes	Yes
		LCR NB	170	65	130	Yes	Yes
J12	JOR / Ferry Street / CAR	JOR EB	150	45	40	Yes	Yes
		Ferry Street SB	210	60	50	Yes	Yes
		JOR WB	190	60	70	Yes	Yes
		Ferry Street NB	90	65	75	Yes	Yes
J14	Road D1(S) / WCR / Road D1	Road D1A(S) SB	170	45	45	Yes	Yes
		WCR WB	100	50	50	Yes	Yes
		Road D1NB	130	50	55	Yes	Yes
J15	WCR / CAR	WCR EB	100	45	40	Yes	Yes
		CAR SB	90	55	45	Yes	Yes
		CAR NB	180	60	50	Yes	Yes
J17	LCR / AURW	AURW EB	180	35	30	Yes	Yes
		LCR SB	240	50	55	Yes	Yes
		AURW WB	230	10	15	Yes	Yes
J18*	CAR / AURW	AURW EB	80	60	55	Yes	Yes
		CAR SB	180	75	45	Yes	Yes
		AUR WB	90	55	60	Yes	Yes
		CAR NB	130	65	85	Yes	Yes
J20	CAR / KPD	CAR SB	280	35	25	Yes	Yes
		KPD NB	130	35	45	Yes	Yes
J40	Road D1A(N) / JOR / Road D1A(S)	JOR EB	70	65	55	Yes	Yes
		Road D1(N) SB	260	35	45	Yes	Yes
		JOR WB	150	45	65	Yes	Yes
		Road D1(S) NB	170	35	90	Yes	Yes

Note: * – No Scheme Q

11.6.3 As shown in **Table 11.2**, most of the junctions would be operating with spare capacity with the Core Schemes and the proposed junction improvement schemes. There are another 11 nos. of junctions would be operating with marginal capacity. Some of them are within the Focus Area and some of them are within the hinterland area of the Study Area.

11.6.4 In addition, the queuing analysis also demonstrates that all the locations with critical traffic queues as identified in Section 11.6 would be relieved, in the sense that the average queues would not extend to the junction immediately upstream of the junction in question.

11.6.5 This road infrastructure package could be considered as the minimum requirements that would provide a marginally sustainable road network up to 2031. In relation to the “opportunities” as discussed in Section 12.3, in essence the Core Schemes are oriented at the roads and junctions in the Focus Area. Meanwhile, the junction improvement schemes address the problematic locations on a more localized perspective, in particular for the eastern hinterland area, because of the heavily built-up area offering little or no scope for large-scale, comprehensive new road infrastructure items. The hinterland junctions receive different degrees of performance enhancement, depending on the scale of site constraints.

11.7 Traffic Assessment for Additional Schemes – Schemes H, I, J, Q

11.7.1 With the extra western connections from WRA to WHC, WKH, LCR (north) as well as the CAR Underpass, the key junctions within the Focus Area were assessed. The traffic flows for core and additional schemes are presented in **Figure 11.35**. The results are summarised in **Table 11.4** and **Figure 11.36**. The signal calculation sheets are attached in **Appendix E**.

Table 11.4 2031 Junction Performance – With Core Schemes, Proposed Junction Improvements and Additional Schemes

Junction No.	Junction Name		Junction Type	Reserve Capacity (%) / RFC			
				With Core Schemes		With Core & Additional Schemes	
				AM	PM	AM	PM
J7	JOR / Hoi Po Road		S	57%	57%	14%	27%
J8	NCR (elevated) / JOR (elevated)		S	37%	38%	25%	32%
J9	NCR / JOR		R	0.674	0.513	0.502	0.376
J10	JOR / To Wah Road		P	0.197	0.222	0.211	0.210
J11	JOR / LCR	With LCR SB Right-turn Banned	S	8%	-5%	12%	15%
		With LCR SB Right-turn & Further Road Widening	S	10%	-3%	8%	11%
J12	JOR / Ferry Street / CAR		S	9%	5%	35%	33%
J14	Road D1A(S) / WCR / Road D1		S	18%	22%	14%	30%
J15	CAR / WCR	Without Additional Schemes	S	8%	23%	N/A	N/A
		With CAR Underpass (Scheme Q)	S	N/A	N/A	18%	18%
		With CAR Widening	S	N/A	N/A	19%	22%
J16	NCR / AURW		R	0.235	0.321	0.241	0.190
J17	LCR / AURW		S	56%	33%	46%	11%
J18	CAR / AUR / AURW	Without Additional Schemes	S	4%	0%	N/A	N/A
		With CAR Underpass (Scheme Q)	S	N/A	N/A	34%	8%
		With CAR Widening	S	N/A	N/A	12%	8%
J20	CAR / KPD		S	7%	27%	7%	27%
J40	JOR / Road D1		S	12%	0%	13%	22%

Note: S – Signal-control junction
P – Priority junction
R – Roundabout
N/A – Not Available

11.7.2 The traffic queue at critical locations within the Focus Area were also calculated according to the methodology as stipulated in the Volume 4 of TPDM. The results are summarised in **Table 11.5** and illustrated in **Figure 11.37**.

Table 11.5 2031 Critical Traffic Queue – With Core Schemes, Proposed Junction Improvements and Additional Schemes

Junction No.	Junction	Approach	Capacity (m)	Average Queue Length (m)		Within Capacity	
				AM	PM	AM	PM
J11	Lin Cheung Rd / JOR (Scheme with SB Right-Turn Banned)	JOR EB	120	45	50	Yes	Yes
		LCR SB	100	65	60	Yes	Yes
		JOR WB	70	55	55	Yes	Yes
		LCR NB	170	55	50	Yes	Yes
	Lin Cheung Rd / JOR (Scheme with SB Right-Turn)	JOR EB	120	45	55	Yes	Yes
		LCR SB	100	70	60	Yes	Yes
		JOR WB	70	55	60	Yes	Yes
		LCR NB	170	50	45	Yes	Yes
J12	JOR / Ferry Street / CAR	JOR EB	150	40	35	Yes	Yes
		Ferry Street SB	210	55	40	Yes	Yes
		JOR WB	190	50	55	Yes	Yes
		Ferry Street NB	90	30	55	Yes	Yes
J14	Road D1(S) / WCR / Road D1	Road D1A(S) SB	170	65	55	Yes	Yes
		WCR WB	100	45	35	Yes	Yes
		Road D1NB	130	45	30	Yes	Yes
J15	WCR / CAR (With CAR Underpass Scheme)	WCR EB	100	55	45	Yes	Yes
		CAR SB	90	55	55	Yes	Yes
		CAR NB	180	55	65	Yes	Yes
	WCR / CAR (With CAR Widening Scheme)	WCR EB	100	55	45	Yes	Yes
		CAR SB	90	55	55	Yes	Yes
		CAR NB	180	50	60	Yes	Yes
J17	LCR / AURW	AURW EB	180	35	50	Yes	Yes
		LCR SB	240	45	55	Yes	Yes
		AURW WB	230	30	45	Yes	Yes
J18	CAR / AURW (With CAR Underpass Scheme)	AURW EB	80	45	45	Yes	Yes
		CAR SB	180	40	25	Yes	Yes
		AUR WB	90	45	55	Yes	Yes
		CAR NB	130	50	60	Yes	Yes
J18	CAR / AURW (With CAR Widening Scheme)	AURW EB	80	55	50	Yes	Yes
		CAR SB	180	65	50	Yes	Yes
		AUR WB	90	45	55	Yes	Yes
		CAR NB	130	40	60	Yes	Yes
J20	CAR / KPD	CAR SB	280	35	25	Yes	Yes
		KPD NB	130	35	45	Yes	Yes
J40	Road D1A(N) / JOR / Road D1A(S)	JOR EB	70	60	50	Yes	Yes
		Road D1(N) SB	260	55	35	Yes	Yes
		JOR WB	150	30	40	Yes	Yes
		Road D1(S) NB	170	35	40	Yes	Yes

- 11.7.3 As shown in the above **Tables 11.4 and 11.5**, with the additional schemes, most of the junctions within the Focus Area would be operating with spare capacity, and meanwhile the traffic queue would be within acceptable level and would not cause blocking of junctions. Compared with the scenario with only the Core Schemes and the proposed junction improvement schemes, the additional schemes offer further improvements to the roads and junctions in the Focus Area by drawing traffic to the direct connections to/from the strategic roads without the need of using LCR and CAR.

11.8 Refresh

- 11.8.1 In this Chapter 11, we have gone through the principles of developing the future traffic improvements. We also considered nearly all the possible solutions meanwhile the likely constraints were also highlighted. Some effective schemes were selected, in which some would be straight forward (e.g. works are minor or other parties have already carried out investigation), but some (i.e. Schemes D2, H, I, J & Q) would need further investigation to confirm the feasibility. For ease reference, a plan incorporated the recommended Core and Additional Schemes (i.e. Schemes D2, H, I, J & Q) is presented in **Figure 11.38**. The detail road layout for Focus Area is presented in **Figure 11.39**.
- 11.8.2 In Chapter 14, we would propose the implementation programme for the selected traffic schemes mentioned in this Chapter as well as other pedestrian and transport schemes identified in the coming Chapters.

11.9 Suggestions for the Coming WKCD Study

- 11.9.1 Among all the possible improvement schemes as presented in **Table 11.1**, Schemes F, G, K & N are mainly proposed for serving the possible westernmost WKCD access point (i.e. to the west of WHC portal as shown in **Figure 10.19**). These schemes were not further considered in this Study due to land constraint and the unknown internal road layout inside WKCD. If the WKCD would like to make use of the said access point in future, it is suggested that the consultants of WKCD should further study the feasibility of these schemes. Also, WHC should be consulted as the access road is within the Tunnel Area.

12. FUTURE PUBLIC TRANSPORT INTERCHANGE IN FOCUS AREA

12.1 General

12.1.1 The purpose of this Chapter is to review the existing and planned PTIs within the Focus Area and services to enhance their efficiency and minimise their impact on the local traffic circulation.

12.2 Existing Public Transport Services and PTIs

12.2.1 The existing public transport facilities within the Focus Area are illustrated in **Figure 12.1**, these include:

- Railway –KOW with services of AEL and TCL
- Franchised Bus – Bus termini at KOW (KOW PTI), WCR (Jordan PTI) and CFT (CFT PTI), and roadside bus stops along CAR, JOR, AURW and WHC Toll Plaza.
- GMB – GMB terminus at KOW, and roadside stops along CAR, JOR, WCR, AURW.
- Taxi – Taxi stands at KOW and CFT PTI.
- Non-franchised Bus – AEL Shuttles at KOW and Cross-boundary coach services at CFT PTI

12.2.2 The details of the bus/GMB routes at the 3 current PTIs within the Focus Area are presented in **Table 12.1**.

Table 12.1 Bus/GMB Routes at the Existing PTIs

Type	Route No.	Terminating Points	
Bus	8	KOW PTI	Star Ferry
Bus	11	KOW PTI	Diamond Hill Station
Bus	203E	KOW PTI	Choi Hung
Bus	215X	KOW PTI	Lam Tin (Kwong Tin Estate)
Bus	270A	KOW PTI	Sheung Shui
Bus	281A	KOW PTI	Kwong Yuen
Bus	259B	KOW PTI	Tuen Mun Pier Head
GMB	26	KOW PTI	Tokwawan
GMB	74	KOW PTI	Mongkok
GMB	77M	KOW PTI	TST East
Bus	36B	Jordan PTI	Lei Muk Shue Public Transport Interchange
Bus	42A	Jordan PTI	Cheung Hang
Bus	46	Jordan PTI	Lai Yiu
Bus	60X	Jordan PTI	Tuen Mun Central
Bus	63X	Jordan PTI	Tin Tsz
Bus	68X	Jordan PTI	Hung Shi Kiu (Hung Yuen Road)
Bus	69X	Jordan PTI	Tin Shui
Bus	81	Jordan PTI	Wo Che

Type	Route No.	Terminating Points	
Bus	95	Jordan PTI	Tsui Lam
Bus	110	Jordan PTI	Shau Kei Wan
Bus	296D	Jordan PTI	Sheung Tak
Bus	3C	CFT PTI	Tsz Wan Shan
Bus	14	CFT PTI	Yau Tong
Bus	238P, 238X	CFT PTI	Tsuen Wan

12.2.3 **Figure 12.2** show the terminating points diagrammatically of the existing bus and GMB routes at KOW PTI, Jordan PTI and CFT PTI.

12.2.4 **Figures 12.3 to 12.5** show the existing layouts of the three existing PTIs.

12.3 Interim Public Transport Arrangement

12.3.1 The bus terminus of the existing Jordan PTI, and the other transport facilities for private mode such as coach and motor cycle parking spaces would be relocated to To Wah Road i.e. at the northeast of LCR/JOR junction. See **Figure 12.1**. According to the tentative programme, the works of the temporary PTI at To Wah Road would commence in the late 2009.

12.3.2 Meanwhile, the KSL AUS would be opened in 2009.

12.4 Modal Split of Public Transport Demands

12.4.1 Before providing sensible recommendations for the permanent PTIs and proposing enhancement for their efficiency, it is necessary to understand the future demand on Public Transport.

12.4.2 The estimated transport modal split of various developments in the Focus Area are summarised in **Table 12.2**.

Table 12.2 Estimated Transport Modal Split in the Focus Area (2031 Peak Hour)

	Rail	Bus	GMB	Taxi	Coach	Private Car	Other ^(*)
WKCD – Performance Venus/Museum/Open Space ⁽¹⁾	44%	20%	5%	9%	5%	15%	2%
WKT – Patronage ⁽²⁾	43%	10%	1%	30%	5%	6%	5%
KOW – TCL&AEL Patronage ⁽³⁾	10%	6%	6%	4%	0%	0%	74%
AUS – Patronage ⁽⁴⁾	1.5%	12%	5%	1.5%	0%	1%	79%
General Development Modal Split (Residential, Office, Retail, Hotel) ⁽⁵⁾	50%	15%	5%	10%	0%	10%	10%

Note: (*) including “walking”

(1) refer to interview survey at existing performance venues with adjustment

(2) refer to the current MTRCL WKT Study

(3) refer to MTR Transport Planning Study 2006

(4) refer to previous STICs

(5) refer to MVA's in-house model (general estimate)

- 12.4.3 With the significant difference in the future catchment area of “rail and “bus” within 30 minutes as shown in **Figure 12.6**, it explained why “rail” would be more attractive than “bus” for WKRA in general as indicated in **Table 12.2**. Thus well pedestrian connections (grade separation, convenient, direct) from all the developments in WKRA to the three rail stations and JOR would be essential. This would be discussed in details in Chapter 15.
- 12.4.4 For WKT passengers, as they are more time sensitive, percentage of “taxi” would be relatively higher in general.
- 12.4.5 WKCD visitors to performance venues would also be time sensitive and higher percentage of the local visitors may be car owners, thus the percentage of “taxi” and “private car” would be relatively higher than that of the property developments in the area.

12.5 Proposed Permanent Public Transport Arrangement

- 12.5.1 It is proposed by XRL/WKT to relocate the permanent Jordan PTI to a land at immediate north of WKT, after the completion of WKT. As agreed with Transport Department, this relocated PTI would contain 10 nos of saw-tooth bus bays and 2 GMB stops. Apart from the PTI, 26 nos. of coach parking spaces and 16 nos. of motorcycle parking spaces would also be provided in the vicinity. Pick up/drop off facilities for Taxi or other private cars would not be provided in this permanent Jordan PTI because such facilities would be provided within the WKT. **Figure 12.7** indicates the location of this permanent PTI. Footbridge would be provided to connect the PTI with WKT.
- 12.5.2 The main objective of relocating the permanent PTI is to create a more spacious ground level pedestrian/green area along the north-south spine of WKT Site. By considering intermediate bus stops would be provided within WKT and grade separated pedestrian connections would be provided to connect the relocated PTI with WKT, the proposed relocation is acceptable. Regarding the access of the relocated PTI, it is recommended to have access at Road D1A because the intermediate bus stops of WKT would be provided along Road D1 (minimise the bus travelling time), and also LCR at north of JOR would be too heavily trafficked for adding any vehicular access.
- 12.5.3 After the completion of WKT and WKCD, the public transport facilities within the Focus Area (excluding WKCD) are illustrated in **Figure 12.8**, these include:
- Railway – KOW (AEL/TCL); AUS (KSL); and WKT (XRL)
 - Franchised Bus – Bus termini at KOW PTI, Relocated Permanent Jordan PTI and CFT PTI; roadside bus stops along CAR, JOR, AURW and WHC Toll Plaza; and intermediate bus stops at WKT (which should contain the bus stops for the bus routes at Jordan PTI).
 - GMB – GMB terminus at KOW PTI and Permanent Jordan PTI; roadside stops along CAR, JOR, WCR, AURW, and Road D1 outside WKT;
 - Taxi – Taxi stands at KOW, CFT PTI, and WKT.

12.5.4 By considering the locations of the 3 permanent PTIs within the Focus Area, KOW PTI would be the most important one in future, as it is close to all the major population spots in WKRA including the WKCD, KOW, and WKT. Therefore, its role would be more important and should act as the transport hub for WKR. Thus, well pedestrian connections should be provided (See Chapter 15).

12.5.5 Recommendation for re-arranging the bus routes amongst the PTIs is outside the scope of this study and it is understood that TD would review the bus routes in later stage. For the purpose of the following discussion in this Section 14.5, it is assumed that KOW PTI, Jordan PTI and CFT PTI will remain to serve the existing bus routes respectively, e.g. KOW PTI –mostly for Kowloon Urban services; Jordan PTI – mostly for NT service; and CFT PTI - Kowloon East and Tsuen Wan.

12.5.6 The **Table 12.3** summarised the relationship between the three PTIs and the major developments in WKR.

Table 12.3 PTIs and Developments

KOW PTI		
Development	Future Situation	Suggestions
WKCD (western part)	- Walking Distance – 1km, too far (unless for crowd dispersion) - Connection – walk to the central part and then use the at-grade pedestrian deck/crossings at LCR/AUR junction	Temporary bus pick up/drop off facilities within WKCD during big event
WKCD (central part)	- Walking Distance – reasonable - Connections - Could access through at-grade pedestrian deck/crossings at LCR/AUR junction	Could consider a footbridge connect to Element directly (see Chapter 6)
WKCD (eastern part)	- Walking Distance – acceptable - Connections - Could access through at-grade pedestrian deck/crossings at LCR/AUR junction or via WKT and then footbridge or subway	Nil
WKT	- Walking Distance – reasonable - Connection - With footbridges or subway connections	Nil
KOW	- Walking Distance – very close - Connection - With internal walkways	Nil
Site C	- Walking Distance – reasonable - Connection – footbridges via WKT	Could consider re-provide the existing intermediate bus stops at JOR
Site D	- Walking Distance – reasonable - Connection – footbridges/subways via WKT	Nil

Jordan PTI		
Development	Future Situation	Suggestions
WKCD (western part)	- Walking Distance – too far - Connection – no	Temporary bus pick up/drop off facilities within WKCD during big event
WKCD (central part)	- Walking Distance – 600m to 1km, relatively far. And people would use the intermediate bus stops at WKT instead - Connections - Could access through WKT	Nil
WKCD (eastern part)	- Walking Distance – 600m, relatively far. And people would use the intermediate bus stops at WKT instead - Connections - Could access through WKT	Nil
WKT	Walking Distance – very close for the property development	Nil

Jordan PTI		
Development	Future Situation	Suggestions
	at the north but WKT passenger may use the intermediate bus stops at WKT instead • Connection - With footbridge	
KOW	• Walking Distance – reasonable but some people may use the intermediate bus stops at WKT instead • Connection - With footbridges or via WKT	Nil
Site C	• Walking Distance – reasonable but some people may use the intermediate bus stops at WKT instead • Connection - With footbridges or via WKT	Nil
Site D	• Walking Distance – reasonable but some people may use the intermediate bus stops at WKT instead • Connection - via WKT	Nil

CFT PTI		
WKCD (western part)	• Walking Distance – too far. CFT have only few bus routes and could use the bus routes at KOW as alternative. • Connection – no	Nil
WKCD (central part)	• Walking Distance – reasonable • Connections – Walkway in WKCD and then footpath along CAR	Nil
WKCD (eastern part)	• Walking Distance – reasonable • Connections – Walkway in WKCD and then footpath along CAR	Nil
WKT	• Walking Distance – reasonable but some people may use the intermediate bus stops at CAR (near WCR) instead • Connection – via WKCD	Nil
KOW	• Walking Distance – acceptable, but relatively far in comparing with similar bus services at KOW PTI. • Connection - via WKCD	Nil
Site C	• Walking Distance – reasonable but most of the people may use the intermediate bus stops at CAR (near WCR) instead • Connection – Footpath along CAR	Nil
Site D	• Walking Distance – reasonable but most of the people may use the intermediate bus stops at CAR (near WCR) instead • Connection – Footpath along CAR	Nil

12.6 Suggestions for the coming WKCD Study

- 12.6.1 For the public transport demand generated by the future event in WKCD, it is suggested to review the possibility in providing bus stop/lay-by at the western end of WKCD, diverting the routings of the bus routes at either KOW and Jordan PTIs (temporary intermediate stop) or providing special bus services.
- 12.6.2 If the Jordan PTI is considered too far from WKCD, it is also suggested to provide coach pick up/drop off or parking facilities in WKCD. The 26 nos. of coach parking spaces at Jordan PTI are the re-provision for the existing facilities and will not be able to accommodate the potential coach demand caused by WKCD.
- 12.6.3 In view that the southern and western sides of WKCD are directly fronting the Victoria Harbor, it is suggested that the provision of marine facilities such as ferry pier as shown in **Figure 12.8**, could be examined further by the WKCD in the context of its preparation of the Development Plan for the WKCD.

13. FUTURE PEDESTRIAN FACILITIES

13.1 Objectives

- 13.1.1 This chapter addresses the pedestrian planning aspects for WKR. The overall goals of this pedestrian planning exercise are “planning for providing the best pedestrian integration possible and practicable for (1) EXTERNAL SENSITIVITY - between WKRA and its adjoining districts especially Jordan and TST; and (2) INTERNAL SENSITIVITY – in-between the developments within WKR.”

13.2 Existing Pedestrian Facilities

- 13.2.1 The existing pedestrian facilities within the Focus Area are shown in **Figure 2.13**.

External/

- 13.2.2 At present the external pedestrian connections between WKRA and Jordan area (or MTR JOR of Tsuen Wan Line (TWL) are relying on two subway systems at the junctions of JOR/CAR and AUR/CAR; and the at-grade pedestrian crossings at the junction of WCR/CAR.
- 13.2.3 Given the existing configuration of the two subway systems, pedestrian walking between the south-east corner to south-west corner of both junctions would experience certain degree of detouring. In addition, pedestrian crossings across CAR at WCR/CAR junction are only available at the northern side of the junction, as staggered crossings (i.e. requiring 2 split walks for 1 road crossing). The longer section of the crossing would require to cross 7 nos. of traffic lanes at one time. As a conclusion, the existing external pedestrian connections between WKRA and Jordan area are not “user-friendly”, and should therefore be upgraded before the completion of WKT, WKCD and Sites C&D.
- 13.2.4 The external pedestrian connections between WKRA and TST area may be provided either via AUR & Nathan Road, or via CAR. As mentioned before, the pedestrian subway leading to AUR is arguably not “user-friendly”. On the other hand, the pedestrian would encounter several vehicular accesses at the western footpath of CAR before they could arrive Gateway. In particular, the CFT PTI access would involve significant traffic flows and pedestrian flows. Thus the pedestrian queuing area at both sides of the PTI access are often very congested.
- 13.2.5 Pedestrian connection to the heart of TST e.g. Nathan Road, Park Lane, and MTR TST Station, are physically separated by the Kowloon Park which is generally formed at higher level than road /footpath level of CAR.

Internal/

- 13.2.6 Pedestrian movements along the roads within the Focus Area are currently very light given most of the development intakes are yet to take place and are adequately served by at-grade footpaths.

- 13.2.7 The pedestrian crossing facilities at the junction of JOR/LCR are in both at-grade and elevated forms. Movements across the northern arm of LCR, and the western arm of JOR are catered for by the JOR footbridge, while at-grade pedestrian crossing is provided across the southern arm of LCR.
- 13.2.8 On the western side, the pedestrian movements across WHC toll plaza to the bus stops alongside WKH are served by an elevated walkway system.
- 13.2.9 Footpath is also provided at the northern side of elevated JOR to serve the pedestrians walking to/from PCWA and the bus stops provided at the WHC toll plaza.

13.3 Issues to be Considered

- 13.3.1 A range of planning issues is facing WKRA in general and WKCD in particular. As far as pedestrian planning and design are concerned the following issues are noteworthy:
1. The importance of pedestrian planning, design and facility provision for WKCD is paramount and cannot be over-stressed. Such importance is evident from a review of the relevant public comments obtained so far (see **Appendix F** for the detailed comments raised and recorded).
 2. How can we plan for WKCD integration with TST from a WKRA district perspective, while NOT pre-empting the future planning by WKCD.
 3. The case for providing Automated People Mover (APM) in WKCD remains uncertain, implying a strong need for a robust pedestrian plan for WKRA that can work either with or without APM in place. In any case, good WKCD integration with Jordan and TST districts, can ensure having “walking” as a key mode/choice for accessing WKCD in addition to APM (if provided) and other mechanized modes.
 4. The planning for WKR/WKCD calls for innovation, e.g. pedestrian links and spaces shall be planned and designed in an “organic” manner stressing a clear people orientation. The facilities shall be provided for the people to encourage and allow their flexible, easy and comfortable use.
 5. How to make the walks/rests as interesting as possible for a diversified population of patrons in order to enhance the amenity experienced and to minimize the perceived walking time through uplifting “boring” time to the level of “quality” time.
 6. How to best blend varying design features in a coherent way to offer the busy urban dwellers a new and refreshing walking/resting experience.
 7. How to provide a “barrier-free” and “continuous” path for the disabled in order to increase their connectivity within the area of WKR.

13.4 Proposed Future External Connections – Jordan

- 13.4.1 Apart from connecting between “new” and “old” districts, the connection between WKRA and Jordan district should also perform a function of connecting to MTR TWL.

- 13.4.2 In this respect, three east-west connections as indicated in **Figure 13.1** were identified to promote district level walking as well as connection to MTR TWL, they are (1) JOR; (2) Bowring Street; and (3) AUR.
- 13.4.3 The initial ideas, opportunities, and constraints for these three connections are described as follows:
1. **JOR link:** Difficult to provide subway from an engineering perspective given the dense underground utilities there. Both footbridge and footpath/crossing improvements are conceivable, but subject to further feasibility study and socio-political views in the neighbourhood.
 2. **Bowring Street link:** MTR unpaid subway between Jordan Station (JOS) and AUS is preferred at this stage, which allows MTR entry/exit/transfer movements as well as non-MTR public through walks.
 3. **AUR link:** MTR unpaid subway and/or at-grade walkway enhancement including possibility of major footpath widening as allowed by a traffic scheme to convert AUR from 2-way to 1-way operation, which can reduce traffic lane requirements and enhance footpath provision.
- 13.4.4 To further enhance the connectivity of the above Bowring Street link and AUR link, it is proposed to extend the pedestrian subway underneath the CAR/AUR/AURW junction to connect with Bowring Street link. Meanwhile, the section of the said subway across CAR is proposed to shift southward in order to accommodate the CAR Underpass of Scheme Q as mentioned in Paragraph 11.4.32. The modified layout of the subway is illustrated in **Figure 13.2**.
- 13.4.5 These links have the potential to establish themselves as the top tiers in the pedestrian network hierarchy for WKR, in a way similar to the major Wanchai and Central footbridges integrating extensive reclamation areas back to the respective heartlands.
- 13.4.6 There are three specific sources for contributing pedestrian demands to the three WKR-JOR strategic pedestrian links described above. They are:
- Rail-rail interchange demands
 - Rail-street station entry/exit demands
 - Non-rail pedestrian demands, which encompass a wide variety of walking activities including development-specific movements as well as urban leisure walks

Rail-Rail

- 13.4.7 MVA in-house modelling investigations have suggested that these three JOS pedestrian links may attract only limited demands (up to a few hundred pedestrians/hour) interchanging between the existing JOS and AUS/WKT/KOW stations at peak time periods.

- 13.4.8 Of these rail-rail interchange movements JOS-AUS would be the dominating movement, with WKT mainly interchanging with AUS and KOW (instead of JOS), and KOW being located too far away from JOS to generate any significant interchange flow. Note that WKT's railway interchange is separately handled by shorter dedicated links to AUS and KOW stations respectively.

Rail-Street

- 13.4.9 As regards rail-street movements, both JOS and AUS can make use of pedestrian links to spread walk-in/walk-out movements along an east-west direction. JOS can effectively distribute passengers to or from the East, and AUS station can do the same to/from the West.
- 13.4.10 Without a detailed local pedestrian model, the scale of such station entry/exit demands using the three walk links is difficult to assess. At this stage it is envisaged that such movements could generate a few thousand pedestrians per hour. The three links can potentially draw thousands of pedestrians per hour including the small volume of rail-rail interchange discussed before.
- 13.4.11 **Figure 13.3** shows the 500m catchment area for each of the four concerned MTR stations, plus how dedicated pedestrian links can realize and boost the activity synergy spanning over the four stations.

Non-Rail

- 13.4.12 Of the three demand sources the source of non-rail pedestrian demands is most difficult to predict given the variety and multiplicity of walking behaviours involved in this demand category.
- 13.4.13 Examples of such non-rail demands include:
- Bus stop/terminus access/egress demands
 - Site C & Site D residents walking to/from Nathan Road buses during commuting
 - WKT office workers walking to/from Jordan areas, say, for lunch
 - KUD shoppers strolling to/from JOS to continue shopping/dining visits
 - KUD residents and workers going to/from Nathan Road for lunch/commuting
 - WKCD related flows
- 13.4.14 Assuming several thousand people coming from a range of sources can find the JOS walk links useful, then the above indicated rail related pedestrian flow volumes can easily be expanded resulting from the non-rail walks being drawn into the subway system by improved convenience.
- 13.4.15 Notwithstanding the above postulation, note that WKCD will have a different set of demand drivers related to public events and cultural performances, which can draw crowds/audience of a different (much higher) ballpark scale subject to further WKCD planning.

13.4.16 **Figure 13.4** shows an array of the pedestrian demand sources envisaged for the three JOS pedestrian links. At this preliminary stage it can be assumed that of the three sources, generally speaking the non-rail demands might exceed rail-street flows, which might in turn exceed the rail-rail interchange flows, subject to further investigation and confirmation.

13.4.17 Of the 3 pedestrian links, it is expected that the Bowring Street link will provide better connection to areas at the east of the focus area as:

1. the Bowring Street link is a centralized route for the focus area and, as a result, can most effectively serve all pedestrian traffic in the region;
2. the JOS link has a weaker connection to the rail-related demand, which are mainly more efficiently connected to the southern areas of the focus area; and
3. the AURW link can only work effectively if AURW becomes a one-way corridor, which may undermine road traffic desirability and local circulation efficiency.

13.5 Proposed Future External Connections – TST

13.5.1 The need of connection between WKRA and TST would involve concerns more along the lines of visitors in TST area walking to/from WKCD, and WKT.

13.5.2 The constraints for providing continuous pedestrian connection(s) from WKRA to TST are shown in **Figure 13.5** including:

1. KSL Rail Alignment and utilities affecting the possibility of providing pedestrian subway
2. Limited footpath width along CAR limiting the possibility to provide footbridge columns and landings
3. The lack of internal walkway between CFT and Harbour City
4. The waterfront area of CFT being a restricted zone
5. Kowloon Park built at higher levels and blocking the direction to Nathan Road

13.5.3 In spite of the above constraints, it is found that a reserved subway connection at the southern end of AUS may further extend to connect with WKCD and TST (e.g. China HK City or further to Gateway) as shown in **Figure 13.6**. However, as the potential subway would pass through the site area of WKCD, detailed investigation for the said subway would be carried out under the coming WKCD study. It is noted that such requirement have already been added in the Study Brief of that Study.

13.5.4 As an alternative to the above subway connection, it is proposed to make use of the upgraded section of western CAR footpath outside WKCD and CFT to serve the pedestrian between WKRA and TST (see **Figure 13.6**).

13.6 Proposed Internal Connections

13.6.1 The proposed internal (within the Focus Area) pedestrian connections are shown in **Figure 13.7**.

WKCD

- 13.6.2 It is possible for WKCD to have at-grade connection to the bus stops at both side of WHC toll plaza. In addition, it is also possible to have elevated connection to the existing footbridge across the toll plaza. (See **Figure 13.8**) These connections provide an additional mode of travel to cross-harbour public transport services from WKCD.
- 13.6.3 It is possible for WKCD to have footbridges connecting to the southern side of KOW (at the retail area, Element). One of the possible footbridge locations is at the south-west corner of KOW, at which the footbridge should connect KOW at Level 2. The other possible footbridge is near the south-east corner of KOW at Level 1 (see **Figure 13.8** and **Appendix G**). Although this area connects directly to the retail area, it can also serve as an indirect route to public transport services located at the KOW Station. In addition, without this connection, pedestrians from WKCD would have to travel to the at-grade crosswalk/pedestrian deck (greenway crossing), which is connected to the southeast corner of the KOW Station boundary and mainly fronts the WKT AURW frontage – a rather inefficient route for pedestrians from the west side of WKCD.
- 13.6.4 For road scheme D2, WKCD would have a free-pedestrian deck at ground level connecting to WKT between LCR and Road D1. The pedestrian deck fosters free pedestrian movements across AURW as vehicular traffic on AURW travels underneath the pedestrian deck.
- 13.6.5 It is possible for WKCD to have footbridge and/or subway connecting to AUS. These footbridge and subway allow for direct connection to the AUS without the need to travel in an indirect manner e.g. via WKT or the subway at AURW/CAR/AUR junction.
- 13.6.6 The pedestrian routings between WKCD and major pedestrian spots (mainly public transport facilities) are indicated in **Figures 13.9**.

WKT

- 13.6.7 The connections between WKT and WKCD have been discussed in Para 13.6.4.
- 13.6.8 The connections between WKT and KOW would include three footbridges across LCR. These footbridges would connect both sites at the retail area and would connect to the KOW PTI as well as AEL/TCL station via KOW internal pedestrian circulation. It is envisaged that the majority of the retail/public transport pedestrian traffic would utilize the middle and southern footbridges while the northern bridge will be mainly populated by residential users.
- 13.6.9 In addition to the three footbridges, it is also proposed to have a pedestrian subway to connect the B1 level of WKT to KOW PTI & AEL/TCL Station. This would serve as a direct connection between the 2 rail-lines.
- 13.6.10 WKT would have a footbridge connecting to the permanent Jordan PTI at the north. This footbridge could also be access via the existing JOR footbridge located beyond the north kerb of JOR.

- 13.6.11 Two footbridges would be connecting to AUS. In addition, a subway is also provided to connect WKT and AUS at concourse level providing for direct access between the 2 rail-lines.
- 13.6.12 A pedestrian subway is proposed to connect the WKT concourse to the WKT station car park underneath WKCD. This subway mainly serves as an internal pedestrian walkway within the WKT, but it is possible to have pedestrian entrance to connect the surface WKCD area. This possible entrance provision could be reviewed under the coming WKCD Conceptual Plan Study.
- 13.6.13 The pedestrian routings between WKT and major pedestrian spots (mainly public transport facilities) are indicated in **Figure 13.10**.

KOW

- 13.6.14 The connections from KOW to WKCD and WKT have been discussed in the above.
- 13.6.15 At the northern side of KOW, there would be a footbridge which could connect to PCWA (via footpath of elevated JOR); permanent Jordan PTI; and CAR. With the at-grade crossings, on-street pedestrians can travel KOW to the permanent Jordan PTI without the need to first enter WKT.
- 13.6.16 If the PCWA would be removed and replaced with a park, a new footbridge is proposed parallel to the elevated JOR, which will directly connect to the future park.
- 13.6.17 The pedestrian routings between KOW and major pedestrian spots are indicated in **Figure 13.11**.

AUS, Sites C & D

- 13.6.18 The connections from AUS to WKT and WKCD have been discussed in the above.
- 13.6.19 Pedestrian corridor for east-west pedestrian through movement should be provided at either of Site C or Site D, such that the Focus Area could maintain continuous pedestrian routings all the way to the old Jordan district as well as JOS of TWL.
- 13.6.20 The pedestrian routings between AUS/Sites C & D and major pedestrian spots are indicated in **Figure 13.12**.

13.7 Initial Capacity Checks

- 13.7.1 This section addresses the location and capacity requirements of the internal walk links at underground, grade and elevated levels.
- 13.7.2 The general approach to the pedestrian flow forecasting within the Focus Area was based on the following analyses:
- pedestrian flow generation;
 - directional split;
 - modal split; and
 - station/development analysis.

- 13.7.3 The WKCD pedestrian flow generation/attraction attributes were based on assumed future land-uses/seating capacity. Pedestrian trips for cultural land-uses assume that half of the total maximum seating would arrive within the peak hour (for WKCD). Pedestrian trips for other land-uses such as residential/retail/office/hotel were determined based on the pedestrian generation rates in MVA's in-house database as shown in **Table 13.1**.

Table 13.1 Pedestrian Trip Generation Rates

Land-use	Assumed/Adopted Trip Generation/ Attraction Rate (Two-way)
Residential (apartment)	0.60 ped/hr/flat
Service Apartment	0.40 ped/hr/flat
Hotel	1.70 ped/hr/room
Office	2.88 ped/hr/100m ² GFA
Retail	7.89 ped/hr/100m ² GFA

- 13.7.4 The trip generations for WKT, AUS and KOW stations plus their associated properties were determined by two parts:
- station trip generation; and
 - development trip generation.
- 13.7.5 The pedestrian trip generation for WKT was based on the latest available forecast of peak hour rail demands.
- 13.7.6 The development trip generation was based on the latest available proposed land-uses associated with the WKT station.
- 13.7.7 The pedestrian trip generation for AUS was based on the latest available peak hour forecasts documented in the latest revision of the Station & Transportation Integration Committee (STIC) report for the station. The development part of the trip generation was based on the latest available proposed land-uses associated with the AUS.
- 13.7.8 The pedestrian generation for KOW was based on an indicative patronage of 10,000 during the peak hour¹. The development trip generation was based on the latest available proposed land-uses associated with the KOW.
- 13.7.9 Based on the above assumptions, the total trip generations were estimated and summarised in the **Table 13.2** for the Focused Area.

¹ As understood from MTR, TCL KOW drew, in 2006, a peak hour two-way flow in the range of 2-3,000 passengers, and AEL KOW draws some 500-1,000 passengers, giving a total flow within 4,000 passengers. In future it is assumed the ultimate flow could be in the order of 10,000 passengers.

Table 13.2 Pedestrian Trip Generation Estimates

Development	Planned Land Use			Seating Capacity (no. of seats)	Area (m ²)	No. of Units (no.)	2-way Peak Hour Person Generation (pph)	
West Kowloon Cultural District	Performing Arts Venue	Phase I	Mega Performance Venue		15,000	--	--	7,500
			A Great Theatre		2,200	--	--	1,100
			Two Medium-sized Theatres		800 each	--	--	800
			Four Black box Theatres		250 each	--	--	500
			A Concert Hall		2,000	--	--	1,000
			A Chamber Music Hall		800	--	--	400
			A Xiqu Performance Venue	1,400	--	--	700	
				Centre	Small Theatre	400	--	--
		Piazza Areas		15,000	30,000	--	7,500	
		Phase II	A Great Theatre		1,900	--	--	950
	Two Medium-sized Theatres		800 each	--	--	800		
	Museum Facilities and Exhibition Centre:	M+ (Including Design, Moving Image, Pupular Culture, Visual Arts)			--	Gross Floor Area: 61,950 (On-site Area)	--	2119
		An Exhibition Centre			--	Net Operating Floor Area: 10,000	--	988
	Other Arts and Cultural Uses			--	15,000	--	378	
	Communal Facilities			--	20,000	--	312	
	Residential: Villa Houses			--	145,257	151	91	
	Residential: Apartments			--		1089	654	
	Hotel			--	56,000	700	1190	
	Office			--	107,683	--	3101	
	Retail, Dining & Entertainment			--	119,000	--	9389	
	Open Space				230,000		4600	
	Sub-total						44272	
Property Development in Union Square	Residential			--	608,003	5,809	3485	
	Retail			--	82,417	--	6503	
	Office			--	231,474	--	7873	
	Hotel			--	167,420	996	2135	
	Service Apartment			--		606	410	
	Sub-total						20406	
Property Development in Site A	Retail			--	29,419	--	2321	
	Office			--	294,185	--	8473	
	Sub-total						10794	
Property Development in Site C	Residential			--	62,500	896	538	
	Retail			--	12,500	--	986	
	Sub-total						1524	
Property Development in Site D	Residential			--	77,500	900	540	
	Retail			--	15,500	--	6975	
	Sub-total						7515	
Austin Station of Kowloon Southern Link							23163	
West Kowloon Terminus of Express Rail Link							19887	
Kowloon Station of Airport Express Line and Tung Chung Line							10000	
All Sites							137,560	

Note: The most updated office GFA, hotel room no. and service apartment unit no. were received from PlanD on 12/12/08. However, the person generation of these three types of developments are still based on the original received / assumed numbers (i.e. office GFA = 273,364, hotel room no. = 1256 and service apartment unit no. = 910) for conservative reasons.

Directional Split

13.7.10 The directional split calculation was based on information gathered from MVCTS model within the vicinity of the walkable areas (approximately within 500m radius) centering at WKT. The general directional splits assumed are as follows:

- North – 20%;
- East – 70%;
- South – 10%

Modal Split

13.7.11 In general, the modal splits were based on available information from STIC submissions, planning reports, and other relevant documents. The KOW modal splits were based on information from the Transport Planning Report 2006

13.7.12 For the development analyses of all the sites, it is assumed that 70% of the total trips generated would take public transport, 10% would walk with the remaining 20% using other means of travel Results Summary.

13.7.13 Utilizing the above assumptions, the pedestrian demand and width requirements of major roadways within the focus area is summarised in **Tables 13.3 and 13.4**.

Table 13.3 Summary of Pedestrian Flow Results (two-way peak hour flow): Along Road Pedestrian Traffic Move

	WKCD	AUS	WKT	KOW Station	Inter-Station Pedestrian Flow	Total	Expected Width Range
LCR Pedestrian Flow	60	0	65	255	-	380	small
Road D1A Pedestrian Flow	60	350	65	255	-	730	small
CAR Pedestrian Flow	55	1,340	85	320	-	1,800	small
JOR Pedestrian Flow	0	2,150	270	1,050	240	3,710	small
WCR Pedestrian Flow	0	0	15	60	-	75	small
AUR Pedestrian Flow	610	2,465	310	1,210	240	4835	small

Table 13.4 Summary of Pedestrian Flow Results (two-way peak hour flow): Road Crossing Pedestrian Traffic Move

Connection Link	Pedestrian Flow (pph)	Footpath Width
WKCD <-> WKT/KOW Greenway Link	16,000	large
WKCD <-> KOW Footbridge	4,000	small
WKCD <-> WKT Subway	Approx. 100	small
WKCD <-> AUS Footbridge	16,000	large
AUS Footbridge <-> WKT/KOW	14,500	medium
AUS Subway <-> WKT/KOW	10,100	medium
AUS Street <-> WKT/KOW	1,300	small
KOW Footbridge <-> WKT/AUS	7,300	medium
KOW Subway <-> WKT/AUS	2,000	small
KOW Street <-> WKT/AUS	500	small

Note: a footpath (clearance) width of small indicates that the requirement is less than 5m, a medium width indicates that requirement is between 5m – 10m, and a large width indicates that requirement is larger than 10m. This requirement is based on pedestrian flows at Level of Service B.

- 13.7.14 Diagrammatic drawings summarising the potential pedestrian flows at the street, footbridge, and subway levels are shown in **Figure 13.13**.
- 13.7.15 From the above data, the width of footpath to the east and north of WKCD is recommended to be 10m, and the remaining footpath within the Focus Area would be 5m wide, except some short sections around Sites C and D, which range from 3m to 4m, due to site constraints. The detailed widths of footpaths have already been illustrated in **11.39**.

13.8 Suggestions for the coming WKCD Study

- 13.8.1 As discussed in Paragraphs 13.6.2 to 13.6.6 and illustrated in **Figures 13.7 to 13.9**, it is possible to provide footbridges / subways across AURW to connect WKCD and KOW / AUS. Also, to further improve the connectivity with TST, it may be possible to extend the subway from AUS underneath the eastern side of the WKCD to a location outside China Hong Kong City / Harbour City. The feasibility and arrangement of these pedestrian facilities would be subject to the master plan of WKCD and it is suggested to be reviewed by the consultants of the WKCD Study.
- 13.8.2 In addition, it is understood that there is concern on the pedestrian connection between WKCD and Kowloon Park / TST Station of MTR TWL. In Draft WP3, an innovative idea known as “Bi-Square Tri-Boulevard” concept (as shown in attached **Figure 13.14**) had been conceptually examined, but finally was not further considered due to various planning uncertainties in WKCD area and this scheme was dropped out in Final WP3. It is suggested that the feasibility of the said scheme for enhancing the connectivity between WKCD and Kowloon Park / TST Station could be further examined in the context of the Development Plan to be prepared by the WKCDA in which there would be more information on the detailed land uses of the WKCD.

14. TRANSPORT PLAN AND IMPLEMENTATION PROGRAMME

14.1 Introduction

14.1.1 This Chapter draws together all the selected schemes (including road traffic, PTI, and pedestrian) after the traffic evaluation and analysis mentioned in the previous chapters of this working paper.

14.1.2 Since this study has only conducted the assessments for ultimate design year 2031, it is not possible for this study to recommend detailed implementation programme for each selected scheme. The recommended implementation programme in the following sections would base on the results of the quantitative assessments for 2031 as well as the qualitative analysis for any major interim milestones in the Study Area (e.g. opening of WKT + Phase 1 of WKCD; and full intake in WKR).

14.2 Summary of Selected/Preferred Traffic Scheme

Core Schemes

14.2.1 Scheme D2 – LCR-AURW Underpass, Depressed Junction at LCR/AUR and Associate Junction Improvements

General Descriptions	• Can accommodate the current design concept of WKT, particularly the central grand at-grade pedestrian deck connecting with WKCD • Free pedestrian at-grade movement at LCR/AUR junction with traffic calming to control the minor traffic/pedestrian conflict at the car park egress route • Separate through traffic and local traffic to ensure the accessibilities of local developments • Improve the overall capacity of the road networks in the Focus Area • With queue management
Considerations	• Essential to WKT • MTR is studying the engineering feasibility • Encroachment in WKCD
Alternative Scheme	• Scheme D1
Suggested Implementation Programme	• 2014/2015 before opening of WKT and WKCD Phase 1

14.2.2 Scheme E – KOW Scheme 4 (i.e. road link from WHC NB to JOR)

General Descriptions	• Can improve the connection from WHC to KOW and WKCD • Relieve the traffic pressure on LCR
Considerations	• Essential to KOW and WKCD • Has been gazetted and it is now resolving the objection received during the gazette period
Alternative Scheme	• Nil
Suggested Implementation Programme	• 2009/2010 to cope with opening of ICC and commencement of construction works of WKT and WKCD
Remark	• This scheme will be undertaken by private developers

Additional Schemes

14.2.3 Scheme H – Connection to WKH via elevated JOR and Hoi Po Road

General Descriptions	• Relieve the traffic loading on LCR NB • Avoid affecting PCWA or waterfront promenade • Avoid impact on WHC during construction
Considerations	• Need to widen elevated NCR • Engineering feasibility should be investigated
Alternative Scheme	• Scheme G
Suggested Implementation Programme	• Desirable for completion before 2014/15, to accommodate the increased traffic volume arising from the WKT and WKCD (Phase 1) which would be opened in 2014/2015. • It is suggested that such programme would need to be ascertained at the next technical feasibility stage to be undertaken by others.

14.2.4 Scheme I – New link road from elevated NCR to WHC

General Descriptions	• Relieve the traffic loading on LCR NB
Considerations	• Should be considered only if Scheme H go ahead • Benefit to KOW and WKCD • For small car only • Should consider the safety at the merging point • Engineering feasibility should be investigated
Alternative Scheme	• Scheme G
Suggested Implementation Programme	• Same as Scheme H

14.2.5 Scheme J – WKH SB link to at grade NCR

General Descriptions	• Relieve the traffic loading on LCR SB • Avoid affecting PCWA or waterfront promenade • Avoid impact on WHC during construction
Considerations	• Engineering feasibility should be investigated
Alternative Scheme	• Scheme G
Suggested Implementation Programme	• Same as Scheme H

14.2.6 Scheme Q – CAR Underpass

General Descriptions	• Improve the capacity of CAR/AUR/AURW junction • Reduce delay for N-S traffic of the junction
Considerations	• Require modification of the pedestrian subway underneath CAR/AUR/AURW junction • Require encroachment into WKCD • Engineering feasibility should be investigated
Alternative Scheme	• Further widening of the at-grade junction could be a fallback option if underpass is found infeasible in feasibility study.
Suggested Implementation Programme	• Desirable for completion before 2014/15, because (i) the construction of the underpass after completion of WKT and WKCD (Phase 1), i.e. 2014/15, would encounter more constraints and would cause continual inconvenience to public, and (ii) to cater for the increased traffic volume arising from WKT and WKCD.

14.2.7 It is noted that all the Additional Schemes are recommended to be implemented before 2014/15. However, in case that the Schemes H, I, J and Q could not be constructed/implemented in one go, it is recommended to implement Schemes H and J first, then Scheme Q, and finally Scheme I.

14.2.8 Since Schemes H and J could relieve the loading at LCR no matter there is LCR-AURW Underpass or not, the whole network could be benefited as long as these two schemes are available. Hence, Schemes H and J are put in top priority for improvement of the road network.

14.2.9 Scheme Q is proposed to locally improve the Junction of CAR/AUR/AURW. The locations benefited by Scheme Q would be relatively less than that in Schemes H and J; therefore Scheme Q could be implemented after Schemes H and J.

- 14.2.10 With regard to Scheme I, it would mainly serve the egress traffic from WKCD and ICC. In view of public benefit, Scheme I is recommended to put in the lowest priority among the four schemes.

Other Junction Improvement Schemes

- 14.2.11 Suggested Implementation programme are as follows:

Junction		General Descriptions	Suggested Implementation Programme
J1	Hoi Wang Road / Lai Cheung Road	To cope with CKR	2016
J5	Kansu Street / Ferry Street / Yan Cheung Road	Construction of CKR would likely affect the junction	2016
J11	LCR / JOR	Part of Scheme D2	2014/2015
J12	CAR / JOR / Ferry Street		2014/2015
J17	LCR / AURW	Part of Scheme D2	2014/2015
J18	CAR / AUR	Scheme Q	2014/2015
J38	Ferry Street / Man Cheong Street / Saigon Street		2014/2015
J39	Hoi Wang Road / Yan Cheung Road / Road D1A(N)	Construction of CKR would likely affect the junction	2016
J41	AURW / Road D1	Part of Scheme D2	2014/2015

PTI Schemes

- 14.2.12 All the proposed PTI arrangements as discussed in Chapter 14, should be cope with the opening of WKT and WKCD. Therefore, they are proposed to be implemented before 2014/2015.

Pedestrian Scheme

- 14.2.13 All the proposed Pedestrian Schemes as discussed in Chapter 15 should be cope with the opening of WKT and WKCD. Therefore, they are proposed to be implemented before 2014/2015.

14.3 Proposed / Desirable Implementation Programme

- 14.3.1 The proposed / desirable implementation programme are summarised in **Table 14.1**.

Table 14.1 Proposed / Desirable Implementation Programme

Before 2010	Before 2014 / 15	Before 2016
<i>Road Schemes</i>		
• Core - Scheme E [Private Sector]	• Core - Scheme D2 [MTRCL]	
	• Additional 1 st – Schemes H & J ⁽²⁾	
	• Additional 2 nd – Scheme Q ⁽²⁾	
	• Additional 3 rd – Scheme I ⁽²⁾	

Before 2010	Before 2014 / 15	Before 2016
<i>Junction Improvement Schemes</i>		
	• J11 – LCR / JOR	• J1 - Hoi Wang Road / Lai Cheung Road
	• J12 - CAR / JOR / Ferry Street	• J5 - Kansu Street / Ferry Street / Yan Cheung Road
	• J17 –LCR / AURW [MTRCL]	• J39 - Hoi Wang Road / Yan Cheung Road / Road D1A(N)
	• J18 – CAR / AUR / AURW	
	• J38 - Ferry Street / Man Cheong Street / Saigon Street	
<i>PTI Schemes</i>		
• To Wah Road Temporary PTI	• Relocated Jordan PTI [MTRCL]	
	• Bus/GMB pick up/drop off at WKT [MTRCL]	
	• Possible bus facilities in WKCD [WKCD]	
<i>Pedestrian Scheme</i>		
	• WKT – 3 Footbridges to KOW; 1 Subway to KOW; 2 Footbridges to AUS; 1 Subway to AUS; 1 Subway to WKCD; at grade Pedestrian Deck to WKCD; 1 Footbridge to Jordan PTI [MTRCL]	
	• WKCD – 2 Footbridges to KOW; 1 Footbridge to AUS	
	• Pedestrian Deck at LCR/AUR Junction [MTRCL]	
	• Bowring Street Link (WKRA to JOR) ⁽²⁾	
	• Modification to AUR/CAR/AURW Subway ⁽²⁾	
	• Relevant modification works to Footbridge system along JOR carried out by XRL [MTRCL]	

- Notes:
1. The names in the brackets are the parties responsible for the implementation of the schemes. For other road and junction improvement schemes, they would be identified under normal government procedures.
 2. It is suggested that such programme would need to be ascertained at the next technical feasibility stage to be undertaken by others.

15. INTERIM TRAFFIC CONDITION

15.1 Construction Activities

Future Developments and Planned Road Network

- 15.1.1 As mentioned in Chapter 10, within Focus Area, apart from the remaining new developments in KUD (e.g. full intake of ICC) and the AUS of KSL to be operated in mid 2009, there would be other planned developments including (i) WKT of XRL and the associated property development, (ii) WKCD, and (iii) property developments at Sites C & D.
- 15.1.2 In addition to the new developments, new road network as recommended in Chapter 11 and the 3rd Working Group Meeting (WKM3) would include: (i) LCR–AURW Underpass and Depressed junction of LCR/AUR (Scheme D2), (ii) Upgrading NCR (Elevated) and Direct Connection to WKH via Hoi Po Road and JOR (Elevated) (Scheme H), (iii) New Link Road from NCR to WHC (Scheme I), (iv) WKH SB Link to At-grade NCR (Scheme J), and (v) CAR Underpass (Scheme Q).
- 15.1.3 On top of the above new road schemes proposed by this study, there would be CKR connecting to YMT Int., as well as Road D1A(N), Road D1A(S) and Road D1 running in N-S direction in between WKT and AUS to connect with J/O Hoi Wang Road/Yan Cheung Road and AURW.
- 15.1.4 The location of the aforementioned planned developments, strategic route, and proposed road network are shown in **Figure 15.1**. In order to identify the critical design year at interim stage, the works area and construction periods of individual development and road scheme were obtained and will be discussed in the Paragraphs 15.1.5-15.1.14.

West Kowloon Terminus and the Associated Property Development

- 15.1.5 According to the tentative construction programme, the construction works would commence in early 2010 and is targeted to be completed in 2015. The associated property development above WKT would start to construct after 2015.
- 15.1.6 As LCR and AURW are situated immediate to the west and south of WKT respectively, construction of the LCR-AURW Underpass would be closely related to WKT. Details of construction programme of LCR-AURW Underpass will be presented in Paragraphs 15.1.10 – 15.1.11.
- 15.1.7 It is worthwhile to note that the section of WCR between LCR and the future Road D1/D1A(S) (hereinafter called “Western WCR”) would be decommissioned in 2011 to facilitate the construction of main part of the WKT station. Details would be further discussed in Paragraphs 15.3.6 – 15.3.7.

West Kowloon Cultural District

- 15.1.8 Construction of WKCD would commence in 2012, and would be completed in two phases. Phase I which includes most of the performing arts venues, part of the museum and all the property developments is expected to be finished in 2014/15, while Phase II which consists of the three theatres and remaining part of the museum are targeted to

be completed in 2026 and 2031 respectively. Since WKCD is situated immediate to the south of AURW, further investigation for co-ordination of constructing WKCD and LCR-AURW Underpass is required.

Property Developments at Sites C & D

- 15.1.9 The tentative construction programme of Sites C and D would be from 2012/13 to 2014/15.

Recommended Road Improvement Schemes in Focus Area

- 15.1.10 In Chapter 11 and WGM3 of this Study, six long-term road improvement schemes (Core and Additional Schemes as mentioned in Chapter 11) were proposed to mitigate the long term traffic problems. Details of these six schemes are reiterated as follows:

- Scheme D2 - LCR-AURW Underpass and Depressed J/O LCR/AUR: LCR-AURW Underpass is a dual two lane underpass is proposed running from north of JOR along and below LCR and AURW to the west of CAR. The J/O LCR/AUR is proposed to be depressed at -2mPD level to permit a pedestrian deck above to connect WKT and WKCD.
- Scheme E – Road Link and Widening of Existing Bus-Only Ramp from WKH NB to Elevated JOR EB for Direct Connection from WHC NB to WKR: The scheme comprises a new at-grade road connection from the WHC NB toll plaza to the up-ramp to JOR(Ele.), and a short road deck at the J/O JOR (Ele.)/NCR (Ele.). This scheme has already been gazetted and would be in operation in 2009/2010.
- Scheme H - Upgrading NCR (Ele.) and Direct Connection to WKH via Hoi Po Road and JOR (Ele.): The scheme would include road widening on the NCR (Ele.) near the elevated structure of J/O NCR/JOR, as well as a new connection from Hoi Po Road to WKH.
- Scheme I - New Link Road from NCR to WHC: This scheme would provide a U-turn down ramp from NCR (Ele.) NB to WHC SB outside the Cullinan.
- Scheme J - WKH SB Link to At-grade NCR: This Scheme would provide a more direct connection from WKH SB to NCR where would have two level of links connecting to the at-grade roundabout at JOR/NCR (for KOW, WKT, and Jordan) or to the NCR (Ele.) (for KUD and TST).
- Scheme Q - CAR Underpass: This scheme would include the underpass along CAR N-S direction to bypass the J/O CAR/AUR/AURW. This scheme could allow a free flow movement for CAR NB and SB traffic.

- 15.1.11 It is understood that Scheme D2 will be included as part of the construction works of the XRL project and would be completed before 2015. Moreover, Schemes H, I and J should be in place to cater for the increased traffic volume arising from the completed WKT and Phase 1 of WKCD, so these three schemes should be completed before 2014/15. For Scheme Q, there would be very limited scope to accommodate construction works and keep traffic flowing after the planned opening of WKT (2015)

and Phase 1 of WKCD (2014/15), thus this scheme should also be completed before 2014/2015.

Central Kowloon Route

- 15.1.12 CKR, commissioned by Highways Department (HyD), is the strategic route which runs in East-West direction connecting the East and West Kowloon. The nearest part of CKR to the Focus Area of this Study includes (i) the western tunnel portal and (ii) a section of cut-and-cover tunnel along Kansu Street to the west of Shanghai Street.
- 15.1.13 It is known that, for the section of cut-and-cover tunnel along Kansu Street, traffic diversion would be proposed to facilitate the construction works. However, the traffic would not be diverted via the Focus Area, and therefore this Study would not be affected by the construction of that section of CKR.
- 15.1.14 As a result, only the western portal of CKR, which would be connected to the east of YMT Int., is of concern. In view that the slip roads from CKR to WKH, LCR and WHC would be in conflict with the works area of XRL (i.e. the area bounded by Lai Cheung Road to the north, Hoi Wang Road/Road D1A(N) to the east, JOR to the south, LCR to the west), completion of that section of XRL rail is required before the construction of the said slip roads to CKR. As a result, though the construction period for the whole CKR would be from 2012 to 2016, the construction of the concerned slip roads to CKR could only start after 2014/15.

15.2 Design Year

- 15.2.1 The construction periods of the aforementioned major construction works, i.e. property developments and road works, within Focus Area are summarized in **Table 15.1**. The table also outlines the development intakes with the Focus Area.

Table 15.1 Major Construction and Development Intake Activities within Focus Area

Year	Major Construction/ Development Intake Activities
2009	Commissioning of AUS of KSL
2010	Construction of WKT (Station) Starts Full intake of Kowloon Station Development
2011	<i>Commencement of LCR-AURW Underpass Construction & Deleting Western WCR</i>
2012	Construction of WKCD (Phase I) Starts
2012/13	Construction of Sites C & D Property Developments Starts
2013	External Construction Works of WKT end Construction of LCR-AURW Underpass ends
2014	Commissioning of LCR-AURW Underpass
2014/15	Commissioning of Proposed Schemes H, I, J & Q Commissioning of WKCD (Phase I) Occupation Intake Sites C & D Property Developments Construction of Slip Roads to Central Kowloon Route Start
2015	Commissioning of WKT
2016	Commissioning of Central Kowloon Route
Beyond 2015	Construction of WKT Property Development and WKCD (Phase II)

- 15.2.2 In 2011, the major construction activities (e.g. excavation) of WKT would be in progress, and LCR-AURW Underpass would start to construct. To cater for these works, Western WCR would be required to decommission, substantial change in road network would be resulted. Therefore it is essential to determine whether Road D1A(S) and Road D1 or temporary roads with similar functions should be completed earlier to replace the function of the Western WCR.
- 15.2.3 In the view of the above, 2011 is considered as the most critical period of which minimal / adequate road network requirement before deleting Western WCR should be investigated.
- 15.2.4 To adapt a more conservative approach, even the construction traffic of WKCD may not exist in 2011, the 2011 design flows would include WKCD construction traffic (also with WKT, Sites C & D construction traffic). These would be discussed in Chapter 18 in more details.

15.3 2011 Reference Road Network

- 15.3.1 The 2011 reference road network in the Study Area is illustrated in **Figures 15.2 to 15.6**.

Short Term Improvement Schemes

- 15.3.2 As mentioned in Chapter 9, the proposed short term improvement schemes or their principles should be implemented before the construction of WKT and WKCD. Therefore, the proposed short term improvement schemes should be taken into account in the road network in year 2011. The junctions with improvement schemes are listed below:

- J3 - Junction of Nathan Road / Waterloo Road (**Figure 9.1**)
- J11 - Junction of JOR / LCR (**Figure 9.4**)
- J13 - Junction of Nathan Road / JOR (**Figure 9.8**)
- J14 - Junction of LCR / WCR (**Figure 9.9**)
- J18 - Junction of CAR / AUR / AURW (**Figure 9.11**)
- J20 - Junction of CAR / KPD (**Figure 9.14**)

New Roads to Serve Opening of AUS (2009)

- 15.3.3 In order to serve the AUS which is scheduled to be operated in 2009, a single-two carriageway called "Road D1" will be formed along the western side of the station and spanning between WCR and AURW. Road D1 would have a width of 7.3m. Its intersection at WCR is a left in/ left out priority junction, whereas its southern intersection with AURW is an all-movement priority junction. The layout of Road D1 is shown in **Figure 15.6**.
- 15.3.4 In addition, an Emergency Vehicular Access (EVA) for AUS will be provided to the west of northern AUS between JOR and WCR. This 6m wide EVA is named as "EVA 1". The layout of EVA 1 is illustrated in **Figure 15.6**. In Chapter 10, EVA 1 was proposed to be

widened to 7.3m and open for all traffic in one-way southbound in the early stage of WKT construction, i.e. 2010, such that it would form part of the diversion route for the banned JOR WB right-turning traffic at J/O JOR/CAR/Ferry Street. The northern intersection of EVA 1 with JOR would be a left-in only and the southern junction at WCR will allow left-out movement only.

- 15.3.5 Moreover, the section of AURW between LCR and CAR will be upgraded from 1-way WB to 7.3m wide single two carriageway in 2009. The change will provide an additional EB AURW carriageway, but only left-turning movement to CAR NB will be allowed as shown in **Figure 15.6**. All the mentioned new roads have been incorporated in the 2011 reference road network.

Availability of Recommended Core Schemes in Focus Area

- 15.3.6 As mentioned in Paragraphs 15.1.10 – 15.1.11, Scheme D2 will be part of the construction works of the XRL project while Scheme E would be implemented in 2009/2010. Therefore, Scheme D would not be incorporated in the reference road network, but Scheme E would form part of the reference road network.
- 15.3.7 For Schemes H, I & J, as these schemes would relieve the traffic loading along LCR, it is assumed that these schemes would not be available in reference case for conservative reason. In addition, the lane configuration at J/O CAR/AUR/AURW could be maintained during the construction of Scheme Q – CAR Underpass, hence there would not be any change to the road network no matter there is the CAR Underpass or not.

Closure of Western WCR

- 15.3.8 To facilitate the construction of the WKT, Western WCR which spans the WKT site is required to be abandoned during the construction of the station as well as the LCR-AURW Underpass. To ensure the WKT could be in operation in 2015, this road closure should be implemented as early as possible, e.g. during the first year of construction, that is, in 2010. By considering the 2011 traffic forecast, the eastbound carriageway of WCR would require to handle some 2,400 pcu traffic in the morning peak hour, which almost 95% of them were turning right at the junction of WCR/CAR towards TST. This requests an alternative route, which must have adequate traffic capacity and without substantial detour, should be identified before closure of Western WCR.
- 15.3.9 This Study will investigate if the reference road network could accommodate the diverted traffic for the case without Western WCR. In case the reference road network without Western WCR is not capable to cope with the reference flows, this Study will explore if there is any opportunity to enhance the reference road network and/or to advance the upgrading of roads to accommodate the diverted traffic. Detailed assessment would be presented in Chapter 16.

15.4 Public Transport Facilities

- 15.4.1 The road-based public transport facilities within the Focus Area in year 2011 are illustrated in **Figure 15.7**, these include:

- Railway – KOW of AEL and TCL, AUS of KSL

- Franchised Bus – Bus termini at KOW, CFT, To Wah Road, and roadside bus stops along CAR, JOR, AURW and WHC Toll Plaza.
- GMB – GMB terminus at KOW, and roadside stops along CAR, JOR, WCR, AURW.
- Taxi – Taxi stands at KOW and CFT.

15.4.2 It is noted that the Jordan PTI which is currently located at WCR will be temporarily relocated to To Wah Road, at the northeast corner of the junction of JOR/LCR, to facilitate the construction of WKT. The PTI relocation will be carried out prior to commencement of the construction works for WKT. The current tentative commissioning date of the temporary PTI is at the 4th quarter of 2009. Hence, the relocated Jordan PTI should be incorporated the 2011 reference road network.

15.5 Pedestrian Facilities

15.5.1 The pedestrian facilities at year 2011 are shown in **Figure 15.8**. Similar to the existing condition, pedestrian movements along the roads within the Focus Area would be adequately served by at-grade footpaths. The movements across the J/O JOR/CAR/Ferry Street and J/O CAR/AUR/AURW would be entirely served by pedestrian subways.

15.5.2 The pedestrian crossing facilities at the junction of JOR/LCR would still be provided in both at-grade and elevated forms. At-grade pedestrian crossing would be available across the southern arm of LCR, and the movements across the northern arm of LCR, and the western arm of JOR would be accommodated by the JOR footbridge. An additional footbridge branched off from the JOR footbridge across JOR near EVA 1 would be provided.

15.5.3 It is noted that the JOR footbridge would be demolished during the construction of WKT and would be re-provisioned by a temporary footbridge for facilitating the TTMS for construction of WKT. Details of footbridge demolition and re-provision will be further discussed in later Chapter.

15.6 Traffic Impact Assessment – Reference Case

Junction Capacity

15.6.1 The junction capacity of the key junctions within the Study Area were assessed by using the 2011 traffic flows (reference case) as presented in **Figure 15.9**. The key plan of the assessed junction is shown in **Figure 15.10**. The assessment results are summarised in **Table 15.2** and illustrated in **Figures 15.11 and 15.12**. 2011 reference junction layouts could refer to **Figures 15.2 to 15.6**. The calculation sheets are attached in **Appendix E**.

Table 15.2 2011 Junction Performance – Reference Case

Junction No.	Junction Name	Junction Type	RC (%) / RFC	
			AM	PM
J1	Hoi Wang Road / Lai Cheung Road	S	29%	33%
J2	Ferry St / Lai Cheung Road / Waterloo Road	S	56%	36%
J3	Nathan Road / Waterloo Road	S	8%	6%
J4	Hoi Wang Road / Ngo Cheung Road	S	42%	64%
J5	Yan Cheung Road / Ferry St / Kansu St	S	58%	45%
J6	Nathan Road / Kansu St / Gascoigne Road	S	28%	16%
J7	JOR / Hoi Po Road	S	308%	461%
J8	NCR (elevated) / JOR (elevated)	S	42%	82%
J9	NCR / JOR	R	0.384	0.365
J10	JOR / To Wah Road	P	0.418	0.470
J11	JOR / LCR	S	14%	12%
J12	JOR / Ferry Street / CAR	S	-20%	-22%
J13	Nathan Road / JOR	S	16%	9%
J14	LCR / WCR	S	14%	18%
J15	CAR / WCR	S	3%	6%
J16	NCR / AURW	R	0.193	0.166
J17	LCR / AURW	R	0.504	0.624
J18	CAR / AUR / AURW	S	18%	10%
J19	Nathan Road / AUR	S	5%	8%
J20	CAR / KPD	S	29%	32%
J21	Salisbury Road / CAR	S	137%	105%
J22	Salisbury Road / KPD	S	84%	57%
J23	Salisbury Road / Nathan Road	S	7%	8%
J24	AUR / Cox's Road / Pine Tree Hill Road	S	7%	10%
J25	Nathan Road / Hill Wood Road	P	0.643	0.620
J26	JOR / Gascoigne Road	S	21%	11%
J27	CAR / Haiphong Road	S	246%	212%
J28	CAR / Peking Road	S	245%	203%
J29	Peking Road / KPD	S	79%	64%
J30	KPD / Middle Road	S	47%	39%
J31	Nathan Road / Kimberley Road	S	44%	48%
J32	Nathan Road / Granville Road	S	69%	88%
J33	Nathan Road / Cameron Road	F	N/A	N/A
J34	Nathan Road / Haiphong Road / Humphreys Avenue	S	66%	75%
J35	Nathan Road / Mody Road	F	N/A	N/A
J36	Nathan Road / Peking Road	S	127%	136%
J37	Nathan Road / Middle Road	P	0.323	0.436
J38	Ferry Street / Man Cheong Street / Saigon Street	S	51%	57%
J39	JOR / EVA 1	F	N/A	N/A
J40	Road D1 / WCR	P	0.142	0.146
J41	Road D1 / AURW	P	0.449	0.163

Note: S – Signal-control junction

P – Priority junction

R – Roundabout

F – Free-flow junction

N/A – Not available

Queue Length Analysis

15.6.2 The traffic queues at critical locations within the Focus Area were also calculated according to the methodology as stipulated in the Volume 4 of Transport Planning and Design Manual. The results are summarised in **Table 15.3** and illustrated in **Figure 15.13**.

Table 15.3 2011 Critical Traffic Queue – Reference Case

Junction No.	Name of the Junction	Approach	Average Queue Length (m)		Length of Road Segment (m)	Within Capacity	
			AM	PM		AM	PM
J11	LCR / JOR	JOR EB	40	40	120	Yes	Yes
		LCR SB	40	40	285	Yes	Yes
		JOR WB	45	45	285	Yes	Yes
		LCR NB	50	50	180	Yes	Yes
J12	Ferry Street / JOR	JOR EB	240	290	270	Yes	No
		Ferry Street SB	160	170	210	Yes	Yes
		JOR WB	275	320	190	No	No
		CAR NB	95	135	90	No	No
J14	LCR / WCR	LCR SB	60	60	175	Yes	Yes
		WCR WB	40	45	220	Yes	Yes
		LCR NB	50	55	150	Yes	Yes
J15	WCR / CAR	WCR EB	75	70	90	Yes	Yes
		CAR SB	65	60	90	Yes	Yes
		CAR NB	55	55	180	Yes	Yes
J18	AURW / CAR	CAR SB	40	60	180	Yes	Yes
		AURW WB	50	55	90	Yes	Yes
		CAR NB	30	60	130	Yes	Yes

Problem Identification

15.6.3 As presented in **Table 15.2**, the following junctions would be overloaded in year 2011:

- J3 - Nathan Road / Waterloo Road
- J12 - JOR / Ferry Street / CAR
- J13 - Nathan Road / JOR
- J15 - CAR / WCR
- J19 - Nathan Road / AUR
- J23 - Salisbury Road / Nathan Road
- J24 - AUR / Cox's Road / Pine Tree Hill Road

- 15.6.4 Among the above problematic junctions, some are located outside the Focus Area, i.e. J3, J13, J19, J23 and J24. During the construction of WKCD and WKT, most of the construction traffic has been assumed to be either travelled to/from the barging points at WKCD or travelled via WKH/LCR towards Northwest Kowloon direction. Therefore, the insufficient capacities of these junctions are not due to the construction works at WKCD and WKT. Moreover, the mentioned junctions in fact would be overloaded in 2031. As stated in Chapter 12, improvement to these junctions would require re-development of buildings or public consultation, and were considered as long-term. As such, there is limited scope to improve these junctions at interim stage. Details of long term improvement schemes could refer to Chapter 12.
- 15.6.5 Inside the Focus Area, there would be two problematic junctions, namely J12 and J15. For J12, as mentioned in Chapter 10, there is a proposed improvement scheme including banning of the right-turning movement of JOR WB in order to combine two signal stages in the MOC. The diversion route for the banned right-turning movement is via JOR WB, EVA 1, WCR EB and CAR NB to form a Q-turn as previously shown in **Figure 9.6**. With the banned turn, the layout of J/O JOR/CAR/Ferry Street could be modified to provide 1 left-turn lane and straight ahead lanes as presented in preceding **Figure 9.5**.
- 15.6.6 Furthermore, as presented in **Table 15.3**, long queues are found along JOR WB and CAR NB at J12 J/O JOR/CAR/Ferry Street. After the implementation of the ban turn scheme at J12, long queue would not exist as the MOC will be revised from 4-stage to 3-stage, more green time would be allocated to each approach.
- 15.6.7 Being part of the public road along the diversion route, EVA 1 is required to widen to 7.3m wide. To avoid abortive work and interfacing issues, it is reasonable to request XRL to widen the EVA 1 or construct the temporary Road D1A(S) SB in early stage of WKT construction. Therefore, it is assumed that the proposed improvement scheme for J12 would be incorporated at in early stage of WKT construction.
- 15.6.8 With regard to J15, it is proposed to improve the junction performance by (i) modify the lane configuration of CAR SB to provide 2 straight ahead lanes and 2 right-turn lanes, and (ii) widen a section of CAR NB approach to provide 1 left-turn lane and 4 straight ahead lanes. Furthermore, in order to increase the stacking length of the WCR EB left-turn lane, it is proposed to shift the stop line to the east. The revised layout is shown in **Figure 15.14**. In view that the difficulty of implementing this scheme is not high, it is also recommended to implement this scheme in early stage of WKT construction.

16. TEMPORARY TRAFFIC MANAGEMENT SCHEMES

16.1 General Requirements

- 16.1.1 In view that the road network within the Focus Area would be operating very close to its capacity in 2011, closure of any road without re-provisioning during construction would not be acceptable from traffic point of view. As regard, a core operational objective when developing the TTMS is to maintain the original provisions of transport facilities including the number of traffic lanes, lane configurations and method of controls along roads and/or at junctions during construction.
- 16.1.2 If the construction occupies the carriageway, consideration shall be given to retain the traffic lane(s) or to set back the kerb/central divider as far as practicable for re-provision. Otherwise, the entire road/junction shall be shifted/displaced to cope with the construction arrangement.
- 16.1.3 If the works occupy the footpaths, a minimum width of footpath shall be maintained or temporary decking shall be provided for pedestrian movements or vehicular manoeuvring to/from run in/out during the construction. If footbridge is affected, temporary footbridge shall be constructed and opened for use prior to the demolition of the existing one in order to maintain a continuous pedestrian network and preserve the accessibility to the public transport facilities.
- 16.1.4 Priorities should also be given to those TTMS, which can secure efficient operations of public transport without undue delay.
- 16.1.5 Fire fighting and safety requirements shall be observed and complied with during construction.
- 16.1.6 The minimum width of various types of carriageway and footpath required to be maintained during construction are recommended as in **Table 16.1**.

Table 16.1 Minimum Width of Carriageways and Footpaths

Type of Carriageway/ Footpath	No. of Lanes (with construction)	Minimum Width (m)
Single Carriageway for 1-way traffic	1	3.5
	2	6.75
Single Carriageway for 2-way traffic	2	7.3
	3	10.3
	4	13.5
Dual Carriageway	1	3.5
	2	6.75
	3	10.3
	4	14.0
Footpath	-	1.6 or as existing

16.2 Demand for Road D1A(S)

Assumed Alternative Route for Closure of Western WCR (without New Road)

- 16.2.1 As mentioned in Paragraphs 15.3.8 and 15.3.9, Western WCR would be closed during the construction period. Hence, it is essential to check if the reference road network without Western WCR would be able to handle the traffic flows. In addition, it is also needed to shift the LCR (between YMT Int. and JOR) eastward in order to provide works space for the WKT construction, in accordance to the WKT proposed works sequence.
- 16.2.2 With regard to the absence of the Western WCR, the possible alternative routing (without new road) for the through traffic which composes the major portion of the road network traffic within Focus Area were identified. As illustrated in **Figure 16.1**, for the SB traffic, Routing No. 1 would require to open a right-turning movement at JOR EB at J/O JOR/CAR/Ferry Street, while Routing No.3 would need to create a similar right-turning movement at AURW at J/O AUR/CAR/AURW. For Routing No. 2, no new movement would be needed and vehicles would travel according to original lane configuration.
- 16.2.3 Taking into account that Routing No. 2 and 3 would pass through LCR and AURW, these two roads should be with similar road width as the original, i.e. dual 2 to 3-lane carriageway, in order to cope with the heavy through traffic from LCR to TST. As a result, works area for construction of LCR-AURW Underpass as well as WKT would be constrained by such wide carriageways. In addition, the detour is considered too long. Therefore, Routing No. 1 for SB through traffic would be relatively better to be the alternative route for the case when Western WCR is closed. Similar argument applies on the NB through traffic, and Routing No. 1 was also chosen as alternative.

Construction Traffic Generation Estimates

- 16.2.4 With reference to the WKT Study, it was assumed that construction vehicle movements would be distributed evenly through the 11-hour working day (08:00-19:00), even though construction traffic activities are practically to be less frequent during the commuting peaks.
- 16.2.5 The works area of WKT is divided into six work zones as shown in **Figure 16.2**. It was also assumed that most of the spoil and construction materials would be transported through barging points at WKCD so as to minimise construction vehicles to pass through the already saturated road network and their negative impact on adjacent critical junctions. All concrete trucks and the dump trucks to/from work zones 1-3 were assumed to use the batching plant and barging points in WKCD respectively, whilst the dumping substances generated from work zones 4-5 would be transported using road based transports and towards northwest direction.
- 16.2.6 The construction traffic generations by WKT estimated by WKT Study are presented in **Table 16.2**.

Table 16.2 Construction Traffic Generations by WKT

Site/ Work Zone	Traffic Generations (pcu/hr)											
	AM Peak						PM Peak					
	Generation			Attraction			Generation			Attraction		
	DT ⁽³⁾	CT ⁽⁴⁾	Total	DT ⁽³⁾	CT ⁽⁴⁾	Total	DT ⁽³⁾	CT ⁽⁴⁾	Total	DT ⁽³⁾	CT ⁽⁴⁾	Total
Zone 1 ⁽¹⁾	0	0	0	0	0	0	0	0	0	0	0	0
Zone 2	115	42	157	115	42	157	115	42	157	115	42	157
Zone 3	169	31	200	169	31	200	169	31	200	169	31	200
Zone 4	62	15	77	62	15	77	62	15	77	62	15	77
Zone 5	22	7	29	22	7	29	22	7	29	22	7	29
Zone 6 ⁽²⁾	0	0	0	0	0	0	0	0	0	0	0	0
Total	368	95	463	368	95	463	368	95	463	368	95	463

Notes: (1) Zone 1: construction traffic will go to the barging point through internal roads without access to external road network.

(2) Zone 6: no major civil construction/building works to be carried out, site is for provision of the temporary public transport terminus.

(3) DT – Spoil or dump truck

(4) CT – concrete truck

16.2.7 Since the construction method and material used for the developments in WKCD have not yet known, the estimation of the construction traffic generations by the WKCD is roughly estimated by comparing the site area and the excavation volume with that of WKT. This should be overestimated as the excavation works of WKCD would be much less than WKT. But for this exercise, the conservative approach is adopted.

16.2.8 The estimated construction trip generations by WKCD are presented in **Table 16.3**.

Table 16.3 Construction Traffic Generations by WKCD

Item	Traffic Generations (pcu/hr)											
	AM Peak						PM Peak					
	Generation			Attraction			Generation			Attraction		
	DT ⁽²⁾	CT ⁽³⁾	Total	DT ⁽²⁾	CT ⁽³⁾	Total	DT ⁽²⁾	CT ⁽³⁾	Total	DT ⁽²⁾	CT ⁽³⁾	Total
Barging	-	-	345	-	-	345	-	-	345	-	-	345
Non-Barging ⁽¹⁾	-	-	65	-	-	65	-	-	65	-	-	65
Total	200	210	410	200	210	410	200	210	410	200	210	410

Notes: (1) According to WKT's Study, non-barging is equivalent to 16% of total construction traffic. Construction traffic will go to the barging point through internal roads of WKCD without access to external road network.

(2) DT – Spoil or dump truck

(3) CT – concrete truck

16.2.9 Although the Sites C and D would start to construct in 2012/13, the construction traffic generated by these two sites are also taken into account for conservative reason. In view that the sites area is not large and excavation is not required for the construction of property developments, it is roughly estimated that the sites would generate/attract 10 pcu/hr in AM and PM peak hour periods.

Traffic Impact Assessment – Without Western WCR

16.2.10 The design traffic flows which are composed by the diverted reference traffic flows as well as construction traffic flows by WKT and WKCD (routings are shown in **Figures 16.3 and 16.4**) for the case without Western WCR is illustrated in **Figure 16.5**. The junction capacities of the key junctions within the Focus Area were assessed by using the above alternative routing and design flows. The assessment results are summarised in **Table 16.4**. The calculation sheets are attached in **Appendix E**.

Table 16.4 2011 Junction Performance – Without Western WCR

Junction No.	Junction Name	Junction Type	RC (%) / RFC	
			AM	PM
J7	JOR / Hoi Po Road	S	308%	461%
J8	NCR (elevated) / JOR (elevated)	S	42%	72%
J9	NCR / JOR	R	0.380	0.403
J10	JOR / To Wah Road	P	0.464	0.539
J11	JOR / LCR	S	36%	42%
J12	JOR / Ferry Street / CAR	S	-46%	-47%
J14	LCR / WCR	S	N/A	N/A
J15	CAR / WCR	S	-19%	-3%
J16	NCR / AURW	R	0.178	0.203
J17	LCR / AURW	S	21%	24%
J18	CAR / AUR / AURW	S	23%	12%
J20	CAR / KPD	S	29%	32%
J39	Northern: LCR / JOR	S	-40%	-36%
	Southern: EVA 1 / JOR	F	N/A	N/A
J40	EVA 1 / WCR / Road D1	P	N/A	N/A
J41	Road D1 / AURW	S	36%	40%

Note: S – Signal-control junction
P – Priority junction
R – Roundabout
F – Free-flow junction
N/A – Not available

16.2.11 It is shown in **Table 16.4** that J12, J15 and J39 would be heavily overloaded. This is because (i) J12 is required to operate with 4-stage MOC once the JOR EB right turn is opened, (ii) the two CAR SB straight ahead lanes at J15 are incapable to handle the heavy straight ahead through traffic flows, and (iii) it is not desirable to provide three LCR SB left-turn lanes at J39 to accommodate the heavy left turn movement. By considering the above problems, it could conclude that new roads should be formed to relieve the loading at these two junctions before deleting the Western WCR. The most effective road should be the “Road D1A(S)”.

Traffic Impact Assessment – Without Western WCR and With Road D1A(S)

16.2.12 With Road D1A(S), the through traffic flows, WKT and WKCD construction flows would be diverted as shown in **Figures 16.6 to 16.8** correspondingly. The design flows adopted in the case without Western WCR and with Road D1A(S) is presented in **Figure 16.9**. To verify if it is effective to have Road D1A(S) during the construction period, the

above junctions were assessed, and the results are summarised in **Table 16.5**. The calculation sheets are attached in **Appendix E**.

Table 16.5 2011 Junction Performance – Without Western WCR and With Road D1A(S)

Junction No.	Junction Name	Junction Type	RC (%) / RFC			
			w/o Western WCR		w/o Western WCR and w/ Road D1A(S)	
			AM	PM	AM	PM
J7	JOR / Hoi Po Road	S	308%	461%	308%	461%
J8	NCR (elevated) / JOR (elevated)	S	42%	72%	42%	75%
J9	NCR / JOR	R	0.380	0.403	0.380	0.403
J10	JOR / To Wah Road	P	0.464	0.539	0.445	0.520
J11	JOR / LCR	S	36%	42%	5% ⁽⁵⁾	5% ⁽⁵⁾
J12	JOR / Ferry Street / CAR	S	-46%	-47%	24%	13%
J15	CAR / WCR	S	-19%	-3%	8%	8%
J16	NCR / AURW	R	0.178	0.203	0.198	0.203
J17	LCR / AURW	S	21%	24%	14%	15%
J18	CAR / AUR / AURW	S	23%	12%	23%	12%
J20	CAR / KPD	S	29%	32%	29%	32%
J39	Road D1A(S) / JOR / LCR	S	-40%	-36%	5% ⁽⁵⁾	5% ⁽⁵⁾
J40	Road D1A(S) / WCR / Road D1	S	N/A	N/A	8%	8%
J41	Road D1 / AURW	S	36%	40%	30%	35%

Note: (1) S – Signal-control junction
(2) P – Priority junction
(3) R – Roundabout
(4) F – Free Flow Junction
(5) MOC of J11 and J39 are combined.

16.2.13 As shown in **Table 16.5**, capacities at J12, J15 and J39 were greatly improved for the case with provision of Road D1A(S). Though there are still four junctions (J11, J15, J39 & J40) operating with marginal capacities (around +5% to +8%), the RCs are acceptable for construction stage. Hence, it could be concluded that Road D1A(S) should be constructed before the closure of Western WCR so as to enhance the road network capacity.

16.3 Major Construction Staging

Major Stages

16.3.1 During the construction of WKT and WKCD, the road network within Focus Area would be divided into three major stages described as follows:

- Stage 1 (See **Figure 16.10**) – As traffic volume along AURW would increase once construction commence, capacity of the carriageway and road safety would be of concern, especially when there are concrete trucks or dump trucks travelling on the roads. Therefore, it is necessary to upgrade the section of AURW from single-2 lane road to dual-2 carriageway. The EVA 1 would be widened to 7.3m in order to complete the diversion route for the ban turn scheme at J/O JOR/CAR/Ferry Street.

- Stage 2 (See Figure **16.11**) – During the construction of LCR-AURW Underpass and station of WKT, Western WCR would be closed. The section of LCR between JOR and AURW would be shifted to the east of the LCR-AURW Underpass to provide sufficient space for the construction of LCR-AURW Underpass, and it would mainly serve the local and construction traffic. The section of LCR north of JOR would further shifted eastward to join the newly built Road D1A(S) such that to complete the main stream (LCR-Road D1A(S)-WCR-CAR) for accommodating the through traffic. In addition, the JOR footbridge would be re-provisioned by the temporary footbridge at this stage.
- Stage 3 (See Figure **16.12**) – The LCR-AURW Underpass, the depressed J/O LCR/AURW and the road network surrounding WKT and WKCD would be completed. The section of LCR north of JOR would be shifted back to its original alignment in connection with the southern LCR. Road D1A(S) would be realigned to its permanent location and Road D1A(N) would be commissioned. The temporary footbridge would be demolished and a permanent JOR footbridge would be in service.

Traffic Impact Assessment – Stages 1 and 2

- 16.3.2 It is noted that the Stage 3 in fact is the completed future road network layout within Focus Area, and would not have any capacity problem. Traffic impact arising from the TTMS during Stages 1 and 2 were then assessed.
- 16.3.3 At Stage 1, the road network layout is the same as the reference network, except the minor detouring for the banned JOR WB right-turning traffic as stated in Paragraph 16.3.1 1st bullet point, the routing for through traffic would be consistent with the original routing in reference road network. For the WKT and WKCD construction traffic, the routings are shown in **Figures 16.13 and 16.14**. The design flows adopted for assessment of Stage 1 is presented in **Figure 16.15**.
- 16.3.4 At Stage 2, the condition is identical to that discussed in Paragraph 16.2.12 – the case without Western WCR and with Road D1A(S). Therefore, the diverted through traffic flows refer to **Figure 16.6**, while the diverted WKT and WKCD construction flows refer to **Figures 16.7 and 16.8** respectively. The design flows adopted for assessment of Stage 2 is reference to **Figure 16.9**.
- 16.3.5 The assessment results for Stages 1 and 2 are listed in **Table 16.6**. The RCs of the corresponding junctions within Focus Area in reference case are also shown in the Table for easy comparison. The calculation sheets are attached in **Appendix E**.

Table 16.6 2011 Junction Performance – Reference Case, Construction Stages 1 and 2

Junction No.	Junction Name	Junction Type	RC (%) / RFC					
			Reference Case (w/ Western WCR)		Stage 1 (w/ Western WCR)		Stage 2 (w/o Western WCR & w/ Road D1A(S))	
			AM	PM	AM	PM	AM	PM
J7	JOR / Hoi Po Road	S	308%	461%	308%	461%	308%	461%
J8	NCR (elevated) / JOR (elevated)	S	42%	82%	42%	82%	42%	75%
J9	NCR / JOR	R	0.384	0.365	0.341	0.365	0.380	0.403
J10	JOR / To Wah Road	P	0.418	0.470	0.453	0.502	0.445	0.520
J11	JOR / LCR	S	14%	12%	9%	7%	5% ⁽⁵⁾	5% ⁽⁵⁾
J12	JOR / Ferry Street / CAR	S	-20% ⁽⁶⁾	-22% ⁽⁶⁾	31%	24%	24%	13%
J14	LCR / WCR	S	14%	18%	5%	9%	N/A	N/A
J15	CAR / WCR	S	3%	6%	8%	24%	8%	8%
J16	NCR / AURW	R	0.193	0.166	0.198	0.202	0.198	0.203
J17	LCR / AURW	R	0.504	0.624	0.710	0.737	N/A	N/A
		S	N/A	N/A	N/A	N/A	14%	15%
J18	CAR / AUR / AURW	S	18%	10%	18%	10%	23%	12%
J20	CAR / KPD	S	29%	32%	29%	32%	29%	32%
J39	Road D1A(S) / JOR / LCR	S	N/A	N/A	N/A	N/A	5% ⁽⁵⁾	5% ⁽⁵⁾
J40	EVA 1 / WCR	P	N/A	N/A	0.406	0.607	N/A	N/A
	Road D1 / WCR	P	0.142	0.146	0.146	0.151	N/A	N/A
	Road D1A(S) / WCR / Road D1	S	N/A	N/A	N/A	N/A	8%	8%
J41	Road D1/ AURW	P	0.449	0.163	0.450	0.163	N/A	N/A
		S	N/A	N/A	N/A	N/A	30%	35%

- Notes: (1) S – Signal-control junction
 (2) P – Priority junction
 (3) R – Roundabout
 (4) F – Free Flow Junction
 (5) MOC of J11 and J39 are combined.
 (6) Without ban-turn (because EVA 1 has not been converted to public road yet)

Queue Length Analysis – Stages 1 and 2

- 16.3.6 The traffic queues at critical locations within the Focus Area for three cases, i.e. Reference Case, Construction Stages 1 and 2 are shown in **Table 16.7**.

Table 16.7 2011 Critical Traffic Queue – Reference Case, Construction Stages 1 and 2

Junction No.	Name of the Junction	Approach	Length of Segment (m)			Reference				Construction Stage 1				Construction Stage 2			
			Reference	Construction Stage 1	Construction Stage 2	Average Queue Length (m)		Within Capacity		Average Queue Length (m)		Within Capacity		Average Queue Length (m)		Within Capacity	
						AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
J11	LCR / JOR	JOR EB	120	120	N/A	40	40	Yes	Yes	40	40	Yes	Yes	N/A	N/A	N/A	N/A
		LCR SB	285	285	N/A	40	40	Yes	Yes	45	40	Yes	Yes	N/A	N/A	N/A	N/A
		JOR WB	285	285	40	45	45	Yes	Yes	45	50	Yes	Yes	25	25	Yes	Yes
		LCR NB	180	180	450	50	50	Yes	Yes	55	60	Yes	Yes	15	15	Yes	Yes
J12	Ferry Street / JOR	JOR EB	270	270	220	240	290	Yes	No	50	55	Yes	Yes	55	55	Yes	Yes
		LCR SB	210	210	210	160	170	Yes	Yes	45	35	Yes	Yes	45	35	Yes	Yes
		JOR WB	190	190	190	275	320	No	No	60	65	Yes	Yes	65	70	Yes	Yes
		LCR NB	90	90	90	95	135	No	No	30	60	Yes	Yes	60	70	Yes	Yes
J14	LCR / WCR	LCR SB	175	175	N/A	60	60	Yes	Yes	70	65	Yes	Yes	N/A	N/A	N/A	N/A
		WCR WB	220	220	N/A	40	45	Yes	Yes	45	50	Yes	Yes	N/A	N/A	N/A	N/A
		LCR NB	150	150	N/A	50	55	Yes	Yes	65	65	Yes	Yes	N/A	N/A	N/A	N/A
J15	WCR / CAR	WCR EB	90	90	90	75	70	Yes	Yes	70	60	Yes	Yes	70	60	Yes	Yes
		CAR SB	90	90	90	65	60	Yes	Yes	70	60	Yes	Yes	70	30	Yes	Yes
		CAR NB	180	180	180	55	55	Yes	Yes	40	45	Yes	Yes	45	40	Yes	Yes
J17	LCR / AURW	AURW EB	N/A	N/A	310	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60	60	Yes	Yes
		LCR SB	N/A	N/A	400	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50	50	Yes	Yes
		AURW WB	N/A	N/A	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	45	50	Yes	Yes
		LCR NB	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30	30	Yes	Yes
J18	AURW / CAR	CAR SB	180	180	180	40	60	Yes	Yes	40	60	Yes	Yes	65	60	Yes	Yes
		AURW WB	90	90	90	50	55	Yes	Yes	50	55	Yes	Yes	50	55	Yes	Yes
		CAR NB	130	130	130	30	60	Yes	Yes	30	60	Yes	Yes	30	60	Yes	Yes
J39	LCR / JOR / Road D1A(S)	JOR EB	N/A	N/A	220	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	40	40	Yes	Yes
		LCR SB	N/A	N/A	270	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	65	60	Yes	Yes
		JOR WB	N/A	N/A	180	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50	50	Yes	Yes
		Road D1A(S) NB	N/A	N/A	220	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50	55	Yes	Yes
J40	Road D1A(S) / WCR / Road D1	Road D1A(S) SB	N/A	N/A	210	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60	65	Yes	Yes
		WCR WB	N/A	N/A	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50	65	Yes	Yes
		Road D1A NB	N/A	N/A	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50	60	Yes	Yes
J41	Road D1 / AURW	AURW EB	N/A	N/A	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35	35	Yes	Yes
		Road D1A SB	N/A	N/A	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	15	Yes	Yes
		AURW WB	N/A	N/A	110	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35	35	Yes	Yes

Conclusion

- 16.3.7 The results shown in **Table 16.6** indicate that J11, J14 and J15 at Stage 1, and J11, J15, J39 and J40 at Stage 2 would operate with marginal capacities. The RCs of these problematic junctions range from 5% to 9% during construction stages. From **Table 16.7**, it is found that the queue length at all the approaches would lie within the capacities at both Stages 1 and 2.
- 16.3.8 It is understood that the main problem within Focus Area is the through traffic, so it is undoubted that all the aforementioned problematic junctions would be lying along the routing of through traffic. It is known that the problem caused by the through traffic could only be resolved by the LCR-AURW Underpass, which would be under construction at the interim critical stage. In the light of this, the capacities of the problematic junctions under such large scale TTMS during the construction stages are considered to be within acceptable limit from traffic point of view.

17. SUMMARY

- 17.1.1 This Final Report (FR) incorporated the finalised details presented in the TN1, WP1, WP2, WP3 and WP4 including the modelling methodology, validation results, problem identification and recommendation of mitigation measures for short-term, long-term and interim conditions in Focus Area and Study Area. It also incorporated the relevant comments on DFR from relevant departments and parties.
- 17.1.2 The modelling assumptions and methodology were presented. The existing traffic data by manual classified turning movement counts were used for model validation, and the validation results were considered satisfactory.
- 17.1.3 Trip Generation Surveys for developments of different land uses were conducted. A set of trip rates adopted in this Study were recommended based on the comparisons among the surveyed trip rates, the trip rates from other studies, DR 439 as well as TD's New Trip Rates
- 17.1.4 For existing condition, it was found that 9 junctions within the Study Area are currently operating with marginal/insufficient capacities. However, J/O WCR/CAR would be improved after relocation of WCR Temporary PTI. Therefore, only 8 junctions would need short term improvements.
- 17.1.5 The short term improvement schemes were designed such that they could be implemented within a short period, i.e. within 2 years. Short-term improvement schemes were provided for 6 junctions, while improvement scheme for J/O CAR/JOR/Ferry Street was classified as "short-term/interim scheme". In view of site constraints at J/O AUR/Nathan Road, there was no practical short-term improvement scheme for the junction.
- 17.1.6 It had also identified potential problems in the reference case network in year 2031, in which all the major developments and infrastructures in WKRA would be fully completed. Meanwhile it had gone through the principles of developing the future traffic improvements. All the possible solutions and the likely constraints were highlighted. Some effective schemes were selected, in which the Core Schemes would be straight forward (e.g. works are minor or other parties have already carried out investigation), but the Additional Schemes would need further investigation to confirm the feasibility.
- 17.1.7 Since this study had only conducted the assessments for ultimate design year 2031, it is not possible to recommend detailed implementation programme for each selected scheme. The recommended implementation programme for individual scheme in this FR was based on the results of the quantitative assessments for 2031 as well as the qualitative analysis for any major interim milestones in the Study Area (e.g. opening of WKT + Phase 1 of WKCD; and full intake in WKR).
- 17.1.8 For interim critical stage while WKCD, XRL and new roads are being constructed, Western WCR should be closed in order to facilitate the construction of WKT. It was found from the analysis that Road D1A(S) should be in place prior to the decommissioning of Western WCR, so as to release the traffic loading at some critical junctions.

- 17.1.9 During the construction of WKT and WKCD, the road network within Focus Area would be divided into three major stages., the RCs of the problematic junctions range from 5% to 9%, and queue length at all the approaches would lie within the capacities during the construction stages.
- 17.1.10 Since the problem of marginal junction capacities within Focus Area would be due to the heavy through traffic, which could only be resolved by the LCR-AURW Underpass, the capacities of the problematic junctions under such large scale TTMS during the construction stages were considered to be within acceptable limit from traffic point of view. The proposed Stage 1 to Stage 3 would be feasible and should incorporate the necessary short-term and interim junction improvement schemes.
- 17.1.11 The proposed improvement schemes for short term, interim and long term stage are summarized in **Table 17.1**.

Table 17.1 Summary of Proposed Improvement Schemes

Stage		Improvement Schemes	Ref. Para.	Ref. Figure	Implementation Parties
Short Term	Before 2010	<i>Road Schemes</i>			
		• Scheme E – KOW Scheme 4	11.4.16-11.4.21	11.10	Private Sector
		<i>Junction Improvement Schemes</i>			
		• J3 – Nathan Road / Waterloo Road	9.1.2-9.1.3	9.1	(See Note)
		• J11 – JOR / LCR	9.1.4-9.1.14	9.4	(See Note)
		• J13 – Nathan Road / JOR	9.1.20-9.1.24	9.8	(See Note)
		• J14 – LCR / WCR	9.1.25-9.1.26	9.9	(See Note)
		• J18 – CAR / AUR / AURW	9.1.27-9.1.29	9.11	(See Note)
		• J20 – CAR / KPD	9.1.34	9.14	MTRCL
Interim	2011	<i>Junction Improvement Schemes</i>			
		• J12 – JOR / Ferry Street / CAR	9.1.15-9.1.19, 15.6.5-15.6.7	9.5	MTRCL
		• J15 – CAR / WCR	15.6.8	15.14	(See Note)
		<i>Temporary Traffic Management Schemes</i>			
		• Construction Stage 1	16.3.1-1 st Bullet	16.10	MTRCL
		• Construction Stage 2	16.3.1-2 nd Bullet	16.11	MTRCL
		• Construction Stage 3	16.3.1-3 rd Bullet	16.12	MTRCL

Stage		Improvement Schemes	Ref. Para.	Ref. Figure	Implementation Parties
Long Term	Before 2014 / 2015	<i>Road Schemes</i>			
		• Scheme D2 – LCR-AURW Underpass	11.4.1-11.4.15	11.3-11.9	MTRCL
		• Schemes H – Upgrading NCR plus new connection from Hoi Po Road to WKH NB	11.4.22-11.4.23	11.11-11.12	(See Note)
		• Scheme I – New link road from elevated NCR to WHC	11.4.24-11.4.25	11.13	(See Note)
		• Schemes J – WKH SB link to at-grade NCR	11.4.26	11.14	(See Note)
		• Scheme Q – CAR Underpass / CAR Widening	11.4.27-11.4.30	11.15-11.16	(See Note)
		<i>Junction Improvement Schemes</i>			
		• J11 – LCR / JOR	11.5.12-11.5.13	11.5, 11.22	MTRCL
		• J12 – CAR / JOR / Ferry Street	11.5.14	11.24	(See Note)
		• J17 – LCR / AURW	11.5.21	11.6	MTRCL
		• J18 – CAR / AUR / AURW	11.5.22	11.15-11.16	(See Note)
		• J38 – Ferry Street / Man Cheong Street / Saigon Street	11.5.43	11.29	(See Note)
	Before 2016	<i>Junction Improvement Schemes</i>			
		• J1 – Hoi Wang Road / Lai Cheung Road	11.5.1	11.18	(See Note)
		• J5 – Kansu Street / Ferry Street / Yan Cheung Road	11.5.7	11.21	(See Note)
		• J39 – Hoi Wang Road / Yan Cheung Road / Road D1A(N)	11.5.44	11.30	• Western & southern arm by MTRCL • Other arms by normal government procedures

Note: Parties responsible for implementation of these road and junction improvement schemes would be identified under normal government procedures

17.1.12 With the above improvement schemes, junctions within the WKRA (Focus Area) would all operate with spare capacity. The lowest reserve capacity is 7% as estimated at J20-CAR/KPD. For those major junctions outside the Focus Area but within the Study Area, only Nathan Road/Waterloo Road would operate marginally below capacity at -5% and -4% in AM and PM peak period which is comparable/similar to the existing condition.