Chapter-4

TRAFFIC STUDIES

4.1 Introduction

This Chapter examines the Traffic Studies for the present day traffic and traffic forecast besides "Toll Studies" which section contains the analyses of system options, makes recommendations regarding the level of toll to be applied to different vehicle categories.

The presently available routes for traffic between Meerut (Start Point of Expressway) & Prayagraj Bypass on NH-19 (old NH-2) (End Point of Expressway) are indicated on Figure 4.1.

The Expressway is access controlled with only entry/exit at Nodes (*intersecting points of National Highway or State Highways or Major District Roads – crossing with the proposed Expressway Alignment*) are lettered "A" to "R" as listed on Table 4.1:

Table 4.1: Details of Toll Nodes for entry / exit proposed on the Expressway

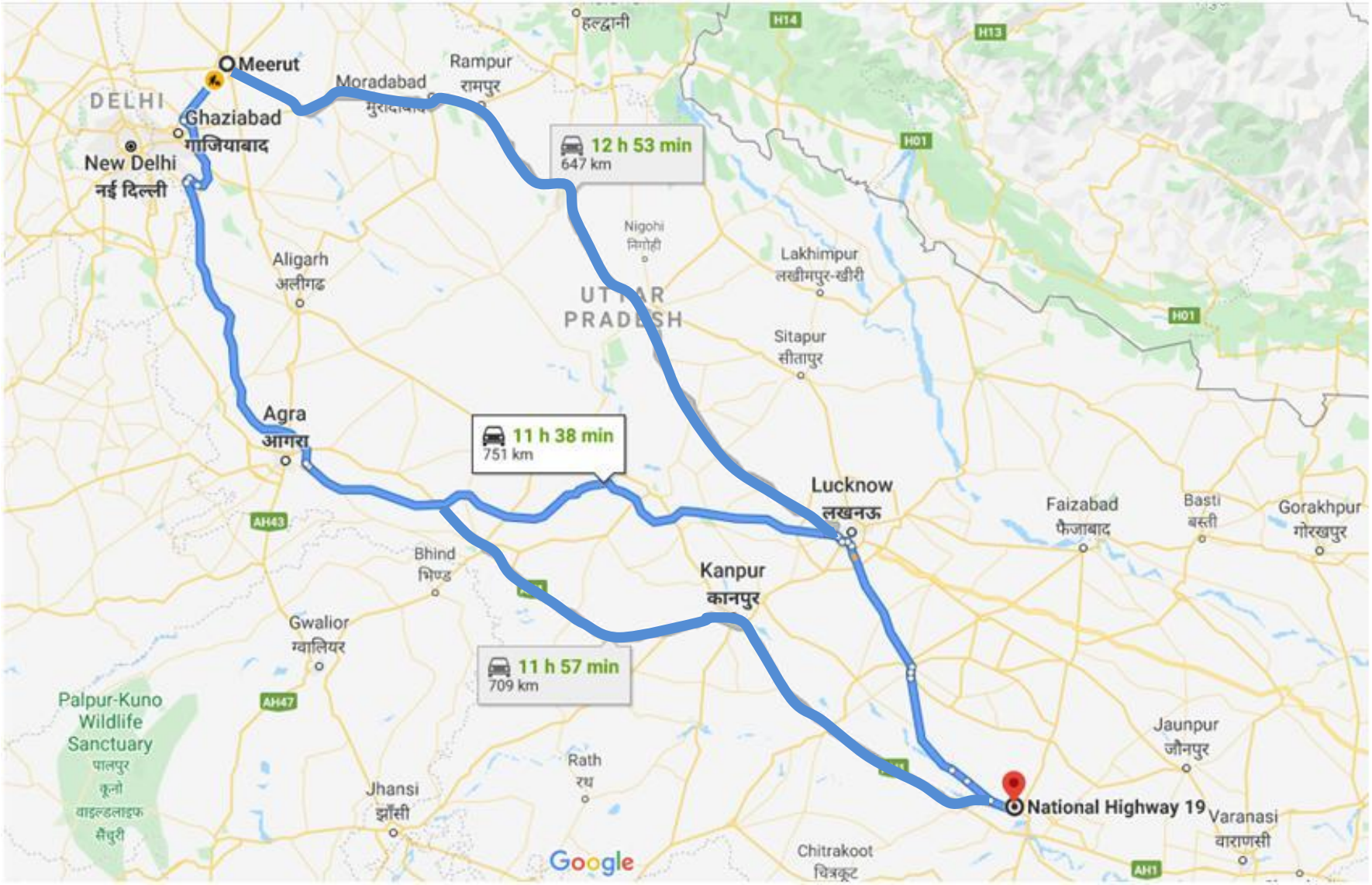
Toll Nodes	Chainage	Details of the Intersecting Roads	Road No.	Type of Intersection
A	0+100	Delhi - Meerut Expressway	Expressway	Trumpet
B	9+030	Meerut – Hapur	NH 58	Trumpet
C	35+600	Hapur - Garhmukteshwar	NH 24 B	Trumpet
D	54+800	Bulandshahr - Garhmukteshwar	SH 65	Diamond
E	74+340	Hasanpur-Anupshahar	SH	Diamond
F	102+600	Anupshahr - Moradabad	MDR	Diamond
G	123+500	Babrala - Chandausi	NH 93	Trumpet
H	173+700	Chandausi - Budaun	SH 43	Trumpet
I	189+650	Budaun - Bareilly	SH 33	Trumpet
J	255+380	Farukkhabad - Shahjahanpur	SH 29	Trumpet
K	283+070	Farukkhabad - Shahbad	MDR	Diamond
L	330+170	Kannauj - Hardoi	SH 21	Trumpet
M	378+350	Agra - Lucknow Expressway	Expressway	Trumpet
N	421+200	Kanpur - Lucknow	NH 25	Trumpet
O	487+600	Lalganj - Raebareli	NH 232	Trumpet
P	517+730	Raebareli - Unchachar	NH 24 B	Trumpet
Q	554+400	Manikpur - Bela Pratapgarh	MDR	Diamond
R	599+900	Prayagraj Bypass	NH 19	Trumpet

Table showing distances between various destinations from Ganga Expressway, that traffic which are likely to use the sections of Expressway between these lettered nodes "A"to "R" are provided as follows:

(a) on the presently available network of alternative routes – Table 4.2; and
(b) as estimated on the Proposed Expressway– Table 4.3.

Table 4.2 shows Traffic Zones from Expressway, the distances travelled by *"passenger cars"*. Distances travelled by truck are occasionally longer – these vehicles must use especially-designated truck routes.

Figure 4.1 Presently Available Routes for Through Traffic between Meerut and Prayagraj



National Highway NH 19 (old NH 2), Agra-Lucknow Expressway and NH 30 (Old NH24) are the alternate routes:

The present status of these alternate routes between Prayagraj and Meerut are as follows:

Alternate Route	**Description of Route**	**Distance (Kms)**	**Travel Times (Hours : Minutes)**	**Journey Speed (Average) (Km/hr)**
NH19 Route Prayagraj – Kanpur – Agra – Greater Noida – Dasna – Meerut	• Prayagraj - Kanpur (NH19, old NH2); • Kanpur – Bachhela/Bachheli – Agra (Agra Lucknow Expressway); • Agra – Greater Noida (Yamuna Expressway); • Greater Noida – Dasna (Easter Pheripheral Expressway); and • Dasna - Meerut (NH34, old NH58)	709	11h:57m *(includes lesser sections of other Expressways)*	59.33 (approx. 60 Km/hr)
Agra Lucknow Expressway Prayagraj – Lucknow – Agra – Greater Noida – Dasna – Meerut	• Prayagraj - Lucknow (NH 30); • Lucknow – Agra (Agra Lucknow Expressway); • Agra – Greater Noida (Yamuna Expressway); • Greater Noida – Dasna (Easter Pheripheral Expressway); and • Dasna - Meerut (NH34, old NH58)	751	11h:38m *(includes maximum sections of other Expressways)*	64.55 (approx. 65 Km/hr)
NH 30 Route (no sections of expressways) Prayagraj – Lucknow – Bareilly – Rampur – Moradabad – Garhmukteshwar – Meerut	• Prayagraj - Lucknow – Bareilly (NH 30); • Bareilly – Rampur (NH 530); • Rampur - Moradabad – Garhmukteshwar (NH9); and • Garhmukteshwar - Meerut (SH14)	647	12h:53m *(does not include any sections of other Expressways)*	50.21 (approx. 50 Km/hr)

Table 4.2: Distance (in Kms) to Destination Zones from Expressway

Name of District Centres	**Origin Zones**	**Expressway Nodes (A to R)**	**Distance** *(in Kms)*	**Journey Speed** *(Km/hr)*
Saharanpur	11	A	122.0	52
Muzaffarnagar	12	A	57.7	52
Bulandshahr	13	G	86.6	42
Ghaziabad	14	C	147.0	45
Meerut	15	B	11.0	-
Noida	16	C	74.3	49
Baghpat	17	B	60.9	44
Greater Noida	18	G	131.0	41
Shamli	19	A	75.2	51
Bijnor	20	E	86.4	39
Moradabad	21	G	61.6	43
Rampur	22	I	111.0	47
Jyotiba Phule Nagar	23	E	36.1	19
Kasganj	24	I	83.4	45
Bareilly	25	I	38.9	40
Pilibhit	26	J	129.0	43
Shahjahanpur	27	J	38.6	38
Ayodhya	28	M	217.0	55
Yusuf	29	-	-	-
Hardoi	30	L	26.7	38
Kheri	31	J	138.0	42
Lucknow	32	M	71.9	58
Raebareli	33	O	26.5	44
Sitapur	34	L	98.3	42
Unnao	35	N	9.0	54
Amethi	36	N	86.0	43
Hapur	37	C	17.1	45
Sambhal	38	F	7.0	53
Amroha	39	E	36.1	19
Bahraich	40	L	200.0	44
Barabanki	41	M	109.0	52
Faizabad	42	M	217.0	55
Gonda	43	M	199.0	51
Sultanpur	44	M	218.0	57
Ambedkar Nagar	45	M	283.0	63
Shrawasti	46	L	246.0	44
Balrampur	47	L	277.0	48
Budaun	48	I	13.2	36
Chitrakoot	49	R	129.0	43
Azamgarh	50	M	350.0	51
Basti	51	M	275.0	55
Deoria	52	M	399.0	54
Gorakhpur	53	M	351.0	55
Mau	54	M	395.0	60
Siddharth Nagar	55	M	351.0	53
Mahrajganj	56	M	380.0	51
Padrauna	57	M	426.0	55
Sant Kabir Nagar	58	M	319.0	56
Hathras	59	M	304.0	68

Name of District Centres	**Origin Zones**	**Expressway Nodes (A to R)**	**Distance** *(in Kms)*	**Journey Speed** *(Km/hr)*
Ballia	60	M	473.0	58
Ghazipur	61	M	422.0	58
Jaunpur	62	R	108.0	47
Mirzapur	63	R	120.0	41
Sonbhadra	64	R	213.0	43
Varanasi	65	R	134.0	44
Sant Ravidas Nagar	66	R	81.0	47
Chandauli	67	R	163.0	43
Kushinagar	68	M	426.0	55
Lakhimpur - Kheri	69	J	138.0	42
Prayagraj	70	R	10.0	60
Fatehpur	71	O	42.4	41
Pratapgarh	72	Q	41.9	44
Kaushambi	73	R	73.0	43
Kannauj	74	L	34.6	40
Etawah	75	M	149.0	68
Farrukhabad	76	J	50.5	39
Kanpur Dehat	77	N	89.6	42
Kanpur Nagar	78	N	21.6	26
Auraiya	79	M	125.0	50
Agra	80	M	260.0	76
Aligarh	81	M	362.0	69
Etah	82	I	101.0	44
Firozabad	83	M	219.0	67
Mainpuri	84	M	179.0	74
Mathura	85	M	320.0	76
Mahamaya Nagar	86	M	295.0	69
Kanshiram Nagar	87	I	70.1	45
Lalitpur	88	-	-	-
Mahoba	89	-	-	-
Banda	90	-	-	-
Hamirpur	91	-	-	-
Jalaun	92	-	-	-
Jhansi	93	-	-	-
Other Influence States Assam, Bihar, Chhattisgarh, Chandigarh, Gujarat, Himachal Pradesh, Haryana, Jharkhand, Karnataka, Maharashtra, Madhyapradesh, New Delhi, Nepal, Odisha, Punjab, Rajasthan, TamilNadu, Telangana, Uttarakhand, WestBengal	AS, BR, CG, CH, GJ, HP, HR, JH, KA, MH, MP, NDLS, Nepal, OR, PB, RJ, TN, TS, UK, WB	-	500+	-

Table 4.3: Distance Matrix between Toll Nodes (Nodes "A" to "R") of Expressway

(Distance in Kms)

Toll Nodes	A (EW)	B (NH 58)	C (NH24 B)	D (SH 65)	E (SH)	F (MDR)	G (NH 93)	H (SH 43)	I (SH 33)	J (SH 29)	K (MDR)	L (SH 21)	M (EW)	N (NH 25)	O (NH 232)	P (NH24 B)	Q (MDR)	R (NH 19 Bypass)
A (EW)	**0**	9.030	35.600	54.800	74.340	102.600	123.500	173.700	189.650	255.380	283.070	330.170	378.350	421.200	487.600	517.730	554.400	601.300
B (NH 58)	*9.030*	**0**	26.570	45.770	65.310	93.570	114.470	164.670	180.620	246.350	274.040	321.140	369.320	412.170	478.570	508.700	545.370	592.270
C (NH 24 B)	*35.600*	*26.570*	**0**	19.200	38.740	67.000	87.900	138.100	154.050	219.780	247.470	294.570	342.750	385.600	452.000	482.130	518.800	565.700
D (SH 65)	*54.800*	*45.770*	*19.200*	**0**	19.540	47.800	68.700	118.900	134.850	200.580	228.270	275.370	323.550	366.400	432.800	462.930	499.600	546.500
E (SH)	*74.340*	*65.310*	*38.740*	*19.540*	**0**	28.260	49.160	99.360	115.310	181.040	208.730	255.830	304.010	346.860	413.260	443.390	480.060	526.960
F (MDR)	*102.600*	*93.570*	*67.000*	*47.800*	*28.260*	**0**	20.900	71.100	87.050	152.780	180.470	227.570	275.750	318.600	385.000	415.130	451.800	498.700
G (NH 93)	*123.500*	*114.470*	*87.900*	*68.700*	*49.160*	20.900	**0**	50.200	66.150	131.880	159.570	206.670	254.850	297.700	364.100	394.230	430.900	477.800
H (SH 43)	*173.700*	*164.670*	*138.100*	*118.900*	*99.360*	*71.100*	*50.200*	**0**	15.950	81.680	109.370	156.470	204.650	247.500	313.900	344.030	380.700	427.600
I (SH 33)	*189.650*	*180.620*	*154.050*	*134.850*	*115.310*	*87.050*	*66.150*	*15.950*	**0**	65.730	93.420	140.520	188.700	231.550	297.950	328.080	364.750	411.650
J (SH 29)	*255.380*	*246.350*	*219.780*	*200.580*	*181.040*	*152.780*	*131.880*	*81.680*	*65.730*	**0**	27.690	74.790	122.970	165.820	232.220	262.350	299.020	345.920
K (MDR)	*283.070*	*274.040*	*247.470*	*228.270*	*208.730*	*180.470*	*159.570*	*109.370*	*93.420*	*27.690*	**0**	47.100	95.280	138.130	204.530	234.660	271.330	318.230
L (SH 21)	*330.170*	*321.140*	*294.570*	*275.370*	*255.830*	*227.570*	*206.670*	*156.470*	*140.520*	*74.790*	*47.100*	**0**	48.180	91.030	157.430	187.560	224.230	271.130
M (EW)	*378.350*	*369.320*	*342.750*	*323.550*	*304.010*	*275.750*	*254.850*	*204.650*	*188.700*	*122.970*	*95.280*	*48.180*	**0**	42.850	109.250	139.380	176.050	222.950
N (NH 25)	*421.200*	*412.170*	*385.600*	*366.400*	*346.860*	*318.600*	*297.700*	*247.500*	*231.550*	*165.820*	*138.130*	*91.030*	*42.850*	**0**	66.400	96.530	133.200	180.100
O (NH 232)	*487.600*	*478.570*	*452.000*	*432.800*	*413.260*	*385.000*	*364.100*	*313.900*	*297.950*	*232.220*	*204.530*	*157.430*	*109.250*	*66.400*	**0**	30.130	66.800	113.700
P (NH24 B)	*517.730*	*508.700*	*482.130*	*462.930*	*443.390*	*415.130*	*394.230*	*344.030*	*328.080*	*262.350*	*234.660*	*187.560*	*139.380*	*96.530*	*30.130*	**0**	36.670	83.570
Q (MDR)	*554.400*	*545.370*	*518.800*	*499.600*	*480.060*	*451.800*	*430.900*	*380.700*	*364.750*	*299.020*	*271.330*	*224.230*	*176.050*	*133.200*	*66.800*	*36.670*	**0**	46.900
R (NH 19 Bypass)	*601.300*	*592.270*	*565.700*	*546.500*	*526.960*	*498.700*	*477.800*	*427.600*	*411.650*	*345.920*	*318.230*	*271.130*	*222.950*	*180.100*	*113.700*	*83.570*	*46*.900	**0**

Note: Distance for reverse routes shall have same diagonal values

4.2 Traffic Surveys

4.2.1 Introduction

The traffic surveys were of three main types:

(a) origin and destination surveys (which included willingness-to-pay *"stated-preference"* questions and, in one instance where this type of survey was possible, a *"revealed-preference"* survey – see below); and
(b) classified count surveys;

All three survey types were conducted in accordance with the guidelines specified in IRC 9-1972, IRC 102-1988 and IRC SP19-2001.

4.2.2 Origin and Destination Surveys

The origin and destination surveys were the most important traffic surveys - as it is from these that the **Candidate Traffic** was derived. The surveys were conducted at points close to where the proposed Expressway would intersect with the National, State and other highways/district roads and other locations from which, traffic that may eventually use the Expressway either partly or entirely. The traffic survey locations are shown on Figure 4.2 and listed on Table 4.4.

Table 4.4: Locations for Road-Side Origin and Destination (O-D) Surveys

OD.No.	Survey Location	Stretch & Road Name	Day & Date of O-D Survey
1	Siwaya Toll Booth	Muzaffarnagar - Meerut	Wednesday, 12th February 2020
2	Nizampur	Meerut - Garhmukteshwar	Friday, 6th December 2019
3	Kurkawali	Hasanpur - Chandausi	Monday, 4th November 2019
5	Nagariya	Aligarh - Etah	Wednesday, 27th November 2019
6	Khankah e Niyaziya	Aliganj - Farrukhabad	Monday, 9th December 2019
7	Samdhan	Farrukhabad - Kannauj	Wednesday, 27th November 2019
8	Bilhaur	Kannauj - Kanpur	Monday, 2nd December 2019
9	Katohan Toll Booth	Fatehpur - Prayagraj	Monday, 16th February 2020
10	Agwanpur	Bijnor - Moradabad	Friday, 29th November 2019
11	Faridpur Toll Booth	Bareilly - Shahjahanpur	Monday, 2nd December 2019
12	Nawada	Chandausi - Budaun	Thursday, 28th November 2019
13	Usawan	Budaun - Farrukhabad	Thursday, 5th December 2019
14	Shahabad	Shahjahanpur - Hardoi	Friday, 29th November 2019
15	Safipur	Bangarmau - Unnao	Wednesday, 4th December 2019
16	Semari	Unnao - Lalganj	Friday, 6th December 2019
17	Andiyari	Unchahar - Prayagraj	Tuesday, 10th December 2019

At all sites, the questions, besides *"origin"* and *"destination"*, ascertained trip purpose, type frequency, and for freight vehicles the nature of any loads and the tonnage carried.

For the purpose of analysing the data from origin and destination surveys,

(i) all of the areas on either sides of the proposed Expressway alignment were divided into 72 Zones, i.e. each on left side and right side of 18 nodes - A to R; and in order to arrive at the candidate traffic and homogeneous traffic sections for the proposed alignment of Expressway, traffic with origin and destinations in this area are considered more likely to use certain sections of the Expressway and a percentage of it that may use the entire length of the Expressway.
(ii) The rest of the areas were divided into 83 (district) Zones lying within the State of Lucknow, and into 20 Zones for other States (project influence) of India.

These zones served principally to assess the proportion of traffic that travels even less than 25 Kms using existing roads that may divert to the Expressway (refer Table 4.5).

Figure 4.2 Traffic Survey Sites

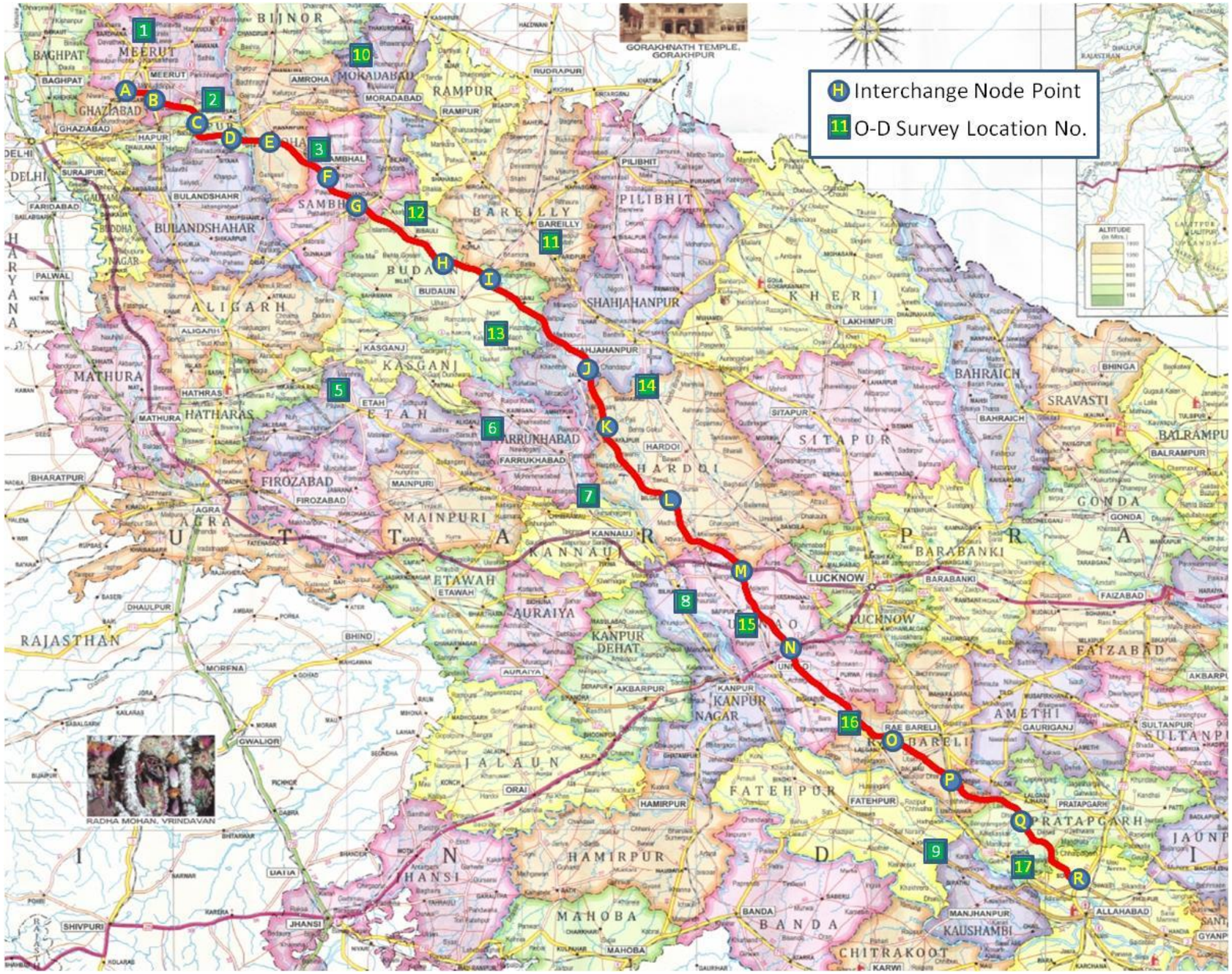


Table 4.5 Zoning Definitions

Sl. No.	Region / City / District / State	Zoning Code	Origin/Destination Villages/Places
1.	Saharanpur	11	Abdal Pur, Abdalpur, Abdalpur Up, Ananybad, Badhu, Bedhu, Bhaidpur, Bongarpur, Boral, Deoband, Deoband Up, Dhorshi, Gagoh, Gangohi, Gangohi Up, Hardakheda, Jaroda, Jaroda Up, Jharoda Up, Maqsoodpur, Marv, Punkaji, Sahanranpur, Saharanpur, Saharanpur, Saharanpur Up, Sedpur, Sharanpur, Sheikhpur, Shigna, Shiman Up, Sholda, Sholda Up, Shondi, Shopur, Sispodi, Sodkhand, Wajeerpur
2.	Muzaffarnagar	12	Baghra, Baghra Up, Bawrala, Chapar, Chaper, Chapur, Chhapar, Chhapar Up, Chittorganj, Jambalhera, Jhiyad, Johad, Khatoli, Khatoli Up, Kiranabad, Mansupur, Morna, Muzaffar Nagar, Muzaffar Nagar Up, Muzaffarnagar, Muzaffarnagar, Muzzafar Nagar, Purkaji, Sambalhera, Sambhalhera, Sapur, Shahpur, Shahpur Up, Shampur, Shapur, Sipoli, Sisholi, Sisoli Up, Sisona, Tigree
3.	Bulandshahr	13	Adainagar, Aurang, Aurangabad Up, Baharpur, Banche, Bejuee, Bhalt, Bilsuri, Binuvat, Borha, Bulandhahr, Bulandhshahr, Bulandshahr, Bulandshahr, Bulandshahr Up, Bulandshehar, Bundnio, Chawali, Dhatori, Dhaturi Up, Dibai, Dibai Up, Ganga, Ghort, Halpura, Halwani, Jahanpur, Jaharpur, Jamunanagar Up, Jehangirabad, Jehangirabad Up, Karada, Karliya, Kheja, Khurga, Khurja, Khurja Up, Kurzo, Lakhoti, Lakhoti Up, Nowganj, Noydd, Pahasu Up, Pahsu, Palsa, Plunger, Polwayi, Pousha, Really, Ridshi, Sarangpur, Shamal, Shamul, Shikapur, Shikarpur, Shikarpur Up, Sikandrabad, Vilashi, Village, Vilshi, Vilshi Up, Vinvat, Zahidpur
4.	Ghaziabad	14	Gajiyabad, Gaziabad, Gaziabad Up, Gaziyabad, Ghaziabad, Ghaziabad, Sabibabad Up, Sahibabad, Vishali
5.	Meerut	15	All, College, Daurala, Gedpur, Gorum, Has, Meerut, Meerut, Meerut Up
6.	Noida	16	Noida
7.	Baghpat	17	Baghpat
8.	Greater Noida	18	Bahtta, Bhatta, Buhtta, Greater Noida, Habibpur, Haldoni, Jhajhar, Junad, Noida, Noida Hr, Noida Up, Sambalpur, Sambhalpur
9.	Shamli	19	Shamli
10.	Bijnor	20	Akbarabad, Akbarpur Up, Akbrabad, Bangal Rawra, Bangarpul Up, Bangarpur, Berulu, Bhinor Up, Bijnor, Bijnor, Bijnore, Bijnour, Chandpur, Dhampur, Dhundhli, Dhundhlijhalu, Gurdaspur, Haldar, Jhalu, Kanth, Karabali, Kiratpur, Nagina, Najibabad, Noorpur, Qadarganj, Samshabad, Sarai, Seohara, Shadpur, Shamsabad, Shamshabad, Shashabad, Shikhora, Shungrmeda

Sl. No.	Region / City / District / State	Zoning Code	Origin/Destination Villages/Places
11.	Moradabad	21	Agwanpur, Barkheda, Barkhera, Bilari, Gherat Up, Janmot, Kandarki, Karula, Karula Up, Karulabad, Kundarki, Moradabad, Moradabad, Moradabad , Muradabad, Pakwara, Palanpur, Umri Kalan, Umrikalan
12.	Rampur	22	Ali Nagar, Alinagar, Alinagar Up, Bahapur, Bikli, Bilaspur, Degarpur, Hajitpur, Kashipur, Khau, Milak, Milock, Rampur, Rampur
13.	Jyotiba Phule Nagar	23	Jyotiba Phule Nagar
14.	Kasganj	24	Alipur, Amanpur, Badhonu, Badhun, Bahedia, Bahodia, Dariyaganj, Kasganj, Kasganj, Kashganj, Sahwar, Shahawar, Shahway
15.	Bareilly	25	Bachoom, Bachrom, Bahari, Bahedi, Baheri, Baliamirand, Baliatpur, Barali, Barapeli, Bareilly, Bareily, Bareily Up, Bareli, Bareli Up, Bareliey, Barely, Bariely, Barili, Biharipur, Billpur, Bilpur, Bilwa, Borali, Dakni, Devchara Up, Faridpur, Fatehganj Purbi, Folar, Ganj, Gatsol, Hafizganj, Izzatnagar, Jade, Jasdanpur, Kargaina, Kesarpur, Manpur, Mirganj, Mirgunj, Mokalganj, Nahoma, Nakitsy, Paiga, Parsakheda, Rafiabad, Rafiyabad, Rampura Ratan, Rampuraratan, Richha, Richola, Tajua, Tisua, Umarsia
16.	Pilibhit	26	Bebor, Bisalpur, Bishalpur, Changli, Pilibhit, Pilibhit, Pilibhit Up, Puranpur, Satipur, Shitarganj, Sitaraganj, Sitarganj, Vishalpur
17.	Shahjahanpur	27	Banisha, Banthra, Bathra, Feroz, Katra, Kattra, Khandelwal, Khutar, Khutar Up, Kurpur, Maanhila, Madnapur, Maikalganj, Mohanpur, Morena, Morewa, Nagashi, Nagasi, Nighoi, Nighroi, Nigohi, Patiana, Pedu, Rampura, Sahajanpur, Sahjanpur, Samdil, Sasanpur, Sashanpur, Shahajahnpur, Shahjahanpur, Shahjahanpur, Shahjahnpur, Shahjanpur, Shahjapur, Shahjehanpur, Tilhar, Tillor, Vashari, Vashri
18.	Ayodhya	28	Ayodhya
19.	Yusuf	29	Yusuf
20.	Hardoi	30	Atarli, Athroli, Atrali, Atroli, Bagholi, Balamau, Bharti, Gopamau, Hardoi, Hardoi, Hardoi Up, Jiman, Launi, Malechabad, Malehabad, Malihabad, Mandara, Naruganj, Pihani, Pihoni, Sahabad, Sandi, Sandila, Shabad, Shahabad, Shahbad, Shamshapur, Sondila, Tandila,
21.	Kheri	31	Kheri
22.	Lucknow	32	Agar, Atal Nagar, Behta, Bhagwaniya, Kalampur, Lucknow, Lucknow, Lucknow Up, Mohanlal Ganj, Nazirabad, Nizampur, Paliya, Samoshi, Transport Ngr, Ushmi

Sl. No.	Region / City / District / State	Zoning Code	Origin/Destination Villages/Places
23.	Raebareli	33	Aihar, Bursganj, Burshaganj, Dedaur, Kondganj, Rae, Raebareily, Raebareli, Raebareli, Raebareli Up, Raibareily, Raibareli, Raibareli Up, Raibarely, Raibariely, Raibawali, Salon, Salon Up
24.	Sitapur	34	Ailiya, Aruwa, Bandya, Benaura, Bhawana Up, Biswa, Biswan, Dewaji, Dewayi, Dewyi, Dhanayi, Diryi, Diwai Up, Diwayi, Diyi, Guzra, Itina, Kamoli, Katiya, Khairabad, Khirbad P, Kutub Nagar, Laharpur, Local Up, Maholi, Maholi Up, Maigalganj, Misrikh, Mohali, Mohali Up, Neri, Sheswan, Sindhauli, Sindhauli Up, Sitapur, Sitapur, Sitapur P, Tandua, Titapur
25.	Unnao	35	Ajgain, Azgen, Bakram, Chimor, Ganjmurkhed, Hasanganj, Hindokheda, Hinduheda, Hindukheda, Indoptan, Lakhmi, Nawab Ganj, Nawabganj, Orash, Saraon, Shrodhi, Simri, Unnao, Unnao, Vgo,
26.	Amethi District	36	Amethi
27.	Hapur	37	Badgoo, Bajooda, Garh Mukteshwar, Garhmukteshwar, Garmukteshwar Up, Hapad, Hapud, Hapur, Hapur, Hapur Up
28.	Sambhal	38	Baboala, Babrala, Dhanry, Faizapur, Jargaon, Sambal, Sambhal, Sambhal, Sambhal Up
29.	Amroha (J.P. Nagar)	39	Ampko, Amplio, Amro, Amroh, Amroha, Amroha (J.P. Nagar), Dhanora, Dharora, Didauli, Gangeshwari, Gangeshwari Up, Hashampur, Jalsurya, Jalwaray, Joya,Kalampur Up
30.	Bahraich	40	Bahraich, Bangal, Behraich, Bengal, Bichuna
31.	Barabanki	41	Bara Banki, Barabanki, Barabanki, Barabanki Up, Bheriya, Haidargarh, Haidargarh Up, Jaroli, Kotara, Mehmoodpur,
32.	Faizabad	42	Bachholi, Chirra, Faizabad, Faizabad, Faizabad Up, Kurbabad, Ranchi, Satna, Wazeerganj,
33.	Gonda	43	Gonda, Shidpur
34.	Sultanpur	44	Baranpur, Gauriganj, Goriganj, Katawabul, Nayoda, Nayrda, Rajuh, Shakhana, Sulanpur, Sultanpur, Sultanpur, Sultanpur Up, Sultanpuri, Uchhgaon
35.	Ambedkar Nagar	45	Akbarpur, Ambedkar Nagar, Ambedkar Nagar, Malipur, Ravi, Ravipur, Warora
36.	Shrawasti	46	Shrawasti
37.	Balrampur	47	Balrampur, Deonagar, Kamda, Vithar
38.	Budaun	48	Aapna, Adhapur, Alapu, Aldarmali, Allapur, Badaan, Badam,

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			Badaun, Badayu, Badayun, Badhayun, Barahkalan, Bilhar, Bilhari, Bilhawad, Bilshi, Bilsi, Bisli, Budaun, Chiroli, Deputa, Diblai, Gaawan, Gaawana Up, Gauram, Gavan, Gawan, Gennor, Ginnor, Ginnor Up, Gonar, Guneer, Gunnoor, Hoista, Jharpur, Kakarala, Kakrala, Kokrala, Kurau, Mek, Mev, Miahu, Mithu, Myau, Narora, Narorda, Osawa, Palaw Sarai, Ramghat, Ramghat Up, Risrodi, Sahaswan, Sane, Sasman, Saswan, Seshwan, Shanpur, Shrugimo, Singhpur, Singpur, Thanugadi, Ughani, Ujhani, Usawa, Usawan, Usawat, Uset, Velopur, Workapur, Yenor
39.	Chitrakoot	49	Chitrakoot, Manikpur
40.	Azamgarh	50	Azamgarh, Azamgarh, Gopalpur, Kamhepur, Kasba, Madia, Newada, Pihargaon, Vidhyapur,
41.	Basti	51	Bahanpur, Basti, Budhiya, Karza, Khatiyar,
42.	Deoria	52	Bagra, Deoria, Deoria, Gohari, Gohri, Guhari, Madanpur,
43.	Gorakhpur	53	Gorakhpur, Gorakhpur, Gorakhpur Up, Mahu,
44.	Mau	54	Kasari, Kawala, Mau, Mau Up, Paligarh, Siura, Udarn,
45.	Siddharth Nagar	55	Banshi, Bansi, Bansy, Bhatal, Bhatul, Bhutal, Kesar, Kusawa, Santa, Siddharth Nagar,
46.	Mahrajganj	56	Dashrathpur, Farendu, Mahrajganj
47.	Padrauna	57	Padrauna
48.	Sant Kabir Nagar	58	Sant Kabir Nagar, Upraudh, Uprauth
49.	Hathras	59	Hasayan, Hasayan Up, Hathras, Hathras, Hathras Up, Khati, Murasa, Pashayan, Piprama
50.	Ballia	60	Azahar, Azhar, Baliya, Ballia, Balliya, Bori, Bouri, Khari, Ujair,
51.	Ghazipur	61	Badorose, Chhatarpur, Firozpur, Gazipur, Ghazipur, Kurshyaganj, Malikpur, Mohamadabad, Mohammadabad, Raipur, Saidpur, Sonwal, Tajpur,
52.	Jaunpur	62	Ambikapur, Bithar, Bithor, Faridabad, Jaunpur, Jaunpur, Jaunpur Up, Jhampur, Jhanpur, Jonpur, Kalapur, Kanhapur, Machhlishahar,
53.	Mirzapur	63	Chunaar, Chunar, Dauhya, Daulatpur, Gopiganj, Gyanpur, Kanhaipur, Khalapur, Mirzapur, Mirzapur,
54.	Sonbhadra	64	Kewal, Renukoot, Robatsganj, Robitsganj, Sonbhadra, Sonpat,
55.	Varanasi	65	Badoh, Ballabhpuram, Banaras, Banaras Up, Behaura, Bhainsa,

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			Gul, Gula, Gulab Bagh, Kash, Pahladpur, Ramnagar, Ramnau, Varanasi, Varanasi, Varanasi Up,
56.	Sant Ravidas Nagar	66	Bhadohi, Bhadoni, Darwaji, Darwashi, Darwayi, Dhavarsi, Dhawarasi Up, Dhawarsi, Dorwyi, Sant Ravidas Nagar,
57.	Chandauli	67	Besila, Candoli, Chandauli, Chandauli, Chandauli Up, Chandoli, Kamalpur, Kamalpur Up, Mugalsarai, Mughal Sarai, Mughalsarai, Pathhan,
58.	Kushinagar	68	Kushinagar
59.	Lakhimpur - Kheri	69	Bhuria, Darra, Gokarnath, Gorakhnath, Islamabad, Jangbahadur Ganj, Jangbahadurganj, Khiri, Khitai Up, Lakhimpur, Lakhimpur - Kheri, Lakhimpur Kheri, Lakhimpur P, Mahdi, Mailani, Mailani Up, Mirpur, Mohamadi, Nigasan, Pilia, Piliya, Pillya, Sarkhanpur
60.	Prayagraj	70	Allahabad, Allahabad, Allahabad Up, Allahapur, Allahpur, Andheridham, Basahi, Bhatoripura, Billhore, Chalapurgaon, Dhanupur, Fafaamor, Fulbattis, Handia, Handiya, Jeri, Jhusi, Kadhabool, Kareli, Katayali, Mahjapur, Meerganj, Mollawa, Naini, Phaphamau, Phoolpur, Phophamau, Prayagraj, Prayagraj Up, Sahjadpur, Sirsa, Soraon, Surabgaon
61.	Fatehpur	71	Ajhawa, Ajhuwa, Bahua, Bilanda, Bindhki, Bindki, Binki, Budwan, Fatehpur, Fatehpur, Fatehpur Up, Hardoan, Hardod, Haswa, Iskuri, Jakhmi, Katagham, Katogham, Khaga, Khajuha, Kodarpur, Kora Jahanabad, Kotagham, Maharajpur, Malwan, Malwan Up, Mannikheda, Pichhuli, Pilhi, Raiwardi, Rewari, Sauran, Tharian, Thariaon, Vidhki
62.	Pratapgarh	72	Aghiya, Ajhar, Ajhar Up, Basauli, Kashar, Kunda, Patava, Pati, Pratapgarh, Pratapgarh, Rakha, Rakri
63.	Kaushambi	73	Bariya, Bharwari, Chail, Daranagar, Devrand, Dolchi, Karari, Kasiya, Kaushambi, Mandook, Manoharganj, Moradpur, Saraibhajitamal, Sirathu, Sirothu, Sitahu
64.	Kannauj	74	Anash, Annajj, Arash, Bidai, Chhipra, Chhipramau, Chibramau, Garshayera, Gathoshi, Gatoshi, Ghosar, Gotashi, Gursaganj, Gursahaiganj, Gursaiganj, Gursarai, Gurusaiganj, Guthashi, Jaryapur, Kadhaganj, Kadhganj, Kahukawad, Kandganj, Kannauj, Kannauj, Kannauj Up, Kannoj, Kannoz, Khudaganj, Kodaganj, Kundaganj, Ladhar, Locla, Majhana, Makanpur, Makhanpur, Mushyna, Sahmadhan, Samdhan, Shadhan, Shamdhan, Shandhan, Sirdi, Sirli, Sudaganj, Sundhan, Talgram, Terara, Terru, Uncha
65.	Etawah	75	Aman, Aorema, Aroj, Aroz, Balarayi, Balragi, Balrai, Balrai Up, Balraji, Balrayi, Balruji, Balryi, Bedpur, Bedpura, Bharthana Up, Chithbhaon, Dhamua, Dhanua, Etawa, Etawa

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			Up, Etawa Upq, Etawah, Etawah, Etawah Up, Jaswant Nagar, Jaswant Nagar Up, Jefayi, Karawani, Kewala, Nowali, Saifai, Saifai Up, Sarai Bhopat Up, Saryi Bhopat, Sefayi, Suryibhopat, Udhampur, Udrampur,
66.	Farrukhabad	76	Amritpur, Atena, Barshayaganj, Basili, Borili, Chiwarmau, Chiwramal, Daltun, Dursamganj, Farrukhabad, Farrukhabad, Farrukhabad Up, Fatehgarh, Geari, Geri, Gueri, Jarari, Kalan, Kalantar, Kamalganj, Kamganj, Kayamganj, Kharsuiya, Kudaganj, Roshan, Roshanabad, Roshnabad, Sagar, Sagaria, Saraiadhhar, Saraighat, Sarraiadhar, Tathiya, Tatia
67.	Kanpur Dehat (Rural)	77	Anti, Bara, Bihari, Kakwan, Kanpur Dehat Rural), Kokwan, Rajpura, Ramiya, Rania, Raniya, Raniya Up, Rasulabad, Roniya, Sarayan, Sukhabad
68.	Kanpur Nagar	78	Amiliha, Amiliya, Araul, Atrapuri, Bakathi, Bakedi, Bakhuti, Bakodi, Bakothi, Barra, Barro, Bihaur, Bilhaur, Bilhore, Billore, Bilohre, Chobepur, Chorepur, Dalhai, Dehrampur, Ghimau, Gimau, Harshnagar, Hathipur, Kalyanpur, Kamri, Kanpur, Kanpur Nagar, Kanpur Up, Karachi Khana, Koriya, Korliya, Mandhana, Manthana, Manthna, Monthana, Naramau, Nison, Pilar, Pormi, Prempur, Ramaipur, Rawatpur, Roma, Rooma, Sarsaul, Shivrajpur, Shubhampur, Shuklapur, Suklaganj, Tatiyaganj, Tatyaganj, Udetpur, Udetpur Up,
69.	Auraiya	79	Amla, Aoraiya, Aoraiya Up, Aorya, Auraiya, Auraiya, Babarpur, Bidhuna Up, Bidona, Billawa, Bithona, Houriya, Oraiya, Oriya, Vidhana
70.	Agra	80	Agra, Agra, Agra Up, Amritpuri, Bamdha, Barham, Barhanshi, Beelpura, Bidhari, Bordi, Fatehabad, Fatehpur Sikri, Gajol, Sakganj, Shahganj, Sirauli, Siroli
71.	Aligarh	81	Aligarh, Aligarh, Aligarh Up, Barauli, Bharatpur, Bharatpur Up, Bhartpur, Bidhana, Dudpur, Ekri, Enkri, Harduaganj, Harduaganj P, Jalali Up, Jalalpur, Jatpur, Jatpura, Jidali, Jilali, Kankit, Kannore, Kasimpur, Khair, Khair Up, Lathgarh, Madrak, Madrak Up, Malhapur, Manai, Manai Up, Manesar, Purhan, Shiddha, Siddha, Siddhu, Singhar, Vishanpur
72.	Etah	82	Ahmadpur, Aliganj, Barigo, Barigo Up, Baringo, Barthar Up, Barther, Bather, Bathore, Borthor, Burigo, Dharra, Eta Up, Etah, Etah, Etha, Ganjdulware, Jaithara, Jaythara, Khatia, Khera, Kishangarh, Local, Malawan, Manjhana, Miyau, Myuni, Nagriya, Nogriya, Paringo, Patiyali, Patyali, Pilua, Pilua Up, Pilwa, Pinoa, Salali, Sarni, Saroni, Sidhpura, Sunashi, Sunshi, Yamuna
73.	Firozabad	83	Asfabad, Bilahna, Bilahna Up, Dabrai, Darayi, Darbai, Durbai, Fathgyi, Firojabad Up, Firozabad, Firozabad, Firozabad Up, Jaithgyi, Jashrama, Jasrana, Jasrana Up, Jathgyi, Nilhoma,

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			Parham, Parham P, Paruji, Sargai, Satgai Up, Sathgyi, Sershaganj, Shatgay, Shekhoyabad, Shersaganj, Shikhobad, Shikhohabad, Shikohabad, Shikohabad Up, Sikohabad, Sirlaganj, Sirsaganj, Sirsaganj Up, Undani, Undani Up, Undashi
74.	Mainpuri	84	Andani, Barnahal, Barnal Up, Chandpura, Karahal Up, Karalia Up, Karhal, Kurawali Up, Kurwali, Mainpuri, Mainpuri, Muimpuri, Nayagaon, Pakhna, Udham, Udhan, Udhanaj
75.	Mathura	85	Badhon, Barshna, Dehgaon, Dolatpur, Mathura, Mathura, Mathura Up, Nagaria, Nagariya, Naroli, Naroli Up, Nawali, Palar, Sankit Up, Semari, Semri,
76.	Mahamaya Nagar	86	Mahamaya Nagar (Hathras)
77.	Kanshiram Nagar	87	Kanshiram Nagar (Kasganj)
78.	Lalitpur	88	Bhadramandi, Lalitpur, Nagda
79.	Mahoba	89	Mahoba, Mahoba, Mahoba Up
80.	Banda	90	Banda, Manipur
81.	Hamirpur	91	Atra, Bebar, Beobar, Bewar, Bilga, Bilgaon, Hamirpur, Hamirpur, Orath, Sumerpur
82.	Jalaun	92	Bigapur, Bijapur, Bilua Up, Chandawali, Chandola, Chandwali, Chanuwali, Jalaun, Kalpi, Kosba, Kudhod, Orai, Orai Mp, Rewa
83.	Jhansi	93	Bijoli, Bukhara, Jhansi, Jhansi, Katera, Lalitpur, Launda, Sajjanpur
84.	Node A Left South	AL1	Johiri,
85.	Node A Left North	AL2	Kirwa, Modi Nagar, Modinagar, Mohannagar, Nabali, Nabli, Partapur, Sheyana Up, Simana Up, Siwai Up, Siyana, Siyana Up, Siyna
86.	Node A Right South	AR1	Ganela, Jaani, Jani, Jani Up, Khore, Khori,
87.	Node A Right North	AR2	Baralwad, Bodha, Budana, Budhana, Budhana Up, Budhna, Khiwai, Khiwai Up, Khiwaji, Khiwayi, Khiwyi, Lakhwa, Mator, Pohli, Samli, Shamoli
88.	Node B Left South	BL1	Bana, Bharala, Gokalpur, Gokulgaon, Gokulpur, Gokulpur Gaon, Nagli Sadharan
89.	Node B Left North	BL2	Dohrala, Dorala, Dordla, Dorla, Dortal, Dorula, Medpur Up, Murlipur, Murlipur Up, Rahsa, Ruhasa, Sakaveti, Sakoti,

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			Sardhana, Sardhana Up, Sarthana Up, Sirdhana, Ukawa
90.	Node B Right South	BR1	Chatri
91.	Node C Left South	CL1	Baksar
92.	Node C Left North	CL2	Mukteshwar, Nanpur
93.	Node C Right South	CR1	Sikhera
94.	Node C Right North	CR2	Babugarh, Madhapur
95.	Node D Left South	DL1	Aali Nagar, Gaaran Up, Kheda
96.	Node D Left North	DL2	Bhaina Up, Dholpur, Hastinapur, Nagli, Nawana Up, Nigli, Salonda
97.	Node D Right South	DR1	Bagrasi, Bugrasi, Bugrasi Up
98.	Node D Right North	DR2	Shiyna
99.	Node E Left South	EL1	Hasanpur, Hasanpur Up, Hashanpur, Hashpur, Rajabpur, Rajabpur Up, Ujhari, Ujhari Up
100.	Node E Left North	EL2	Galshua, Gulsua, Naagli
101.	Node E Right South	ER1	Bhavarsi
102.	Node E Right North	ER2	Gagrola, Gajaraula, Gajrala, Gajratola, Gajraula, Gajrola, Gajrola Up, Garola, Gazota, Gazrolla, Gorula
103.	Node F Left South	FL1	Saraitarin, Sirsha, Sirshi, Sirsi
104.	Node F Left North	FL2	Asmoli, Dehpa, Sujatpur, Syed Nagri
105.	Node G Left South	GL1	Baniyakhera, Chandausi, Chandausi Up, Chandoshi, Chandoshi Up, Chandosi, Chandroshi, Faizganj, Faizgaon, Nehta
106.	Node G Left North	GL2	Afzalpur, Afzalpur Up, Akroli, Narauli, Pawas, Pawsa, Pawsa Up, Sarthal
107.	Node G Right South	GR1	Bahjai, Bahjoi, Bahroi Up, Behjayi, Bejoi, Islam Nagar, Islamnagar, Islamnagar Up, Naroda, Naroda Up
108.	Node H Left North	HL2	Bisauli, Bisolee, Bisoli, Karanpur, Raheria, Raherial, Raheriya, Sureni, Urari, Vajirganj, Wajeerganj, Wazirganj
109.	Node I Left South	IL1	Binarar, Binawar Up, Dataganj, Dhakka, Kanshi, Narka Patta, Narkheda

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110.	Node I Left North	IL2	Aonia, Aonla, Aowla
111.	Node I Right North	IR2	Kuthiya
112.	Node J Left North	JL2	Muzaffarpu,Muzaffarpur
113.	Node J Right South	JR1	Dahena, Dhena, Jalalabad
114.	Node J Right North	JR2	Dasiya, Sakhanu
115.	Node K Left South	KL1	Pali
116.	Node K Left North	KL2	Akri
117.	Node K Right South	KR1	Baron, Baroun
118.	Node K Right North	KR2	Allaganj, Allganj
119.	Node L Left South	LL1	Sanjalhera
120.	Node L Right South	LR1	Bilgram, Billgram
121.	Node L Right North	LR2	Panthora, Panthro,
122.	Node M Left South	ML1	Kulha,
123.	Node M Left North	ML2	Gosganj, Goshganj, Mallawa, Mallawan, Mallowa,
124.	Node M Right South	MR1	Bagarmau, Bagarmaw, Bangarmau, Bangarmuva, Darola, Ugo, Ugu,
125.	Node M Right North	MR2	Aazmen, Parmi, Raghpur
126.	Node N Left South	NL1	Katha
127.	Node N Left North	NL2	Chagalwanshi, Jagdahpur, Jagdishpur
128.	Node N Right South	NR1	Achalganj,Acharganj, Anuppur, Badarka, Gandhinagar
129.	Node N Right North	NR2	Bethor, Safipur, Supipur
130.	Node O Left North	OL2	Fatehganj, Gonamau
131.	Node O Right South	OR1	Dalamun, Dalmau, Dolmau, Dolmoon, Domau, Kaammau, Korihara, Lalganj, Lalganj Up, Raithana
132.	Node O Right North	OR2	Akthi, Augadh, Bighapur, Bighpur, Bihar, Bihargaon, Kushela, Lakhyapuri, Lakshipur, Lalkua, Lalkuan, Pidua, Poova, Sareni, Takiya
133.	Node P Left	PL1	Bhikh, Parhari, Unchahar

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	South		
134.	Node P Left North	PL2	Bhena
135.	Node Q Right South	QR1	Barai, Bhulsa, Chakerhum, Intaura, Mangarh
136.	Node Q Right North	QR2	Pariyawaan, Pariyawan
137.	Node R Left North	RL2	Kharga, Kurga, Mendara, Raiya
138.	Node R Right South	RR1	Bajha
139.	Node R Right North	RR2	Anapur, Bedhan, Deeha, Dheemi, Dhophamau, Kasimpur Jharha, Kaurihar, Lalgopalganj, Lankapuri
140.	Assam	ZAS	Assam, Goahati, Guwahati, Guwahati Ms, Katoni, Sonali Bodar, Varywer
141.	Bihar	ZBR	Gaya, Patna, Patna Bihar, Patna Br, Purni, Purniya, Siwan, Aurangabad, Aurangabad , Aurangabad Br, Baliya Br, Bedhna, Bhagalpur Uk, Chandi, Gopalganj, Hatwa, Kewla, Kishanganj, Kishanganj Br, Kosiya, Lohni, Mourawan, Nalanda, Ramapur, Renukoot Br, Sarh, Sasaram, Vithoma
142.	Chattisgarh	ZCG	Bhilai Cg, Bilaspur Cg, Bilhama, Bilhma, Chhattisgarh, Danyo, Korba Cg, Merai, Pithora, Raipur Cg
143.	Chandigarh	ZCH	Chadigarh Up, Chandigarh, Chandigarh Ch, Chandigarh Cn, Chandigarh Pb
144.	Gujarat	ZGJ	Gujrat, Jamnagar, Kambola, Khangan
145.	Himachal Pradesh	ZHP	Baddi, Himachal, Kalka, Kulu Manali, Kunala, Manaji, Nalagarh Hp, Shimla, Shimla Hp, Simla, Solan Hp
146.	Haryana	ZHR	Ambala, Ambala Pb, Badrai, Banaas, Bidhuki, Bidhuwa, Damla, Dehya, Gurgaon, Gurgaon Hr, Gurugram, Gurugram Up, Haryana, Hisar Hr, Jatoli, Jhajjar, Jindi, Jondhan, Kaithla, Karnal, Karnal Hr, Kundal, Kurnal, Kurukshetra, Malram, Malran, Milkpur, Narayangarh Hr, Palwal Hr, Panipat, Panipat Hr, Punchkula, Rohtak, Sonipat, Tarolikheda, Yamuna Nagar, Yamuna Nagar Up, Yamunanagar, Yamunanagar Hr
147.	Jharkhand	ZJH	Bagodar, Bokaro, Chaibasa, Dhanabad, Dhanbad, Dhanbad Jh, Hazaribagh, Jamshedpur, Jharkhand, Kandi, Katbhori, Ranchi Jh
148.	Karnataka	ZKA	Mangalore
149.	Maharashtra	ZMH	Daund, Jaywant Nagar, Nagpur, Porla, Pune Mh, Walwan, Mumbai Mh
150.	Madhya Pradesh	ZMP	Bhind, Bhind Mp, Bhojipura, Bhopal, Bhopal Mp, Bijawar, Chanderhi, Chhatarpur Mp, Dhyanpur, Dochara, Gwalior,

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			Harda, Ichhapur, Jabalpur, Jabalpur Mp, Jaranpur, Kajroda, Kannod, Kannod Up, Kardiya, Kasrawad, Katni, Katni Mp, Khatiya, Khumar, Kudpur, Orchhi, Piyani, Piyon, Rewa Mp, Satna Mp, Shajapur, Shihuda, Shivpuri, Shivpuri Mp, Udabi, Udani, Udhani, Udhyani, Ujhawan, Urai Mp
151.	New Delhi	ZNDLS	Anand Vihar, Delhi, Delhi Dl, Kabil, Mangla Sahab, New Delhi, Polar
152.	Nepal	ZNEPAL	Amritganj, Znepal
153.	Orissa	ZOR	Bhuwaneshwar, Cuttack, Odisha, Penga, Pikla, Salipur
154.	Punjab	ZPB	Amritsar, Amritsar Pb, Hoshiarpur, Jalandhar, Jalandhar Pb, Ludhiana, Ludhiana Pb, Ludhiyana, Manyi, Pathan, Pathankot, Patiala, Patiali, Patiyala, Punjab
155.	Rajasthan	ZRJ	Ajmer, Bagroli, Bhavri, Bundi, Chittorgarh Rj, Dholpa Rj, Hathipura Rj, Jaipur, Jaipur Rj, Jakhoni, Karawali Up, Mandhawa, Mandhawan, Nareyli, Nayala, Puriya, Shekhawad, Sinhli Agir, Sinhli Jagir Up, Thakri
156.	Tamil Nadu	ZTN	Tamil Nadu
157.	Telangana	ZTS	Secunderabad
158.	Uttarakhand	ZUK	Aldwani, Almoda, Almora, Almora Uk, Aroli, Badrinath, Bharli, Budhan, Chamoli, Chamoli Uk, Champavat, Chan, Chayli, Deban Uk, Dehradoon, Dehradoon Uk, Dehradun, Dehradun Uk, Devprayag, Dewan Uk, Dhella, Dohalam, Dohra, Donda, Haldwani, Haldwani Uk, Ardiwar, Haridwar, Haridwar Uk, Hariyali, Hridwar, Joshi, Joshimath, Karbali, Kathiya, Kedarnath, Khandila, Khatar, Khoatar, Lalkuan Uk, Maneshwar, Masoori, Masoorie, Mosari Uk, Moshri Uk, Nagoli, Nagoria, Nainital, Nainital Uk, Nehu, Pilighoti, Piran Kaliya, Piran Aliyar, Pirankalihar, Pithoragarh, Pithoregarh, Purthi, Puthri Up, Rachna Up, Ranikhet, Ranikhet Uk, Ranikot Up, Rishikesh, Roorkee, Roorkie, Roorkie Uk, Roorkie Up, Rudrapr, Rudraprayag, Rudrapur, Rudrapur Uk, Sawa, Srinagar, Srinagar Uk, Tanakpura, Uttar Ashipur Uk, Uttarakhand, Uttarkashi, Uttarkashi Uk
159.	West Bengal	ZWB	Akharpur, Asansole, Darjelling, Doband, Kadarpur, Kharagpur Wb, Khibayi, Khirai, Kolkata, Kolkata (Wb), Kolkata Wb, Siligudi, Siligurhi, Siliguri, Unab

4.2.3 Classified Count Surveys

The principal purpose of the classified count surveys on Traffic Survey Locations (existing alternate roads to the proposed Expressway), was to establish Expansion Factors for the origin and destination data – thus permitting to establish average daily traffic flows.

4.2.3.1 Average Daily Traffic

Seven-day count using video coverage was undertaken on National Highways/State Highways/Major District Roads where Road Side Origin-Destination Surveys were carried out – results **(Average Daily Traffic - ADT**) are shown on Tables 4.6 and detailed counts at each location are provided in Appendix.

The survey form, divided vehicles into the normal classifications for such surveys in India. The larger trucks were, however, further divided into following sub-categories:
(a) 2-axled truck;
(b) 3-axled truck;
(c) 4+ axled vehicles (Multi Axle Vehicle- MAV)

This latter category MAV, although frequently observed at present, can be expected to grow in importance once the Varanasi Port[1] becomes fully operational and it is possible to assess whether, or not, it would be appropriate to charge such vehicles a higher toll.

The classified counts were undertaken at the same locations as the origin and destination surveys and were for periods which incorporated the days in which the origin and destination surveys were undertaken. The classified count information, besides providing the above-referred to expansion factors, was used to indicate the hours of the week that might be categorised as:
(a) *"peak"*;
(b) *"shoulders"* to the peak; and
(c) *"off-peak"* periods.

These are important data, needed when calculating likely journey time-savings and vehicle operating cost savings. When congestion is less on Expressways comparatively, a smaller proportion of through-traffic will be prepared to pay tolls.

A summary of the variations in flow by direction is also shown on Table 4.7. There is very little difference in the pattern of in-bound and out-bound flows (to Fatehpur / to Prayagraj) and, for this reason, all further analyses are in terms of total two-directional flows. The division of the hours of the week into these 3 periods is shown on Table 4.8 and summarised below:

(a) *"Peak"* hours: 08:00 to 18:00 (70 hours total per week)
(average two-way flows on the NH19 (old NH2) near Katoghan Toll Plaza are **1515 vehicles/hour,** i.e. ***average peak hour factor of 5.74%*****)**

(b) *"Shoulder"* hours: 07:00 to 08:00 & 18:00 to 01:00 (56 hours total per week)
(average two-way flows on the NH19 (old NH2) near Katoghan Toll Plaza are **959 vehicles/hour,** i.e. ***average shoulder factor of 3.63%*****)**

(c) *"Off-Peak"* hours: 01:00 to 07:00 (42 hours total per week)
(average two-way flows on the NH19 (old NH2) near Katoghan Toll Plaza are **599 vehicles/hour** i.e. ***average off-peak hour factor of 2.27%***).

The time divisions are assumed to be the same for all sections of the proposed Expressway.

[1] **Varanasi Multi-Modal Terminal** or **Varanasi Port** is an Inland river port situated in the city of Varanasi, Uttar Pradesh. The port is located on the River Ganga. This port is built under the central government's **Jal Marg Vikas** project. The port has provided a direct link with the Port of Kolkata and Haldia Port

Table 4.6: Average Daily Traffic (ADT) on Existing Alternate Roads

(7-day Average)

Vehicle Classification			PCU Factor	Muzaffarnagar – Meerut	Aligarh - Etah	Aliganj - Farrukhabad	Farrukhabad - Kannauj	Kannauj - Kanpur	Budaun - Farrukhabad	Meerut - Garhmukteshwar	Hasanpur - Chandausi	Chandausi - Budaun	Bijnor - Moradabad	Bareilly - Shahjahanpur	Shahjahanpur - Hardoi	Bangarmau - Unnao	Unnao - Lalganj	Unchahar - Prayagraj	Fatehpur - Prayagraj
Passenger Vehicles	Two Wheeler		0.5	**5380**	1750	2813	3569	2723	1776	3683	2285	3453	7080	**9565**	3514	6026	2838	6245	3162
	Three Wheeler		1.5	**877**	605	124	658	415	87	695	254	212	934	**1749**	347	362	74	586	300
	Car/Van/ Jeep		1.0	**12525**	736	679	1921	2444	964	4879	855	2027	5179	**5976**	2476	2163	1282	4632	3094
	Mini Bus		1.5	**21**	4	18	9	35	7	11	8	7	39	**21**	19	31	3	52	32
	Bus		3.0	**1253**	541	37	75	249	244	430	202	278	581	**578**	197	191	210	490	469
Govt. & Others Vehicles	Tempo/ LCV		1.5	**1048**	346	226	344	795	315	842	510	707	745	**1794**	783	742	618	956	1274
	Commercial Vehicles	2 Axle	3.0	**484**	1061	73	85	853	430	599	164	456	263	**1509**	231	280	493	448	1033
		3 Axle	3.0	**325**	1066	50	90	877	438	561	176	447	283	**1453**	392	491	501	656	1062
		M-Axle	4.5	**665**	826	138	146	972	454	481	152	509	143	**2375**	467	606	778	1171	2464
Agricultural Vehicles	Tractor		1.5	**20**	26	17	17	20	31	48	26	50	43	**26**	28	38	20	34	13
	Tractor with Trailer		4.5	**71**	82	139	99	103	151	250	250	282	325	**206**	243	111	37	356	89
Passenger Vehicles	Cycle		0.5	**42**	152	950	357	239	286	385	82	500	125	**527**	835	500	570	501	151
	Cycle Rickshaw		2.0	**11**	2	0	0	0	9	23	3	7	26	**0**	0	0	0	0	11
Goods Vehicles	Animal Drawn	Bullock Cart	8.0	**0**	2	13	10	1	24	50	0	6	14	**84**	30	16	17	47	0
		Horse	8.0	**0**	3	0	0	0	35	0	0	24	11	**0**	0	0	0	0	0
	Hand Cart		3.0	**0**	0	0	0	0	1	0	0	1	1	**0**	0	0	0	0	0
	Other (Pl. Specify)		2.0	**24**	10	0	3	6	17	28	7	14	42	**29**	31	1	9	3	16
Total Vehicles (Nos.)				**22749**	**7212**	**5277**	**7383**	**9733**	**5269**	**12966**	**4974**	**8980**	**15833**	**25892**	**9594**	**11558**	**7449**	**16178**	13170
Total Vehicles (PCUs)				**27761**	**15313**	**4975**	**7364**	**16617**	**9240**	**17867**	**6692**	**12859**	**17245**	**39371**	**12376**	**13428**	**11487**	**22484**	26414

Note: Data may not add up to the total due to rounding.

Table 4.7: Average Daily Traffic (ADT) Direction Flows on NH19 (old NH2) (near Katoghan Toll)

(7 day Average)

Vehicle Classification			PCU Factor	Prayagraj to Fatehpur	Fatehpur to Prayagraj	Both Directions
Passenger Vehicles	Two Wheeler		0.5	1686	1476	3162
	Three Wheeler		1.5	154	146	300
	Car/Van/ Jeep		1.0	1633	1461	3094
	Mini Bus		1.5	16	16	32
	Bus		3.0	233	236	469
Govt. & Others Vehicles	Tempo/ LCV		1.5	640	634	1274
	Commercial Vehicles	2 Axle	3.0	520	513	1033
		3 Axle	3.0	535	527	1062
		M-Axle	4.5	1239	1225	2464
Agricultural Vehicles	Tractor		1.5	8	5	13
	Tractor with Trailer		4.5	42	47	89
Passenger Vehicles	Cycle		0.5	85	67	151
	Cycle Rickshaw		2.0	5	6	11
Goods Vehicles	Animal Drawn	Bullock Cart	8.0	0	0	0
		Horse	8.0	0	0	0
	Hand Cart		3.0	0	0	0
	Other (Pl. Specify)		2.0	11	5	16
Total Vehicles (Nos.)				**6807**	**6364**	**13170**
Total Vehicles (PCUs)				**13406**	**13008**	**26414**

Note: Data may not add up to the total due to rounding.

Table 4.8 Hourly PCUs Variation over the Week on NH19 (old NH2) (near Katoghan Toll)

(Total No. of Vehicles per hour)

Date & Hour of Day	17-02-20	18-02-20	19-02-20	20-02-20	14-02-20	15-02-20	16-02-20	7 – Day Average
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
00:00 - 01:00	722	802	876	698	839	924	790	807.3
01:00 - 02:00	*766*	*699*	*853*	*559*	*638*	*766*	*651*	*704.4*
02:00 - 03:00	*682*	*535*	*831*	*478*	*608*	*718*	*482*	*619.1*
03:00 - 04:00	*635*	*471*	*662*	*424*	*566*	*644*	*465*	*552.4*
04:00 - 05:00	*568*	*424*	*494*	*664*	*484*	*548*	*399*	*511.4*
05:00 - 06:00	*512*	*439*	*639*	*677*	*393*	*417*	*738*	*545.0*
06:00 - 07:00	*748*	*674*	*648*	*611*	*615*	*624*	*707*	*661.0*
07:00 - 08:00	946	889	848	841	784	886	868	866.0
08:00 - 09:00	**1427**	**1554**	**1428**	**1586**	**1600**	**1510**	**1513**	**1516.9**
09:00 - 10:00	**1382**	**1507**	**1428**	**1566**	**1466**	**1600**	**1451**	**1485.0**
10:00 - 11:00	**1475**	**1627**	**1543**	**1581**	**1569**	**1505**	**1485**	**1540.7**
11:00 - 12:00	**1354**	**1460**	**1327**	**1388**	**1339**	**1365**	**1318**	**1364.4**
12:00 - 13:00	**1486**	**1493**	**1610**	**1569**	**1607**	**1592**	**1524**	**1554.4**
13:00 - 14:00	**1377**	**1495**	**1427**	**1552**	**1549**	**1542**	**1561**	**1500.4**
14:00 - 15:00	**1499**	**1403**	**1445**	**1322**	**1418**	**1499**	**1380**	**1423.0**
15:00 - 16:00	**1557**	**1581**	**1591**	**1524**	**1622**	**1475**	**1591**	**1563.0**
16:00 - 17:00	**1474**	**1727**	**1307**	**1690**	**1843**	**1761**	**1750**	**1650.3**
17:00 - 18:00	**1305**	**1753**	**1676**	**1650**	**1645**	**1536**	**1313**	**1554.0**
18:00 - 19:00	1256	1273	1343	1086	972	1095	1186	1173.0
19:00 - 20:00	991	946	1019	1030	1085	1007	928	1000.9
20:00 - 21:00	911	1006	1048	1532	803	867	946	1016.1
21:00 - 22:00	1055	998	959	1180	1116	1081	912	1043.0
22:00 - 23:00	1057	804	1017	826	943	883	891	917.3
23:00 - 24:00	975	844	878	730	811	866	811	845.0
Total (24 hr PCUs)	**26,154**	**26,399**	**26,890**	**26,757**	**26,310**	**26,708**	**25,655**	**26,414**
Avg. Peak Hr. Traffic	1433	1560	1478	1543	1566	1538	1488	**1515**
Peak Hour Factor	5.48%	5.91%	5.50%	5.76%	5.95%	5.76%	5.80%	**5.74%**
Avg. Shoulder Traffic	989	945	998	990	919	951	916	959
Shoulder Hour Factor	3.78%	3.58%	3.71%	3.70%	3.49%	3.56%	3.57%	3.63%
Avg. Off-Peak Hr. Traffic	652	540	688	569	550	619	573	599
Off Peak Factor	2.49%	2.05%	2.56%	2.12%	2.09%	2.32%	2.24%	2.27%

Note: Data may not add up to the total due to rounding.

4.2.3.2 Past Traffic Data

Review of Literature: Past Traffic data has been collected from Toll Plaza at Sasaram on NH19 (old NH2) and its vehicle wise data area shown on Table 4.9.

Table 4.9: Annual Average Daily Traffic on NH19 (old NH 2)
Vehicle Type: Car+Jeep+Van (CJV)

Month	2011	2012	2013	2014	2015	2016	2017
Jan	0	1971	2248	2204	2517	3092	2937
Feb	0	2319	3084	2718	3139	3589	2504
Mar	0	2293	2527	2590	2960	3486	2006
Apr	0	2626	2624	2389	3126	4021	3428
May	0	2113	3316	2947	3561	3107	3910
Jun	0	2520	2406	2880	3061	3026	3581
Jul	0	2226	2051	2226	2397	3177	2925
Aug	0	1848	1944	2089	2781	2897	2784
Sep	3459	1778	1933	2431	2426	3057	3550
Oct	3034	2400	2210	2514	2887	3163	3610
Nov	2823	2328	2504	2513	2985	2150	0
Dec	1854	2381	2293	2523	3142	2311	0
AADT	**2787**	**2238**	**2424**	**2500**	**2913**	**3096**	**3126**

Source: Toll Booth Operator at Sasaram

The **annual growth rate of Car traffic** on NH19 (old NH2) over 5 year period between Year 2012 and Year 2017 is about **6.91%**

Vehicle Type: Bus

Month	2011	2012	2013	2014	2015	2016	2017
Jan		106	105	85	95	105	156
Feb		93	139	87	102	106	169
Mar		112	146	118	127	151	201
Apr		75	88	82	105	132	177
May		96	97	80	81	99	172
Jun		63	68	70	98	78	176
Jul		70	54	65	78	78	198
Aug		134	67	88	102	102	221
Sep	202	139	118	136	99	180	317
Oct	111	162	93	123	158	141	275
Nov	105	118	102	102	118	82	0
Dec	80	79	70	75	87	93	0
AADT	**2787**	**2238**	**2424**	**2500**	**2913**	**3096**	**3126**

Source: Toll Booth Operator at Sasaram

The **annual growth rate of Bus traffic** on NH19 (old NH2) over 5 year period between Year 2012 and Year 2017 is about **14.62%**

Vehicle Type: Mini Bus

Month	2011	2012	2013	2014	2015	2016	2017
Jan		238	232	228	229	260	290
Feb		269	291	276	273	290	252
Mar		244	269	177	253	276	133
Apr		286	276	128	278	293	283
May		266	303	272	311	280	336
Jun		268	265	269	270	271	297
Jul		261	249	241	223	278	273
Aug		263	226	221	258	280	278
Sep	288	233	231	234	198	281	287
Oct	392	244	238	232	169	275	246
Nov	96	252	253	251	252	170	0
Dec	204	251	235	231	245	225	0
AADT	**246**	**257**	**255**	**230**	**246**	**266**	**267**

Source: Toll Booth Operator at Sasaram

The **annual growth rate of Mini Bus** on NH19 (old NH2) over 5 year period between Year 2012 and Year 2017 is about **0.81%.**

Vehicle Type: Light Commercial Vehicle (LCV)

Month	2011	2012	2013	2014	2015	2016	2017
Jan		282	261	294	219	227	291
Feb		237	278	326	193	239	305
Mar		247	301	343	199	294	310
Apr		262	310	328	208	229	275
May		242	295	298	182	212	254
Jun		258	276	308	182	230	247
Jul		282	299	334	189	220	223
Aug		238	252	297	196	216	251
Sep	0	255	281	306	191	236	276
Oct	0	260	256	245	178	229	204
Nov	346	252	280	330	199	121	0
Dec	289	290	310	314	237	252	0
AADT	**159**	**260**	**283**	**310**	**198**	**226**	**263**

Source: Toll Booth Operator at Sasaram

The **annual growth rate of LCV traffic** on NH19 (old NH2) over 5 year period between Year 2012 and Year 2017 is about **0.27%**

Vehicle Type: 2-Axle Truck

Month	2011	2012	2013	2014	2015	2016	2017
Jan		651	485	434	525	642	733
Feb		692	522	456	623	706	835
Mar		642	524	469	598	700	808
Apr		616	533	447	575	670	831
May		690	531	462	542	717	804
Jun		623	480	493	558	724	759
Jul		514	441	415	538	683	668
Aug		498	415	408	508	697	759
Sep	565	476	467	482	573	766	804
Oct	665	509	436	397	562	759	597
Nov	634	479	411	437	575	396	0
Dec	623	511	463	445	700	681	0
AADT	**622**	**576**	**475**	**445**	**573**	**681**	**759**

Source: Toll Booth Operator at Sasaram

The **annual growth rate of 2-axle truck traffic** on NH19 (old NH2) over 5 year period between Year 2012 and Year 2017 is about **5.65%.**

Vehicle Type: Multi Axle Vehicle (MAV) Trucks

Month	2011	2012	2013	2014	2015	2016	2017
Jan		4866	5290	5032	4742	6920	6846
Feb		5439	5338	5601	6816	6372	8127
Mar		5794	5457	5558	6580	5926	8173
Apr		5523	4799	5596	6472	6806	7916
May		5826	4792	5645	6908	7095	9135
Jun		5650	4906	6305	6926	7011	8538
Jul		5065	4483	5387	5604	5272	5478
Aug		4685	4285	4798	5214	5279	5863
Sep	4327	4615	5232	5907	5419	5962	6253
Oct	4768	5180	5004	5610	5745	6870	5475
Nov	5102	5079	5510	6351	6371	4888	0
Dec	4812	5364	5597	5737	6373	6369	0
AADT	**4753**	**5271**	**5055**	**5623**	**6089**	**6248**	**7167**

Source: Toll Booth Operator at Sasaram

The **annual growth rate of MAV Truck** on NH19 (old NH2) over 5 year period between Year 2012 and Year 2017 is about **6.34%**

4.2.3.3 Annual Average Daily Traffic (AADT)

Factors for seasonal corrections were also derived from the sale of fuel (petrol for passenger vehicles like cars, two wheelers and diesel for commercial vehicles like light commercial vehicles, trucks and larger vehicles) at fuel pump stations available along the proposed alignment of Expressway. **Annual Average Daily Traffic (AADT)** is established considering the Seasonal Correction Factors of 1.003 for Passenger Vehicles and 1.063 for commercial vehicles – results (**Annual Average Daily Traffic - ADT**) are shown on Table 4.10.

Table 4.10: Annual Average Daily Traffic (AADT) on Existing Alternate Roads

Vehicle Classification			PCU Factor	Muzaffarnagar - Meerut	Aligarh - Etah	Aliganj - Farrukhabad	Farrukhabad - Kannauj	Kannauj - Kanpur	Budaun - Farrukhabad	Meerut - Garhmukteshwar	Hasanpur - Chandausi	Chandausi - Budaun	Bijnor - Moradabad	Bareilly - Shahjahanpur	Shahjahanpur - Hardoi	Bangarmau - Unnao	Unnao - Lalganj	Unchahar - Prayagraj	Fatehpur - Prayagraj
Passenger Vehicles	Two Wheeler		0.5	5396	1755	2821	3580	2731	1781	3694	2292	3463	7101	9594	3525	6044	2847	6264	3171
	Three Wheeler		1.5	880	607	124	660	416	87	697	255	213	937	1754	348	363	74	588	301
	Car/Van/ Jeep		1.0	12563	738	681	1927	2451	967	4894	858	2033	5195	5994	2483	2169	1286	4646	3103
	Mini Bus		1.5	22	4	19	10	37	7	12	9	7	41	22	20	33	3	55	34
	Bus		3.0	1332	575	39	80	265	259	457	215	296	618	614	209	203	223	521	499
Govt. & Others Vehicles	Tempo/ LCV		1.5	1114	368	240	366	845	335	895	542	752	792	1907	832	789	657	1016	1354
	Commercial Vehicles	2 Axle	3.0	514	1128	78	90	907	457	637	174	485	280	1604	246	298	524	476	1098
		3 Axle	3.0	345	1133	53	96	932	466	596	187	475	301	1545	417	522	533	697	1129
		M-Axle	4.5	707	878	147	155	1033	483	511	162	541	152	2525	496	644	827	1245	2619
Agricultural Vehicles	Tractor		1.5	21	28	18	18	21	33	51	28	53	46	28	30	40	21	36	14
	Tractor with Trailer		4.5	75	87	148	105	109	161	266	266	300	345	219	258	118	39	378	95
Passenger Vehicles	Cycle		0.5	42	152	950	357	239	286	385	82	500	125	527	835	500	570	501	151
	Cycle Rickshaw		2.0	11	2	0	0	0	9	23	3	7	26	0	0	0	0	0	11
Goods Vehicles	Animal Drawn	Bullock Cart	8.0	0	2	13	10	1	24	50	0	6	14	84	30	16	17	47	0
		Horse	8.0	0	3	0	0	0	35	0	0	24	11	0	0	0	0	0	0
	Hand Cart		3.0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0
	Other (Pl. Specify)		2.0	24	10	0	3	6	17	28	7	14	42	29	31	1	9	3	16
Total Vehicles (Nos.)				**23047**	**7470**	**5332**	**7456**	**9995**	**5408**	**13196**	**5078**	**9169**	**16026**	**26445**	**9761**	**11741**	**7630**	**16474**	**13595**
Total Vehicles (PCUs)				**28,504**	**16,117**	**5,109**	**7,530**	**17,389**	**9,661**	**18,485**	**6,965**	**13,387**	**17,703**	**40,986**	**12,822**	**13,907**	**12,020**	**23,341**	**27,762**

Note: Data may not add up to the total due to rounding.

4.2.4 Origin – Destination (O-D) Matrices

O-D matrices for Tollable Traffic (vehicle types as listed in Table 4.11) are generated from the information recorded during the Origin-Destination Surveys, and expanded by multiplying with corresponding Expansion Factors to arrive at the Expanded O-D Matrix (Vehicle Type, Existing Alternate Road) and results are annexed to Appendix.

4.2.4.1 Expansion Factors

Expansion Factors were derived from the percentage of tollable vehicles interviewed during the origin and destination surveys to that of the ADT arrived for respective roads. The values of expansion factors for tollable traffic type at each of the origin & destination survey locations are given shown on Table 4.11.

Table 4.11: Expansion Factors for O-D Matrices (Tollable Traffic)

Survey Location	Tollable Vehicles	Car	Bus	LCV	2-Axle Truck	3-Axle Truck	MAV (4 + axles)
On Muzaffarnagar - Meerut Stretch at Siwaya Toll Booth	% Interviewed	2.46%	5.49%	6.11%	9.12%	10.12%	9.19%
	Expansion Factor	40.65	18.22	16.38	10.96	9.88	10.88
On Fatehpur - Prayagraj Stretch at Katodhan Toll Booth	% Interviewed	7.58%	7.02%	6.87%	4.56%	3.81%	3.55%
	Expansion Factor	13.20	14.25	14.56	21.95	26.25	28.16
On Meerut - Garhmukteshwar Stretch at Nizampur	% Interviewed	6.19%	13.23%	5.14%	1.88%	1.68%	6.07%
	Expansion Factor	16.15	7.56	19.46	53.10	59.66	16.48
On Hasanpur - Chandausi Stretch at Kurkawali	% Interviewed	18.87%	8.90%	7.19%	11.47%	13.37%	18.52%
	Expansion Factor	5.30	11.23	13.90	8.72	7.48	5.40
On Chandausi - Budaun Stretch at Nawada	% Interviewed	11.17%	12.18%	5.46%	5.77%	3.37%	5.91%
	Expansion Factor	8.95	8.21	18.33	17.32	29.68	16.92
On Aligarh - Etah Stretch at Nagariya	% Interviewed	18.42%	11.42%	7.07%	6.57%	5.65%	6.95%
	Expansion Factor	5.43	8.76	14.14	15.23	17.70	14.39
On Aliganj - Farrukhabad Stretch at Khankah e Niyaziya	% Interviewed	24.81%	28.09%	18.76%	38.46%	44.84%	24.45%
	Expansion Factor	4.03	3.56	5.33	2.60	2.23	4.09
On Farrukhabad - Kannauj Stretch at Samdhan	% Interviewed	7.79%	13.85%	10.38%	26.46%	12.48%	20.66%
	Expansion Factor	12.84	7.22	9.63	3.78	8.01	4.84
On Kannauj - Kanpur Stretch at Bilhaur	% Interviewed	6.81%	8.32%	6.03%	3.31%	1.72%	4.55%
	Expansion Factor	14.68	12.02	16.58	30.21	58.26	21.99
On Budaun - Farrukhabad Stretch at Usawan	% Interviewed	18.02%	16.21%	17.33%	11.15%	7.73%	10.57%
	Expansion Factor	5.55	6.17	5.77	8.97	12.93	9.46
On Bijnor - Moradabad Stretch at Agwanpur	% Interviewed	3.75%	4.86%	6.94%	10.00%	7.64%	6.60%
	Expansion Factor	26.64	20.57	14.40	10.00	13.09	15.16
On Bareilly - Shahjahanpur Stretch at Faridpur Toll Booth	% Interviewed	3.95%	5.37%	2.94%	4.80%	5.18%	4.87%
	Expansion Factor	25.29	18.61	34.05	20.83	19.30	20.53
On Shahjahanpur - Hardoi Stretch at Shahabad	% Interviewed	5.44%	8.60%	4.57%	8.94%	4.79%	4.84%
	Expansion Factor	18.39	11.63	21.90	11.18	20.86	20.68
On Bangarmau - Unnao Stretch at Safipur	% Interviewed	8.16%	10.36%	5.68%	9.78%	5.64%	6.94%
	Expansion Factor	12.25	9.65	17.61	10.23	17.72	14.41
On Unnao - Lalganj Stretch at Semari	% Interviewed	11.21%	16.16%	5.26%	7.84%	5.07%	5.45%
	Expansion Factor	8.92	6.19	19.00	12.75	19.73	18.34
On Unchahar - Prayagraj Stretch at Andiyari	% Interviewed	3.59%	4.22%	5.70%	8.61%	7.03%	5.46%
	Expansion Factor	27.82	23.68	17.53	11.61	14.23	18.30

4.2.4.2 Candidate Traffic for Proposed Expressway (All trip lengths)

Candidate Traffic is that traffic on the alternate existing roads whose travel pattern (origin-destination) can be serviced by the proposed Expressway. Origin-Destination pairs that can be serviced by the proposed Expressway are extracted from the Expanded O-D Matrix, and thus form the Candidate Traffic for proposed Expressway.

Derived *"Candidate"* traffic are shown on Appendix

For cars and trucks, these volumes were obtained from:

(a) a careful examination of the origin and destination data and the elimination of trips that would not find travel by the proposed Expressway useful (mainly trips to and from Zones East/West perpendicularly to the proposed Expressway alignment); and

(b) by multiplying the above-derived numbers by the earlier-described Expansion Factors and applying the appropriate Seasonal Correction Factors.

For buses, these volumes were obtained from an examination of advertised origins and destinations. Only those services known to be on journeys to and from points beyond corresponding Interchange Nodes in (north direction) & (south direction) were considered.

4.2.4.3 Candidate Traffic for Proposed Expressway

However, the it is prudent not to restrict the Candidate Traffic of those traffic whose trip lengths would be even lesser than ~25 Kms (*approximate usage of any one package of the proposed alignment of expressway*), this is basically to reflect the users choice of intending to the Expressway for shorter trip lengths (shorter trip lengths may incur time savings/perceived cost savings/avoid congestion, i.e. does trigger route choice).

The Zones (Origins & Destinations) as shown on Table 4.5 served as base, with Trip Matrix for O-D pairs as shown in Table 4.12 were used to generate the Candidate Traffic between designated Toll Nodes (Nodes A to R) of the Proposed Expressway.

While movement "AE" shown in the matrix from Node A to Node E represents traffic that will use the Expressway from Node A to Node E and "EA" shown in the matrix from Zone E to Zone A represents traffic that will use the Expressway from Node E to Node A.

Trip Matrix was matched with Expanded OD Matrices to arrive the Candidate Traffic; Movement Matrix-Tollable Traffic results are shown on Tables 4.13 to Tables 4.18

Table 4.12: Trip Matrix for O-D Pairs (Trips within Districts of Uttar Pradesh)

Zones	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
11	-	-	-	-	-	-	-	-	-	-	-	-	AE	-	AH	AH	AJ	AM	-	AL	AJ	AM	AO	AK	AN	AO	-	AG	AE	-	AM	AM	AM	AM	AM	-	-	AH	AR	AM	AM	AM	AM	AM	AM	AM	AM	AM	-	AM	AM	AR	AR	AR	AR	AR	AR	AM	AJ	AR	AO	AQ	AR	AL	-	AK	AL	AN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-	AE	-	AH	AH	AJ	AM	-	AL	AJ	AM	AO	AK	AN	AO	-	AG	AE	-	AM	AM	AM	AM	AM	-	-	AH	AR	AM	AM	AM	AM	AM	AM	AM	AM	AM	-	AM	AM	AR	AR	AR	AR	AR	AR	AM	AJ	AR	AO	AQ	AR	AL	-	AK	AL	AN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	GJ	GM	-	GL	GJ	GM	GO	GK	GN	GO	-	-	-	GJ	GM	GM	GM	GM	GM	GJ	GJ	-	GR	GM	GM	GM	GM	GM	GM	GM	GM	GM	-	GM	GM	GR	GR	GR	GR	GR	GR	GM	GJ	GR	GO	GQ	GR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-	CE	-	CH	CH	CJ	CM	-	CJ	CJ	CM	CO	CK	CN	CO	-	CG	CE	CJ	CM	CM	CM	CM	CM	CJ	CJ	CH	CR	CM	CM	CM	CM	CM	CM	CM	CM	CM	-	CM	CM	CR	CR	CR	CR	CR	CR	CM	CJ	CR	CO	CQ	CR	-	-	CK	CL	CN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-	-	BE	-	BH	BH	BJ	BM	-	BJ	BJ	BM	BO	BK	BN	BO	-	BG	BE	BJ	BM	BM	BM	BM	BM	BJ	BJ	BH	BR	BM	BM	BM	BM	BM	BM	BM	BM	BM	-	BM	BM	BR	BR	BR	BR	BR	BR	BM	BJ	BR	BO	BQ	BR	-	-	BK	BL	BN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	-	-	CE	-	CH	CH	CJ	CM	-	CJ	CJ	CM	CO	CK	CN	CO	-	CG	CE	CJ	CM	CM	CM	CM	CM	CJ	CJ	CH	CR	CM	CM	CM	CM	CM	CM	CM	CM	CM	-	CM	CM	CR	CR	CR	CR	CR	CR	CM	CJ	CR	CO	CQ	CR	-	-	CK	CL	CN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	BE	-	BH	BH	BJ	BM	-	BJ	BJ	BM	BO	BK	BN	BO	-	BG	BE	BJ	BM	BM	BM	BM	BM	BJ	BJ	BH	BR	BM	BM	BM	BM	BM	BM	BM	BM	BM	-	BM	BM	BR	BR	BR	BR	BR	BR	BM	BJ	BR	BO	BQ	BR	-	-	BK	BL	BN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	GJ	GM	-	GL	GJ	GM	GO	GK	GN	GO	-	-	-	GJ	GM	GM	GM	GM	GM	GJ	GJ	-	GR	GM	GM	GM	GM	GM	GM	GM	GM	GM	-	GM	GM	GR	GR	GR	GR	GR	GR	GM	GJ	GR	GO	GQ	GR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	AE	-	AH	AH	AJ	AM	-	AL	AJ	AM	AO	AK	AN	AO	-	AG	AE	-	AM	AM	AM	AM	AM	-	-	AH	AR	AM	AM	AM	AM	AM	AM	AM	AM	AM	-	AM	AM	AR	AR	AR	AR	AR	AR	AM	AJ	AR	AO	AQ	AR	AL	-	AK	AL	AN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	EJ	EM	-	EL	EJ	EM	EO	EK	EN	EO	-	-	-	EJ	EM	EM	EM	EM	EM	EJ	EJ	-	ER	EM	EM	EM	EM	EM	EM	EM	EM	EM	-	EM	EM	ER	ER	ER	ER	ER	ER	EM	EJ	ER	EO	EQ	ER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	GJ	GM	-	GL	GJ	GM	GO	GK	GN	GO	-	-	-	GJ	GM	GM	GM	GM	GM	GJ	GJ	-	GR	GM	GM	GM	GM	GM	GM	GM	GM	GM	-	GM	GM	GR	GR	GR	GR	GR	GR	GM	GJ	GR	GO	GQ	GR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	IM	-	IL	-	IM	IO	IK	IN	IO	-	-	-	-	IM	IM	IM	IM	IM	-	-	-	IR	IM	IM	IM	IM	IM	IM	IM	IM	IM	-	IM	IM	IR	IR	IR	IR	IR	IR	IM	-	IR	IO	IQ	IR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	EA	EA	-	EC	EB	EC	EB	-	EA	-	-	-	-	-	-	-	EJ	EM	-	EL	EJ	EM	EO	EK	EN	EO	-	-	-	EJ	EM	EM	EM	EM	EM	EJ	EJ	-	ER	EM	EM	EM	EM	EM	EM	EM	EM	EM	-	EM	EM	ER	ER	ER	ER	ER	ER	EM	EJ	ER	EO	EQ	ER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	IM	-	IL	-	IM	IO	IK	IN	IO	-	-	-	-	IM	IM	IM	IM	IM	-	-	-	IR	IM	IM	IM	IM	IM	IM	IM	IM	IM	-	IM	IM	IR	IR	IR	IR	IR	IR	IM	-	IR	IO	IQ	IR	-	-	-	IN	IN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	HA	HA	-	HC	HB	HC	HB	-	HA	-	-	-	-	-	-	-	-	IM	-	IL	-	IM	IO	IK	IN	IO	-	-	-	-	IM	IM	IM	IM	IM	-	-	-	IR	IM	IM	IM	IM	IM	IM	IM	IM	IM	-	IM	IM	IR	IR	IR	IR	IR	IR	IM	-	IR	IO	IQ	IR	-	-	-	IN	IN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	HA	HA	-	HC	HB	HC	HB	-	HA	-	-	-	-	-	-	-	-	JM	-	JL	-	JM	JO	-	JN	IO	-	-	-	-	JM	JM	JM	JM	JM	-	-	-	JR	JM	JM	JM	JM	JM	JM	JM	JM	JM	-	JM	JM	JR	JR	JR	JR	JR	JR	JM	-	JR	JO	JQ	JR	-	-	-	JN	JN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	JA	JA	JG	JC	JB	JC	JB	JG	JA	JE	JG	-	JE	-	-	-	-	JM	-	JL	-	JM	JO	-	JN	IO	-	-	-	-	JM	JM	JM	JM	JM	-	-	-	JR	JM	JM	JM	JM	JM	JM	JM	JM	JM	-	JM	JM	JR	JR	JR	JR	JR	JR	JM	-	JR	JO	JQ	JR	-	-	-	JN	JN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	-	-	-	-	-	-	-	MC	MG	-	-	-	-	-	-	-	-	-	MI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	LA	LA	LG	JC	JB	JC	JB	LG	LA	LE	LG	LI	LE	LI	LI	LJ	LJ	-	-	-	-	-	LO	-	LN	LO	LC	LG	LE	-	-	LM	-	LM	LM	-	-	-	LR	LM	LM	LM	LM	LM	LM	LM	LM	LM	-	LM	LM	LR	LR	LR	LR	LR	LR	LM	-	LR	LO	LQ	LR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	JA	JA	JG	JC	JB	JC	JB	JG	JA	JE	JG	-	JE	-	-	-	-	-	-	-	-	-	-	-	-	-	JC	JG	JE	-	-	-	-	-	-	-	-	-	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	-	-	PR	-	-	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	-	-	-	-	-	-	-	MC	MG	ME	-	-	-	-	-	-	-	-	MI	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	-	-	PR	-	-	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	OA	OA	OG	OC	OB	OC	OB	OG	OA	OE	OG	OI	OE	OI	OI	OJ	OJ	-	-	OL	-	-	-	-	ON	-	OC	OG	OE	-	-	-	-	-	-	-	-	-	OR	-	-	-	-	-	-	-	-	-	-	-	OR	-	OR	OR	OR	OR	OR	-	-	OR	-	-	OR	OM	OM	OK	ON	ON	OM	OM	OM	OJ	OM	OM	OM	OM	OI	-	-	-	-	-	-
34	KA	KA	KG	KC	KB	KC	KB	KG	KA	KE	KG	KI	KE	KI	KI	-	-	-	-	-	-	-	-	-	-	-	LC	LG	LE	-	-	-	-	-	-	-	-	LI	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	-	-	PR	-	-	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	NA	NA	NG	NC	NB	NC	NB	NG	NA	NE	NG	NI	NE	NI	NI	NJ	NJ	-	-	NL	-	-	NO	-	-	-	NC	NG	NE	-	-	-	-	-	-	-	-	NI	NR	-	-	-	-	-	-	-	-	-	NM	-	NR	NR	NR	NR	NR	NR	NR	-	-	NR	-	-	NR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	OA	OA	OG	OC	OB	OC	OB	OG	OA	OE	OG	OI	OE	OI	OI	OI	OI	-	-	OL	-	-	-	-	-	-	NC	NG	NE	-	-	-	-	-	-	-	-	NI	NR	-	-	-	-	-	-	-	-	-	NM	-	NR	NR	NR	NR	NR	NR	NR	-	-	NR	-	-	NR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CM	-	CL	CJ	CM	CO	CL	CN	CN	-	CG	-	CJ	CM	-	CM	CM	CM	CJ	CJ	CH	CR	CM	CM	CM	CM	CM	CM	CM	CM	CM	-	CM	CM	CR	CR	CR	CR	CR	CR	CM	-	CR	CO	CQ	CR	-	-	CK	CL	CN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	GA	GA	-	GC	GB	GC	GB	-	GA	-	-	-	-	-	-	-	-	GM	-	GL	GJ	GM	GO	GL	GN	GN	GC	-	-	FJ	FM	-	FM	FM	FM	FJ	FJ	-	FR	FM	FM	FM	FM	FM	FM	FM	FM	FM	-	FM	FM	FR	FR	FR	FR	FR	FR	FM	-	FR	FO	FQ	FR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	EA	EA	-	EC	EB	EC	EB	-	EA	-	-	-	-	-	-	-	-	-	-	EL	EJ	EM	EO	EL	EN	EN	-	-	-	EJ	EM	-	EM	EM	EM	EJ	EJ	-	ER	EM	EM	EM	EM	EM	EM	EM	EM	EM	-	EM	EM	ER	ER	ER	ER	ER	ER	EM	-	ER	EO	EQ	ER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	-	-	JG	JC	JB	JC	JB	JG	-	JE	JG	-	JE	-	-	-	-	-	-	-	-	-	-	-	-	-	JC	JF	JE	-	-	-	-	-	-	-	-	LI	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	-	-	PR	-	-	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	-	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	-	-	PR	-	-	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MI	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	-	-	PR	-	-	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	-	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	-	-	PR	-	-	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	-	-	PR	-	-	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	-	-	PR	-	-	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	-	JG	JC	JB	JC	JB	JG	-	JE	JG	-	JE	-	-	-	-	-	-	-	-	-	-	-	-	-	JC	JF	JE	-	-	-	-	-	-	-	-	LI	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	-	-	PR	-	-	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	-	-	JG	JC	JB	JC	JB	JG	-	JE	JG	-	JE	-	-	-	-	-	-	-	-	-	-	-	-	-	JC	JF	JE	-	-	-	-	-	-	-	-	LI	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	-	-	PR	-	-	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	HA	HA	-	HC	HB	HC	HB	-	HA	-	-	-	-	-	-	-	-	IM	-	-	-	IM	-	IL	IN	IN	HC	-	-	IL	IM	IM	IM	IM	IM	IL	IL	-	IR	IM	IM	IM	IM	IM	IM	IM	IM	IM	-	IM	IM	IR	IR	IR	IR	IR	IR	IM	-	IR	IO	IQ	IR	-	-	-	IN	IN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	RP	-	-	RQ	-	RM	-	RK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
53	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
55	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
56	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
57	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
58	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MN	MN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
61	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	RO	-	RN	RN	MC	MF	ME	-	-	-	-	-	-	-	-	MI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
62	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	-	-	-	-	RN	RN	RC	RF	RE	-	-	-	-	-	-	-	-	RI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	RM	RM	RK	RN	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	-	-	-	-	-	-
63	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	RM	RM	RK	RN	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	-	-	-	-	-	-
64	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	RM	RM	RK	RN	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	-	-	-	-	-	-
65	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	RM	RM	RK	RN	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	-	-	-	-	-	-
66	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	RM	RM	RK	RN	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	-	-	-	-	-	-
67	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	RM	RM	RK	RN	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	-	-	-	-	-	-
68	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	ML	-	-	-	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69	JA	JA	JG	JC	JB	JC	JB	JG	JA	JE	JG	-	JE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	-	-	PR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	RP	-	-	-	-	RM	RM	RK	RN	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	-	-	-	-	-	-
71	OA	OA	OG	OC	OB	OC	OB	OG	OA	OE	OG	OI	OE	OI	OI	OJ	OJ	-	-	OL	-	-	-	-	-	-	OC	OF	OE	-	-	-	-	-	-	-	-	OI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	OR	OM	OM	OK	ON	ON	OM	OM	OM	OJ	OM	OM	OM	OM	OI	-	-	-	-	-	-
72	QA	QA	QG	QC	QB	QC	QB	QG	QA	QE	QG	QI	QE	QI	QI	QJ	QJ	-	-	QL	-	-	-	-	-	-	QC	QF	QE	-	-	-	-	-	-	-	-	QI	QR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	QR	QM	QM	QK	QN	QN	QM	QM	QM	QJ	QM	QM	QM	QM	QI	-	-	-	-	-	-
73	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	RP	-	RO	RQ	-	RM	RM	RK	RN	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	-	-	-	-	-	-
74	LA	LA	-	-	-	-	-	-	LA	-	-	-	-	-	-	-	-	-	-	-	-	-	MO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MR	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	MO	MQ	MR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	MO	MQ	MR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76	KA	KA	-	KC	KB	KC	KB	-	KA	-	-	-	-	-	-	-	-	KM	-	-	-	-	KO	-	-	-	KC	-	-	-	-	-	-	-	-	-	-	-	KR	-	-	-	-	-	-	-	-	-	-	-	-	KR	KR	KR	KR	KR	KR	-	-	KR	KO	KQ	KR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
77	LA	LA	-	LC	LB	LC	LB	-	LA	-	-	-	-	NI	NI	NJ	NJ	-	-	-	-	-	NO	-	-	-	LC	-	-	-	-	-	-	-	-	-	-	NI	-	-	-	-	-	-	-	-	-	-	-	-	-	NR	NR	NR	NR	NR	NR	-	-	NR	NO	NQ	NR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
78	NA	NA	-	NC	NB	NC	NB	-	NA	-	-	-	-	NI	NI	NJ	NJ	-	-	-	-	-	NO	-	-	-	NC	-	-	-	-	-	-	-	-	-	-	NI	-	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	NO	NQ	MR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	MO	MQ	MR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	MO	MQ	MR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	MO	MQ	MR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	JO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	JO	JQ	MR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	MO	MQ	MR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	MO	MQ	MR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	MO	MQ	MR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	MO	MQ	MR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	IO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	IO	IQ	MR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Trip Matrix for O-D Pairs (Trips between Districts of Uttar Pradesh and Expressway Interchange Node Zones+Other States of India)

Zones	AL1	AL2	AR1	AR2	BL1	BL2	BR1	CL1	CL2	CR1	CR2	DL1	DL2	DR1	DR2	EL1	EL2	ER1	ER2	FL1	FL2	GL1	GL2	GR1	HL2	IL1	IL2	IR2	JL2	JR1	JR2	KL1	KL2	KR1	KR2	LL1	LR1	LR2	ML1	ML2	MR1	MR2	NL1	NL2	NR1	NR2	OL2	OR1	OR2	PL1	PL2	QR1	QR2	RL2	RR1	RR2	ZAS	ZBR	ZCG	ZCH	ZGJ	ZHP	ZHR	ZJH	ZKA	ZMH	ZMP	ZNDLS	ZNepal	ZOR	ZPB	ZRJ	ZTN	ZTS	ZUK	ZWB
11	-	-	-	-	AB	AB	AB	AC	AC	AC	AC	AD	AD	AD	AD	AE	AE	AE	AE	AF	AF	AG	AG	AG	AH	AI	AI	AI	AJ	AJ	AJ	AK	AK	AK	AK	AL	AL	AL	AM	AM	AM	AM	AN	AN	AN	AN	AO	AO	AO	AP	AP	AQ	AQ	AR	AR	AR	AR	AR	AR	-	-	-	-	AR	-	-	-	-	-	AR	-	-	-	-	-	AR
12	-	-	-	-	AB	AB	AB	AC	AC	AC	AC	AD	AD	AD	AD	AE	AE	AE	AE	AF	AF	AG	AG	AG	AH	AI	AI	AI	AJ	AJ	AJ	AK	AK	AK	AK	AL	AL	AL	AM	AM	AM	AM	AN	AN	AN	AN	AO	AO	AO	AP	AP	AQ	AQ	AR	AR	AR	AR	AR	AR	-	-	-	-	AR	-	-	-	-	-	AR	-	-	-	-	-	AR
13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	GH	GI	GI	GI	GJ	GJ	GJ	GK	GK	GK	GK	GL	GL	GL	GM	GM	GM	GM	GN	GN	GN	GN	GO	GO	GO	GP	GP	GQ	GQ	GR	GR	GR	GR	GR	GR	-	-	-	-	GR	-	-	-	-	-	GR	-	-	-	-	-	GR
14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CE	CE	CE	CE	CF	CF	CG	CG	CG	CH	CI	CI	CI	CJ	CJ	CJ	CK	CK	CK	CK	CL	CL	CL	CM	CM	CM	CM	CN	CN	CN	CN	CO	CO	CO	CP	CP	CQ	CQ	CR	CR	CR	CR	CR	CR	-	-	-	-	CR	-	-	-	-	-	CR	-	-	-	-	-	CR
15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	BE	BE	BE	BE	BF	BF	BG	BG	BG	BH	BI	BI	BI	BJ	BJ	BJ	BK	BK	BK	BK	BL	BL	BL	BM	BM	BM	BM	BN	BN	BN	BN	BO	BO	BO	BP	BP	BQ	BQ	BR	BR	BR	BR	BR	BR	-	-	-	-	BR	-	-	-	-	-	BR	-	-	-	-	-	BR
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CE	CE	CE	CE	CF	CF	CG	CG	CG	CH	CI	CI	CI	CJ	CJ	CJ	CK	CK	CK	CK	CL	CL	CL	CM	CM	CM	CM	CN	CN	CN	CN	CO	CO	CO	CP	CP	CQ	CQ	CR	CR	CR	CR	CR	CR	-	-	-	-	CR	-	-	-	-	-	CR	-	-	-	-	-	CR
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	BE	BE	BE	BE	BF	BF	BG	BG	BG	BH	BI	BI	BI	BJ	BJ	BJ	BK	BK	BK	BK	BL	BL	BL	BM	BM	BM	BM	BN	BN	BN	BN	BO	BO	BO	BP	BP	BQ	BQ	BR	BR	BR	BR	BR	BR	-	-	-	-	BR	-	-	-	-	-	BR	-	-	-	-	-	BR
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	GH	GI	GI	GI	GJ	GJ	GJ	GK	GK	GK	GK	GL	GL	GL	GM	GM	GM	GM	GN	GN	GN	GN	GO	GO	GO	GP	GP	GQ	GQ	GR	GR	GR	GR	GR	GR	-	-	-	-	GR	-	-	-	-	-	GR	-	-	-	-	-	GR
19	-	-	-	-	AB	AB	AB	AC	AC	AC	AC	AD	AD	AD	AD	AE	AE	AE	AE	AF	AF	AG	AG	AG	AH	AI	AI	AI	AJ	AJ	AJ	AK	AK	AK	AK	AL	AL	AL	AM	AM	AM	AM	AN	AN	AN	AN	AO	AO	AO	AP	AP	AQ	AQ	AR	AR	AR	AR	AR	AR	-	-	-	-	AR	-	-	-	-	-	AR	-	-	-	-	-	AR
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	EH	EI	EI	EI	EJ	EJ	EJ	EK	EK	EK	EK	EL	EL	EL	EM	EM	EM	EM	EN	EN	EN	EN	EO	EO	EO	EP	EP	EQ	EQ	ER	ER	ER	ER	ER	ER	-	-	-	-	ER	-	-	-	-	-	ER	-	-	-	-	-	ER
21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	GJ	GJ	GJ	GK	GK	GK	GK	GL	GL	GL	GM	GM	GM	GM	GN	GN	GN	GN	GO	GO	GO	GP	GP	GQ	GQ	GR	GR	GR	GR	GR	GR	-	-	-	-	GR	-	-	-	-	-	GR	-	-	-	-	-	GR
22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	IK	IK	IK	IK	IL	IL	IL	IM	IM	IM	IM	IN	IN	IN	IN	IO	IO	IO	IP	IP	IQ	IQ	IR	IR	IR	IR	IR	IR	-	-	-	-	IR	-	-	-	-	-	IR	-	-	-	-	-	IR
23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	EF	EF	EG	EG	EG	EH	EI	EI	EI	EJ	EJ	EJ	EK	EK	EK	EK	EL	EL	EL	EM	EM	EM	EM	EN	EN	EN	EN	EO	EO	EO	EP	EP	EQ	EQ	ER	ER	ER	ER	ER	ER	-	-	-	-	ER	-	-	-	-	-	ER	-	-	-	-	-	ER
24	IA	IA	IA	IA	IB	IB	IB	IC	IC	IC	IC	ID	ID	ID	ID	IE	IE	IE	IE	-	-	-	-	-	-	-	-	-	-	-	-	IK	IK	IK	IK	IL	IL	IL	IM	IM	IM	IM	IN	IN	IN	IN	IO	IO	IO	IP	IP	IQ	IQ	IR	IR	IR	IR	IR	IR	-	-	-	-	IR	-	-	-	-	-	IR	-	-	-	-	-	IR
25	IA	IA	IA	IA	IB	IB	IB	IC	IC	IC	IC	ID	ID	ID	ID	IE	IE	IE	IE	-	-	-	-	-	-	-	-	-	-	-	-	IK	IK	IK	IK	IL	IL	IL	IM	IM	IM	IM	IN	IN	IN	IN	IO	IO	IO	IP	IP	IQ	IQ	IR	IR	IR	IR	IR	IR	-	-	-	-	IR	-	-	-	-	-	IR	-	-	-	-	-	IR
26	JA	JA	JA	JA	JB	JB	JB	JC	JC	JC	JC	JD	JD	JD	JD	JE	JE	JE	JE	JF	JF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	JL	JL	JL	JM	JM	JM	JM	JN	JN	JN	JN	JO	JO	JO	JP	JP	JQ	JQ	JR	JR	JR	JR	JR	JR	-	-	-	-	JR	-	-	-	-	-	JR	-	-	-	-	-	JR
27	JA	JA	JA	JA	JB	JB	JB	JC	JC	JC	JC	JD	JD	JD	JD	JE	JE	JE	JE	JF	JF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	JL	JL	JL	JM	JM	JM	JM	JN	JN	JN	JN	JO	JO	JO	JP	JP	JQ	JQ	JR	JR	JR	JR	JR	JR	-	-	-	-	JR	-	-	-	-	-	JR	-	-	-	-	-	JR
28	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MA	-	MA	MA	-	-	-	-	MA	-	-	MA	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	LA	LA	LA	LA	LB	LB	LB	LC	LC	LC	LC	LD	LD	LD	LD	LE	LE	LE	LE	LF	LF	LG	LG	LG	LH	LI	LI	LI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	LN	LN	LN	LN	LO	LO	LO	LP	LP	LQ	LQ	LP	LP	LP	LR	LR	LR	LA	-	LA	LA	LR	-	-	-	LA	-	LR	LA	-	-	-	-	LR
31	JA	JA	JA	JA	JB	JB	JB	JC	JC	JC	JC	JD	JD	JD	JD	JE	JE	JE	JE	JF	JF	JG	JG	JG	JH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	PR	JA	-	JA	JA	PR	-	-	-	JA	-	PR	-	-	-	-	-	PR
32	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PQ	PQ	PR	PR	PR	PR	PR	PR	MA	-	MA	MA	PR	-	-	-	MA	-	PR	MA	-	-	-	MA	PR
33	OA	OA	OA	OA	OB	OB	OB	OC	OC	OC	OC	OD	OD	OD	OD	OE	OE	OE	OE	OF	OF	OG	OG	OG	OH	OI	OI	OI	OJ	OJ	OJ	OK	OK	OK	OK	OL	OL	OL	OM	OM	OM	OM	ON	ON	ON	ON	-	-	-	OP	OP	OQ	OQ	OR	OR	OR	OR	OR	OR	OA	-	OA	OA	OR	-	-	-	OA	-	OR	OA	-	-	-	OA	PR
34	LA	LA	LA	LA	LB	LB	LB	LC	LC	LC	LC	LD	LD	LD	LD	LE	LE	LE	LE	LF	LF	LG	LG	LG	LH	LI	LI	LI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	PR	LA	-	LA	LA	PR	-	-	-	LA	-	PR	-	-	-	-	LA	PR
35	NA	NA	NA	NA	NB	NB	NB	NC	NC	NC	NC	ND	ND	ND	ND	NE	NE	NE	NE	NF	NF	NG	NG	NG	NH	NI	NI	NI	NJ	NJ	NJ	NK	NK	NK	NK	NL	NL	NL	-	-	-	-	NO	NO	NO	NO	-	-	-	NP	NP	NQ	NQ	NR	NR	NR	NR	NR	NR	NA	-	NA	NA	NR	-	-	-	NA	-	NR	NA	-	-	-	NA	NR
36	NA	NA	NA	NA	NB	NB	NB	NC	NC	NC	NC	ND	ND	ND	ND	NE	NE	NE	NE	NF	NF	NG	NG	NG	NH	NI	NI	NI	NJ	NJ	NJ	NK	NK	NK	NK	NL	NL	NL	-	-	-	-	NO	NO	NO	NO	-	-	-	NP	NP	NQ	NQ	NR	NR	NR	NR	NR	NR	NA	-	NA	NA	NR	-	-	-	NA	-	NR	NA	-	-	-	NA	NR
37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CE	CE	CE	CE	CF	CF	CG	CG	CG	CH	CI	CI	CI	CJ	CJ	CJ	CK	CK	CK	CK	CL	CL	CL	CM	CM	CM	CM	CN	CN	CN	CN	CO	CO	CO	CP	CP	CQ	CQ	CR	CR	CR	CR	CR	CR	-	-	-	-	CR	-	-	-	-	-	CR	-	-	-	-	-	CR
38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FJ	FJ	FJ	FK	FK	FK	FK	FL	FL	FL	FM	FM	FM	FM	FN	FN	FN	FN	FO	FO	FO	FP	FP	FQ	FP	FR	FR	FR	FR	FR	FR	-	-	-	-	FR	-	-	-	-	-	FR	-	-	-	-	-	FR
39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	EJ	EJ	EJ	EK	EK	EK	EK	EL	EL	EL	EM	EM	EM	EM	EN	EN	EN	EN	EO	EO	EO	EP	EP	EQ	EP	ER	ER	ER	ER	ER	ER	-	-	-	-	ER	-	-	-	-	-	ER	-	-	-	-	-	ER
40	LA	LA	LA	LA	LB	LB	LB	LC	LC	LC	LC	LD	LD	LD	LD	LE	LE	LE	LE	LF	LF	LG	LG	LG	LH	LI	LI	LI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	PR	LA	-	LA	LA	PR	-	-	-	LA	-	PR	-	-	-	-	LA	PR
41	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PQ	PQ	PR	PR	PR	PR	PR	PR	MA	-	MA	MA	PR	-	-	-	MA	-	PR	MA	-	-	-	MA	PR
42	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PQ	PQ	PR	PR	PR	PR	PR	PR	MA	-	MA	MA	PR	-	-	-	MA	-	PR	MA	-	-	-	MA	PR
43	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PQ	PQ	PR	PR	PR	PR	PR	PR	MA	-	MA	MA	PR	-	-	-	MA	-	PR	MA	-	-	-	MA	PR
44	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PQ	PQ	PR	PR	PR	PR	PR	PR	MA	-	MA	MA	PR	-	-	-	MA	-	PR	MA	-	-	-	MA	PR
45	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PQ	PQ	PR	PR	PR	PR	PR	PR	MA	-	MA	MA	PR	-	-	-	MA	-	PR	MA	-	-	-	MA	PR
46	LA	LA	LA	LA	LB	LB	LB	LC	LC	LC	LC	LD	LD	LD	LD	LE	LE	LE	LE	LF	LF	LG	LG	LG	LH	LI	LI	LI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	PR	LA	-	LA	LA	PR	-	-	-	LA	-	PR	-	-	-	-	LA	PR
47	LA	LA	LA	LA	LB	LB	LB	LC	LC	LC	LC	LD	LD	LD	LD	LE	LE	LE	LE	LF	LF	LG	LG	LG	LH	LI	LI	LI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	PR	LA	-	LA	LA	PR	-	-	-	LA	-	PR	-	-	-	-	LA	PR
48	IA	IA	IA	IA	IB	IB	IB	IC	IC	IC	IC	ID	ID	ID	ID	IE	IE	IE	IE	-	-	-	-	-	-	-	-	-	-	-	-	IK	IK	IK	IK	IL	IL	IL	IM	IM	IM	IM	IN	IN	IN	IN	IO	IO	IO	IP	IP	IQ	IQ	IR	IR	IR	IR	IR	IR	-	-	-	-	IR	-	-	-	-	-	IR	-	-	-	-	-	IR
49	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	RQ	RQ	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	-	-	-	RA	-
50	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MA	-	MA	MA	-	-	-	-	NA	-	-	MA	-	-	-	MA	-
51	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MA	-	MA	MA	-	-	-	-	NA	-	-	MA	-	-	-	MA	-
52	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MA	-	MA	MA	-	-	-	-	NA	-	-	MA	-	-	-	MA	-
53	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MA	-	MA	MA	-	-	-	-	NA	-	-	MA	-	-	-	MA	-
54	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MA	-	MA	MA	-	-	-	-	NA	-	-	MA	-	-	-	MA	-
55	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MA	-	MA	MA	-	-	-	-	NA	-	-	MA	-	-	-	MA	-
56	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MA	-	MA	MA	-	-	-	-	NA	-	-	MA	-	-	-	MA	-
57	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MA	-	MA	MA	-	-	-	-	NA	-	-	MA	-	-	-	MA	-
58	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MA	-	MA	MA	-	-	-	-	NA	-	-	MA	-	-	-	MA	-
59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MN	MN	MN	MN	MO	MO	MO	MP	MP	MQ	MQ	MR	MR	MR	MR	MR	MR	-	-	-	-	MR	-	-	-	-	-	MR	-	-	-	-	-	MR
60	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MA	-	MA	MA	-	-	-	-	NA	-	-	MA	-	-	-	MA	-
61	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MA	-	MA	MA	-	-	-	-	NA	-	-	MA	-	-	-	MA	-
62	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	-	-	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	-	-	-	RA	-
63	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	-	-	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	-	-	-	RA	-
64	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	-	-	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	-	-	-	RA	-
65	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	-	-	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	-	-	-	RA	-
66	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	-	-	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	-	-	-	RA	-
67	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	-	-	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	-	-	-	RA	-
68	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MA	-	MA	MA	-	-	-	-	NA	-	-	MA	-	-	-	MA	-
69	JA	JA	JA	JA	JB	JB	JB	JC	JC	JC	JC	JD	JD	JD	JD	JE	JE	JE	JE	JF	JF	JG	JG	JG	JH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	PR	PR	PR	PR	PR	PR	JA	-	JA	JA	PR	-	-	-	JA	-	PR	-	-	-	-	-	PR
70	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	-	-	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	-	-	-	RA	-
71	OA	OA	OA	OA	OB	OB	OB	OC	OC	OC	OC	OD	OD	OD	OD	OE	OE	OE	OE	OF	OF	OG	OG	OG	OH	OI	OI	OI	OJ	OJ	OJ	OK	OK	OK	OK	OL	OL	OL	OM	OM	OM	OM	ON	ON	ON	ON	-	-	-	OP	OP	OQ	OQ	OR	OR	OR	OR	OR	OR	OA	-	OA	OA	OR	-	-	-	OA	-	OR	OA	-	-	-	OA	PR
72	QA	QA	QA	QA	QB	QB	QB	QC	QC	QC	QC	QD	QD	QD	QD	QE	QE	QE	QE	QF	QF	QG	QG	QG	QH	QI	QI	QI	QJ	QJ	QJ	QK	QK	QK	QK	QL	QL	QL	QM	QM	QM	QM	QN	QN	QN	QN	QO	QO	QO	-	-	-	-	-	-	-	QR	QR	QR	QA	-	QA	QA	QR	-	-	-	QA	-	QR	QA	-	-	-	QA	QR
73	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	-	-	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	-	-	-	RA	-
74	LA	LA	LA	LA	LB	LB	LB	LC	LC	LC	LC	LD	LD	LD	LD	LE	LE	LE	LE	LF	LF	LG	LG	LG	LH	LI	LI	LI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	LN	LN	LN	LN	LO	LO	LO	LP	LP	LQ	LQ	LP	LP	LP	LR	LR	LR	LA	-	LA	LA	LR	-	-	-	LA	-	LR	LA	-	-	-	-	LR
75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MN	MN	MN	MN	MO	MO	MO	MP	MP	MQ	MQ	MR	MR	MR	MR	MR	MR	-	-	-	-	MR	-	-	-	-	-	MR	-	-	-	-	-	MR
76	JA	JA	JA	JA	JB	JB	JB	JC	JC	JC	JC	JD	JD	JD	JD	JE	JE	JE	JE	JF	JF	JG	JG	JG	JH	-	JI	JI	-	-	-	JK	JK	JK	JK	JL	JL	JL	JM	JM	JM	JM	JN	JN	JN	JN	JO	JO	JO	JP	JP	JQ	JQ	JR	JR	JR	JR	JR	JR	JA	-	JA	JA	JR	-	-	-	JA	-	JR	JA	-	-	-	JA	JR
77	NA	NA	NA	NA	NB	NB	NB	NC	NC	NC	NC	ND	ND	ND	ND	NE	NE	NE	NE	NF	NF	NG	NG	NG	NH	NI	NI	NI	NJ	NJ	NJ	NK	NK	NK	NK	NL	NL	NL	-	-	-	-	NO	NO	NO	NO	-	-	-	NP	NP	NQ	NQ	NR	NR	NR	NR	NR	NR	NA	-	NA	NA	NR	-	-	-	NA	-	NR	NA	-	-	-	NA	NR
78	NA	NA	NA	NA	NB	NB	NB	NC	NC	NC	NC	ND	ND	ND	ND	NE	NE	NE	NE	NF	NF	NG	NG	NG	NH	NI	NI	NI	NJ	NJ	NJ	NK	NK	NK	NK	NL	NL	NL	-	-	-	-	NO	NO	NO	NO	-	-	-	NP	NP	NQ	NQ	NR	NR	NR	NR	NR	NR	NA	-	NA	NA	NR	-	-	-	NA	-	NR	NA	-	-	-	NA	NR
79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MN	MN	MN	MN	MO	MO	MO	MP	MP	MQ	MQ	MR	MR	MR	MR	MR	MR	-	-	-	-	MR	-	-	-	-	-	MR	-	-	-	-	-	MR
80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MN	MN	MN	MN	MO	MO	MO	MP	MP	MQ	MQ	MR	MR	MR	MR	MR	MR	-	-	-	-	MR	-	-	-	-	-	MR	-	-	-	-	-	MR
81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MN	MN	MN	MN	MO	MO	MO	MP	MP	MQ	MQ	MR	MR	MR	MR	MR	MR	-	-	-	-	MR	-	-	-	-	-	MR	-	-	-	-	-	MR
82	IA	IA	IA	IA	IB	IB	IB	IC	IC	IC	IC	ID	ID	ID	ID	IE	IE	IE	IE	-	-	-	-	-	-	-	-	-	-	-	-	IK	IK	IK	IK	IL	IL	IL	IM	IM	IM	IM	IN	IN	IN	IN	IO	IO	IO	IP	IP	IQ	IQ	IR	IR	IR	IR	IR	IR	-	-	-	-	IR	-	-	-	-	-	IR	-	-	-	-	-	IR
83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MN	MN	MN	MN	MO	MO	MO	MP	MP	MQ	MQ	MR	MR	MR	MR	MR	MR	-	-	-	-	MR	-	-	-	-	-	MR	-	-	-	-	-	MR
84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MN	MN	MN	MN	MO	MO	MO	MP	MP	MQ	MQ	MR	MR	MR	MR	MR	MR	-	-	-	-	MR	-	-	-	-	-	MR	-	-	-	-	-	MR
85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MN	MN	MN	MN	MO	MO	MO	MP	MP	MQ	MQ	MR	MR	MR	MR	MR	MR	-	-	-	-	MR	-	-	-	-	-	MR	-	-	-	-	-	MR
86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MN	MN	MN	MN	MO	MO	MO	MP	MP	MQ	MQ	MR	MR	MR	MR	MR	MR	-	-	-	-	MR	-	-	-	-	-	MR	-	-	-	-	-	MR
87	IA	IA	IA	IA	IB	IB	IB	IC	IC	IC	IC	ID	ID	ID	ID	IE	IE	IE	IE	-	-	-	-	-	-	-	-	-	-	-	-	IK	IK	IK	IK	IL	IL	IL	IM	IM	IM	IM	IN	IN	IN	IN	IO	IO	IO	IP	IP	IQ	IQ	IR	IR	IR	IR	IR	IR	-	-	-	-	IR	-	-	-	-	-	IR	-	-	-	-	-	IR
88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Trip Matrix for O-D Pairs (Trips between Expressway Interchange Node Zones + Other States of India and Districts of Uttar Pradesh)

Zones	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
AL1	-	-	-	-	-	-	-	-	-	-	-	-	-	AI	AI	AJ	AJ	AM	-	AL	AJ	AM	AO	AL	AN	AN	-	-	-	AL	AM	AM	AM	AM	AM	AL	AL	AI	AR	AM	AM	AM	AM	AM	AM	AM	AM	AM	-	AM	AM	AR	AR	AR	AR	AR	AR	AM	AJ	AR	AO	AQ	AR	AL	-	AJ	AN	AN	-	-	-	AI	-	-	-	-	AI	-	-	-	-	-	-
AL2	-	-	-	-	-	-	-	-	-	-	-	-	-	AI	AI	AJ	AJ	AM	-	AL	AJ	AM	AO	AL	AN	AN	-	-	-	AL	AM	AM	AM	AM	AM	AL	AL	AI	AR	AM	AM	AM	AM	AM	AM	AM	AM	AM	-	AM	AM	AR	AR	AR	AR	AR	AR	AM	AJ	AR	AO	AQ	AR	AL	-	AJ	AN	AN	-	-	-	AI	-	-	-	-	AI	-	-	-	-	-	-
AR1	-	-	-	-	-	-	-	-	-	-	-	-	-	AI	AI	AJ	AJ	AM	-	AL	AJ	AM	AO	AL	AN	AN	-	-	-	AL	AM	AM	AM	AM	AM	AL	AL	AI	AR	AM	AM	AM	AM	AM	AM	AM	AM	AM	-	AM	AM	AR	AR	AR	AR	AR	AR	AM	AJ	AR	AO	AQ	AR	AL	-	AJ	AN	AN	-	-	-	AI	-	-	-	-	AI	-	-	-	-	-	-
AR2	-	-	-	-	-	-	-	-	-	-	-	-	-	AI	AI	AJ	AJ	AM	-	AL	AJ	AM	AO	AL	AN	AN	-	-	-	AL	AM	AM	AM	AM	AM	AL	AL	AI	AR	AM	AM	AM	AM	AM	AM	AM	AM	AM	-	AM	AM	AR	AR	AR	AR	AR	AR	AM	AJ	AR	AO	AQ	AR	AL	-	AJ	AN	AN	-	-	-	AI	-	-	-	-	AI	-	-	-	-	-	-
BL1	BA	BA	-	-	-	-	-	-	BA	-	-	-	-	BI	BI	BJ	BJ	BM	-	BL	BJ	BM	BO	BL	BN	BN	-	-	-	BL	BM	BM	BM	BM	BM	BL	BL	BI	BR	BM	BM	BM	BM	BM	BM	BM	BM	BM	-	BM	BM	BR	BR	BR	BR	BR	BR	BM	BJ	BR	BO	BQ	BR	BL	-	BJ	BN	BN	-	-	-	BI	-	-	-	-	BI	-	-	-	-	-	-
BL2	BA	BA	-	-	-	-	-	-	BA	-	-	-	-	BI	BI	BJ	BJ	BM	-	BL	BJ	BM	BO	BL	BN	BN	-	-	-	BL	BM	BM	BM	BM	BM	BL	BL	BI	BR	BM	BM	BM	BM	BM	BM	BM	BM	BM	-	BM	BM	BR	BR	BR	BR	BR	BR	BM	BJ	BR	BO	BQ	BR	BL	-	BJ	BN	BN	-	-	-	BI	-	-	-	-	BI	-	-	-	-	-	-
BR1	BA	BA	-	-	-	-	-	-	BA	-	-	-	-	BI	BI	BJ	BJ	BM	-	BL	BJ	BM	BO	BL	BN	BN	-	-	-	BL	BM	BM	BM	BM	BM	BL	BL	BI	BR	BM	BM	BM	BM	BM	BM	BM	BM	BM	-	BM	BM	BR	BR	BR	BR	BR	BR	BM	BJ	BR	BO	BQ	BR	BL	-	BJ	BN	BN	-	-	-	BI	-	-	-	-	BI	-	-	-	-	-	-
CL1	CA	CA	-	-	-	-	-	-	CA	-	-	-	-	CI	CI	CJ	CJ	CM	-	CL	CJ	CM	CO	CL	CN	CN	-	-	-	CL	CM	CM	CM	CM	CM	CL	CL	CI	CR	CM	CM	CM	CM	CM	CM	CM	CM	CM	-	CM	CM	CR	CR	CR	CR	CR	CR	CM	CJ	CR	CO	CQ	CR	CL	-	CJ	CN	CN	-	-	-	CI	-	-	-	-	CI	-	-	-	-	-	-
CL2	CA	CA	-	-	-	-	-	-	CA	-	-	-	-	CI	CI	CJ	CJ	CM	-	CL	CJ	CM	CO	CL	CN	CN	-	-	-	CL	CM	CM	CM	CM	CM	CL	CL	CI	CR	CM	CM	CM	CM	CM	CM	CM	CM	CM	-	CM	CM	CR	CR	CR	CR	CR	CR	CM	CJ	CR	CO	CQ	CR	CL	-	CJ	CN	CN	-	-	-	CI	-	-	-	-	CI	-	-	-	-	-	-
CR1	CA	CA	-	-	-	-	-	-	CA	-	-	-	-	CI	CI	CJ	CJ	CM	-	CL	CJ	CM	CO	CL	CN	CN	-	-	-	CL	CM	CM	CM	CM	CM	CL	CL	CI	CR	CM	CM	CM	CM	CM	CM	CM	CM	CM	-	CM	CM	CR	CR	CR	CR	CR	CR	CM	CJ	CR	CO	CQ	CR	CL	-	CJ	CN	CN	-	-	-	CI	-	-	-	-	CI	-	-	-	-	-	-
CR2	CA	CA	-	-	-	-	-	-	CA	-	-	-	-	CI	CI	CJ	CJ	CM	-	CL	CJ	CM	CO	CL	CN	CN	-	-	-	CL	CM	CM	CM	CM	CM	CL	CL	CI	CR	CM	CM	CM	CM	CM	CM	CM	CM	CM	-	CM	CM	CR	CR	CR	CR	CR	CR	CM	CJ	CR	CO	CQ	CR	CL	-	CJ	CN	CN	-	-	-	CI	-	-	-	-	CI	-	-	-	-	-	-
DL1	DA	DA	-	-	-	-	-	-	DA	-	-	-	-	DI	DI	DJ	DJ	DM	-	DL	DJ	DM	DO	DL	DN	DN	-	-	-	DL	DM	DM	DM	DM	DM	DL	DL	DI	DR	DM	DM	DM	DM	DM	DM	DM	DM	DM	-	DM	DM	DR	DR	DR	DR	DR	DR	DM	DJ	DR	DO	DQ	DR	DL	-	DJ	DN	DN	-	-	-	DI	-	-	-	-	DI	-	-	-	-	-	-
DL2	DA	DA	-	-	-	-	-	-	DA	-	-	-	-	DI	DI	DJ	DJ	DM	-	DL	DJ	DM	DO	DL	DN	DN	-	-	-	DL	DM	DM	DM	DM	DM	DL	DL	DI	DR	DM	DM	DM	DM	DM	DM	DM	DM	DM	-	DM	DM	DR	DR	DR	DR	DR	DR	DM	DJ	DR	DO	DQ	DR	DL	-	DJ	DN	DN	-	-	-	DI	-	-	-	-	DI	-	-	-	-	-	-
DR1	DA	DA	-	-	-	-	-	-	DA	-	-	-	-	DI	DI	DJ	DJ	DM	-	DL	DJ	DM	DO	DL	DN	DN	-	-	-	DL	DM	DM	DM	DM	DM	DL	DL	DI	DR	DM	DM	DM	DM	DM	DM	DM	DM	DM	-	DM	DM	DR	DR	DR	DR	DR	DR	DM	DJ	DR	DO	DQ	DR	DL	-	DJ	DN	DN	-	-	-	DI	-	-	-	-	DI	-	-	-	-	-	-
DR2	DA	DA	-	-	-	-	-	-	DA	-	-	-	-	DI	DI	DJ	DJ	DM	-	DL	DJ	DM	DO	DL	DN	DN	-	-	-	DL	DM	DM	DM	DM	DM	DL	DL	DI	DR	DM	DM	DM	DM	DM	DM	DM	DM	DM	-	DM	DM	DR	DR	DR	DR	DR	DR	DM	DJ	DR	DO	DQ	DR	DL	-	DJ	DN	DN	-	-	-	DI	-	-	-	-	DI	-	-	-	-	-	-
EL1	EA	EA	-	EC	EB	EC	EB	-	EA	-	-	-	-	EI	EI	EJ	EJ	EM	-	EL	EJ	EM	EO	EL	EN	EN	EC	-	-	EL	EM	EM	EM	EM	EM	EL	EL	EI	ER	EM	EM	EM	EM	EM	EM	EM	EM	EM	-	EM	EM	ER	ER	ER	ER	ER	ER	EM	EJ	ER	EO	EQ	ER	EL	-	EJ	EN	EN	-	-	-	EI	-	-	-	-	EI	-	-	-	-	-	-
EL2	EA	EA	-	EC	EB	EC	EB	-	EA	-	-	-	-	EI	EI	EJ	EJ	EM	-	EL	EJ	EM	EO	EL	EN	EN	EC	-	-	EL	EM	EM	EM	EM	EM	EL	EL	EI	ER	EM	EM	EM	EM	EM	EM	EM	EM	EM	-	EM	EM	ER	ER	ER	ER	ER	ER	EM	EJ	ER	EO	EQ	ER	EL	-	EJ	EN	EN	-	-	-	EI	-	-	-	-	EI	-	-	-	-	-	-
ER1	EA	EA	-	EC	EB	EC	EB	-	EA	-	-	-	-	EI	EI	EJ	EJ	EM	-	EL	EJ	EM	EO	EL	EN	EN	EC	-	-	EL	EM	EM	EM	EM	EM	EL	EL	EI	ER	EM	EM	EM	EM	EM	EM	EM	EM	EM	-	EM	EM	ER	ER	ER	ER	ER	ER	EM	EJ	ER	EO	EQ	ER	EL	-	EJ	EN	EN	-	-	-	EI	-	-	-	-	EI	-	-	-	-	-	-
ER2	EA	EA	-	EC	EB	EC	EB	-	EA	-	-	-	-	EI	EI	EJ	EJ	EM	-	EL	EJ	EM	EO	EL	EN	EN	EC	-	-	EL	EM	EM	EM	EM	EM	EL	EL	EI	ER	EM	EM	EM	EM	EM	EM	EM	EM	EM	-	EM	EM	ER	ER	ER	ER	ER	ER	EM	EJ	ER	EO	EQ	ER	EL	-	EJ	EN	EN	-	-	-	EI	-	-	-	-	EI	-	-	-	-	-	-
FL1	FA	FA	-	FC	FB	FC	FB	-	FA	-	-	-	FE	-	-	FJ	FJ	FM	-	FL	FJ	FM	FO	FL	FN	FN	FC	-	-	FL	FM	FM	FM	FM	FM	FL	FL	-	FR	FM	FM	FM	FM	FM	FM	FM	FM	FM	-	FM	FM	FR	FR	FR	FR	FR	FR	FM	FJ	FR	FO	FQ	FR	FL	-	FJ	FN	FN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FL2	FA	FA	-	FC	FB	FC	FB	-	FA	-	-	-	FE	-	-	FJ	FJ	FM	-	FL	FJ	FM	FO	FL	FN	FN	FC	-	-	FL	FM	FM	FM	FM	FM	FL	FL	-	FR	FM	FM	FM	FM	FM	FM	FM	FM	FM	-	FM	FM	FR	FR	FR	FR	FR	FR	FM	FJ	FR	FO	FQ	FR	FL	-	FJ	FN	FN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL1	GA	GA	-	GC	GB	GC	GB	-	GA	-	-	-	GE	-	-	-	-	GM	-	GL	GJ	GM	GO	GL	GN	GN	GC	-	-	GL	GM	GM	GM	GM	GM	GL	GL	-	GR	GM	GM	GM	GM	GM	GM	GM	GM	GM	-	GM	GM	GR	GR	GR	GR	GR	GR	GM	GJ	GR	GO	GQ	GR	GL	-	GJ	GN	GN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL2	GA	GA	-	GC	GB	GC	GB	-	GA	-	-	-	GE	-	-	-	-	GM	-	GL	GJ	GM	GO	GL	GN	GN	GC	-	-	GL	GM	GM	GM	GM	GM	GL	GL	-	GR	GM	GM	GM	GM	GM	GM	GM	GM	GM	-	GM	GM	GR	GR	GR	GR	GR	GR	GM	GJ	GR	GO	GQ	GR	GL	-	GJ	GN	GN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GR1	GA	GA	-	GC	GB	GC	GB	-	GA	-	-	-	GE	-	-	-	-	GM	-	GL	GJ	GM	GO	GL	GN	GN	GC	-	-	GL	GM	GM	GM	GM	GM	GL	GL	-	GR	GM	GM	GM	GM	GM	GM	GM	GM	GM	-	GM	GM	GR	GR	GR	GR	GR	GR	GM	GJ	GR	GO	GQ	GR	GL	-	GJ	GN	GN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HL2	HA	HA	HG	HC	HB	HC	HB	HG	HA	HE	-	-	HE	-	-	-	-	HM	-	HL	HJ	HM	HO	HL	HN	HN	HC	-	-	HL	HM	HM	HM	HM	HM	HL	HL	-	HR	HM	HM	HM	HM	HM	HM	HM	HM	HM	-	HM	HM	HR	HR	HR	HR	HR	HR	HM	HJ	HR	HO	HQ	HR	HL	-	HJ	HN	HN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IL1	IA	IA	IG	IC	IB	IC	IB	IG	IA	IE	-	-	IE	-	-	-	-	IM	-	IL	-	IM	IO	IL	IN	IN	IC	-	-	IL	IM	IM	IM	IM	IM	IL	IL	-	IR	IM	IM	IM	IM	IM	IM	IM	IM	IM	-	IM	IM	IR	IR	IR	IR	IR	IR	IM	-	IR	IO	IQ	IR	IL	-	-	IN	IN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IL2	IA	IA	IG	IC	IB	IC	IB	IG	IA	IE	-	-	IE	-	-	-	-	IM	-	IL	-	IM	IO	IL	IN	IN	IC	-	-	IL	IM	IM	IM	IM	IM	IL	IL	-	IR	IM	IM	IM	IM	IM	IM	IM	IM	IM	-	IM	IM	IR	IR	IR	IR	IR	IR	IM	-	IR	IO	IQ	IR	IL	-	IJ	IN	IN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IR2	IA	IA	IG	IC	IB	IC	IB	IG	IA	IE	-	-	IE	-	-	-	-	IM	-	IL	-	IM	IO	IL	IN	IN	IC	-	-	IL	IM	IM	IM	IM	IM	IL	IL	-	IR	IM	IM	IM	IM	IM	IM	IM	IM	IM	-	IM	IM	IR	IR	IR	IR	IR	IR	IM	-	IR	IO	IQ	IR	IL	-	IJ	IN	IN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JL2	JA	JA	JG	JC	JB	JC	JB	JG	JA	JE	JG	-	JE	-	-	-	-	JM	-	-	-	JM	JO	-	JN	JN	JC	JF	JE	-	JM	JM	JM	JM	JM	-	-	-	JR	JM	JM	JM	JM	JM	JM	JM	JM	JM	-	JM	JM	JR	JR	JR	JR	JR	JR	JM	-	JR	JO	JQ	JR	-	-	-	JN	JN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JR1	JA	JA	JG	JC	JB	JC	JB	JG	JA	JE	JG	-	JE	-	-	-	-	JM	-	-	-	JM	JO	-	JN	JN	JC	JF	JE	-	JM	JM	JM	JM	JM	-	-	-	JR	JM	JM	JM	JM	JM	JM	JM	JM	JM	-	JM	JM	JR	JR	JR	JR	JR	JR	JM	-	JR	JO	JQ	JR	-	-	-	JN	JN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JR2	JA	JA	JG	JC	JB	JC	JB	JG	JA	JE	JG	-	JE	-	-	-	-	JM	-	-	-	JM	JO	-	JN	JN	JC	JF	JE	-	JM	JM	JM	JM	JM	-	-	-	JR	JM	JM	JM	JM	JM	JM	JM	JM	JM	-	JM	JM	JR	JR	JR	JR	JR	JR	JM	-	JR	JO	JQ	JR	-	-	-	JN	JN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KL1	KA	KA	KG	KC	KB	KC	KB	KG	KA	KE	KG	KI	KE	KI	KI	-	-	KM	-	-	-	-	KO	-	KN	KN	KC	KF	KE	-	-	-	-	-	-	-	-	KI	KR	KM	KM	KM	KM	KM	KM	KM	KM	KM	-	KM	KM	KR	KR	KR	KR	KR	KR	KM	-	KR	KO	KQ	KR	-	-	KJ	KN	KN	-	-	-	KI	-	-	-	-	KI	-	-	-	-	-	-
KL2	KA	KA	KG	KC	KB	KC	KB	KG	KA	KE	KG	KI	KE	KI	KI	-	-	KM	-	-	-	-	KO	-	KN	KN	KC	KF	KE	-	-	-	-	-	-	-	-	KI	KR	KM	KM	KM	KM	KM	KM	KM	KM	KM	-	KM	KM	KR	KR	KR	KR	KR	KR	KM	-	KR	KO	KQ	KR	-	-	KJ	KN	KN	-	-	-	KI	-	-	-	-	KI	-	-	-	-	-	-
KR1	KA	KA	KG	KC	KB	KC	KB	KG	KA	KE	KG	KI	KE	KI	KI	-	-	KM	-	-	-	-	KO	-	KN	KN	KC	KF	KE	-	-	-	-	-	-	-	-	KI	KR	KM	KM	KM	KM	KM	KM	KM	KM	KM	-	KM	KM	KR	KR	KR	KR	KR	KR	KM	-	KR	KO	KQ	KR	-	-	KJ	KN	KN	-	-	-	KI	-	-	-	-	KI	-	-	-	-	-	-
KR2	KA	KA	KG	KC	KB	KC	KB	KG	KA	KE	KG	KI	KE	KI	KI	-	-	KM	-	-	-	-	KO	-	KN	KN	KC	KF	KE	-	-	-	-	-	-	-	-	KI	KR	KM	KM	KM	KM	KM	KM	KM	KM	KM	-	KM	KM	KR	KR	KR	KR	KR	KR	KM	-	KR	KO	KQ	KR	-	-	KJ	KN	KN	-	-	-	KI	-	-	-	-	KI	-	-	-	-	-	-
LL1	LA	LA	LG	LC	LB	LC	LB	LG	LA	LE	LG	LI	LE	LI	LI	LJ	LJ	-	-	-	-	-	LO	-	LN	LN	LC	LF	LE	-	-	-	-	-	-	-	-	LI	LR	LM	LM	LM	LM	LM	LM	LM	LM	LM	-	LM	LM	LR	LR	LR	LR	LR	LR	LM	-	LR	LO	LQ	LR	-	-	LJ	LN	LN	-	-	-	LI	-	-	-	-	LI	-	-	-	-	-	-
LR1	LA	LA	LG	LC	LB	LC	LB	LG	LA	LE	LG	LI	LE	LI	LI	LJ	LJ	-	-	-	-	-	LO	-	LN	LN	LC	LF	LE	-	-	-	-	-	-	-	-	LI	LR	LM	LM	LM	LM	LM	LM	LM	LM	LM	-	LM	LM	LR	LR	LR	LR	LR	LR	LM	-	LR	LO	LQ	LR	-	-	LJ	LN	LN	-	-	-	LI	-	-	-	-	LI	-	-	-	-	-	-
LR2	LA	LA	LG	LC	LB	LC	LB	LG	LA	LE	LG	LI	LE	LI	LI	LJ	LJ	-	-	-	-	-	LO	-	LN	LN	LC	LF	LE	-	-	-	-	-	-	-	-	LI	LR	LM	LM	LM	LM	LM	LM	LM	LM	LM	-	LM	LM	LR	LR	LR	LR	LR	LR	LM	-	LR	LO	LQ	LR	-	-	LJ	LN	LN	-	-	-	LI	-	-	-	-	LI	-	-	-	-	-	-
ML1	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	-	-	-	MO	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	MR	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	MO	MQ	MR	-	-	MJ	-	-	-	-	-	MI	-	-	-	-	MI	-	-	-	-	-	-
ML2	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	-	-	-	MO	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	MR	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	MO	MQ	MR	-	-	MJ	-	-	-	-	-	MI	-	-	-	-	MI	-	-	-	-	-	-
MR1	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	-	-	-	MO	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	MR	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	MO	MQ	MR	-	-	MJ	-	-	-	-	-	MI	-	-	-	-	MI	-	-	-	-	-	-
MR2	MA	MA	MG	MC	MB	MC	MB	MG	MA	ME	MG	MI	ME	MI	MI	MJ	MJ	-	-	-	-	-	MO	-	-	-	MC	MF	ME	-	-	-	-	-	-	-	-	MI	MR	-	-	-	-	-	-	-	-	-	-	-	-	MR	MR	MR	MR	MR	MR	-	-	MR	MO	MQ	MR	-	-	MJ	-	-	-	-	-	MI	-	-	-	-	MI	-	-	-	-	-	-
NL1	NA	NA	NG	NC	NB	NC	NB	NG	NA	NE	NG	NI	NE	NI	NI	NJ	NJ	-	-	NL	-	-	NO	-	ON	ON	NC	NF	NE	-	-	-	-	-	-	-	-	NI	NR	-	-	-	-	-	-	-	-	-	NM	-	-	NR	NR	NR	NR	NR	NR	-	-	NR	NO	NQ	NR	NL	NM	NJ	ON	ON	NM	NM	NM	NI	NM	NM	NM	NM	NI	-	-	-	-	-	-
NL2	NA	NA	NG	NC	NB	NC	NB	NG	NA	NE	NG	NI	NE	NI	NI	NJ	NJ	-	-	NL	-	-	NO	-	ON	ON	NC	NF	NE	-	-	-	-	-	-	-	-	NI	NR	-	-	-	-	-	-	-	-	-	NM	-	-	NR	NR	NR	NR	NR	NR	-	-	NR	NO	NQ	NR	NL	NM	NJ	ON	ON	NM	NM	NM	NI	NM	NM	NM	NM	NI	-	-	-	-	-	-
NR1	NA	NA	NG	NC	NB	NC	NB	NG	NA	NE	NG	NI	NE	NI	NI	NJ	NJ	-	-	NL	-	-	NO	-	ON	ON	NC	NF	NE	-	-	-	-	-	-	-	-	NI	NR	-	-	-	-	-	-	-	-	-	NM	-	-	NR	NR	NR	NR	NR	NR	-	-	NR	NO	NQ	NR	NL	NM	NJ	ON	ON	NM	NM	NM	NI	NM	NM	NM	NM	NI	-	-	-	-	-	-
NR2	NA	NA	NG	NC	NB	NC	NB	NG	NA	NE	NG	NI	NE	NI	NI	NJ	NJ	-	-	NL	-	-	NO	-	ON	ON	NC	NF	NE	-	-	-	-	-	-	-	-	NI	NR	-	-	-	-	-	-	-	-	-	NM	-	-	NR	NR	NR	NR	NR	NR	-	-	NR	NO	NQ	NR	NL	NM	NJ	ON	ON	NM	NM	NM	NI	NM	NM	NM	NM	NI	-	-	-	-	-	-
OL2	OA	OA	OG	OC	OB	OC	OB	OG	OA	OE	OG	OI	OE	OI	OI	OJ	OJ	-	-	OL	-	-	-	-	-	-	OC	OF	OE	-	-	-	-	-	-	-	-	OI	OR	-	-	-	-	-	-	-	-	-	OM	-	-	OR	OR	OR	OR	OR	OR	-	-	OR	-	OQ	OR	OL	OM	OJ	-	-	OM	OM	OM	OI	OM	OM	OM	OM	OI	-	-	-	-	-	-
OR1	OA	OA	OG	OC	OB	OC	OB	OG	OA	OE	OG	OI	OE	OI	OI	OJ	OJ	-	-	OL	-	-	-	-	-	-	OC	OF	OE	-	-	-	-	-	-	-	-	OI	OR	-	-	-	-	-	-	-	-	-	OM	-	-	OR	OR	OR	OR	OR	OR	-	-	OR	-	OQ	OR	OL	OM	OJ	-	-	OM	OM	OM	OI	OM	OM	OM	OM	OI	-	-	-	-	-	-
OR2	OA	OA	OG	OC	OB	OC	OB	OG	OA	OE	OG	OI	OE	OI	OI	OJ	OJ	-	-	OL	-	-	-	-	-	-	OC	OF	OE	-	-	-	-	-	-	-	-	OI	OR	-	-	-	-	-	-	-	-	-	OM	-	-	OR	OR	OR	OR	OR	OR	-	-	OR	-	OQ	OR	OL	OM	OJ	-	-	OM	OM	OM	OI	OM	OM	OM	OM	OI	-	-	-	-	-	-
PL1	PA	PA	PG	PC	PB	PC	PB	PG	PA	PE	PG	PI	PE	PI	PI	PJ	PJ	-	-	PL	-	-	PO	-	PN	PN	PC	PF	PE	-	-	-	-	-	-	-	-	PI	PR	-	-	-	-	-	-	-	-	-	PM	-	-	PR	PR	PR	PR	PR	PR	-	-	PR	PO	-	PR	PL	PM	PJ	PN	PN	PM	PM	PM	PI	PM	PM	PM	PM	PI	-	-	-	-	-	-
PL2	PA	PA	PG	PC	PB	PC	PB	PG	PA	PE	PG	PI	PE	PI	PI	PJ	PJ	-	-	PL	-	-	PO	-	PN	PN	PC	PF	PE	-	-	-	-	-	-	-	-	PI	PR	-	-	-	-	-	-	-	-	-	PM	-	-	PR	PR	PR	PR	PR	PR	-	-	PR	PO	-	PR	PL	PM	PJ	PN	PN	PM	PM	PM	PI	PM	PM	PM	PM	PI	-	-	-	-	-	-
QR1	QA	QA	QG	QC	QB	QC	QB	QG	QA	QE	QG	QI	QE	QI	QI	QJ	QJ	-	-	QL	-	QP	QO	-	QN	QN	QC	QF	QE	-	QP	QP	QP	QP	QP	-	-	QI	QR	-	-	-	-	-	-	-	-	-	QM	-	-	-	-	-	-	-	-	-	-	-	QO	-	-	QL	QM	QJ	QN	QN	QM	QM	QM	QI	QM	QM	QM	QM	QI	-	-	-	-	-	-
QR2	QA	QA	QG	QC	QB	QC	QB	QG	QA	QE	QG	QI	QE	QI	QI	QJ	QJ	-	-	QL	-	QP	QO	-	QN	QN	QC	PF	PE	-	QP	QP	QP	QP	QP	-	-	QI	QR	-	-	-	-	-	-	-	-	-	QM	-	-	-	-	-	-	-	-	-	-	-	QO	-	-	QL	QM	QJ	QN	QN	QM	QM	QM	QI	QM	QM	QM	QM	QI	-	-	-	-	-	-
RL2	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	PL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	RM	-	-	-	-	-	-	-	-	-	RP	-	RO	-	-	PL	RM	RJ	RN	RN	RM	RM	RM	RI	RM	RM	RM	RM	RI	-	-	-	-	-	-
RR1	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	PL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	RM	-	-	-	-	-	-	-	-	-	RP	-	RO	-	-	PL	RM	RJ	RN	RN	RM	RM	RM	RI	RM	RM	RM	RM	RI	-	-	-	-	-	-
RR2	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	PL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	RM	-	-	-	-	-	-	-	-	-	RP	-	RO	-	-	PL	RM	RJ	RN	RN	RM	RM	RM	RI	RM	RM	RM	RM	RI	-	-	-	-	-	-
ZAS	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	RM	-	-	-	-	-	-	-	-	-	RP	-	RO	RQ	-	RL	RM	RJ	RN	RN	RM	RM	RM	RI	RM	RM	RM	RM	RI	-	-	-	-	-	-
ZBR	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	RM	-	-	-	-	-	-	-	-	-	RP	-	RO	RQ	-	RL	RM	RJ	RN	RN	RM	RM	RM	RI	RM	RM	RM	RM	RI	-	-	-	-	-	-
ZCG	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	RM	-	-	-	-	-	-	-	-	-	RP	-	RO	RQ	-	RL	RM	RJ	RN	RN	RM	RM	RM	RI	RM	RM	RM	RM	RI	-	-	-	-	-	-
ZCH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	AM	-	AL	AJ	AM	AO	AL	AN	AN	-	-	-	AL	AM	AM	AM	AM	AM	AL	AL	-	AR	AM	AM	AM	AM	AM	AM	AM	AM	AM	-	AM	AM	AR	AR	AR	AR	AR	AR	AM	AJ	AR	AO	AQ	AR	AL	-	AJ	AN	AN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZGJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZHP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	AM	-	AL	AJ	AM	AO	AL	AN	AN	-	-	-	AL	AM	AM	AM	AM	AM	AL	AL	-	AR	AM	AM	AM	AM	AM	AM	AM	AM	AM	-	AM	AM	AR	AR	AR	AR	AR	AR	AM	AJ	AR	AO	AQ	AR	AL	-	AJ	AN	AN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZHR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	AM	-	AL	AJ	AM	AO	AL	AN	AN	-	-	-	AL	AM	AM	AM	AM	AM	AL	AL	-	AR	AM	AM	AM	AM	AM	AM	AM	AM	AM	-	AM	AM	AR	AR	AR	AR	AR	AR	AM	AJ	AR	AO	AQ	AR	AL	-	AJ	AN	AN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZJH	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	RM	-	-	-	-	-	-	-	-	-	RP	-	RO	RQ	-	RL	RM	RJ	RN	RN	RM	RM	RM	RI	RM	RM	RM	RM	RI	-	-	-	-	-	-
ZKA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZMH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZMP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZNDLS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	AM	-	AL	AJ	AM	AO	AL	AN	AN	-	-	-	AL	AM	AM	AM	AM	AM	AL	AL	-	AR	AN	AN	AN	AN	AN	AN	AN	AN	AN	-	AN	AN	AR	AR	AR	AR	AR	AR	AN	AJ	AR	AO	AQ	AR	AL	-	AJ	AN	AN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZNepal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZOR	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	RP	RP	RO	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	RM	-	-	-	-	-	-	-	-	-	RP	-	RO	RQ	-	RL	RM	RJ	RN	RN	RM	RM	RM	RI	RM	RM	RM	RM	RI	-	-	-	-	-	-
ZPB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	AM	-	AL	-	AM	AO	-	AN	AN	-	-	-	-	AM	AM	AM	AM	AM	-	-	-	AR	AM	AM	AM	AM	AM	AM	AM	AM	AM	-	AM	AM	AR	AR	AR	AR	AR	AR	AM	-	AR	AO	AQ	AR	AL	-	AJ	AN	AN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZRJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZTN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZUK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	AM	AO	AL	AN	AN	-	-	-	AL	AM	AM	AM	AM	AM	AL	AL	-	AR	AM	AM	AM	AM	AM	AM	AM	AM	AM	-	AM	AM	AR	AR	AR	AR	AR	AR	AM	-	AR	AO	AQ	AR	-	-	AJ	AN	AN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZWB	RA	RA	RG	RC	RB	RC	RB	RG	RA	RE	RG	RI	RE	RI	RI	RJ	RJ	-	-	RL	RP	RP	RP	RP	RN	RN	RC	RF	RE	RP	RP	RP	RP	RP	RP	RP	RP	RI	-	-	-	-	-	-	-	-	-	-	RM	-	-	-	-	-	-	-	-	-	RP	-	RP	RQ	-	RL	RM	RJ	RN	RN	RM	RM	RM	RI	RM	RM	RM	RM	RI	-	-	-	-	-	-

Trip Matrix for O-D Pairs (Trips between Interchange Node Zones and Other States of India)

Zones	AL1	AL2	AR1	AR2	BL1	BL2	BR1	CL1	CL2	CR1	CR2	DL1	DL2	DR1	DR2	EL1	EL2	ER1	ER2	FL1	FL2	GL1	GL2	GR1	HL2	IL1	IL2	IR2	JL2	JR1	JR2	KL1	KL2	KR1	KR2	LL1	LR1	LR2	ML1	ML2	MR1	MR2	NL1	NL2	NR1	NR2	OL2	OR1	OR2	PL1	PL2	QR1	QR2	RL2	RR1	RR2	ZAS	ZBR	ZCG	ZCH	ZGJ	ZHP	ZHR	ZJH	ZKA	ZMH	ZMP	ZNDLS	ZNepal	ZOR	ZPB	ZRJ	ZTN	ZTS	ZUK	ZWB
AL1	-	-	-	-	AB	AB	AB	AC	AC	AC	AC	AD	AD	AD	AD	AE	AE	AE	AE	AF	AF	AG	AG	AG	AH	AI	AI	AI	AJ	AJ	AJ	AK	AK	AK	AK	AL	AL	AL	AM	AM	AM	AM	AN	AN	AN	AN	AO	AO	AO	AP	AP	AQ	AQ	AR	AR	AR	AR	AR	AR	-	-	-	-	AR	-	-	-	-	-	AR	-	-	-	-	-	AR
AL2	-	-	-	-	AB	AB	AB	AC	AC	AC	AC	AD	AD	AD	AD	AE	AE	AE	AE	AF	AF	AG	AG	AG	AH	AI	AI	AI	AJ	AJ	AJ	AK	AK	AK	AK	AL	AL	AL	AM	AM	AM	AM	AN	AN	AN	AN	AO	AO	AO	AP	AP	AQ	AQ	AR	AR	AR	AR	AR	AR	-	-	-	-	AR	-	-	-	-	-	AR	-	-	-	-	-	AR
AR1	-	-	-	-	AB	AB	AB	AC	AC	AC	AC	AD	AD	AD	AD	AE	AE	AE	AE	AF	AF	AG	AG	AG	AH	AI	AI	AI	AJ	AJ	AJ	AK	AK	AK	AK	AL	AL	AL	AM	AM	AM	AM	AN	AN	AN	AN	AO	AO	AO	AP	AP	AQ	AQ	AR	AR	AR	AR	AR	AR	-	-	-	-	AR	-	-	-	-	-	AR	-	-	-	-	-	AR
AR2	-	-	-	-	AB	AB	AB	AC	AC	AC	AC	AD	AD	AD	AD	AE	AE	AE	AE	AF	AF	AG	AG	AG	AH	AI	AI	AI	AJ	AJ	AJ	AK	AK	AK	AK	AL	AL	AL	AM	AM	AM	AM	AN	AN	AN	AN	AO	AO	AO	AP	AP	AQ	AQ	AR	AR	AR	AR	AR	AR	-	-	-	-	AR	-	-	-	-	-	AR	-	-	-	-	-	AR
BL1	BA	BA	BA	BA	-	-	-	BC	BC	BC	BC	BD	BD	BD	BD	BE	BE	BE	BE	BF	BF	BG	BG	BG	BH	BI	BI	BI	BJ	BJ	BJ	BK	BK	BK	BK	BL	BL	BL	BM	BM	BM	BM	BN	BN	BN	BN	BO	BO	BO	BP	BP	BQ	BQ	BR	BR	BR	BR	BR	BR	BA	-	BA	BA	BR	-	-	-	BA	-	BR	BA	-	-	-	BA	BR
BL2	BA	BA	BA	BA	-	-	-	BC	BC	BC	BC	BD	BD	BD	BD	BE	BE	BE	BE	BF	BF	BG	BG	BG	BH	BI	BI	BI	BJ	BJ	BJ	BK	BK	BK	BK	BL	BL	BL	BM	BM	BM	BM	BN	BN	BN	BN	BO	BO	BO	BP	BP	BQ	BQ	BR	BR	BR	BR	BR	BR	BA	-	BA	BA	BR	-	-	-	BA	-	BR	BA	-	-	-	BA	BR
BR1	BA	BA	BA	BA	-	-	-	BC	BC	BC	BC	BD	BD	BD	BD	BE	BE	BE	BE	BF	BF	BG	BG	BG	BH	BI	BI	BI	BJ	BJ	BJ	BK	BK	BK	BK	BL	BL	BL	BM	BM	BM	BM	BN	BN	BN	BN	BO	BO	BO	BP	BP	BQ	BQ	BR	BR	BR	BR	BR	BR	BA	-	BA	BA	BR	-	-	-	BA	-	BR	BA	-	-	-	BA	BR
CL1	CA	CA	CA	CA	CB	CB	CB	-	-	-	-	CD	CD	CD	CD	CE	CE	CE	CE	CF	CF	CG	CG	CG	CH	CI	CI	CI	CJ	CJ	CJ	CK	CK	CK	CK	CL	CL	CL	CM	CM	CM	CM	CN	CN	CN	CN	CO	CO	CO	CP	CP	CQ	CQ	CR	CR	CR	CR	CR	CR	CA	-	CA	CA	CR	-	-	-	CA	-	CR	CA	-	-	-	CA	CR
CL2	CA	CA	CA	CA	CB	CB	CB	-	-	-	-	CD	CD	CD	CD	CE	CE	CE	CE	CF	CF	CG	CG	CG	CH	CI	CI	CI	CJ	CJ	CJ	CK	CK	CK	CK	CL	CL	CL	CM	CM	CM	CM	CN	CN	CN	CN	CO	CO	CO	CP	CP	CQ	CQ	CR	CR	CR	CR	CR	CR	CA	-	CA	CA	CR	-	-	-	CA	-	CR	CA	-	-	-	CA	CR
CR1	CA	CA	CA	CA	CB	CB	CB	-	-	-	-	CD	CD	CD	CD	CE	CE	CE	CE	CF	CF	CG	CG	CG	CH	CI	CI	CI	CJ	CJ	CJ	CK	CK	CK	CK	CL	CL	CL	CM	CM	CM	CM	CN	CN	CN	CN	CO	CO	CO	CP	CP	CQ	CQ	CR	CR	CR	CR	CR	CR	CA	-	CA	CA	CR	-	-	-	CA	-	CR	CA	-	-	-	CA	CR
CR2	CA	CA	CA	CA	CB	CB	CB	-	-	-	-	CD	CD	CD	CD	CE	CE	CE	CE	CF	CF	CG	CG	CG	CH	CI	CI	CI	CJ	CJ	CJ	CK	CK	CK	CK	CL	CL	CL	CM	CM	CM	CM	CN	CN	CN	CN	CO	CO	CO	CP	CP	CQ	CQ	CR	CR	CR	CR	CR	CR	CA	-	CA	CA	CR	-	-	-	CA	-	CR	CA	-	-	-	CA	CR
DL1	DA	DA	DA	DA	DB	DB	DB	DC	DC	DC	DC	-	-	-	-	DE	DE	DE	DE	DF	DF	DG	DG	DG	DH	DI	DI	DI	DJ	DJ	DJ	DK	DK	DK	DK	DL	DL	DL	DM	DM	DM	DM	DN	DN	DN	DN	DO	DO	DO	DP	DP	DQ	DQ	DR	DR	DR	DR	DR	DR	DA	-	DA	DA	DR	-	-	-	DA	-	DR	DA	-	-	-	DA	DR
DL2	DA	DA	DA	DA	DB	DB	DB	DC	DC	DC	DC	-	-	-	-	DE	DE	DE	DE	DF	DF	DG	DG	DG	DH	DI	DI	DI	DJ	DJ	DJ	DK	DK	DK	DK	DL	DL	DL	DM	DM	DM	DM	DN	DN	DN	DN	DO	DO	DO	DP	DP	DQ	DQ	DR	DR	DR	DR	DR	DR	DA	-	DA	DA	DR	-	-	-	DA	-	DR	DA	-	-	-	DA	DR
DR1	DA	DA	DA	DA	DB	DB	DB	DC	DC	DC	DC	-	-	-	-	DE	DE	DE	DE	DF	DF	DG	DG	DG	DH	DI	DI	DI	DJ	DJ	DJ	DK	DK	DK	DK	DL	DL	DL	DM	DM	DM	DM	DN	DN	DN	DN	DO	DO	DO	DP	DP	DQ	DQ	DR	DR	DR	DR	DR	DR	DA	-	DA	DA	DR	-	-	-	DA	-	DR	DA	-	-	-	DA	DR
DR2	DA	DA	DA	DA	DB	DB	DB	DC	DC	DC	DC	-	-	-	-	DE	DE	DE	DE	DF	DF	DG	DG	DG	DH	DI	DI	DI	DJ	DJ	DJ	DK	DK	DK	DK	DL	DL	DL	DM	DM	DM	DM	DN	DN	DN	DN	DO	DO	DO	DP	DP	DQ	DQ	DR	DR	DR	DR	DR	DR	DA	-	DA	DA	DR	-	-	-	DA	-	DR	DA	-	-	-	DA	DR
EL1	EA	EA	EA	EA	EB	EB	EB	EC	EC	EC	EC	ED	ED	ED	ED	-	-	-	-	EF	EF	EG	EG	EG	EH	EI	EI	EI	EJ	EJ	EJ	EK	EK	EK	EK	EL	EL	EL	EM	EM	EM	EM	EN	EN	EN	EN	EO	EO	EO	EP	EP	EQ	EQ	ER	ER	ER	ER	ER	ER	EA	-	EA	EA	ER	-	-	-	EA	-	ER	EA	-	-	-	EA	ER
EL2	EA	EA	EA	EA	EB	EB	EB	EC	EC	EC	EC	ED	ED	ED	ED	-	-	-	-	EF	EF	EG	EG	EG	EH	EI	EI	EI	EJ	EJ	EJ	EK	EK	EK	EK	EL	EL	EL	EM	EM	EM	EM	EN	EN	EN	EN	EO	EO	EO	EP	EP	EQ	EQ	ER	ER	ER	ER	ER	ER	EA	-	EA	EA	ER	-	-	-	EA	-	ER	EA	-	-	-	EA	ER
ER1	EA	EA	EA	EA	EB	EB	EB	EC	EC	EC	EC	ED	ED	ED	ED	-	-	-	-	EF	EF	EG	EG	EG	EH	EI	EI	EI	EJ	EJ	EJ	EK	EK	EK	EK	EL	EL	EL	EM	EM	EM	EM	EN	EN	EN	EN	EO	EO	EO	EP	EP	EQ	EQ	ER	ER	ER	ER	ER	ER	EA	-	EA	EA	ER	-	-	-	EA	-	ER	EA	-	-	-	EA	ER
ER2	EA	EA	EA	EA	EB	EB	EB	EC	EC	EC	EC	ED	ED	ED	ED	-	-	-	-	EF	EF	EG	EG	EG	EH	EI	EI	EI	EJ	EJ	EJ	EK	EK	EK	EK	EL	EL	EL	EM	EM	EM	EM	EN	EN	EN	EN	EO	EO	EO	EP	EP	EQ	EQ	ER	ER	ER	ER	ER	ER	EA	-	EA	EA	ER	-	-	-	EA	-	ER	EA	-	-	-	EA	ER
FL1	FA	FA	FA	FA	FB	FB	FB	FC	FC	FC	FC	FD	FD	FD	FD	FE	FE	FE	FE	-	-	FG	FG	FG	FH	FI	FI	FI	FJ	FJ	FJ	FK	FK	FK	FK	FL	FL	FL	FM	FM	FM	FM	FN	FN	FN	FN	FO	FO	FO	FP	FP	FQ	FQ	FR	FR	FR	FR	FR	FR	FA	-	FA	FA	FR	-	-	-	FA	-	FR	FA	-	-	-	FA	FR
FL2	FA	FA	FA	FA	FB	FB	FB	FC	FC	FC	FC	FD	FD	FD	FD	FE	FE	FE	FE	-	-	FG	FG	FG	FH	FI	FI	FI	FJ	FJ	FJ	FK	FK	FK	FK	FL	FL	FL	FM	FM	FM	FM	FN	FN	FN	FN	FO	FO	FO	FP	FP	FQ	FQ	FR	FR	FR	FR	FR	FR	FA	-	FA	FA	FR	-	-	-	FA	-	FR	FA	-	-	-	FA	FR
GL1	GA	GA	GA	GA	GB	GB	GB	GC	GC	GC	GC	GD	GD	GD	GD	GE	GE	GE	GE	GF	GF	-	-	-	GH	GI	GI	GI	GJ	GJ	GJ	GK	GK	GK	GK	GL	GL	GL	GM	GM	GM	GM	GN	GN	GN	GN	GO	GO	GO	GP	GP	GQ	GQ	GR	GR	GR	GR	GR	GR	GA	-	GA	GA	GR	-	-	-	GA	-	GR	GA	-	-	-	GA	GR
GL2	GA	GA	GA	GA	GB	GB	GB	GC	GC	GC	GC	GD	GD	GD	GD	GE	GE	GE	GE	GF	GF	-	-	-	GH	GI	GI	GI	GJ	GJ	GJ	GK	GK	GK	GK	GL	GL	GL	GM	GM	GM	GM	GN	GN	GN	GN	GO	GO	GO	GP	GP	GQ	GQ	GR	GR	GR	GR	GR	GR	GA	-	GA	GA	GR	-	-	-	GA	-	GR	GA	-	-	-	GA	GR
GR1	GA	GA	GA	GA	GB	GB	GB	GC	GC	GC	GC	GD	GD	GD	GD	GE	GE	GE	GE	GF	GF	-	-	-	GH	GI	GI	GI	GJ	GJ	GJ	GK	GK	GK	GK	GL	GL	GL	GM	GM	GM	GM	GN	GN	GN	GN	GO	GO	GO	GP	GP	GQ	GQ	GR	GR	GR	GR	GR	GR	GA	-	GA	GA	GR	-	-	-	GA	-	GR	GA	-	-	-	GA	GR
HL2	HA	HA	HA	HA	HB	HB	HB	HC	HC	HC	HC	HD	HD	HD	HD	HE	HE	HE	HE	HF	HF	HG	HG	HG	-	HI	HI	HI	HJ	HJ	HJ	HK	HK	HK	HK	HL	HL	HL	HM	HM	HM	HM	HN	HN	HN	HN	HO	HO	HO	HP	HP	HQ	HQ	HR	HR	HR	HR	HR	HR	HA	-	HA	HA	HR	-	-	-	HA	-	HR	HA	-	-	-	HA	HR
IL1	IA	IA	IA	IA	IB	IB	IB	IC	IC	IC	IC	ID	ID	ID	ID	IE	IE	IE	IE	IF	IF	IG	IG	IG	IH	-	-	-	IJ	IJ	IJ	IK	IK	IK	IK	IL	IL	IL	IM	IM	IM	IM	IN	IN	IN	IN	IO	IO	IO	IP	IP	IQ	IQ	IR	IR	IR	IR	IR	IR	IA	-	IA	IA	IR	-	-	-	IA	-	IR	IA	-	-	-	IA	IR
IL2	IA	IA	IA	IA	IB	IB	IB	IC	IC	IC	IC	ID	ID	ID	ID	IE	IE	IE	IE	IF	IF	IG	IG	IG	IH	-	-	-	IJ	IJ	IJ	IK	IK	IK	IK	IL	IL	IL	IM	IM	IM	IM	IN	IN	IN	IN	IO	IO	IO	IP	IP	IQ	IQ	IR	IR	IR	IR	IR	IR	IA	-	IA	IA	IR	-	-	-	IA	-	IR	IA	-	-	-	IA	IR
IR2	IA	IA	IA	IA	IB	IB	IB	IC	IC	IC	IC	ID	ID	ID	ID	IE	IE	IE	IE	IF	IF	IG	IG	IG	IH	-	-	-	IJ	IJ	IJ	IK	IK	IK	IK	IL	IL	IL	IM	IM	IM	IM	IN	IN	IN	IN	IO	IO	IO	IP	IP	IQ	IQ	IR	IR	IR	IR	IR	IR	IA	-	IA	IA	IR	-	-	-	IA	-	IR	IA	-	-	-	IA	IR
JL2	JA	JA	JA	JA	JB	JB	JB	JC	JC	JC	JC	JD	JD	JD	JD	JE	JE	JE	JE	JF	JF	JG	JG	JG	JH	JI	JI	JI	-	-	-	JK	JK	JK	JK	JL	JL	JL	JM	JM	JM	JM	JN	JN	JN	JN	JO	JO	JO	JP	JP	JQ	JQ	JR	JR	JR	JR	JR	JR	JA	-	JA	JA	JR	-	-	-	JA	-	JR	JA	-	-	-	JA	JR
JR1	JA	JA	JA	JA	JB	JB	JB	JC	JC	JC	JC	JD	JD	JD	JD	JE	JE	JE	JE	JF	JF	JG	JG	JG	JH	JI	JI	JI	-	-	-	JK	JK	JK	JK	JL	JL	JL	JM	JM	JM	JM	JN	JN	JN	JN	JO	JO	JO	JP	JP	JQ	JQ	JR	JR	JR	JR	JR	JR	JA	-	JA	JA	JR	-	-	-	JA	-	JR	JA	-	-	-	JA	JR
JR2	JA	JA	JA	JA	JB	JB	JB	JC	JC	JC	JC	JD	JD	JD	JD	JE	JE	JE	JE	JF	JF	JG	JG	JG	JH	JI	JI	JI	-	-	-	JK	JK	JK	JK	JL	JL	JL	JM	JM	JM	JM	JN	JN	JN	JN	JO	JO	JO	JP	JP	JQ	JQ	JR	JR	JR	JR	JR	JR	JA	-	JA	JA	JR	-	-	-	JA	-	JR	JA	-	-	-	JA	JR
KL1	KA	KA	KA	KA	KB	KB	KB	KC	KC	KC	KC	KD	KD	KD	KD	KE	KE	KE	KE	KF	KF	KG	KG	KG	KH	KI	KI	KI	KJ	KJ	KJ	-	-	-	-	KL	KL	KL	KM	KM	KM	KM	KN	KN	KN	KN	KO	KO	KO	KP	KP	KQ	KQ	KR	KR	KR	KR	KR	KR	KA	-	KA	KA	KR	-	-	-	KA	-	KR	KA	-	-	-	KA	KR
KL2	KA	KA	KA	KA	KB	KB	KB	KC	KC	KC	KC	KD	KD	KD	KD	KE	KE	KE	KE	KF	KF	KG	KG	KG	KH	KI	KI	KI	KJ	KJ	KJ	-	-	-	-	KL	KL	KL	KM	KM	KM	KM	KN	KN	KN	KN	KO	KO	KO	KP	KP	KQ	KQ	KR	KR	KR	KR	KR	KR	KA	-	KA	KA	KR	-	-	-	KA	-	KR	KA	-	-	-	KA	KR
KR1	KA	KA	KA	KA	KB	KB	KB	KC	KC	KC	KC	KD	KD	KD	KD	KE	KE	KE	KE	KF	KF	KG	KG	KG	KH	KI	KI	KI	KJ	KJ	KJ	-	-	-	-	KL	KL	KL	KM	KM	KM	KM	KN	KN	KN	KN	KO	KO	KO	KP	KP	KQ	KQ	KR	KR	KR	KR	KR	KR	KA	-	KA	KA	KR	-	-	-	KA	-	KR	KA	-	-	-	KA	KR
KR2	KA	KA	KA	KA	KB	KB	KB	KC	KC	KC	KC	KD	KD	KD	KD	KE	KE	KE	KE	KF	KF	KG	KG	KG	KH	KI	KI	KI	KJ	KJ	KJ	-	-	-	-	KL	KL	KL	KM	KM	KM	KM	KN	KN	KN	KN	KO	KO	KO	KP	KP	KQ	KQ	KR	KR	KR	KR	KR	KR	KA	-	KA	KA	KR	-	-	-	KA	-	KR	KA	-	-	-	KA	KR
LL1	LA	LA	LA	LA	LB	LB	LB	LC	LC	LC	LC	LD	LD	LD	LD	LE	LE	LE	LE	LF	LF	LG	LG	LG	LH	LI	LI	LI	LJ	LJ	LJ	LK	LK	LK	LK	-	-	-	LM	LM	LM	LM	LN	LN	LN	LN	LO	LO	LO	LP	LP	LQ	LQ	LR	LR	LR	LR	LR	LR	LA	-	LA	LA	LR	-	-	-	LA	-	LR	LA	-	-	-	LA	LR
LR1	LA	LA	LA	LA	LB	LB	LB	LC	LC	LC	LC	LD	LD	LD	LD	LE	LE	LE	LE	LF	LF	LG	LG	LG	LH	LI	LI	LI	LJ	LJ	LJ	LK	LK	LK	LK	-	-	-	LM	LM	LM	LM	LN	LN	LN	LN	LO	LO	LO	LP	LP	LQ	LQ	LR	LR	LR	LR	LR	LR	LA	-	LA	LA	LR	-	-	-	LA	-	LR	LA	-	-	-	LA	LR
LR2	LA	LA	LA	LA	LB	LB	LB	LC	LC	LC	LC	LD	LD	LD	LD	LE	LE	LE	LE	LF	LF	LG	LG	LG	LH	LI	LI	LI	LJ	LJ	LJ	LK	LK	LK	LK	-	-	-	LM	LM	LM	LM	LN	LN	LN	LN	LO	LO	LO	LP	LP	LQ	LQ	LR	LR	LR	LR	LR	LR	LA	-	LA	LA	LR	-	-	-	LA	-	LR	LA	-	-	-	LA	LR
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ML2	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	MN	MN	MN	MN	MO	MO	MO	MP	MP	MQ	MQ	MR	MR	MR	MR	MR	MR	MA	-	MA	MA	MR	-	-	-	MA	-	MR	MA	-	-	-	MA	MR
MR1	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	MN	MN	MN	MN	MO	MO	MO	MP	MP	MQ	MQ	MR	MR	MR	MR	MR	MR	MA	-	MA	MA	MR	-	-	-	MA	-	MR	MA	-	-	-	MA	MR
MR2	MA	MA	MA	MA	MB	MB	MB	MC	MC	MC	MC	MD	MD	MD	MD	ME	ME	ME	ME	MF	MF	MG	MG	MG	MH	MI	MI	MI	MJ	MJ	MJ	MK	MK	MK	MK	ML	ML	ML	-	-	-	-	MN	MN	MN	MN	MO	MO	MO	MP	MP	MQ	MQ	MR	MR	MR	MR	MR	MR	MA	-	MA	MA	MR	-	-	-	MA	-	MR	MA	-	-	-	MA	MR
NL1	NA	NA	NA	NA	NB	NB	NB	NC	NC	NC	NC	ND	ND	ND	ND	NE	NE	NE	NE	NF	NF	NG	NG	NG	NH	NI	NI	NI	NJ	NJ	NJ	NK	NK	NK	NK	NL	NL	NL	NM	NM	NM	NM	-	-	-	-	NO	NO	NO	NP	NP	NQ	NQ	NR	NR	NR	NR	NR	NR	NA	-	NA	NA	NR	-	-	-	NA	-	NR	NA	-	-	-	NA	NR
NL2	NA	NA	NA	NA	NB	NB	NB	NC	NC	NC	NC	ND	ND	ND	ND	NE	NE	NE	NE	NF	NF	NG	NG	NG	NH	NI	NI	NI	NJ	NJ	NJ	NK	NK	NK	NK	NL	NL	NL	NM	NM	NM	NM	-	-	-	-	NO	NO	NO	NP	NP	NQ	NQ	NR	NR	NR	NR	NR	NR	NA	-	NA	NA	NR	-	-	-	NA	-	NR	NA	-	-	-	NA	NR
NR1	NA	NA	NA	NA	NB	NB	NB	NC	NC	NC	NC	ND	ND	ND	ND	NE	NE	NE	NE	NF	NF	NG	NG	NG	NH	NI	NI	NI	NJ	NJ	NJ	NK	NK	NK	NK	NL	NL	NL	NM	NM	NM	NM	-	-	-	-	NO	NO	NO	NP	NP	NQ	NQ	NR	NR	NR	NR	NR	NR	NA	-	NA	NA	NR	-	-	-	NA	-	NR	NA	-	-	-	NA	NR
NR2	NA	NA	NA	NA	NB	NB	NB	NC	NC	NC	NC	ND	ND	ND	ND	NE	NE	NE	NE	NF	NF	NG	NG	NG	NH	NI	NI	NI	NJ	NJ	NJ	NK	NK	NK	NK	NL	NL	NL	NM	NM	NM	NM	-	-	-	-	NO	NO	NO	NP	NP	NQ	NQ	NR	NR	NR	NR	NR	NR	NA	-	NA	NA	NR	-	-	-	NA	-	NR	NA	-	-	-	NA	NR
OL2	OA	OA	OA	OA	OB	OB	OB	OC	OC	OC	OC	OD	OD	OD	OD	OE	OE	OE	OE	OF	OF	OG	OG	OG	OH	OI	OI	OI	OJ	OJ	OJ	OK	OK	OK	OK	OL	OL	OL	OM	OM	OM	OM	ON	ON	ON	ON	-	-	-	OP	OP	OQ	OQ	OR	OR	OR	OR	OR	OR	OA	-	OA	OA	OR	-	-	-	OA	-	OR	OA	-	-	-	OA	OR
OR1	OA	OA	OA	OA	OB	OB	OB	OC	OC	OC	OC	OD	OD	OD	OD	OE	OE	OE	OE	OF	OF	OG	OG	OG	OH	OI	OI	OI	OJ	OJ	OJ	OK	OK	OK	OK	OL	OL	OL	OM	OM	OM	OM	ON	ON	ON	ON	-	-	-	OP	OP	OQ	OQ	OR	OR	OR	OR	OR	OR	OA	-	OA	OA	OR	-	-	-	OA	-	OR	OA	-	-	-	OA	OR
OR2	OA	OA	OA	OA	OB	OB	OB	OC	OC	OC	OC	OD	OD	OD	OD	OE	OE	OE	OE	OF	OF	OG	OG	OG	OH	OI	OI	OI	OJ	OJ	OJ	OK	OK	OK	OK	OL	OL	OL	OM	OM	OM	OM	ON	ON	ON	ON	-	-	-	OP	OP	OQ	OQ	OR	OR	OR	OR	OR	OR	OA	-	OA	OA	OR	-	-	-	OA	-	OR	OA	-	-	-	OA	OR
PL1	PA	PA	PA	PA	PB	PB	PB	PC	PC	PC	PC	PD	PD	PD	PD	PE	PE	PE	PE	PF	PF	PG	PG	PG	PH	PI	PI	PI	PJ	PJ	PJ	PK	PK	PK	PK	PL	PL	PL	PM	PM	PM	PM	PN	PN	PN	PN	PO	PO	PO	-	-	PQ	PQ	PR	PR	PR	PR	PR	PR	PA	-	PA	PA	PR	-	-	-	PA	-	PR	PA	-	-	-	PA	PR
PL2	PA	PA	PA	PA	PB	PB	PB	PC	PC	PC	PC	PD	PD	PD	PD	PE	PE	PE	PE	PF	PF	PG	PG	PG	PH	PI	PI	PI	PJ	PJ	PJ	PK	PK	PK	PK	PL	PL	PL	PM	PM	PM	PM	PN	PN	PN	PN	PO	PO	PO	-	-	PQ	PQ	PR	PR	PR	PR	PR	PR	PA	-	PA	PA	PR	-	-	-	PA	-	PR	PA	-	-	-	PA	PR
QR1	QA	QA	QA	QA	QB	QB	QB	QC	QC	QC	QC	QD	QD	QD	QD	QE	QE	QE	QE	QF	QF	QG	QG	QG	QH	QI	QI	QI	QJ	QJ	QJ	QK	QK	QK	QK	QL	QL	QL	QM	QM	QM	QM	QN	QN	QN	QN	QO	QO	QO	QP	QP	-	-	QR	QR	QR	QR	QR	QR	QA	-	QA	QA	QR	-	-	-	QA	-	QR	QA	-	-	-	QA	QR
QR2	QA	QA	QA	QA	QB	QB	QB	QC	QC	QC	QC	QD	QD	QD	QD	QE	QE	QE	QE	QF	QF	QG	QG	QG	QH	QI	QI	QI	QJ	QJ	QJ	QK	QK	QK	QK	QL	QL	QL	QM	QM	QM	QM	QN	QN	QN	QN	QO	QO	QO	QP	QP	-	-	QR	QR	QR	QR	QR	QR	QA	-	QA	QA	QR	-	-	-	QA	-	QR	QA	-	-	-	QA	QR
RL2	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	RQ	RQ	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	-	-	-	RA	-
RR1	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	RQ	RQ	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	-	-	-	RA	-
RR2	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	RQ	RQ	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	-	-	-	RA	-
ZAS	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	RQ	RQ	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	RA	-	-	RA	-
ZBR	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	RQ	RQ	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	RA	-	-	RA	-
ZCG	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	RQ	RQ	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	RA	-	-	RA	-	-	-	RA	-
ZCH	-	-	-	-	AB	AB	AB	AC	AC	AC	AC	AD	AD	AD	AD	AE	AE	AE	AE	AF	AF	AG	AG	AG	AH	AI	AI	AI	AJ	AJ	AJ	AK	AK	AK	AK	AL	AL	AL	AM	AM	AM	AM	AN	AN	AN	AN	AO	AO	AO	AP	AP	AQ	AQ	AR	AR	AR	AR	AR	AR	-	-	-	-	AR	-	-	-	-	-	AR	-	-	-	-	-	AR
ZGJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	AR	-	-	-	-	-	-	-	-	-	-	-	AR
ZHP	-	-	-	-	AB	AB	AB	AC	AC	AC	AC	AD	AD	AD	AD	AE	AE	AE	AE	AF	AF	AG	AG	AG	AH	AI	AI	AI	AJ	AJ	AJ	AK	AK	AK	AK	AL	AL	AL	AM	AM	AM	AM	AN	AN	AN	AN	AO	AO	AO	AP	AP	AQ	AQ	AR	AR	AR	AR	AR	AR	-	-	-	-	-	-	-	-	-	-	AR	-	-	-	-	-	AR
ZHR	-	-	-	-	AB	AB	AB	AC	AC	AC	AC	AD	AD	AD	AD	AE	AE	AE	AE	AF	AF	AG	AG	AG	AH	AI	AI	AI	AJ	AJ	AJ	AK	AK	AK	AK	AL	AL	AL	AM	AM	AM	AM	AN	AN	AN	AN	AO	AO	AO	AP	AP	AQ	AQ	AR	AR	AR	AR	AR	AR	-	-	-	-	AR	-	-	-	-	-	AR	-	-	-	-	-	AR
ZJH	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	RQ	RQ	-	-	-	-	-	-	RA	RA	-	RA	-	-	-	-	RA	-	-	RA	RA	-	-	RA	-
ZKA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	RA	-	-	-	-	-	RA	-
ZMH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	RA	-	-	-	-	-	RA	-
ZMP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	RA	-	-	-	-	-	RA	-
ZNDLS	-	-	-	-	AB	AB	AB	AC	AC	AC	AC	AD	AD	AD	AD	AE	AE	AE	AE	AF	AF	AG	AG	AG	AH	AI	AI	AI	AJ	AJ	AJ	AK	AK	AK	AK	AL	AL	AL	AM	AM	AM	AM	AN	AN	AN	AN	AO	AO	AO	AP	AP	AQ	AQ	AR	AR	AR	AR	AR	AR	-	-	-	-	AR	-	-	-	-	-	-	-	-	-	-	-	AR
ZNepal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	AR	AR	AR	-	-	-	-	-	-	-	-	AR
ZOR	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	RQ	RQ	-	-	-	-	-	-	RA	-	RA	RA	-	-	-	-	-	-	-	RA	-	-	-	RA	-
ZPB	-	-	-	-	AB	AB	AB	AC	AC	AC	AC	AD	AD	AD	AD	AE	AE	AE	AE	AF	AF	AG	AG	AG	AH	AI	AI	AI	AJ	AJ	AJ	AK	AK	AK	AK	AL	AL	AL	AM	AM	AM	AM	AN	AN	AN	AN	AO	AO	AO	AP	AP	AQ	AQ	AR	AR	AR	AR	AR	AR	-	-	-	-	AR	-	-	-	-	-	AR	-	-	-	-	-	AR
ZRJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	AR	AR	-	-	-	-	-	AR	-	-	-	-	-	-	-	-	-	-	-	AR
ZTN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	RA	-
ZTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	RA	-
ZUK	-	-	-	-	AB	AB	AB	AC	AC	AC	AC	AD	AD	AD	AD	AE	AE	AE	AE	AF	AF	AG	AG	AG	AH	AI	AI	AI	AJ	AJ	AJ	AK	AK	AK	AK	AL	AL	AL	AM	AM	AM	AM	AN	AN	AN	AN	AO	AO	AO	AP	AP	AQ	AQ	AR	AR	AR	AR	AR	AR	-	-	-	-	AR	AR	AR	AR	-	-	AR	-	-	AR	AR	-	AR
ZWB	RA	RA	RA	RA	RB	RB	RB	RC	RC	RC	RC	RD	RD	RD	RD	RE	RE	RE	RE	RF	RF	RG	RG	RG	RH	RI	RI	RI	RJ	RJ	RJ	RK	RK	RK	RK	RL	RL	RL	RM	RM	RM	RM	RN	RN	RN	RN	RO	RO	RO	RP	RP	RQ	RQ	-	-	-	-	-	-	RA	RA	RA	RA	-	-	-	-	RA	RA	-	RA	RA	-	-	RA	-

Table 4.13: Movement Matrix – Car

Nodes	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	Total
A	0	90	20	111	209	0	66	72	12	37	0	35	48	45	22	9	43	83	**901**
B	163	0	20	5	48	0	34	8	11	0	0	0	0	8	8	0	11	5	**323**
C	0	0	0	0	0	4	24	5	0	0	1	0	0	0	2	0	0	20	**55**
D	22	5	0	0	0	0	5	0	0	2	0	0	5	0	0	0	0	0	**39**
E	81	32	0	0	0	0	7	11	34	50	0	19	21	17	5	0	0	20	**297**
F	0	4	2	0	2	0	0	6	0	4	0	0	0	0	26	0	0	12	**56**
G	76	52	7	0	4	4	0	33	0	12	1	8	14	3	5	0	0	47	**265**
H	84	36	4	0	2	3	18	0	0	4	0	1	4	0	0	0	0	0	**156**
I	25	11	0	2	60	0	3	0	0	2	36	87	93	62	26	0	0	62	**469**
J	22	0	0	0	91	3	23	1	4	0	0	129	33	16	0	0	1	25	**347**
K	3	3	1	0	0	0	8	0	53	0	0	0	0	6	7	0	0	3	**84**
L	35	3	1	6	48	3	33	1	92	104	0	0	7	48	77	0	0	43	**501**
M	34	22	9	5	9	12	16	0	56	30	0	8	0	6	37	3	9	150	**406**
N	38	7	0	0	20	0	4	0	32	3	0	97	0	0	66	3	18	96	**384**
O	66	0	1	0	3	20	23	0	52	15	8	96	93	23	0	0	0	424	**824**
P	36	11	0	0	0	0	9	0	0	9	0	3	5	9	0	0	0	231	**314**
Q	0	0	0	0	0	3	0	0	0	0	0	9	3	13	0	0	0	9	**38**
R	150	23	41	0	52	7	40	0	61	22	7	27	210	91	315	240	0	0	**1285**
Total	**834**	**299**	**106**	**129**	**546**	**57**	**313**	**137**	**408**	**295**	**53**	**520**	**535**	**347**	**598**	**255**	**81**	**1230**	

Note: Data may not add up to the total due to rounding.

Table 4.14: Movement Matrix – Bus

Nodes	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	Total
A	0	0	0	9	10	0	23	9	0	19	0	1	1	42	0	8	0	20	**143**
B	0	0	0	0	3	0	6	3	0	4	0	0	0	4	0	0	0	0	**19**
C	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	5	**9**
D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
E	0	5	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	11	**20**
F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	**14**
G	13	23	4	0	0	4	0	0	0	0	0	2	0	0	0	0	0	11	**55**
H	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**4**
I	0	0	0	0	0	0	0	0	0	0	0	10	6	4	0	0	0	7	**27**
J	12	0	0	0	0	0	0	0	0	0	0	16	0	0	7	0	0	0	**34**
K	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**
L	2	0	0	0	0	0	0	0	0	12	0	0	0	24	2	0	0	0	**39**
M	6	3	0	0	0	0	3	0	6	4	0	0	0	0	11	0	0	28	**61**
N	6	17	0	0	0	0	0	0	4	0	0	6	0	0	6	0	0	10	**49**
O	7	0	2	0	0	0	0	0	0	0	0	0	9	8	0	0	0	16	**42**
P	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	32	**34**
Q	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	**10**
R	15	0	9	0	7	7	4	0	1	0	7	0	17	16	24	32	0	0	**139**
Total	**60**	**51**	**16**	**9**	**20**	**11**	**39**	**12**	**11**	**38**	**9**	**35**	**33**	**110**	**51**	**39**	**0**	**153**	

Note: Data may not add up to the total due to rounding.

Table 4.15: Movement Matrix – LCV

Nodes	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	Total
A	0	0	0	0	49	0	27	56	6	9	7	15	11	29	12	6	6	57	**291**
B	0	0	0	6	6	0	6	21	6	0	0	0	8	11	0	0	0	0	**66**
C	0	0	0	0	0	0	9	5	0	29	0	12	1	0	0	0	0	0	**56**
D	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**6**
E	42	0	0	0	0	0	0	0	27	24	0	14	5	6	0	0	1	6	**125**
F	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	**7**
G	16	5	0	0	5	0	0	0	0	26	0	1	12	4	0	0	0	0	**68**
H	49	26	5	0	0	0	0	0	0	5	0	2	0	2	0	0	0	0	**88**
I	0	0	0	0	31	0	0	0	0	2	79	71	12	35	0	0	0	13	**244**
J	6	0	21	0	12	8	25	5	1	0	0	84	7	9	38	0	0	13	**230**
K	0	0	0	0	0	0	11	0	24	0	0	0	0	0	7	0	0	18	**60**
L	32	0	12	0	18	0	1	2	62	41	0	0	0	18	22	3	0	40	**251**
M	22	0	11	0	0	0	6	0	22	19	0	0	0	0	3	0	0	99	**183**
N	30	8	0	0	0	0	5	2	23	16	0	12	0	0	0	0	6	155	**256**
O	6	0	3	0	0	0	3	0	0	18	7	25	13	10	0	0	0	50	**134**
P	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	**34**
Q	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**6**
R	52	8	0	0	0	0	5	0	14	25	16	33	105	194	57	35	0	0	**545**
Total	**268**	**53**	**52**	**6**	**121**	**8**	**99**	**90**	**187**	**221**	**110**	**269**	**175**	**317**	**139**	**45**	**14**	**478**	

Note: Data may not add up to the total due to rounding.

Table 4.16: Movement Matrix – 2 Axle Truck

Nodes	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	Total
A	0	0	0	0	18	0	3	15	0	5	52	52	60	38	20	0	0	70	**333**
B	0	0	0	0	0	0	18	0	0	3	6	0	26	28	1	0	0	0	**81**
C	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	8	**15**
D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
E	0	0	0	0	0	0	3	0	0	14	7	0	18	4	7	0	0	8	**60**
F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
G	6	0	0	0	0	0	0	0	0	0	14	7	41	7	3	0	0	18	**96**
H	14	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**43**
I	0	0	0	0	0	0	0	0	0	0	7	0	48	38	11	0	0	21	**126**
J	23	3	7	0	7	0	4	0	0	0	0	7	0	11	0	0	0	7	**69**
K	12	9	3	0	7	0	14	0	7	0	0	0	0	0	0	0	0	55	**106**
L	50	0	2	0	0	0	7	2	9	11	0	0	0	0	0	0	0	22	**102**
M	44	15	4	0	4	0	29	0	26	7	0	0	0	0	17	0	0	164	**309**
N	77	7	9	0	3	0	7	0	12	7	0	0	3	0	0	0	0	27	**154**
O	43	6	0	0	0	0	1	0	0	3	6	0	9	4	0	0	0	4	**76**
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	**22**
Q	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
R	56	18	6	0	11	0	18	0	47	8	98	11	152	31	4	22	0	0	**481**
Total	**324**	**85**	**31**	**0**	**50**	**0**	**103**	**17**	**101**	**66**	**189**	**77**	**358**	**162**	**63**	**22**	**0**	**425**	

Note: Data may not add up to the total due to rounding.

Table 4.17 Movement Matrix – 3 Axle Truck

Nodes	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	Total
A	0	4	0	0	0	0	7	4	0	4	23	45	148	175	71	0	0	180	**661**
B	0	0	0	0	0	0	0	0	0	0	10	6	26	20	20	0	0	35	**117**
C	0	0	0	0	0	0	0	0	0	0	0	0	8	7	0	0	0	61	**76**
D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
E	0	0	0	0	0	0	0	0	0	0	0	0	18	0	10	0	0	16	**44**
F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
G	7	0	2	0	2	0	0	0	0	0	0	0	7	6	19	0	0	26	**69**
H	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**4**
I	0	0	0	0	0	0	0	0	0	0	6	7	13	6	0	0	0	89	**122**
J	8	0	0	0	0	0	0	0	0	0	0	21	7	7	12	0	0	24	**79**
K	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**11**
L	35	0	0	0	0	0	0	0	0	14	0	0	0	0	7	0	0	0	**56**
M	73	25	9	0	20	0	13	0	25	0	0	0	0	3	0	0	0	149	**316**
N	119	7	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	24	**157**
O	88	28	4	0	0	0	7	0	0	0	4	0	0	2	0	0	0	5	**137**
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Q	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
R	183	34	44	0	9	0	42	0	72	21	0	0	175	31	11	0	0	0	**623**
Total	**522**	**102**	**62**	**0**	**32**	**0**	**69**	**4**	**97**	**38**	**43**	**79**	**401**	**256**	**149**	**7**	**0**	**609**	

Table 4.18: Movement Matrix – Multi Axle Truck

Nodes	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	Total
A	0	0	7	0	0	0	0	0	0	9	2	29	192	154	65	0	0	755	**1212**
B	0	0	0	0	0	0	0	0	0	0	0	0	25	5	6	0	0	38	**74**
C	0	0	0	0	0	0	0	0	0	0	0	0	10	0	2	0	0	38	**50**
D	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**5**
E	0	5	0	0	0	0	0	0	0	0	0	0	14	2	0	0	0	34	**55**
F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
G	11	0	0	0	0	0	0	0	2	0	0	0	14	5	0	0	0	83	**114**
H	0	2	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	**8**
I	5	0	0	0	0	0	0	0	0	0	0	7	9	4	31	0	0	42	**98**
J	14	0	13	0	0	0	0	0	0	0	0	7	0	1	12	0	0	19	**65**
K	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**13**
L	27	0	2	0	0	0	0	0	7	0	0	0	0	0	0	0	0	15	**51**
M	182	16	9	0	11	0	30	0	27	0	0	0	0	0	5	0	0	146	**425**
N	102	5	3	0	0	0	8	0	2	1	0	0	0	0	0	0	0	12	**133**
O	58	7	3	0	0	0	0	0	0	0	6	0	5	0	0	0	0	20	**99**
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	**7**
Q	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
R	882	71	18	0	14	0	71	0	77	18	0	24	114	12	6	5	0	0	**1313**
Total	**1299**	**108**	**54**	**0**	**25**	**0**	**114**	**0**	**114**	**28**	**8**	**66**	**383**	**182**	**126**	**5**	**0**	**1209**	

Note: Data may not add up to the total due to rounding.

From the above tables; the Candidate Traffic i.e. the sectional traffic loads on each section of the proposed Expressway i.e. between Node "A" to Node "R" is shown in Table 4.19

Table 4.19: Candidate Traffic/Day for Proposed Expressway

Section	A-B	B-C	C-D	D-E	E-F	F-G	G-H	H-I	I-J	J-K	K-L	L-M	M-N	N-O	O-P	P-Q	Q-R
Car	1735	1852	1932	1816	1917	2009	2032	1762	2324	2456	2379	2189	2279	2187	2242	2615	2515
Bus	203	273	298	288	293	318	262	246	284	288	292	282	317	263	249	302	292
LCV	559	679	787	787	838	854	884	740	1029	1120	1033	817	901	1057	997	1043	1023
2 Axle Truck	657	823	869	870	945	945	1086	1030	1256	1245	1266	1152	1176	986	863	906	906
3 Axle Truck	1183	1394	1532	1532	1607	1607	1708	1700	1918	2012	1964	1843	1779	1493	1239	1232	1232
Multi Axle Truck	2511	2693	2783	2780	2849	2849	3055	3048	3246	3269	3258	3219	2950	2683	2511	2522	2522
Total Vehicles (Nos.)	**6849**	**7713**	**8201**	**8073**	**8450**	**8582**	**9027**	**8525**	**10058**	**10391**	**10193**	**9501**	**9402**	**8668**	**8100**	**8621**	**8491**
Total Vehicles (PCUs)	**20,004**	**22,456**	**23,733**	**23,577**	**24,529**	**24,720**	**26,273**	**25,513**	**28,852**	**29,483**	**29,157**	**27,729**	**26,719**	**24,071**	**22,085**	**22,852**	**22,691**

Note: Data may not add up to the total due to rounding.

4.2.5 Other Traffic Survey Data

Analyses of other data derived from the Origin and Destination Surveys (and used mainly in the financial and economic appraisals) for Passenger & Goods Statistics are provided on Chapters 1 to 5 of Appendix. For passengers, these data relate to the average occupancy of vehicles, trip purpose and the origin and destination of trips that are from/to Interchange Nodes and the immediate areas. For freight, these data refer to commodities carried, axle loads and the origins and destination of trips that are from/to Interchange Nodes and the immediate areas.

4.2.6 Speed-Time Surveys

Travel times have been estimated using passenger car for *"peak"* travel times and for those portions of each trip on 2/4/6 lane roads, with free access from sides and urban sections on these roads. It can be seen that, during peak periods, the full length journeys are:

(a) ***for 2-lane configuration in rural areas with free access to road from either sides**:* requiring 45 minutes to complete the average 34.1 km between Meerut outer point and Garhmukteshwar outer point – implying an average speed of about **45.46 km/hour**.

(b) ***for 4-lane configuration toll roads**:* requiring 66 minutes to complete the 71.1 km between Moradabad and Bareilly on National Highway NH530 (old NH24)– implying a spot speed of about **64.63 km/hour;** however, the **journey speeds** observed on alternate route *(journey combines 4-lane National Highway & 2-lane State Highways, Hasanpur – Chandausi – Budaun sections)* in the project influence areas, the average journey speed falls to about **35.0 Km/hour**

(c) ***for 6-lane/4-lane configuration in rural areas with heavily built up areas**:* requiring average of 11 hours 38 minutes to complete the approx. 751 km (maximum sections of access controlled Expressway) – implying an average speed of about **64.55 km/hour**.

4.3 Traffic Assignments

Traffic assignments of Candidate Traffic has been done using diversion curve method, wherein a logit model computes expected diversion % based on the ratio of perceived cost on the existing alternate roads and proposed Expressway. The perceived cost is the financial vehicle operating cost and the vehicle operating time saving cost including toll charges (if any).

The estimated *"generalised"* costs for travel between Node A and Node R on the proposed Expressway and between outer origins & outer destinations while in two comparing circumstances:

(a) when using the presently available alternate through route NH19 (old NH2) (4/6-lane dual carriageway without service roads or with service roads on either/one side at few urban stretches with traffic signals causing travel time delays); and

(b) when using the proposed Expressway (6-lane dual carriageway access controlled facility with 2 lane services road on either/one side).

These *"generalised"* costs are:

(a) *for buses and trucks:* the **financial costs of travel (including passenger and other time costs)** plus any tolls;

(b) *for cars:* the **perceived costs of travel** (a term applied mainly to private users who are known to make route and modal choice decisions not on total, or even marginal costs, but on the costs of only a few specific items – normally fuel, tyres and time)

Vehicle Operating Costs (VOC) and Vehicle Operating Time (VOT) Costs have been estimated using the relationships presented in IRC Special Publication SP-30 2009, Manual on Economic Evaluation of Highway Projects in India, Indian Road Congress 2009. Perceived cost (VOC + VOT +Toll charges) in Rs/Km computed for presently available alternate route NH 19 (existing condition) vis a vis proposed Expressway (6-lane dual carriageway) is shown on Appendix.

According to logit model a vehicle user will shift if the perceived cost on the proposed Expressway is lower in comparison to existing alternate road NH19 (old NH2). The diversion equations for carrying out traffic assignment have been adopted from Study on Expressway System Planning, March 1991 done by Wilbur Smith Associates for Ministry of Surface Transport, Govt. of India.

Diversion percentages using Cost Ratio relationships as explained below, were estimated for alternate route NH 19 (old NH 2) versus proposed Expressway (Refer Table 4.20)

Table 4.20: Diversion Formulae (Logit Model)

Vehicle	Cost Ratio (CR)	Relationship
Car	CR < 0.634	% Div = 98.75 – ((CR/0.634)*8.125
	0.634 <= CR < 1.465	% Div = 90.625 – ((CR – 0.634)/0.831)*84.375
	1.465 <= CR <=2.00	% Div = 6.25 – ((CR – 1.465)/0.535))*5.25
Bus & Truck	CR < 0.75	% Div = 100 – ((CR/0.75)*5)
	0.75 <= CR < 1.25	% Div = 95 – ((CR-0.75)/0.5)*90
	1.25 <= CR <= 2.00	% Div = ((2-CR)/0.75)*5

Thus the perceived cost (VOC + VOT +Toll charges) in Rs/Km for different alternate routes (a combination of four/six lane dual carriageway with free access - *in future*) vis a vis proposed Expressway (6-lane dual carriageway) with restricted access will determine the route choice of the user; the link characteristics as shown on Table 4.21 adopted here represents better Level of Service of roads under tolling scenario, for calculation of Vehicle Operating Costs – results (VOC & VOT) are shown on Table 4.22

All the alternate routes NH19 (old NH2) are either toll operated 4/6 Lane dual carriageway (*a combination of NH19 (old NH2), Agra-Lucknow Expressway, Lucknow–Moradabad, Moradabad–Garhmukteshwar, Garhmukteshwar-Meerut*) or under various stages of widening i.e. from existing two lane to four lane standards or from existing four lane to six lane; for instance, the stretch from Meerut to Garhmukteshwar is presently two lane, proposed for four laning in near future and instance of six laning of National Highway NH19 at various sections from Prayagraj to Agra. Similarly National Highways/State Highways/Major District Roads which intersect with the proposed Expressway are under various stages of improvement including 2/4/6-laning by Central/State Agencies.

Toll charges (Rs/km) is likely to be charged on the proposed Expressway is per UPEIDA Toll Rules, similarly the Agra to Prayagraj (under widening scheme by NHAI/MoRTH) will also be tolled as per NH Toll Rules; However, the Expressway is expected to have higher toll rates due to the fact that Expressway will have more structures like Bridges, ROBs, and Viaducts at some interchanges/crossings.

Table 4.21 Link Characteristics for VOC Calculations

Description	Expressway	Alternate Road (NH 19)
Lane Configuration	6 lane Dual Carriageway	4/6 lane dual carriageway
Access Control	Restricted Access	Free Access
Traffic 2020 (PCUs)	21173	27762
Car Speed (Km/hr)	89.81	81.10
Roughness (mm/km)	Between 1800 and 2500	Between 2500 and 3000
Rise & Fall (m)	1	3

Diversion percentage between Proposed Expressway and alternate 4/6 lane toll road NH19 (AR) as per Cost Ratios – results (diversion percentages) are shown in Table 4.22

Table 4.22: Diversion of Traffic

Perceived Cost	Car		Bus		LCV		2-Axle Truck		3-Axle Truck		MAV(4+Axles)	
Roads	**PR**	**AR**	**PR**	**PR**	**PR**	**AR**	**PR**	**AR**	**PR**	**AR**	**PR**	**AR**
VOC (Rs./km)	5.51	5.57	14.04	16.57	12.57	14.78	13.91	16.67	24.86	30.61	26.49	32.79
VOT (Rs./km)	2.81	3.57	1.35	1.93	38.13	49.45	4.38	6.56	6.09	10.78	8.25	14.60
Toll (Rs./km)	1.95	0.86	3.10	1.41	6.23	2.90	6.23	3.21	9.58	3.21	9.58	5.56
Total Cost (Rs./km)	10.26	10.00	18.49	19.91	56.94	67.12	24.53	26.44	40.54	44.60	44.33	52.95
Cost Ratio (PR/AR)	**1.042**		**0.976**		**0.891**		**0.997**		**0.951**		**0.876**	
% Diversion	**49.20%**		**54.34%**		**69.69%**		**50.49%**		**58.80%**		**72.38%**	

Diversion percentages were applied to the Candidate Traffic as shown in Table 4.19 to arrive at the Tollable Traffic on each section of the proposed Expressway, i.e. sectional traffic between Node 'A' and Node 'R' is shown on Table 4.23.

Table 4.23: Tollable Traffic/Day for Proposed Expressway

Section	A-B	B-C	C-D	D-E	E-F	F-G	G-H	H-I	I-J	J-K	K-L	L-M	M-N	N-O	O-P	P-Q	Q-R
Car	854	911	950	893	943	988	999	866	1143	1208	1170	1077	1121	1076	1103	1287	1237
Bus	141	190	207	201	204	221	182	171	198	201	203	197	221	183	173	211	203
LCV	304	369	428	421	449	457	474	395	552	602	562	444	490	574	542	567	556
2 Axle Truck	332	416	439	439	476	476	547	519	633	628	639	582	594	498	436	458	458
3 Axle Truck	696	819	901	901	945	945	1004	999	1128	1183	1155	1084	1046	878	728	724	724
Multi Axle Truck	1817	1949	2015	2011	2060	2060	2210	2204	2348	2365	2358	2330	2135	1942	1817	1826	1826
Total Vehicles (Nos.)	**4144**	**4654**	**4939**	**4864**	**5077**	**5148**	**5417**	**5156**	**6003**	**6186**	**6088**	**5712**	**5606**	**5151**	**4799**	**5072**	**5004**
Total Vehicles (PCUs)	**12,995**	**14,510**	**15,298**	**15,193**	**15,764**	**15,874**	**16,856**	**16,449**	**18,416**	**18,787**	**18,617**	**17,811**	**17,044**	**15,352**	**14,104**	**14,530**	**14,442**

Note: Data may not add up to the total due to rounding.

4.4 Diverted and Generated Traffic

4.4.1 Diverted Traffic

In this Study, the term "diverted" traffic refers to traffic which has diverted from other modes. Traffic diverting from other roads was, of course, considered above.

Although rail freight traffic is growing, the modal-share of surface transport that the railways enjoy has fallen, nationally, from about 78.45% in 1955 to 26% in 2001. The railways although reporting operating revenues in excess of operating expenditures are, also, not recovering sufficient revenue for needed capital investments and, when these items are taken into account, it is estimated that the users are being subsidised by the equivalent of about 20% of current tariffs. Also, the growth of Rail Freight and Road Freight in terms of Billion Tonnes Kilo Meters (BTKM) is 4% and 9% respectively from 1950-51 to 2000-01 (five decades).

As the nascent access controlled expressway system in India (esp. Uttar Pradesh) grows and, as the quality-of-service offered by road transport companies grows in-line, it is likely that there will be further shifts away from rail and towards road. This has been the experience of other countries. Additional shifts towards road transport will also occur if the railways are required to recover their full capital expenditures from users. The share of road transport will also continue to increase given the highly competitive nature of road transport, convenience and flexibility in tariffs, and the capability of road to handle smaller loads vis a vis rail transport.

While the general trend away from rail will undoubtedly continue, it can be seen that almost all rail freight movements along the proposed truck route are bulk in nature and that, as such, these are not cargoes likely soon (or ever) to shift to the proposed Expressway.

It is, moreover, noted that, except for occasional bulk raw material deliveries, agro processing, food processing, textiles, leather based industry, handloom and handicrafts, sports goods, bio-technology, mineral based industry, tourism and IT and ITeS industries, including software, captive business process outsourcing (BPO) and electronics industries now dominating the Uttar Pradesh economy, have high-value inputs and outputs, generally unsuited to rail transport.

It is worth noting that Indian Railways operate two trains only which directly connect Meerut City Junction station and Prayagraj Junction station, and travel times of these trains are somewhere between 10 hours 45 minutes and 13 hours 35 minutes costing about Rs. 360 per one way trip, but has passenger load factor of more than 1 all round the year, primarily is linked to patrons/matrons of law from Meerut attending the Judicial Complex at Prayagraj on a regular basis. This waitlisted passenger may shift to the Expressway, on either as bus/mini bus trips, car pool trips or private trips, as the travel times between Meerut and Prayagraj shall reduce by 3 hours.

For the purposes of this Study, it is assumed no immediate shift from rail to road. Any long term trend in the shift from rail to road will, of course, shall be accounted for in the described forecasts for natural growth later in this report.

The share of inland waterways and pipelines, which are both energy efficient modes of transport have relatively lower chances of being operative in the next few decades and hence not being projected and its impact in this report.

4.4.2 Generated Traffic

The project road, which will comprise various elements of an Expressway from Meerut (District Meerut) to Prayagraj Bypass (District Prayagraj) and which will have restricted access, is of itself unlikely to cause the generation of much locally-based traffic. There are, however, two elements of generated traffic that should be considered:

(a) *increase in traffic will occur from Expressway development purposely located close to interchanges* – such developments, while possibly substantial, are, however, notoriously difficult to predict – the best approach has therefore been to test the effect on Economic Internal Rate of Return (EIRRs) of the assumption that the growth in traffic (***will be proportionate to growth of the population/migration in the Interchange Node areas***) during the first five years of the Project, increases by an additional 1% per year (*factored over the development period*) as a direct result of the Project and that this additional traffic, on average, will use any section of the proposed Expressway to access its destination.

(b) *Varanasi Multi Modal Terminal or Varanasi Port* - One very important generator of traffic, that also needs special mention will be the Varanasi Port[2] towards (about 120 Kms away from Prayagraj) on the Southern End of the proposed Expressway. The timing of this project, featuring prominently on the centre's development plans, accentuates need of an access controlled highway (*probably phase 2 of the Ganga Expressway*) connecting the proposed Expressway to the Varanasi port. Noting that inland waterways offer significant economic advantages compared to overland logistics in India, with average cost of moving one ton of cargo by ship/waterways estimated at Rs. 1.10 per km versus Rs. 1.41 per km by Train/railways and Rs. 2.28 per km by Truck. Nonetheless, it can be stated that:

(i) when *Phase 2 of Ganga Expressway* is constructed by the State or Centre/MoRTH, the Varanasi Port will be a direct generator (and, from the land side development (*about 150 ha. of land parcel-sweetner under the port based special economic zone (SEZ development*) induced to locate around the Varanasi Port site, also an indirect generator of large volumes of road traffic – though the extent of such generation remains unknown; and

(ii) most of the traffic generated will be out of the Meerut/Prayagraj and, thus, large volumes that have origins and destinations far outside the Meerut/Prayagraj might be induced to use the Expressway as it is presently conceived (in this regard, **a direct Expressway from Meerut to Prayagraj Bypass and to the Varanasi Port** would carry more port related traffic – such a Expressway, more usefully, serving destinations on the outskirts of the Uttar Pradesh State as well).

In/Out Bound Heavy Vehicle Traffic of Varanasi Port: The cargo handling capacity of the Varanasi port or multi modal terminal is estimated to be 1.2 million metric tons per year (MTPA), i.e. about 3287 TEUS (Twenty Foot Equivalent Unit) or roughly about 150 Trucks per day would be handled at Varanasi Port; most of which will access NH 19 (old NH2) from the northern direction, as the Varanasi Port traffic on southern side would be through waterways to reach Kolkata Port/Haldia Port. About 50% of these may use the proposed Expressway (from Node M to Node R).

It should finally be noted that the Centre/MoRTH is only ever prepared to invest funds in such capital intensive projects, to take into account revenues about which they are absolutely certain – i.e. deriving from either existing traffic or from land parcels/developments that are: clearly committed; for which financing has already been arranged; and/or for which construction is about to commence or under construction. It has, therefore, deemed appropriate to include the benefit from the development of Varanasi Port in both the economic or financial analyses.

[2] **Varanasi Multi-Modal Terminal** or **Varanasi Port** is an Inland river port situated in the city of Varanasi, Uttar Pradesh. The port is located on the River Ganga. This port is built under the central government's **Jal Marg Vikas** project. The port has provided a direct link with the Port of Kolkata and Haldia Port

4.4.3 Base Estimates of Tollable Traffic (2020) Section-by-Section for Proposed Expressway

The base year (2020) estimates of total traffic on each section of the Expressway are shown on Table 4.24.

Table 4.24: Base Estimates of Tollable Traffic (2020) Section including Varanasi Port bound Traffic

Section	A-B	B-C	C-D	D-E	E-F	F-G	G-H	H-I	I-J	J-K	K-L	L-M	M-N	N-O	O-P	P-Q	Q-R
Car	854	911	950	893	943	988	999	866	1143	1208	1170	1077	1121	1076	1103	1287	1237
Bus	141	190	207	201	204	221	182	171	198	201	203	197	221	183	173	211	203
LCV	304	369	428	421	449	457	474	395	552	602	562	444	490	574	542	567	556
2 Axle Truck	332	416	439	439	476	476	547	519	633	628	639	582	594	498	436	458	458
3 Axle Truck	696	819	901	901	945	945	1004	999	1128	1183	1155	1084	***1121***	***953***	***803***	***799***	***799***
Multi Axle Truck	1817	1949	2015	2011	2060	2060	2210	2204	2348	2365	2358	2330	2135	1942	1817	1826	1826
Total Vehicles (Nos.)	**4144**	**4654**	**4939**	**4864**	**5077**	**5148**	**5417**	**5156**	**6003**	**6186**	**6088**	**5712**	5681	5226	4874	5147	5079
Total Vehicles (PCUs)	**12,995**	**14,510**	**15,298**	**15,193**	**15,764**	**15,874**	**16,856**	**16,449**	**18,416**	**18,787**	**18,617**	**17,811**	**17,269**	**15,577**	**14,329**	**14,755**	**14,667**

Note: Data may not add up to the total due to rounding.

50% of all commercial vehicles (3-Axle Truck) assumed to handle Port bound traffic at Varanasi may use stretch between Node R (Prayagraj Bypass) and Node M (Agra Lucknow Expressway)

4.4.4 Capacity Constraints

The Indian recommended design service volumes (DSV) of expressways for Level of Service B (LoS-B) and peak hour traffic in the range of 6% (actual peak hour traffic on the project highway is likely to be lower – no more than 6%) for plain terrain shall be 1300 PCU/hr/lane are shown below (source: IRC SP: 99-2013), viz Table 4.25:

Table 4.25: Design Service Volume (DSV) in PCUs per day for Level of Service (LOS) B

Peak Hour	4-Lane	6-Lane	8-Lane
6%	86,000	1,30,000	1,73,000
8%	65,000	98,000	1,30,000

It can be seen from Table 4.26 that the lane requirement for the Base Estimates of Traffic (2020) for all sections is two lane configurations.

Table 4.26: Lane Requirement at DSV for LOS B for Proposed Expressway (2020)

Sections	Base Traffic (PCUs)	Peak Hour (6%)	Peak Hour (8%)
A-B	12,995	780	1040
B-C	14,510	871	1161
C-D	15,298	918	1224
D-E	15,193	912	1215
E-F	15,764	946	1261
F-G	15,874	952	1270
G-H	16,856	1011	1348
H-I	16,449	987	1316
I-J	18,416	1105	1473
J-K	18,787	1127	1503
K-L	18,617	1117	1489
L-M	17,811	1069	1425
M-N	17,269	1036	1382
N-O	15,577	935	1246
O-P	14,329	860	1146
P-Q	14,755	885	1180
Q-R	14,667	880	1173

Note: DSV of 1300 PCU/h/lane has been considered

For the purposes of Development Proposal of Expressway, the lane configuration requirement shall be carried for a forecasted traffic for a 25 Year period from year 2024 (*year of start of traffic operations on the Expressway*), i.e. 3 year (36 months) construction period and 20 year operations period (for 20 year design)

4.5 Traffic Growth

4.5.1 Vehicular Registration

Data showing growth in numbers of registered vehicles throughout Uttar Pradesh is provided on Table 4.27. It can be seen that the decadal and recent annual growth in:

(a) the *"all-vehicle"* fleet has been:
- 11.61% per year from 2000 to 2015;
- 11.53% per year from 2005 to 2015; and
- 10.65% per year from 2010 to 2015

(b) the truck fleet (goods vehicles) has been:
- 12.93% per year from 2000 to 2015;
- 11.83% per year from 2005 to 2015; and
- 7.21% per year from 2010 to 2015

(c) the motor-car fleet (passenger vehicles) has been:
- 9.23% per year from 2000 to 2015;
- 11.88% per year from 2005 to 2015; and
- 6.62% per year from 2010 to 2015,

it may be noted that the annual growth last year of motor-car fleet has been about 13.5%;

(d) the two-wheeler fleet has been:
- 12.71% per year from 2000 to 2015;
- 11.54% per year from 2005 to 2015; and
- 12.10% per year from 2010 to 2015

Table 4.27: Vehicle Registration Data in Uttar Pradesh

Year	Motor Cycle	Motor Car	Bus	Mini Bus	Truck	Delivery Vehicle	Tractor	Tempo / Auto Rickshaw	Others	Total
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1980-81	41401	3810	1242	-	5591	-	14146	-	5112	71302
1981-82	-	-	-	-	-	-	-	-	-	0
1982-83	57393	4019	1587	-	5222	-	12216	-	4311	84748
1983-84	71136	3625	1862	250	2776	529	13364	1714	3209	98465
1984-85	85004	4256	2194	117	3634	433	13835	2792	4095	116360
1985-86	92711	6111	1187	116	4396	370	15222	2601	4257	126971
1986-87	140014	8081	1747	157	4117	455	18644	2474	4657	180346
1987-88	160370	12123	1640	238	5324	532	19435	3295	2024	204981
1988-89	149013	9768	1611	208	5648	571	25586	5023	1858	199286
1989-90	179676	10358	1574	264	6994	974	27176	6692	6141	239849
1990-91	187436	11104	1209	633	8056	1314	35933	7337	2922	255944
1991-92	173703	10009	1198	367	6411	1472	36289	6847	2722	239018
1992-93	128816	6973	1521	1104	3706	709	27506	3974	4102	178411
1993-94	152398	11687	1213	889	3713	911	28175	4179	3848	207013
1994-95	167258	12200	1493	1092	5953	1156	30467	4811	3468	227898
1995-96	168676	13978	1400	763	7310	2093	28450	5083	6686	234439
1996-97	230933	27309	1146	588	10581	3659	34718	10796	11162	330892
1997-98	254225	28985	1813	730	9593	3112	39311	10145	8439	356353
1998-99	325793	33197	1244	814	9282	3837	52650	10698	12882	450397
1999-00	329633	42766	1575	1031	8312	3921	51286	10934	10897	460355
2000-01	406216	39840	1450	1439	7202	4817	84141	11933	7625	564663
2001-02	364839	64241	730	745	3619	2325	38750	6927	16550	498726
2002-03	552378	43827	1452	1005	7051	3531	40715	9546	9912	669417
2003-04	585013	47189	1182	910	13259	3766	39421	11302	8773	710815
2004-05	665589	52311	1223	942	16827	4260	42714	9691	9130	802687
2005-06	769183	60090	1570	1209	17825	5216	52705	12627	14364	934789
2006-07	773478	71213	1565	1206	22895	4909	45173	20235	16189	956863
2007-08	748731	81158	1402	1080	24590	5282	41338	14078	21894	939553
2008-09	831946	92423	1910	1471	23529	5789	46219	21404	24928	1049619
2009-10	1120748	116706	2628	2024	36353	6620	80123	34034	42809	1442045
2010-11	1269550	127116	3097	2385	43474	7112	83287	34480	42814	1613315
2011-12	1368524	134580	2753	2120	50178	7766	73513	38374	50068	1727876
2012-13	1455867	140549	3594	2768	61370	5712	77972	38254	68556	1854642
2013-14	1713375	141646	3709	2858	53105	6099	87315	32062	58829	2098998
2014-15	1653456	134004	2804	2161	42905	4306	78991	26359	47814	1992800
Total(Lakhs)	**173.75**	**16.07**	**.59**	**0.33**	**5.40**	**1.04**	**14.36**	**4.21**	**5.43**	**221.20**
Population	215609813									
Ownership%	**8.06**	**0.75**	**0.03**	**0.02**	**0.25**	**0.05**	**0.67**	**0.20**	**0.25**	**10.26**

Source: Annual Report of Transport Department, Govt. of Uttar Pradesh

4.5.2 Regional Influences on Traffic Growth

The findings from the economic profile of the project influence areas and the data contained herein are highly relevant to forecasts for future traffic growth, viz:

(a) *freight:* the majority of *"candidate"* road freight is agricultural (often perishable) goods and goods destined for the secondary, manufacturing and construction sectors; and goods for the non-agricultural primary sector (mining and quarrying) etc. and bulk products for the secondary sector travel mainly by rail (see below) – and goods for the tertiary sector (mainly service industries) are light and while, no doubt most are travelling by road, these do not contribute significantly to total *"candidate"* road freight traffic (see Appendix for the commodity distribution by freight traffic)

(b) *passenger:* most *"candidate"* passenger travel is by persons with incomes much higher than the average (even when those persons are travelling by bus) – the average income of car passengers is half the national average and the average income of bus passengers about a quarter of the national average; in Uttar Pradesh total vehicle ownership is only 10.26 per 100 head of population; and car ownership is only 0.75 per 100 head of population (see Table 4.27) – which data implies that there is much scope for growth in this sector.

Consequently, it better to believe that future growth in:

(a) *candidate freight traffic:* might reasonably be linked to growth in the *"NSDP"* of those regional and State economies which are presently contributing candidate traffic; and

(b) *candidate passenger traffic*: might reasonably be linked to two factors in combination:

- growth in the *"populations"* (P) of those regional and State economies which are presently contributing *"candidate"* traffic; and

- growth in the *"average per capita incomes"* (I) of those regional and State economies which are presently contributing *"candidate"* traffic.

Recent growth in three indices for the above and for each of regions and States that contribute *"trip-ends"* for *"candidate"* traffic are shown on Tables 4.28.

Table 4.28: Zonal Influence Factors (%)

State Name	Car	Bus	LCV	2-Axle Truck	3-Axle Truck	Multi-Axle Truck
Uttar Pradesh	94.36%	84.20%	94.08%	84.95%	74.55%	56.82%
Assam	0.08%	-	0.13%	0.23%	0.05%	0.06%
Bihar	0.51%	-	1.16%	0.94%	3.02%	5.94%
Chandigarh	0.04%	-	0.18%	0.00%	0.43%	0.19%
Chattisgarh	-	0.19%	0.28%	0.47%	0.87%	4.84%
Himachal Pradesh	0.06%	-	0.23%	0.28%	0.36%	1.08%
Haryana	0.43%	0.47%	0.63%	3.08%	3.91%	6.42%
Jharkhand	0.35%	-	-	0.17%	0.11%	1.81%
Maharashtra	-	-	-	-	0.24%	0.41%
Madhya Pradesh	0.03%	-	-	0.57%	0.87%	0.35%
New Delhi	1.60%	7.94%	1.65%	3.34%	2.85%	3.42%
Orissa	0.07%	-	0.00%	0.10%	0.41%	0.32%
Punjab	0.25%	-	0.68%	1.19%	4.85%	10.84%
Rajasthan	-	-	-	-	-	0.08%
Telangana	0.12%	-	-	-	-	-
Uttarakhand	1.99%	6.80%	0.84%	3.76%	6.24%	6.27%
West Bengal	0.12%	0.40%	0.13%	0.90%	1.25%	1.15%

From the zonal influence factors, it is clear that the growth rate of passenger car and bus (public transport) shall be regressed with growth of per capita income and growth of population of states of Uttar Pradesh and its neighbouring states respectively – results are shown on Table 4.29 and Table 4.30

On the Table 4.29 and 4.30, a weighted average for each of these indices has been derived and in the case of passenger traffic, the *"growth in car traffic"* was correlated against the *"growth in relevant per capita incomes"* and for bus traffic *multiplied by the growth in relevant populations"*.

In the case of freight, the *"growth in freight traffic"* correlated against the weighted average for *"NSDP"* as shown on Table 4.31.

Table 4.29: Regression Co-efficient of Car Growth with Per Capital Income of Project Influence Areas

State / Union Territory	Regression Variables	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Growth Rate (2012-19)	Regression Co-efficient (Elasticity Value)	R Square	t-stat	Factored Growth	Zone Influence Factors	Weighted Growth Rate
Assam	Cars	318627	366884	445177	539920	578122	582024	676337	734778	**12.68%**						
	PCI	41142	41609	43002	44809	50642	53745	57099	58833	**5.24%**	1.87	0.86	6.06	9.78%	0.08%	**0.01%**
Bihar	Cars	256346	297507	346120	390770	434258	482962	526792	572163	**12.15%**						
	PCI	21750	22201	22776	23223	24064	25825	28101	30617	**5.01%**	2.13	0.85	5.75	10.66%	0.51%	**0.05%**
Haryana	Cars	988958	1134514	1293065	1454182	1609544	1764448	1920484	2076589	**11.18%**						
	PCI	106085	111780	119791	125032	137748	148193	157649	168209	**6.81%**	1.55	0.98	16.10	10.52%	0.43%	**0.05%**
Himachal Pradesh	Cars	162723	209116	234788	265384	297514	332505	364808	397514	**13.61%**						
	PCI	87721	92672	98816	105241	112723	122208	128840	136881	**6.56%**	1.86	0.97	13.79	12.18%	0.06%	**0.01%**
Jharkhand	Cars	557932	627945	563713	248949	282929	332671	332671	332671	**7.52%**						
	PCI	41254	44176	43779	48781	44524	48826	54246	57157	**4.04%**	0.79	0.35	1.26	3.19%	0.35%	**0.01%**
Madhya Pradesh	Cars	526970	598810	686456	767032	871334	925644	1018526	1101141	**11.10%**						
	PCI	38551	41287	42778	44336	47763	53253	55677	58706	**6.19%**	1.66	0.95	10.86	10.30%	0.03%	**0.00%**
Odisha	Cars	247575	287183	328836	367217	412257	460486	498408	540641	**11.80%**						
	PCI	48370	50714	54109	54210	57592	66240	69864	74927	**6.45%**	1.66	0.93	8.72	10.71%	0.07%	**0.01%**
Punjab	Cars	554699	583850	605714	627577	649441	671304	695597	718502	**3.77%**						
	PCI	85577	88915	93238	95807	100141	105848	110834	116222	**4.47%**	0.82	0.99	21.21	3.66%	0.25%	**0.01%**
Telangana	Cars	0	0	797546	885318	976312	1145108	1234491	1347859	**11.07%**						
	PCI	91121	92732	96039	101424	112267	121568	132380	145082	**8.60%**	1.28	0.98	16.17	11.00%	0.12%	**0.01%**
Uttar Pradesh	Cars	1208699	1367795	1523603	1779146	2161533	2435390	2623049	2873626	**13.17%**						
	PCI	32002	32908	34044	34583	36923	38965	41082	43102	**4.35%**	2.90	0.96	11.37	12.59%	94.36%	**11.88%**
Uttara khand	Cars	177363	223329	267432	304674	340644	345318	399356	434469	**13.65%**						
	PCI	100305	106318	112803	118788	126952	138286	147204	155151	**6.43%**	1.85	0.93	8.96	11.90%	1.99%	**0.24%**
West Bengal	Cars	572466	2573013	991981	1063592	1137056	1187057	1237058	1287059	**12.27%**						
	PCI	51543	53157	53811	54520	57255	60618	65497	73202	**5.14%**	0.63	0.03	0.46	3.24%	0.12%	**0.00%**
Chandigarh	Cars	268410	290075	313792	248187	265660	291356	277168	276479	**0.42%**						
	PCI	159116	169492	180779	183029	195595	210405	232116	235167	**5.74%**	0.01	0.00	0.04	0.05%	0.04%	**0.00%**
Delhi	Cars	2258434	2303052	2547877	2691282	2859620	3009234	3168294	3327354	**5.69%**						
	PCI	185361	193175	202216	215726	235737	247255	262682	279601	**6.05%**	0.95	0.98	18.73	5.73%	1.60%	**0.09%**
														Car Traffic Growth Rate for FY 2020		**12.37%**

Source: Transport Research Wing Ministry of Surface Transport & National Statistical Office (NSO)
Note: PCI - Per Capita Income (in Rs.) are at 2011-12 Constant Prices as Independent Variable & Cars (no. of registered vehicles) as Dependent Variable

Table 4.30: Regression Co-efficient of Bus Growth with Population of Project Influence Areas

State / Union Territory	Regression Variables	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Growth Rate (2012-19)	Regression Co-efficient (Elasticity Value)	R Square	t-stat	Factored Growth	Zone Influence Factors	Weighted Growth Rate
Chhattisgarh	Bus	8596	12049	13071	48501	52783	58026	72649	84214	**12.40%**						
	Population	24258	24585	24909	25232	25555	25879	26186	26488	**3.76%**	28.01	0.89	7.04	35.41%	0.19%	**0.07%**
Haryana	Bus	35646	39153	42800	45893	50207	53348	56984	60549	**11.18%**						
	Population	25439	25854	26266	26675	27079	27477	27868	28253	**6.81%**	5.04	1.00	48.32	7.60%	0.47%	**0.04%**
Uttar Pradesh	Bus	31922	34428	40501	45607	51866	57939	62461	67818	**13.17%**						
	Population	200764	204250	207739	211217	214671	218088	221469	224829	**4.35%**	6.97	0.99	29.10	11.36%	84.20%	**9.56%**
Uttarakhand	Bus	8066	8504	8997	9962	10716	7736	9592	9762	**13.65%**						
	Population	9943	10084	10224	10362	10499	10632	10761	10887	**6.43%**	1.46	0.17	1.11	1.90%	6.80%	**0.13%**
West Bengal	Bus	34184	35603	51660	53899	56878	44771	58066	61466	**12.27%**						
	Population	89499	90320	91122	91920	92725	93550	94334	95109	**5.14%**	8.47	0.65	3.30	7.39%	0.40%	**0.03%**
Delhi	Bus	45757	20142	19912	19590	19695	43723	43615	50768	**5.69%**						
	Population	8596	12049	13071	48501	52783	58026	72649	84214	**6.05%**	2.91	0.20	1.24	8.42%	7.94%	**0.67%**
														Bus Traffic Growth Rate for FY 2020		**10.49%**

Source: Transport Research Wing Ministry of Surface Transport & National Statistical Office (NSO)
Note: Population (in 000') as Independent Variable & Buses (no. of registered vehicles) as Dependent Variable

Table 4.31: Regression Co-efficient of Multi-Axle Truck Growth with NSDP of Project Influence Areas

State / Union Territory	Regression Variables	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Growth Rate (2012-18)	Regression Co-efficient (Elasticity Value)	R Square	t-stat	Factored Growth	Zone Influence Factors	Weighted Growth Rate
Assam	Goods Vehicle	171878	191479	69342	226612	243409	254929	265773	**7.53%**						
	NSDP	129354	132518	138725	146425	167629	175745	186992	**6.33%**	1.85	0.33	1.58	11.73%	0.06%	**0.01%**
Bihar	Goods Vehicle	73472	83191	103211	109010	123744	141242	152276	**12.91%**						
	NSDP	228497	236933	246915	255739	268333	294890	328824	**6.25%**	1.96	0.89	6.47	12.29%	5.94%	**0.73%**
Chhattisgarh	Goods Vehicle	127610	141441	155981	171840	186960	204692	218537	**9.38%**						
	NSDP	142273	148760	163494	165418	175362	190841	203174	**6.12%**	1.52	0.97	13.41	9.27%	4.84%	**0.45%**
Haryana	Goods Vehicle	389546	417632	445020	479951	516633	550506	580221	**6.87%**						
	NSDP	271152	289414	314224	331413	361231	392729	422969	**7.69%**	0.91	0.99	27.37	6.98%	6.42%	**0.45%**
Himachal Pradesh	Goods Vehicle	99294	96855	128017	136760	143008	144977	162380	**8.54%**						
	NSDP	60536	64519	69398	74553	80563	86186	91593	**7.15%**	1.22	0.89	6.32	8.69%	1.08%	**0.09%**
Jharkhand	Goods Vehicle	35330	39389	41242	105786	117759	158508	174557	**30.51%**						
	NSDP	137383	149526	150609	170568	158231	177622	185623	**5.14%**	6.03	0.86	5.48	31.03%	1.81%	**0.56%**
Madhya Pradesh	Goods Vehicle	195627	217618	242811	263039	297188	374592	380522	**11.73%**						
	NSDP	282371	306853	322598	339247	369929	417903	443183	**7.80%**	1.56	0.99	23.37	12.16%	0.35%	**0.04%**
Maha rashtra	Goods Vehicle	973788	1067825	1142091	1273256	1360214	1396713	1514610	**7.64%**						
	NSDP	1126595	1189711	1267538	1345388	1454411	1598422	1712905	**7.23%**	1.01	0.95	10.28	7.29%	0.41%	**0.03%**
Odisha	Goods Vehicle	219691	239749	267615	285887	303035	324105	346367	**7.88%**						
	NSDP	204226	216301	233122	235935	255713	282775	302909	**6.79%**	1.12	0.95	9.95	7.61%	0.32%	**0.02%**
Punjab	Goods Vehicle	169553	201758	201758	201758	201758	352427	312939	**10.75%**						
	NSDP	239227	251813	267515	278485	294895	314402	332072	**5.62%**	1.97	0.74	3.77	11.07%	10.84%	**1.20%**
Rajasthan	Goods Vehicle	385796	431537	478379	467758	564152	617367	645339	**8.95%**						
	NSDP	395331	409802	434292	465599	498138	535208	573628	**6.40%**	1.34	0.95	9.67	8.60%	0.08%	**0.01%**
Uttar Pradesh	Goods Vehicle	307058	338977	400061	467786	511631	562503	617627	**12.35%**						
	NSDP	645132	673552	707469	729686	790993	846834	901353	**5.73%**	2.07	0.95	9.50	11.89%	56.82%	**6.75%**
Uttara khand	Goods Vehicle	39169	50456	52098	58232	62789	84657	84957	**13.77%**						
	NSDP	101960	109529	117777	125702	136144	143975	153601	**7.07%**	1.84	0.94	8.78	12.98%	6.27%	**0.81%**
West Bengal	Goods Vehicle	248776	281995	436839	468719	495790	407229	536444	**13.66%**						
	NSDP	473205	492901	503952	515702	546988	590958	642999	**5.24%**	1.92	0.51	2.29	10.09%	1.15%	**0.12%**
Chandigarh	Goods Vehicle	24331	25704	27077	29416	30031	30668	34572	**6.03%**						
	NSDP	16930	18305	19813	20353	22296	23681	25331	**6.95%**	0.81	0.95	9.42	5.62%	0.19%	**0.01%**
Delhi	Goods Vehicle	242331	129339	131715	142203	153406	281159	207708	**9.94%**						
	NSDP	314650	334193	356528	388183	429149	465770	503507	**8.54%**	0.64	0.13	0.86	5.26%	3.42%	**0.18%**
													Multi Axle Truck Traffic Growth Rate for FY 2020		**11.47%**

Source: Transport Research Wing Ministry of Surface Transport & National Statistical Office (NSO)
Note: NSDP – Net State Domestic Product (in Crores) are at 2011-12 Constant Prices as Independent Variable & Goods Vehicle (no. of registered vehicles) as Dependent Variable

Elasticities were then derived. In the case of freight, the weighted average elasticity of MAVs is 1.94 and, in the case of passengers the average elasticity is 2.80, in case of bus the average elasticity is 6.31 – implying that:

(a) growth in freight travel is growing faster than growth in the *"NDSP"* of the regional and State economies which presently contribute candidate traffic; and

(b) growth in passenger travel is growing faster than growth in the *"per capita incomes"* of the regional and State economies which presently contribute candidate traffic.

(c) growth in bus travel is growing faster than growth in the *"populations"* of the regional and State which presently contribute candidate traffic.

The weighted average elasticites changes for LCVs, 2-Axle Trucks and 3-Axle Trucks change marginally from weighted average elasticies of 1.94 obtained for MAVs because of change in project influence area factors, as 2.03, 1.98 and 1.98 respectively

This is, as expected, and typical of developing economies that, like Uttar Pradesh and the rest of India, are experiencing a surge in economic growth. The elasticity can however be expected to fall with time. The *"best estimate"* forecasts for traffic, which assume continued growth in the *"NSDP"* sectors and in *"per capita incomes"* at projected rates and a convincing increase in average loads caused by the use of greater numbers of larger trucks, and an improvement in load factors, refer Appendix for year wise projections for *"NSDP"* and *"per capita incomes"*.

The growth in multi-axle vehicles (which are mainly articulated MAVs) is assumed to be 0.25% per annum higher than those of LCVs. There is relatively higher number of multi-axle vehicles amongst the candidate vehicles. The experience of almost all other developing countries at a similar stage of development has been for a major growth in these vehicles types – particularly when nascent expressway systems across the country are being developed.

During the last few years growth in real incomes started raising above growth in per capita GDP – it is expected that over the next decade that trend should continue. Also during the last few years growth in population is falling behind growth – it is expected that over the next few decade that trend should reduce)

These growth rates may initially seem high (*additional 1% per year factored for induced traffic as a direct result of the Project*) and, over the next twenty five years, are consistent with: a 7.5 fold increase in *"candidate"* freight traffic; a 12.4 fold increase in car traffic (*implying car ownership of still only about 0.75 per 100 head of population*) and a 6.0 fold increase in bus passengers. These are not unreasonable expectations.

Summary of annual growth rate for vehicles during the development period of the expressway and further 25 year Horizon is shown in Table 4.32.

Table 4.32: Annual Growth Rates for Vehicles Development Period & further 25 Year Horizon

Year	Cars	All Buses	LCV	2-Axle Trucks	3-Axle Trucks	MAV (4+ axles)
FY 2021	12.31%	10.24%	11.66%	11.49%	11.41%	11.41%
FY 2022	12.24%	9.99%	11.37%	11.20%	11.13%	11.13%
FY 2023	12.17%	9.75%	11.07%	10.92%	10.85%	10.85%
FY 2024	12.08%	9.51%	10.79%	10.65%	10.58%	10.57%
FY 2025	11.98%	9.26%	10.50%	10.38%	10.31%	10.30%
FY 2026	11.87%	9.02%	10.22%	10.11%	10.05%	10.04%
FY 2027	11.76%	8.79%	9.95%	9.85%	9.79%	9.78%
FY 2028	11.63%	8.55%	9.68%	9.59%	9.54%	9.52%
FY 2029	11.49%	8.31%	9.41%	9.33%	9.29%	9.27%
FY 2030	11.35%	8.08%	9.15%	9.08%	9.04%	9.02%
FY 2031	11.19%	7.85%	8.89%	8.83%	8.80%	8.78%
FY 2032	11.03%	7.62%	8.63%	8.59%	8.55%	8.54%
FY 2033	10.86%	7.40%	8.38%	8.34%	8.32%	8.30%
FY 2034	10.67%	7.17%	8.13%	8.11%	8.08%	8.07%
FY 2035	10.48%	6.95%	7.88%	7.87%	7.85%	7.83%
FY 2036	10.28%	6.73%	7.63%	7.63%	7.62%	7.60%
FY 2037	10.07%	6.51%	7.39%	7.40%	7.39%	7.38%
FY 2038	9.84%	6.29%	7.15%	7.17%	7.17%	7.15%
FY 2039	9.61%	6.07%	6.91%	6.95%	6.95%	6.93%
FY 2040	9.37%	5.86%	6.68%	6.72%	6.73%	6.71%
FY 2041	9.12%	5.65%	6.44%	6.50%	6.51%	6.50%
FY 2042	8.86%	5.44%	6.21%	6.28%	6.29%	6.28%
FY 2043	8.59%	5.23%	5.98%	6.06%	6.08%	6.07%
FY 2044	8.31%	5.02%	5.75%	5.84%	5.87%	5.86%
FY 2045	8.02%	4.82%	5.53%	5.62%	5.66%	5.65%

Given the uncertain nature of traffic forecasting, for financial analysis sensitivity purposes, assumptions are:

(a) low or pessimistic growth rates of 0.9 times these values; and
(b) high or optimistic growth rates of 1.1 times these values.

This is in line with normal practice in such situations.

4.5.3 Traffic Projections

Base Estimates of Tollable Traffic (2020) section by section of proposed Expressway as shown in Table 4.24 have been projected by assigning the above annual growth rates for the corresponding periods – results are shown in Tables 4.33 to 4.35

Table 4.33: Traffic Forecast (FY 2025) Section by Section of Proposed Expressway

Sections	Cars	All Buses	All LCVs	2-Axle Trucks	3-Axle Trucks	MAV (4-6axles)	Total Traffic Nos.	Total Traffic PCUs.
A-B	1515	225	514	558	1165	3042	**7018**	**21816**
B-C	1617	303	624	698	1372	3262	**7875**	**24349**
C-D	1687	330	723	737	1508	3372	**8357**	**25670**
D-E	1584	320	712	737	1508	3366	**8226**	**25490**
E-F	1673	325	759	800	1582	3449	**8588**	**26452**
F-G	1753	353	773	800	1582	3449	**8710**	**26637**
G-H	1773	290	801	919	1681	3699	**9164**	**28293**
H-I	1538	273	669	872	1673	3690	**8714**	**27598**
I-J	2028	316	934	1064	1888	3931	**10160**	**30918**
J-K	2143	320	1018	1054	1980	3958	**10474**	**31546**
K-L	2077	324	950	1073	1933	3948	**10305**	**31257**
L-M	1911	313	750	977	1814	3900	**9665**	**29896**
M-N	1990	352	828	997	1876	3574	**9616**	**28988**
N-O	1909	292	971	836	1595	3250	**8853**	**26161**
O-P	1957	276	916	731	1345	3042	**8267**	**24075**
P-Q	2283	335	959	769	1338	3056	**8740**	**24798**
Q-R	2196	324	940	769	1338	3056	**8622**	**24648**

Note: Data may not add up to the total due to rounding.

Table 4.34: Traffic Forecast (FY 2035) Section by Section of Proposed Expressway

Sections	Cars	All Buses	All LCVs	2-Axle Trucks	3-Axle Trucks	MAV (4-6axles)	Total Traffic Nos.	Total Traffic PCUs.
A-B	4392	484	1219	1316	2739	7145	**17296**	**51992**
B-C	4688	652	1481	1647	3226	7662	**19356**	**57963**
C-D	4890	711	1717	1738	3546	7920	**20523**	**61093**
D-E	4593	689	1689	1738	3546	7905	**20161**	**60619**
E-F	4851	699	1801	1889	3720	8100	**21061**	**62929**
F-G	5083	759	1836	1889	3720	8100	**21387**	**63393**
G-H	5141	625	1902	2169	3954	8688	**22479**	**67336**
H-I	4459	588	1587	2058	3934	8667	**21292**	**65578**
I-J	5880	680	2217	2511	4440	9232	**24959**	**73639**
J-K	6215	688	2416	2488	4657	9297	**25762**	**75178**
K-L	6023	697	2254	2533	4547	9272	**25325**	**74457**
L-M	5542	674	1781	2305	4266	9159	**23727**	**71164**
M-N	5770	757	1966	2353	4412	8393	**23652**	**69056**
N-O	5536	628	2305	1973	3750	7634	**21828**	**62405**
O-P	5675	595	2174	1726	3162	7144	**20477**	**57534**
P-Q	6621	722	2275	1814	3147	7177	**21756**	**59380**
Q-R	6367	697	2231	1814	3147	7177	**21434**	**58986**

Note: Data may not add up to the total due to rounding.

Table 4.35: Traffic Forecast (FY 2045) Section by Section of Proposed Expressway

Sections	Cars	All Buses	All LCVs	2-Axle Trucks	3-Axle Trucks	MAV (4-6axles)	Total Traffic Nos.	Total Traffic PCUs.
A-B	10596	848	2303	2497	5202	13554	**35000**	**100683**
B-C	11310	1141	2797	3126	6127	14533	**39035**	**112088**
C-D	11797	1245	3244	3299	6734	15024	**41343**	**118104**
D-E	11081	1207	3191	3299	6734	14994	**40506**	**117061**
E-F	11703	1224	3403	3583	7066	15366	**42345**	**121572**
F-G	12263	1329	3467	3583	7066	15366	**43075**	**122545**
G-H	12401	1094	3592	4116	7510	16481	**45195**	**130114**
H-I	10756	1029	2998	3904	7471	16440	**42599**	**126448**
I-J	14186	1190	4187	4764	8432	17512	**50271**	**142428**
J-K	14993	1205	4564	4721	8845	17636	**51965**	**145516**
K-L	14529	1220	4257	4806	8636	17587	**51037**	**144047**
L-M	13369	1180	3364	4374	8101	17374	**47763**	**137565**
M-N	13919	1325	3714	4465	8380	15921	**47725**	**133647**
N-O	13355	1100	4354	3745	7123	14482	**44158**	**120957**
O-P	13691	1041	4107	3276	6006	13551	**41672**	**111801**
P-Q	15972	1264	4298	3443	5977	13614	**44567**	**115732**
Q-R	15359	1220	4214	3443	5977	13614	**43828**	**114865**

Note: Data may not add up to the total due to rounding.

4.5.4 Capacity Constraints and Proposed Intervention

The 25 year horizon traffic forecasts (FY 2045) on all sections from Node A to R of the proposed expressway exceeds 86,000[3] PCUs per day, i.e. the requirement is 6-lane requirement and on 5 sections viz. G-H, I-J, J-K, K-L, L-M and M-N, the traffic forecasts (year 2045) exceeds 1,30,000[4] PCUs per day, i.e the requirement is 8-lane requirement.

The projected traffic warrants the following the lane requirement for each section to maintain a design service volume for Level of Service B on the proposed expressway at the years mentioned in Table 4.50

Table 4.50: Lane Requirement to maintain Level of Service B on the Expressway

Sections	4-Lane requirement (threshold 40,000 PCUs)	6-Lane requirement (threshold 86,000 PCUs)	8-Lane requirement (threshold 130,000 PCUs)
A-B	FY 2032	FY 2043	After FY 2045
B-C	FY 2031	FY 2041	After FY 2045
C-D	FY 2030	FY 2040	After FY 2045
D-E	FY 2030	FY 2040	After FY 2045
E-F	FY 2030	FY 2040	After FY 2045
F-G	FY 2030	FY 2040	After FY 2045
G-H	FY 2029	FY 2039	After FY 2045
H-I	FY 2029	FY 2039	FY 2045
I-J	FY 2028	FY 2038	FY 2044
J-K	FY 2028	FY 2037	FY 2044
K-L	FY 2028	FY 2037	FY 2044
L-M	FY 2029	FY 2038	FY 2045
M-N	FY 2029	FY 2039	FY 2045

[3] the DSV for LOS B on 4-lane (refer Table 4.39)
[4] the DSV for LOS B on 6-lane configuration(refer Table 4.39)

Sections	4-Lane requirement (threshold 40,000 PCUs)	6-Lane requirement (threshold 86,000 PCUs)	8-Lane requirement (threshold 130,000 PCUs)
N-O	FY 2030	FY 2040	After FY 2045
O-P	FY 2031	FY 2041	After FY 2045
P-Q	FY 2031	FY 2041	After FY 2045
Q-R	FY 2031	FY 2041	After FY 2045

Note: DSV of 1300 PCU/h/lane has been considered

It can be seen that a 6-lane configuration can cater to the forecasted traffic till FY 2043, i.e. (20 year design period / operations period) from start of operations of the Expressway; beyond which, widening of few sections of the Expressway to 8-lane configuration becomes necessary.

Thus the development proposal for expressway shall be a 6-lane dual carriageway configuration with Structures (Culvets, Underpassess, Flyovers, ROBs) of 8-lane configuration so that road widening (median side) is possible as and when warranted by traffic. Thus the life cycle cost of development of the Expressway is justified.

Appendix:

Appendix to this Report – Traffic Studies, is given as a separate volume.