Appendix 8

Appendix 8-1 Cross Section Traffic Volume (Passenger) (Up & Down)

Appendix 8-2 Cross Section Traffic Volume (Freight) (Up & Down)

Appendix 8.1 Cross Section of Traffic Volume (Passenger) (Up & Down)

Aleppo〜Homs1

Station Name 1	Station Name 2	Distance (km)	Volume (Person/day)			
			Cross sectional traffic volume			
			2005	2010	2015	2020
- Aleppo Bagdad	Ansari	7.0	913	1,011	1,936	2,942
Ansari	Aleppo Baghdad	7.0	913	1,011	1,936	3,870
- Jubrin	Ansari	17.5	371	436	472	928
Ansari	Jubrin	17.5	371	436	472	928
- Ansari	Wudehi	8.0	1,284	1,447	2,408	3,870
Wudehi	Ansari	8.0	1,284	1,447	2,408	3,870
- Wudehi	Hamidia	14.5	651	782	1,608	1,900
Hamidia	Wudehi	14.5	651	782	1,608	1,900
- Hamidia	Abu Dhour	30.0	651	782	1,608	1,900
Abu Dhour	Hamidia	30.0	651	782	1,608	1,900
- Abu Dhour	Sinjar	18.0	651	782	1,608	1,900
Sinjar	Abu Dhour	18.0	651	782	1,608	1,900
- Sinjar	Hamdania	22.4	651	782	1,608	1,897
Hamdania	Sinjar	22.4	651	782	1,608	1,897
- Hamdania	Qoumhana	27.0	651	782	1,608	1,897
Qoumhana	Hamdania	27.0	651	782	1,608	1,897
- Qoumhana	Hama	13.0	651	782	1,608	1,897
Hama	Qoumhana	13.0	651	782	1,608	1,897
- Hama	Kafar Buhom	11.3	644	804	1,634	1,879
Kafar Buhom	Hama	11.3	644	804	1,634	1,879
- Kafar Buhom	Har Bnafsi	13.0	644	804	1,634	1,879
Har Bnafsi	Kafar Buhom	13.0	644	804	1,634	1,879
- Har Bnafsi	Sneisel	17.0	644	804	1,634	1,879
Sneisel	Har Bnafsi	17.0	644	804	1,634	1,879
- Sneisel	Homs1 (Passenger)	7.3	644	804	1,634	1,879
Homs1 (Passenger)	Sneisel	7.3	644	804	1,634	1,879

Homs1〜Damascus

Station Name 1	Station Name 2	Distance(km)	Volume(Person/day)			
			Cross sectional traffic volume			
			2005	2010	2015	2020
- Homs1	Homs 2	1.0	723	1,134	2,086	2,512
Homs 2	Homs1	1.0	723	1,134	2,086	2,512
- Homs Goods	Shinshar	14.2	723	1,134	2,086	2,512
Shinshar	Homs Goods	14.2	723	1,134	2,086	2,512
- Shinshar	Khnefis	13.6	723	1,134	2,086	2,512
Khnefis	Shinshar	13.6	723	1,134	2,086	2,512
- Khnefis	Noamia	21.1	723	1,134	2,086	2,512
Noamia	Khnefis	21.1	723	1,134	2,086	2,512
- Noamia	Mhine	14.8	723	1,134	2,086	2,512
Mhine	Noamia	14.8	723	1,134	2,086	2,512
- Mhine	Bir Ghadir	22.8	723	1,333	2,438	2,937
Bir Ghadir	Mhine	22.8	723	1,333	2,438	2,937
- Bir Ghadir	Khanat	18.5	723	1,333	2,438	2,937
Khanat	Bir Ghadir	18.5	723	1,333	2,438	2,937
- Khanat	Jai Rood	14.9	723	1,333	2,438	2,937
Jai Rood	Khanat	14.9	723	1,333	2,438	2,937
- Jai Rood	Dmeir	16.8	723	1,333	2,438	2,937
Dmeir	Jai Rood	16.8	723	1,333	2,438	2,937
- Dmeir	Baharia	16.3	683	1,267	2,323	2,777
Baharia	Dmeir	16.3	683	1,267	2,323	2,777
- Baharia	Turkmania	15.5	683	1,267	2,323	2,777
Turkmania	Baharia	15.5	683	1,267	2,323	2,777
- Turkmania	Damascus (Freight)	16.7	683	1,267	2,323	2,777
Damascus (Freight)	Turkmania	16.7	683	1,267	2,323	2,777
- Damascus (P)	Damascus (Freight)	6.7	683	1,267	2,232	2,650
Damascus (Freight)	Damascus (Passe)	6.7	683	1,267	2,232	2,650

Aleppo～Arrai・Midan Ekbas

Station Name 1	Station Name 2	Distance(km)	Volume(Person/day)			
			Cross sectional traffic volume			
			2005	2010	2015	2020
- Muslimia	Aleppo Baghdad	14.0	139	158	283	423
AleppoBaghdad	Muslimia	14.0	139	158	283	423
- Muslimia	Akhtarin	29.1	23	24	34	35
Akhtarin	Muslimia	29.1	23	24	34	35
- Akhtarin	Arrai	16.1	23	24	34	35
Arrai	Akhtarin	16.1	23	24	34	35
- Muslimia	Tel Rifaat	22.9	116	134	249	388
Tel Rifaat	Muslimia	22.9	116	134	249	388
- Tel Rifaat	Qatma	17.0	116	134	249	388
Qatma	Tel Rifaat	17.0	116	134	249	388
- Qatma	Afrin	17.7	116	134	249	388
Afrin	Qatma	17.7	116	134	249	388
- Afrin	Rajo	25.3	116	134	249	388
Rajo	Afrin	25.3	116	134	249	388
- Rajo	Midan Ekbas	19.0	116	134	249	388
Midan Ekbas	Rajo	19.0	116	134	249	388

Mhine～Tadmor～Deir el Zor

Station Name 1	Station Name 2	Distance(km)	Volume(Person/day)			
			Cross sectional traffic volume			
			2005	2010	2015	2020
- Mhine	Al-Rumeila	12.0	0	415	608	683
Al-Rumeila	Mhine	12.0	0	415	608	683
- Al-Rumeila	Al-Qariyatein	14.0	0	415	608	683
Al-Qariyatein	Al-Rumeila	14.0	0	415	608	683
- Al-Qariyatein	Al-Barida	22.0	0	415	608	683
Al-Barida	Al-Qariyatein	22.0	0	415	608	683
- Al-Barida	Al-Bsayra	19.0	0	415	608	683
Al-Bsayra	Al-Barida	19.0	0	415	608	683
- Al-Bsayra	Al-Fajwa	15.0	0	415	608	683
Al-Fajwa	Al-Bsayra	15.0	0	415	608	683
- Al-Fajwa	Al-Hamra	17.0	0	415	608	683
Al-Hamra	Al-Fajwa	17.0	0	415	608	683
- Al-Hamra	Al-Sharqia	12.0	0	415	608	683
Al-Sharqia	Al-Hamra	12.0	0	415	608	683
- Al-Sharqia	Abtar	11.4	0	415	608	683
Abtar	Al-Sharqia	11.4	0	415	608	683
- Abtar	Saqqar	19.3	0	415	608	683
Saqqar	Abtar	19.3	0	415	608	683
- Saqqar	Tadmor	14.0	0	415	608	683
Tadmor	Saqqar	14.0	0	415	608	683
- Tadmor	Arak	26.6	0	415	608	683
Arak	Tadmor	26.6	0	415	608	683
- Arak	As-Sukhne	44.5	0	415	608	683
As-Sukhne	Arak	44.5	0	415	608	683
- As-Sukhne	Judban	29.4	0	415	608	683
Judban	As-Sukhne	29.4	0	415	608	683
- Judban	Kabajeb	32.1	0	415	608	683
Kabajeb	Judban	32.1	0	415	608	683
- Kabajeb	Al-Jaula	27.7	0	415	608	683
Al-Jaula	Kabajeb	27.7	0	415	608	683
- Al-Jaula	Deir ez Zor (P.)	33.7	0	415	608	683
Deir ez Zor P. (West)	Al-Jaula	33.7	0	415	608	683
- Deir ez Zor P. (West)	Deir ez-Zor (F.)	4.8	0	415	608	683
Deir ez-Zor (F.)	Deir ez Zor P.	4.8	0	415	608	683

Homs〜Lattakia

Station Name 1	Station Name 2	Distance(km)	Volume(Person/day) Cross sectional traffic volume			
			2005	2010	2015	2020
- Homs Goods	Kharbettin	8.0	315	566	804	1,176
Kharbettin	Homs Goods	8.0	315	566	804	1,176
- Kharbettin	Al-Khansa	16.0	315	566	804	1,176
Al-Khansa	Kharbettin	16.0	315	566	804	1,176
- Al-Khansa	Umm Jaamah	15.7	315	566	804	1,176
Umm Jaamah	Al-Khansa	15.7	315	566	804	1,176
- Umm Jaamah	Tel Kalakh	13.0	315	566	804	1,176
Tel Kalakh	Umm Jaamah	13.0	315	566	804	1,176
- Tel Kalakh	Akkari	11.0	315	566	804	1,176
Akkari	Tel Kalakh	11.0	315	566	804	1,176
- Akkari	Samariyan	22.0	315	563	803	1,175
Samariyan	Akkari	22.0	315	563	803	1,175
- Samariyan	Tartous	21.3	315	563	803	1,175
Tartous	Samariyan	21.3	315	563	803	1,175
- Tartous	Roueisa	20.8	286	467	640	1,036
Roueisa	Tartous	20.8	286	467	640	1,036
- Roueisa	Marqia	13.0	286	467	640	1,036
Marqia	Roueisa	13.0	286	467	640	1,036
- Marqia	Baniyas	17.3	286	467	640	1,036
Baniyas	Marqia	17.3	286	467	640	1,036
- Baniyas	El-Sin	8.4	286	467	640	1,036
El-Sin	Baniyas	8.4	286	467	640	1,036
- El-Sin	Jabla	13.4	286	467	640	1,036
Jabla	El-Sin	13.4	286	467	640	1,036
- Jabla	Sharbit	29.0	286	467	640	1,036
Sharbit	Jabla	29.0	286	467	640	1,036
- Sharbit	Lattakia (Passenger)	2.5	286	467	640	1,036
Lattakia(passenger)	Sharbit	2.5	286	467	640	1,036

Wudehi〜Lattakia

Station Name 1	Station Name 2	Distance(km)	Volume(Person/day) Cross sectional traffic volume			
			2005	2010	2015	2020
- Wudehi	Kafar Halab	24.6	891	1,157	1,694	2,936
Kafar Halab	Wudehi	24.6	891	1,157	1,694	2,936
- Kafar Halab	Maarret Ikhwan	18.6	891	1,157	1,694	2,936
Maarret Ikhwan	Kafar Halab	18.6	891	1,157	1,694	2,936
- Maarret Ikhwan	Bishmaroun	20.0	891	1,157	1,694	2,936
Bishmaroun	Maarret Ikhwan	20.0	891	1,157	1,694	2,936
- Bishmar0un	Mhambel	21.5	891	1,157	1,694	2,936
Mhambel	Bishmaroun	21.5	891	1,157	1,694	2,936
- Mhambel	Frika	15.4	891	1,157	1,693	2,936
Frika	Mhambel	15.4	891	1,157	1,693	2,936
- Frika	Jisr Elshogour	10.0	891	1,157	1,693	2,936
Jisr Elshogour	Frika	10.0	891	1,157	1,693	2,936
- Jisr Elshogour	Budama	15.0	713	926	1,354	2,349
Budama	Jisr Elshogour	15.0	713	926	1,354	2,349
- Budama	Bibar	11.0	713	926	1,354	2,349
Bibar	Budama	11.0	713	926	1,354	2,349
- Bibar	Sheikhana	8.3	713	926	1,354	2,349
Sheikhana	Bibar	8.3	713	926	1,354	2,349
- Sheikhana	As-Safkoun	14.0	713	926	1,354	2,349
As-Safkoun	Sheikhana	14.0	713	926	1,354	2,349
- As-Safkoun	Al-Kabir	15.4	713	926	1,354	2,349
Al-Kabir	As-Safkoun	15.4	713	926	1,354	2,349
- Al-Kabir	Lattakia (Passenger)	11.4	713	926	1,354	2,349
Lattakia(passenger)	Al-Kabir	11.4	713	926	1,354	2,349

Aleppo～Deil el Zor

Station Name 1	Station Name 2	Distance(km)	Volume(Person/day)			
			Cross sectional traffic volume			
			2005	2010	2015	2020
- Aleppo	Jubrin	16.0	202	305	473	781
Jubrin	Aleppo	16.0	202	305	473	781
- Jubrin	Tel Blat	9.0	573	741	945	1,709
Tel Blat	Jubrin	9.0	573	741	945	1,709
- Tel Blat	Sheikh Ahmad	18.0	573	741	945	1,709
Sheikh Ahmad	Tel Blat	18.0	573	741	945	1,709
- Sheikh Ahmad	Fodda	29.0	573	741	945	1,709
Fodda	Sheikh Ahmad	29.0	573	741	945	1,709
- Fodda	Hassan	16.0	573	741	945	1,709
Hassan	Fodda	16.0	573	741	945	1,709
- Hassan	Qadissiya	27.0	573	741	945	1,709
Qadissiya	Hassan	27.0	573	741	945	1,709
- Qadissiya	Abu Asi	13.0	573	741	945	1,709
Abu Asi	Qadissiya	13.0	573	741	945	1,709
- Abu Asi	Al-Grin	17.6	573	741	945	1,709
Al-Grin	Abu Asi	17.6	573	741	945	1,709
- Al-Grin	Hneida	16.0	573	741	945	1,709
Hneida	Al-Grin	16.0	573	741	945	1,709
- Hneida	Kdeiran	12.0	573	741	945	1,709
Kdeiran	Hneida	12.0	573	741	945	1,709
- Kdeiran	Salhabiya	16.0	573	741	945	1,709
Salhabiya	Kdeiran	16.0	573	741	945	1,709
- Salhabiya	Raqqa	14.0	573	741	945	1,709
Raqqa	Salhabiya	14.0	573	741	945	1,709
- Raqqa	Al-Karama	24.1	439	696	885	1,544
Al-Karama	Raqqa	24.1	439	696	885	1,544
- Al-Karama	Judaida	16.0	439	696	885	1,544
Judaida	Al-Karama	16.0	439	696	885	1,544
- Judaida	Milaj	28.0	439	696	885	1,544
Milaj	Judaida	28.0	439	696	885	1,544
- Milaj	Zalabiya	16.0	439	696	885	1,544
Zalabiya	Milaj	16.0	439	696	885	1,544
- Zalabiya	Al-Kasra	15.0	439	696	885	1,544
Al-Kasra	Zalabiya	15.0	439	696	885	1,544
- Al-Kasra	Muheimida	18.0	439	696	885	1,544
Muheimida	Al-Kasra	18.0	439	696	885	1,544
- Muheimida	Deir ez-Zor (F.)	11.0	439	696	885	1,544
Deir ez(f)	Muheimida	11.0	439	696	885	1,544
- Deir ez(F)	Deir ez-Zor (P)	6.0	439	1,111	1,493	2,227
Deir ez(P)	Deir ez-Zor (F)	6.0	439	1,111	1,493	2,227

Deir El Zor〜Qamishili〜Al Yaroubiye

Station Name 1	Station Name 2	Distance(km)	Volume(Person/day)			
			Cross sectional traffic volume			
			2005	2010	2015	2020
- Deir ez(f)	Al-Jazira	19.0	304	610	776	1,307
Al-Jazira	Deir ez-Zor (Frieght)	19.0	304	610	776	1,307
- Al-Jazira	Bir Juwaief	28.1	304	610	776	1,307
Bir Juwaief	Al-Jazira	28.1	304	610	776	1,307
- Bir Juwaief	Abu Fas	23.0	304	610	776	1,307
Abu Fas	Bir Juwaief	23.0	304	610	776	1,307
- Abu Fas	Rumeilan	19.2	304	610	776	1,307
Rumeilan	Abu Fas	19.2	304	610	776	1,307
- Rumeilan	Sabah al-Kheir	25.0	304	610	776	1,307
Sabah al Kheir	Rumeilan	25.0	304	610	776	1,307
- Sabah al Kheir	Hassaka	22.0	304	610	776	1,307
Hassaka	Sabah al-Kheir	22.0	304	610	776	1,307
- Hassaka	Siha	17.0	171	349	438	743
Siha	Hassaka	17.0	171	349	438	743
- Siha	Kabaka	23.0	171	349	438	743
Kabaka	Siha	23.0	171	349	438	743
- Kabaka	Sbate	21.0	171	349	438	743
Sbate	Kabaka	21.0	171	349	438	743
- Sbate	New Qamishli	17.0	171	349	438	743
New Qamishli	Sbate	17.0	171	349	438	743
- New Qamishili	Qahtaniyya	28.3	31	65	79	136
Qahtaniyya	New Qamishli	28.3	31	65	79	136
- Old Qamishili	Qahtaniyya	25.2	0	0	0	0
Qahtaniyya	Old Qamishli	25.2	0	0	0	0
- Qahtaniyya	Tel Alo	21.0	31	65	79	136
Tel Alo	Qahtaniyya	21.0	31	65	79	136
- Tel Alo	Al-Yaroubiye	30.0	31	65	79	136
Al-Yaroubiye	Tel Alo	30.0	31	65	79	136

Damascus〜Daraa

Station Name 1	Station Name 2	Distance(km)	Volume(Person/day)			
			Cross sectional traffic volume			
			2005	2010	2015	2020
- Damascus(Freight)	Alkesweh	13.0	0	70	158	179
Alkesweh	Damascus (Freight)	13.0	0	70	158	179
- Alkesweh	Ghbagheb	18.2	0	0	158	179
Ghbagheb	Alkesweh	18.2	0	0	158	179
- Ghbagheb	Sanamein	12.0	0	0	148	168
Sanamein	Ghbagheb	12.0	0	0	148	168
- Sanamein	Mahaje	13.2	0	0	144	163
Mahaje	Sanamein	13.2	0	0	144	163
- Mahaje	Sheikh Meskin	15.5	0	0	128	140
Sheikh Meskin	Mahaje	15.5	0	0	128	140
- Sheikh Meskin	Dael	15.5	0	0	116	124
Dael	Sheikh Meskin	15.5	0	0	116	124
- Dael	Daraa	9.5	0	0	114	122
Daraa	Dael	9.5	0	0	114	122

Other

Station Name 1	Station Name 2	Distance(km)	Volume(Person/day)			
			Cross sectional traffic volume			
			2005	2010	2015	2020
- Homs Goods	Qattineh	6.7	6	16	27	30
Qattineh	Homs Goods	6.7	6	16	27	30
- Qattineh	Arqusair	17.0	6	16	27	30
Arqusair	Qattineh	17.0	6	16	27	30
- Kharbettin	HomsPassenger	11.3	102	151	214	305
HomsPassenger	Kharbettin	11.3	102	151	214	305
- Deir ez Zor(P)	Al-Jazira	18.9	0	0	0	69
Al-Jazira	Deir ez Zor(P)	18.9	0	0	0	69
- Al kabir	Sharbit	6.8	13	30	40	43
Sharbit	Al kabir	6.8	13	30	40	43
- Dmeir	Adra	14.3	0	0	10	10
Adra	Dmeir	14.3	0	0	10	10
- Adra	Douma	11.1	0	0	10	10
Douma	Adra	11.1	0	0	10	10
- Douma	Harasta	10.2	0	0	10	10
Harasta	Douma	10.2	0	0	10	10
- Harasta	Kaboun	2.2	0	0	10	10
Kaboun	Harasta	2.2	0	0	10	10
- Maarret Ikhwan	Ibrib	31.0	0	0	10	10
Ibrib	Maarret Ikhwan	31.0	0	0	10	10
- Darra	As Sweida	65.0	7	22	30	30
As Sweida	Darra	65.0	7	22	30	30

Appendix 8.2 Cross Section of Traffic Volume (Freight ton/day) (Up & Down)

Aleppo ～Damascus

Station 1	Station 2	Distance (km)	2005	2010	2015	2020	2005	2010	2015	2020	2005	2010	2015	2020
			Phosphate				Others				Total			
- Jubrin	Aleppo	18.5	0	0	0	0	243	503	1,024	1,939	243	503	1,024	1,939
Aleppo	Jubrin	0	0	0	0	0	493	1,021	2,077	3,934	493	1,021	2,077	3,934
- Aleppo	Ansari	7	0	0	0	0	755	1,498	3,299	6,164	755	1,498	3,299	6,164
Ansari	Aleppo	7	0	0	0	0	1,031	2,482	4,767	8,130	1,031	2,482	4,767	8,130
- Ansari	Wudehi	8	0	0	0	0	3,002	3,044	7,173	13,426	3,002	3,044	7,173	13,426
Wudehi	Ansari	8	0	0	0	0	4,643	6,105	13,054	23,748	4,643	6,105	13,054	23,748
- Wudehi	Hamidia	14.5	0	0	0	0	1,554	2,367	4,975	9,207	1,554	2,367	4,975	9,207
Hamidia	Wudehi	14.5	0	0	0	0	3,240	4,255	9,327	17,017	3,240	4,255	9,327	17,017
- Hamidia	Abu Dhour	30	0	0	0	0	1,597	2,474	5,223	9,685	1,597	2,474	5,223	9,685
Abu Dhour	Hamidia	30	0	0	0	0	3,197	4,153	9,089	16,548	3,197	4,153	9,089	16,548
- Abu Dhour	Sinjar	18	0	0	0	0	1,785	2,896	6,168	11,460	1,785	2,896	6,168	11,460
Sinjar	Abu Dhour	18	0	0	0	0	3,032	3,792	8,260	14,928	3,032	3,792	8,260	14,928
- Sinjar	Hamdania	22.4	0	0	0	0	1,786	2,900	6,218	11,562	1,786	2,900	6,218	11,562
Hamdania	Sinjar	22.4	0	0	0	0	3,031	3,790	8,210	14,830	3,031	3,790	8,210	14,830
- Hamdania	Qoumhana	27	0	0	0	0	1,925	3,197	6,871	12,821	1,925	3,197	6,871	12,821
Qoumhana	Hamdania	27	0	0	0	0	2,903	3,505	7,542	13,502	2,903	3,505	7,542	13,502
- Qoumhana	Hama	13	0	0	0	0	1,925	3,197	6,871	12,821	1,925	3,197	6,871	12,821
Hama	Qoumhana	13	0	0	0	0	2,903	3,505	7,542	13,502	2,903	3,505	7,542	13,502
- Hama	Kafar Buhom	11.3	0	0	0	0	1,773	2,989	6,435	11,997	1,773	2,989	6,435	11,997
Kafar Buhom	Hama	11.3	0	0	0	0	3,685	4,635	9,383	16,333	3,685	4,635	9,383	16,333
- Kafar Buhom	Har Bnafsi	13	0	0	0	0	1,775	3,001	6,458	12,040	1,775	3,001	6,458	12,040
Har Bnafsi	Kafar Buhom	13	0	0	0	0	3,683	4,631	9,369	16,311	3,683	4,631	9,369	16,311
- Har Bnafsi	Sneisel	17	0	0	0	0	1,775	3,001	6,458	12,040	1,775	3,001	6,458	12,040
Sneisel	Har Bnafsi	17	0	0	0	0	3,683	4,631	9,369	16,311	3,683	4,631	9,369	16,311
- Sneisel	Homs1	7.3	0	0	0	0	1,775	3,013	6,486	12,092	1,775	3,013	6,486	12,092
Homs1	Sneisel	7.3	0	0	0	0	3,682	4,630	9,369	16,306	3,682	4,630	9,369	16,306
- Homs1	Homs 2	1	0	0	0	0	0	0	0	0	0	0	0	0
Homs 2	Homs1	1	0	0	0	0	0	0	0	0	0	0	0	0
- Homs 2	Shinshar	14.2	0	0	0	0	4,266	9,352	17,362	29,299	4,266	9,352	17,362	29,299
Shinshar	Homs 2	14.2	5,688	6,922	8,421	10,011	1,074	3,617	6,742	11,963	6,762	10,539	15,163	21,974
- Shinshar	Khnefis	13.6	0	0	0	0	4,266	9,352	17,366	29,312	4,266	9,352	17,366	29,312
Khnefis	Shinshar	13.6	5,688	6,922	8,421	10,011	1,074	3,615	6,731	11,944	6,762	10,537	15,152	21,955
- Khnefis	Noamia	21.1	0	0	0	0	4,266	9,352	17,366	29,312	4,266	9,352	17,366	29,312
Noamia	Khnefis	21.1	5,688	6,922	8,421	10,011	1,074	3,615	6,731	11,944	6,762	10,537	15,152	21,955
- Noamia	Mhine	14.8	0	0	0	0	4,266	9,352	17,366	29,312	4,266	9,352	17,366	29,312
Mhine	Noamia	14.8	5,688	6,922	8,421	10,011	1,074	3,615	6,731	11,944	6,762	10,537	15,152	21,955
- Mhine	Bir Ghadir	22.8	0	0	0	0	4,222	7,780	14,662	24,939	4,222	7,780	14,662	24,939
Bir Ghadir	Mhine	22.8	0	0	0	0	973	2,729	6,174	12,085	973	2,729	6,174	12,085
- Bir Ghadir	Khanat	18.5	0	0	0	0	4,222	7,780	14,662	24,939	4,222	7,780	14,662	24,939
Khanat	Bir Ghadir	18.5	0	0	0	0	973	2,729	6,174	12,085	973	2,729	6,174	12,085
- Khanat	Ard Azzour	22.8	0	0	0	0	4,286	7,780	14,662	24,939	4,286	7,780	14,662	24,939
Ard Azzour	Khanat	22.8	0	0	0	0	781	2,729	6,174	12,085	781	2,729	6,174	12,085
- Ard Azzour	Dmeir	18	0	0	0	0	4,286	7,966	15,073	25,720	4,286	7,966	15,073	25,720
Dmeir	Ard Azzour	18	0	0	0	0	781	2,239	5,077	9,946	781	2,239	5,077	9,946
- Dmeir	Baharia	16.3	0	0	0	0	1,404	2,014	2,644	3,024	1,404	2,014	2,644	3,024
Baharia	Dmeir	16.3	0	0	0	0	296	807	1,541	2,028	296	807	1,541	2,028
- Baharia	Turkmania	15.5	0	0	0	0	1,404	2,014	2,644	3,026	1,404	2,014	2,644	3,026
Turkmania	Baharia	15.5	0	0	0	0	296	807	1,541	2,028	296	807	1,541	2,028
- Turkmania	Damascus (F)	16.7	0	0	0	0	1,404	2,014	2,644	3,026	1,404	2,014	2,644	3,026
Damascus (F)	Turkmania	16.7	0	0	0	0	296	807	1,541	2,028	296	807	1,541	2,028
- Damascus (F)	Damascus (p)	6.7	0	0	0	0	0	0	0	0	0	0	0	0
Damascus(P)	Damascus(F)	6.7	0	0	0	0	0	0	0	0	0	0	0	0

Aleppo ～Arrai・Midan Ekbas

Station 1	Station 2	Distance (km)	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020
			Phosphate				Others				Total			
- Muslimia	Aleppo	14	0	0	0	0	2,248	2,519	5,376	10,098	2,248	2,519	5,376	10,098
Aleppo	Muslimia	14	0	0	0	0	1,031	2,482	4,798	8,191	1,031	2,482	4,798	8,191
- Muslimia	Akhtarin	29.1	0	0	0	0	65	124	243	428	65	124	243	428
Akhtarin	Muslimia	29.1	0	0	0	0	442	968	2,181	4,196	442	968	2,181	4,196
- Akhtarin	Arrai	16.1	0	0	0	0	65	124	243	428	65	124	243	428
Arrai	Akhtarin	16.1	0	0	0	0	442	968	2,181	4,196	442	968	2,181	4,196
- Muslimia	Tel Rifaat	22.9	0	0	0	0	65	124	243	428	65	124	243	428
Tel Rifaat	Muslimia	22.9	0	0	0	0	442	968	2,181	4,196	442	968	2,181	4,196
- Tel Rifaat	Qatma	17	0	0	0	0	65	124	243	428	65	124	243	428
Qatma	Tel Rifaat	17	0	0	0	0	442	968	2,181	4,196	442	968	2,181	4,196
- Qatma	Afrin	17.7	0	0	0	0	65	124	243	428	65	124	243	428
Afrin	Qatma	17.7	0	0	0	0	442	968	2,181	4,196	442	968	2,181	4,196
- Afrin	Rajo	25.3	0	0	0	0	65	124	243	428	65	124	243	428
Rajo	Afrin	25.3	0	0	0	0	442	968	2,181	4,196	442	968	2,181	4,196
- Rajo	Midan Ekbas	19	0	0	0	0	65	124	243	428	65	124	243	428
Midan Ekbas	Rajo	19	0	0	0	0	442	968	2,181	4,196	442	968	2,181	4,196

Mhine～Tadmor～Die el Zor

Station 1	Station 2	Distance (km)	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020
			Phosphate				Others				Total			
- Mhine	Al-Rumeila	12	0	0	0	0	81	2,937	5,387	9,511	81	2,937	5,387	9,511
Al-Rumeila	Mhine	12	5,688	6,922	8,421	10,011	138	2,251	3,240	4,997	5,826	9,173	11,661	15,008
- Al-Rumeila	Al-Qariyatein	14	0	0	0	0	81	2,950	5,414	9,566	81	2,950	5,414	9,566
Al-Qariyatein	Al-Rumeila	14	5,688	6,922	8,421	10,011	103	2,181	3,091	4,720	5,791	9,103	11,512	14,731
- Al-Qariyatein	Al-Barida	22	0	0	0	0	81	2,950	5,414	9,566	81	2,950	5,414	9,566
Al-Barida	Al-Qariyatein	22	5,688	6,922	8,421	10,011	103	2,181	3,091	4,720	5,791	9,103	11,512	14,731
- Al-Barida	Al-Bsayra	19	0	0	0	0	81	2,950	5,414	9,566	81	2,950	5,414	9,566
Al-Bsayra	Al-Barida	19	5,688	6,922	8,421	10,011	103	2,181	3,091	4,720	5,791	9,103	11,512	14,731
- Al-Bsayra	Al-Fajwa	15	0	0	0	0	81	2,950	5,414	9,566	81	2,950	5,414	9,566
Al-Fajwa	Al-Bsayra	15	5,688	6,922	8,421	10,011	103	2,181	3,091	4,720	5,791	9,103	11,512	14,731
- Al-Fajwa	Al-Hamra	17	0	0	0	0	81	2,950	5,414	9,566	81	2,950	5,414	9,566
Al-Hamra	Al-Fajwa	17	3,888	5,122	6,621	8,211	103	2,181	3,091	4,720	3,991	7,303	9,712	12,931
- Al-Hamra	Al-Sharqia	12	0	0	0	0	81	2,950	5,414	9,566	81	2,950	5,414	9,566
Al-Sharqia	Al-Hamra	12	3,888	5,122	6,621	8,211	103	2,181	3,091	4,720	3,991	7,303	9,712	12,931
- Al-Sharqia	Abtar	11.4	0	0	0	0	0	3,043	5,596	9,912	0	3,043	5,596	9,912
Abtar	Al-Sharqia	11.4	0	0	0	0	0	2,037	2,789	4,163	0	2,037	2,789	4,163
- Abtar	Saqqar	19.3	0	0	0	0	0	3,043	5,596	9,912	0	3,043	5,596	9,912
Saqqar	Abtar	19.3	0	0	0	0	0	2,037	2,789	4,163	0	2,037	2,789	4,163
- Saqqar	Tadmor	14	0	0	0	0	0	3,043	5,596	9,912	0	3,043	5,596	9,912
Tadmor	Saqqar	14	0	0	0	0	0	2,037	2,789	4,163	0	2,037	2,789	4,163
- Tadomor	Arak	26.6	0	0	0	0	0	2,897	5,325	9,424	0	2,897	5,325	9,424
Arak	Tadomor	26.6	0	0	0	0	0	2,045	2,808	4,198	0	2,045	2,808	4,198
- Arak	As Sukne	44.5	0	0	0	0	0	2,897	5,325	9,424	0	2,897	5,325	9,424
As Sukne	Arak	44.5	0	0	0	0	0	2,045	2,808	4,198	0	2,045	2,808	4,198
- As Sukne	Judban	29.4	0	0	0	0	0	2,897	5,325	9,424	0	2,897	5,325	9,424
Judban	As Sukne	29.4	0	0	0	0	0	2,045	2,808	4,198	0	2,045	2,808	4,198
- Judban	Kabajeb	32.1	0	0	0	0	0	2,897	5,325	9,424	0	2,897	5,325	9,424
Kabajeb	Judban	32.1	0	0	0	0	0	2,045	2,808	4,198	0	2,045	2,808	4,198
- Kabajeb	Al Jaula	27.7	0	0	0	0	0	2,897	5,325	9,424	0	2,897	5,325	9,424
Al Jaula	Kabajeb	27.7	0	0	0	0	0	2,045	2,808	4,198	0	2,045	2,808	4,198
- Al Jaula	Deri ez Zor(P)	33.7	0	0	0	0	0	2,872	5,274	9,320	0	2,872	5,274	9,320
Deri ez Zor(P)	Al Jaula	33.7	0	0	0	0	0	2,052	2,825	4,249	0	2,052	2,825	4,249
- Deri ez Zor(P)	Deri ez Zor(F)		0	0	0	0	0	2,872	5,274	9,320	0	2,872	5,274	9,320
Deri ez Zor(F)	Deri ez Zor(P)		0	0	0	0	0	2,052	2,825	4,249	0	2,052	2,825	4,249

Homs～ Lattakia

Station 1	Station 2	Distance (km)	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020
			Phosphate				Others				Total			
- Homs Goods	Kharbettin	8	5,511	6,707	8,160	9,700	480	2,269	4,558	8,258	5,991	8,976	12,718	17,958
Kharbettin	Homs Goods	8	0	0	0	0	6,951	12,004	17,890	27,031	6,951	12,004	17,890	27,031
- Kharbettin	Al-Khansa	16	5,511	6,707	8,160	9,700	480	2,269	4,558	8,258	5,991	8,976	12,718	17,958
Al-Khansa	Kharbettin	16	0	0	0	0	6,951	12,004	17,890	27,031	6,951	12,004	17,890	27,031
- Al-Khansa	Umm Jaamah	15.7	5,511	6,707	8,160	9,700	480	2,269	4,558	8,258	5,991	8,976	12,718	17,958
Umm Jaamah	Al-Khansa	15.7	0	0	0	0	6,951	12,004	17,890	27,031	6,951	12,004	17,890	27,031
- Umm Jaamah	Tel Kalakh	13	5,511	6,707	8,160	9,700	480	2,269	4,558	8,258	5,991	8,976	12,718	17,958
Tel Kalakh	Umm Jaamah	13	0	0	0	0	6,951	12,004	17,890	27,031	6,951	12,004	17,890	27,031
- Tel Kalakh	Akkari	11	5,511	6,707	8,160	9,700	480	2,269	4,558	8,258	5,991	8,976	12,718	17,958
Akkari	Tel Kalakh	11	0	0	0	0	6,951	12,004	17,890	27,031	6,951	12,004	17,890	27,031
- Akkari	Samariyan	22	5,511	6,707	8,160	9,700	480	2,272	4,553	8,245	5,991	8,979	12,713	17,945
Samariyan	Akkari	22	0	0	0	0	6,951	11,995	17,871	26,988	6,951	11,995	17,871	26,988
- Samariyan	Tartous	21.3	5,511	6,707	8,160	9,700	480	2,272	4,553	8,245	5,991	8,979	12,713	17,945
Tartous	Samariyan	21.3	0	0	0	0	6,951	11,995	17,871	26,988	6,951	11,995	17,871	26,988
- Tartous	Roueisa	20.8	0	0	0	0	553	893	1,929	3,337	553	893	1,929	3,337
Roueisa	Tartous	20.8	0	0	0	0	173	463	1,030	2,055	173	463	1,030	2,055
- Roueisa	Marqia	13	0	0	0	0	553	893	1,929	3,337	553	893	1,929	3,337
Marqia	Roueisa	13	0	0	0	0	173	463	1,030	2,055	173	463	1,030	2,055
- Marqia	Baniyas	17.3	0	0	0	0	553	893	1,929	3,337	553	893	1,929	3,337
Baniyas	Marqia	17.3	0	0	0	0	173	463	1,030	2,055	173	463	1,030	2,055
- Baniyas	El-Sin	8.4	0	0	0	0	554	895	1,921	3,335	554	895	1,921	3,335
El-Sin	Baniyas	8.4	0	0	0	0	173	460	1,023	2,041	173	460	1,023	2,041
- El-Sin	Jabla	13.4	0	0	0	0	554	895	1,921	3,335	554	895	1,921	3,335
Jabla	El-Sin	13.4	0	0	0	0	173	460	1,023	2,041	173	460	1,023	2,041
- Jabla	Sharbit	29	0	0	0	0	585	956	2,055	3,587	585	956	2,055	3,587
Sharbit	Jabla	29	0	0	0	0	156	409	921	1,853	156	409	921	1,853
- Sharbit	Lattakia (F)	2.5	0	0	0	0	585	956	2,055	3,587	585	956	2,055	3,587
Lattakia (F)	Sharbit	2.5	0	0	0	0	156	406	921	1,853	156	406	921	1,853

Wudehi～Lattakia

Station 1	Station 2	Distance (km)	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020
			Phosphate				Others				Total			
- Wudehi	Kafar Halab	24.6	0	0	0	0	1,448	1,823	2,198	4,219	1,448	1,823	2,198	4,219
Kafar Halab	Wudehi	24.6	0	0	0	0	1,394	1,850	3,727	6,731	1,394	1,850	3,727	6,731
- Kafar Halab	Maarret Ikhwa	18.6	0	0	0	0	1,454	1,836	2,218	4,258	1,454	1,836	2,218	4,258
Maarret Ikhwan	Kafar Halab	18.6	0	0	0	0	1,383	1,818	3,664	6,606	1,383	1,818	3,664	6,606
- Maarret Ikhwan	Bishmaroun	20	0	0	0	0	1,459	1,871	2,283	4,377	1,459	1,871	2,283	4,377
Bishmaroun	Maarret Ikhwa	20	0	0	0	0	1,375	1,791	3,376	6,056	1,375	1,791	3,376	6,056
- Bishmaroun	Mhambel	21.5	0	0	0	0	1,407	1,281	1,154	2,165	1,407	1,281	1,154	2,165
Mhambel	Bishmaroun	21.5	0	0	0	0	1,501	2,000	4,236	7,492	1,501	2,000	4,236	7,492
- Mhambel	Frika	15.4	0	0	0	0	1,407	1,285	1,162	2,182	1,407	1,285	1,162	2,182
Frika	Mhambel	15.4	0	0	0	0	1,500	1,995	4,191	7,395	1,500	1,995	4,191	7,395
- Frika	Jisr Elshogour	10	0	0	0	0	1,407	1,285	1,162	2,182	1,407	1,285	1,162	2,182
Jisr Elshogour	Frika	10	0	0	0	0	1,500	1,995	4,191	7,395	1,500	1,995	4,191	7,395
- Jisr Elshogour	Budama	15	0	0	0	0	1,462	1,447	1,431	2,685	1,462	1,447	1,431	2,685
Budama	Jisr Elshogour	15	0	0	0	0	1,448	1,869	3,904	6,844	1,448	1,869	3,904	6,844
- Budama	Bibar	11	0	0	0	0	1,462	1,447	1,431	2,685	1,462	1,447	1,431	2,685
Bibar	Budama	11	0	0	0	0	1,448	1,869	3,904	6,844	1,448	1,869	3,904	6,844
- Bibar	Sheikhana	8.3	0	0	0	0	1,462	1,447	1,431	2,685	1,462	1,447	1,431	2,685
Sheikhana	Bibar	8.3	0	0	0	0	1,448	1,869	3,904	6,844	1,448	1,869	3,904	6,844
- Sheikhana	As-Safkoun	14	0	0	0	0	1,568	1,818	2,068	4,005	1,568	1,818	2,068	4,005
As-Safkoun	Sheikhana	14	0	0	0	0	1,308	1,521	3,078	5,116	1,308	1,521	3,078	5,116
- As-Safkoun	Al-Kabir	15.4	0	0	0	0	1,568	1,818	2,068	4,005	1,568	1,818	2,068	4,005
Al-Kabir	As-Safkoun	15.4	0	0	0	0	1,308	1,521	3,078	5,116	1,308	1,521	3,078	5,116
Al-Kabir	Sharbit	6.8	0	0	0	0	1,568	1,818	2,068	4,005	1,568	1,818	2,068	4,005
Sharbit	Al-Kabir	6.8	0	0	0	0	1,308	1,521	3,078	5,116	1,308	1,521	3,078	5,116

Jubrin～Al Yalobie

Station 1	Station 2	Distance (km)	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020
			Phosphate				Others				Total			
- Ansari	Jubrin	17.5	0	0	0	0	3,203	2,642	8,087	15,212	3,203	2,642	8,087	15,212
Jubrin	Ansari	17.5	0	0	0	0	2,326	1,546	2,717	5,398	2,326	1,546	2,717	5,398
- Jubrin	Tel Blat	9	0	0	0	0	2,422	2,464	5,210	10,576	2,422	2,464	5,210	10,576
Tel Blat	Jubrin	9	0	0	0	0	2,244	1,182	2,121	3,761	2,244	1,182	2,121	3,761
- Tel Blat	Sheikh Ahmad	18	0	0	0	0	2,425	2,472	5,021	9,590	2,425	2,472	5,021	9,590
Sheikh Ahmad	Tel Blat	18	0	0	0	0	2,214	1,269	2,183	3,788	2,214	1,269	2,183	3,788
- Sheikh Ahmad	Fodda	29	0	0	0	0	2,425	2,472	5,021	9,590	2,425	2,472	5,021	9,590
Fodda	Sheikh Ahmad	29	0	0	0	0	2,214	1,269	2,183	3,788	2,214	1,269	2,183	3,788
- Fodda	Hassan	16	0	0	0	0	2,425	2,472	5,021	9,590	2,425	2,472	5,021	9,590
Hassan	Fodda	16	0	0	0	0	2,214	1,269	2,183	3,788	2,214	1,269	2,183	3,788
- Hassan	Qadissiya	27	0	0	0	0	2,425	2,472	5,021	9,590	2,425	2,472	5,021	9,590
Qadissiya	Hassan	27	0	0	0	0	2,214	1,269	2,183	3,788	2,214	1,269	2,183	3,788
- Qadissiya	Abu Asi	13	0	0	0	0	2,425	2,472	5,021	9,590	2,425	2,472	5,021	9,590
Abu Asi	Qadissiya	13	0	0	0	0	2,214	1,267	2,183	3,788	2,214	1,267	2,183	3,788
- Abu Asi	Al-Grin	17.6	0	0	0	0	2,425	2,472	5,021	9,590	2,425	2,472	5,021	9,590
Al-Grin	Abu Asi	17.6	0	0	0	0	2,214	1,267	2,183	3,788	2,214	1,267	2,183	3,788
- Al-Grin	Hneida	16	0	0	0	0	2,278	2,216	4,506	8,617	2,278	2,216	4,506	8,617
Hneida	Al-Grin	16	0	0	0	0	2,216	1,274	2,189	3,808	2,216	1,274	2,189	3,808
- Hneida	Kdeiran	12	0	0	0	0	2,278	2,216	4,506	8,617	2,278	2,216	4,506	8,617
Kdeiran	Hneida	12	0	0	0	0	2,216	1,274	2,189	3,808	2,216	1,274	2,189	3,808
- Kdeiran	Salhabiya	16	0	0	0	0	2,278	2,216	4,506	8,617	2,278	2,216	4,506	8,617
Salhabiya	Kdeiran	16	0	0	0	0	2,216	1,274	2,189	3,808	2,216	1,274	2,189	3,808
- Salhabiya	Raqqa	14	0	0	0	0	2,278	2,216	4,506	8,617	2,278	2,216	4,506	8,617
Raqqa	Salhabiya	14	0	0	0	0	2,216	1,274	2,189	3,808	2,216	1,274	2,189	3,808
- Raqqa	Al-Karama	24.1	0	0	0	0	1,811	1,417	2,934	5,725	1,811	1,417	2,934	5,725
Al-Karama	Raqqa	24.1	0	0	0	0	2,024	956	1,581	2,724	2,024	956	1,581	2,724
- Al-Karama	Judaida	16	0	0	0	0	1,811	1,417	2,934	5,725	1,811	1,417	2,934	5,725
Judaida	Al-Karama	16	0	0	0	0	2,024	956	1,581	2,724	2,024	956	1,581	2,724
- Judaida	Milaj	28	0	0	0	0	1,782	1,371	2,828	5,533	1,782	1,371	2,828	5,533
Milaj	Judaida	28	0	0	0	0	2,025	962	1,602	2,779	2,025	962	1,602	2,779
- Milaj	Zalabiya	16	0	0	0	0	1,782	1,371	2,828	5,533	1,782	1,371	2,828	5,533
Zalabiya	Milaj	16	0	0	0	0	2,025	962	1,602	2,779	2,025	962	1,602	2,779
- Zalabiya	Al-Kasra	15	0	0	0	0	1,782	1,371	2,828	5,533	1,782	1,371	2,828	5,533
Al-Kasra	Zalabiya	15	0	0	0	0	2,025	962	1,602	2,779	2,025	962	1,602	2,779
- Al-Kasra	Muheimida	18	0	0	0	0	1,782	1,371	2,828	5,533	1,782	1,371	2,828	5,533
Muheimida	Al-Kasra	18	0	0	0	0	2,025	962	1,602	2,779	2,025	962	1,602	2,779
- Muheimida	Deir ez-Zor (F)	11	0	0	0	0	1,782	1,371	2,828	5,533	1,782	1,371	2,828	5,533
Deir ez-Zor (F)	Muheimida	11	0	0	0	0	2,025	962	1,602	2,779	2,025	962	1,602	2,779
- Deir ez-Zor (F)	Deir ez-Zor (P)	6	0	0	0	0	0	0	0	0	0	0	0	0
Deir ez-Zor (P)	Deir ez-Zor (F	6	0	0	0	0	0	0	0	0	0	0	0	0
- Deir ez-Zor (F)	Al-Jazira	19	0	0	0	0	1,051	2,380	4,452	8,027	1,051	2,380	4,452	8,027
Al-Jazira	Deir ez-Zor (F)	19	0	0	0	0	532	1,166	2,071	3,600	532	1,166	2,071	3,600
- Al-Jazira	Bir Juwaief	28.1	0	0	0	0	1,051	2,380	4,452	8,044	1,051	2,380	4,452	8,044
Bir Juwaief	Al-Jazira	28.1	0	0	0	0	532	1,166	2,071	3,747	532	1,166	2,071	3,747
- Bir Juwaief	Abu Fas	23	0	0	0	0	1,051	2,380	4,452	8,044	1,051	2,380	4,452	8,044
Abu Fas	Bir Juwaief	23	0	0	0	0	532	1,166	2,071	3,747	532	1,166	2,071	3,747
- Abu Fas	Rumeilan	19.2	0	0	0	0	1,051	2,380	4,452	8,044	1,051	2,380	4,452	8,044
Rumeilan	Abu Fas	19.2	0	0	0	0	532	1,166	2,071	3,747	532	1,166	2,071	3,747
- Rumeilan	Sabah al-Kheir	25	0	0	0	0	1,051	2,380	4,452	8,044	1,051	2,380	4,452	8,044
Sabah al-Kheir	Rumeilan	25	0	0	0	0	532	1,166	2,071	3,747	532	1,166	2,071	3,747
- Sabah al-Kheir	Hassaka	22	0	0	0	0	1,051	2,380	4,452	8,044	1,051	2,380	4,452	8,044
Hassaka	Sabah al-Kheir	22	0	0	0	0	532	1,166	2,071	3,747	532	1,166	2,071	3,747
- Hassaka	Siha	17	0	0	0	0	519	1,205	2,127	3,803	519	1,205	2,127	3,803
Siha	Hassaka	17	0	0	0	0	510	1,102	1,937	3,478	510	1,102	1,937	3,478
- Siha	Kabaka	23	0	0	0	0	519	1,205	2,127	3,803	519	1,205	2,127	3,803
Kabaka	Siha	23	0	0	0	0	510	1,102	1,937	3,478	510	1,102	1,937	3,478
- Kabaka	Sbate	21	0	0	0	0	519	1,205	2,127	3,803	519	1,205	2,127	3,803
Sbate	Kabaka	21	0	0	0	0	510	1,102	1,937	3,478	510	1,102	1,937	3,478
- Sbate	New Qamishli	17	0	0	0	0	519	1,205	2,127	3,803	519	1,205	2,127	3,803
New Qamishli	Sbate	17	0	0	0	0	510	1,102	1,937	3,478	510	1,102	1,937	3,478
- New Qamishli	Qahtaniyya	28.3	0	0	0	0	59	131	252	483	59	131	252	483
Qahtaniyya	New Qamishli	28.3	0	0	0	0	60	153	311	592	60	153	311	592
- Old Qamishli	Qahtaniyya	25.2	0	0	0	0	47	116	231	430	47	116	231	430
Qahtaniyya	Old Qamishli	25.2	0	0	0	0	22	26	30	37	22	26	30	37
- Qahtaniyya	Tel Alo	21	0	0	0	0	10	11	21	30	10	11	21	30
Tel Alo	Qahtaniyya	21	0	0	0	0	13	37	80	162	13	37	80	162
- Tel Alo	Al-Yaroubiye	30	0	0	0	0	10	11	21	30	10	11	21	30
Al-Yaroubiye	Tel Alo	30	0	0	0	0	13	37	80	163	13	37	80	163

Damascus〜Daraa

Station 1	Station 2	Distance (km)	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020
			Phosphate				Others				Total			
- Damascus (F)	Alkesweh	13	0	0	0	0	0	0	8,811	15,492	0	0	8,811	15,492
Alkesweh	Damascus (F)	13	0	0	0	0	0	0	1,331	2,606	0	0	1,331	2,606
- Alkesweh	Ghbagheb	18.2	0	0	0	0	0	0	4,003	7,178	0	0	4,003	7,178
Ghbagheb	Alkesweh	18.2	0	0	0	0	0	0	751	1,402	0	0	751	1,402
- Ghbagheb	Sanamein	12	0	0	0	0	0	0	4,005	7,180	0	0	4,005	7,180
Sanamein	Ghbagheb	12	0	0	0	0	0	0	731	1,358	0	0	731	1,358
- Sanamein	Mahaje	13.2	0	0	0	0	0	0	3,619	6,490	0	0	3,619	6,490
Mahaje	Sanamein	13.2	0	0	0	0	0	0	728	1,349	0	0	728	1,349
- Mahaje	Sheikh Meskin	15.5	0	0	0	0	0	0	3,345	5,992	0	0	3,345	5,992
Sheikh Meskin	Mahaje	15.5	0	0	0	0	0	0	683	1,252	0	0	683	1,252
- Sheikh Meskin	Dael	15.5	0	0	0	0	0	0	3,342	5,987	0	0	3,342	5,987
Dael	Sheikh Meskin	15.5	0	0	0	0	0	0	639	1,164	0	0	639	1,164
- Dael	Daraa	9.5	0	0	0	0	0	0	2,892	5,153	0	0	2,892	5,153
Daraa	Dael	9.5	0	0	0	0	0	0	590	1,070	0	0	590	1,070

Deir el Zor (Frieght)-Al Bukamal

Station 1	Station 2	Distance (km)	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020
			Phosphate				Others				Total			
- Deir el-Zor (F)	Al-Tabiye	21	0	0	0	0	197	563	1,119	2,172	197	563	1,119	2,172
Al-Tabiye	Deir el-Zor (F)	21	0	0	0	0	1,421	1,561	1,707	2,042	1,421	1,561	1,707	2,042
- Al-Tabiye	Al-Mayadin	25	0	0	0	0	197	563	1,119	2,172	197	563	1,119	2,172
Al-Mayadin	Al-Tabiye	25	0	0	0	0	63	483	921	1,926	63	483	921	1,926
- Al-Mayadin	Ghranij	25	0	0	0	0	104	305	598	1,166	104	305	598	1,166
Ghranij	Al-Mayadin	25	0	0	0	0	63	100	233	489	63	100	233	489
- Ghranij	Al-Bahra	24	0	0	0	0	101	296	583	1,138	101	296	583	1,138
Al-Bahra	Ghranij	24	0	0	0	0	63	90	171	365	63	90	171	365
- Al-Bahra	Al-Maslakha	24.4	0	0	0	0	100	288	570	1,110	100	288	570	1,110
Al-Maslakha	Al-Bahra	24.4	0	0	0	0	63	80	117	242	63	80	117	242
- Al-Maslakha	Al-Bukamal	20	0	0	0	0	98	279	557	1,080	98	279	557	1,080
Al-Bukamal	Al-Maslakha	20	0	0	0	0	63	80	100	200	63	80	100	200

Others

Station 1	Station 2	Distance (km)	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020	2,005	2,010	2,015	2,020
			Phosphate				Others				Total			
- Homs Goods	Qattineh	6.7	177	215	261	311	78	166	305	811	255	381	566	1,122
Qattineh	Homs Goods	6.7	0	0	0	0	65	141	249	702	65	141	249	702
- Qattineh	Arqusair	17	0	0	0	0	55	112	214	467	55	112	214	467
Arqusair	Qattineh	17	0	0	0	0	0	0	0	0	0	0	0	0
- Kharbettin	Homs1	11.3	0	0	0	0	0	0	0	0	0	0	0	0
Homs1	Kharbettin	11.3	0	0	0	0	0	0	0	0	0	0	0	0
- Deir ez Zor(P)	Al-Jazira	18.9	0	0	0	0	0	0	0	0	0	0	0	0
Al-Jazira	Deir ez Zor(P)	18.9	0	0	0	0	0	0	0	0	0	0	0	0
- Al kabir	Sharbit	6.8	0	0	0	0	0	0	2,068	4,710	0	0	2,068	4,710
Sharbit	Al kabir	6.8	0	0	0	0	0	0	3,078	8,634	0	0	3,078	8,634
- Dmeir	Adra	14.3	0	0	0	0	2,882	5,952	12,431	22,694	2,882	5,952	12,431	22,694
Adra	Dmeir	14.3	0	0	0	0	485	1,432	3,536	7,918	485	1,432	3,536	7,918
- Adra	Douma	11.1	0	0	0	0	2,882	5,952	12,431	22,694	2,882	5,952	12,431	22,694
Douma	Adra	11.1	0	0	0	0	485	1,432	3,536	7,918	485	1,432	3,536	7,918
- Douma	Harasta	10.2	0	0	0	0	2,882	5,952	12,431	22,694	2,882	5,952	12,431	22,694
Harasta	Douma	10.2	0	0	0	0	485	1,432	3,536	7,918	485	1,432	3,536	7,918
- Harasta	Kaboun	2.2	0	0	0	0	2,882	5,952	12,431	22,694	2,882	5,952	12,431	22,694
Kaboun	Harasta	2.2	0	0	0	0	485	1,432	3,536	7,918	485	1,432	3,536	7,918
- Maarret Ikhwan	Ibrib	31	0	0	0	0	1	1	31	108	1	1	31	108
Ibrib	Maarret Ikhwa	31	0	0	0	0	13	39	331	952	13	39	331	952
- Darra	As Sweida	65	0	0	0	0	0	0	0	90	0	0	0	90
As Sweida	Darra	65	0	0	0	0	0	0	0	326	0	0	0	326
- New Port	Tartous	4.1	0	0	0	0	1,821	3,657	5,577	14,524	1,821	3,657	5,577	14,524
Tartous	New Port	4.1	5,551	6,707	8,160	9,700	2,637	4,662	7,613	10,940	8,188	11,369	15,773	20,640
- Lattaki Sea port	Lattakia F	5.9	0	0	0	0	1,376	1,612	2,860	8,178	1,376	1,612	2,860	8,178
LattakiaF	Lattaki Sea por	5.9	0	0	0	0	1,234	224	427	688	1,234	224	427	688
- Al Grin	Al Sadaqa	4.3	0	0	0	0	153	277	549	1,307	153	277	549	1,307
Al Sadaqa	Al Grin	4.3	0	0	0	0	4	14	28	122	4	14	28	122
- Tel blat	Rodwania	5.5	0	0	0	0	100	100	310	1,134	100	100	310	1,134
Rodwania	Tel blat	5.5	0	0	0	0	0	0	0	0	0	0	0	0
- Ansari	Arabia	0.8	0	0	0	0	0	0	0	0	0	0	0	0
Arabia	Ansari	0.8	0	0	0	0	0	0	0	0	0	0	0	0
- Muslimia	Eskan	3.1	0	0	0	0	0	0	0	0	0	0	0	0
Eskan	Muslimia	3.1	0	0	0	0	0	0	0	34	0	0	0	34
- Dmeir	Tishreen	24.6	0	0	0	0	160	160	1,054	1,798	160	160	1,054	1,798
Tishreen	Dmeir	24.6	0	0	0	0	2	12	35	90	2	12	35	90
- Muslimia	Industrial Area	8.4	0	0	0	0	0	0	0	0	0	0	0	0
Industrial Area	Muslimia	8.4	0	0	0	0	0	64	163	365	0	64	163	365

Appendix 9

Appendix 9.1 Rolling stock plan of year wise and type wise

Appendix 9.2 Periodical inspection place of rolling stock

Appendix 9.3 Maintenance/repair machines and test equipments

Appendix 9.4 Detailed cost of necessary amount of cost for workshop and depot

Appendix 9.1 Rolling stock plan of year wise and type wise

Basic points of increase plan of rolling stock

1. Locomotives are used for freight trains, night trains mainly in the domestic transportation and international passenger trains.
2. For performing the frequent service of domestic passenger transportation, DC trains composed of 1-8 cars are operated.
3. Some DCs have the driving cab at the both end or one side. Types of DCs are 1st class and 2nd class.
4. Passenger trains for domestic night or international operation are composed of 4-5 numbers of ACM and sleeping car, 3-4 numbers of AM or AP, 1 (one) of WR and 1 (one) of DPOST type.
5. Running kms per day and spares rate of rolling stock are shown as the followings :

Type	Running kms per day	Spares rate	Type	Running kms per day	Spare rate
Locomotive	450 km	20 %	Passenger coach	400 km	50% (2005, 2010) 30% (2015, 2020)
Diesel car	500 km	20 %	Freight wagon	—	20 %

6. Service lifes of existing passenger coaches like the ACM, Sleeping car, AM, AP and WR etc. decided during 30 years. But service lifes of in the future purchased passenger coaches like the ACM, Sleeping car, AM, AP and WR etc. decided during 50 years.
7. Increase plan of rolling stock

(1) Locomotive

① For passenger trains and freight trains

Form	Number of rolling stock on the books in June, 2000.	2005 year Books number	2010 year Books number	2015 year Books number	2020 year Books number
LDE2800 (O)	29	0	0	0	0
LDE2800 (N)	77	32	32	32	32
LDE1800	26	0	0	0	0
LDE3200	-	30	30	30	30
LDE3500	-	20	20	20	20
LDE3500	-	-	33	33	33
LDE3500	-	-	-	70	70
LDE3500	-	-	-	-	100
Sub total	132	82	115	185	285
Introduced new cars	-	50	33	70	100

② Shunting work

Form	Number of rolling stock on the books in June, 2000.	2005 year Books number	2010 year Books number	2015 year Books number	2020 year Books number
LDE1500	25	25	25	0	0
LDE1200	11	6	6	6	0
LDE2800 (O)	0	15	15	0	0
New (LS1)	-	-	-	30	30
New (LS2)	-	-	-	-	6
Sub total	36	46	46	36	36
Introduced new cars	-	0	0	30	6
UNILOK	6	26	26	26	26

③ Locomotive increase numbers plan

Type	2005 year	2010 year	2015 year	2020 year	Total
Main line	50	33	70	100	253
Shunting	0	0	30	6	36
Total	50	33	100	106	289

(2) Diesel car

Form	Number of rolling stock on the books in June, 2000.	2005 year Books number	2010 year Books number	2015 year Books number	2020 year Books number
All form	0	55	55	55	55
New (D1)	-	-	30	30	30
New (D2)	-	-	-	110	110
New (D3)	-	-	-	-	95
Total	0	55	85	195	290
Introduced new cars	-	55	30	110	95

(2) Passenger coach

① Sleeping car

Form	Number of rolling stock on the books in June, 2000.	2005 year Books number	2010 year Books number	2015 year Books number	2020 year Books number
ACM	10	10	0	0	0
Sleeping car	44	44	44	0	0
New (PS1)	-	3	3	3	3
New (PS2)	-	-	4	4	4
New (PS3)	-	-	-	49	49
Sub total	54	57	51	56	56
Introduced new cars	-	3	4	49	0

② 1 st class

Form	Number of rolling stock on the books in June, 2000.	2005 year Books number	2010 year Books number	2015 year Books number	2020 year Books number
AM	5	5	0	0	0
AP	96	96	96	0	0
New (PA1)	-	-	-	56	56
Sub total	101	101	96	56	56
Introduced new cars	-	0	0	56	0

③ 2 nd class

Form	Number of rolling stock on the books in June, 2000.	2005 year Books number	2010 year Books number	2015 year Books number	2020 year Books number
BM	10	10	0	0	0
BHM	49	49	0	0	0
BH	80	80	80	0	0
Sub total	139	139	80	0	0
Introduced new car	-	0	0	0	0

④ Restaurant

Form	Number of rolling stock on the books in June, 2000.	2005 year Books number	2010 year Books number	2015 year Books number	2020 year Books number
WR	19	19	19	0	0
New (PW1)	-	-	-	14	14
Sub total	19	19	19	14	14
Introduced new cars	-	0	0	14	0

⑤ Luggage

Form	Number of rolling stock on the books in June, 2000.	2005 year Books number	2010 year Books number	2015 year Books number	2020 year Books number
DPEM	15	15	15	15	15
DPOST	8	8	8	8	8
Sub total	23	23	23	23	23
Introduced new car	-	0	0	0	0

⑥ Passenger coach increase numbers plan

Type	2005 year	2010 year	2015 year	2020 year	Total
Sleeping	3	4	49	0	56
1 st	0	0	56	0	56
2 nd	0	0	0	0	0
WR	0	0	14	0	14
DPOST	0	0	0	0	0
Total	3	4	119	0	126

(4) Freight wagon

① Petroleum

Form	Number of rolling stock on the books in June, 2000.	2005 year Books number	2010 year Books number	2015 year Books number	2020 year Books number
Existing	931	931	888	888	770
New (FP1)	-	-	482	482	482
New (FP2)	-	-	-	600	600
New (FP3)	-	-	-	-	1,428
Sub total	931	931	1,370	1,970	3,280
Introduced new cars	-	-	482	600	1,428

② Cement (B)

Form	Number of rolling stock on the books in June, 2000.	2005 year Books number	2010 year Books number	2015 year Books number	2020 year Books number
Existing	90	90	90	90	80
New (FB1)	-	10	10	10	10
New (FB2)	-	-	50	50	50
New (FB3)	-	-	-	60	60
New (FB4)	-	-	-	-	160
Sub total	90	100	150	210	360
Introduced new cars	-	10	50	60	160

③ Phosphate

Form	Number of rolling stock on the books in June, 2000.	2005 year Books number	2010 year Books number	2015 year Books number	2020 year Books number
Existing	323	323	323	323	323
Sub total	323	323	323	323	323
Introduced new car	-	-	-	-	-

④ Cereal

Form	Number of rolling stock on the books in June, 2000.	2005 year Books number	2010 year Books number	2015 year Books number	2020 year Books number
Existing	597	597	597	597	597
New (FC1)	-	123	123	123	123
New (FC2)	-	-	360	360	360
New (FC3)	-	-	-	470	470
New (FC4)	-	-	-	-	1,030
Sub total	597	720	1,080	1,550	2,580
Introduced new cars	-	123	360	470	1,030

⑤ Another

Form	Number of rolling stock on the books in June, 2000.	2005 year Books number	2010 year Books number	2015 year Books number	2020 year Books number
Existing	3,119	3,039	2,950	2,950	2,950
New (FA1)	-	-	1,690	1,690	1,690
New (FA2)	-	-	-	2,170	2,170
New (FA3)	-	-	-	-	4,710
Sub total	3,119	3,039	4,640	6,810	11,520
Introduced new cars	-	-	1,690	2,170	4,710

⑥ Freight wagon increase numbers plan

Type	2005 year	2010 year	2015 year	2020 year	Total
Petroleum	-	482	600	1,428	2,510
Cement	10	50	60	160	280
Phosphate	0	0	0	0	0
Cereal	123	360	470	1,030	1,983
Another	-	1,690	2,170	4,710	8,570
Total	133	2,582	3,300	7,328	13,343

Appendix 9.2 Periodical inspection place of rolling stock

1. Locomotive

Name	M1	M2	M3	M4	M5	M6
Workshop	-	-	-	-	○	○
Lattakia dep.	○	○	○	○	-	-
Damascas dep.	○	○	○	○	-	-
Tartous dep.	○	○	○	○	-	-
Zeri-Zor dep.	○	○	○	○	-	-
Qamishli dep.	○	○	○	○	-	-
Aleppo dep.	○	○	○	○	-	-
Homs dep.	○	○	○	○	-	-

2. Diesel car

Name	D1	D2	D3	D4	D5	D6
Workshop	-	-	-	-	○	○
Lattakia dep.	○	○	○	○	-	-
Damascas dep.	○	○	○	○	-	-
Tartous dep.	○	○	○	○	-	-
Zeri-Zor dep.	○	○	○	○	-	-
Qamishli dep.	○	○	○	○	-	-
Aleppo dep.	○	○	○	○	-	-
Homs dep.	○	○	○	○	-	-

3. Passenger coach and Freight wagon

Name	Passenger coach	Freight wagon
Workshop	○	○
Jubrin dep.	×	○
Aleppo dep.	○	○
Hama dep.	○	○
Homs dep.	○	○
Damascas dep.	○	○
Raqqa dep.	○	○
Zeriel-Zor dep.	○	○
Hassaka dep.	○	○
Qamishili dep.	○	○
Lattakia dep.	○	○
Tartous dep.	○	○
Midan Ekbas dep.	○	○

Appendix 9.3 Maintenance/repair machines and test equipments

Shop name	Machine name
Draw out the oil and water shop	1. Oil collection equipment
Body lifting, lowering, repair shop	1. EOT crane 2. Support 3. Dummy bogie 4. Height working scaffold 5. Under frame equipment mounting and dismounting equipment 6. Dielectric strength tester
Bogie repair shop	1. EOT crane 2. Washing equipment 3. Painting equipment 4. Support
Foundation brake, bogie parts repair shop	1. Shot blasting machine 2. Magnetic flow detector 3. Oil press 4. Spring test machine 5. Oil damper test machine 6. Washing machine
Traction motor, main generator, rotating device repair shop, etc.	1. EOT crane 2. Air blow dust collecting equipment 3. Commutator correction machine 4. Commutator grooving machine 5. Rotating testing machine 6. Oven 7. Impregnation equipment 8. Compressor testing machine
Wheel repair shop, Machine-processing shop	1. EOT crane 2. Wheel lathe 3. Ultrasonic flaw detector 4. Magnetic flaw detector 5. Reduction devise testing equipment 6. Wheel fitting press 7. Induction heater 8. Bending machine 9. Lathe 10. Vertical lathe 11. Milling machine
Axle box, bearing repair shop	1. Washing machine
Engine, converter repair shop	1. EOT crane 2. Magnetic flaw detector 3. Support 4. Cylinder head testing machine 5. Valve grinding machine 6. Governor testing machine 7. Injection pump testing machine 8. Painting equipment
Engine cooling device repair shop	1. Radiator, oil cooler washing testing equipment

Shop name	Machine name
Engine performance test shop	1. EOT crane 2. Engine performance testing equipment 3. Exhaust equipment
Battery repair shop	1. Charging-discharging equipment
Brake parts repair shop	1. Each brake parts testing equipment 2. Buffing machine 3. Lapping machine
Electric parts repair shop	1. Each electric parts testing equipment
Foundry shop	1. EOT crane 2. Melting furnace 3. Molding machine 4. Mixing machine
Metal shop	1. Furnace 2. Built up machine 3. Metal cutting machine
Forge shop	1. Furnace 2. Air hammer
Air conditioning repair shop	1. Vacuum exhauster 2. Refrigerant gas draw out device 3. Air conditioning testing machine
Compressor Room	1. Middle-high pressure compressor
Body painting shop	1. Painting scaffold 2. Painting device 3. Exhaust equipment
Locomotive performance test shop	1. Soft water equipment 2. Water, oil supply equipment 3. Locomotive performance testing equipment 4. EOT crane 5. Exhaust equipment
Performance test, final adjustment shop	1. Soft water equipment 2. Water, oil supply equipment 3. Roof top equipment inspection scaffold 4. Charging device 5. Power supply device

Appendix 9.4 Detailed cost of necessary amount of cost for workshop and depot

(Unit : Million SP)

No.	Content	Detail	Q'ty	Amount of cost
1	Construction of locomotive & diesel car workshop	Buildings	1 set	2541.1
		Equipments	1 set	5910.4
		Total		8451.5
2	Change of locomotive depot	Buildings	1 set	700
		Equipments	1 set	300
		Total		1,000
3	Construction of passenger coach workshop	Buildings	1 set	2,500
		Equipments	1 set	1,100
		Total		3,600
4	Equipment of diesel car depot	Buildings	1 set	1,407
		Equipments	1 set	609
		Total		2,016
5	Construction of locomotive depot	Building	1 set	290
		Equipment	1 set	125
		Total		415
6	Modernization of freight wagon workshop	Buildings	1 set	1,640
		Equipments	1 set	710
		Total		2,350
7	Construction of freight wagon workshop	Buildings	1 set	3,220
		Equipments	1 set	1,380
		Total		4,600
8	Modernization of locomotive depot	Equipment	1 set	138
		Total		138

Appendix 10.1

Table of station

and

Signal Station & Double Tracking Plan

- Jubrin to Damascus
- Mhine to Deir el-Zor
- Homs to Tartous
- Jubrin to Deir el-Zor
- Deir el-Zor to Qamishli
- Jubrin－Lattakia－Tartous
- Jubrin to Midan Ekbas
- Qamishli to Al-Yaroubiye

Note: ?－Because of the track alignment,
signal station can not be installed.

Jubrin to Damascus						
Name of Station	km	Distance (St. to St.)	km	Distance (St. to St.)	State of Railway	Year of Improvement
Jubrin	0.000		0.000			
Aleppo	6.269	6.537	6.269	6.537	Double Tracking	2010
Ansari	12.806	7.507	12.806	7.507		
Wudehi	20.313	14.475	20.313	9.773		
Signal Station 1			30.086	4.702	New St.	2020
Hamidia	34.788	29.9	34.788	13.600		
Signal Station 2 (Tel Edjin)			48.388	8.200	New St.	2015
Signal Station 3			56.588	8.100	New St.	
Abu Dhour	64.688	18	64.688	7.600		
Signal Station 4 (Odja)			72.288	10.400	New St.	2020
Sinjar	82.688	22.37	82.688	9.500		
Signal Station 5 (Umm Erdjim)			92.188	12.870	New St.	2015
Hamdania	105.058	29.33	105.058	14.900		
Signal Station 6 (Kevkeb)			119.958	14.430	New St.	2015
Qoumhana	134.388	11.37	134.388	11.370		2020
Signal Station 7			?	?	Double Tracking	
Hama	145.758	11.302	145.758	11.302		
Signal Station 8			?	?		
Kafar Buhom	157.060	13.228	157.060	5.928		
Signal Station 9			162.988	7.300	New St.	2020
Har Bnafsi	170.288	16.517	170.288	12.000		
Signal Station 10			182.288	4.517	New St.	2020
Sneisel	186.805	15.35	186.805		Double Tracking	2010
Homs 1 (Passenger)	202.155	15.35				
Homs 2 (Freight)	201.108	14.179	201.108	14.179		
Signal Station 11			?	?	Doube Tracking	2015
Signal Station 12			?	?		
Shinshar	215.287	13.557	215.287	13.557		
Signal Station 13			?	?	Doube Tracking	2015
Signal Station 14			?	?		
Khnefis	228.844	21.1	228.844	4.100		
Signal Station 15			232.944	6.625	Double Tracking	2010
Signal Station 16			239.569	3.500		
Signal Station 17			243.069	6.875		
Noamia	249.944	14.837	249.944	8.200		
Signal Station 18			258.144	6.637	Double Tracking	2020
Signal Station 19			?	?		
Mhine	264.781	22.832	264.781	22.832		
Signal Station 20			?	?	Double Tracking	2010
Signal Station 21			?	?		
Bir Ghadir	287.613	18.457	287.613	5.820		
Signal Station 22			293.433	7.900	New St.	2010
Signal Station 23			301.333	4.737	New St.	
Khanat	306.070	14.918	306.070	4.150		
Signal Station 24			310.220	4.400	New St.	2015
Signal Station 25			314.620	6.368	New St.	
Jeroud	320.988	25.853	320.988	7.900		
Signal Station 26 (Ard-Elzor)			328.888	17.953	Double Tracking	2015
Signal Station 27			?	?		
Signal Station 28			?	?		
Dmeir	346.841	16.25	346.841	7.559		
Signal Station 29			354.400	8.691	Already D.T. & New St.	2020
Baharia	363.091	15.45	363.091	6.850		
Signal Station 30			369.941	8.600	New St.	2015
Turkmania	378.541	16.715	378.541	8.480		
Signal Station 31			387.021	8.235	New St.	2015
Damascus (Freight)	395.256	6.652	395.256	6.652		
Damascus (Pasnger)	401.908		401.908			

Mhine to Deir el-Zor						
Name of Station	km	Distance (St. to St.)	km	Distance (St. to St.)	State of Railway	Year of Improvement
Mhine	264.781	12.154	264.781	12.154		
Signal Station 32			?	?	D. Tracking	2010
Al-Rumeila	276.935	14.762	276.935	8.550		
Signal Station 33			285.485	6.212	New St.	2010
Al-Qariyatein	291.697	20.900	291.697	11.600		
Signal Station 34			303.297	9.300	New St.	2010
Al-Barida	312.597	18.721	312.597	8.186		
Signal Station 35			320.783	10.535	New St.	2015
Al-Bsayra	331.318	15.200	331.318	15.200		
Al-Fajwa	346.518	17.000	346.518	17.000		2010
Signal Station 36			?	?	D. Tracking	
Al-Hamra	363.518	12.000	363.518	12.000		
Signal Station 37			?	?	D. Tracking	
Al-Sharqia	375.518	11.363	375.518	11.363		
Construction New Line						
Abtar	386.881	19.3	386.881	19.300		
Saqqar	406.181	13.97	406.181	13.970		
Tadmor	420.151		420.151			
New Line Plan						
Tadmor	0.000	26.6	0.000	13.300		
Signal Station 59			13.300	13.300	St. Addition	2020
Arak	26.600	44.5	26.600	22.250		
Signal Station 60			48.850	22.250	St. Addition	2015
As-Sukhna	71.100	29.35	71.100	14.675		
Signal Station 61			85.775	14.675	St. Addition	2020
Judban	100.450	32.07	100.450	16.035		
Signal Station 62			116.485	16.035	St. Addition	2020
Kabajeb	132.520	37.7	132.520	18.850		
Signal Station 63			151.370	18.850	St. Addition	2020
Al-Jaula	170.220	23.68	170.220	11.840		
Signal Station 64			182.060	11.840	St. Addition	2020
Deir el-Zor West	193.900		193.900			
Deir el-Zor (Freight)						

Homs - Tartous						
Name of Station	km	Distance (St. to St.)	km	Distance (St. to St.)	State of Railway	Year of Improvement
Tartous	292.559	16.297	292.559	5.300		
Signal Station 38			297.859	6.400	New St.	2020
Signal Station 39			304.259	4.597	New St.	2020
Samariyan	308.856	21.660	308.856	7.680		
Signal Station 40			316.536	13.980	Double Tracking	2010
Signal Station 41			?	?		
Akkari	330.516	10.964	330.516	10.964		
Signal Station 42			?	?	Double Tracking	2015
Signal Station 43			?	?		
Tel Kalakh	341.480	12.782	341.480	8.382		
Signal Station 44			?	?	Double Tracking	2015
Signal Station 45			349.862	4.400		
Umm Jaamah	354.262	15.687	354.262	15.687		
Signal Station 46			?	?	Double Tracking	2010
Signal Station 47			?	?		
Al-Khansa	369.949	16.162	369.949	12.102		
Signal Station 48			?	?	Double Tracking	2015
Signal Station 49 (Hourbettine)			382.051	4.060		
Kharbettin	386.111	8.452	386.111	8.452		
Homs 1	394.563		394.563		Double Tracking	2010
Homs 2						

Jubrin to Deir el-Zor						
Name of Station	km	Distance (St. to St.)	km	Distance (St. to St.)	State of Railway	Year of Improvement
Jubrin	0.000	9.182	0.000	4.600		
Signal Station 50			4.600	4.582	New St.	2020
Tel Blat	9.182	18.350	9.182	9.175		
Signal Station 51			18.357	9.175	New St.	2020
Sheikh Ahmad	27.532	29.435	27.532	9.800		
Signal Station 52			37.332	9.800	New St.	
Signal Station 53			47.132	9.835	New St.	2020
Fodda	56.967	15.870	56.967	9.610		
Signal Station 54			66.577	6.260	New St.	2020
Hassan	72.837	26.584	72.837	8.900		
Signal Station 55			81.737	8.900	New St.	2015
Signal Station 56			90.637	8.784	New St.	2015
Qadissiya	99.421	13.009	99.421	13.009		
Abu Asi	112.430	10.049	112.430	10.049		
(Al-Grin)	122.479	7.541	122.479	7.541		
Al-Sadaqa	130.020	15.971	130.020	15.971		
Hneida	145.991	11.029	145.991	11.029		
Kdeiran	157.020	16.555	157.020	16.555	St. Signaling	2020
Salhabiya	173.575	13.540	173.575	13.540	St. Signaling	2020
Raqqa	187.115	24.114	187.115	24.114		
Al-Karama	211.229	17.700	211.229	17.700	St. Signaling	2020
Judaida	228.929	27.951	228.929	13.601		
Signal Station 57			242.530	14.35	New St.	2020
Milaj	256.880	15.956	256.880	15.956		
Zalabiya	272.836	14.985	272.836	14.985		
Al-Kasra	287.821	18.099	287.821	18.099	St. Signaling	2020
Muheimida	305.920	10.600	305.920	10.600	St. Signaling	2020
Deir el-Zor (Freight)	316.520	6.484	316.520	6.484		
Deir el-Zor (Pass.)	323.004		323.004			

Deir el-Zor to Qamishli						
Name of Station	km	Distance (St. to St.)	km	Distance (St. to St.)	State of Railway	Year of Improvement
Al-Jazira	335.611	28.113	335.611	28.113		
Bir Juwaief	363.724	22.800	363.724	22.800		
Abu Fas	386.524	19.239	386.524	19.239	St. Signaling	
Rumeilan	405.763	25.048	405.763	25.048		
Sabah al-Kheir	430.811	21.980	430.811	21.980	St. Signaling	
Hassaka	452.791	17.199	452.791	17.199		
Siha	469.990	22.515	469.990	22.515		
Kabaka	492.505	21.239	492.505	21.239		
Sbate	513.744	17.132	513.744	17.132		
New Qamishli	530.876	3.146	530.876	3.146		
Old Qamishli	534.022		534.022			

Jubrin - Lattakia-Tartous						
Name of Station	km	Distance (St. to St.)	km	Distance (St. to St.)	State of Railway	Year of Improvement
Jubrin	0.000	12.806	0.000	12.806		
Ansari	12.806	7.507	12.806	7.507		
Wudehi	20.313	24.567	20.313	24.567		
Khan Toman						
Kafar Halab	44.880	18.625	44.880	18.625		
Maarret Ikhwan	63.505	20.035	63.505	20.035		
Bishmaroun	83.540	21.530	83.540	21.530		
Mhambel	105.070	15.400	105.070	15.400		
Frika	120.470	9.640	120.470	9.640	St. Signaling	2020
Jisr Elshogour	130.110	15.000	130.110	15.000		
Budama	145.110	10.695	145.110	10.695		
Bibar	155.805	8.305	155.805	8.305	St. Signaling	2020
Sheikhana	164.110	14.042	164.110	14.042		
As-Safkoun	178.152	15.431	178.152	15.431	St. Signaling	2020
Al-Kabir	193.583	9.285	193.583	9.285		
Lattakia (Freight)	202.868	2.082	202.868	2.082		
Lattakia (Passenger)	204.950	2.797	204.950	2.797		
Old Port	207.747	3.078	207.747	3.078		
New Port	210.825		210.825			
Lattakia (Freight)						
Sharbit	200.373	6.790	200.373	6.790		
Jabla	219.693	13.370	219.693	13.370		
El-Sin	233.063	8.430	233.063	8.430		
Baniyas	241.493	17.300	241.493	17.300		
Marqia	258.793	13.000	258.793	13.000		
Roueisa	271.793	20.766	271.793	20.766		
Tartous	292.559		292.559			

Jubrin to Midan Ekbas						
Name of Station	km	Distance (St. to St.)	km	Distance (St. to St.)	State of Railway	Year of Improvement
Jubrin	0.000	16.560	0.000	16.560		
Aleppo	16.560	14.267	16.560	14.267		
Muslimia	30.827	22.940	30.827	22.940		
Tel Rifaat	53.767	17.430	53.767	17.430		
Qatma	71.197	17.724	71.197	17.724		
Afrin	88.921	25.320	88.921	25.320		
Rajo	114.241	18.956	114.241	18.956		
Midan Ekbas	133.197		133.197			
Muslimiyya to Arrai						
Muslimia	30.827	59.877	30.827	59.877		
Akhtarin	90.704	26.090	90.704	26.090		
Arrai	116.794		116.794			
Joban Bec						

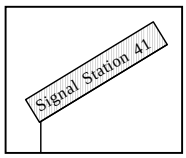
Qamishli to Al-Yaroubiye						
Name of Station	km	Distance (St. to St.)	km	Distance (St. to St.)	State of Railway	Year of Improvement
New Qamishli	530.876					
Qahtaniyya	559.197	23.228				
Tel Alo	582.425	27.830				
Al-Yaroubiye	610.255					
To Mosul						

Appendix 10.2

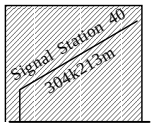
Layout of Signal Station and Double Tracking

- Midan Ekbas－Aleppo
- Aleppo－Damascus (1)－(4)
- Plan Nearby 5km
- Wudehi－Lattakia－Tartous (1)－(2)
- Tartous－Homs
- Jubrin－Deir el-Zor－Qamishli (1)－(3)
- Mhine－A-Sharqia(1)－(2)

Note:

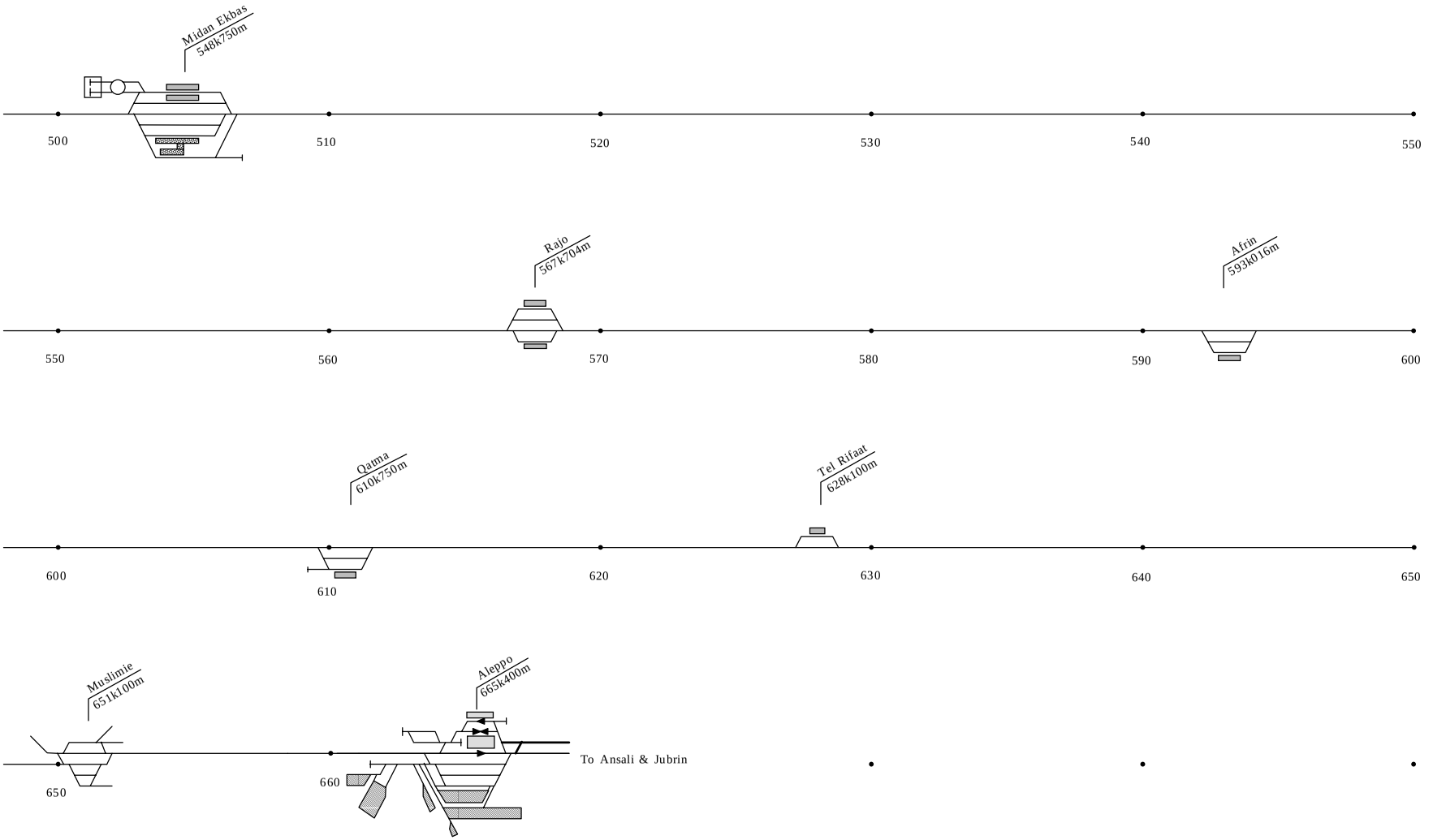


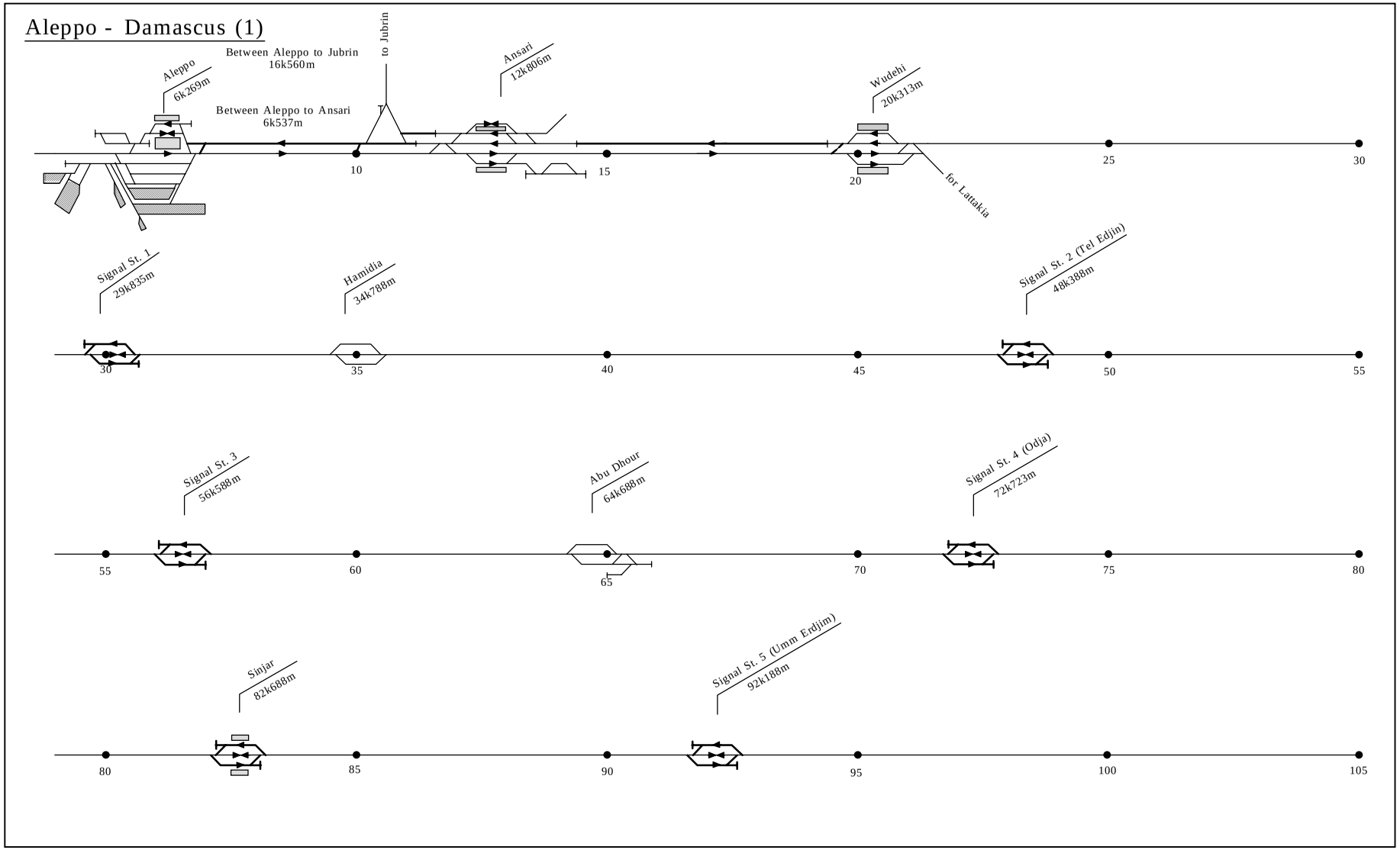
Because of the track alignment,
signal station can not be installed.

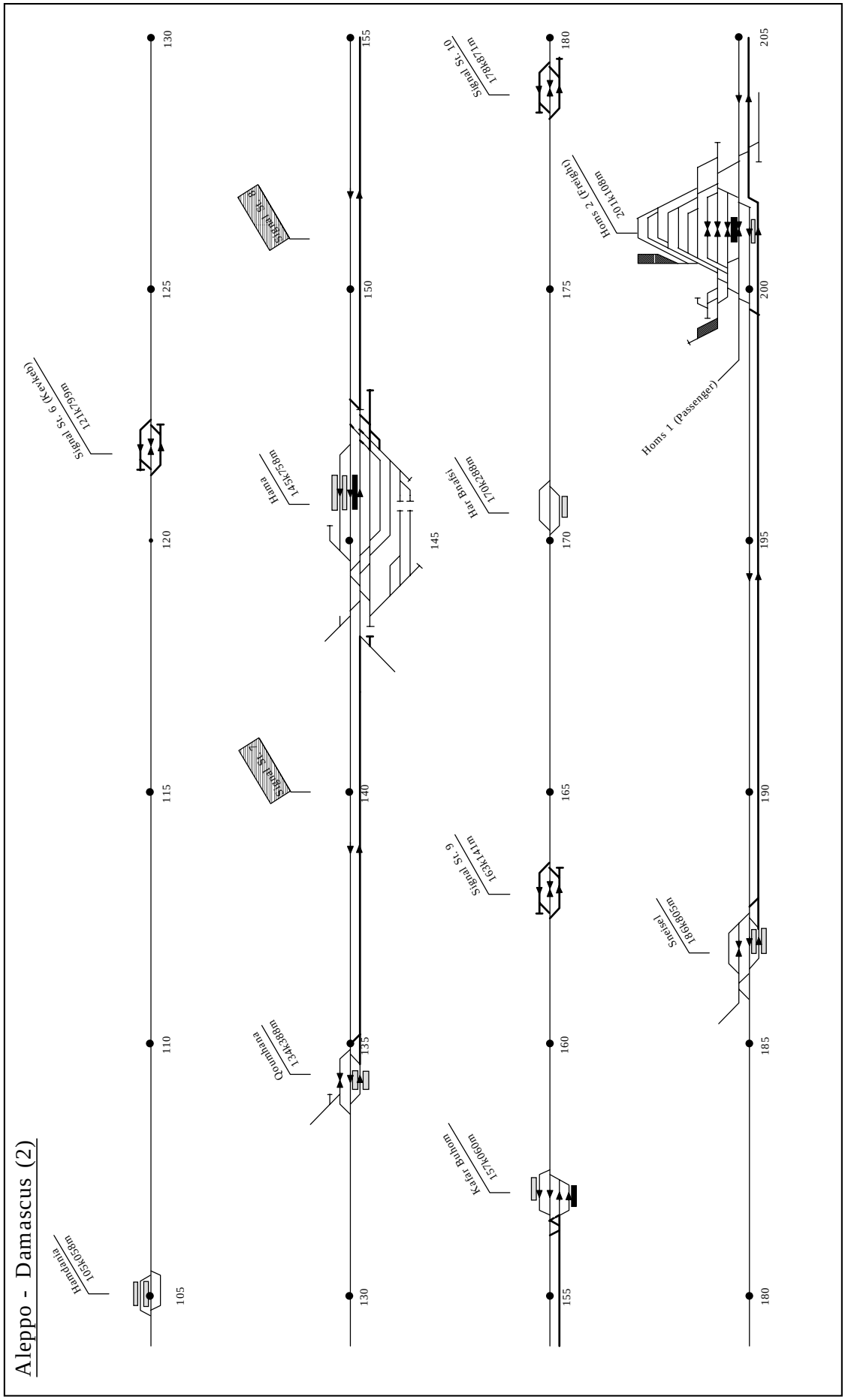


Signal station can be installed but,
for train operation handling reason,
it will be double tracked.

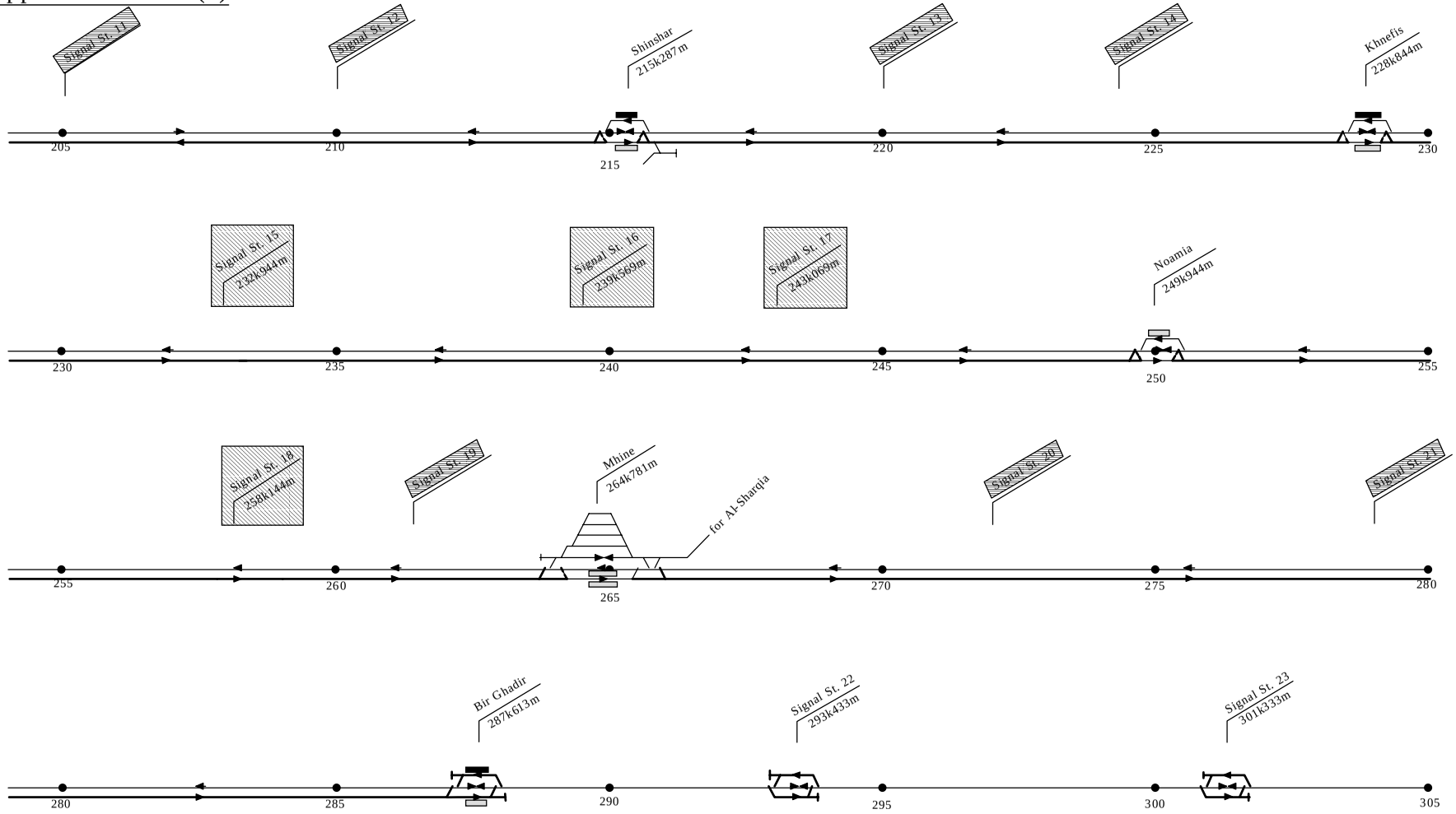
Midan Ekbas - Aleppo



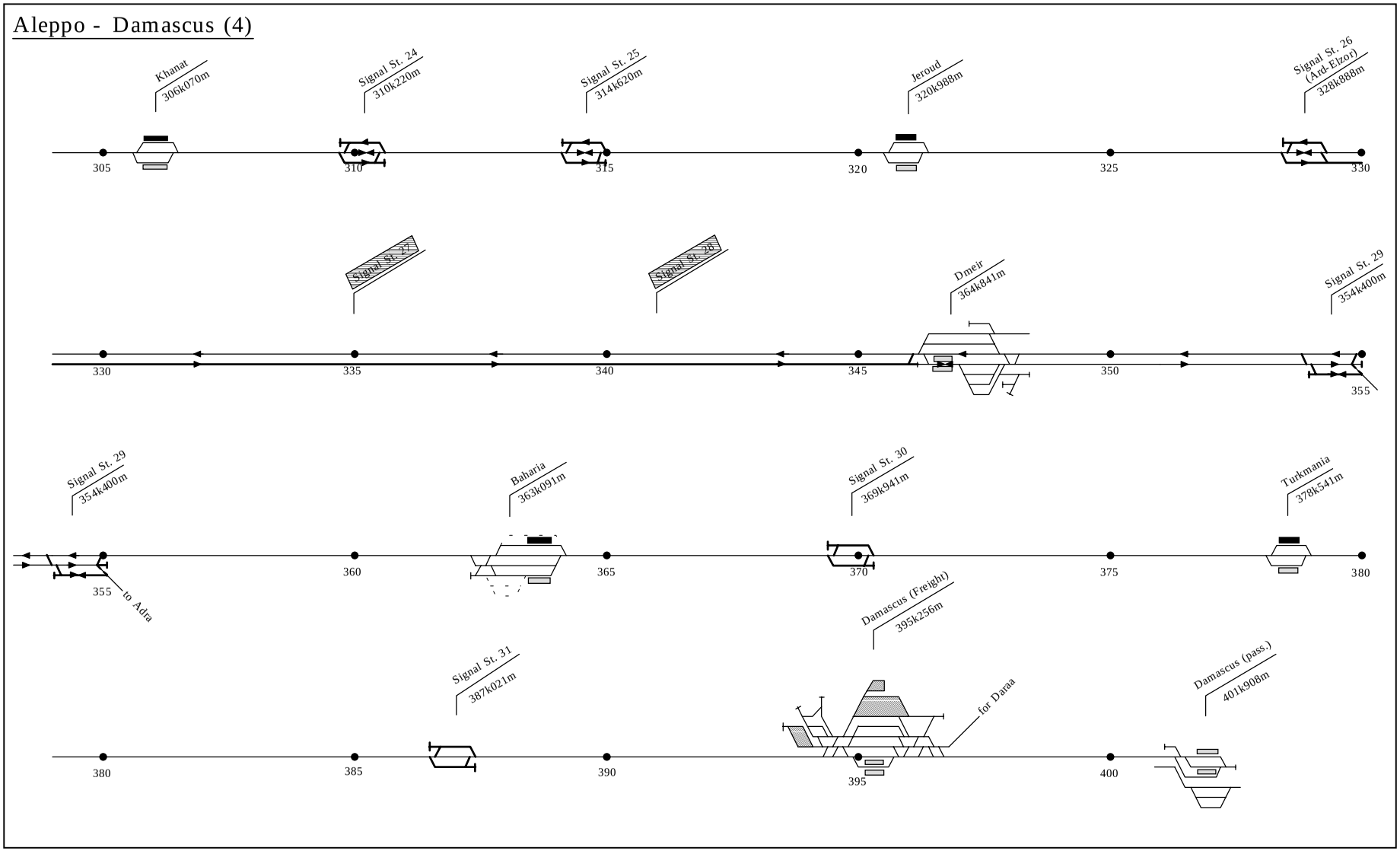

Aleppo - Damascus (1)
Between Aleppo to Jubrin
16k560m
Between Aleppo to Ansari
6k537m
to Jubrin
Aleppo
6k269m
Ansari
12k806m
Wudehi
20k313m
for Lattakia
Signal St. 1
29k835m
Hamidia
34k788m
Signal St. 2 (Tel Edjin)
48k388m
Signal St. 3
56k588m
Abu Dhour
64k688m
Signal St. 4 (Odja)
72k723m
Sinjar
82k688m
Signal St. 5 (Umm Erdjim)
92k188m


Aleppo - Damascus (2)
Hamdania
105K058m
Sighnal St. 6 (Kevlieb)
131K799m
Hamra
145K758m
Sighnal St.
Sighnal St.
Qoumbana
134K388m
Sighnal St. 10
178K871m
Har Bnaksi
170K288m
Sighnal St. 9
163K141m
Kadar Bubom
157K060m
Homs 2 (Freight)
201K108m
Homs 1 (Passenger)
Stacket
186K805m
105
110
115
120
125
130
130
135
140
145
150
155
155
160
165
170
175
180
180
185
190
195
200
205

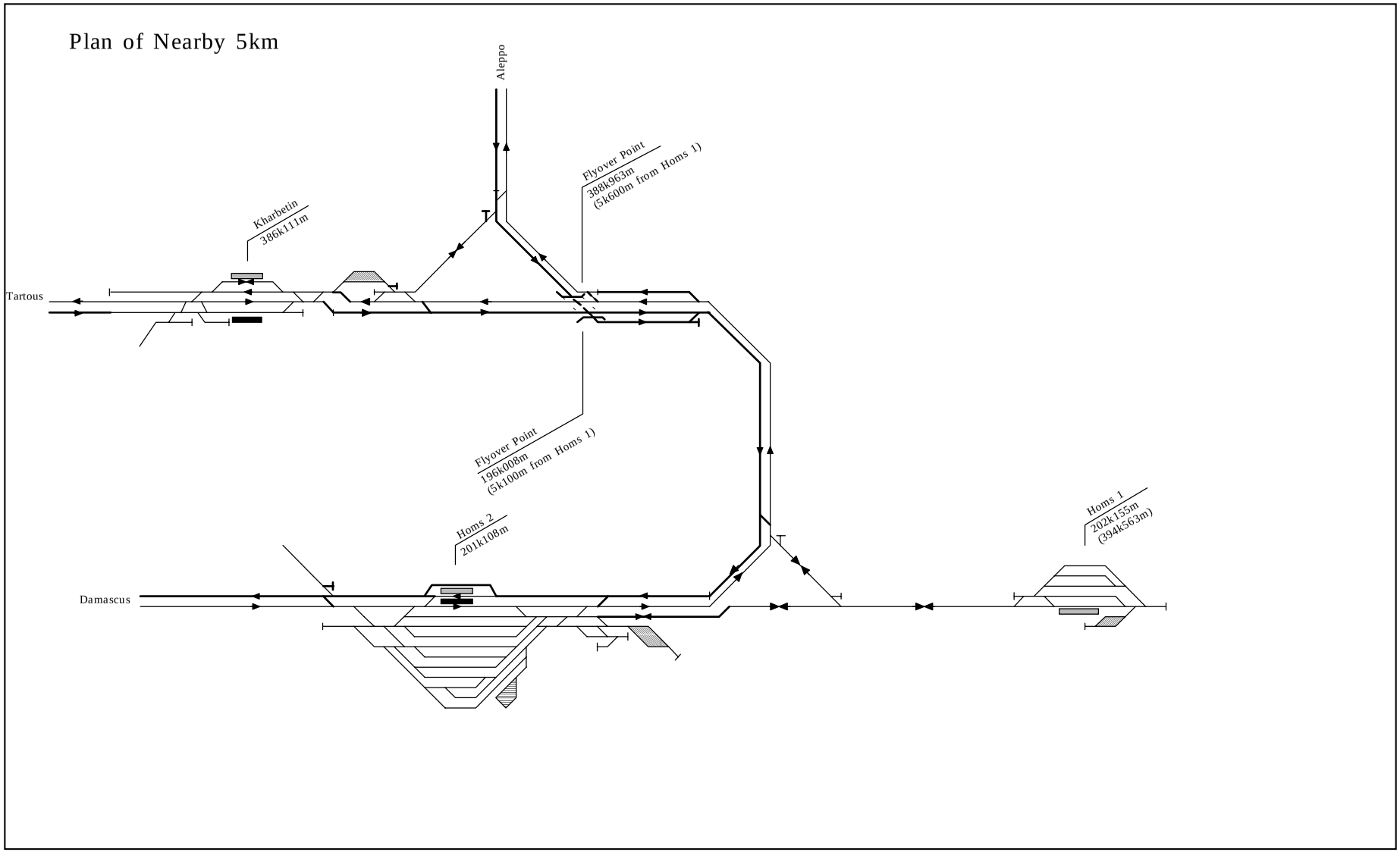
Aleppo - Damascus (3)



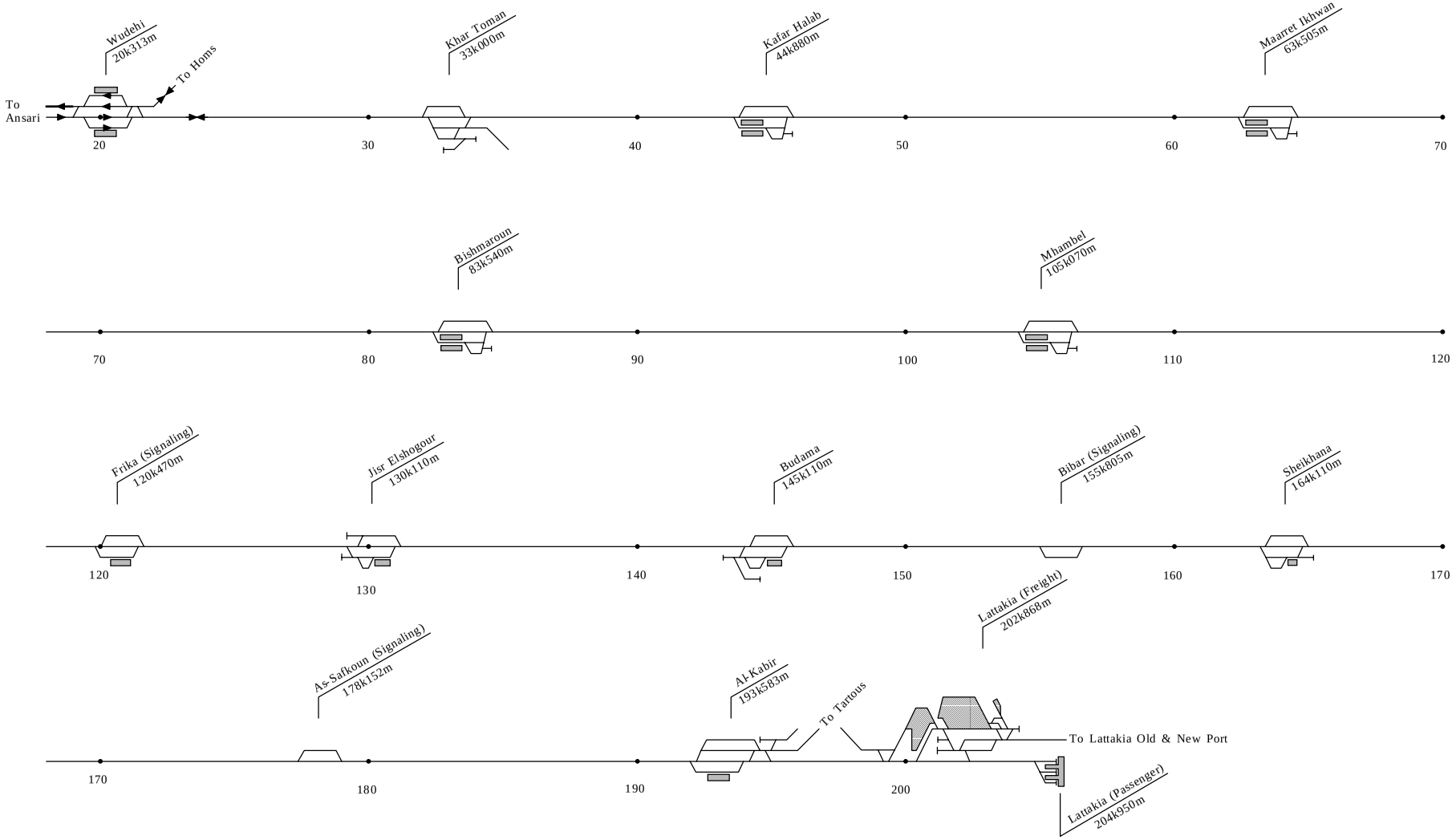
Aleppo - Damascus (4)

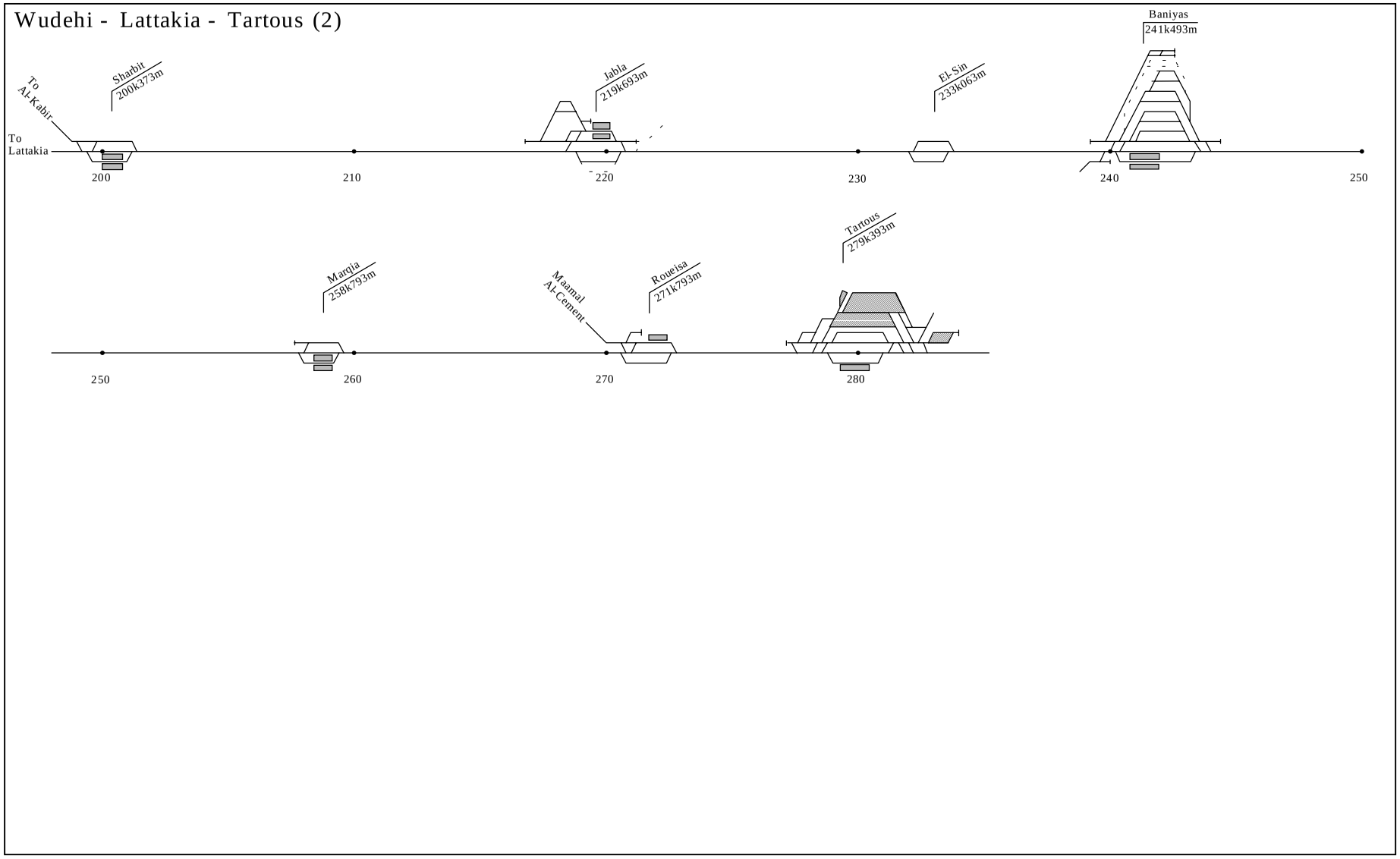


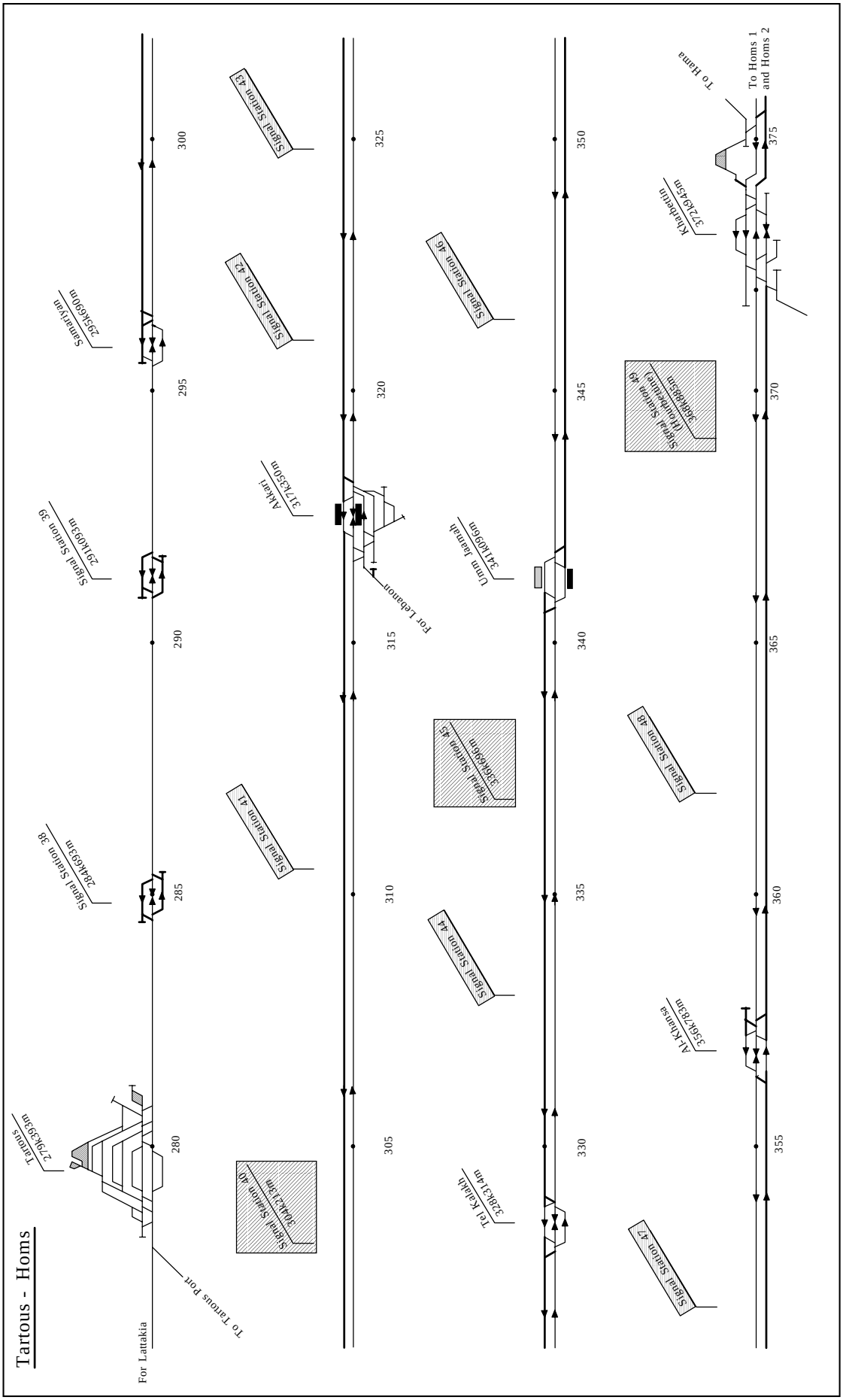
Plan of Nearby 5km

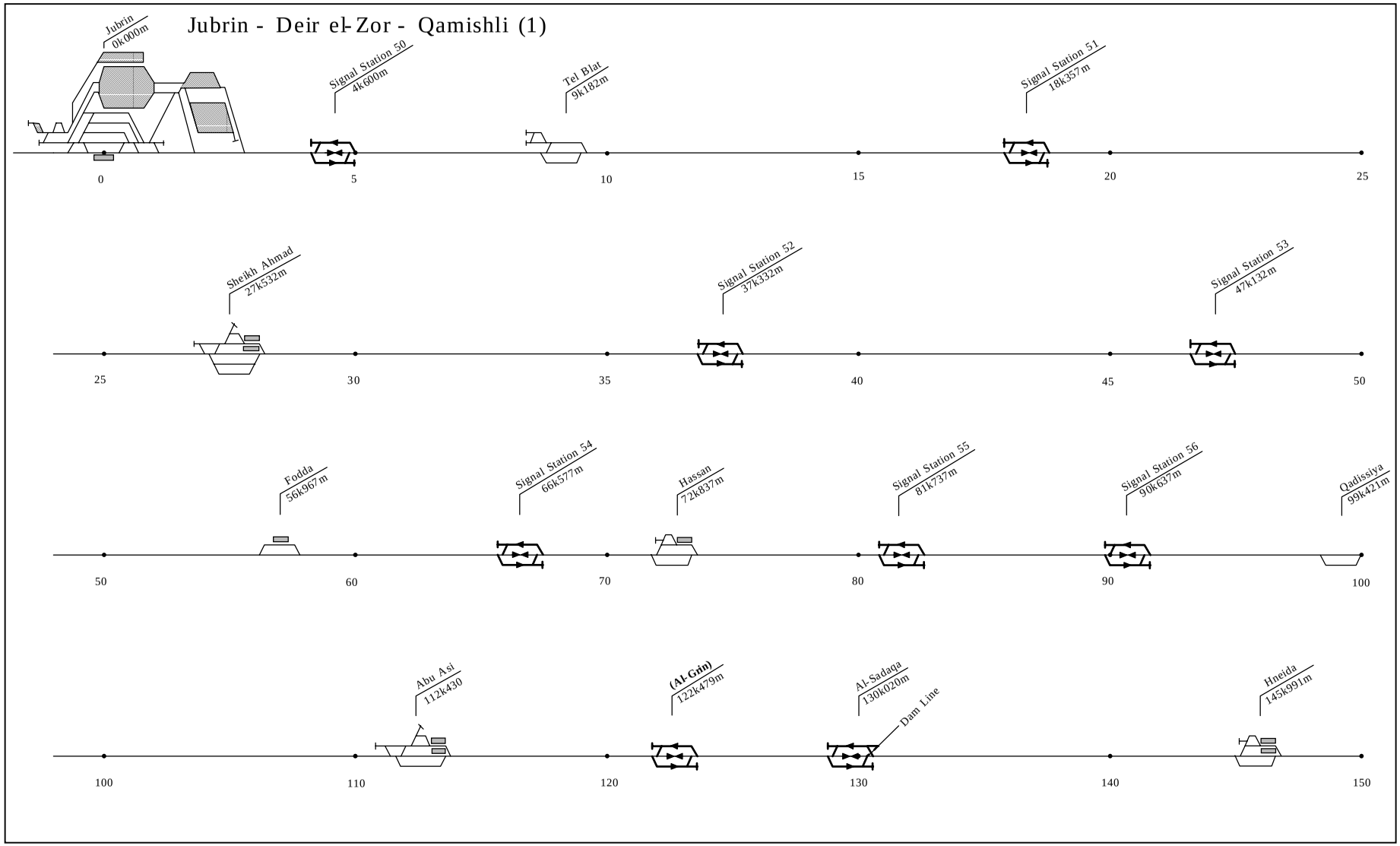


Wudehi - Lattakia - Tartous (1)

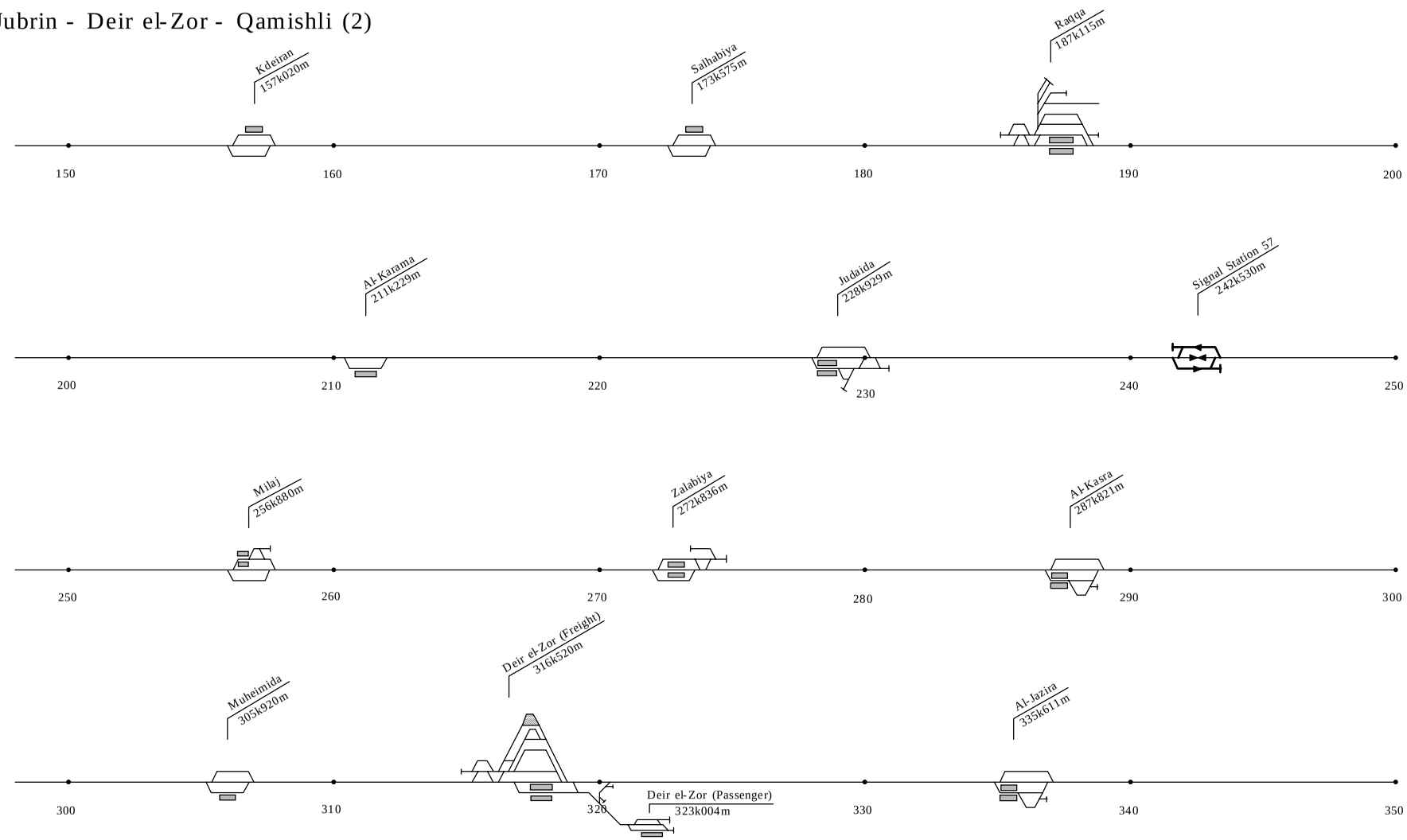



Wudehi - Lattakia - Tartous (2)
To
Al-Kabir
To
Lattakia
Sharbit
200k373m
Jabla
219k693m
El-Sin
233k063m
Baniyas
241k493m
200
210
220
230
240
250
Marqia
258k793m
Maamal
Al-Cement
Rouelsa
271k793m
Tartous
279k393m
250
260
270
280

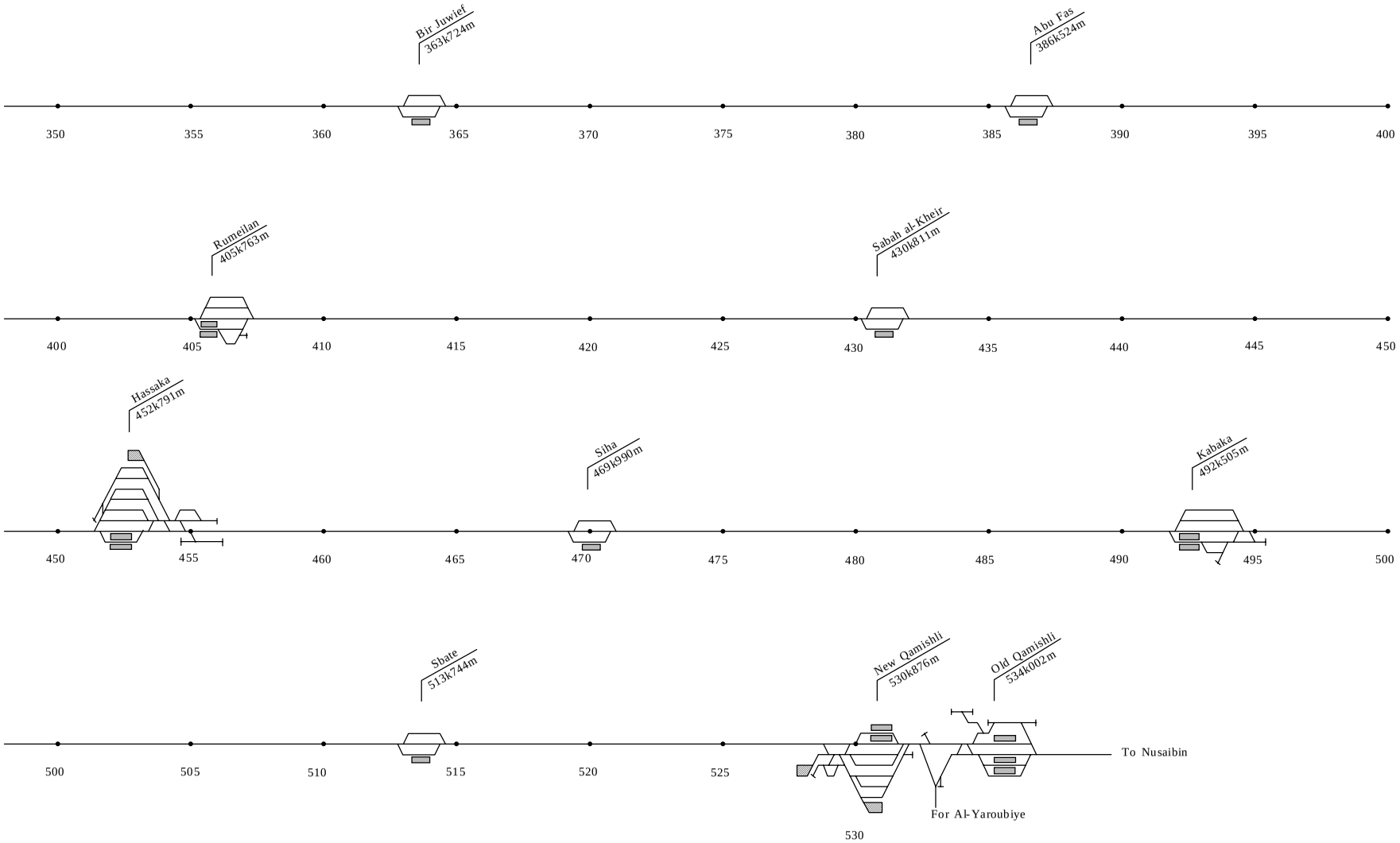

Tartous - Homs
Tartous
279k399m
To Tartous port
For Lattakia
280
Signal Station 40
304k213m
285
Signal Station 38
284k693m
Signal Station 41
290
Signal Station 39
291k093m
Signal Station 42
295
Samariyan
295k690m
Signal Station 43
300
305
Tel kalakh
320k314m
Signal Station 44
310
Signal Station 45
335k696m
315
Akkari
317k350m
For Lebanon
320
Signal Station 46
325
Umm Jaramh
341k096m
330
Signal Station 47
335
Al-Khansa
355k783m
340
Signal Station 48
345
Signal Station 49
(Hourbenane)
368k088m
350
Khirbetenn
372k945m
To Hama
355
360
To Homs 1
and Homs 2
365
370
375

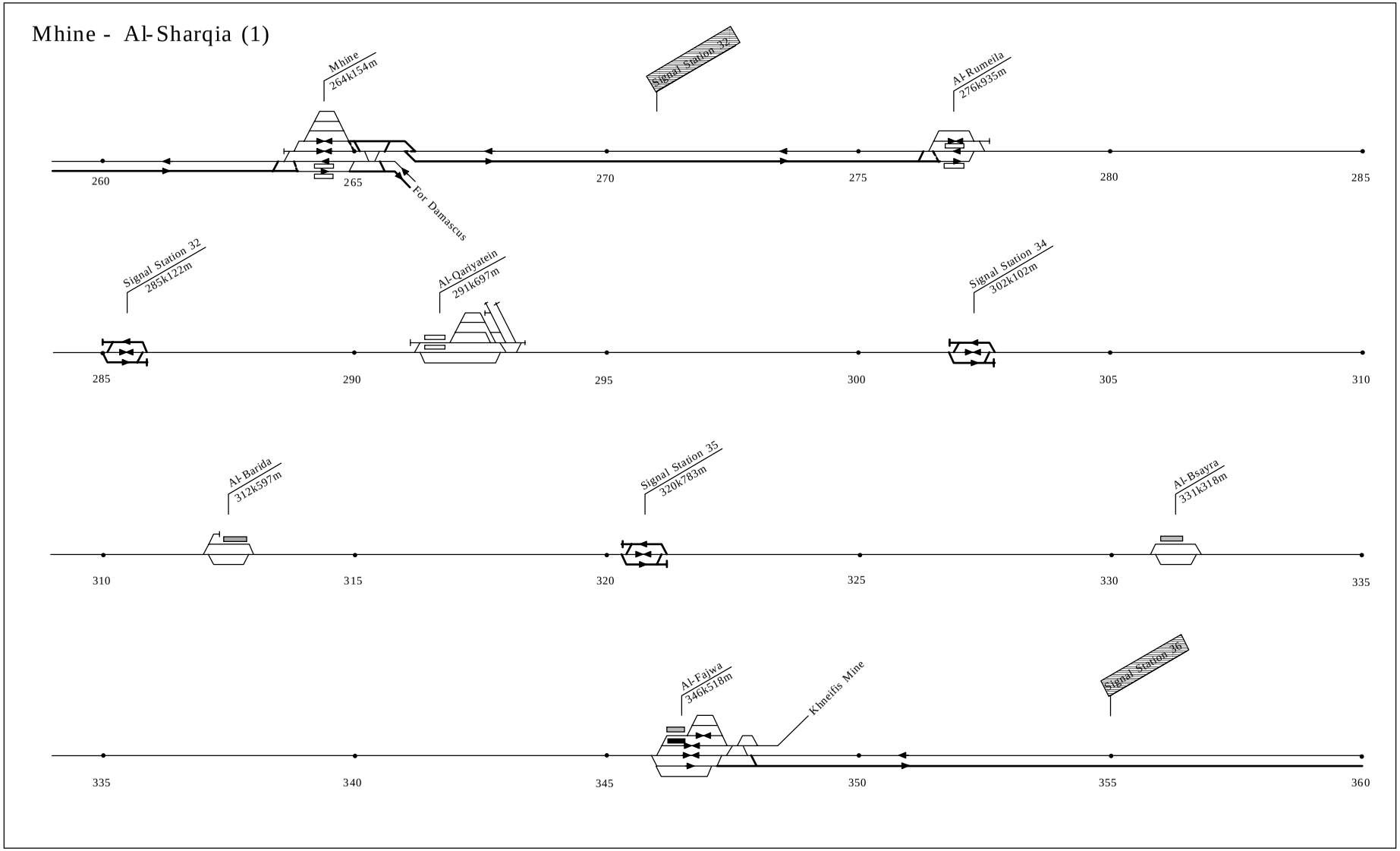

Jubrin - Deir el-Zor - Qamishli (1)
Jubrin
0k000m
Signal Station 50
4k600m
Tel Blat
9k182m
Signal Station 51
18k357m
0
5
10
15
20
25
Sheikh Ahmad
27k532m
Signal Station 52
37k332m
Signal Station 53
47k132m
25
30
35
40
45
50
Fodda
56k967m
Signal Station 54
66k577m
Hassan
72k837m
Signal Station 55
81k737m
Signal Station 56
90k637m
Qadissiya
99k421m
50
60
70
80
90
100
Abu Asi
112k430
(Al-Grin)
122k479m
Al-Sadaqa
130k020m
Dam Line
Hneida
145k991m
100
110
120
130
140
150

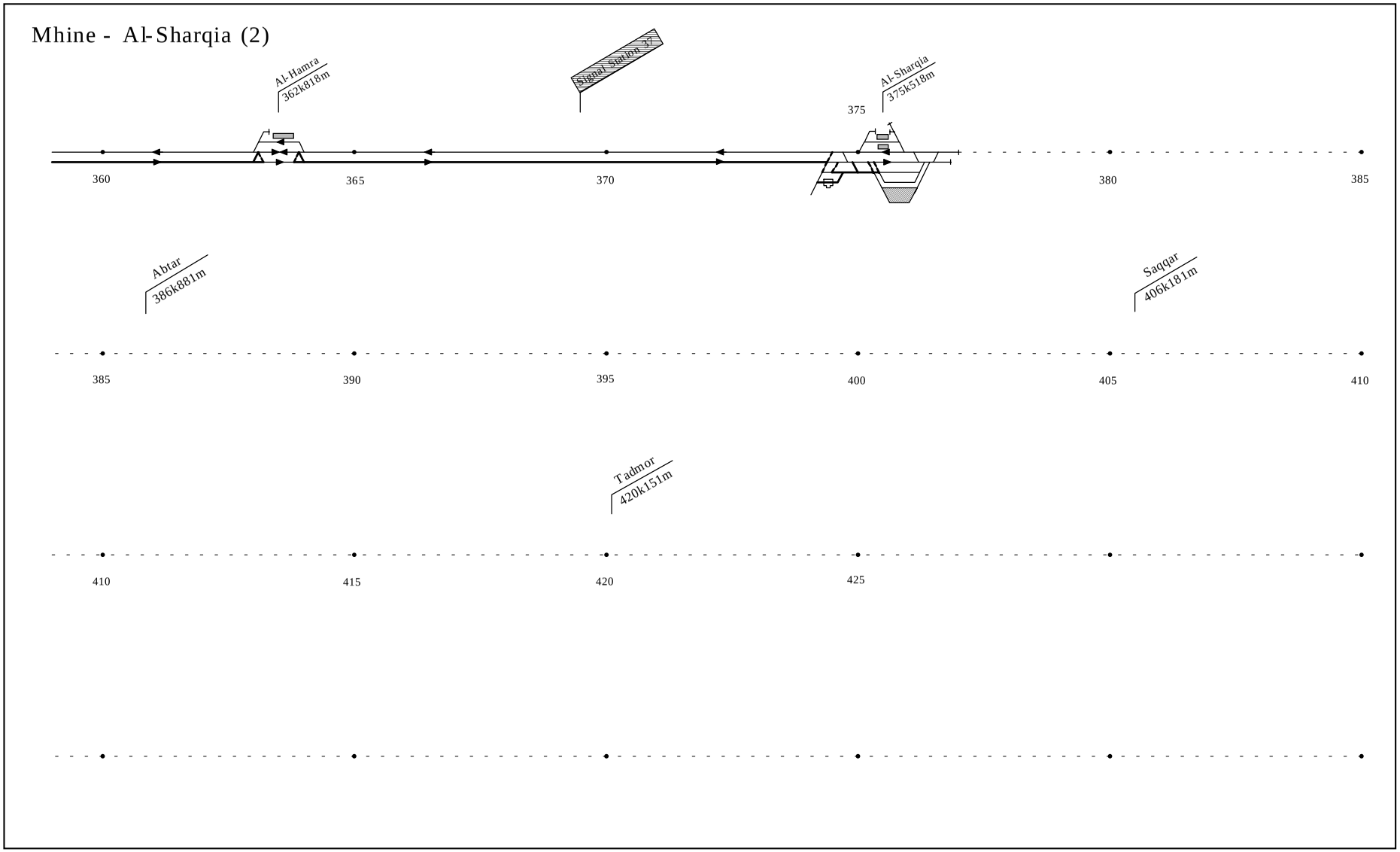
Jubrin - Deir el-Zor - Qamishli (2)



Jubrin - Deir el-Zor - Qamishli (3)




Mhine - Al-Sharqia (1)
Mhine
264k154m
Signal Station 33
Al-Rumeila
276k935m
260
265
270
275
280
285
For Damascus
Signal Station 32
285k122m
Al-Qariyatein
291k697m
Signal Station 34
302k102m
285
290
295
300
305
310
Al-Barida
312k597m
Signal Station 35
320k783m
Al-Bsayra
331k318m
310
315
320
325
330
335
Al-Faiwa
346k518m
Khneifis Mine
Signal Station 36
335
340
345
350
355
360


Mhine - Al-Sharqia (2)
Al-Hamra
362k818m
Signal Station 37
Al-Sharqia
375k518m
375
360
365
370
380
385
Abtar
386k881m
Saqqar
406k181m
385
390
395
400
405
410
Tadmor
420k151m
410
415
420
425

Appendix 10.4

Control of Railway Track

CONTROL OＦ RAILWAY TRACK
(Control on Irregularity of Track)

Receiving repeated load of train, track is subject to make displacement and deformation so called “track irregularity”. When this track irregularity become large, the riding comfort of train become bad and if this become extremely larger, both alignment and level irregularity will occur and may lead to the derailment of freight train.
Therefore, condition of irregularity must be always grasped properly and such places must be either maintained or improved in quick.

1. Definition of Track Irregularity

1.1 Irregularity of Gauge

Track irregularity is the difference between the stipulated dimension (narrow gauge 1067mm, Shinkansen 1435mm) (at curved section, irregularity volume of stipulated dimension plus slacks) and indicated as (+) when larger than stipulated volume, （－） when smaller than stipulated volume.

1.2 Irregularity of Cross level

Cross level irregularity is the difference of height between left and right rail for the stipulated dimension (1067mm or 1435mm). When there is a super-elevation (CANT) at the curved section, it indicates the increased and or decreased volume against the formal CANT volume. Signs for the cross level irregularity at straight section, left side rail backing the original point shall be defined as standard and when the right side rail is high, (+) sign and when it is low, (-) sign is used. At curved section, when it is larger than formal CANT volume, （＋）sign is used and when smaller, (-) is used.

1.3 Irregularity of Longitudinal level

Irregularity of longitudinal level means the unevenness of rail when measured the top of rail, In general,10meters of string is stretched on the rail and vertical length between the string and rail is measured at the center of string. When there is a vertical curve at near the grade changing point, versed sine is so adjusted from the measured volume. (when the vertical line is in concave

shape, reduce the versed sine volume from the measured volume and add when the case of convex shape.) Signs of longitudinal level irregularity, (+) sign is used for concaved shape and (-)sign is used for convex shape.

1.4 Alignment defect

Alignment defect means the unevenness of the side of rail. In general, 10 meters of string is stretched on the side of rail and expressed in terms of horizontal distance measured at the middle of string. At curved section, reduce the versed sine volume from the measured value calculated from the radius curvature.

Versed sine volume is obtained from the following formula.(the same at the curved section) ;

$$V = \frac{C^2}{8R}$$

Where; *V*: amount of versine

R: radius curvature

C: measuring chord length(generally 10meter)

Sign of alignment irregularity is expressed in (+) when irregularity extended to the outer direction of gauge and (-) when extended to the inside direction of gauge.

1.5 Track distortion

Track distortion is the expression of “Twist” condition of railway track against plane (surface).
Distortion value is found lateral difference level irregularity between 2 points separated with certain distance. Further, at the transition curve section, the super-elevation (CANT) is gradually decreased and therefore, even the level irregularity is expressed completely 0 value, track distortion is under the irregularity condition. For instance, when the figure of CANT is 400 multiple, there is an irregularity of $\frac{5{,}000}{400} = 12.5\text{m}$ for the 5 meters track. To judge the quality of distortion, the inevitable irregularity arising from the CANT gradual reduction is included.
Measuring span of distortion is determined as 5 meters for narrow gauge line because the definite axle maximum distance is 4.6 meters and for Shinkansen, the measuring span is fixed at 2.5 meters because the maximum fixed axle length is also 2.5 meters.

2. Maintenance Standard of Track Irregularity

2.1 Transition of Maintenance standard

Maintenance of track at the time of opening the railway for service in 1870s era was based on the “Duty direction of track maintenance” issued by British engineer named Edmund Gregory Holtham who was assigned as construction engineer in 1877.

This “Direction” describes the principles of track maintenance but no such article particular on track maintenance is written. And it is presumed that the discretion was left to the engineers in charge at that time.

In 1912, with the purpose to integrate the maintenance conditions which were all in diverse conditions including the railways bought up by the Government, “ Regulations on Track Maintenance” was enacted and maintenance standard of gauge and level was shown at the first time.

Namely, within the difference of [gauge within 1/4 inch (about 6.4 mm) and rail cant difference of 1/8 inch (about 3.2 mm) can be considered out of adjustment necessity].

Secondly, in 1923, rearrangement and consolidation the above mentioned Regulation and Enforcement regulation defined locally at regional railway administration, new “Track Maintenance Direction” was enacted. However, in this direction, no article on track irregularity was shown. At that time, it is presumed that enough maintenance was enforced and the track was kept well so that no particular permissible limitation was not necessarily be established.

Afterward, drastic revision was made on construction regulation in 1929 and uniformed standard was shifted into three grade (A, B, and C) and railway operation was managed according to the importance of lines. Maintenance of track is also followed this principle, and in1932, “Track Maintenance Direction” was revised on 4 items of “gauge” “level” “cant” and “alignment” were established as indicated in Table 1.

In addition, in 1943, to meet the needs of time of the second world war to accomplish war time maintenance with minimum materials and labor, large revision of “track maintenance” Direction was enacted (30 April 1943). As shown in Table 2, for the standard of track irregularity, “Cant”

“Level” which are the main items of maintenance work, about 1-3 mm easement were made. Further, dynamic track maintenance was firstly introduced based on the train movement.

Table 1 Maintenance standard as of 1932

By Item		Main track			Side track
		A line	B line	C line	
Gauge		＋7, －4			Correspond to main line track
Level	Straight line	4	4	6	Correspond to C Class C line
	Curved line	6	6	8	Correspond to C Class C line
longitudinal level		5	5	7	Correspond to C Class C line
Alignment	Straight line	5	5	7	Correspond to C Class C line
	Curved line	8	8	10	Correspond to C Class C line

Table 2 Maintenance standard as of 1943

By Item		Main track				Side track
		A line	B line	C line	Simple line of class C track	
Gauge		＋7, －4				Correspond to main line track
Level	Straight line	6	7	8	10	Correspond to C Class C line
	Curved line	7	8	9	11	Correspond to C Class C line
longitudinal level		7	8	9	11	Correspond to C Class C line
Alignment	Straight line	5	6	7	9	Correspond to C Class C line
	Curved line	7	8	9	11	Correspond to C Class C line

2.2 Present maintenance standard

Maintenance standards stated above are characterized as “maintenance Target” not related directly to the safety operation of train which can be evinced from the articles of maintenance of track using the expression that [not obliged to adjust to the above irregularity].

However, yearly increase of speed-up and heavy weight of train bring about the problem of existence of irregularity which require to establish the criterion to regulate, or, to establish the maintenance standard to accord with the system to switch over from the former “from time to time” repair method into “periodic” repair method, From these reasons, ever since 1961, logical and experimental studies were made including outside academic members seeking the way of maintenance standard and as a result, concrete program was obtained and brought into for enforcement in 1972.

New maintenance standard is as shown in Table 3 and its character and handlings are as stated below.

Table 3 Maintenance standard value and completion value (unit mm)

Kind / By line / Kind of irregularity	B class repair maintenance standard value				C class repair maintenance standard value				Completion standard value	
									Common in each line	
	A line	B line	C line	Simplified Line	A line	B line	C line	Simplified Line	General Section	Concrete roadbed section
Gauge	+10 (+6) −5 (−4)								(+1) (−3)	(0) (−3)
Level	11 (7)	12 (8)	13 (9)	16 (11)					(4)	(2)
Longitudinal Level	13 (7)	14 (8)	16 (9)	19 (11)	23 (15)	25 (17)	27 (19)	30 (22)	(4)	(2)
Alignment	13 (7)	14 (8)	16 (9)	19 (11)	23 (15)	25 (17)	27 (19)	30 (22)	(4)	(2)
Track distortion					23 (18) (including gradual decrease of volume of CANT)				(4) (not include gradual decrease volume)	

(Remark) 1. Numerical volume shows dynamic volume by high speed track measuring car, however, parenthesis ( ) shows static value.
2. Track distortion shows level variation volume for 5m
3. Slack, CANT and versine volume of curved line (include vertical curve) is not included.
4. Side track corresponds to class C line.

(1) Completion standard

Completion standard means to show the value which should be kept less than indicated value for the case of track repair, construction and new line construction.

This standard was not defined in the former maintenance standard, however, decision was made to establish the standard because it was found effective to bring up the quality of maintenance staff and also the maintenance interval can be prolonged in “periodical maintenance method”.

Completion standard is able to prolong the maintenance interval when the value is small but will require laborious work and when the value is large, adjusting work become rather simple but maintenance interval become short.

For the decision of the standard, technical possibility and secure the necessary maintenance intervals were taken into consideration as stated above.

At first, as regard to the technical possibility for maintenance work, according to the past result like in case of out-sourcing work etc., it was acknowledged that the maintenance value is

almost the degree of 1/2 than that of defined in “track maintenance direction”.

Also, according to the result of track investigation, it is comparatively easy to finish under such value. From these factors, ±4mm was decided for “level”, “cant” “alignment” and “twist” as the standard value.

As for the “gauge” rather rigid value of (+1, -3mm) was adopted because easy adjustment compared with other items.

As for the concrete track bed, should this be laid with large irregularities from the time of construction, it is not only difficult to make adjustment later on but also reduce the advantage of concrete roadbed itself, therefore, more severe value than ordinary track(± 2mm) was adopted.

(2) Class B repair standard

Class B repair standard is to maintain the adjustment of track irregularity in systematic way in order to maintain tracks in good condition until the time of Class A repair work (overall repair in every 2 – 4 years). Therefore, from the object of the class B maintenance standard, this standard was decided considering to secure the good train riding comfort and to minimize the Class C repair work.

At first, as for the riding comfort, “ Riding Comfort Index 2” value was found from the various running test result.

Also, as to the relation between class C repair work volume, the following study was made on surfacing work which constitute the main work of class B repair.

That is to say, the maintenance of track is work frequency of class C repair will be reduced inevitably if class B repairs are done frequently, in reverse, if the class B repairs in less frequency, the frequency of class C repairs will be increased. On the other hand, observing from the work volume, class C repairs are done partially and therefore, compared with class B repairs which are done with group workers under systematic plan, require many working member and is uneconomical.

In general, it is preferable to minimize the class C repair work, however, to make utterly

to condition, the class B repair work volume become extremely large and become not economical.

From these conditions stated above, upon seeking the value as to be able to obtain the minimum total of class B and C repair work volume and compared with the previously described riding comfort index 2 and consequently it was found that there was no great difference.

Class B maintenance repair standard is decided upon such studies above, and the static standard value is almost the same as the formal track maintenance direction's value.

Application method to the work planning of class B repair maintenance standard is as stated as below.

1) Divide the Maya measuring chart into approximately 500 meters and for every portion divided, find the exceeding number of class B repair maintenance standard value on each repair subject, and if this exceeding number more than 2 or 3, class B repair will be applied. (including the case of rail gauge irregularity when exceed more than 30 meters continuously within one divided portion)

2) The way of finding the exceeding number of class B repair maintenance standard value by Maya chart is as follows;

   ① In case of irregularities on longitudinal level and alignment will the total of left and right rail.
   ② In case more than 2 irregularities exceed the Class B repair maintenance value and exist nearer than 15 m (30m in case of rail gauge irregularity), it will be regarded as 1 place of irregularity. For longitudinal level and alignment level, the same will be the case when irregularities exist close within 15 m of length.

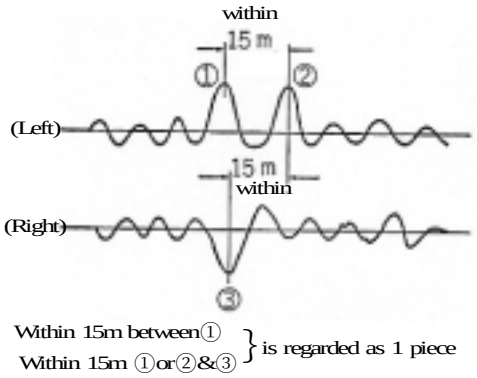


Fig.1

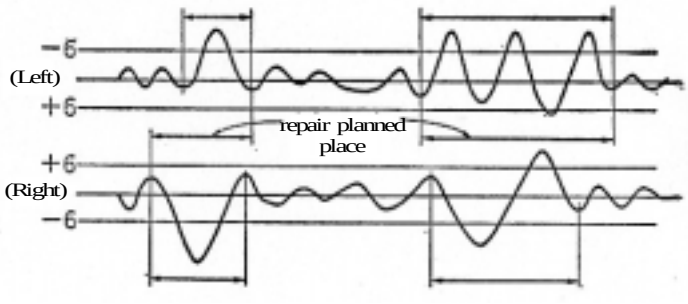


Fig.2

3) When measured by static method, it will be handled by above (1) and (2) correspondingly.

4) Number of places to be repaired within one divided portion which was decided to apply class B repair work shall be the place more than 6mm(+2, -4mm in case of gauge irregularity) of volume on Maya chart irregularity as shown in Figure 7.2. In case of static measuring, the subject of repair shall be the value of more than the completion standard.

(3) Class C Repair Maintenance Standard

Class C repair is the work for unforeseeably occur and impossible to plan in advance, or not economical otherwise. Therefore, class C repair is to make repair on limited part between class A and B repair planned in advance. And it is deemed appropriate to decide considering the safety of train operation.

Safety limit of track irregularity is different depend on the conditions of operation, rolling stock and track and also the compound condition of track irregularity and it is therefore difficult to decide uniformly.. Therefore, values established by “Tsurumi technical Investigation Committee” of (longitudinal level 40mm, alignment 36mm, twist 27mm) for judging the safety operation added by the consideration of advancement of irregularity from the time of finding of irregularity until the completion of repair was decided as class C repair maintenance standard value.

Besides, class C standard value was established only on longitudinal level, alignment and twist and nothing was established on rail gauge and level because, as for the rail gauge , the advancement of irregularity is generally slow and the safety can be secured by class B repair amendment standard value with adequate plan and for the level, more than the

volume of irregularity, the volume of varied irregularity will affect the safely running and further, the variation of volume can be sufficed by the control of twist. so is concluded.

Application method of class C repair maintenance standard value is as follows;

1) Track irregularity which reached to the value of class C repair maintenance standard value and those the advancement of irregularity is progressing rapidly although the value are not reaching to the designated value, repair work shall be executed within 15 days. Providing however, when the irregularity is found extremely exceed the class C repair maintenance standard value, expedite the executing date of repair.

2) In the case, within 15 days after the track condition became to execute class C repair (providing, irregularity found extremely exceeding the class C repair maintenance standard value, marginal repair days), unavoidably unable to execute the repair, action must be taken to slow down operation of train.

(3) Emergency maintenance value of gauge

As explained above, the present maintenance standard, rail gauge is not regulated in class C repair maintenance standard value. This is because based on the concept that the rail gauge irregularity develop slow and the safety can be secured fully should the class B repair is executed as planned. However, considering the occurrence of derailment in 1973 caused from expansion of rail gauge between Ushinohama and Satsuma-Okawa on Kagoshima main line, the emergency maintenance value as shown in Table 4 is issued as guidance on 9th October 1973.

Table 4 Emergency maintenance value of track gauge (mm)

By slack	Dynamic	Static
Place less than 20mm of straight and slack	20	14
Place slack is more than 25 mm	15	9

This value, as explained below, finding the maximum dimension of rail gauge calculated from the related dimension of wheel and rail so as the wheel does not fall into rail gauge and decision was made considering the rail slacking and margin and this should be treated to correspond the class C repair maintenance standard value.

(4) Maintenance standard for compound irregularity of alignment & level (Draft)

The present maintenance standard is the restricting value against track irregularity existed independently. However, according to the study result made for preventing the freight train

derailment, continuous compound irregularity, although the irregularity value is small, especially irregularity continuously compounded in opposite location of alignment and level, it is found unfavorable for safety running of freight train. As a result, at present, the below maintenance value is suggested for utmost maintenance by official document letter approved from Chief of Track Maintenance Division of Department of Track and Structure on 7th July 1977.

(a) Applicable extent

Sections where freight trains are to be operated, providing however, other train speed (maximum 45km/h) applied on simplified line stipulated in Article 119 Train Operation Handling Standard Regulation is excluded.

(b) Wave form of irregularity subject to maintain

When the waveform of compound irregularities measured by Maya chart shows more than the value of the following. (Figure3)

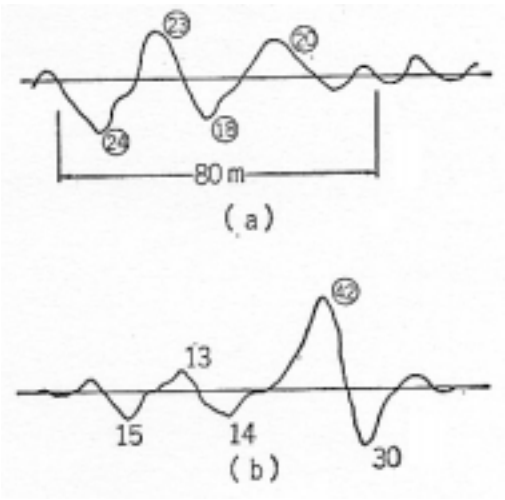


Figure 3 Compound irregularity subject to maintain

1) Within the section of 80 m, where more than 4 compound irregularities are found with the wave height of more than 18 mm.
2) Compound irregularity of more than 35 mm

(c) Timing of maintenance

1) Maintenance shall be conducted within 1 month after finding the irregularity.
2) In case irregularity of (2) of (b) (1) above exist at the section, timing of maintenance shall be expedited.

This maintenance standard (Draft) was obtained from the experimental test conducted between 1967 through 1970 at Karikachi test line in Hokkaido. The test was done for running test using 2 axle freight cars under reverse phasing of various compound combinations of 3 sinusoidal waves on alignment & level irregularities.

Second result was obtained from the magnified short waveform simulated imitation running test which were not obtainable from the experimental test line.

Third one was obtained from the test line of Karikachi line later in 1976 again.

As regard to the continued compound irregularity of alignment & track level, if the value of (alignment irregularity)—1.5 x (track level irregularity y) become more than 23mm and when the case the compound irregularity continued more than 2.5 waves, the probability of rate of freight car axle weight reduction more than 80% (safety target instructed by “Tsurumi technical investigation committee”) is possibly expected and found that not preferable from the safety running.(Figure 4)

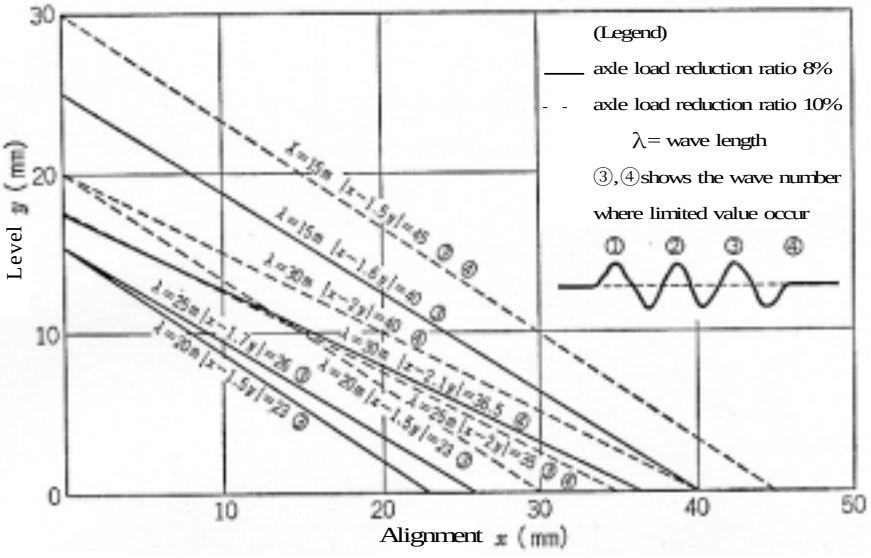


Fig 7.4 Relationship between wheel weight reduction ratio and compound irregularity

Further, in addition to this alignment & track level compound irregularities, other study was made the case of pound together the expanded gauge irregularity by the simulation and as a result, marginal value of x—1.3 y =20.5 was obtained.

To this marginal value, consideration of advancement irregularity by the time of repair, 18mm was obtained as maintenance standard (Draft) for compound irregularity of alignment and track level.

Secondly, as to the continued number of compound irregularities, according to the simulation

result in the past, wave number ③ of Figure 5 running characteristic value (especially, off-load of wheel) are shown at most cases as a peak. Therefore, restriction was made not to have compound irregularities of 2 wave length and 4 places ahead of ③ to be existed. The reason for section length of 80m is because from the logically and from the past experiences, the easily occurring wave length of derailment is 3 wave length (75m) of 20 – 25 m wave length. added by margin length.

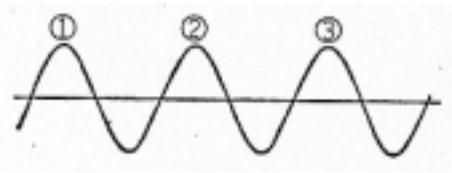


Figure 5

Independent extraordinary large restricting value of 35 mm was decided using the result of Karikachi experiment track conducted in 1976, that is to say, the results of experiment track with the irregularity value of track level 20mm and alignment of 10 mm, there were no kind of car exceeded the limited restriction (derailment coefficient 0.8, axle reduction ratio 80%) however, track level of over 25mm, there were some cases exceed the limitation.

If calculate the compound irregularities of track level 20mm, alignment 10mm
10 – 1.5 x (-20)=40mm and 35mm was obtained calculate margin.

2.3 Track maintenance standard of Shinkansen

(1) Maintenance standard

Maintenance standard of track irregularity on Shinkansen is as shown in Table 5.

Table 7.5 Track maintenance standard of Shinkansen

Item \ by line / unit		Main line for train speed more than 160km/h	Main line for train speed less than 160km/h	Sub main track dead head line arrival/departure pool line	Side track
Gauge	mm	increase 6 decrease 4			
level	mm	5	6	7	9
longitudinal level	mm/10m	7	8	9	10
alignment	same as above	4	5	6	7
track distortion	mm/2.5m	5	6	7	8

(remark) At curved portion, slack CANT and versine volume (including vertical curve) are deducted.

The character of this maintenance standard is almost similar to the case of class B repair maintenance standard of narrow track and defined as maintenance standard of riding comfort control target value as described on items below.

(2) Target value of various kinds of maintenance

Completion target value of track irregularity and riding comfort control target value and other various maintenance target value are based on the result of test conducted near Kamonomiya model line in addition to the actual maintenance result after the service operation, and, at present, applied as shown in Table 6.

Table 6 Various target value on track maintenance (V=160－210km/h section)

Kinds		Unit	Complete target value	Maintenance planned target	Riding comfort control target	Safety control target	Slow down speed control target	
							160km/h slow down	70km/h slow down
track irregularity	longitudinal level	mm/10m	4	6	7	10	15	20
	alignment	mm/10m	3	4	4	6	9	11
	Gauge	mm	±2	+6 −4	+6 −4	+6 −4	—	—
	level	mm	3	5	5	7	—	—
	track distortion	mm/2.5m	3	4	4	6	—	—
Motion Accelerate degree	Vertical motion	g (full amplitude)	—	0.25	0.25	0.30	0.45	—
	lateral motion	g (full amplitude)	—	0.20	0.20	0.25	0.35	—

(Remark) Above value is the measured value of high speed track inspection/measuring car.

Explanations are added as follow in detail.

(a) Completion target value

The following three conditions were studied as for target value of completion after the

maintenance work

1) Should be within the capable scope.
2) Time between the track irregularity once repaired until the time track irregularity become large enough to disturb the riding comfort should be considerably long.
3) Economical viewing from the labor to finish.

In other word, capability and finishing labor in every contract unit of outside ordering work in every 2 – 3 month and also, on the other hand, advance of irregularity was properly grasped to obtain the most reasonable value. For instance, to find the relation between the completion value of longitudinal level irregularity and maintenance cost using several maintenance planning target as assumptions, it is like shown in Fig 6.

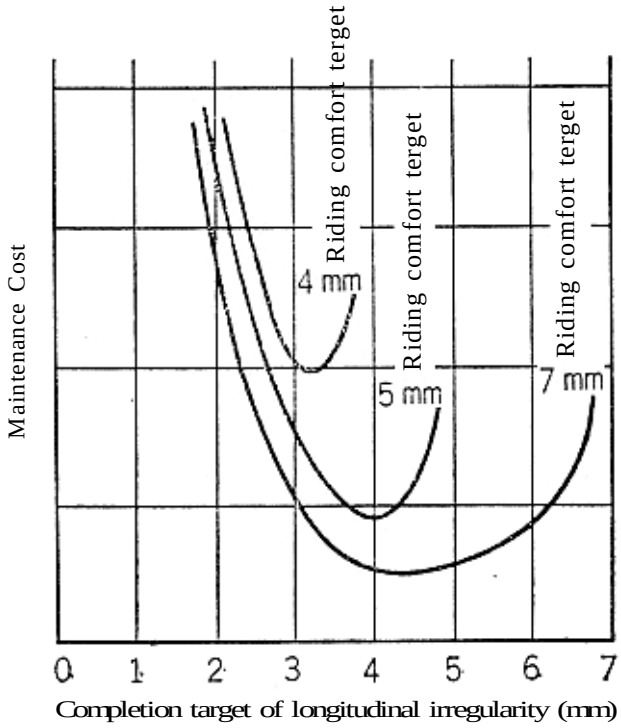


Fig 6 Relation between Target value of longitudinal irregularity and maintenance

It has made known that against the 7mm of maintenance planned target value, 4mm is more favorable. For other irregularities, completion target values were decided by the similar studies.

(a) Riding comfort control target value

Riding comfort control target value has been obtained through studies on riding comfort

by rolling stock movement of 200km/h operating section of model line.

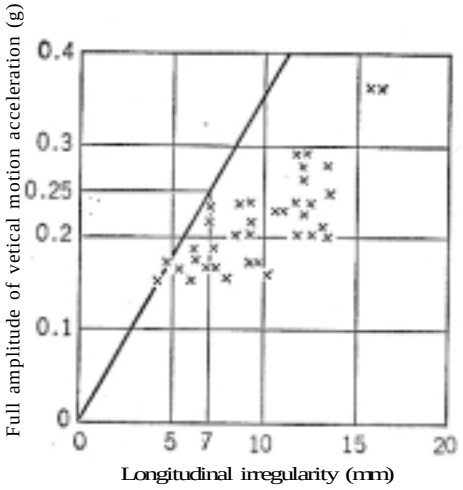


Fig 7.7 Longitudinal irregularity and Vertical Motion

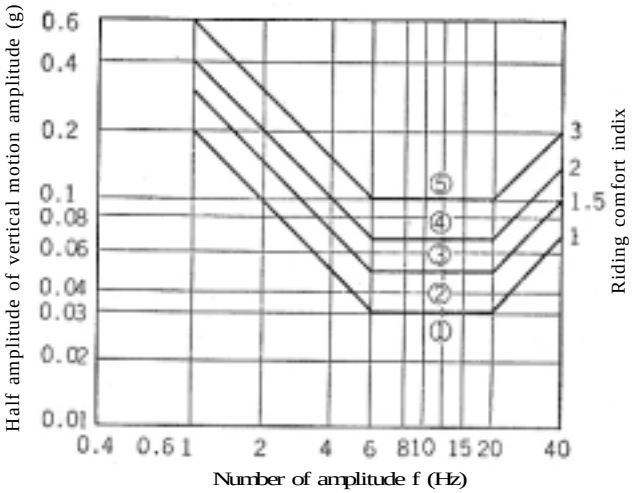


Fig7.8 Vertical motion and riding comfort

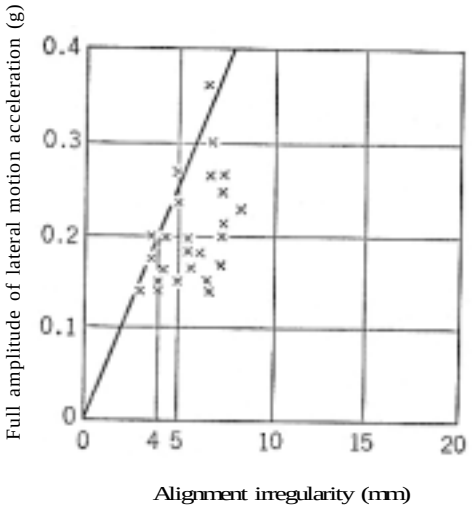


Fig7.9 Alignment irregularity and Lateral motion

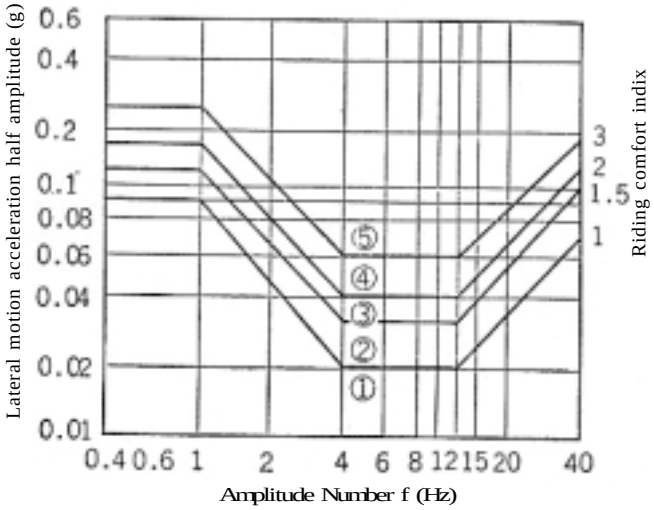


Fig7.10 Lateral motion and riding comfort index

(i) Irregularity of longitudinal level

By plotting the relation of longitudinal irregularity level between the vertical movement acceleration speed of electric railcar of 210 km/h on model line and high-speed track measuring car , and draw line to include all plotted points, it is as shown in Figure 7.7 On the other hand, if the target of riding comfort to be set at the index of 1-2, and since the car motion cycle of Shinkansen is 1-2 c/s, as shown in Figure 7.8, it is found that the vertical acceleration speed is enough to hold down to less than half amplitude of 0.13g (0.25g of full amplitude). Therefore, from Figure 7.7, the longitudinal level irregularity corresponding to 0.25g is 7mm and decided as riding comfort control target value.

(ii) Alignment irregularity

Like as the case of longitudinal irregularity level, the relation between vertical movement acceleration and alignment irregularity is as shown in Figure 7.9 and also, the vertical movement of rolling stock is 1-2 c/s and in order to keep riding comfort of vertical motion index as 1～2, it is found the half amplitude from Figure 7.10 should be hold down less than 0.1g (full amplitude 0.2g), therefore ,according to the Figure 7.9, riding comfort control target value was set as 4mm.

(iii) Other irregularity

As for the irregularity of gauge, as long as the alignment irregularity stay in the range of riding comfort control target value, there is no direct relation with car motion and practically +6, -44mm range, the riding comfort is satisfactory enough to be set as riding comfort control target value.

And, as for the irregularity in cross level (CANT), at actual site, within 5mm and also for track distortion is within 5mm/2.5m and since those values satisfy the riding comfort established as the target value thereafter.

(c) Maintenance planning target value

To conduct the track straightening work, it is necessary to define the standard value in advance for more than what values should the track irregularity be straitened. This value must be bigger than completion target but smaller than riding comfort control target value. However, even within this extent, if it is too close to the completion target value, straightening work volume become large but the improving volume become comparatively small and consequence is loss.

From these reasons, longitudinal level irregularity and track distortion which compose the main work of straightening work, the value was set 1mm small than riding comfort control target value and for other items, they were set as the value of riding comfort control target.

(d) Safety control target value

Safety control target value was established as preventive measure before track irregularity become large to cause disturbing riding comfort or slow speed operation.

This value was set after selecting the intermediate value between aforementioned riding comfort control target value and slow operation target value as described below and if detected this value, emergency repair will be made at night of the same day.

(e) Slowdown target value

Exceeding this value, 200km/h operation will be disturbed. This is the target value to

slow down to 160 –70 km/h and this was obtained from the experience from the past. Should this value once detected, this will be immediately contacted to central maintenance dispatcher from the measuring car to arrange the slowdown operation from the next train and emergency repair will be done at the same night.

1.3 Inspection of track irregularity

1.3.1. Narrow gauge line

Inspection of track irregularity on narrow gauge line is defined to enforce the followings in “Standard regulation of track inspection” (November 1964, notification No.10-Maintenace)

(1) Main track

General tracks and attached turnout of the main track shall be inspected more than 4 times a year on each item of gauge, level, longitudinal level, alignment and track distortion. However as for the track distortion, it is limited to the section where high-speed track inspection car.

Number of inspection of class 4 line where limited express train is not operated, it can be more than 2 times per 1 year.

(2) Side track

General tracks and attached turnout of the side line shall be inspected more than 1 time a year on gauge, level, longitudinal level and alignment. Inspection of track irregularity, on general tracks of main lines, mainly done by high-speed track inspection car and at present, the operating sections reaches almost 97% of entire sections. Also, the number of inspections done by the high-speed track inspection/measuring car is almost as follow:

- Important lines like 120km/h operating sections 6 times per year
- General lines 4 times per year
- Simplified lines among class 4 lines 2 rimes per year

Further, for the high-speed track inspection cars, as from 1978, inspection/measuring recorders were installed to detect compound alignment irregularity and level arranged particularly for freight train on-the-way derailment on all 9 high-speed inspection/measuring cars from 1978.

1.3.2. Shinkansen

Inspection of track irregularity on Shinkansen line is defined to enforce the followings in

“Regulation of inspection standard of Shinkansen track” (Notification on March 1969 –No.4 maintenance)

(1) Main track

Main track out of railway station yard and general track of main track and attached turnouts are to be inspected more than 1 time for 1 month on rail gauge, level ,longitudinal level, alignment and track distortion.

General tracks of sub-main track, deadhead track and arrival/departure pooling track are to be inspected more than 1 time for every 2 months on items indicated above.

(2) Side track

Turnouts connected to the general track of the side line are to be inspected more than 1 time a year on track gauge, level, longitudinal level and alignment.

As for Shinkansen, the track irregularity inspection of main track out of railway station and general track of main line are conducted by “Electric track comprehensive test car” and its interval is 1 time for every 10 days ratio.

Further, high speed track inspection car of Shinkansen is making inspection on long wave longitudinal irregularity and 20m chord track irregularity necessary to control riding comfort. (surface and alignment).

1.4 Sectional control of track irregularity

Track irregularity need individual spot control but also necessary to have sectional control of some length indicating the irregularity condition.

National Railways have had INDEX “P” to indicate the quality of certain section. Details are as follow:

Distribution of numerical value group of track irregularity which was chosen at random form the continuously existed track irregularities in certain section can be generally regarded as formal distribution.

Suppose the frequency of irregularity degree $\chi\pi$, (mm) regarded as $f\pi$, arrange value of numerical value group m and standard variation $\delta$is ;

$$m = \frac{\sum frxr}{\sum fr}$$

$$\delta = \sqrt{\frac{\sum fr(x_r - m)^2}{\sum fr}} = \sqrt{\frac{\sum rxr^2}{fr}} = m^2 = \sqrt{\delta^2 - m^2}$$

Also the distribution of numerical group can be indicated as (Fig 7.11)

$$y = \frac{1}{\sqrt{2n\delta}} \exp - \frac{(x-m)^2}{2\delta^2}$$

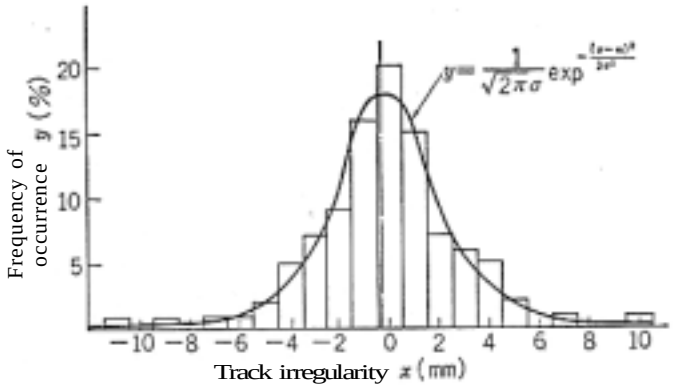


Fig 7.11

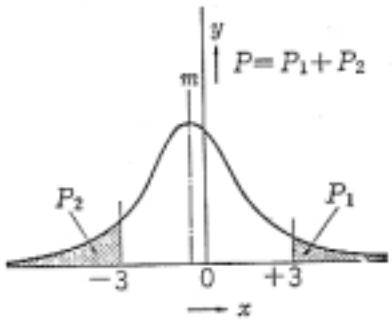


Fig 7.12

As being explained, irregularity condition of certain section can be indicated by 2 index number of m and δ

However, it is more convenient to indicate irregularity group by 1 index number linking 2 index numbers.

As an method, like shown in Figure 7.12, draw certain limited line ±a mm on track irregularity curved line and find the rate % of irregularity exceeding the drawn line. This is the track irregularity index P.

$$P1 = \int_{+a}^{+00} \frac{1}{\sqrt{2\pi\delta}} \exp - \frac{(x-m)^2}{2\delta^2} dz \times 100$$

$$P1 = \int_{-00}^{-a} \frac{1}{\sqrt{2\pi\delta}} \exp - \frac{(x-m)^2}{2\delta^2} dz \times 100$$

$$P = P_1 + P_2$$

Limited value of a, 3 mm has been adopted. Reason of adoption of 3mm, P values are scattered in vast extent from 20 to 60 corresponding the equality of track irregularities and comparison of irregularity condition is easily made. If a value set at large, it makes difficult to make comparison because the extent will be small.

1.4.2 Method to gain P index number of track irregularity

Method to find index number P of track irregularity, as stated below, manual method 1 and 2 and 3rd method by automatic calculation of high speed track inspection car. National Railway is depending on 3rd method.

(1) No.1 Method

To divide responsible area of maintenance sub-depot by each 1km and select more than 120 measuring point equally, M., δ^2 and $\delta$of each divided part using the formula shown in proceeding paragraph.

Next from M and δ, find index P of irregularity by Table 7.7.

In case of seeking P in terms of track sub maintenance depot, track maintenance main depot, by railway operating division, or by line or by line of each grade, from m, , δ and calculate P value of each from this m and δ

$$\overline{m} = \frac{\sum m}{K}$$

$$\delta_{0^2} = \frac{\sum \delta_{0^2}}{K}$$

$$\overline{\delta} = \sqrt{\delta_{0^2} - \overline{m}^2}$$

where K : Number of Portion

(2) 2nd method

This method is the simplified method of No.1 method.

Draw limit line of ±3mm on track irregularity chart recorded by track inspection ear, and every certain interval (generally track length of 7m) check if exceed the limit line and calculate the P value by the following formula.

Table 7.7　m, σ (1)

mσ	0	±0.1	±0.2	±0.3	±0.4	±0.5	±0.6	±0.7	±0.8	±0.9	±1.0	±1.1	±1.2	±1.3	±1.4	±1.5	±1.6	±1.7	±1.8	±1.9	±2.0
0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.6
0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.5	0.8	1.4	2.3
0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.4	0.6	1.0	1.5	2.3	3.3	4.8
0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.5	0.8	1.1	1.6	2.3	3.2	4.3	5.8	7.7
0.8	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.4	0.6	0.9	1.2	1.7	2.3	3.0	4.0	5.2	6.7	8.5	10.6
0.9	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.5	0.7	1.0	1.3	1.7	2.3	3.0	3.8	4.8	6.0	7.4	9.1	11.1	13.3
1.0	0.3	0.3	0.3	0.4	0.5	0.6	0.8	1.1	1.4	1.8	2.3	2.9	3.6	4.5	5.5	6.7	8.1	9.7	11.5	13.6	15.9
1.1	0.6	0.7	0.7	0.8	1.0	1.2	1.5	1.9	2.3	2.8	3.5	4.2	5.1	6.1	7.3	8.6	10.2	11.9	13.8	15.9	18.2
1.2	1.2	1.3	1.4	1.5	1.7	2.0	2.4	2.9	3.4	4.1	4.8	5.7	6.7	7.8	9.1	10.6	12.2	14.0	15.9	18.0	20.3
1.3	2.1	2.1	2.3	2.5	2.7	3.1	3.5	4.1	4.7	5.5	6.3	7.3	8.4	9.6	11.0	12.5	14.1	15.9	17.8	19.9	22.1
1.4	3.2	3.3	3.4	3.6	3.9	4.3	4.8	5.4	6.1	6.9	7.9	8.9	10.1	11.3	12.7	14.3	15.9	17.7	19.6	21.6	22.8
1.5	4.6	4.6	4.7	5.0	5.3	5.8	6.3	7.0	7.7	8.5	9.5	10.6	11.8	13.1	14.5	16.0	17.7	19.4	21.3	23.2	25.3
1.6	6.1	6.1	6.3	6.5	6.9	7.3	7.9	8.6	9.3	10.2	11.2	12.3	13.5	14.8	16.2	17.7	19.3	21.0	22.8	24.7	26.7
1.7	7.8	7.8	8.0	8.2	8.6	9.1	9.6	10.3	11.1	11.9	12.9	14.0	15.2	16.4	17.8	19.1	20.8	22.5	24.3	26.1	28.0
1.8	9.6	9.6	9.8	10.0	10.4	10.9	11.4	12.1	12.8	13.7	14.6	15.7	16.9	18.1	19.4	20.9	22.4	24.0	25.6	27.3	29.2
1.9	11.4	11.5	11.6	11.9	12.2	12.7	13.2	13.9	14.6	15.5	16.4	17.4	18.5	19.7	21.0	22.1	23.8	25.4	27.0	28.8	30.4
2.0	13.4	13.4	13.6	13.8	14.1	14.6	15.1	15.7	16.4	17.3	18.1	19.1	20.2	21.4	22.6	23.9	25.3	26.7	28.3	29.8	31.5
2.1	15.3	15.4	15.5	15.7	16.1	16.5	17.0	17.6	18.3	19.0	19.9	20.8	21.9	22.9	24.1	25.4	26.7	28.1	29.5	31.0	32.6
2.2	17.3	17.3	17.4	17.7	18.0	18.4	18.9	19.4	20.1	20.8	21.6	22.5	23.5	24.5	25.6	26.8	28.1	29.4	30.7	32.2	33.6
2.3	19.2	19.2	19.4	19.6	19.9	20.3	20.7	21.3	21.9	22.6	23.3	24.2	25.0	26.1	27.1	28.2	29.4	30.7	31.9	33.3	34.7
2.4	21.1	21.2	21.3	21.5	21.8	22.1	22.6	23.1	23.6	24.3	25.0	25.8	26.7	27.6	28.6	29.6	30.8	31.9	33.1	34.4	35.7
2.5	23.0	23.1	23.2	23.4	23.6	23.9	24.3	24.8	25.4	26.0	26.7	27.4	28.2	29.1	30.0	31.0	32.1	33.2	34.3	35.5	36.7
2.6	24.9	24.9	25.0	25.2	25.4	25.7	26.1	26.6	27.1	27.6	28.3	29.0	29.8	30.6	31.5	32.4	33.4	34.4	35.5	36.6	37.7
2.7	26.7	26.7	26.8	26.9	27.2	27.5	27.8	28.2	28.7	29.3	29.9	30.5	31.2	32.0	32.8	33.7	34.6	35.6	36.6	37.7	38.8
2.8	28.4	28.4	28.5	28.7	28.9	29.2	29.5	29.9	30.3	30.8	31.4	32.0	32.7	33.4	34.2	35.0	35.9	36.8	37.7	38.7	40.0
2.9	30.1	30.1	30.2	30.3	30.6	30.8	31.1	31.5	31.9	32.4	32.9	33.5	34.1	34.8	35.5	36.3	37.1	38.0	38.8	39.8	40.7
3.0	31.7	31.8	31.8	32.0	32.2	32.4	32.7	33.0	33.4	33.9	34.4	34.9	35.5	36.1	36.8	37.5	38.3	39.1	39.9	40.8	41.7
3.1	33.3	33.4	33.4	33.5	33.7	34.0	34.2	34.5	34.9	35.3	35.8	36.3	36.8	37.5	38.1	38.7	39.5	40.2	41.0	41.8	42.7
3.2	34.8	35.0	35.0	35.1	35.2	35.4	35.7	36.0	36.3	36.7	37.2	37.6	38.1	38.7	39.3	40.0	40.6	41.3	42.1	42.8	43.6
3.3	36.3	36.4	36.4	36.5	36.7	36.9	37.1	37.4	37.7	38.1	38.5	38.9	39.4	40.0	40.4	41.1	41.8	42.4	43.1	43.8	44.6
3.4	37.8	37.8	37.8	37.9	38.1	38.3	38.5	38.8	39.1	39.4	39.8	40.2	40.7	41.1	41.7	42.2	42.8	43.5	44.1	44.8	45.5
3.5	39.1	39.1	39.2	39.3	39.5	39.6	39.8	40.1	40.3	40.7	41.1	41.4	41.9	42.4	42.8	43.3	43.9	44.5	45.1	45.8	46.4
3.6	40.5	40.5	40.5	40.6	40.8	40.9	41.1	41.3	41.6	41.9	42.2	42.6	43.0	43.5	43.9	44.4	44.9	45.5	46.1	46.7	47.3
3.7	41.7	41.8	41.8	41.9	42.1	42.2	42.3	42.6	42.8	43.1	43.4	43.8	44.1	44.6	45.0	45.5	46.0	46.5	47.0	47.6	48.2
3.8	43.0	43.0	43.0	43.1	43.2	43.4	43.6	43.8	44.1	44.3	44.6	44.9	45.2	45.6	46.0	46.5	46.9	47.4	47.9	48.5	49.0
3.9	44.2	44.2	44.2	44.3	44.4	44.6	44.7	44.9	45.1	45.4	45.7	46.0	46.3	46.6	47.1	47.4	47.9	48.4	48.8	49.3	49.9
4.0	45.3	45.4	45.4	45.5	45.6	45.7	45.8	46.0	46.2	46.5	46.7	47.0	47.3	47.7	48.0	48.4	48.8	49.3	49.7	50.2	80.7
4.1	46.4	46.5	46.5	46.5	46.7	46.8	46.9	47.1	47.3	47.5	47.7	48.0	48.3	48.6	49.0	49.3	50.0	50.2	50.6	51.0	51.5
4.2	47.5	47.5	47.5	47.6	47.7	47.7	48.0	48.1	48.4	48.5	48.8	49.0	49.3	49.6	49.9	50.3	50.6	51.0	51.4	51.8	52.3
4.3	48.5	48.6	48.6	48.7	48.7	48.9	49.0	49.1	49.3	49.5	49.7	49.9	50.2	50.5	50.8	51.1	51.5	51.9	52.2	52.6	53.0
4.4	49.5	49.5	49.6	49.6	49.7	49.8	50.0	50.1	50.2	50.5	50.6	50.9	51.1	51.4	51.7	52.0	52.3	52.7	53.0	53.4	53.8
4.5	50.5	50.5	50.6	50.6	50.7	50.7	50.9	51.0	51.2	51.3	51.6	51.8	52.0	52.2	52.5	52.8	53.1	53.5	53.8	54.2	54.5
4.6	51.4	51.5	51.5	51.5	51.6	51.7	51.7	51.9	52.1	52.2	52.4	52.6	52.9	53.0	53.3	53.6	53.9	54.2	54.6	54.9	55.3
4.7	52.3	52.3	52.4	52.4	52.5	52.6	52.7	52.9	52.9	53.1	53.2	53.5	53.7	53.9	54.2	54.4	54.7	55.0	55.3	55.6	55.9
4.8	53.2	53.2	53.2	53.2	53.3	53.4	53.5	53.6	53.8	53.9	54.1	54.3	54.5	54.7	54.9	55.1	55.4	55.7	56.0	56.3	56.6
4.9	54.0	54.0	54.1	54.1	54.2	54.3	54.3	54.5	54.6	54.7	54.9	55.0	55.3	55.4	55.6	55.9	56.1	56.5	56.7	57.0	57.3
5.0	54.9	54.9	54.9	54.9	55.0	55.1	55.1	55.2	55.4	55.5	55.6	55.8	56.0	56.2	56.4	56.6	56.9	57.1	57.4	57.6	57.9

Table 7.7　m, σ (2)

σ \ m	±2.1	±2.2	±2.3	±2.4	±2.5	±2.6	±2.7	±2.8	±2.9	±3.0	±3.1	±3.2	±3.3	±3.4	±3.5	±3.6	±3.7	±3.8	±3.9	±4.0
0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	2.3	15.9	50.0	84.1	97.7	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
0.2	0.0	0.0	0.0	0.1	0.6	2.3	6.7	15.9	30.9	50.0	69.2	84.1	93.3	97.7	99.4	99.9	100.0	100.0	100.0	100.0
0.3	0.1	0.4	1.0	2.3	4.8	9.1	15.9	25.2	37.0	50.0	63.0	74.8	84.1	90.9	95.2	97.7	99.0	99.6	99.9	100.0
0.4	1.2	2.3	4.0	6.7	10.6	15.9	22.7	30.9	40.1	50.0	59.9	69.2	77.3	84.1	89.4	93.3	96.0	97.7	98.8	99.4
0.5	3.6	5.5	8.1	11.5	15.9	21.3	27.4	34.5	42.1	50.0	57.9	65.5	72.6	78.8	84.1	88.5	91.9	94.5	96.4	97.7
0.6	6.7	9.1	12.2	15.9	20.3	25.2	30.9	37.0	43.4	50.0	56.6	63.0	69.2	74.8	79.8	84.1	87.8	90.9	93.3	95.2
0.7	9.9	12.7	15.9	19.6	22.8	28.4	33.4	38.7	44.3	50.0	55.7	61.3	66.6	71.6	77.2	80.4	84.1	87.4	90.1	92.4
0.8	13.0	15.9	19.1	22.7	26.6	30.9	35.4	40.1	45.0	50.0	55.0	59.9	64.6	69.2	73.4	77.3	80.9	84.1	87.0	89.4
0.9	15.9	18.7	21.8	25.2	28.9	32.9	37.0	41.2	45.6	50.0	54.4	58.8	63.0	67.1	71.1	74.8	78.2	81.3	84.1	86.7
1.0	18.4	21.2	24.2	27.4	30.9	34.5	38.2	42.1	46.1	50.0	53.9	57.9	61.8	65.5	69.2	72.6	75.8	78.8	81.6	84.1
1.1	20.7	23.4	26.2	29.3	32.5	35.8	39.2	42.8	46.4	50.0	53.6	57.2	60.8	64.2	67.5	70.7	73.8	76.6	79.3	81.0
1.2	22.7	25.2	28.0	30.9	33.8	37.0	40.1	43.4	46.7	50.0	53.3	56.6	59.9	63.0	66.2	69.2	72.0	74.8	77.3	79.8
1.3	24.5	26.9	29.5	32.2	35.0	37.9	40.9	43.9	46.9	50.0	53.1	56.1	59.1	62.1	65.0	67.8	70.5	73.1	75.6	77.9
1.4	26.0	28.4	30.9	33.4	36.1	38.7	41.5	44.3	47.2	50.0	52.8	55.7	58.5	61.3	64.0	66.6	69.2	71.6	74.0	77.2
1.5	27.5	29.7	32.1	34.5	37.0	39.5	42.1	44.7	47.3	50.0	52.7	55.3	57.9	60.5	63.0	65.5	68.0	70.3	72.6	74.8
1.6	28.7	30.9	33.1	35.4	37.8	40.2	42.6	45.0	47.5	50.0	52.5	55.0	57.5	59.9	62.3	64.6	66.9	69.2	71.3	73.4
1.7	30.0	32.0	34.1	36.3	38.5	40.8	43.1	45.3	47.7	50.0	52.4	54.7	57.0	59.3	61.6	63.8	66.0	68.1	70.2	72.2
1.8	31.1	33.1	35.0	37.1	39.2	41.3	43.5	45.6	47.8	50.0	52.3	54.5	56.7	58.8	61.0	63.1	65.1	67.2	69.2	71.1
1.9	32.1	34.0	35.9	37.8	39.8	41.8	43.9	45.9	48.0	50.1	52.2	54.2	56.3	58.4	60.4	62.4	64.4	66.3	68.2	70.1
2.0	33.2	34.9	36.7	38.6	40.4	42.3	44.3	46.3	48.2	50.1	52.1	54.0	56.0	58.0	59.9	61.8	63.7	65.6	67.4	69.2
2.1	34.2	35.8	37.5	39.3	41.0	42.9	44.6	46.5	48.3	50.2	52.1	53.9	55.8	57.7	59.5	61.3	63.1	64.9	66.7	68.3
2.2	35.2	36.7	38.3	40.0	41.6	43.3	45.1	46.8	48.6	50.3	52.1	53.9	55.6	57.4	59.1	60.9	62.6	64.3	66.0	67.6
2.3	36.1	37.6	39.1	40.6	42.3	43.8	45.5	47.1	48.8	50.5	52.1	53.8	55.5	57.2	58.8	60.5	62.1	63.8	65.4	66.9
2.4	37.1	38.5	39.9	41.4	42.9	44.4	45.9	47.5	49.0	50.6	52.2	53.8	55.4	57.0	58.6	60.2	61.8	63.3	64.8	66.4
2.5	38.0	39.3	40.7	42.1	43.5	44.9	46.4	47.8	49.3	50.8	52.3	53.9	55.4	56.9	58.4	59.9	61.4	62.9	64.4	65.8
2.6	39.0	40.2	41.4	42.8	44.1	45.4	46.8	48.2	49.6	51.1	52.5	53.9	55.4	56.8	58.2	59.7	61.2	62.5	63.9	65.4
2.7	39.9	41.1	42.2	43.5	44.8	46.0	47.3	48.6	50.0	51.3	52.7	54.0	55.4	56.8	58.2	59.5	61.0	62.2	63.6	64.9
2.8	40.8	41.9	43.1	44.2	45.4	46.6	47.8	49.1	50.3	51.6	52.9	54.2	55.5	56.8	58.1	59.4	60.7	62.0	63.3	64.6
2.9	41.8	42.8	43.9	44.9	46.1	47.2	48.4	49.5	50.7	51.9	53.1	54.4	55.6	56.9	58.1	59.3	60.7	61.8	63.0	64.3
3.0	42.7	43.6	44.7	45.7	46.7	47.8	48.9	50.0	51.1	52.3	53.4	54.6	55.8	56.9	58.1	59.3	60.5	61.7	62.9	64.0
3.1	43.6	44.5	45.4	46.4	47.4	48.4	49.4	50.5	51.6	52.7	53.7	54.9	56.0	57.1	58.2	59.4	60.5	61.6	62.7	63.9
3.2	44.5	45.3	46.2	47.1	48.1	49.0	50.0	51.0	52.0	53.0	54.1	55.1	56.2	57.3	58.3	59.4	60.5	61.6	62.6	63.7
3.3	45.4	46.2	47.0	47.9	48.7	49.7	50.6	51.5	52.5	53.5	54.4	55.5	56.5	57.5	58.5	59.5	60.5	61.5	62.6	63.6
3.4	46.2	47.0	47.8	48.6	49.4	50.3	51.2	52.1	53.0	53.9	54.8	55.8	56.7	57.7	58.6	59.6	60.6	61.6	62.6	63.5
3.5	47.1	47.8	48.6	49.4	50.1	50.9	51.7	52.6	53.4	54.3	55.2	56.1	57.0	57.9	58.9	59.8	60.7	61.7	62.6	63.5
3.6	48.0	48.6	49.4	50.1	50.8	51.6	52.4	53.1	53.9	54.8	55.6	56.5	57.3	58.2	59.1	60.0	60.8	61.7	62.6	63.6
3.7	48.0	49.5	50.0	50.8	51.5	52.2	52.9	53.7	54.5	55.2	56.0	56.8	57.7	58.4	59.3	60.2	61.1	61.9	62.7	63.6
3.8	49.6	50.2	50.9	51.5	52.1	52.8	53.5	54.2	55.0	55.7	56.5	57.3	58.0	58.8	59.6	60.4	61.2	62.0	62.8	63.7
3.9	50.4	51.0	51.6	52.2	52.8	53.5	54.1	54.8	55.5	56.2	56.9	57.6	58.4	59.1	59.9	60.7	61.4	62.2	63.0	63.7
4.0	51.2	51.8	52.3	52.9	53.5	54.1	54.7	55.4	56.0	56.7	57.4	58.1	58.8	59.5	60.2	60.9	61.7	62.4	63.1	63.9
4.1	52.0	52.5	53.0	53.6	54.1	54.7	55.3	55.9	56.6	57.2	57.8	58.5	59.1	59.8	60.5	61.2	61.9	62.6	63.3	64.0
4.2	52.8	53.3	53.7	54.2	54.8	55.3	55.9	56.5	57.0	57.7	58.3	58.9	59.5	60.2	60.8	61.5	62.2	62.8	63.5	64.2
4.3	53.5	54.0	54.4	54.9	55.4	55.9	56.5	57.0	57.6	58.2	58.7	59.3	59.9	60.6	61.2	61.8	62.4	63.1	63.7	64.4
4.4	54.2	54.6	55.1	55.6	56.0	56.5	57.1	57.6	58.1	58.6	59.5	59.7	60.3	60.9	61.5	62.1	62.7	63.3	64.0	64.6
4.5	54.9	55.3	55.7	56.2	56.7	57.1	57.6	58.1	58.6	59.1	59.6	60.2	60.8	61.3	61.9	62.4	63.0	63.6	64.2	64.8
4.6	55.6	56.0	56.4	56.9	57.2	57.7	58.2	58.6	59.0	59.6	60.1	60.6	61.1	61.7	62.2	62.7	63.3	63.9	64.5	65.0
4.7	56.3	56.7	57.0	57.4	57.9	58.3	58.7	59.1	59.6	60.1	60.6	61.1	61.6	62.1	62.6	63.1	63.6	64.1	64.7	65.3
4.8	56.9	57.3	57.7	58.1	58.5	58.9	59.2	59.7	60.1	60.6	61.0	61.5	62.0	62.4	62.9	63.4	63.9	64.5	65.0	65.5
4.9	57.6	58.0	58.3	58.7	59.0	59.4	59.8	60.2	60.6	61.0	61.5	61.9	62.4	62.9	63.3	63.8	64.3	64.7	65.3	65.7
5.0	58.3	58.6	58.9	59.2	59.6	60.0	60.3	60.7	61.1	61.5	61.9	62.4	62.8	63.0	63.7	64.1	64.6	65.1	65.5	66.0

$$P_1 = \frac{f}{n} \times 100$$

$$P_2 = \frac{f_-}{n} \times 100$$

$$p = p_1 + p_2$$

where f+ and f- : Number exceeding 3 mm and – 3mm

n : number of measuring point

(3) No. 3 Method

From the number of measuring point n which was outputted by automatic calculating device of high speed inspection car and from number f which exceed the ±3mm, P value is calculated by the following formula

$$P = \frac{f}{n} \times 100$$

Number of measuring points are 1,000 measuring points for each 500m of track length at present.

This out-put is measured for in every maintenance sub-depot when running the track measuring car. Also, recorded magnetic type of track irregularity gained while running the measuring car will be handled on ground to type out the P value for every 500 of route.

1.4.3 Sectional control by P value

(1) Maintenance condition of track is preferably kept equalized as much as possible by each place

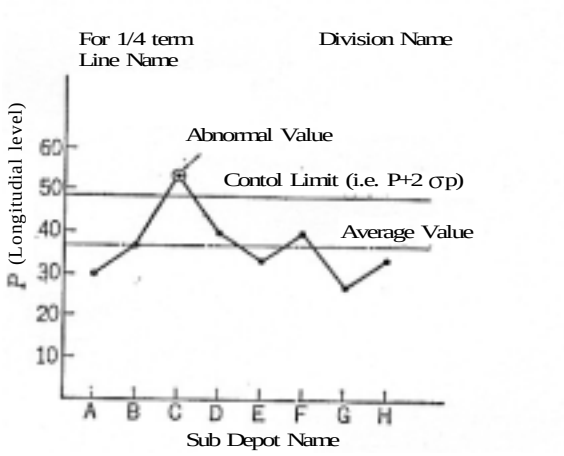


Fig.7.13 Sample of P Value control drawing

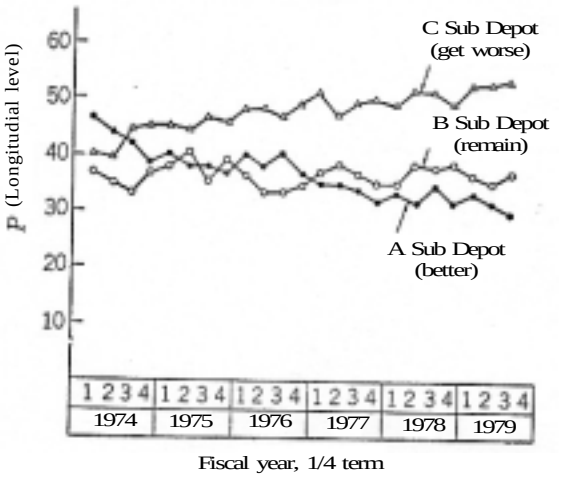


Fig.7.14 Sample of P Value progress drawing

For example, as shown in Fig. 7.13 control drawing for every 500 m lot at certain time or P value of

each maintenance sub-depot be placed side by side in horizontally can be arranged. This control drawing can be made in every 500 m, every class of lines as well.

(2) P value progress drawing

In order to grasp the variation of long term P value, progress drawing shall be prepared.

As shown in Figure 7.14, for every maintenance main depot or for every line, indicate the P value progress in every quarter to judge the tendency of P value weather change for the worse, change for the better or remaining condition.

If the P value in worsening condition, investigation shall be made and countermeasure shall be studied.

Appendix 11

Comparison of Axle Counting System with Track Circuit

Appendix 11

Comparison of Axle Counting System with track circuit

It should be determined which system is suitable as block equipments or railway crossing control equipments in a railway section after considering the following various conditions or items.

1. Reliability
2. Block length
3. Track and track bed
4. Track maintenance work
5. Maintenance of system
6. Construction cost

7. Additional equipment

Boundary of the track circuits is determined in the locations of the rail joint insulators.
So it is necessary to install a pair of the rail joint insulations and signal bonds in the track circuit.
In axle counting system, boundaries of the block sections would be designated at any position.

8. Damages due to the track maintenance works

Current axle counting systems are electronic type and become compact.
Accordingly, it is not necessary to remove them in track maintenance work.
However it is necessary to take precaution not to be broken by the track maintenance works.

9. Detection of rail break-down

It is necessary for safety of railway transportation to detect the rail break-down quickly.
The track circuit system is applicable for this issue.

10. Detection of Rolling-stock numbers on the track

In axle counting system, it is possible to indicate number of rolling-stocks which are holding at the storage siding.

11. Counting errors

Counting errors may occur on the mal-track bed.

Recently, the some errors have been eliminated through usage of electronic counting treadle.

However it is inevitable to consider track and track bed, the type of rolling stocks and the shape of wheels running on a track.

12. Sensibility of train shunt

In track circuit it is inevitable to consider the influence of fluctuation of leakage conductance.

Sensibility of train shunt is the target to judge the performance of track circuit, and it is indicated generally by the maximum value of resistance, when the de-energized contacts track relay in case of closed track circuit, the energized contacts in case of 0pen track shall just meet, by means of shunting the rails by resistance at any site of track circuit.

The maximum value of resistance is necessary to be kept over the specified value.

Sensibility of train shunt shall be maintained.

13. Power characteristics

The power consumption of track circuits depend on the span of track circuits.

The energy requirement of axle counting system is lower in comparison with track circuits and independent of the span.

In axle counting system, it is inevitable to take special countermeasures against power failure due to necessity maintaining information just before power failure.