

# SR 710 North Study

## Draft Project Report – List of Attachments

07 - LA - 710, PM 26.7/32.1T  
EA: 07 - 187900  
EFIS: 0700000191

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<b>Attachment J</b>	<b>Freeway Tunnel Alternative – Single-Bore Tunnel</b>
	J-1a: Freeway Tunnel – Single-Bore Tunnel Alternative Exhibit J-1b: Existing SR 710 Typical Section at South Portal J-1c: Existing SR 710 Typical Section at North Portal J-1d: Single-Bore Tunnel Cross Section J-1e: Single-Bore Tunnel Cut-and-Cover/Bored Tunnel Transition Section J-2: Design Plans – Proposed Freeway Single-Bore Tunnel Improvements

<b>Attachment K</b>	<b>Advance Planning Study Reports</b>
	K-1: TSM/TDM Alternative Advance Planning Study Reports; K-1a: SR 710 Connector Underpass K-1b: Garfield Avenue Bridge (Widen) K-2: Freeway Tunnel Alternative – Dual-Bore Tunnel Advance Planning Study Reports; K-2a: Ramona Boulevard Undercrossing (Widen) K-2b: Route 710/10 Separation (Widen) K-2c: Laguna Basin Bridge K-2d: Hellman Avenue Overcrossing K-2e: Valley Boulevard Overcrossing K-2f: Cut-and-Cover Tunnel (South Portal) K-2g: Cut-and-Cover Tunnel (North Portal) K-2h: Green Street OC K-3: Freeway Tunnel Alternative – Single-Bore Alternative Advance Planning Study Reports; K-3a: Laguna Basin Bridge K-3b: Hellman Avenue Overcrossing K-3c: Valley Boulevard Overcrossing K-3d: Cut-and-Cover Tunnel (South Portal) K-3e: Cut-and-Cover Tunnel (North Portal) K-3f: Green Street Overcrossing
<b>Attachment L</b>	<b>Preliminary Cost Estimates (Build Alternatives)</b>
	L-1: TSM/TDM Alternative Preliminary Cost Estimate L-2: BRT Alternative Preliminary Cost Estimate L-3: LRT Alternative Preliminary Cost Estimate L-4: Freeway Tunnel Dual-Bore Alternative Preliminary Cost Estimate L-5: Freeway Tunnel Single-Bore Alternative Preliminary Cost Estimate
<b>Attachment M</b>	<b>Transportation Management Plan (TMP) Data Sheet (Build Alternatives)</b>
	M-1: TSM/TDM Alternative TMP Data Sheet M-2: BRT Alternative TMP Data Sheet M-3: LRT Alternative TMP Data Sheet M-4: Freeway Tunnel Dual-Bore Alternative TMP Data Sheet M-5: Freeway Tunnel Single-Bore Alternative TMP Data Sheet
<b>Attachment N</b>	<b>Right-of-Way (ROW) Data Sheets (Build Alternatives)</b>
	N-1: TSM/TDM Alternative ROW Data Sheet N-2: BRT Alternative ROW Data Sheet N-3: LRT Alternative ROW Data Sheet N-4: Freeway Tunnel Dual-Bore Alternative ROW Data Sheet N-5: Freeway Tunnel Single-Bore Alternative ROW Data Sheet
<b>Attachment O</b>	<b>Project Risk Register (2014 – In Progress)</b>
<b>Attachment P</b>	<b>Stormwater Data Report – Appendix E</b>
<b>Attachment Q</b>	<b>Draft Environmental Document (under separate cover) – To be provided</b>

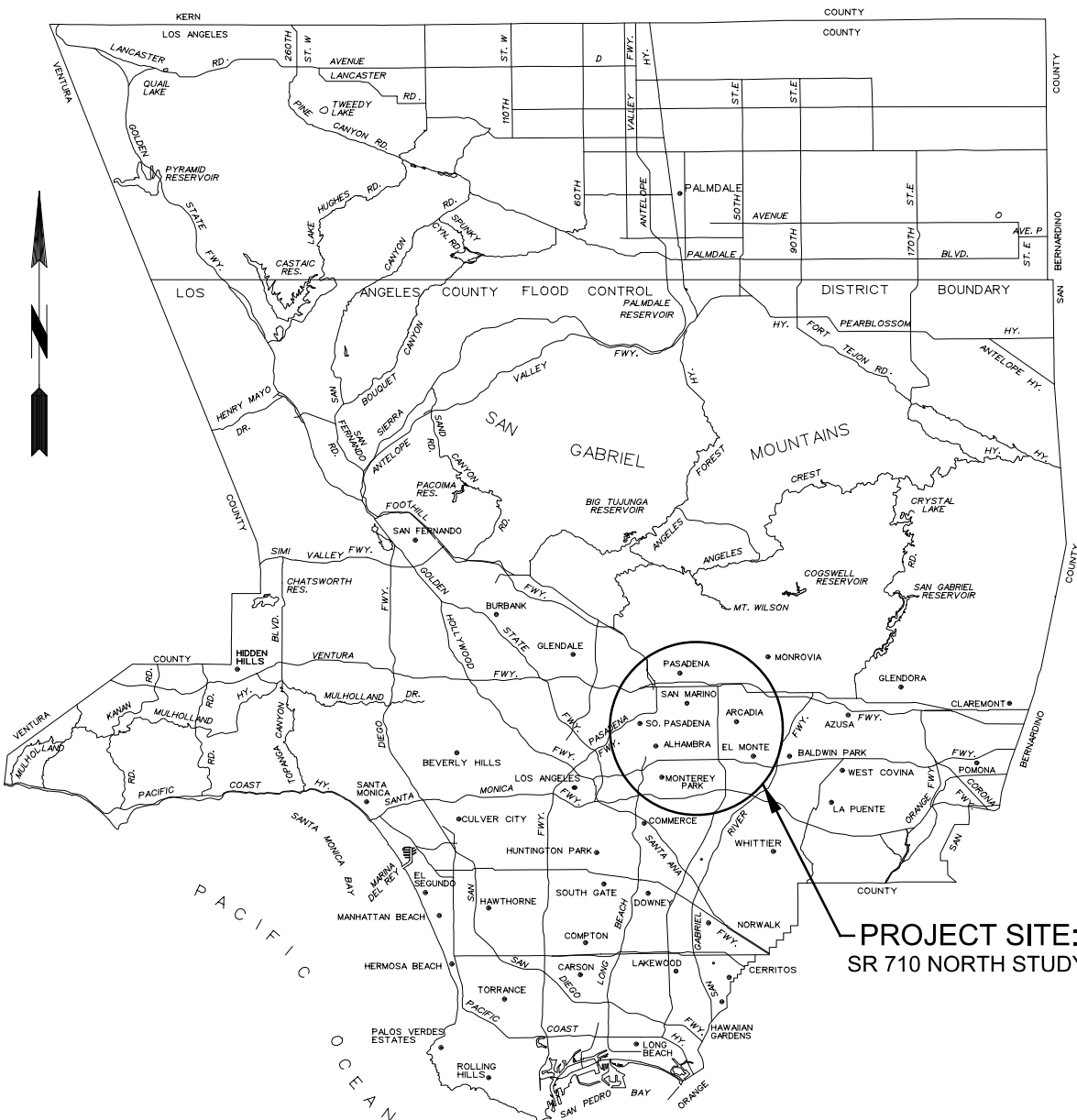


**Attachment A  
Vicinity Map**

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PROJECT LOCATION



ATTACHMENT A - VICINITY MAP

SR 710 NORTH STUDY  
 07-LA-710 (SR 710)  
 EA 187900  
 EFIS 0700000191

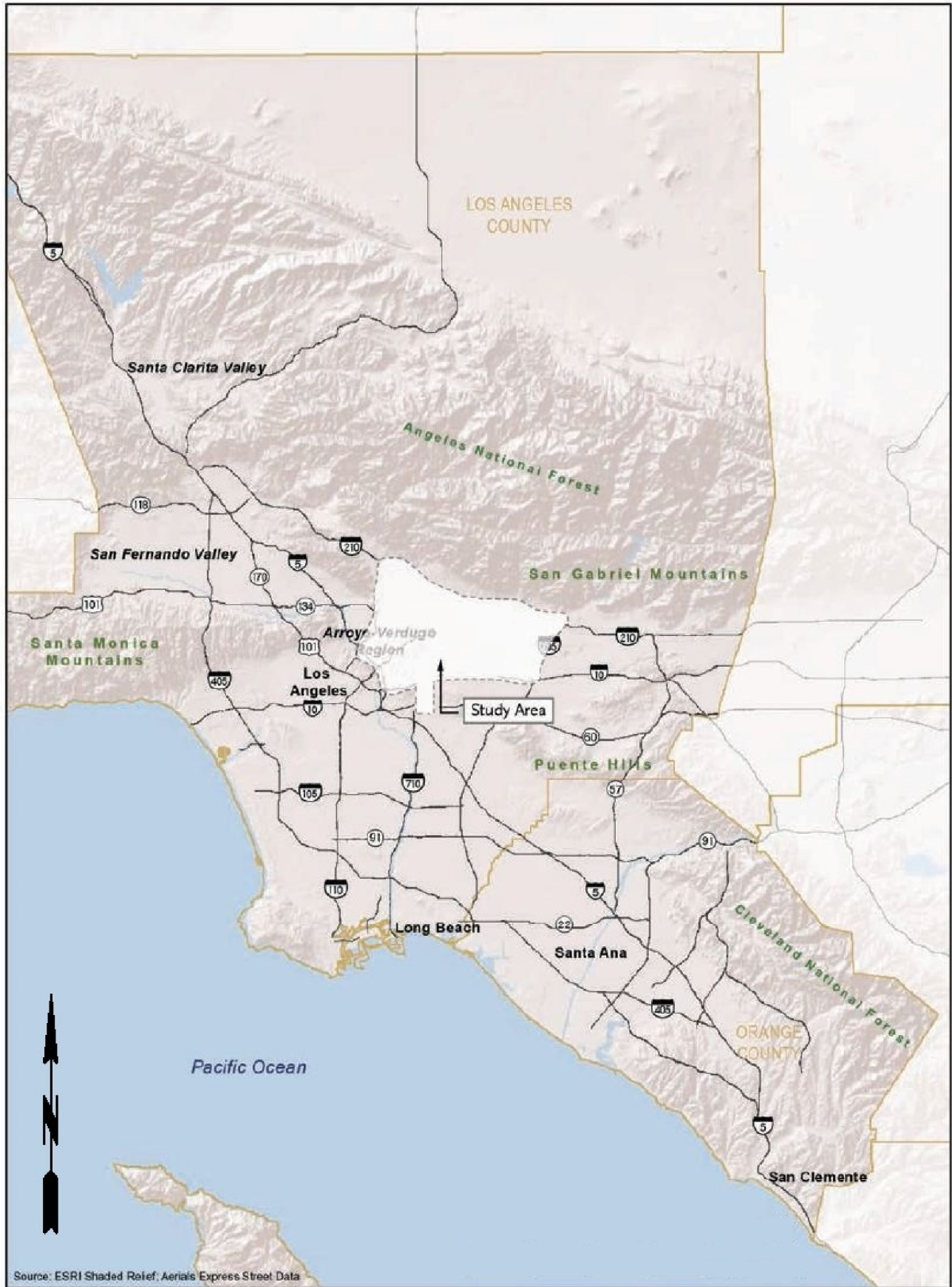


**Attachment B  
Location Map**

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# ATTACHMENT B - LOCATION MAP

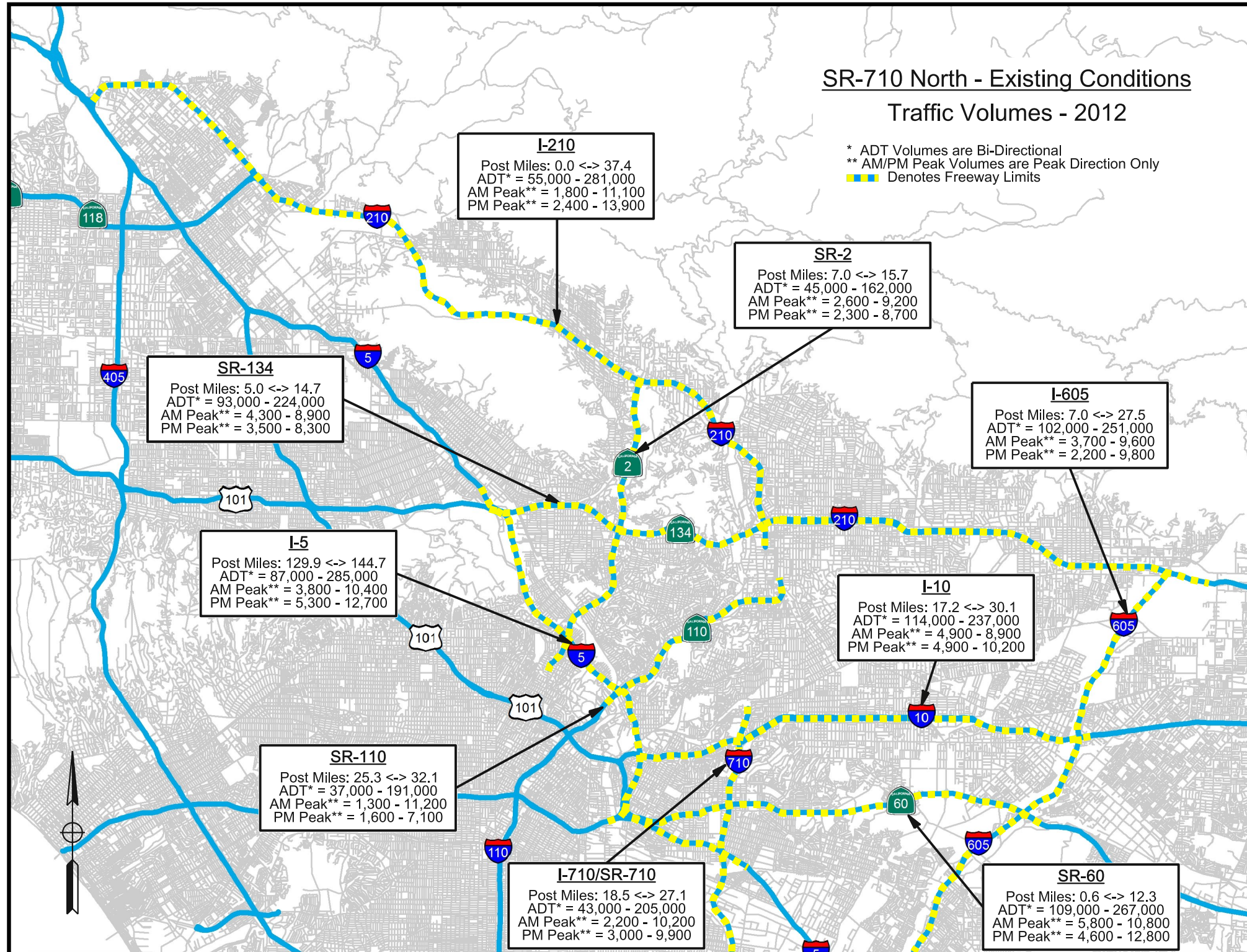
SR 710 NORTH STUDY  
 07-LA-710 (SR 710)  
 EA 187900  
 EFIS 0700000191

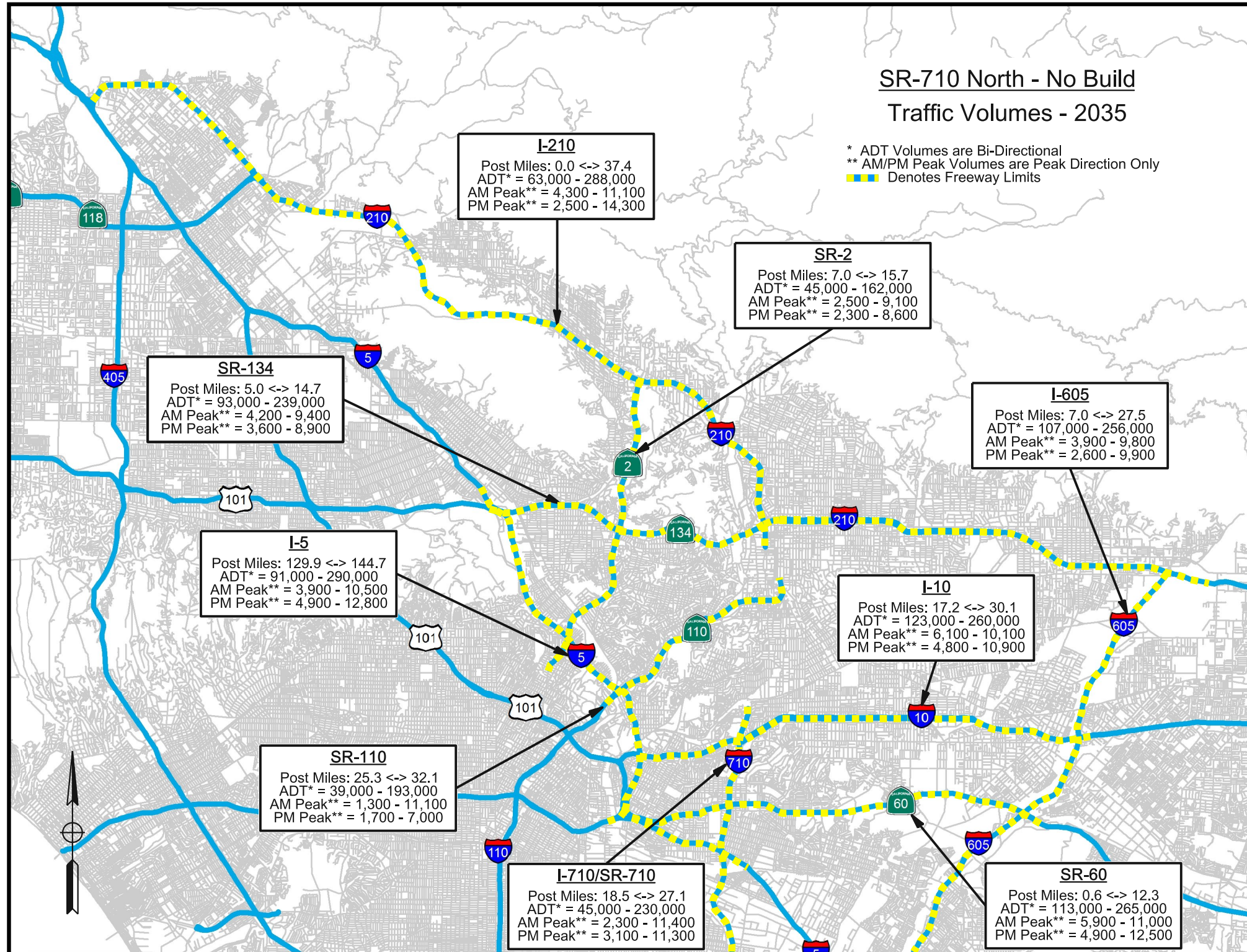


**Attachment C**  
**Traffic Volume Exhibits**

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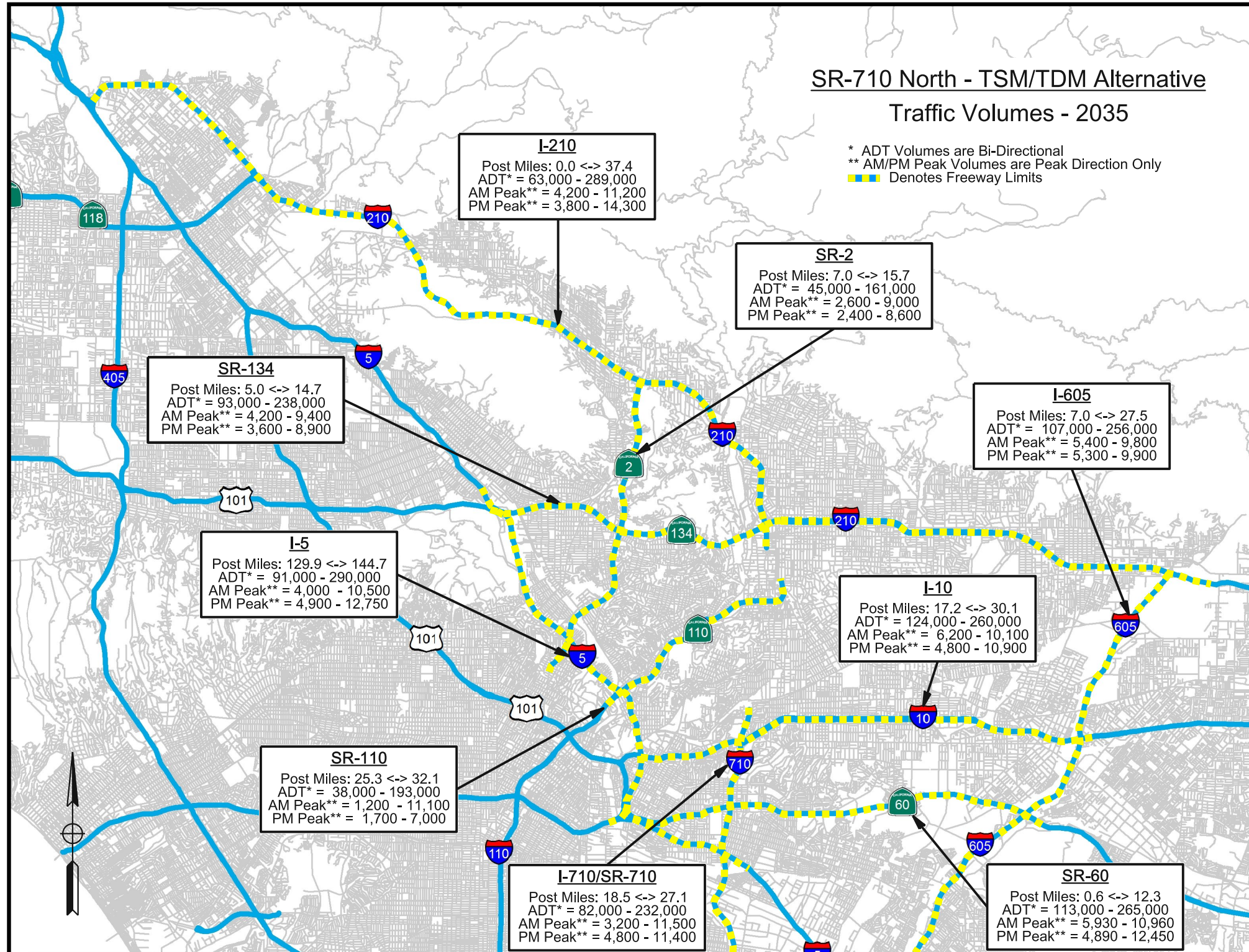


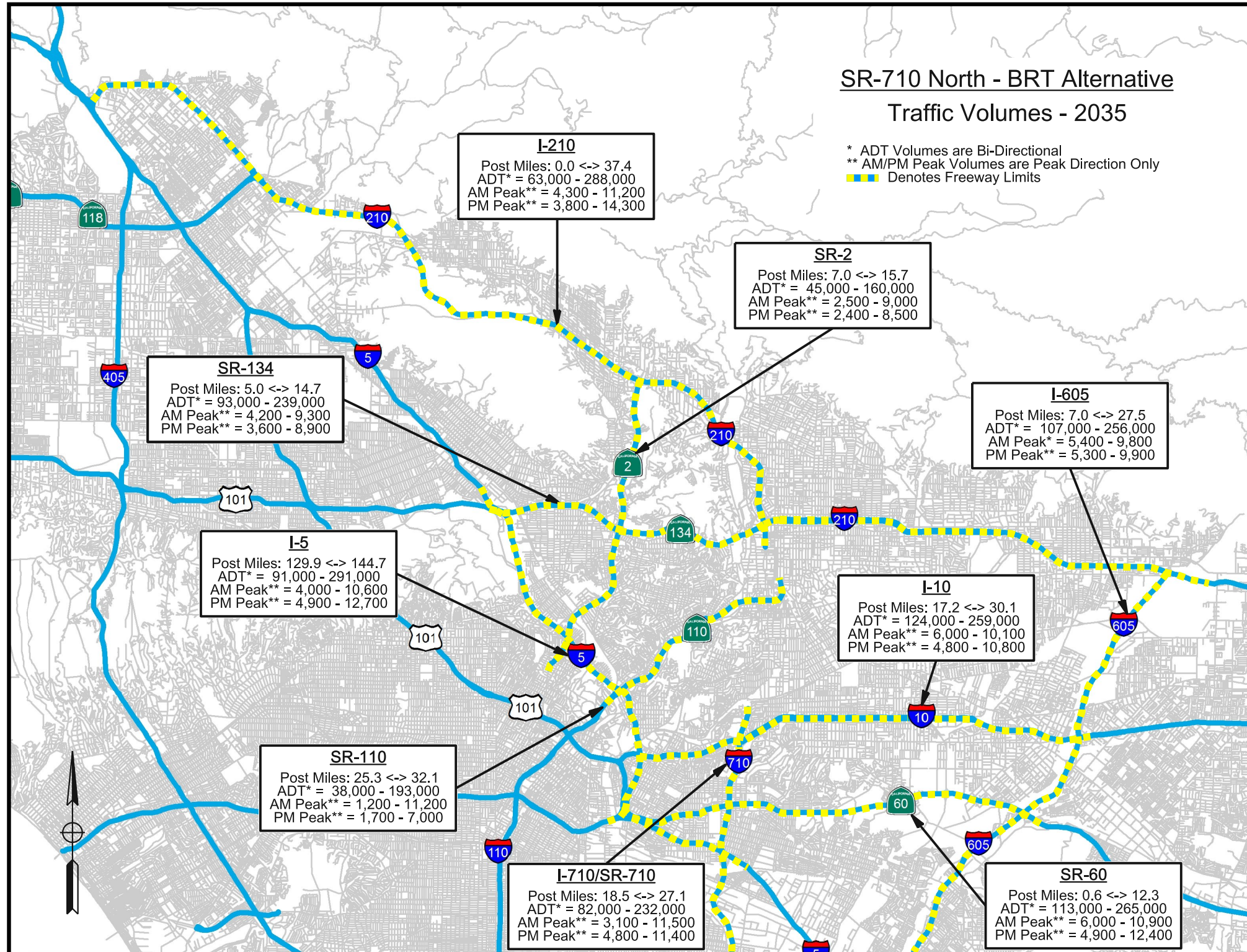


## SR-710 North - TSM/TDM Alternative

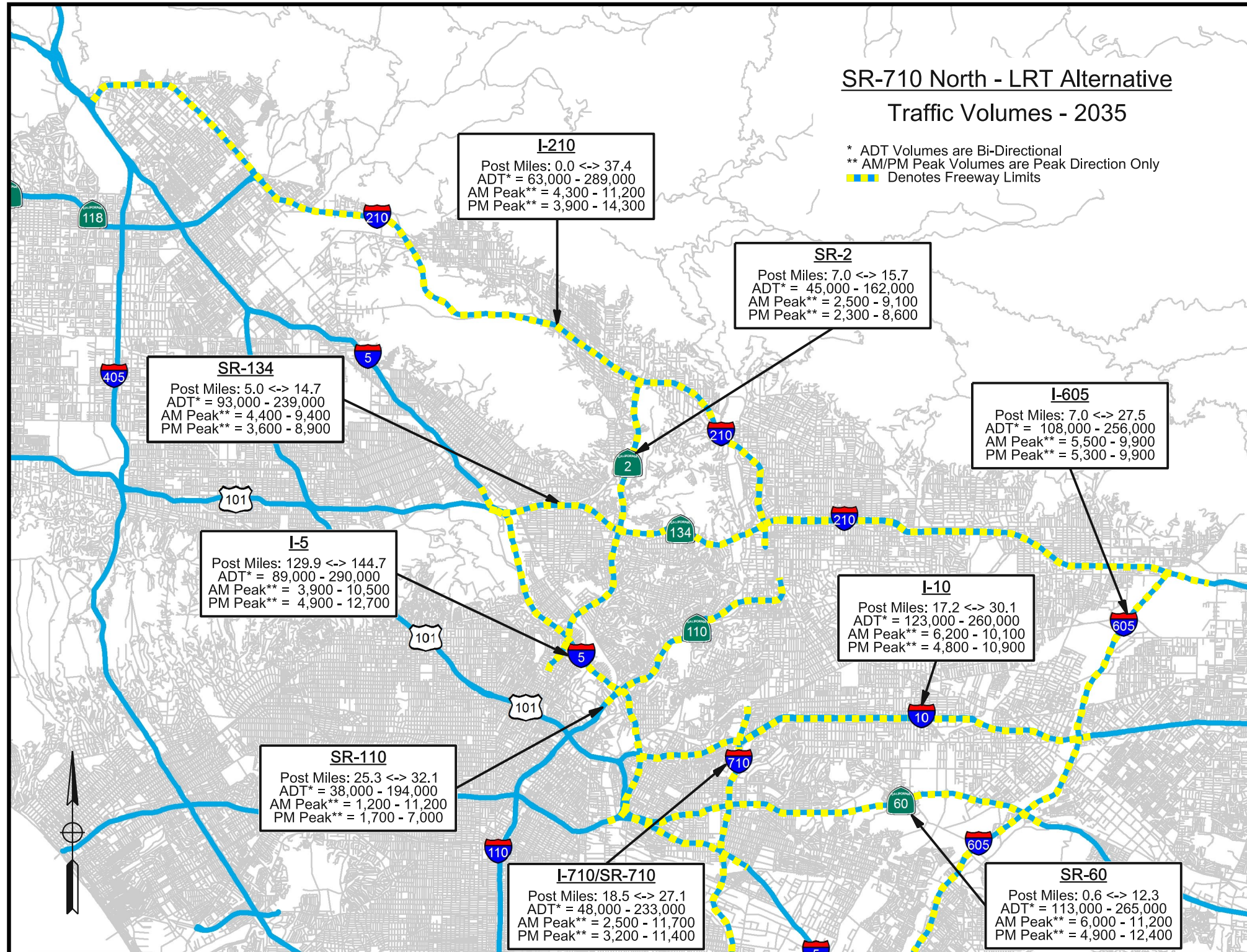
### Traffic Volumes - 2035

\* ADT Volumes are Bi-Directional  
 \*\* AM/PM Peak Volumes are Peak Direction Only  
 ■ ■ ■ Denotes Freeway Limits





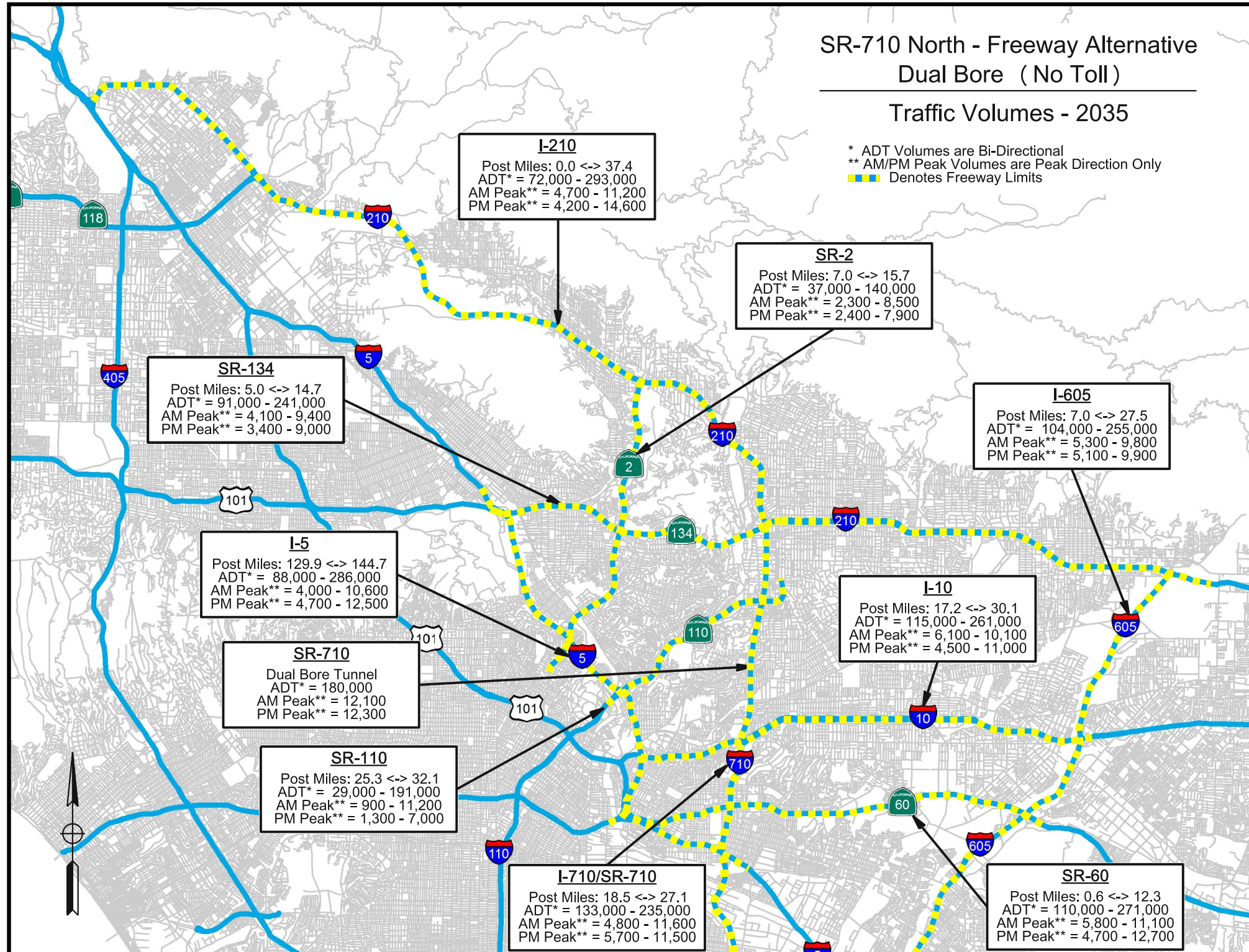




SR-710 North - Freeway Alternative  
Dual Bore (No Toll)

Traffic Volumes - 2035

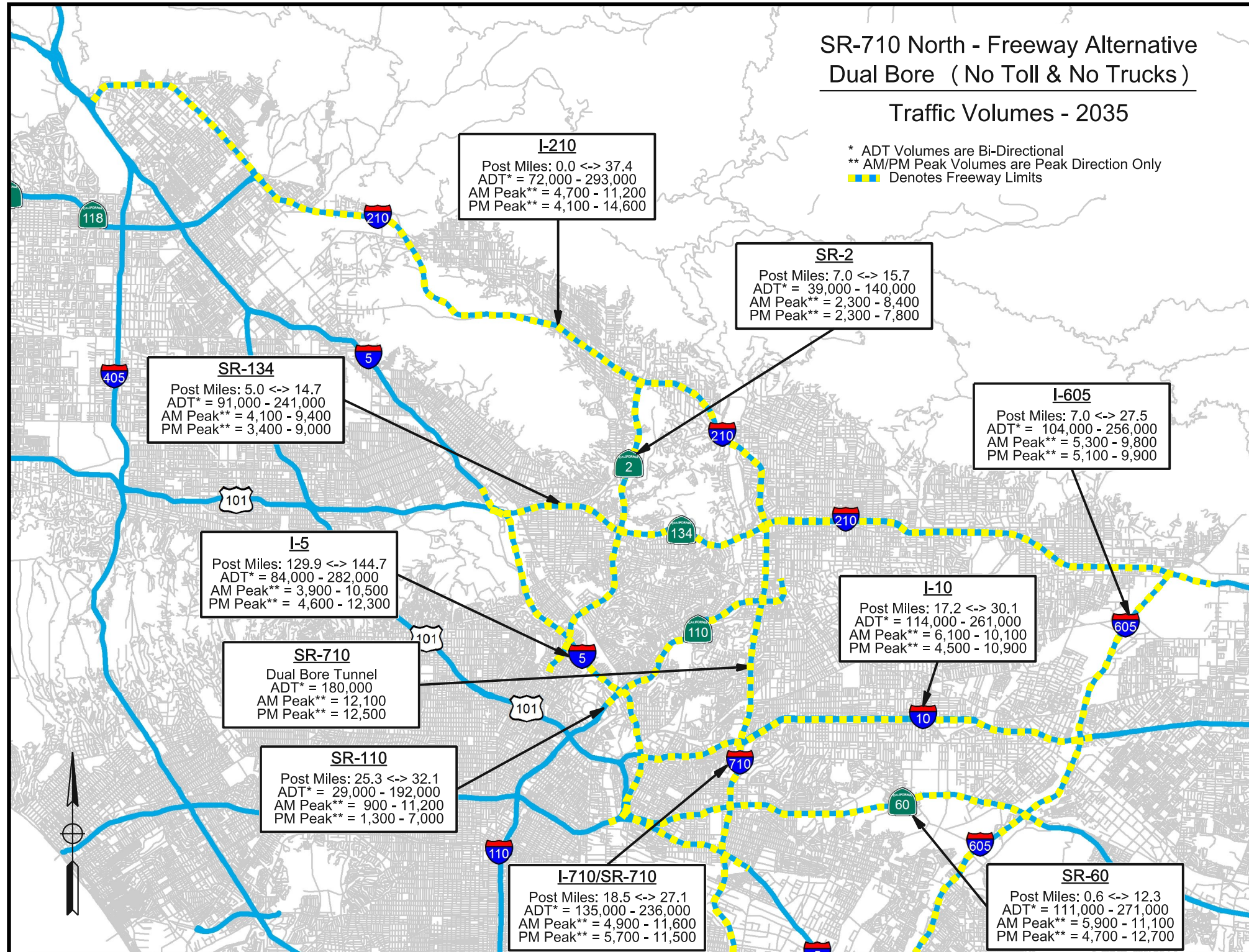
\* ADT Volumes are Bi-Directional  
\*\* AM/PM Peak Volumes are Peak Direction Only  
■ ■ ■ Denotes Freeway Limits



# SR-710 North - Freeway Alternative Dual Bore ( No Toll & No Trucks )

## Traffic Volumes - 2035

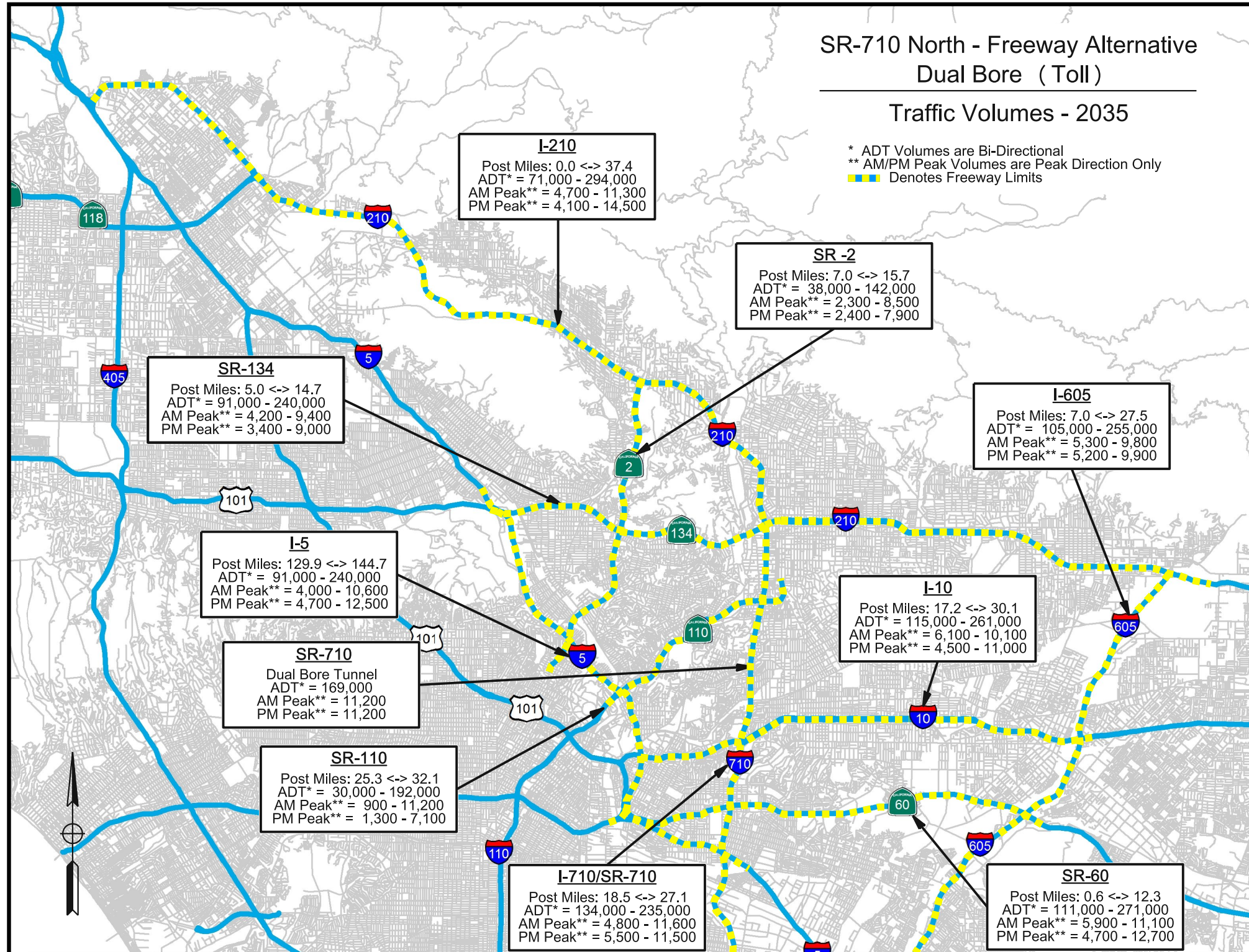
\* ADT Volumes are Bi-Directional  
 \*\* AM/PM Peak Volumes are Peak Direction Only  
 ■ ■ ■ Denotes Freeway Limits



# SR-710 North - Freeway Alternative Dual Bore (Toll)

## Traffic Volumes - 2035

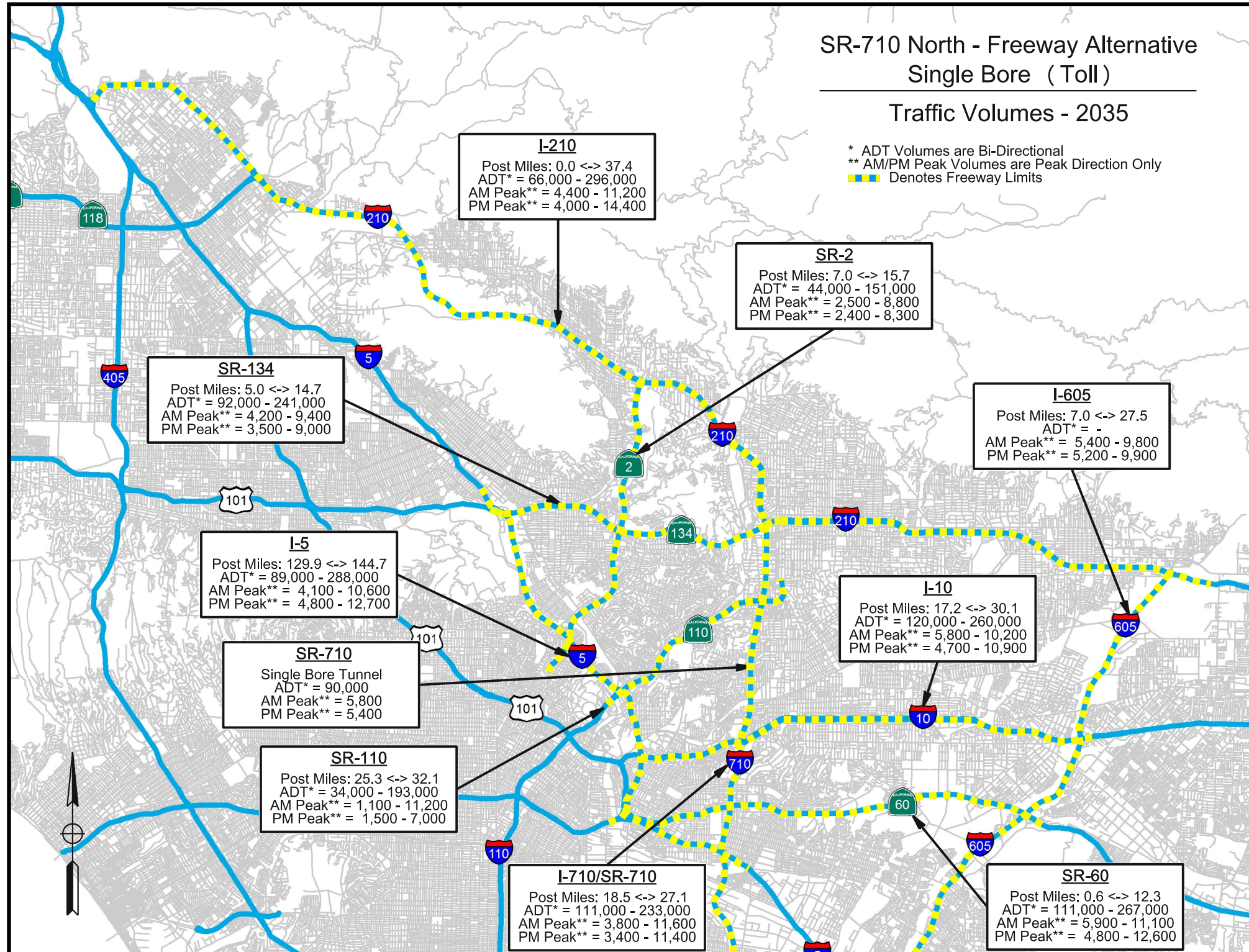
\* ADT Volumes are Bi-Directional  
 \*\* AM/PM Peak Volumes are Peak Direction Only  
 ■ ■ ■ Denotes Freeway Limits



# SR-710 North - Freeway Alternative Single Bore (Toll)

## Traffic Volumes - 2035

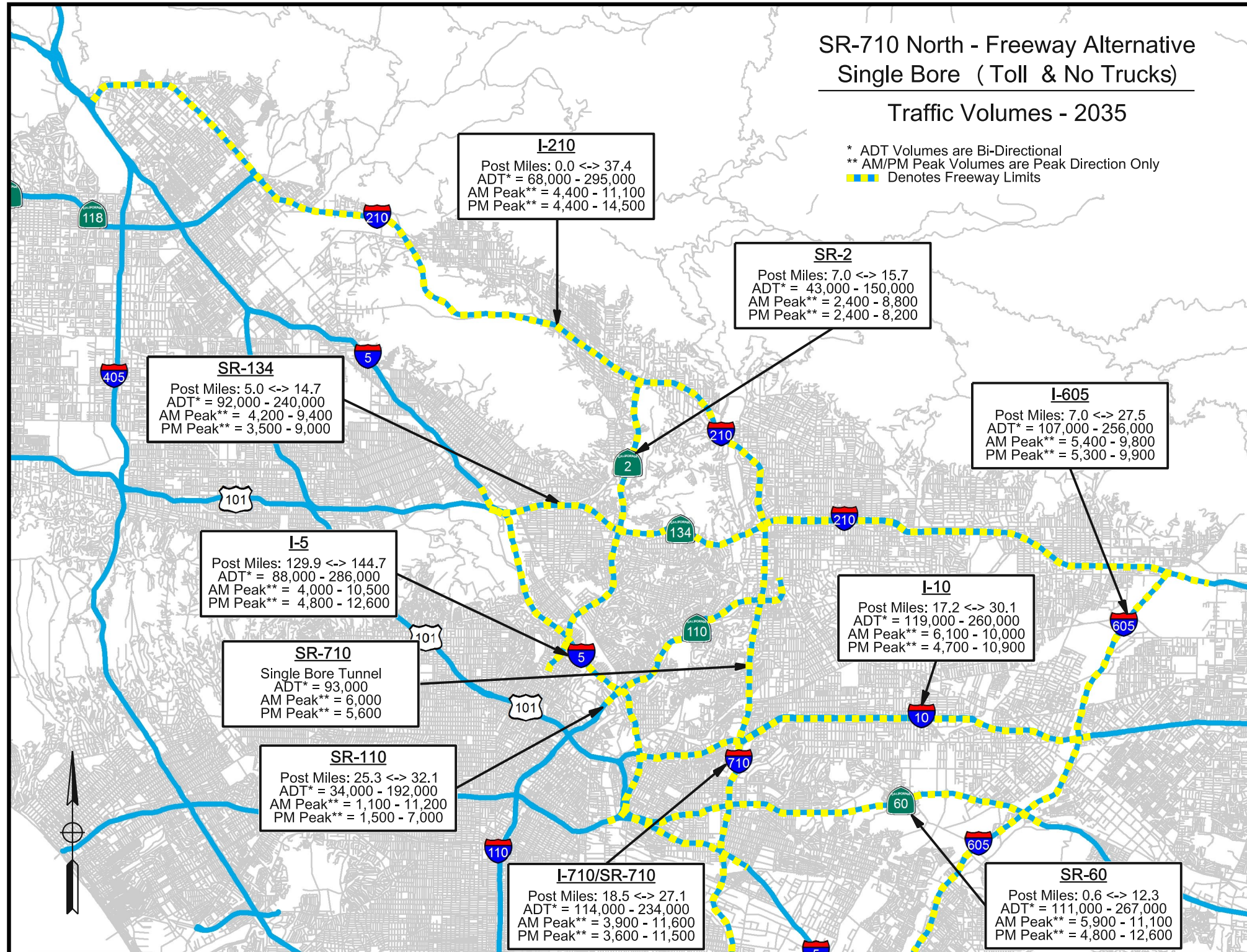
\* ADT Volumes are Bi-Directional  
 \*\* AM/PM Peak Volumes are Peak Direction Only  
 ■ ■ ■ Denotes Freeway Limits



SR-710 North - Freeway Alternative  
Single Bore (Toll & No Trucks)

Traffic Volumes - 2035

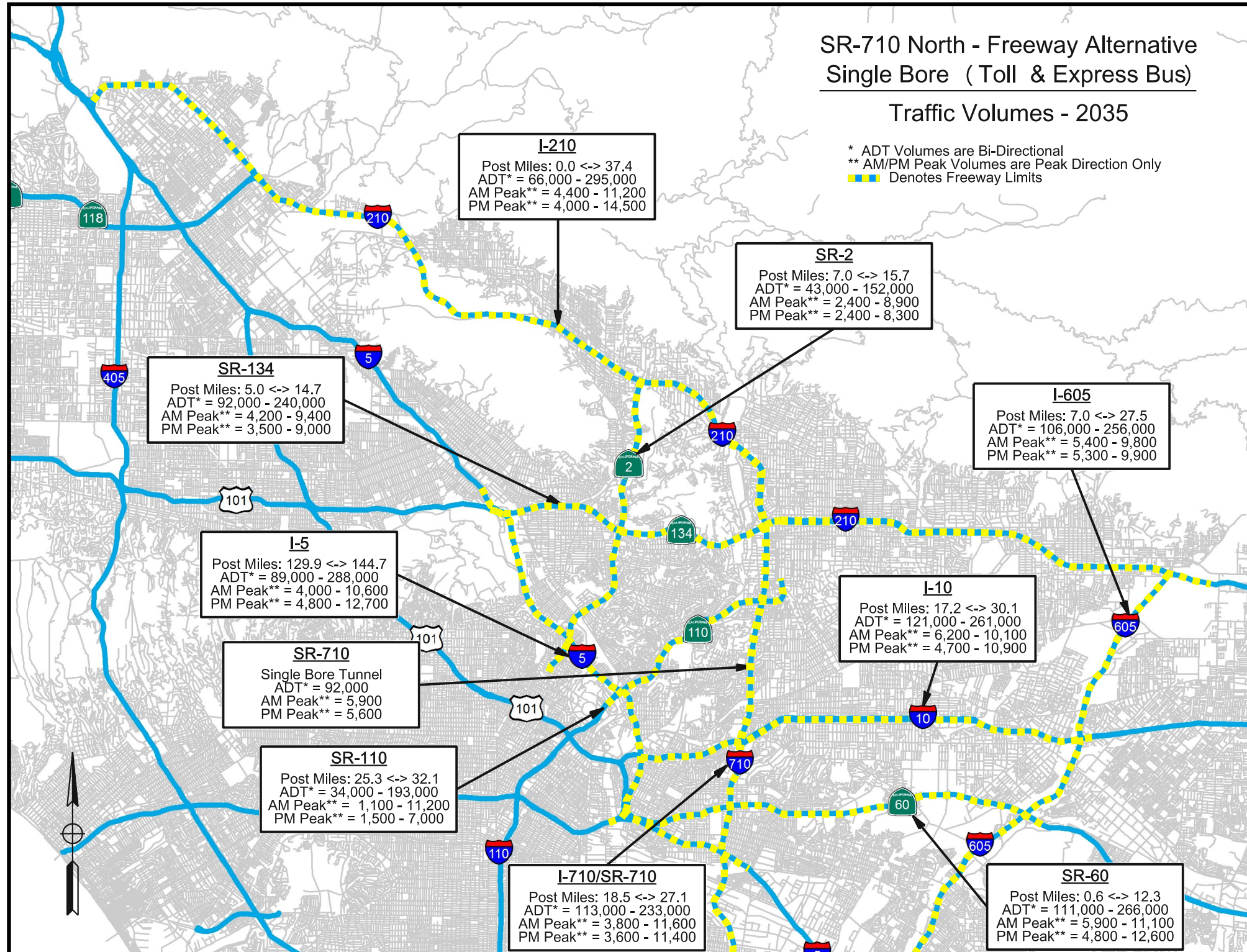
\* ADT Volumes are Bi-Directional  
\*\* AM/PM Peak Volumes are Peak Direction Only  
■ ■ ■ Denotes Freeway Limits



## SR-710 North - Freeway Alternative Single Bore (Toll & Express Bus)

### Traffic Volumes - 2035

\* ADT Volumes are Bi-Directional  
 \*\* AM/PM Peak Volumes are Peak Direction Only  
 ■ ■ ■ Denotes Freeway Limits







**Attachment D**  
**Accident Data (TASAS – Table B)**

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OTM22130

Table B - Selective Accident Rate Calculation

Report Parameters-

Event ID: 3600948  
 Request Name: CHRIS #625  
 Ref Date: 01/27/2014

Request- & Line	L O	D I	L S	Route/Location	Begin Date	End Date	Rate Type	Out Seq	Override Rates			Override ADT		Req. Type	Com- bine?	Excl Ramp?
									Rate	Inj%	Fat%	Main	Cross			
1 3	H	E	I	07 LA 002 013.000 - 07 LA 002 R023.438	01-JAN-09	31-DEC-11	N	L						N	N	Y
1 4	H	E	I	07 LA 002 013.000 - 07 LA 002 R023.438	01-JAN-09	31-DEC-09	N	L						N	N	Y
1 5	H	E	I	07 LA 002 013.000 - 07 LA 002 R023.438	01-JAN-10	31-DEC-10	N	L						N	N	Y
1 6	H	E	I	07 LA 002 013.000 - 07 LA 002 R023.438	01-JAN-11	31-DEC-11	N	L						N	N	Y
1 7	H	W	I	07 LA 002 013.000 - 07 LA 002 R023.438	01-JAN-09	31-DEC-11	N	L						N	N	Y
1 8	H	W	I	07 LA 002 013.000 - 07 LA 002 R023.438	01-JAN-09	31-DEC-09	N	L						N	N	Y
1 9	H	W	I	07 LA 002 013.000 - 07 LA 002 R023.438	01-JAN-10	31-DEC-10	N	L						N	N	Y
1 10	H	W	I	07 LA 002 013.000 - 07 LA 002 R023.438	01-JAN-11	31-DEC-11	N	L						N	N	Y

Event Log:

Job id is : 537593 Accidents Table B Request CHRIS #625 Submitted by T7YSFAIL  
 LOCATION NOT PROCESSED - DIRECTION REQUESTED/UNDIVIDED : 012.750 013.612  
 07 LA 002 13 - 07 LA 002 R 23.438 01/01/2009 TO 12/31/2011  
 LOCATION NOT PROCESSED - DIRECTION REQUESTED/UNDIVIDED : 012.750 013.612  
 07 LA 002 13 - 07 LA 002 R 23.438 01/01/2009 TO 12/31/2009  
 LOCATION NOT PROCESSED - DIRECTION REQUESTED/UNDIVIDED : 012.750 013.612  
 07 LA 002 13 - 07 LA 002 R 23.438 01/01/2010 TO 12/31/2010  
 LOCATION NOT PROCESSED - DIRECTION REQUESTED/UNDIVIDED : 012.750 013.612  
 07 LA 002 13 - 07 LA 002 R 23.438 01/01/2011 TO 12/31/2011  
 LOCATION NOT PROCESSED - DIRECTION REQUESTED/UNDIVIDED : 012.750 013.612  
 07 LA 002 13 - 07 LA 002 R 23.438 01/01/2009 TO 12/31/2011  
 LOCATION NOT PROCESSED - DIRECTION REQUESTED/UNDIVIDED : 012.750 013.612  
 07 LA 002 13 - 07 LA 002 R 23.438 01/01/2010 TO 12/31/2010  
 LOCATION NOT PROCESSED - DIRECTION REQUESTED/UNDIVIDED : 012.750 013.612  
 07 LA 002 13 - 07 LA 002 R 23.438 01/01/2011 TO 12/31/2011

California Department of Transportation  
Table B - Selective Accident Rate Calculation

Location Description	Rate Group (RUS)	No. of Accidents / Significance								ADT Main X-St	Total MV+ or MVM	Actual		Accident Rates			
		Tot	Fat	Inj	F+I	Multi Veh	Wet	Dark	Pers Kld Inj			Fat	F+I	Tot	Fat	F+I	Tot
07 LA 002 013.613 - 07 LA 002 R023.437 0001-0003 2009-01-01 2011-12-31	9.825 MI H 36 mo. EAST U	187	0	78	78	126	18	79	0	53.6	576.11	0.000	.14	.33	0.003	.23	.70
07 LA 002 013.613 - 07 LA 002 R023.437 0001-0004 2009-01-01 2009-12-31	9.825 MI H 12 mo. EAST U	63	0	26	26	46	2	19	0	53.3	191.14	0.000	.14	.33	0.003	.23	.70
07 LA 002 013.613 - 07 LA 002 R023.437 0001-0005 2010-01-01 2010-12-31	9.825 MI H 12 mo. EAST U	72	0	26	26	43	11	32	0	53.3	190.96	0.000	.14	.38	0.003	.23	.70
07 LA 002 013.613 - 07 LA 002 R023.437 0001-0006 2011-01-01 2011-12-31	9.825 MI H 12 mo. EAST U	52	0	26	26	37	5	28	0	54.1	194.01	0.000	.13	.27	0.003	.23	.70
07 LA 002 013.613 - 07 LA 002 R023.437 0001-0007 2009-01-01 2011-12-31	9.825 MI H 36 mo. WEST U	322	1	98	99	248	30	74	2	53.6	576.11	0.002	.17	.56	0.003	.23	.70
07 LA 002 013.613 - 07 LA 002 R023.437 0001-0008 2009-01-01 2009-12-31	9.825 MI H 12 mo. WEST U	90	1	24	25	67	8	20	2	53.3	191.14	0.005	.13	.47	0.003	.23	.70
07 LA 002 013.613 - 07 LA 002 R023.437 0001-0009 2010-01-01 2010-12-31	9.825 MI H 12 mo. WEST U	113	0	31	31	81	16	27	0	53.3	190.96	0.000	.16	.59	0.003	.23	.70
07 LA 002 013.613 - 07 LA 002 R023.437 0001-0010 2011-01-01 2011-12-31	9.825 MI H 12 mo. WEST U	119	0	43	43	100	6	27	0	54.1	194.01	0.000	.22	.61	0.003	.23	.70

Accident Rates expressed as: # of accidents / Million vehicle miles

+ denotes that Million Vehicles (MV) used in accident rates instead (for intersections and ramps).

For Ramps RUS only considers R(Rural) U(Urban)

OTM22130

Table B - Selective Accident Rate Calculation

Report Parameters-

Event ID: 3600720  
 Request Name: CHRIS #626  
 Ref Date: 01/24/2014

Request- & Line	L O C	D I R	L I C	Route/Location	Begin Date	End Date	Rate Type	Out Seq	Override Rates			Override ADT		Req. Type	Com- bine?	Excl Ramp?
									Rate	Inj%	Fat%	Main	Cross			
1 1	H	N	I	07 LA 005 013.000 - 07 LA 005 023.001	01-JAN-09	31-DEC-11	N	L						N	N	Y
1 2	H	N	I	07 LA 005 013.000 - 07 LA 005 023.001	01-JAN-09	31-DEC-09	N	L						N	N	Y
1 3	H	N	I	07 LA 005 013.000 - 07 LA 005 023.001	01-JAN-10	31-DEC-10	N	L						N	N	Y
1 4	H	N	I	07 LA 005 013.000 - 07 LA 005 023.001	01-JAN-11	31-DEC-11	N	L						N	N	Y
1 5	H	S	I	07 LA 005 013.000 - 07 LA 005 023.001	01-JAN-09	31-DEC-11	N	L						N	N	Y
1 6	H	S	I	07 LA 005 013.000 - 07 LA 005 023.001	01-JAN-09	31-DEC-09	N	L						N	N	Y
1 7	H	S	I	07 LA 005 013.000 - 07 LA 005 023.001	01-JAN-10	31-DEC-10	N	L						N	N	Y
1 8	H	S	I	07 LA 005 013.000 - 07 LA 005 023.001	01-JAN-11	31-DEC-11	N	L						N	N	Y

Event Log:

Job id is : 537454 Accidents Table B Request CHRIS #626 Submitted by T7YSFAIL  
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 07 LA 005 13 - 07 LA 005 23.001 01/01/2011 TO 12/31/2011  
 07 LA 005 13 - 07 LA 005 23.001 01/01/2009 TO 12/31/2011  
 07 LA 005 13 - 07 LA 005 23.001 01/01/2009 TO 12/31/2009  
 07 LA 005 13 - 07 LA 005 23.001 01/01/2010 TO 12/31/2010  
 07 LA 005 13 - 07 LA 005 23.001 01/01/2011 TO 12/31/2011

California Department of Transportation  
Table B - Selective Accident Rate Calculation

Location Description	Rate Group (RUS)	No. of Accidents / Significance									ADT Main X-St	Total MV+ or MVM	Actual		Accident Rates Average			
		Tot	Fat	Inj	F+I	Multi Veh	Wet	Dark	Pers Kld Inj	Fat			F+I	Tot	Fat	F+I	Tot	
07 LA 005 013.000 - 07 LA 005 023.000 0001-0001 2009-01-01 2011-12-31	10.001 MI H 36 mo. NORTH NA	1490	3	340	343	1367	71	437	3	485	124.5	1363.41	0.002	.25	1.09	0.005	.37	1.19
07 LA 005 013.000 - 07 LA 005 023.000 0001-0002 2009-01-01 2009-12-31	10.001 MI H 12 mo. NORTH NA	467	2	99	101	425	13	145	2	136	124.5	454.29	0.004	.22	1.03	0.005	.37	1.19
07 LA 005 013.000 - 07 LA 005 023.000 0001-0003 2010-01-01 2010-12-31	10.001 MI H 12 mo. NORTH NA	540	0	112	112	496	41	162	0	164	125.0	456.11	0.000	.25	1.18	0.005	.37	1.19
07 LA 005 013.000 - 07 LA 005 023.000 0001-0004 2011-01-01 2011-12-31	10.001 MI H 12 mo. NORTH NA	483	1	129	130	446	17	130	1	185	124.1	453.01	0.002	.29	1.07	0.005	.37	1.19
07 LA 005 013.000 - 07 LA 005 023.000 0001-0005 2009-01-01 2011-12-31	10.001 MI H 36 mo. SOUTH NA	2211 H99	2	528 H92	530	2037	114	564	2	820	124.5	1363.41	0.001	.39	1.62	0.005	.37	1.19
07 LA 005 013.000 - 07 LA 005 023.000 0001-0006 2009-01-01 2009-12-31	10.001 MI H 12 mo. SOUTH NA	669 H99	1	152	153	610	31	152	1	223	124.5	454.29	0.002	.34	1.47	0.005	.37	1.19
07 LA 005 013.000 - 07 LA 005 023.000 0001-0007 2010-01-01 2010-12-31	10.001 MI H 12 mo. SOUTH NA	779 H99	1	178	179	720	56	224	1	270	125.0	456.11	0.002	.39	1.71	0.005	.37	1.19
07 LA 005 013.000 - 07 LA 005 023.000 0001-0008 2011-01-01 2011-12-31	10.001 MI H 12 mo. SOUTH NA	763 H99	0	198 H97	198 H97	707	27	188	0	327	124.1	453.01	0.000	.44	1.68	0.005	.37	1.19

Accident Rates expressed as: # of accidents / Million vehicle miles

+ denotes that Million Vehicles (MV) used in accident rates instead (for intersections and ramps).

For Ramps RUS only considers R(Rural) U(Urban)

OTM22130

Table B - Selective Accident Rate Calculation

Report Parameters-

Event ID: 3600722  
 Request Name: CHRIS #627  
 Ref Date: 01/24/2014

Request- & Line	L O C	D I S C	Route/Location	Begin Date	End Date	Rate Type	Out Seq	Override Rates			Override ADT		Req. Type	Com- bine?	Excl Ramp?	
								Rate	Inj%	Fat%	Main	Cross				
1 1	H	E	I	07 LA 010 018.000 - 07 LA 010 032.001	01-JAN-09	31-DEC-11	N	L						N	N	Y
1 2	H	E	I	07 LA 010 018.000 - 07 LA 010 032.001	01-JAN-09	31-DEC-09	N	L						N	N	Y
1 3	H	E	I	07 LA 010 018.000 - 07 LA 010 032.001	01-JAN-10	31-DEC-10	N	L						N	N	Y
1 4	H	E	I	07 LA 010 018.000 - 07 LA 010 032.001	01-JAN-11	31-DEC-11	N	L						N	N	Y
1 5	H	W	I	07 LA 010 018.000 - 07 LA 010 032.001	01-JAN-09	31-DEC-11	N	L						N	N	Y
1 6	H	W	I	07 LA 010 018.000 - 07 LA 010 032.001	01-JAN-09	31-DEC-09	N	L						N	N	Y
1 7	H	W	I	07 LA 010 018.000 - 07 LA 010 032.001	01-JAN-10	31-DEC-10	N	L						N	N	Y
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Event Log:

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 07 LA 010 18 - 07 LA 010 32.001 01/01/2011 TO 12/31/2011  
 07 LA 010 18 - 07 LA 010 32.001 01/01/2009 TO 12/31/2011  
 07 LA 010 18 - 07 LA 010 32.001 01/01/2009 TO 12/31/2009  
 07 LA 010 18 - 07 LA 010 32.001 01/01/2010 TO 12/31/2010  
 07 LA 010 18 - 07 LA 010 32.001 01/01/2011 TO 12/31/2011

California Department of Transportation  
Table B - Selective Accident Rate Calculation

Location Description	Rate Group (RUS)	No. of Accidents / Significance									ADT Main X-St	Total MV+ or MVM	Accident Rates				
		Tot	Fat	Inj	F+I	Multi Veh	Wet	Dark	Pers Kld Inj	Actual Fat			Actual F+I	Tot	Average Fat	Average F+I	Tot
07 LA 010 018.000 - 07 LA 010 032.000 0001-0001 2009-01-01 2011-12-31	14.656 MI H 36 mo. EAST NA	2193 H99	9	524 H90	533 H92	1979	124	808	9	107.0	1716.37	0.005	.31	1.28	0.004	.29	.95
07 LA 010 018.000 - 07 LA 010 032.000 0001-0002 2009-01-01 2009-12-31	14.656 MI H 12 mo. EAST NA	689 H99	4	193 H90	197	623	28	251 H95	4	110.2	589.51	0.007	.33	1.17	0.004	.30	.99
07 LA 010 018.000 - 07 LA 010 032.000 0001-0003 2010-01-01 2010-12-31	14.656 MI H 12 mo. EAST NA	782 H99	4	177	181	704	62	298 H99	4	106.6	570.25	0.007	.32	1.37	0.004	.30	.97
07 LA 010 018.000 - 07 LA 010 032.000 0001-0004 2011-01-01 2011-12-31	14.656 MI H 12 mo. EAST NA	722 H99	1	154	155	652	34	259 H99	1	104.1	556.61	0.002	.28	1.30	0.004	.29	.95
07 LA 010 018.000 - 07 LA 010 032.000 0001-0005 2009-01-01 2011-12-31	14.656 MI H 36 mo. WEST NA	1945 H99	10	485	495	1685	125	609	10	107.0	1716.37	0.006	.29	1.13	0.004	.29	.95
07 LA 010 018.000 - 07 LA 010 032.000 0001-0006 2009-01-01 2009-12-31	14.656 MI H 12 mo. WEST NA	581 H99	2	155	157	487	39	170	2	110.2	589.51	0.003	.27	.99	0.004	.30	.99
07 LA 010 018.000 - 07 LA 010 032.000 0001-0007 2010-01-01 2010-12-31	14.656 MI H 12 mo. WEST NA	681 H99	4	166	170	590	53	218	4	106.6	570.25	0.007	.30	1.19	0.004	.30	.97
07 LA 010 018.000 - 07 LA 010 032.000 0001-0008 2011-01-01 2011-12-31	14.656 MI H 12 mo. WEST NA	683 H99	4	164	168	608	33	221 H90	4	104.1	556.61	0.007	.30	1.23	0.004	.29	.95

Accident Rates expressed as: # of accidents / Million vehicle miles

+ denotes that Million Vehicles (MV) used in accident rates instead (for intersections and ramps).

For Ramps RUS only considers R(Rural) U(Urban)



OTM22130

Table B - Selective Accident Rate Calculation

Report Parameters-

Event ID: 3603451

Request Name: DARRELL #697

Ref Date: 01/31/2014

Request- & Line	L O C	D I R	L S C	Route/Location	Begin Date	End Date	Rate Type	Out Seq	Override Rates			Override ADT		Req. Type	Com- bine?	Excl Ramp?
									Rate	Inj%	Fat%	Main	Cross			
1 1	H	E	I	07 LA 060 R000.545 - 07 LA 060 012.029	01-APR-09	31-MAR-12	N	L						N	N	Y
1 2	H	W	I	07 LA 060 R000.545 - 07 LA 060 012.029	01-APR-09	31-MAR-12	N	L						N	N	Y

Event Log:

Job id is : 538821 Accidents Table B Request DARRELL #697 Submitted by T7YSFAIL  
07 LA 060 R .545 - 07 LA 060 12.029 04/01/2009 TO 03/31/2012  
07 LA 060 R .545 - 07 LA 060 12.029 04/01/2009 TO 03/31/2012

Location Description	Rate Group (RUS)	No. of Accidents / Significance								Pers Kld Inj	ADT Main X-St	Total MV+ or MVM	Accident Rates					
		Tot	Fat	Inj	F+I	Multi Veh	Wet	Dark	Actual				Average					
													Fat	F+I	Tot	Fat	F+I	Tot
07 LA 060 R000.545 - 07 LA 060 012.028 0001-0001 2009-04-01 2012-03-31	11.451 MI H 36 mo. EAST NA	1245	6	353	359	1054	114	397	6	112.3	1409.05	0.004	.25	.88	0.004	.29	.95	
07 LA 060 R000.545 - 07 LA 060 012.028 0001-0002 2009-04-01 2012-03-31	11.451 MI H 36 mo. WEST NA	1046	5	322	327	879	86	316	6	112.3	1409.05	0.004	.23	.74	0.004	.29	.95	

Accident Rates expressed as: # of accidents / Million vehicle miles

+ denotes that Million Vehicles (MV) used in accident rates instead (for intersections and ramps).

For Ramps RUS only considers R(Rural) U(Urban)

OTM22130

Table B - Selective Accident Rate Calculation

Report Parameters-

Event ID: 3600778  
 Request Name: CHRIS #640  
 Ref Date: 01/24/2014

Request- & Line	L O	D I	L S	Route/Location	Begin Date	End Date	Rate Type	Out Seq	Override Rates			Override ADT		Req. Type	Com- bine?	Excl Ramp?
									Rate	Inj%	Fat%	Main	Cross			
1 1	H	T	I	07 LA 110 025.000 R - 07 LA 110 025.484 R	01-JAN-09	31-DEC-11	N	L						N	N	Y
1 2	H	N	I	07 LA 110 025.484 - 07 LA 110 031.913	01-JAN-09	31-DEC-11	N	L						N	N	Y
1 3	H	T	I	07 LA 110 025.000 R - 07 LA 110 025.484 R	01-JAN-09	31-DEC-09	N	L						N	N	Y
1 4	H	N	I	07 LA 110 025.484 - 07 LA 110 031.913	01-JAN-09	31-DEC-09	N	L						N	N	Y
1 5	H	T	I	07 LA 110 025.000 R - 07 LA 110 025.484 R	01-JAN-10	31-DEC-10	N	L						N	N	Y
1 6	H	N	I	07 LA 110 025.484 - 07 LA 110 031.913	01-JAN-10	31-DEC-10	N	L						N	N	Y
1 7	H	T	I	07 LA 110 025.000 R - 07 LA 110 025.484 R	01-JAN-11	31-DEC-11	N	L						N	N	Y
1 8	H	N	I	07 LA 110 025.484 - 07 LA 110 031.913	01-JAN-11	31-DEC-11	N	L						N	N	Y
1 9	H	T	I	07 LA 110 025.000 L - 07 LA 110 025.436 L	01-JAN-09	31-DEC-11	N	L						N	N	Y
1 10	H	S	I	07 LA 110 025.484 - 07 LA 110 031.913	01-JAN-09	31-DEC-11	N	L						N	N	Y
1 11	H	T	I	07 LA 110 025.000 L - 07 LA 110 025.436 L	01-JAN-09	31-DEC-09	N	L						N	N	Y
1 12	H	S	I	07 LA 110 025.484 - 07 LA 110 031.913	01-JAN-09	31-DEC-09	N	L						N	N	Y
1 13	H	T	I	07 LA 110 025.000 L - 07 LA 110 025.436 L	01-JAN-10	31-DEC-10	N	L						N	N	Y
1 14	H	S	I	07 LA 110 025.484 - 07 LA 110 031.913	01-JAN-10	31-DEC-10	N	L						N	N	Y
1 15	H	T	I	07 LA 110 025.000 L - 07 LA 110 025.436 L	01-JAN-11	31-DEC-11	N	L						N	N	Y
1 16	H	S	I	07 LA 110 025.484 - 07 LA 110 031.913	01-JAN-11	31-DEC-11	N	L						N	N	Y

Event Log:

Job id is : 537508 Accidents Table B Request CHRIS #640 Submitted by T7YSFAIL  
 07 LA 110 25R - 07 LA 110 25.484R 01/01/2009 TO 12/31/2011  
 07 LA 110 25.484 - 07 LA 110 31.913 01/01/2009 TO 12/31/2011

California Department of Transportation  
Table B - Selective Accident Rate Calculation

Location Description	Rate Group (RUS)	No. of Accidents / Significance									ADT Main X-St	Total MV+ or MVM	Accident Rates				
		Tot	Fat	Inj	F+I	Multi Veh	Wet	Dark	Pers Kld Inj	Actual Fat			Actual F+I	Average Tot	Average Fat	Average F+I	Tot
07 LA 110 025.000 R- 07 LA 110 025.483 R 0001-0001 2009-01-01 2011-12-31	.484 MI H 65 U	193 H99	0	52 H99	52 H99	178	42 H99	77 H99	0	90.9	48.19	0.000	1.08	4.01	0.002	.18	.58
07 LA 110 025.484 - 07 LA 110 031.912 0001-0002 2009-01-01 2011-12-31	6.429 MI H NORTH U	455 H99	1	122 H99	123 H99	270	148 H99	178 H99	1	47.4	333.80	0.003	.37	1.36	0.004	.24	.76
07 LA 110 025.000 R- 07 LA 110 025.483 R 0001-0003 2009-01-01 2009-12-31	.484 MI H 65 U	59 H99	0	15 H99	15 H99	52	7 H99	27 H99	0	91.4	16.15	0.000	.93	3.65	0.002	.18	.58
07 LA 110 025.484 - 07 LA 110 031.912 0001-0004 2009-01-01 2009-12-31	6.429 MI H NORTH U	139 H99	1	42 H99	43 H99	83	48 H99	60 H99	1	47.6	111.58	0.009	.39	1.25	0.004	.24	.76
07 LA 110 025.000 R- 07 LA 110 025.483 R 0001-0005 2010-01-01 2010-12-31	.484 MI H 65 U	72 H99	0	21 H99	21 H99	66	22 H99	29 H99	0	91.0	16.08	0.000	1.31	4.48	0.002	.18	.58
07 LA 110 025.484 - 07 LA 110 031.912 0001-0006 2010-01-01 2010-12-31	6.429 MI H NORTH U	155 H99	0	35 H95	35 H92	94	51 H99	61 H99	0	47.2	110.76	0.000	.32	1.40	0.004	.24	.76
07 LA 110 025.000 R- 07 LA 110 025.483 R 0001-0007 2011-01-01 2011-12-31	.484 MI H 65 U	62 H99	0	16 H99	16 H99	60	13 H99	21 H99	0	90.4	15.97	0.000	1.00	3.88	0.002	.18	.58
07 LA 110 025.484 - 07 LA 110 031.912 0001-0008 2011-01-01 2011-12-31	6.429 MI H NORTH U	161 H99	0	45 H99	45 H99	93	49 H99	57 H99	0	47.5	111.46	0.000	.40	1.44	0.004	.24	.76
07 LA 110 025.000 L- 07 LA 110 025.435 L 0001-0009 2009-01-01 2011-12-31	.436 MI H U	54 H99	0	14 H95	14 H95	44	4 H95	16 H95	0	91.0	43.44	0.000	.32	1.24	0.002	.19	.60
07 LA 110 025.484 - 07 LA 110 031.912 0001-0010 2009-01-01 2011-12-31	6.429 MI H SOUTH U	547 H99	6 H99	173 H99	179 H99	324	195 H99	176 H99	6	47.4	333.80	0.018	.54	1.64	0.004	.24	.76
07 LA 110 025.000 L- 07 LA 110 025.435 L 0001-0011 2009-01-01 2009-12-31	.436 MI H U	17 H97	0	4	4	15	1	6	0	91.5	14.56	0.000	.27	1.17	0.002	.19	.60
07 LA 110 025.484 - 07 LA 110 031.912 0001-0012 2009-01-01 2009-12-31	6.429 MI H SOUTH U	174 H99	3 H97	55 H99	58 H99	106	60 H99	53 H99	3	47.6	111.58	0.027	.52	1.56	0.004	.24	.76

Accident Rates expressed as: # of accidents / Million vehicle miles

+ denotes that Million Vehicles (MV) used in accident rates instead (for intersections and ramps).

For Ramps RUS only considers R(Rural) U(Urban)

Location Description	Rate Group (RUS)	No. of Accidents / Significance									ADT Main X-St	Total MV+ or MVM	Actual		Accident Rates Average			
		Tot	Fat	Inj	F+I	Multi Veh	Wet	Dark	Pers Kld Inj	Fat			F+I	Tot	Fat	F+I	Tot	
07 LA 110 025.000 L- 07 LA 110 025.435 L 0001-0013 2010-01-01 2010-12-31	12 mo. .436 MI H U	19 H99	0	4	4	17	1	6	0	4	91.0	14.48	0.000	.28	1.31	0.002	.19	.60
07 LA 110 025.484 - 07 LA 110 031.912 0001-0014 2010-01-01 2010-12-31	12 mo. 6.429 MI H SOUTH U	189 H99	0	54 H99	54 H99	110	76 H99	61 H99	0	66	47.2	110.76	0.000	.49	1.71	0.004	.24	.76
07 LA 110 025.000 L- 07 LA 110 025.435 L 0001-0015 2011-01-01 2011-12-31	12 mo. .436 MI H U	18 H99	0	6 H92	6 H92	12	2	4	0	6	90.5	14.40	0.000	.42	1.25	0.002	.18	.59
07 LA 110 025.484 - 07 LA 110 031.912 0001-0016 2011-01-01 2011-12-31	12 mo. 6.429 MI H SOUTH U	184 H99	3 H97	64 H99	67 H99	108	59 H99	62 H99	3	76	47.5	111.46	0.027	.60	1.65	0.004	.24	.76

Accident Rates expressed as: # of accidents / Million vehicle miles

+ denotes that Million Vehicles (MV) used in accident rates instead (for intersections and ramps).

For Ramps RUS only considers R(Rural) U(Urban)

OTM22130

Table B - Selective Accident Rate Calculation

Report Parameters-

Event ID: 3600730  
 Request Name: CHRIS #645  
 Ref Date: 01/24/2014

Request- & Line	L O C	D I R	L I C	Route/Location	Begin Date	End Date	Rate Type	Out Seq	Override Rates			Override ADT		Req. Type	Com- bine?	Excl Ramp?
									Rate	Inj%	Fat%	Main	Cross			
1 1	H	E	I	07 LA 134 R009.000 - 07 LA 134 R013.341	01-JAN-09	31-DEC-11	N	L						N	N	Y
1 2	H	E	I	07 LA 134 R009.000 - 07 LA 134 R013.341	01-JAN-09	31-DEC-09	N	L						N	N	Y
1 3	H	E	I	07 LA 134 R009.000 - 07 LA 134 R013.341	01-JAN-10	31-DEC-10	N	L						N	N	Y
1 4	H	E	I	07 LA 134 R009.000 - 07 LA 134 R013.341	01-JAN-11	31-DEC-11	N	L						N	N	Y
1 5	H	W	I	07 LA 134 R009.000 - 07 LA 134 R013.341	01-JAN-09	31-DEC-11	N	L						N	N	Y
1 6	H	W	I	07 LA 134 R009.000 - 07 LA 134 R013.341	01-JAN-09	31-DEC-09	N	L						N	N	Y
1 7	H	W	I	07 LA 134 R009.000 - 07 LA 134 R013.341	01-JAN-10	31-DEC-10	N	L						N	N	Y
1 8	H	W	I	07 LA 134 R009.000 - 07 LA 134 R013.341	01-JAN-11	31-DEC-11	N	L						N	N	Y

Event Log:

Job id is : 537464 Accidents Table B Request CHRIS #645 Submitted by T7YSFAIL  
 07 LA 134 R 9 - 07 LA 134 R 13.341 01/01/2009 TO 12/31/2011  
 07 LA 134 R 9 - 07 LA 134 R 13.341 01/01/2009 TO 12/31/2009  
 07 LA 134 R 9 - 07 LA 134 R 13.341 01/01/2010 TO 12/31/2010  
 07 LA 134 R 9 - 07 LA 134 R 13.341 01/01/2011 TO 12/31/2011  
 07 LA 134 R 9 - 07 LA 134 R 13.341 01/01/2009 TO 12/31/2011  
 07 LA 134 R 9 - 07 LA 134 R 13.341 01/01/2009 TO 12/31/2009  
 07 LA 134 R 9 - 07 LA 134 R 13.341 01/01/2010 TO 12/31/2010  
 07 LA 134 R 9 - 07 LA 134 R 13.341 01/01/2011 TO 12/31/2011

Location Description	Rate Group (RUS)	No. of Accidents / Significance									ADT Main X-St	Total MV+ or MVM	Actual		Accident Rates Average			
		Tot	Fat	Inj	F+I	Multi Veh	Wet	Dark	Pers Kld Inj	Fat			F+I	Tot	Fat	F+I	Tot	
07 LA 134 R009.000 - 07 LA 134 R013.340 0001-0001 2009-01-01 2011-12-31	4.341 MI H 36 mo. EAST U	225	2	75	77	172	24	63	3	102.9	489.28	0.004	.16	.46	0.003	.27	.88	
07 LA 134 R009.000 - 07 LA 134 R013.340 0001-0002 2009-01-01 2009-12-31	4.341 MI H 12 mo. EAST U	80	1	25	26	62	7	26	2	102.9	163.04	0.006	.16	.49	0.003	.27	.88	
07 LA 134 R009.000 - 07 LA 134 R013.340 0001-0003 2010-01-01 2010-12-31	4.341 MI H 12 mo. EAST U	87	1	28	29	65	10	23	1	103.4	163.83	0.006	.18	.53	0.003	.27	.88	
07 LA 134 R009.000 - 07 LA 134 R013.340 0001-0004 2011-01-01 2011-12-31	4.341 MI H 12 mo. EAST U	58	0	22	22	45	7	14	0	102.5	162.41	0.000	.14	.36	0.003	.27	.88	
07 LA 134 R009.000 - 07 LA 134 R013.340 0001-0005 2009-01-01 2011-12-31	4.341 MI H 36 mo. WEST U	241	1	94	95	183	27	77	1	102.9	489.28	0.002	.19	.49	0.003	.27	.88	
07 LA 134 R009.000 - 07 LA 134 R013.340 0001-0006 2009-01-01 2009-12-31	4.341 MI H 12 mo. WEST U	73	1	21	22	57	6	22	1	102.9	163.04	0.006	.14	.45	0.003	.27	.88	
07 LA 134 R009.000 - 07 LA 134 R013.340 0001-0007 2010-01-01 2010-12-31	4.341 MI H 12 mo. WEST U	99	0	52	52	71	14	35	0	103.4	163.83	0.000	.32	.60	0.003	.27	.88	
07 LA 134 R009.000 - 07 LA 134 R013.340 0001-0008 2011-01-01 2011-12-31	4.341 MI H 12 mo. WEST U	69	0	21	21	55	7	20	0	102.5	162.41	0.000	.13	.43	0.003	.27	.88	

Accident Rates expressed as: # of accidents / Million vehicle miles

+ denotes that Million Vehicles (MV) used in accident rates instead (for intersections and ramps).

For Ramps RUS only considers R(Rural) U(Urban)

OTM22130

Table B - Selective Accident Rate Calculation

Report Parameters-

Event ID: 3600787  
 Request Name: VENKATA #656  
 Ref Date: 01/24/2014

Request- & Line	L O C	D I S C	Route/Location	Begin Date	End Date	Rate Type	Out Seq	Override Rates			Override ADT		Req. Type	Com- bine?	Excl Ramp?
								Rate	Inj%	Fat%	Main	Cross			
1 1	H E I		07 LA 210 R017.000 - 07 LA 210 R038.001	01-JAN-09	31-DEC-11	N	L						N	N	Y
1 2	H E I		07 LA 210 R017.000 - 07 LA 210 R038.001	01-JAN-09	31-DEC-09	N	L						N	N	Y
1 3	H E I		07 LA 210 R017.000 - 07 LA 210 R038.001	01-JAN-10	31-DEC-10	N	L						N	N	Y
1 4	H E I		07 LA 210 R017.000 - 07 LA 210 R038.001	01-JAN-11	31-DEC-11	N	L						N	N	Y
1 5	H W I		07 LA 210 R017.000 - 07 LA 210 R038.001	01-JAN-09	31-DEC-11	N	L						N	N	Y
1 6	H W I		07 LA 210 R017.000 - 07 LA 210 R038.001	01-JAN-09	31-DEC-09	N	L						N	N	Y
1 7	H W I		07 LA 210 R017.000 - 07 LA 210 R038.001	01-JAN-10	31-DEC-10	N	L						N	N	Y
1 8	H W I		07 LA 210 R017.000 - 07 LA 210 R038.001	01-JAN-11	31-DEC-11	N	L						N	N	Y

Event Log:

Job id is : 537517 Accidents Table B Request VENKATA #656 Submitted by T7YSFAIL  
 07 LA 210 R 17 - 07 LA 210 R 38.001 01/01/2009 TO 12/31/2011  
 07 LA 210 R 17 - 07 LA 210 R 38.001 01/01/2009 TO 12/31/2009  
 07 LA 210 R 17 - 07 LA 210 R 38.001 01/01/2010 TO 12/31/2010  
 07 LA 210 R 17 - 07 LA 210 R 38.001 01/01/2011 TO 12/31/2011  
 07 LA 210 R 17 - 07 LA 210 R 38.001 01/01/2009 TO 12/31/2011  
 07 LA 210 R 17 - 07 LA 210 R 38.001 01/01/2009 TO 12/31/2009  
 07 LA 210 R 17 - 07 LA 210 R 38.001 01/01/2010 TO 12/31/2010  
 07 LA 210 R 17 - 07 LA 210 R 38.001 01/01/2011 TO 12/31/2011



California Department of Transportation  
Table B - Selective Accident Rate Calculation

Location Description	Rate Group (RUS)	No. of Accidents / Significance									ADT Main X-St	Total MV+ or MVM	Accident Rates				
		Tot	Fat	Inj	F+I	Multi Veh	Wet	Dark	Pers Kld Inj	Actual Fat			Actual F+I	Average Tot	Average Fat	Average F+I	Tot
07 LA 210 R017.000 - 07 LA 210 R038.000 0001-0001 2009-01-01 2011-12-31	21.310 MI H 36 mo. EAST NA	2105	9	588	597	1770	167	656	9	107.7	2512.34	0.004	.24	.84	0.003	.27	.88
07 LA 210 R017.000 - 07 LA 210 R038.000 0001-0002 2009-01-01 2009-12-31	21.310 MI H 12 mo. EAST NA	674	4	201	205	548	51	234	4	107.0	832.26	0.005	.25	.81	0.003	.26	.87
07 LA 210 R017.000 - 07 LA 210 R038.000 0001-0003 2010-01-01 2010-12-31	21.310 MI H 12 mo. EAST NA	699	2	185	187	589	84	198	2	107.6	836.93	0.002	.22	.84	0.003	.26	.88
07 LA 210 R017.000 - 07 LA 210 R038.000 0001-0004 2011-01-01 2011-12-31	21.310 MI H 12 mo. EAST NA	732	3	202	205	633	32	224	3	108.4	843.15	0.004	.24	.87	0.003	.27	.88
07 LA 210 R017.000 - 07 LA 210 R038.000 0001-0005 2009-01-01 2011-12-31	21.310 MI H 36 mo. WEST NA	1809	3	491	494	1563	140	450	3	107.7	2512.34	0.001	.20	.72	0.003	.27	.88
07 LA 210 R017.000 - 07 LA 210 R038.000 0001-0006 2009-01-01 2009-12-31	21.310 MI H 12 mo. WEST NA	530	3	146	149	454	34	144	3	107.0	832.26	0.004	.18	.64	0.003	.26	.87
07 LA 210 R017.000 - 07 LA 210 R038.000 0001-0007 2010-01-01 2010-12-31	21.310 MI H 12 mo. WEST NA	570	0	151	151	484	70	152	0	107.6	836.93	0.000	.18	.68	0.003	.26	.88
07 LA 210 R017.000 - 07 LA 210 R038.000 0001-0008 2011-01-01 2011-12-31	21.310 MI H 12 mo. WEST NA	709	0	194	194	625	36	154	0	108.4	843.15	0.000	.23	.84	0.003	.27	.88

Accident Rates expressed as: # of accidents / Million vehicle miles

+ denotes that Million Vehicles (MV) used in accident rates instead (for intersections and ramps).

For Ramps RUS only considers R(Rural) U(Urban)

California Department of Transportation  
Table B - Selective Accident Rate Calculation

Location Description	Rate Group (RUS)	Tot	No. of Accidents / Significance						Pers Kid Inj	ADT Main X-St	Total MV+ or MVM	Actual		Accident Rates Average			
			Fat	Inj	F+I	Multi Veh	Wet	Dark				Fat	F+I	Tot	Fat	F+I	Tot
07 LA 605 R017.000 - 07 LA 605 025.999 0001-0001 2009-01-01 2011-12-31	9.000 MI H 36 mo. NORTH NA	1193	2	329	331	1066	97	329	2	91.8	904.69	0.002	.37	1.32	0.004	.28	.90
07 LA 605 R017.000 - 07 LA 605 025.999 0001-0002 2009-01-01 2009-12-31	9.000 MI H 12 mo. NORTH NA	357	1	107	108	323	14	89	1	92.6	304.03	0.003	.36	1.17	0.004	.28	.91
07 LA 605 R017.000 - 07 LA 605 025.999 0001-0003 2010-01-01 2010-12-31	9.000 MI H 12 mo. NORTH NA	411	1	107	108	363	49	113	1	92.0	302.22	0.003	.36	1.36	0.004	.28	.91
07 LA 605 R017.000 - 07 LA 605 025.999 0001-0004 2011-01-01 2011-12-31	9.000 MI H 12 mo. NORTH NA	425	0	115	115	380	34	127	0	90.9	298.44	0.000	.39	1.42	0.004	.28	.90
07 LA 605 R017.000 - 07 LA 605 025.999 0001-0005 2009-01-01 2011-12-31	9.000 MI H 36 mo. SOUTH NA	650	3	181	184	527	76	156	4	91.8	904.69	0.003	.20	.72	0.004	.28	.90
07 LA 605 R017.000 - 07 LA 605 025.999 0001-0006 2009-01-01 2009-12-31	9.000 MI H 12 mo. SOUTH NA	196	1	51	52	157	22	45	1	92.6	304.03	0.003	.17	.65	0.004	.28	.91
07 LA 605 R017.000 - 07 LA 605 025.999 0001-0007 2010-01-01 2010-12-31	9.000 MI H 12 mo. SOUTH NA	229	1	66	67	194	30	50	2	92.0	302.22	0.003	.22	.76	0.004	.28	.91
07 LA 605 R017.000 - 07 LA 605 025.999 0001-0008 2011-01-01 2011-12-31	9.000 MI H 12 mo. SOUTH NA	225	1	64	65	176	24	61	1	90.9	298.44	0.003	.22	.75	0.004	.28	.90

Accident Rates expressed as: # of accidents / Million vehicle miles

+ denotes that Million Vehicles (MV) used in accident rates instead (for intersections and ramps).

For Ramps RUS only considers R(Rural) U(Urban)

OTM22130

Table B - Selective Accident Rate Calculation

Report Parameters-

Event ID: 3600732  
 Request Name: CHRIS #648  
 Ref Date: 01/24/2014

Request- & Line	L O C	D I S C	Route/Location	Begin Date	End Date	Rate Type	Out Seq	Override Rates			Override ADT		Req. Type	Com- bine?	Excl Ramp?	
								Rate	Inj%	Fat%	Main	Cross				
1 1	H	N	I	07 LA 710	023.000 -	01-JAN-09	31-DEC-11	N	L					N	N	Y
				07 LA 710	T027.475											
1 2	H	N	I	07 LA 710	023.000 -	01-JAN-09	31-DEC-09	N	L					N	N	Y
				07 LA 710	T027.475											
1 3	H	N	I	07 LA 710	023.000 -	01-JAN-10	31-DEC-10	N	L					N	N	Y
				07 LA 710	T027.475											
1 4	H	N	I	07 LA 710	023.000 -	01-JAN-11	31-DEC-11	N	L					N	N	Y
				07 LA 710	T027.475											
1 5	H	S	I	07 LA 710	023.000 -	01-JAN-09	31-DEC-11	N	L					N	N	Y
				07 LA 710	T027.475											
1 6	H	S	I	07 LA 710	023.000 -	01-JAN-09	31-DEC-09	N	L					N	N	Y
				07 LA 710	T027.475											
1 7	H	S	I	07 LA 710	023.000 -	01-JAN-10	31-DEC-10	N	L					N	N	Y
				07 LA 710	T027.475											
1 8	H	S	I	07 LA 710	023.000 -	01-JAN-11	31-DEC-11	N	L					N	N	Y
				07 LA 710	T027.475											

Event Log:

Job id is : 537466 Accidents Table B Request CHRIS #648 Submitted by T7YSFAIL  
 07 LA 710 23 - 07 LA 710 T 27.475 01/01/2009 TO 12/31/2011  
 07 LA 710 23 - 07 LA 710 T 27.475 01/01/2009 TO 12/31/2009  
 07 LA 710 23 - 07 LA 710 T 27.475 01/01/2010 TO 12/31/2010  
 07 LA 710 23 - 07 LA 710 T 27.475 01/01/2011 TO 12/31/2011  
 07 LA 710 23 - 07 LA 710 T 27.475 01/01/2009 TO 12/31/2011  
 07 LA 710 23 - 07 LA 710 T 27.475 01/01/2009 TO 12/31/2009  
 07 LA 710 23 - 07 LA 710 T 27.475 01/01/2010 TO 12/31/2010  
 07 LA 710 23 - 07 LA 710 T 27.475 01/01/2010 TO 12/31/2010  
 07 LA 710 23 - 07 LA 710 T 27.475 01/01/2011 TO 12/31/2011

California Department of Transportation  
Table B - Selective Accident Rate Calculation

Location Description	Rate Group (RUS)	No. of Accidents / Significance									ADT Main X-St	Total MV+ or MVM	Actual		Accident Rates Average		
		Tot	Fat	Inj	F+I	Multi Veh	Wet	Dark	Pers Kid Inj	Fat			F+I	Tot	Fat	F+I	Tot
07 LA 710 023.000 - 07 LA 710 T027.474 0001-0001 2009-01-01 2011-12-31	4.475 MI H 36 mo. NORTH NA	255	1	57	58	230	13	73	1	65.9	322.92	0.003	.18	.79	0.005	.29	.89
07 LA 710 023.000 - 07 LA 710 T027.474 0001-0002 2009-01-01 2009-12-31	4.475 MI H 12 mo. NORTH NA	92	0	19	19	87	10	29	0	67.9	110.82	0.000	.17	.83	0.005	.30	.91
07 LA 710 023.000 - 07 LA 710 T027.474 0001-0003 2010-01-01 2010-12-31	4.475 MI H 12 mo. NORTH NA	77	1	19	20	67	2	23	1	64.7	105.60	0.009	.19	.73	0.005	.29	.88
07 LA 710 023.000 - 07 LA 710 T027.474 0001-0004 2011-01-01 2011-12-31	4.475 MI H 12 mo. NORTH NA	86	0	19	19	76	1	21	0	65.2	106.50	0.000	.18	.81	0.005	.29	.89
07 LA 710 023.000 - 07 LA 710 T027.474 0001-0005 2009-01-01 2011-12-31	4.475 MI H 36 mo. SOUTH NA	361 H99	2	80	82	303	21	114	2	65.9	322.92	0.006	.25	1.12	0.005	.29	.89
07 LA 710 023.000 - 07 LA 710 T027.474 0001-0006 2009-01-01 2009-12-31	4.475 MI H 12 mo. SOUTH NA	137 H99	1	31	32	115	8	53	1	67.9	110.82	0.009	.29	1.24	0.005	.30	.91
07 LA 710 023.000 - 07 LA 710 T027.474 0001-0007 2010-01-01 2010-12-31	4.475 MI H 12 mo. SOUTH NA	119 H97	1	27	28	98	9	37	1	64.7	105.60	0.009	.27	1.13	0.005	.29	.88
07 LA 710 023.000 - 07 LA 710 T027.474 0001-0008 2011-01-01 2011-12-31	4.475 MI H 12 mo. SOUTH NA	105	0	22	22	90	4	24	0	65.2	106.50	0.000	.21	.99	0.005	.29	.89

Accident Rates expressed as: # of accidents / Million vehicle miles

+ denotes that Million Vehicles (MV) used in accident rates instead (for intersections and ramps).

For Ramps RUS only considers R(Rural) U(Urban)

**Attachment E**  
**No Build Alternative**

---



# SR 710 North – No Build Alternative 2035 Programmed Projects

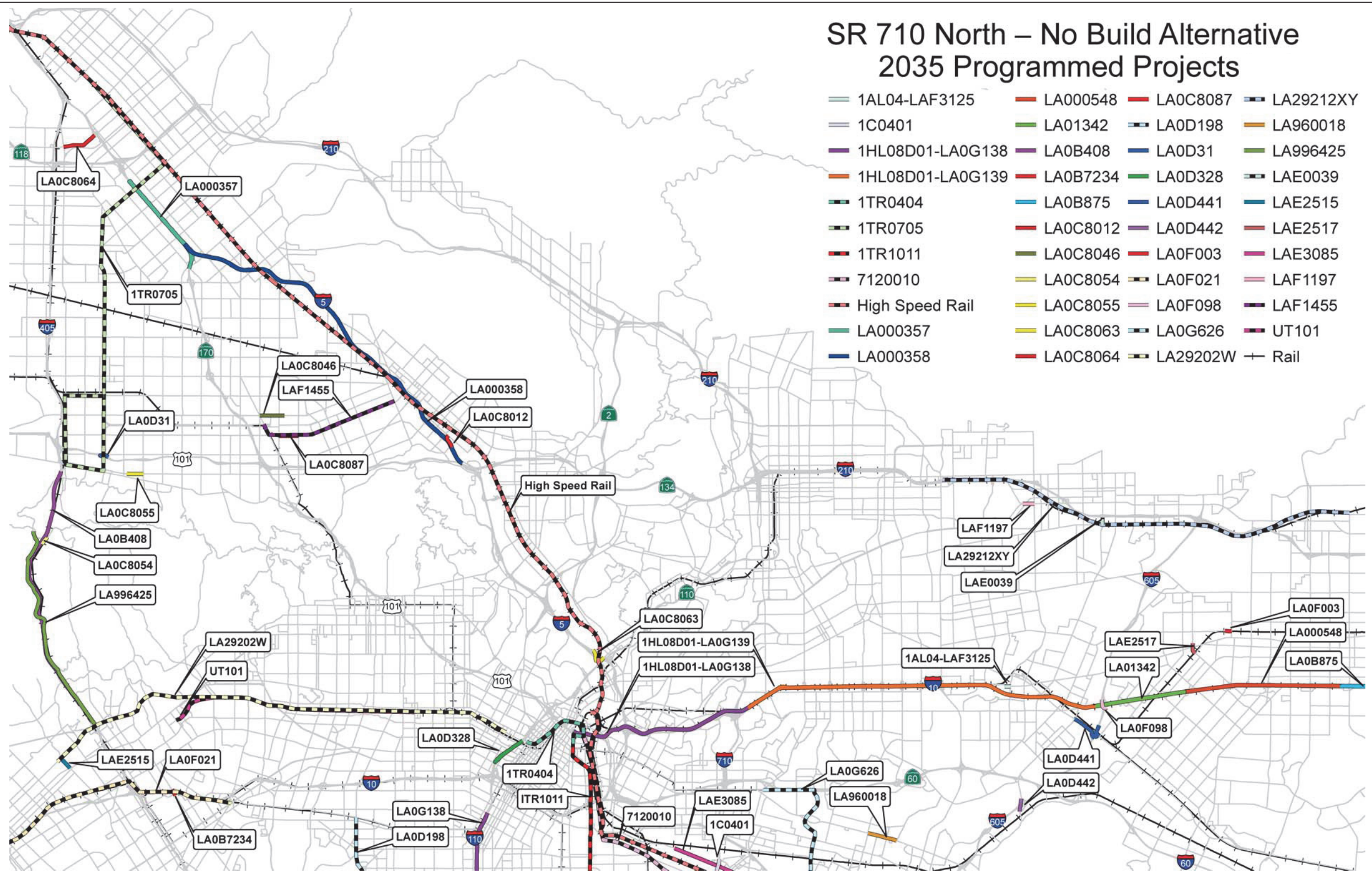


FIGURE E-1



NOT TO SCALE  
 SOURCE: CH2M HILL (2013)  
 I:\CHM1105\G\No Build Alt.cdr (10/27/14)

SR 710 North Study  
 No Build Alternative  
 07-LA-710 (SR 710)  
 EA 187900  
 EFIS 0700000191





**Attachment F**  
**TSM/TDM Alternative**

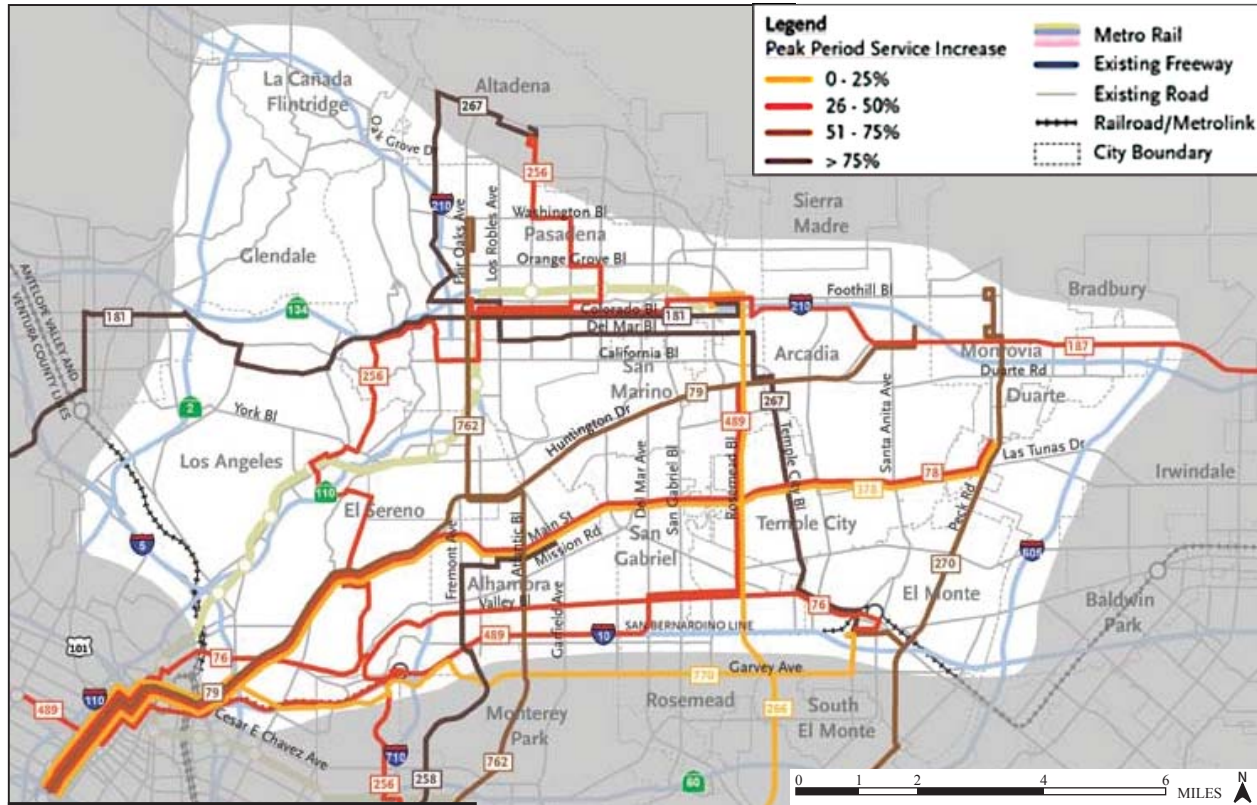
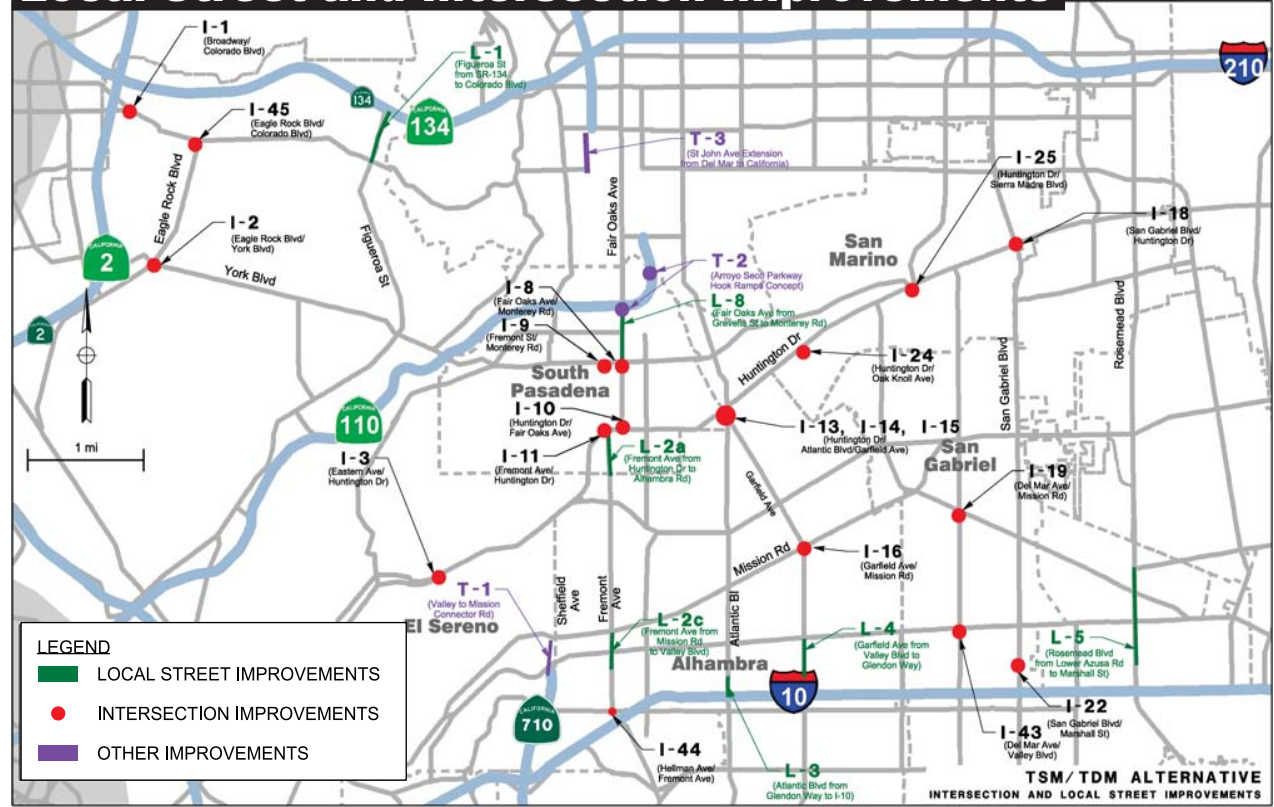
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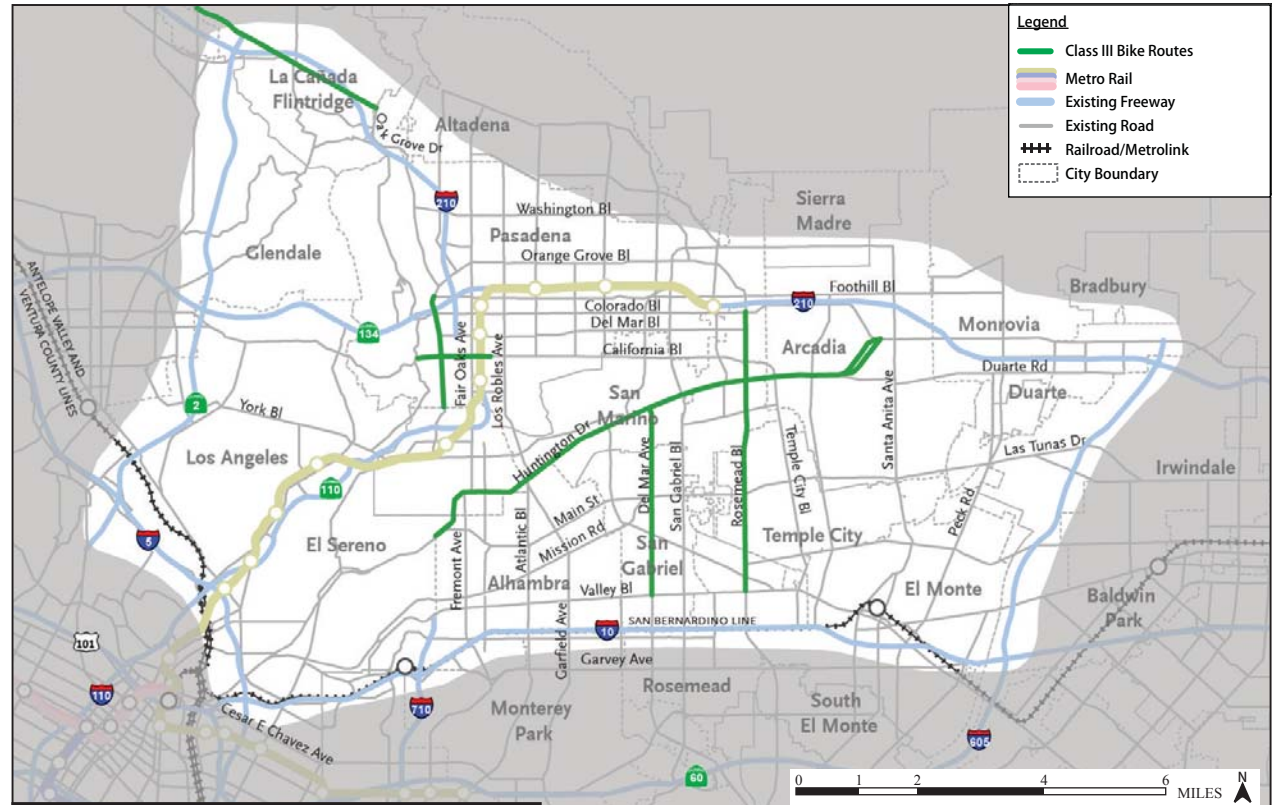
# ITS Improvements



# Local Street and Intersection Improvements



# Transit Refinement



# Active Transportation

# SR 710 NORTH STUDY - TSM/TDM ALTERNATIVE DRAFT PROJECT REPORT PLANS SUBMITTAL JANUARY, 2015

APPROVED AS TO IMPACT ON STATE FACILITIES AND CONFORMANCE WITH APPLICABLE STATE STANDARDS AND PRACTICES AND THAT TECHNICAL OVERSIGHT WAS PERFORMED.

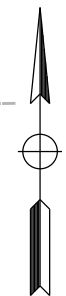
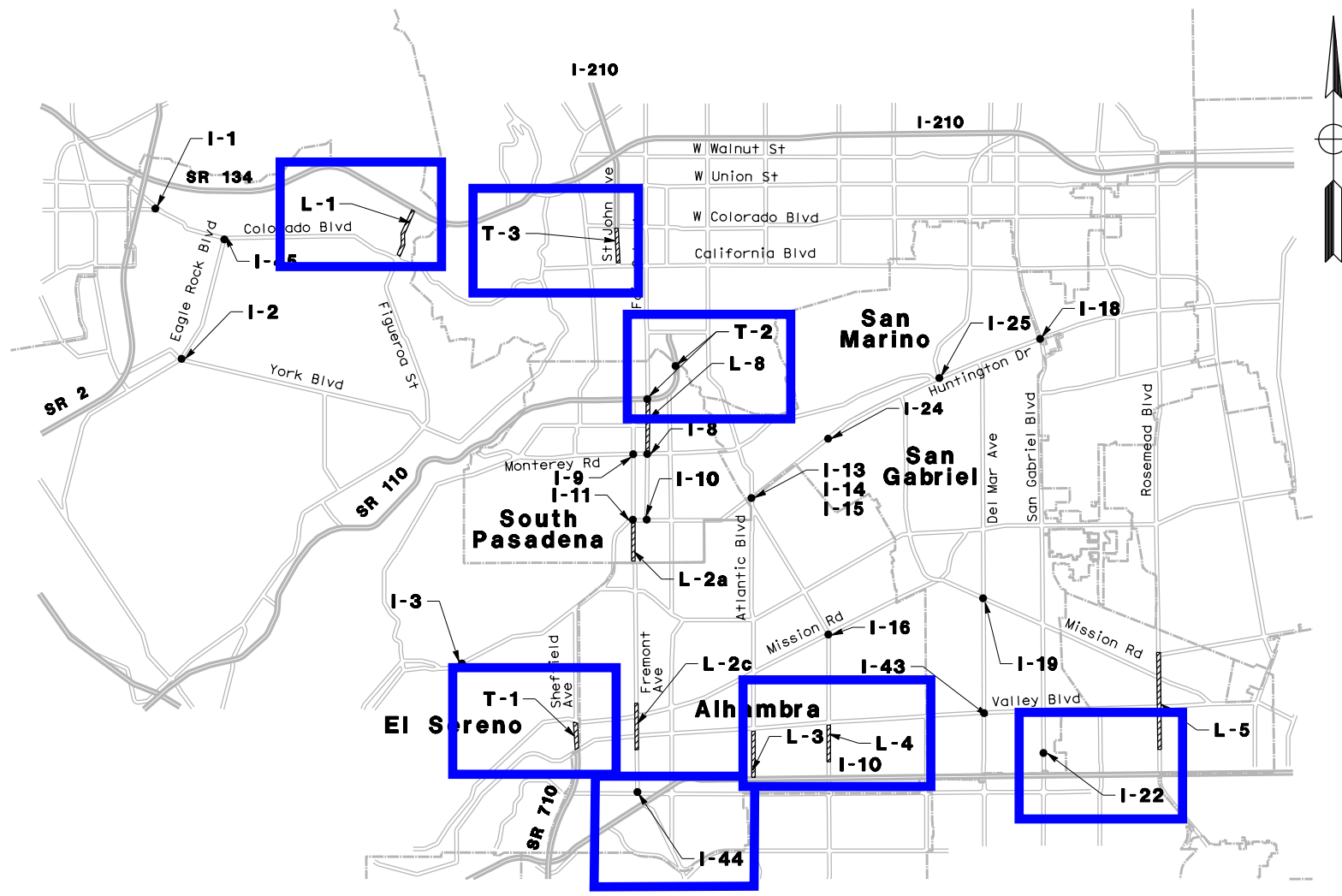
DATE SIGNED

LICENSE EXP DATE

REGISTRATION No.

CALTRANS DESIGN OVERSIGHT APPROVAL

CONSULTANT DESIGN ENGINEER



**LEGEND**  
 BLUE BOXES INDICATE SHEETS WHERE THE PROPOSED TSM/TDM ALTERNATIVE IS WITHIN OR NEAR CALTRANS RIGHT-OF-WAY.

NO SCALE

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ID No.	DESCRIPTION
I-1	Broadway/Colorado Blvd
I-2	Eagle Rock Blvd/York Blvd
I-3	Eastern Ave/Huntington Dr
I-8	Fair Oaks Ave/Monterey Rd
I-9	Fremont St/Monterey Rd
I-10	Huntington Dr/Fair Oaks Ave
I-11	Fremont Ave/Huntington Dr
I-13, I-14, I-15	Huntington Dr/Atlantic Blvd /Garfield Ave
I-16	Garfield Ave/Mission Rd
I-18	San Gabriel Blvd/Huntington Dr
I-19	Del Mar Ave/Mission Rd
I-22	San Gabriel Blvd/Marshall St
I-24	Huntington Dr/Oak Knoll Ave
I-25	Huntington Dr/San Marino Ave
I-43	Del Mar Ave/Valley Blvd
I-44	Fremont Ave/ Hellman Ave
I-45	Eagle Rock Blvd/Colorado Blvd
L-1	Figueroa St from SR-134 to Colorado Blvd
L-2a	Fremont Ave from Huntington Dr to Alhambra Rd
L-2c	Fremont Ave from Mission Rd to Valley Blvd
L-3	Atlantic Blvd from Valley Blvd to I-10

ID No.	DESCRIPTION
L-4	Garfield Ave from Valley Blvd to Glendon Way
L-5	Rosemead Blvd from Lower Azusa Rd to Marshall St
L-8	Fair Oaks Ave from Grevelia St to Monterey Rd
T-1	Valley Blvd to Mission Rd Connector Rd
T-2	Arroyo Seco Parkway Hook Ramps Concept
T-3	St John Ave Extension from Del Mar Ave to California Blvd



THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO BIDDERS."

PROJECT ENGINEER \_\_\_\_\_ DATE \_\_\_\_\_  
 REGISTERED CIVIL ENGINEER



PLANS APPROVAL DATE \_\_\_\_\_  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL 6 HUTTON CENTRE DRIVE, SUITE 700 SANTA ANA, CA 92707	
CONTRACT No.	<b>07-187900</b>
PROJECT ID	<b>0700000191</b>

ATTACHMENT F-2 KEY MAP 1 OF 1

DATE PLOTTED => 17-06-2014

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

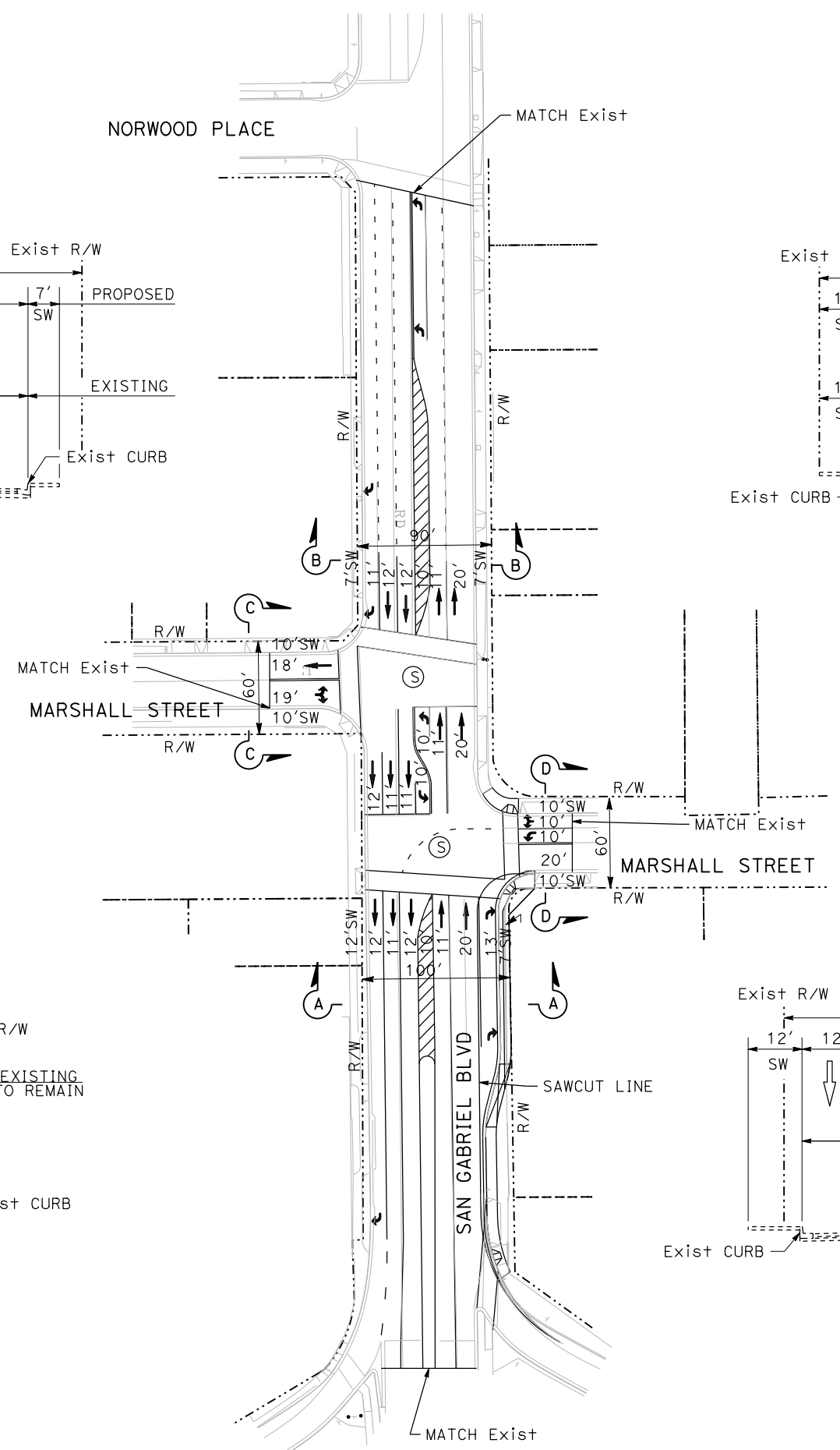
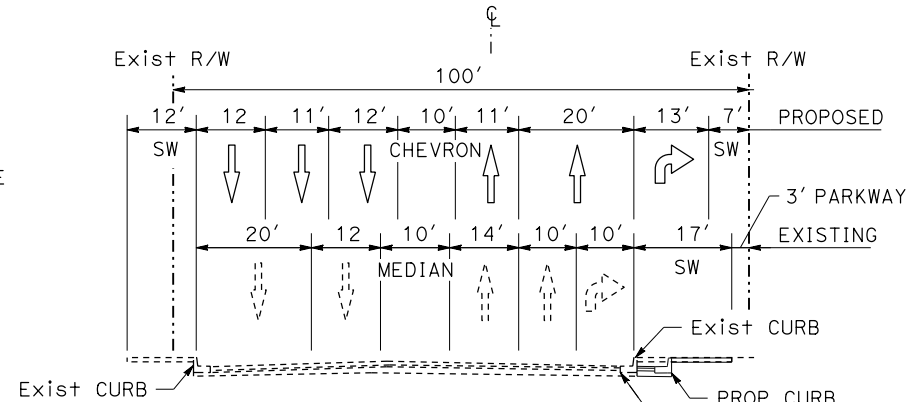
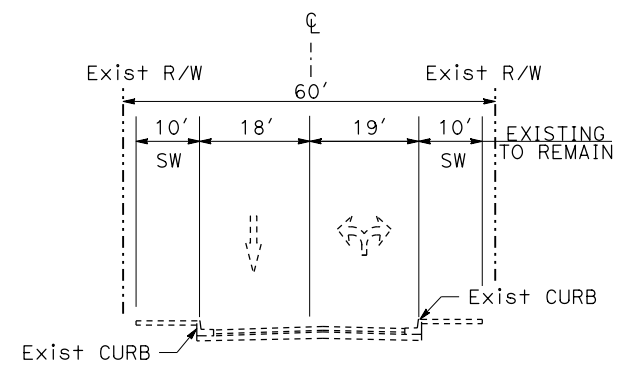
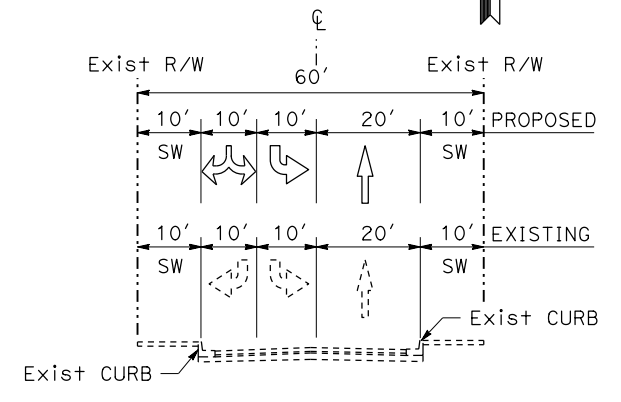
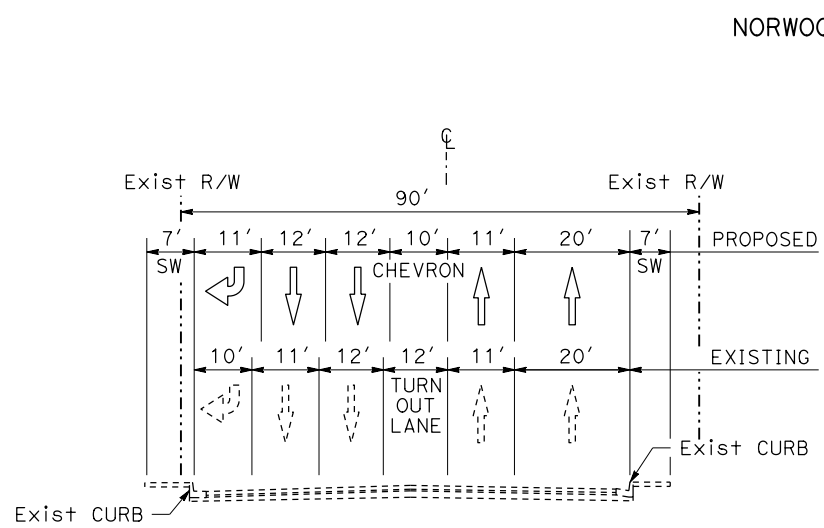
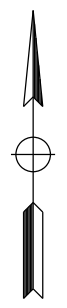
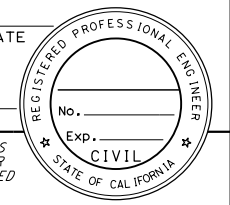
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				

REGISTERED CIVIL ENGINEER	DATE
PLANS APPROVAL DATE	

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

JMD 18645 E. GALE AVE. SUITE 212 INDUSTRY, CA 91748	METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012
--	---



**LEGEND**  
 (S) SIGNALIZED INTERSECTION  
 --- RIGHT OF WAY

ATTACHMENT F-2 SHEET 1 OF 28  
**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**SAN GABRIEL BLVD AND MARSHALL ST**

SCALE: 1"=50'

I-22

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 EtCaltrans

REVISED BY  
DATE

CALCULATED-DESIGNED BY  
CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR

USERNAME => pwsvc  
 DGN FILE => 1-22\_SAN-MAR\_PROP.dgn

BORDER LAST REVISED 7/2/2010

RELATIVE BORDER SCALE  
 IS IN INCHES

UNIT 0000

PROJECT NUMBER & PHASE

07000001911

LAST REVISION | DATE PLOTTED => 28-FEB-2014  
 00-00-00 | TIME PLOTTED => 16:21

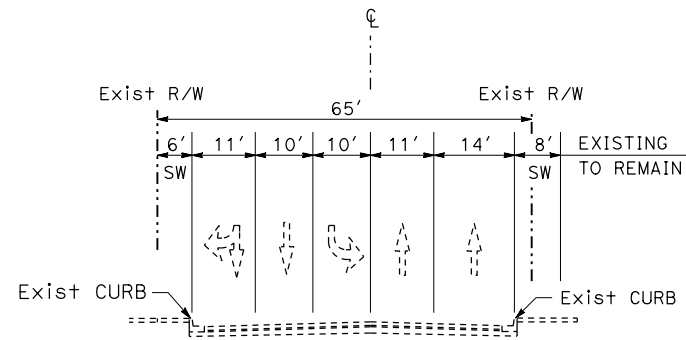
**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				

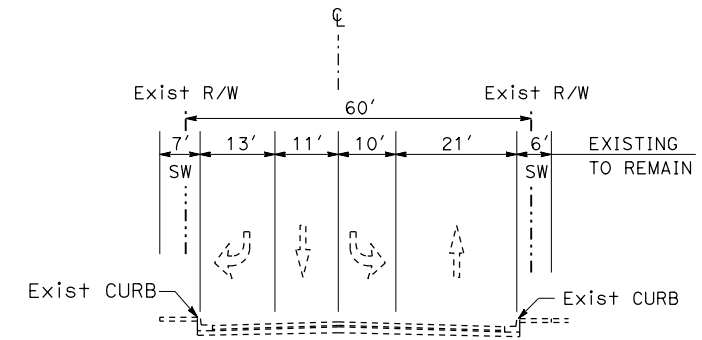
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
No. \_\_\_\_\_  
Exp. \_\_\_\_\_  
CIVIL  
STATE OF CALIFORNIA

JMD  
18645 E. GALE AVE.  
SUITE 212  
INDUSTRY, CA 91748  
METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012

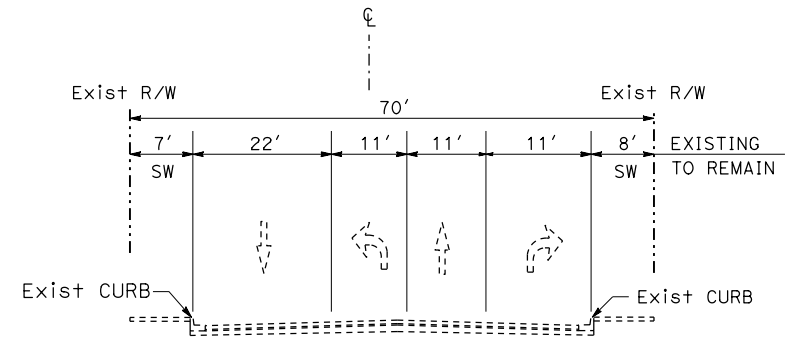
**LEGEND**  
Ⓢ SIGNALIZED INTERSECTION  
--- RIGHT OF WAY



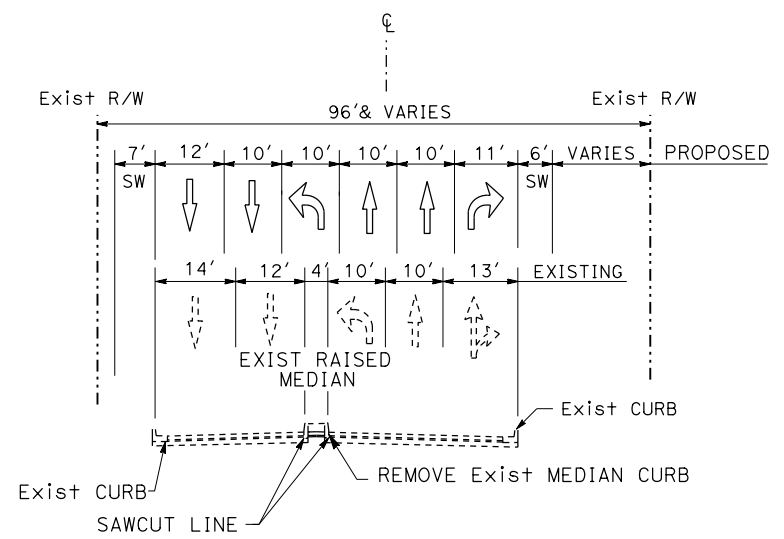
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NTS



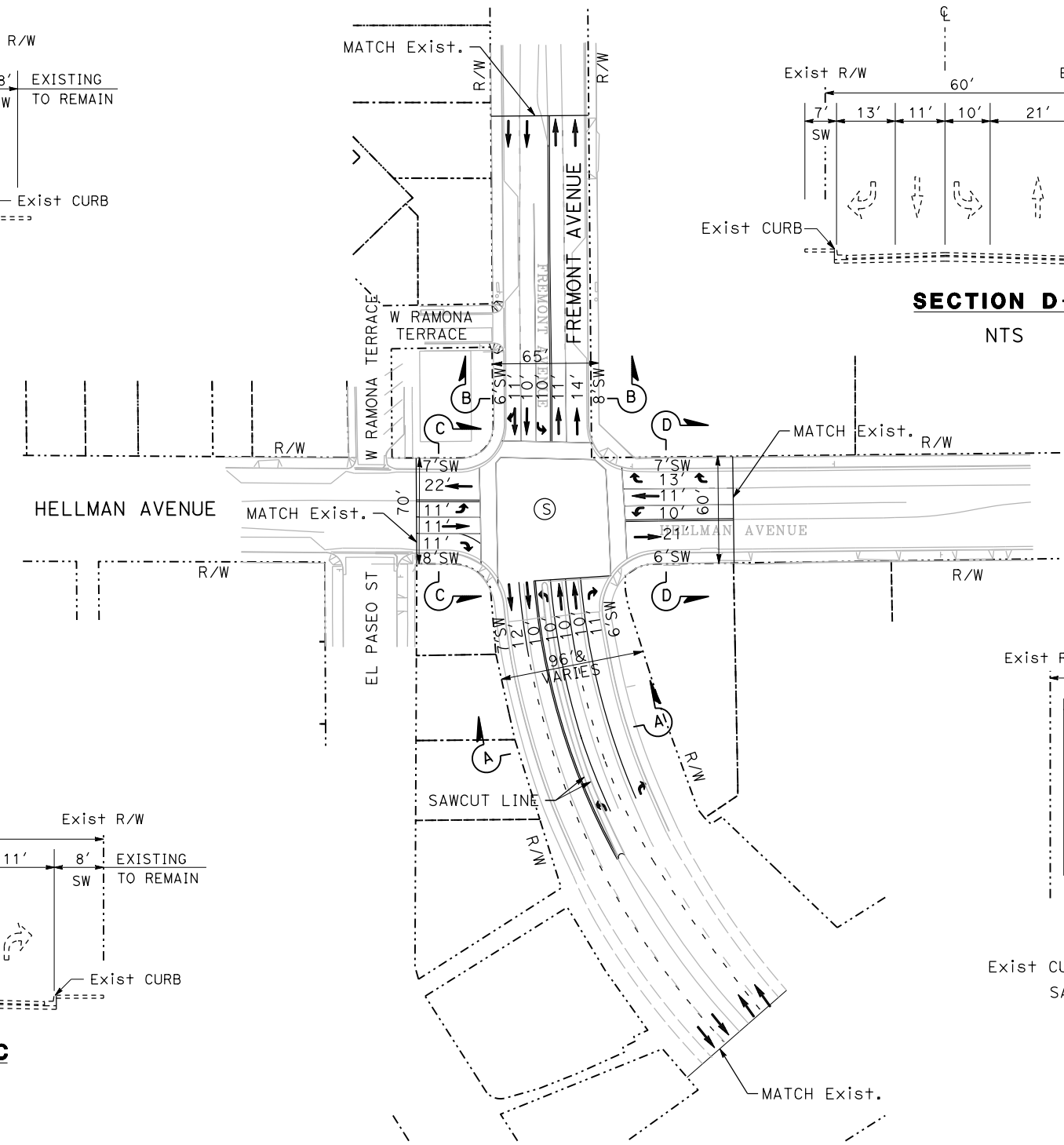
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**SECTION C-C**  
NTS



**SECTION A-A**  
NTS



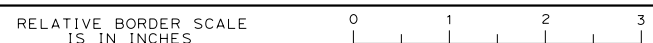
ATTACHMENT F-2 SHEET 2 OF 28

**TSM/TDM ALTERNATIVE  
INTERSECTION AND LOCAL STREET IMPROVEMENT  
FREMONT AVE AND HELLMAN AVE**

**I-44**

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

SCALE: 1"=50'



UNIT 0000

PROJECT NUMBER & PHASE

07000001911

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**

CONSULTANT FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY  
CHECKED BY

REVISED BY  
DATE REVISED

REVISIONS

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

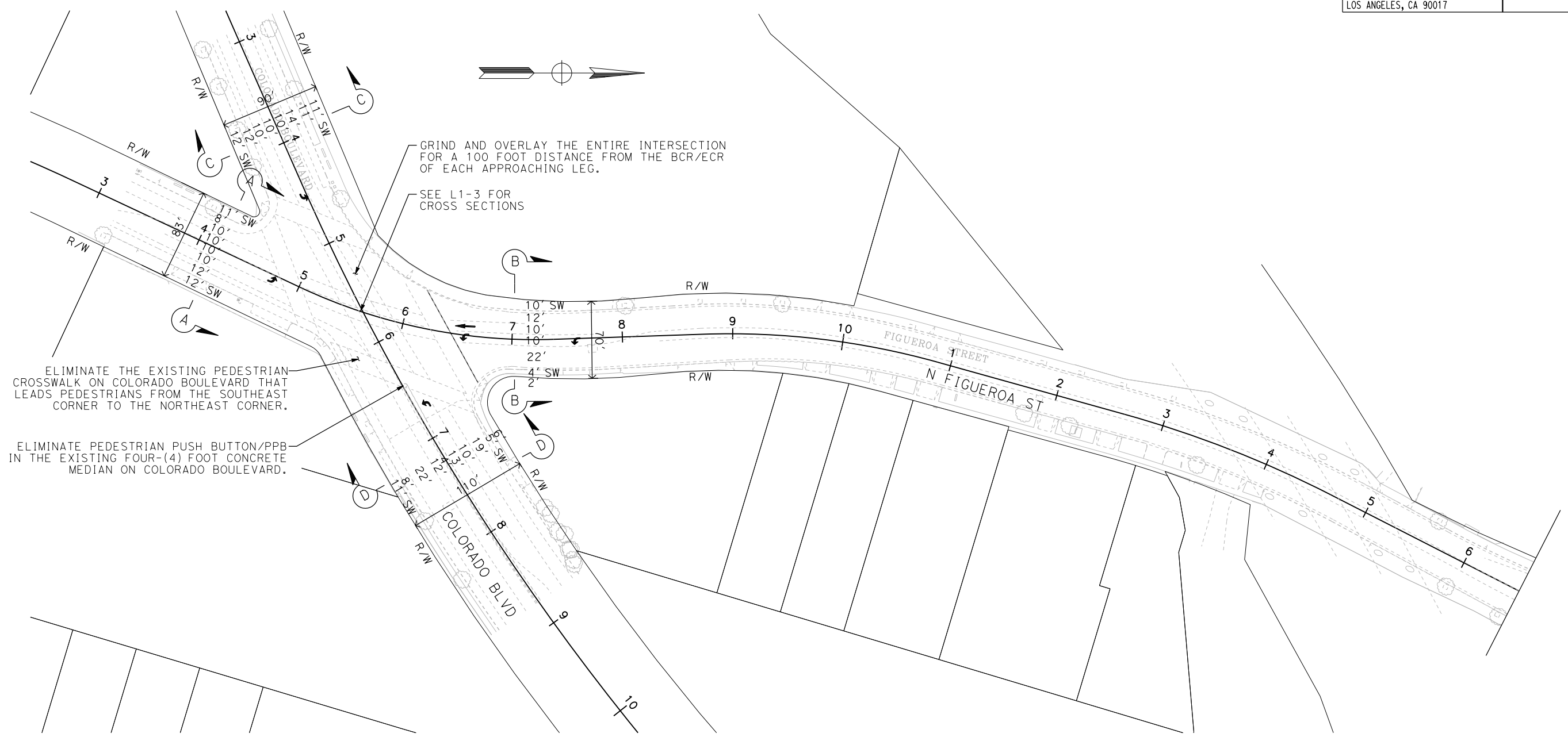
Dist	COUNTY	ROUTE	SHEET No.	TOTAL SHEETS
07	LA	710		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

D R CONSULTANTS & DESIGNERS, Inc. METRO  
 725 S. FIGUEROA STREET SUITE 3320 LOS ANGELES, CA 90017  
 ONE GATEWAY PLAZA LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	REVISOR	DATE
<b>Caltrans</b>	DESIGNED BY	REVISION
	CHECKED BY	DATE
	CALCULATED/DESIGNED BY	REVISION
	CONSULTANT FUNCTIONAL SUPERVISOR	DATE

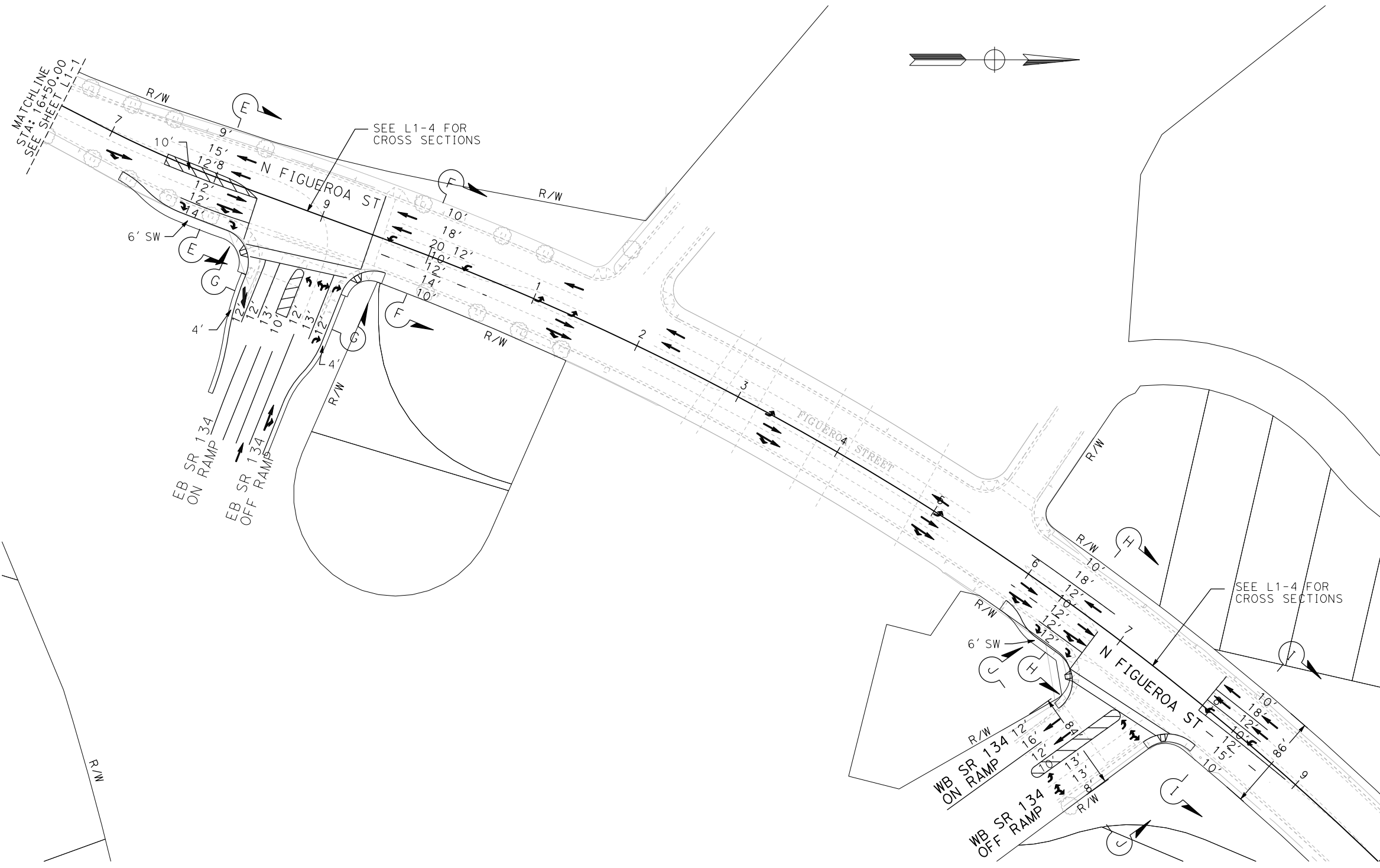
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT F-2 SHEET 3 OF 28  
**TSM/TDM ALTERNATIVE**  
 INTERSECTION AND LOCAL STREET IMPROVEMENT  
**N FIGUEROA St FROM COLORADO Blvd TO SR 134 RAMP**  
 SCALE 1"=50'  
**L1-1**

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	SHEET No.	TOTAL SHEETS
07	LA	710		
REGISTERED CIVIL ENGINEER		DATE		
PLANS APPROVAL DATE				
<p><small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small></p>				
D R CONSULTANTS & DESIGNERS, Inc. METRO 725 S. FIGUEROA STREET SUITE 3320 LOS ANGELES, CA 90017			ONE GATEWAY PLAZA LOS ANGELES, CA 90012	



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR	DATE
<b>Caltrans</b>		CHECKED BY		

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**ATTACHMENT F-2 SHEET 4 OF 28**  
**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**N FIGUEROA St FROM COLORADO TO SR 134 RAMP**  
 SCALE 1"=50'  
**L1-2**

LAST REVISION: 00-00-00 DATE PLOTTED => \$DATE\$ TIME PLOTTED => \$TIME\$

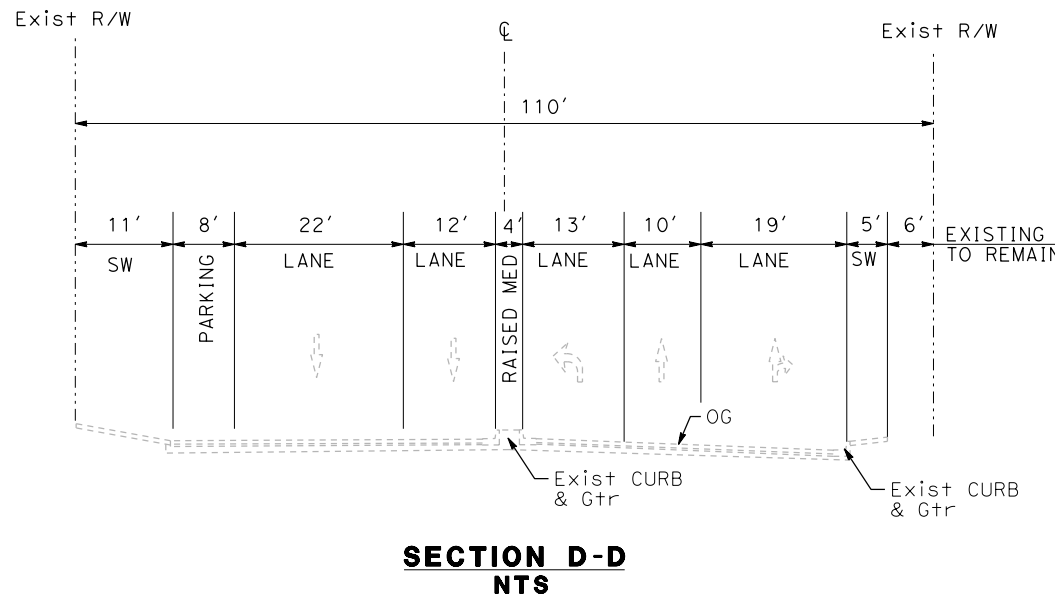
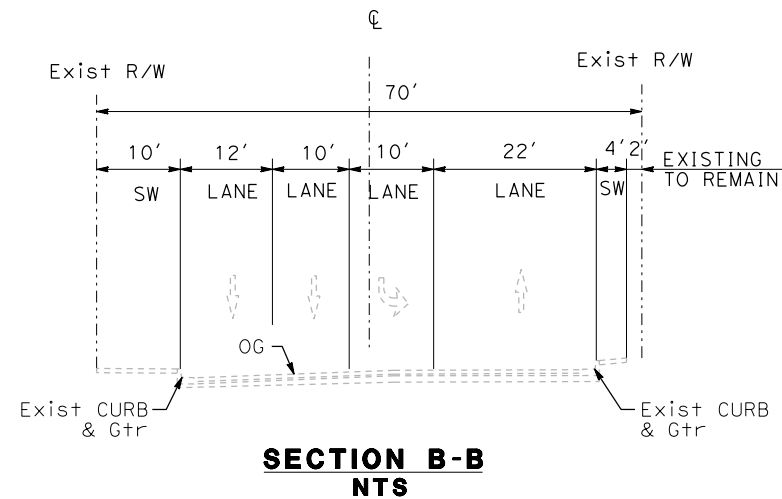
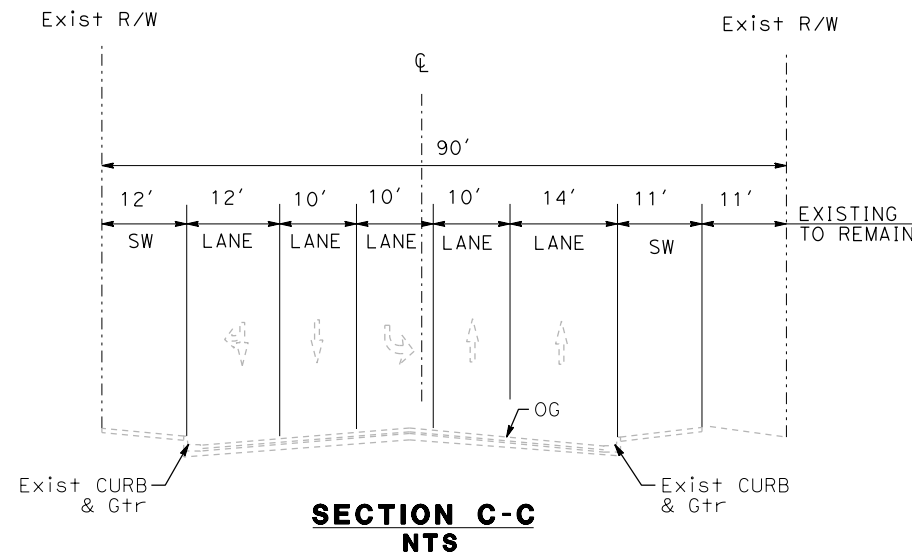
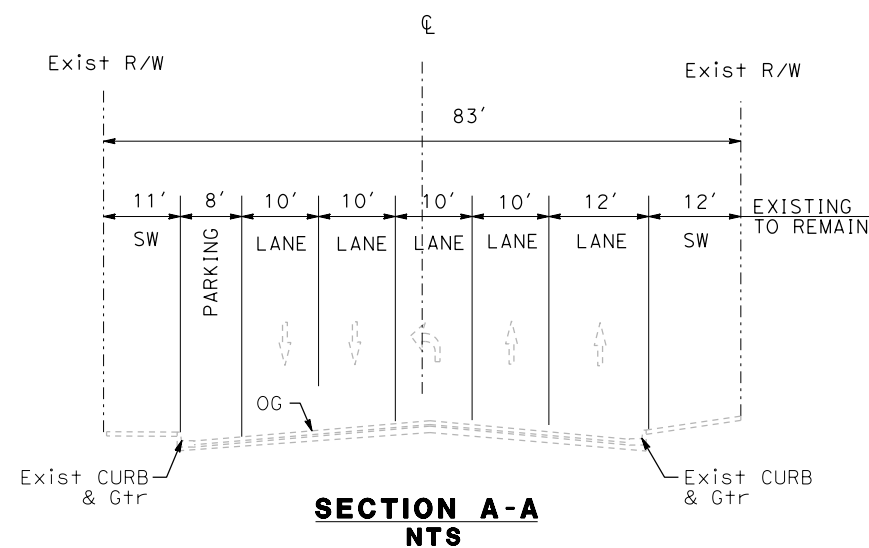


Dist	COUNTY	ROUTE	SHEET No.	TOTAL SHEETS
07	LA	710		

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

REGISTERED CIVIL ENGINEER	DATE
PLANS APPROVAL DATE	
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>	

D R CONSULTANTS & DESIGNERS, Inc. METRO  
725 S. FIGUEROA STREET SUITE 3320 ONE GATEWAY PLAZA  
LOS ANGELES, CA 90017 LOS ANGELES, CA 90012



		REVISED BY	DATE	REVIS	DATE	REVIS	DATE	REVIS	DATE	REVIS	DATE	REVIS	DATE	REVIS	DATE	REVIS	DATE	REVIS	DATE
		CALCULATED/DESIGNED BY	CHECKED BY																
		CONSULTANT	FUNCTIONAL SUPERVISOR																
		DEPARTMENT OF TRANSPORTATION																	



**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**ATTACHMENT F-2 SHEET 5 OF 28**  
**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**N FIGUEROA St FROM COLORADO Blvd TO SR 134 RAMPS**  
**L1-3**  
SCALE 1"=50'

BORDER LAST REVISED 7/2/2010	USERNAME => pwsvc DGN FILE => L1-sh3.dgn	RELATIVE BORDER SCALE IS IN INCHES	0 1 2 3	UNIT 0000	PROJECT NUMBER & PHASE	07000001911
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LAST REVISION DATE PLOTTED => \$DATE\$  
00-00-00 TIME PLOTTED => \$TIME\$

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

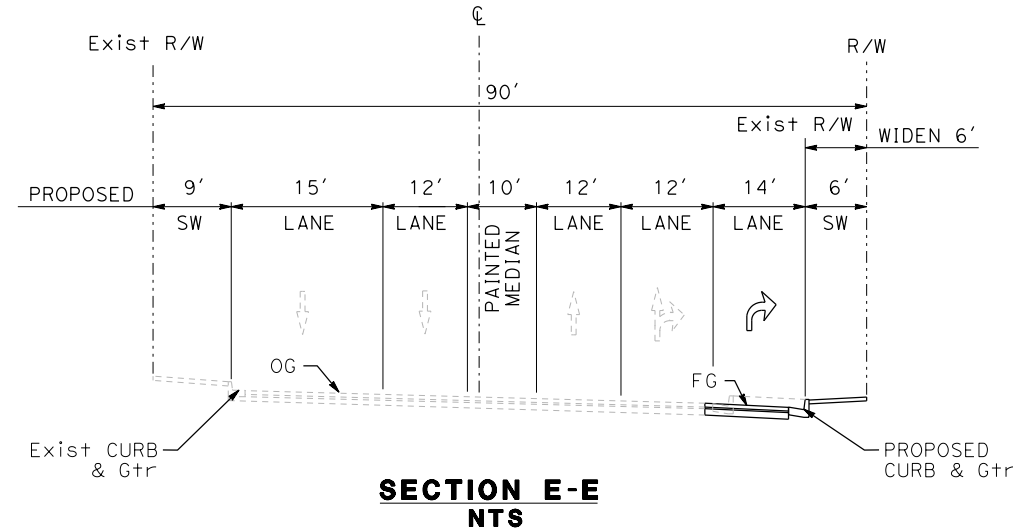
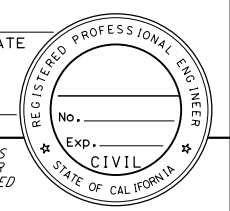
Dist	COUNTY	ROUTE	SHEET No.	TOTAL SHEETS
07	LA	710		

REGISTERED CIVIL ENGINEER DATE

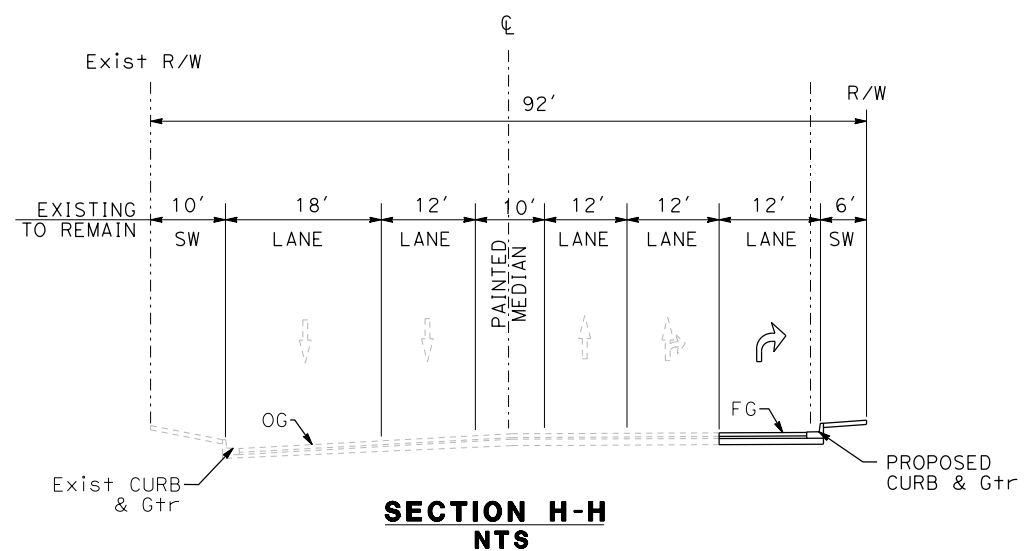
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

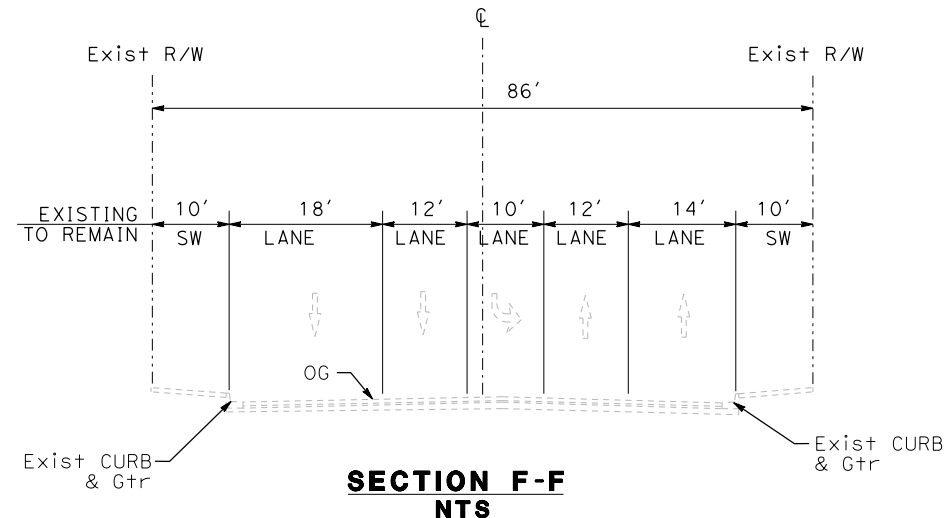
D R CONSULTANTS & DESIGNERS, Inc. METRO  
 725 S. FIGUEROA STREET SUITE 3320 LOS ANGELES, CA 90017  
 ONE GATEWAY PLAZA LOS ANGELES, CA 90012



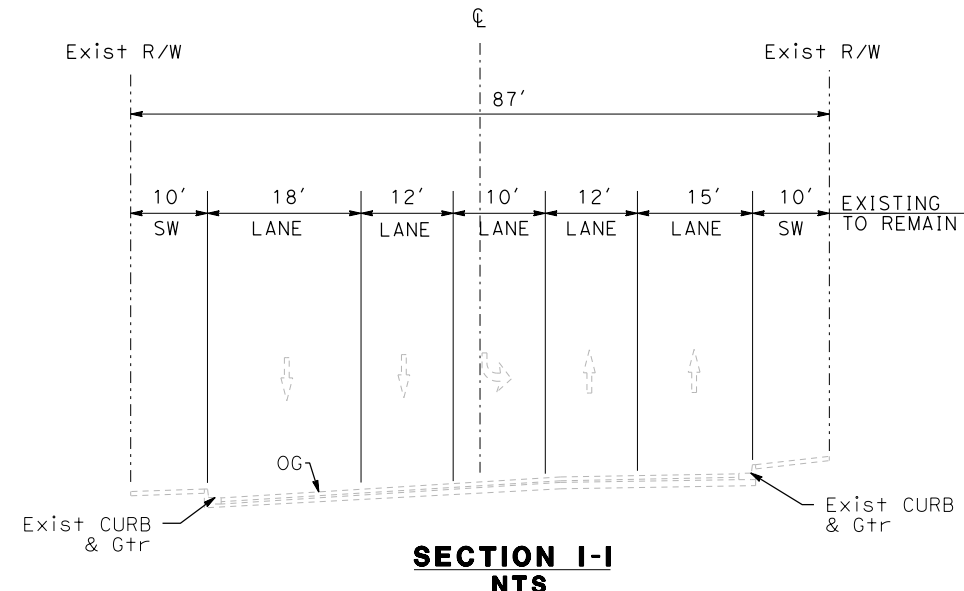
**SECTION E-E NTS**



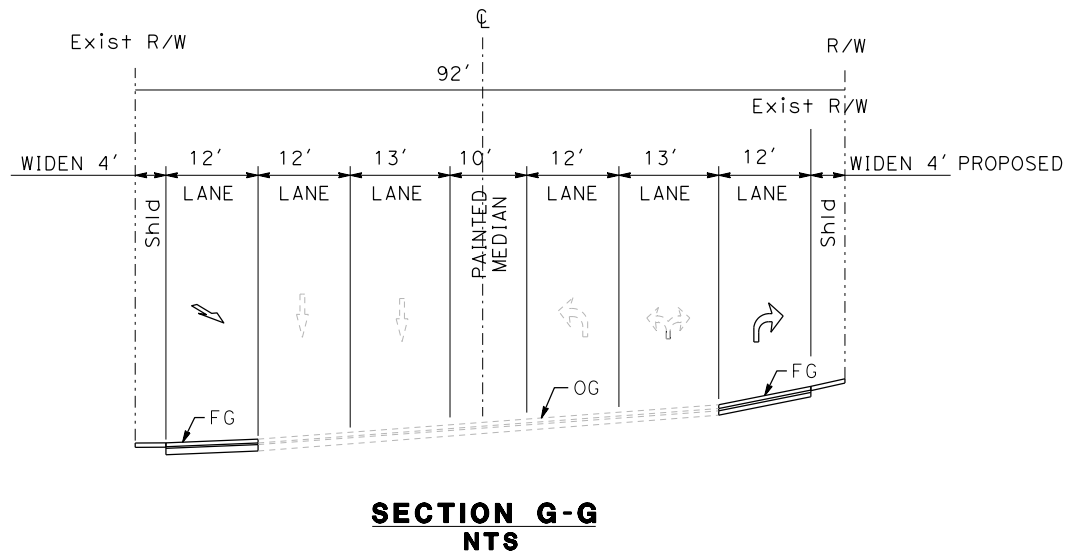
**SECTION H-H NTS**



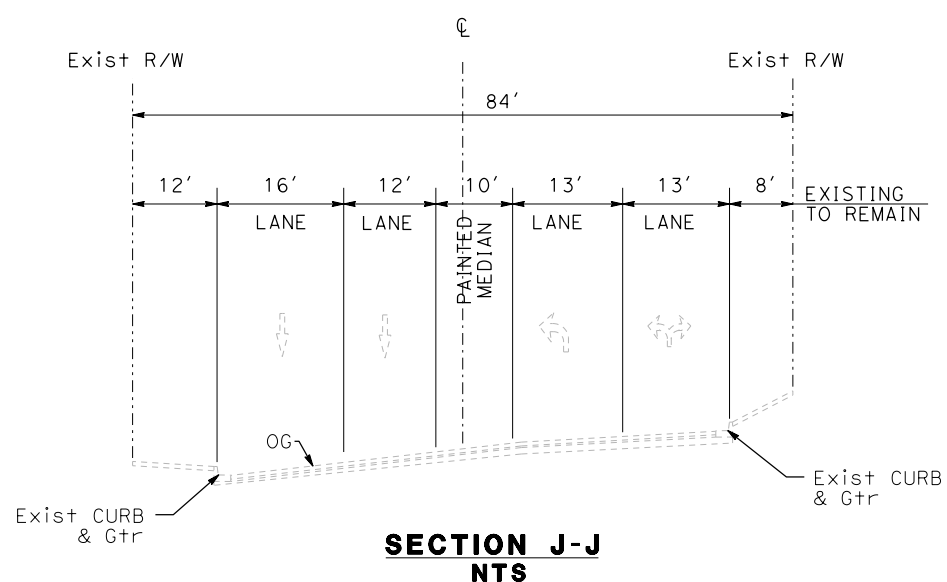
**SECTION F-F NTS**



**SECTION I-I NTS**



**SECTION G-G NTS**



**SECTION J-J NTS**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT F-2 SHEET 6 OF 28

**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**N FIGUEROA St FROM COLORADO TO SR 134 RAMP**  
 SCALE 1"=50'  
**L1-4**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**

REVISOR BY  
 DATE

CALCULATED-DESIGNED BY  
 CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR

BORDER LAST REVISED 7/2/2010

USERNAME => pwsvc  
 DGN FILE => L1-sh4.dgn

RELATIVE BORDER SCALE  
 IS IN INCHES



UNIT 0000

PROJECT NUMBER & PHASE

07000001911

LAST REVISION DATE PLOTTED => \$DATE\$  
 00-00-00 TIME PLOTTED => \$TIME\$

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist:	COUNTY	ROUTE	POST MILES	SHEET TOTAL
07	LA		TOTAL PROJECT	No. SHEETS

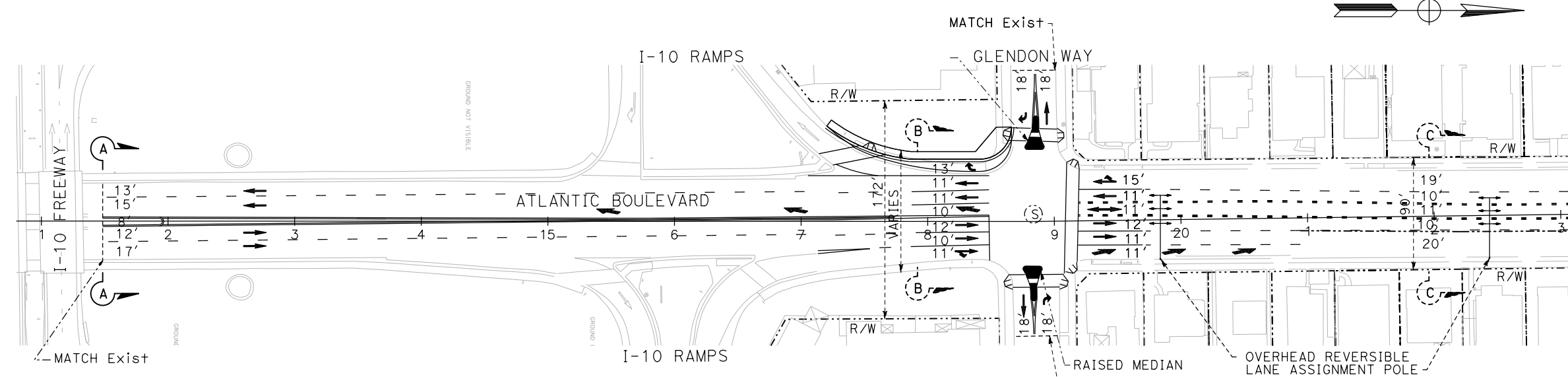
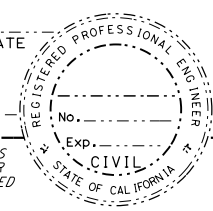
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

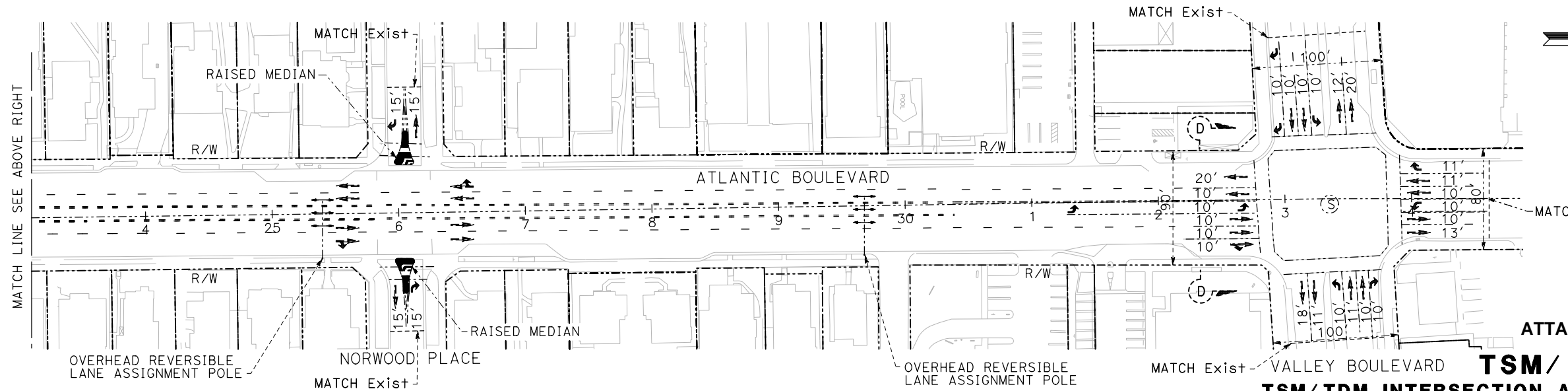
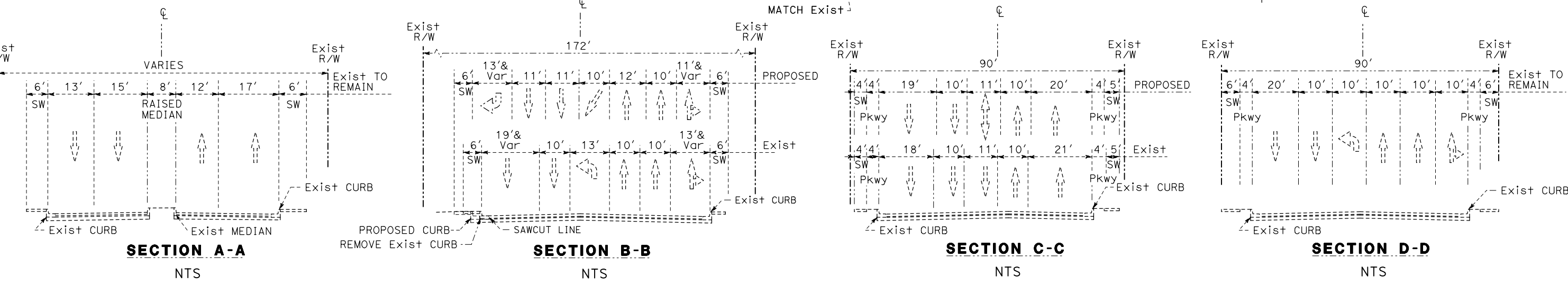
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

JMD  
18645 E. GALE AVE.  
SUITE 212  
INDUSTRY, CA 91748

METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012



**LEGEND**  
(S) SIGNALIZED INTERSECTION  
--- RIGHT OF WAY



ATTACHMENT F-2 SHEET 7 OF 28

**TSM/TDM ALTERNATIVE**  
**TSM/TDM INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**ATLANTIC BLVD - I-10 TO VALLEY BLVD-(L-3 SHEET 1)**

SCALE: 1"=50'

**L-3**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

REVISIONS: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				

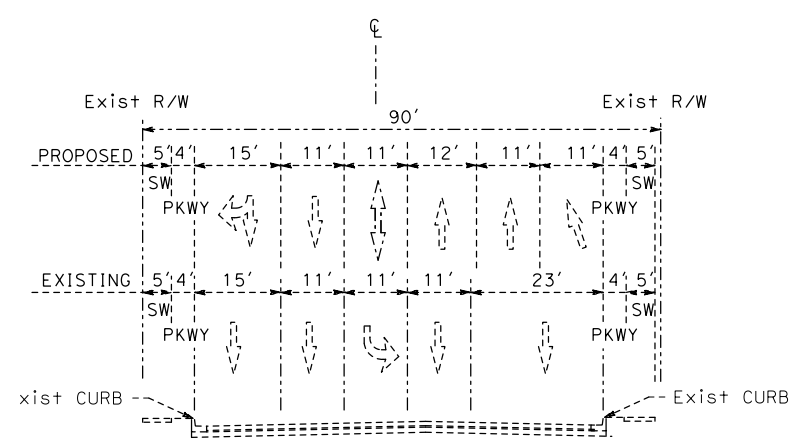
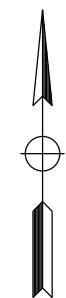
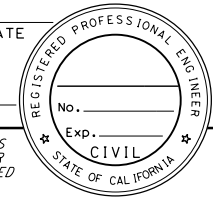
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

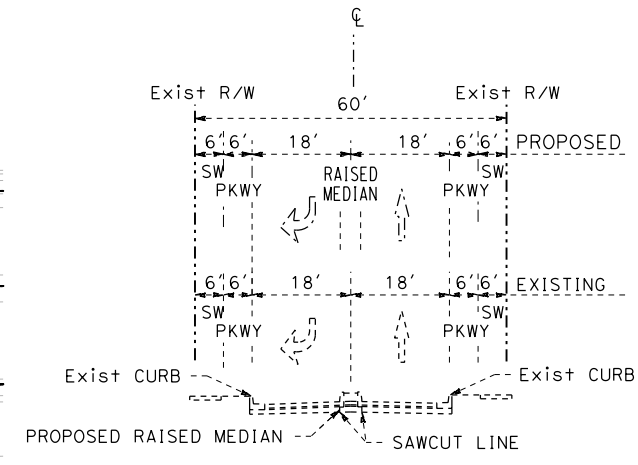
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

JMD  
18645 E. GALE AVE.  
SUITE 212  
INDUSTRY, CA 91748

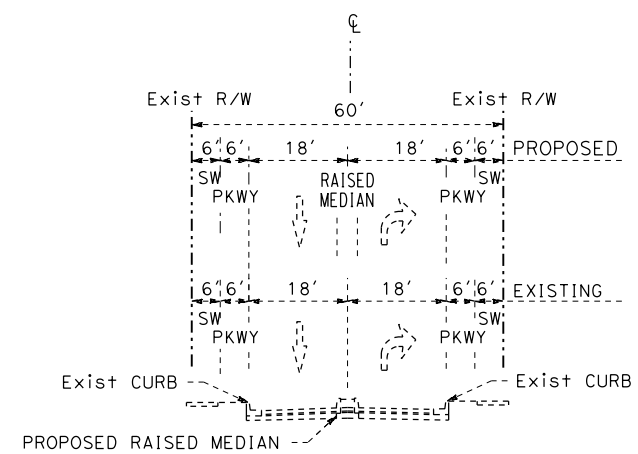
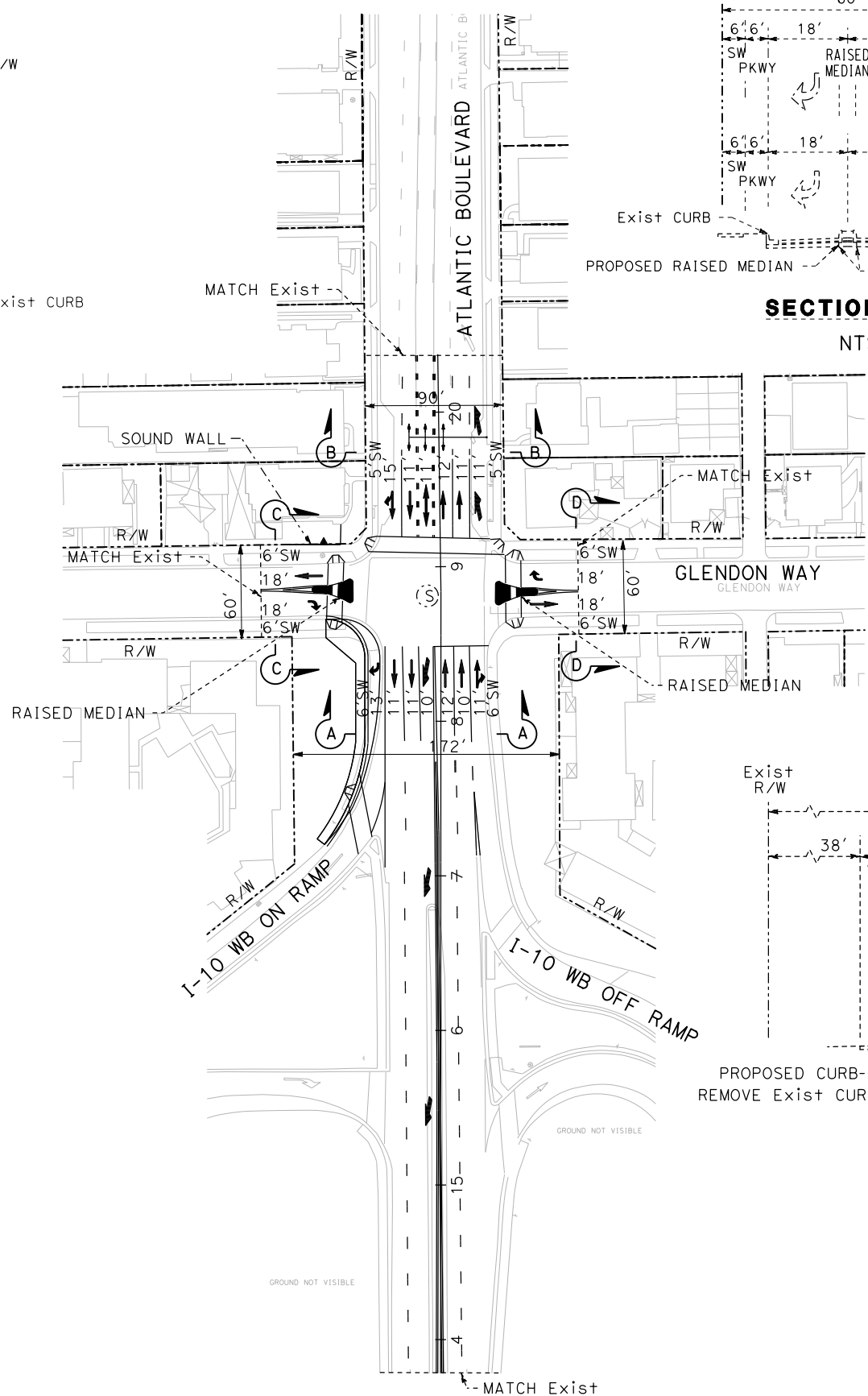
METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012



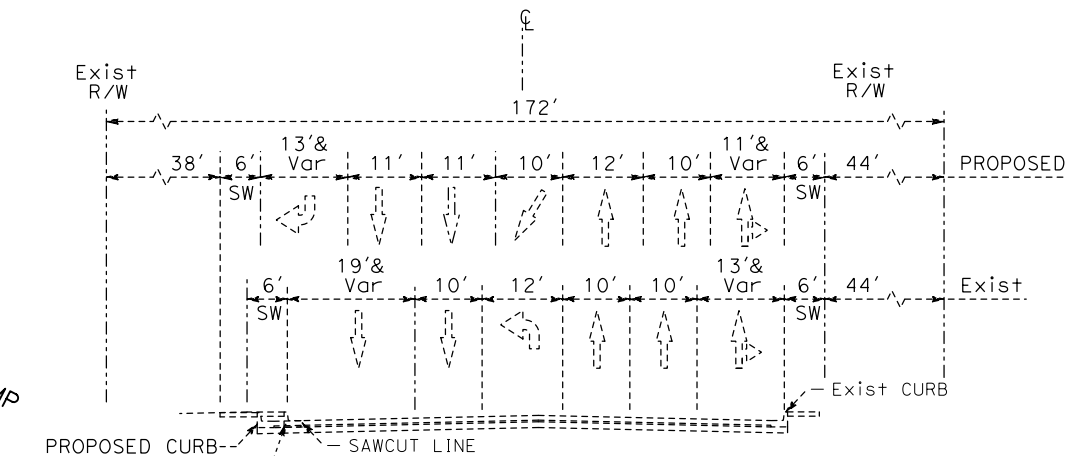
**SECTION B-B**  
NTS



**SECTION D-D**  
NTS



**SECTION C-C**  
NTS



**SECTION A-A**  
NTS

**LEGEND**  
 SIGNALIZED INTERSECTION  
 RIGHT OF WAY

ATTACHMENT F-2 SHEET 8 OF 28

**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**ATLANTIC BLVD AND GLENDON WY-(L-3 SHEET2)**

**L-3**

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

SCALE: 1"=50'

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
CONSULTANT FUNCTIONAL SUPERVISOR  
CALCULATED/DESIGNED BY  
CHECKED BY  
REVISED BY  
DATE REVISED



**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

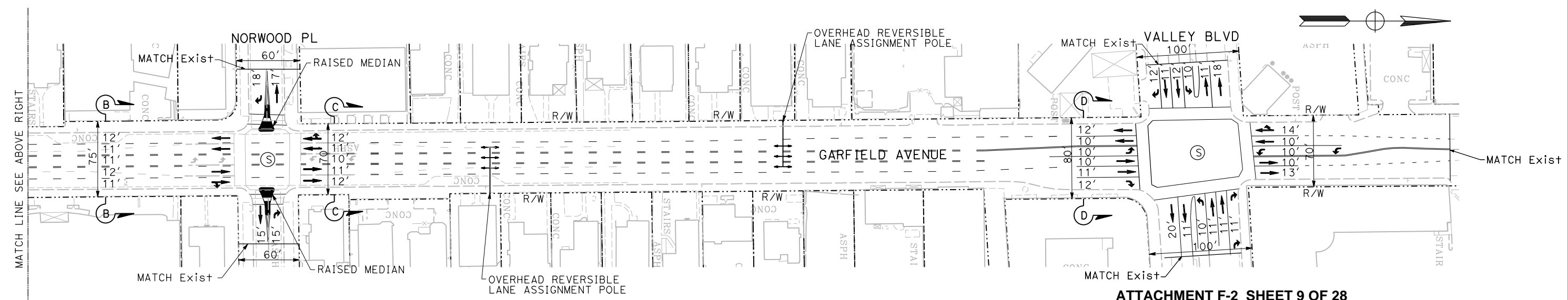
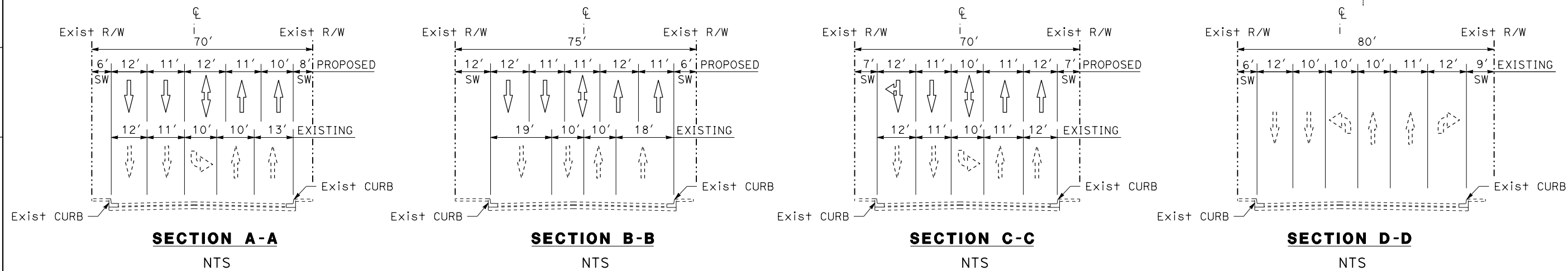
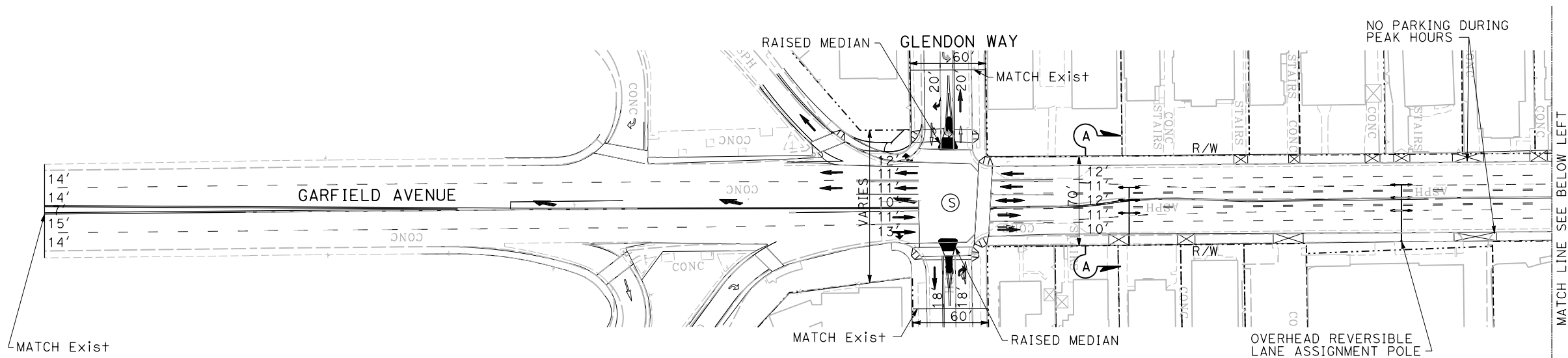
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



JMD  
18645 E. GALE AVE.  
SUITE 212  
INDUSTRY, CA 91748  
METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012

**LEGEND**  
Ⓢ SIGNALIZED INTERSECTION  
--- RIGHT OF WAY



ATTACHMENT F-2 SHEET 9 OF 28  
**TSM/TDM ALTERNATIVE**  
TSM/TDM INTERSECTION AND LOCAL STREET IMPROVEMENT  
GARFIELD AVE - GLENDON WAY TO VALLEY BLVD-(L-4 SHEET 1)

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: 1"=50'  
**L-4**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**

BORDER LAST REVISED 7/2/2010

USERNAME => pwsvc  
DGN FILE => L-4 (SHEET 1)\_GARFIELD(GLENDON TO VALLEY)\_PROP.dgn

RELATIVE BORDER SCALE 15 IN INCHES  
0 1 2 3

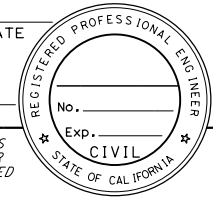
UNIT 0000

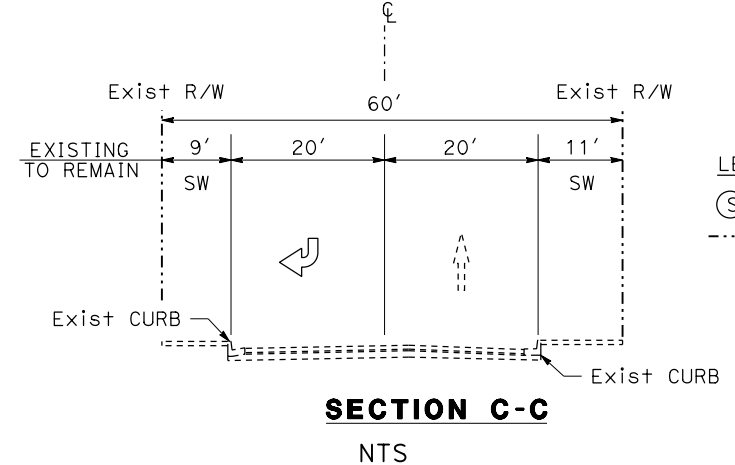
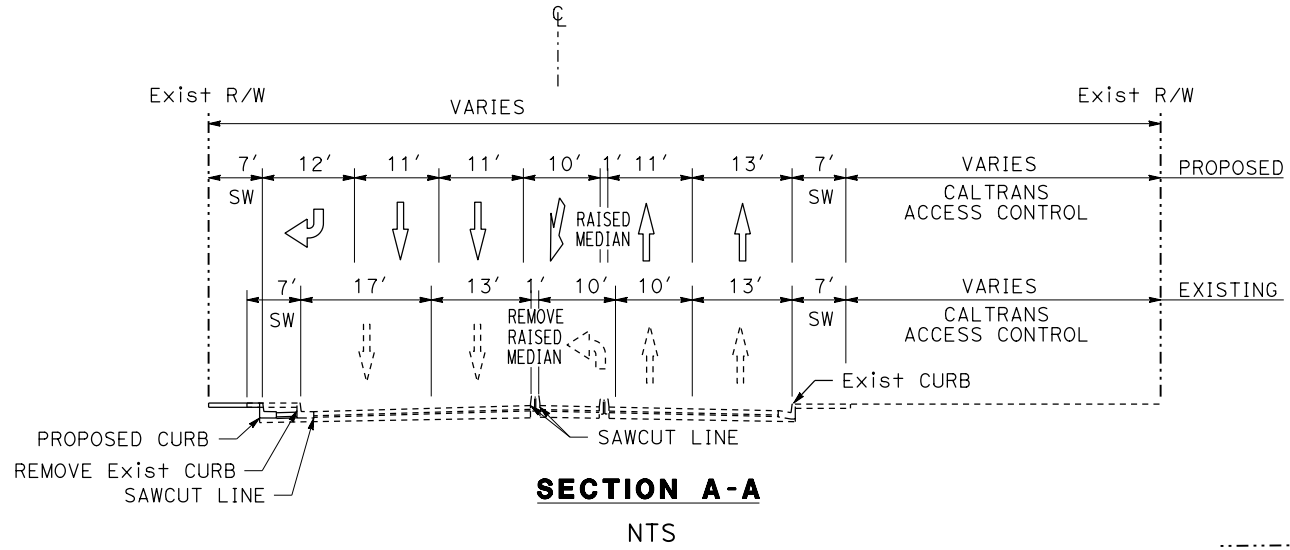
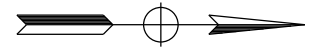
PROJECT NUMBER & PHASE



07000001911

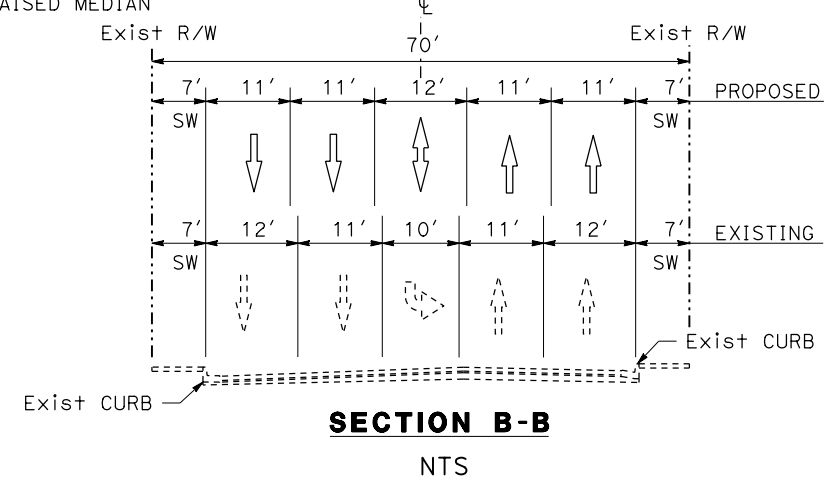
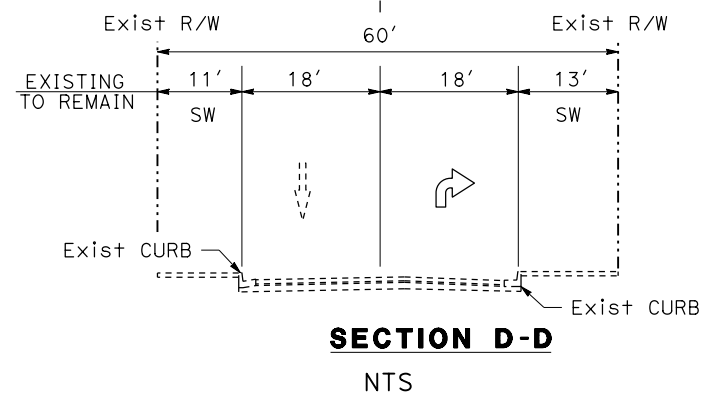
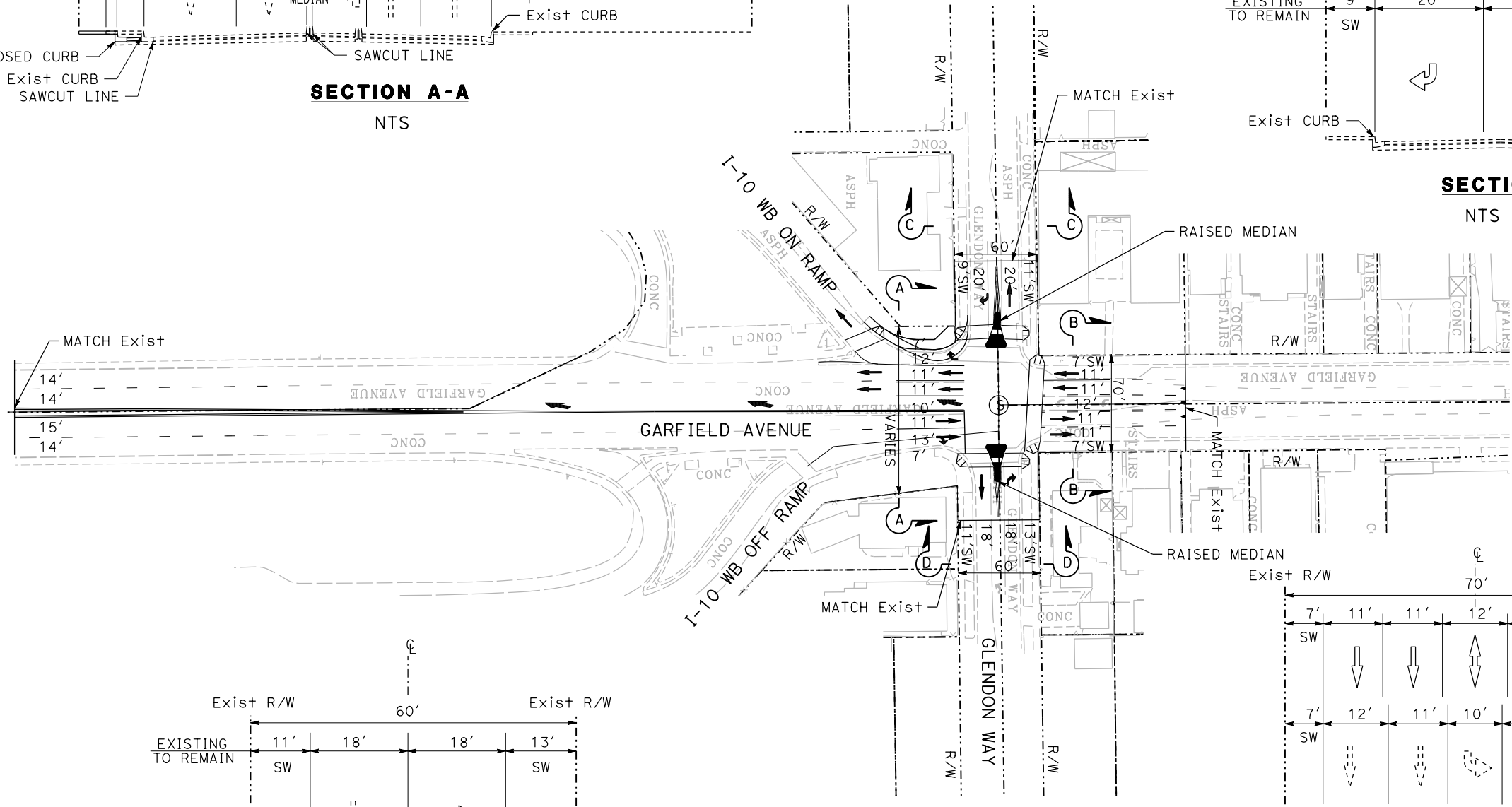
LAST REVISION DATE PLOTTED => 15-MAY-2014  
00-00-00 TIME PLOTTED => 14:55

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
JMD 18645 E. GALE AVE. SUITE 212 INDUSTRY, CA 91748			METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012		



**LEGEND**  
 SIGNALIZED INTERSECTION  
 RIGHT OF WAY




ATTACHMENT F-2 SHEET 10 OF 28  
**TSM/TDM ALTERNATIVE**  
 INTERSECTION AND LOCAL STREET IMPROVEMENT  
 GARFIELD AVE AND GLENDON WY - (L-4 SHEET 2)

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION


SCALE: 1"=50'

L-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CONSULTANT FUNCTIONAL SUPERVISOR
CALCULATED/DESIGNED BY
CHECKED BY
REVISOR
DATE
REVISOR
DATE

USERNAME => pwsvc  
DGN FILE => L-4 (SHEET 2)\_GAR-GLEN\_PROP.dgn

RELATIVE BORDER SCALE IS IN INCHES



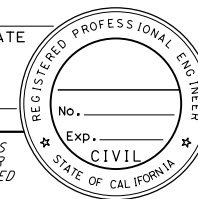
UNIT 0000 PROJECT NUMBER & PHASE 07000001911

LAST REVISION DATE PLOTTED => 16-MAY-2014 00-00-00 TIME PLOTTED => 14:52

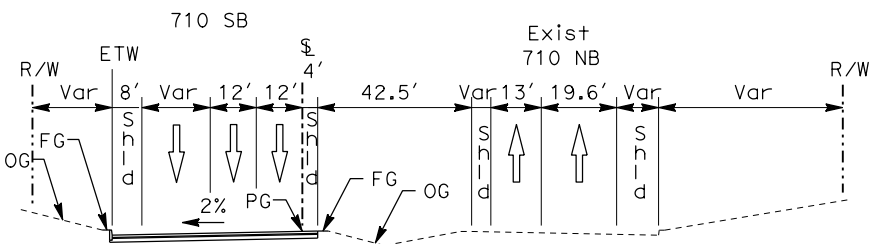
**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



JMD  
18645 E. GALE AVE.  
SUITE 212  
INDUSTRY, CA 91748  
METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012



**SECTION A-A**  
NTS

CURVE DATA

No. @	R	Δ	T	L
①	3200.00'	09°11'03"	257.02'	512.94'
②	3516.00'	09°26'52"	290.54'	579.77'

ATTACHMENT F-2 SHEET 11 OF 28  
**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**710 CONNECTOR VALLEY Blvd TO MISSION Rd**  
SCALE: 1"=50'  
**T1-1**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY	DATE REVISED
<b>Caltrans</b>				

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				

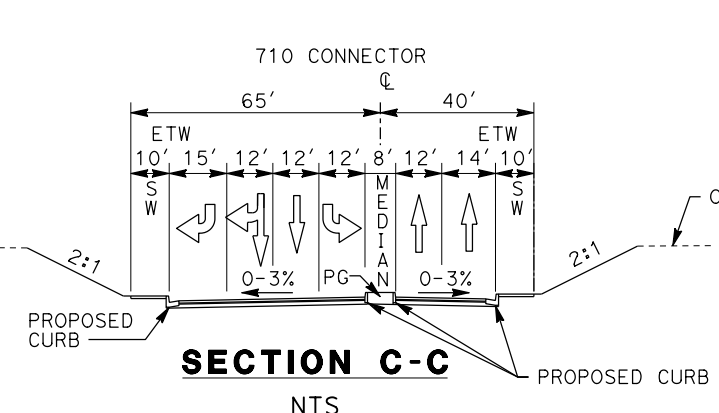
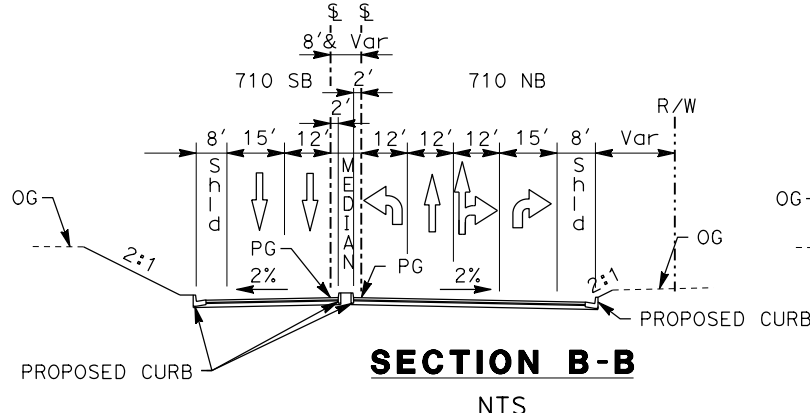
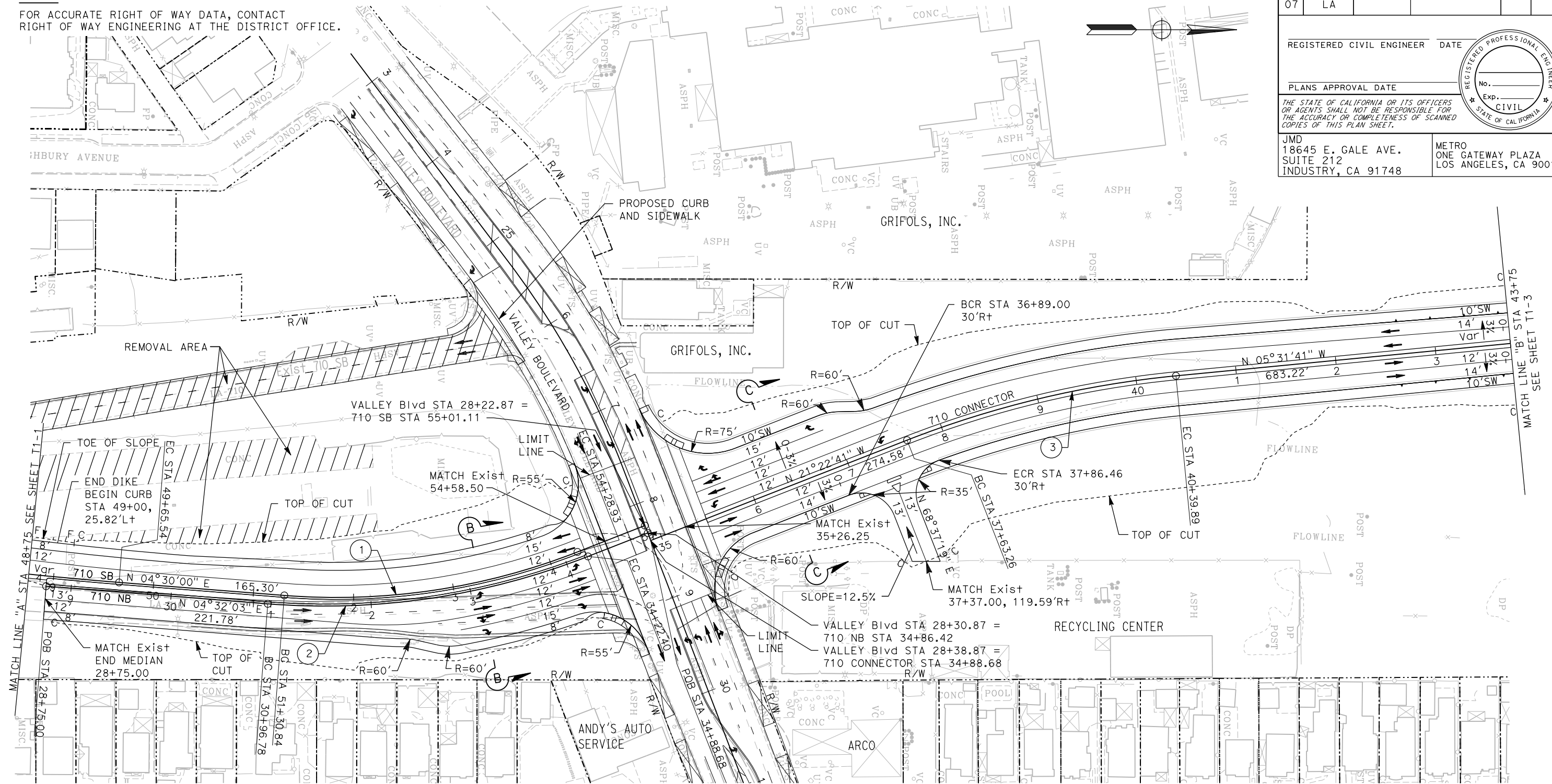
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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JMD  
18645 E. GALE AVE.  
SUITE 212  
INDUSTRY, CA 91748

METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012



**CURVE DATA**

No. @	R	Δ	T	L
①	660.00'	25°52'41"	151.63'	298.09'
②	720.00'	25°54'44"	165.64'	325.62'
③	1000.00'	15°51'00"	139.21'	276.63'

ATTACHMENT F-2 SHEET 12 OF 28  
**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**710 CONNECTOR VALLEY Blvd TO MISSION Rd**  
**T1-2**

SCALE: 1"=50'

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CONSULTANT FUNCTIONAL SUPERVISOR

REVISOR

DATE

CHECKED BY

DESIGNED BY

REVISIONS



USERNAME => pwsvc  
DGN FILE => T1-2 Valley to Mission Plan, 2 of 3.dgn

RELATIVE BORDER SCALE  
15 IN INCHES

UNIT 0000

PROJECT NUMBER & PHASE

07000001911

LAST REVISION DATE PLOTTED => 15-MAY-2014  
00-00-00 TIME PLOTTED => 12:31



**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				

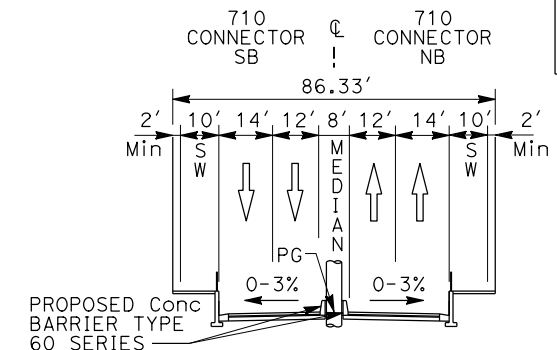
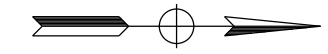
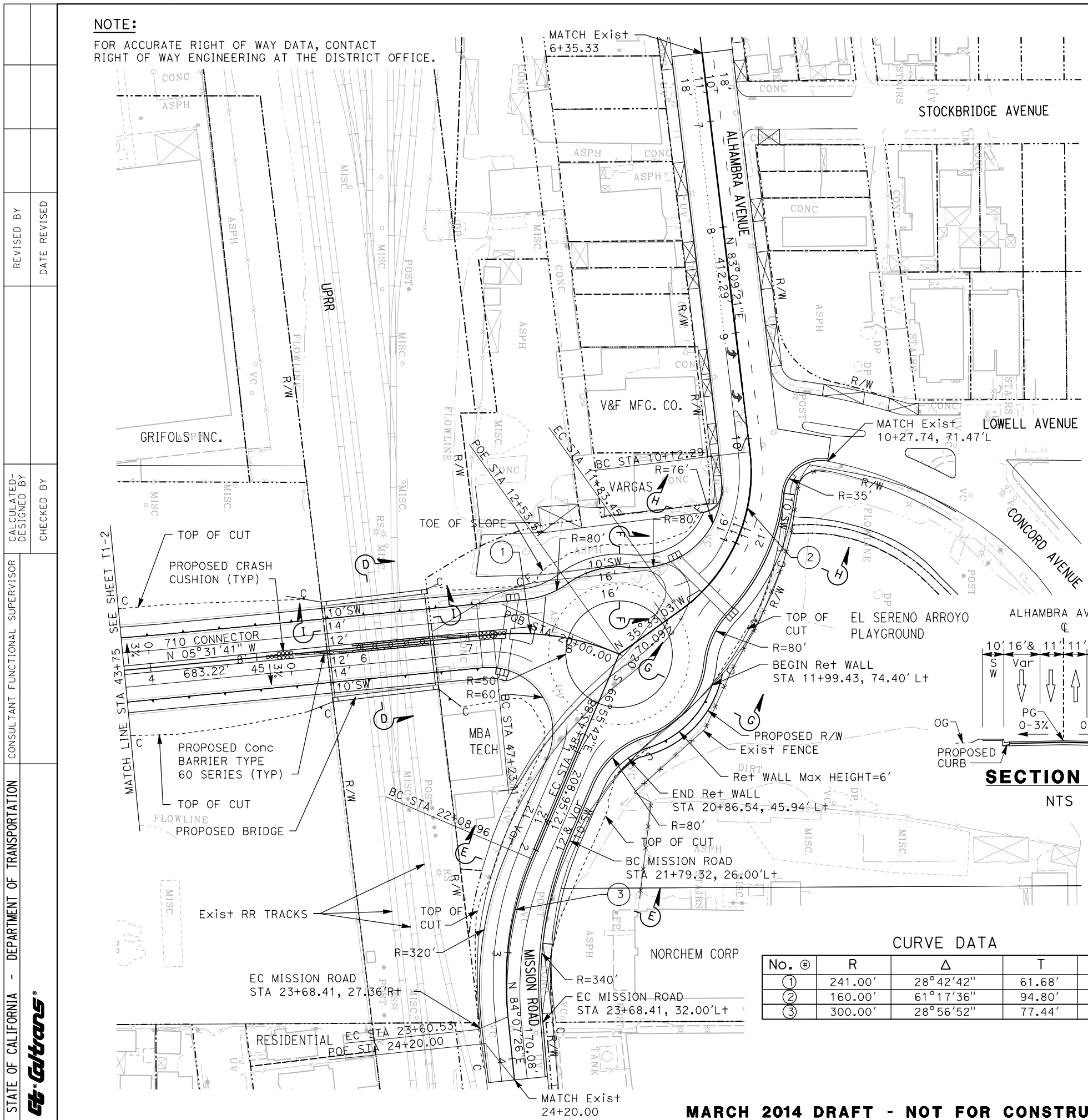
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

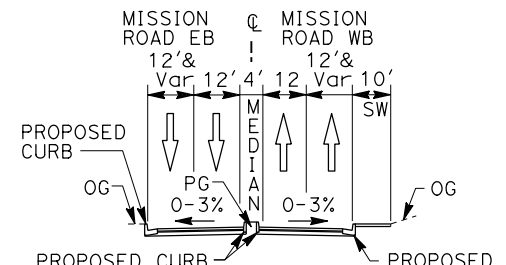
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

JMD  
18645 E. GALE AVE.  
SUITE 212  
INDUSTRY, CA 91748

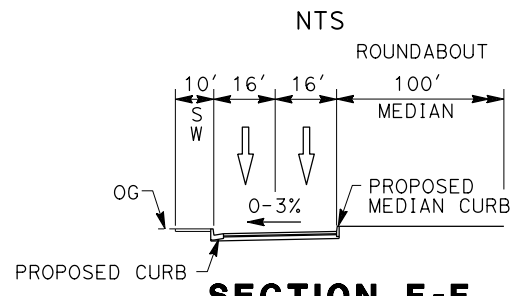
METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012



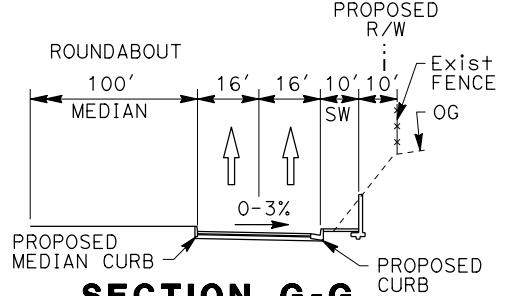
**SECTION D-D (UNDER BRIDGE)**  
NTS



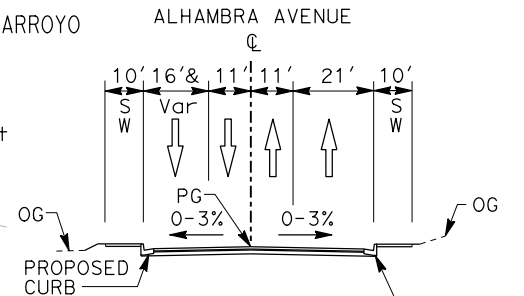
**SECTION E-E**  
NTS



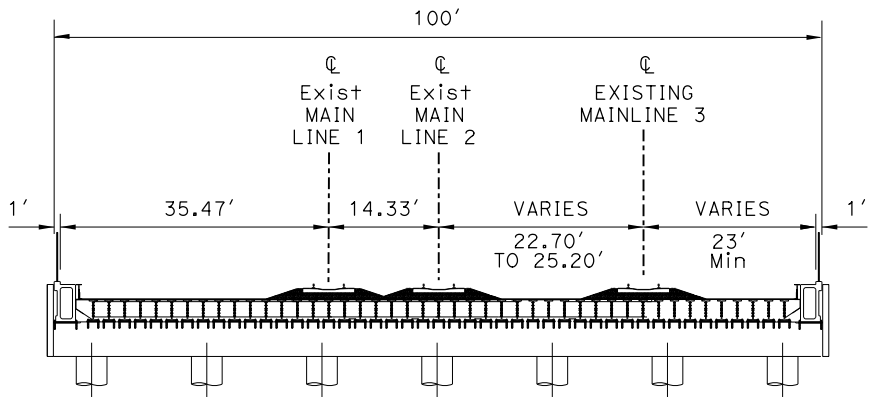
**SECTION F-F**  
NTS



**SECTION G-G**  
NTS



**SECTION H-H**  
NTS

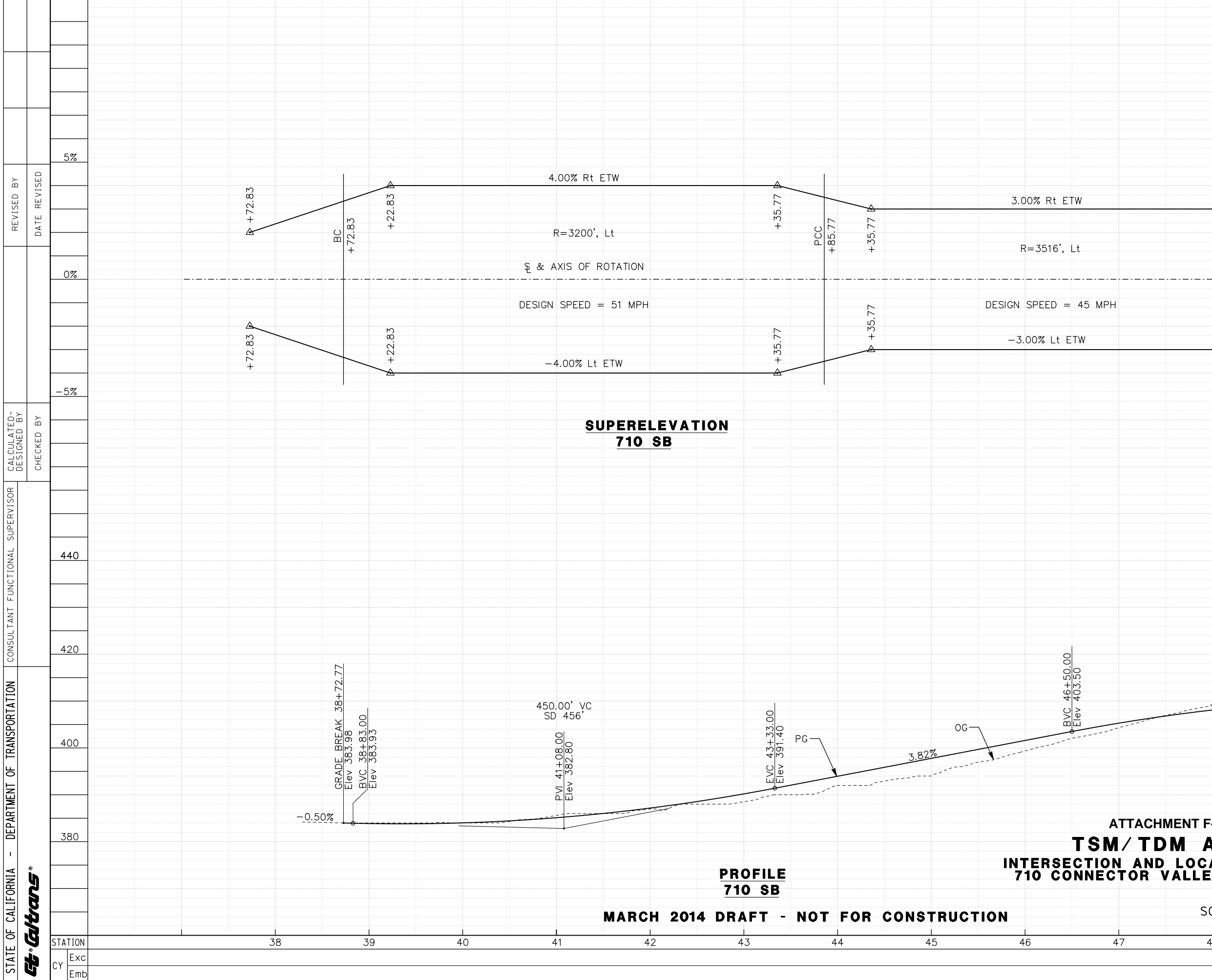


**RAILROAD BRIDGE SECTION I-I**  
NTS

**CURVE DATA**

No. @	R	Δ	T	L
①	241.00'	28°42'42"	61.68'	120.77'
②	160.00'	61°17'36"	94.80'	171.16'
③	300.00'	28°56'52"	77.44'	151.57'

ATTACHMENT F-2 SHEET 13 OF 28  
**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**710 CONNECTOR VALLEY Blvd TO MISSION Rd**  
SCALE: 1"=50'  
**T1-3**



**SUPERELEVATION  
710 SB**

**PROFILE  
710 SB**

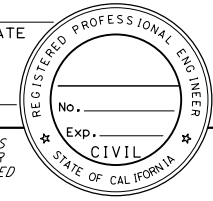
**ATTACHMENT F-2 SHEET 14 OF 28  
TSM/TDM ALTERNATIVE  
INTERSECTION AND LOCAL STREET IMPROVEMENT  
710 CONNECTOR VALLEY Blvd TO MISSION Rd**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: Horiz: 1" = 50'  
Vert: 1" = 10'

**T1-4**

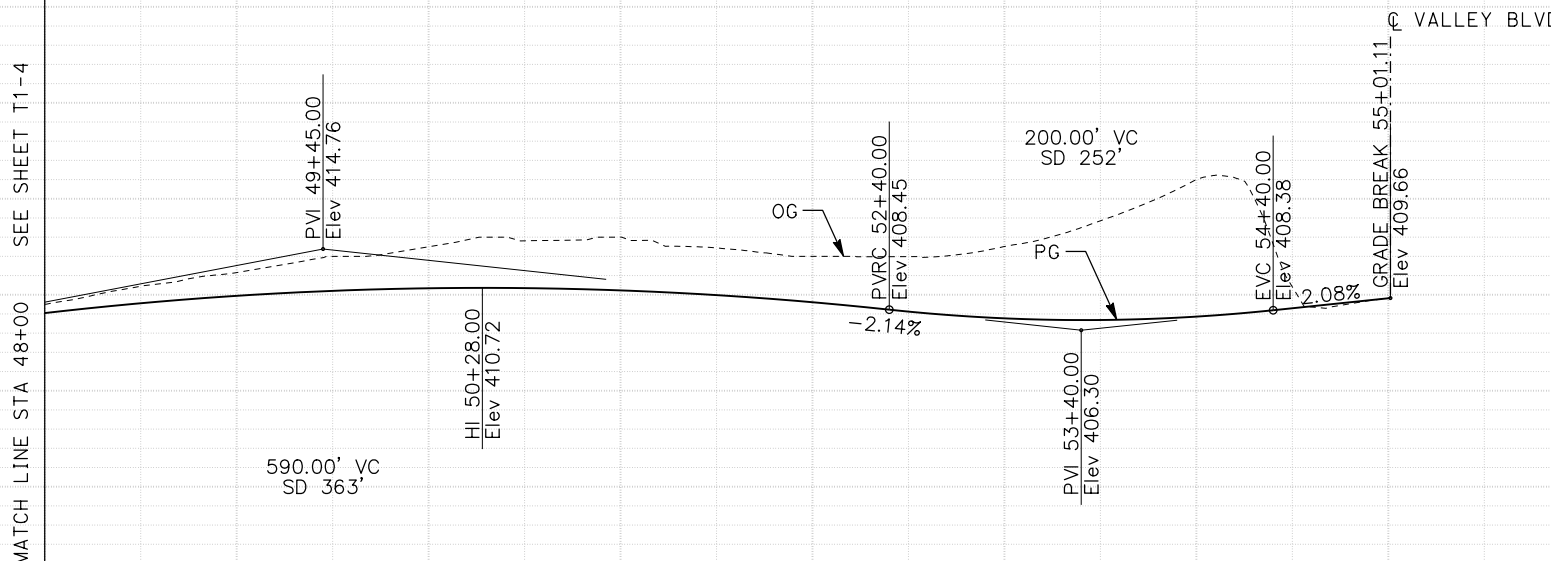
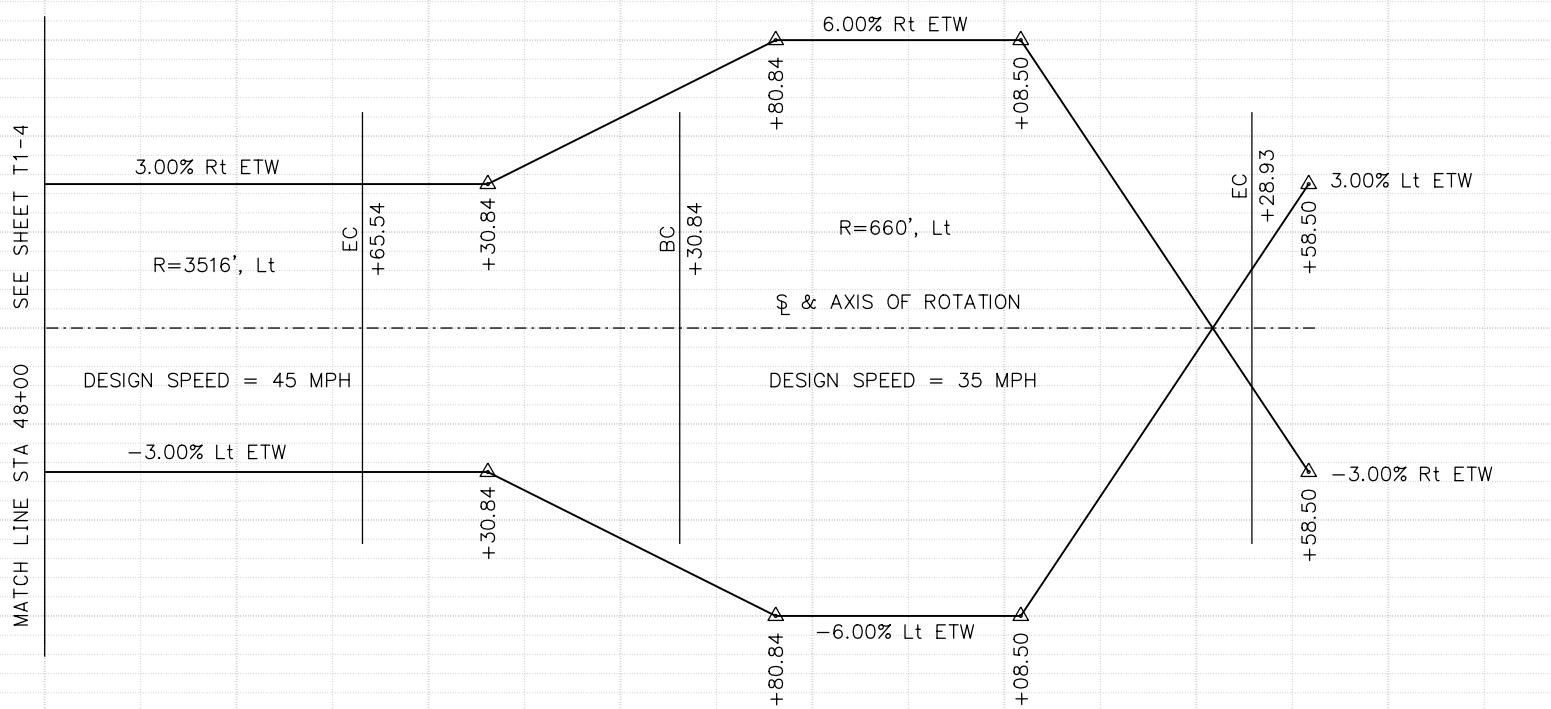
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
JMD 18645 E. GALE AVE. SUITE 212 INDUSTRY, CA 91748			METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012		



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT	FUNCTIONAL SUPERVISOR	440	440									
	DESIGNED BY	CHECKED BY	420	420									
CALCULATED-DESIGNED BY	CHECKED BY	400	400	400									
	CHECKED BY	380	380	380									
REVISOR	DATE	5%											
REVISOR	DATE	0%											
REVISOR	DATE	-5%											
STATION	Exc	38	39	40	41	42	43	44	45	46	47	48	TOTAL
CY	Emb												

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR	DATE							
	440	CHECKED BY	5%								
Exc	STATION	48	49	50	51	52	53	54	55	56	TOTAL
	Emb										

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				
REGISTERED CIVIL ENGINEER DATE PLANS APPROVAL DATE THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
JMD 18645 E. GALE AVE. SUITE 212 INDUSTRY, CA 91748			METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012		

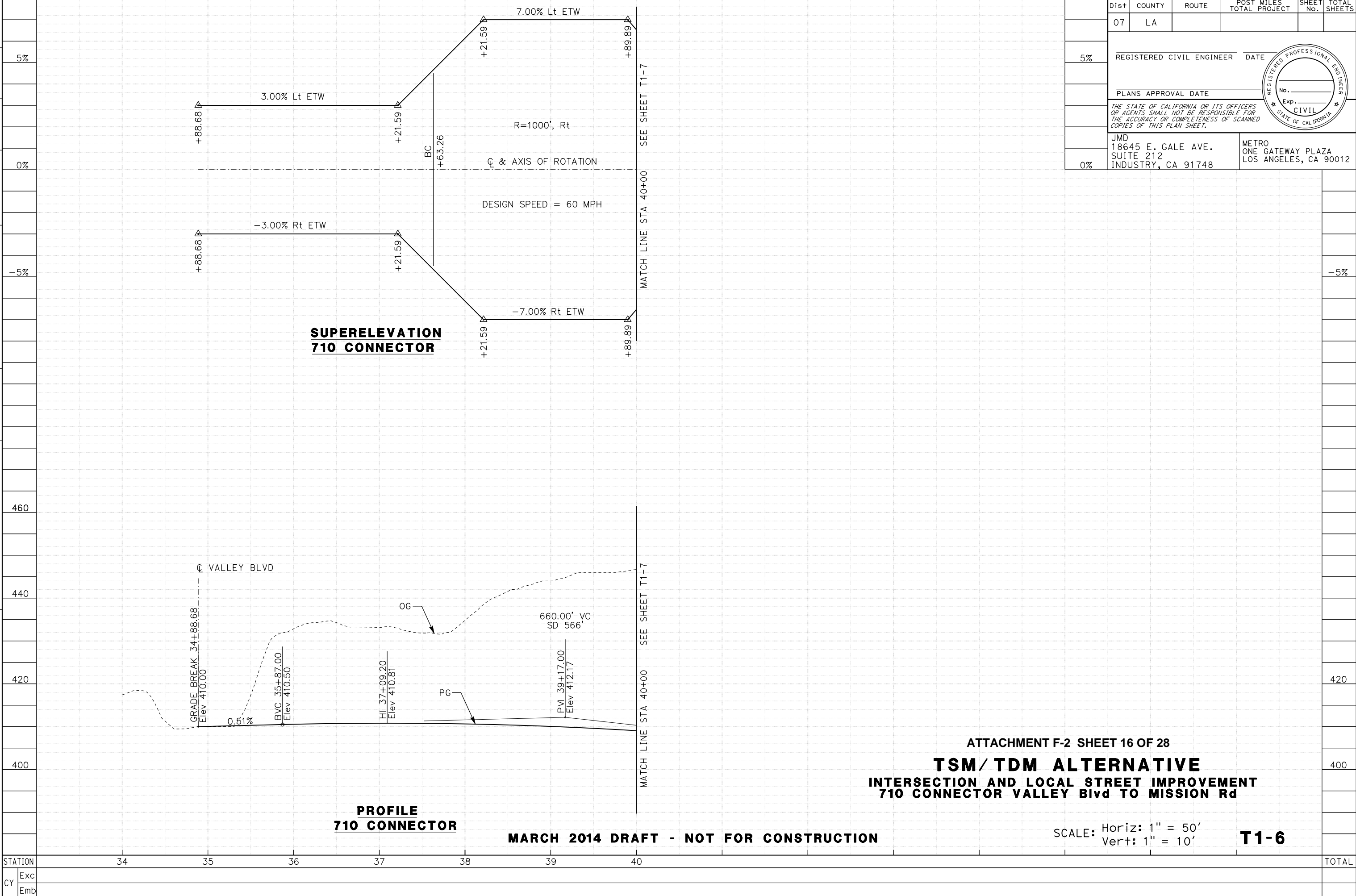


ATTACHMENT F-2 SHEET 15 OF 28  
**TSM/TDM ALTERNATIVE**  
 INTERSECTION AND LOCAL STREET IMPROVEMENT  
 710 CONNECTOR VALLEY Blvd TO MISSION Rd

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: Horiz: 1" = 50'  
 Vert: 1" = 10' **T1-5**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED



**SUPERELEVATION  
710 CONNECTOR**

**PROFILE  
710 CONNECTOR**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

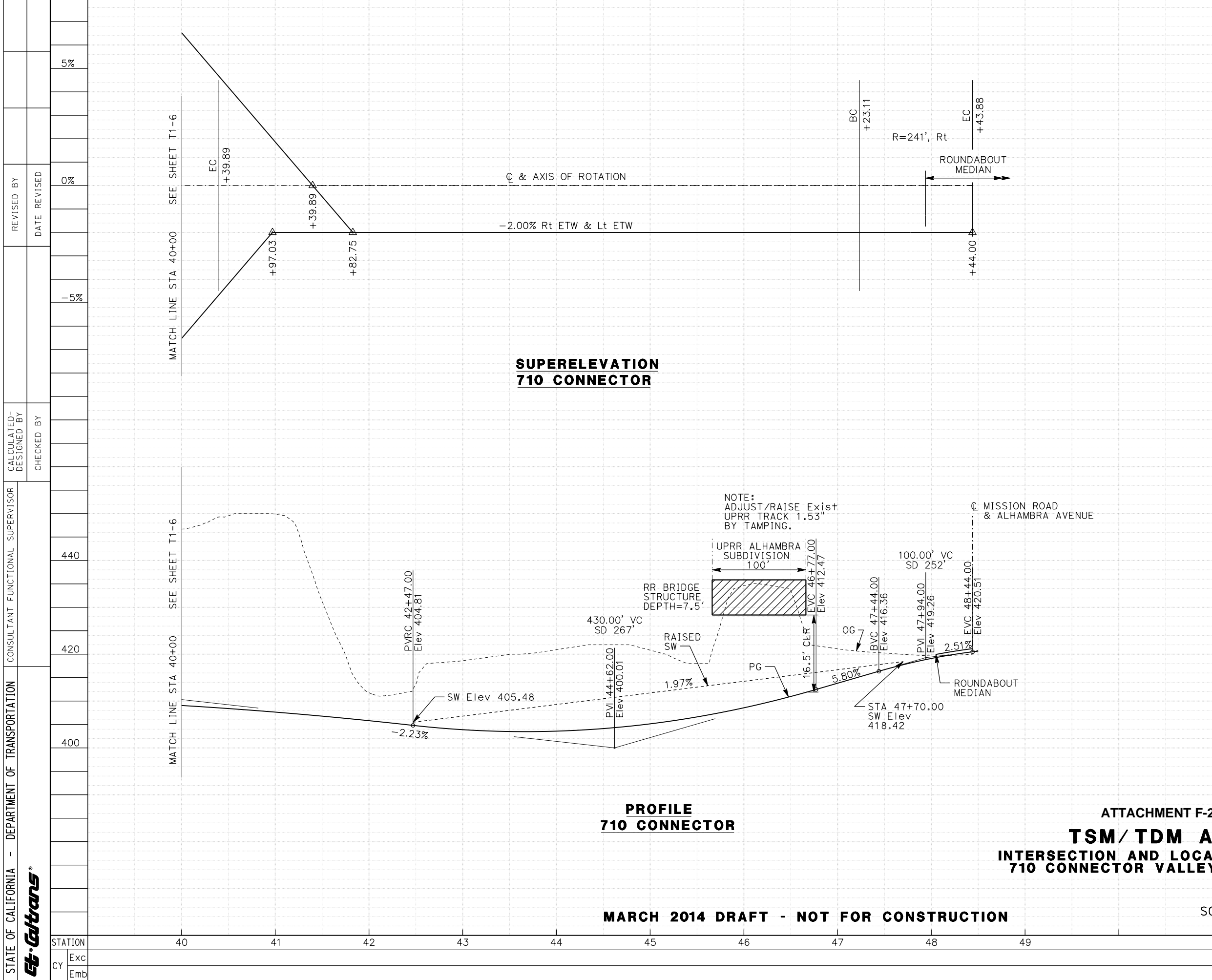
**ATTACHMENT F-2 SHEET 16 OF 28  
TSM/TDM ALTERNATIVE  
INTERSECTION AND LOCAL STREET IMPROVEMENT  
710 CONNECTOR VALLEY Blvd TO MISSION Rd**

SCALE: Horiz: 1" = 50'  
Vert: 1" = 10'

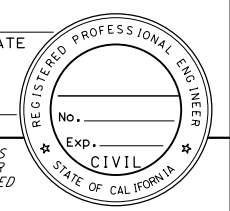
**T1-6**

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				
5%	REGISTERED CIVIL ENGINEER		DATE		
	PLANS APPROVAL DATE				
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
JMD 18645 E. GALE AVE. SUITE 212 INDUSTRY, CA 91748			METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012		





Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				
5%	REGISTERED CIVIL ENGINEER		DATE		
	PLANS APPROVAL DATE				
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
JMD 18645 E. GALE AVE. SUITE 212 INDUSTRY, CA 91748			METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012		



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR	DATE	REVISION
<b>Caltrans</b>		CHECKED BY			

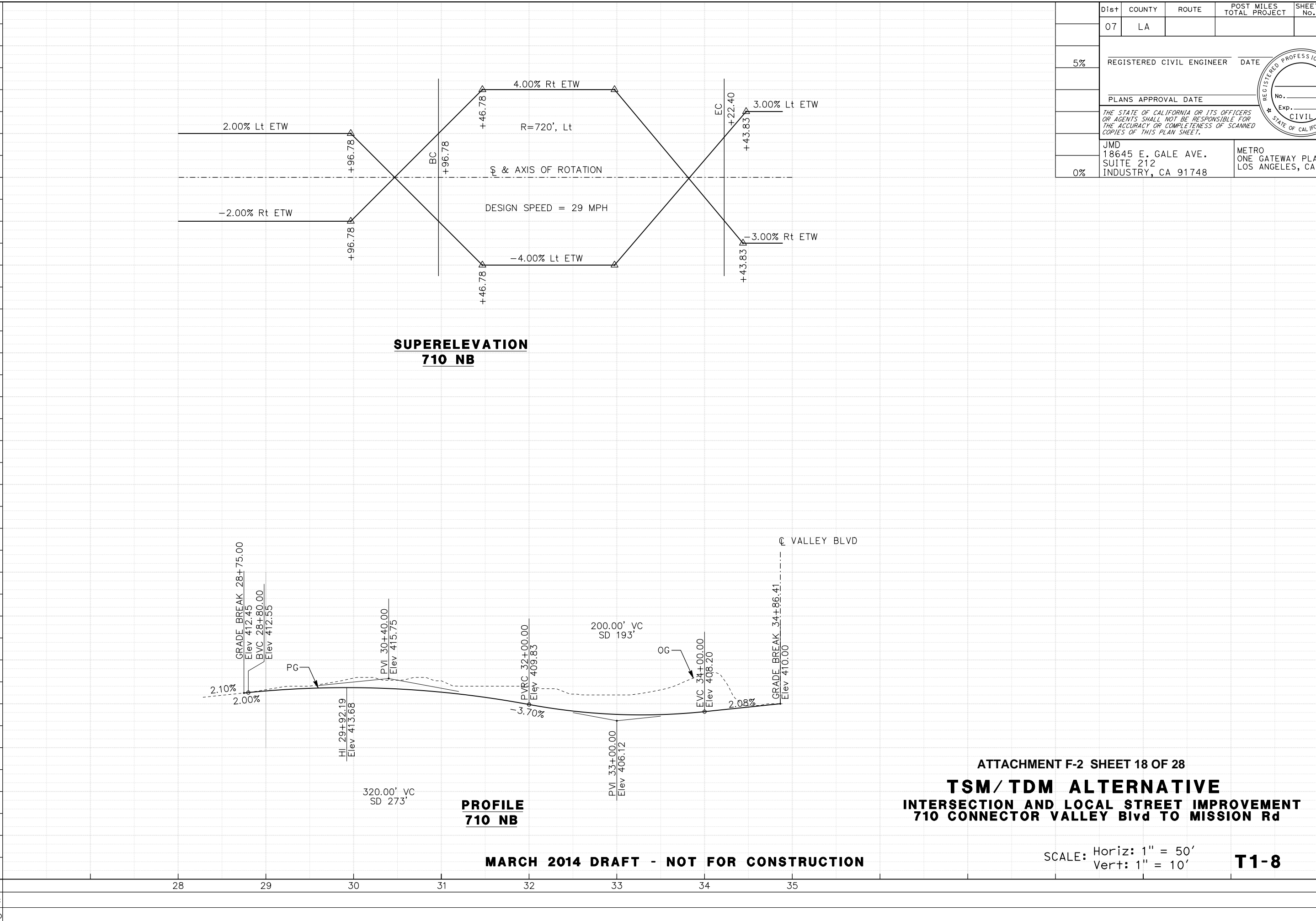
STATION	40	41	42	43	44	45	46	47	48	49	TOTAL
Exc											
Emb											

ATTACHMENT F-2 SHEET 17 OF 28  
**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**710 CONNECTOR VALLEY Blvd TO MISSION Rd**  
 SCALE: Horiz: 1" = 50'  
 Vert: 1" = 10'     
**T1-7**

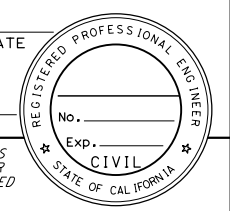
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

LAST REVISION DATE PLOTTED => 12-MAY-2014  
 00-00-00 TIME PLOTTED => 17:26

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED/DESIGNED BY	REVISOR BY	DATE
<b>Caltrans</b>		CHECKED BY		
STATION	Exc	Emb		

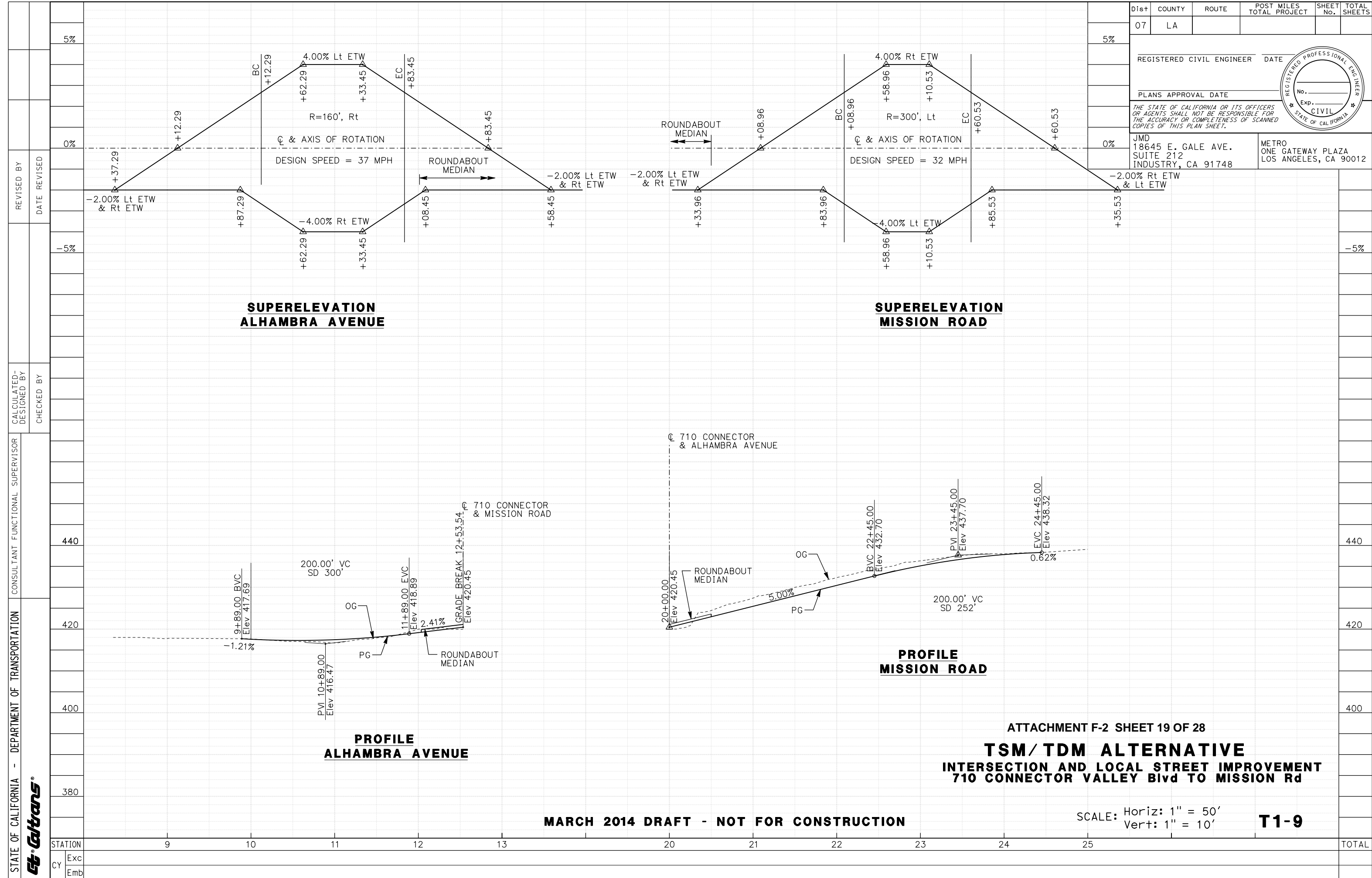


Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				
5%	REGISTERED CIVIL ENGINEER		DATE		
	PLANS APPROVAL DATE				
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
JMD 18645 E. GALE AVE. SUITE 212 INDUSTRY, CA 91748			METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012		



ATTACHMENT F-2 SHEET 18 OF 28  
**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**710 CONNECTOR VALLEY Blvd TO MISSION Rd**

SCALE: Horiz: 1" = 50'  
 Vert: 1" = 10' **T1-8**



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
JMD 18645 E. GALE AVE. SUITE 212 INDUSTRY, CA 91748			METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012		



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR	DATE
<b>Caltrans</b>		CHECKED BY		

STATION	9	10	11	12	13	20	21	22	23	24	25	TOTAL
Exc												
Emb												

ATTACHMENT F-2 SHEET 19 OF 28  
**TSM/ TDM ALTERNATIVE**  
 INTERSECTION AND LOCAL STREET IMPROVEMENT  
 710 CONNECTOR VALLEY Blvd TO MISSION Rd

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

SCALE: Horiz: 1" = 50'  
 Vert: 1" = 10' **T1-9**

LAST REVISION DATE PLOTTED => 28-FEB-2014 00-00-00 TIME PLOTTED => 13:21

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				

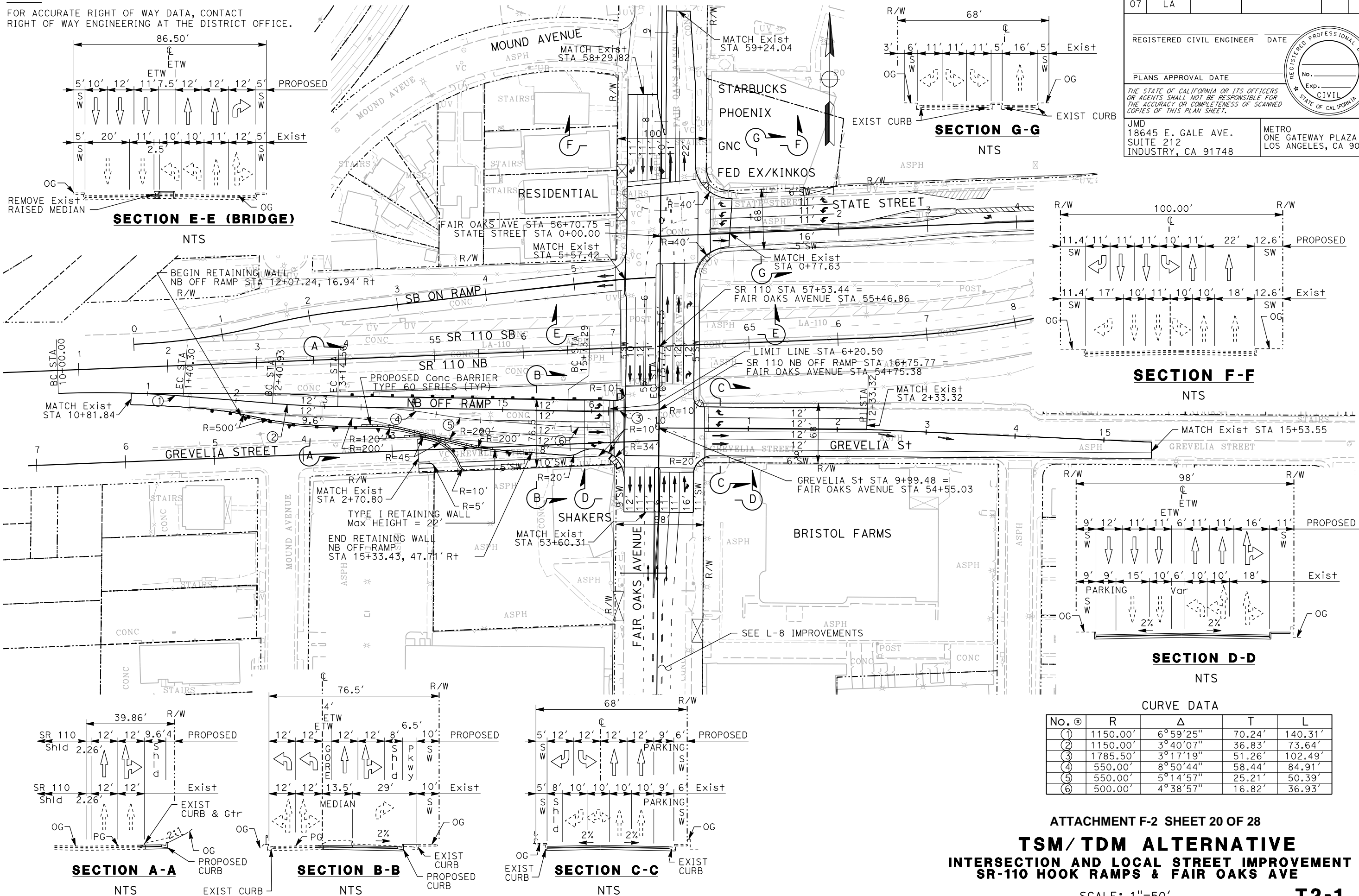
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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JMD  
18645 E. GALE AVE.  
SUITE 212  
INDUSTRY, CA 91748

METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012



**CURVE DATA**

No. @	R	Δ	T	L
(1)	1150.00'	6°59'25"	70.24'	140.31'
(2)	1150.00'	3°40'07"	36.83'	73.64'
(3)	1785.50'	3°17'19"	51.26'	102.49'
(4)	550.00'	8°50'44"	58.44'	84.91'
(5)	550.00'	5°14'57"	25.21'	50.39'
(6)	500.00'	4°38'57"	16.82'	36.93'

**ATTACHMENT F-2 SHEET 20 OF 28**  
**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**SR-110 HOOK RAMPS & FAIR OAKS AVE**

SCALE: 1"=50' **T2-1**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Caltrans

USERNAME => bongawan  
DGN FILE => T2-1 Fair Oaks Ave at 110 Hook Ramps Sheet 1.dgn

RELATIVE BORDER SCALE  
15 IN INCHES

UNIT 0000 PROJECT NUMBER & PHASE 07000001911

REVISOR BY DATE

CALCULATED-DRAWN BY CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Caltrans

LAST REVISION DATE PLOTTED => 30-SEP-2014  
00-00-00 TIME PLOTTED => 17:23



**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				

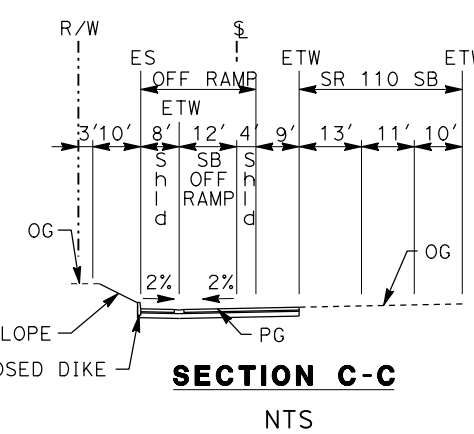
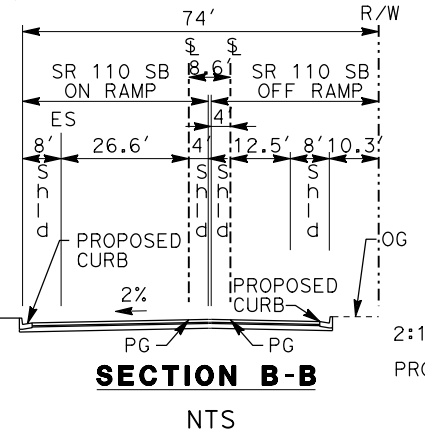
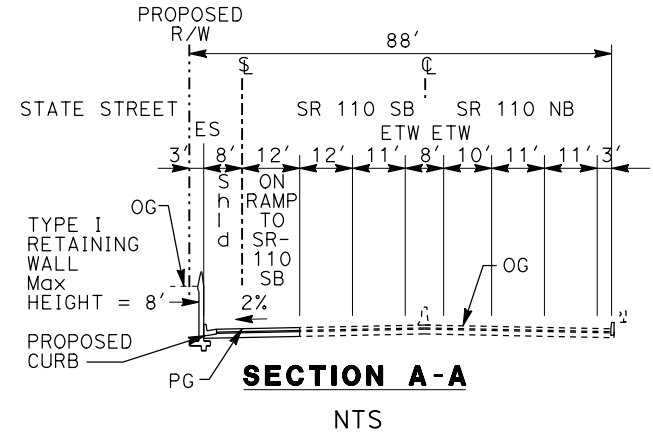
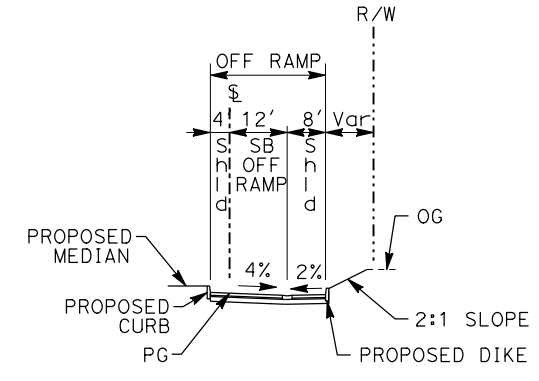
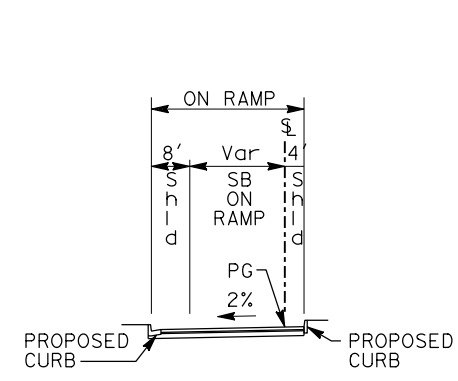
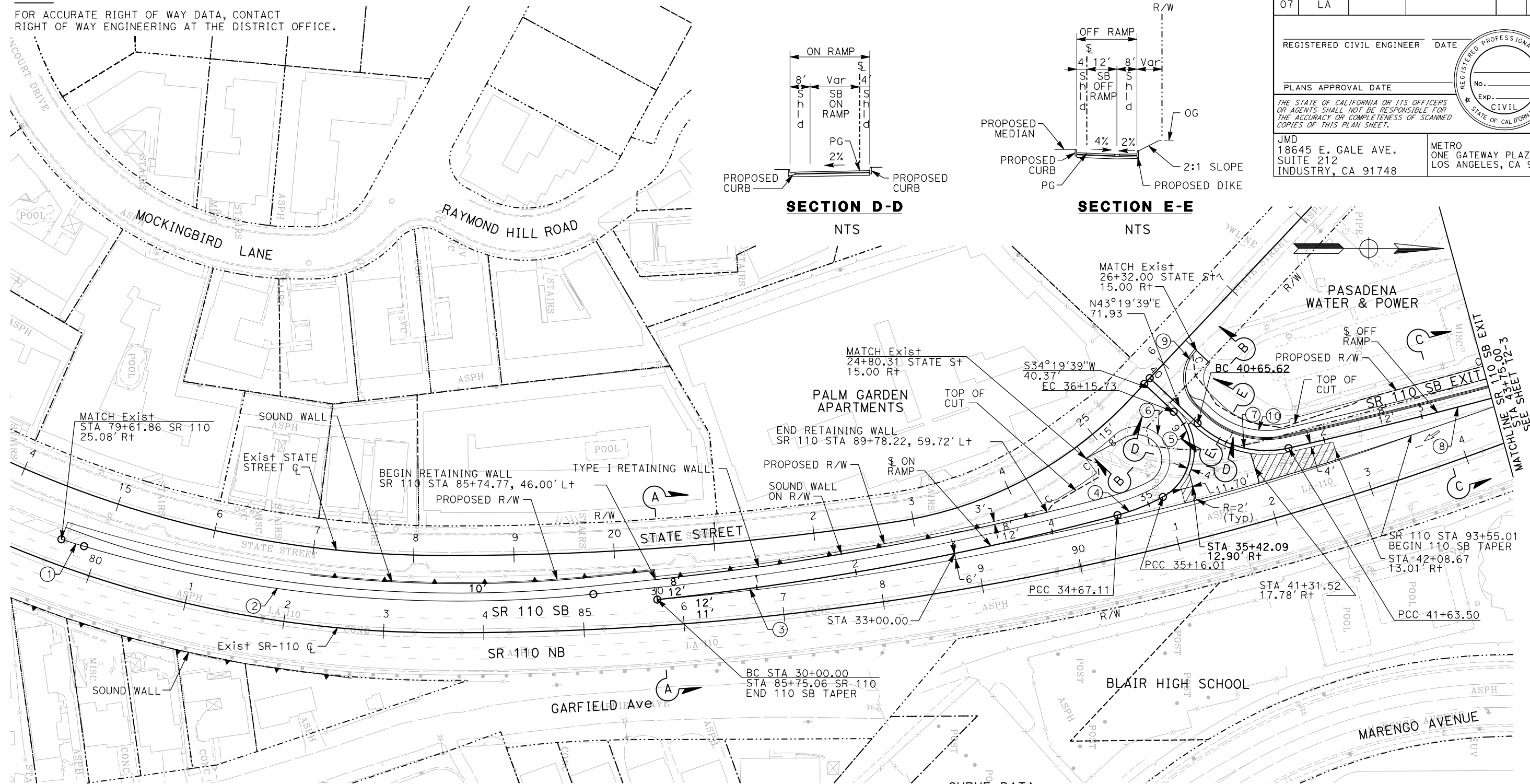
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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SUITE 212  
INDUSTRY, CA 91748

METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012



**CURVE DATA**

No. @	R	Δ	T	L
①	465.00'	2°54'09"	11.78'	23.56'
②	1300.00'	22°38'11"	260.20'	513.61'
③	3000.00'	8°55'16"	234.03'	467.11'
④	200.00'	14°00'31"	24.57'	48.90'
⑤	53.00'	107°48'22"	72.69'	99.72'
⑥	33.00'	194°46'54"	-	112.19'
⑦	100.00'	56°04'44"	53.26'	97.88'
⑧	5714.00'	3°09'14"	157.31'	314.53'
⑨	32.00'	90°00'00"	32.00'	50.27'
⑩	80.00'	56°04'45"	42.61'	78.30'

ATTACHMENT F-2 SHEET 21 OF 28  
**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**SR-110 HOOK RAMPS & FAIR OAKS AVE**  
SCALE: 1"=50'  
**T2-2**

REVISOR: [ ] DATE: [ ]  
CALCULATED/DESIGNED BY: [ ] CHECKED BY: [ ]  
CONSULTANT FUNCTIONAL SUPERVISOR: [ ]  
DEPARTMENT OF TRANSPORTATION - CALIFORNIA  
Ettrans

USERNAME => bongawan  
DGN FILE => T2-2 Fair Oaks Ave at 110 Hook Ramps Sheet 2.dgn

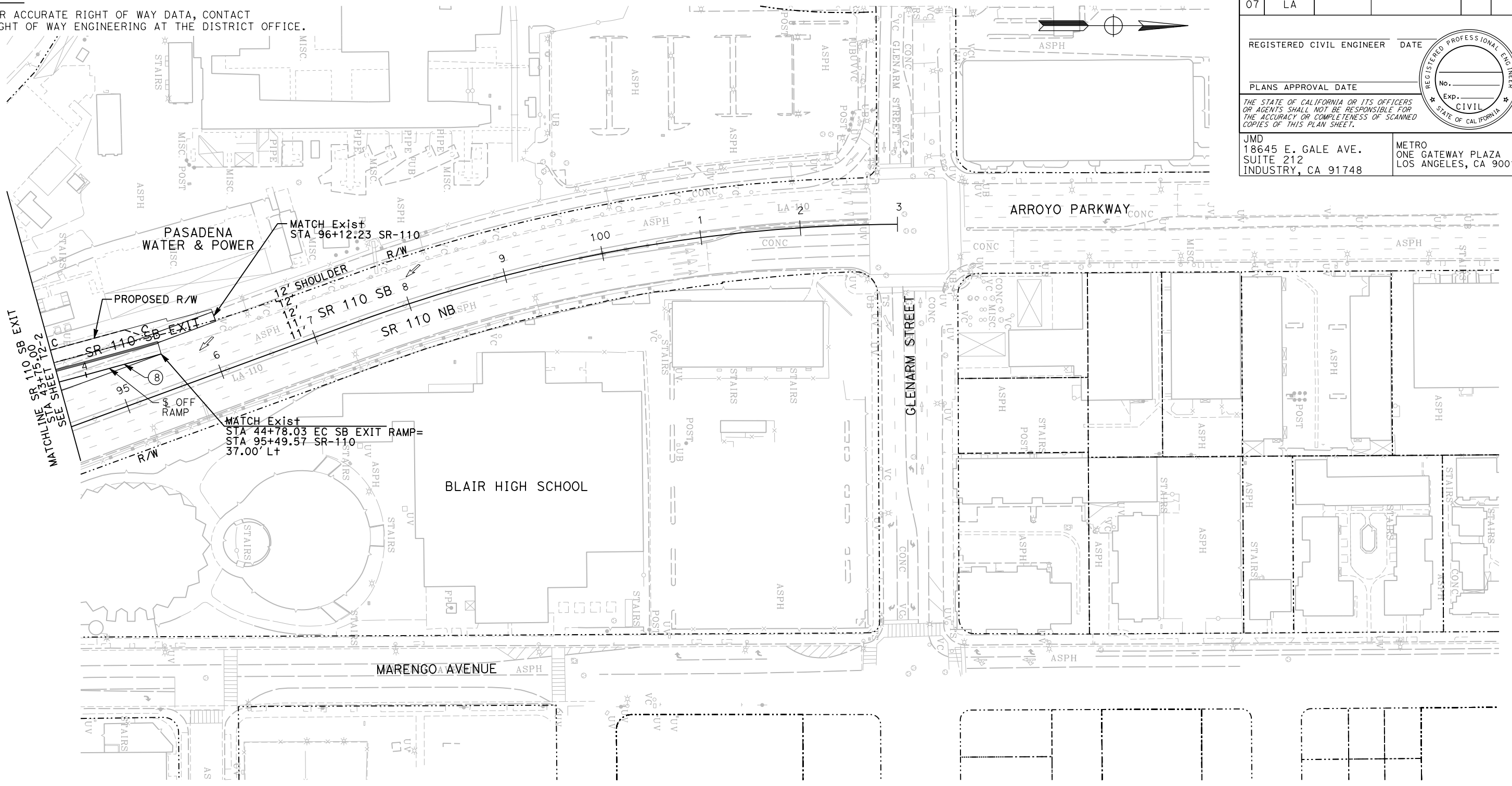
RELATIVE BORDER SCALE IS IN INCHES

UNIT 0000 PROJECT NUMBER & PHASE 07000001911

LAST REVISION: [ ] DATE PLOTTED => 30-SEP-2014  
00-00-00 TIME PLOTTED => 14:37

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED/DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

**NOTE:**  
 FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
 RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				

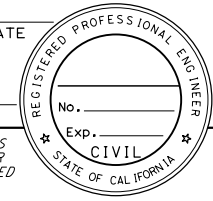
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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JMD  
 18645 E. GALE AVE.  
 SUITE 212  
 INDUSTRY, CA 91748

METRO  
 ONE GATEWAY PLAZA  
 LOS ANGELES, CA 90012



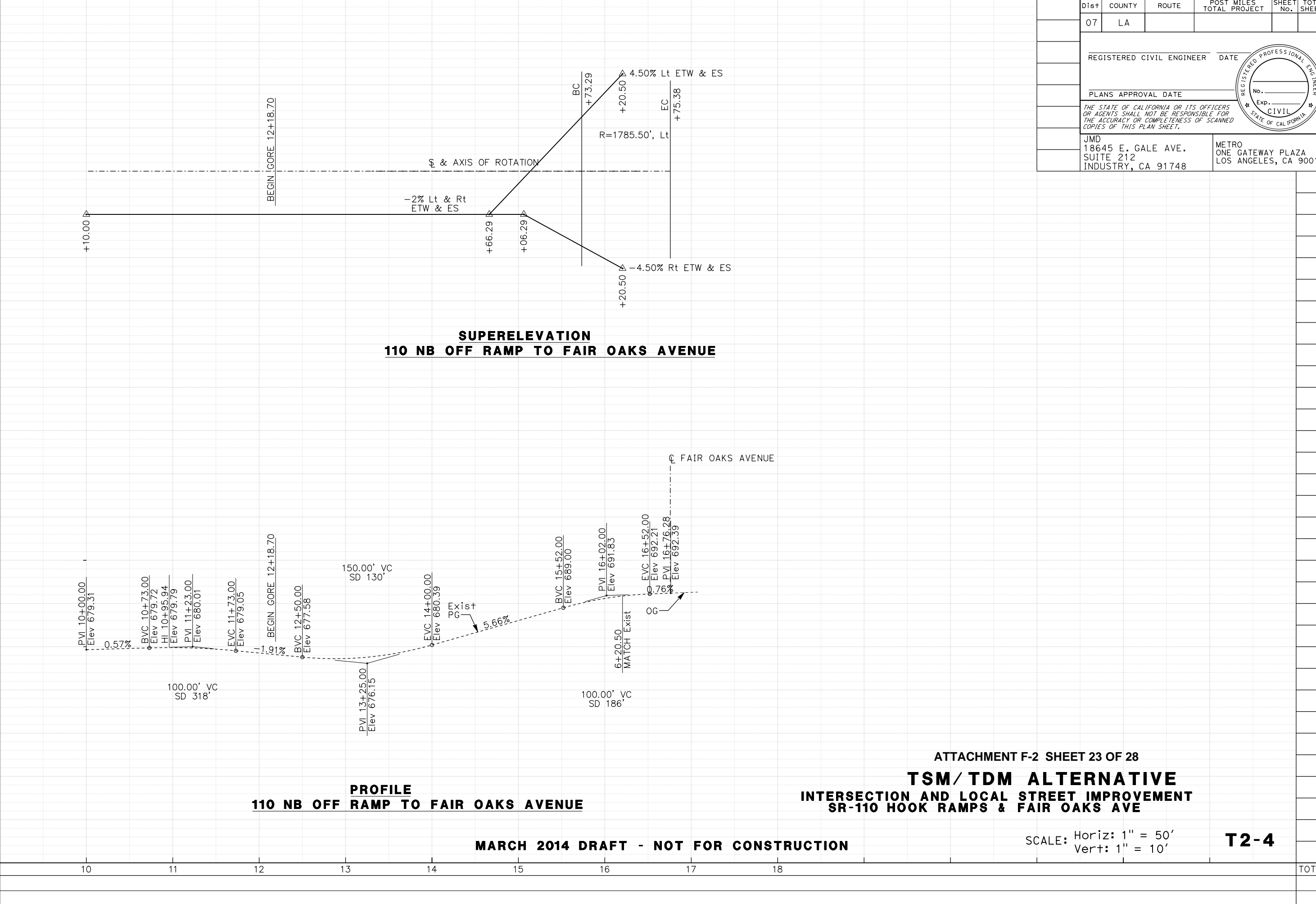
CURVE DATA

No. ⑧	R	Δ	T	L
⑧	5714.00'	3°09'14"	157.31'	314.53'

ATTACHMENT F-2 SHEET 22 OF 28  
**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**SR-110 HOOK RAMPS & FAIR OAKS AVE**  
 SCALE: 1"=50'  
**T2-3**

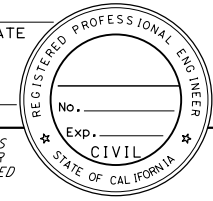
MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	REVISOR	DATE
	REVISOR	DATE
CALCULATED/DESIGNED BY	CHECKED BY	
	CHECKED BY	
CONSULTANT FUNCTIONAL SUPERVISOR		



**SUPERELEVATION**  
**110 NB OFF RAMP TO FAIR OAKS AVENUE**

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				
REGISTERED CIVIL ENGINEER			DATE		
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
JMD 18645 E. GALE AVE. SUITE 212 INDUSTRY, CA 91748			METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012		



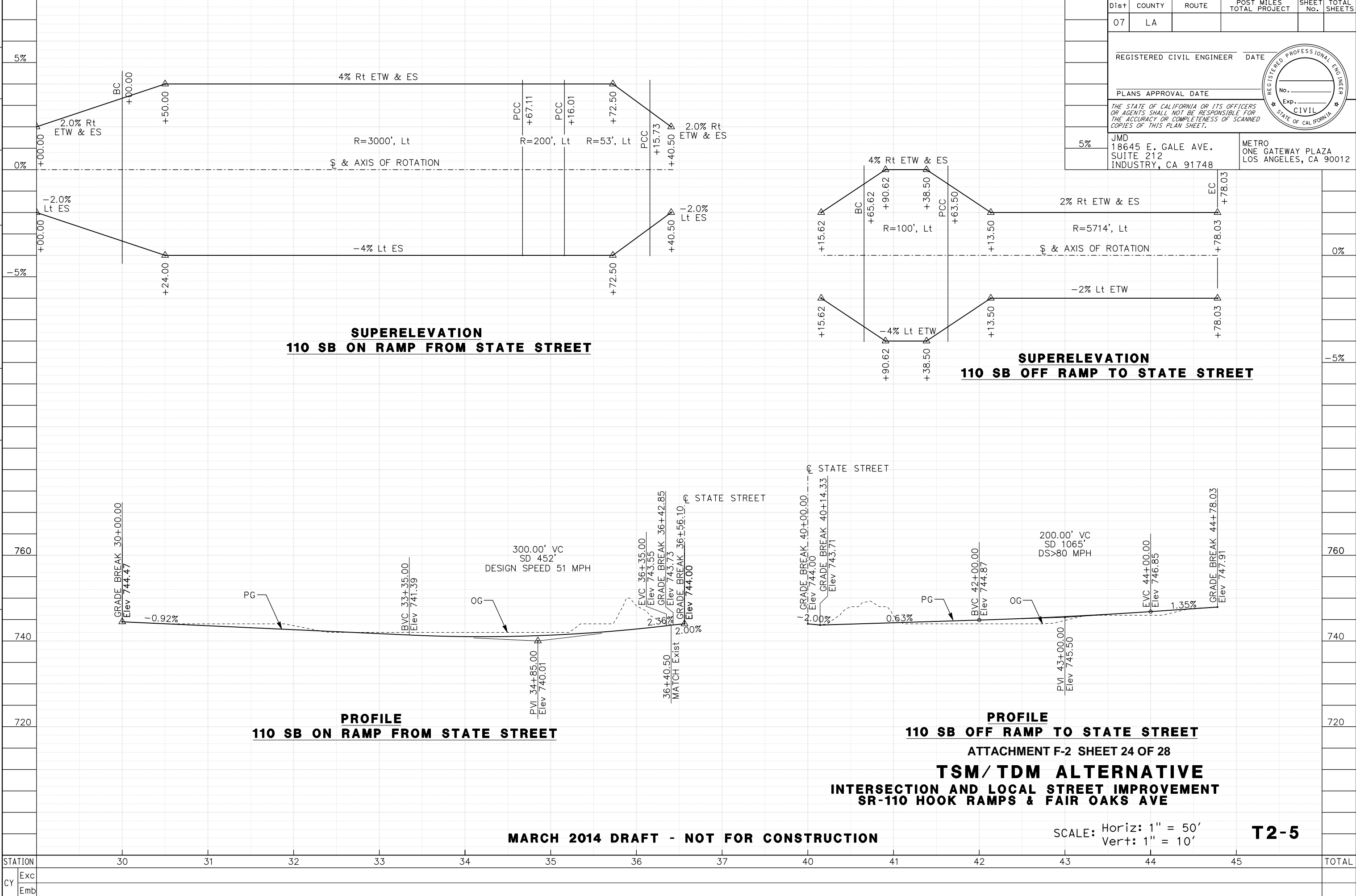
ATTACHMENT F-2 SHEET 23 OF 28  
**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**SR-110 HOOK RAMPS & FAIR OAKS AVE**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: Horiz: 1" = 50'  
Vert: 1" = 10'

**T2-4**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE  
 REVISIONS: x, x, x, x, x



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA				
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
JMD 18645 E. GALE AVE. SUITE 212 INDUSTRY, CA 91748			METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012		



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
 RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

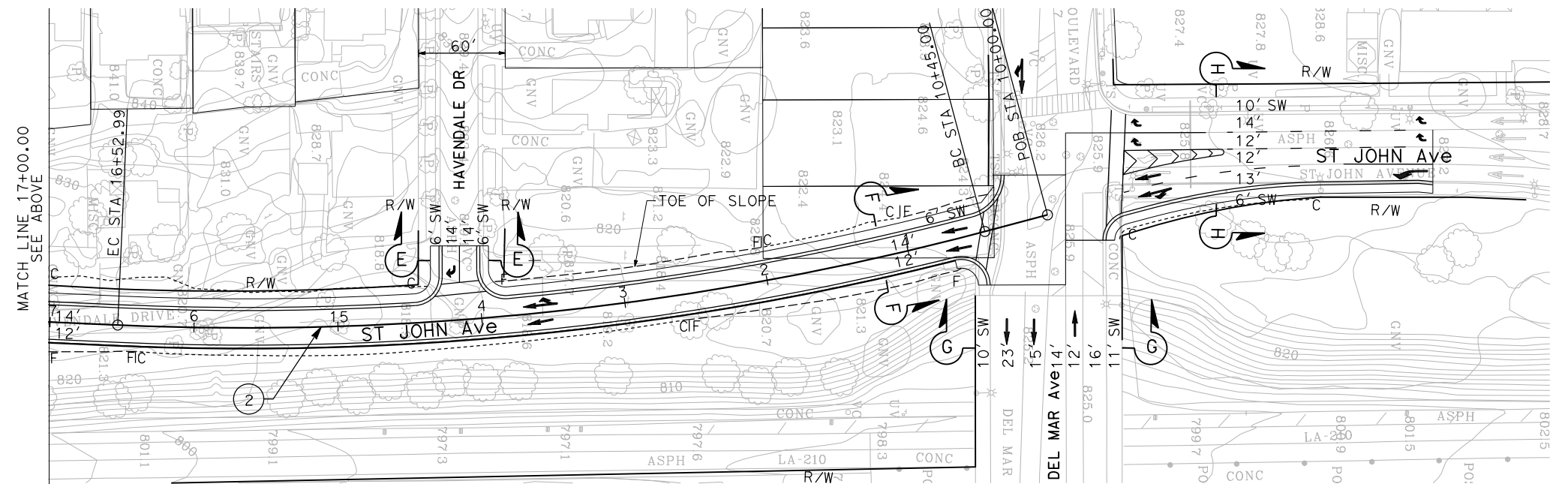
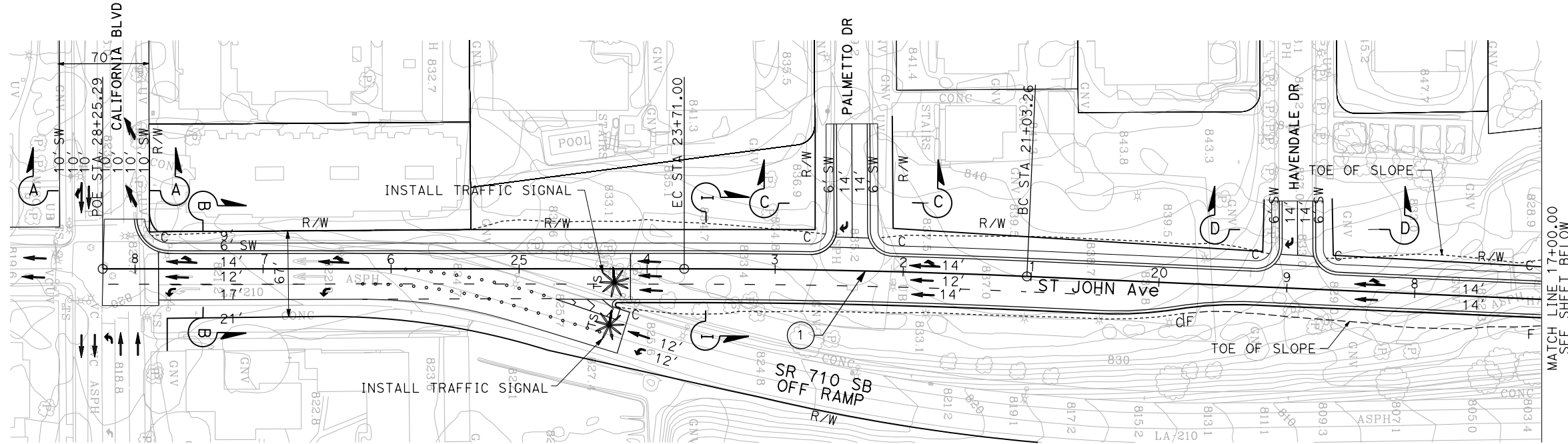
Dist	COUNTY	ROUTE	SHEET No.	TOTAL SHEETS
07	LA	710		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

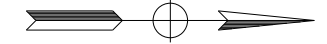
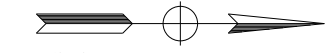
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

D R CONSULTANTS & DESIGNERS, Inc. METRO  
 725 S. FIGUEROA STREET SUITE 3320 LOS ANGELES, CA 90017  
 ONE GATEWAY PLAZA LOS ANGELES, CA 90012



CURVE DATA

No. @	R	Δ	T	L
1	6000.00'	2°33'24.44"	133.90'	267.75'
2	2000.00'	17°25'04.01"	306.36'	608.00'



ATTACHMENT F-2 SHEET 25 OF 28  
**TSM/TDM ALTERNATIVE**  
 INTERSECTION AND LOCAL STREET IMPROVEMENT  
 ST JOHN Ave FROM CALIFORNIA TO DEL MAR  
 SCALE 1"=50'  
**T3-1**

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

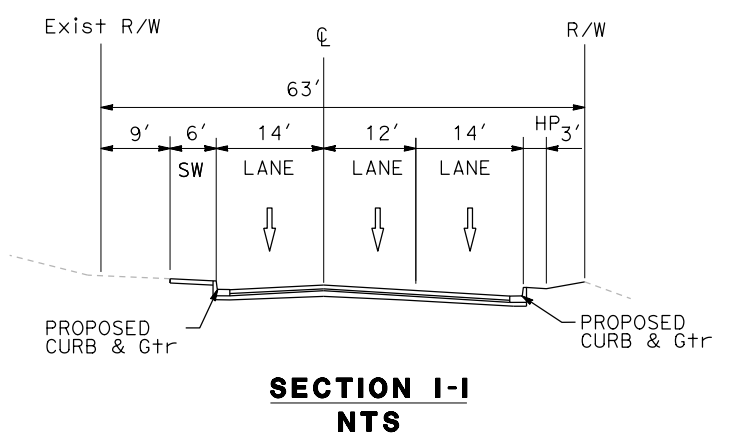
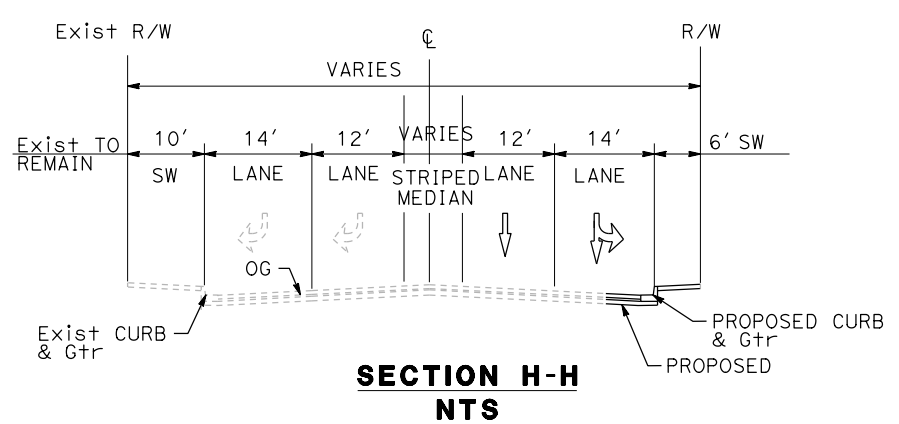
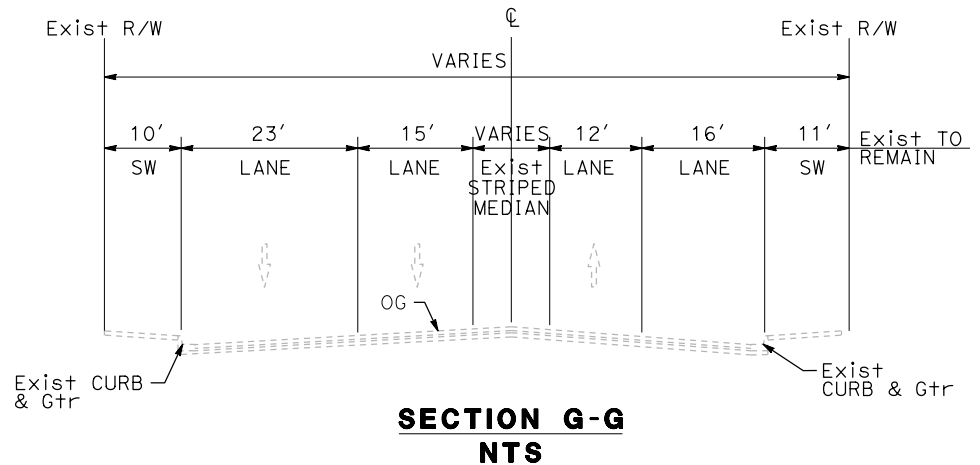
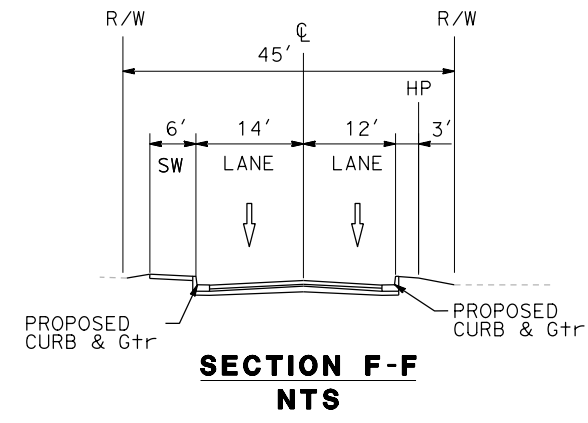
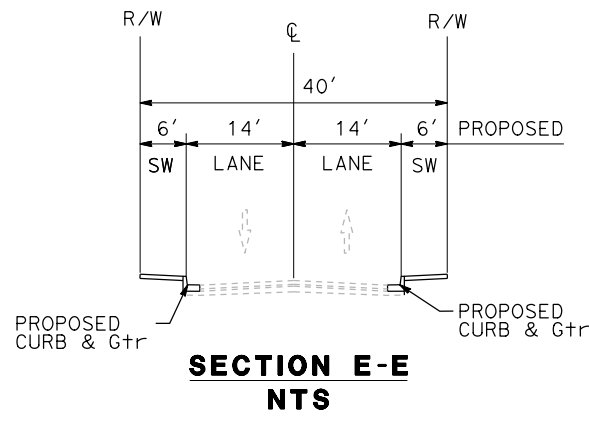
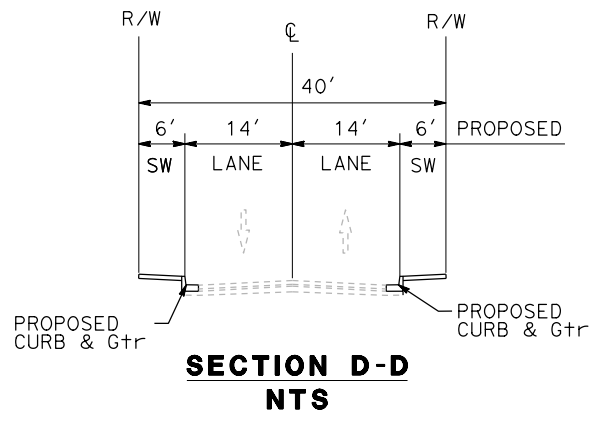
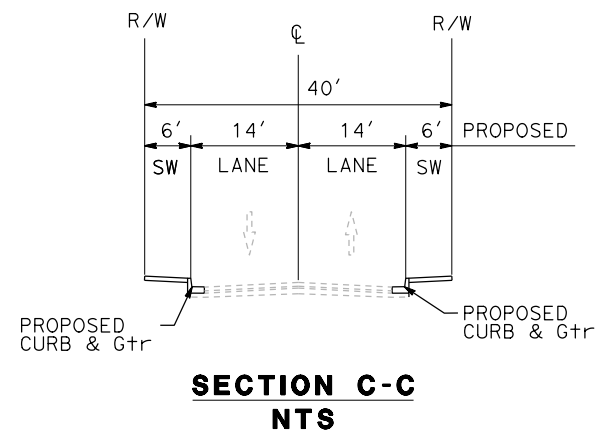
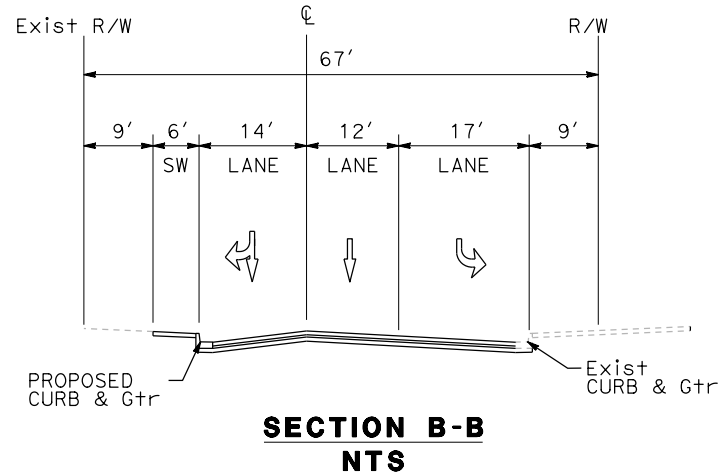
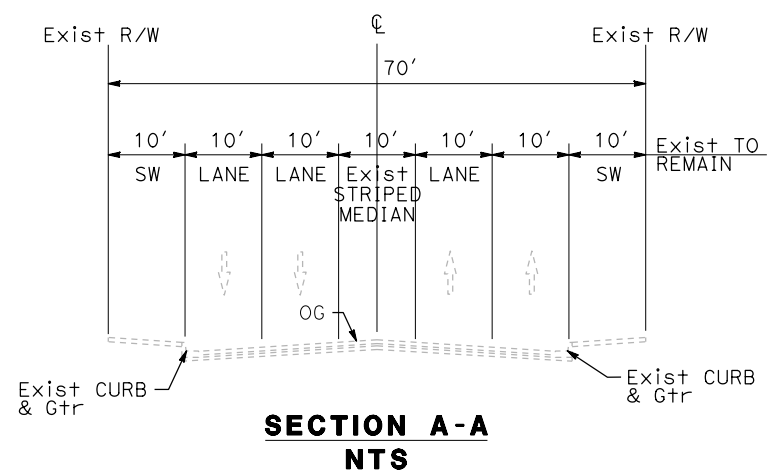
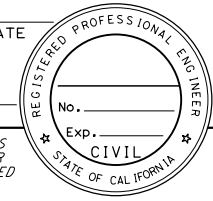
Dist	COUNTY	ROUTE	SHEET No.	TOTAL SHEETS
07	LA	710		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

D R CONSULTANTS & DESIGNERS, Inc. METRO  
 725 S. FIGUEROA STREET SUITE 3320 LOS ANGELES, CA 90017  
 ONE GATEWAY PLAZA LOS ANGELES, CA 90012

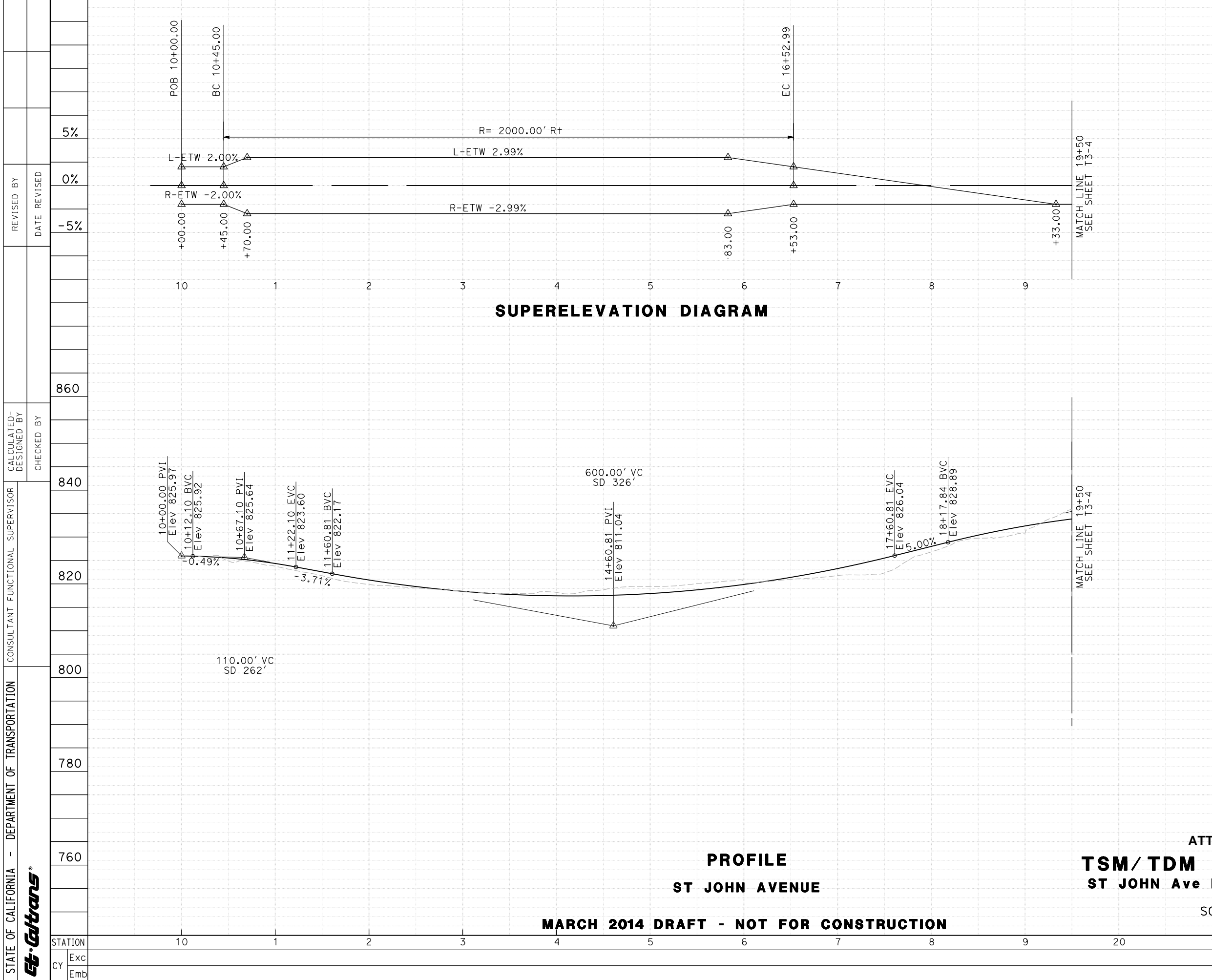


STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED/DESIGNED BY  
 CHECKED BY  
 REVISOR BY  
 DATE REVISOR  
 DATE REVISOR

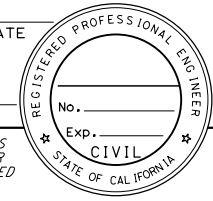


**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**ATTACHMENT F-2 SHEET 26 OF 28**  
**TSM/TDM ALTERNATIVE**  
**INTERSECTION AND LOCAL STREET IMPROVEMENT**  
**ST JOHN Ave FROM CALIFORNIA TO DEL MAR**  
 SCALE 1"=50'  
**T3-2**



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		
REGISTERED CIVIL ENGINEER		DATE			
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
D R CONSULTANTS & DESIGNERS, Inc. 725 S. FIGUEROA STREET SUITE 3320 LOS ANGELES, CA 90017			METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012		



**SUPERELEVATION DIAGRAM**

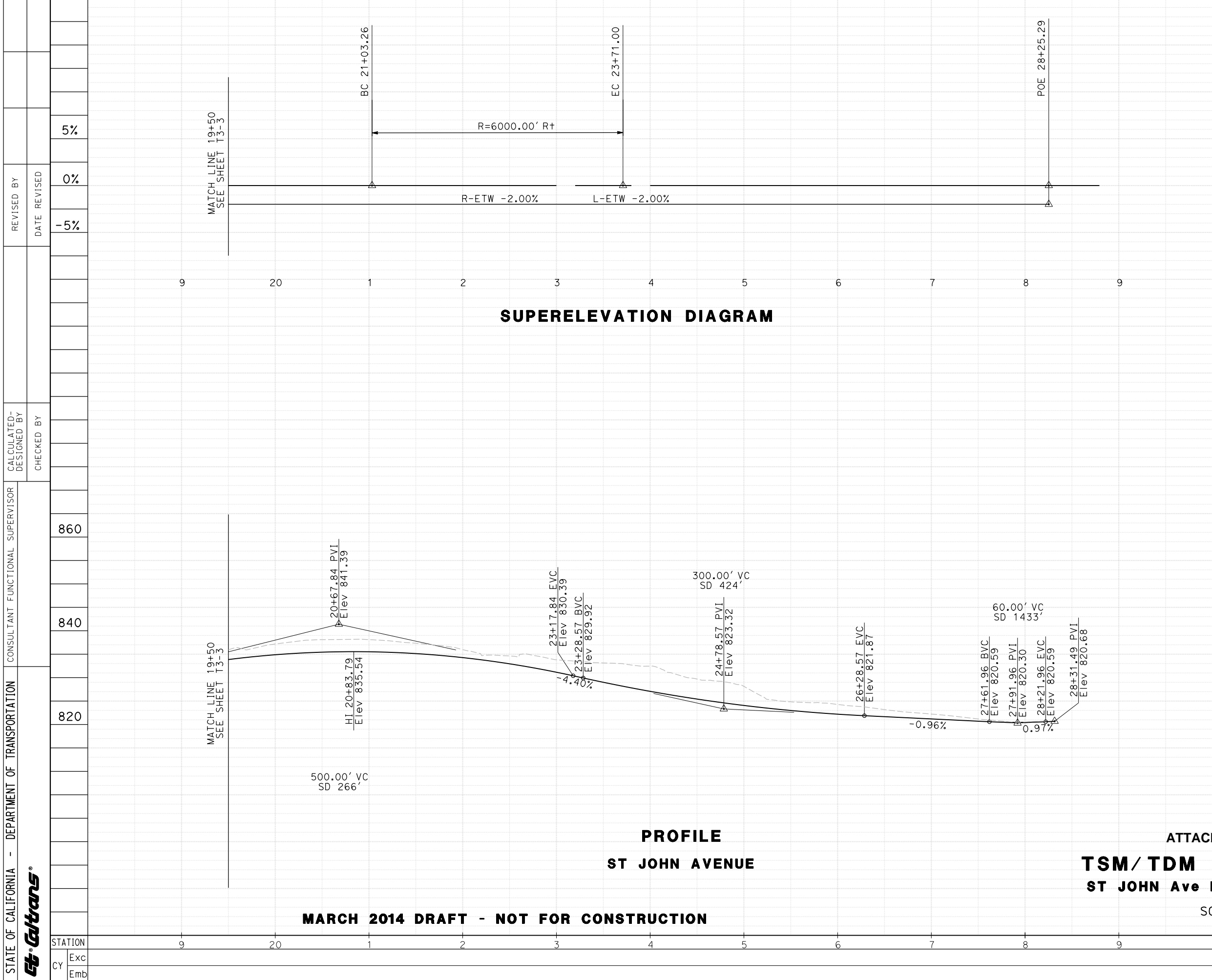
**PROFILE  
ST JOHN AVENUE**

ATTACHMENT F-2 SHEET 27 OF 28  
**TSM/TDM ALTERNATIVE PROFILE**  
ST JOHN Ave FROM CALIFORNIA TO DEL MAR

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: Horiz: 1" = 50'  
Vert: 1" = 20'

**T3-3**



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		
REGISTERED CIVIL ENGINEER		DATE			
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
D R CONSULTANTS & DESIGNERS, Inc. 725 S. FIGUEROA STREET SUITE 3320 LOS ANGELES, CA 90017			METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012		

REVISED BY	DATE	REVISION
		5%
		0%
		-5%
CALCULATED-DESIGNED BY	CHECKED BY	
CONSULTANT FUNCTIONAL SUPERVISOR		860
		840
		820
STATION		
9	20	1
2	3	4
5	6	7
8	9	
CY	Exc	
	Emb	

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE  
ST JOHN AVENUE**

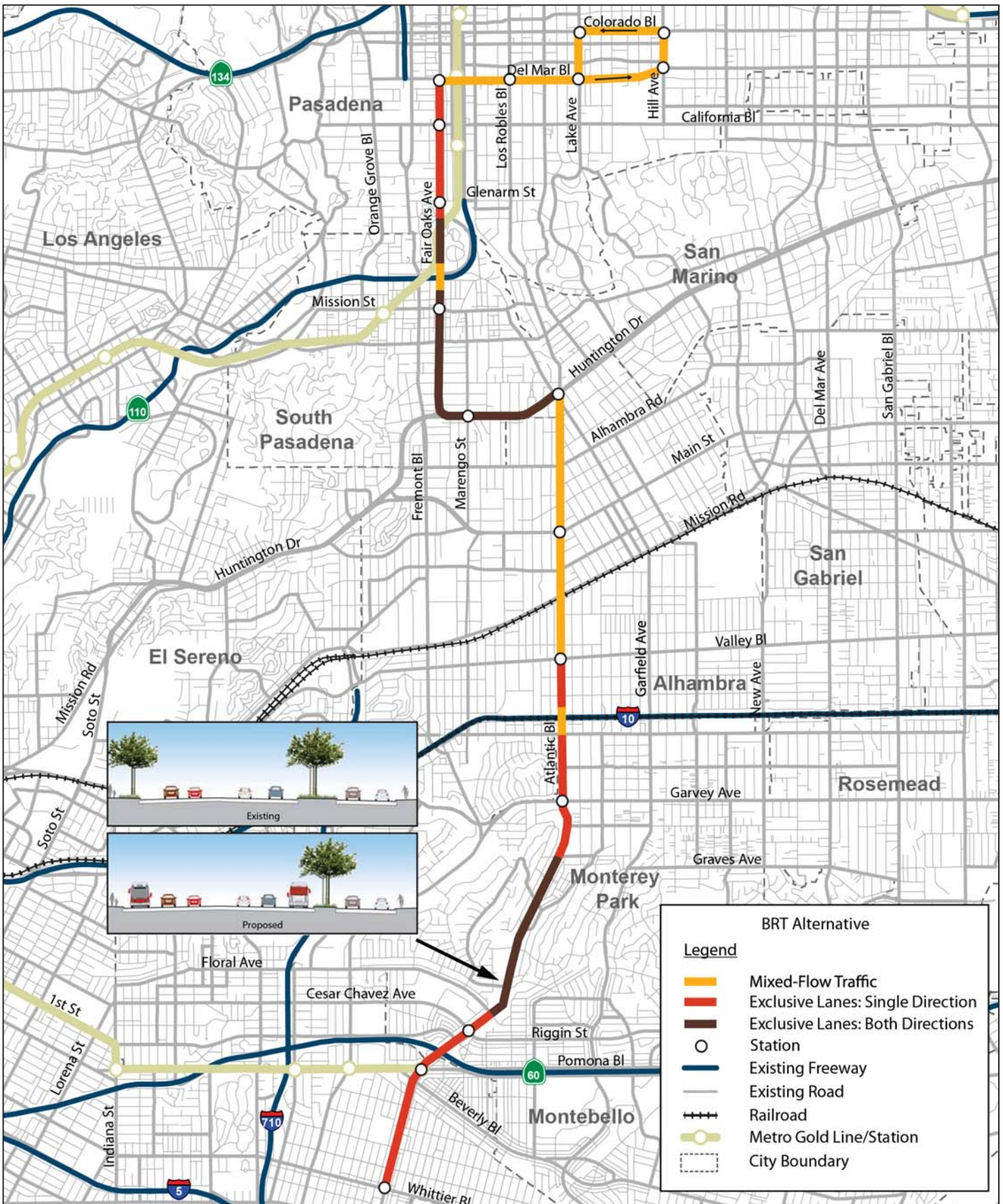
ATTACHMENT F-2 SHEET 28 OF 28  
**TSM/TDM ALTERNATIVE PROFILE**  
**ST JOHN Ave FROM CALIFORNIA TO DEL MAR**  
 SCALE: Horiz: 1" = 50'  
 Vert: 1" = 20' **T3-4**



**Attachment G**  
**BRT Alternative**

---



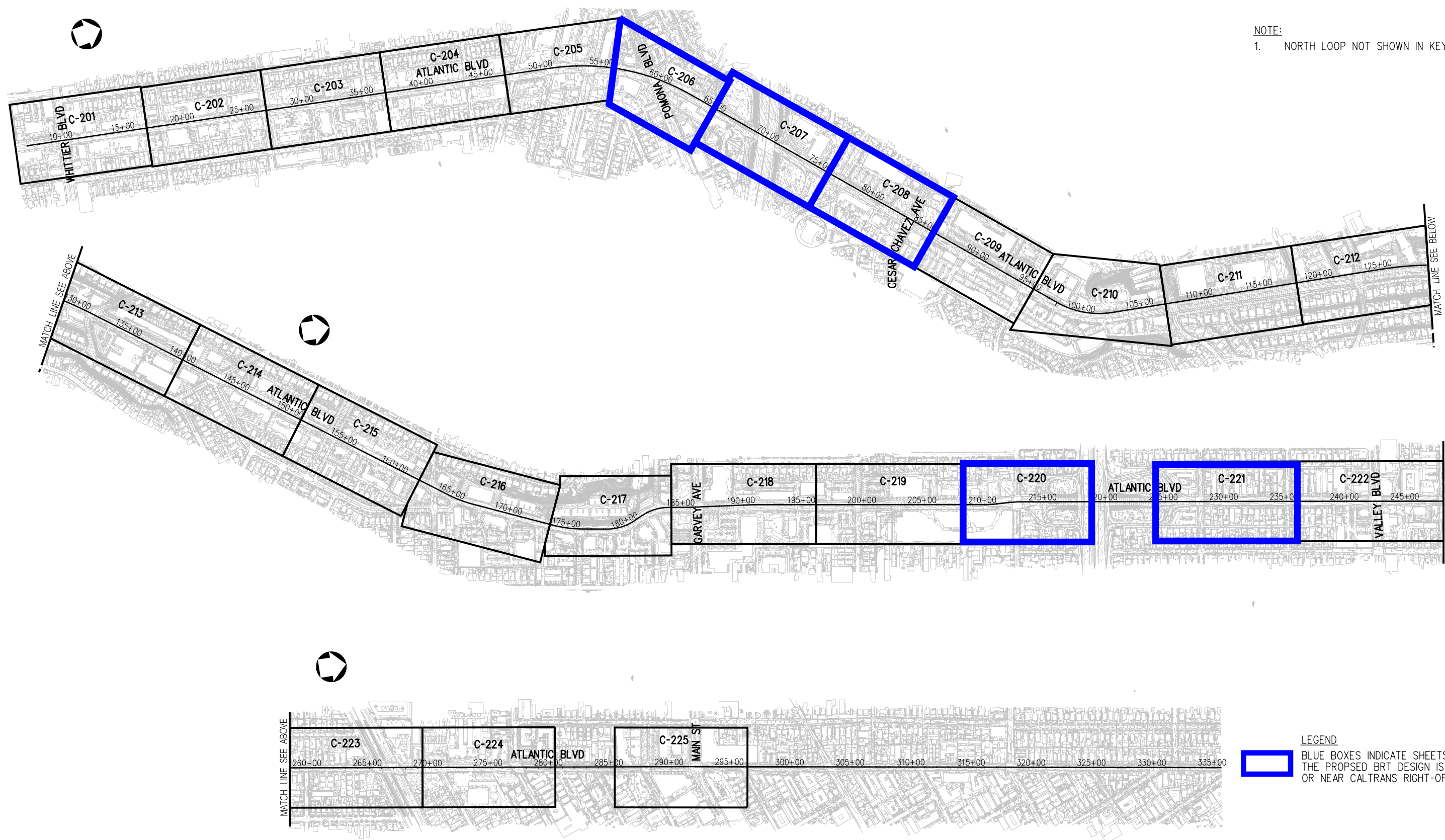


ATTACHMENT G-1





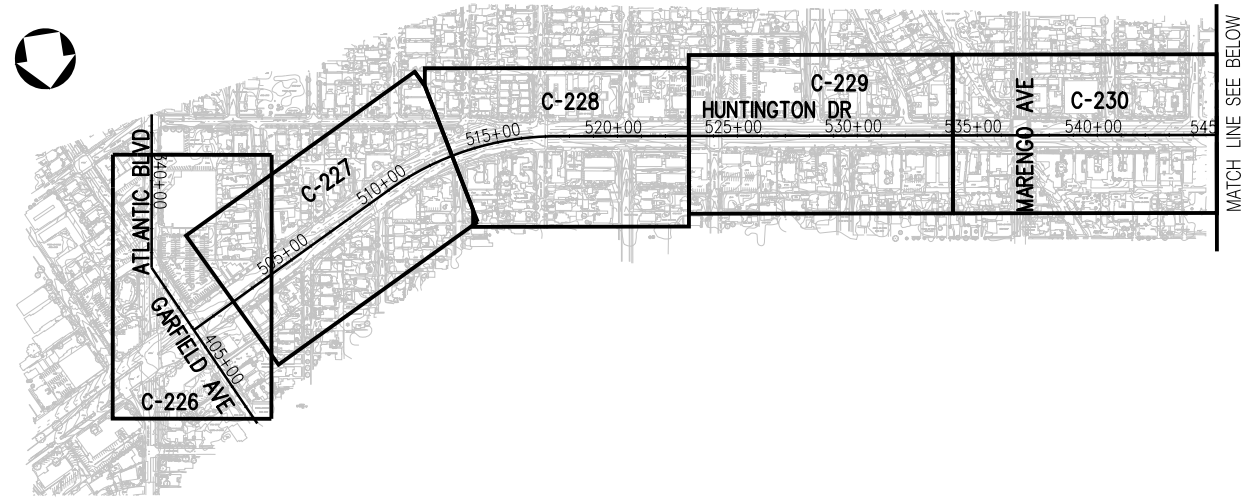
NOTE:  
1. NORTH LOOP NOT SHOWN IN KEY MAP.



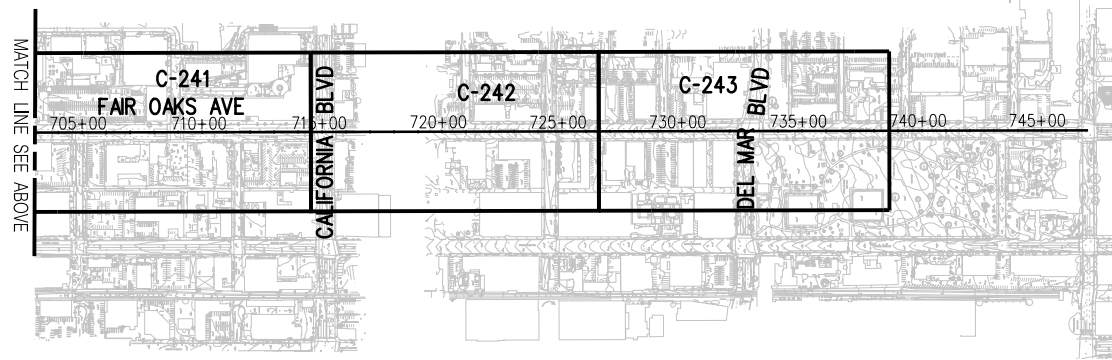
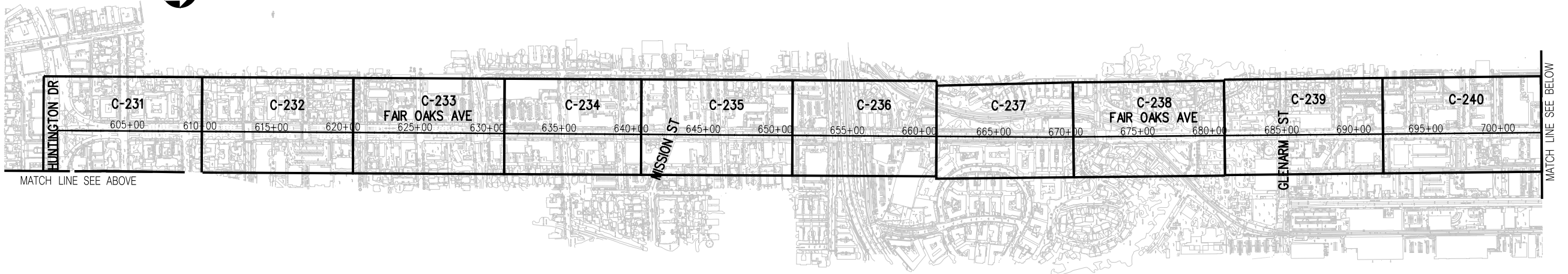
LEGEND  
BLUE BOXES INDICATE SHEETS WHERE THE PROPOSED BRT DESIGN IS WITHIN OR NEAR CALTRANS RIGHT-OF-WAY.

ATTACHMENT G-2 KEY MAP 1 OF 2

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.	DESIGNED BY	 <b>LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY</b>	710 NORTH STUDY-BRT ADVANCED CONCEPTUAL DESIGN KEY MAP		CONTRACT NO					
	DRAWN BY		 1000 WILSHIRE BLVD SUITE 2100 LOS ANGELES, CA 90017	DRAWING NO	REV					
	CHECKED BY			SCALE						
	IN CHARGE			SHEET NO						
	DATE									
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION			



**NOTE:**  
1. NORTH LOOP NOT SHOWN IN KEY MAP.



**LEGEND**  
 BLUE BOXES INDICATE SHEETS WHERE THE PROPOSED BRT DESIGN IS WITHIN OR NEAR CALTRANS RIGHT-OF-WAY.

**ATTACHMENT G-2 KEY MAP 2 OF 2**

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER

DESIGNED BY	
DRAWN BY	
CHECKED BY	
IN CHARGE	
DATE	

**LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY**

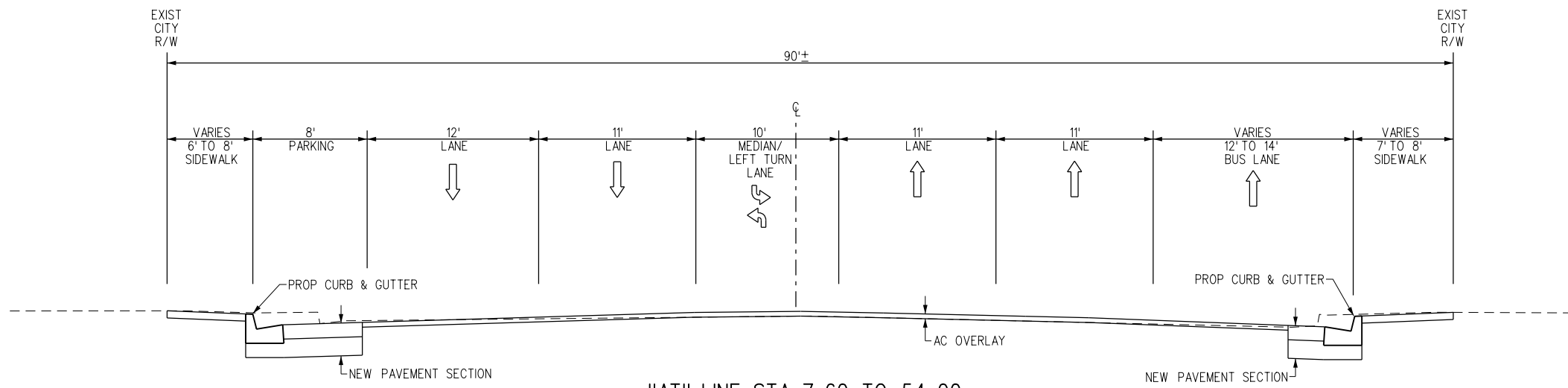
**CH2MHILL**

1000 WILSHIRE BLVD  
 SUITE 2100  
 LOS ANGELES, CA 90017

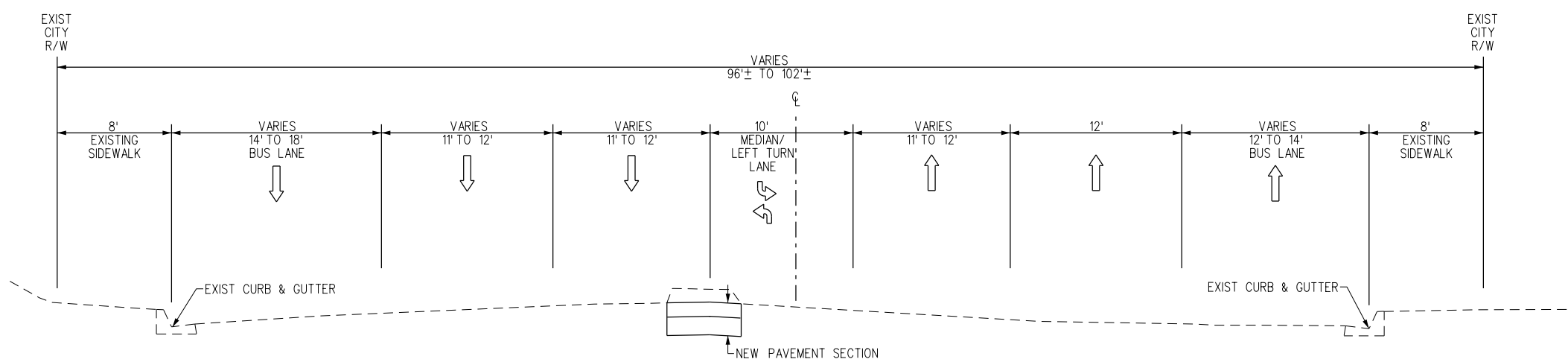
710 NORTH STUDY-BRT  
 ADVANCED CONCEPTUAL DESIGN  
 KEY MAP

CONTRACT NO	
DRAWING NO	REV
SCALE	
SHEET NO	

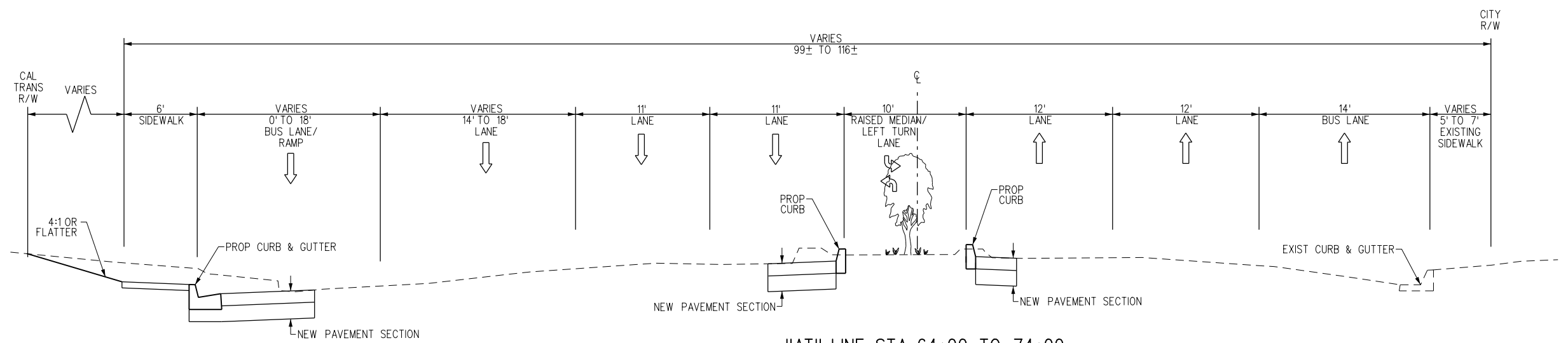
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"AT" LINE STA 7+60 TO 54+00  
ATLANTIC BLVD



"AT" LINE STA 54+00 TO 64+00  
ATLANTIC BLVD



"AT" LINE STA 64+00 TO 74+00  
ATLANTIC BLVD

ATTACHMENT G-2 SHEET 1 OF 11

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	DESCRIPTION

DESIGNED BY  
S. CHAU  
DRAWN BY  
H. ANDERSON  
CHECKED BY  
V. CHIO  
IN CHARGE  
T. BEVAN  
DATE  
8/20/13

**M Metro** LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

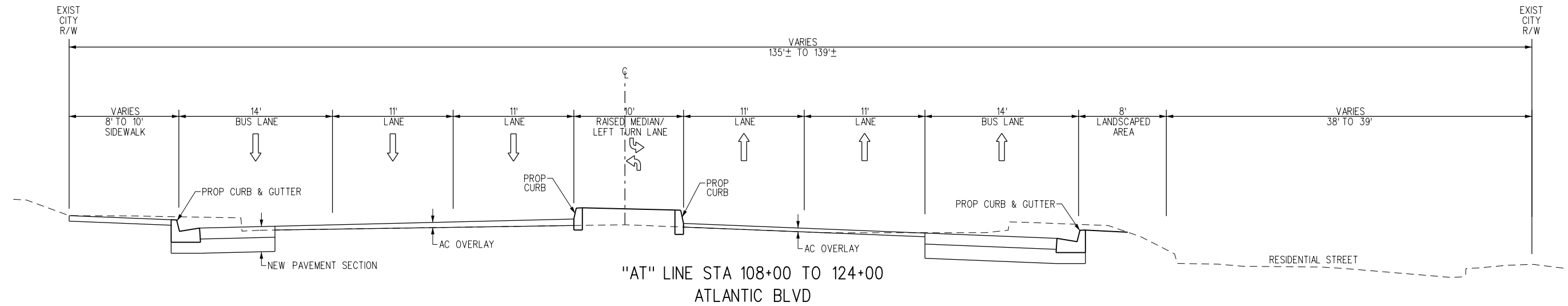
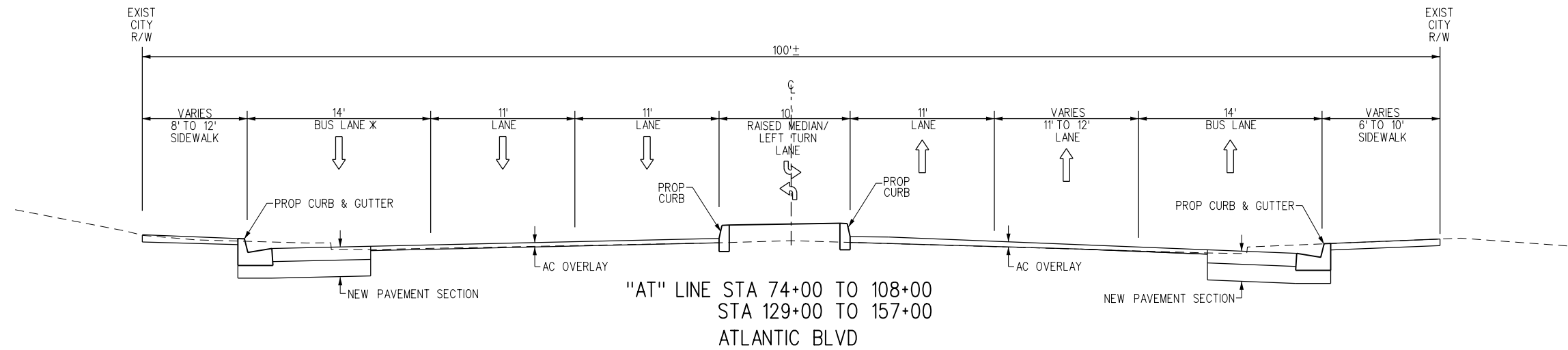
**CH2MHILL** 1000 WILSHIRE BLVD SUITE 2100 LOS ANGELES, CA 90017

710 NORTH STUDY-BRT  
ADVANCED CONCEPTUAL DESIGN  
TYPICAL SECTIONS  
SHEET 1 OF 7

CONTRACT NO	
DRAWING NO X-001	REV
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SHEET NO	

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\* LANE IS NOT EXCLUSIVELY FOR BUSES  
FROM STA 74+00 TO 95+00



**ATTACHMENT G-2 SHEET 2 OF 11**

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER

DESIGNED BY  
S. CHAU  
DRAWN BY  
H. ANDERSON  
CHECKED BY  
V. CHIO  
IN CHARGE  
T. BEVAN  
DATE  
8/20/13

**M Metro** LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

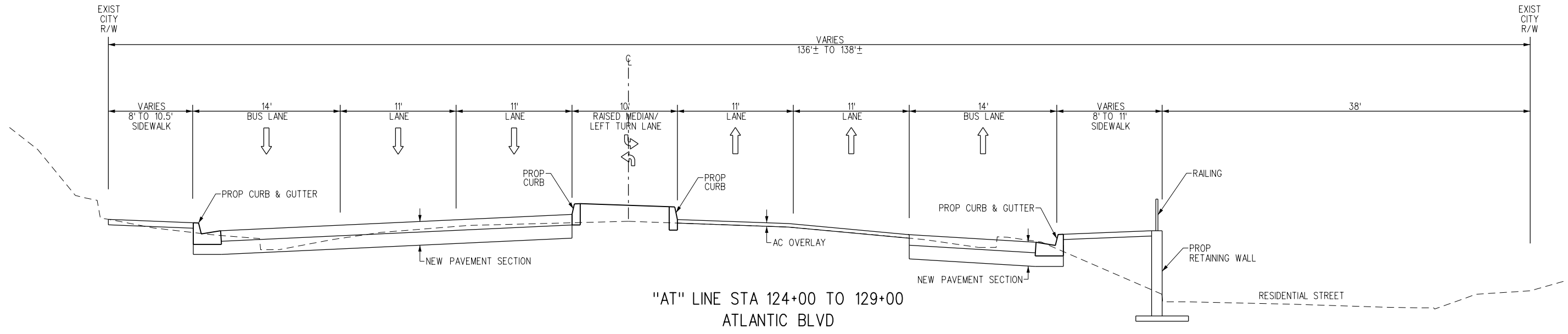
**CH2MHILL** 1000 WILSHIRE BLVD SUITE 2100 LOS ANGELES, CA 90017

710 NORTH STUDY-BRT  
ADVANCED CONCEPTUAL DESIGN  
TYPICAL SECTIONS  
SHEET 2 OF 7

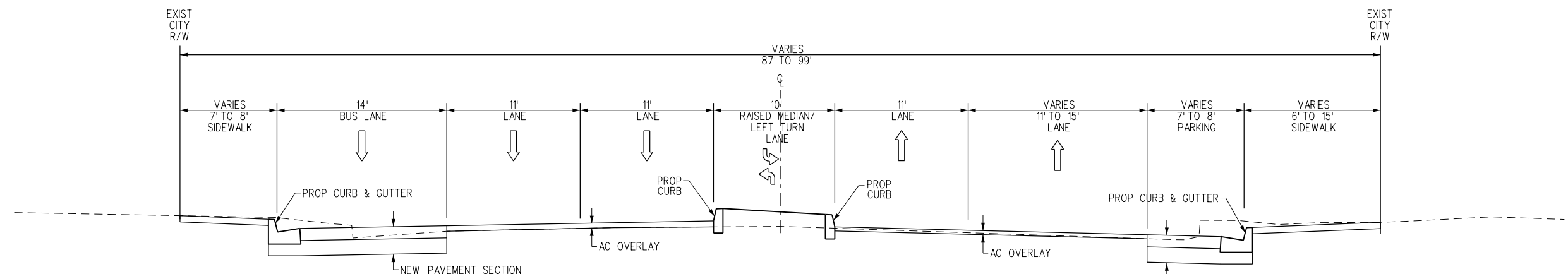
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X-002	
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SHEET NO	

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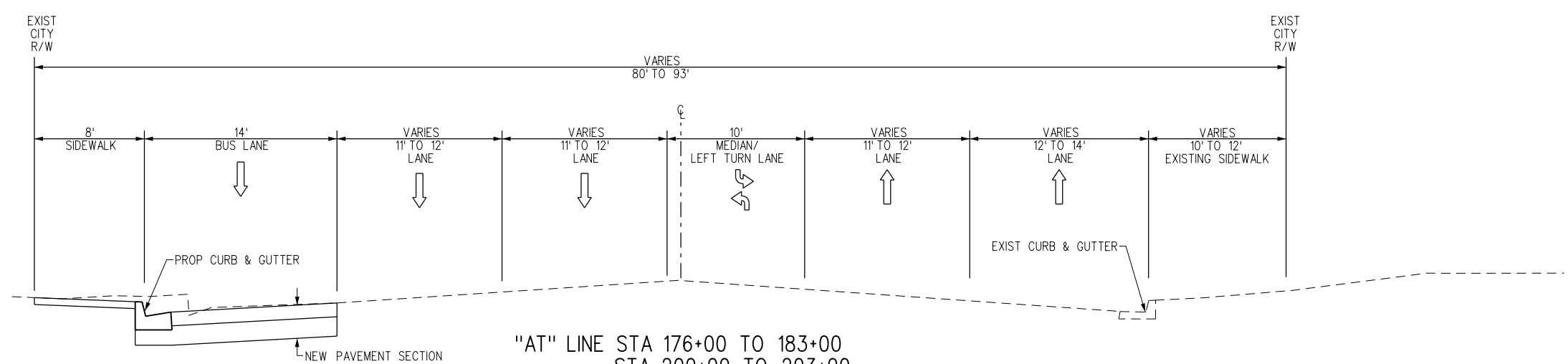




"AT" LINE STA 124+00 TO 129+00  
ATLANTIC BLVD



"AT" LINE STA 157+00 TO 176+00  
STA 232+00 TO 240+00  
ATLANTIC BLVD



"AT" LINE STA 176+00 TO 183+00  
STA 200+00 TO 203+00  
ATLANTIC BLVD

ATTACHMENT G-2 SHEET 3 OF 11

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER

DESIGNED BY  
S. CHAU  
DRAWN BY  
H. ANDERSON  
CHECKED BY  
V. CHIO  
IN CHARGE  
T. BEVAN  
DATE  
8/20/13

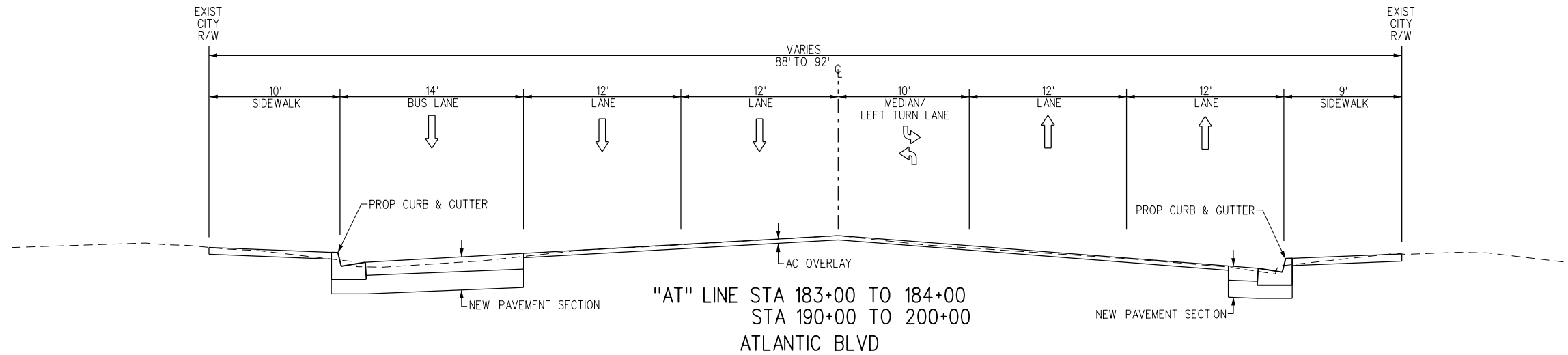
**M Metro** LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

**CH2MHILL** 1000 WILSHIRE BLVD SUITE 2100 LOS ANGELES, CA 90017

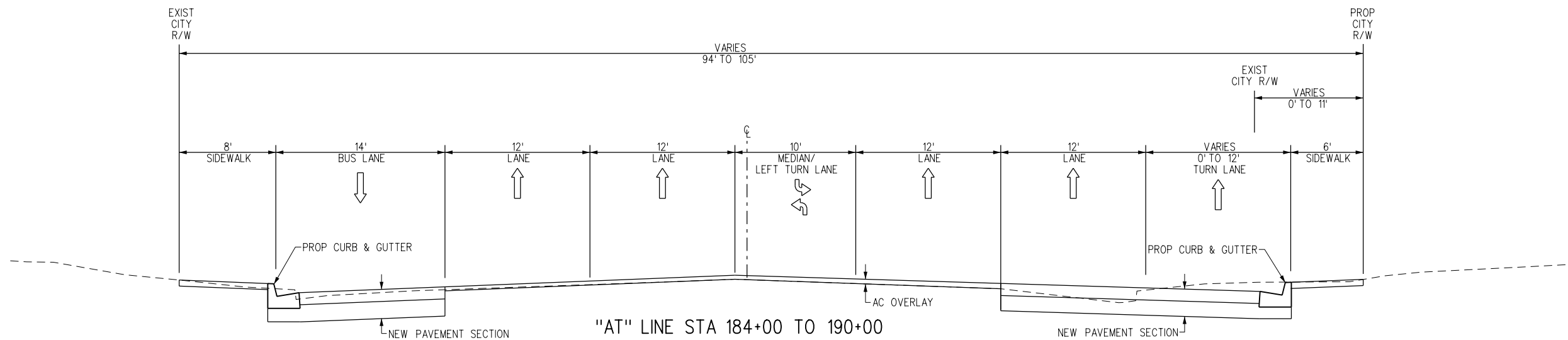
710 NORTH STUDY-BRT  
ADVANCED CONCEPTUAL DESIGN  
TYPICAL SECTIONS  
SHEET 3 OF 7

CONTRACT NO	
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X-003	
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SHEET NO	

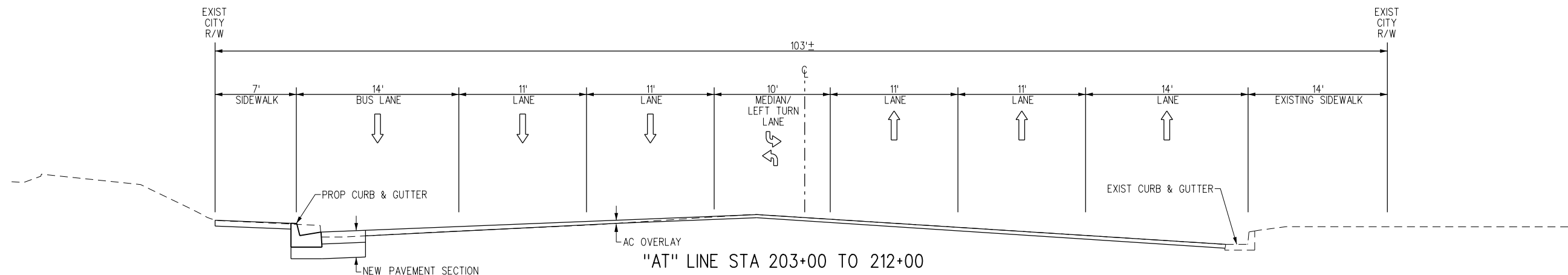
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"AT" LINE STA 183+00 TO 184+00  
STA 190+00 TO 200+00  
ATLANTIC BLVD



"AT" LINE STA 184+00 TO 190+00  
ATLANTIC BLVD



"AT" LINE STA 203+00 TO 212+00  
ATLANTIC BLVD

ATTACHMENT G-2 SHEET 4 OF 11

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER

DESIGNED BY  
S. CHAU  
DRAWN BY  
H. ANDERSON  
CHECKED BY  
V. CHIO  
IN CHARGE  
T. BEVAN  
DATE  
8/20/13

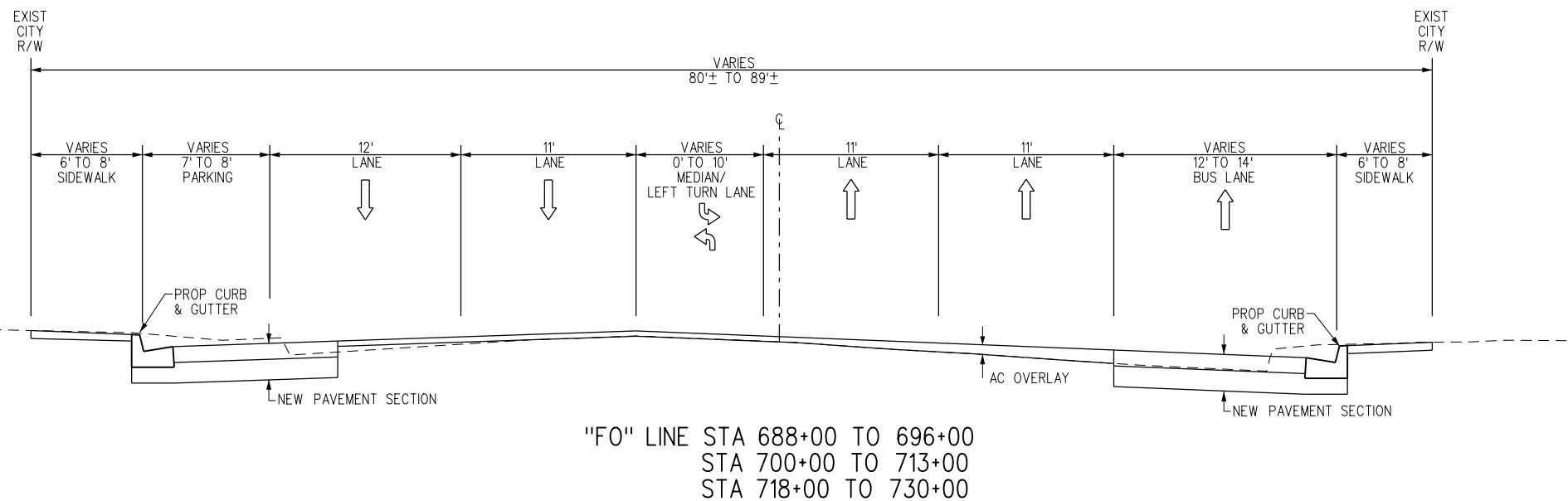
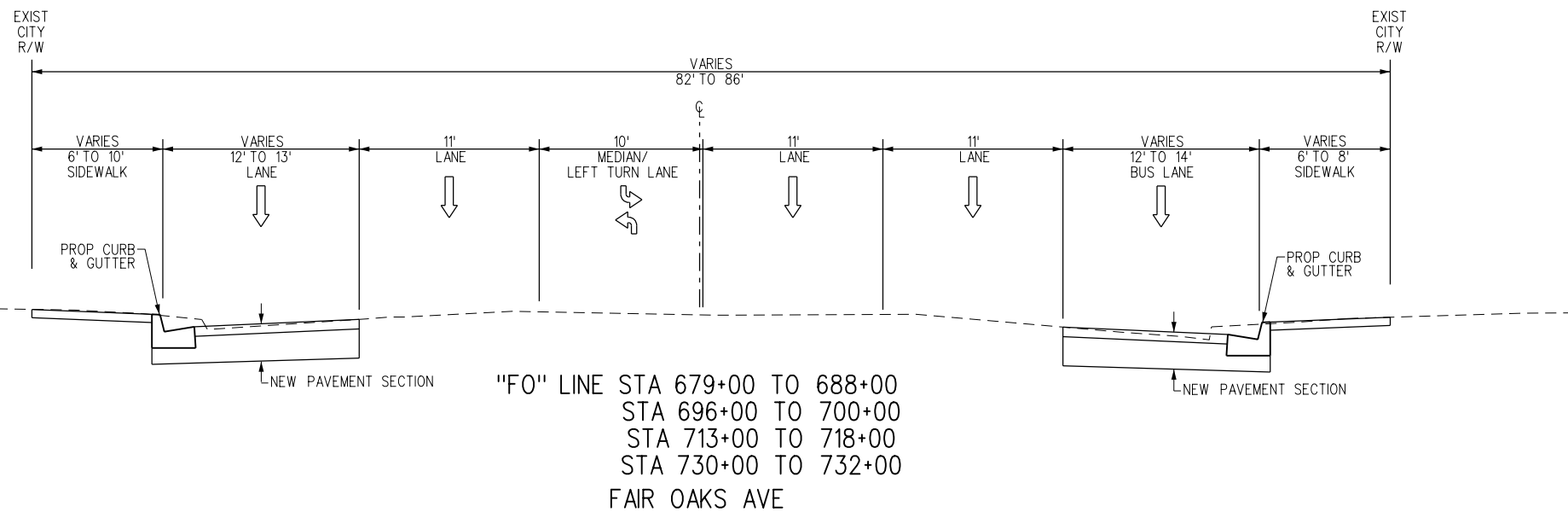
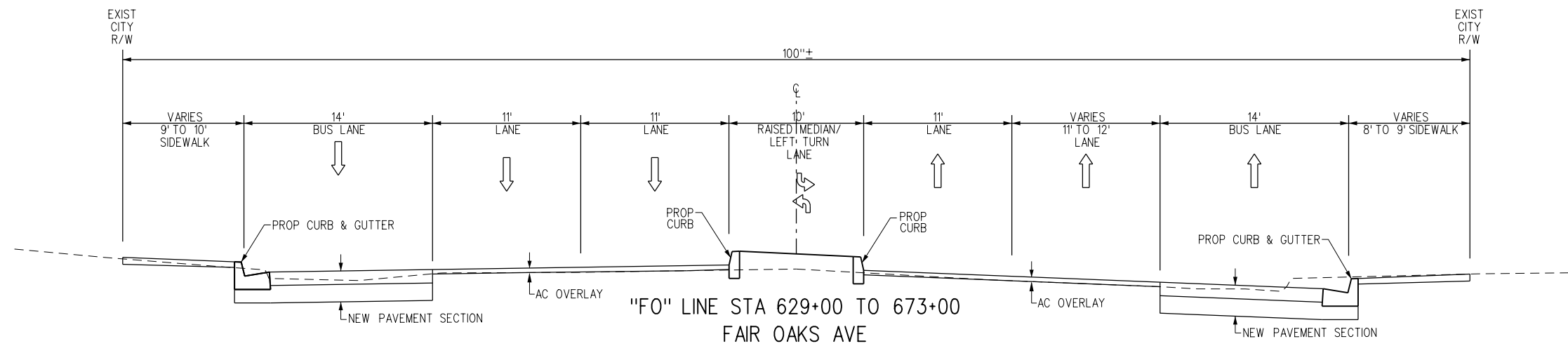
**M Metro** LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

**CH2MHILL** 1000 WILSHIRE BLVD SUITE 2100 LOS ANGELES, CA 90017

710 NORTH STUDY-BRT  
ADVANCED CONCEPTUAL DESIGN  
TYPICAL SECTIONS  
SHEET 4 OF 7

CONTRACT NO	
DRAWING NO	REV
X-004	
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SHEET NO	

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ATTACHMENT G-2 SHEET 5 OF 11

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	DESCRIPTION

DESIGNED BY  
S. CHAU

DRAWN BY  
H. ANDERSON

CHECKED BY  
V. CHIO

IN CHARGE  
T. BEVAN

DATE  
8/20/13

**M** Metro

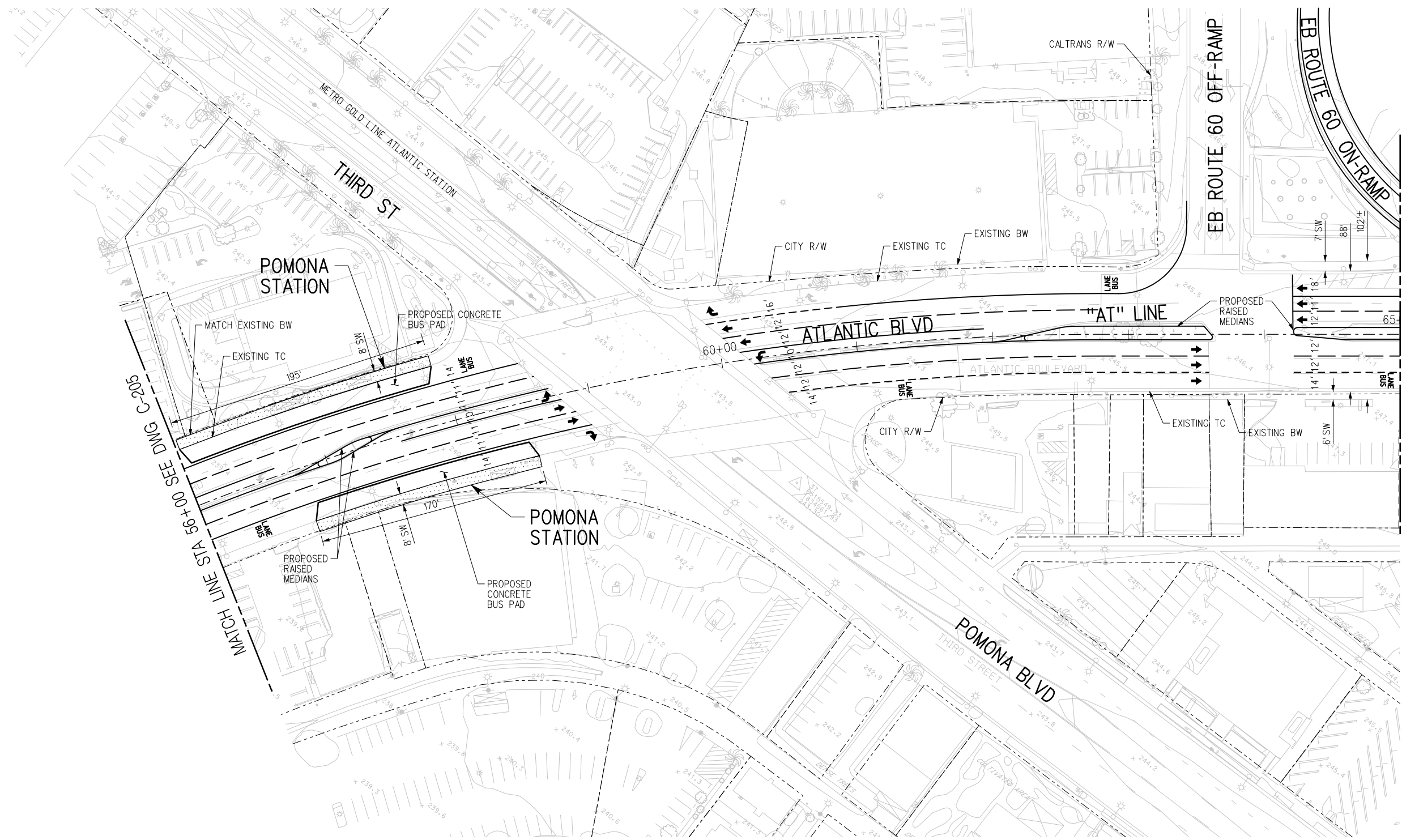
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

**CH2MHILL** 1000 WILSHIRE BLVD SUITE 2100 LOS ANGELES, CA 90017

710 NORTH STUDY-BRT  
ADVANCED CONCEPTUAL DESIGN  
TYPICAL SECTIONS  
SHEET 7 OF 7

CONTRACT NO	
DRAWING NO	REV
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NOT TO SCALE	
SHEET NO	

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MATCH LINE STA 65+00 SEE DWG C-207

MATCH LINE STA 56+00 SEE DWG C-205



ATTACHMENT G-2 SHEET 6 OF 11

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER

DESIGNED BY  
S. CHAU  
DRAWN BY  
H. ANDERSON  
CHECKED BY  
V. CHIO  
IN CHARGE  
T. BEVAN  
DATE  
11/26/13

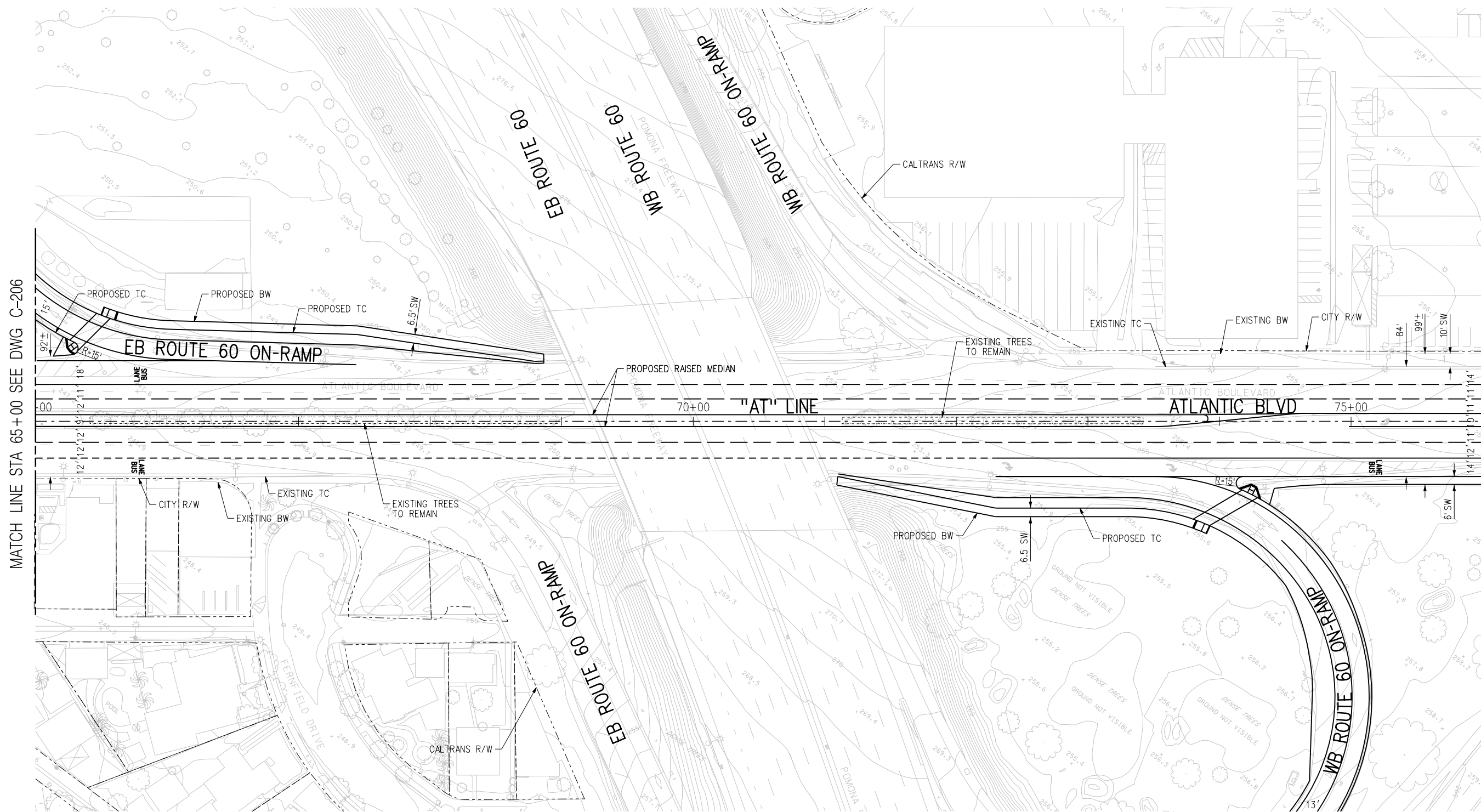
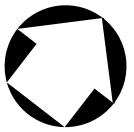
**M Metro** LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

**CH2MHILL** 1000 WILSHIRE BLVD SUITE 2100 LOS ANGELES, CA 90017

710 NORTH STUDY-BRT  
ADVANCED CONCEPTUAL DESIGN  
PLAN  
STA 56+00 TO STA 65+00  
SHEET 6 OF 48

CONTRACT NO	
DRAWING NO C-206	REV
SCALE 1" = 40'	
SHEET NO	

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MATCH LINE STA 65+00 SEE DWG C-206

MATCH LINE STA 76+00 SEE DWG C-208



ATTACHMENT G-2 SHEET 7 OF 11

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER

DESIGNED BY S. CHAU
DRAWN BY H. ANDERSON
CHECKED BY V. CHIO
IN CHARGE T. BEVAN
DATE 11/26/13

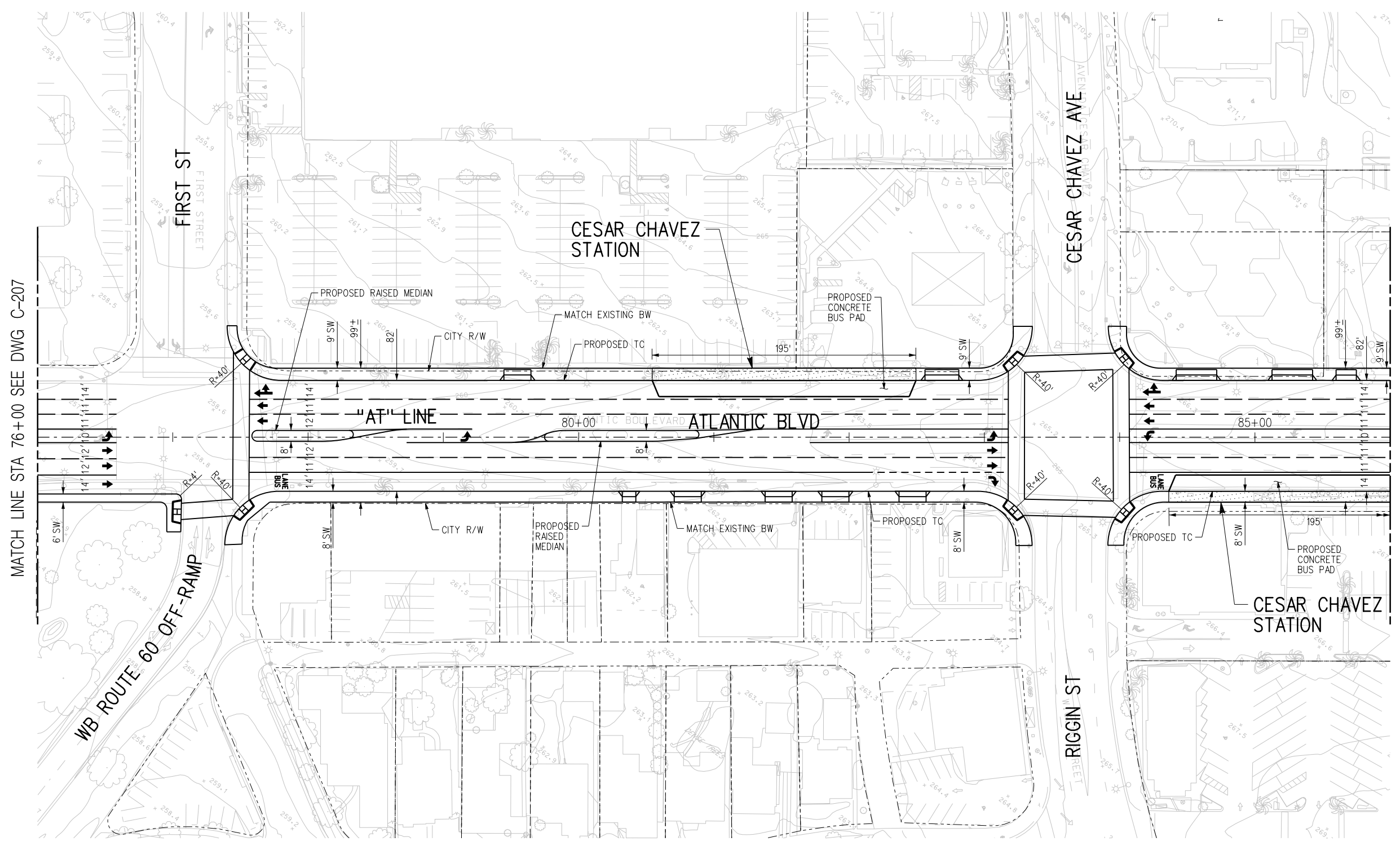
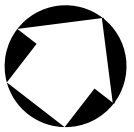
**LOS ANGELES COUNTY  
METROPOLITAN TRANSPORTATION AUTHORITY**

1000 WILSHIRE BLVD  
SUITE 2100  
LOS ANGELES, CA 90017

710 NORTH STUDY-BRT  
ADVANCED CONCEPTUAL DESIGN  
PLAN  
STA 65+00 TO STA 76+00  
SHEET 7 OF 48

CONTRACT NO	
DRAWING NO C-207	REV
SCALE 1" = 40'	
SHEET NO	

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MATCH LINE STA 76+00 SEE DWG C-207

MATCH LINE STA 86+00 SEE DWG C-209



ATTACHMENT G-2 SHEET 8 OF 11

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY  
S. CHAU  
DRAWN BY  
H. ANDERSON  
CHECKED BY  
V. CHIO  
IN CHARGE  
T. BEVAN  
DATE  
11/26/13

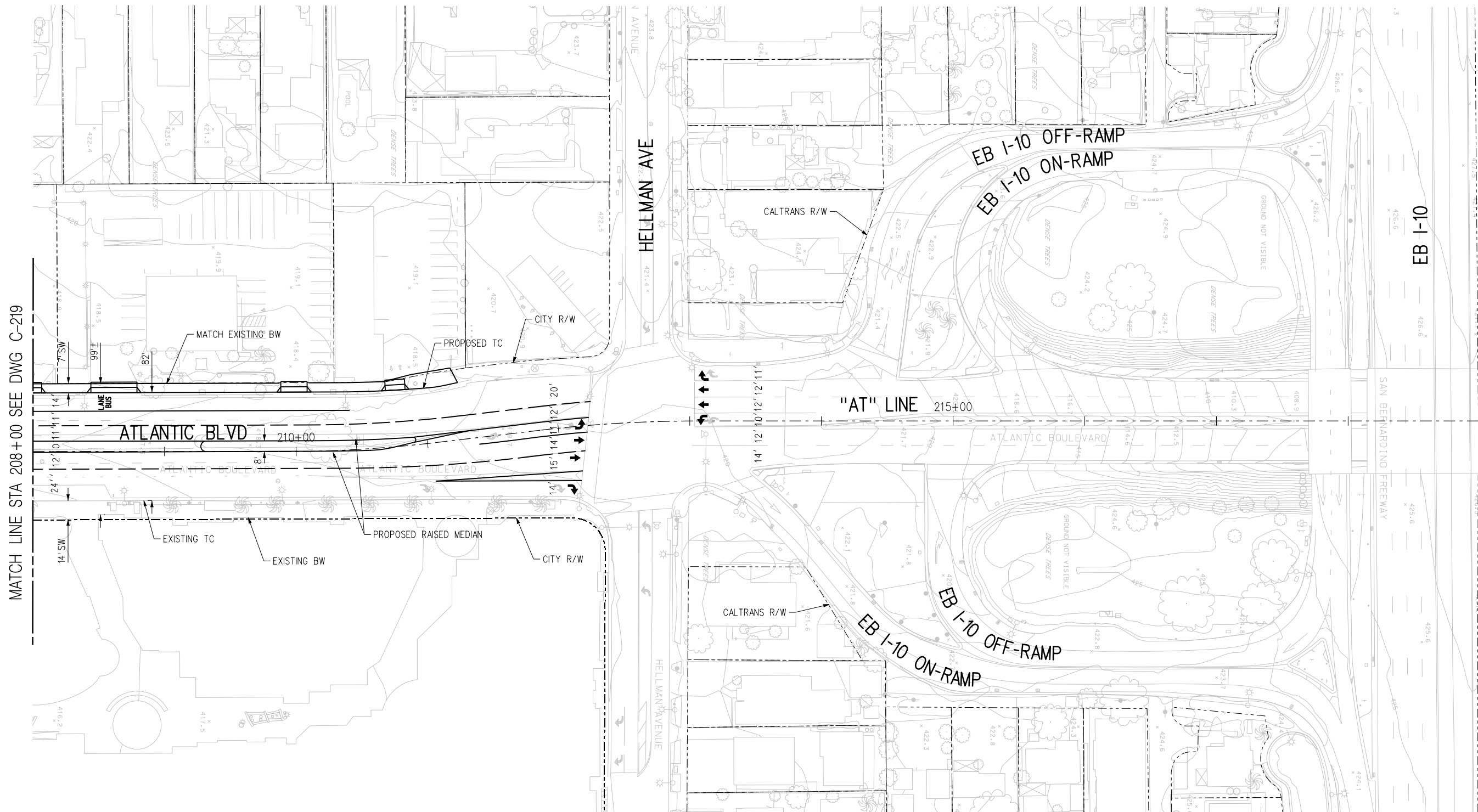
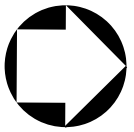
**M Metro** LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

**CH2MHILL** 1000 WILSHIRE BLVD SUITE 2100 LOS ANGELES, CA 90017

710 NORTH STUDY-BRT  
ADVANCED CONCEPTUAL DESIGN  
PLAN  
STA 76+00 TO STA 86+00  
SHEET 8 OF 48

CONTRACT NO	
DRAWING NO C-208	REV
SCALE 1" = 40'	
SHEET NO	

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MATCH LINE STA 208+00 SEE DWG C-219



ATTACHMENT G-2 SHEET 9 OF 11

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY  
S. CHAU  
DRAWN BY  
H. ANDERSON  
CHECKED BY  
V. CHIO  
IN CHARGE  
T. BEVAN  
DATE  
11/26/13

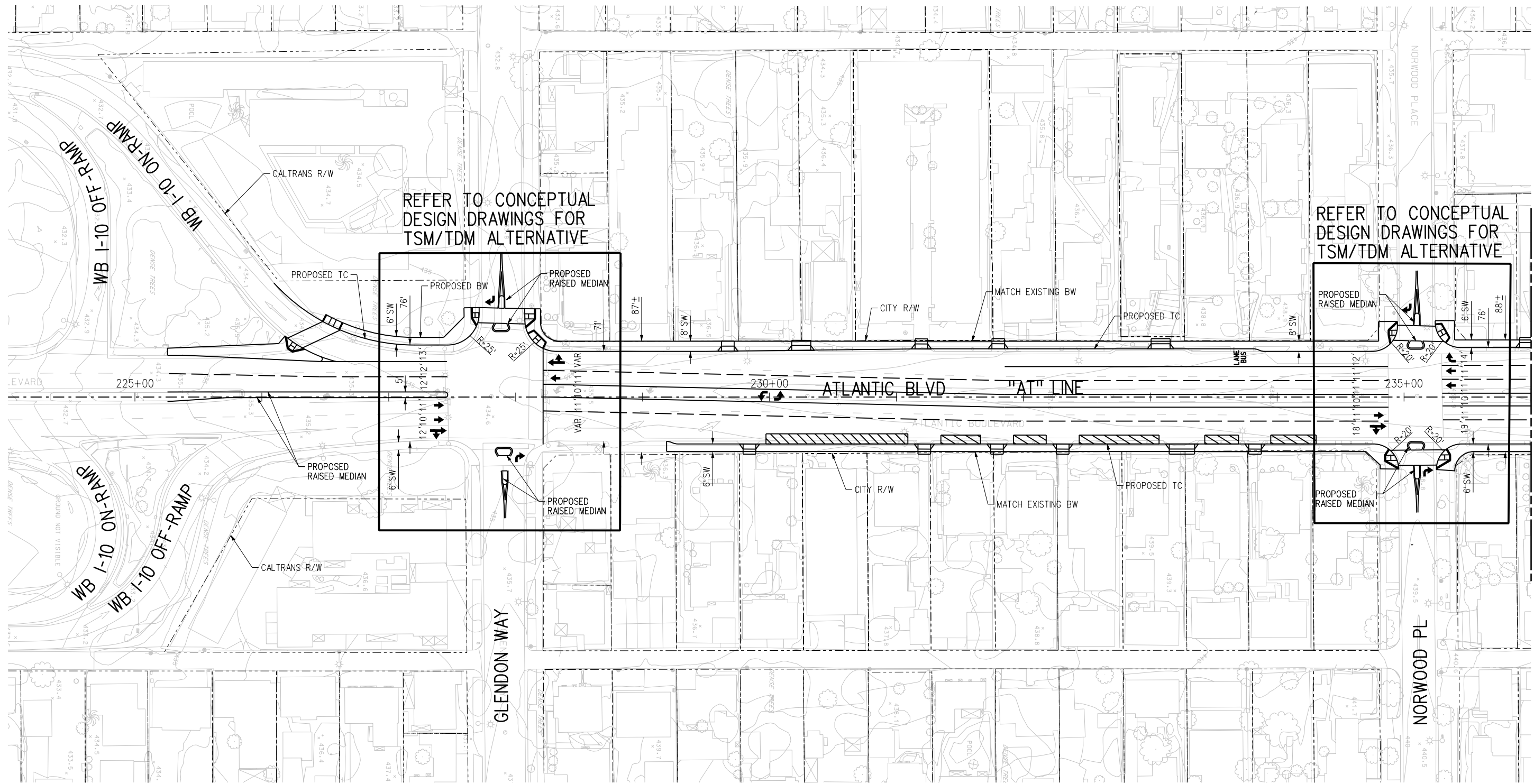
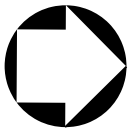
**M Metro** LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

**CH2MHILL** 1000 WILSHIRE BLVD SUITE 2100 LOS ANGELES, CA 90017

710 NORTH STUDY-BRT  
ADVANCED CONCEPTUAL DESIGN  
PLAN  
STA 208+00 TO STA 219+00  
SHEET 20 OF 48

CONTRACT NO	
DRAWING NO C-220	REV
SCALE 1" = 40'	SHEET NO

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MATCH LINE STA 236+00 SEE DWG C-222



ATTACHMENT G-2 SHEET 10 OF 11

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER

DESIGNED BY S. CHAU
DRAWN BY H. ANDERSON
CHECKED BY V. CHIO
IN CHARGE T. BEVAN
DATE 11/26/13

**LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY**

1000 WILSHIRE BLVD  
SUITE 2100  
LOS ANGELES, CA 90017

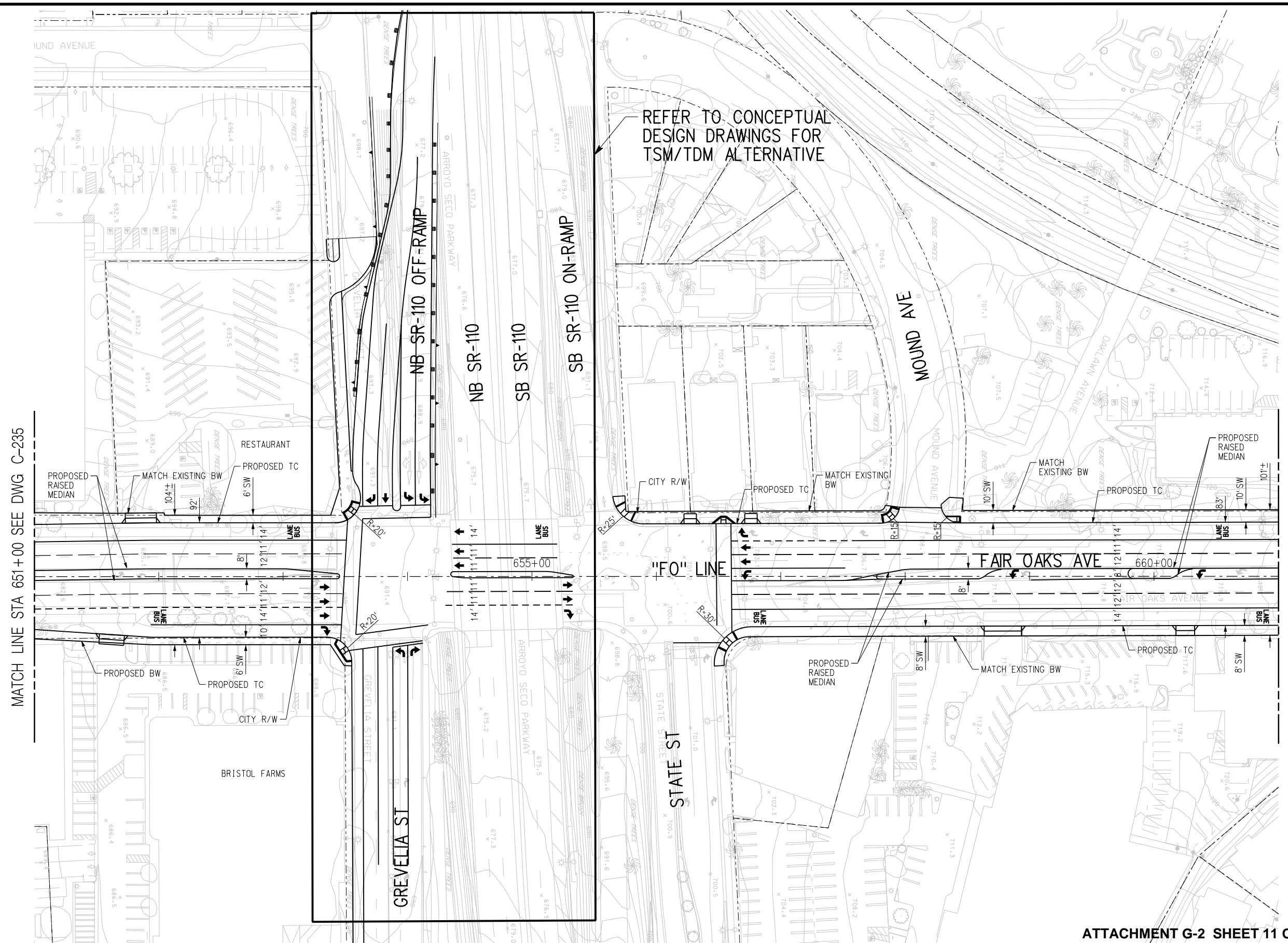
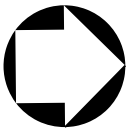
710 NORTH STUDY-BRT  
ADVANCED CONCEPTUAL DESIGN PLAN  
STA 224+00 TO STA 236+00  
SHEET 21 OF 48

CONTRACT NO	
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SHEET NO	

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Model Name= Default





ATTACHMENT G-2 SHEET 11 OF 11

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY  
S. CHAU

DRAWN BY  
H. ANDERSON

CHECKED BY  
V. CHIO

IN CHARGE  
T. BEVAN

DATE  
11/26/13

**M Metro** LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

**CH2MHILL** 1000 WILSHIRE BLVD SUITE 2100 LOS ANGELES, CA 90017

710 NORTH STUDY-BRT  
ADVANCED CONCEPTUAL DESIGN  
PLAN  
STA 651+00 TO STA 661+00  
SHEET 36 OF 48

CONTRACT NO	
DRAWING NO C-236	REV
SCALE 1" = 40'	SHEET NO

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.

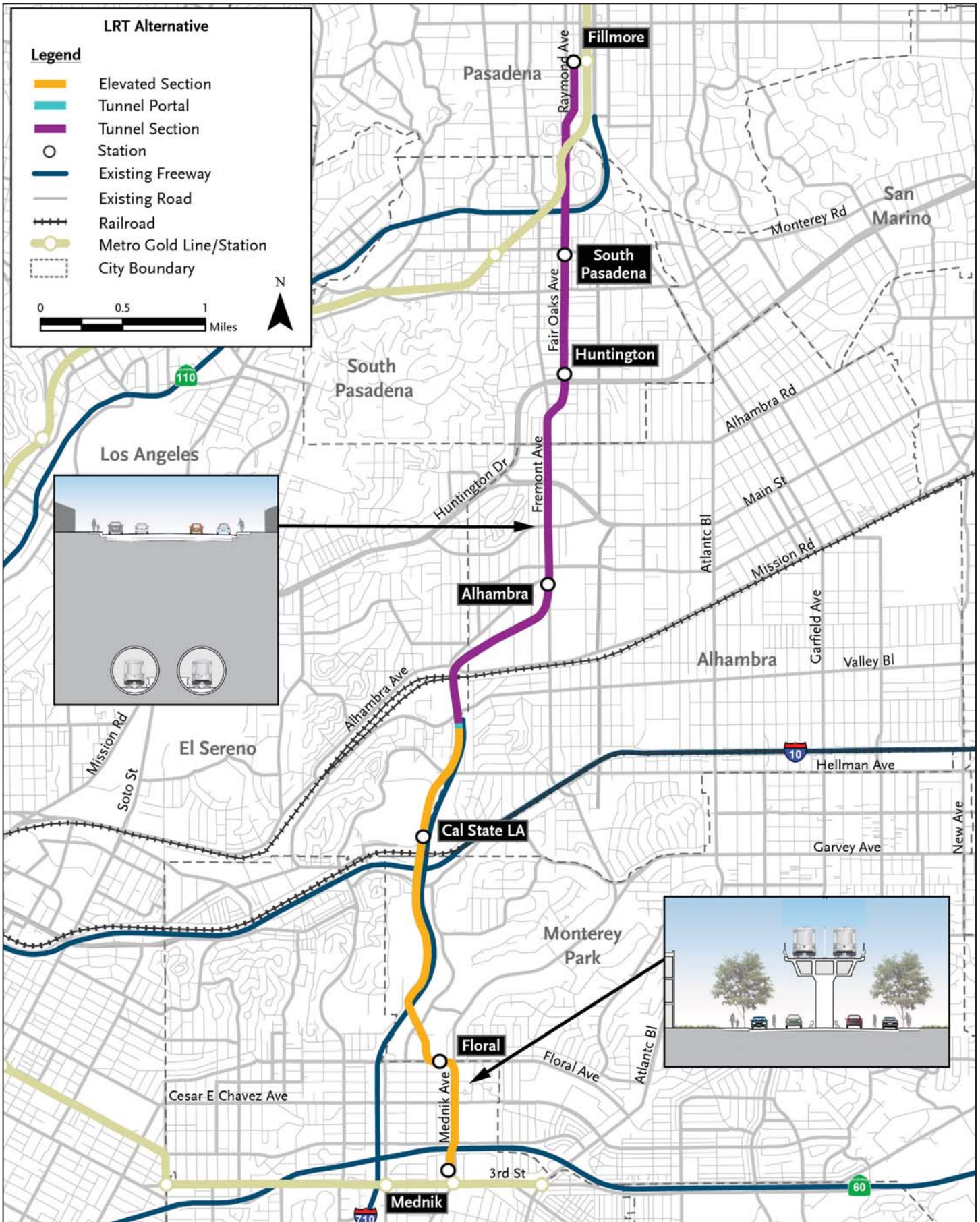
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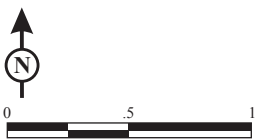
**Attachment H**  
**LRT Alternative**

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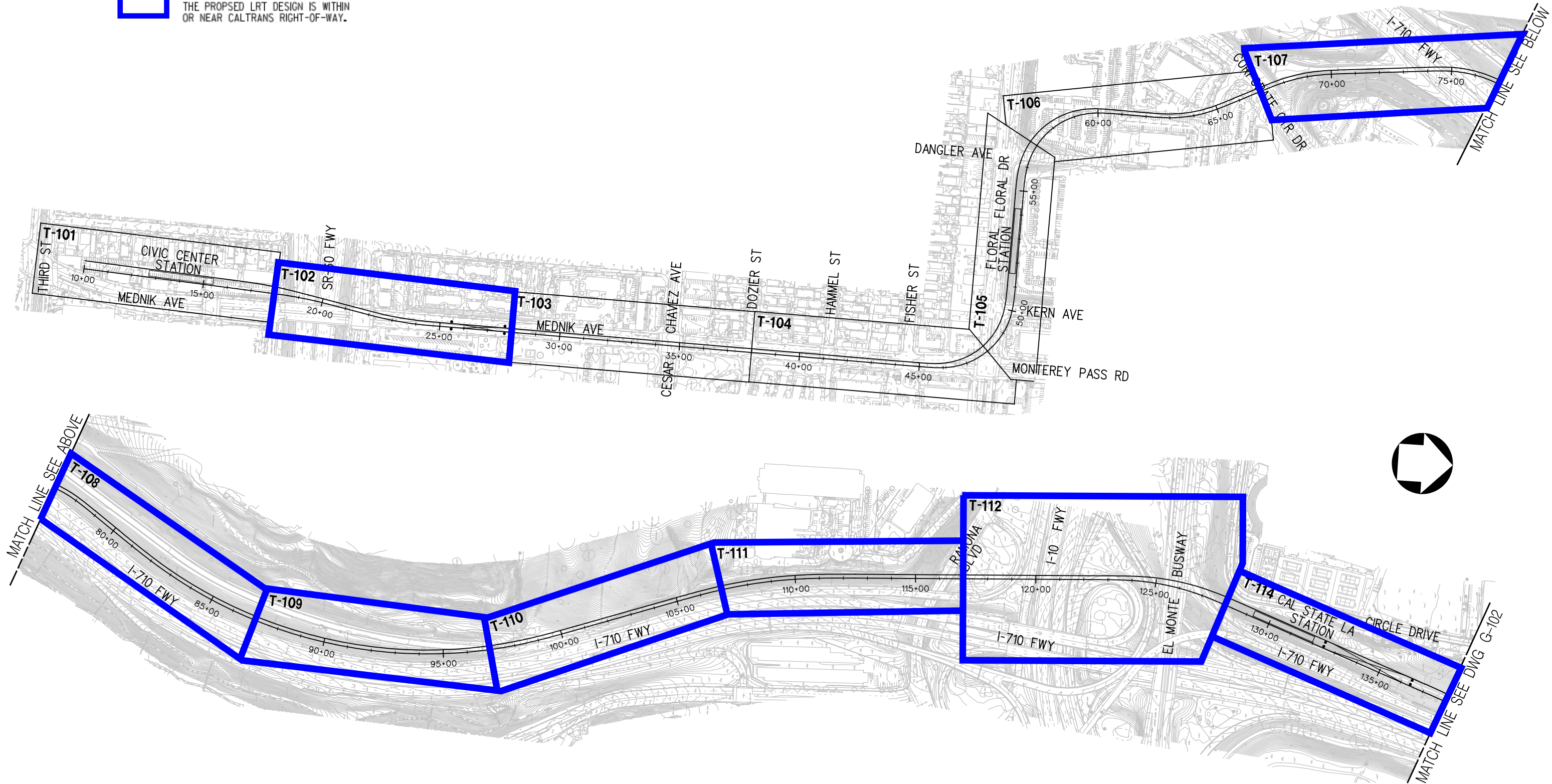


ATTACHMENT H-1





**LEGEND**  
 BLUE BOXES INDICATE SHEETS WHERE THE PROPOSED LRT DESIGN IS WITHIN OR NEAR CALTRANS RIGHT-OF-WAY.




PRELIMINARY

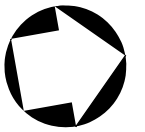
ATTACHMENT H-2 KEY MAP 1 OF 3


THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.							
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

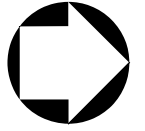
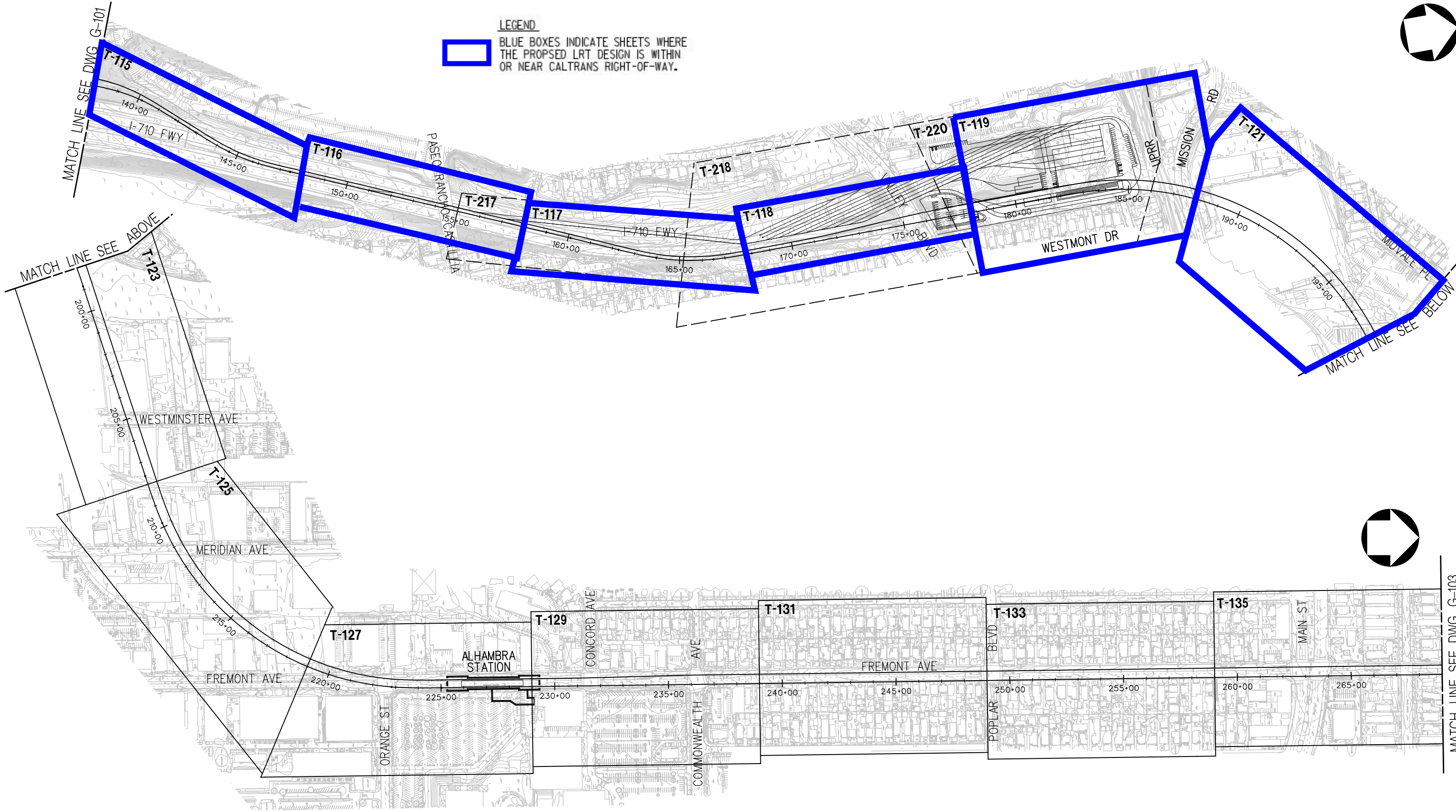
DESIGNED BY	
DRAWN BY	
CHECKED BY	
IN CHARGE	
DATE	


**LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY**

SR 710 NORTH STUDY ADVANCED CONCEPTUAL DESIGN		CONTRACT NO	
KEY MAP SHEET 1 OF 3		DRAWING NO	REV
		SCALE	NO SCALE
		SHEET NO	



**LEGEND**  
 BLUE BOXES INDICATE SHEETS WHERE THE PROPOSED LRT DESIGN IS WITHIN OR NEAR CALTRANS RIGHT-OF-WAY.




PRELIMINARY

ATTACHMENT H-2 KEY MAP 2 OF 3

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER

DESIGNED BY	
DRAWN BY	
CHECKED BY	
IN CHARGE	
DATE	

 **Metro** LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

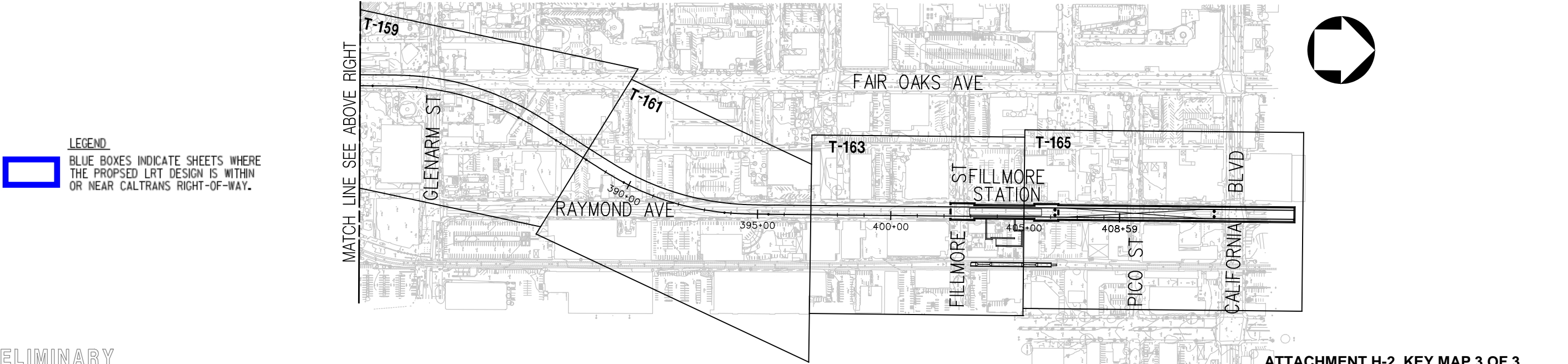
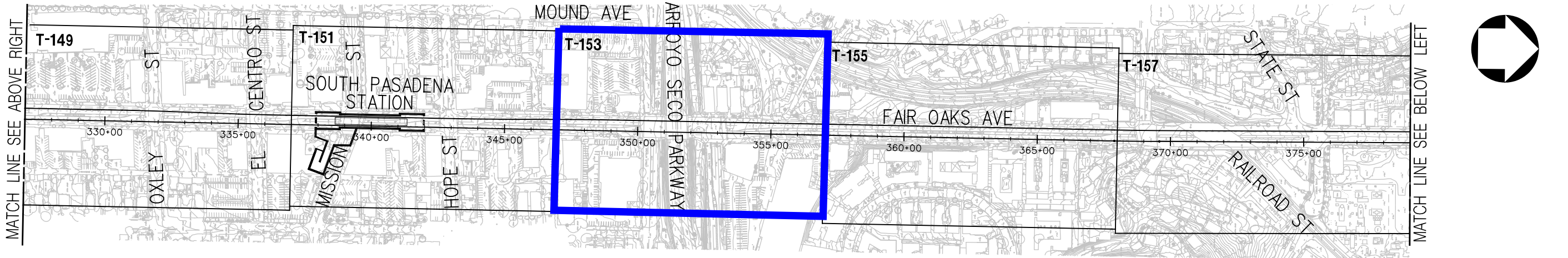
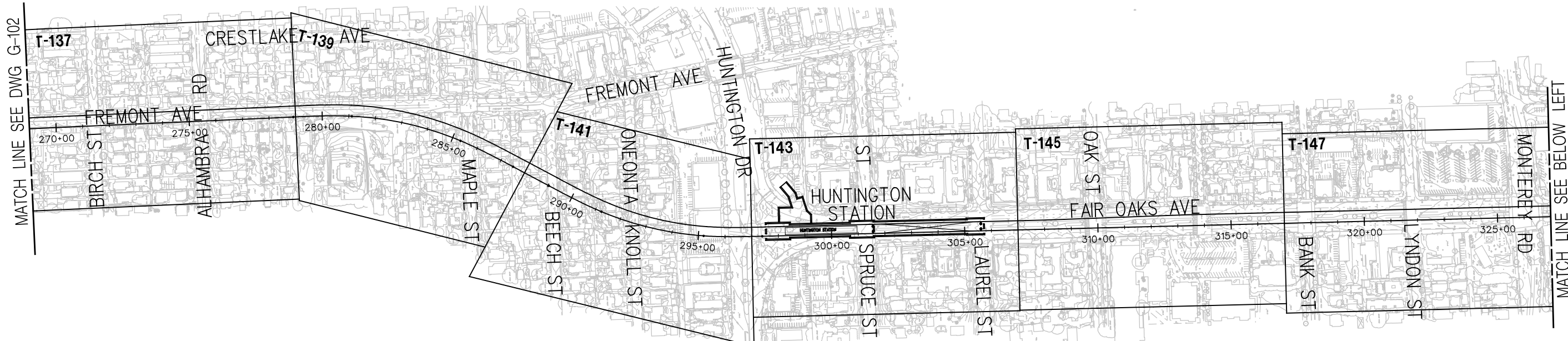
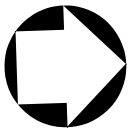
SR 710 NORTH STUDY  
 ADVANCED CONCEPTUAL DESIGN


KEY MAP  
 SHEET 2 OF 3

CONTRACT NO	
DRAWING NO	REV
SCALE	NO SCALE
SHEET NO	

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**LEGEND**  
 BLUE BOXES INDICATE SHEETS WHERE THE PROPOSED LRT DESIGN IS WITHIN OR NEAR CALTRANS RIGHT-OF-WAY.

MATCH LINE SEE BELOW LEFT

MATCH LINE SEE BELOW LEFT


MATCH LINE SEE ABOVE RIGHT

PRELIMINARY

ATTACHMENT H-2 KEY MAP 3 OF 3

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER

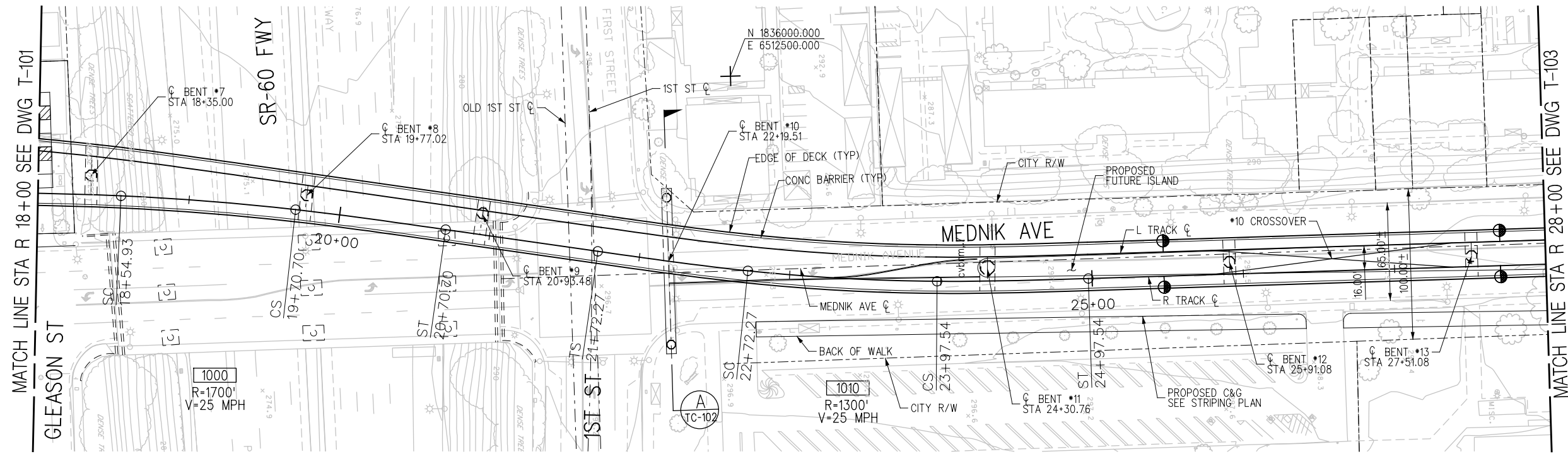
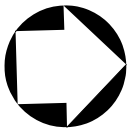
DESIGNED BY	
DRAWN BY	
CHECKED BY	
IN CHARGE	
DATE	

 **LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY**

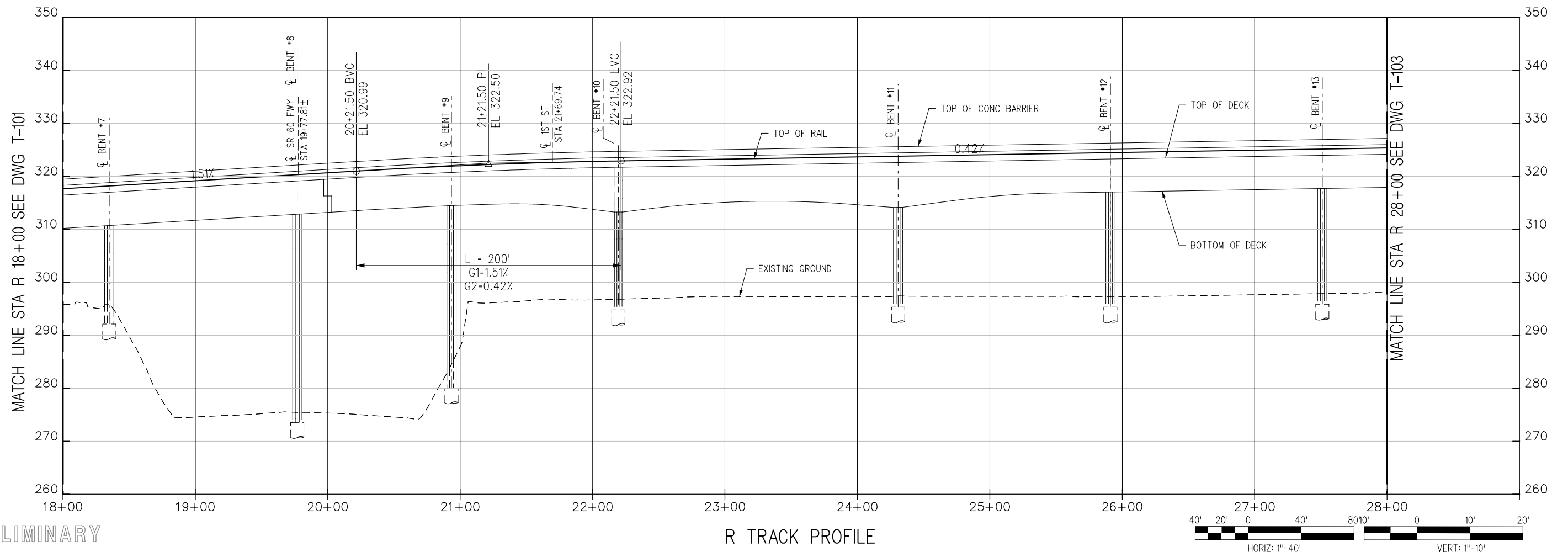
SR 710 NORTH STUDY  
 ADVANCED CONCEPTUAL DESIGN

KEY MAP  
 SHEET 3 OF 3

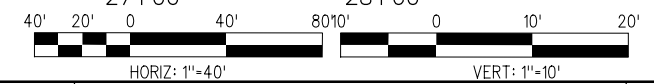
CONTRACT NO	
DRAWING NO	REV
SCALE	NO SCALE
SHEET NO	



PLAN



R TRACK PROFILE



PRELIMINARY

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER
-	2/7/14					
						METRO COMMENTS
						DESCRIPTION

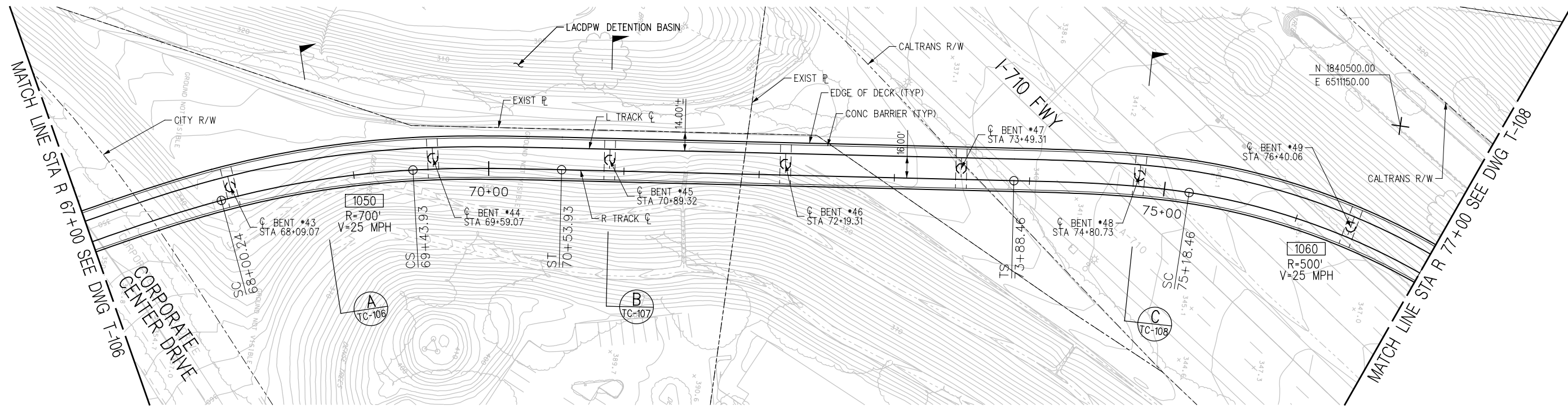
DESIGNED BY A. GRANDOV
DRAWN BY M. AL-MASHAT
CHECKED BY J. AL-MASHAT
IN CHARGE J. AL-MASHAT
DATE 8/12/13

**LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY**

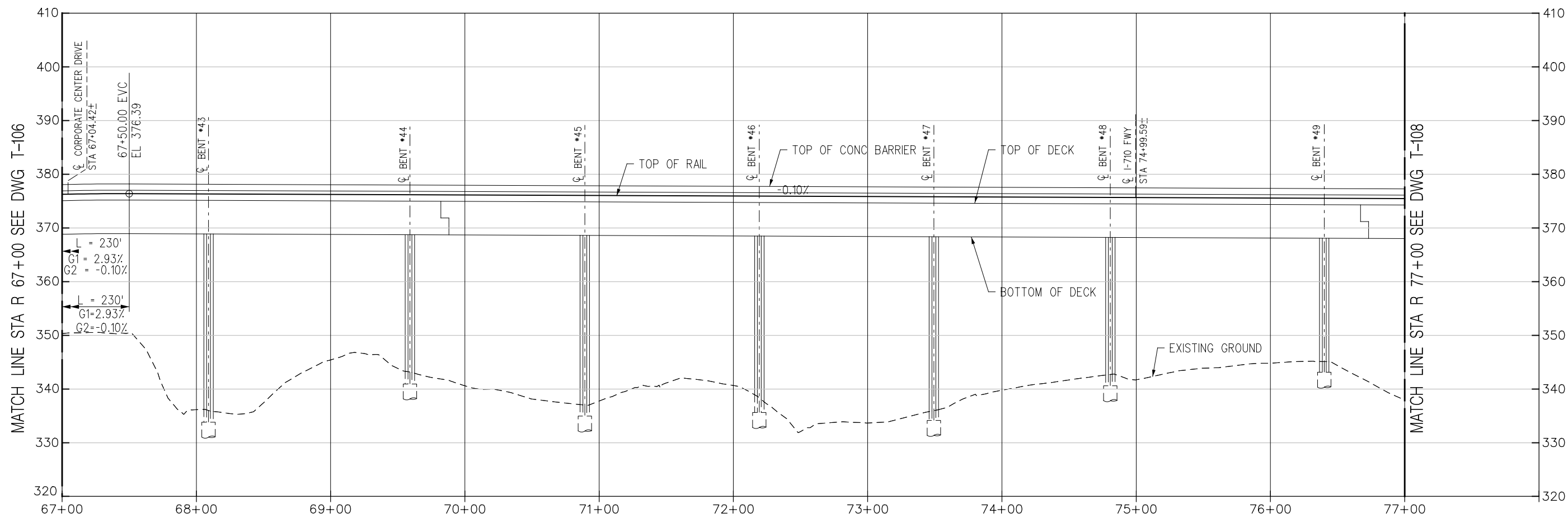
**ATTACHMENT H-2 SHEET 1 OF 19**

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SHEET NO	

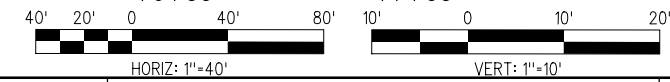
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PLAN



R TRACK PROFILE



PRELIMINARY

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY  
A. GRANDOV  
DRAWN BY  
M. AL-MASHAT  
CHECKED BY  
J. AL-MASHAT  
IN CHARGE  
J. AL-MASHAT  
DATE  
8/12/13

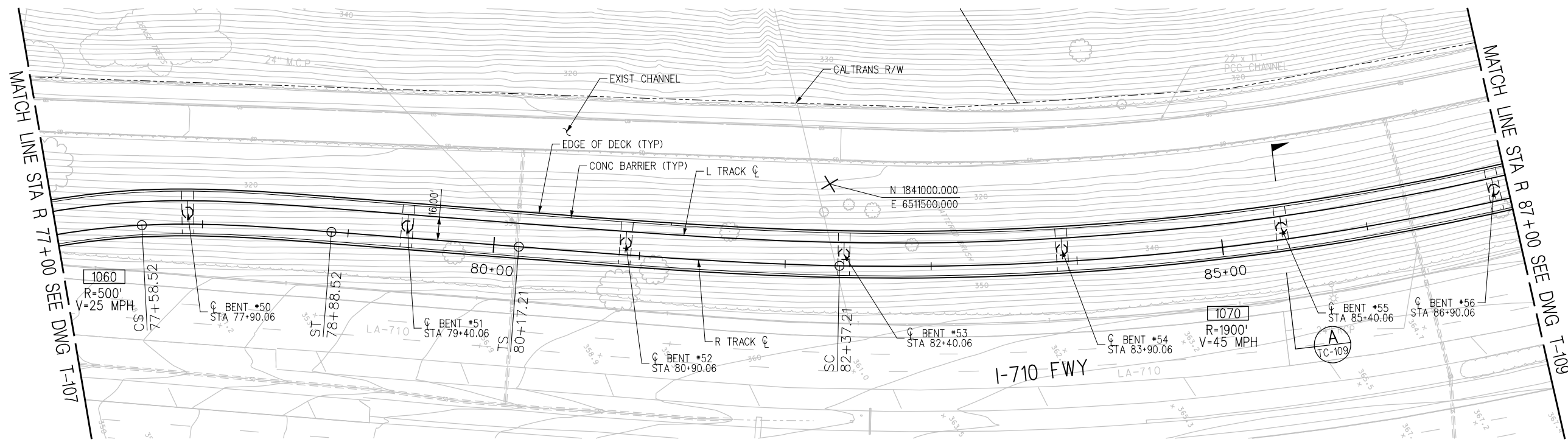


LOS ANGELES COUNTY  
METROPOLITAN TRANSPORTATION AUTHORITY

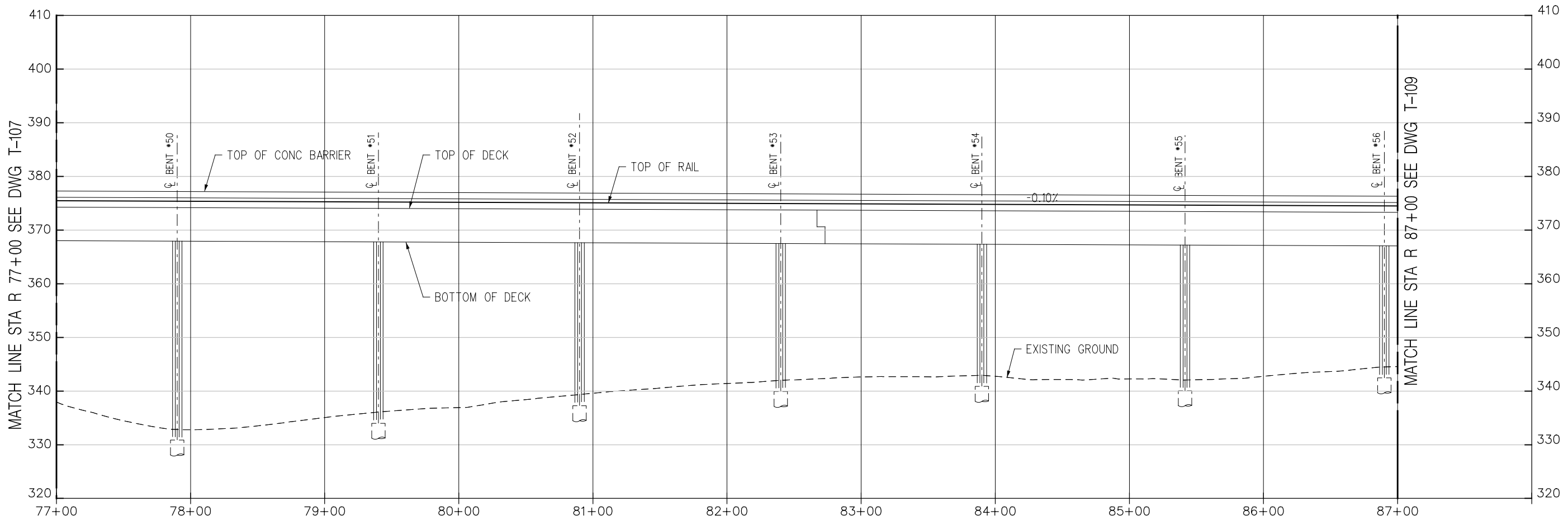
ATTACHMENT H-2 SHEET 2 OF 19

SR 710 NORTH STUDY  
ADVANCED CONCEPTUAL DESIGN  
TRACK ALIGNMENT  
PLAN AND PROFILE  
STA R 67+00 TO STA R 77+00

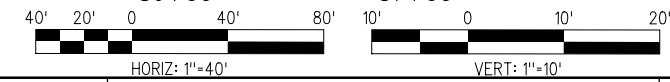
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DRAWING NO	REV
T-107	
SCALE	HORIZ: 1"=40' VERT: 1"=10'
SHEET NO	



PLAN



R TRACK PROFILE



PRELIMINARY

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY A. GRANDOV
DRAWN BY M. AL-MASHAT
CHECKED BY J. AL-MASHAT
IN CHARGE J. AL-MASHAT
DATE 8/12/13

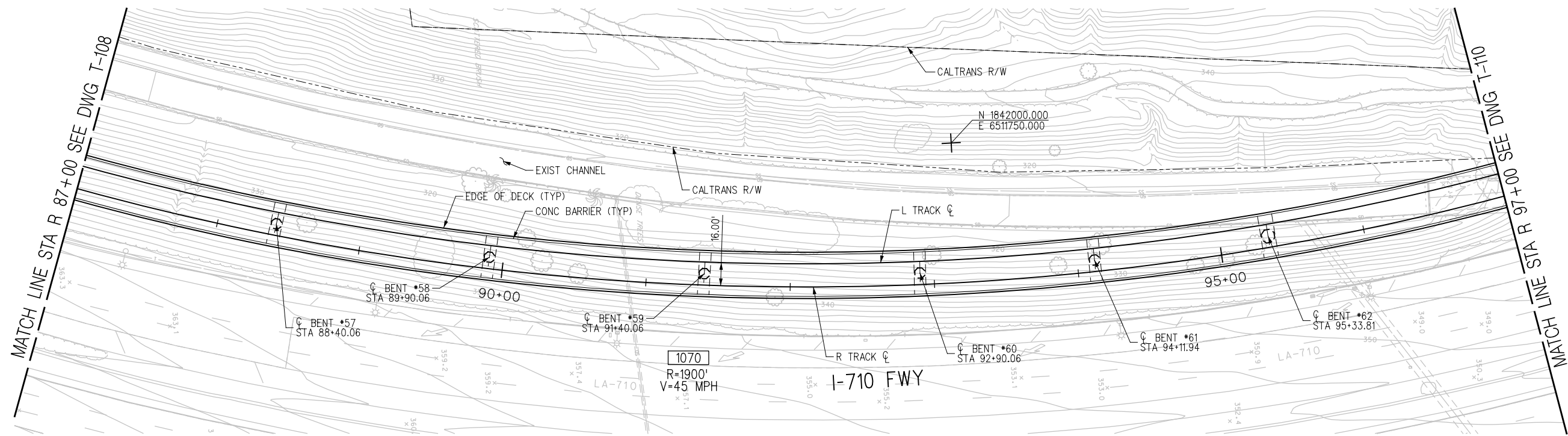
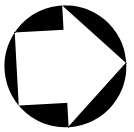


ATTACHMENT H-2 SHEET 3 OF 19

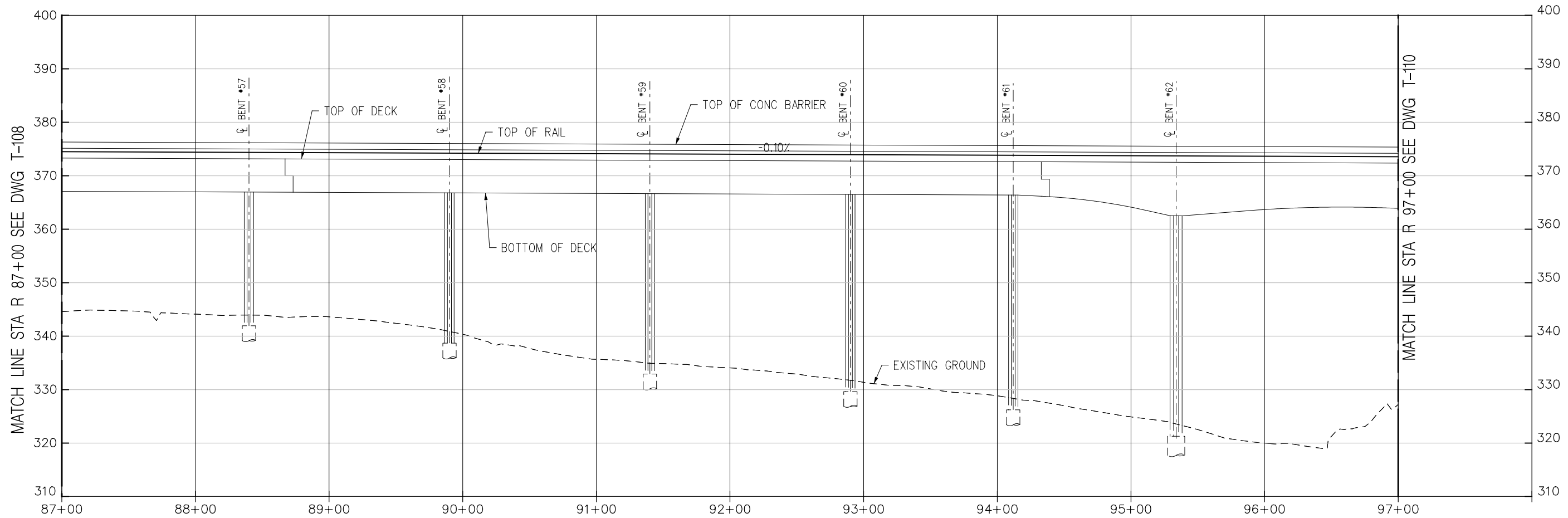
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ADVANCED CONCEPTUAL DESIGN  
TRACK ALIGNMENT  
PLAN AND PROFILE  
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CONTRACT NO	
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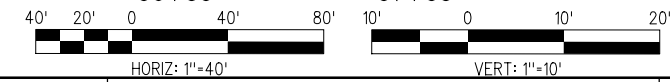
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PLAN



R TRACK PROFILE



PRELIMINARY

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY  
A. GRANDOV  
DRAWN BY  
M. AL-MASHAT  
CHECKED BY  
J. AL-MASHAT  
IN CHARGE  
J. AL-MASHAT  
DATE  
8/12/13

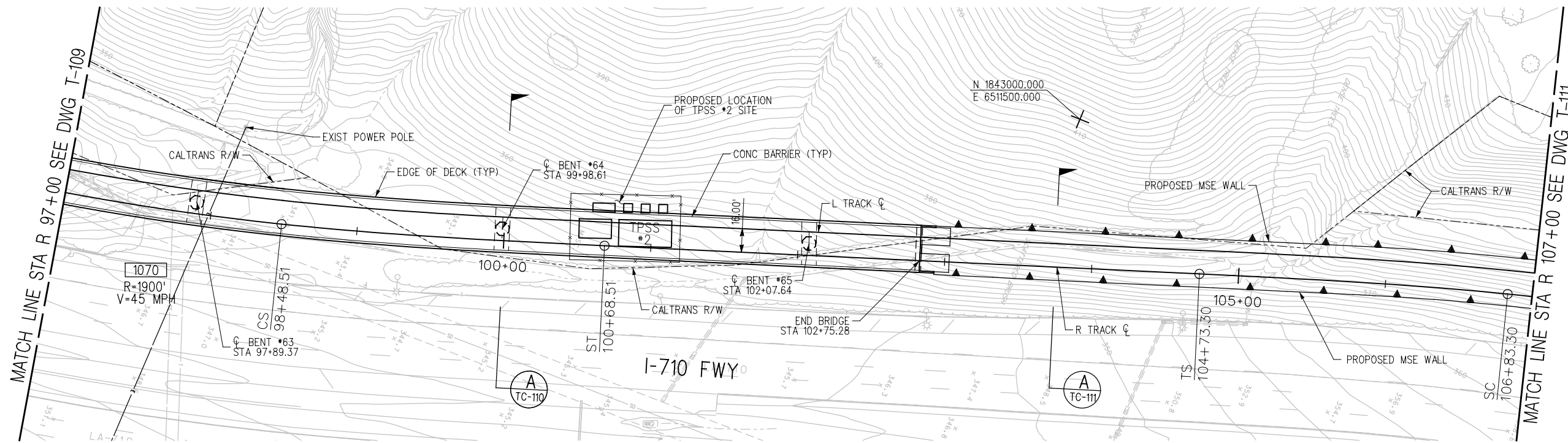


LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

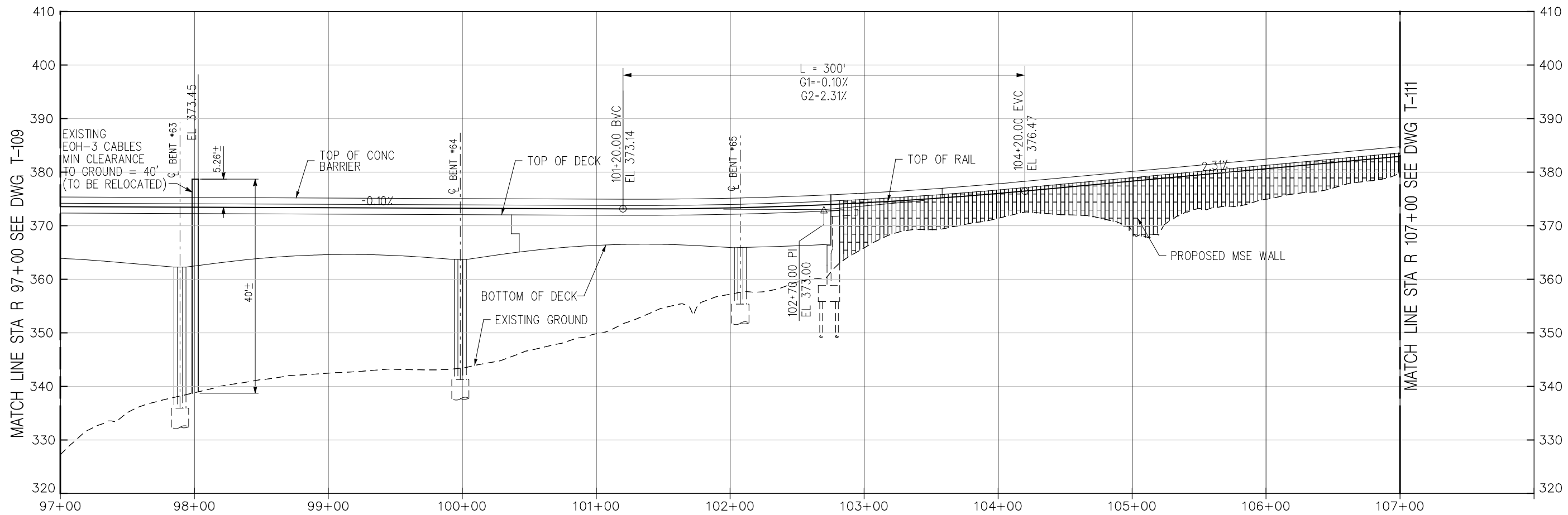
ATTACHMENT H-2 SHEET 4 OF 19

SR 710 NORTH STUDY  
ADVANCED CONCEPTUAL DESIGN  
TRACK ALIGNMENT  
PLAN AND PROFILE  
STA R 87+00 TO STA R 97+00

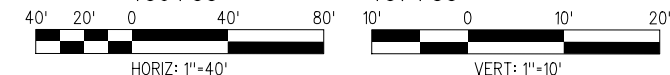
CONTRACT NO	
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SCALE HORIZ: 1"=40' VERT: 1"=10'	SHEET NO



PLAN



R TRACK PROFILE



PRELIMINARY

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY  
A. GRANDOV  
DRAWN BY  
M. AL-MASHAT  
CHECKED BY  
J. AL-MASHAT  
IN CHARGE  
J. AL-MASHAT  
DATE  
8/12/13

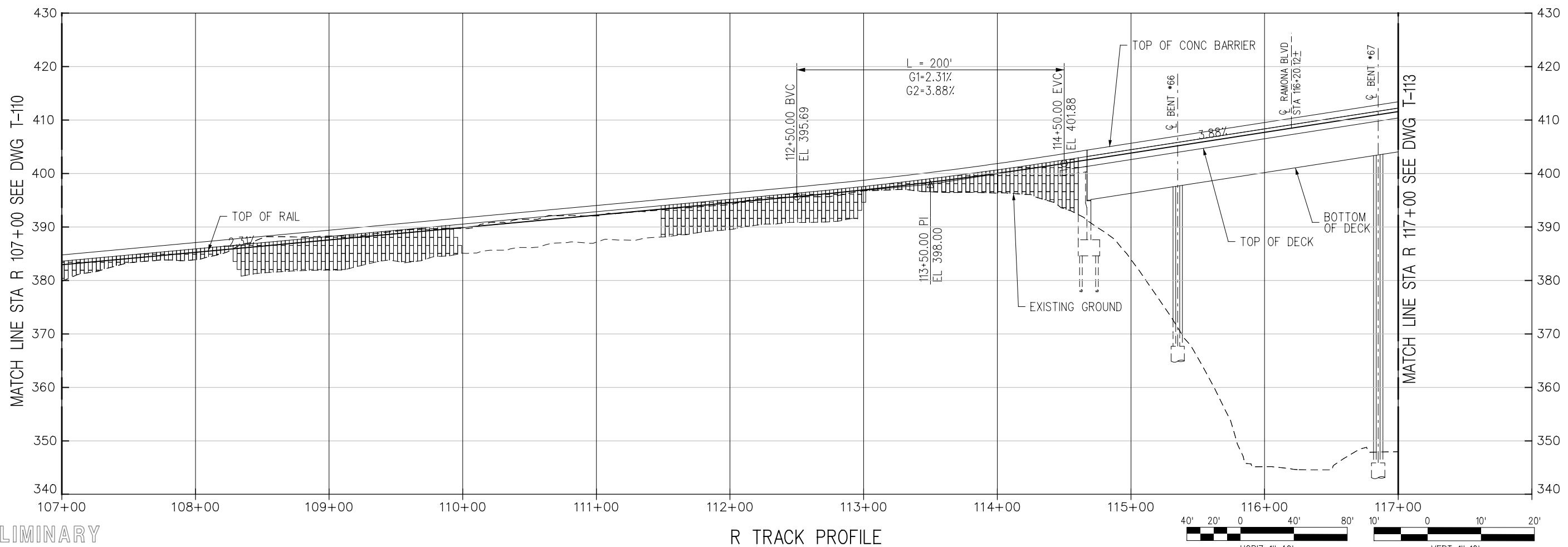
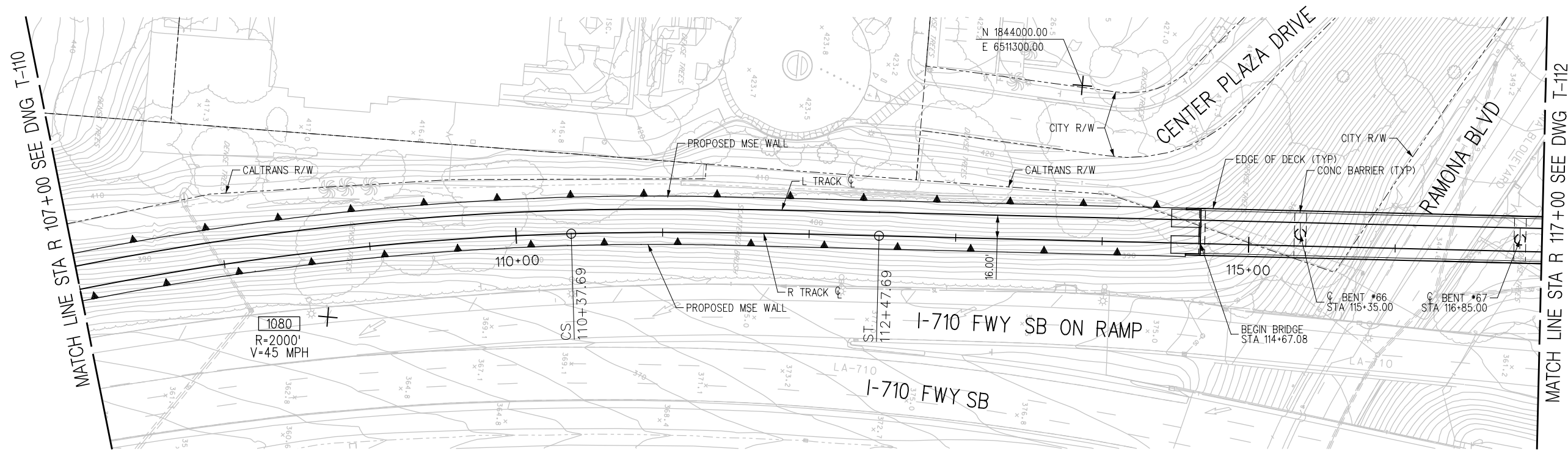
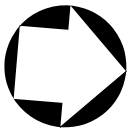


LOS ANGELES COUNTY  
METROPOLITAN TRANSPORTATION AUTHORITY

ATTACHMENT H-2 SHEET 5 OF 19

SR 710 NORTH STUDY  
ADVANCED CONCEPTUAL DESIGN  
TRACK ALIGNMENT  
PLAN AND PROFILE  
STA R 97+00 TO STA R 107+00

CONTRACT NO	
DRAWING NO T-110	REV
SCALE HORIZ: 1"=40' VERT: 1"=10'	
SHEET NO	



PRELIMINARY

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER

DESIGNED BY A. GRANDOV
DRAWN BY M. AL-MASHAT
CHECKED BY J. AL-MASHAT
IN CHARGE J. AL-MASHAT
DATE 8/12/13

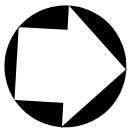
**LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY**

**ATTACHMENT H-2 SHEET 6 OF 19**

SR 710 NORTH STUDY  
 ADVANCED CONCEPTUAL DESIGN  
 TRACK ALIGNMENT  
 PLAN AND PROFILE  
 STA R 107+00 TO STA R 117+00

CONTRACT NO	
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MATCH LINE STA R 117+00 SEE DWG T-111

MATCH LINE STA R 128+00 SEE DWG T-114



PLAN

PRELIMINARY



THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY A. GRANDOV
DRAWN BY M. AL-MASHAT
CHECKED BY J. AL-MASHAT
IN CHARGE J. AL-MASHAT
DATE 8/12/13



LOS ANGELES COUNTY  
METROPOLITAN TRANSPORTATION AUTHORITY

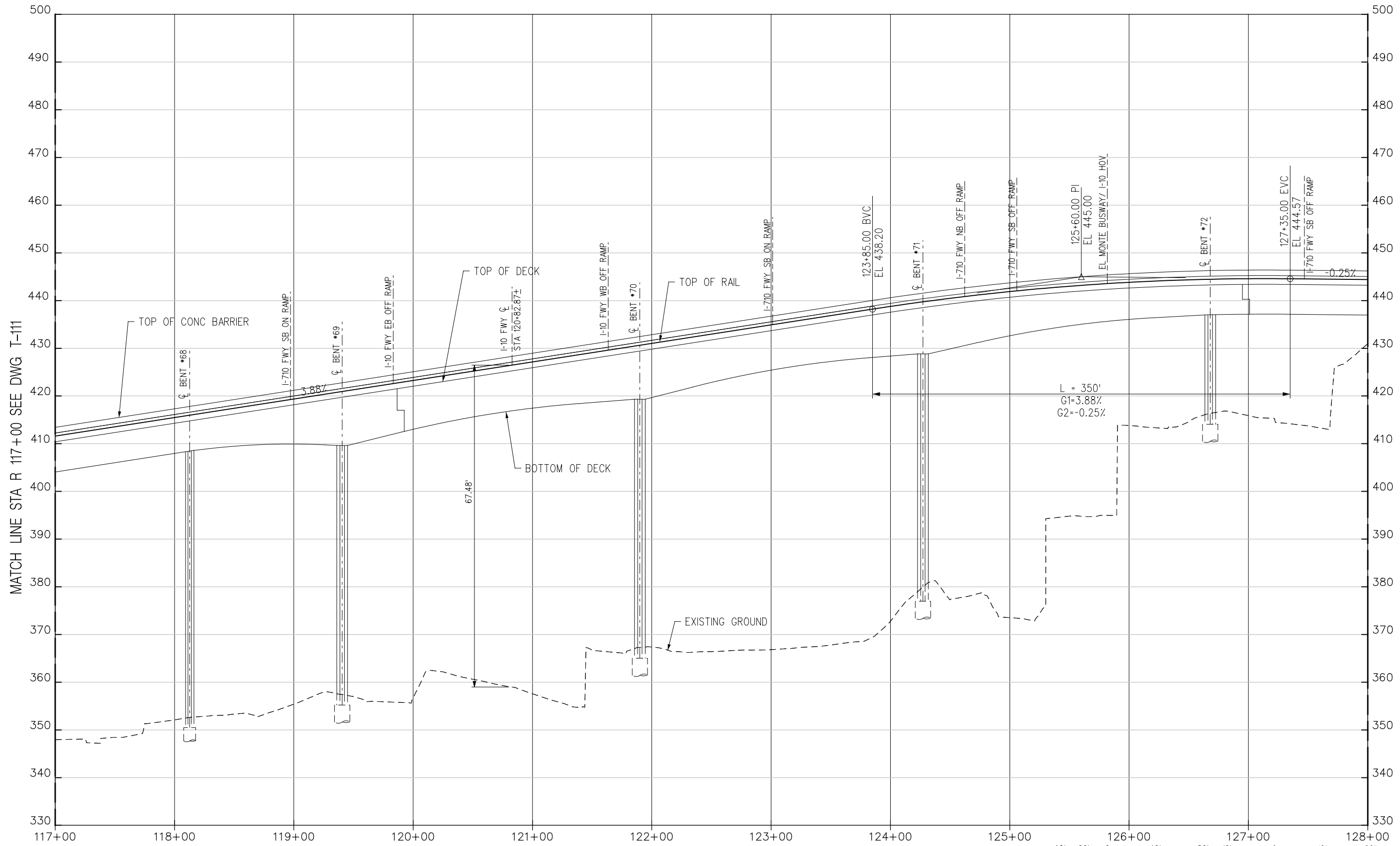
ATTACHMENT H-2 SHEET 7 OF 19

SR 710 NORTH STUDY  
ADVANCED CONCEPTUAL DESIGN  
TRACK ALIGNMENT  
PLAN  
STA R 117+00 TO STA R 128+00

CONTRACT NO	
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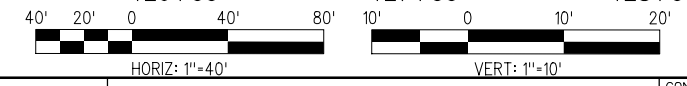
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PRELIMINARY

R TRACK PROFILE



THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	DESCRIPTION

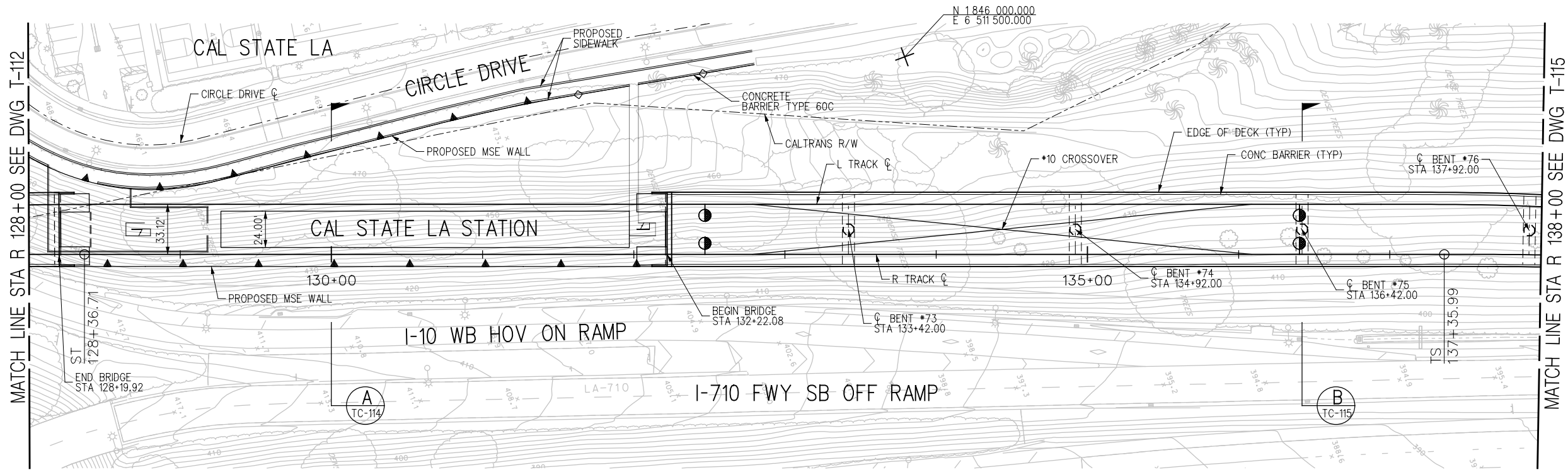
DESIGNED BY A. GRANDOV
DRAWN BY M. AL-MASHAT
CHECKED BY J. AL-MASHAT
IN CHARGE J. AL-MASHAT
DATE 8/12/13

**LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY**  
**ATTACHMENT H-2 SHEET 8 OF 19**

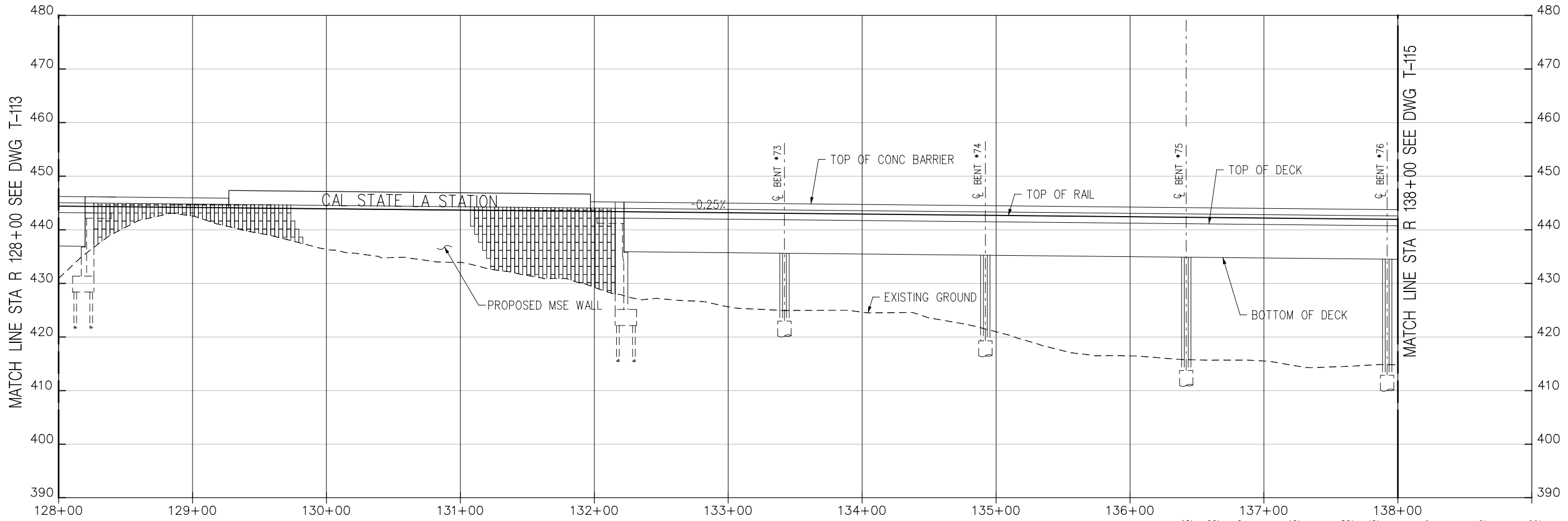
**SR 710 NORTH STUDY**  
**ADVANCED CONCEPTUAL DESIGN**  
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**PROFILE**  
**STA R 117+00 TO STA R 128+00**

CONTRACT NO	
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PLAN



R TRACK PROFILE



PRELIMINARY

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER

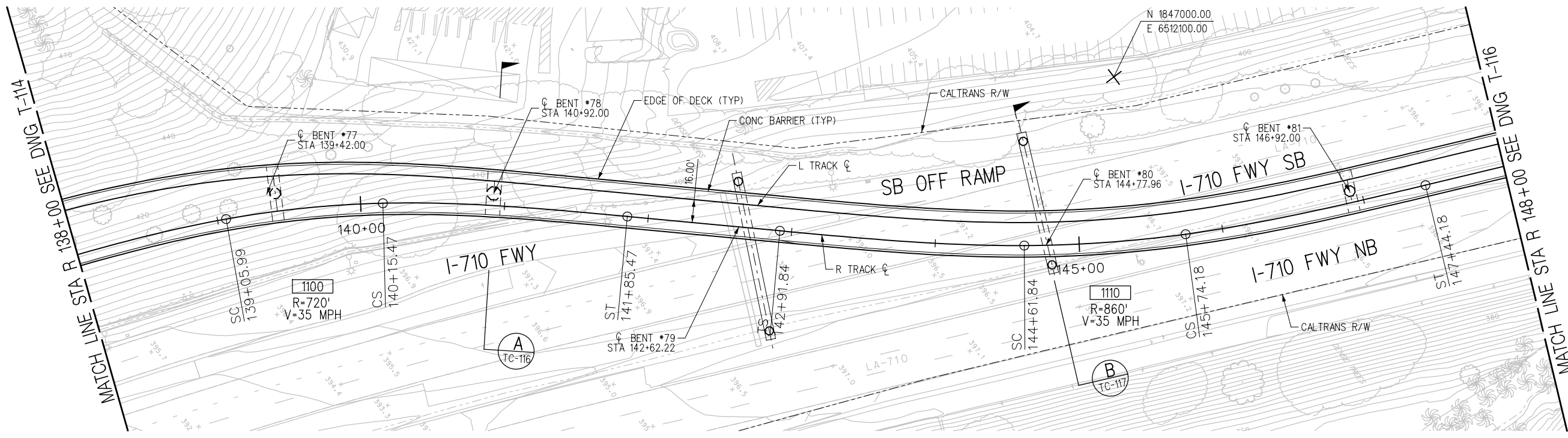
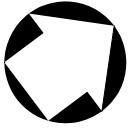
DESIGNED BY A. GRANDOV
DRAWN BY M. AL-MASHAT
CHECKED BY J. AL-MASHAT
IN CHARGE J. AL-MASHAT
DATE 8/12/13

**LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY**  
**ATTACHMENT H-2 SHEET 9 OF 19**

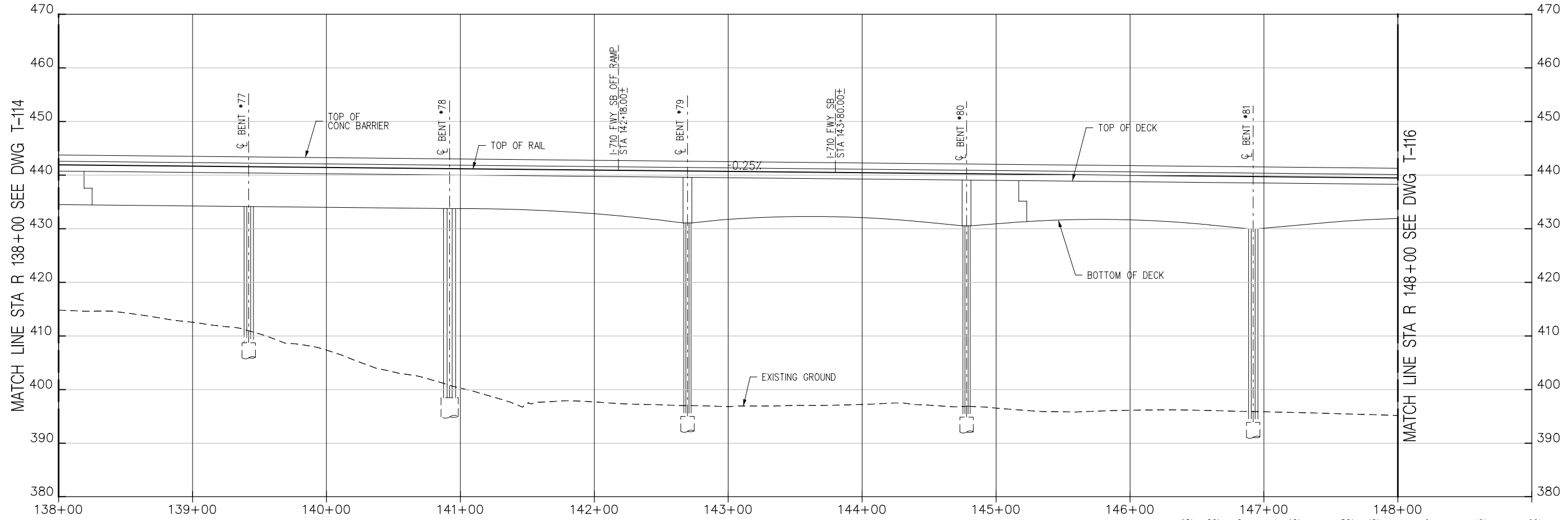
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**ADVANCED CONCEPTUAL DESIGN**  
**TRACK ALIGNMENT**  
**PLAN AND PROFILE**  
**STA R 128+00 TO STA R 138+00**

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SHEET NO	

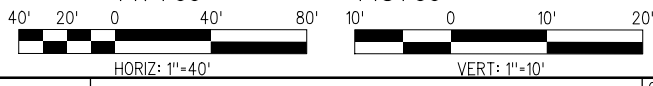
8/28/2013 3:15:03 PM USER:almashatm Plot Driver= M:\HALF-BW-PDF.plt;g Pentable= M:\HALF-BW.plt;g



PLAN



R TRACK PROFILE



PRELIMINARY

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.						
REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER

DESIGNED BY A. GRANDOV
DRAWN BY M. AL-MASHAT
CHECKED BY J. AL-MASHAT
IN CHARGE J. AL-MASHAT
DATE 8/12/13

**LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY**  
**ATTACHMENT H-2 SHEET 10 OF 19**

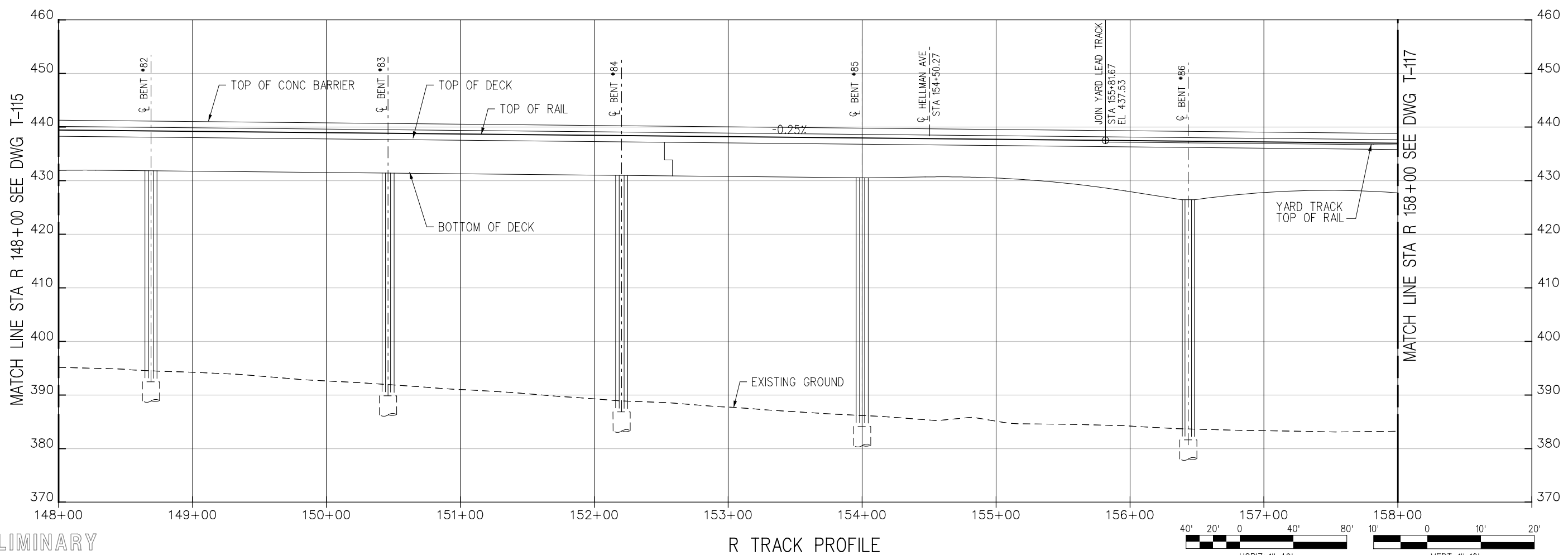
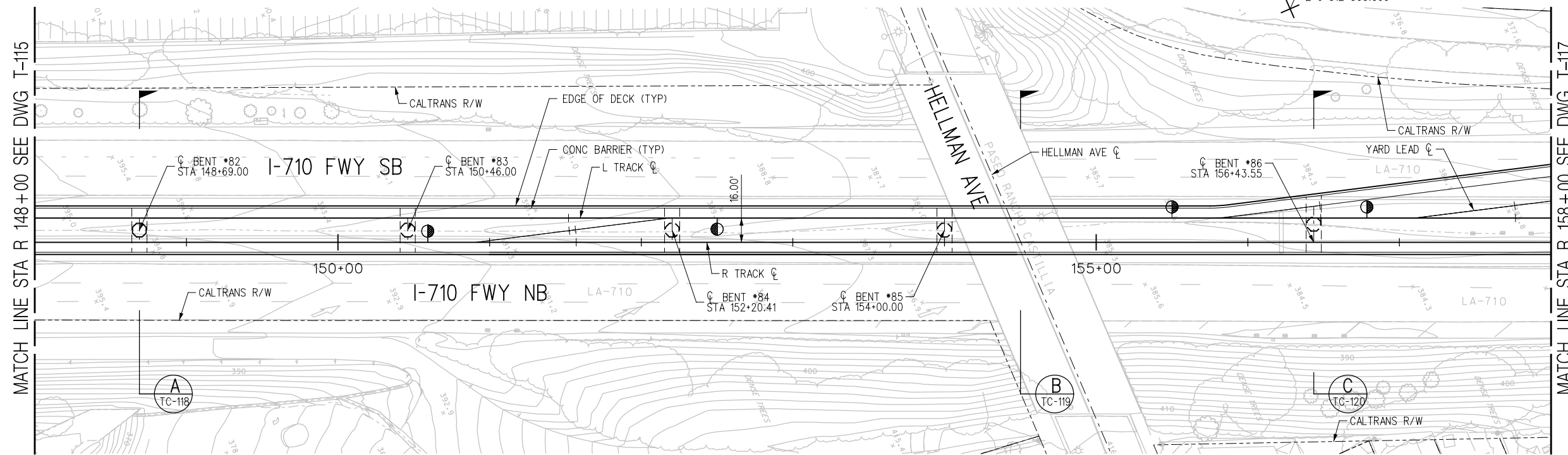
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**ADVANCED CONCEPTUAL DESIGN**  
**TRACK ALIGNMENT**  
**PLAN AND PROFILE**  
**STA R 138+00 TO STA R 148+00**

CONTRACT NO	
DRAWING NO T-115	REV
SCALE HORIZ: 1"=40' VERT: 1"=10'	
SHEET NO	

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N 1848 000.000  
E 6 512 500.000



PRELIMINARY

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REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER

DESIGNED BY A. GRANDOV
DRAWN BY M. AL-MASHAT
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IN CHARGE J. AL-MASHAT
DATE 8/12/13

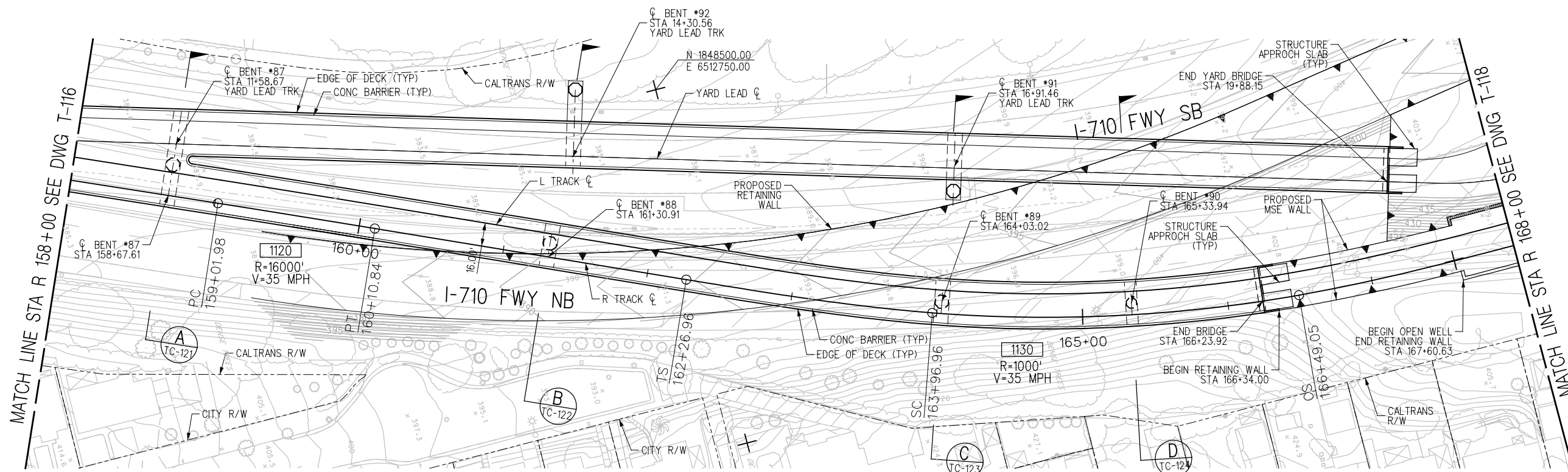

**LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY**

**ATTACHMENT H-2 SHEET 11 OF 19**

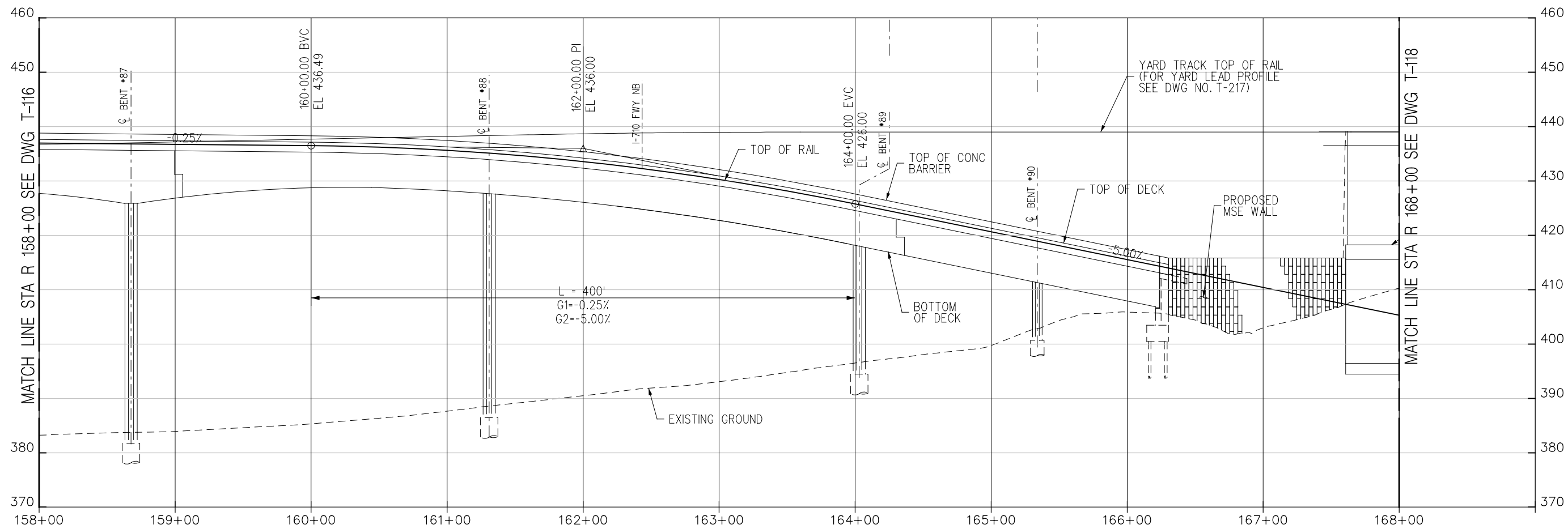
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**ADVANCED CONCEPTUAL DESIGN**  
**TRACK ALIGNMENT**  
**PLAN AND PROFILE**  
**STA R 148+00 TO STA R 158+00**

CONTRACT NO	
DRAWING NO T-116	REV
SCALE HORIZ: 1"=40' VERT: 1"=10'	SHEET NO

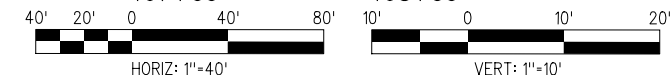
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PLAN



R TRACK PROFILE



PRELIMINARY

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION
-	2/7/14						METRO COMMENTS

DESIGNED BY A. GRANDOV
DRAWN BY M. AL-MASHAT
CHECKED BY J. AL-MASHAT
IN CHARGE J. AL-MASHAT
DATE 8/12/13



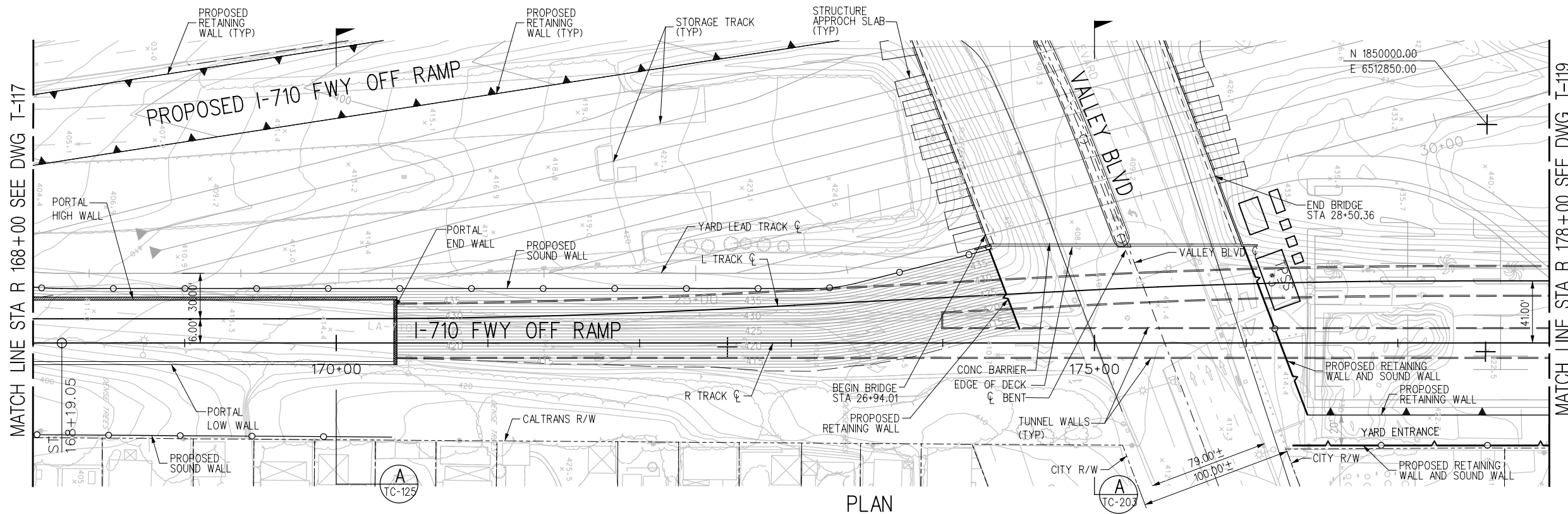
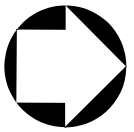
LOS ANGELES COUNTY  
METROPOLITAN TRANSPORTATION AUTHORITY

ATTACHMENT H-2 SHEET 12 OF 19

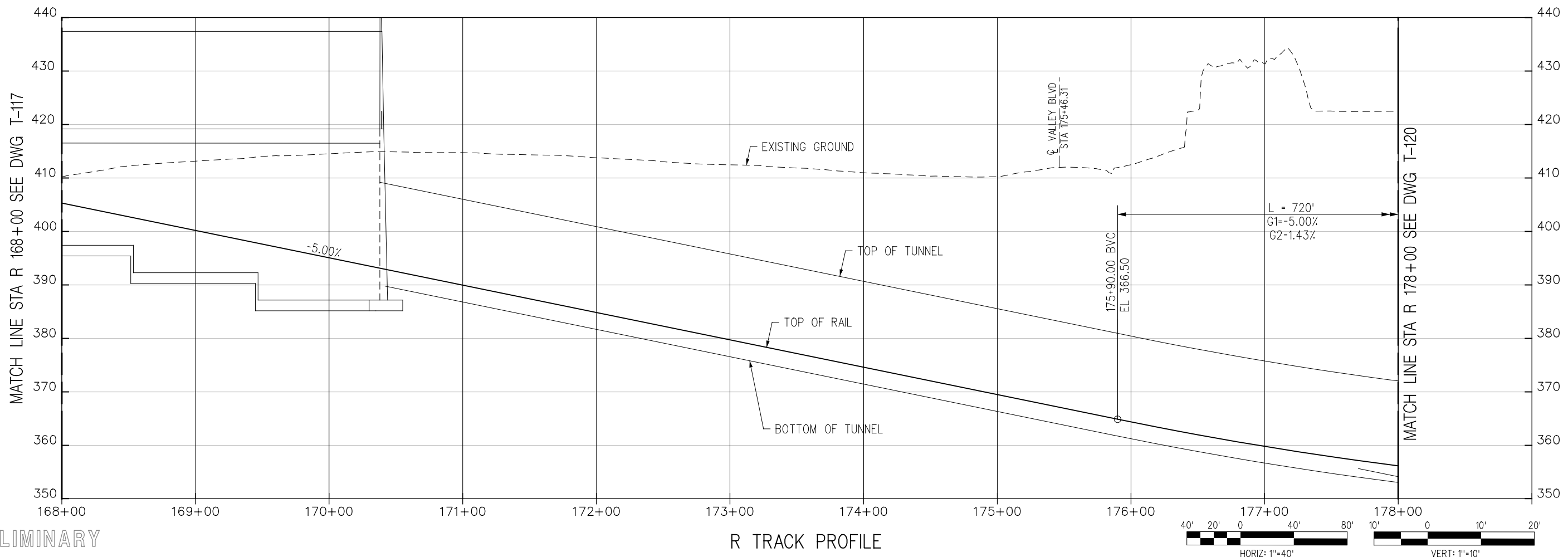
SR 710 NORTH STUDY  
ADVANCED CONCEPTUAL DESIGN  
TRACK ALIGNMENT  
PLAN AND PROFILE  
STA R 158+00 TO STA R 168+00

CONTRACT NO	
DRAWING NO T-117	REV
SCALE HORIZ: 1"=40' VERT: 1"=10'	
SHEET NO	

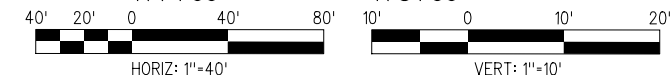
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 Pentable: M:\AL\HALF\_BW.plt



PLAN



R TRACK PROFILE



PRELIMINARY

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REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION
-	2/7/14						METRO COMMENTS

DESIGNED BY A. GRANDOV
DRAWN BY M. AL-MASHAT
CHECKED BY J. AL-MASHAT
IN CHARGE J. AL-MASHAT
DATE 8/12/13

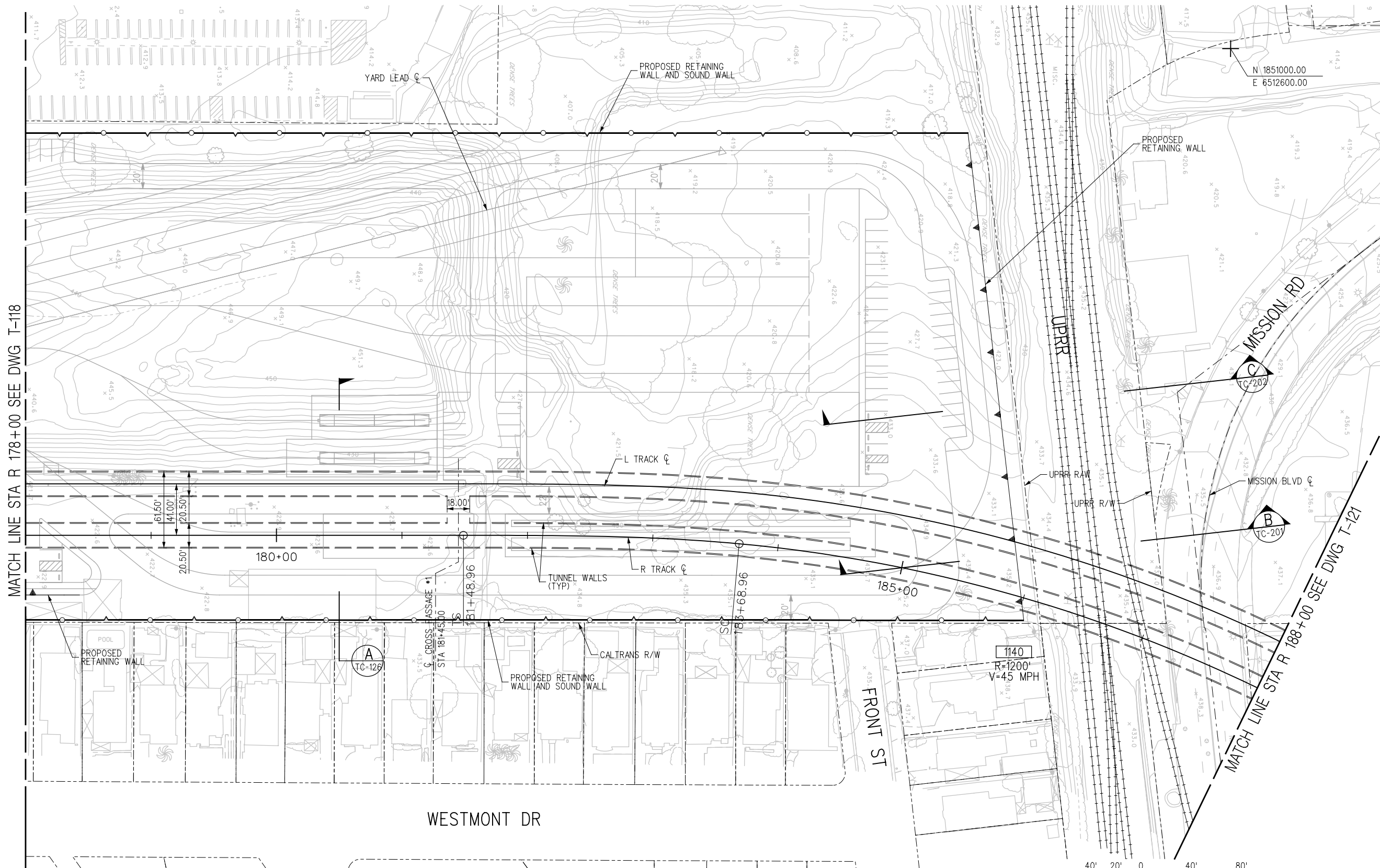
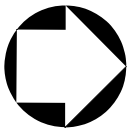


LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

ATTACHMENT H-2 SHEET 13 OF 19

SR 710 NORTH STUDY  
 ADVANCED CONCEPTUAL DESIGN  
 TRACK ALIGNMENT  
 PLAN AND PROFILE  
 STA R 168+00 TO STA R 178+00

CONTRACT NO	
DRAWING NO T-118	REV
SCALE HORIZ: 1"=40' VERT: 1"=10'	
SHEET NO	

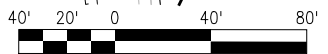


MATCH LINE STA R 178+00 SEE DWG T-118

MATCH LINE STA R 188+00 SEE DWG T-121

PRELIMINARY

PLAN



REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

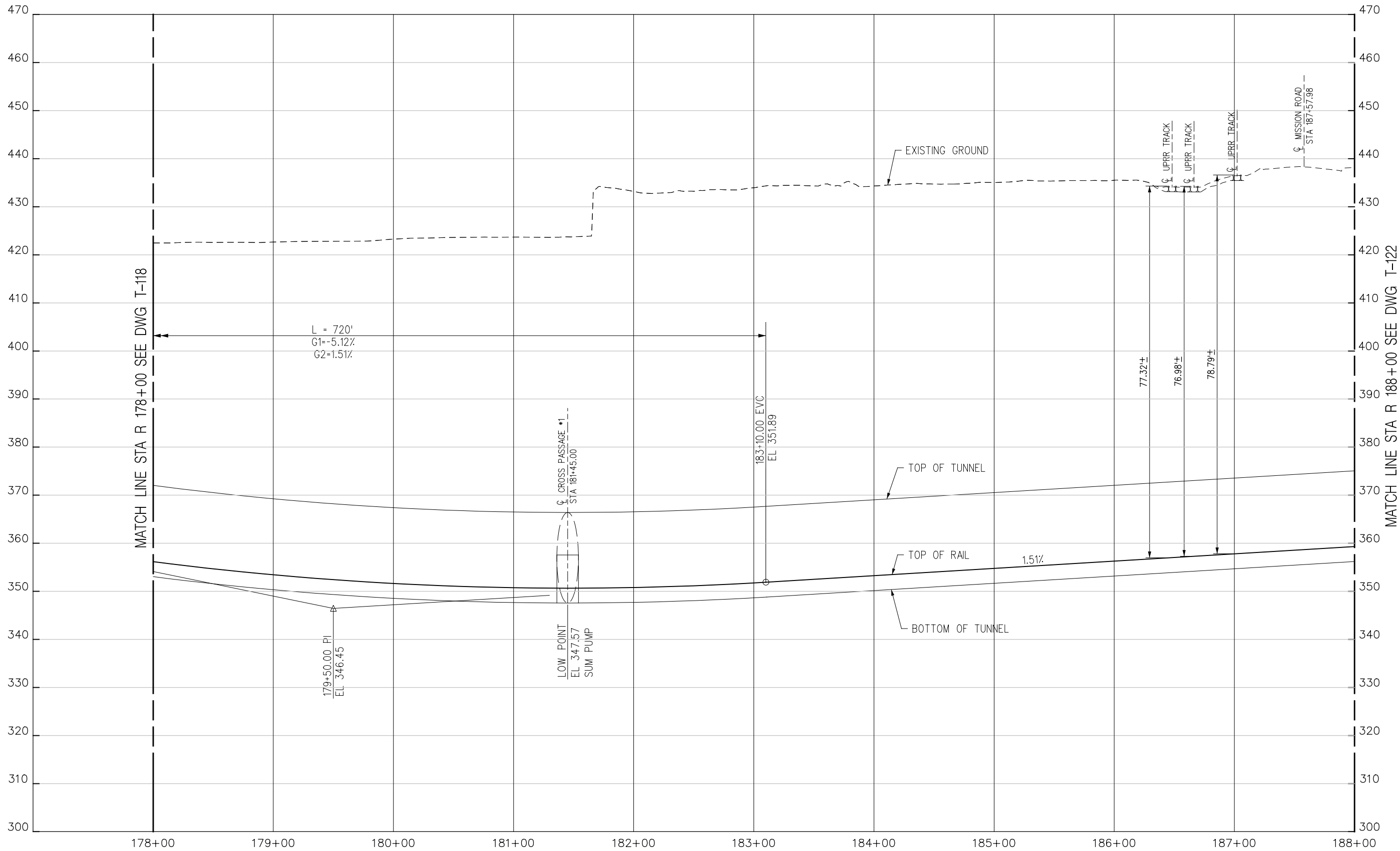
DESIGNED BY A. GRANDOV
DRAWN BY M. AL-MASHAT
CHECKED BY J. AL-MASHAT
IN CHARGE J. AL-MASHAT
DATE 8/12/13

**LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY**  
**ATTACHMENT H-2 SHEET 14 OF 19**

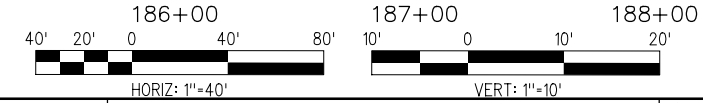
**SR 710 NORTH STUDY**  
**ADVANCED CONCEPTUAL DESIGN**  
**TRACK ALIGNMENT**  
**PLAN**  
**STA R 178+00 TO STA R 188+00**

CONTRACT NO	
DRAWING NO T-119	REV
SCALE 1" = 40'	SHEET NO

8/8/2013 3:15:58 PM USER:almashat ...\\track\Sheets\710G\_AC-T-119.plt Plot Driver: M:\HALF\_BW\_Plot.pltG Pentable: M:\HALF\_BW.plt



R TRACK PROFILE



PRELIMINARY

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REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY  
A. GRANDOV  
DRAWN BY  
M. AL-MASHAT  
CHECKED BY  
J. AL-MASHAT  
IN CHARGE  
J. AL-MASHAT  
DATE  
8/12/13



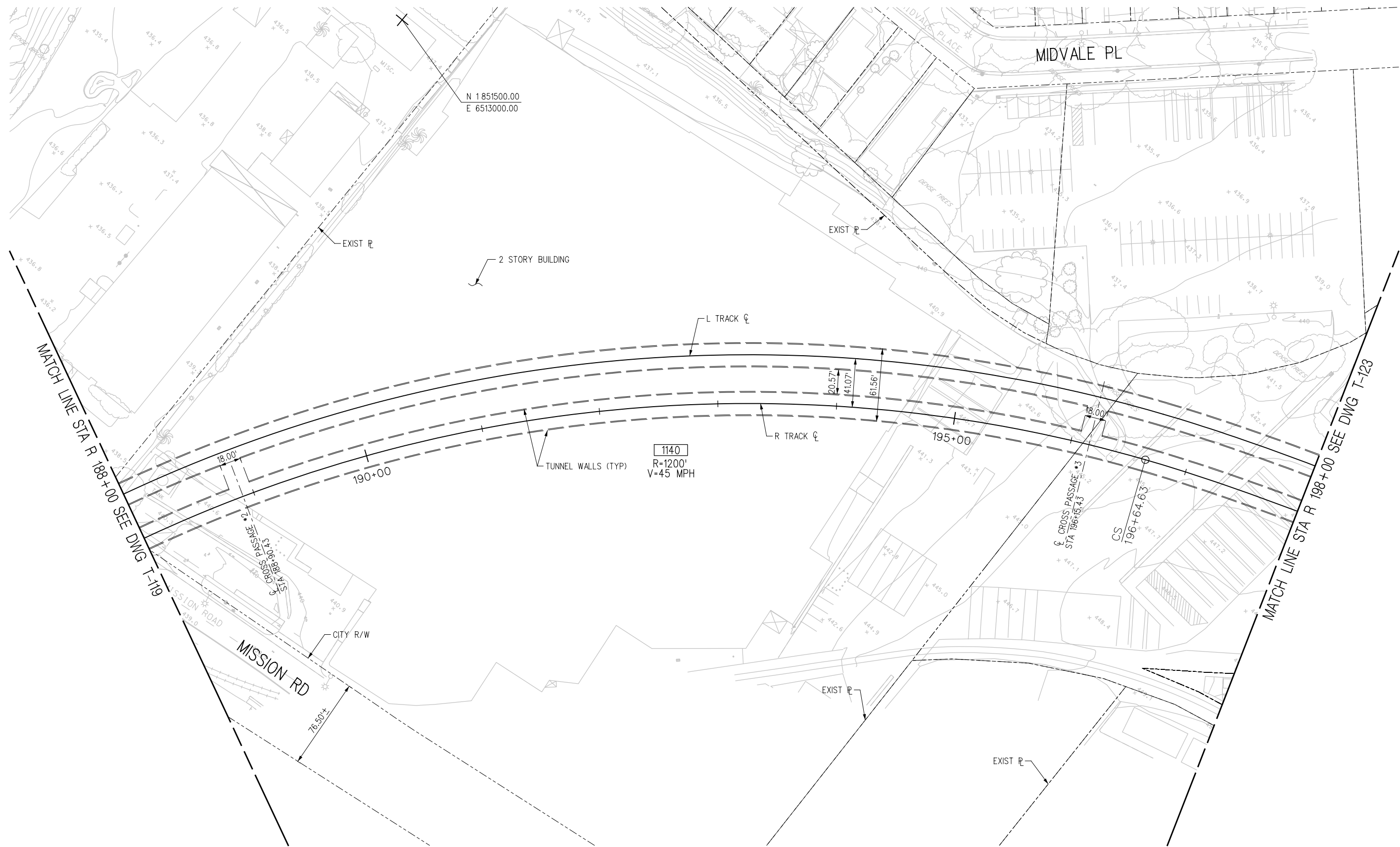
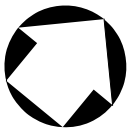
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

ATTACHMENT H-2 SHEET 15 OF 19

SR 710 NORTH STUDY  
ADVANCED CONCEPTUAL DESIGN  
TRACK ALIGNMENT  
PROFILE  
STA R 178+00 TO STA R 188+00

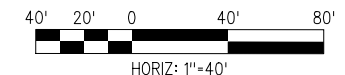
CONTRACT NO	
DRAWING NO T-120	REV
SCALE HORIZ: 1"=40' VERT: 1"=10'	SHEET NO





PRELIMINARY

PLAN



THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY A. GRANDOV
DRAWN BY M. AL-MASHAT
CHECKED BY J. AL-MASHAT
IN CHARGE J. AL-MASHAT
DATE 8/12/13

**M** Metro

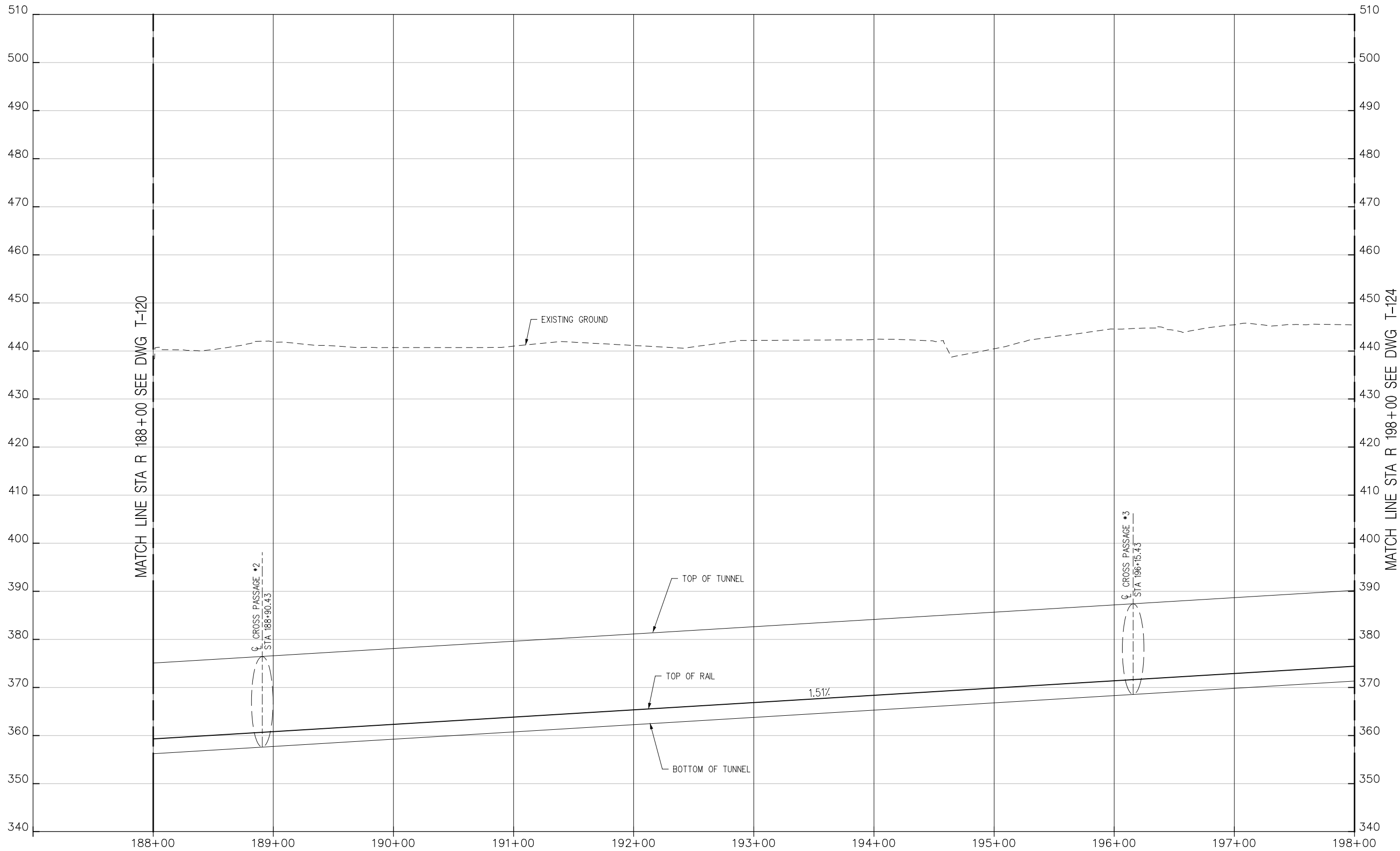
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

**ATTACHMENT H-2 SHEET 16 OF 19**

SR 710 NORTH STUDY  
ADVANCED CONCEPTUAL DESIGN  
TRACK ALIGNMENT  
PLAN  
STA R 188+00 TO STA R 198+00

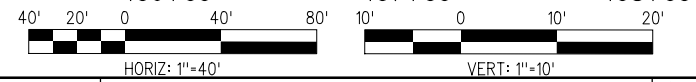
CONTRACT NO	
DRAWING NO	T-121
SCALE	1' = 40'
SHEET NO	

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PRELIMINARY

R TRACK PROFILE



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REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY  
A. GRANDOV  
DRAWN BY  
M. AL-MASHAT  
CHECKED BY  
J. AL-MASHAT  
IN CHARGE  
J. AL-MASHAT  
DATE  
8/12/13



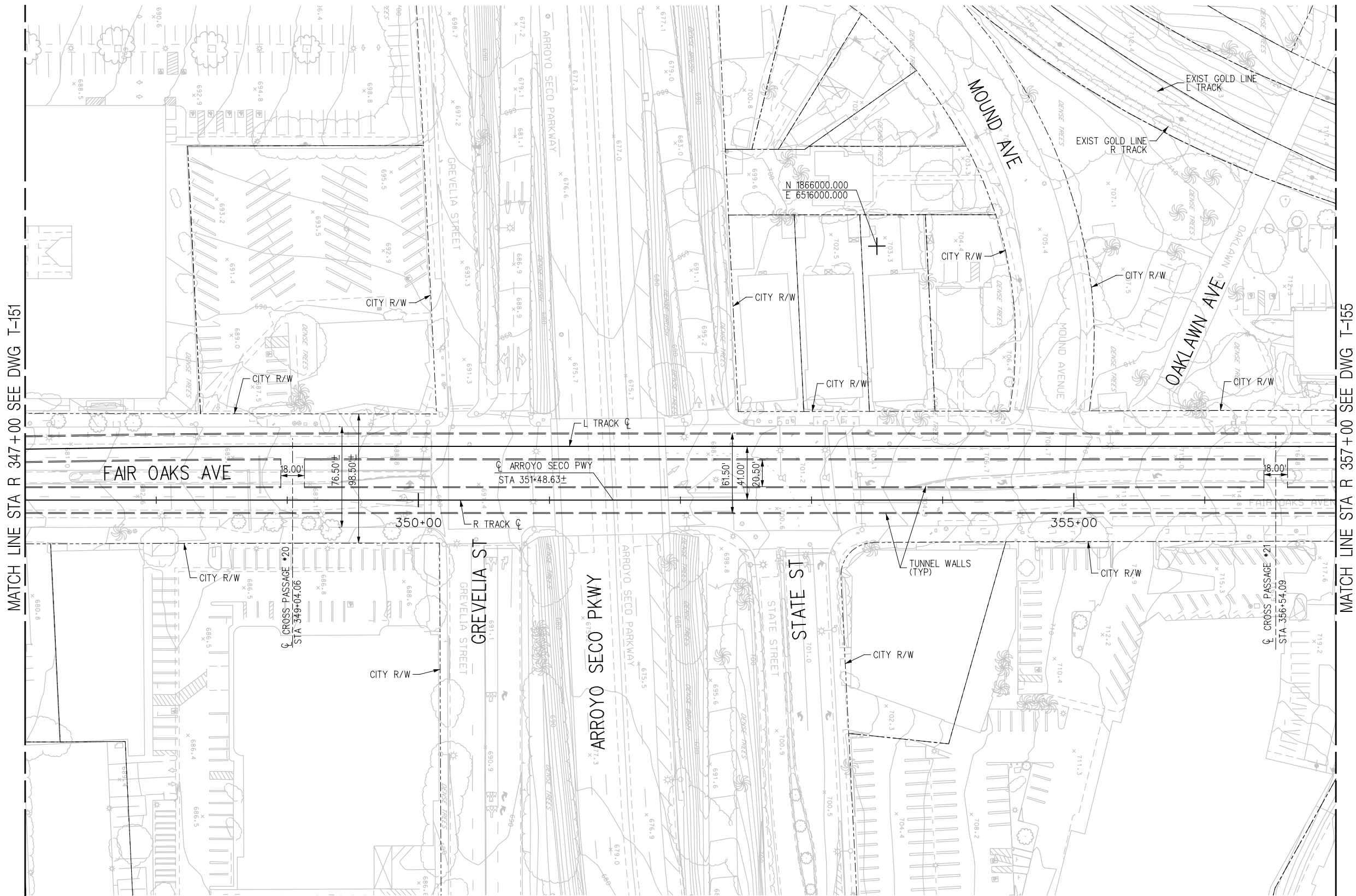
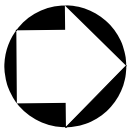
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

ATTACHMENT H-2 SHEET 17 OF 19

SR 710 NORTH STUDY  
ADVANCED CONCEPTUAL DESIGN  
TRACK ALIGNMENT  
PROFILE  
STA R 188+00 TO STA R 198+00

CONTRACT NO	
DRAWING NO T-122	REV
SCALE HORIZ: 1"=40' VERT: 1"=10'	
SHEET NO	

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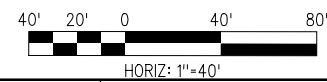


MATCH LINE STA R 347+00 SEE DWG T-151

MATCH LINE STA R 357+00 SEE DWG T-155

PRELIMINARY

PLAN



THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED BY THE TAXES OF THE CITIZENS OF LOS ANGELES COUNTY AND OF THE STATE OF CALIFORNIA.

REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY A. GRANDOV
DRAWN BY M. AL-MASHAT
CHECKED BY J. AL-MASHAT
IN CHARGE J. AL-MASHAT
DATE 8/12/13

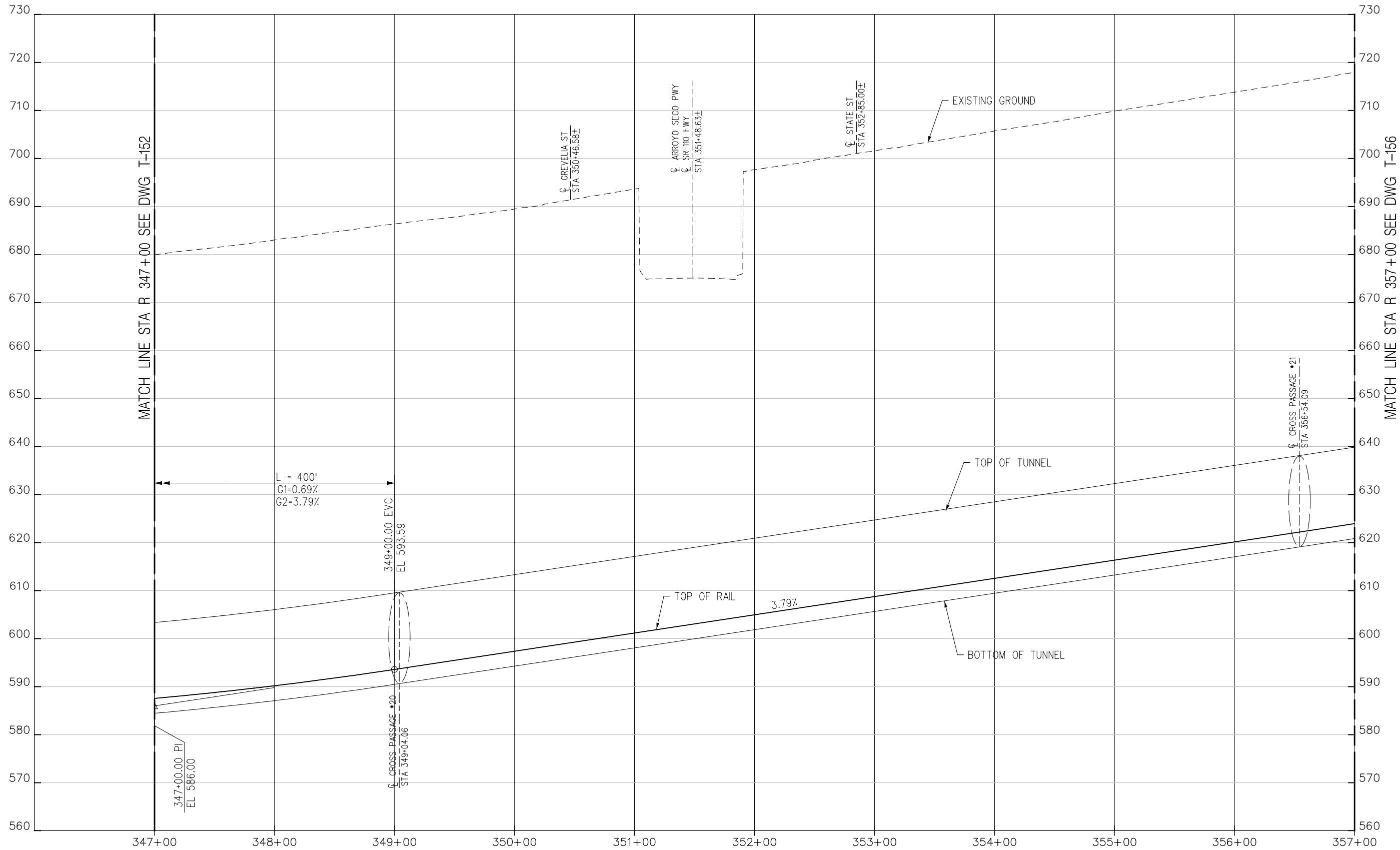

**LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY**

**ATTACHMENT H-2 SHEET 18 OF 19**

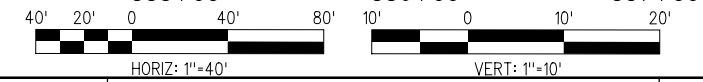
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 ADVANCED CONCEPTUAL DESIGN  
 TRACK ALIGNMENT  
 PLAN  
 STA R 347+00 TO STA R 357+00

CONTRACT NO	
DRAWING NO T-153	REV
SCALE 1" = 40'	SHEET NO

Model Name= Default



R TRACK PROFILE



PRELIMINARY

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REV	DATE	BY	APP	REG NO	EXPIRES	SEAL HOLDER	DESCRIPTION

DESIGNED BY A. GRANDOV
DRAWN BY M. AL-MASHAT
CHECKED BY J. AL-MASHAT
IN CHARGE J. AL-MASHAT
DATE 8/12/13



LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

ATTACHMENT H-2 SHEET 19 OF 19

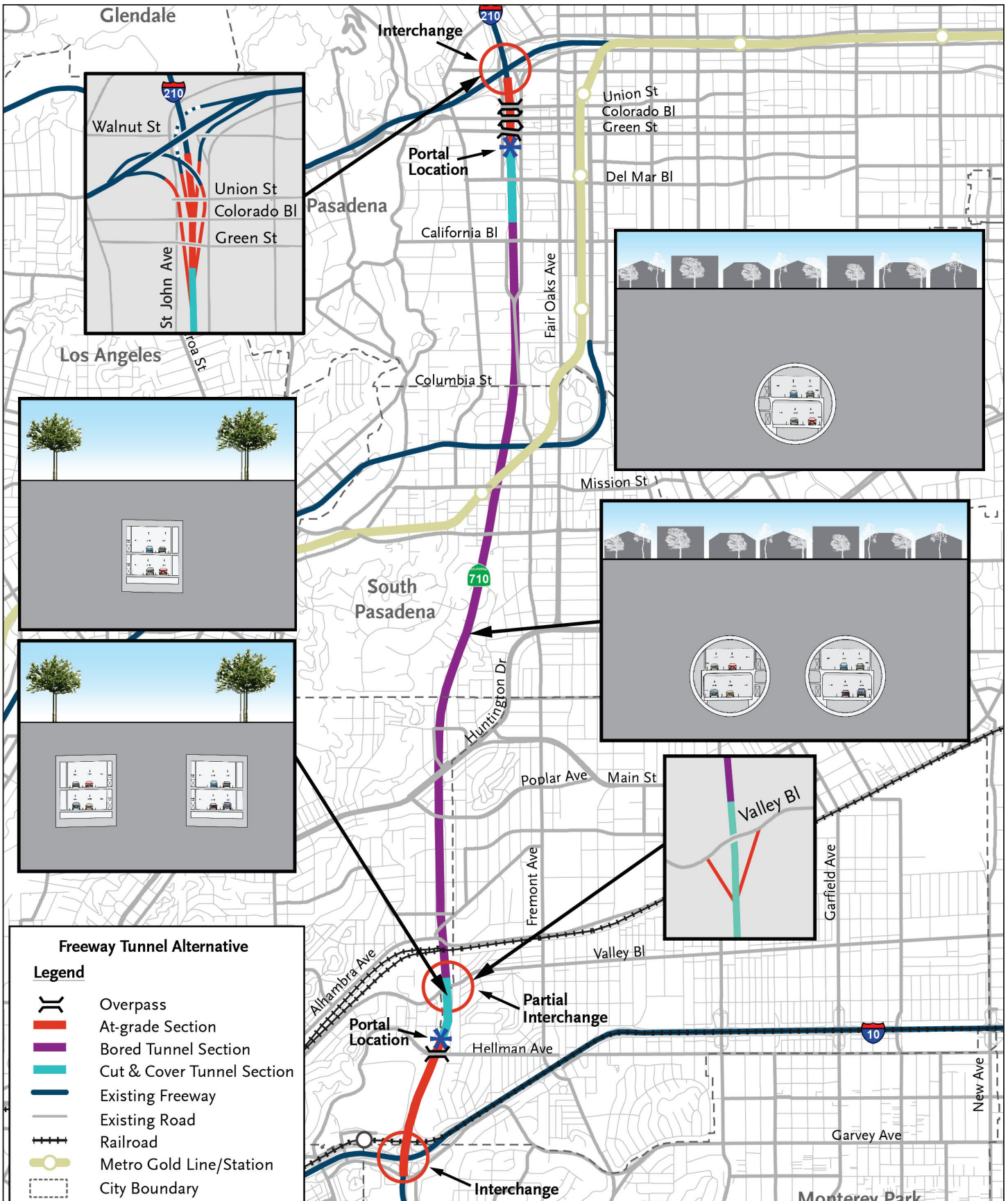
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ADVANCED CONCEPTUAL DESIGN  
TRACK ALIGNMENT  
PROFILE  
STA R 347+00 TO STA R 357+00

CONTRACT NO	
DRAWING NO T-154	REV
SCALE HORIZ: 1"=40' VERT: 1"=10'	SHEET NO

**Attachment I**  
**Freeway Tunnel Alternative – Dual-Bore Tunnel**

---





NOTE: Tunnel cross sections are illustrative and not to scale.

ATTACHMENT I-1a



SOURCE: CH2M HILL (2013)

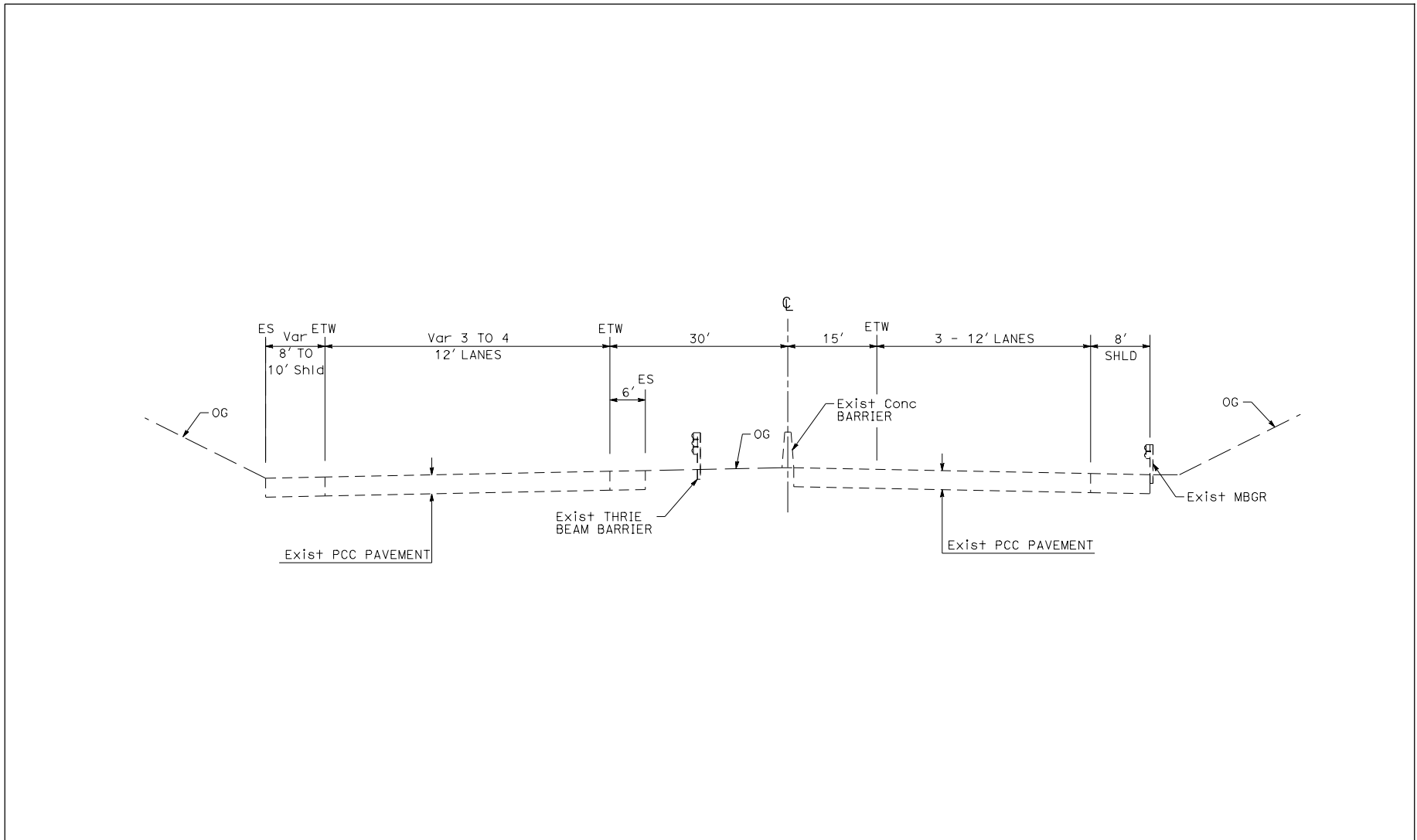
I:\CHM1105\G\Chapter 2\Freeway Tunnel Alt Single&Dual Bore.cdr (11/10/14)

SR 710 North Study  
Freeway Tunnel Alternative  
Dual Bore

07-LA-710 (SR 710)  
EA 187900  
EFIS 0700000191

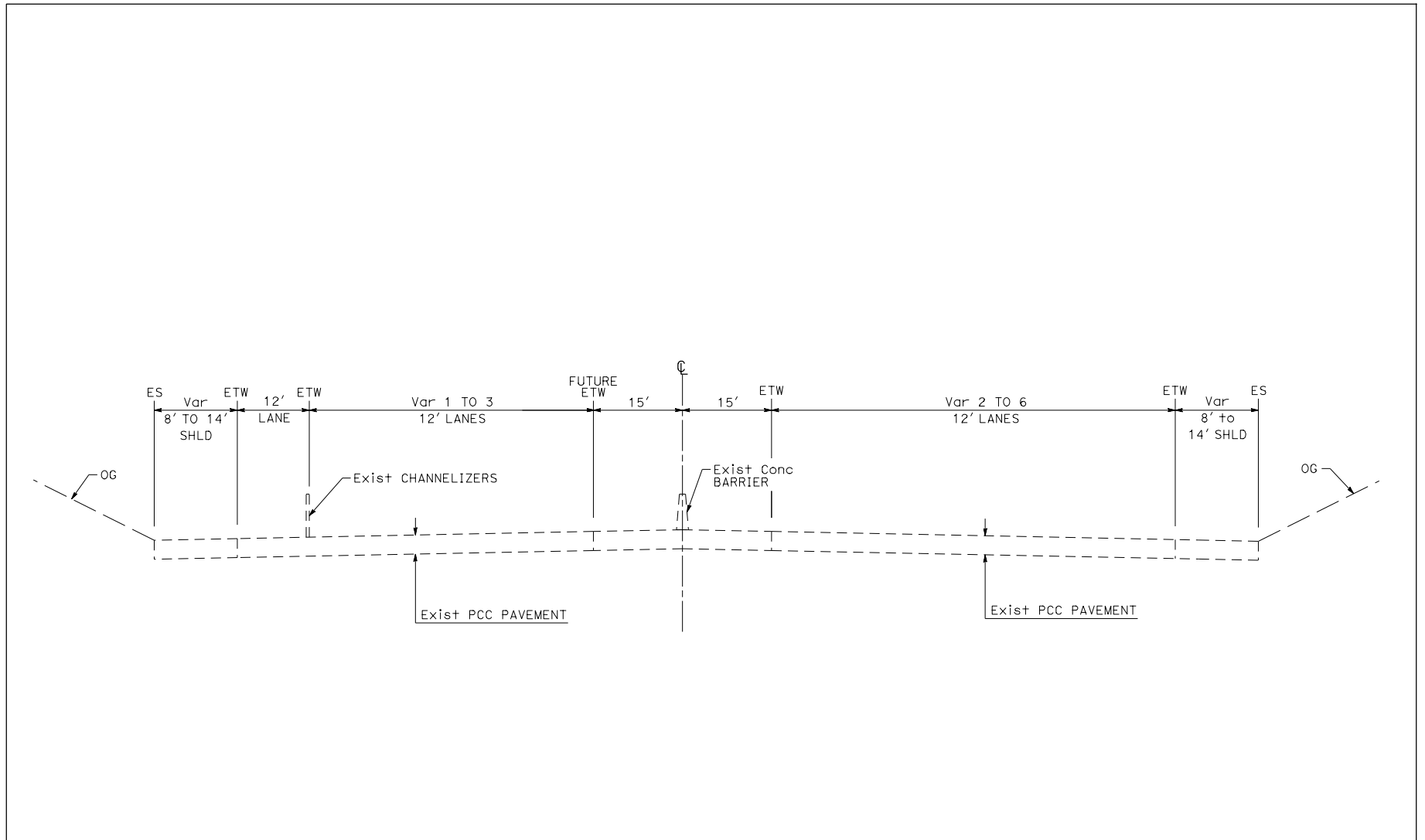






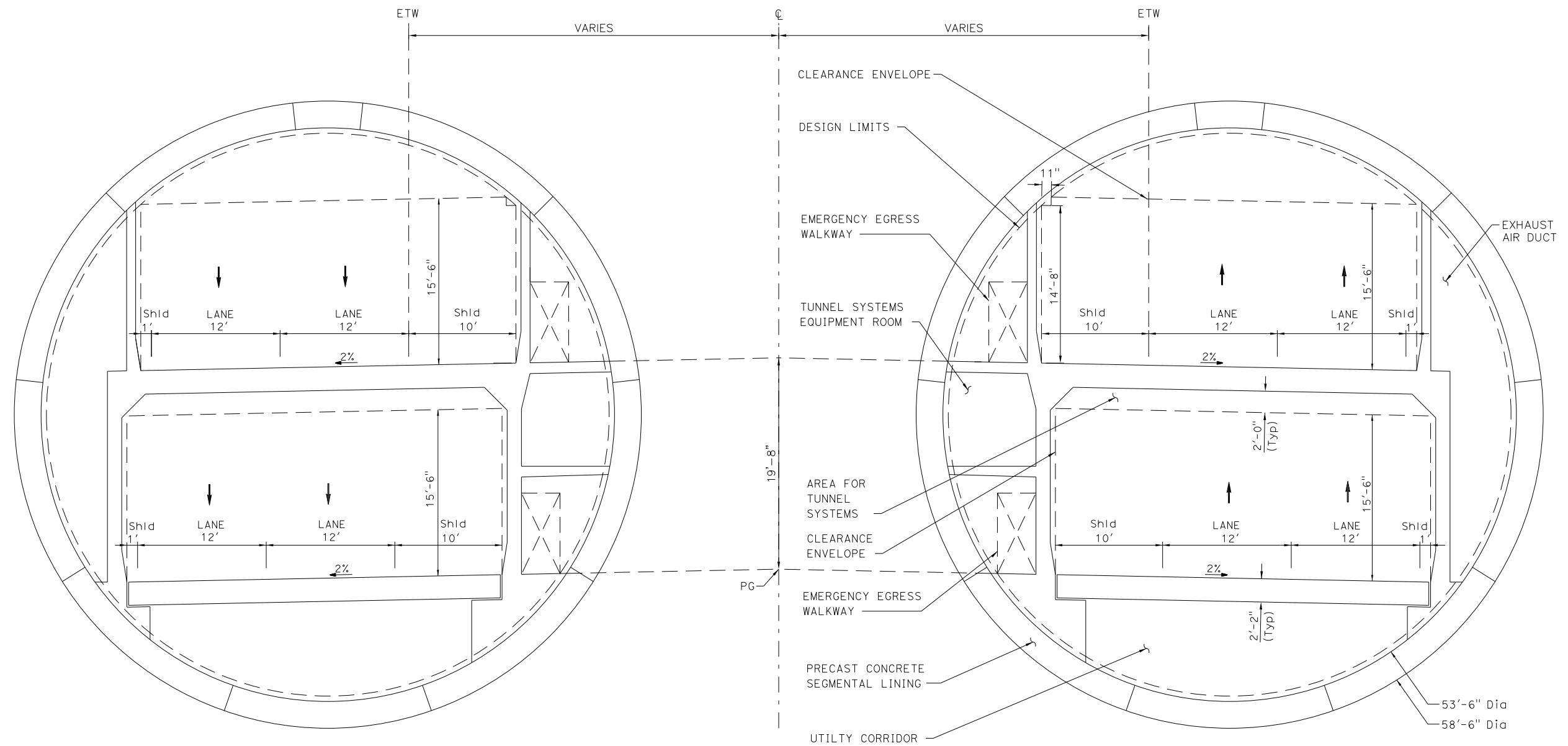
ATTACHMENT I-1b

SR-710 North Study  
 Freeway Tunnel Alternative - Dual Bore  
 Existing at South Portal  
 07-LA-710 (SR-710)  
 EA 197800  
 EFIS 0700000191



ATTACHMENT I-1c

SR-710 North Study  
 Freeway Tunnel Alternative - Dual Bore  
 Existing at North Portal  
 07-LA-710 (SR-710)  
 EA 197800  
 EFIS 0700000191



NOTE: Dimensions are approximate and will be refined during final design.

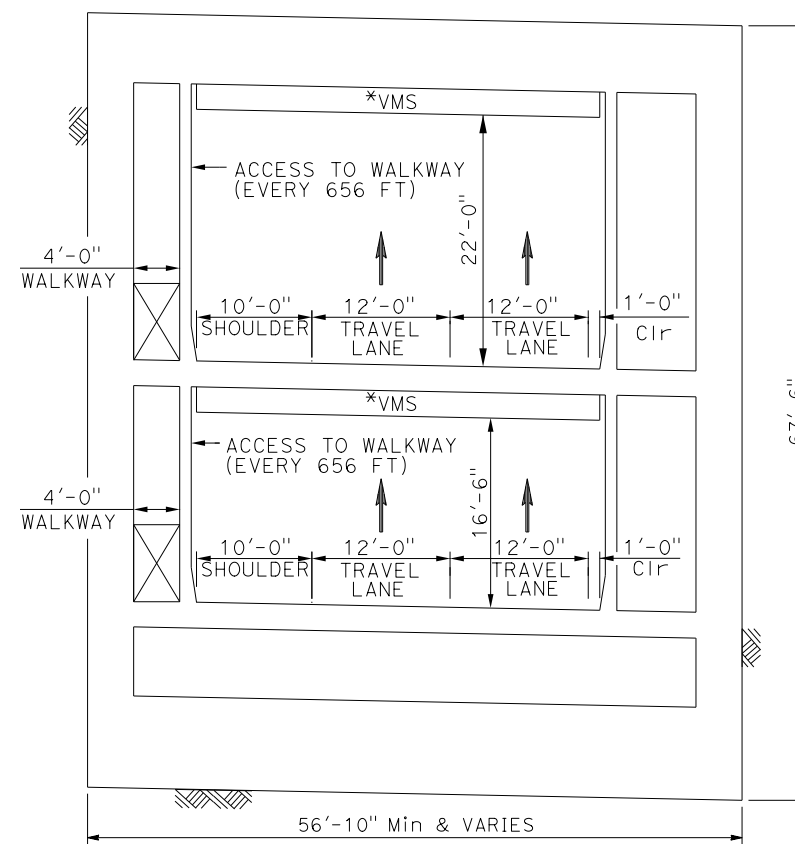
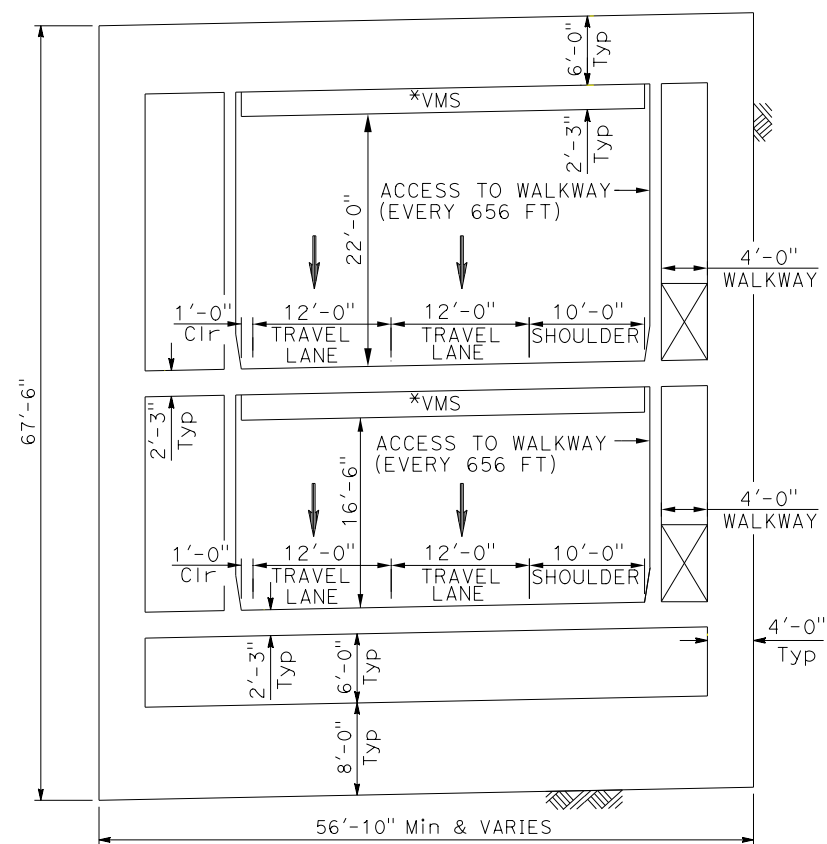
ATTACHMENT I-1d

SR 710 North Study  
 Freeway Tunnel Alternative  
 Dual Bore Cross Section

07-LA-710 (SR 710)  
 EA 187900  
 EFIS 0700000191

**NOTES:**

FOR CUT AND COVER TRANSITIONAL AREA FROM AT-GRADE TO BORED TUNNEL SEE SR-710 NORTH STUDY ADVANCED PLANNING STUDY (APS) REPORTS FOR CUT AND COVER TUNNELS IN ATTACHMENT K-2F & ATTACHMENT K-2G.

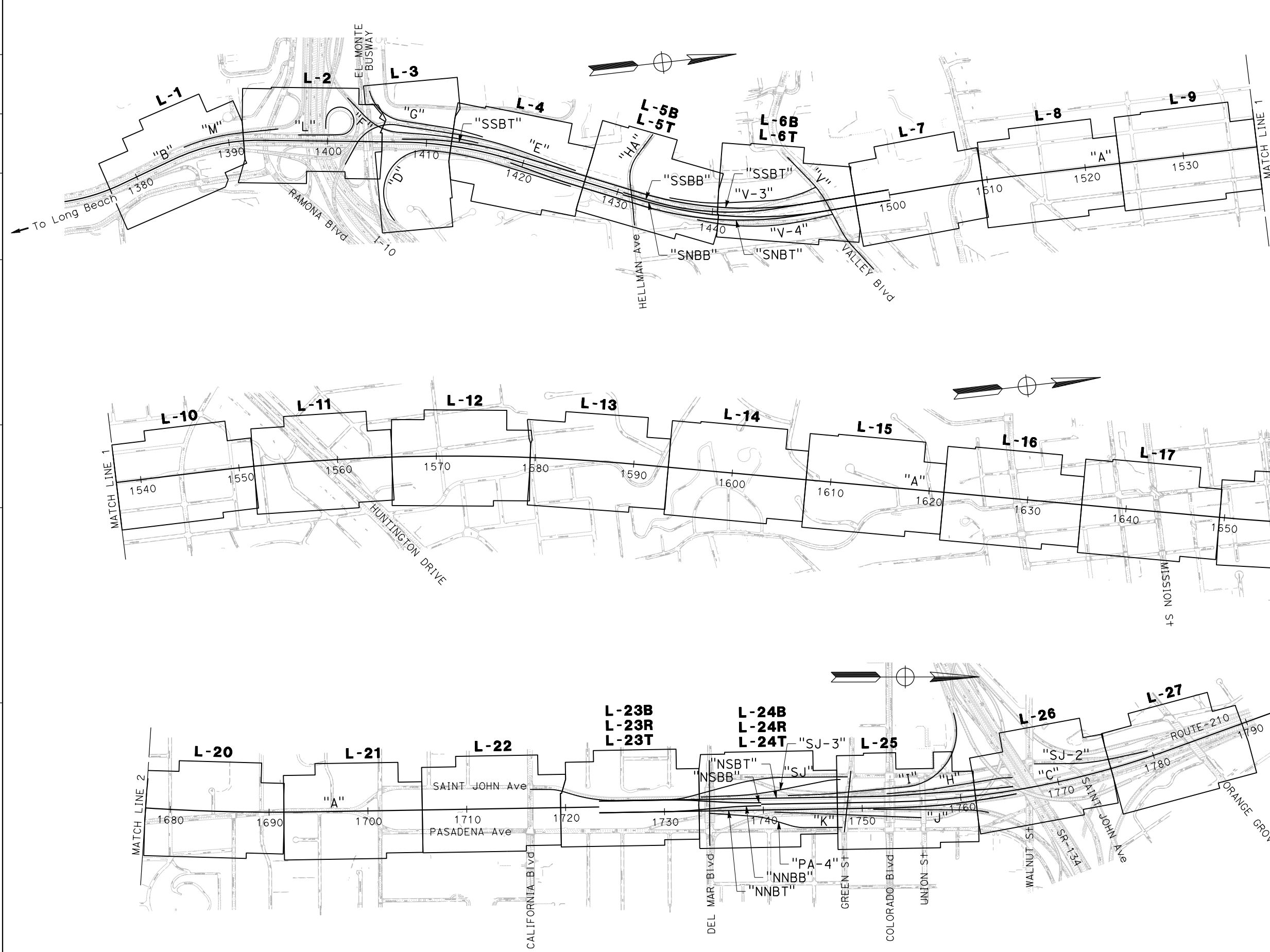


\*VMS: Variable Message Sign

ATTACHMENT I-1e

SR-710 North Study  
 Freeway Tunnel Alternative - Dual Bore  
 Cut and Cover/Bored Tunnel Transition  
 07-LA-710 (SR-710)  
 EA 197800  
 EFIS 0700000191

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
 ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



**KEY MAP AND LINE INDEX**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
 ATTACHMENT I-2 SHEET 1 OF 103  
 NO SCALE  
**K-1**

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX

REGISTERED CIVIL ENGINEER	DATE
PLANS APPROVAL DATE	

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707	METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012
--	--

**NOTES:**

- DIMENSIONS OF THE PAVEMENT STRUCTURES (STRUCTURAL SECTIONS) ARE SUBJECT TO TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATIONS.
- SUPERELEVATIONS ARE SHOWN ON THE SUPERELEVATION DIAGRAMS.
- FOR LOCATION AND LIMITS OF RETAINING WALLS SEE LAYOUT SHEETS.
- PAVEMENT DESIGN HAS NOT BEEN DETERMINED FOR THIS PLANNING PHASE.

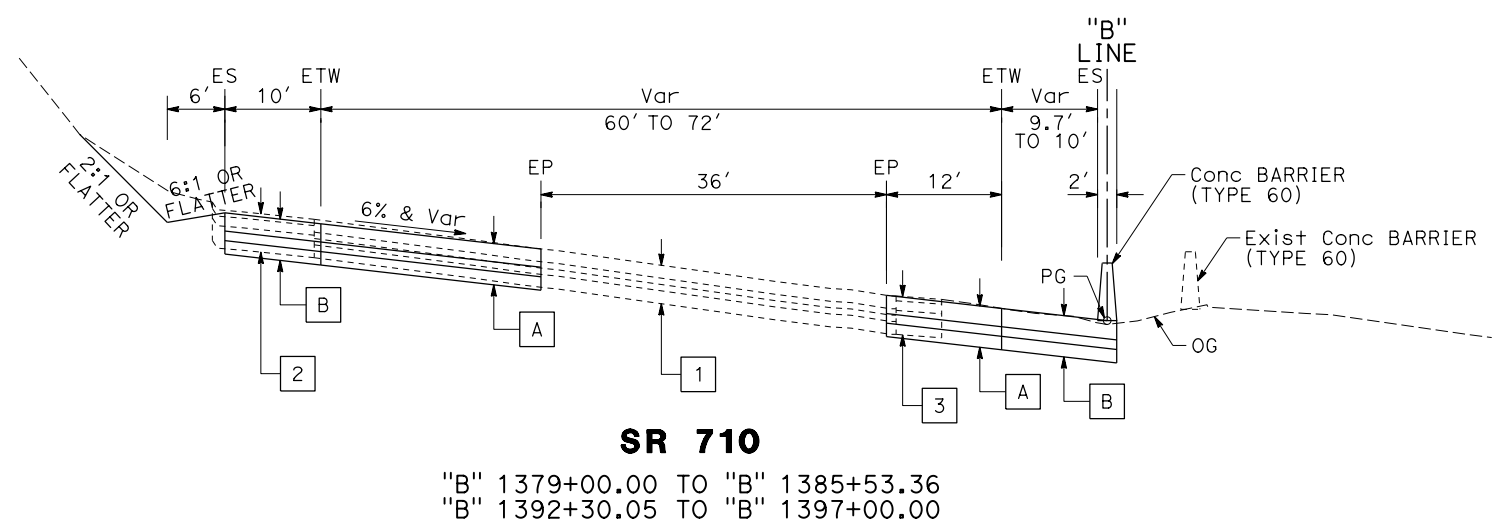
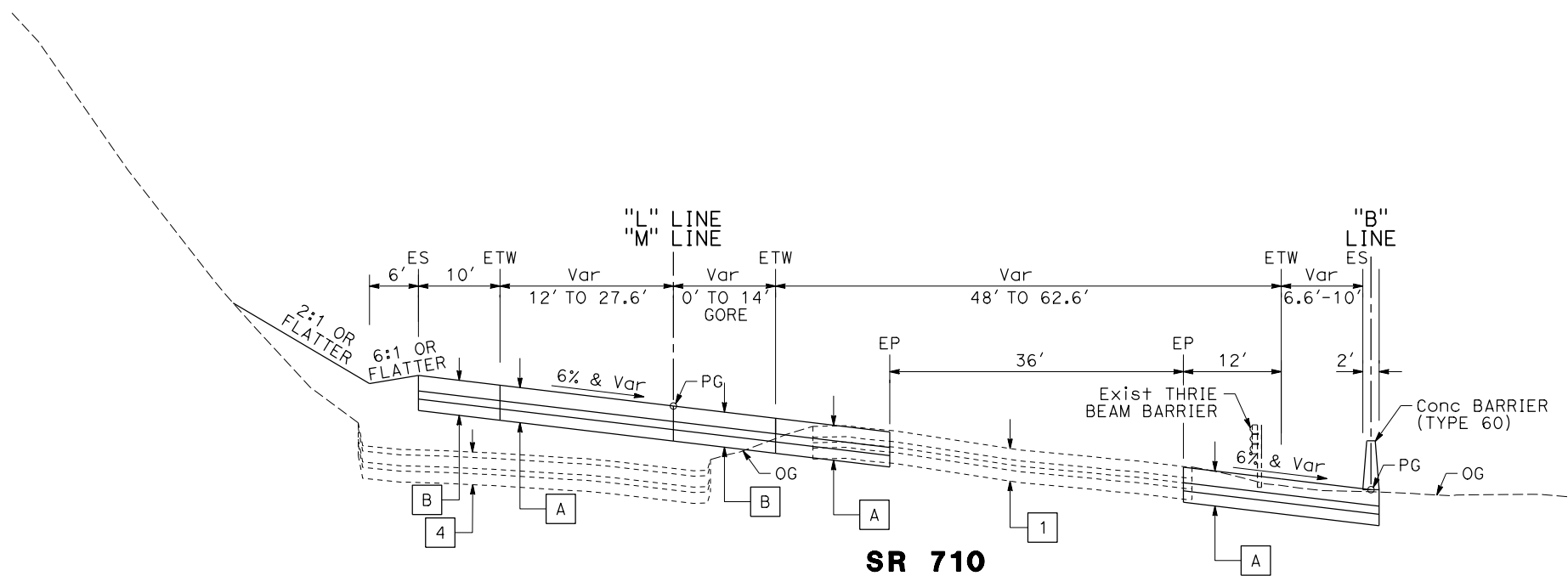
**ABBREVIATIONS:**

**DESIGN DESIGNATION**

ADT (2013)	XXX,XXX	D	XX%
ADT (2033)	XXX,XXX	T	XX%
DHV	XX,XXX	V	XX mph
ESAL	X,XXX,XXX	TI <sub>20</sub>	XX.X

**TYPICAL PAVEMENT STRUCTURE SECTIONS**

- |  |  |
|--|--|
| <p>A</p> <p>B</p> <p>C</p> <p>D</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p> <p>7</p> <p>8</p> <p>9</p> <p>10</p> | <p>X.XX' XX MAINLINE TRAVELED WAY-PCC</p> <p>X.XX' XX MAINLINE SHOULDER-AC</p> <p>X.XX' XX RAMP TRAVELED WAY-AC</p> <p>X.XX' XX LOCAL STREET TRAVELED WAY-AC</p> <p>Exist<br/>0.67' PCC (CLASS B)<br/>0.33' CTB (CLASS A)<br/>0.33' AB<br/>0.67' ASB</p> <p>Exist<br/>0.17'-0.33' AC<br/>0.50' AB<br/>1.17' &amp; Var ASB</p> <p>Exist<br/>0.25' AC (TYPE B-1)<br/>0.50' AB<br/>1.25' ASB</p> <p>Exist<br/>0.33' AC (TYPE B-1)<br/>0.67' CTB (CLASS A)<br/>0.33' AB<br/>0.67' ASB</p> <p>Exist<br/>0.70' PCC<br/>0.40' CTB<br/>0.50' AB</p> <p>Exist<br/>0.30' AC<br/>0.55' AB<br/>0.75' ASB</p> <p>Exist<br/>0.25' AC<br/>0.45' AB<br/>0.90' ASB</p> <p>Exist<br/>0.35' AC<br/>0.65' CTB<br/>0.60' AB</p> <p>Exist<br/>0.17' AC COLD MILL<br/>0.17' AP OVERLAY<br/>0.50' PCC</p> <p>Exist<br/>X.XX' XXX<br/>X.XX' XXX<br/>X.XX' XXX</p> |
|--|--|



**TYPICAL CROSS SECTIONS  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**X - 1**

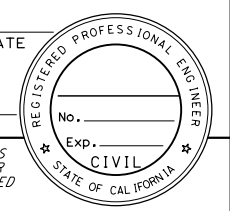
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 2 OF 103

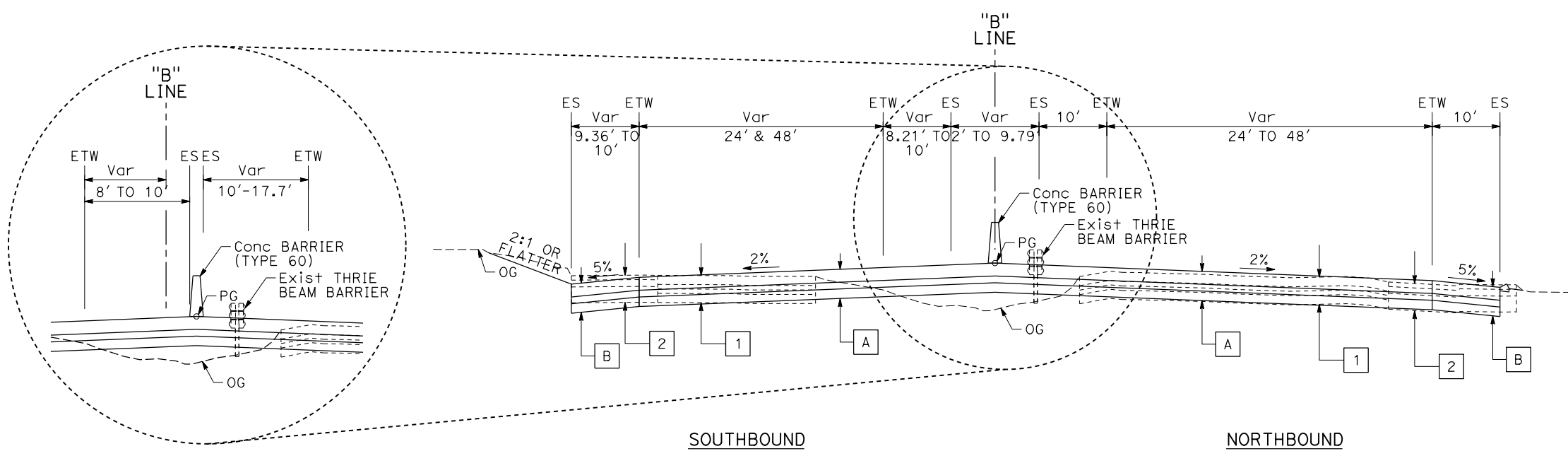
NO SCALE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
 PLANS APPROVAL DATE \_\_\_\_\_  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

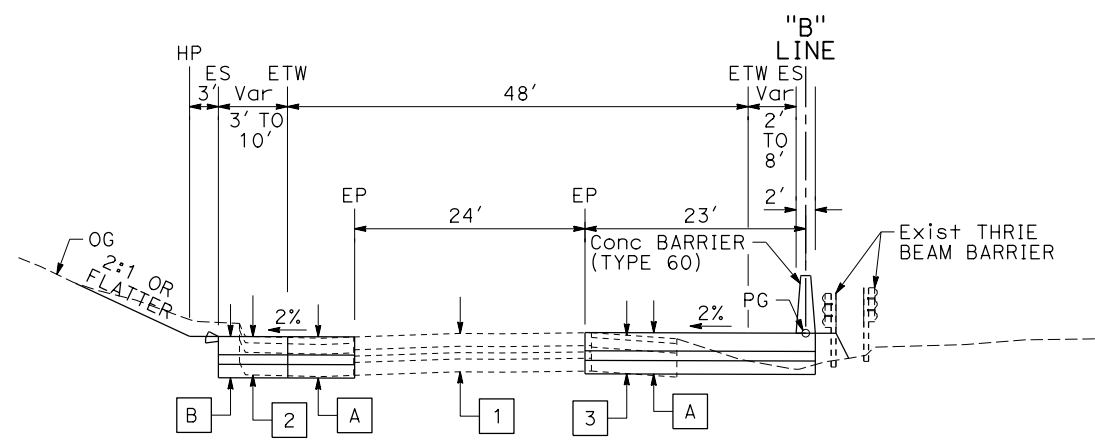


CH2M HILL  
 6 HUTTON CENTRE DRIVE,  
 SANTA ANA, CA 92707  
 METRO  
 ONE GATEWAY PLAZA,  
 LOS ANGELES, CA 90012

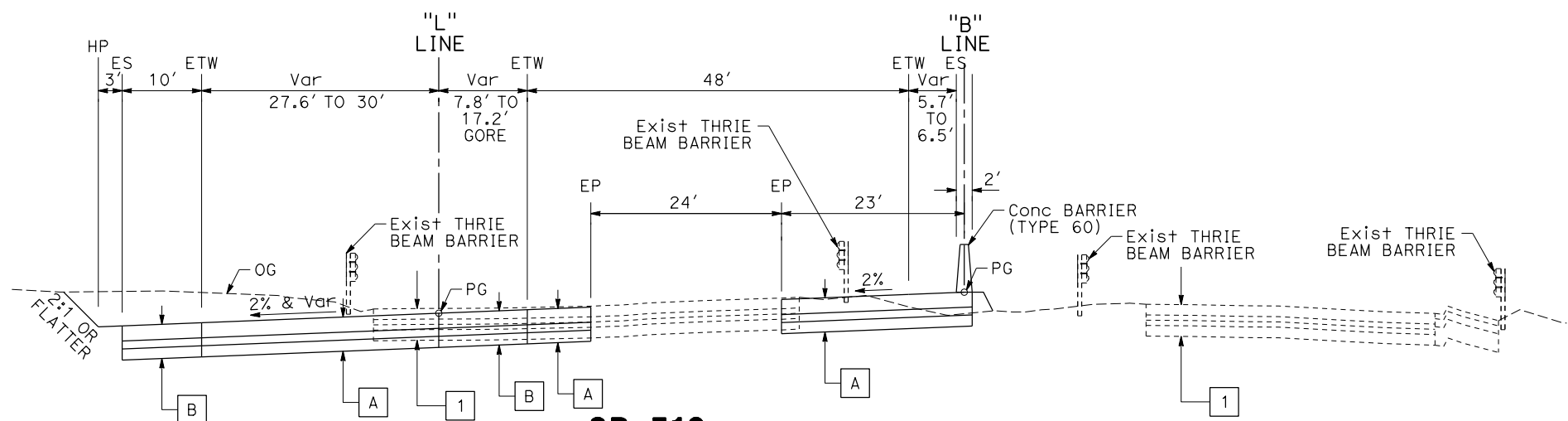


**SR 710**  
 "B" 1406+77.24 TO "B" 1418+62.83

**SR 710**  
 "B" 1406+77.24 TO "B" 1407+53.49  
 "B" 1411+10.80 TO "B" 1418+75.12



**SR 710**  
 "B" 1401+61.99 TO "B" 1406+77.24



**SR 710**  
 "B" 1400+70.63 TO "B" 1401+61.99

**TYPICAL CROSS SECTIONS**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

**X-2**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 3 OF 103

NO SCALE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 Caltrans

BORDER LAST REVISED 7/2/2010

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 DGN FILE => 0700000191ca002.dgn

RELATIVE BORDER SCALE  
 IS IN INCHES

UNIT 0000

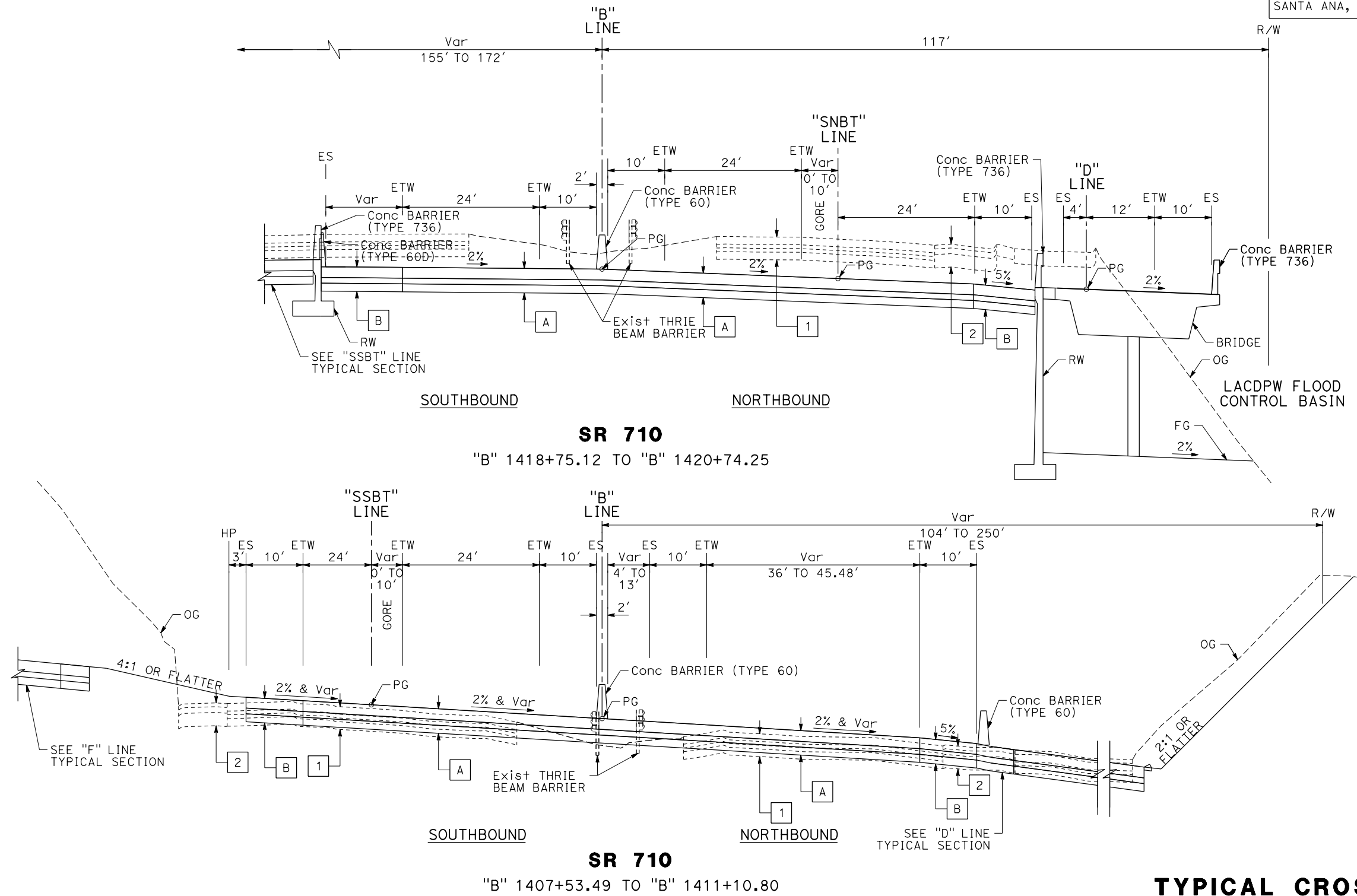
PROJECT NUMBER & PHASE

07000001911

LAST REVISION DATE PLOTTED => 21-MAR-2014  
 00-00-00 TIME PLOTTED => 13:31

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**TYPICAL CROSS SECTIONS**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

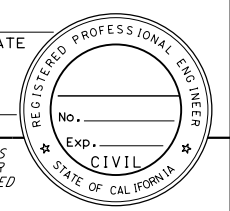
ATTACHMENT I-2 SHEET 4 OF 103 NO SCALE

**X-3**

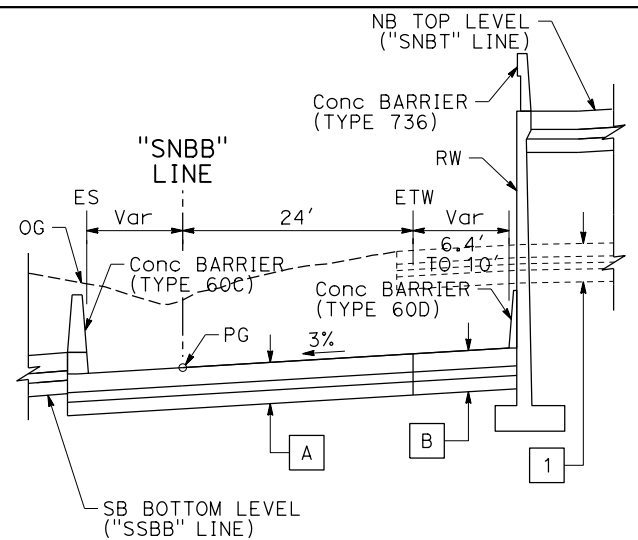


DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
 PLANS APPROVAL DATE \_\_\_\_\_  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

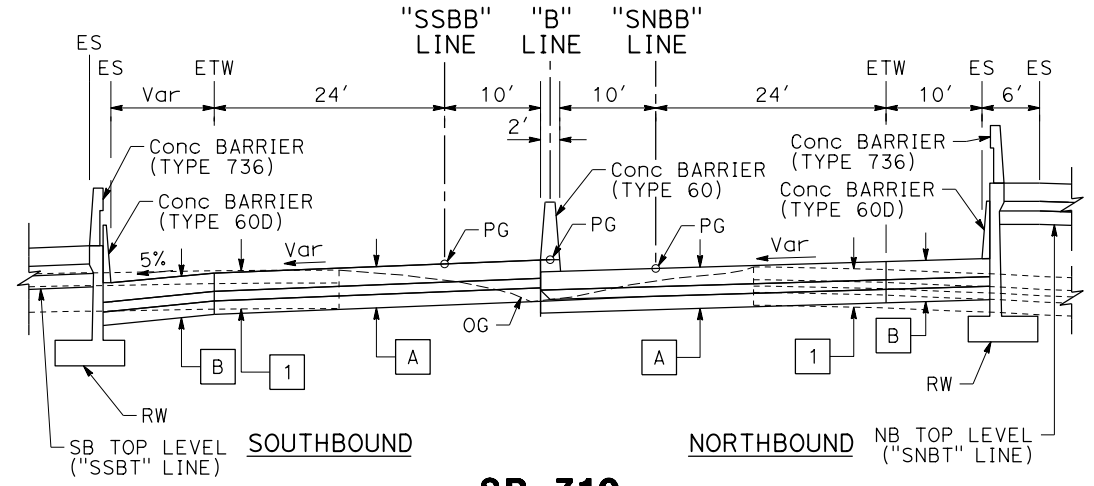


CH2M HILL  
 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
 METRO  
 ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



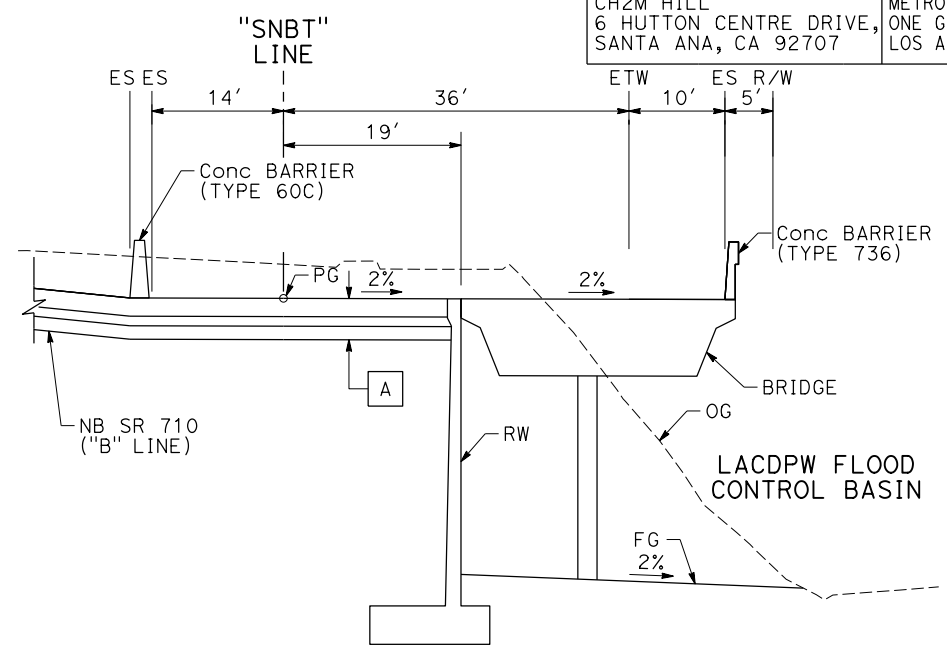
**SR 710**

"SNBB" 1430+55.00 TO "SNBB" 1439+15.00  
 (NB BOTTOM LEVEL)



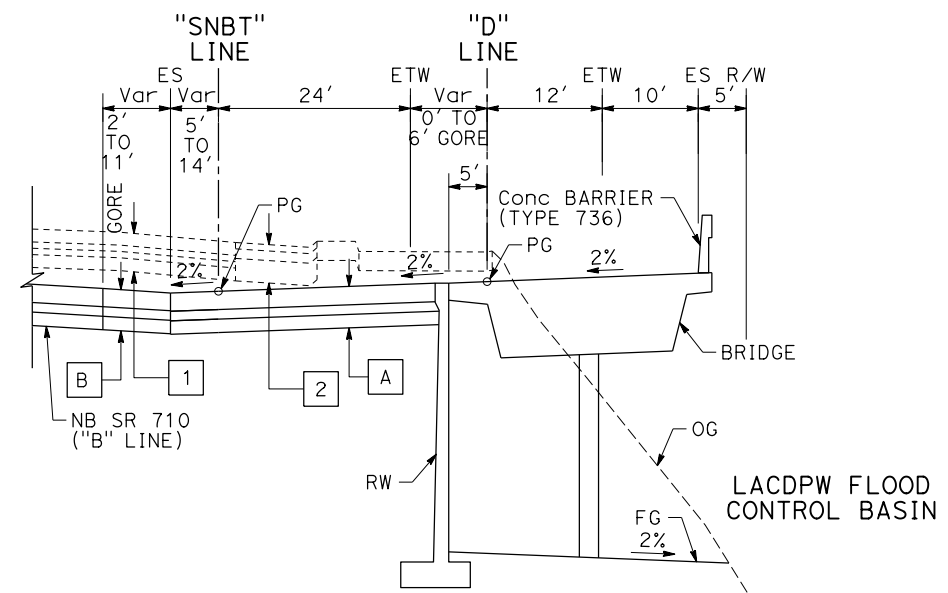
**SR 710**

"B" 1422+75.12 TO "B" 1430+56.85



**SR 710**

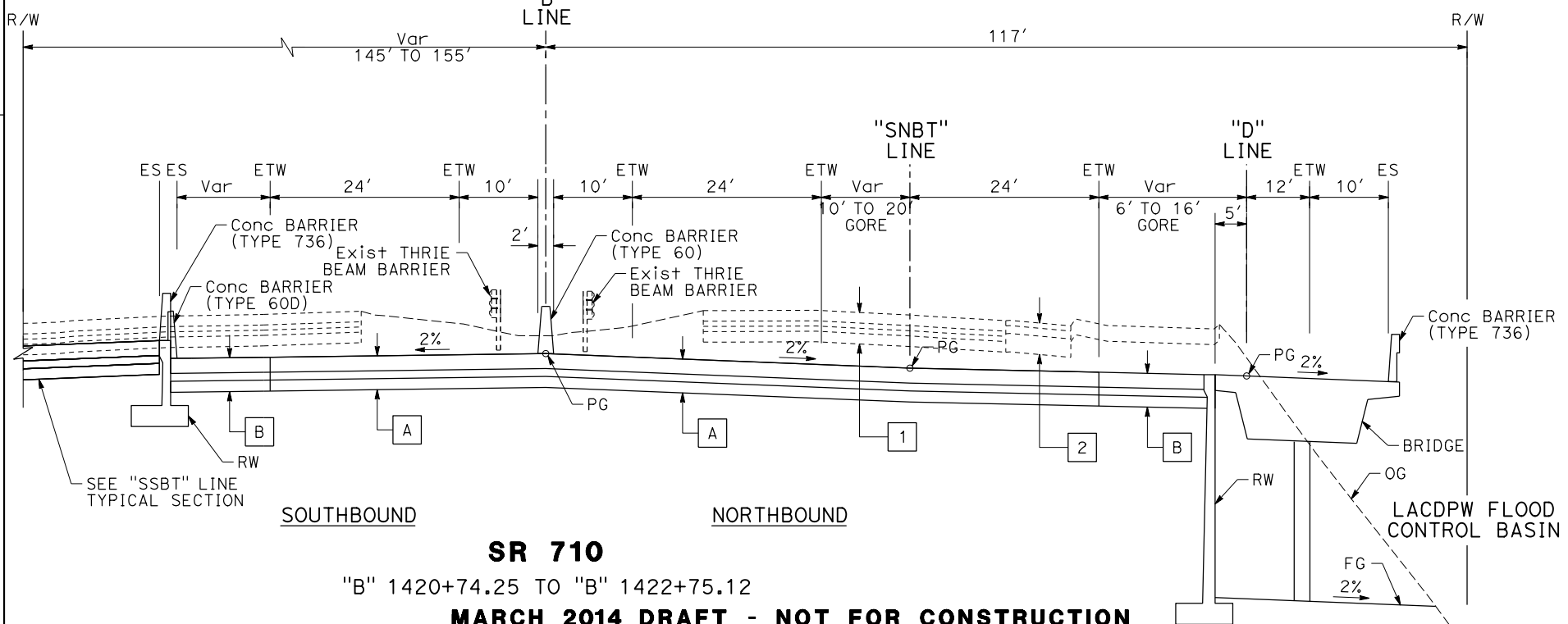
"SNBT" 1425+12.83 TO "SNBT" 1426+80.00  
 (NB TOP LEVEL)



**SR 710**

"SNBT" 1422+56.42 TO "SNBT" 1425+12.83  
 (NB TOP LEVEL)

**TYPICAL CROSS SECTIONS**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**



**SR 710**

"B" 1420+74.25 TO "B" 1422+75.12

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 5 OF 103

NO SCALE

**X - 4**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED/DESIGNED BY  
 CHECKED BY  
 REVISOR BY  
 DATE REVISED  
 Ettrans

USERNAME => pwsvc  
 DGN FILE => 0700000191ca004.dgn

RELATIVE BORDER SCALE  
 IS IN INCHES



UNIT 0000

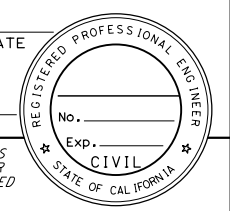
PROJECT NUMBER & PHASE

07000001911

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 00-00-00 TIME PLOTTED => 13:30

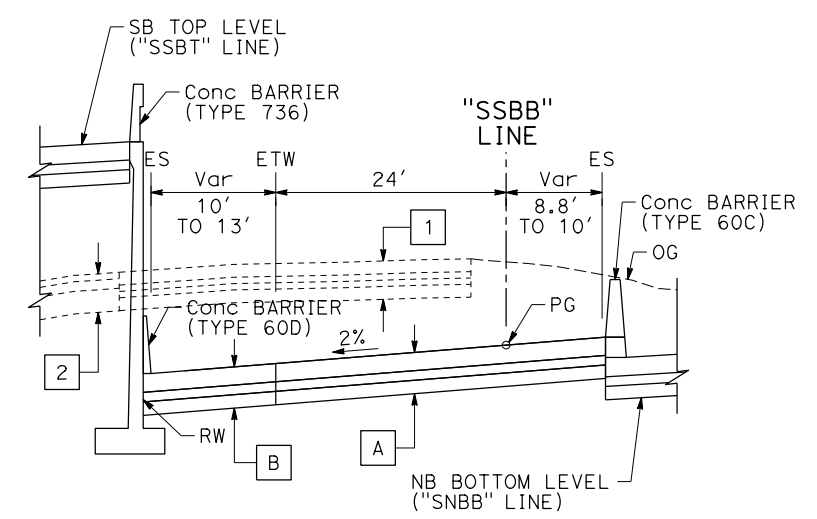
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
 PLANS APPROVAL DATE \_\_\_\_\_  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

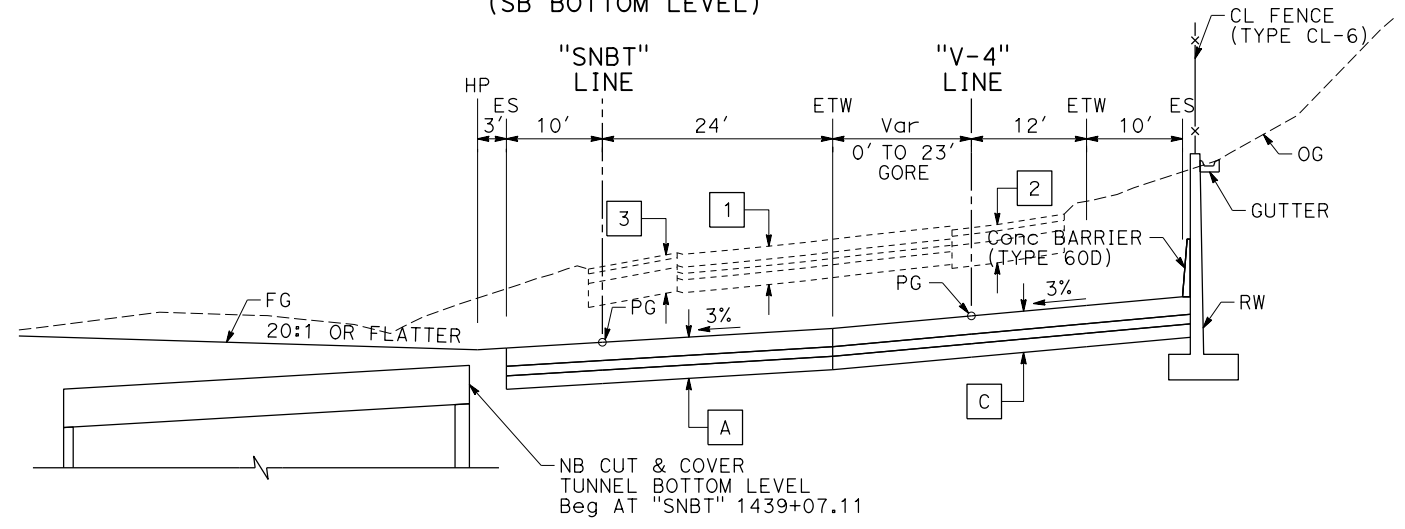


CH2M HILL  
 6 HUTTON CENTRE DRIVE,  
 SANTA ANA, CA 92707

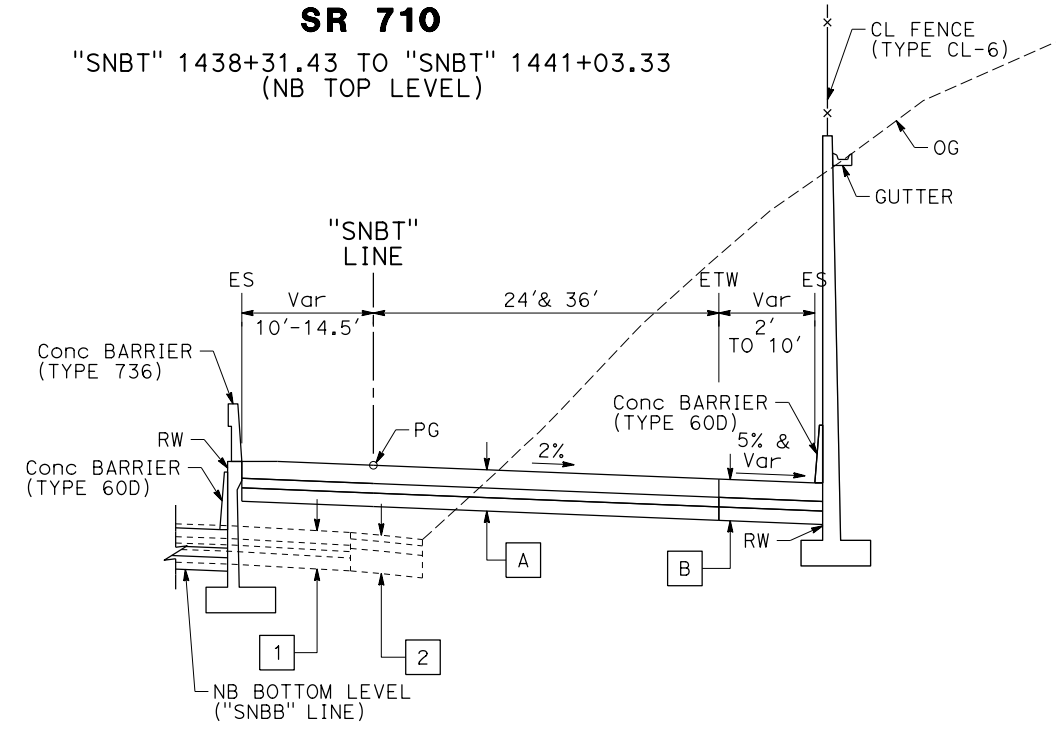
METRO  
 ONE GATEWAY PLAZA,  
 LOS ANGELES, CA 90012



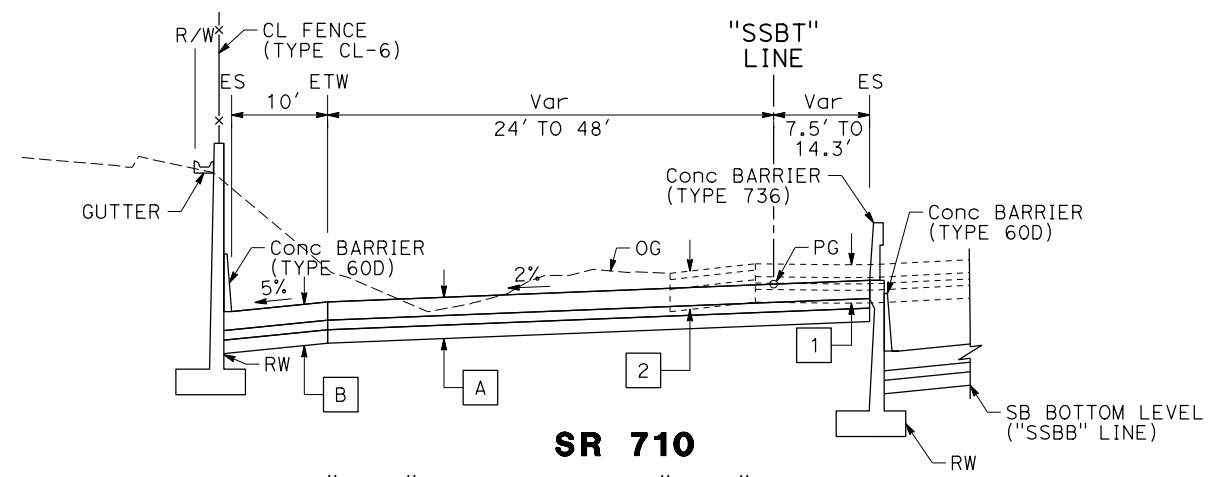
**SR 710**  
 "SSBB" 1430+75.00 TO "SSBB" 1440+35.00  
 (SB BOTTOM LEVEL)



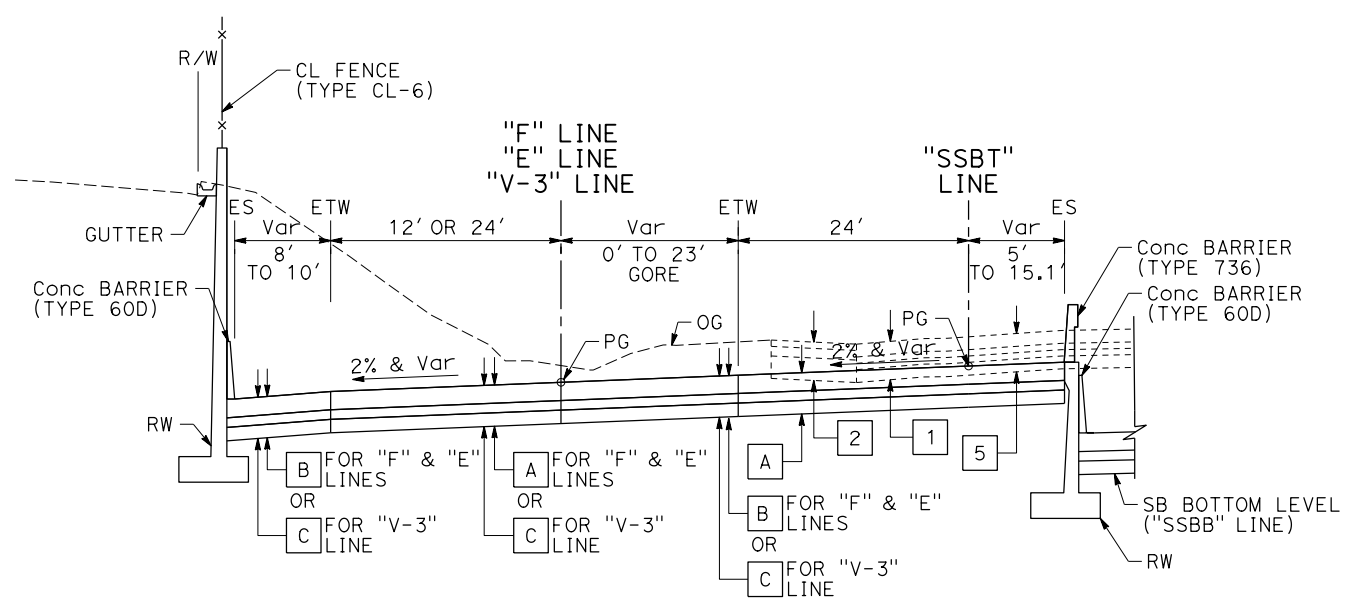
**SR 710**  
 "SNBT" 1438+31.43 TO "SNBT" 1441+03.33  
 (NB TOP LEVEL)



**SR 710**  
 "SNBT" 1426+80.00 TO "SNBT" 1438+31.43  
 "SNBT" 1441+03.33 TO "SNBT" 1446+70.00  
 (NB TOP LEVEL)



**SR 710**  
 "SSBT" 1415+46.26 TO "SSBT" 1421+69.39  
 "SSBT" 1425+69.39 TO "SSBT" 1435+57.72  
 "SSBT" 1440+47.89 TO "SSBT" 1446+75.00  
 (SB TOP LEVEL)



**SR 710**  
 "SSBT" 1411+37.41 TO "SSBT" 1415+46.26  
 "SSBT" 1421+69.39 TO "SSBT" 1425+69.39  
 "SSBT" 1435+57.72 TO "SSBT" 1440+47.89  
 (SB TOP LEVEL)

**TYPICAL CROSS SECTIONS**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

**X-5**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 6 OF 103

NO SCALE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 EtTrans<sup>®</sup>

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 DGN FILE => 0700000191ca005.dgn

RELATIVE BORDER SCALE  
 IS IN INCHES



UNIT 0000

PROJECT NUMBER & PHASE

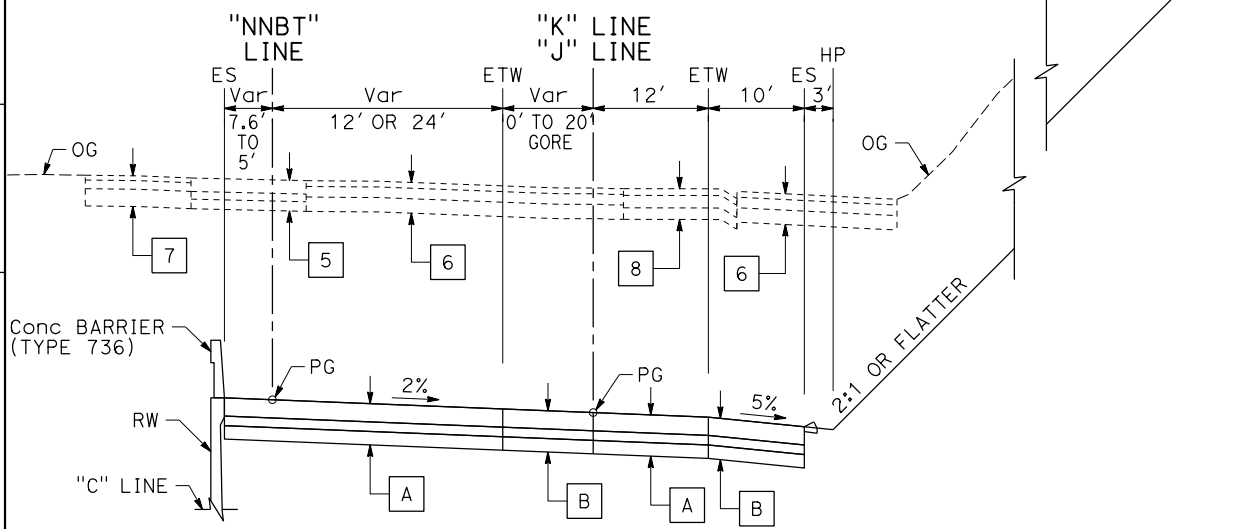
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 00-00-00 TIME PLOTTED => 13:32

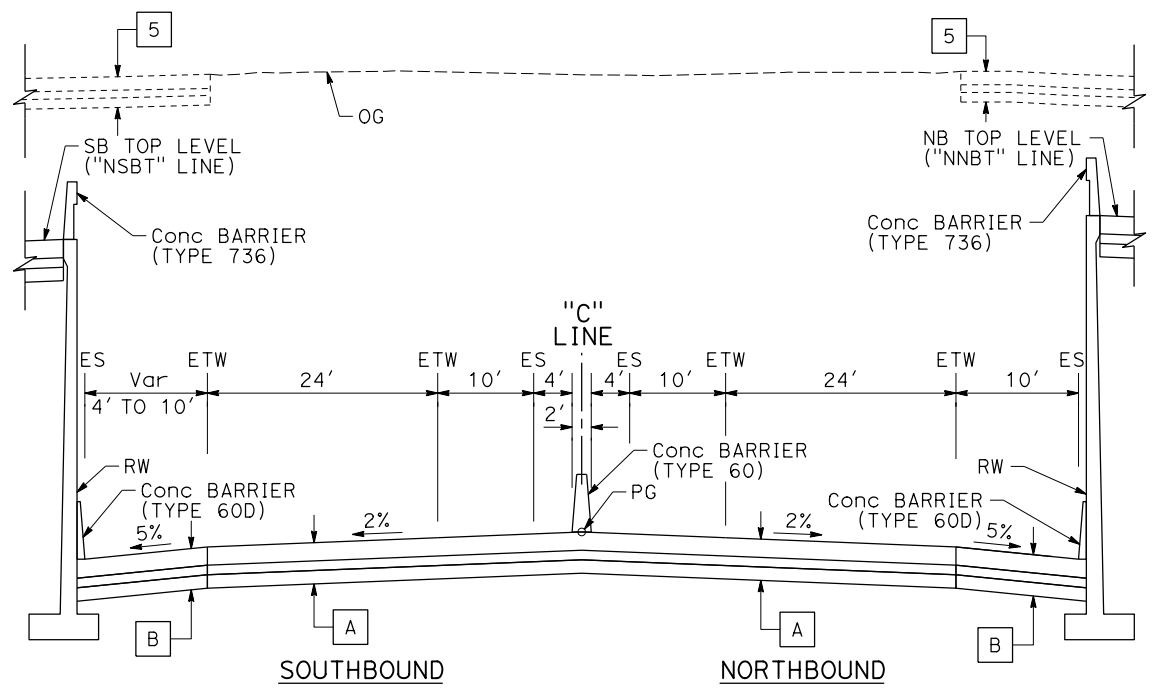
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T	XXX	

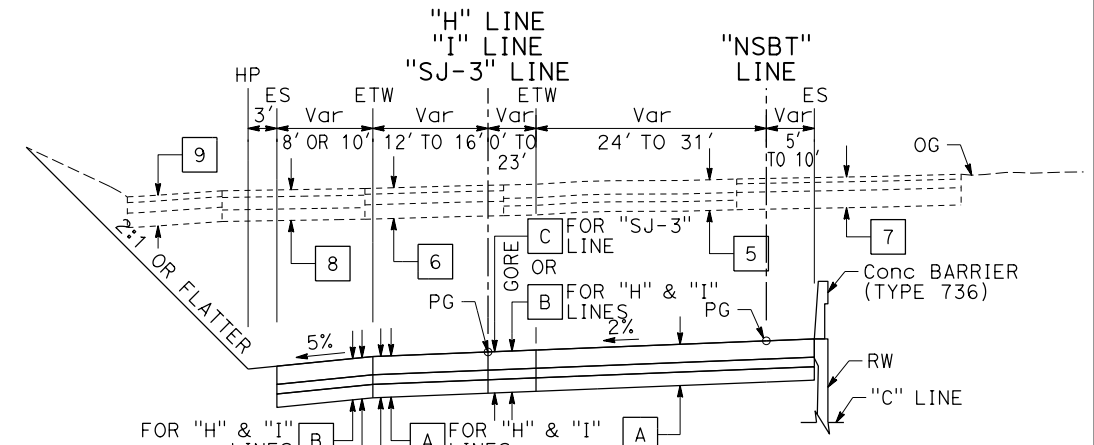
REGISTERED CIVIL ENGINEER	DATE
PLANS APPROVAL DATE	
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>	
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707	METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



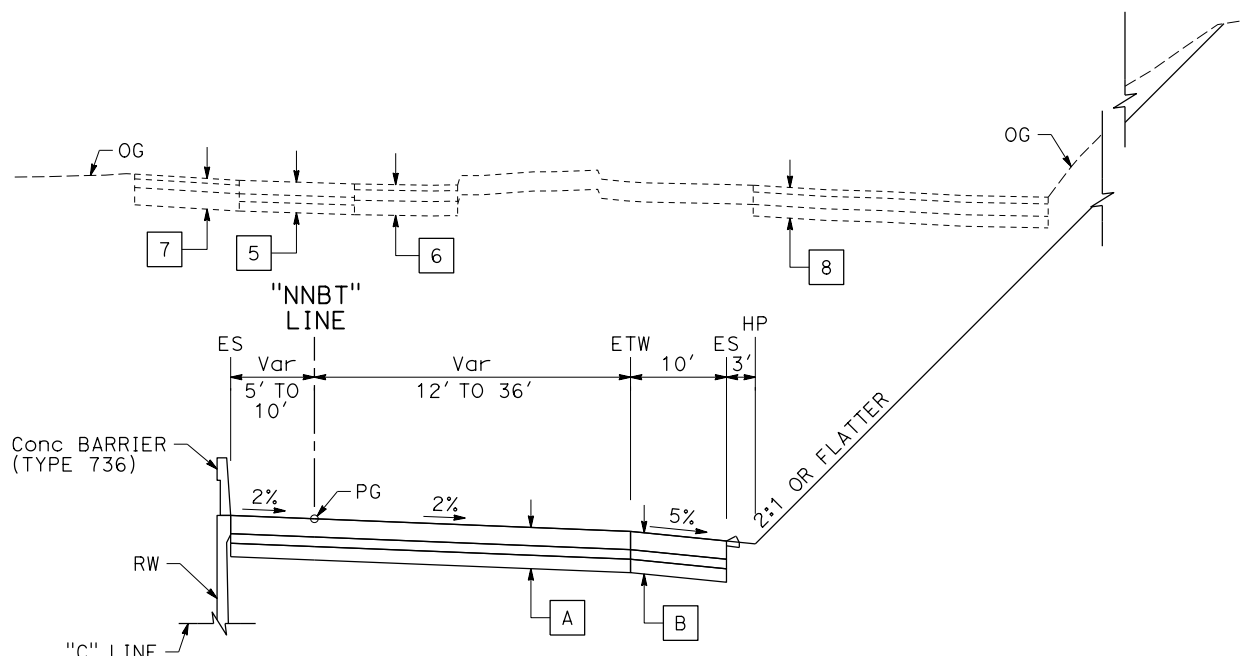
**SR 710**  
 "NNBT" 1741+11.50 TO "NNBT" 1745+11.50  
 "NNBT" 1751+11.50 TO "NNBT" 1756+06.94  
 (NB TOP LEVEL)



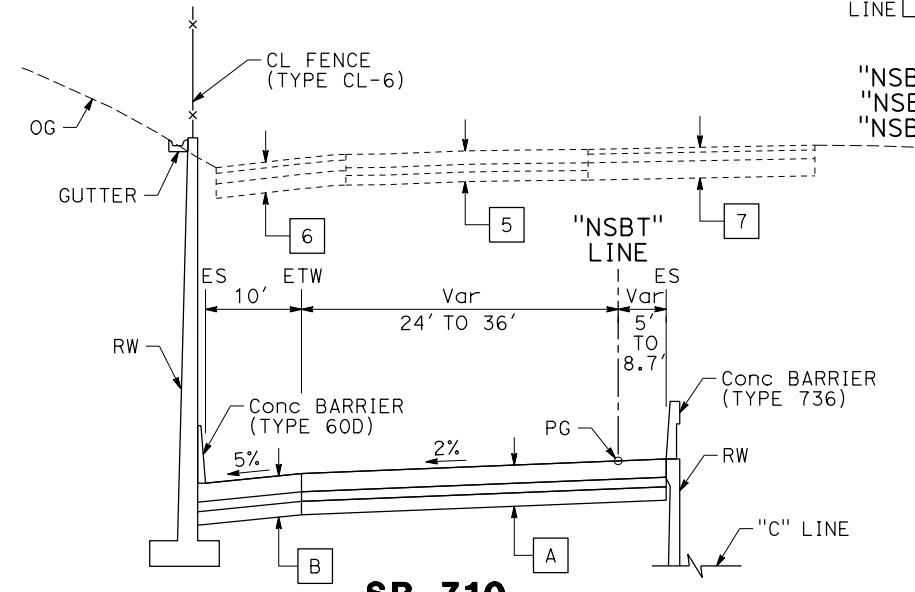
**SR 710**  
 "C" 1739+80.00 TO "C" 1759+08.12



**SR 710**  
 "NSBT" 1737+28.70 TO "NSBT" 1739+92.43  
 "NSBT" 1742+50.00 TO "NSBT" 1748+37.21  
 "NSBT" 1752+50.00 TO "NSBT" 1757+53.75  
 (SB TOP LEVEL)



**SR 710**  
 "NNBT" 1737+28.70 TO "NNBT" 1741+11.50  
 "NNBT" 1745+11.50 TO "NNBT" 1751+11.50  
 "NNBT" 1756+06.94 TO "NNBT" 1759+11.35  
 (NB TOP LEVEL)



**SR 710**  
 "NSBT" 1739+92.43 TO "NSBT" 1742+50.00  
 "NSBT" 1748+37.21 TO "NSBT" 1752+50.00  
 "NSBT" 1757+53.75 TO "NSBT" 1760+68.54  
 (SB TOP LEVEL)

**TYPICAL CROSS SECTIONS**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

ATTACHMENT I-2 SHEET 7 OF 103

NO SCALE

X-6

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 EtTrans

USERNAME => pwsvc  
 DGN FILE => 0700000191ca006.dgn

RELATIVE BORDER SCALE  
 15 IN INCHES



UNIT 0000

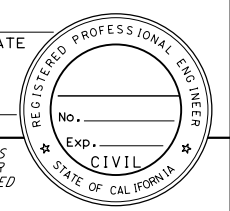
PROJECT NUMBER & PHASE

07000001911

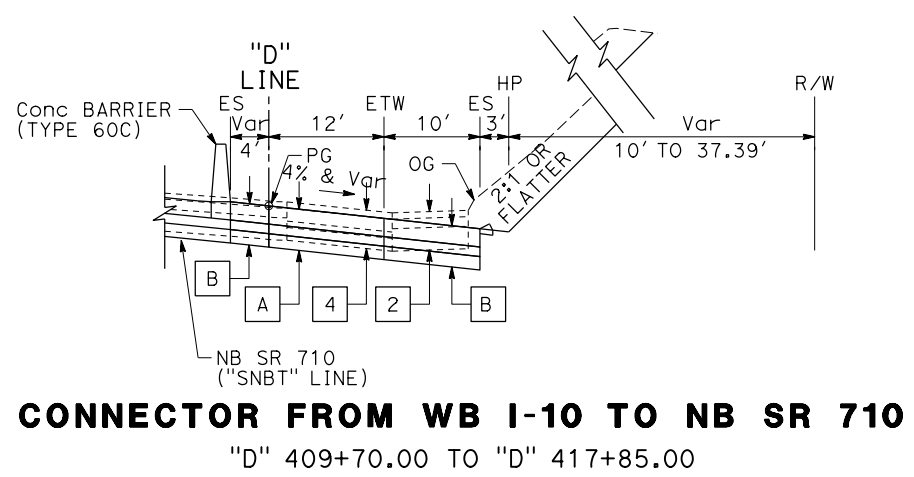
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 00-00-00 TIME PLOTTED => 13:32

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T	XXX	

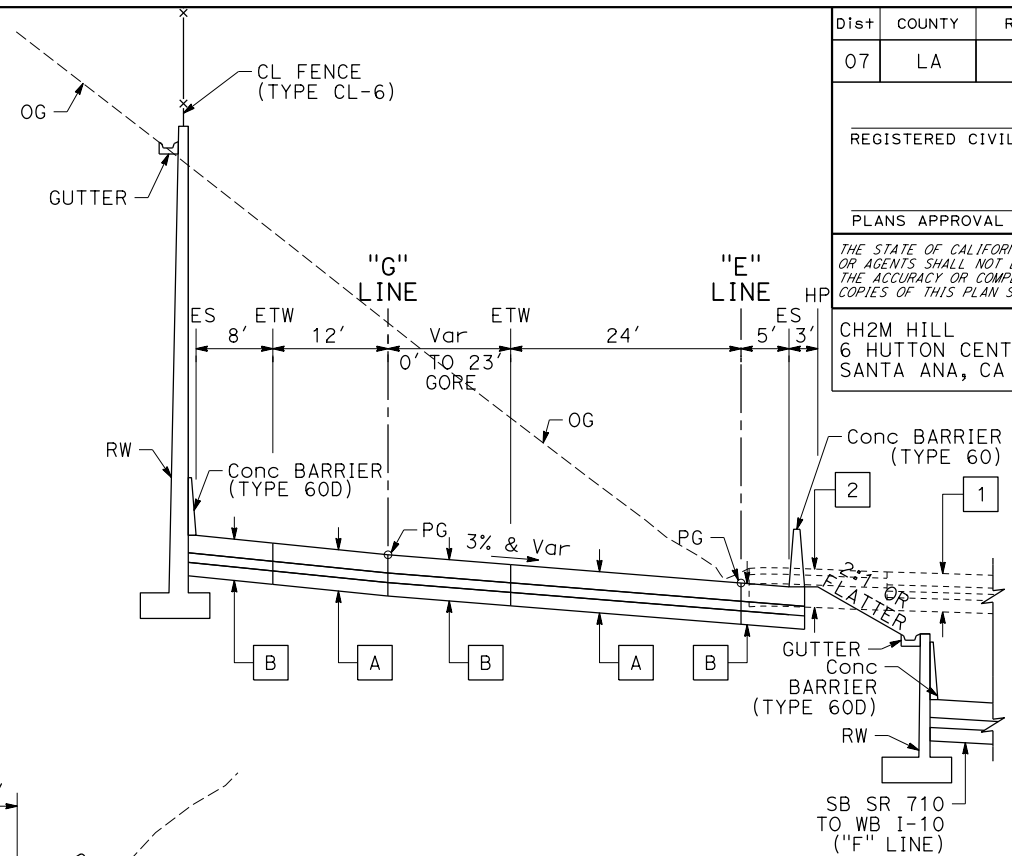
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
 PLANS APPROVAL DATE \_\_\_\_\_  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



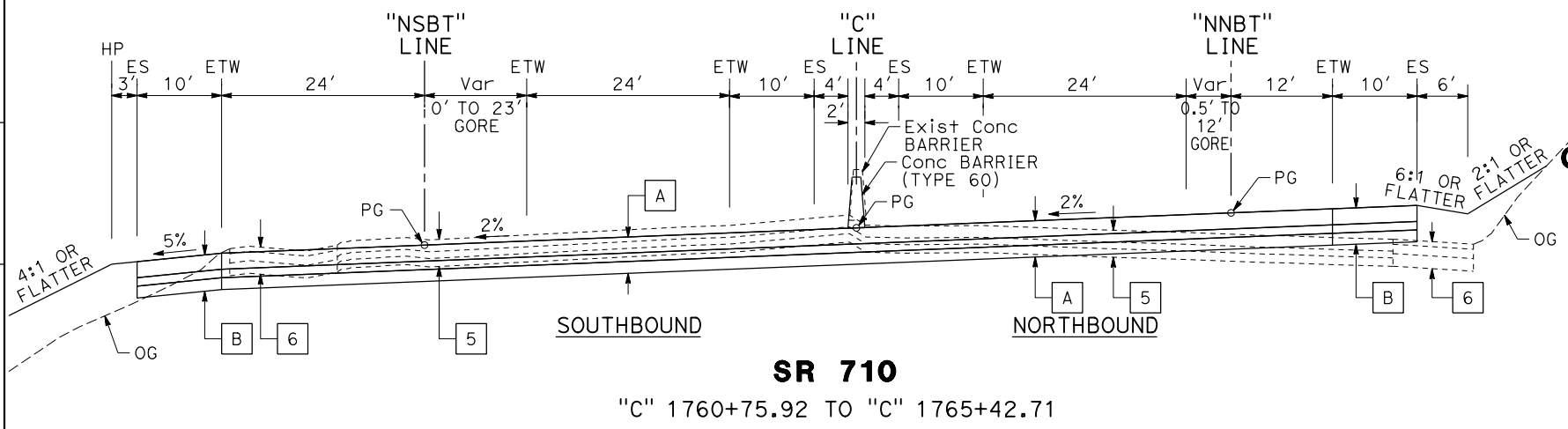
CH2M HILL  
 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
 METRO  
 ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



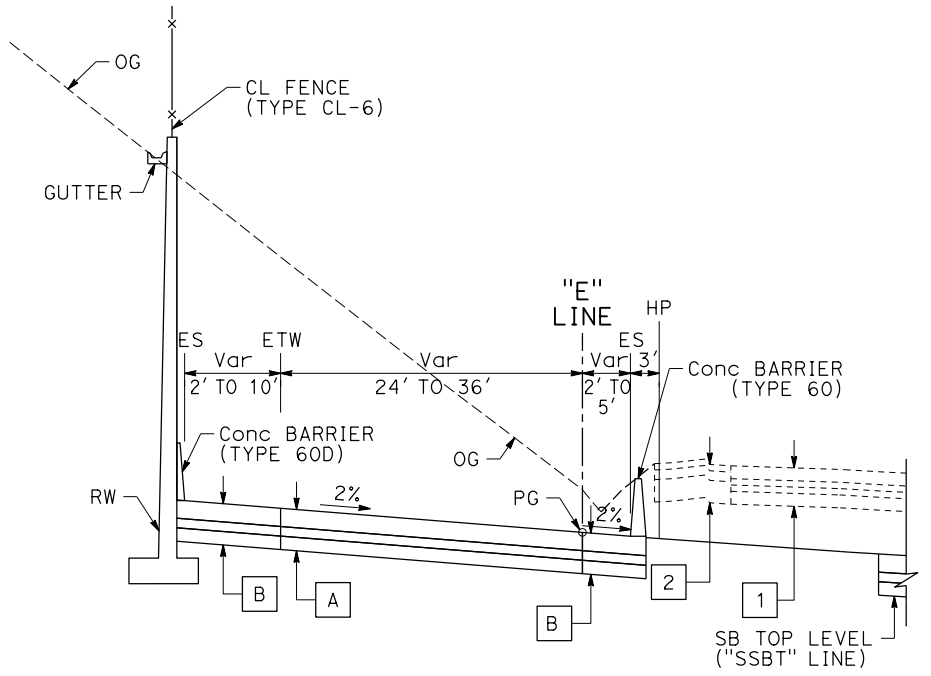
**CONNECTOR FROM WB I-10 TO NB SR 710**  
 "D" 409+70.00 TO "D" 417+85.00



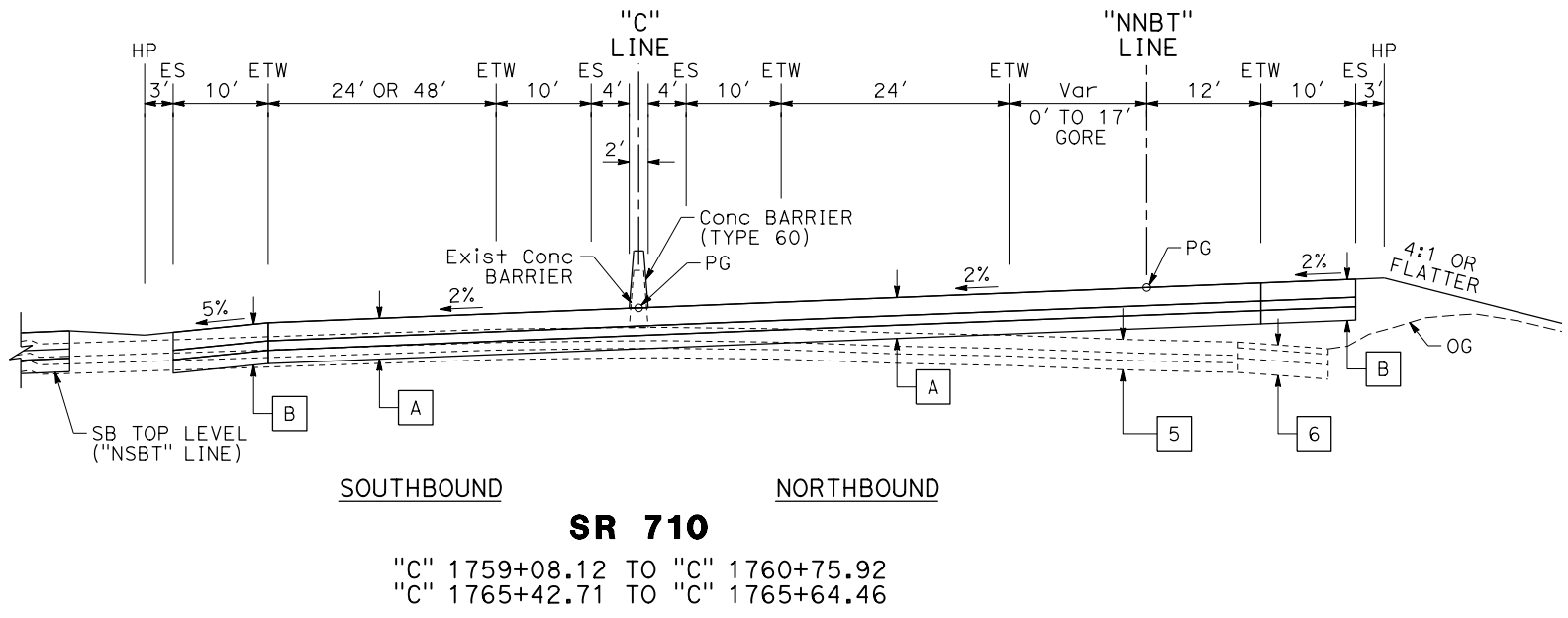
**CONNECTOR FROM SB SR 710 TO EB I-10**  
 "E" 412+58.91 TO "E" 415+67.11



**SR 710**  
 "C" 1760+75.92 TO "C" 1765+42.71



**CONNECTOR FROM SB SR 710 TO EB I-10**  
 "E" 406+90.00 TO "E" 412+58.91  
 "E" 415+67.11 TO "E" 421+64.75



**SR 710**  
 "C" 1759+08.12 TO "C" 1760+75.92  
 "C" 1765+42.71 TO "C" 1765+64.46

**TYPICAL CROSS SECTIONS**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

**X-7**

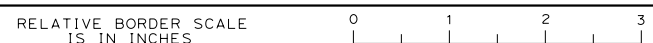
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 8 OF 103

NO SCALE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 EtTrans  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED/DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

USERNAME => pwsvc  
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UNIT 0000

PROJECT NUMBER & PHASE

07000001911

LAST REVISION DATE PLOTTED => 21-MAR-2014  
 00-00-00 TIME PLOTTED => 13:31

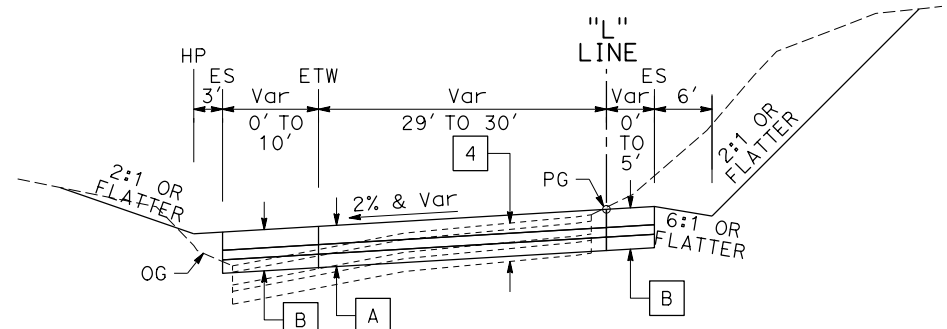
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX

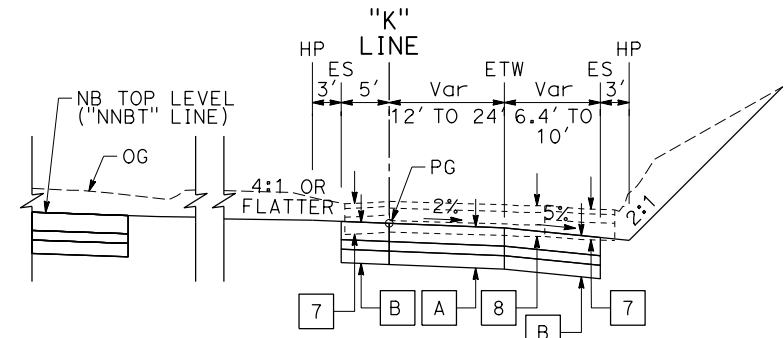
REGISTERED CIVIL ENGINEER	DATE
PLANS APPROVAL DATE	

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

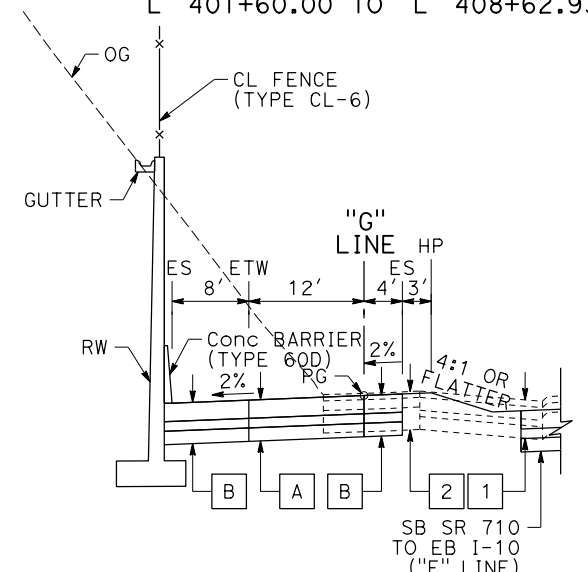
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707	METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012
--	--



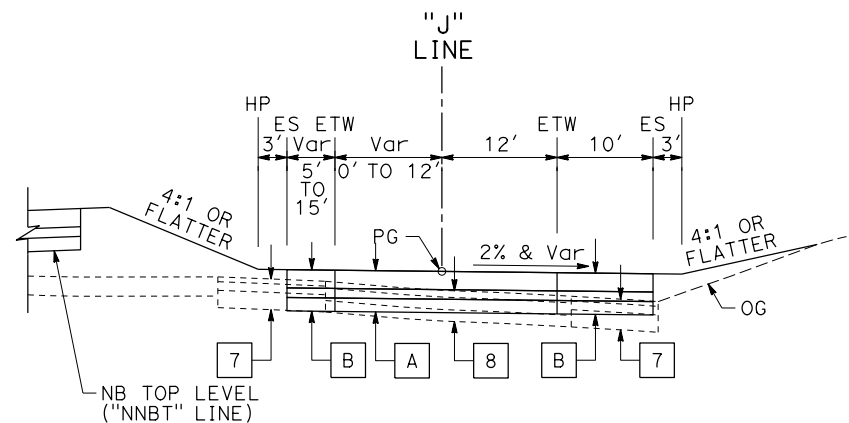
**CONNECTOR FROM WB I-10 TO SB SR 710**  
"L" 401+60.00 TO "L" 408+62.93



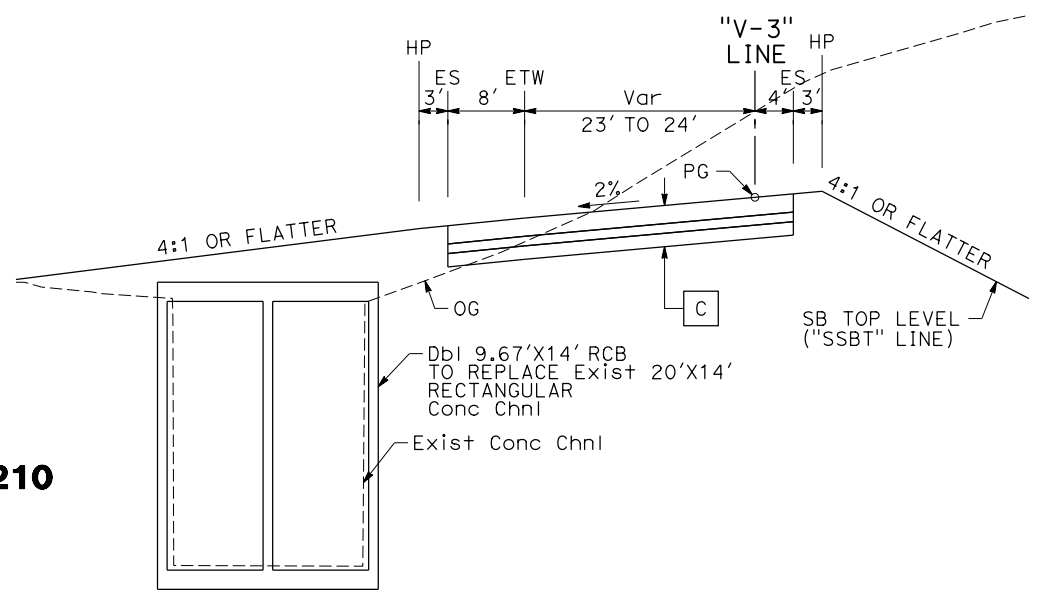
**CONNECTOR FROM NB SR 710 TO WB SR 134**  
"K" 745+15.00 TO "K" 753+95.00



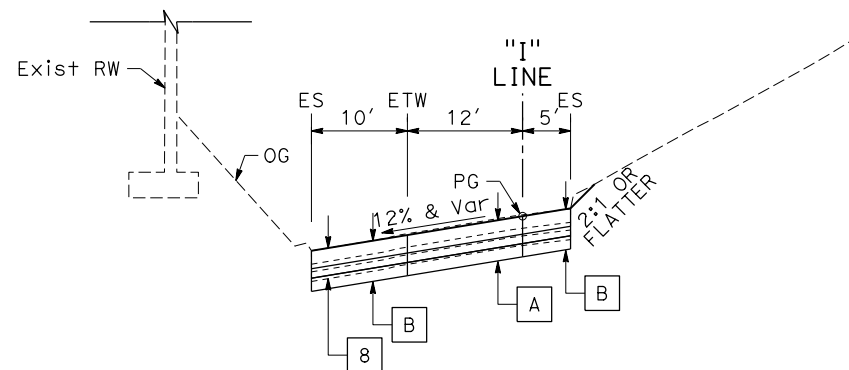
**HOT CONNECTOR FROM SB SR 710 TO WB I-10 HOT LANES**  
"G" 406+40.00 TO "G" 412+60.00



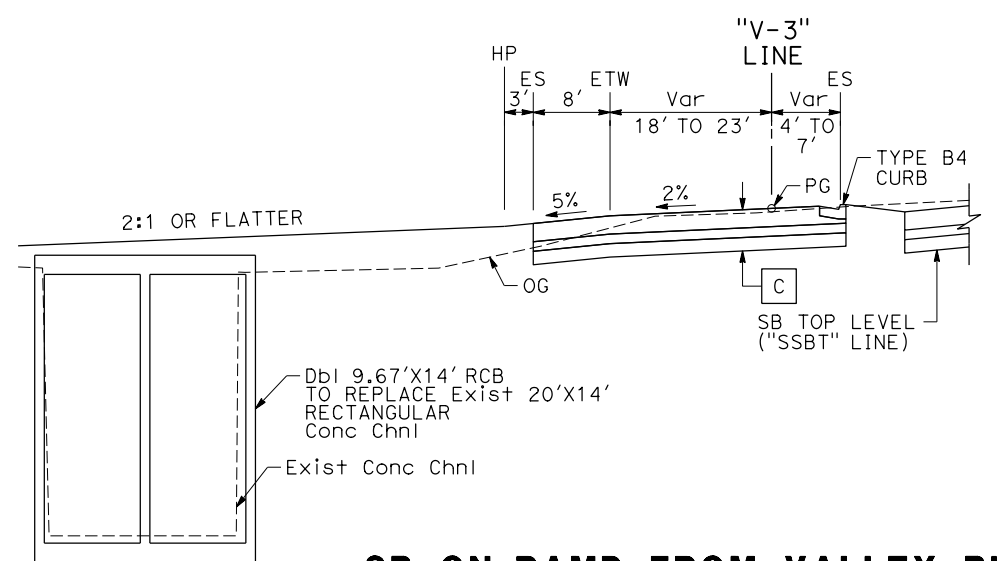
**CONNECTOR FROM NB SR 710 TO EB I-210**  
"J" 756+05.00 TO "J" 760+40.00



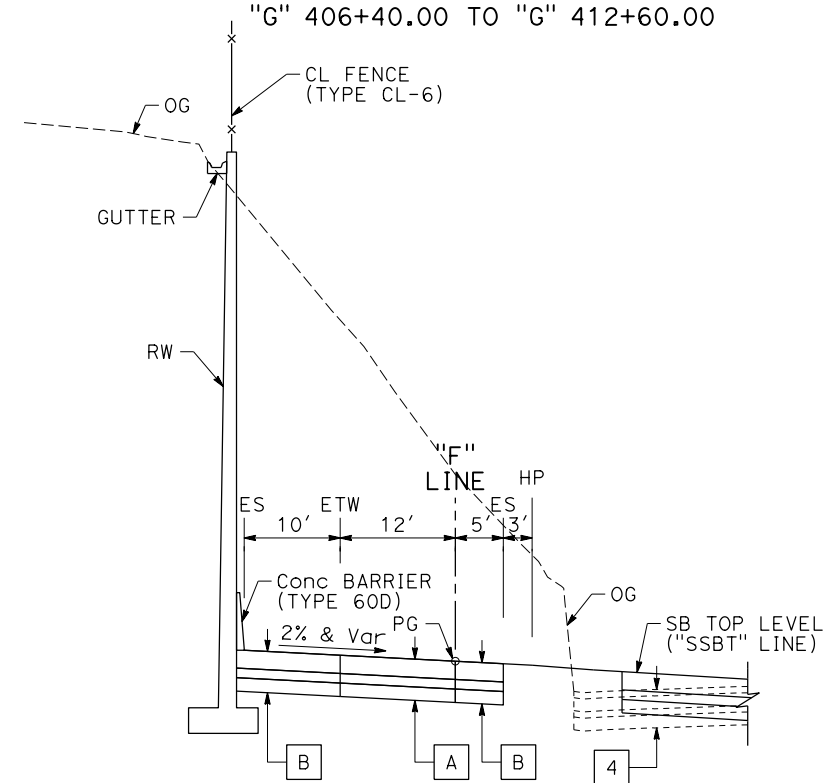
**SB ON-RAMP FROM VALLEY Blvd**  
"V-3" 441+95.00 TO "V-3" 450+30.00



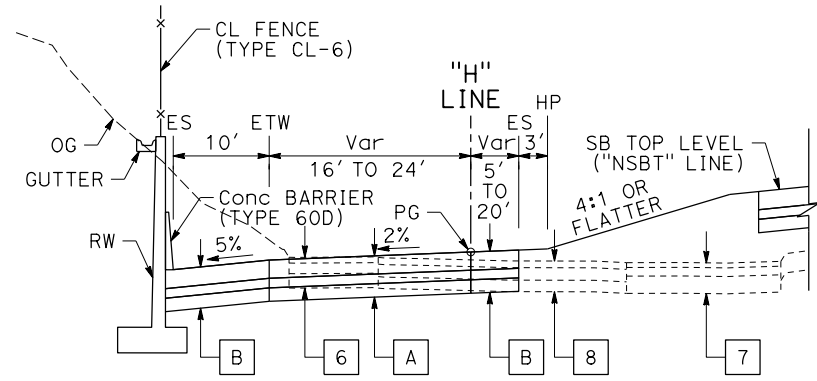
**CONNECTOR FROM EB SR 134 TO SB SR 710**  
"I" 748+40.00 TO "I" 759+80.00



**SB ON-RAMP FROM VALLEY Blvd**  
"V-3" 440+50.00 TO "V-3" 441+95.00



**CONNECTOR FROM SB SR 710 TO WB I-10**  
"F" 402+70.00 TO "F" 411+50.00



**CONNECTOR FROM WB SR 134 TO SB SR 710**  
"H" 757+54.56 TO "H" 765+20.00  
MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

**TYPICAL CROSS SECTIONS**  
FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION

ATTACHMENT I-2 SHEET 9 OF 103 NO SCALE

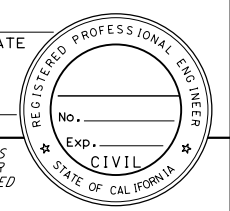
X-8

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED/DESIGNED BY  
 CHECKED BY  
 REVISOR BY  
 DATE REVISOR

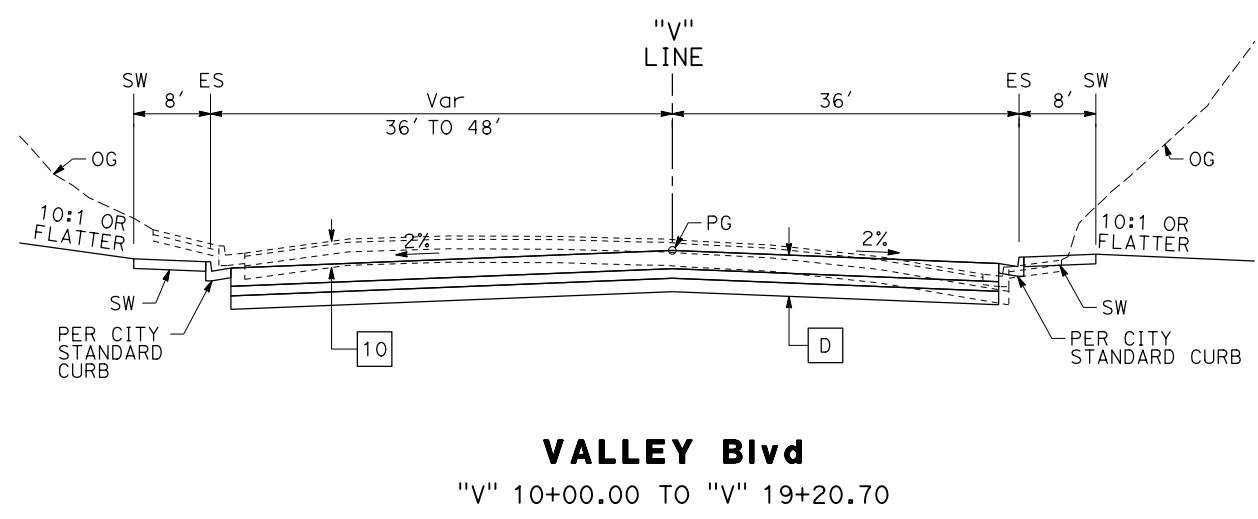
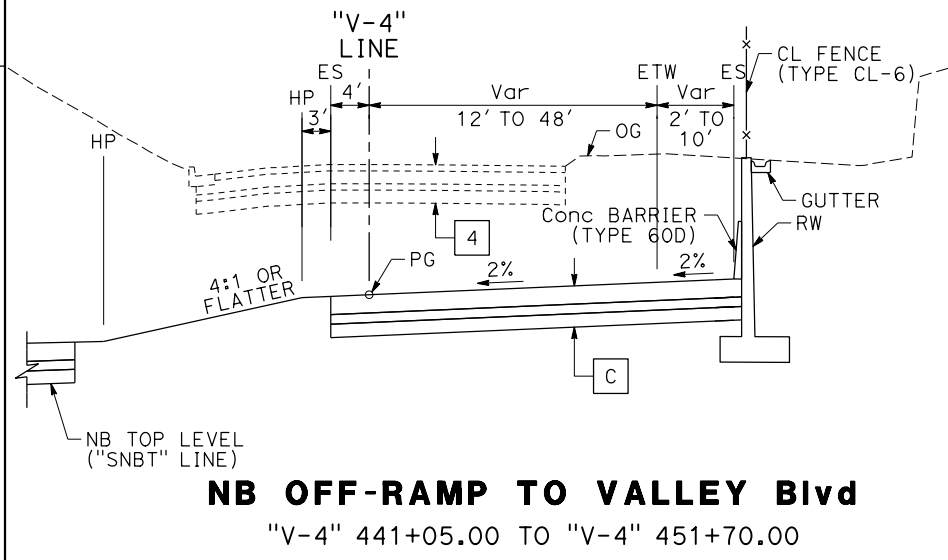
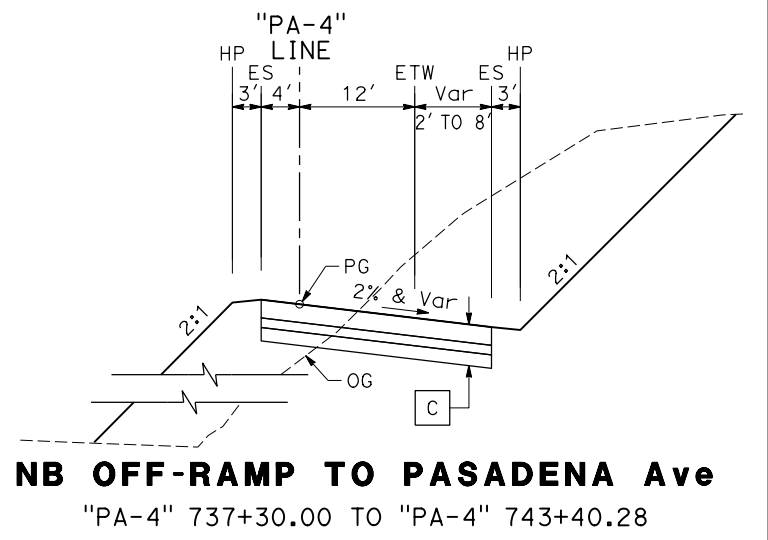
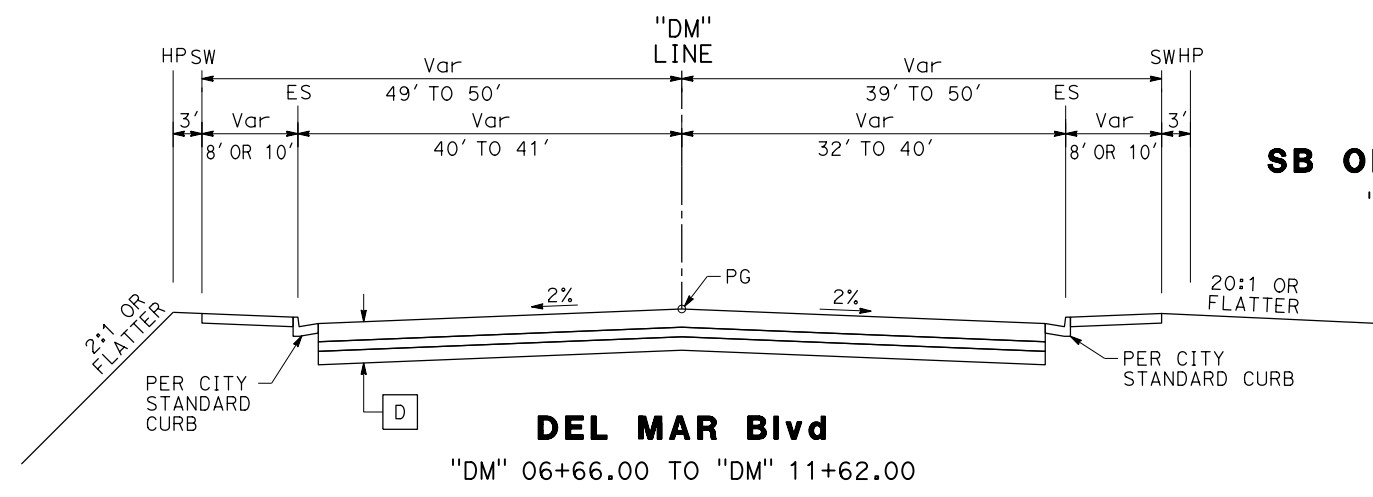
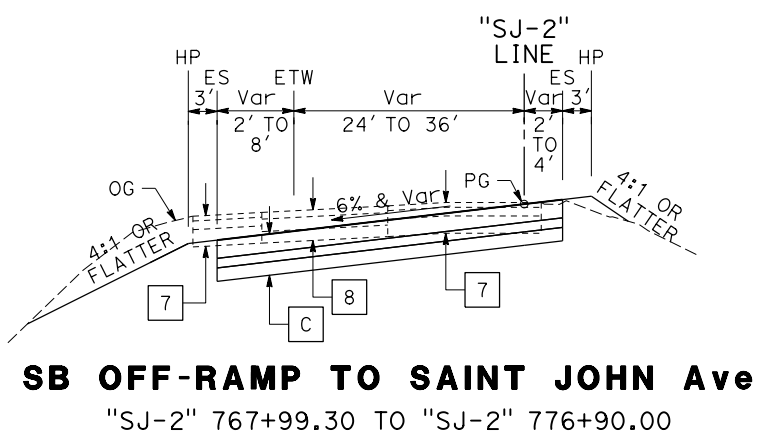
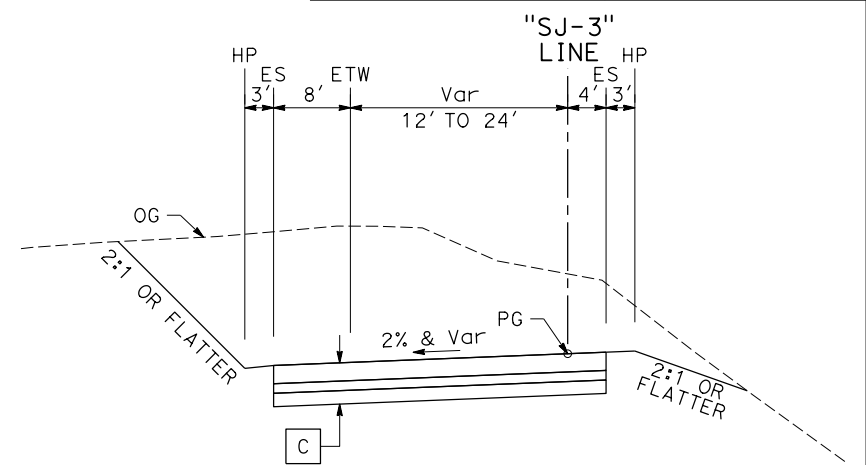
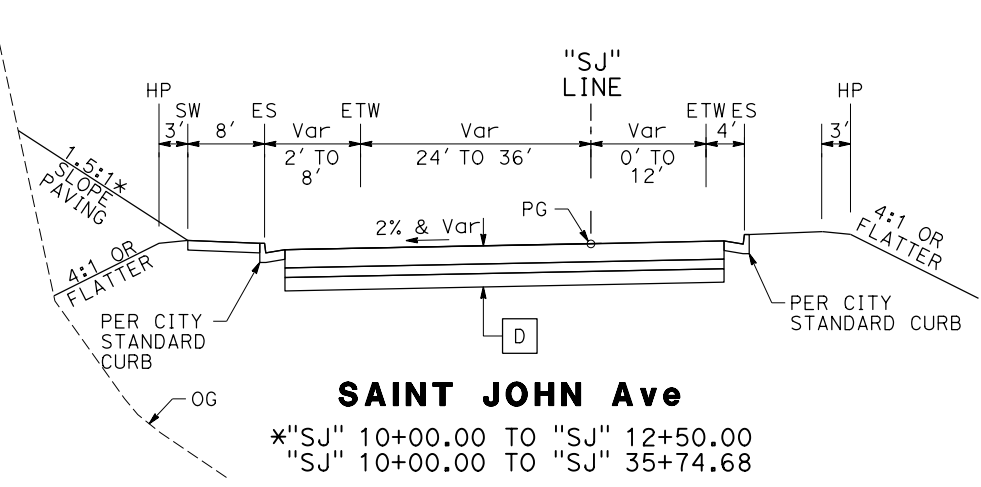
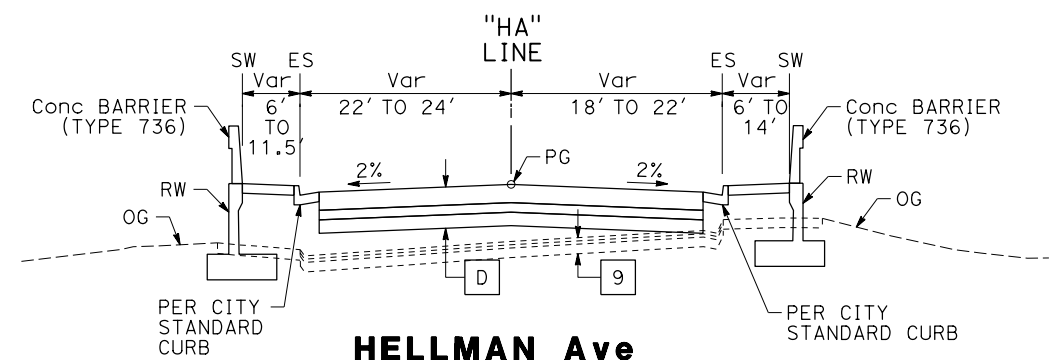
LAST REVISION: DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 13:31

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
 PLANS APPROVAL DATE \_\_\_\_\_  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
 METRO  
 ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



**TYPICAL CROSS SECTIONS**  
 FREEWAY TUNNEL ALTERNATIVE  
 DUAL BORE OPTION

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 EtTrans  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED/DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISIED

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

ATTACHMENT I-2 SHEET 10 OF 103

NO SCALE

X-9

BORDER LAST REVISED 7/2/2010

USERNAME => pwsvc  
 DGN FILE => 0700000191ca009.dgn

RELATIVE BORDER SCALE  
 IS IN INCHES



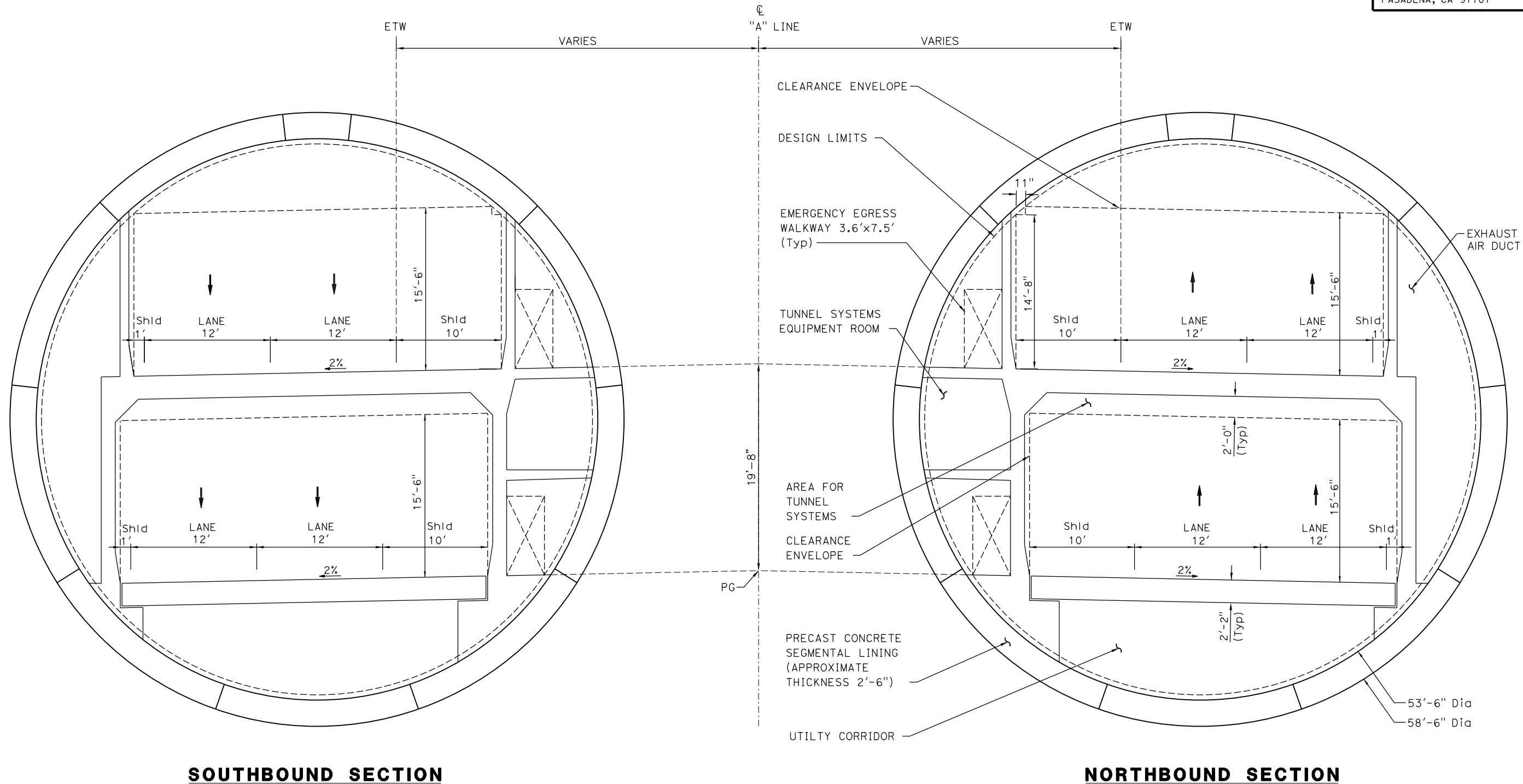
UNIT 0000

PROJECT NUMBER & PHASE

07000001911

LAST REVISION DATE PLOTTED => 06-OCT-2014  
 00-00-00 TIME PLOTTED => 17:53

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
JACOBS ASSOCIATES 234 E COLORADO BLVD, SUITE 400 PASADENA, CA 91101			



**SOUTHBOUND SECTION**

**NORTHBOUND SECTION**

ATTACHMENT I-2 SHEET 11 OF 103

**S2.01**

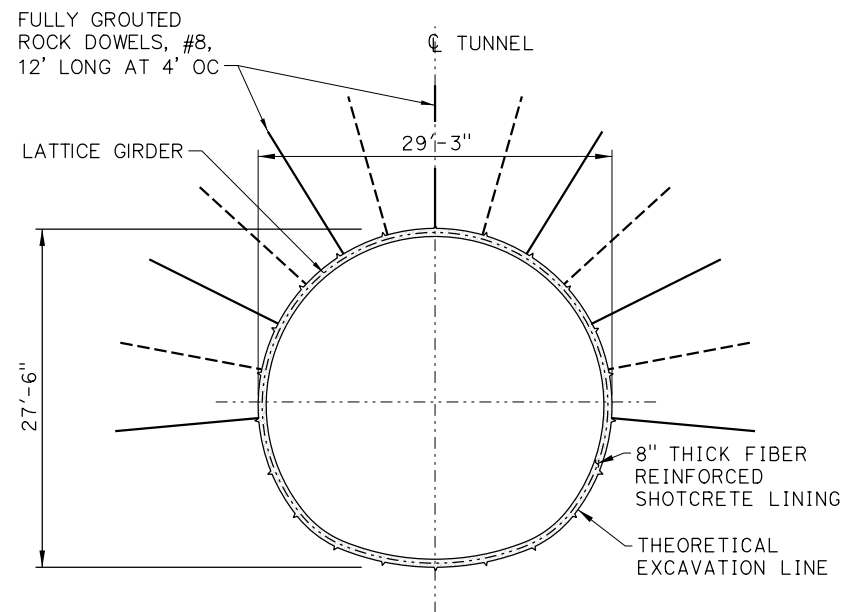
DESIGN OVERSIGHT
SIGN OFF DATE

DESIGNED BY	M. TORSIELLO	DATE	12-19-2013
DRAWN BY	J. TOLES	DATE	12-19-2013
CHECKED BY	S. KLEIN	DATE	2-7-2014
APPROVED	S. DUBNEWYCH	DATE	2-7-2014

X
PROJECT ENGINEER

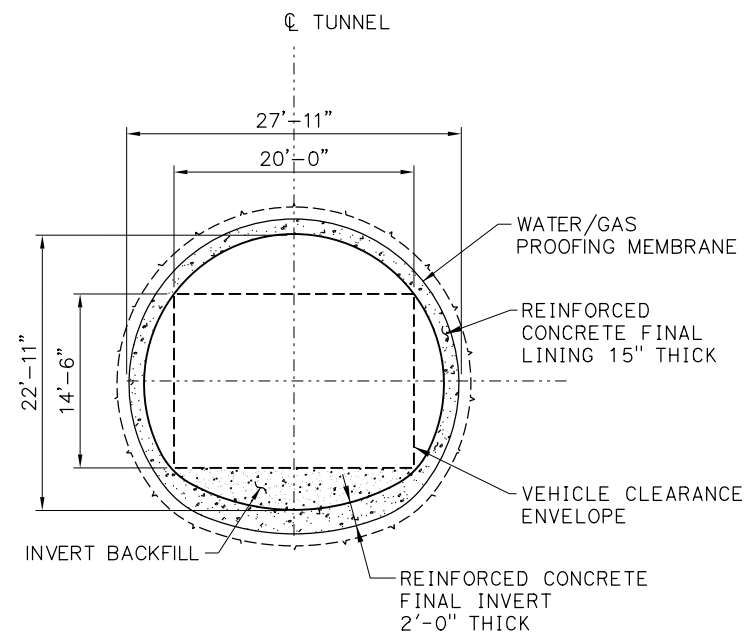
<b>SR 710 NORTH STUDY</b>	
<b>TUNNEL-TYPICAL SECTION</b>	
BRIDGE NO. TBD	UNIT:
SCALE: 1"=10'	PROJECT NUMBER & PHASE:

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
JACOBS ASSOCIATES 234 E COLORADO BLVD, SUITE 400 PASADENA, CA 91101			



**INITIAL LINING SECTION**

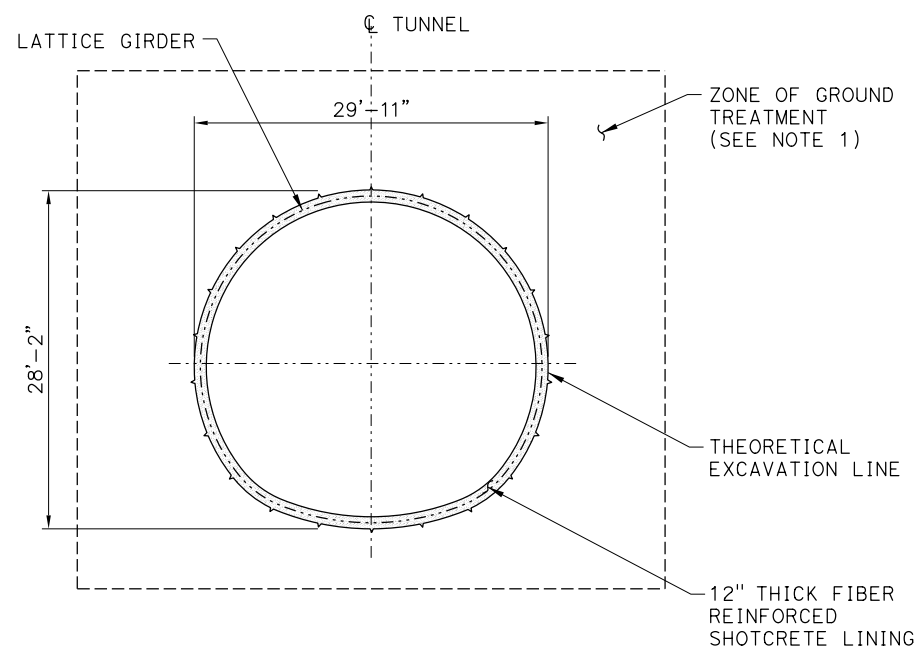
NTS



**FINAL LINING SECTION**

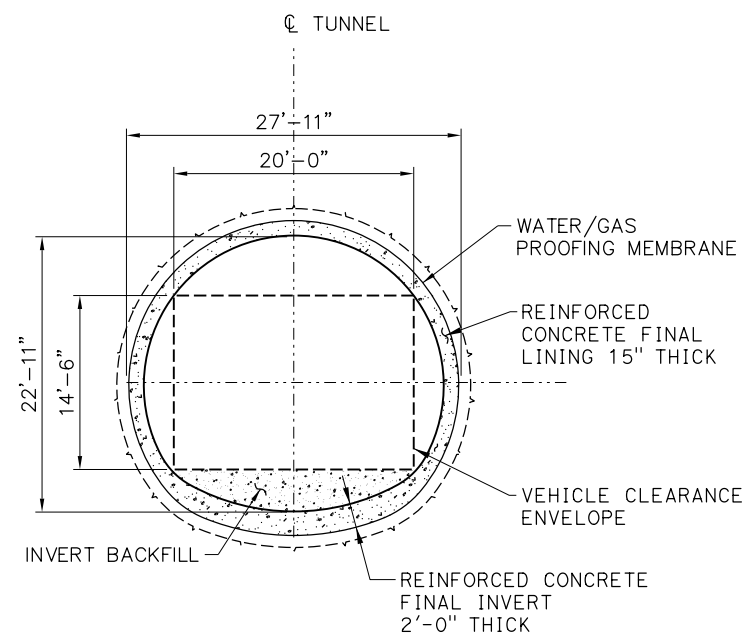
NTS

**CROSS PASSAGE IN ROCK**



**INITIAL LINING SECTION**

NTS



**FINAL LINING SECTION**

NTS

**CROSS PASSAGE IN SOIL**

**NOTES**

- GROUND TREATMENT METHODS INCLUDE, BUT ARE NOT LIMITED TO, PERMEATION GROUTING, CHEMICAL GROUTING, OR GROUND FREEZING. TREATED GROUND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 400 PSI AT 28 DAYS.

ATTACHMENT I-2 SHEET 12 OF 103

**S3.01**

X	DESIGN OVERSIGHT
X	SIGN OFF DATE

DESIGNED BY	Y. SUN	DATE	7-23-2013
DRAWN BY	J. TOLES	DATE	7-23-2013
CHECKED BY	S. KLEIN	DATE	2-7-2014
APPROVED	S. DUBNEWYCH	DATE	2-7-2014

PROJECT ENGINEER	
------------------	--

<b>SR 710 NORTH STUDY</b>	
<b>CROSS PASSAGE 1 OF 7</b>	
BRIDGE NO. TBD	UNIT:
SCALE: AS SHOWN	PROJECT NUMBER & PHASE:



**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**LEGEND:**

- Exist RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- - - - - TEMPORARY CONSTRUCTION EASEMENT
- - - - - PERMANENT FOOTING EASEMENT
- - - - - UNDERGROUND TUNNEL EASEMENT / UNDERGROUND EASEMENT
- CITY BOUNDARY
- - - - - FAULT ZONE BOUNDARY

**ABBREVIATIONS:**

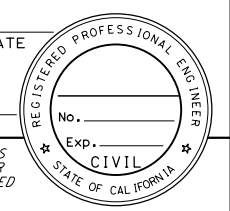
- TCE TEMPORARY CONSTRUCTION EASEMENT
- PFE PERMANENT FOOTING EASEMENT
- UTE UNDERGROUND TUNNEL EASEMENT
- UE UNDERGROUND EASEMENT

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012

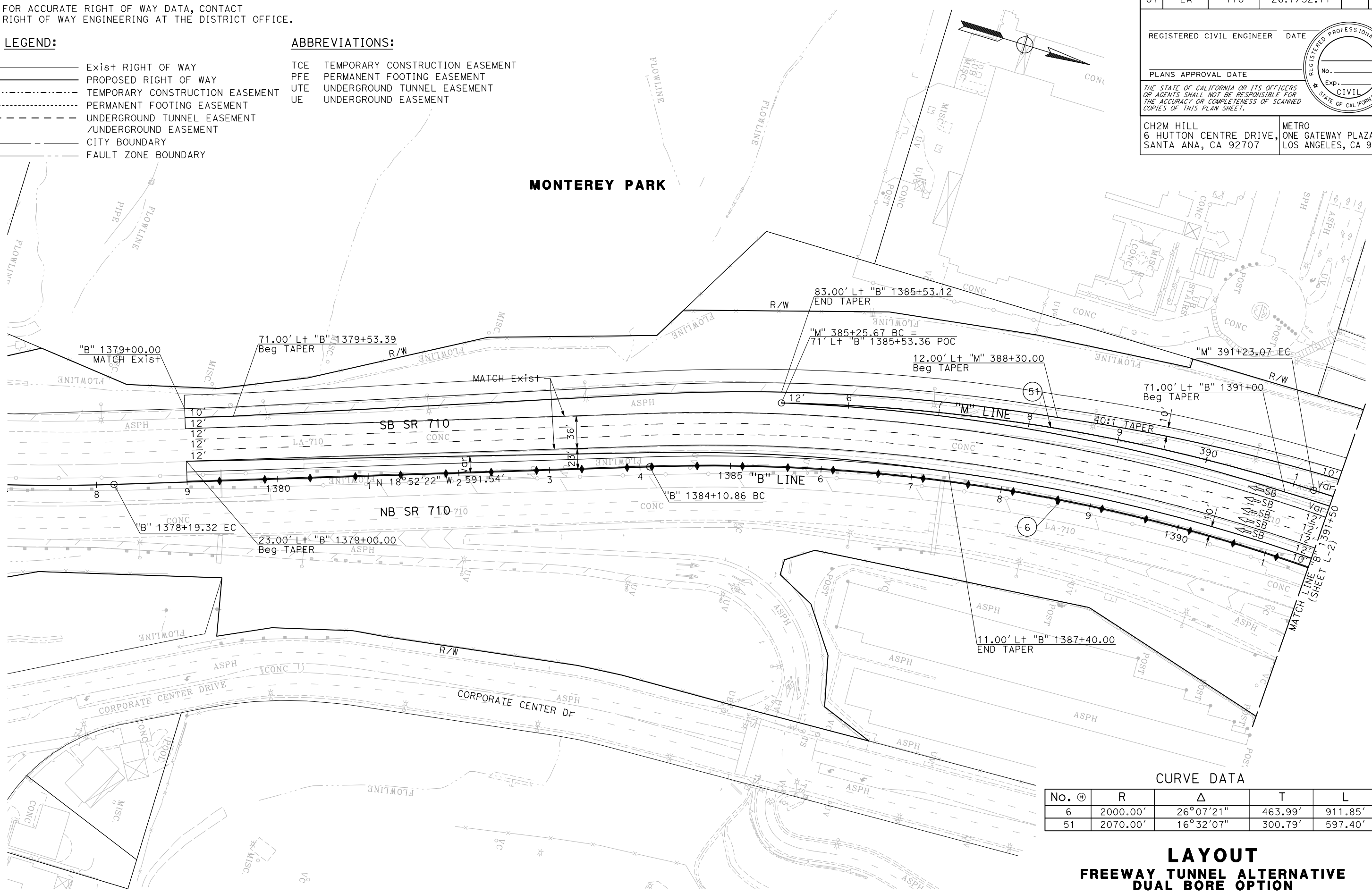
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

REVISOR: [ ] DATE: [ ]

CALCULATED/DESIGNED BY: [ ] CHECKED BY: [ ]

CONSULTANT FUNCTIONAL SUPERVISOR: [ ]



**CURVE DATA**

No. ⊕	R	Δ	T	L
6	2000.00'	26°07'21"	463.99'	911.85'
51	2070.00'	16°32'07"	300.79'	597.40'

**LAYOUT**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 13 OF 103 SCALE 1"=100'

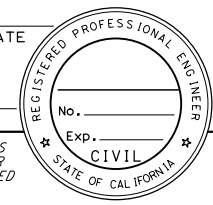
**L - 1**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:32

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

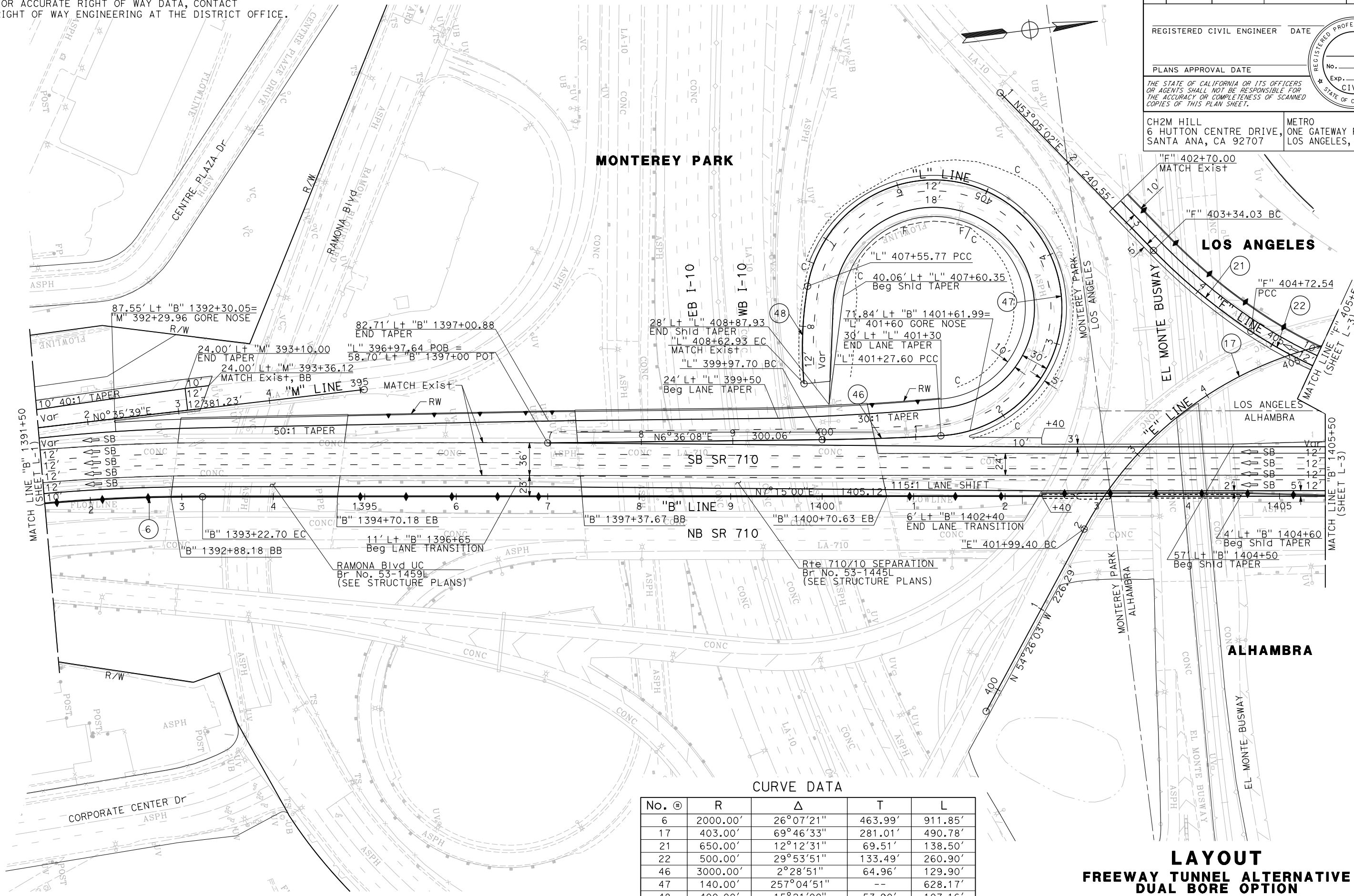
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR
Et-Caltans		CHECKED BY	DATE REVISED



**CURVE DATA**

No. @	R	Δ	T	L
6	2000.00'	26°07'21"	463.99'	911.85'
17	403.00'	69°46'33"	281.01'	490.78'
21	650.00'	12°12'31"	69.51'	138.50'
22	500.00'	29°53'51"	133.49'	260.90'
46	3000.00'	2°28'51"	64.96'	129.90'
47	140.00'	257°04'51"	--	628.17'
48	400.00'	15°21'00"	53.90'	107.16'

**LAYOUT**  
**FREeway TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

SCALE 1"=100'  
**L - 2**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION ATTACHMENT I-2 SHEET 14 OF 103**

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. Ⓢ	R	Δ	T	L
7	4000.00'	16°15'28"	571.34'	1135.00'
13	425.00'	136°51'34"	1075.05'	1015.17'
14	3000.00'	12°25'42"	326.66'	650.75'
17	403.00'	69°46'33"	281.01'	490.78'
22	500.00'	29°53'51"	133.49'	260.90'
23	3500.00'	9°18'05"	284.72'	568.20'
26	401.86'	67°57'06"	270.81'	476.60'
27	1600.00'	4°34'19"	63.87'	127.67'
91	3500.00'	16°15'28"	499.92'	993.13'
106	3950.00'	16°15'28"	564.20'	1120.81'
107	3800.00'	16°15'28"	542.77'	1078.25'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

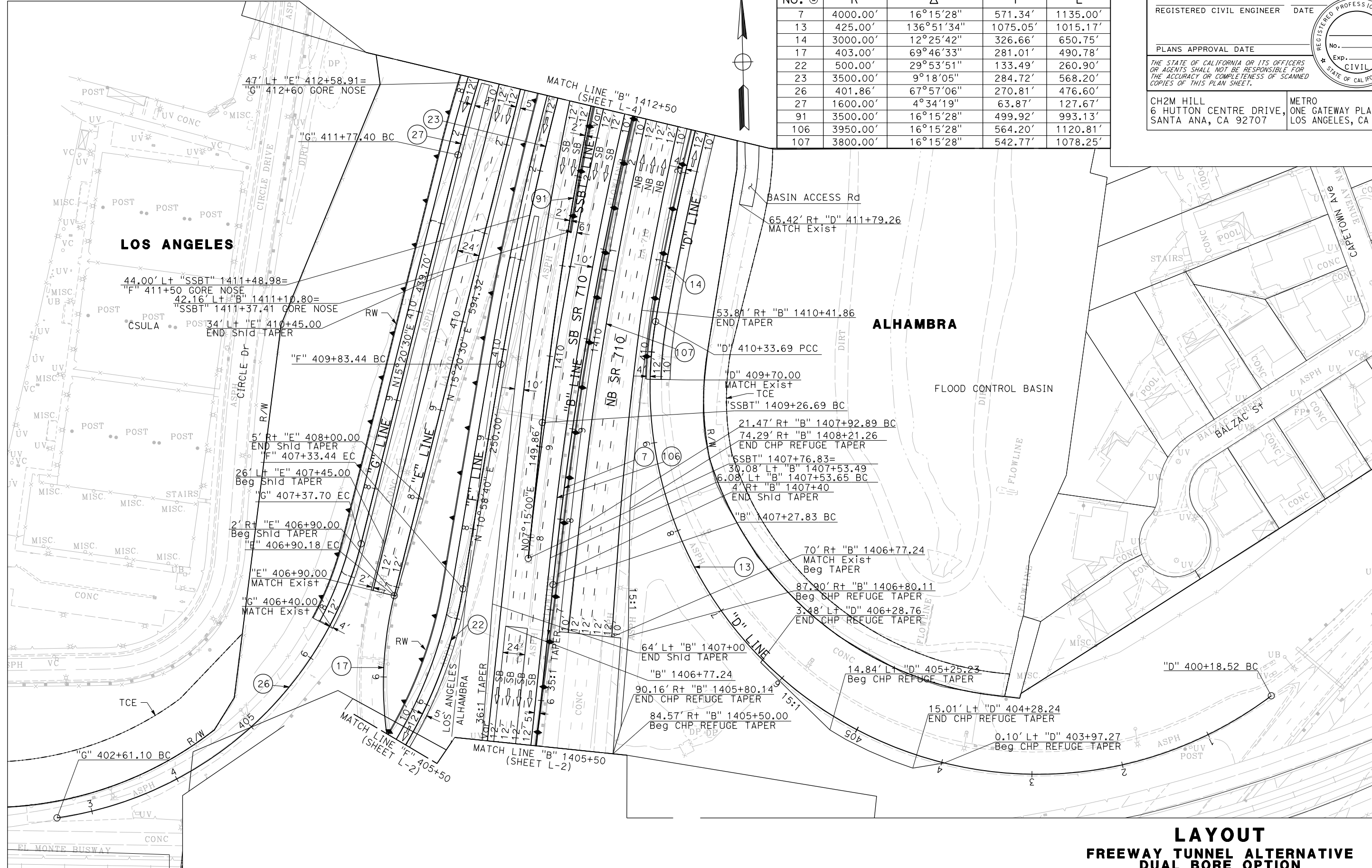
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CONSULTANT FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISOR

DATE



**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**LAYOUT**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

ATTACHMENT I-2 SHEET 15 OF 103

SCALE 1"=100'

**L-3**

LAST REVISION DATE PLOTTED => 27-MAR-2014  
00-00-00 TIME PLOTTED => 18:35

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

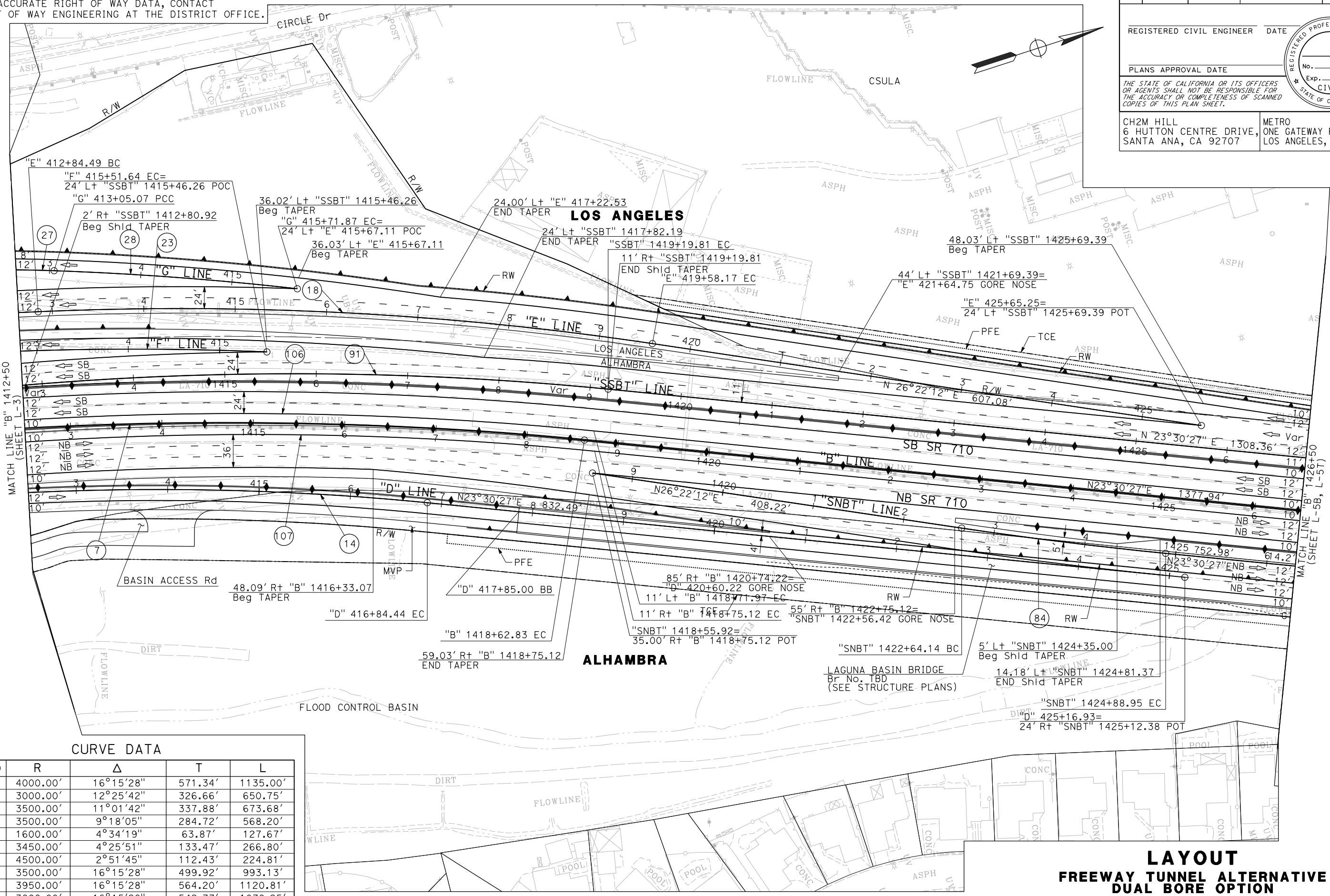
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



**CURVE DATA**

No. @	R	Δ	T	L
7	4000.00'	16°15'28"	571.34'	1135.00'
14	3000.00'	12°25'42"	326.66'	650.75'
18	3500.00'	11°01'42"	337.88'	673.68'
23	3500.00'	9°18'05"	284.72'	568.20'
27	1600.00'	4°34'19"	63.87'	127.67'
28	3450.00'	4°25'51"	133.47'	266.80'
84	4500.00'	2°51'45"	112.43'	224.81'
91	3500.00'	16°15'28"	499.92'	993.13'
106	3950.00'	16°15'28"	564.20'	1120.81'
107	3800.00'	16°15'28"	542.77'	1078.25'

**LAYOUT**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 16 OF 103

SCALE 1"=100'

**L - 4**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CONSULTANT FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISOR BY

DATE REVISED



USERNAME => pwsvc  
DGN FILE => 0700000191ea004.dgn



UNIT 0000

PROJECT NUMBER & PHASE

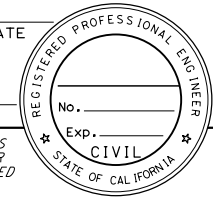
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LAST REVISION DATE PLOTTED => 27-MAR-2014  
00-00-00 TIME PLOTTED => 18:35

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

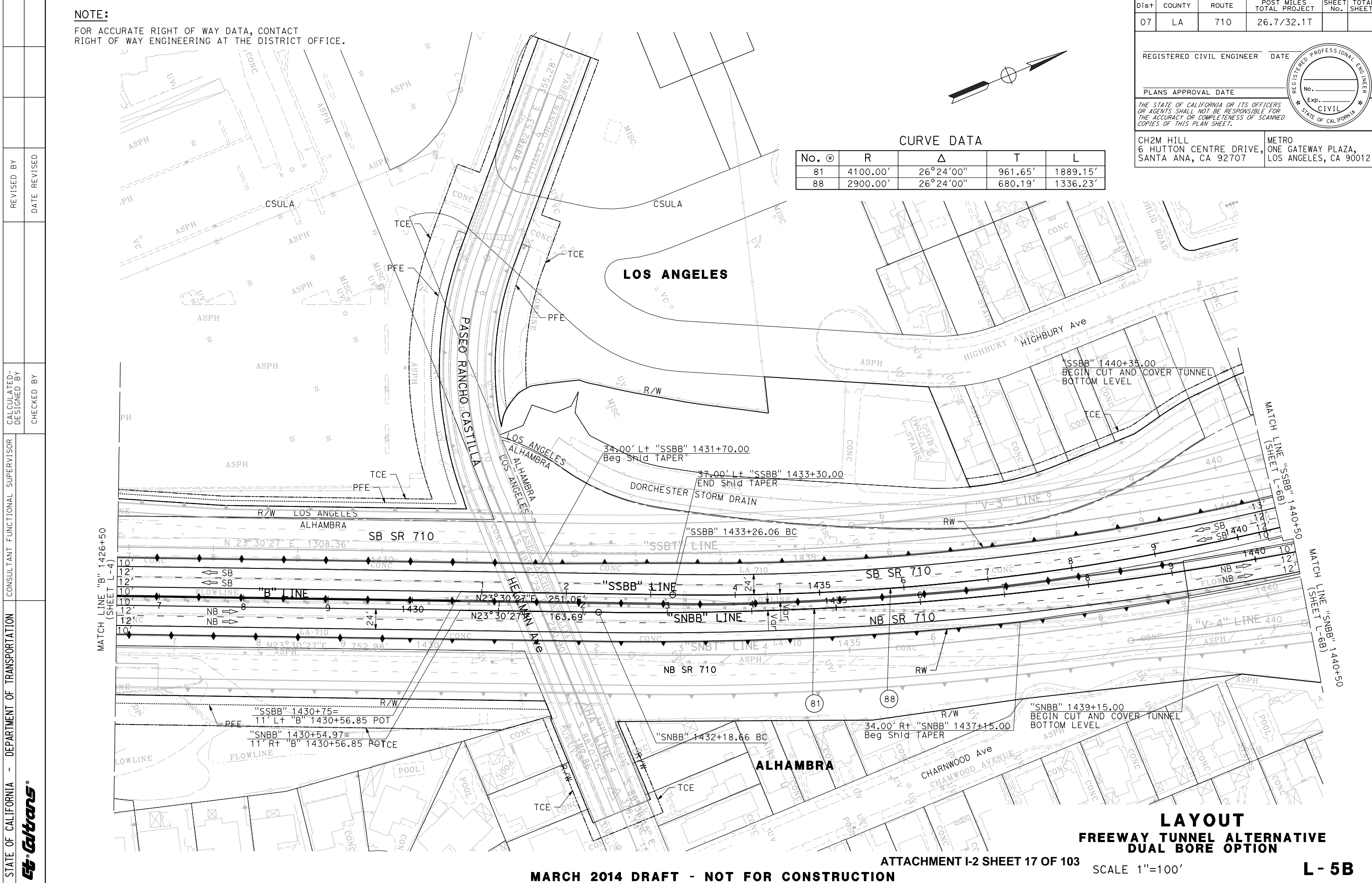
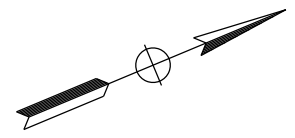
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707  
METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012

**CURVE DATA**

No. @	R	Δ	T	L
81	4100.00'	26°24'00"	961.65'	1889.15'
88	2900.00'	26°24'00"	680.19'	1336.23'



**LAYOUT  
FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

ATTACHMENT I-2 SHEET 17 OF 103

SCALE 1"=100'

**L - 5B**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**



LAST REVISION DATE PLOTTED => 27-MAR-2014 00-00-00 TIME PLOTTED => 18:24

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

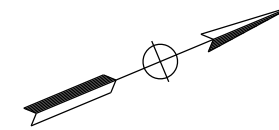
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

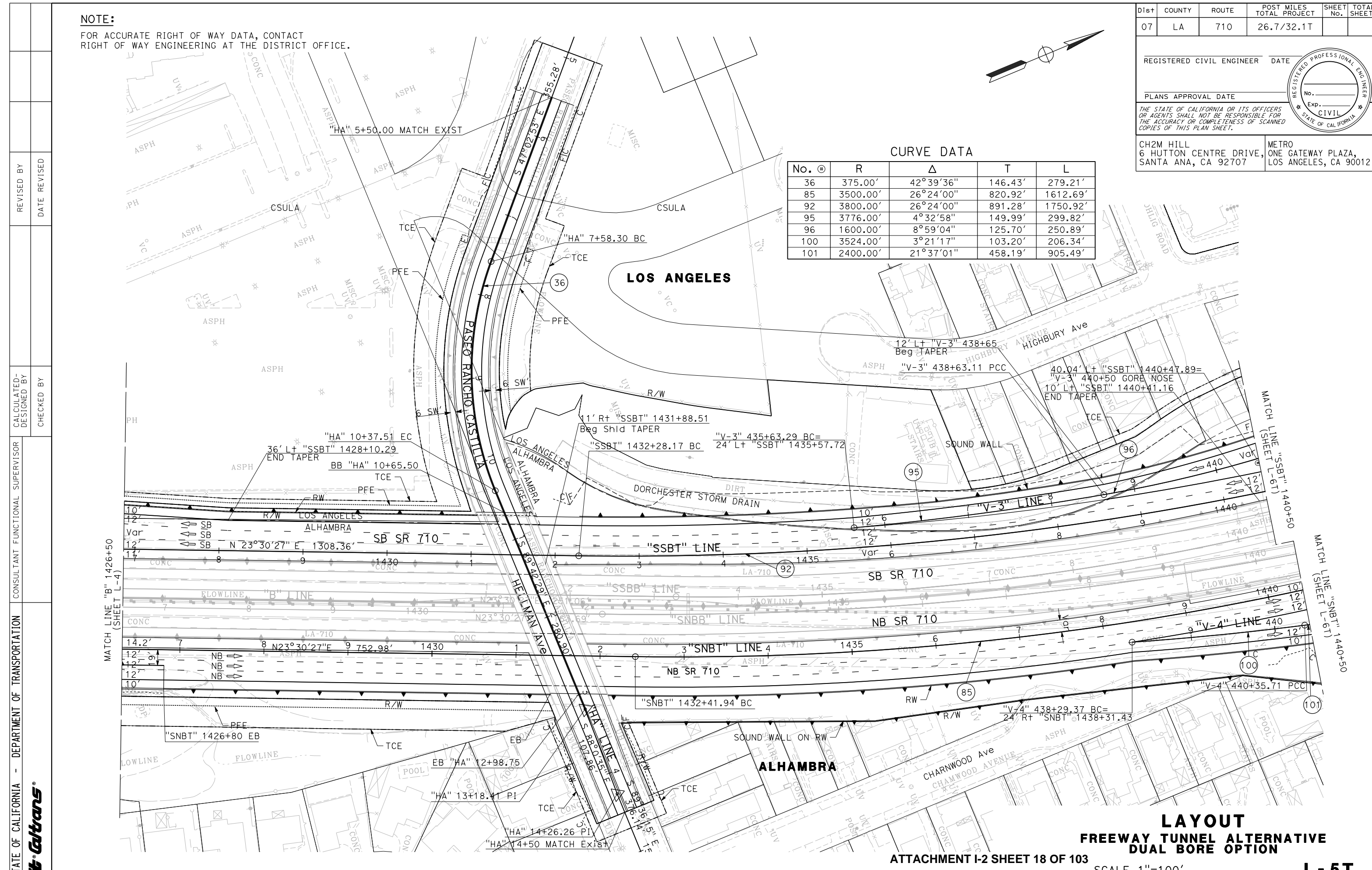
CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



**CURVE DATA**

No. Ⓢ	R	Δ	T	L
36	375.00'	42°39'36"	146.43'	279.21'
85	3500.00'	26°24'00"	820.92'	1612.69'
92	3800.00'	26°24'00"	891.28'	1750.92'
95	3776.00'	4°32'58"	149.99'	299.82'
96	1600.00'	8°59'04"	125.70'	250.89'
100	3524.00'	3°21'17"	103.20'	206.34'
101	2400.00'	21°37'01"	458.19'	905.49'



REVISOR BY DATE REVISOR BY DATE REVISOR BY DATE REVISOR BY DATE

CALCULATED/DESIGNED BY CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR

DEPARTMENT OF TRANSPORTATION - DEPARTMENT OF CALIFORNIA

Caltrans

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**LAYOUT  
FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

ATTACHMENT I-2 SHEET 18 OF 103

SCALE 1"=100'

**L-5T**

BORDER LAST REVISED 7/2/2010

USERNAME => pwsvc  
DGN FILE => 0700000191e005T.dgn

RELATIVE BORDER SCALE IS IN INCHES

UNIT 0000

PROJECT NUMBER & PHASE

07000001911

LAST REVISION DATE PLOTTED => 17-SEP-2014 00:00:00 TIME PLOTTED => 10:35

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

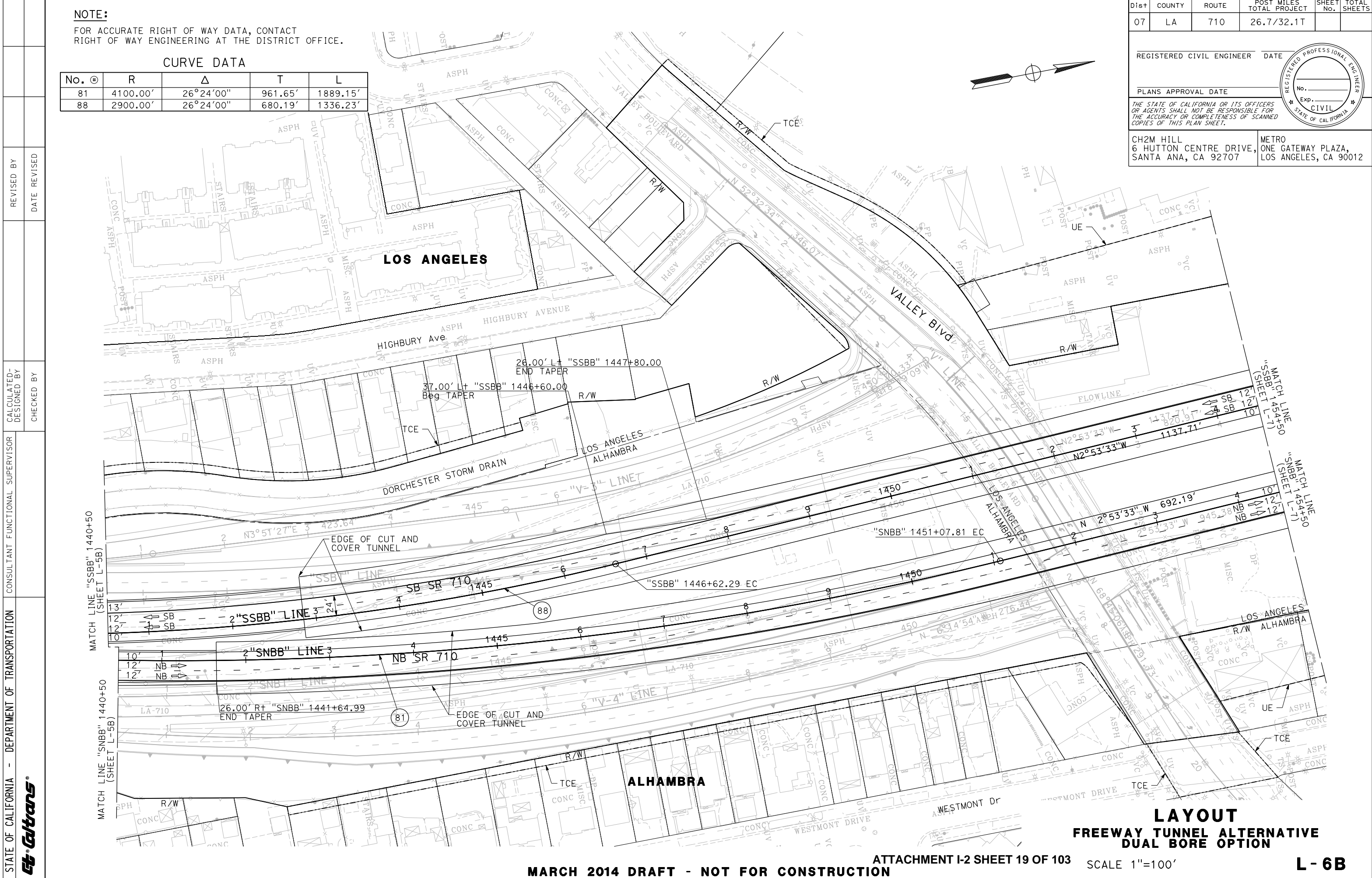
**CURVE DATA**

No. @	R	Δ	T	L
81	4100.00'	26°24'00"	961.65'	1889.15'
88	2900.00'	26°24'00"	680.19'	1336.23'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
No. \_\_\_\_\_  
Exp. \_\_\_\_\_  
CIVIL  
STATE OF CALIFORNIA

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
CONSULTANT FUNCTIONAL SUPERVISOR  
CALCULATED/DESIGNED BY  
CHECKED BY  
REVISED BY  
DATE REVISED



**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 19 OF 103

SCALE 1"=100'

**L - 6B**

**LAYOUT  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. #	R	Δ	T	L
85	3500.00'	26°24'00"	820.92'	1612.69'
92	3800.00'	26°24'00"	891.28'	1750.92'
96	1600.00'	8°59'04"	125.70'	250.89'
97	1200.00'	22°10'36"	235.18'	464.47'
101	2400.00'	21°37'01"	458.19'	905.49'
104	1000.00'	16°12'32"	142.40'	282.90'
105	800.00'	14°53'26"	104.55'	207.91'

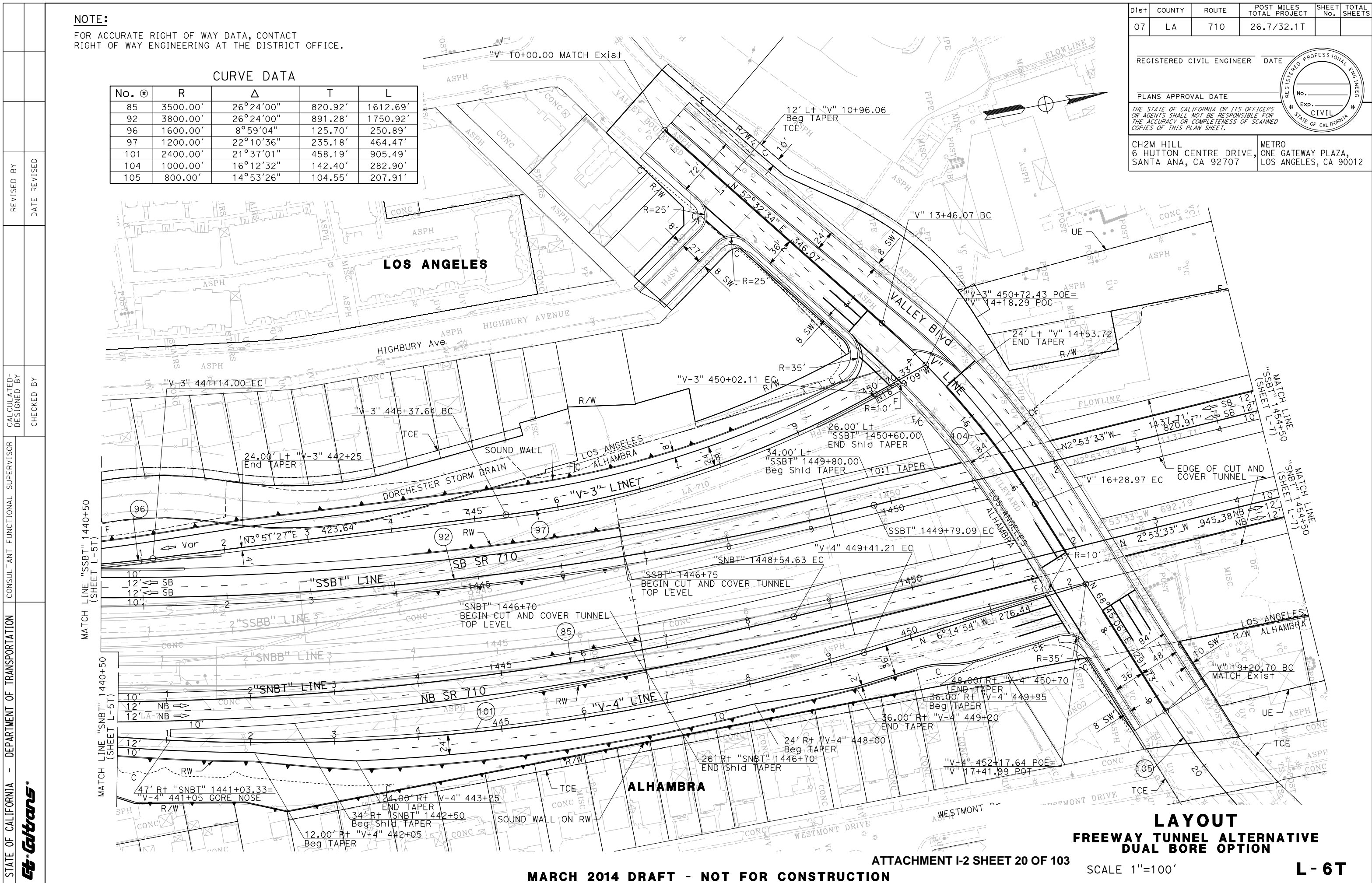
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



REVISOR: [ ] DATE: [ ]

CALCULATED/DESIGNED BY: [ ] CHECKED BY: [ ]

CONSULTANT FUNCTIONAL SUPERVISOR: [ ]

DEPARTMENT OF TRANSPORTATION

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 20 OF 103

**LAYOUT  
FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

SCALE 1"=100'

**L-6T**



**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

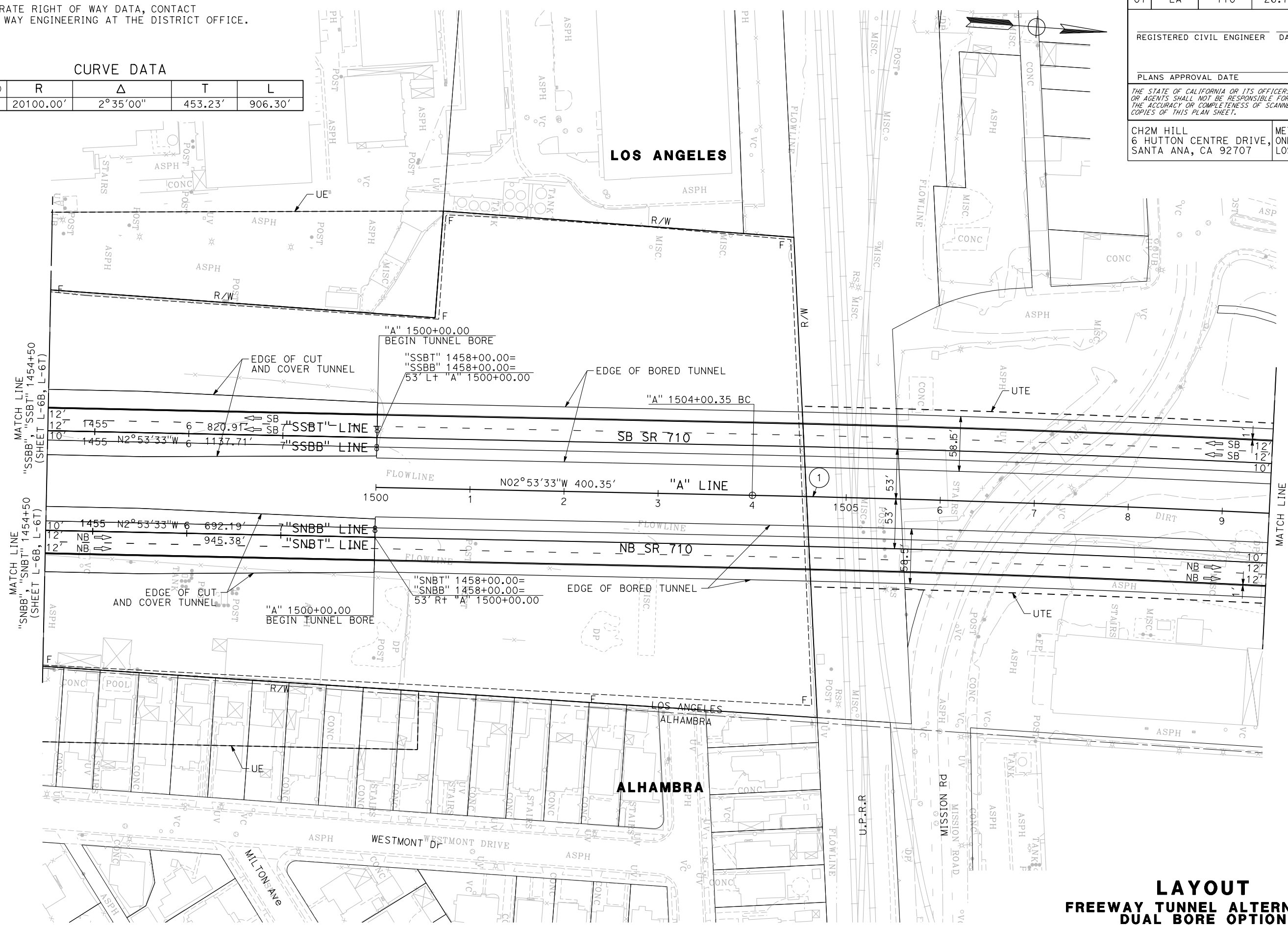
CURVE DATA				
No. @	R	Δ	T	L
1	20100.00'	2°35'00"	453.23'	906.30'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
 PLANS APPROVAL DATE \_\_\_\_\_  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
 METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



**LAYOUT  
 FREEWAY TUNNEL ALTERNATIVE  
 DUAL BORE OPTION**

ATTACHMENT I-2 SHEET 21 OF 103

SCALE 1"=100'

**L-7**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**



**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. Ⓢ	R	Δ	T	L
1	20100.00'	2°35'00"	453.23'	906.30'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

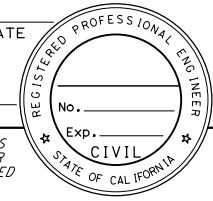
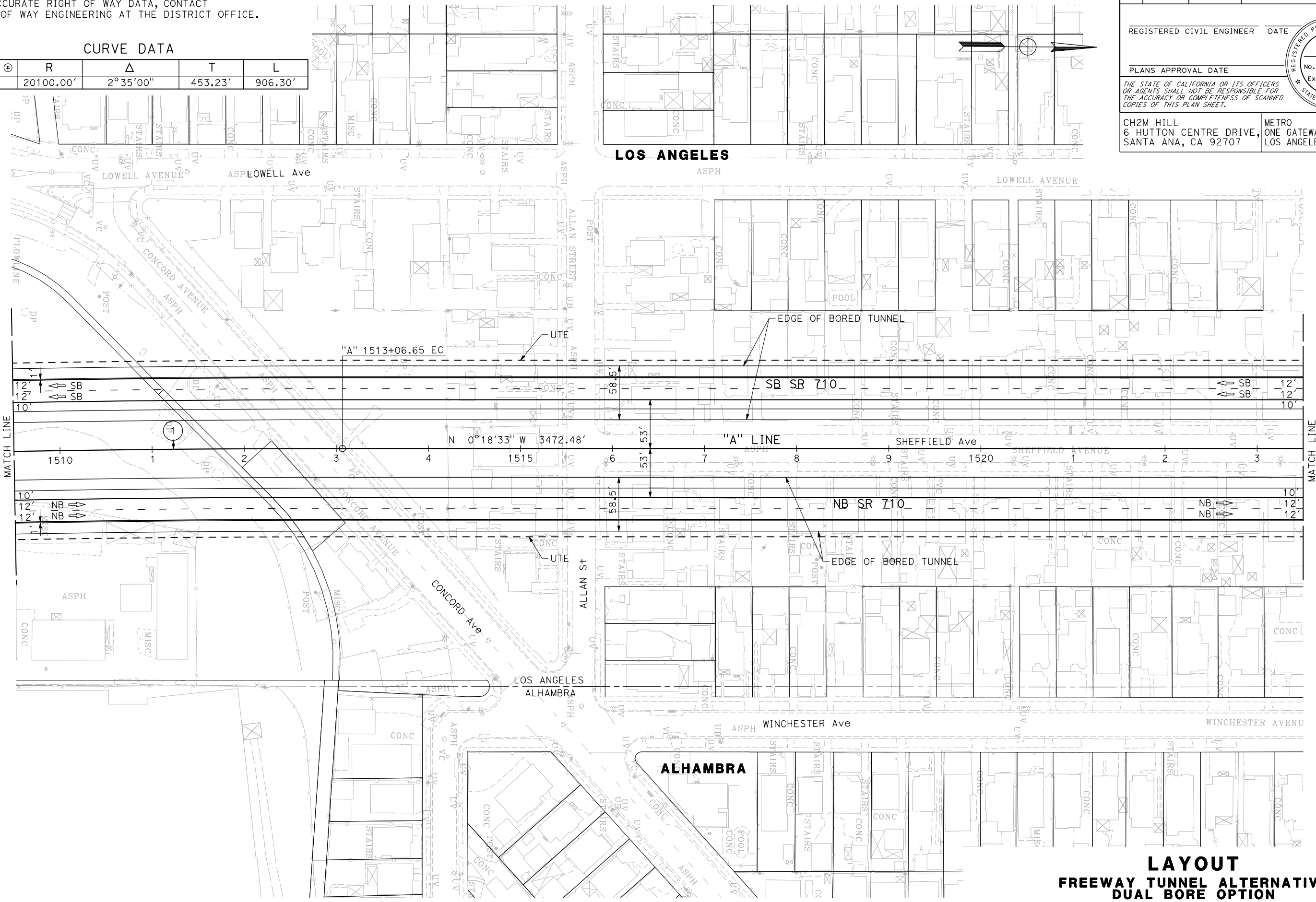
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Ettrans

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 22 OF 103

**LAYOUT  
FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

SCALE 1"=100'

**L - 8**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:31

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED/DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
 RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

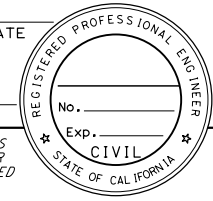
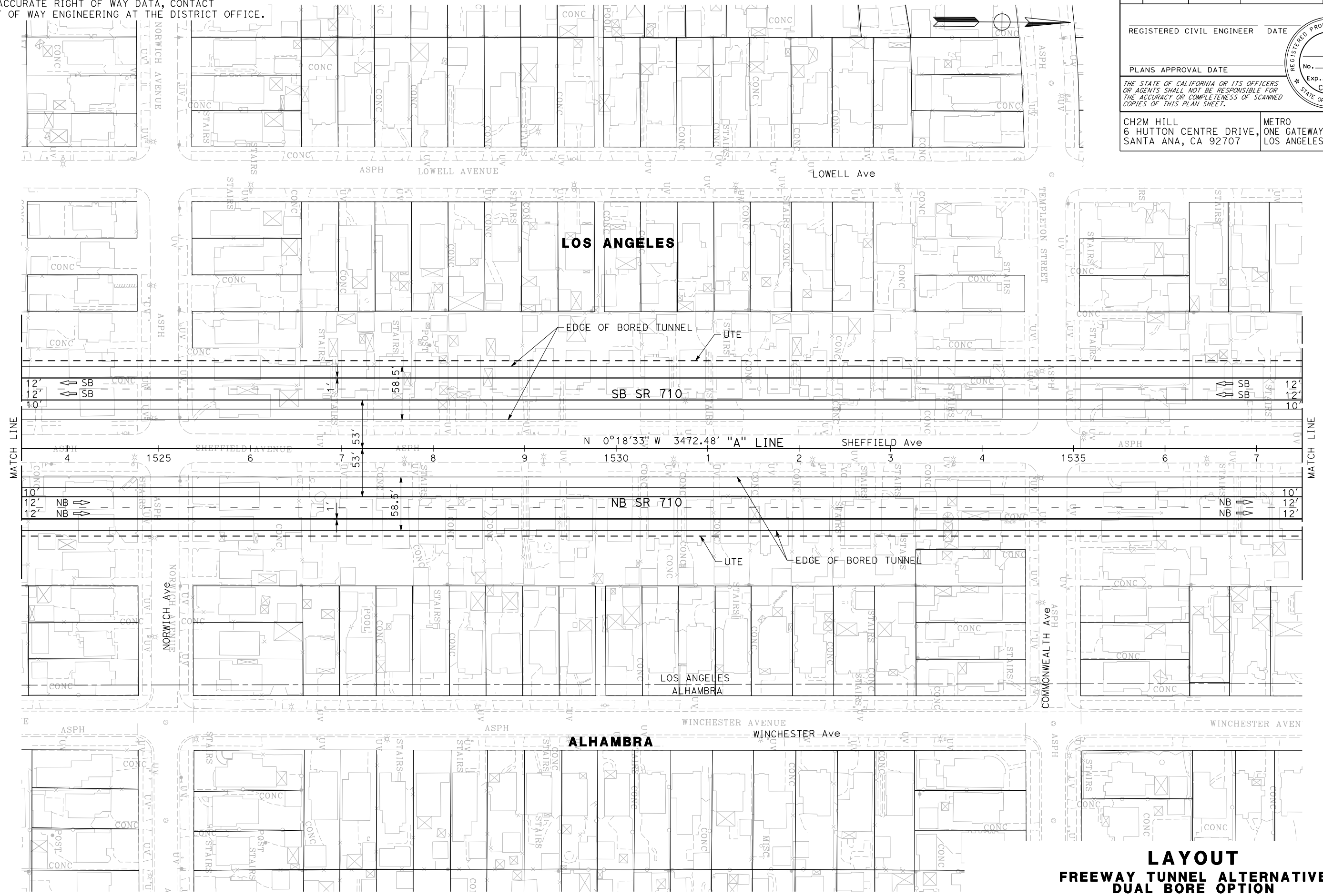
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
 ONE GATEWAY PLAZA, LOS ANGELES, CA 90012

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 23 OF 103

SCALE 1"=100'

**L - 9**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:32



**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. @	R	Δ	T	L
2	20100.00'	12°03'45"	2123.70'	4231.70'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

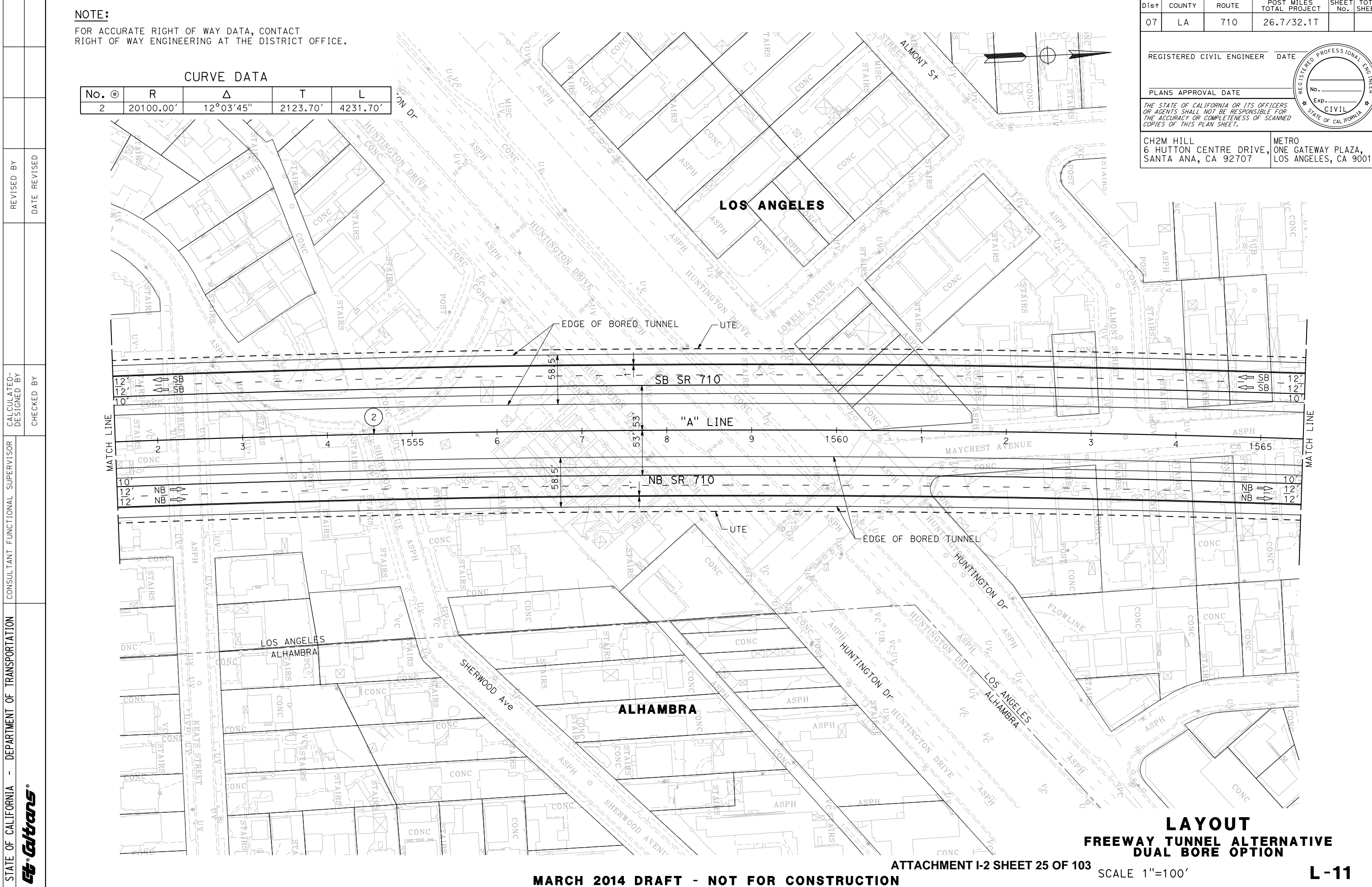
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED/DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 25 OF 103

**LAYOUT  
FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

SCALE 1"=100'

**L-11**

LAST REVISION DATE PLOTTED => 21-MAR-2014  
 00-00-00 TIME PLOTTED => 13:32

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

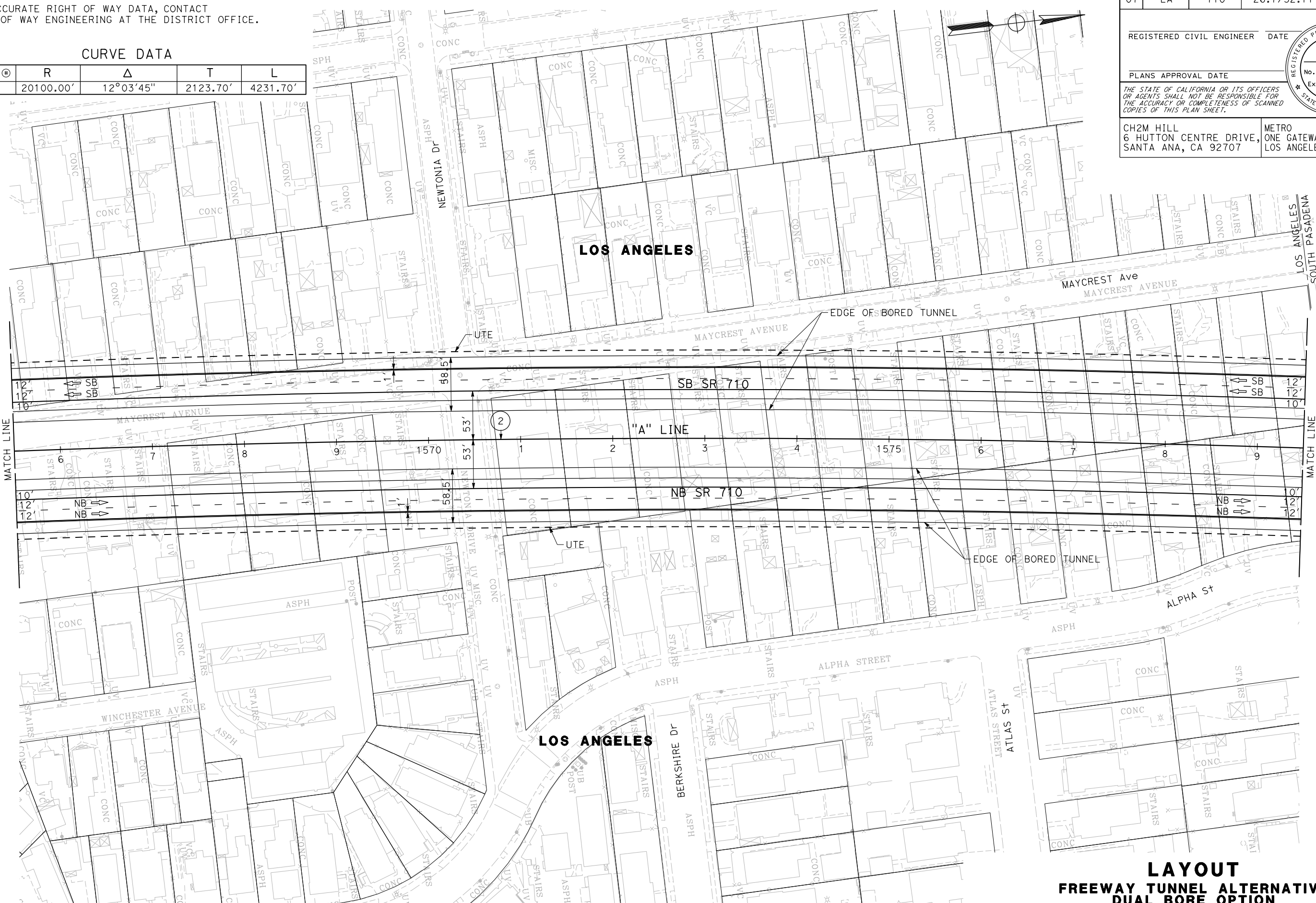
**CURVE DATA**

No. ①	R	Δ	T	L
2	20100.00'	12°03'45"	2123.70'	4231.70'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
No. \_\_\_\_\_  
EXP. \_\_\_\_\_  
CIVIL  
STATE OF CALIFORNIA

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Et-Catrans

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**LAYOUT  
FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

ATTACHMENT I-2 SHEET 26 OF 103

SCALE 1"=100'

**L-12**

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

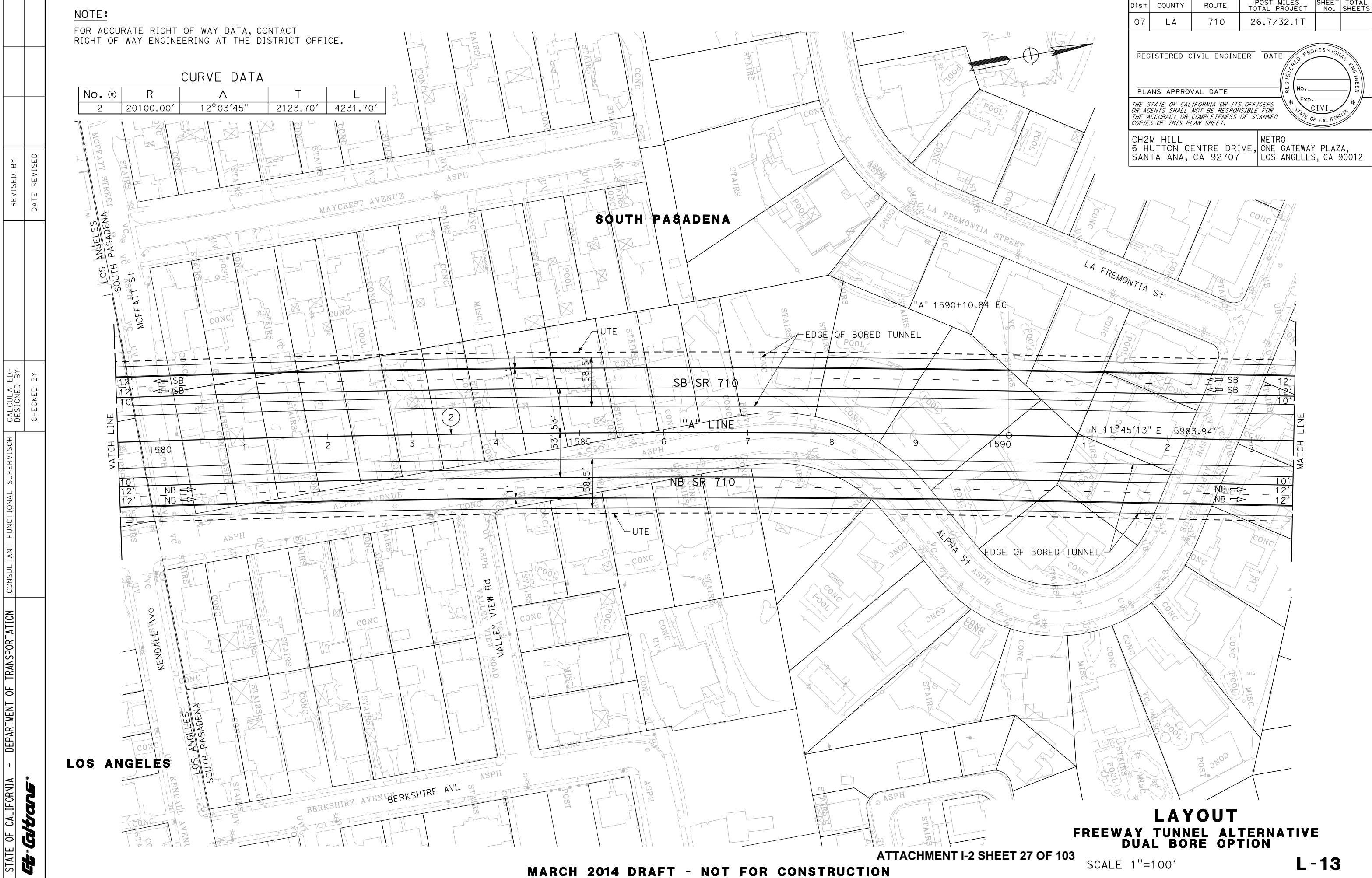
No. @	R	Δ	T	L
2	20100.00'	12°03'45"	2123.70'	4231.70'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
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CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



**LAYOUT  
FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

ATTACHMENT I-2 SHEET 27 OF 103

SCALE 1"=100'

**L-13**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION



REVISED BY  
DATE REVISED

CALCULATED-DESIGNED BY  
CHECKED BY

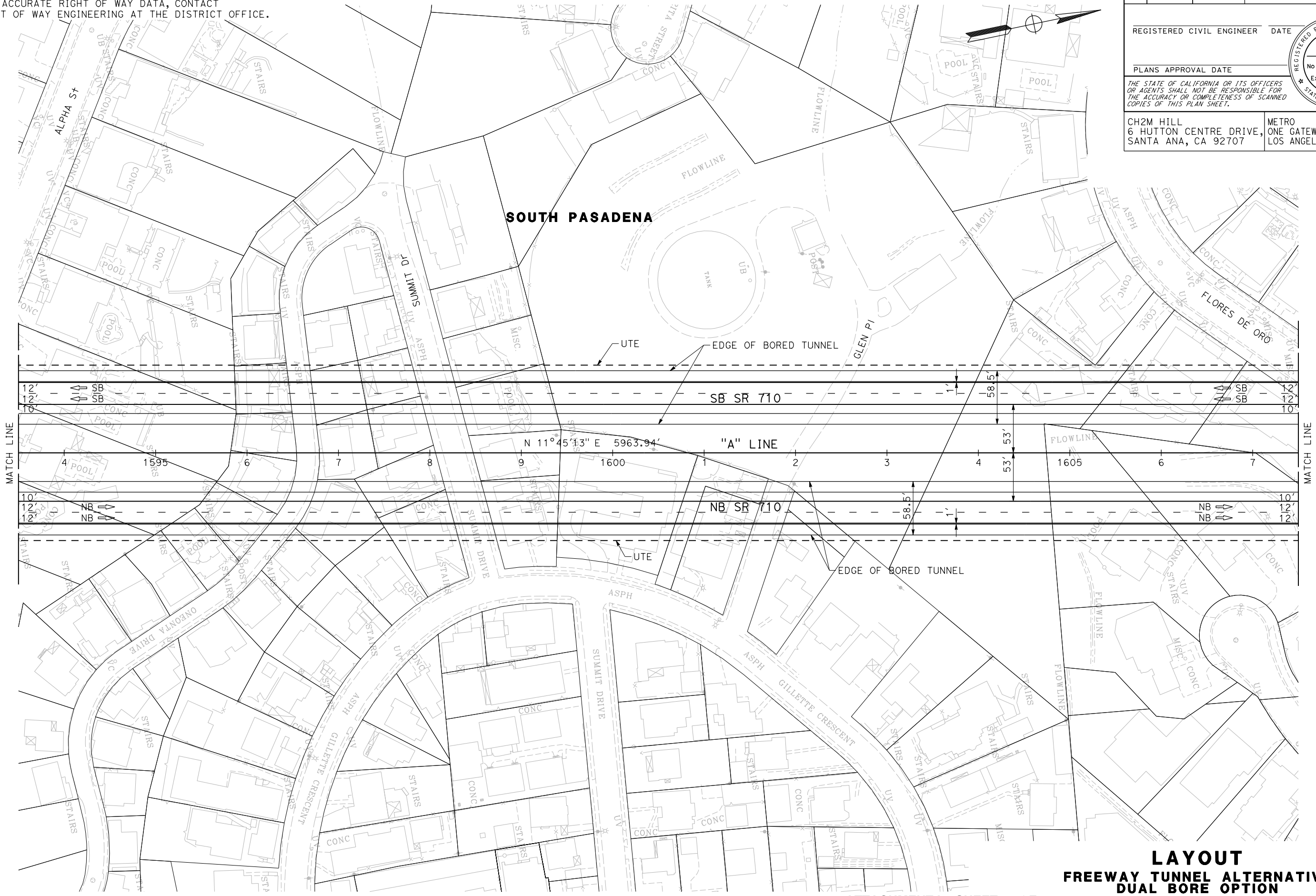
CONSULTANT FUNCTIONAL SUPERVISOR

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
No. \_\_\_\_\_  
Exp. \_\_\_\_\_  
CIVIL  
STATE OF CALIFORNIA

CH2M HILL  
6 HUTTON CENTRE DRIVE, ONE GATEWAY PLAZA,  
SANTA ANA, CA 92707 LOS ANGELES, CA 90012



**LAYOUT**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

ATTACHMENT I-2 SHEET 28 OF 103

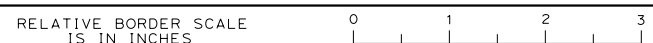
SCALE 1"=100'

**L-14**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED

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DGN FILE => 0700000191ea014.dgn



UNIT 0000

PROJECT NUMBER & PHASE

07000001911

BORDER LAST REVISED 7/2/2010

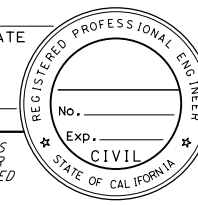
LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 13:33



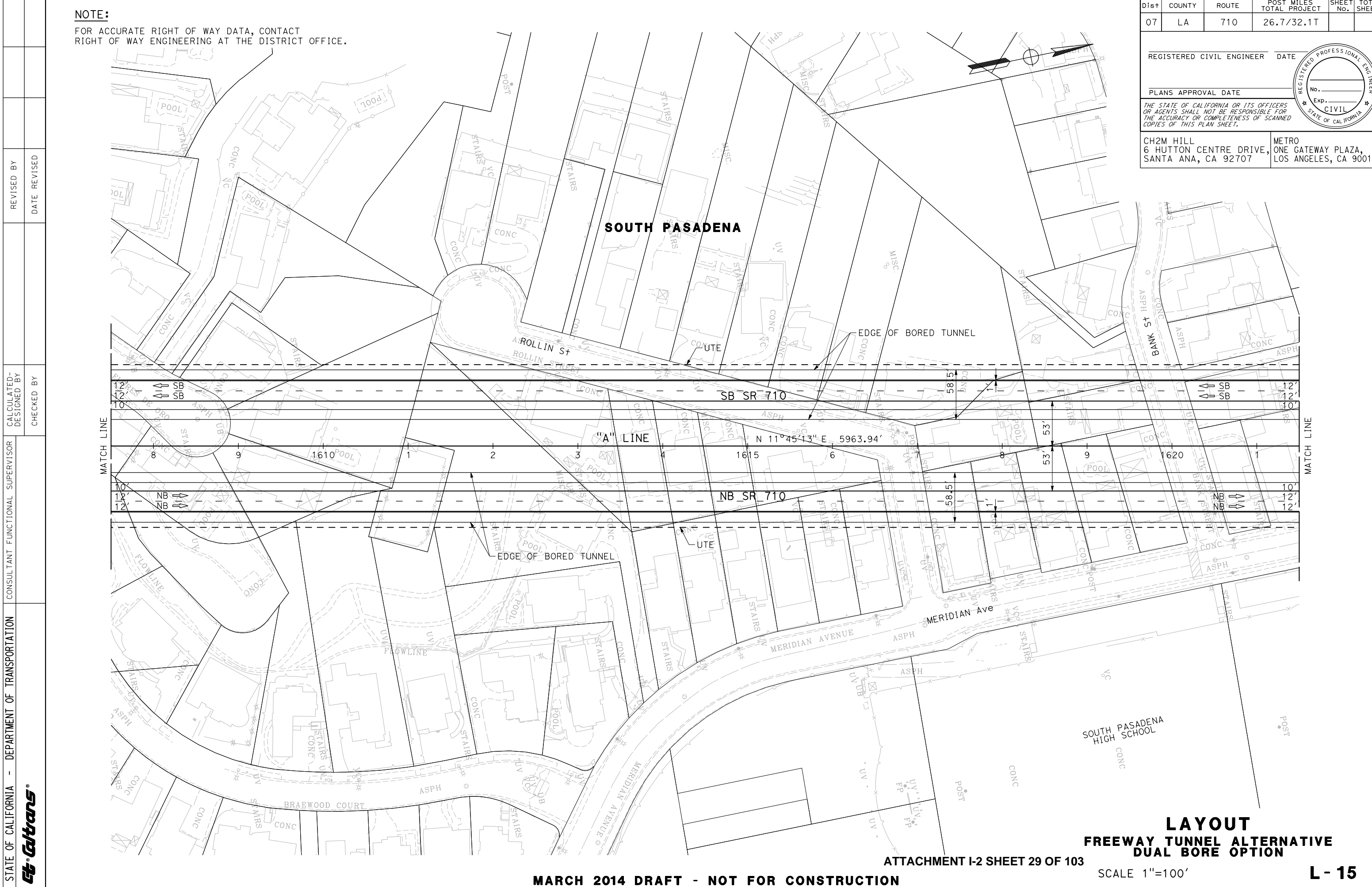
**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**LAYOUT  
FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

ATTACHMENT I-2 SHEET 29 OF 103

SCALE 1"=100'

**L - 15**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:33

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

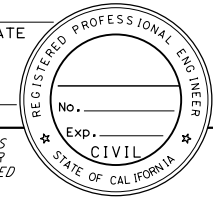
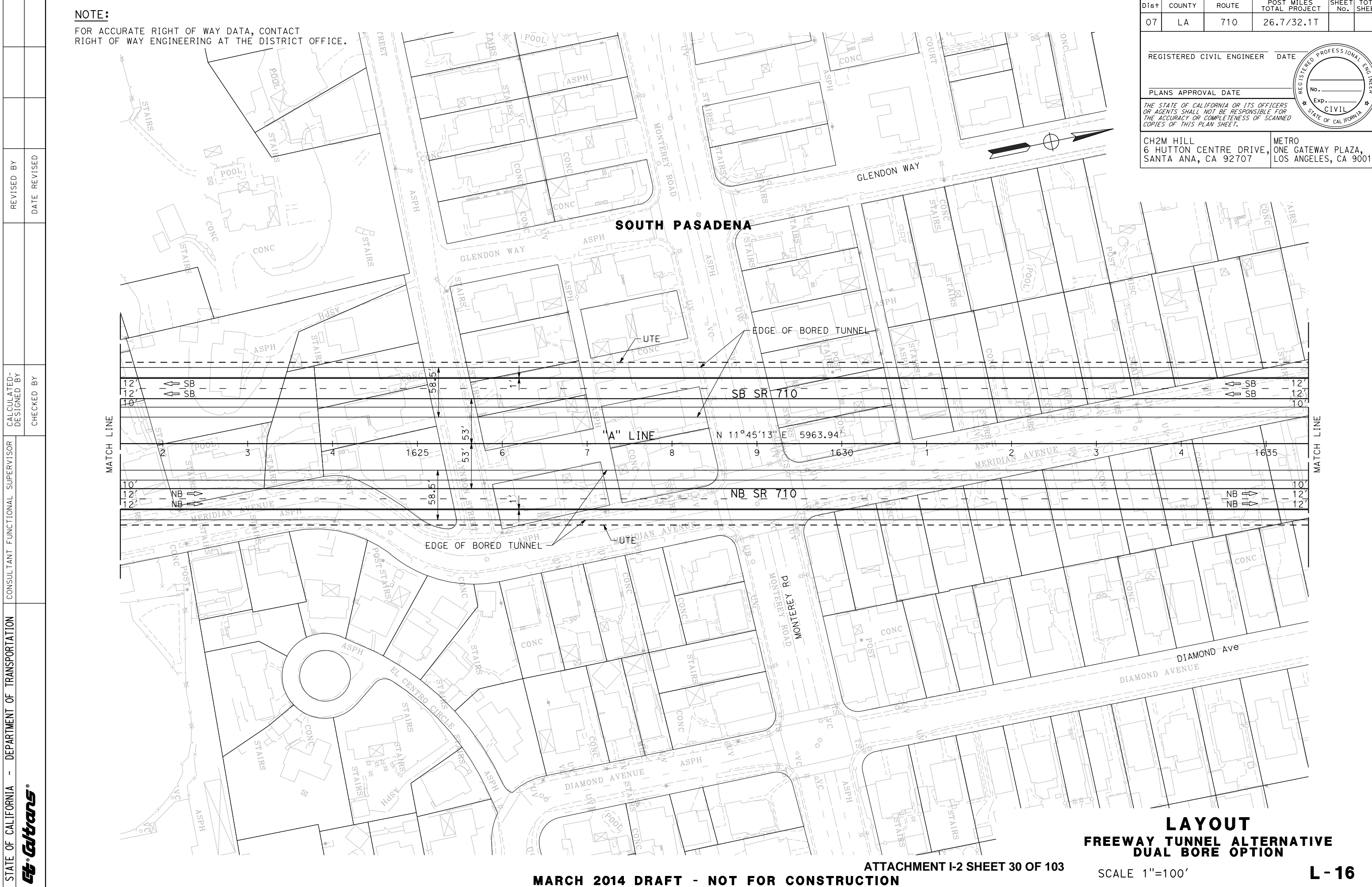
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR
<b>Caltrans</b>		CHECKED BY	DATE REVISED

**LAYOUT**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 30 OF 103

SCALE 1"=100'

**L - 16**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:31

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

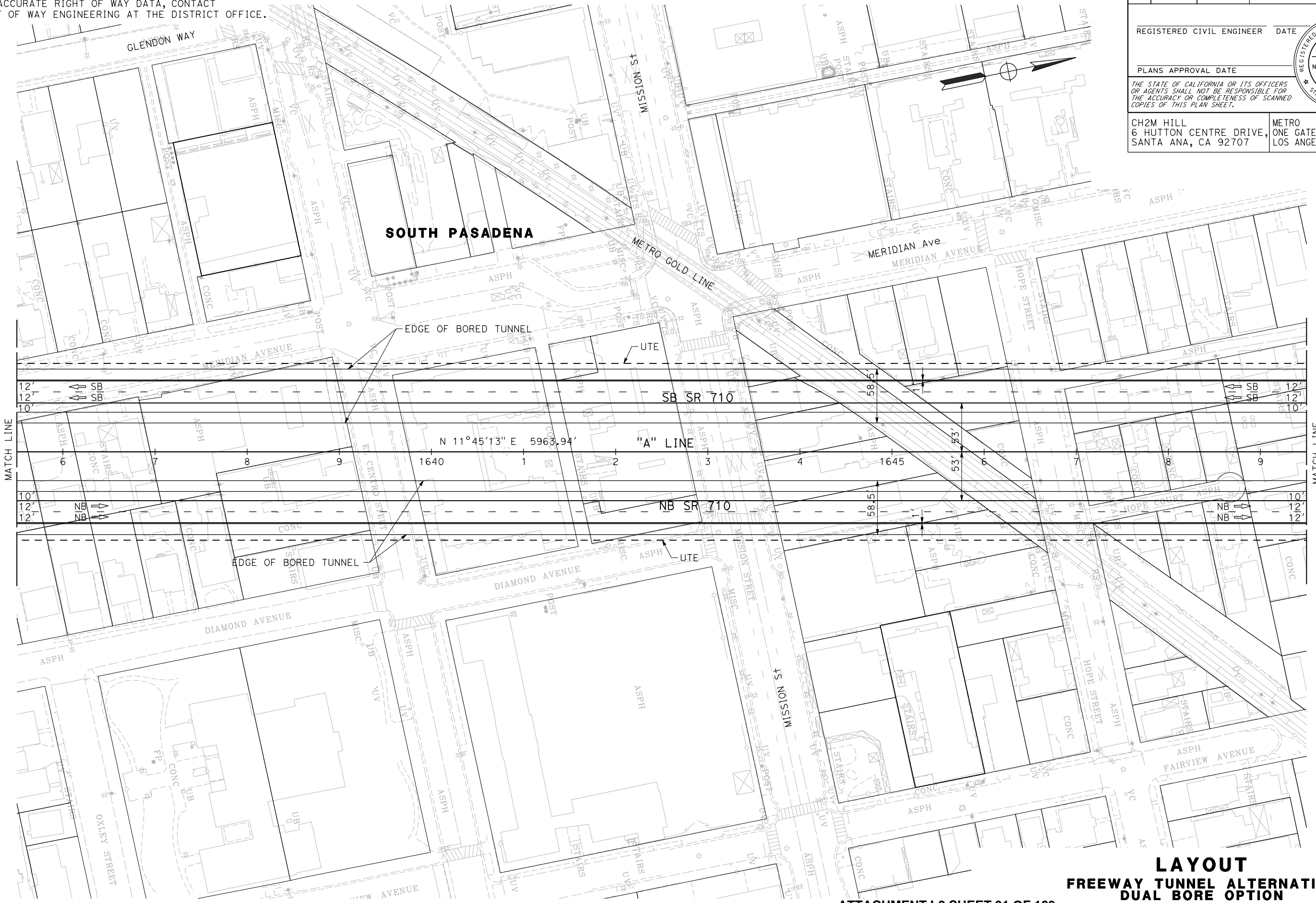
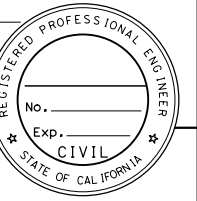
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**LAYOUT  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

ATTACHMENT I-2 SHEET 31 OF 103

SCALE 1"=100'

**L - 17**

LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 13:32

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. Ⓢ	R	Δ	T	L
3	20100.00'	12°37'46"	2224.31'	4430.59'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

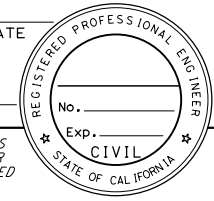
REGISTERED CIVIL ENGINEER DATE


PLANS APPROVAL DATE

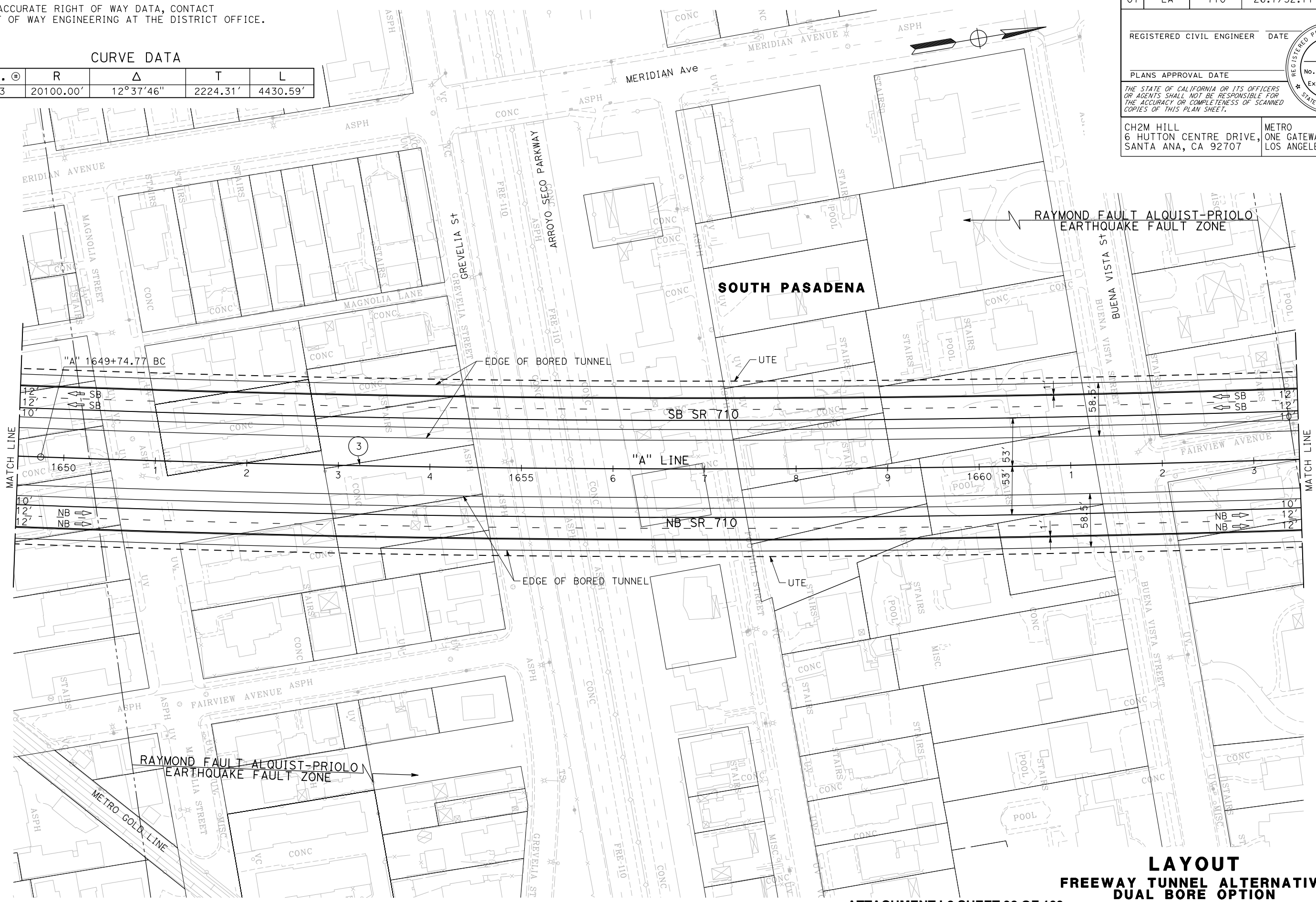
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED/DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED



**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**LAYOUT  
FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

ATTACHMENT I-2 SHEET 32 OF 103

SCALE 1"=100'

**L - 18**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:32

**NOTE:**

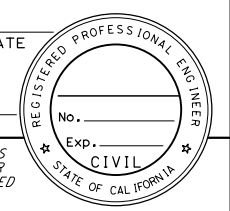
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. Ⓢ	R	Δ	T	L
3	20100.00'	12°37'46"	2224.31'	4430.59'

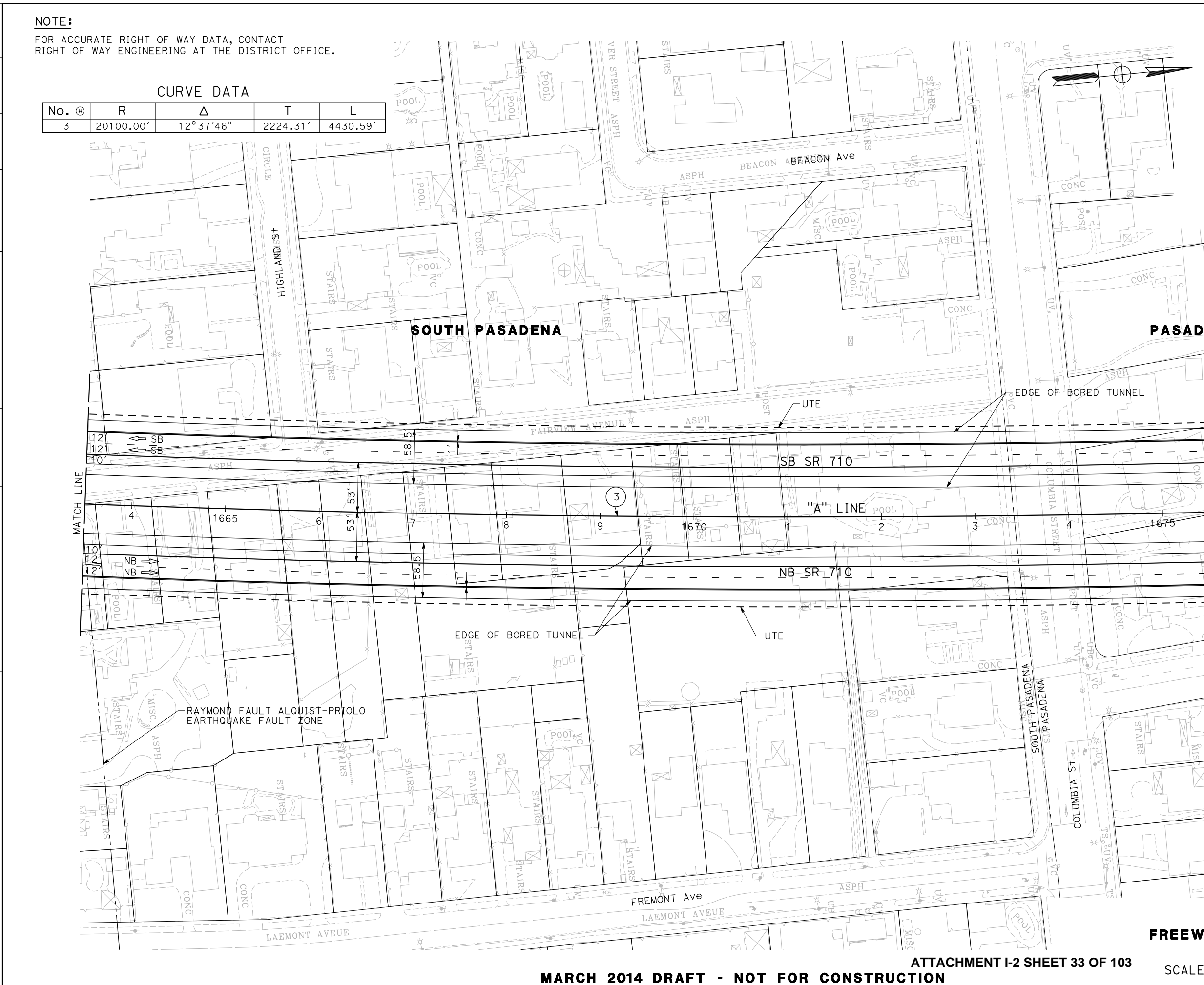
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Et-Caltans



**LAYOUT  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 33 OF 103

SCALE 1"=100'

**L - 19**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:32

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

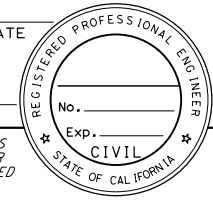
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

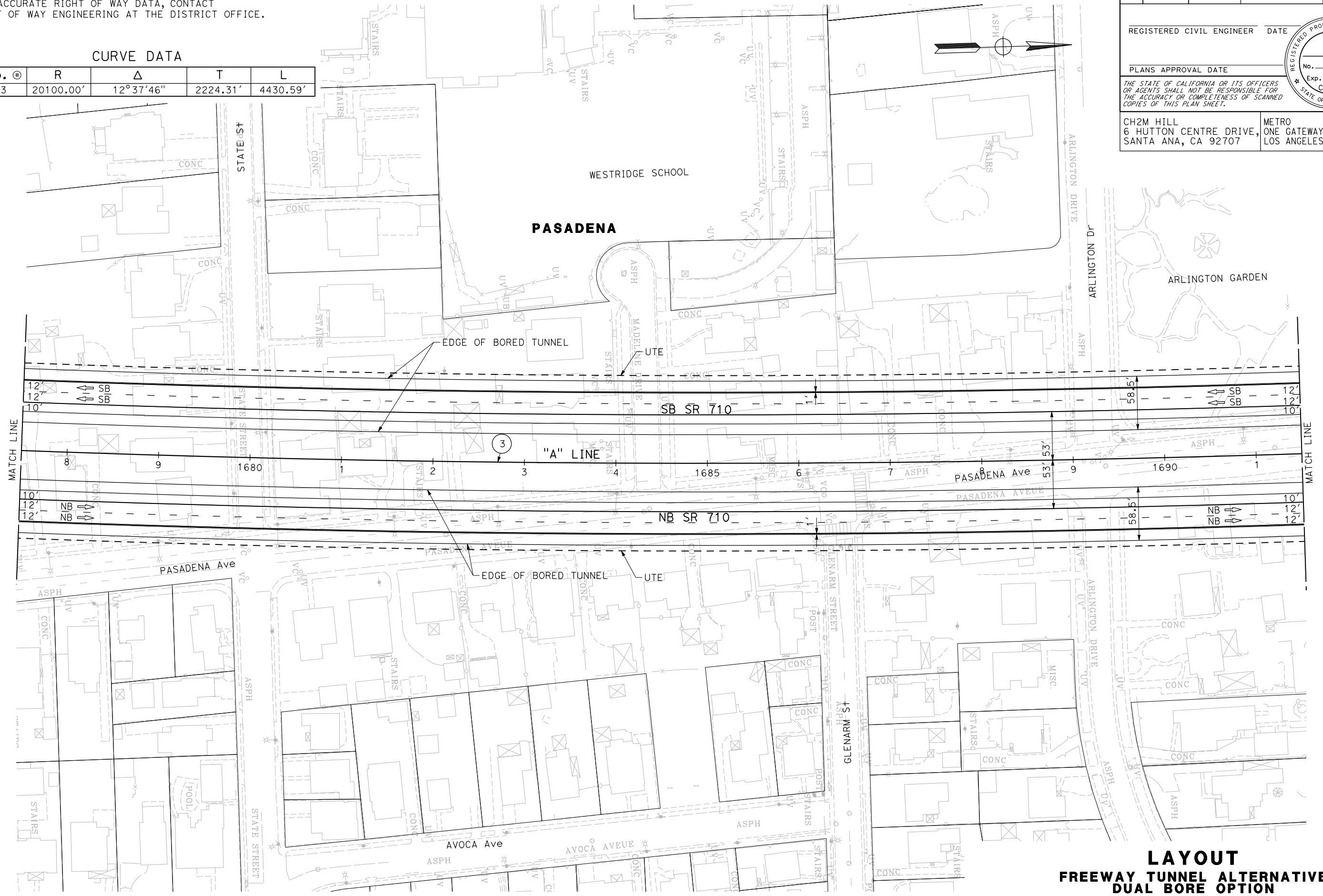
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



**CURVE DATA**

No. ③	R	Δ	T	L
3	20100.00'	12°37'46"	2224.31'	4430.59'



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

REVISOR: [ ]

DESIGNER: [ ]

CHECKED BY: [ ]

CONSULTANT FUNCTIONAL SUPERVISOR: [ ]

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 34 OF 103

**LAYOUT**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

SCALE 1"=100'

**L-20**

LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 13:31

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

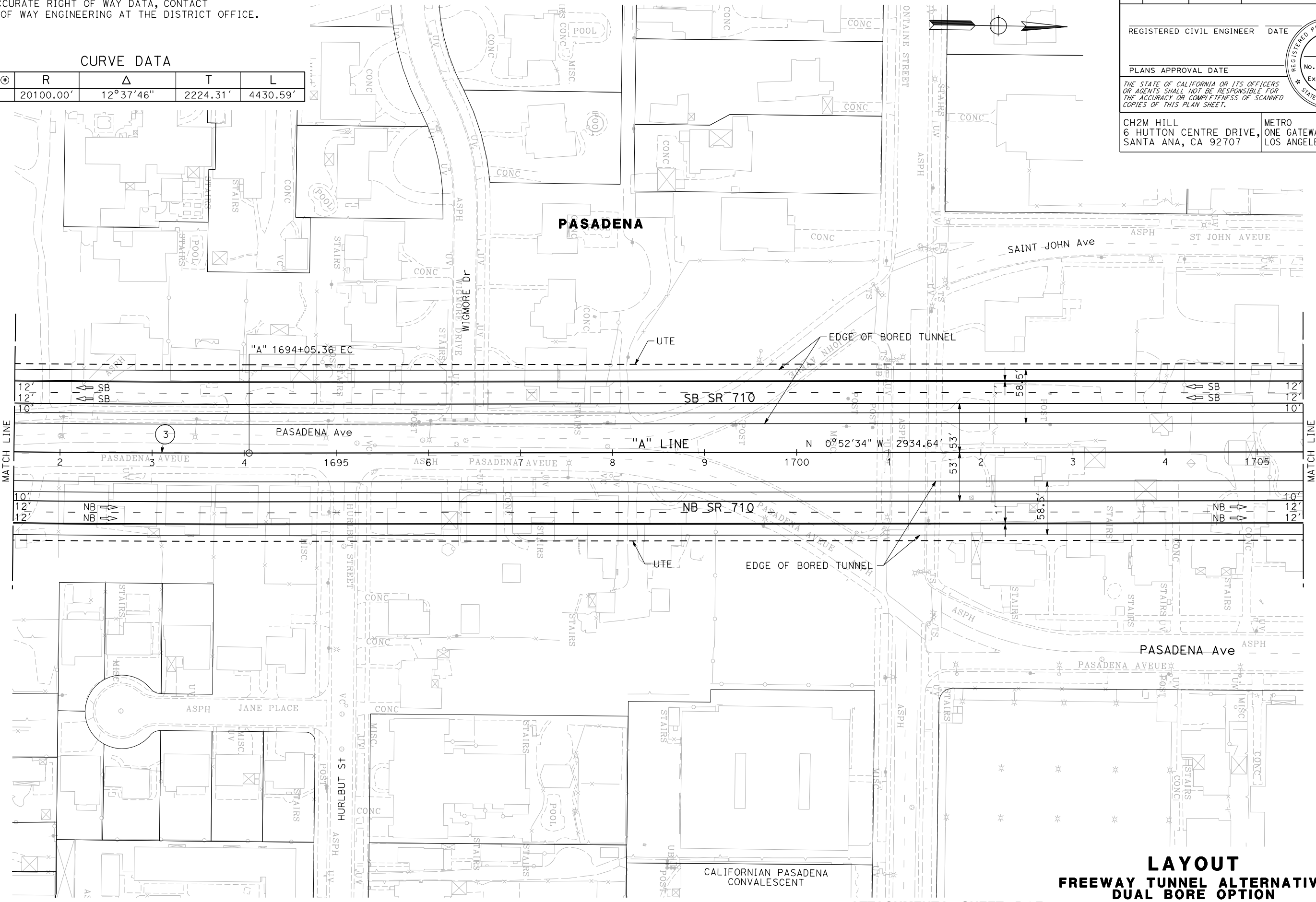
CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



**CURVE DATA**

No. ③	R	Δ	T	L
3	20100.00'	12°37'46"	2224.31'	4430.59'



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

**Caltrans**

CONSULTANT FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISOR BY

DATE REVISED

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 35 OF 103

**LAYOUT  
FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

SCALE 1"=100'

**L - 21**

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. ①	R	Δ	T	L
75	500.00'	16°31'11"	72.58'	144.16'

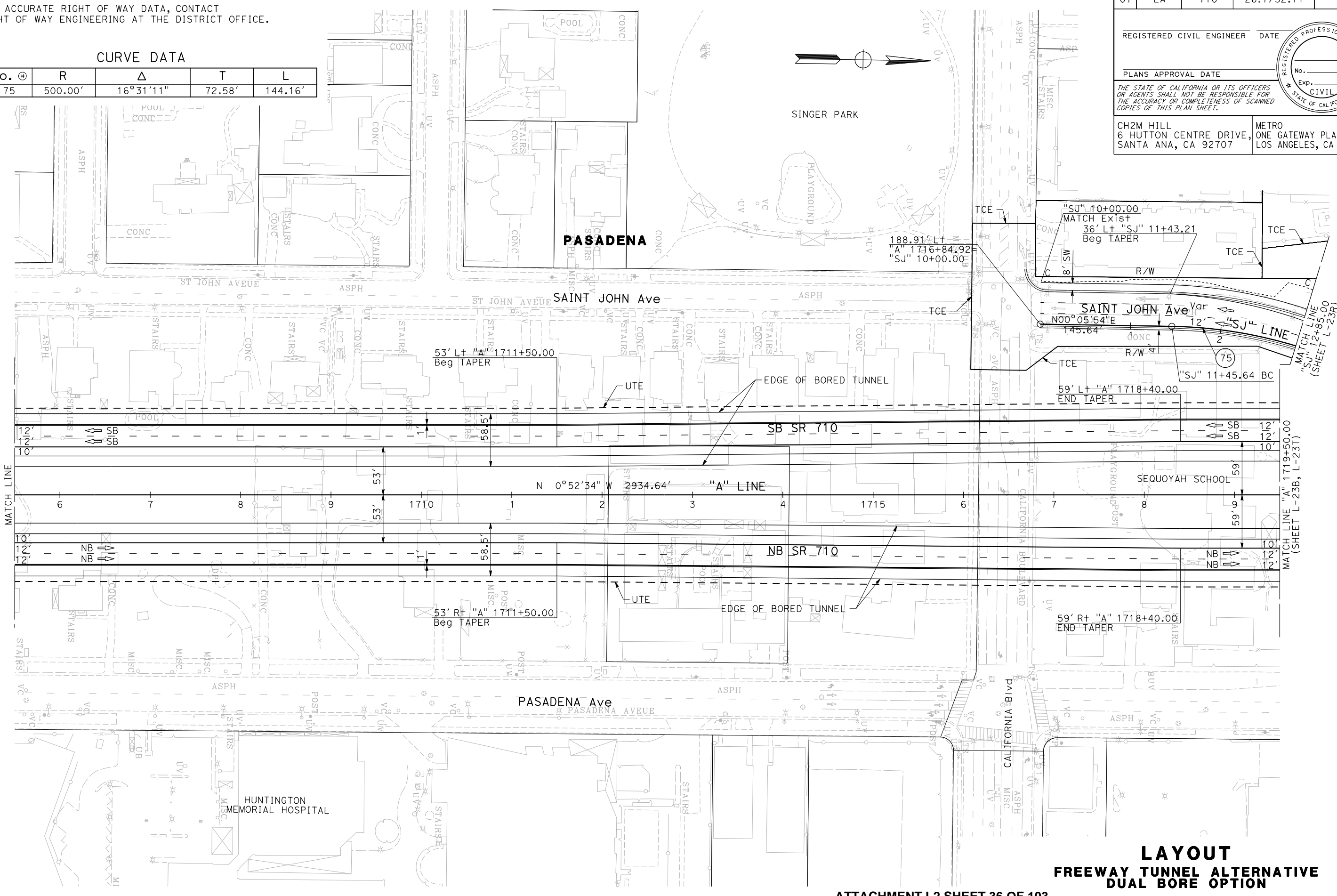
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



**LAYOUT  
FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

ATTACHMENT I-2 SHEET 36 OF 103

SCALE 1"=100'

**L-22**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**





**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

No. ③	R	Δ	T	L
54	4500.00'	4°17'30"	168.61'	337.06'
63	4500.00'	4°17'30"	168.61'	337.06'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE

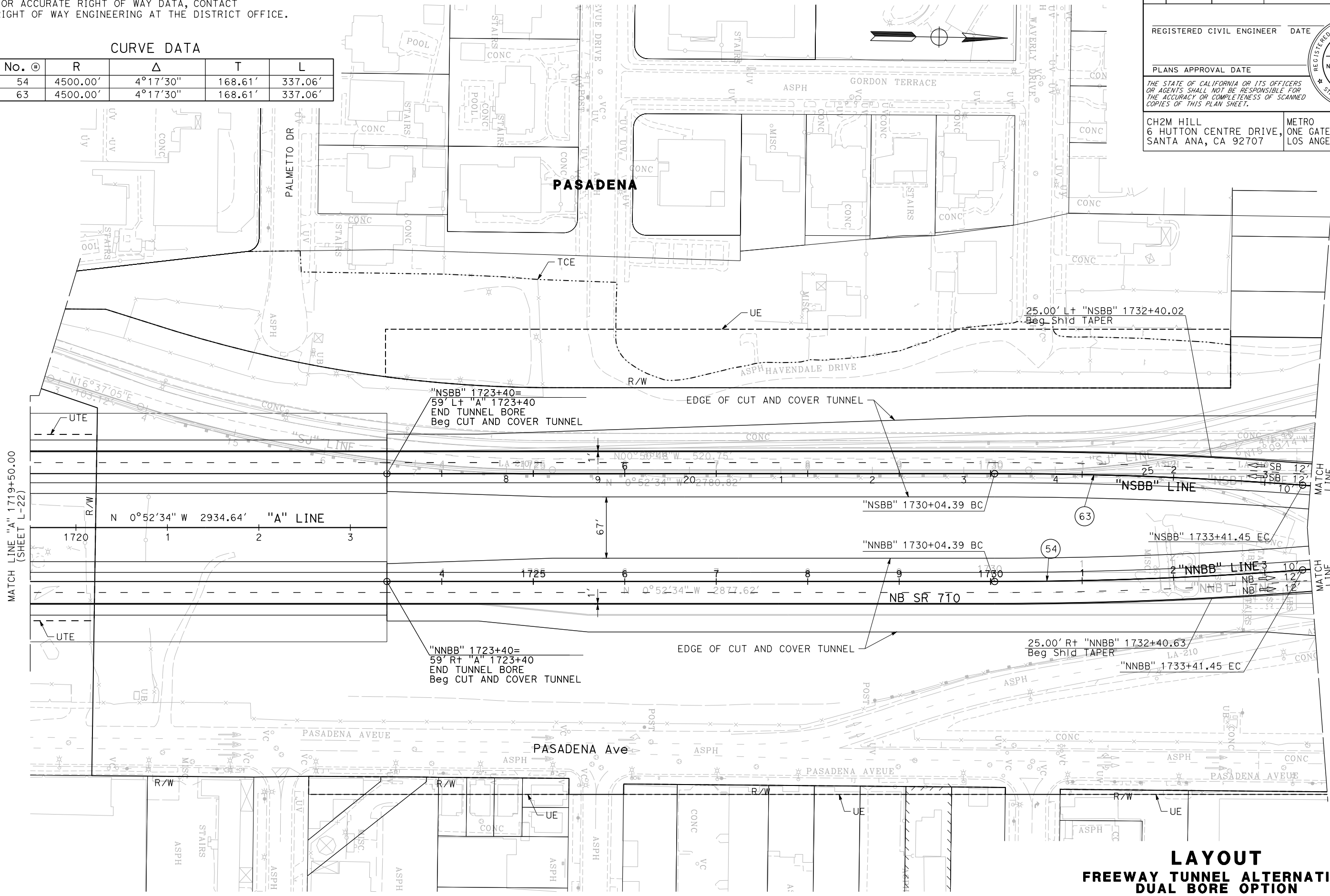
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Ettrans



**LAYOUT**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 37 OF 103

SCALE 1"=100'

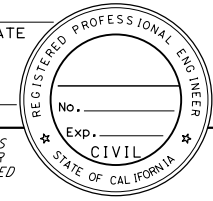
**L-23B**

LAST REVISION DATE PLOTTED => 27-MAR-2014 00-00-00 TIME PLOTTED => 18:24

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

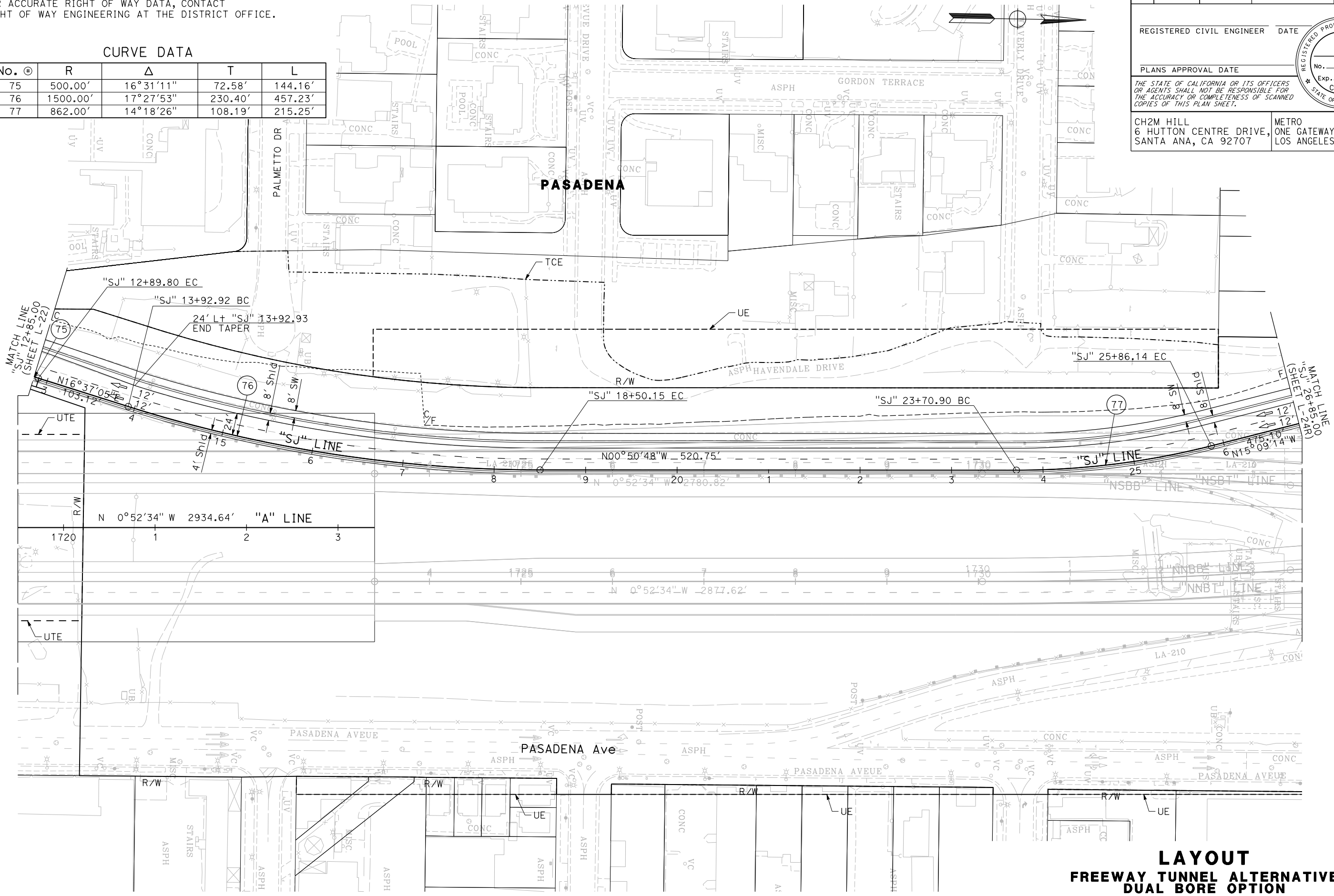
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, METRO  
SANTA ANA, CA 92707 ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012

No. #	R	Δ	T	L
75	500.00'	16°31'11"	72.58'	144.16'
76	1500.00'	17°27'53"	230.40'	457.23'
77	862.00'	14°18'26"	108.19'	215.25'



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Et-Caltans

REVISOR BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
DESIGNED BY: \_\_\_\_\_ CHECKED BY: \_\_\_\_\_

**LAYOUT**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 38 OF 103

SCALE 1"=100'

**L-23R**

LAST REVISION DATE PLOTTED => 06-OCT-2014  
00-00-00 TIME PLOTTED => 16:08

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

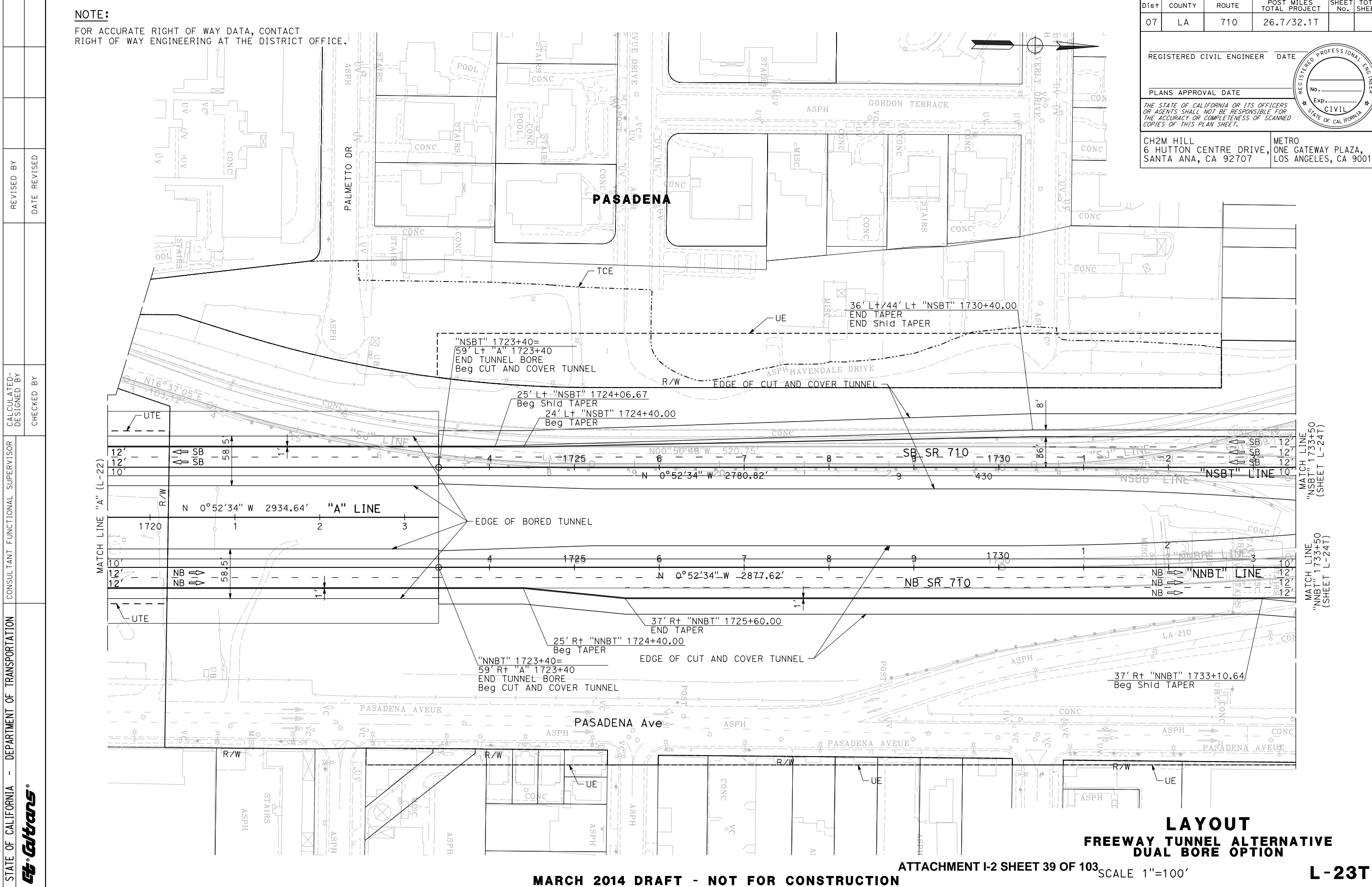
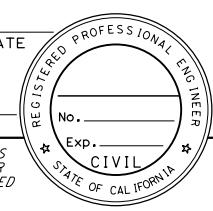
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE, METRO  
SANTA ANA, CA 92707 LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY	DATE REVISED
<b>Caltrans</b>		CHECKED BY		

**LAYOUT  
FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 39 OF 103 SCALE 1"=100'

**L-23T**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:30

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

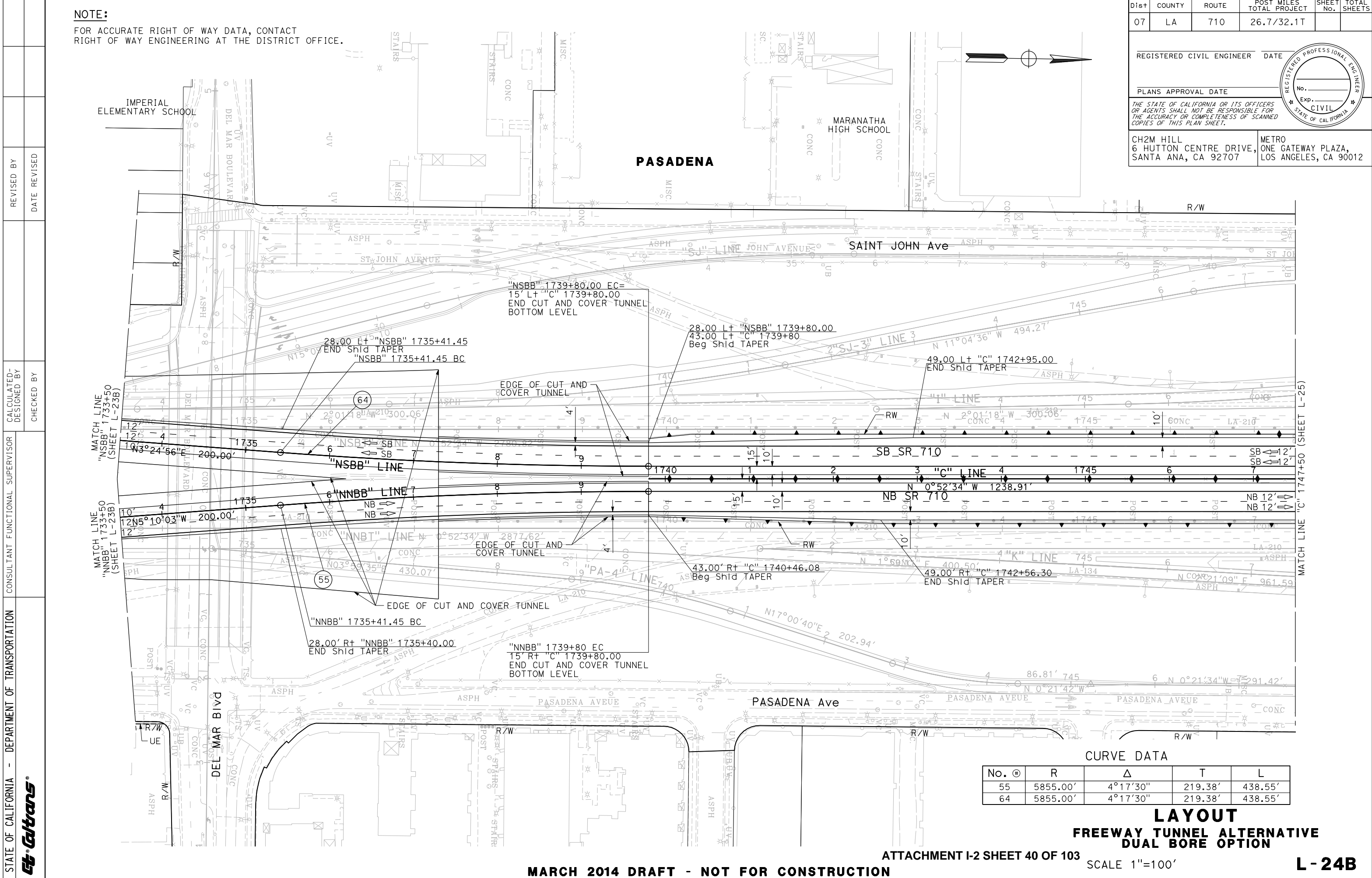
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



CURVE DATA

No. @	R	Δ	T	L
55	5855.00'	4°17'30"	219.38'	438.55'
64	5855.00'	4°17'30"	219.38'	438.55'

**LAYOUT**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 40 OF 103

SCALE 1"=100'

**L-24B**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED

LAST REVISION DATE PLOTTED => 25-APR-2014 00-00-00 TIME PLOTTED => 13:07

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. Ⓢ	R	Δ	T	L
78	1988.00'	14°47'51"	258.15'	513.44'
108	850.00'	13°01'04"	96.98'	193.12'
109	500.00'	17°22'21"	76.39'	151.60'
112	3000.00'	9°03'17"	237.55'	474.11'
113	850.00'	10°43'13"	79.75'	159.04'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

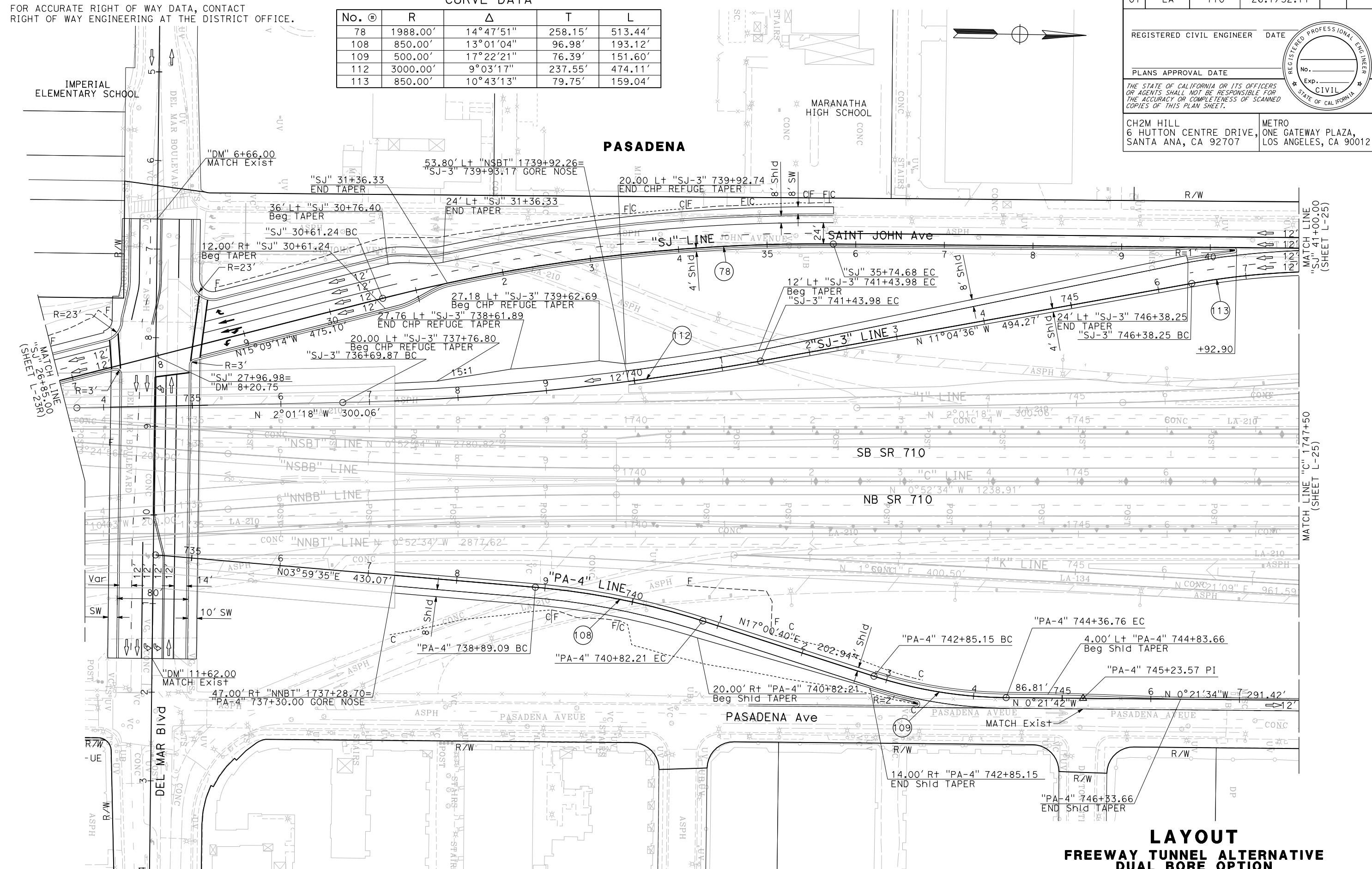
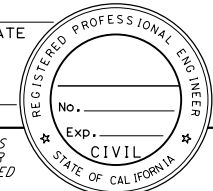
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



REVISION	DATE	BY	REASON

BORDER LAST REVISED 7/2/2010

USERNAME => pwsvc  
DGN FILE => 0700000191ea024R.dgn

RELATIVE BORDER SCALE  
15 IN INCHES

UNIT 0000

PROJECT NUMBER & PHASE

07000001911

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 41 OF 103

SCALE 1"=100'

**L - 24R**



LAST REVISION DATE PLOTTED => 06-OCT-2014  
00-00-00 TIME PLOTTED => 16:06

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

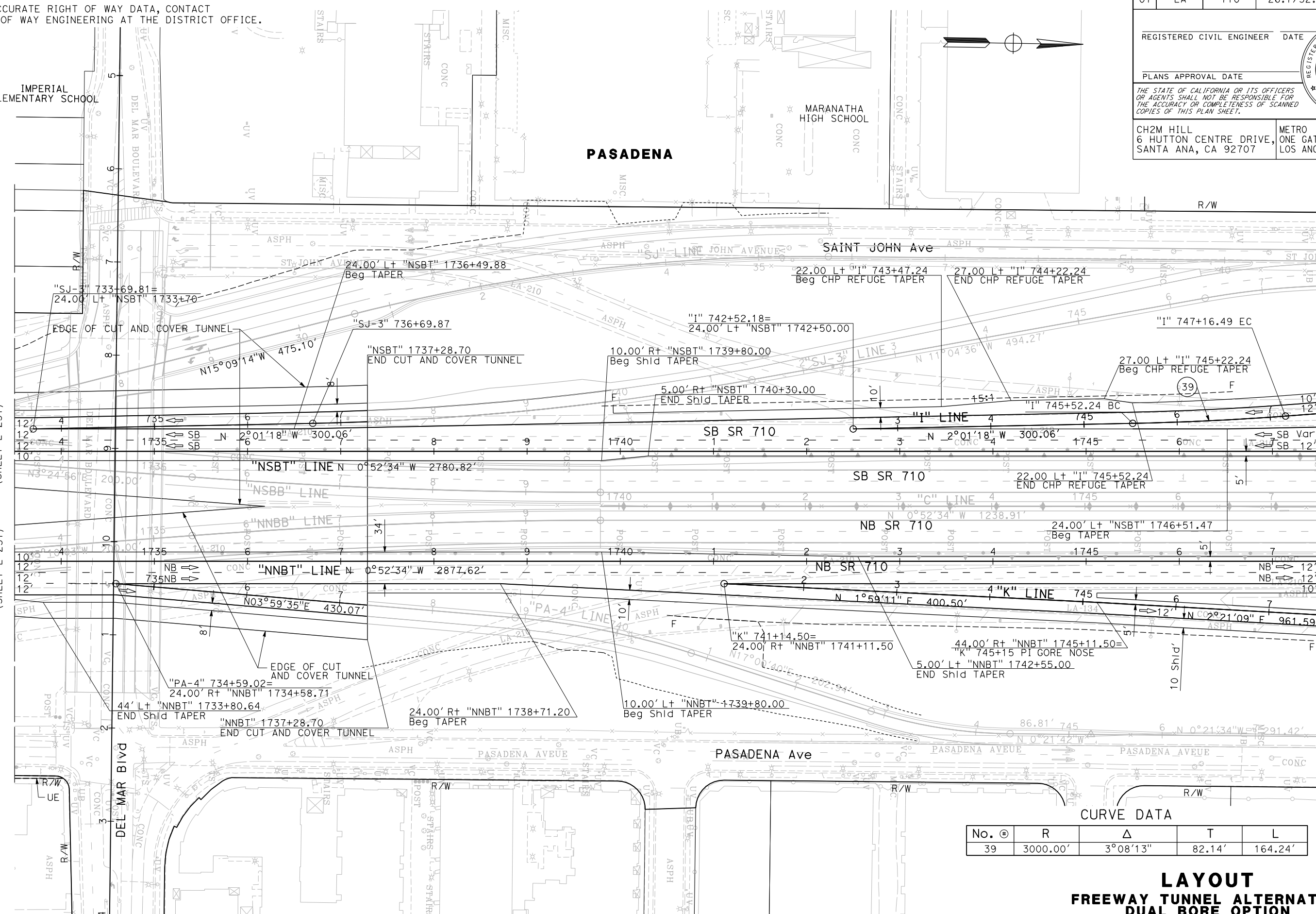
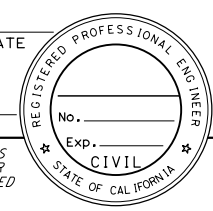
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



**CURVE DATA**

No. Ⓢ	R	Δ	T	L
39	3000.00'	3°08'13"	82.14'	164.24'

**LAYOUT  
FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 42 OF 103

SCALE 1"=100'

**L-24T**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR
<b>Caltrans</b>		CHECKED BY	DATE REVISED

LAST REVISION DATE PLOTTED => 25-APR-2014 00-00-00 TIME PLOTTED => 13:07

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. @	R	Δ	T	L
10	9000.00'	18°57'13"	1502.33'	2977.21'
31	4518.00'	1°20'50"	53.12'	106.23'
32	3000.00'	4°12'58"	110.43'	220.75'
40	562.00'	104°21'43"	724.03'	1023.66'
43	1164.00'	11°33'39"	117.83'	234.86'
58	9059.00'	2°45'05"	217.55'	435.01'
59	5000.00'	5°03'29"	220.84'	441.39'
67	4500.00'	3°00'17"	118.02'	235.98'
68	8960.00'	2°33'29"	200.06'	400.05'
113	850.00'	10°43'13"	79.75'	159.04'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

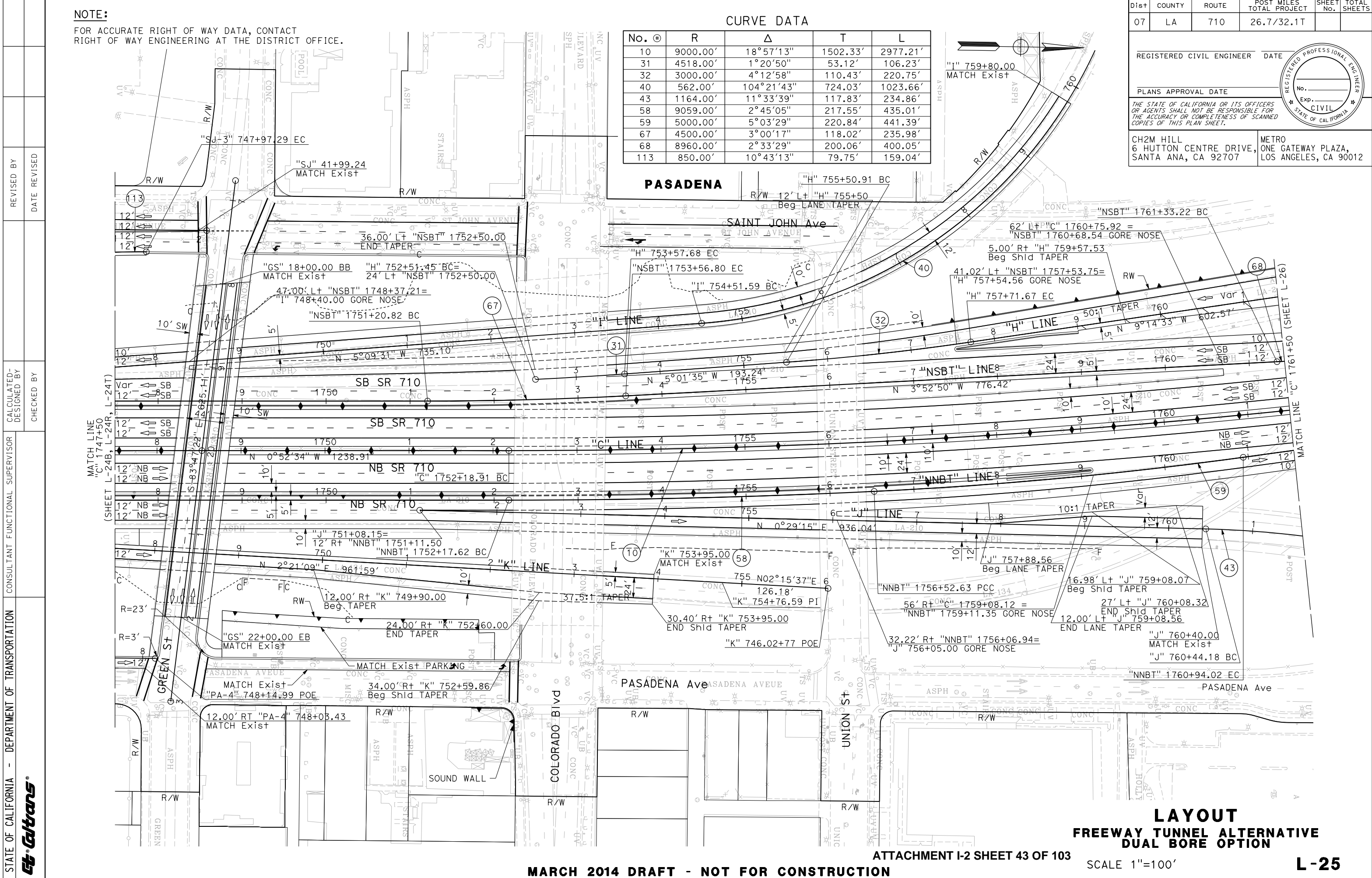
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



**PASADENA**

**LAYOUT  
FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 43 OF 103

SCALE 1"=100'

**L-25**

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. +	R	Δ	T	L
10	9000.00'	18°57'13"	1502.33'	2977.21'
33	964.00'	9°39'43"	81.47'	162.56'
43	1164.00'	11°33'39"	117.83'	234.86'
60	9040.00'	1°54'09"	150.09'	300.16'
68	8960.00'	2°33'29"	200.06'	400.05'
71	1900.00'	10°11'34"	169.45'	338.01'
72	8937.00'	2°59'46"	233.72'	467.33'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

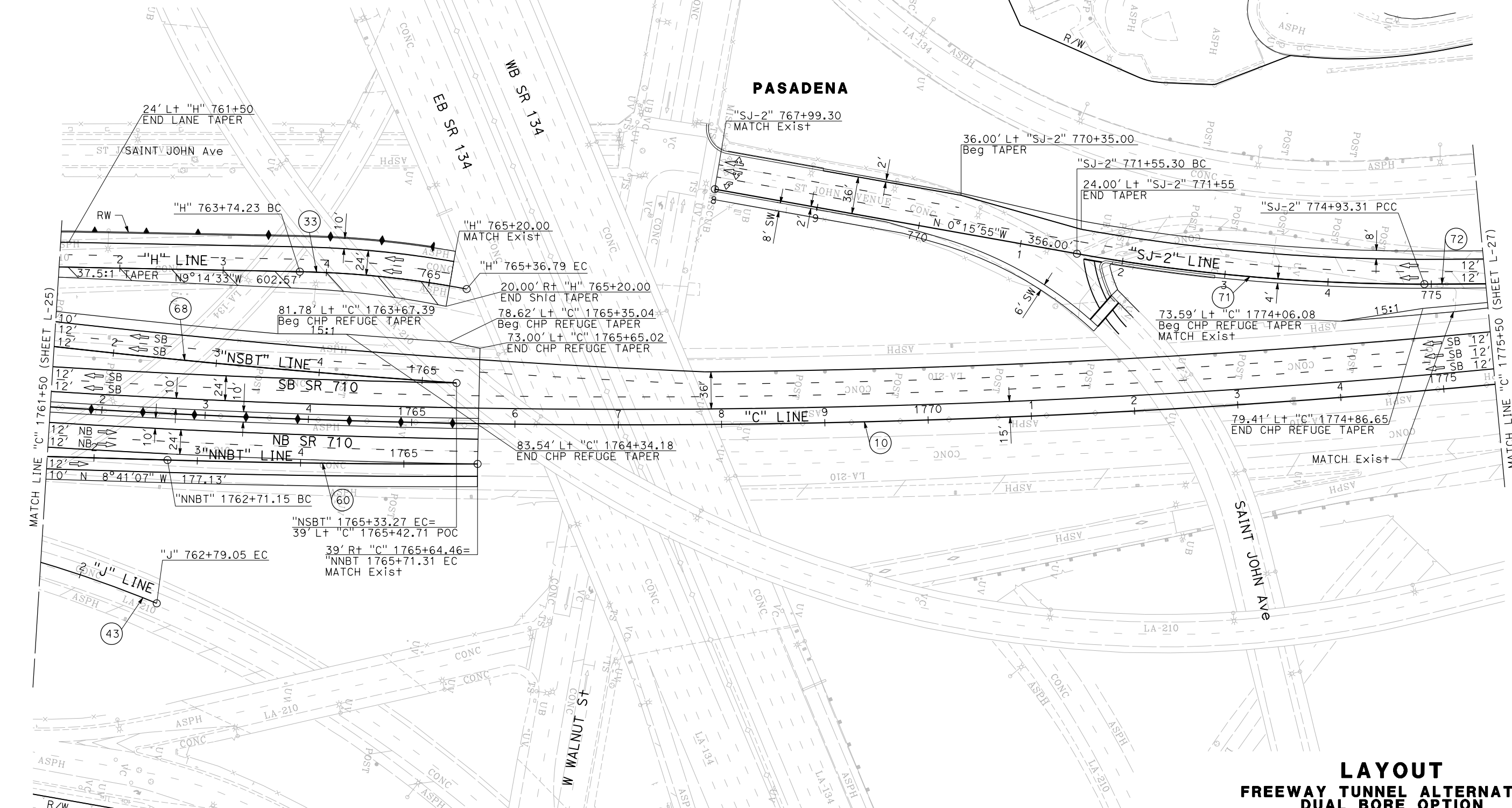
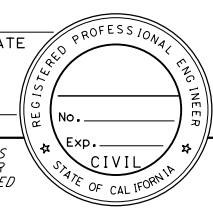
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



**LAYOUT**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT I-2 SHEET 44 OF 103 SCALE 1"=100'

**L-26**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Caltrans

REVISOR BY DATE  
CALCULATED/DESIGNED BY  
CHECKED BY  
CONSULTANT FUNCTIONAL SUPERVISOR  
DATE PLOTTED => 21-APR-2014  
TIME PLOTTED => 15:41



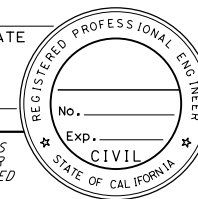
**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. Ⓢ	R	Δ	T	L
10	9000.00'	18°57'13"	1502.33'	2977.21'
72	8937.00'	3°54'8"	304.44'	608.65'

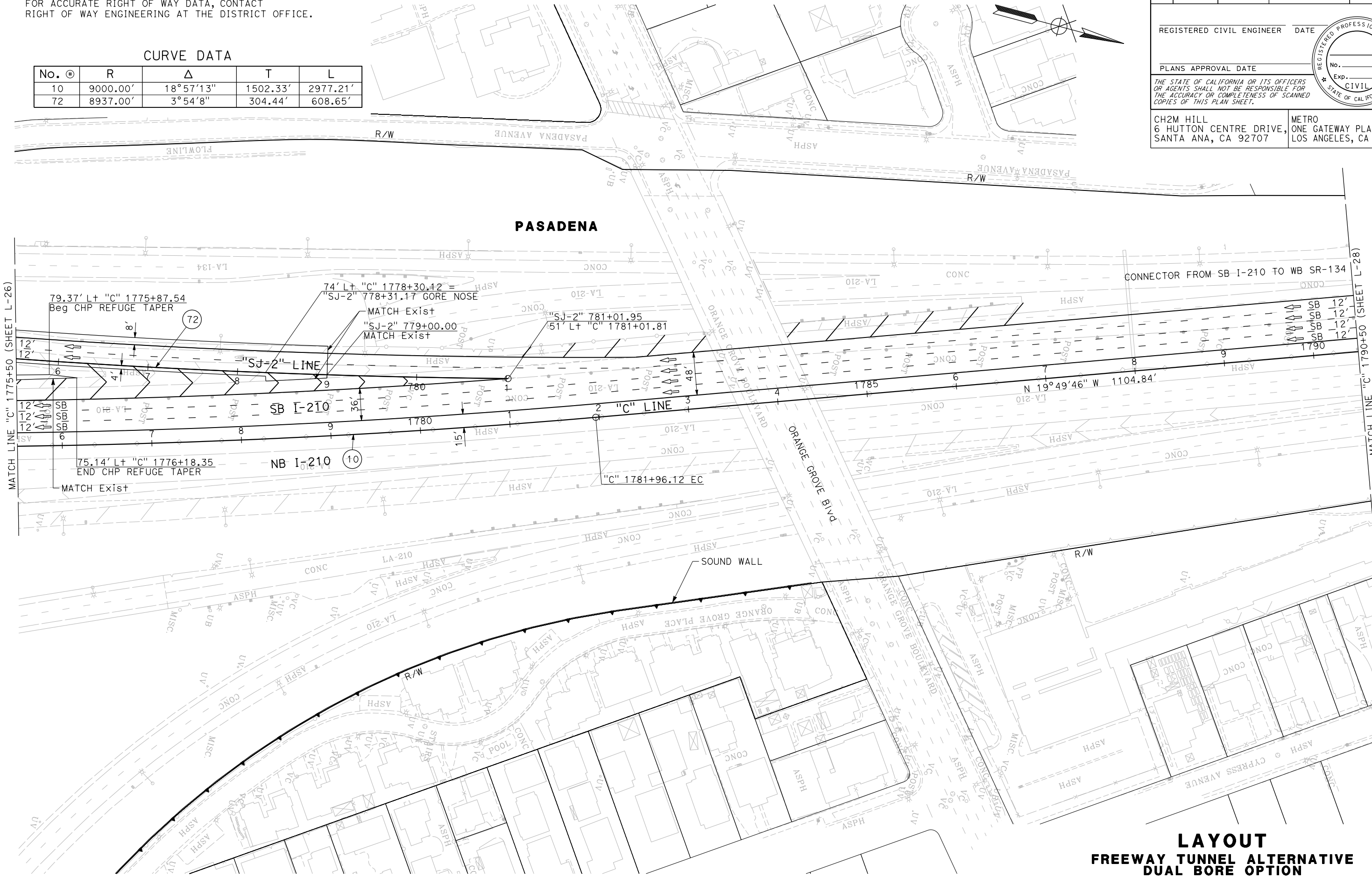
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Caltrans



**LAYOUT  
FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

ATTACHMENT I-2 SHEET 45 OF 103

SCALE 1"=100'

**L-27**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

LAST REVISION DATE PLOTTED => 17-SEP-2014 00-00-00 TIME PLOTTED => 10:35

**NOTE:**

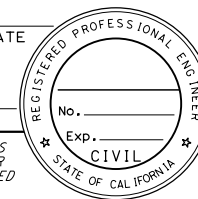
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

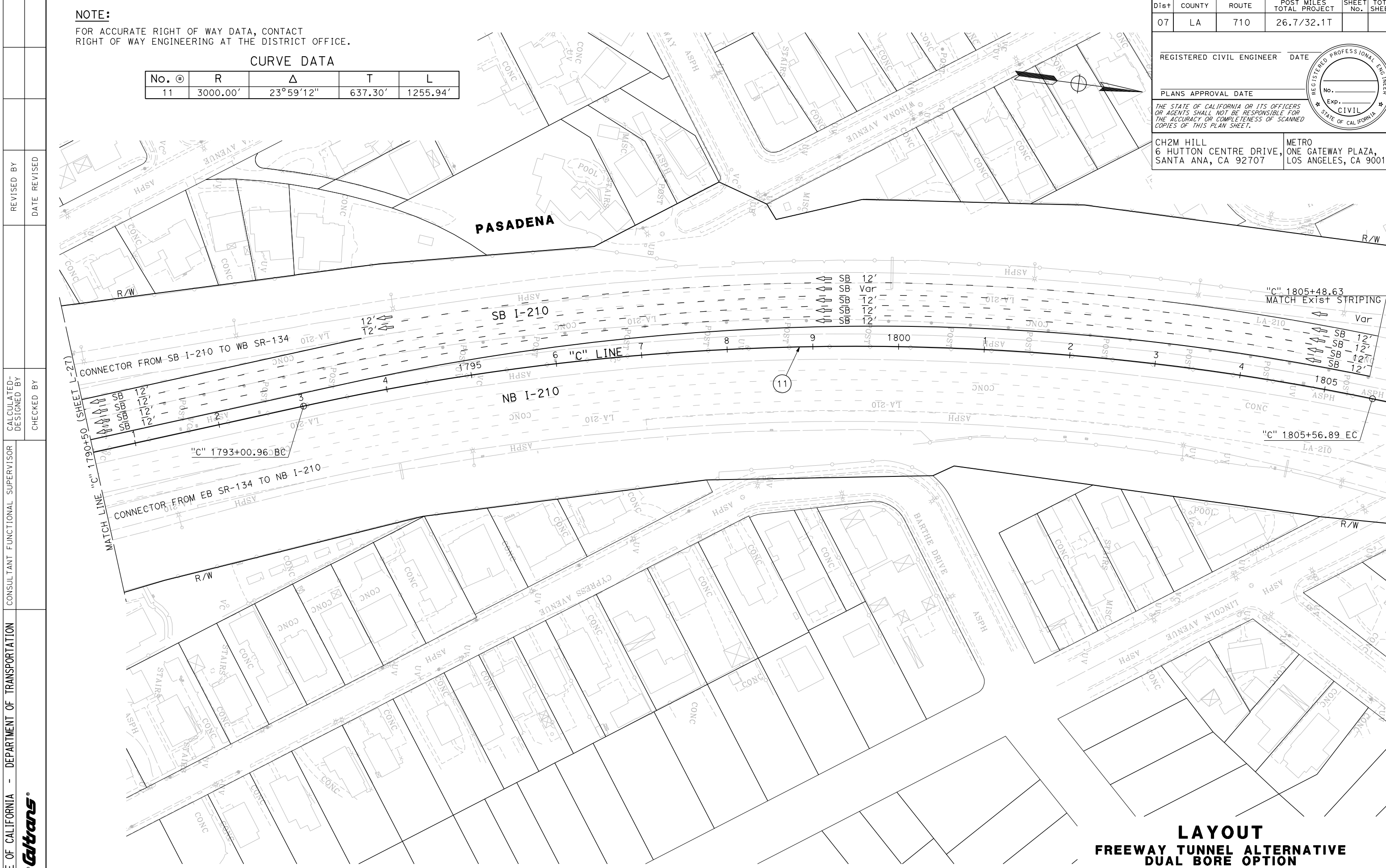
No. Ⓢ	R	Δ	T	L
11	3000.00'	23°59'12"	637.30'	1255.94'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
 PLANS APPROVAL DATE \_\_\_\_\_  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
 METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 Ettrans  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

**LAYOUT  
 FREEWAY TUNNEL ALTERNATIVE  
 DUAL BORE OPTION**

ATTACHMENT I-2 SHEET 46 OF 103

SCALE 1"=100'

**L-28**

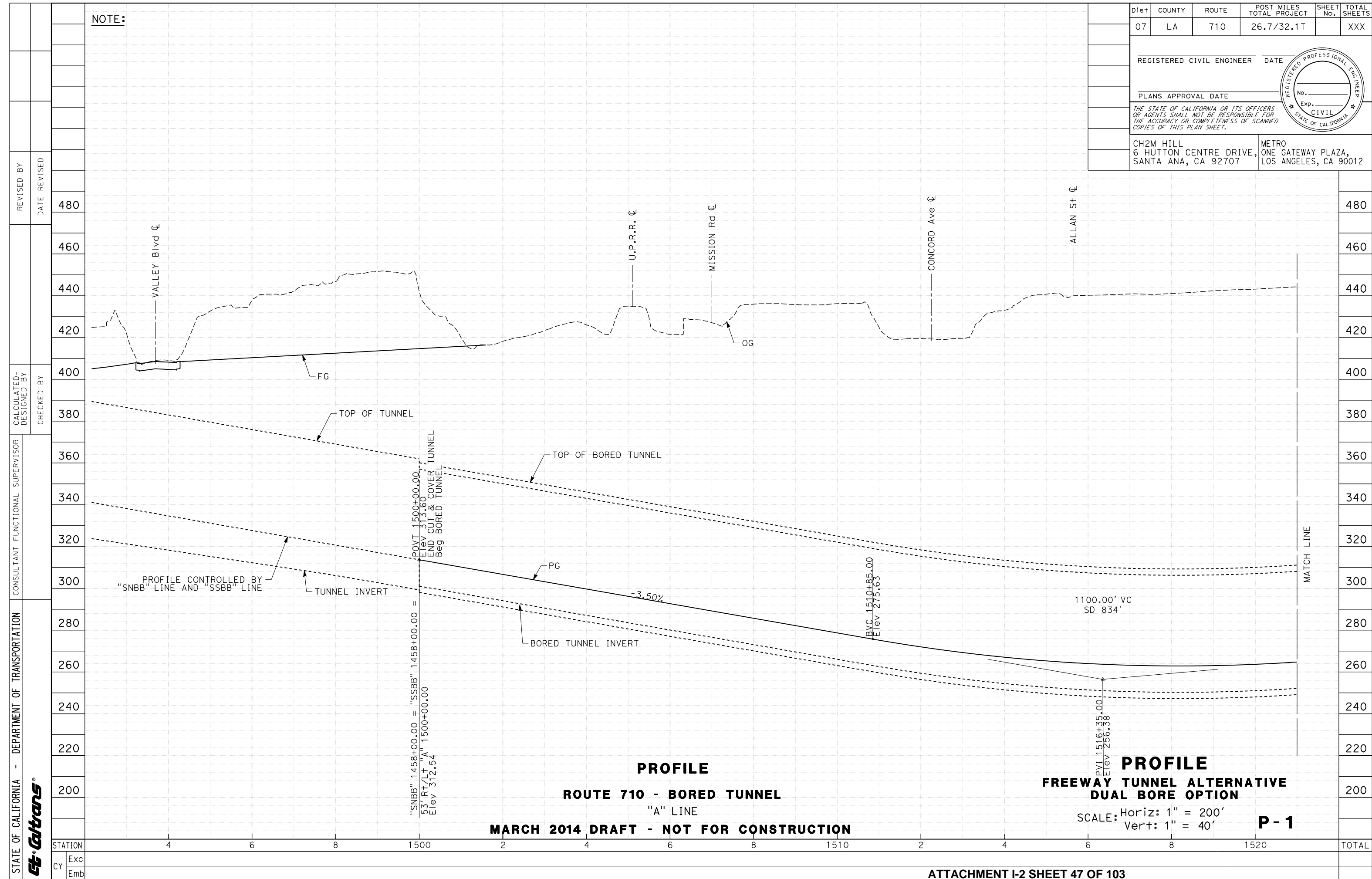
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

LAST REVISION DATE PLOTTED => 21-APR-2014  
 00-00-00 TIME PLOTTED => 15:09

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE
Exc					
Emb					



BORDER LAST REVISED 7/2/2010

USERNAME => pwsvc  
DGN FILE => 0700000191fa001.dgn

RELATIVE BORDER SCALE IS IN INCHES



ATTACHMENT I-2 SHEET 47 OF 103

UNIT 0000

PROJECT NUMBER & PHASE

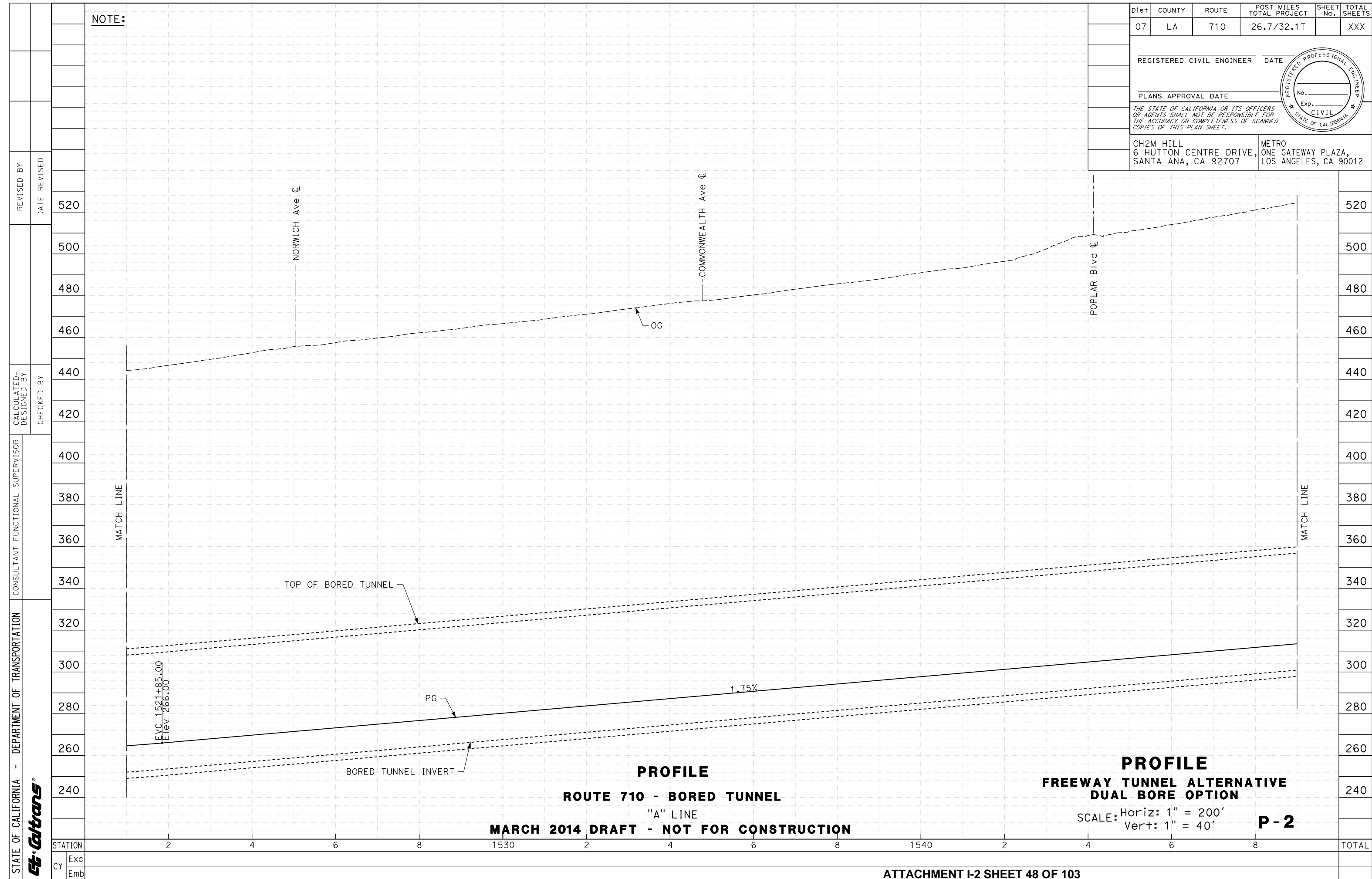
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LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 13:32

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



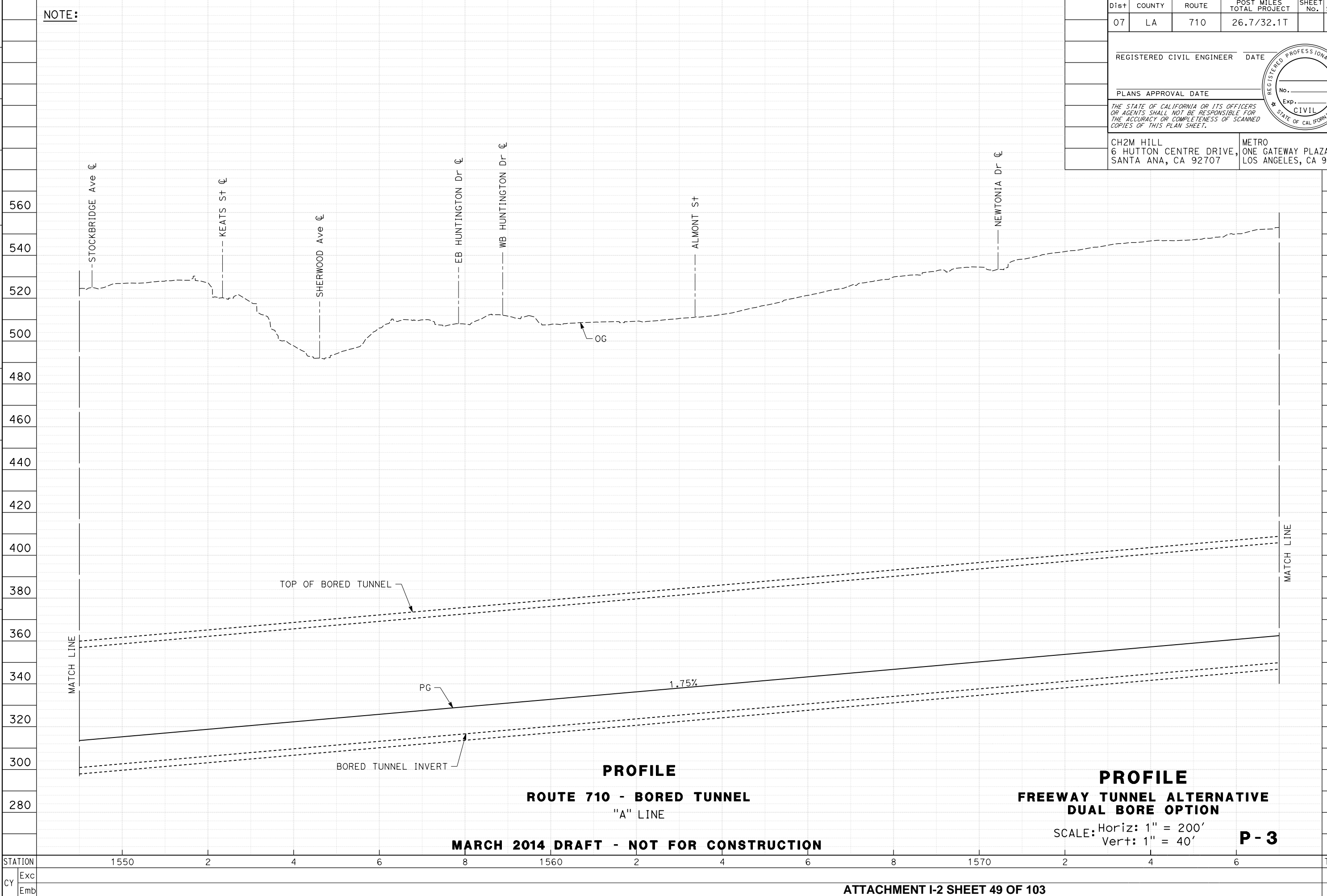
NOTE:



**PROFILE**  
**ROUTE 710 - BORED TUNNEL**  
 "A" LINE  
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
 SCALE: Horiz: 1" = 200'  
 Vert: 1" = 40'  
**P - 2**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED



NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER			DATE		
PLANS APPROVAL DATE			No.		
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.			* CIVIL * STATE OF CALIFORNIA		
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		

**PROFILE**

**ROUTE 710 - BORED TUNNEL**  
 "A" LINE

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

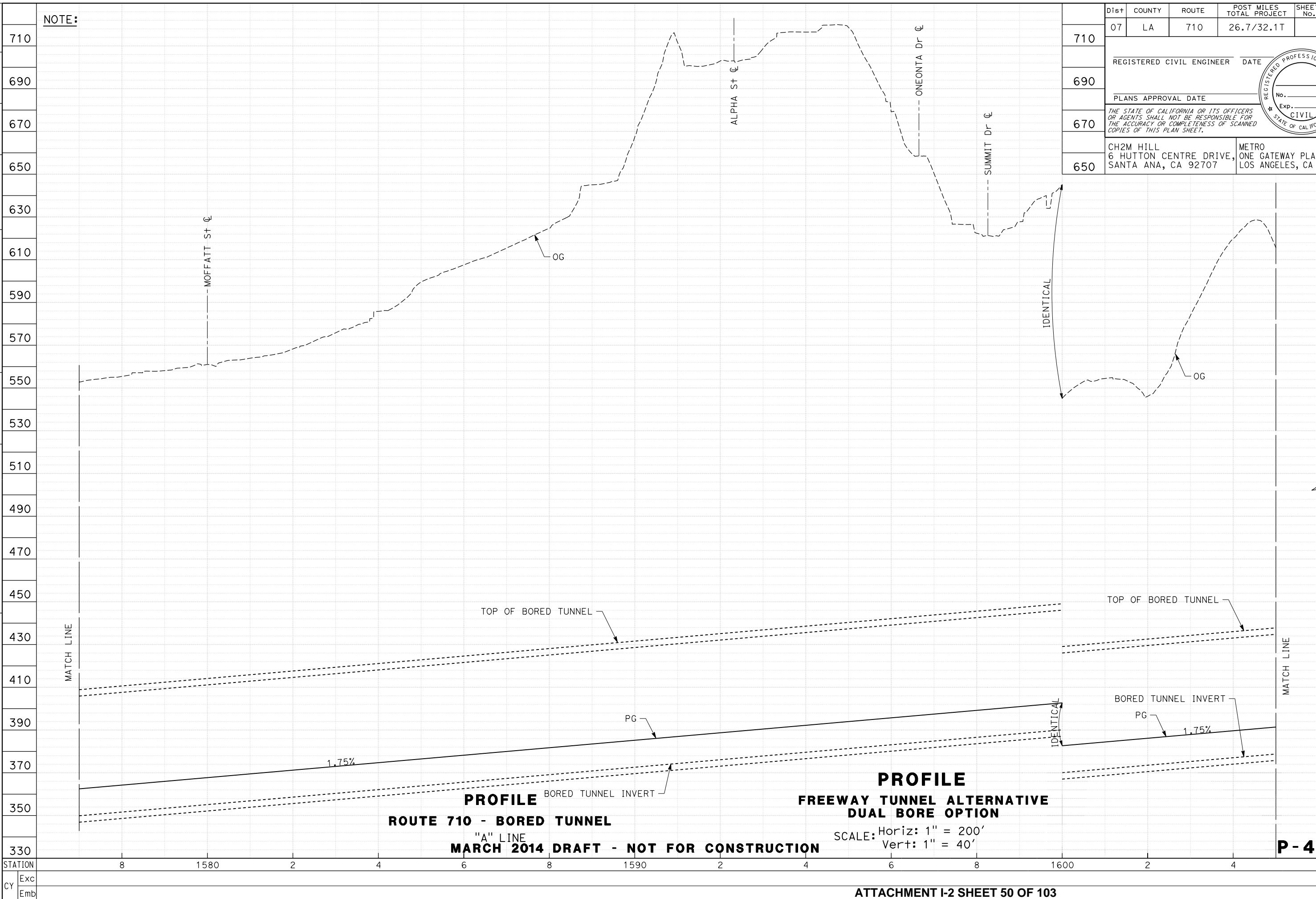
**PROFILE**

**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

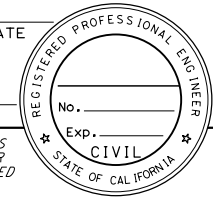
SCALE: Horiz: 1" = 200'  
 Vert: 1" = 40'

**P - 3**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED



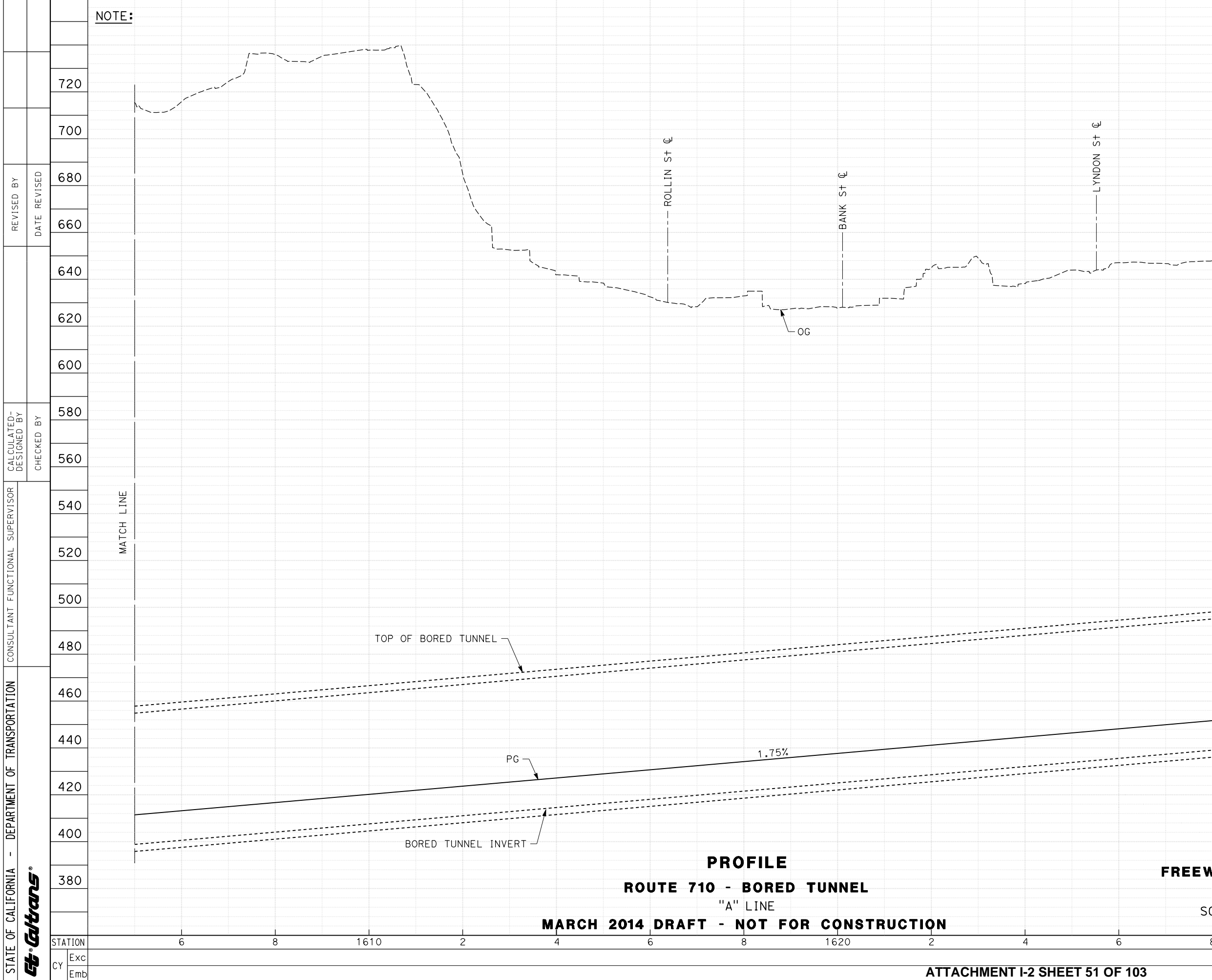
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
710	REGISTERED CIVIL ENGINEER DATE				
690	PLANS APPROVAL DATE				
670	THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.				
650	CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707		METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**PROFILE**  
**ROUTE 710 - BORED TUNNEL**  
 "A" LINE  
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
 SCALE: Horiz: 1" = 200'  
 Vert: 1" = 40'

**P-4**



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
720	PLANS APPROVAL DATE				
700	THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.				
680	CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707		METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE

**PROFILE**  
**ROUTE 710 - BORED TUNNEL**  
 "A" LINE  
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
 SCALE: Horiz: 1" = 200'  
 Vert: 1" = 40'

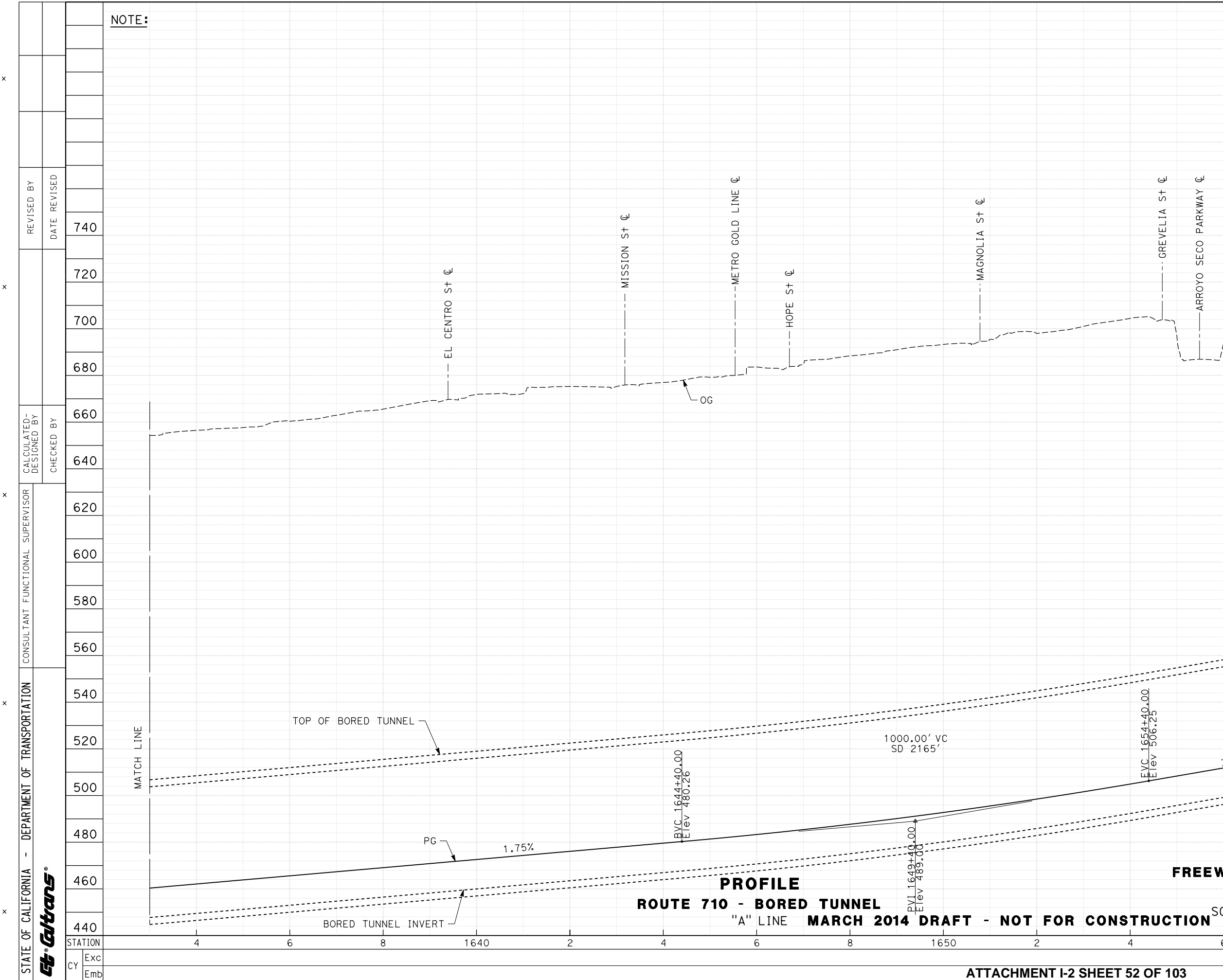
**P-5**

LAST REVISION DATE PLOTTED => 21-MAR-2014  
 00-00-00 TIME PLOTTED => 13:32

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T	XXX	
REGISTERED CIVIL ENGINEER		DATE			
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**PROFILE**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
 SCALE: Horiz: 1" = 200'  
 Vert: 1" = 40'

**PROFILE**  
**ROUTE 710 - BORED TUNNEL**  
**"A" LINE MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**P - 6**

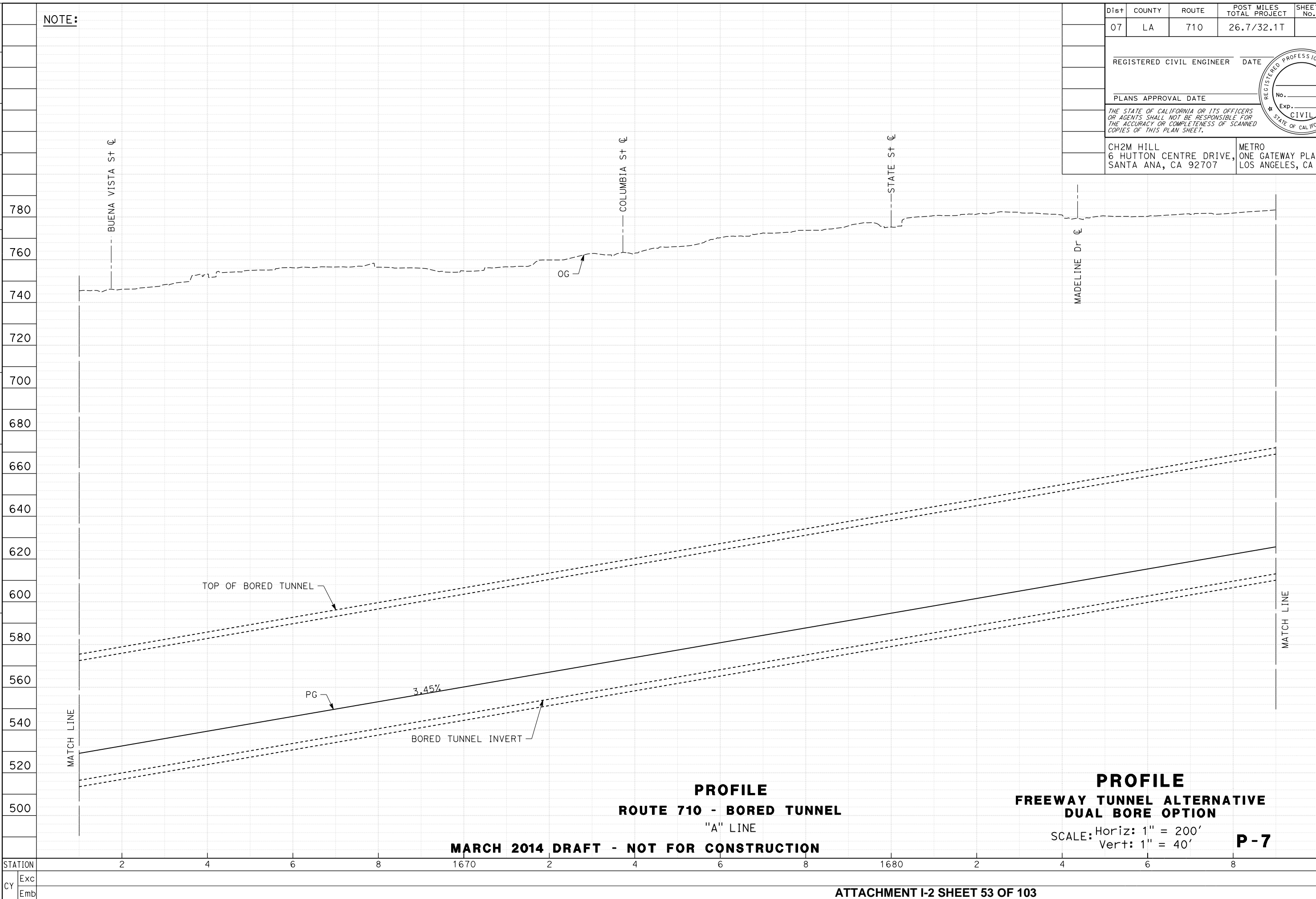
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE	REVISION
<b>Caltrans</b>						
					740	
					720	
					700	
					680	
					660	
					640	
					620	
					600	
					580	
					560	
					540	
					520	
					500	
					480	
					460	
					440	
STATION	Exc	Emb				TOTAL

ATTACHMENT I-2 SHEET 52 OF 103

LAST REVISION DATE PLOTTED => 21-MAR-2014  
 00-00-00 TIME PLOTTED => 13:31

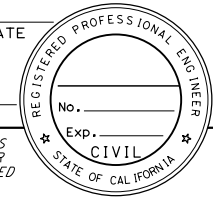


STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED



NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**PROFILE**  
**ROUTE 710 - BORED TUNNEL**  
 "A" LINE

**PROFILE**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
 SCALE: Horiz: 1" = 200'  
 Vert: 1" = 40'

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**P-7**

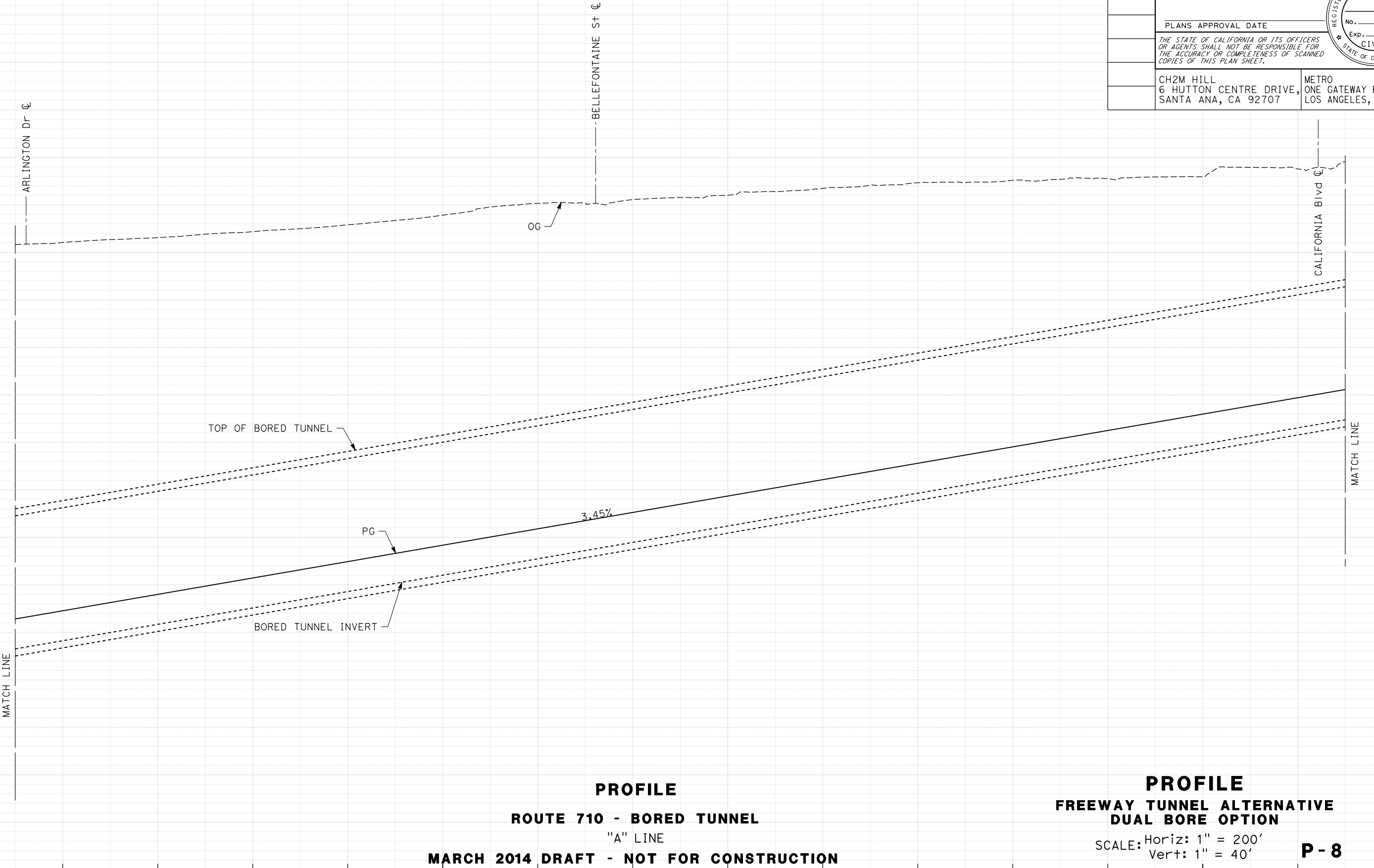
STATION	2	4	6	8	1670	2	4	6	8	1680	2	4	6	8	TOTAL
Exc															
Emb															

ATTACHMENT I-2 SHEET 53 OF 103

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER		DATE			
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**PROFILE**  
**ROUTE 710 - BORED TUNNEL**  
 "A" LINE  
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
 SCALE: Horiz: 1" = 200'  
 Vert: 1" = 40' **P - 8**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE
<b>Caltrans</b>					

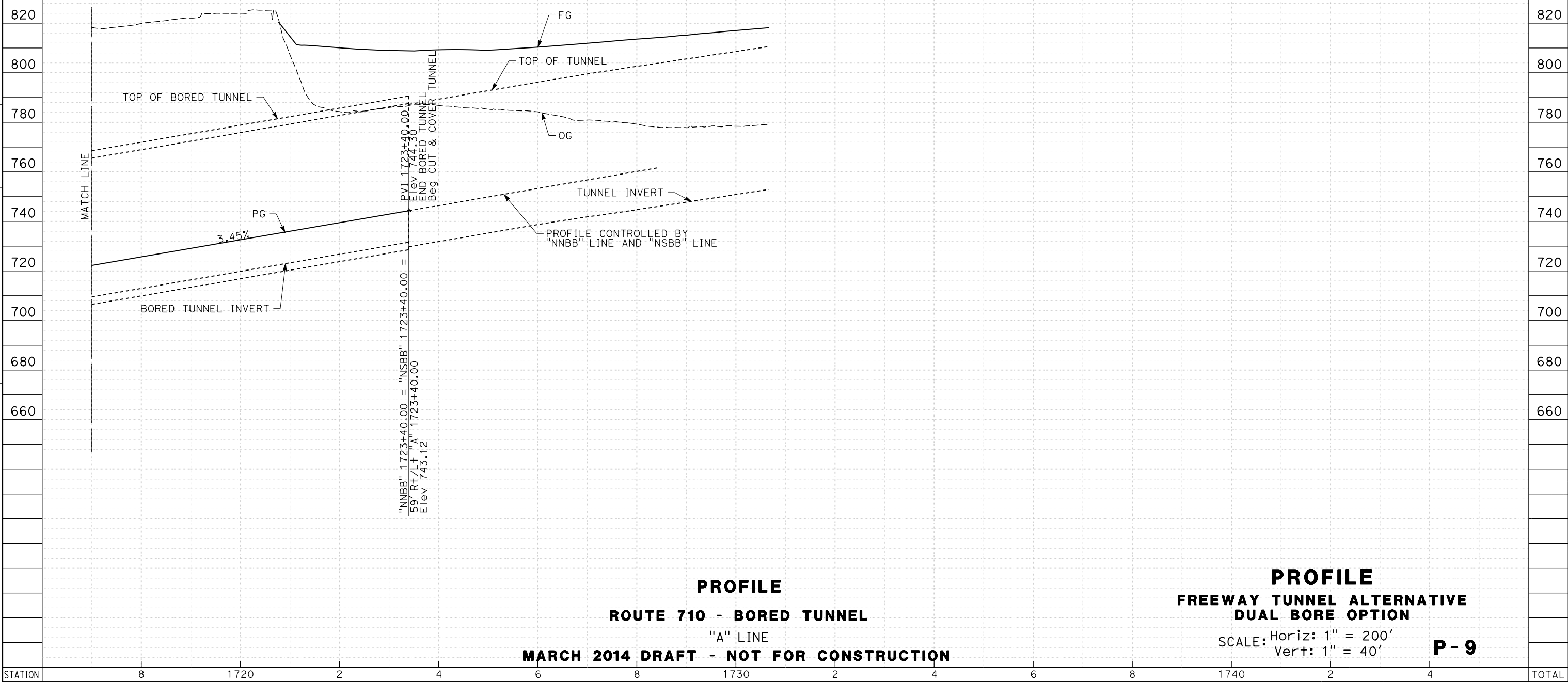
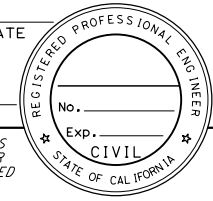
STATION	Exc	Emb	TOTAL
1690			
2			
4			
6			
8			
1700			
2			
4			
6			
8			
1710			
2			
4			
6			
TOTAL			

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:31

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR	DATE
<b>Caltrans</b>		CHECKED BY	DATE	

NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER			DATE		
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**PROFILE**  
**ROUTE 710 - BORED TUNNEL**  
 "A" LINE  
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

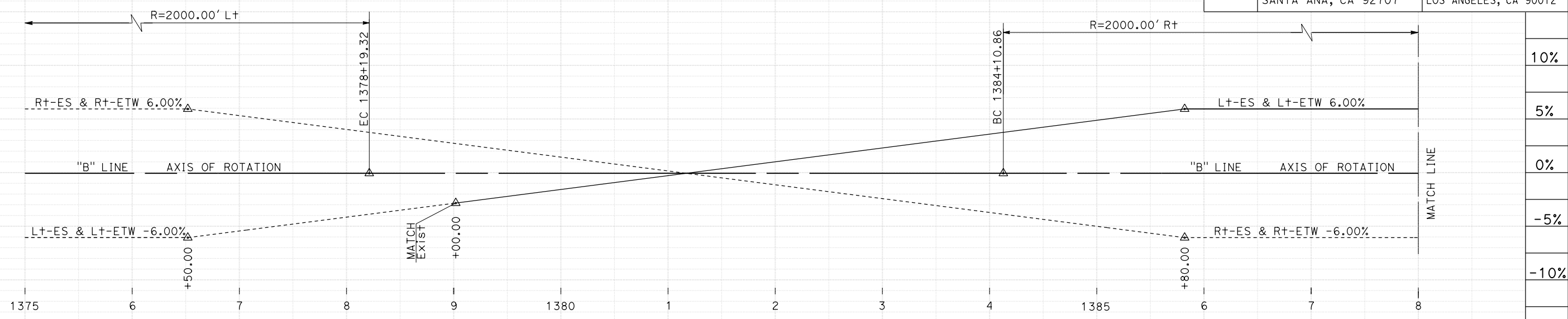
**PROFILE**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
 SCALE: Horiz: 1" = 200'  
 Vert: 1" = 40' **P-9**

STATION	8	1720	2	4	6	8	1730	2	4	6	8	1740	2	4	TOTAL
Exc															
Emb															

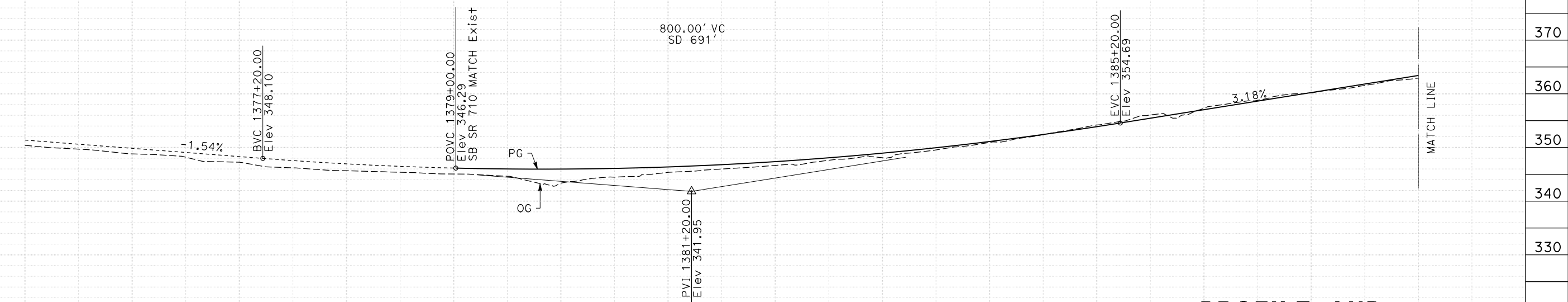
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**

**ROUTE 710  
"B" LINE**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE AND SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-1**

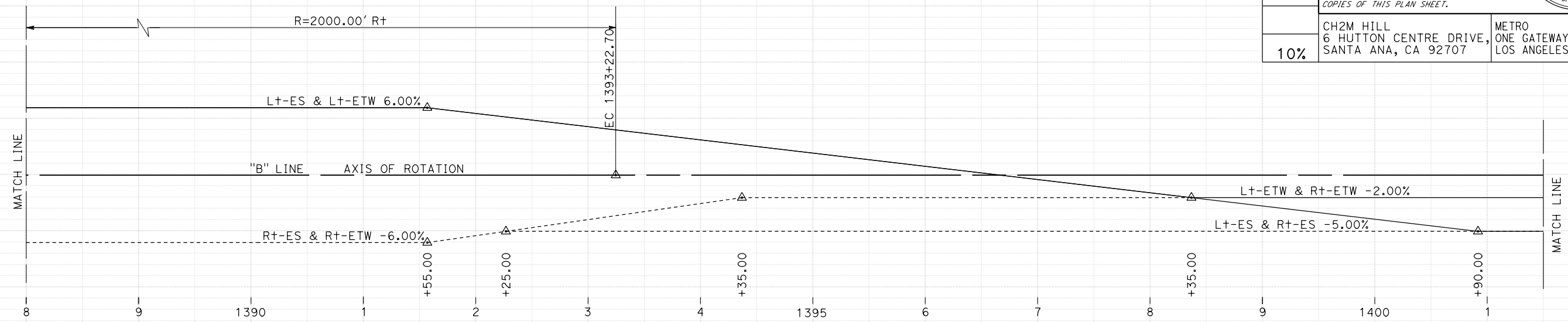
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE
<b>Caltrans</b>					
STATION	Exc	Emb			

1375	6	7	8	9	1380	1	2	3	4	1385	6	7	8	TOTAL
------	---	---	---	---	------	---	---	---	---	------	---	---	---	-------

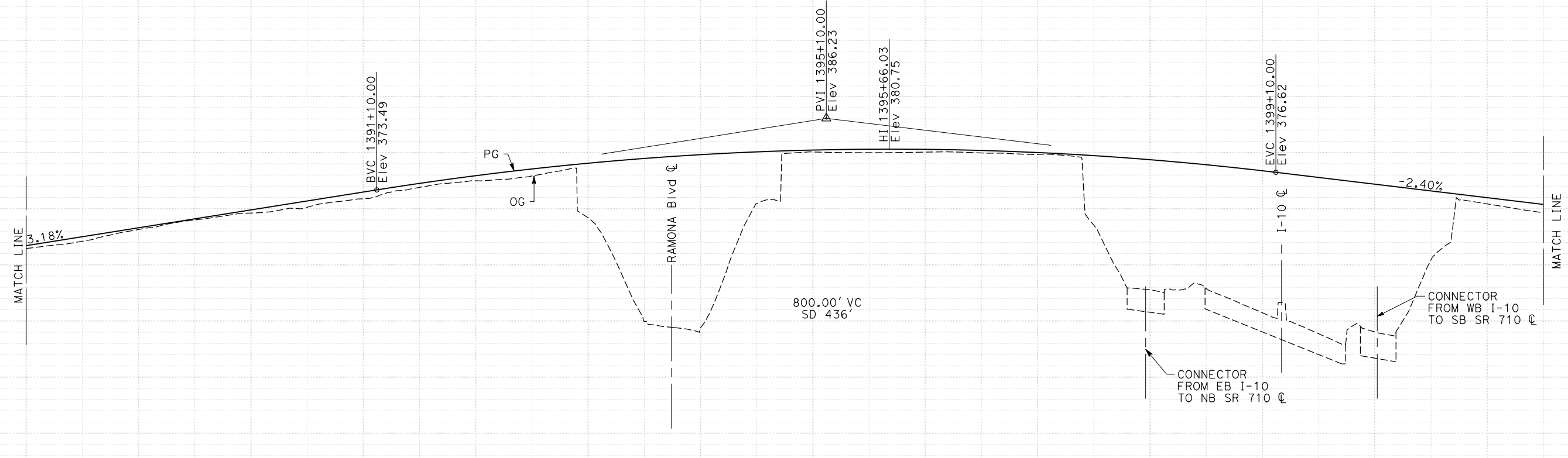
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**

**PROFILE AND SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**ROUTE 710  
"B" LINE  
MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS - 2**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY	DATE	REVISION
<b>Caltrans</b>		CHECKED BY	10%		
			5%		
			0%		
			-5%		
			-10%		
STATION	Exc	Emb			

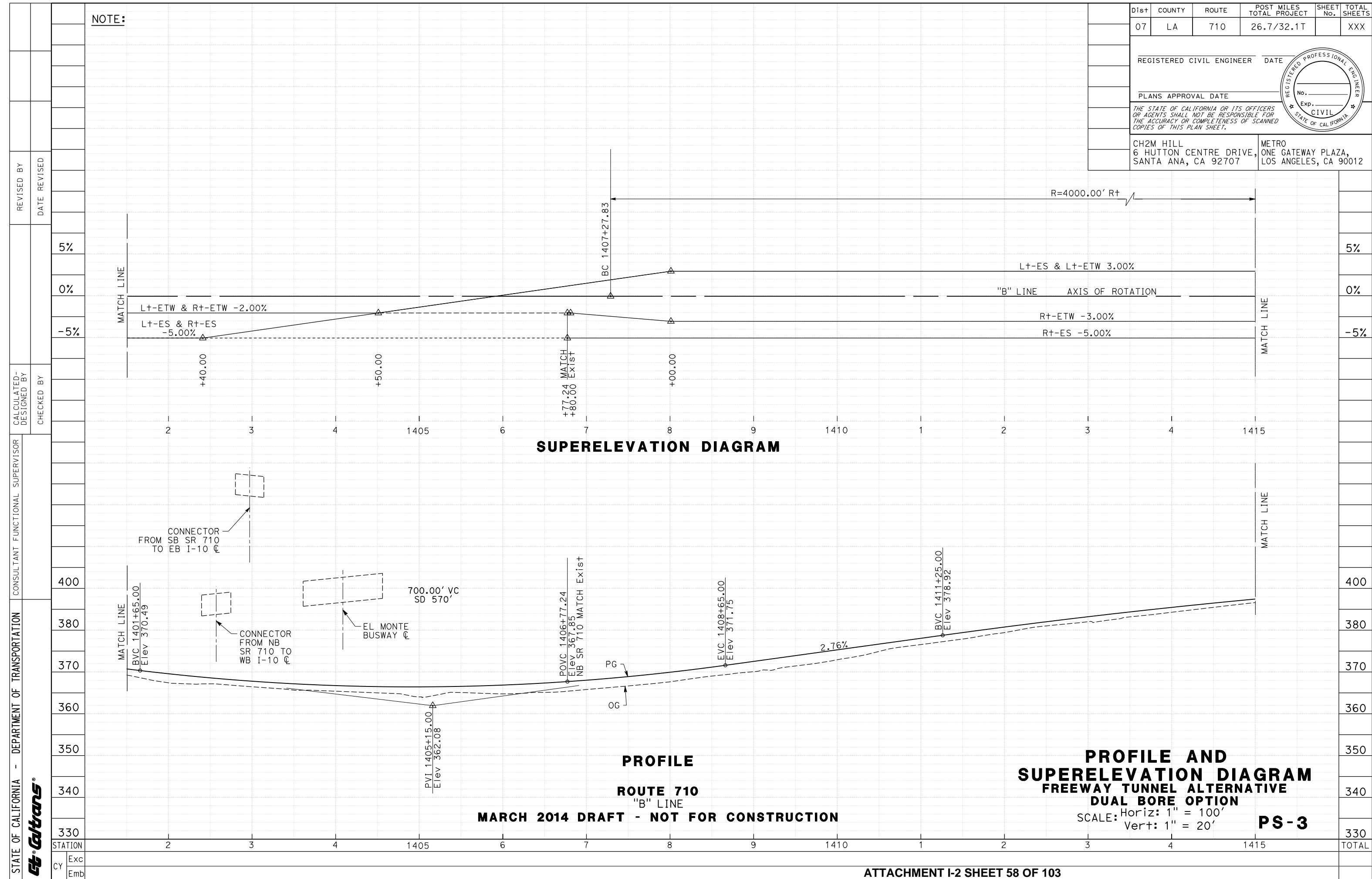
8	9	1390	1	2	3	4	1395	6	7	8	9	1400	1	TOTAL
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LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:31

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER		DATE			
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



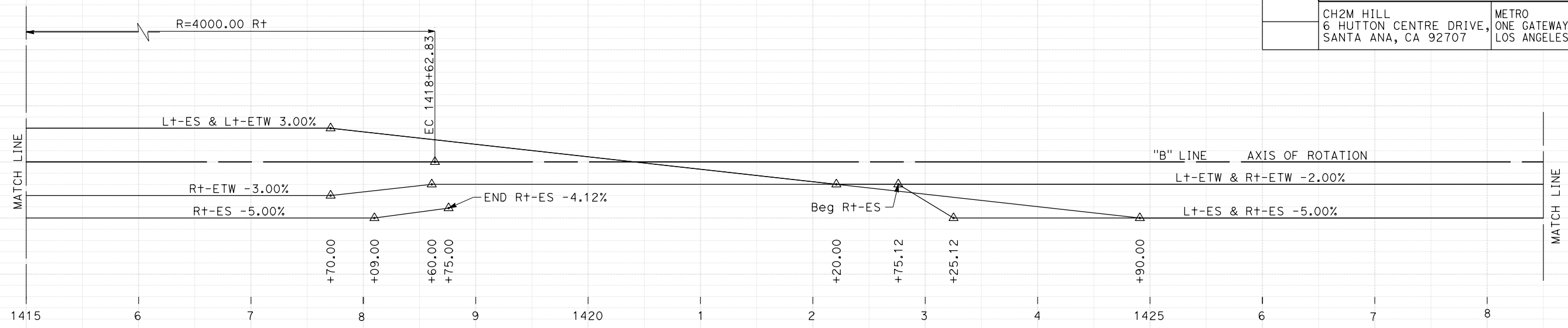
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED/DESIGNED BY	CHECKED BY	REVISOR	DATE
Exc					
Emb					

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:33

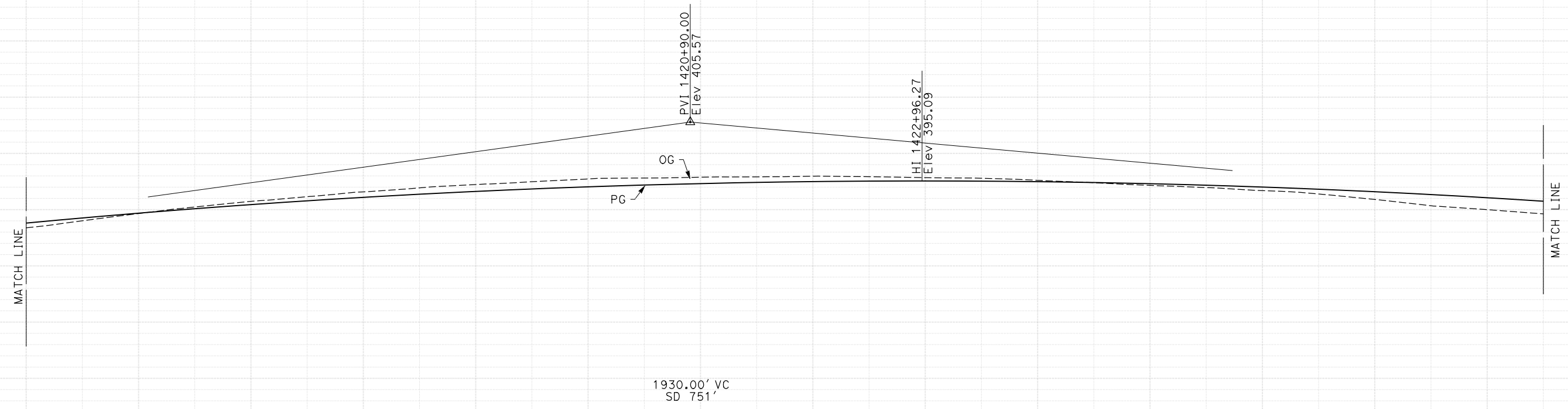
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**

**ROUTE 710  
"B" LINE**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE AND SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-4**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE

STATION	1415	6	7	8	9	1420	1	2	3	4	1425	6	7	8	TOTAL
Exc															
Emb															

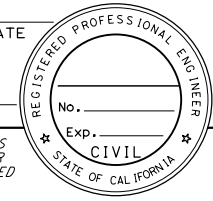
LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 1:31

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012

NOTE:

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
		CHECKED BY	DATE REVISED
STATION			
Exc			
Emb			

5%

0%

-5%

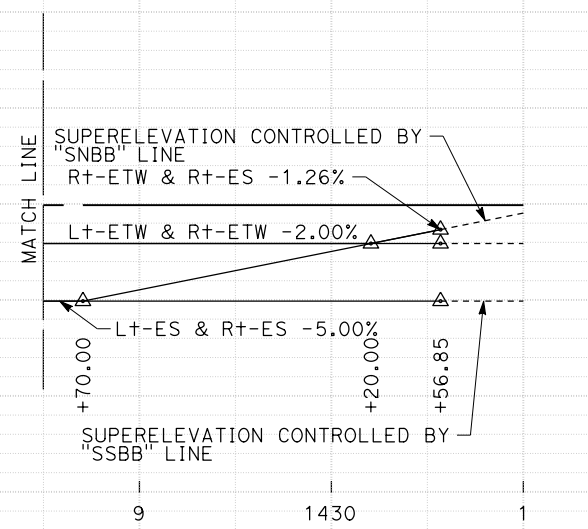
400

390

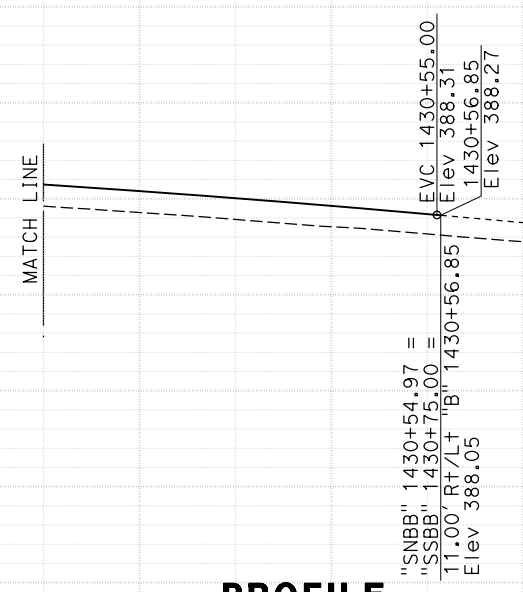
380

370

360



**SUPERELEVATION DIAGRAM**



**PROFILE**

**ROUTE 710  
"B" LINE**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

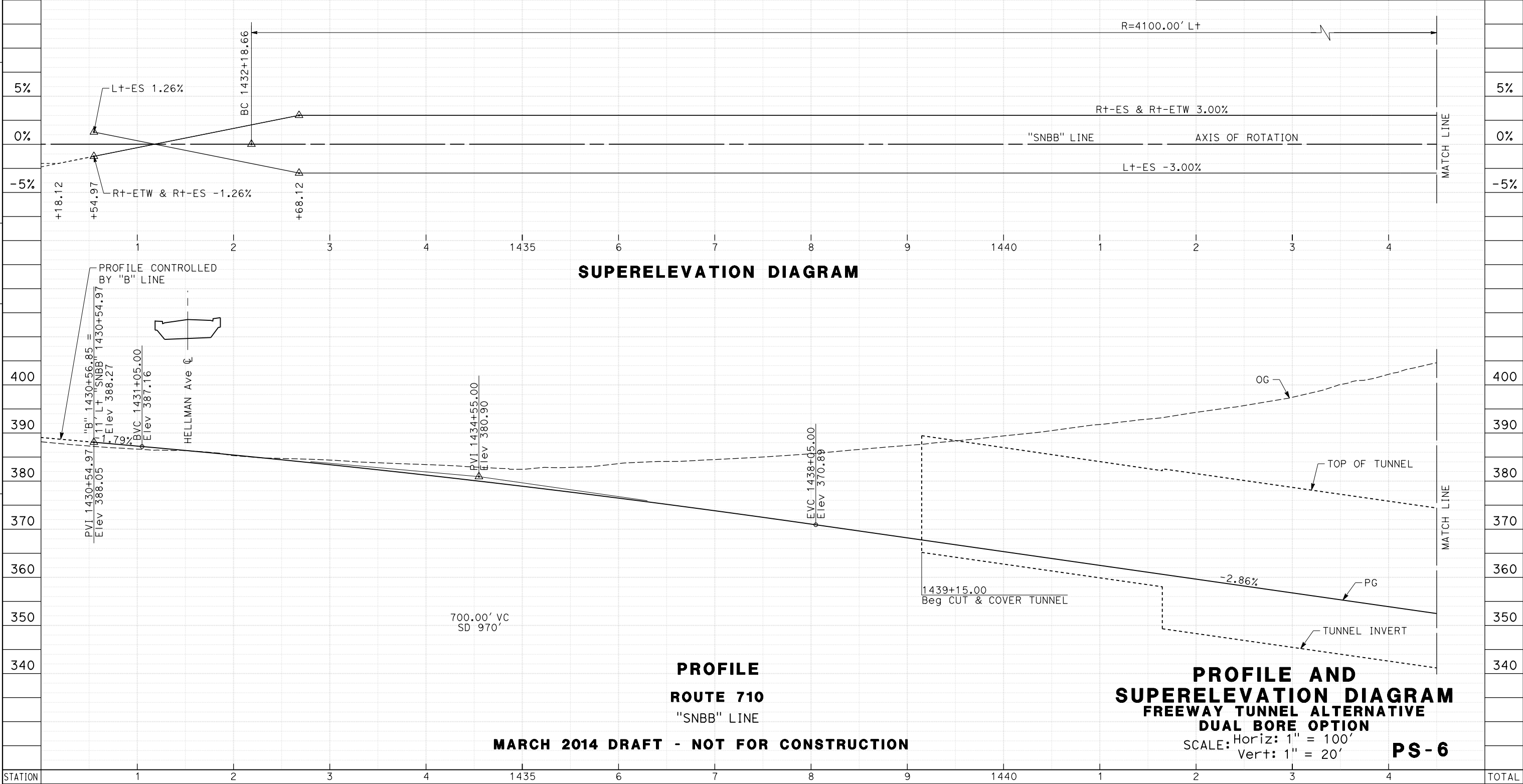
**PS-5**



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISION

NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**SUPERELEVATION DIAGRAM**

**PROFILE  
ROUTE 710  
"SNBB" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

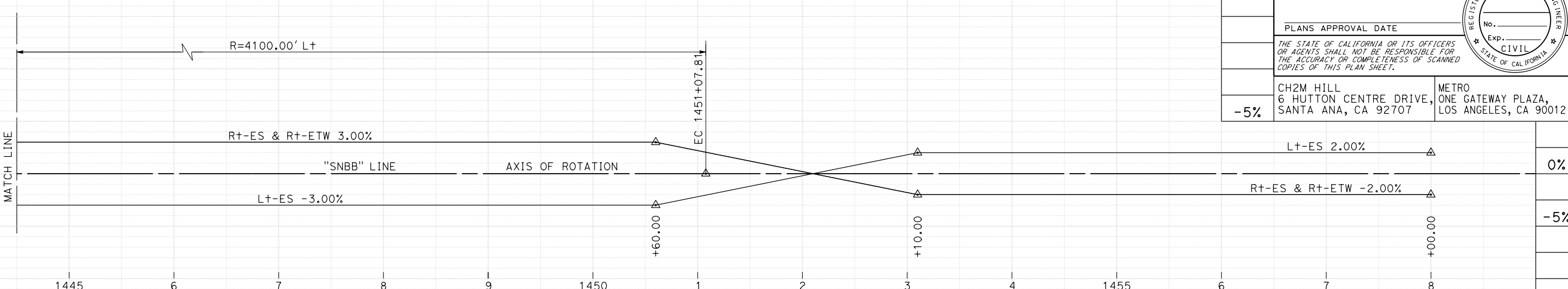
**PS-6**

STATION	1	2	3	4	1435	6	7	8	9	1440	1	2	3	4	TOTAL
Exc															
Emb															

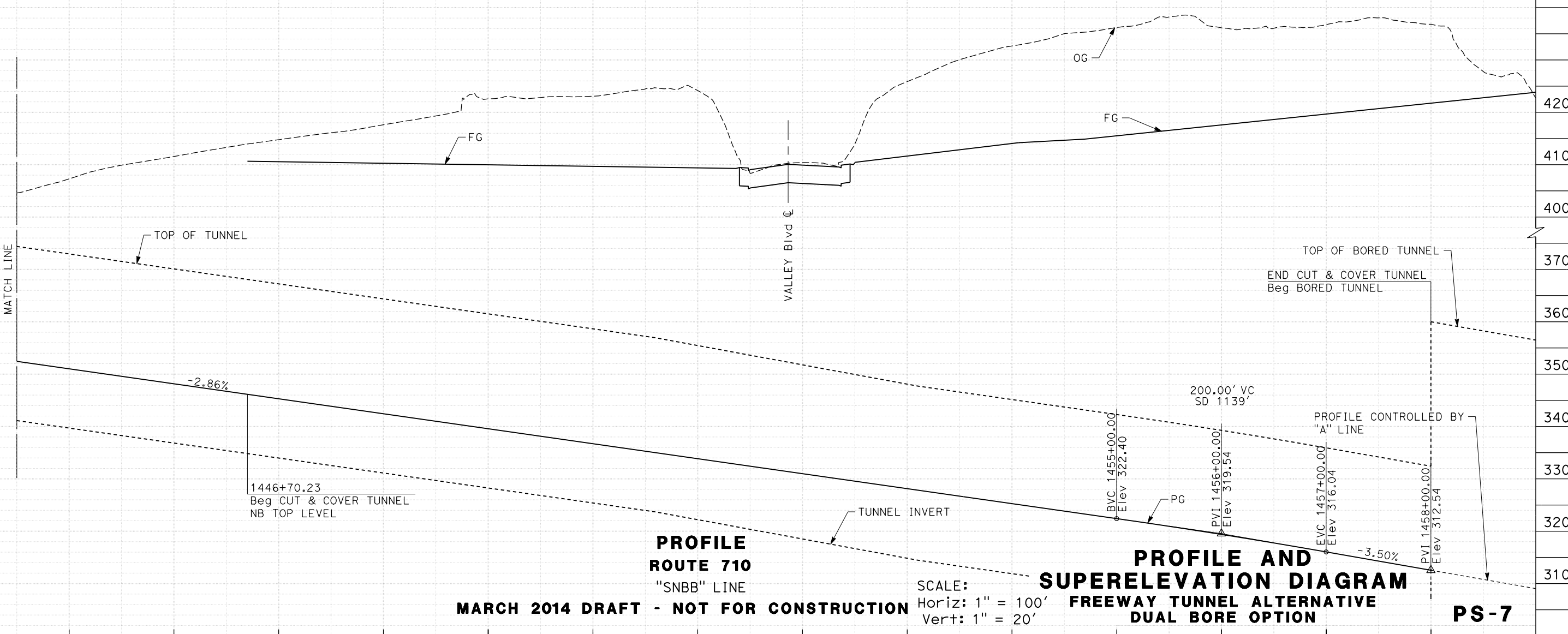
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE  
ROUTE 710  
"SNBB" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**PS-7**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE:  
Horiz: 1" = 100'  
Vert: 1" = 20'

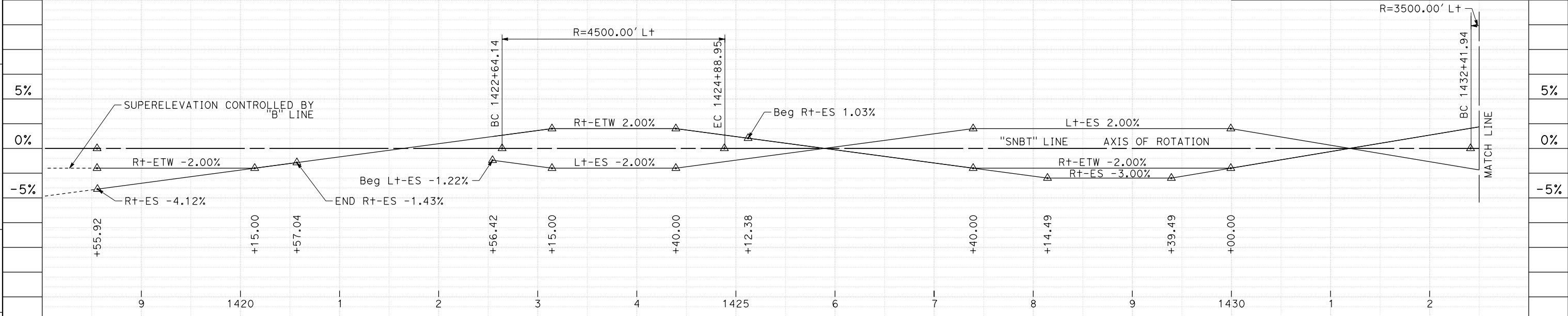
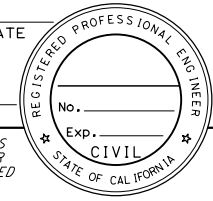
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE	REVISION
Exc	Emb					

STATION	1445	6	7	8	9	1450	1	2	3	4	1455	6	7	8	TOTAL
---------	------	---	---	---	---	------	---	---	---	---	------	---	---	---	-------

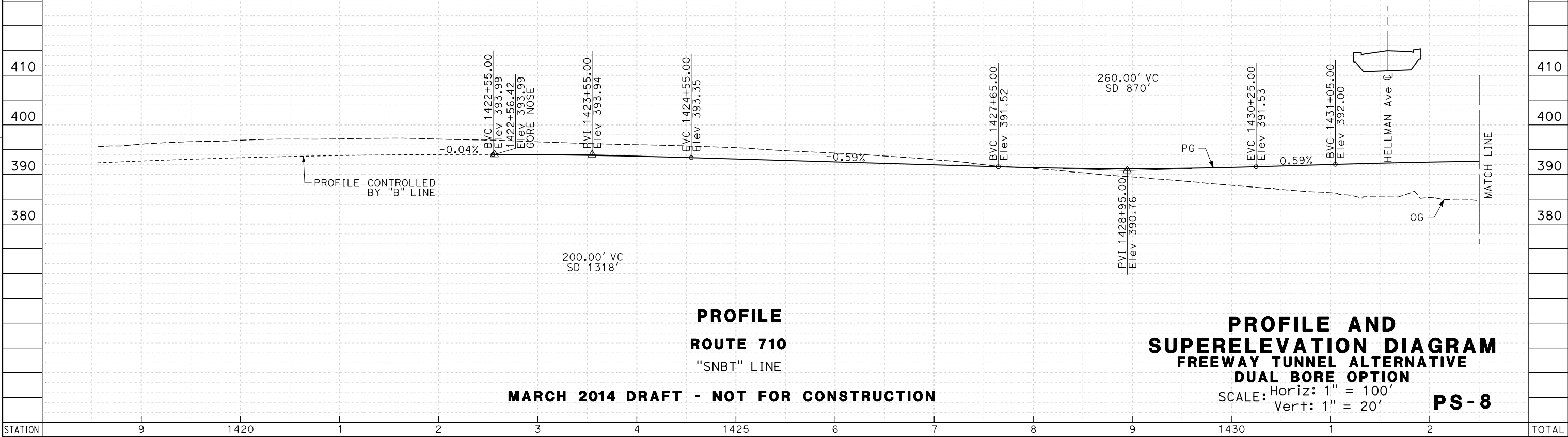
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
720	REGISTERED CIVIL ENGINEER DATE				
710	PLANS APPROVAL DATE				
700	THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.				
690	CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707		METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**SUPERELEVATION DIAGRAM**



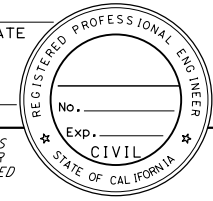
**PROFILE  
 ROUTE 710  
 "SNBT" LINE**

**PROFILE AND  
 SUPERELEVATION DIAGRAM  
 FREEWAY TUNNEL ALTERNATIVE  
 DUAL BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'

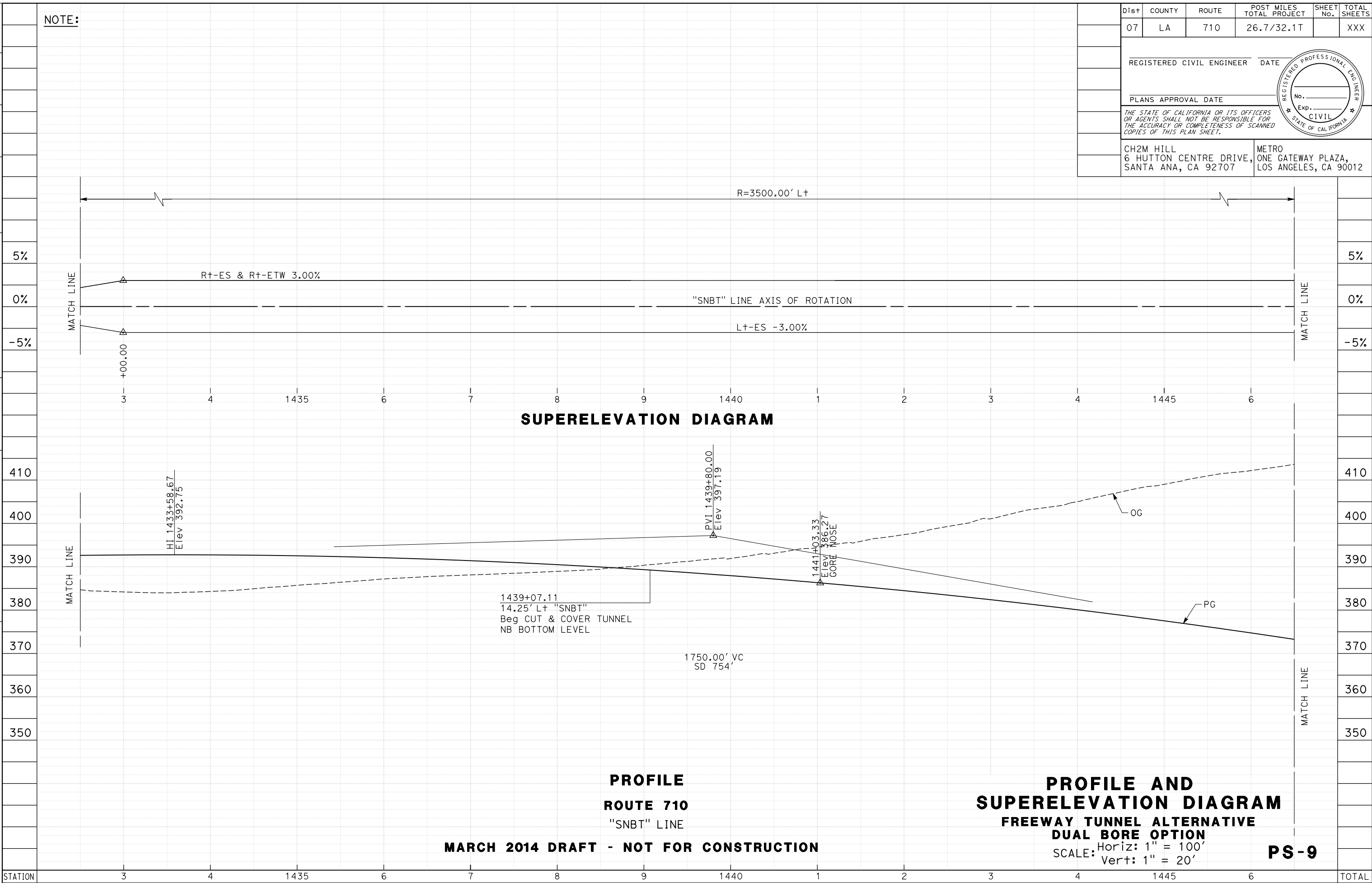
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PS-8**

STATION	9	1420	1	2	3	4	1425	6	7	8	9	1430	1	2	TOTAL
Exc															
Emb															


Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		

NOTE:



MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

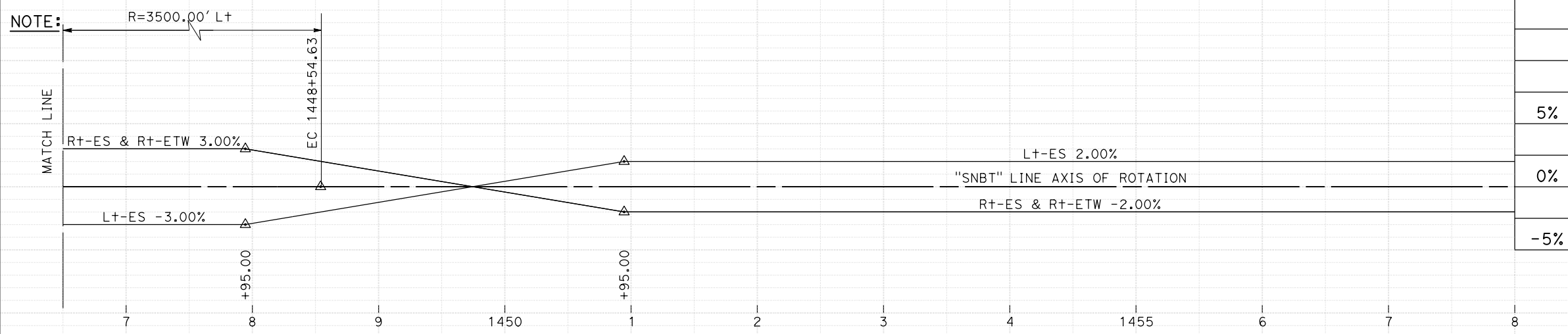
ATTACHMENT I-2 SHEET 64 OF 103

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE
					

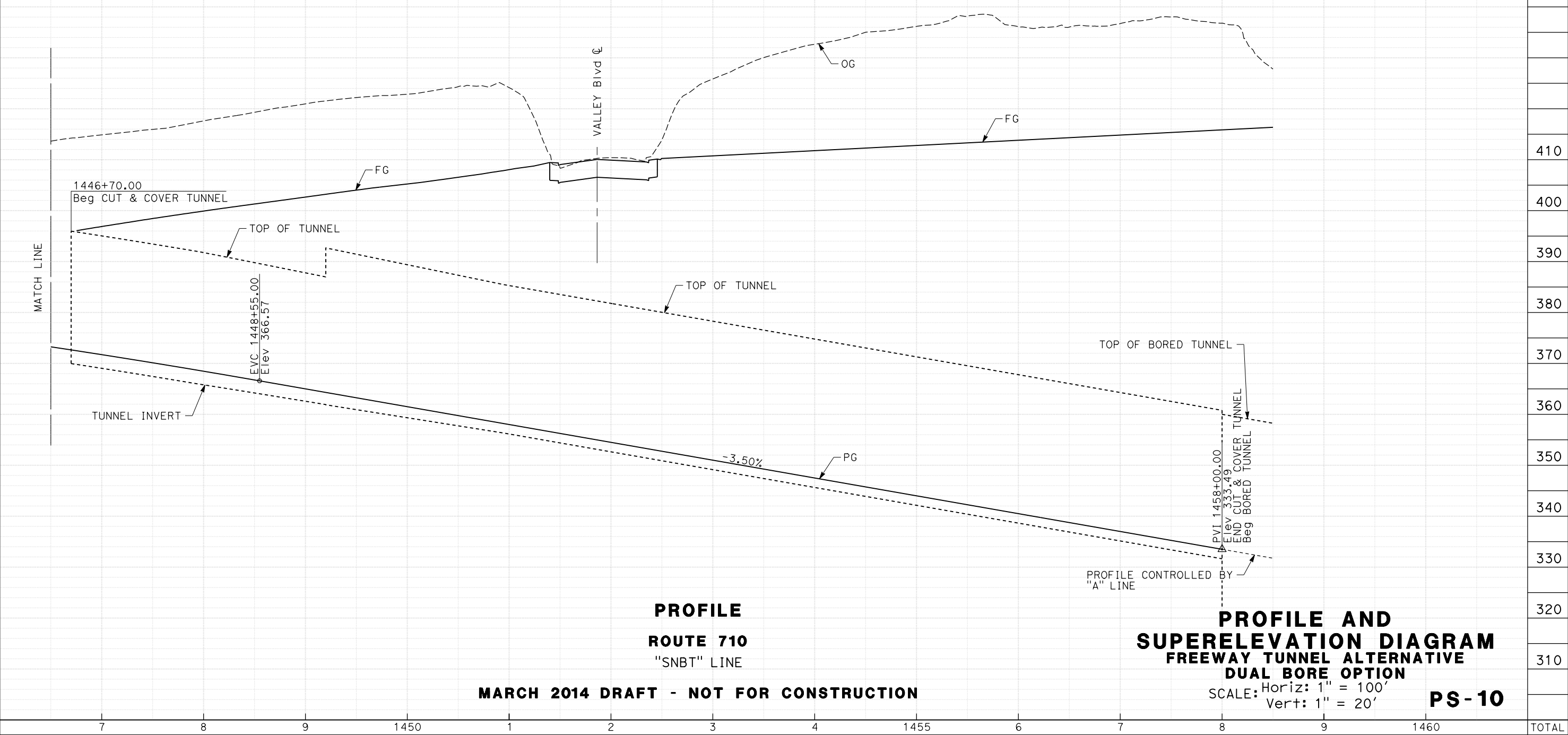
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00-00-00 TIME PLOTTED => 13:32

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISOR BY  
 DATE REVISOR  
 STATION  
 CY Exc  
 Emb

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**SUPERELEVATION DIAGRAM**



**PROFILE**  
**ROUTE 710**  
 "SNBT" LINE

**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

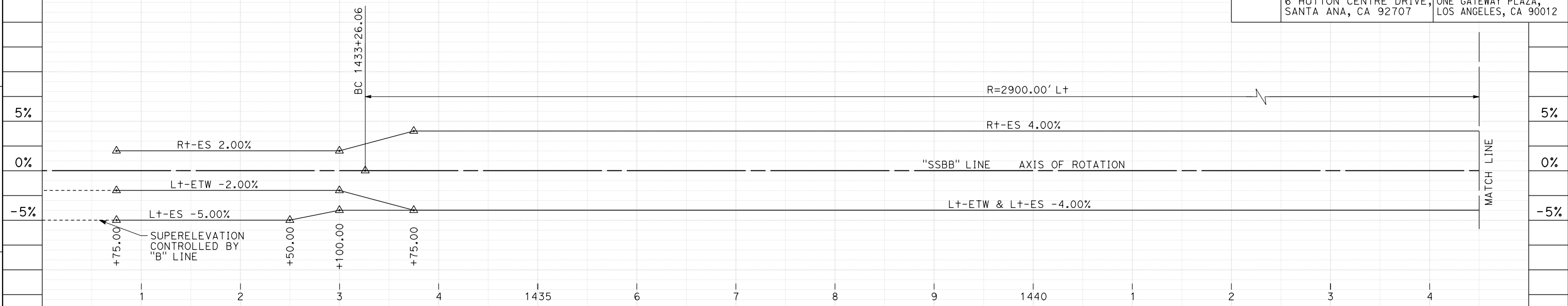
**PS-10**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:33

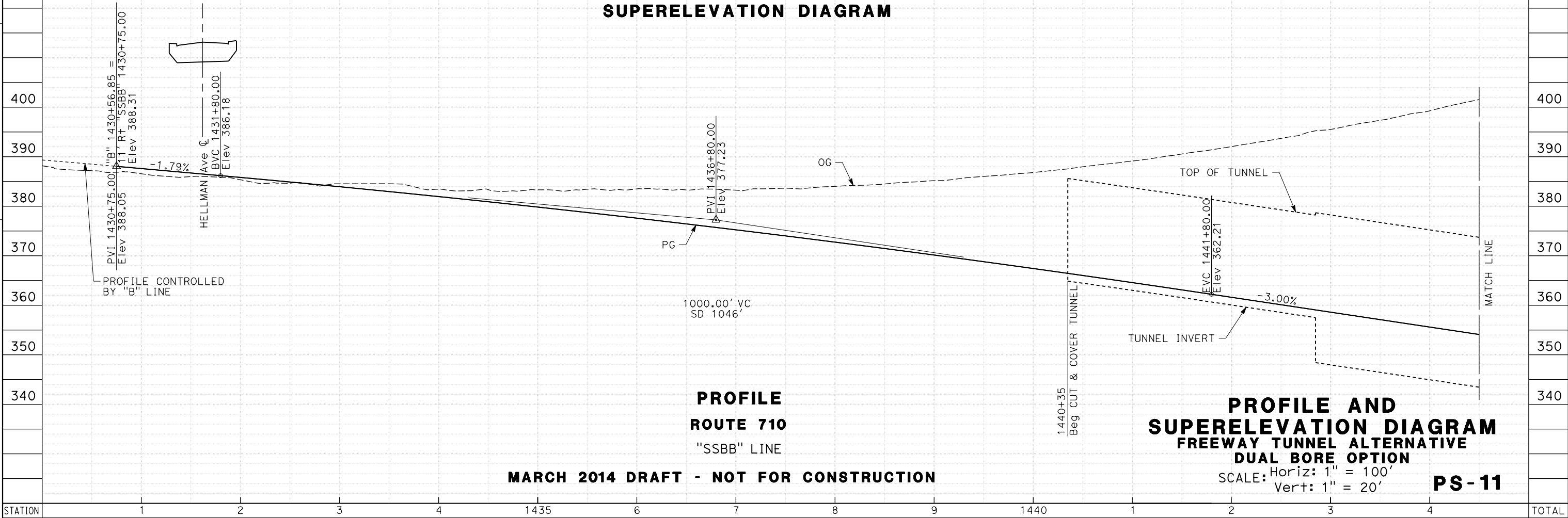
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE  
ROUTE 710  
"SSBB" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-11**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY	DATE
<b>Caltrans</b>		CHECKED BY		
CY	Exc	Emb		

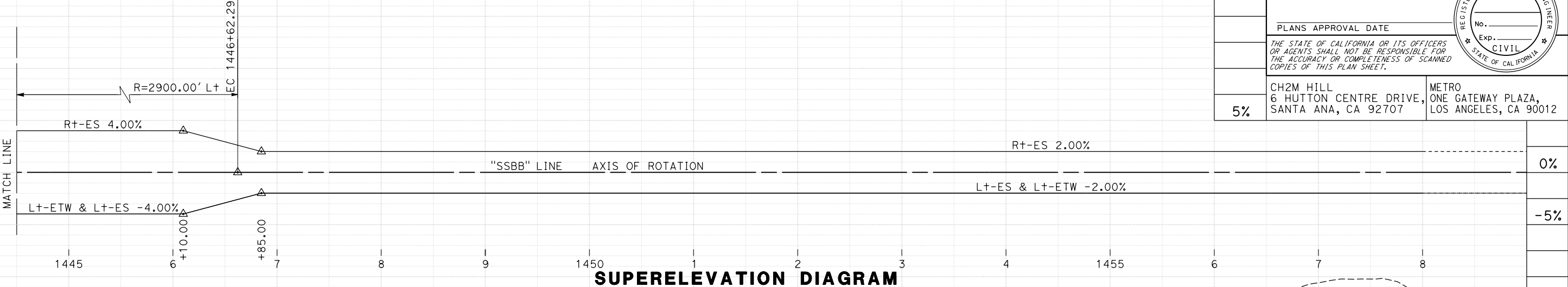
STATION	1	2	3	4	1435	6	7	8	9	1440	1	2	3	4	TOTAL
---------	---	---	---	---	------	---	---	---	---	------	---	---	---	---	-------

LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 13:33

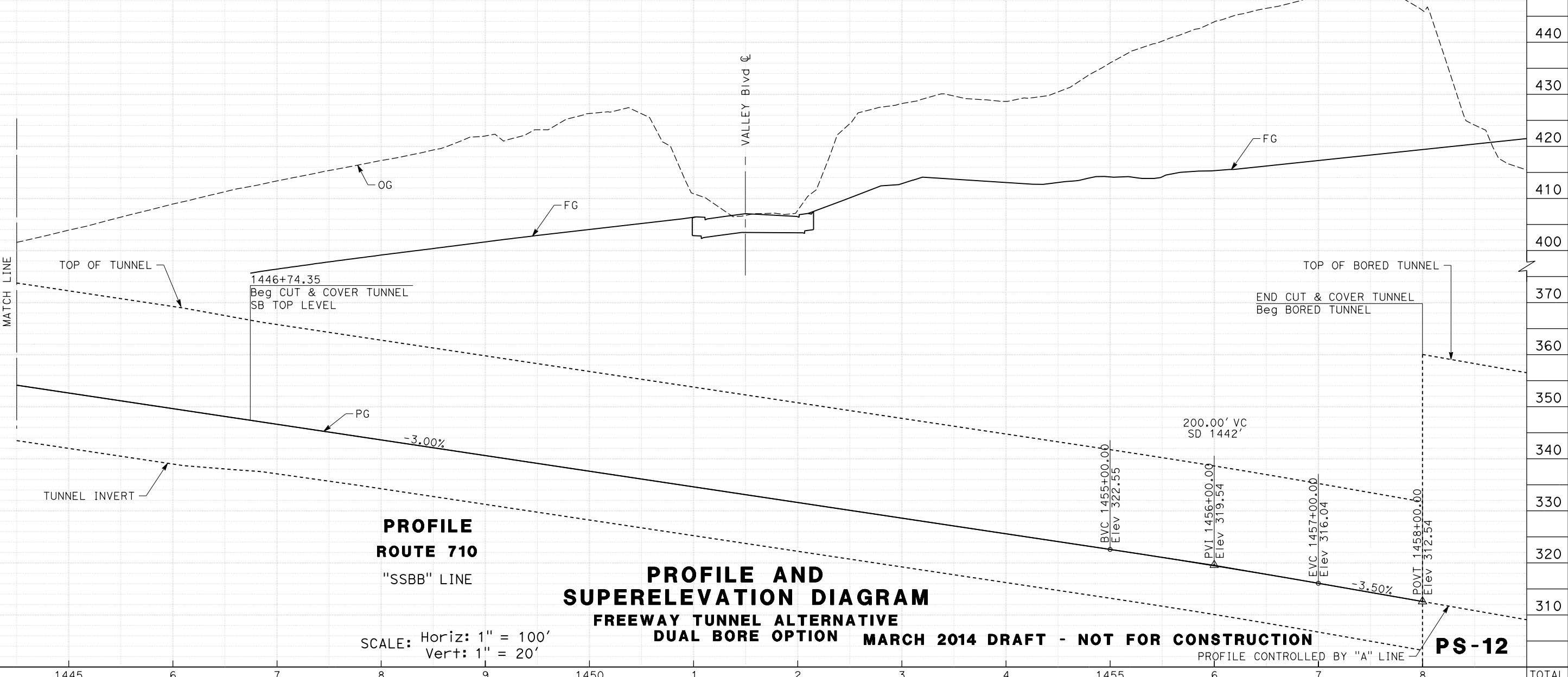
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE  
ROUTE 710  
"SSBB" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

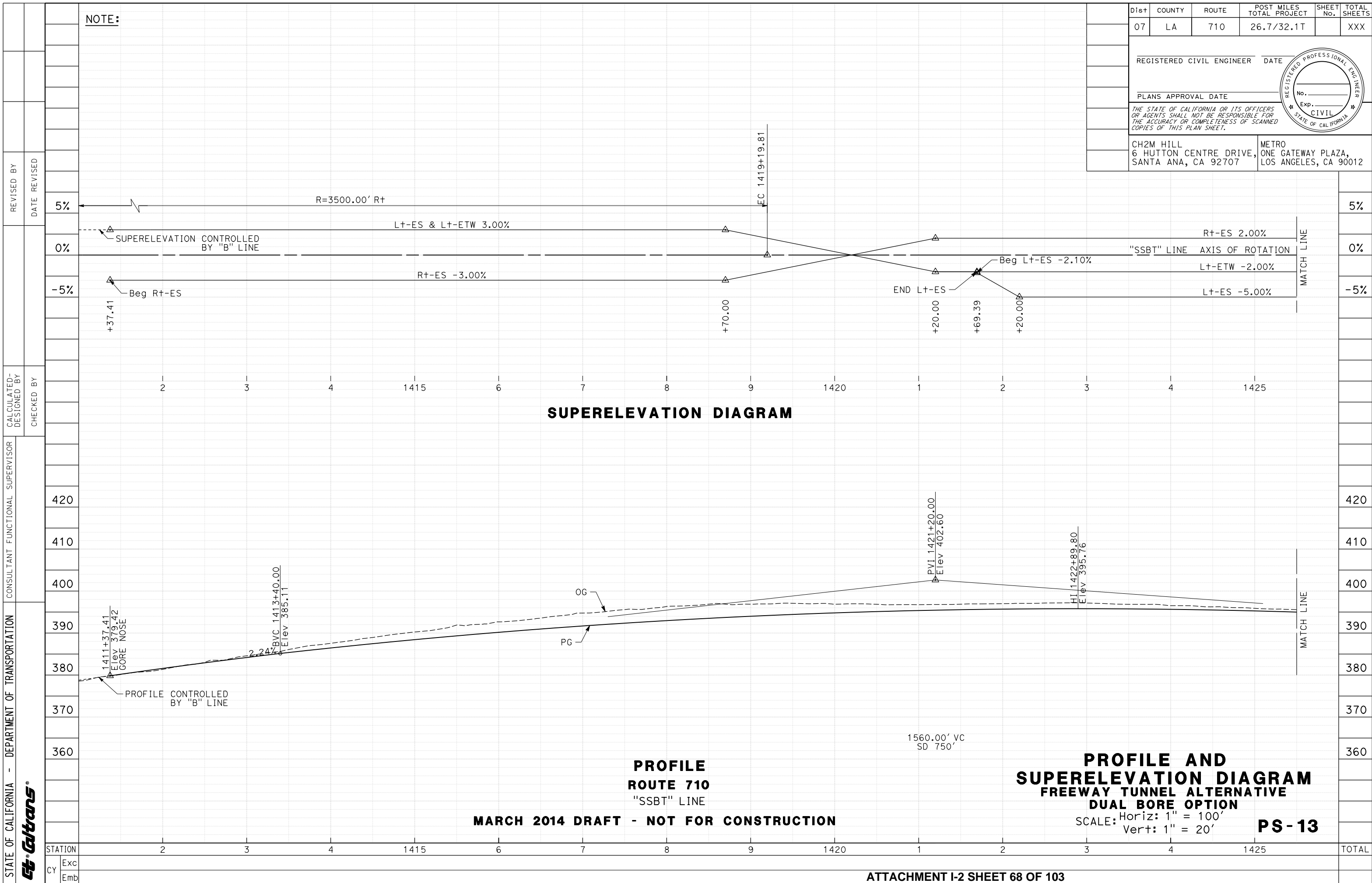
MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

PROFILE CONTROLLED BY "A" LINE **PS-12**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE	REVISION
<b>Caltrans</b>						
Exc	Emb					

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:32

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



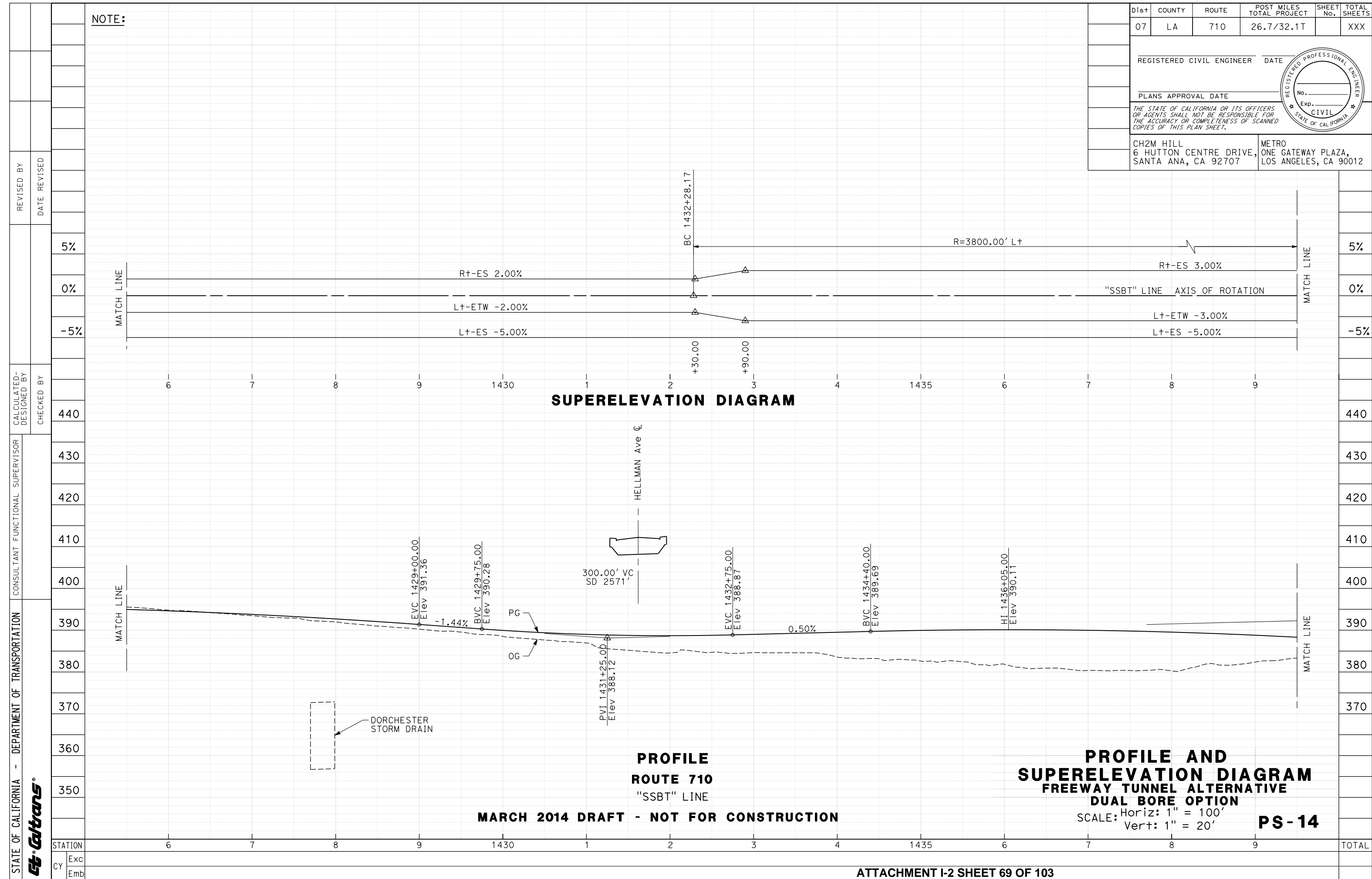
LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 13:32



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER				DATE	
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**

**PROFILE  
ROUTE 710  
"SSBT" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

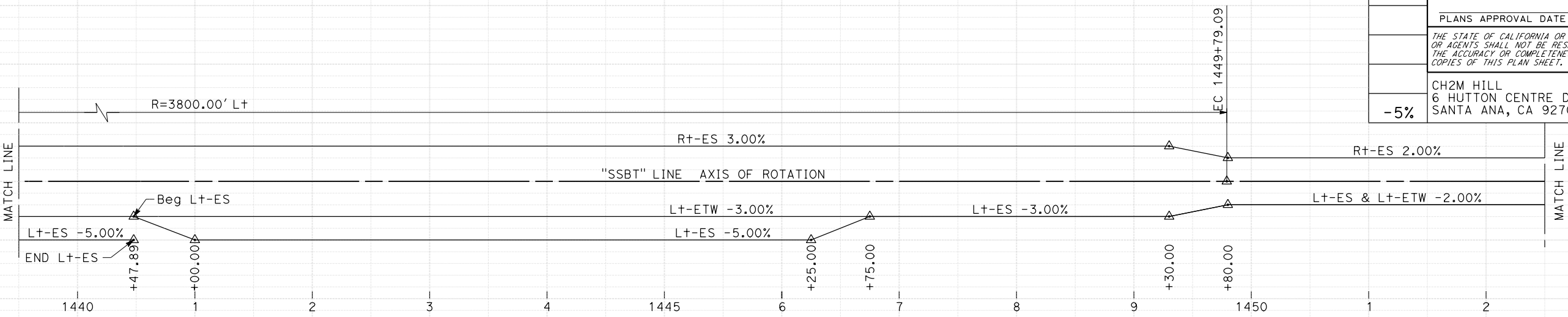
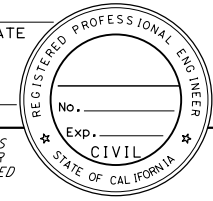
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-14**

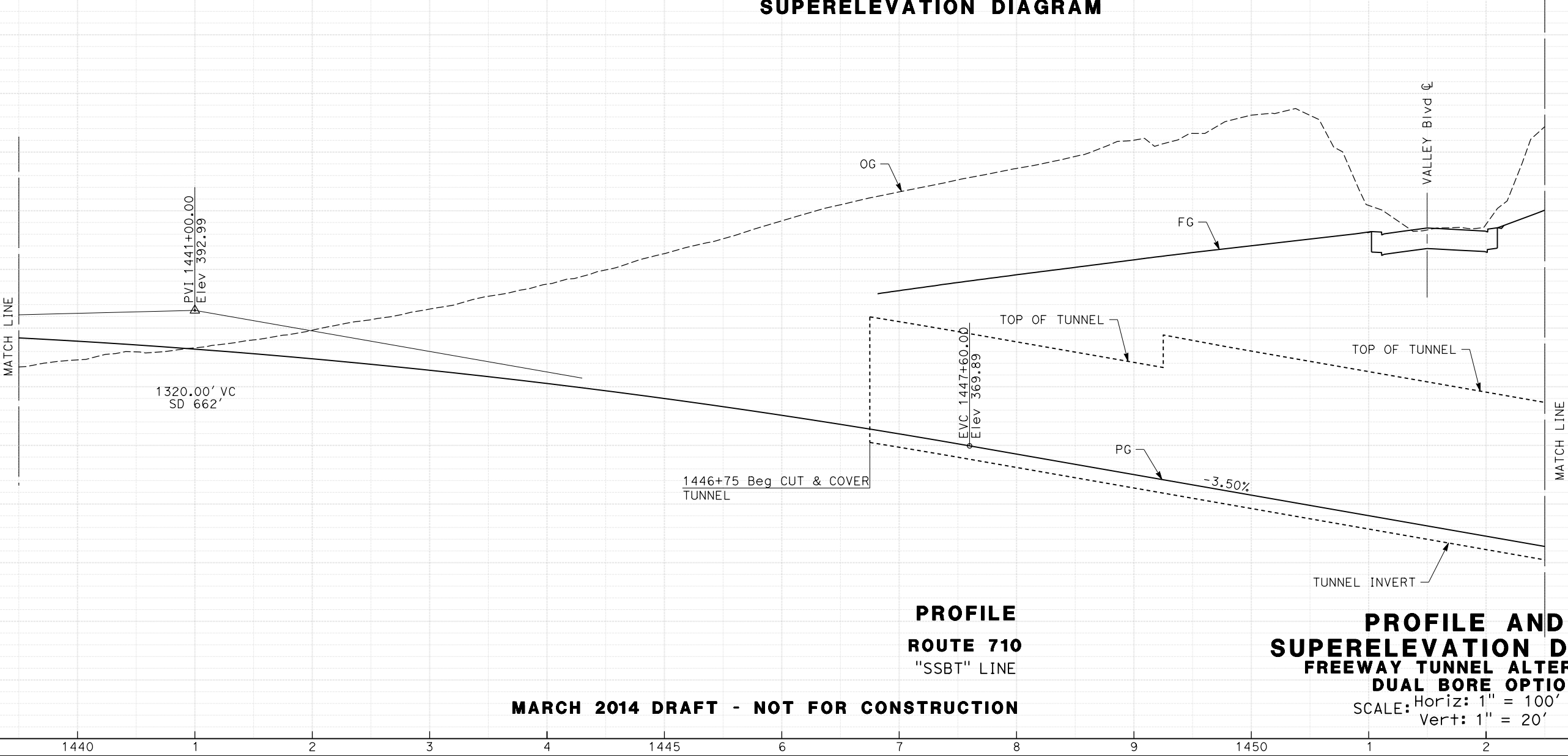
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	REVISOR	DATE
	CALCULATED/DESIGNED BY	CHECKED BY
CONSULTANT FUNCTIONAL SUPERVISOR	430	
	420	
STATION	410	
	400	
CY	390	
	380	
Exc	370	
	360	
Emb	350	
	340	
TOTAL		

NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**SUPERELEVATION DIAGRAM**



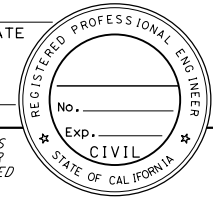
**PROFILE  
ROUTE 710  
"SSBT" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

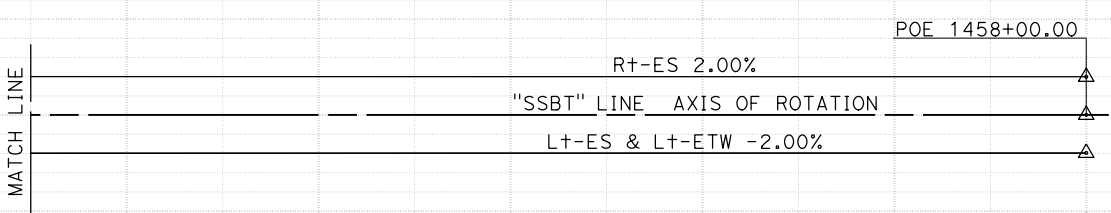
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-15**

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
5%					
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		

NOTE:

5%  
0%  
-5%



**SUPERELEVATION DIAGRAM**

440  
430  
420  
410  
370  
360  
350  
340  
330  
320  
310  
300



**PROFILE**  
**ROUTE 710**  
**"SSBT" LINE**

**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-16**

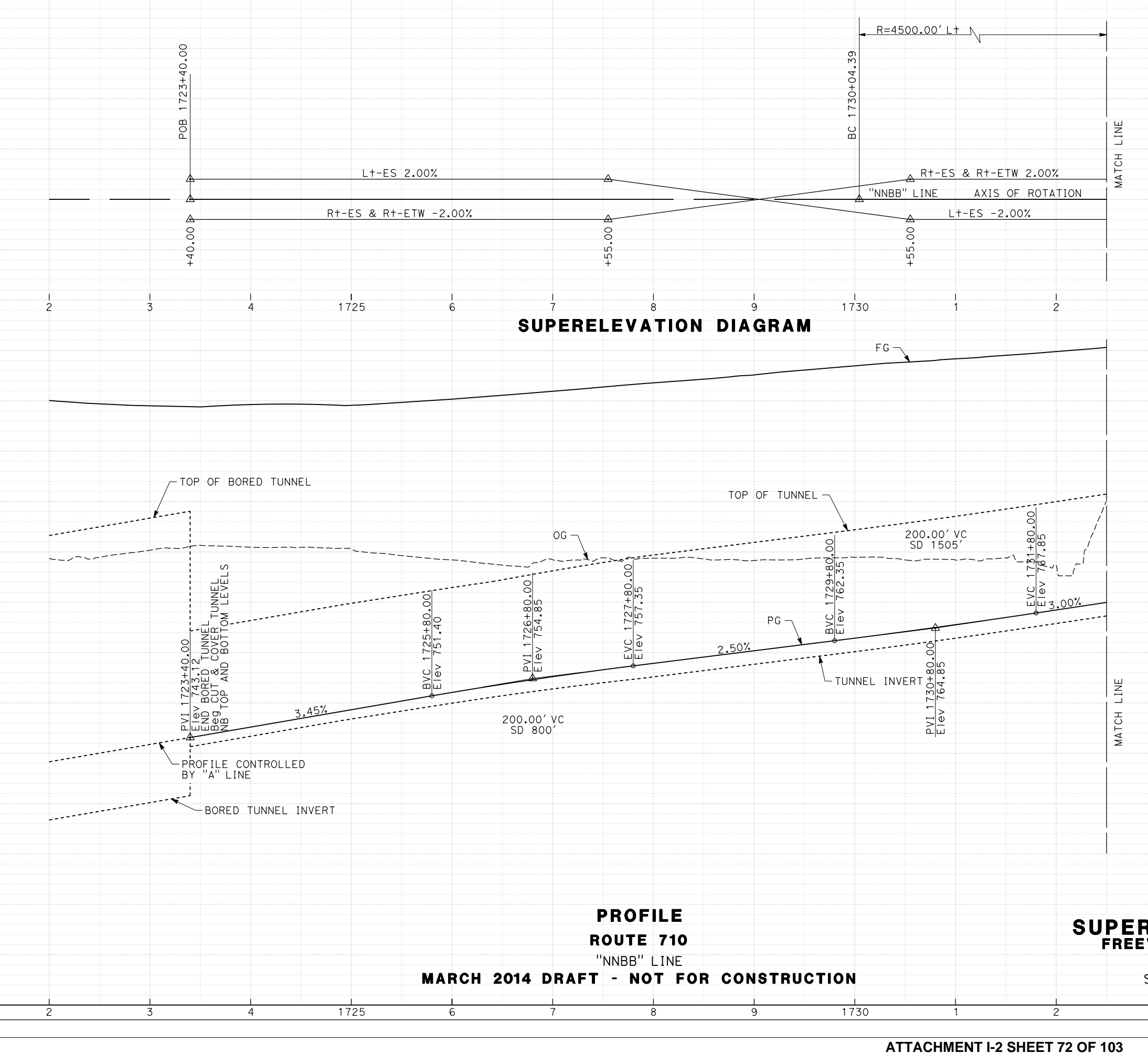
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR	DATE
		CHECKED BY		

STATION	3	4	1455	6	7	8	9	1460	1	2	3	4	1465	6	TOTAL
Exc															
Emb															

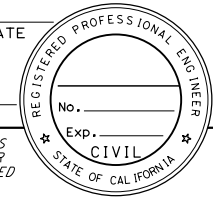
LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:32

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	REVISOR	DATE
	REVISOR	DATE
CALCULATED/DESIGNED BY	CHECKED BY	
	CHECKED BY	
CONSULTANT FUNCTIONAL SUPERVISOR		
STATION		
Exc		
Emb		

NOTE:



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**SUPERELEVATION DIAGRAM**

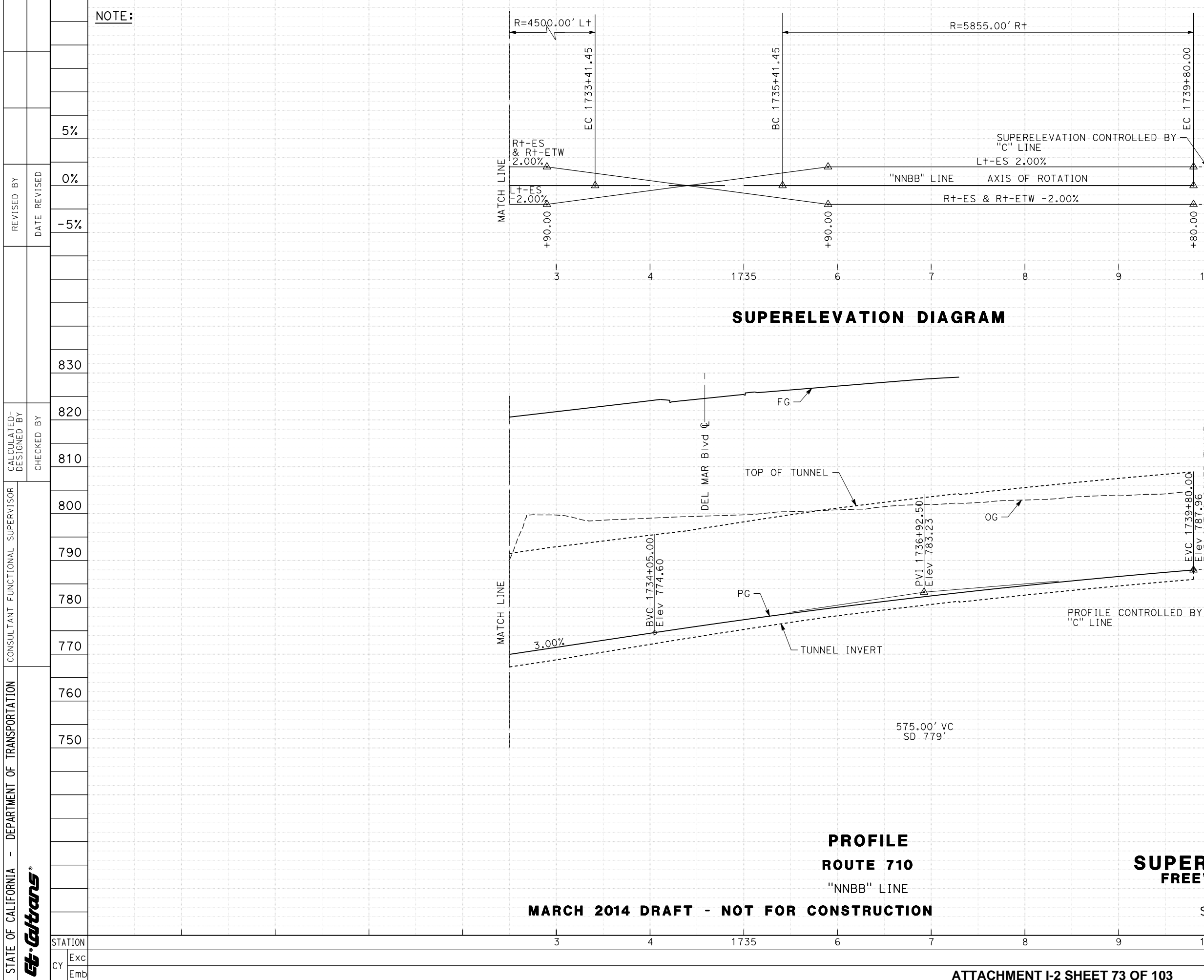
**PROFILE  
ROUTE 710  
"NNBB" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-17**



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX

REGISTERED CIVIL ENGINEER DATE

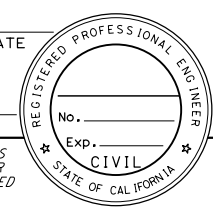
PLANS APPROVAL DATE

5%

0%

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



NOTE:

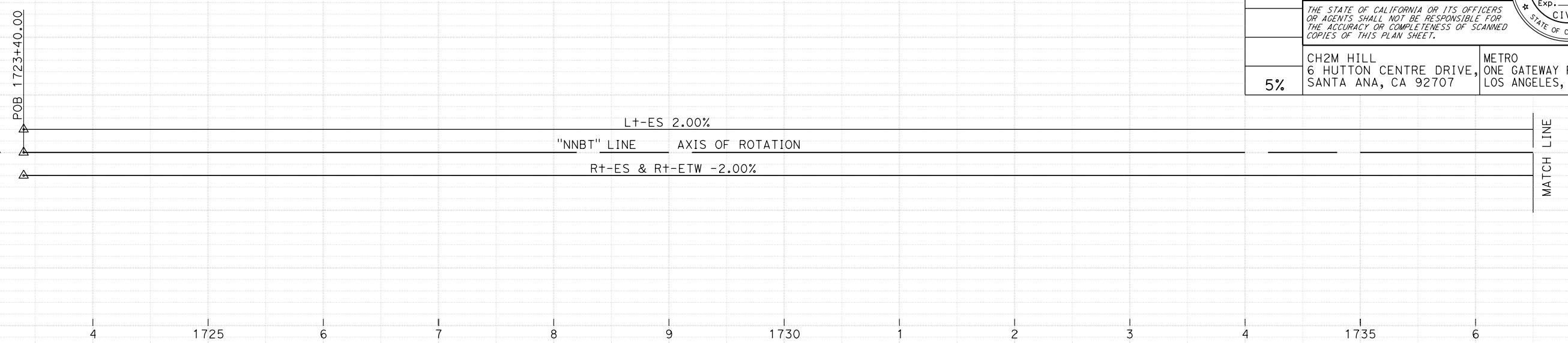
**PROFILE**  
**ROUTE 710**  
"NNBB" LINE  
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'  
**PS-18**

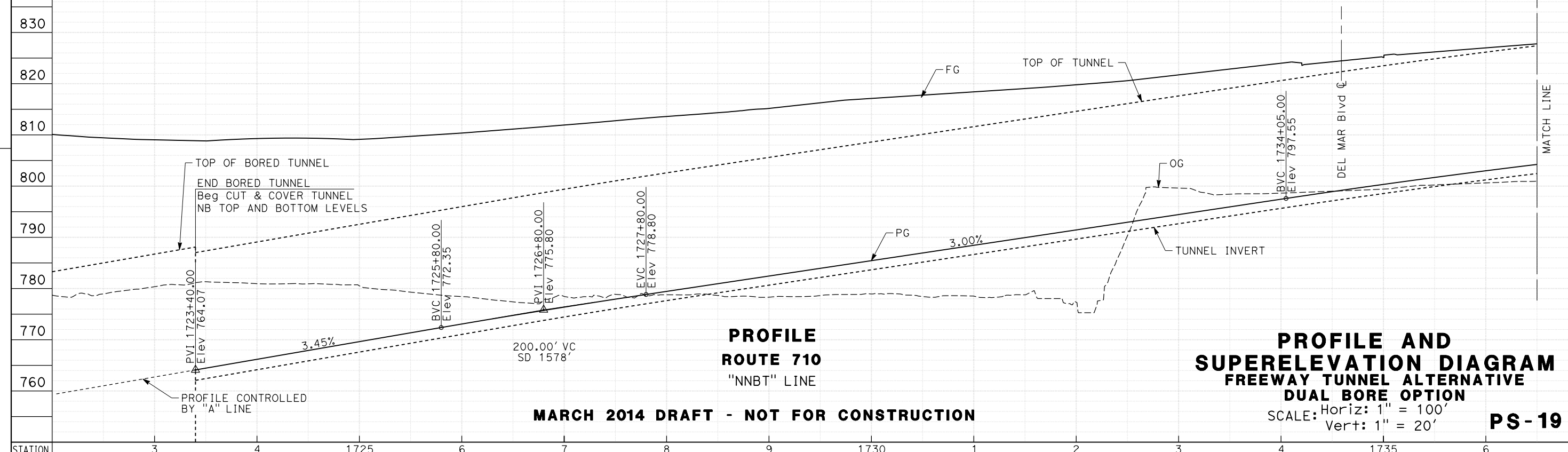
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		
5%					



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE  
ROUTE 710  
"NNBT" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-19**

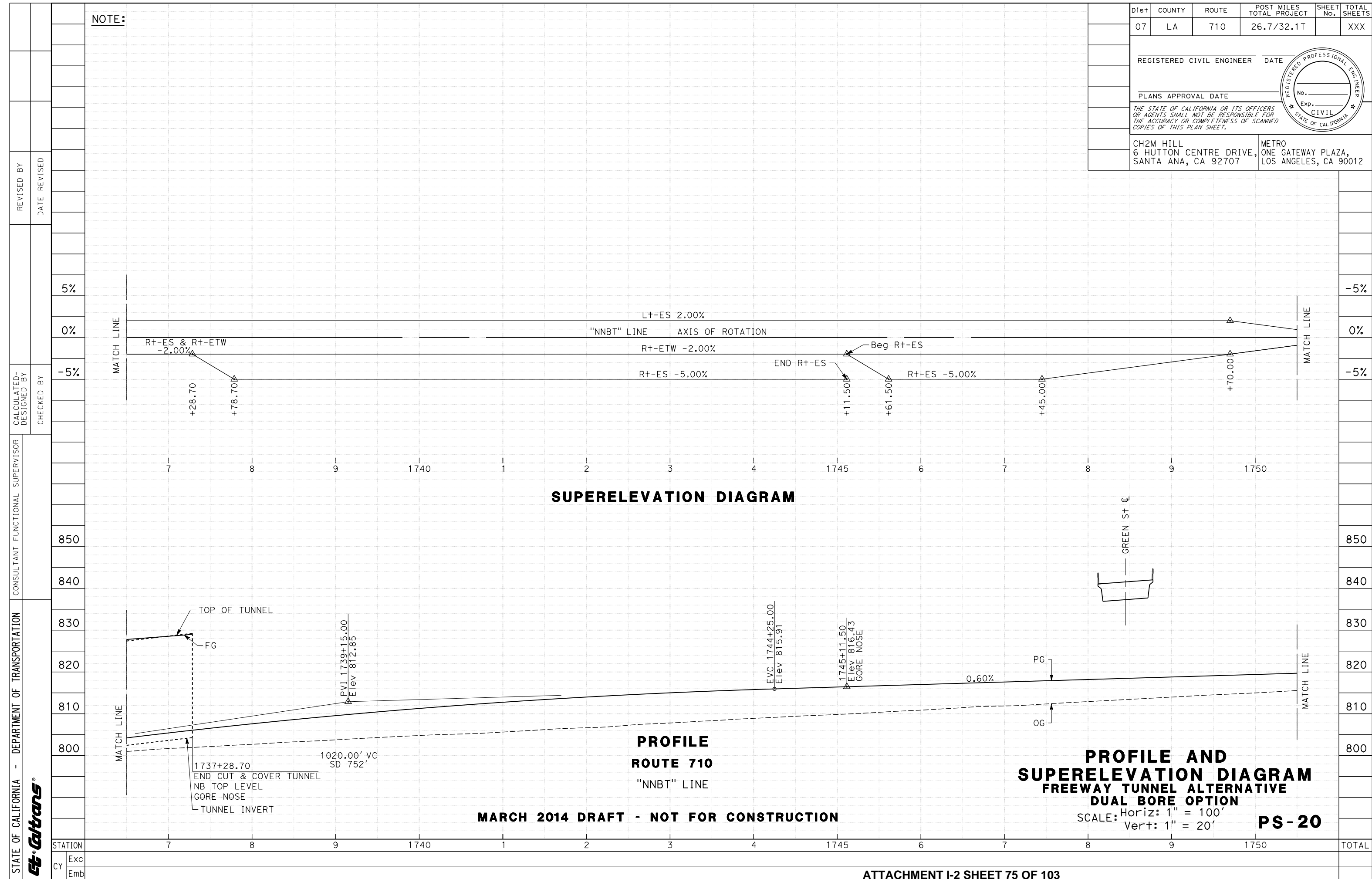
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE	REVISION
Exc	Emb					

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:32

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**

**PROFILE  
ROUTE 710  
"NNBT" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PS-20**

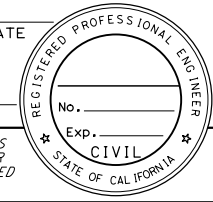
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE
Exc	Emb				

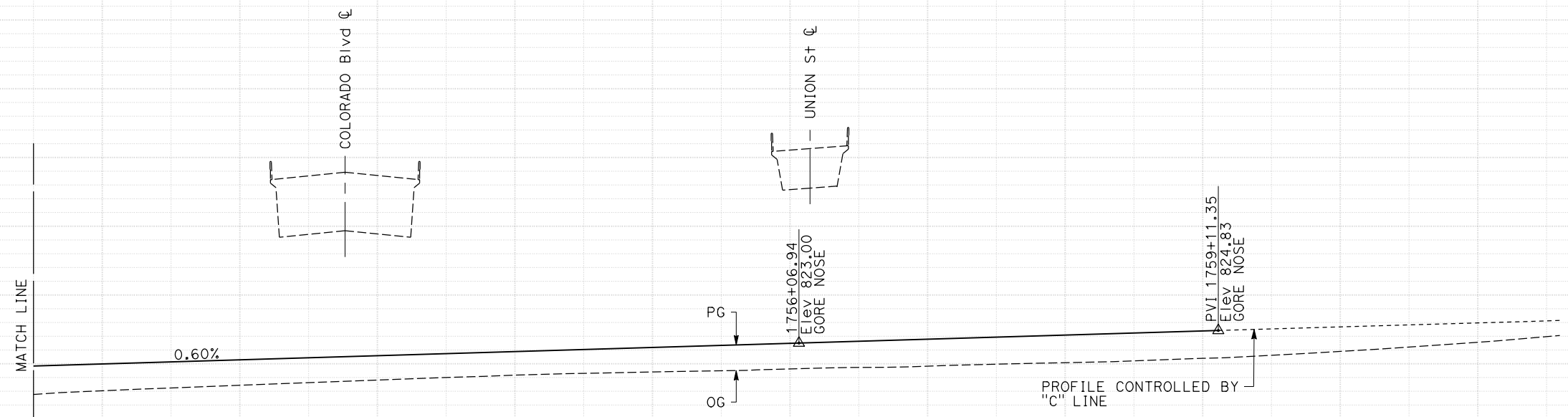
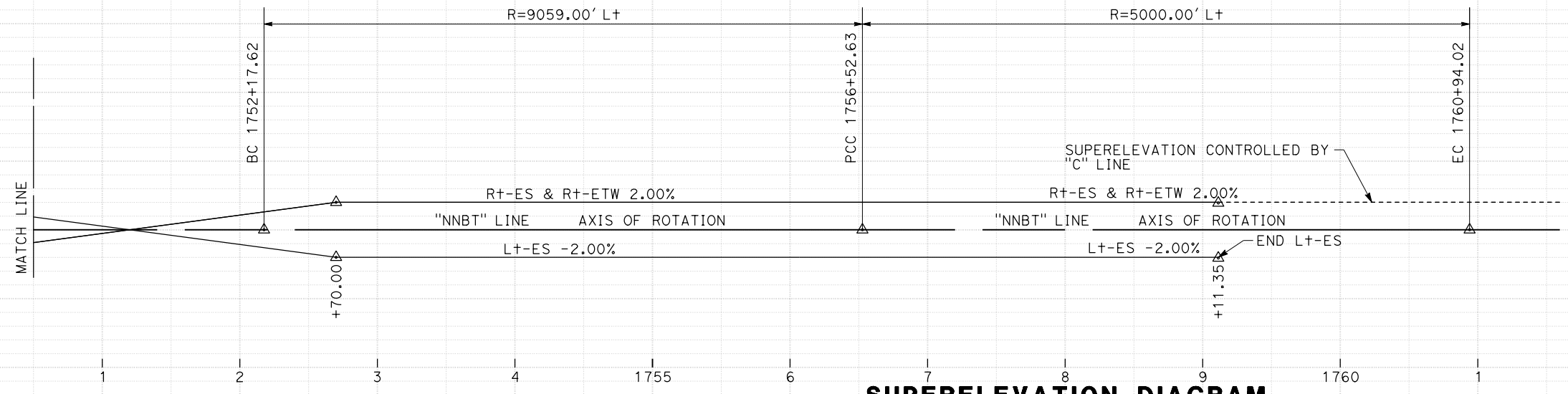
STATION	7	8	9	1740	1	2	3	4	1745	6	7	8	9	1750	TOTAL

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 1:31

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
*Calttrans*  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					 No. _____ Exp. _____ CIVIL STATE OF CALIFORNIA
PLANS APPROVAL DATE					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707					METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



**SUPERELEVATION DIAGRAM**

**PROFILE  
 ROUTE 710  
 "NNBT" LINE**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE AND  
 SUPERELEVATION DIAGRAM  
 FREEWAY TUNNEL ALTERNATIVE  
 DUAL BORE OPTION  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20' **PS-21****

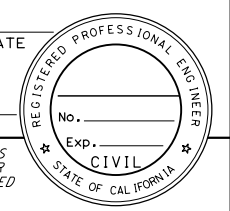
STATION	1	2	3	4	1755	6	7	8	9	1760	1	2	3	4	TOTAL
Exc															
Emb															

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:32



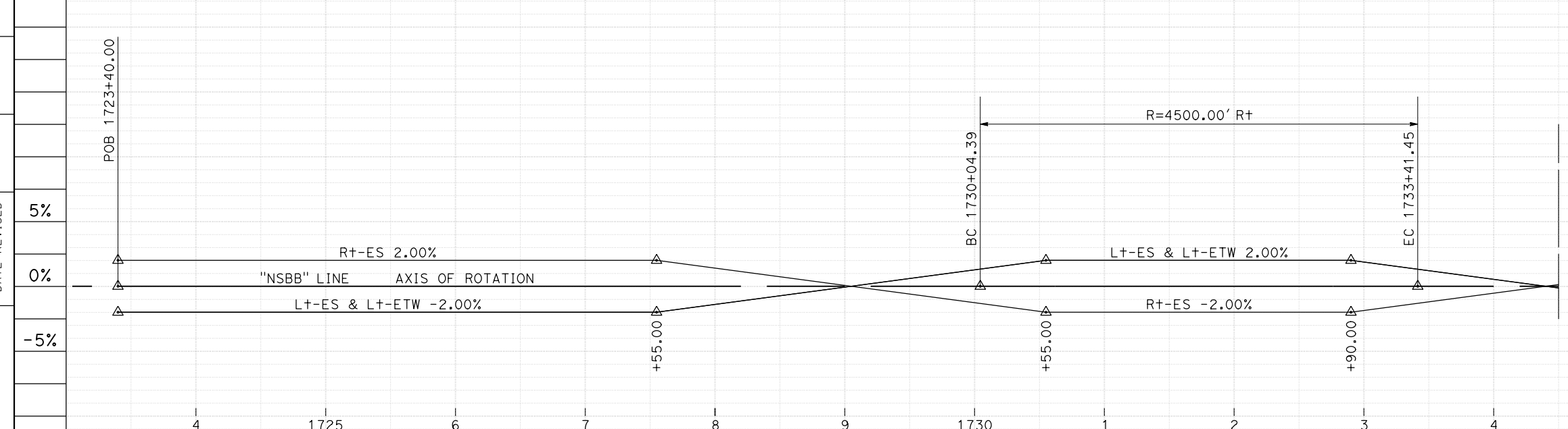
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
 PLANS APPROVAL DATE \_\_\_\_\_  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

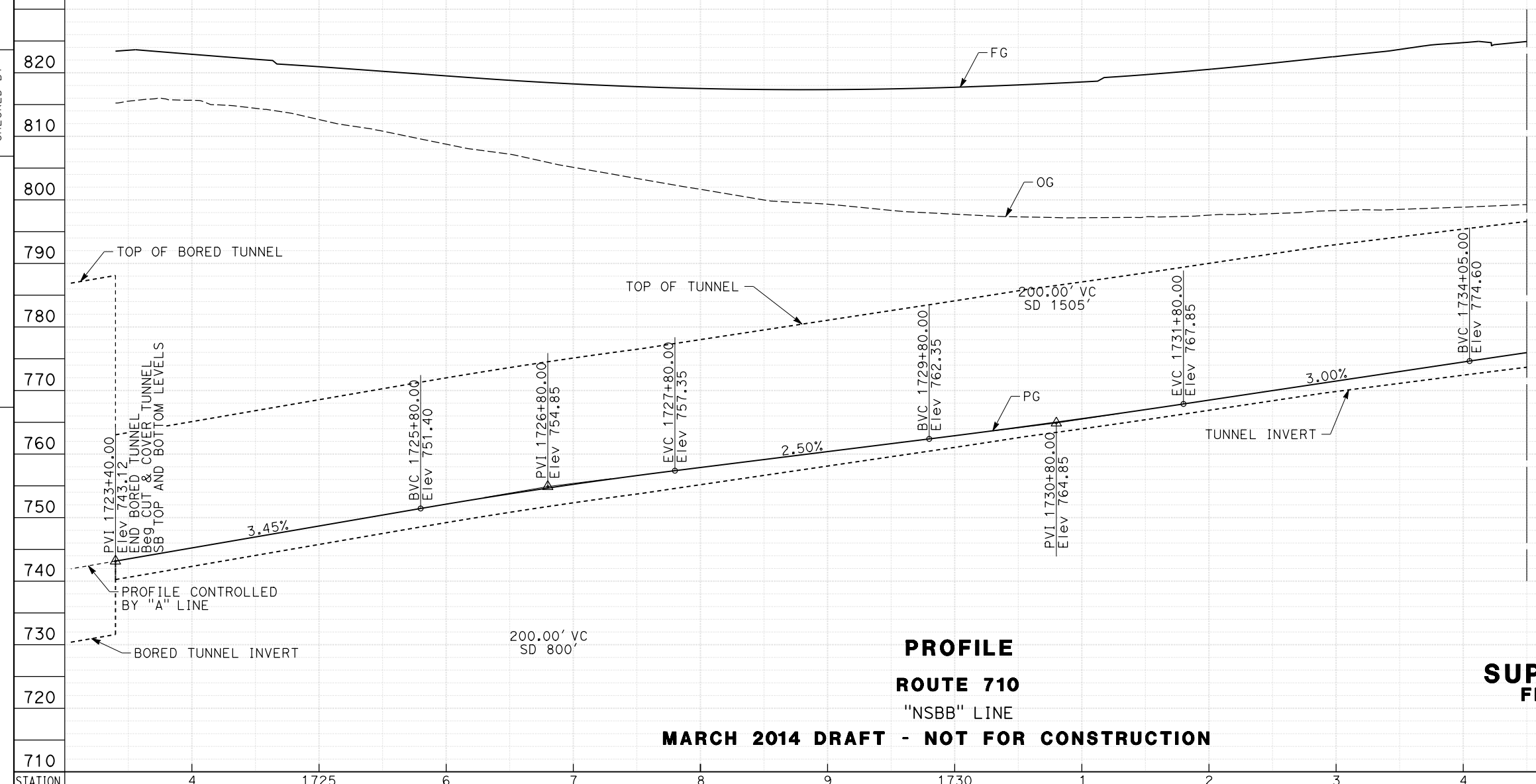


CH2M HILL  
 6 HUTTON CENTRE DRIVE,  
 SANTA ANA, CA 92707  
 METRO  
 ONE GATEWAY PLAZA,  
 LOS ANGELES, CA 90012

NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**

**ROUTE 710**

"NSBB" LINE

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'

**PS-22**

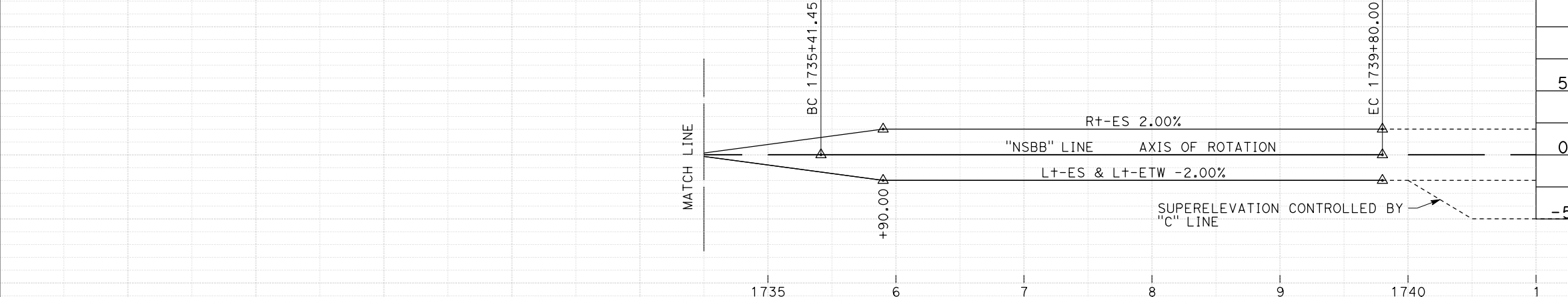
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED  
 5%  
 0%  
 -5%

820  
810  
800  
790  
780  
770  
760  
750  
740  
730  
720  
710  
TOTAL

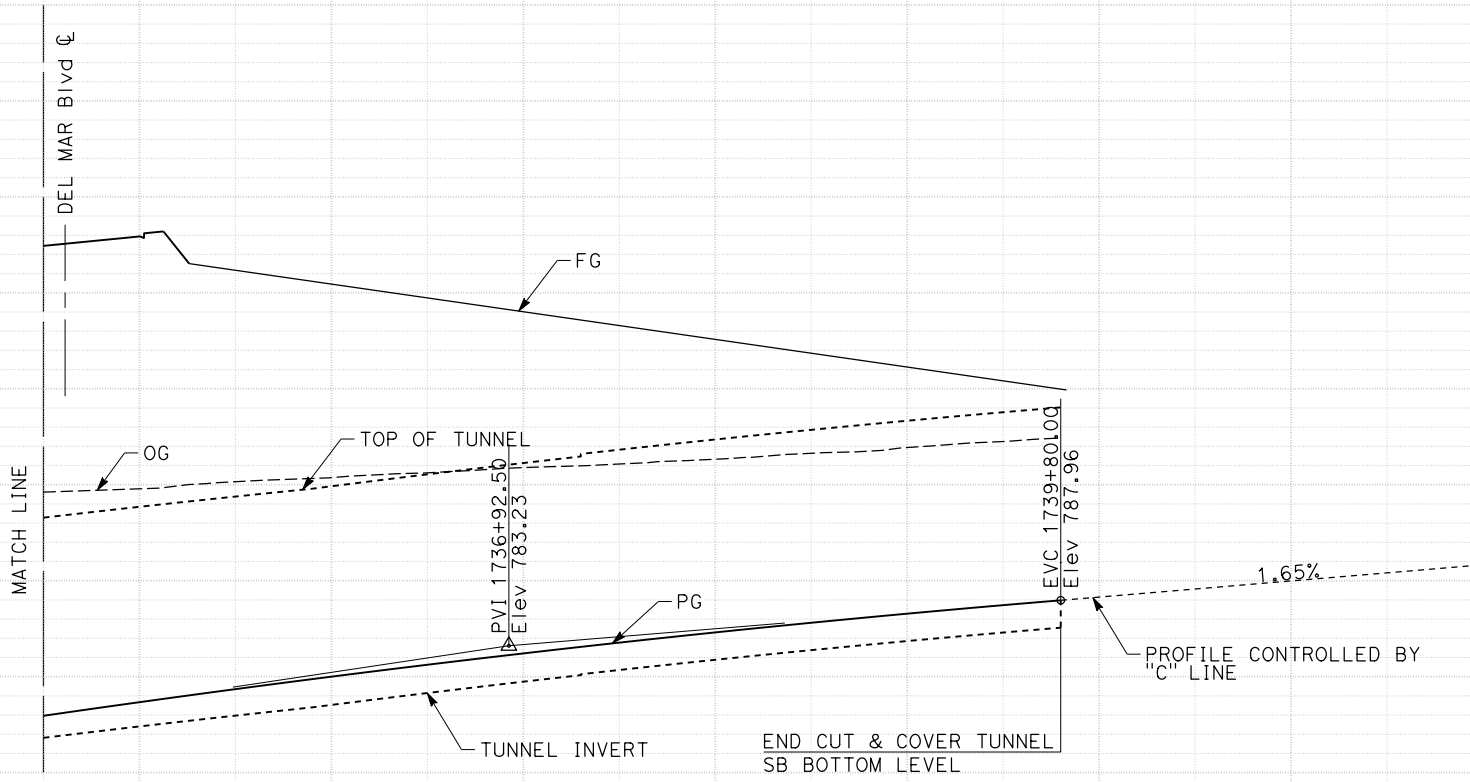
LAST REVISION DATE PLOTTED => 21-MAR-2014  
 00-00-00 TIME PLOTTED => 1:3:33

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	REVISOR	DATE
	REVISOR	DATE
CONSULTANT FUNCTIONAL SUPERVISOR	CHECKED BY	DATE
	CHECKED BY	DATE
CALCULATED-DESIGNED BY	CHECKED BY	DATE
	CHECKED BY	DATE
STATION	Exc	
	Emb	

NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**

**ROUTE 710**  
"NSBB" LINE  
575.00' VC  
SD 778'

**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-23**

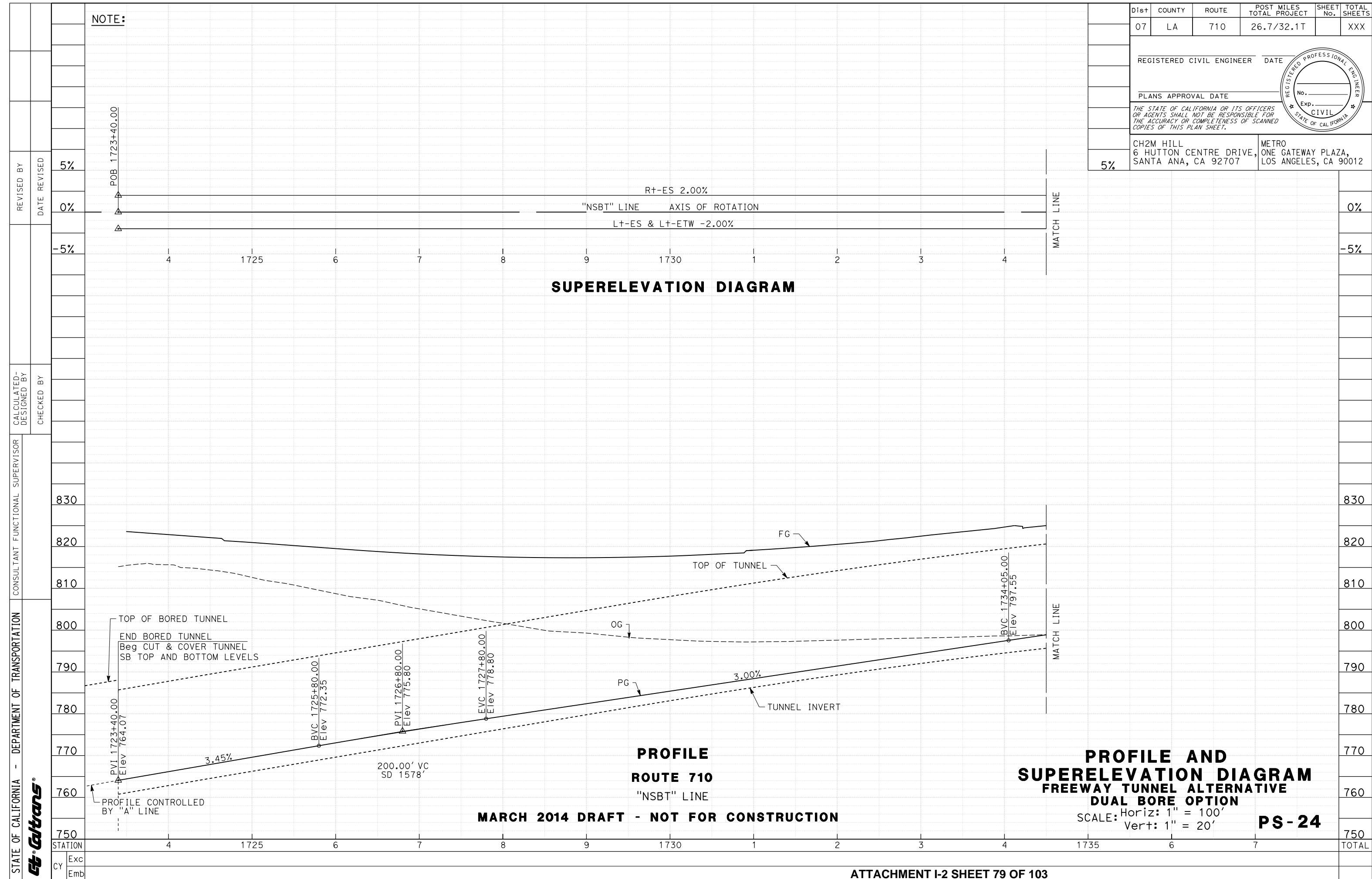
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

1735	6	7	8	9	1740	1	2	TOTAL
------	---	---	---	---	------	---	---	-------

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**

**PROFILE  
ROUTE 710  
"NSBT" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'  
PS-24**

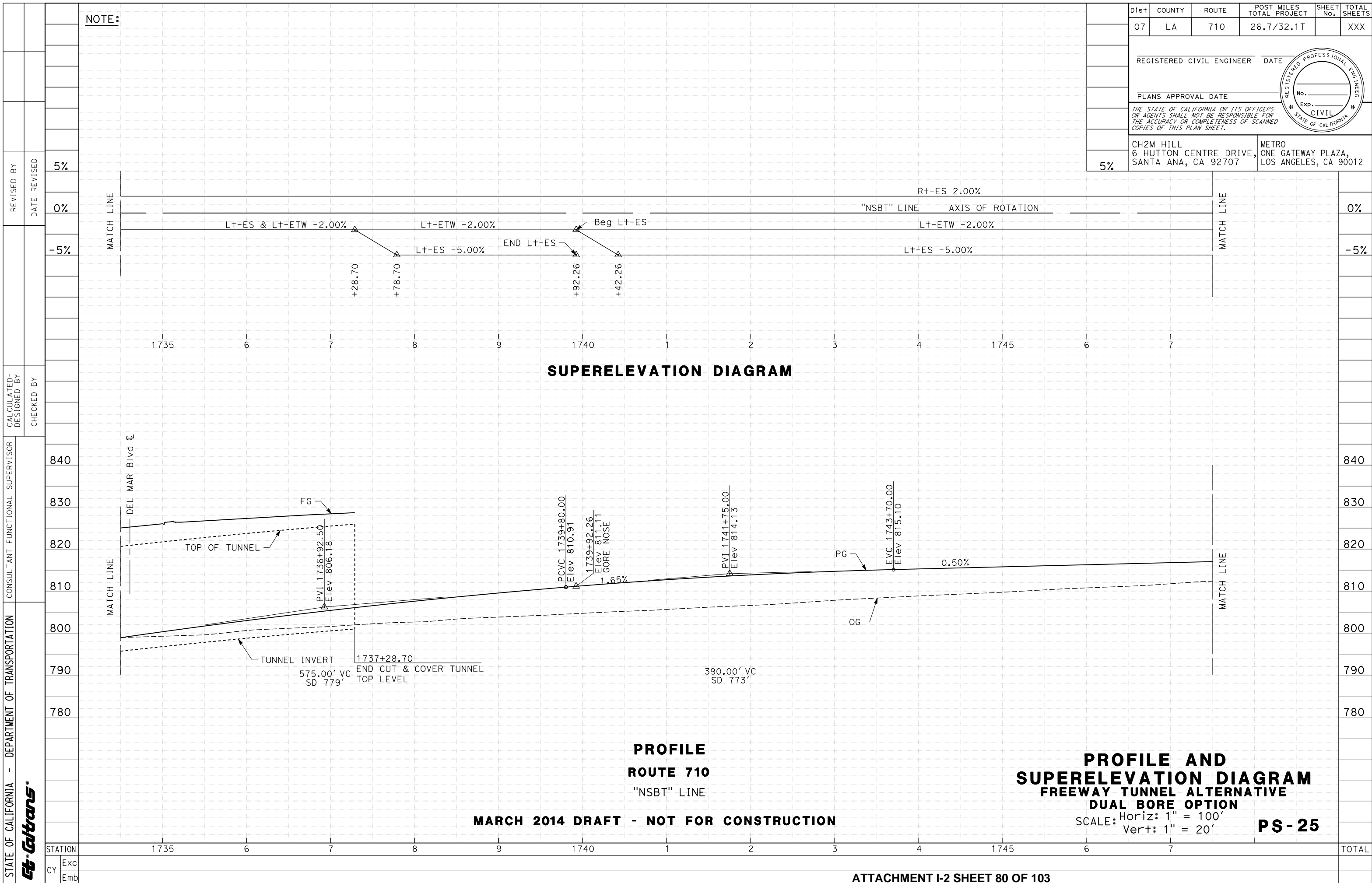
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE	REVISION
Exc						
Emb						

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**

**PROFILE  
ROUTE 710  
"NSBT" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

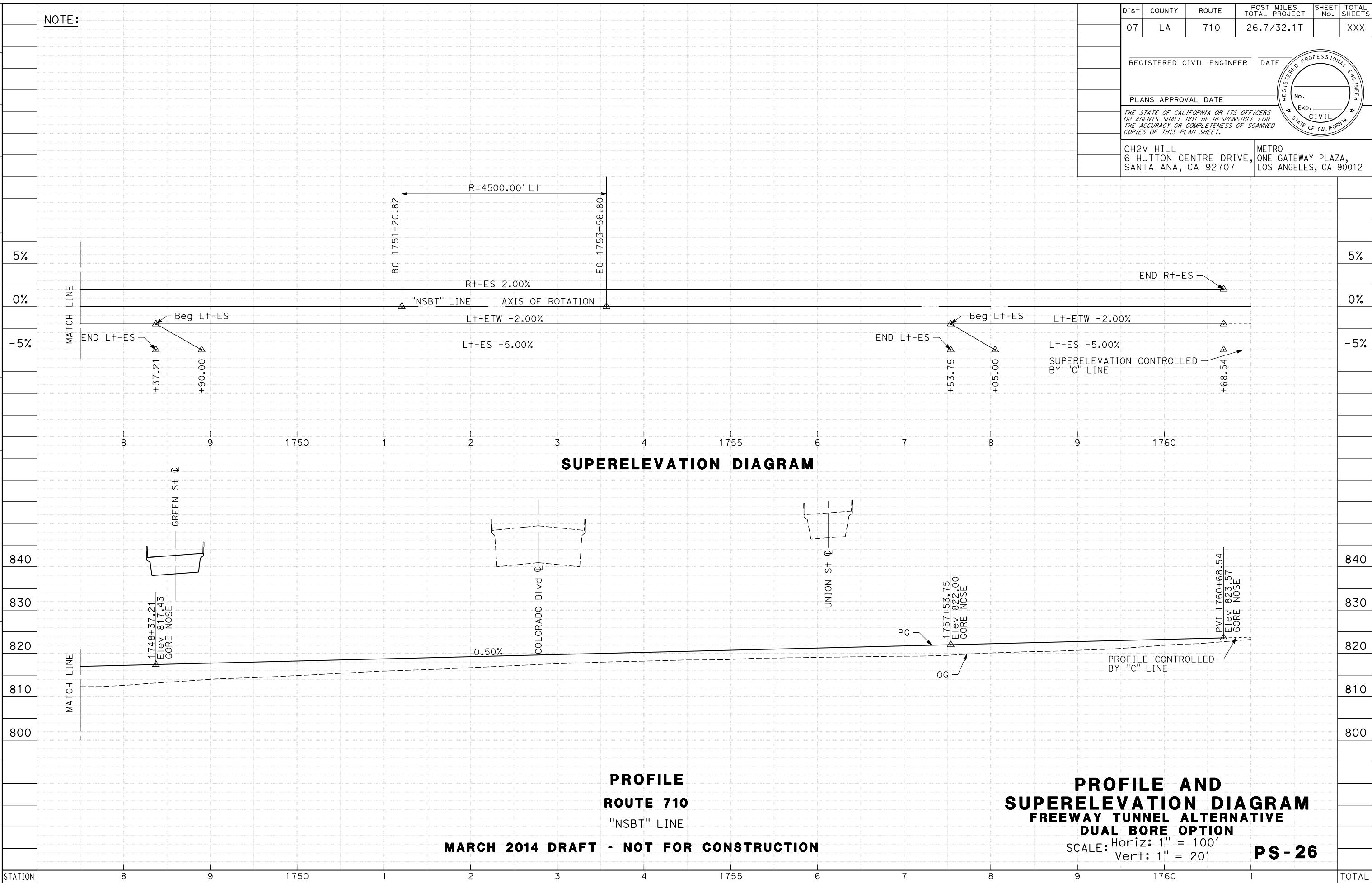
**PS-25**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:30

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**

**PROFILE**  
**ROUTE 710**  
**"NSBT" LINE**

**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PS-26**

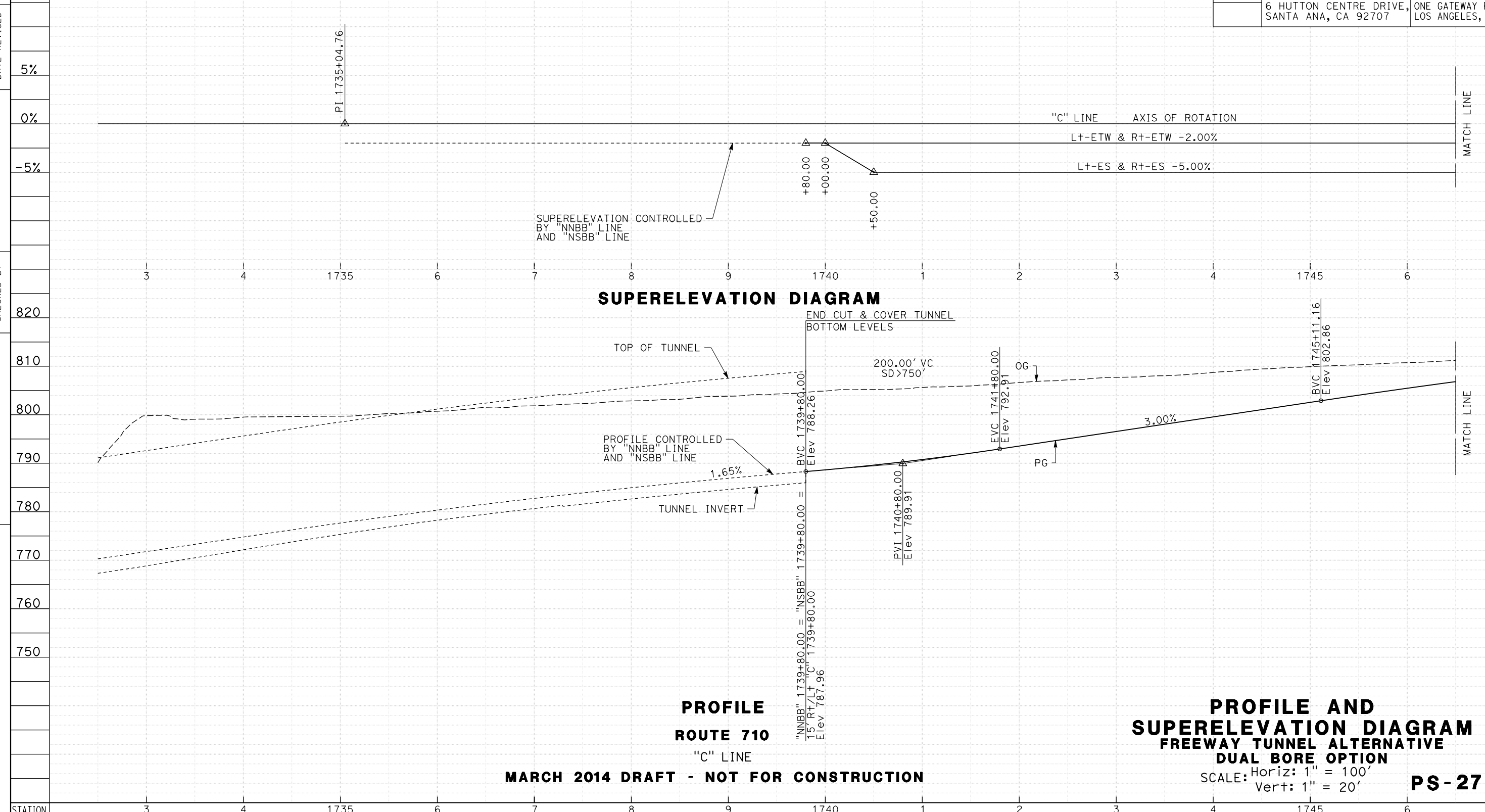
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE
<b>Caltrans</b>					

STATION	8	9	1750	1	2	3	4	1755	6	7	8	9	1760	1	TOTAL
Exc															
Emb															

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER			DATE		
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**PROFILE**  
**ROUTE 710**  
"C" LINE

**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PS-27**

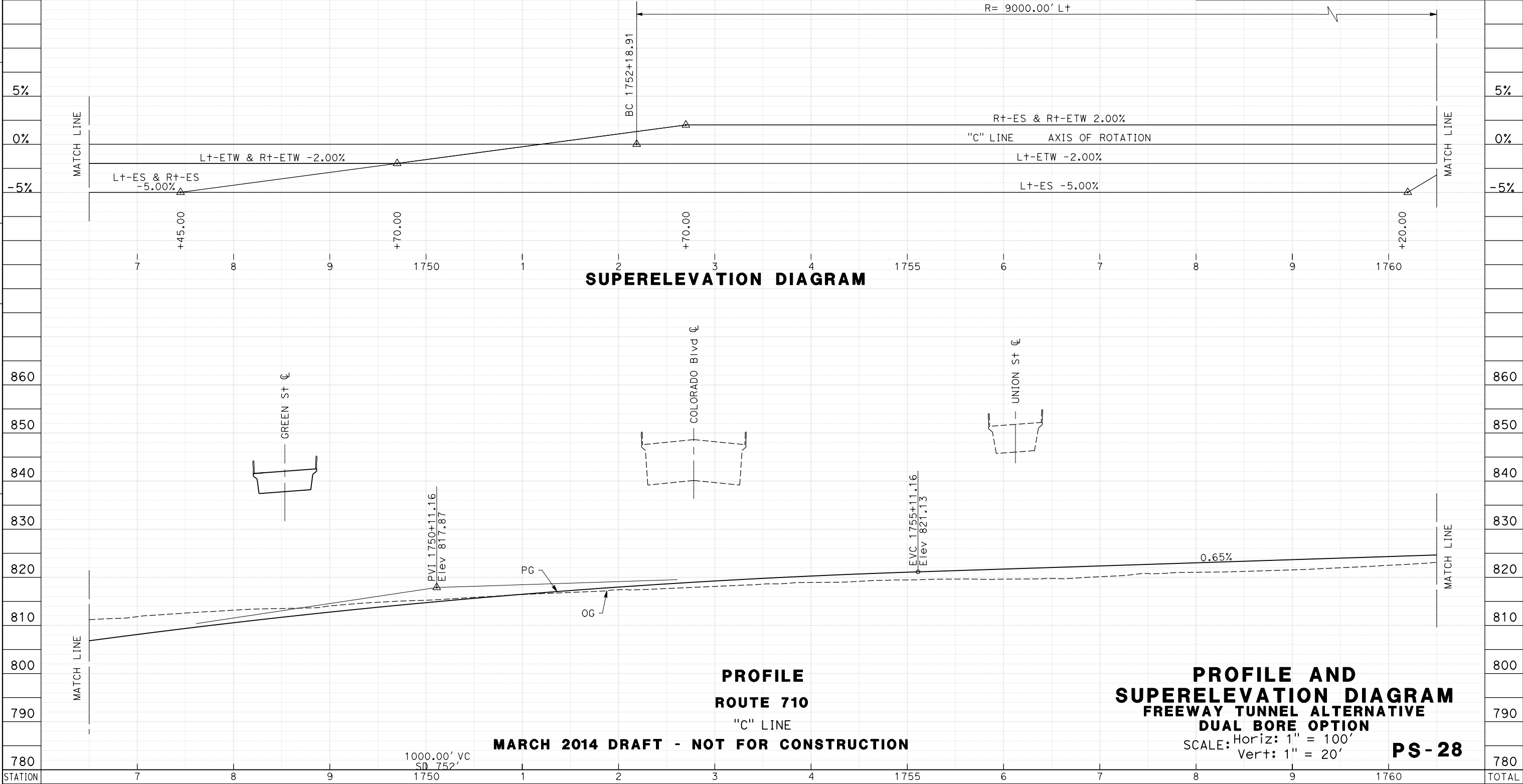
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CHECKED BY	REVISOR	DATE											
	820	820	5%												
	810	810	0%												
	800	800	-5%												
	790	790													
	780	780													
770	770														
760	760														
750	750														
STATION	3	4	1735	6	7	8	9	1740	1	2	3	4	1745	6	TOTAL
Exc															
Emb															

LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 13:30

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



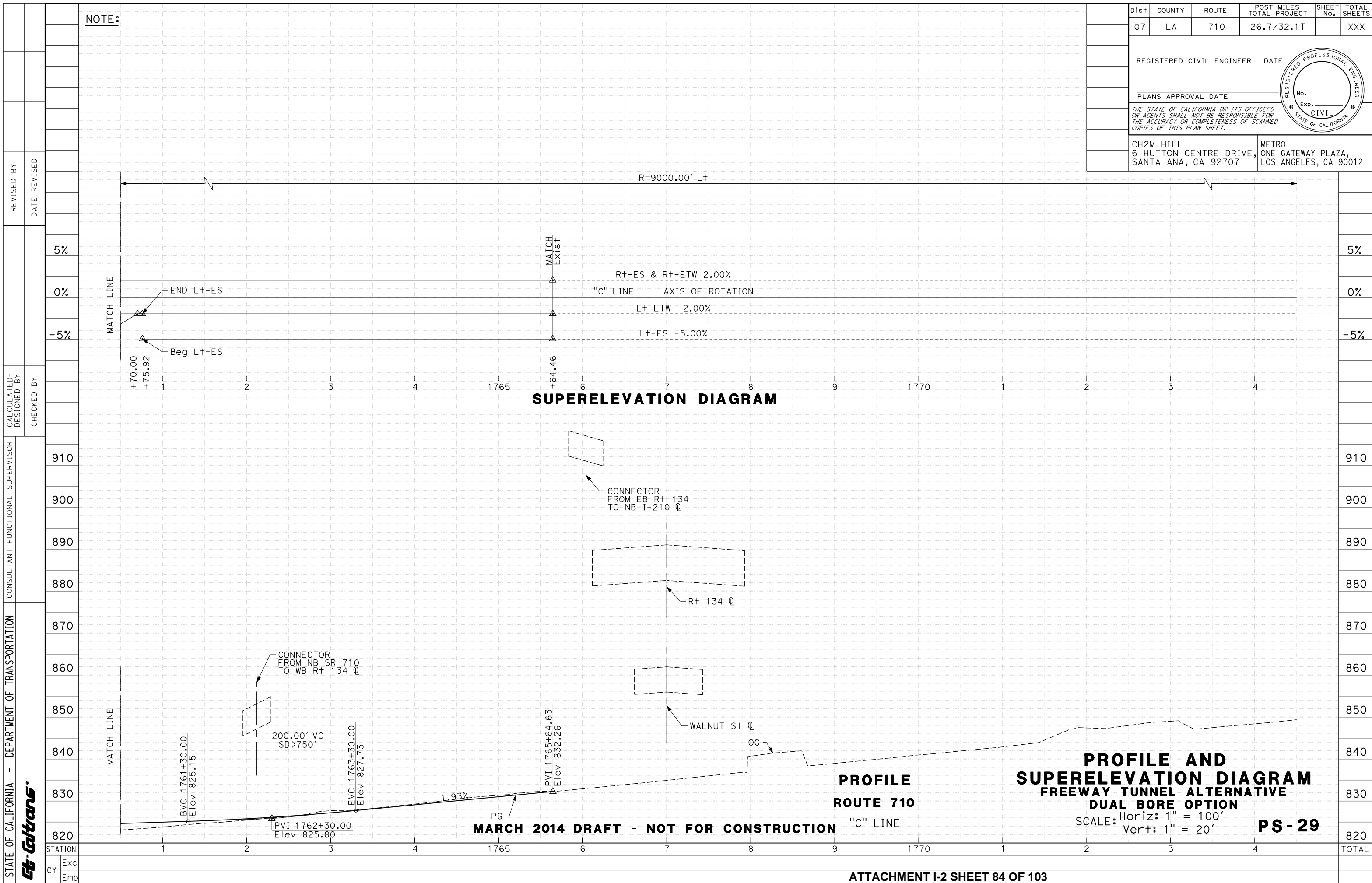
MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

**PROFILE AND SUPERELEVATION DIAGRAM**  
 FREEWAY TUNNEL ALTERNATIVE  
 DUAL BORE OPTION  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'  
**PS-28**

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



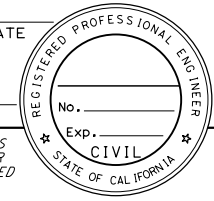
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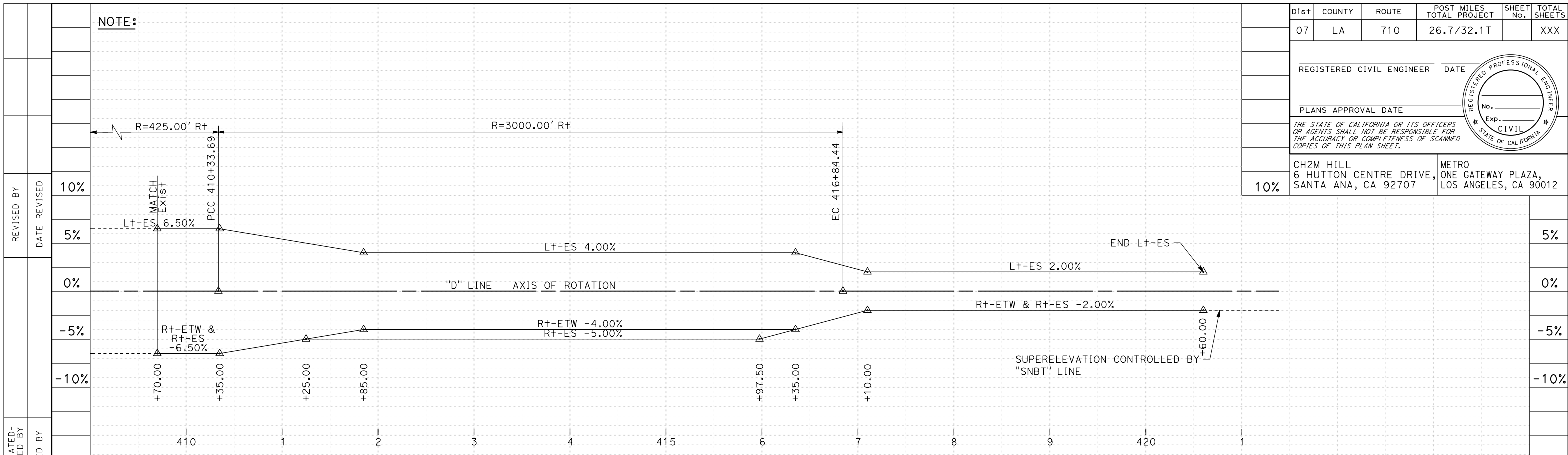


STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CHECKED BY	REVISOR	DATE
Exc	910			
Emb	900			
	890			
	880			
	870			
	860			
	850			
	840			
	830			
	820			
	TOTAL			

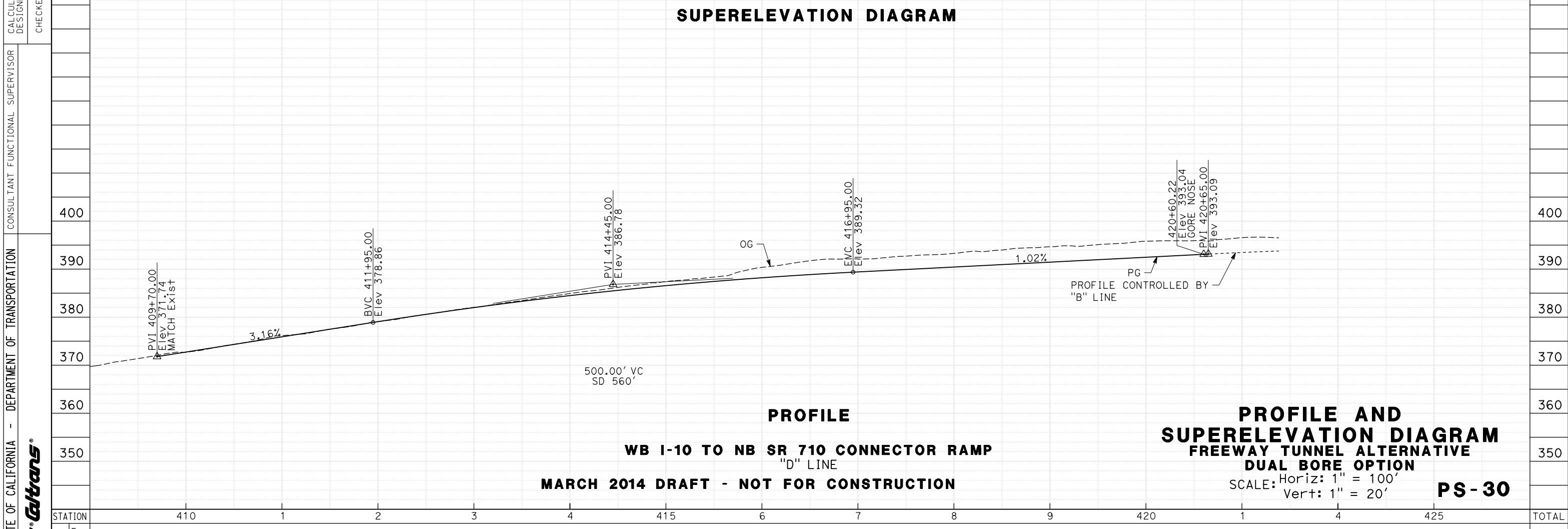
LAST REVISION DATE PLOTTED => 27-MAR-2014  
00-00-00 TIME PLOTTED => 18:24



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**SUPERELEVATION DIAGRAM**



**PROFILE**

**PROFILE AND SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**WB I-10 TO NB SR 710 CONNECTOR RAMP  
"D" LINE  
MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

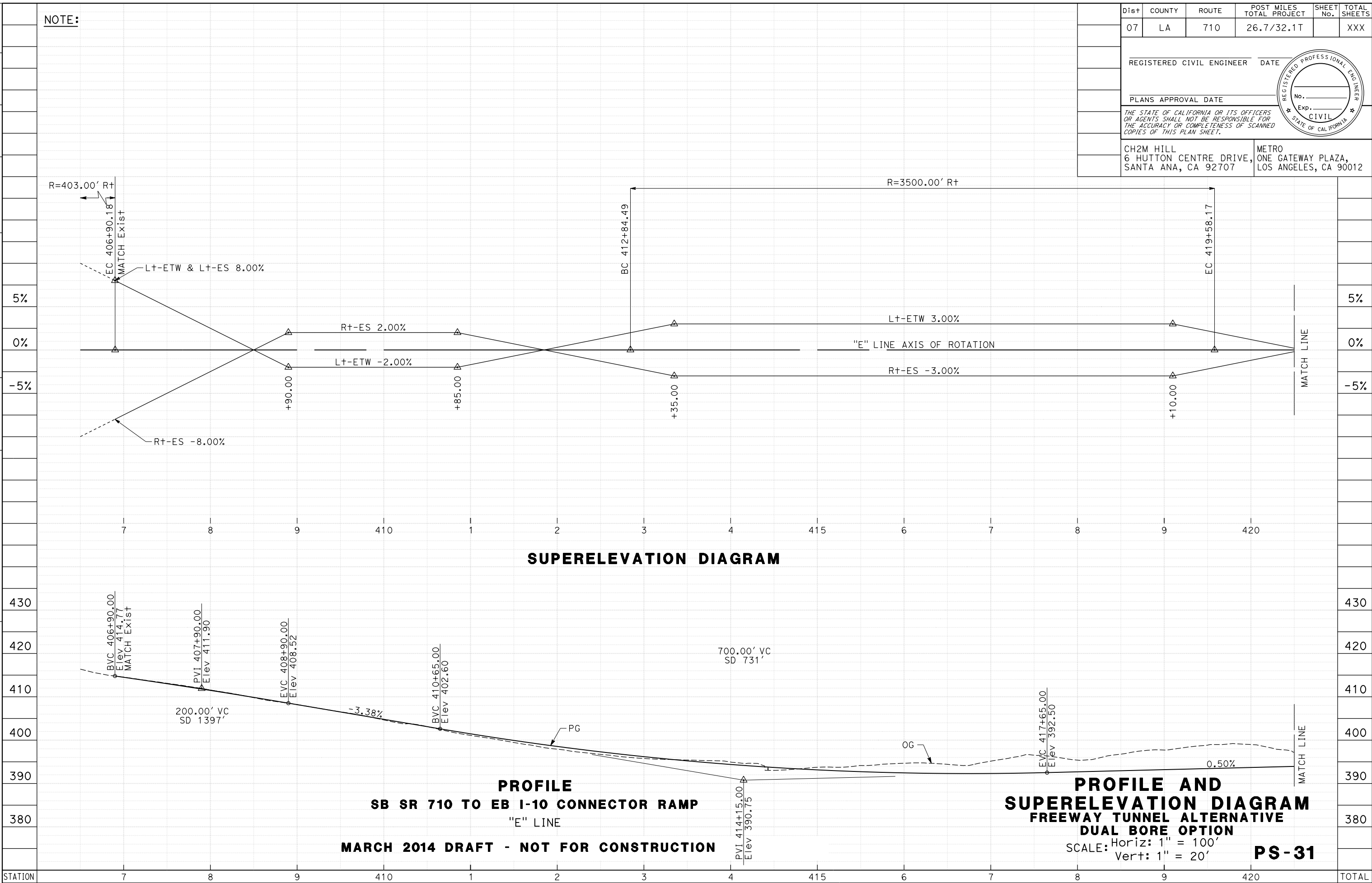
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-30**

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



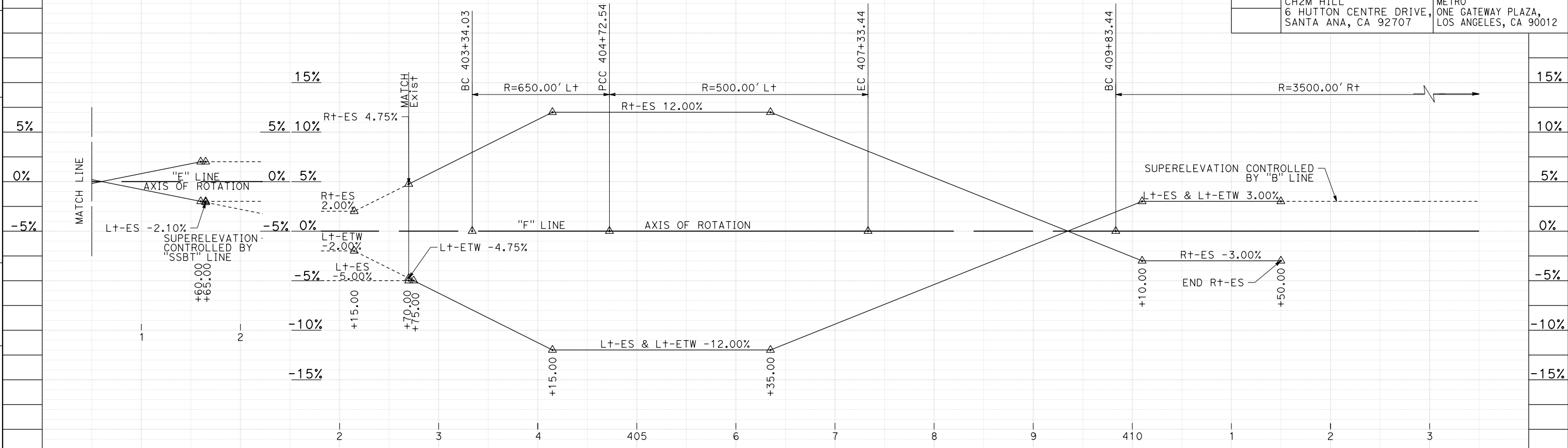
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE
<b>Caltrans</b>					
STATION	Exc	Emb			
7					
8					
9					
410					
1					
2					
3					
4					
415					
6					
7					
8					
9					
420					
TOTAL					

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:50

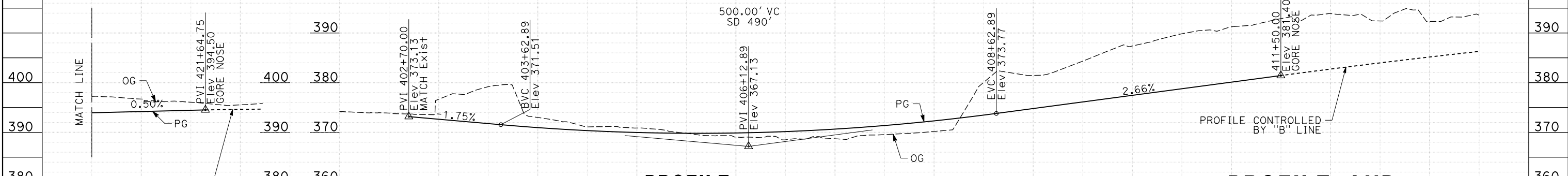
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**

**SB SR 710 TO WB I-10 CONNECTOR RAMP**

"F" LINE

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

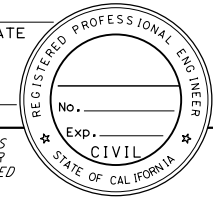
**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

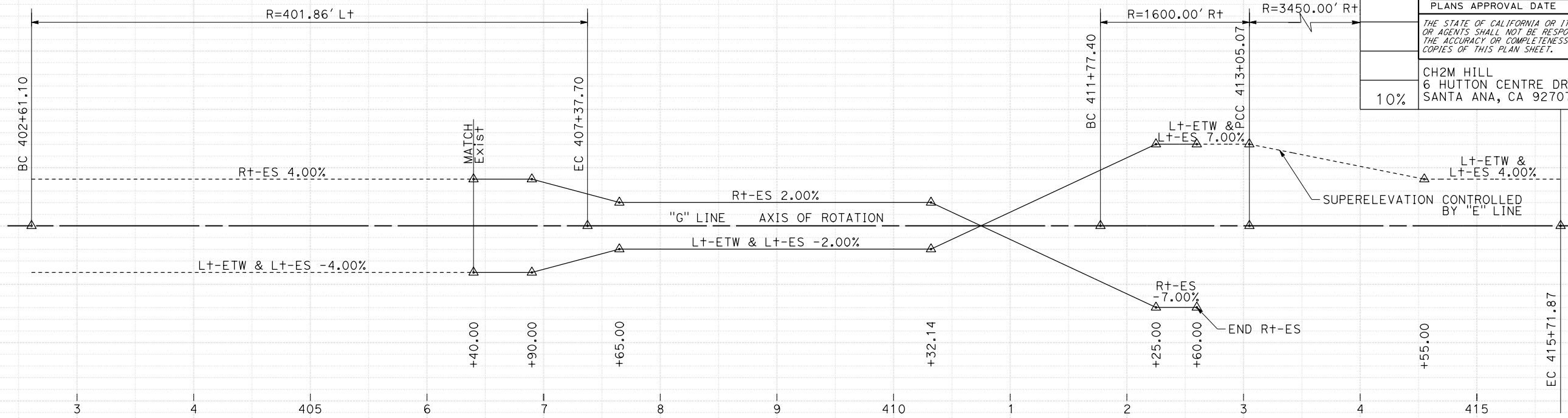
**PS-32**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED

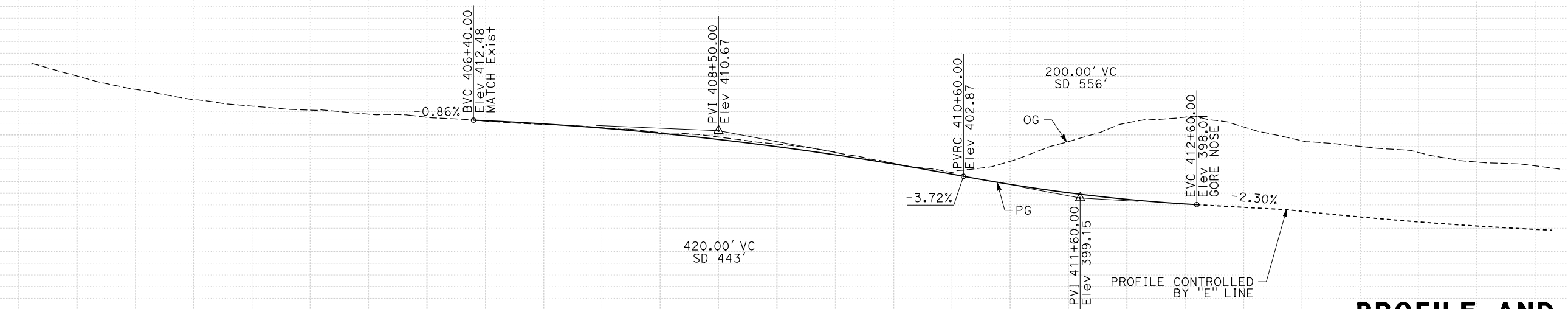
STATION	1	2	3	4	405	6	7	8	9	410	1	2	3	TOTAL
Exc														
Emb														

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		

NOTE:




**SUPERELEVATION DIAGRAM**



**PROFILE**  
**SB SR 710 TO WB I-10 HOT LANES CONNECTOR RAMP**  
**"G" LINE**  
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

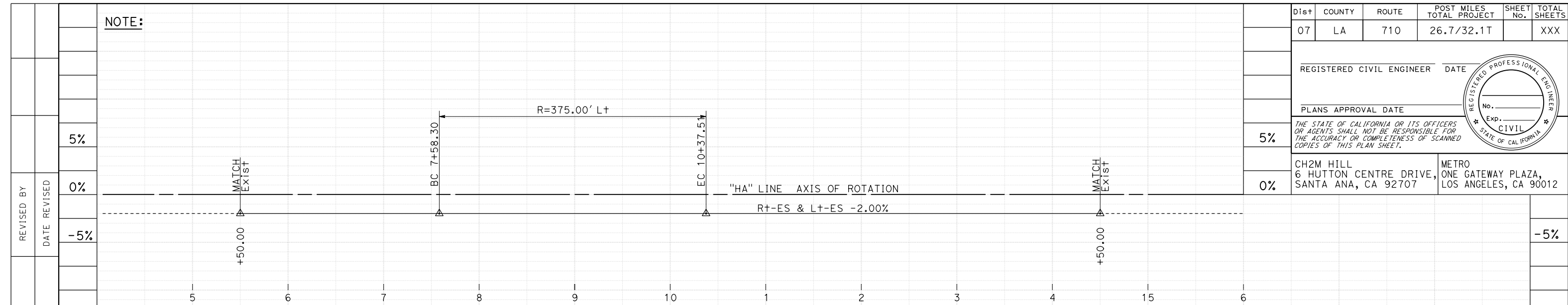
**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'  
**PS-33**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR	DATE	REVISED BY	DATE	REVISED BY	DATE
	450							
	440							
	430							
	420							
	410							
	400							
	390							
	380							
	370							
STATION								
Exc								
Emb								

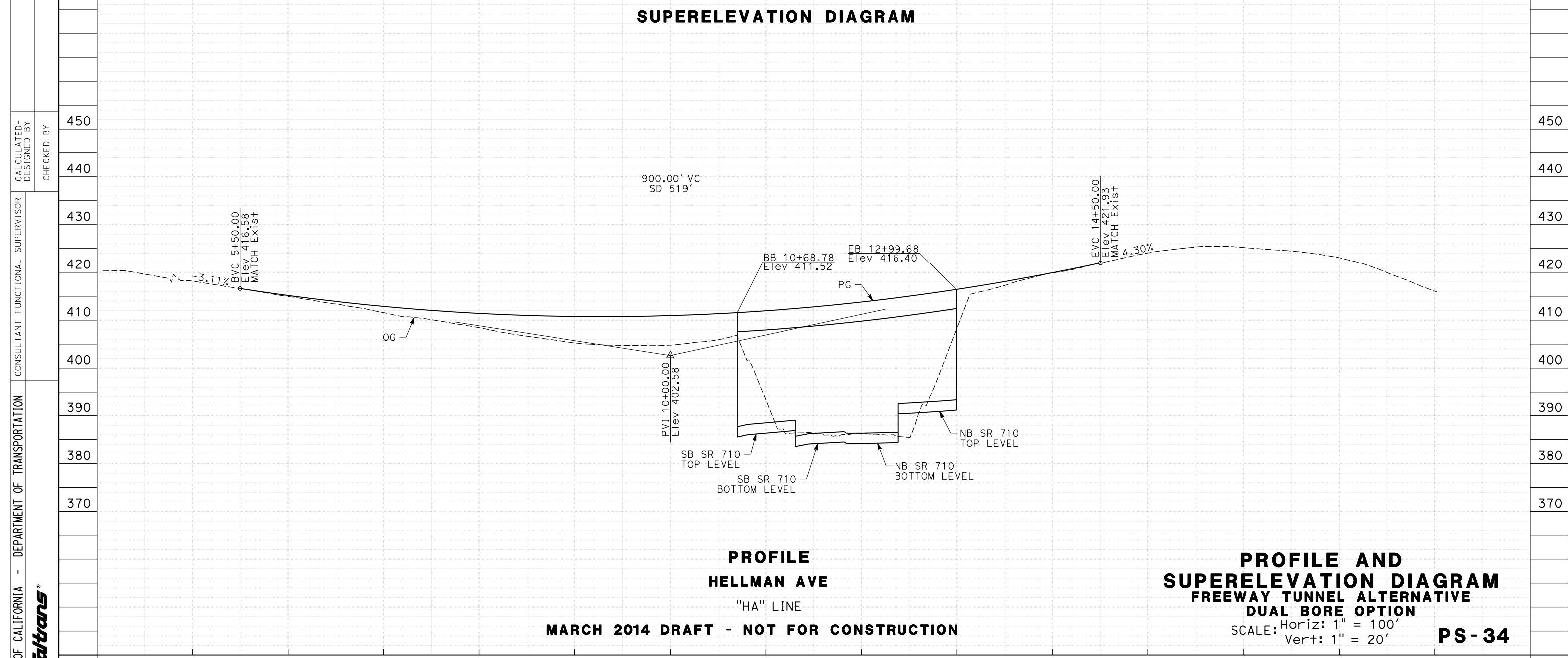
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE  
HELLMAN AVE  
"HA" LINE**

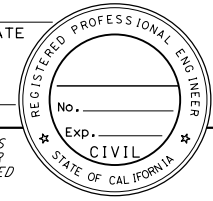
**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

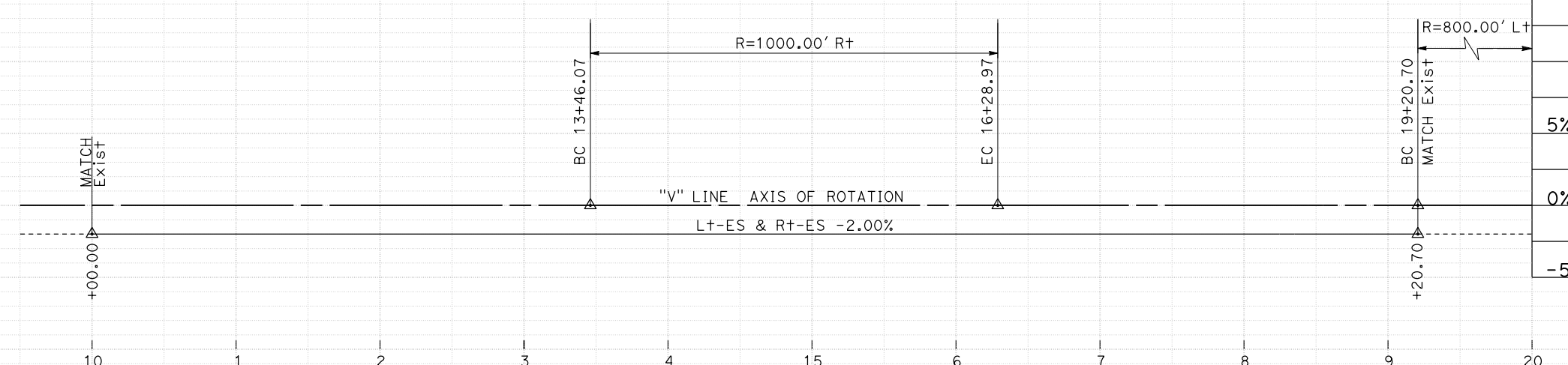
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20' **PS-34**

STATION	5	6	7	8	9	10	1	2	3	4	15	6	7	8	TOTAL
Exc															
Emb															

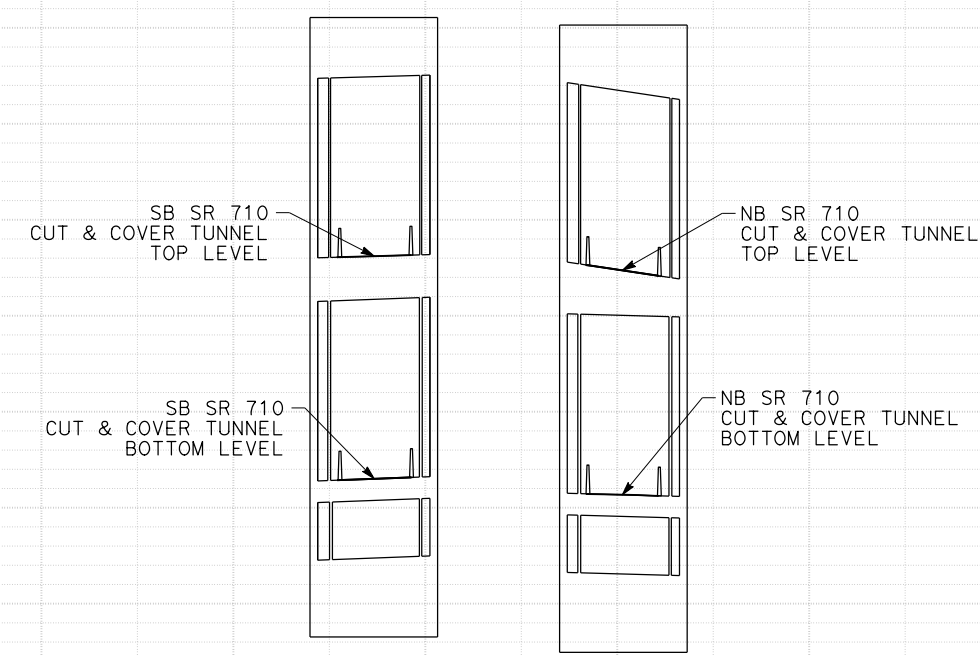
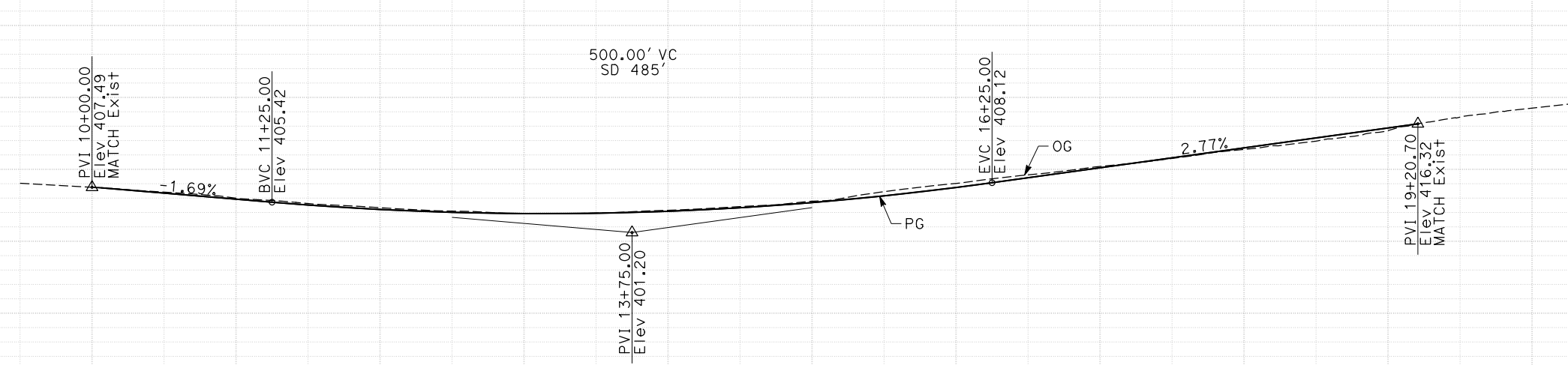
LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:30

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T	XXX	
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		

NOTE:



**SUPERELEVATION DIAGRAM**




**PROFILE VALLEY BLVD "V" LINE**

**PROFILE AND SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20' **PS-35**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE
					

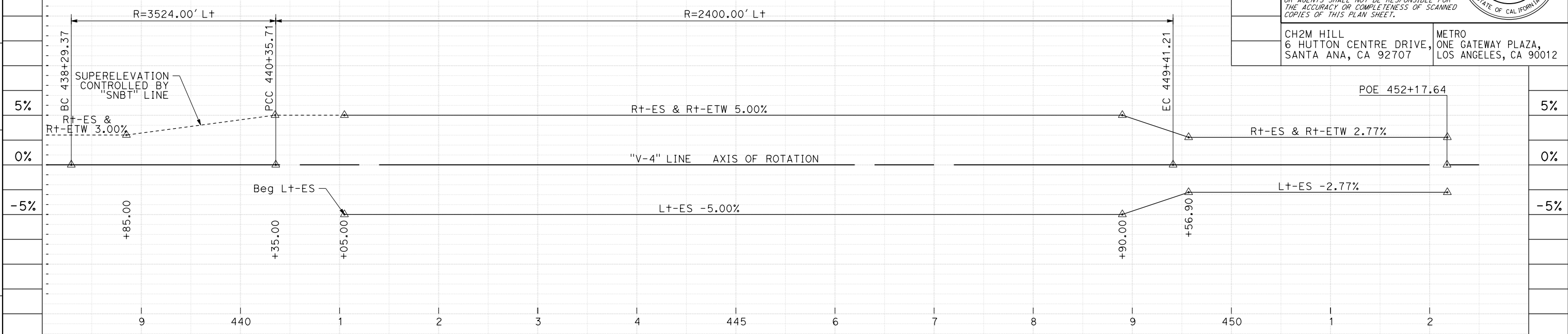
STATION	9	10	1	2	3	4	15	6	7	8	9	20	TOTAL
Exc													
Emb													

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 13:31

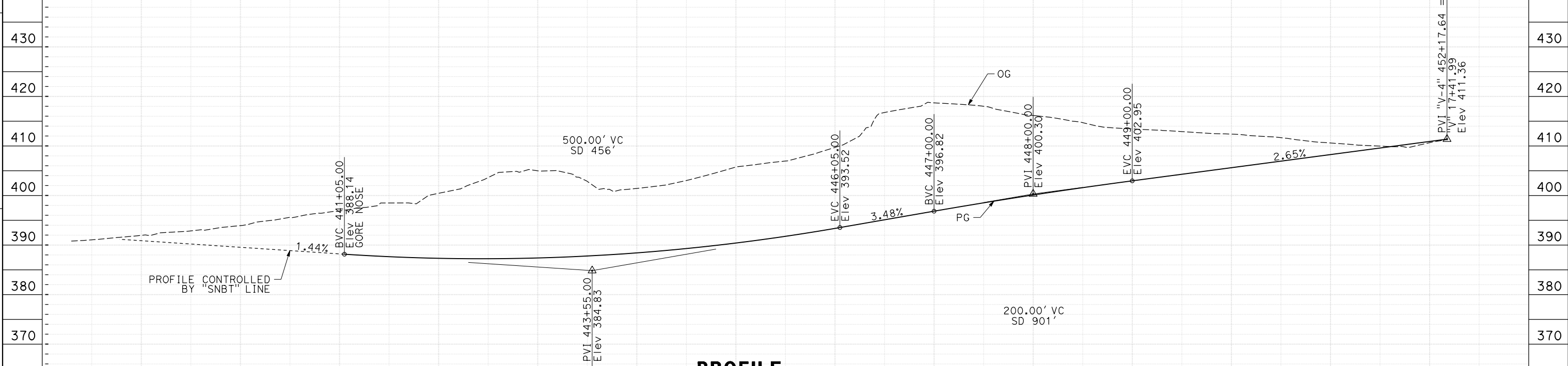
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**

NB OFF RAMP TO VALLEY BLVD

"V-4" LINE

**PROFILE AND SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-36**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISED BY	DATE	REVISOR
<b>Caltrans</b>						

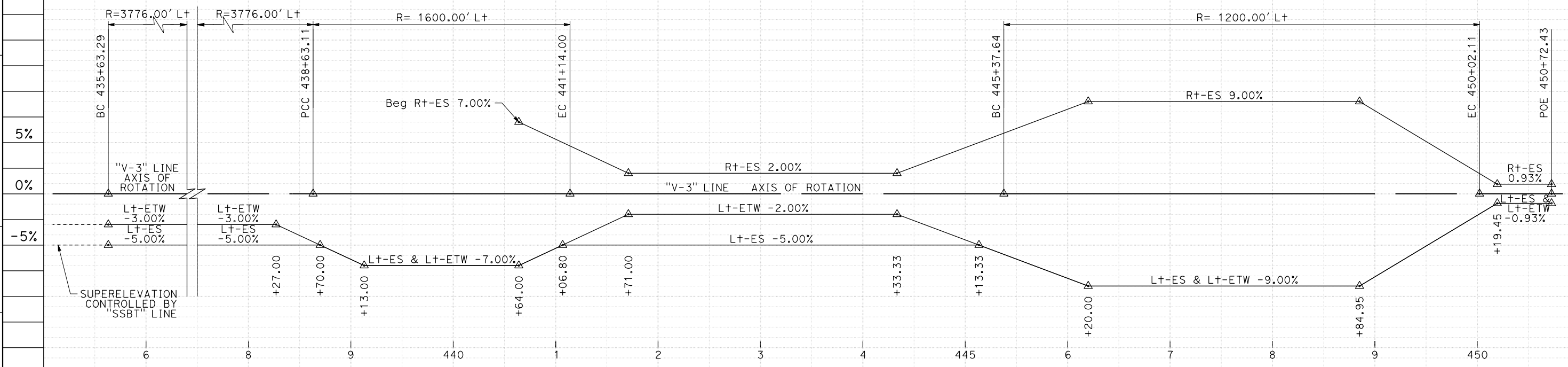
STATION	9	440	1	2	3	4	445	6	7	8	9	450	1	2	TOTAL
Exc															
Emb															



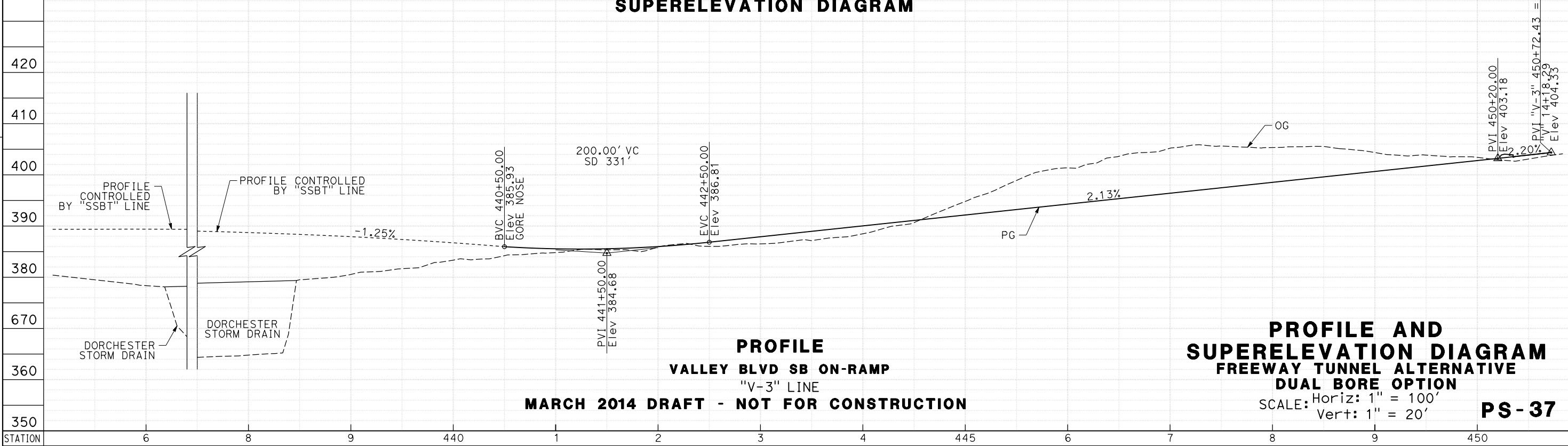
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**  
**VALLEY BLVD SB ON-RAMP**  
**"V-3" LINE**  
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'  
**PS-37**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED
CY	Exc		
	Emb		

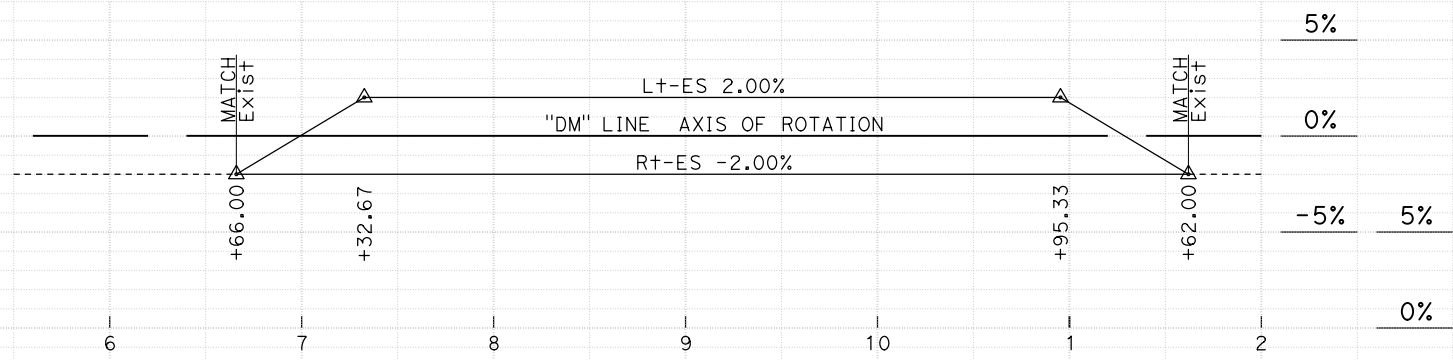
STATION	6	8	9	440	1	2	3	4	445	6	7	8	9	450	TOTAL
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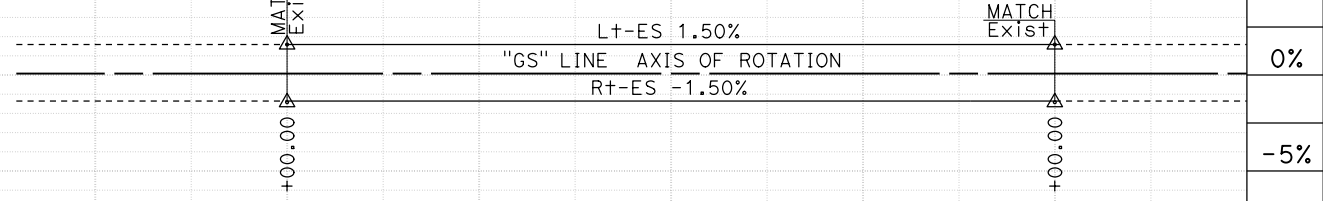
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



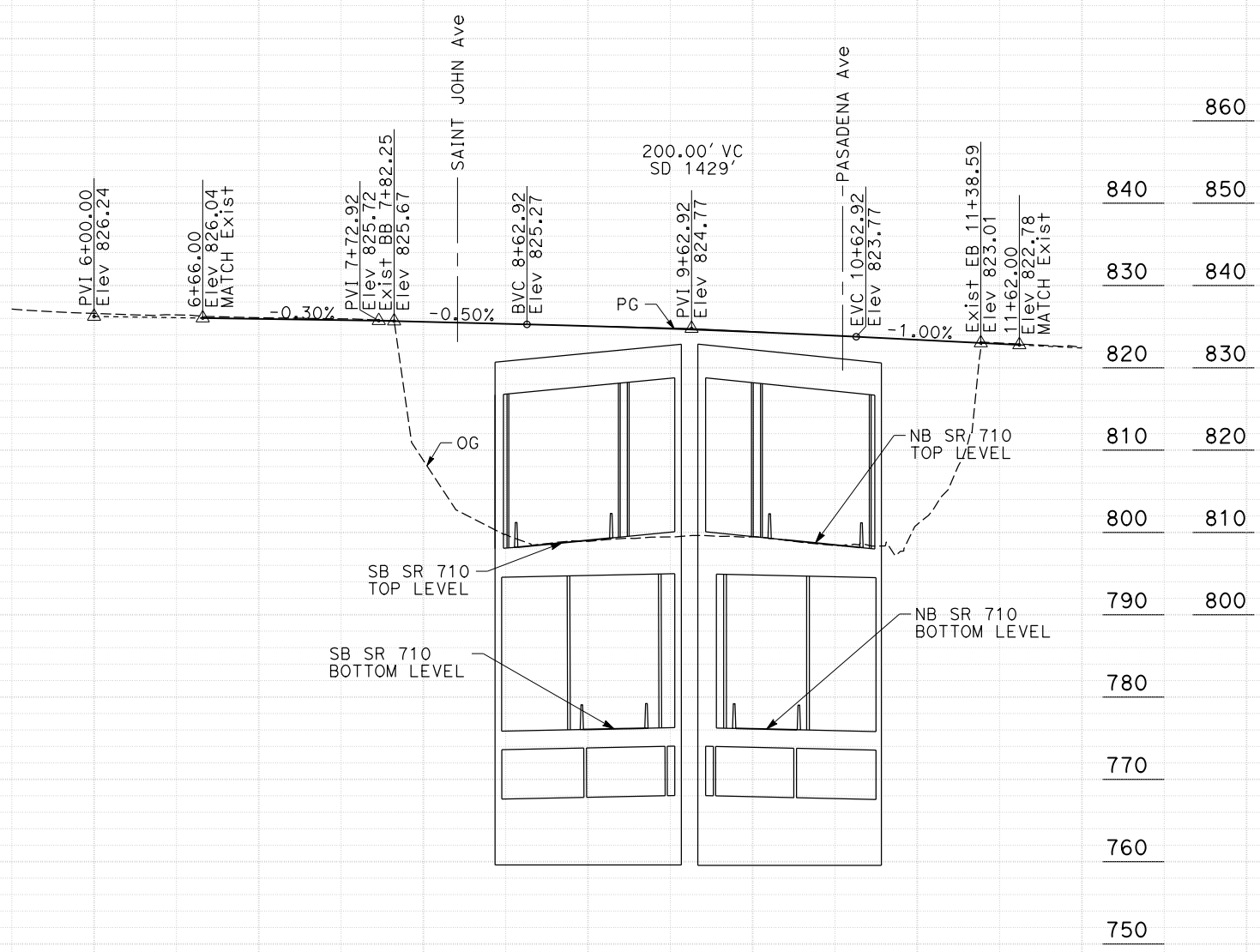
NOTE:



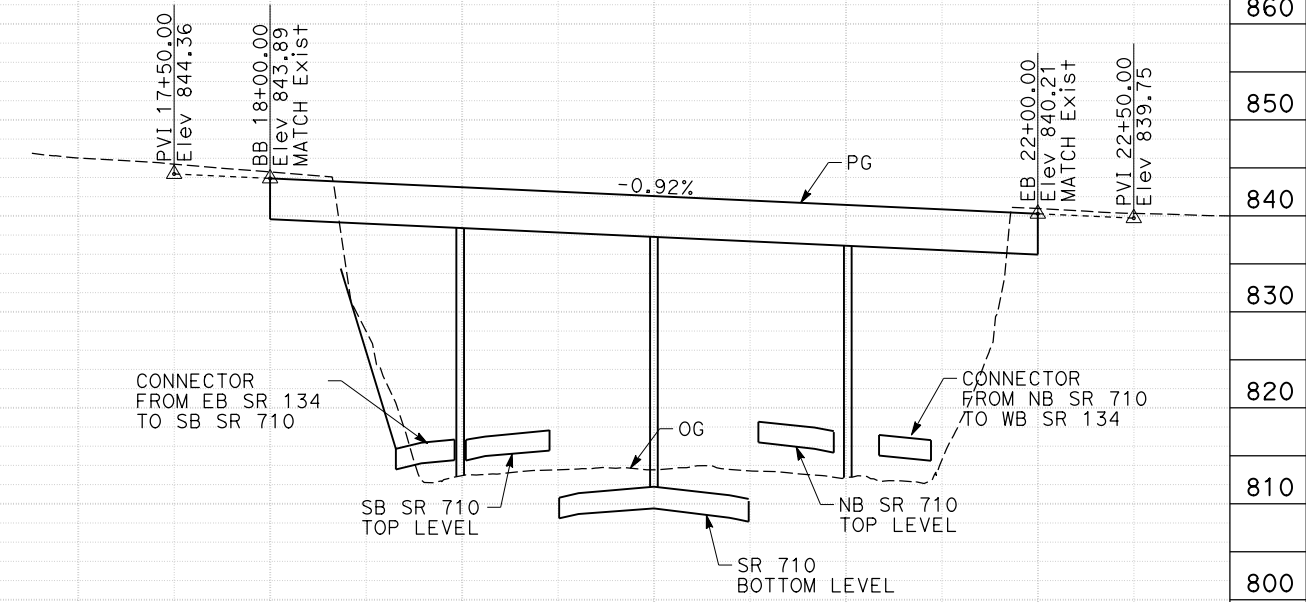
**SUPERELEVATION DIAGRAM**



**SUPERELEVATION DIAGRAM**



**PROFILE  
DEL MAR BLVD  
"DM" LINE**



**PROFILE  
GREEN St  
"GS" LINE**

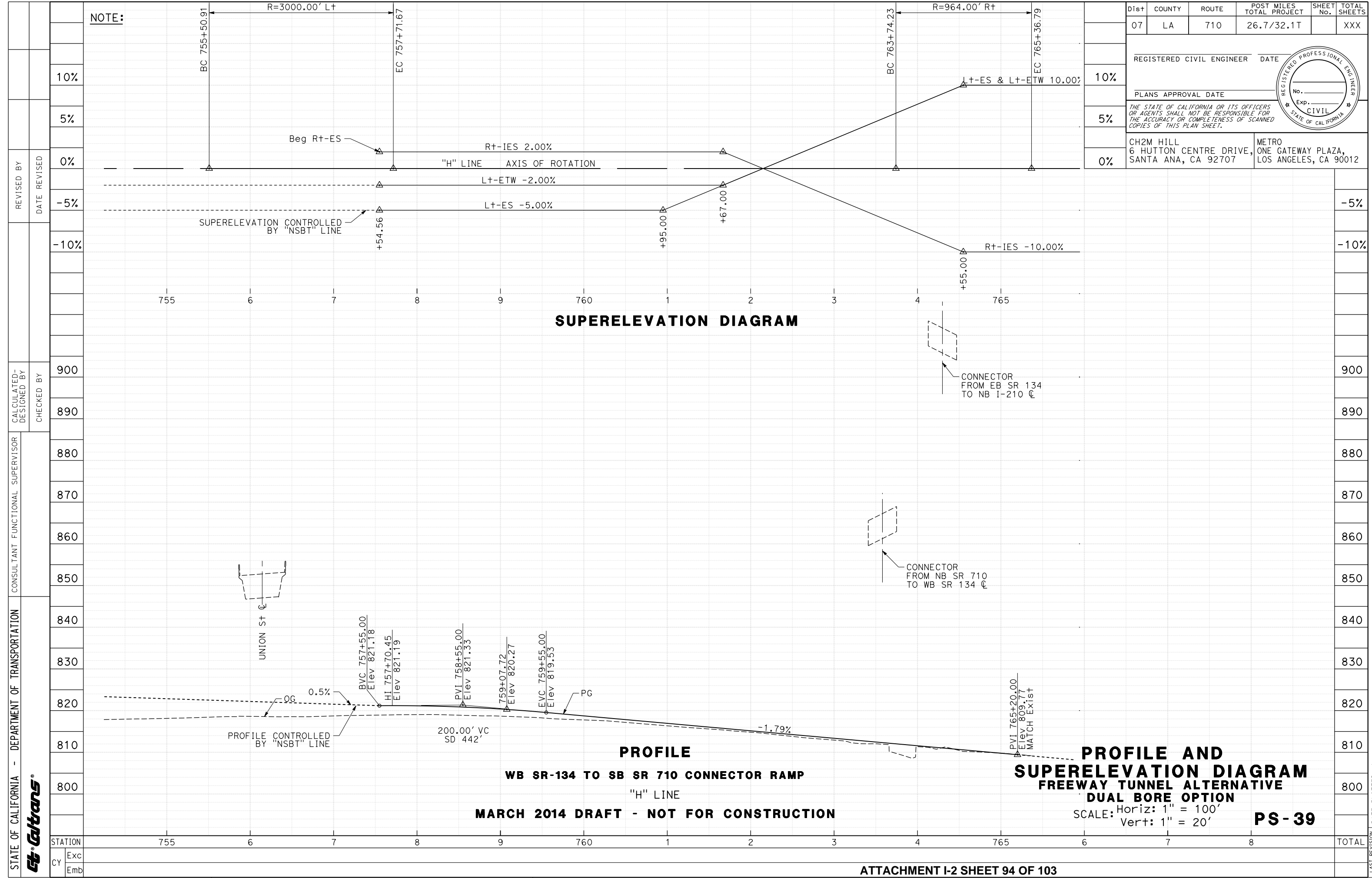
**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

PS-38

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE
Exc					
Emb					

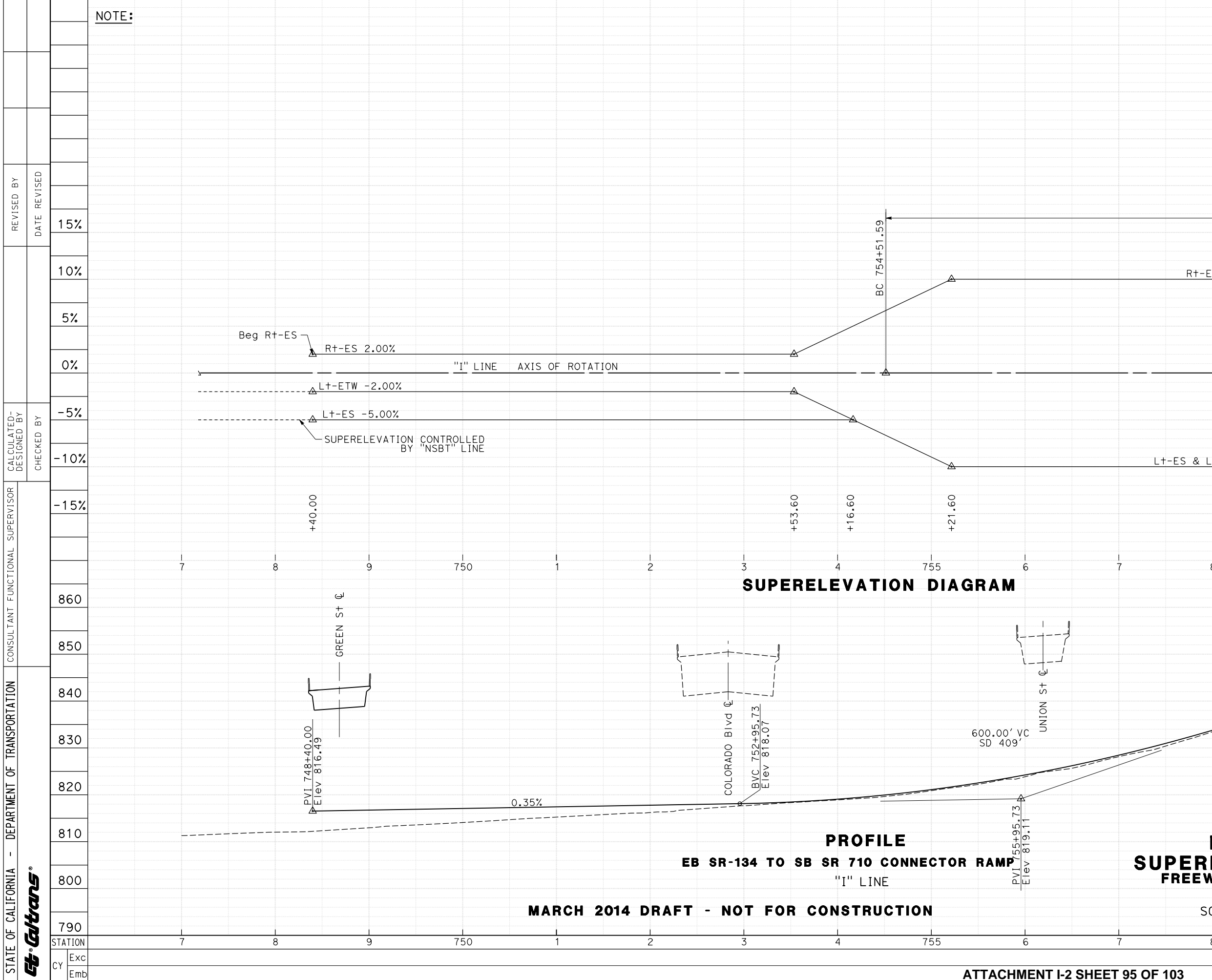
STATION	6	7	8	9	10	1	2	7	8	9	20	1	2	TOTAL
---------	---	---	---	---	----	---	---	---	---	---	----	---	---	-------



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER      DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		

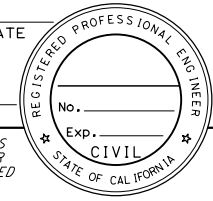


REVISED BY	DATE	10%
		5%
CALCULATED-DESIGNED BY	CHECKED BY	900
		890
CONSULTANT FUNCTIONAL SUPERVISOR	DEPARTMENT OF TRANSPORTATION	880
		870
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	Ettrans	860
		850
CY	Exc	840
		Emb
		830
		820
		810
		800
		TOTAL



NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER			DATE		
PLANS APPROVAL DATE			No.		
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



REVISOR	REVISION	DATE													
	15%														
	10%														
	5%														
	0%														
	-5%														
	-10%														
	-15%														
STATION	7	8	9	750	1	2	3	4	755	6	7	8	9	760	TOTAL
Exc															
Emb															

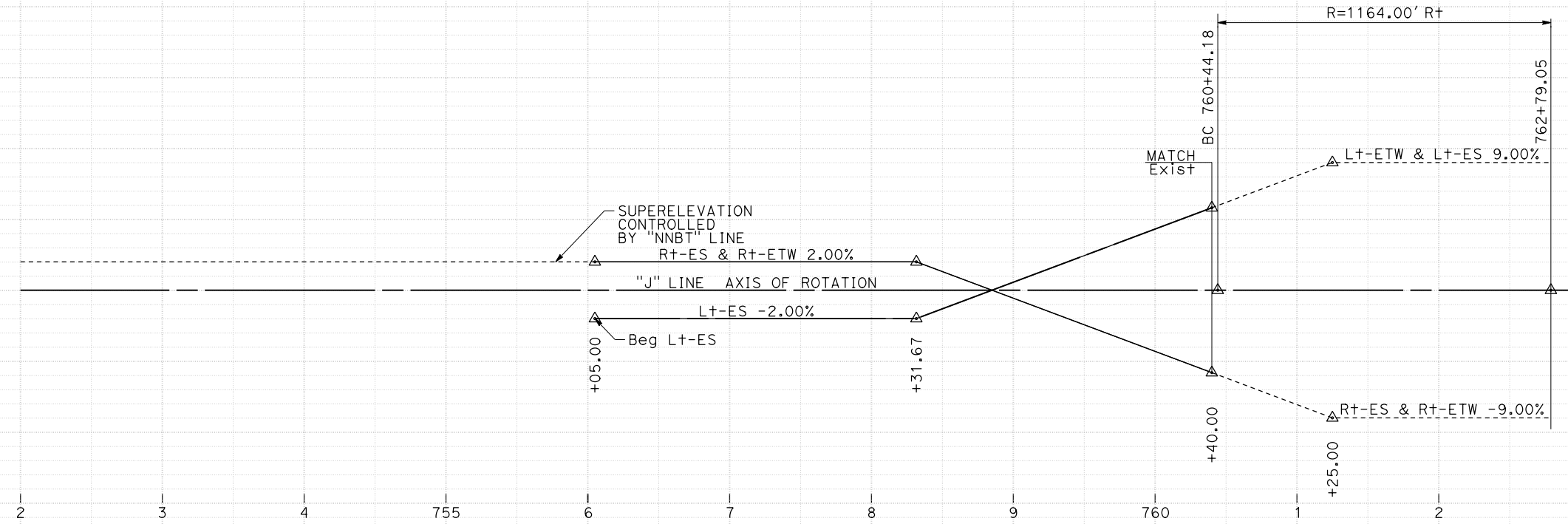
**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'  
**PS-40**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

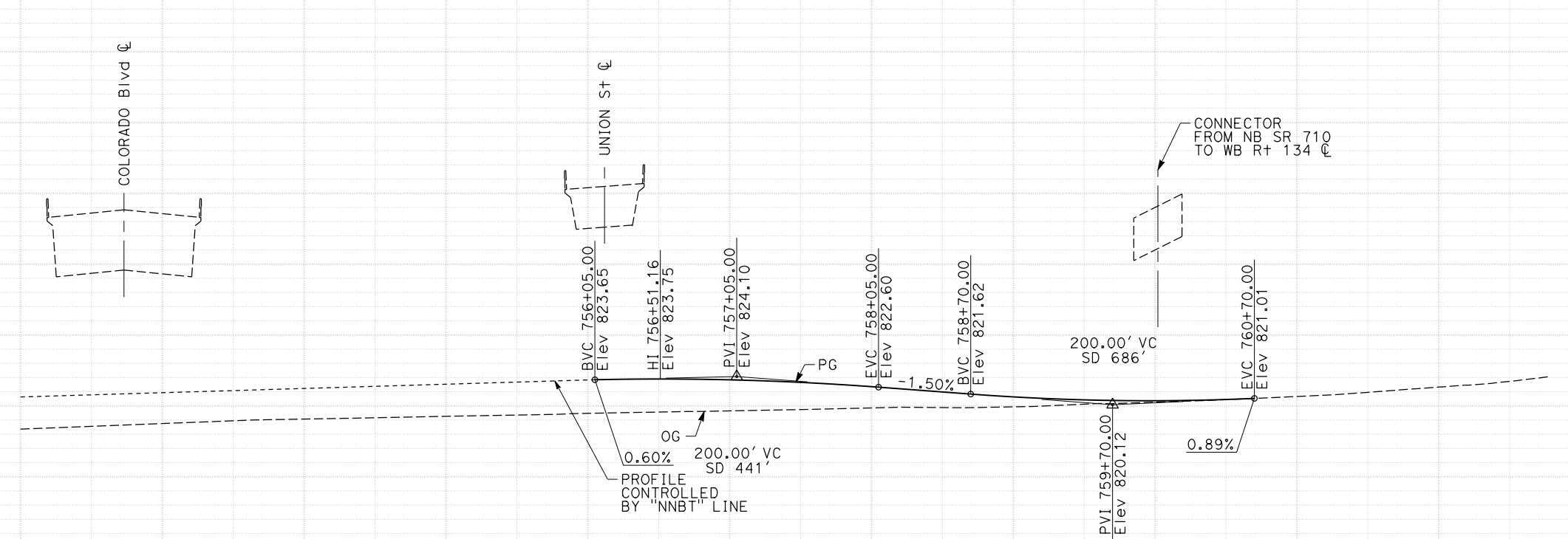
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**  
**NB SR 710 TO EB I-210 CONNECTOR RAMP**  
**"J" LINE**  
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'  
**PS-41**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY	DATE REVISED
<b>Caltrans</b>		CHECKED BY		
STATION	Exc	Emb		

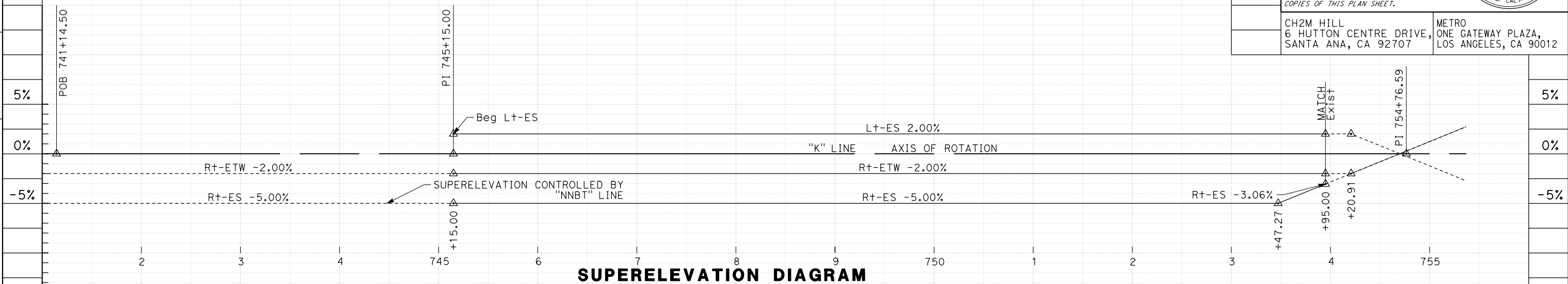
2	3	4	755	6	7	8	9	760	1	2	3	4	765	TOTAL

LAST REVISION DATE PLOTTED => 21-MAR-2014  
 00-00-00 TIME PLOTTED => 13:32

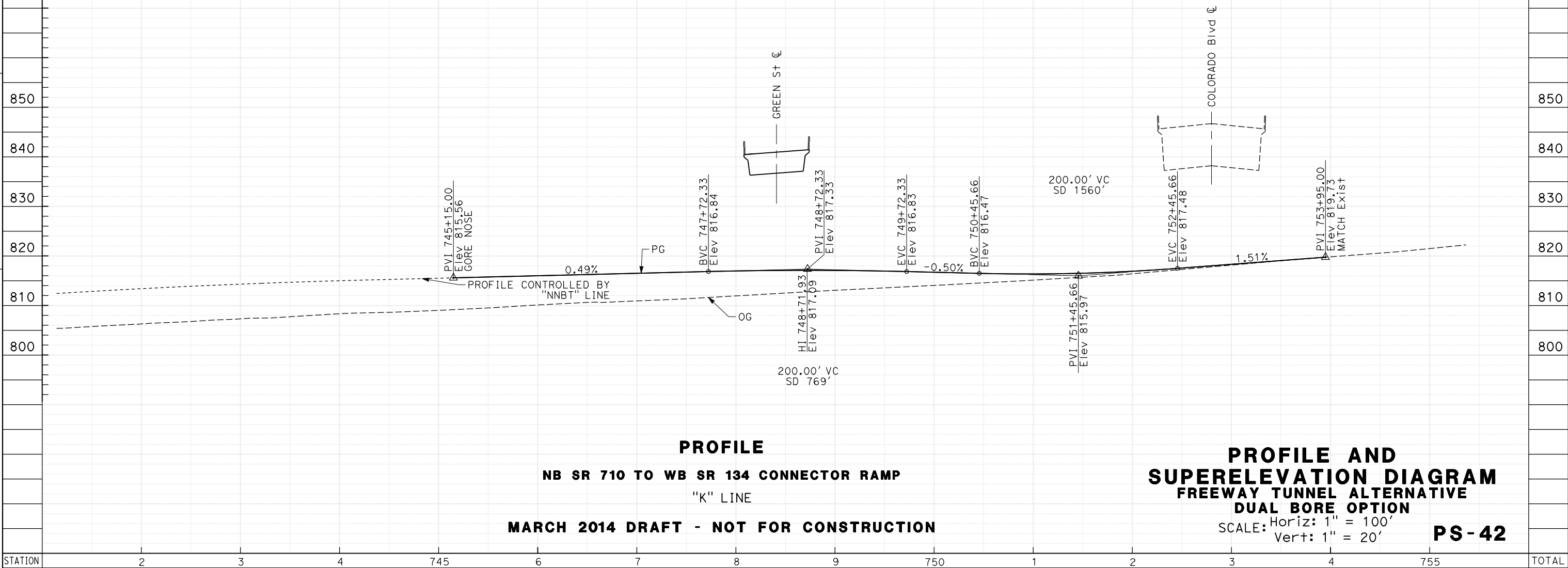
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**

**NB SR 710 TO WB SR 134 CONNECTOR RAMP**

**"K" LINE**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE AND SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-42**

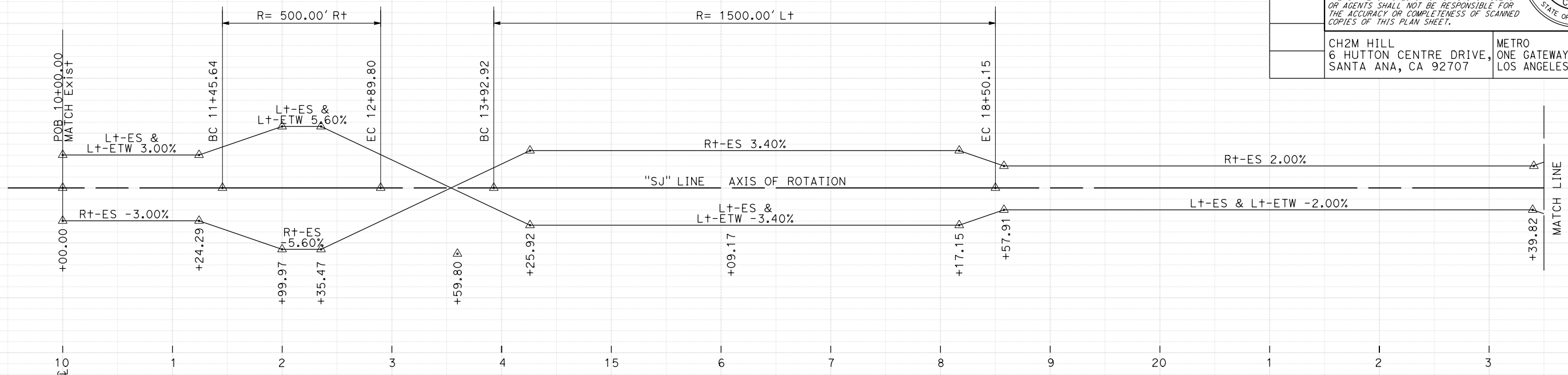
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY	DATE REVISED
<b>Caltrans</b>		CHECKED BY		
Exc				
Emb				

STATION	2	3	4	745	6	7	8	9	750	1	2	3	4	755	TOTAL
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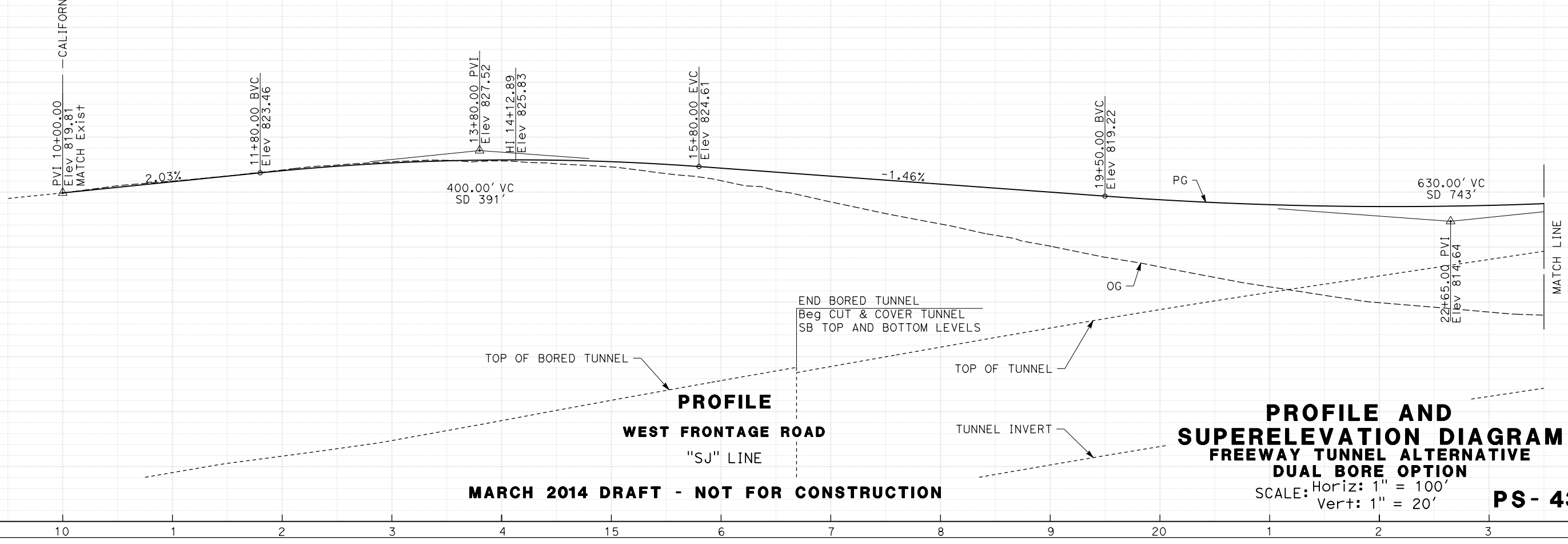
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**

**PROFILE AND SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-43**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE	REVISION
	850					
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	820					
	810					
	800					
	790					
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STATION						
Exc						
Emb						

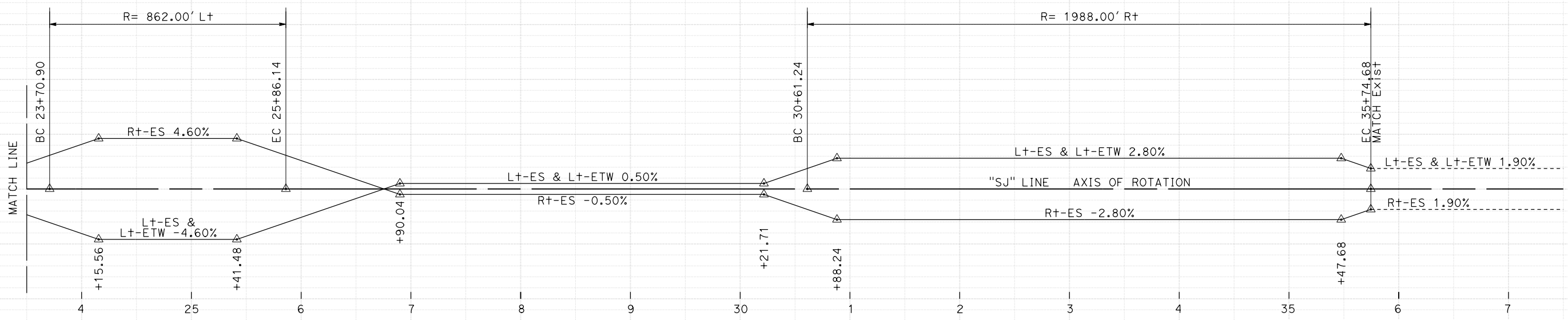
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00-00-00 TIME PLOTTED => 13:33

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07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		

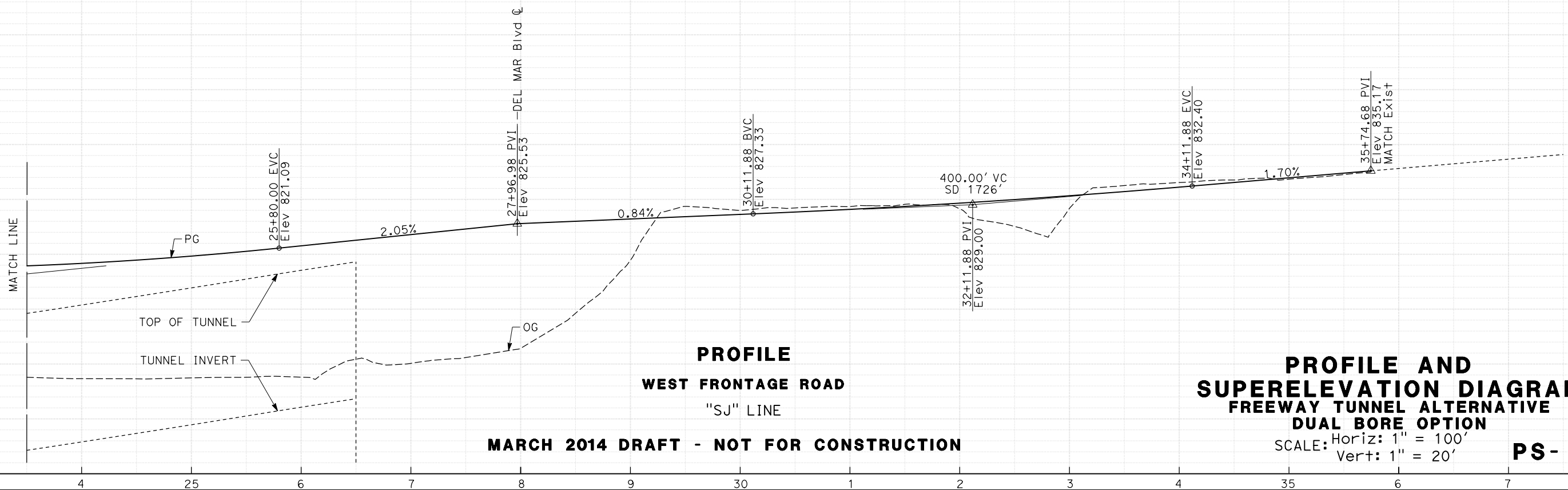


NOTE:

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE
Exc	Emb				



**SUPERELEVATION DIAGRAM**



**PROFILE  
WEST FRONTAGE ROAD  
"SJ" LINE**

**PROFILE AND SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

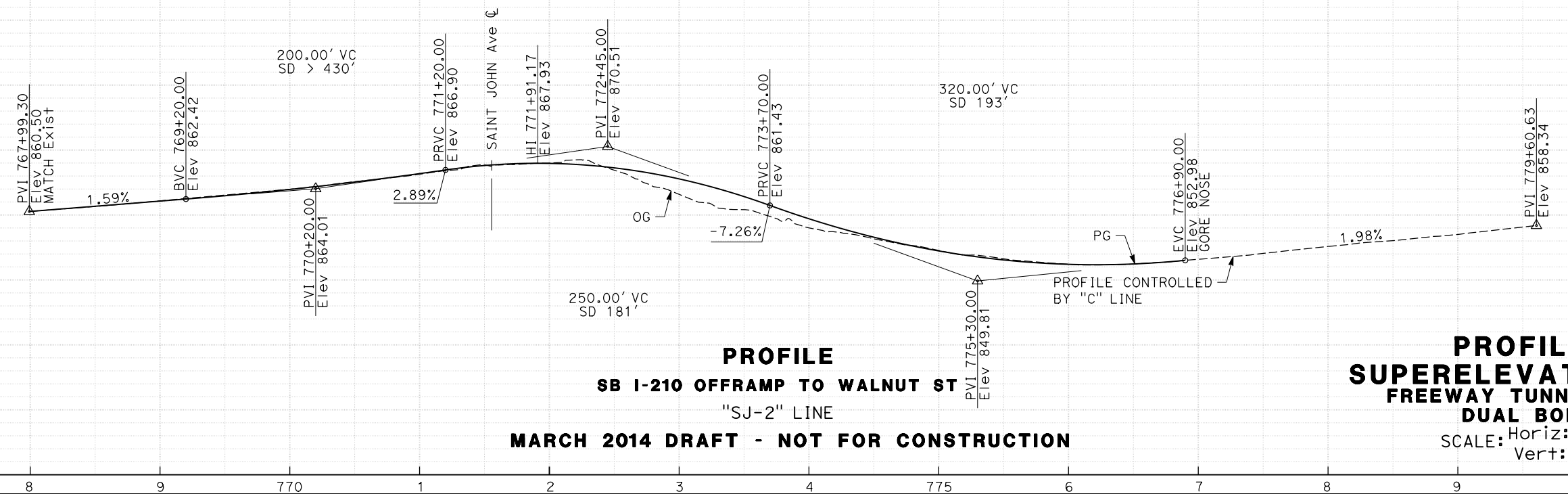
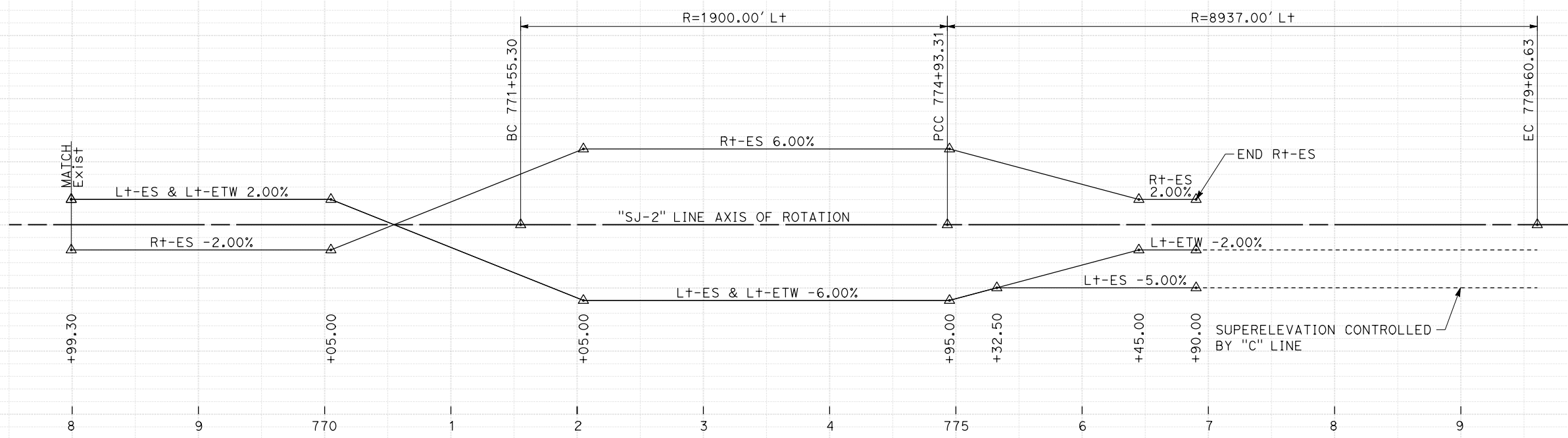
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<b>Caltrans</b>		CHECKED BY	DATE REVISED
Exc			
Emb			

NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER				DATE	
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



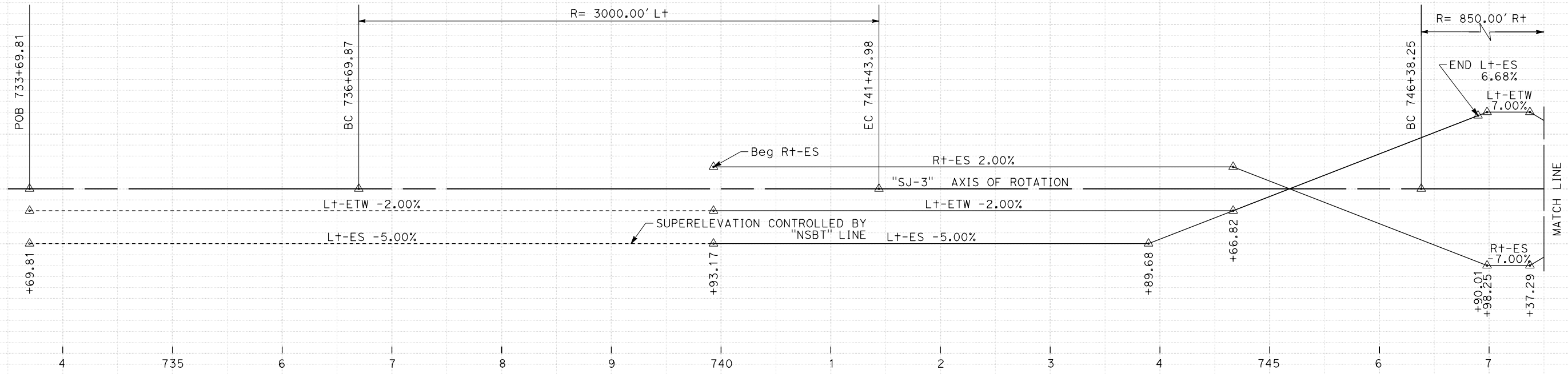
**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'  
**PS-45**



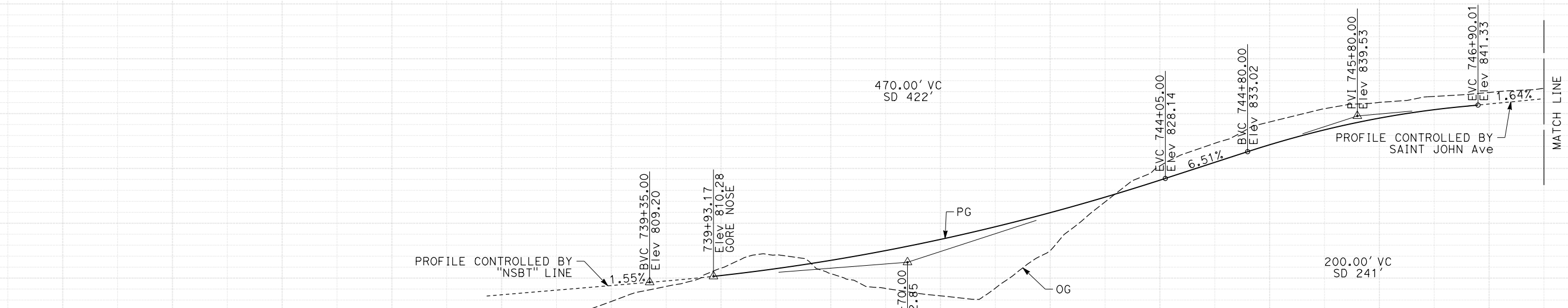
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<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**

**SANT JOHN RAMP REALIGNED**

**"SJ-3" LINE**

**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**DUAL BORE OPTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-46**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

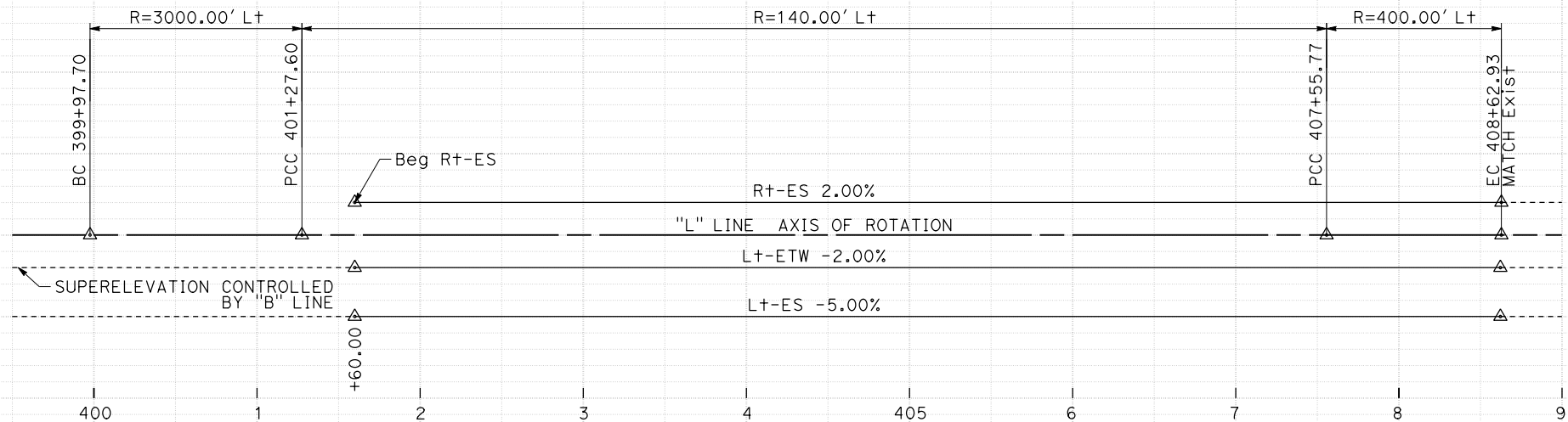
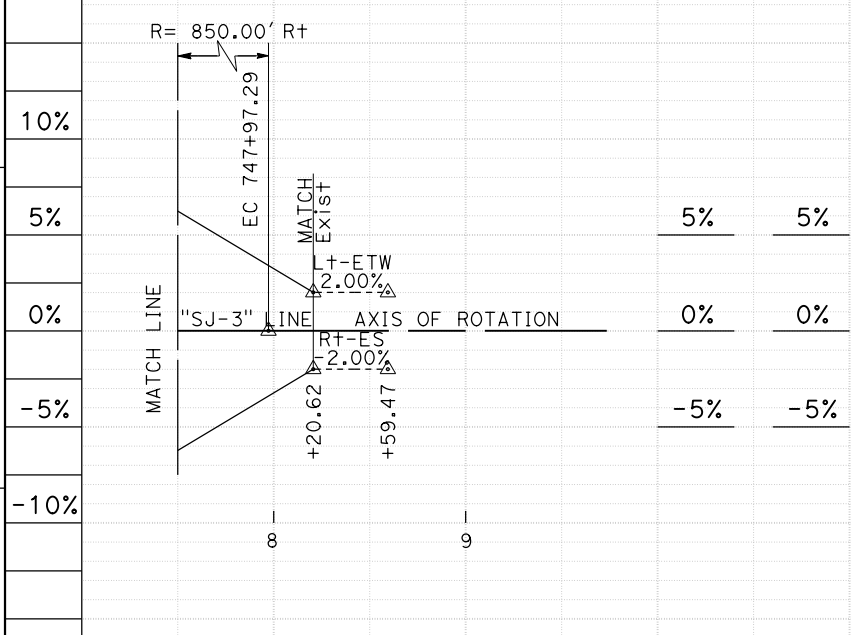
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Emb					

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Exc														
Emb														

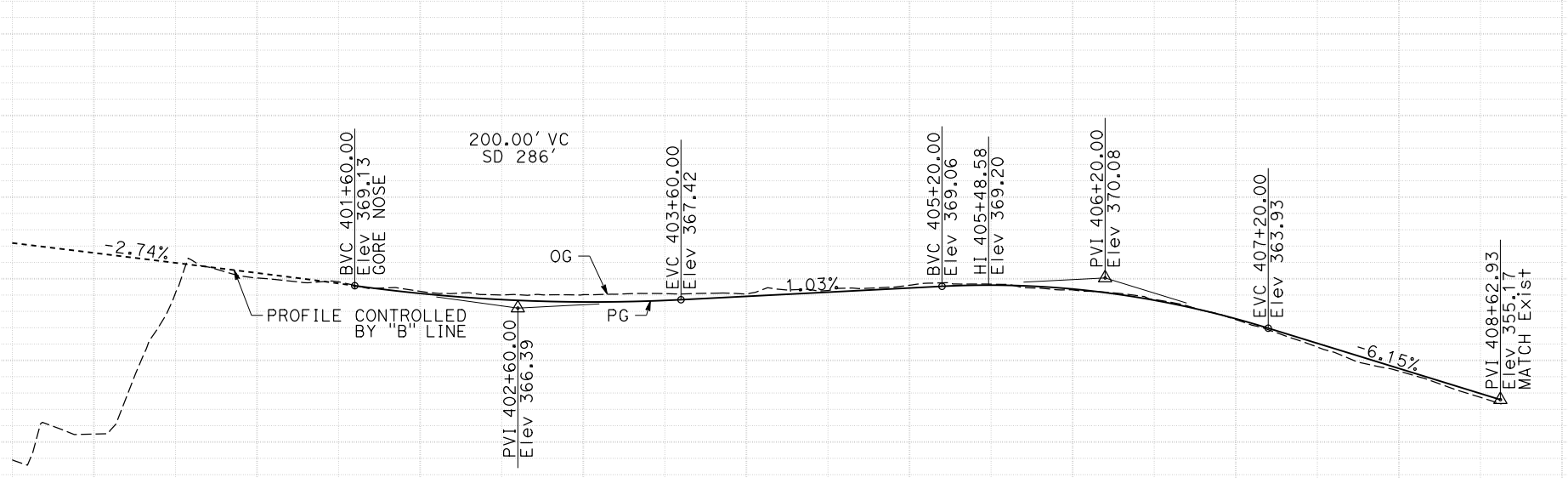
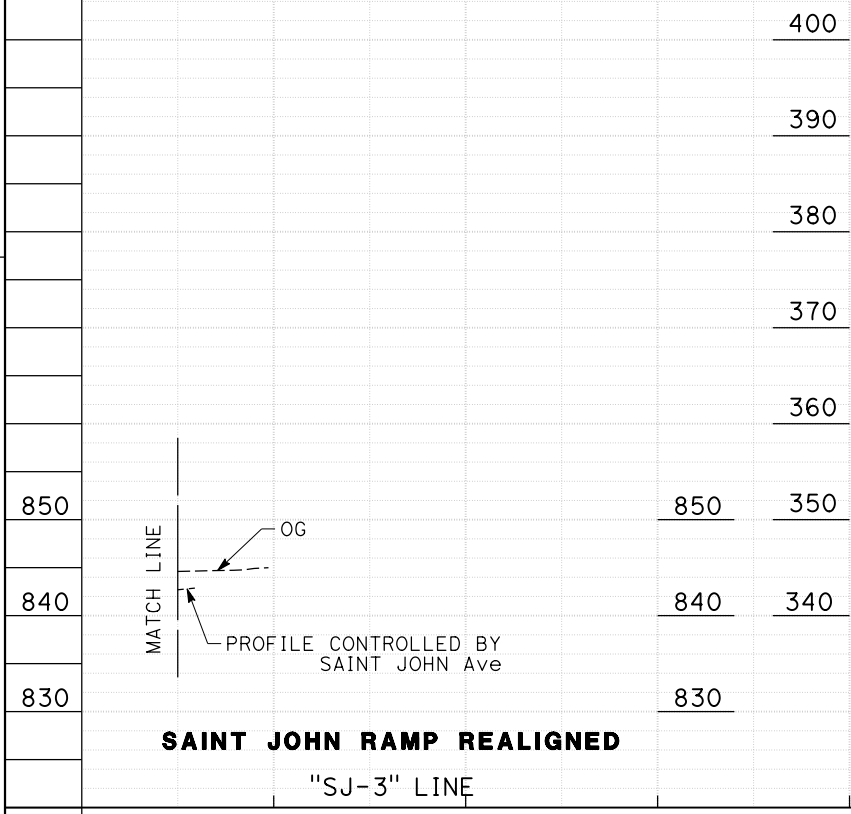
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REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**

**PROFILE AND SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**WB I-10 TO SB I-710 CONNECTOR RAMP  
"L" LINE  
MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

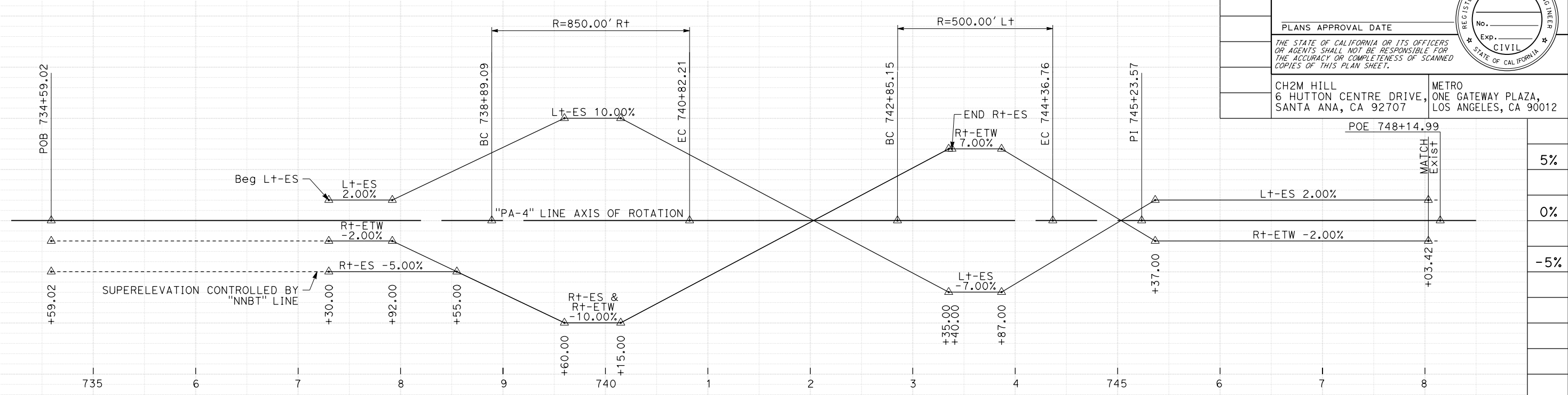
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20' **PS-47**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CHECKED BY	REVISOR BY	DATE	REVISION
					10%
					5%
					0%
					-5%
					-10%
STATION	Exc	Emb			
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9					
400					
1					
2					
3					
4					
405					
6					
7					
8					
9					
TOTAL					

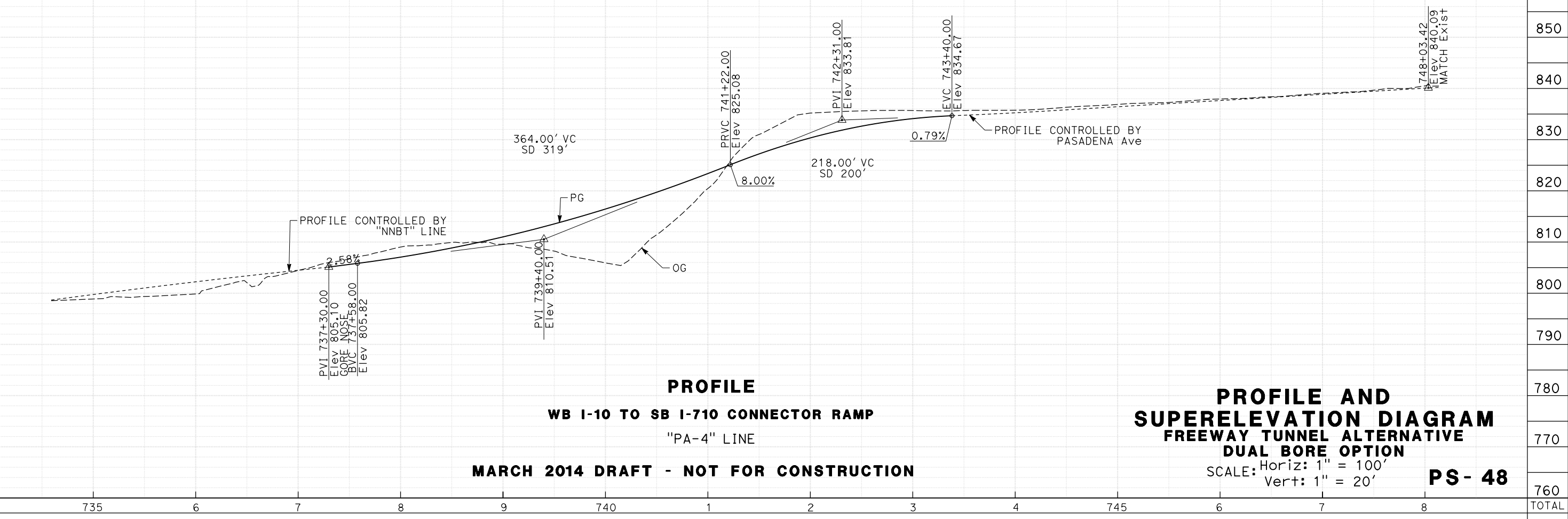
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
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REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**

**WB I-10 TO SB I-710 CONNECTOR RAMP**

**"PA-4" LINE**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE AND SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS- 48**

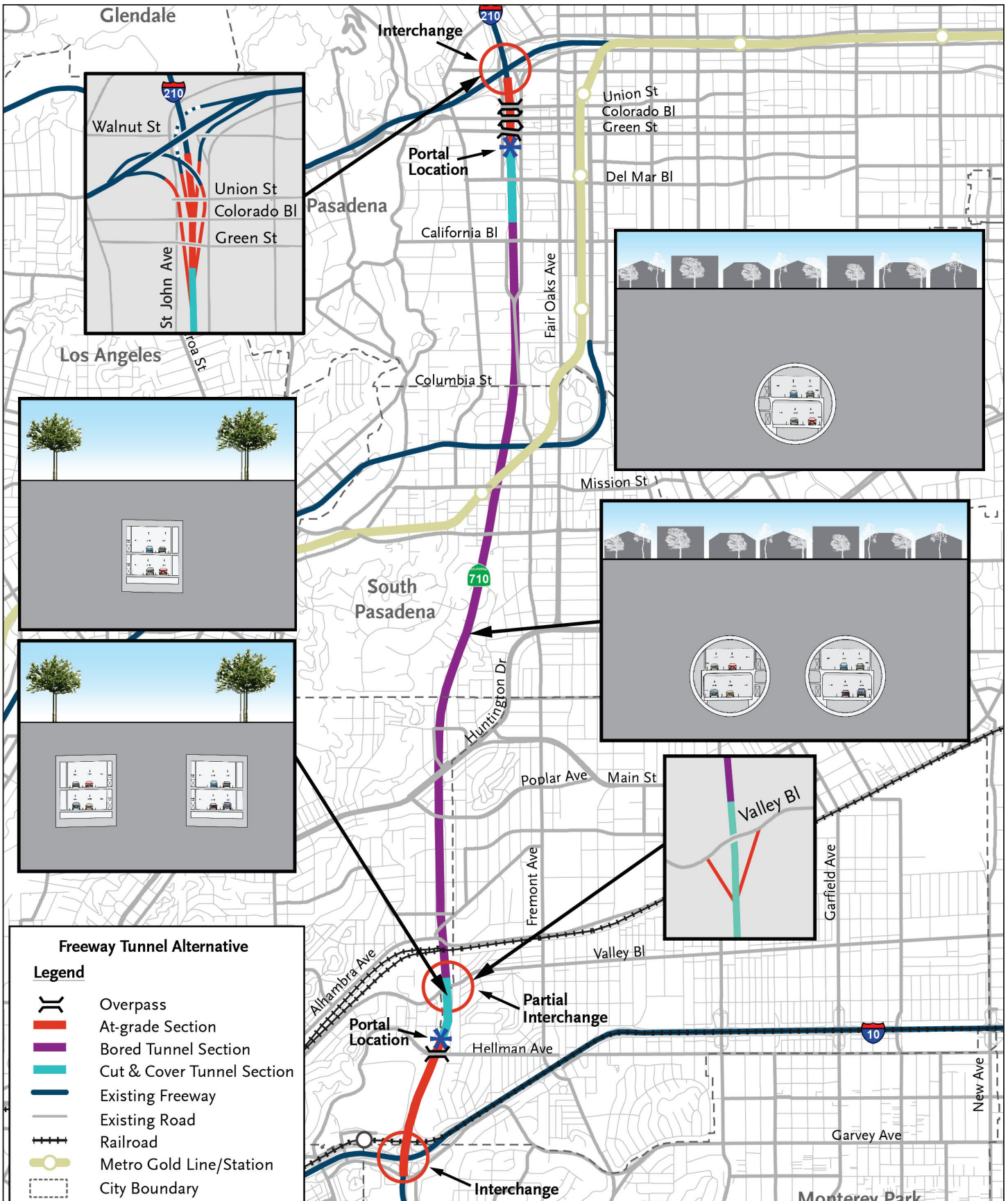
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
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	810		
	800		
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	770		
	760		
	STATION		
	735		
	6		
	7		
	8		
	9		
	740		
	1		
	2		
	3		
	4		
	745		
	6		
	7		
	8		
	TOTAL		



**Attachment J**  
**Freeway Tunnel Alternative – Single-Bore Tunnel**

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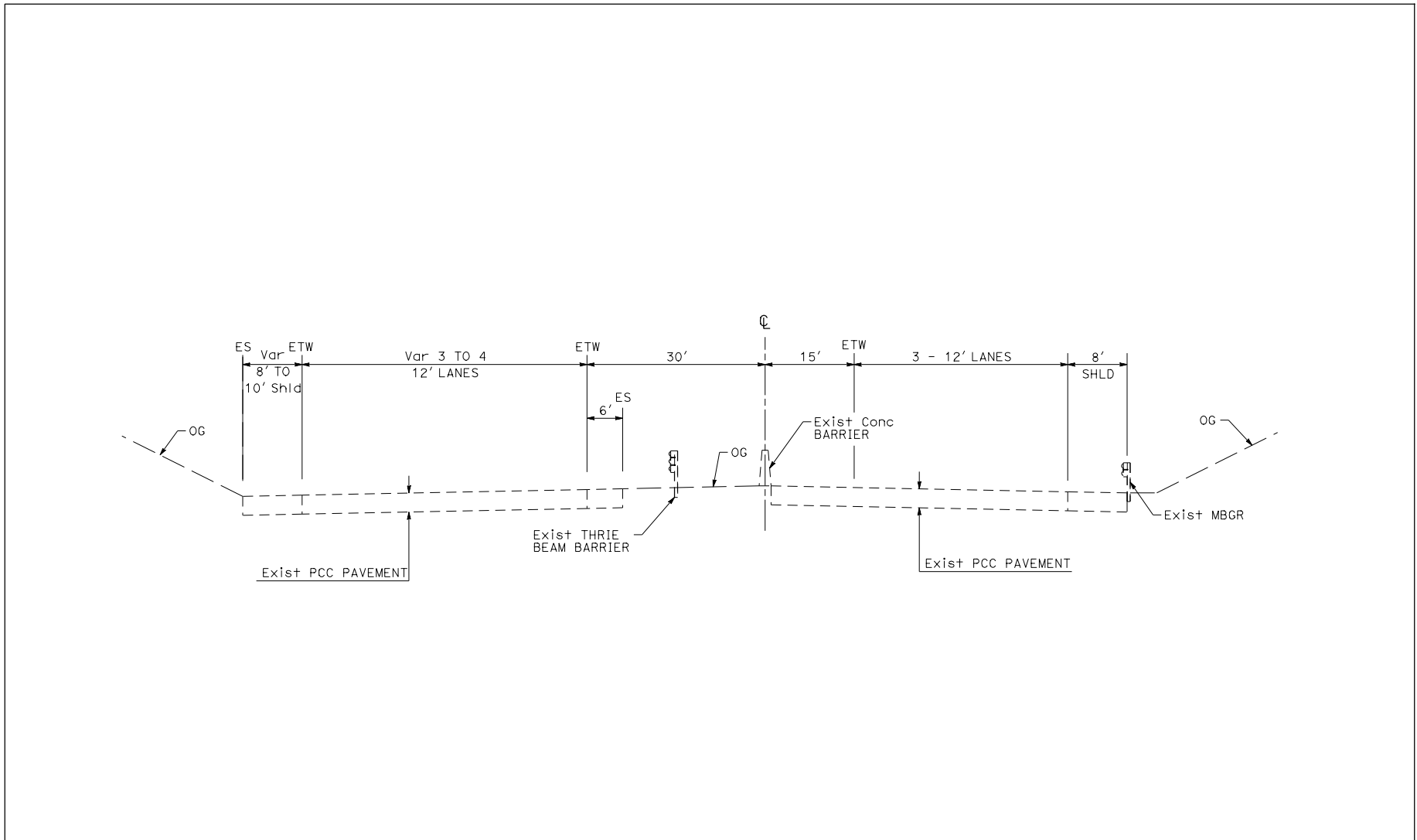
NOTE: Tunnel cross sections are illustrative and not to scale.

ATTACHMENT J-1a

SR 710 North Study  
 Freeway Tunnel Alternative  
 Single Bore

07-LA-710 (SR 710)  
 EA 187900  
 EFIS 0700000191

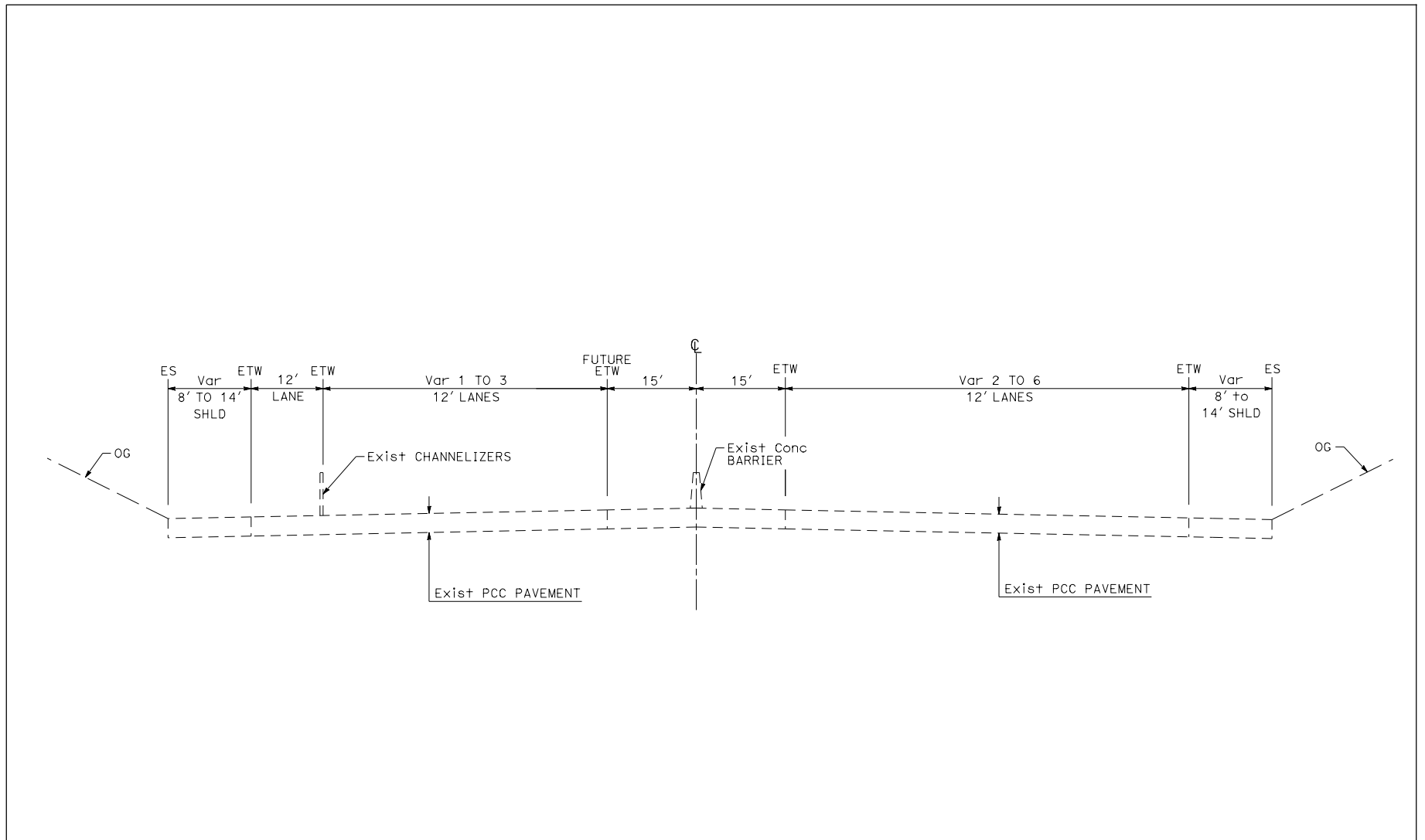




ATTACHMENT J-1b

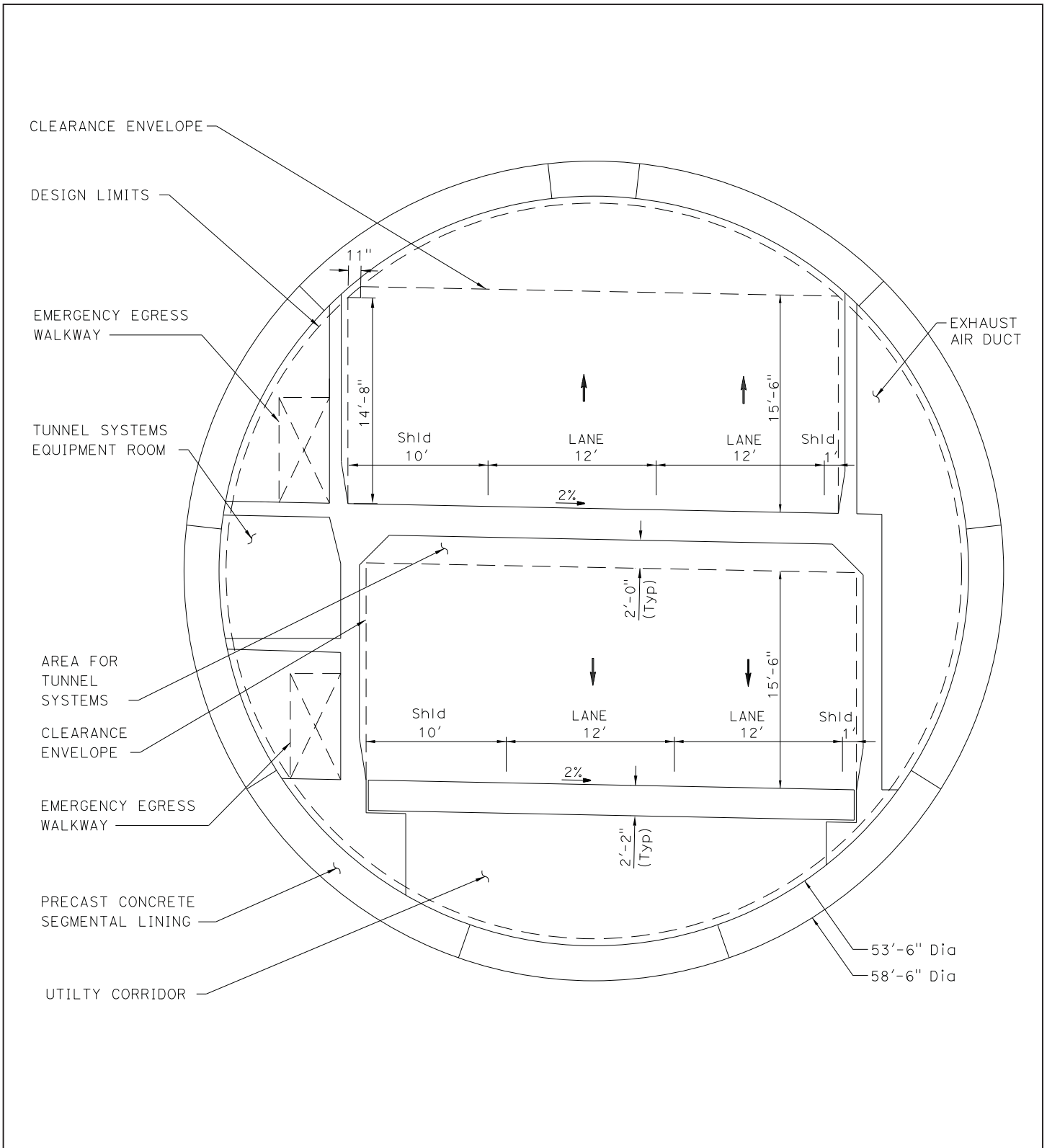
SR-710 North Study  
 Freeway Tunnel Alternative - Single Bore  
 Existing at South Portal  
 07-LA-710 (SR-710)  
 EA 197800  
 EFIS 0700000191





ATTACHMENT J-1c

SR-710 North Study  
 Freeway Tunnel Alternative - Single Bore  
 Existing at North Portal  
 07-LA-710 (SR-710)  
 EA 197800  
 EFIS 0700000191



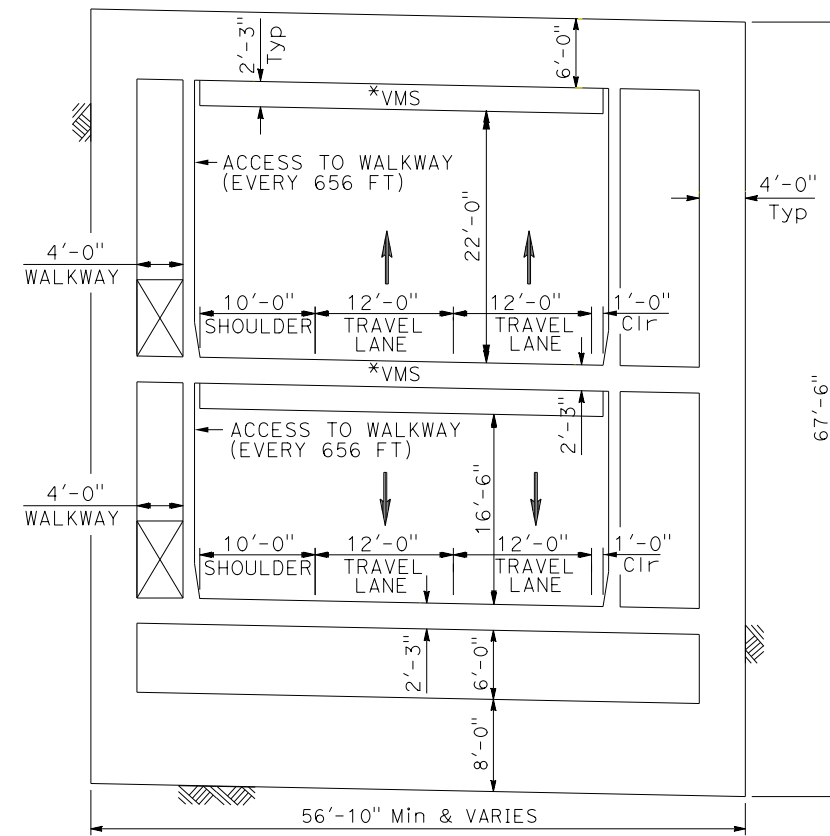
ATTACHMENT J-1d

NOTE: Dimensions are approximate and will be refined during final design.

SR 710 North Study  
 Freeway Tunnel Alternative  
 Single Bore Cross Section  
 07-LA-710 (SR 710)  
 EA 187900  
 EFIS 0700000191

**NOTES:**

FOR CUT AND COVER TRANSITIONAL AREA FROM AT-GRADE TO BORED TUNNEL SEE SR-710NORTH STUDY ADVANCED PLANNING STUDY (APS) REPORTS FOR CUT AND COVER TUNNELS IN ATTACHMENT K-3D & ATTACHMENT K-3E.



\*VMS: Variable Message Sign

ATTACHMENT J-1c

SR-710 North Study  
Freeway Tunnel Alternative - Single Bore  
Cut and Cover/Bored Tunnel Transition  
07-LA-710 (SR-710)  
EA 197800  
EFIS 0700000191

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

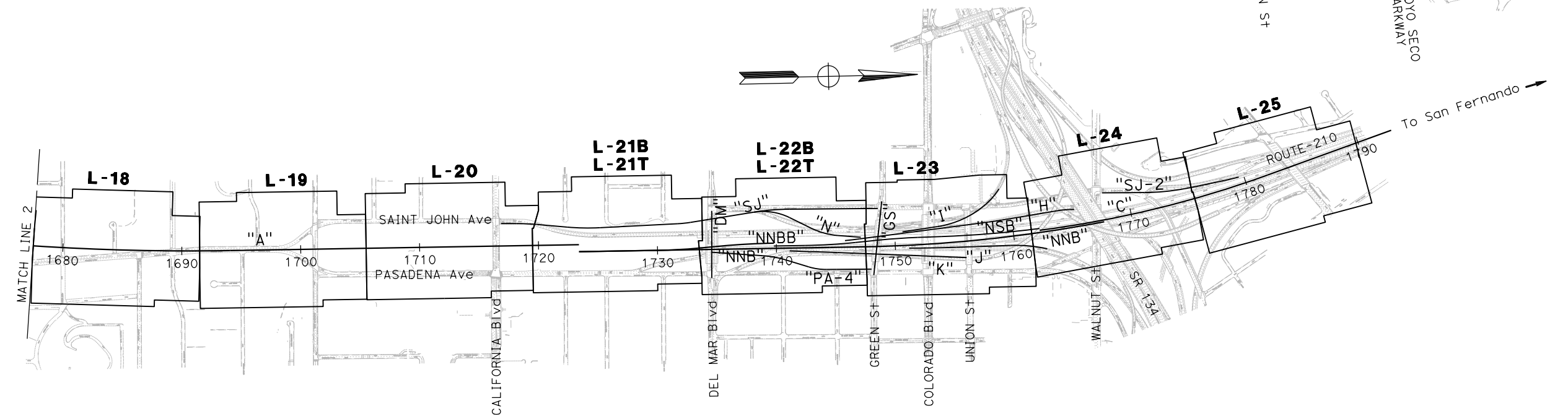
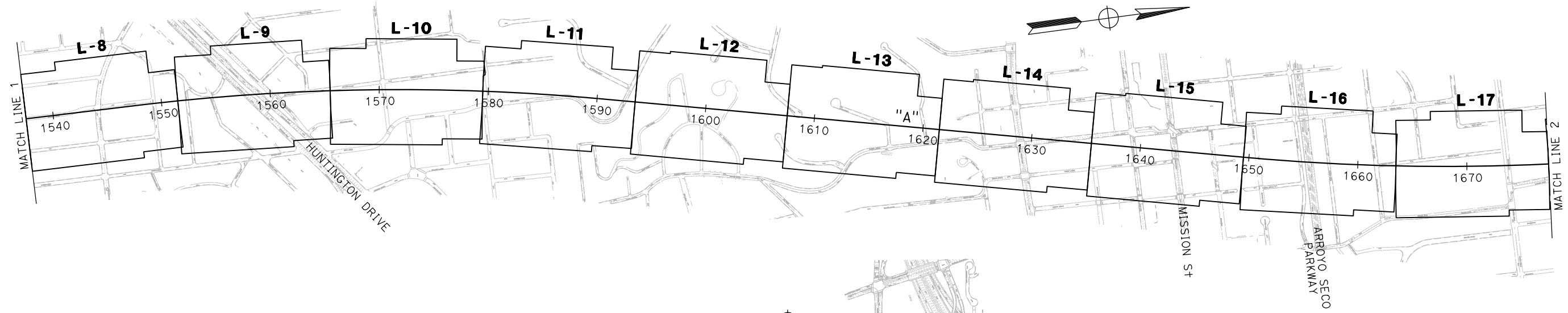
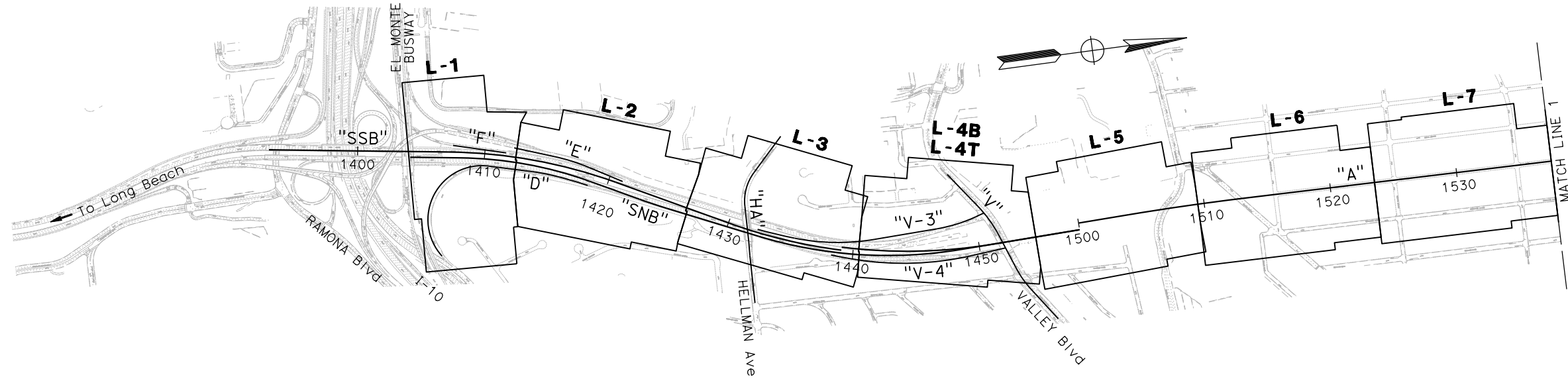
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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CH2M HILL  
 6 HUTTON CENTRE DRIVE,  
 SANTA ANA, CA 92707

METRO  
 ONE GATEWAY PLAZA,  
 LOS ANGELES, CA 90012



**KEY MAP AND LINE INDEX**  
**FREWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION** ATTACHMNET J-2 SHEET 1 OF 79

NO SCALE

**K-1**

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T	XXX	XXX

REGISTERED CIVIL ENGINEER	DATE
PLANS APPROVAL DATE	

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707	METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012
--	--

DESIGN DESIGNATION			
ADT (2013)	XXX,XXX	D	XX%
ADT (2033)	XXX,XXX	T	XX%
DHV	XX,XXX	V	XX mph
ESAL	X,XXX,XXX	TI <sub>20</sub>	XX.X

**NOTES:**

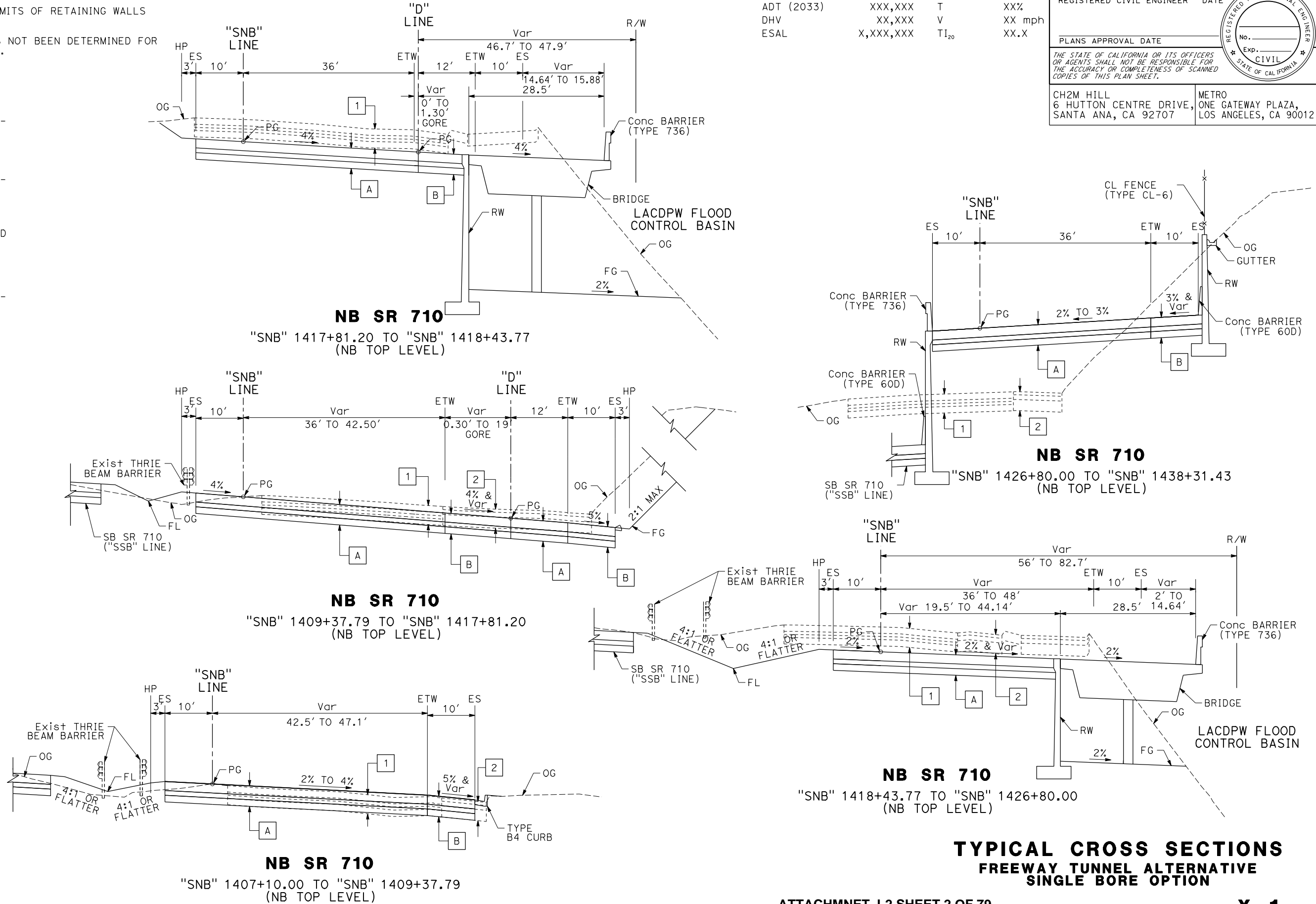
- DIMENSIONS OF THE PAVEMENT STRUCTURES (STRUCTURAL SECTIONS) ARE SUBJECT TO TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATIONS.
- SUPERELEVATIONS ARE SHOWN ON THE SUPERELEVATION DIAGRAMS.
- FOR LOCATION AND LIMITS OF RETAINING WALLS SEE LAYOUT SHEETS.
- PAVEMENT DESIGN HAS NOT BEEN DETERMINED FOR THIS PLANNING PHASE.

**ABBREVIATIONS:**

**TYPICAL PAVEMENT STRUCTURE SECTIONS**

- A [X.XX' XX MAINLINE  
X.XX' XX TRAVELED WAY-  
X.XX' XX PCC
  - B [X.XX' XX SHOULDER  
X.XX' XX TRAVELED WAY-  
X.XX' XX AC
  - C [X.XX' XX RAMP TRAVELED  
X.XX' XX WAY-AC  
X.XX' XX
  - D [X.XX' XX LOCAL STREET  
X.XX' XX TRAVELED WAY-  
X.XX' XX AC
- Exist  
0.67' PCC (CLASS B)  
0.33' CTB (CLASS A)  
0.33' AB  
0.67' ASB
  - Exist  
0.17'-0.33' AC  
0.50' AB  
1.17' & Var ASB
  - Exist  
0.25' AC (TYPE B-1)  
0.50' AB  
1.25' ASB
  - Exist  
0.33' AC (TYPE B-1)  
0.67' CTB (CLASS A)  
0.33' AB  
0.67' ASB
  - Exist  
0.70' PCC  
0.40' CTB  
0.50' AB
  - Exist  
0.30' AC  
0.55' AB  
0.75' ASB
  - Exist  
0.25' AC  
0.45' AB  
0.90' ASB
  - Exist  
0.35' AC  
0.65' CTB  
0.60' AB
  - Exist  
0.17' AC COLD MILL  
0.17' AP OVERLAY  
0.50' PCC
  - Exist  
X.XX' XXX  
X.XX' XXX  
X.XX' XXX

REVISOR: [ ] DATE: [ ]  
 CALCULATED/DESIGNED BY: [ ] CHECKED BY: [ ]  
 CONSULTANT SUPERVISOR: [ ]  
 DEPARTMENT OF TRANSPORTATION  
 STATE OF CALIFORNIA - Caltrans



**TYPICAL CROSS SECTIONS  
 FREEWAY TUNNEL ALTERNATIVE  
 SINGLE BORE OPTION**

ATTACHMENT J-2 SHEET 2 OF 79

NO SCALE

**X - 1**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

LAST REVISION: [ ] DATE PLOTTED => 21-MAR-2014  
 00-00-00 TIME PLOTTED => 13:04

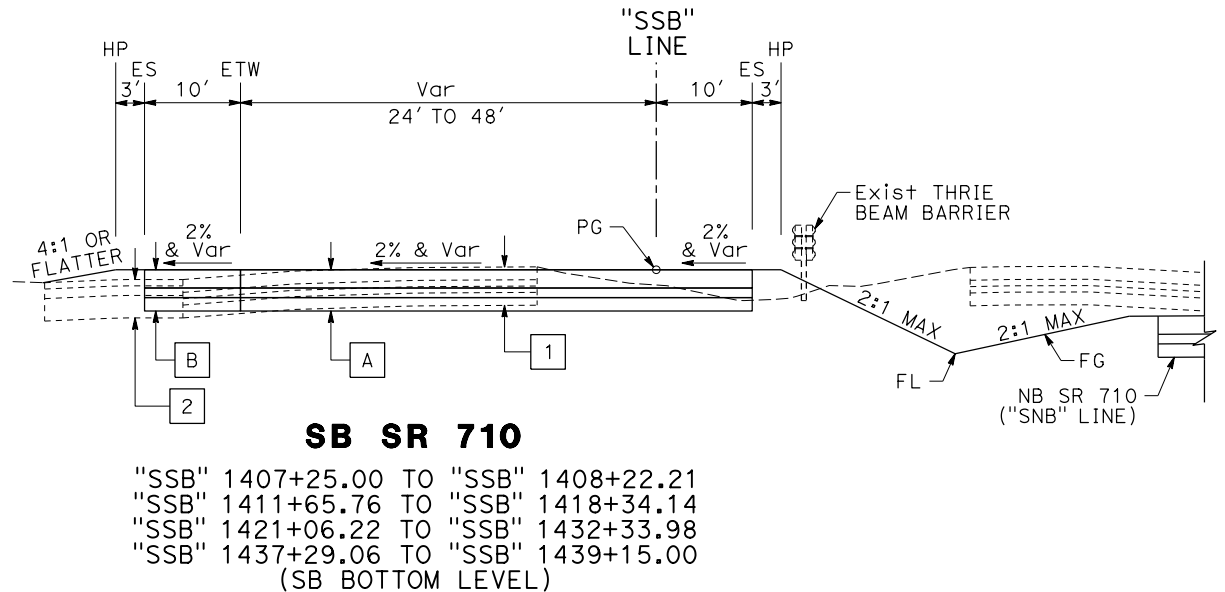
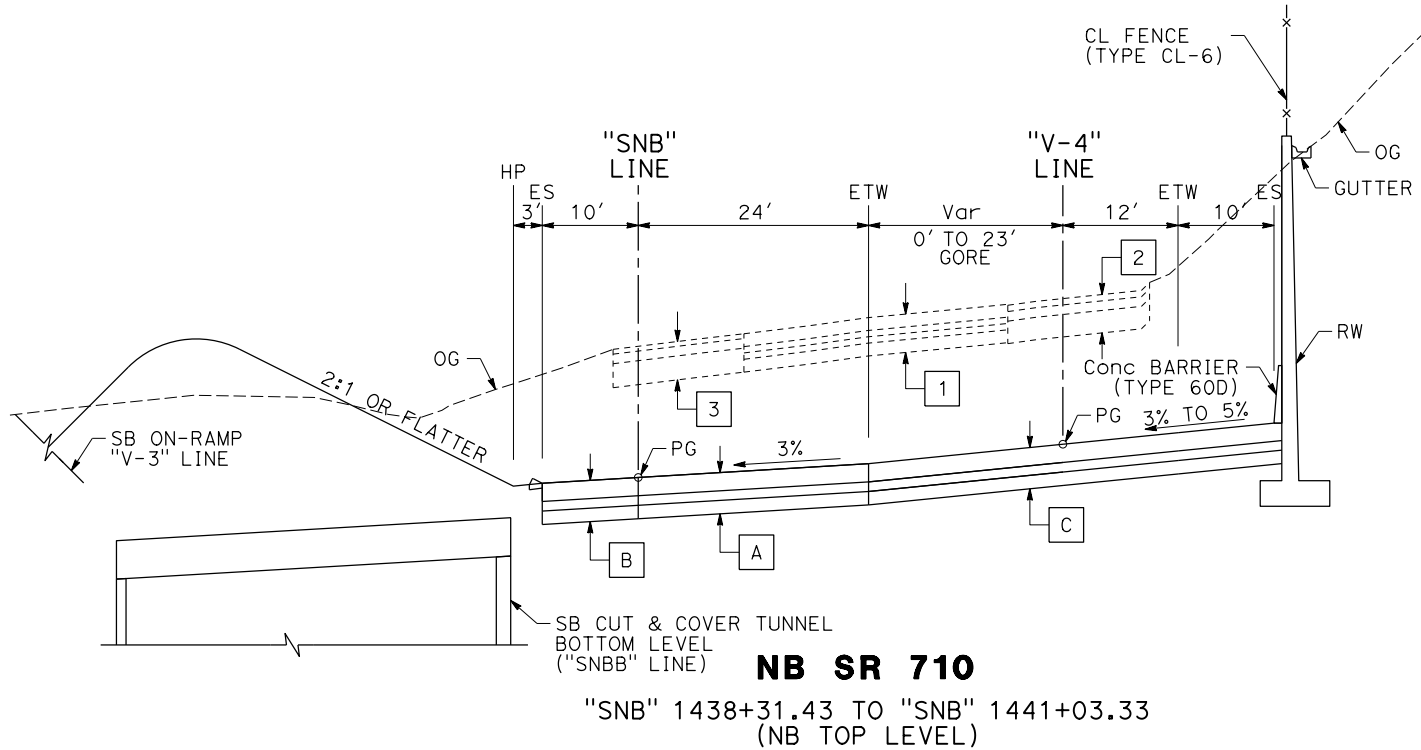
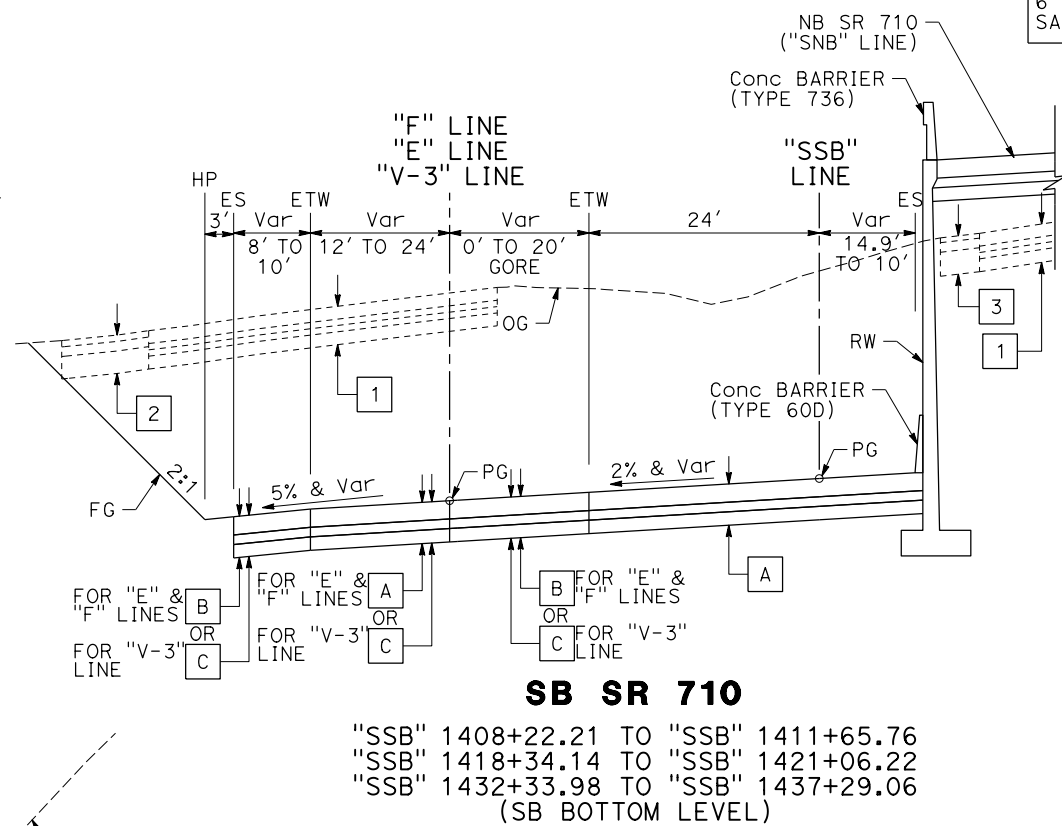
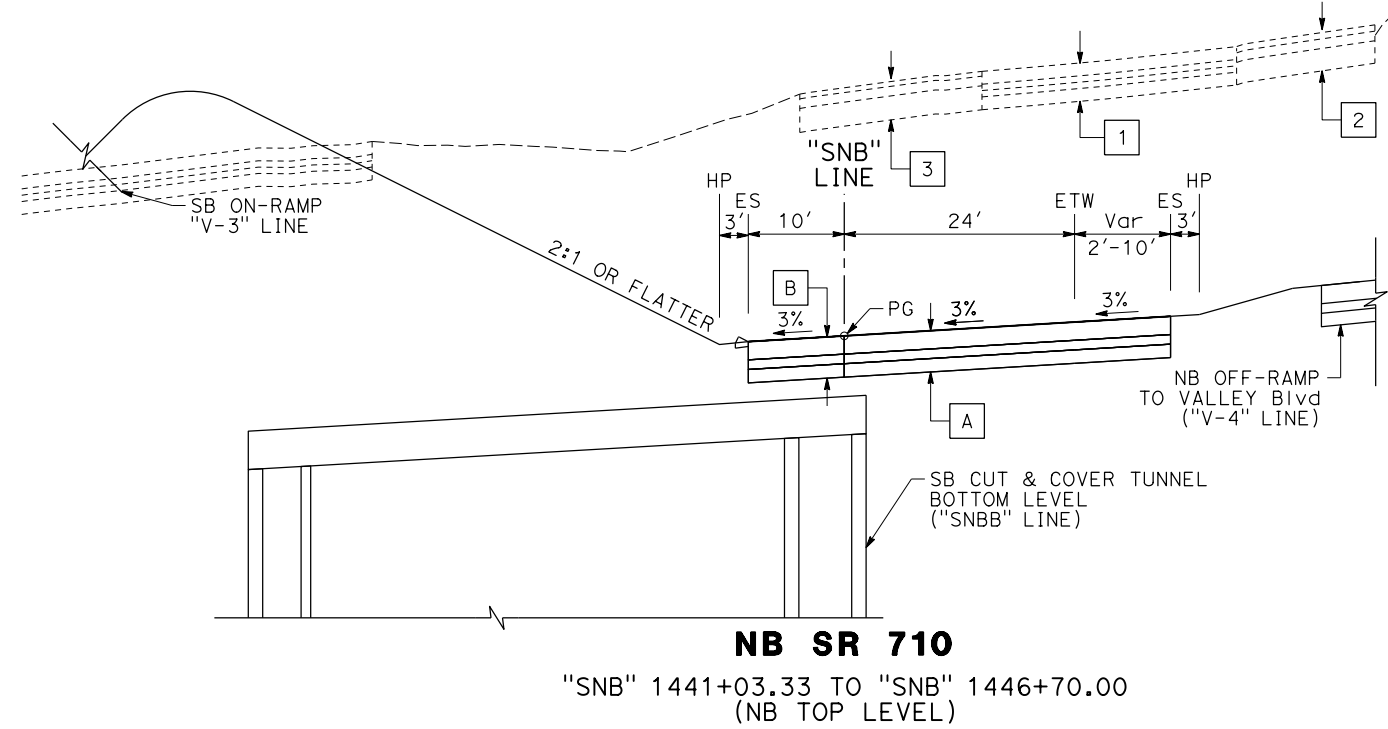
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T	XXX	

REGISTERED CIVIL ENGINEER	DATE
PLANS APPROVAL DATE	

CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707	METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012
--	--



**TYPICAL CROSS SECTIONS  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

ATTACHMNET J-2 SHEET 3 OF 79

NO SCALE

**X-2**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Caltrans

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DGN FILE => 0700000191ca002.dgn

RELATIVE BORDER SCALE IS IN INCHES

UNIT 0000

PROJECT NUMBER & PHASE

07000001911

LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 13:04

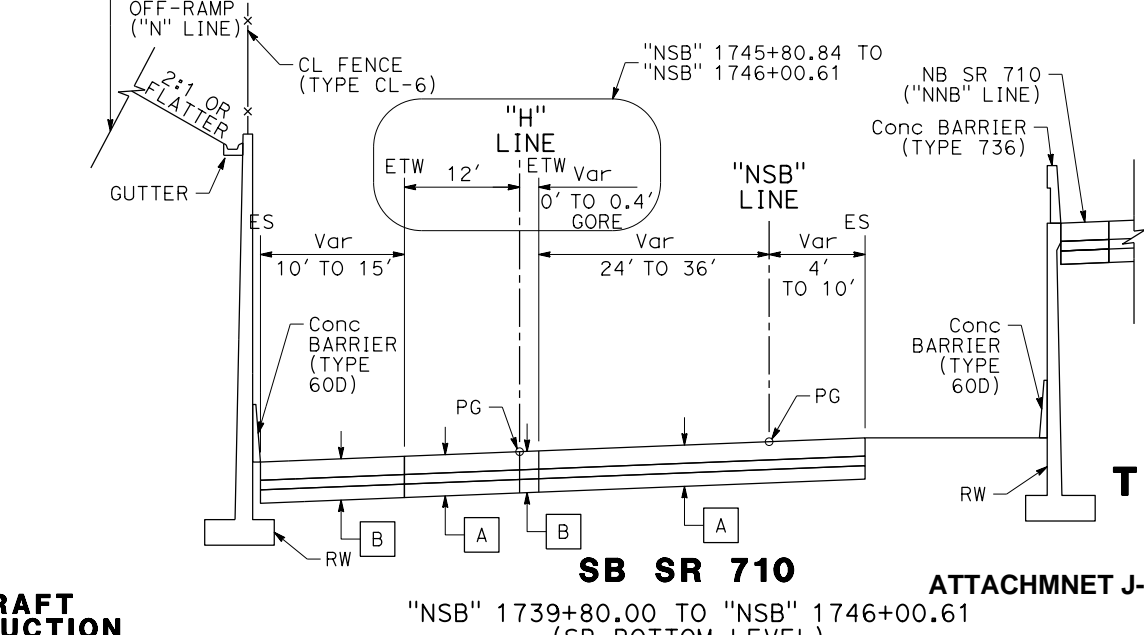
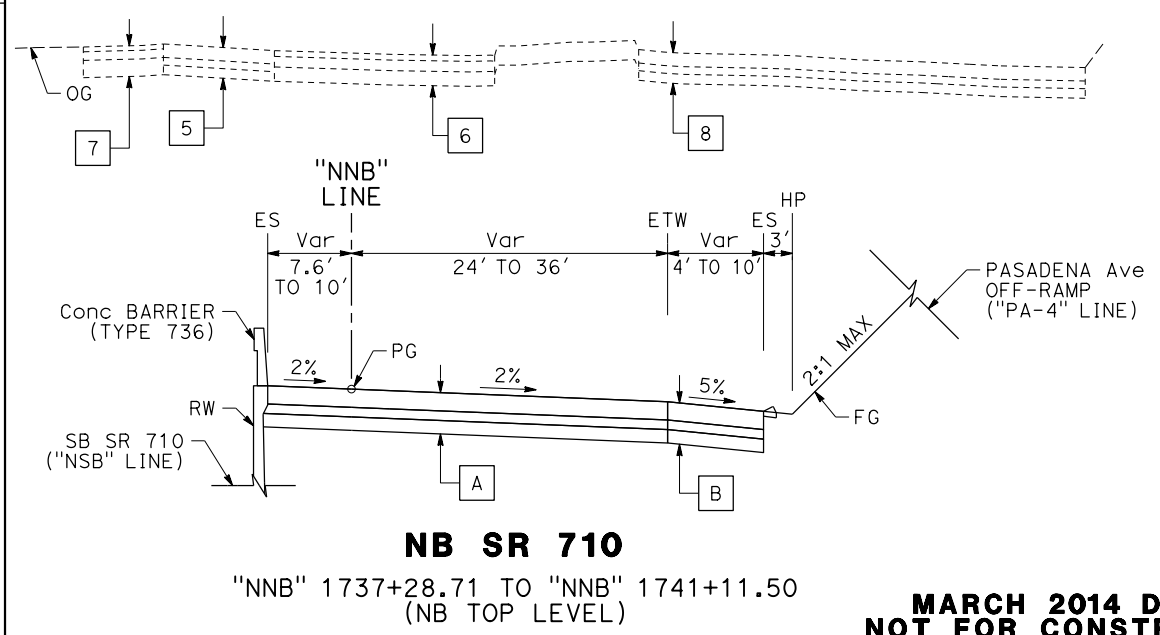
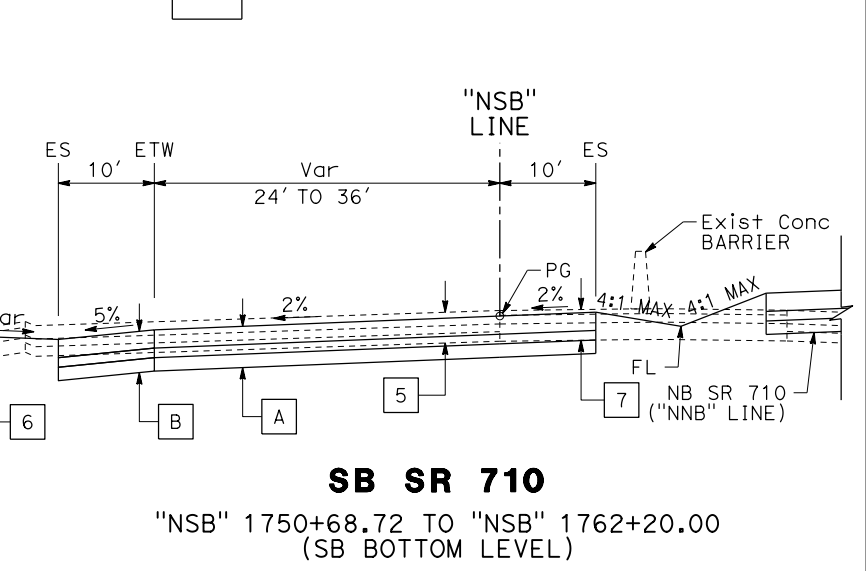
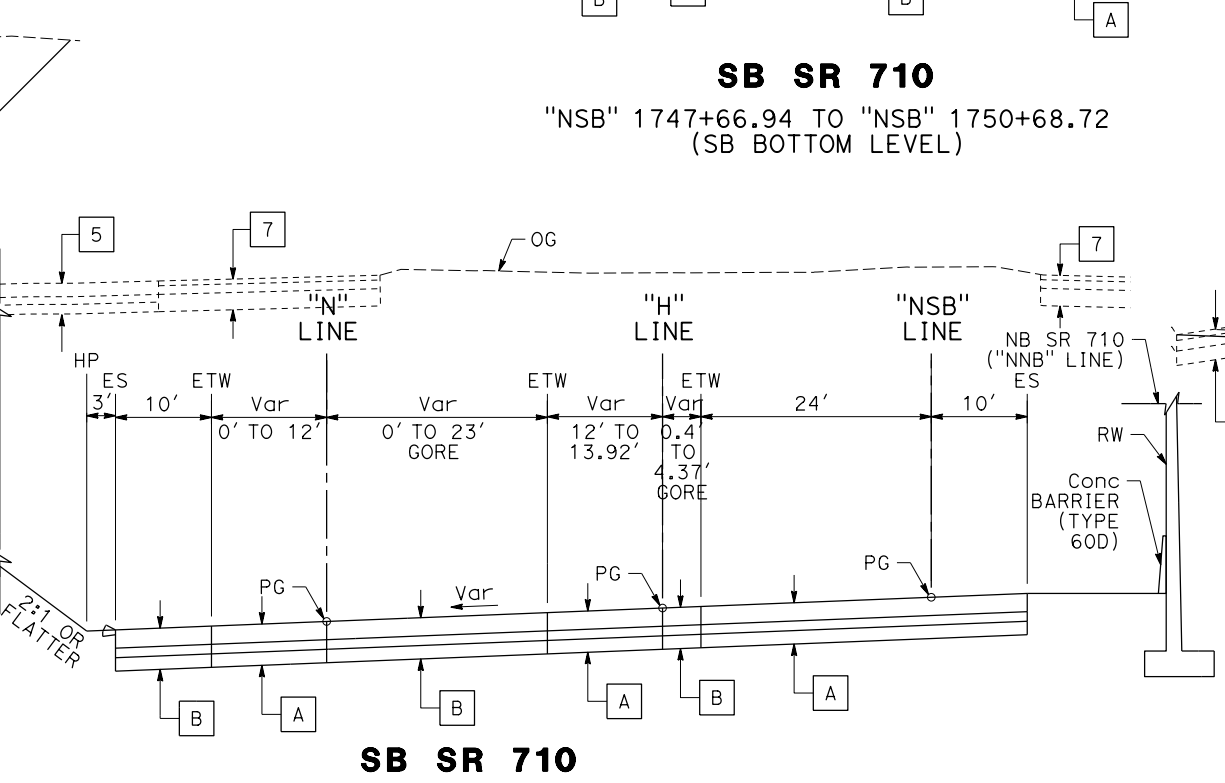
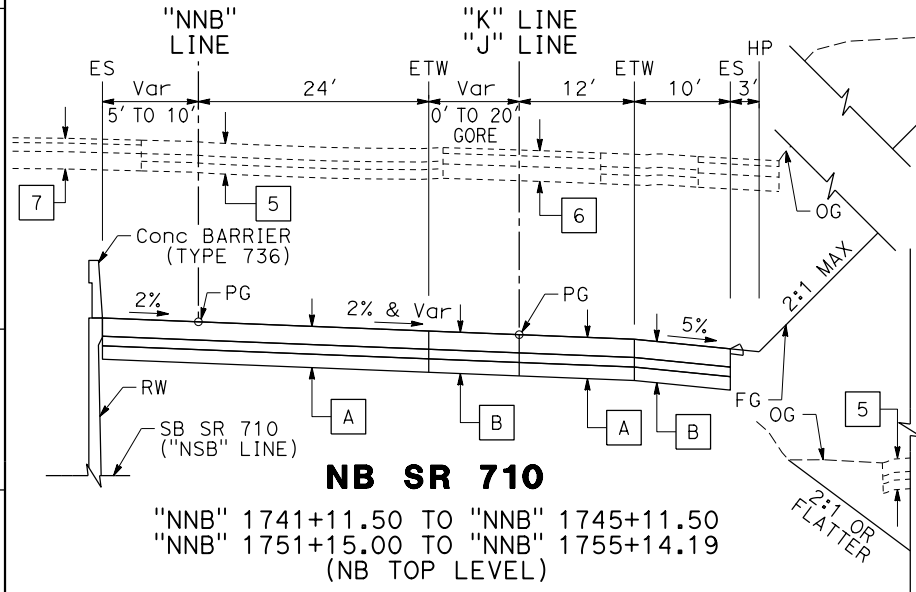
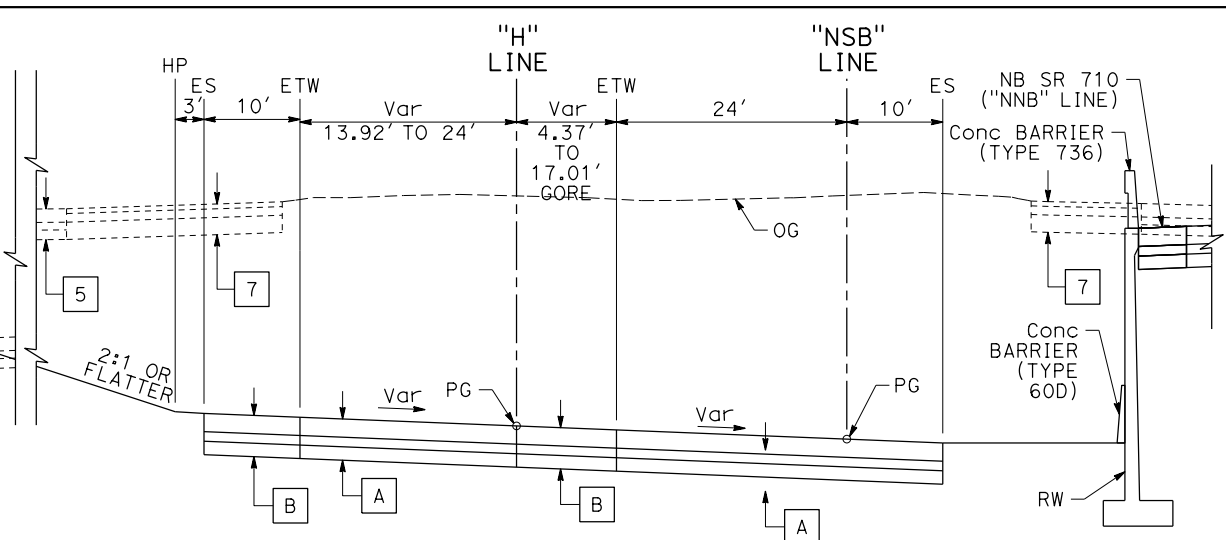
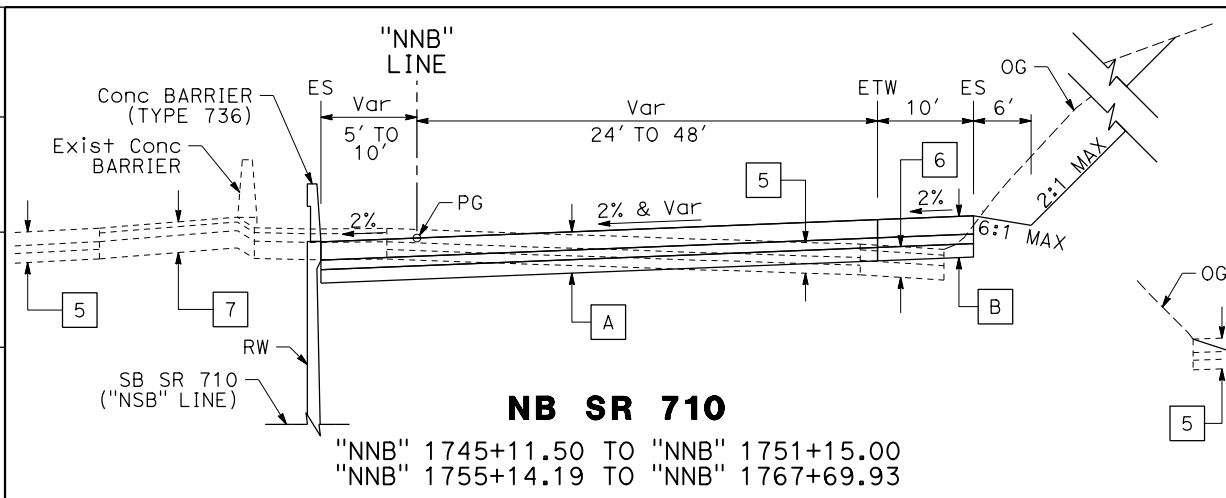
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07	LA	710	26.7/32.1T		XXX

REGISTERED CIVIL ENGINEER	DATE
PLANS APPROVAL DATE	

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CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707	METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012
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**TYPICAL CROSS SECTIONS  
FREWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

ATTACHMNET J-2 SHEET 4 OF 79

NO SCALE

**X-3**

**MARCH 2014 DRAFT  
NOT FOR CONSTRUCTION**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**

BORDER LAST REVISED 7/2/2010

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DGN FILE => 0700000191ca003.dgn

RELATIVE BORDER SCALE  
IS IN INCHES



UNIT 0000

PROJECT NUMBER & PHASE

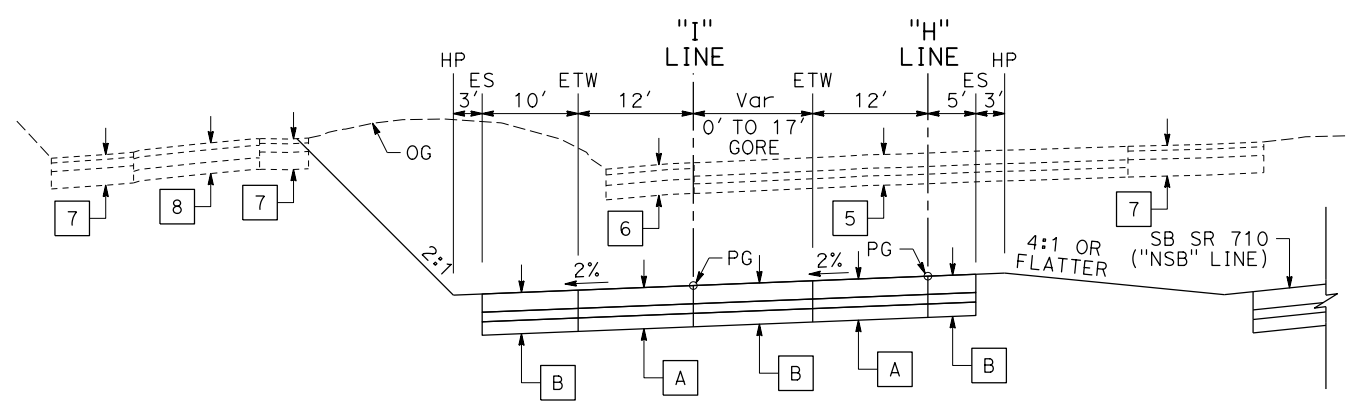
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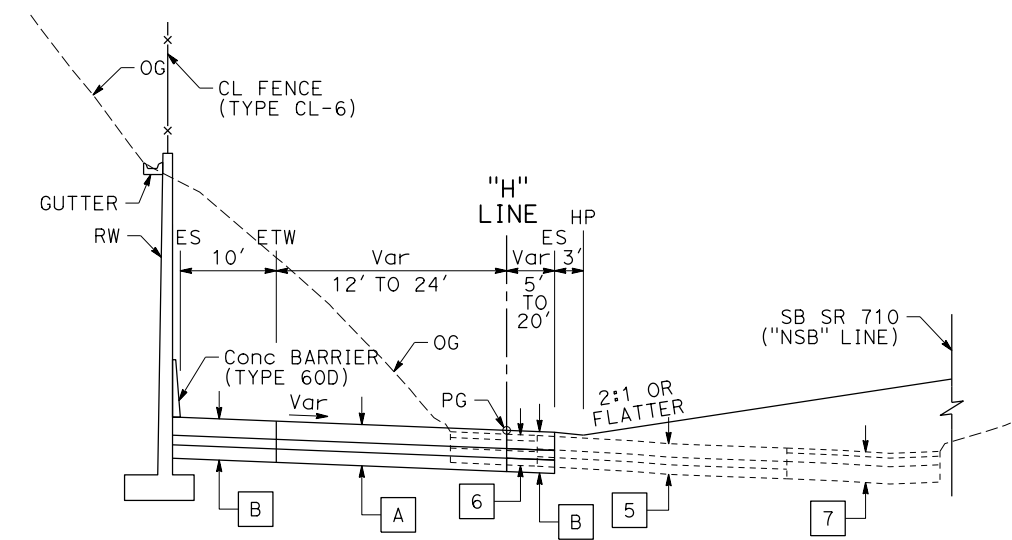
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX

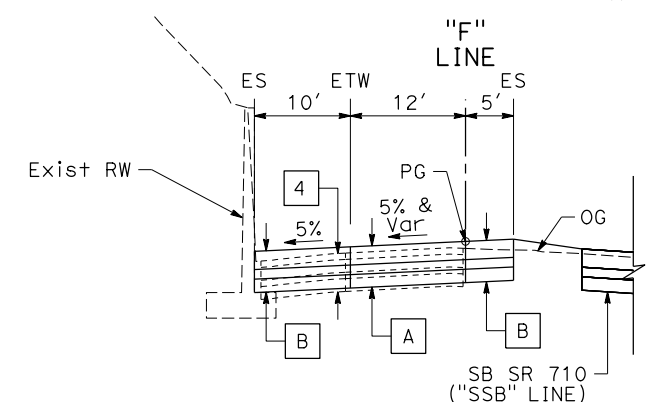
REGISTERED CIVIL ENGINEER	DATE
PLANS APPROVAL DATE	
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>	
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707	METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



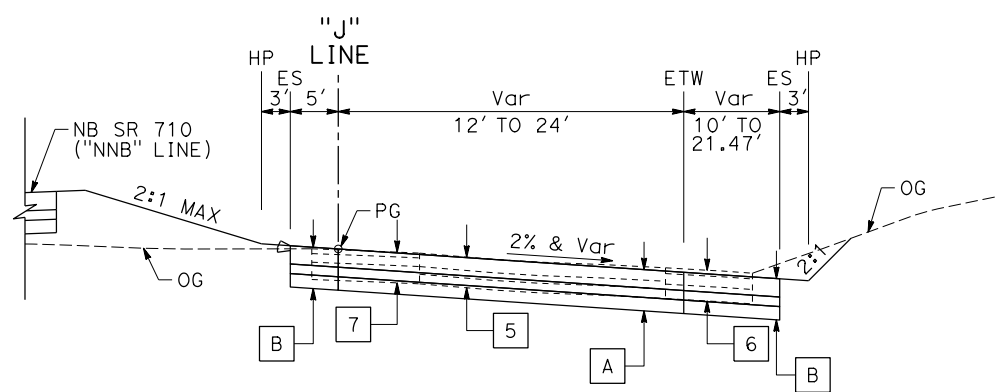
**CONNECTOR FROM WB SR-134 TO SB SR 710**  
 "H" 750+69.67 TO "H" 754+85.56



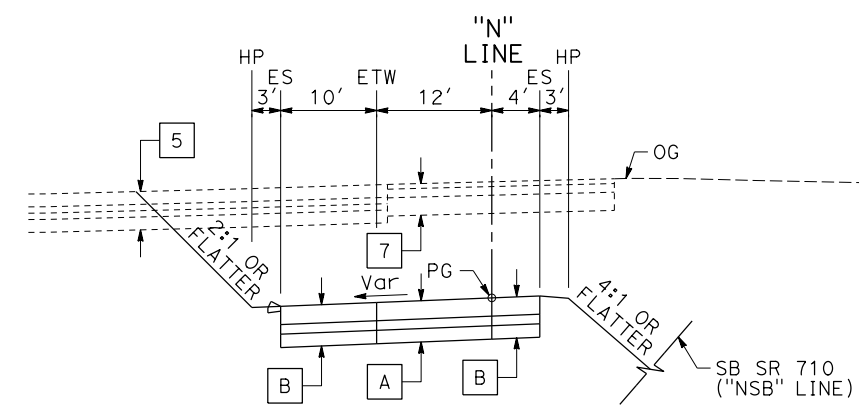
**CONNECTOR FROM WB SR-134 TO SB SR 710**  
 "H" 754+85.56 TO "H" 765+26.39



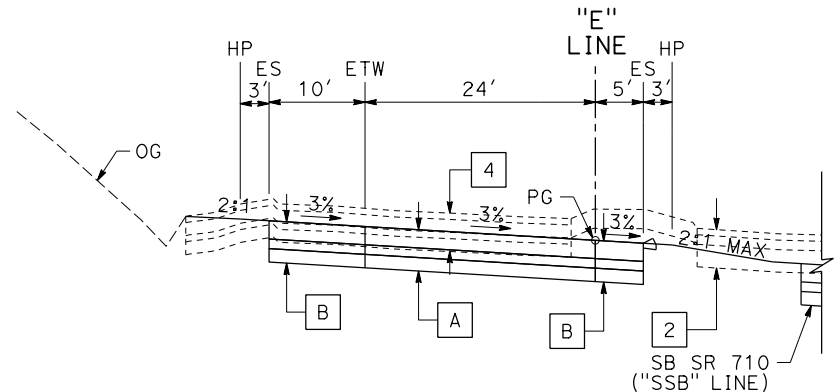
**SB SR 710 TO WB I-10 CONNECTOR RAMP**  
 "F" 407+45.30 TO "F" 408+20.00  
 (SB BOTTOM LEVEL)



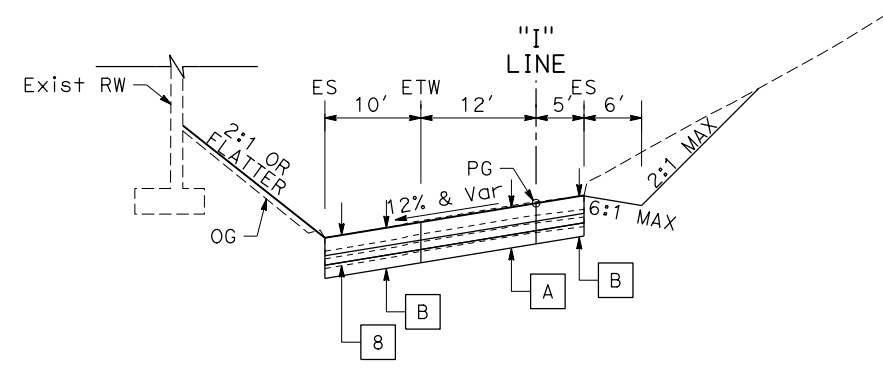
**CONNECTOR FROM NB SR 710 TO EB I-210**  
 "J" 755+15.00 TO "J" 759+50.00



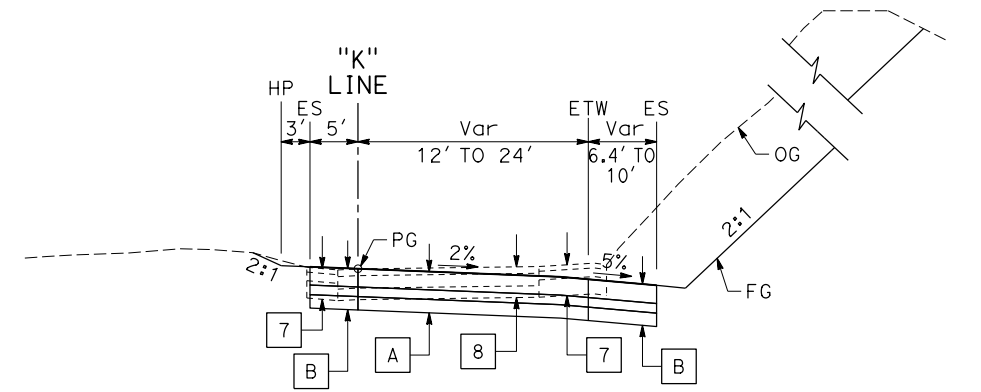
**SB EMERGENCY OFF-RAMP**  
 "N" 750+56.82 TO "N" 756+92.15



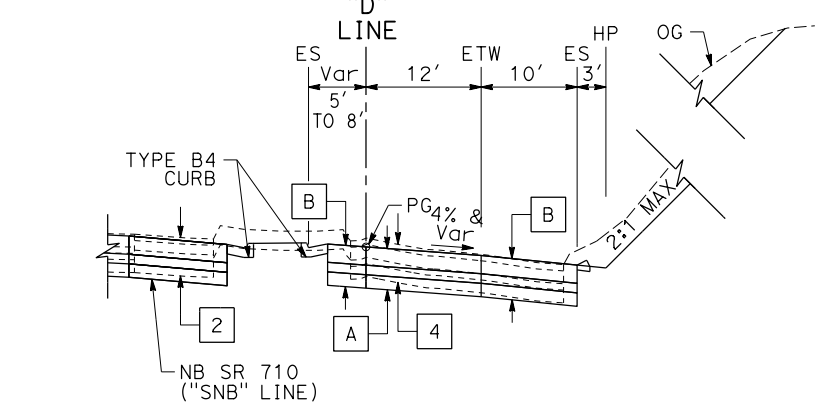
**CONNECTOR FROM SB SR 710 TO EB I-10**  
 "E" 414+35.00 TO "E" 418+35.00



**CONNECTOR FROM EB SR 134 TO SB SR 710**  
 "I" 754+85.24 TO "I" 759+92.14



**CONNECTOR FROM NB SR 710 TO WB SR-134**  
 "K" 745+15.00 TO "K" 753+95.00



**CONNECTOR FROM WB I-10 TO NB SR 710**  
 "D" 407+95.66 TO "D" 409+40.00

**TYPICAL CROSS SECTIONS**  
 FREEWAY TUNNEL ALTERNATIVE  
 SINGLE BORE OPTION

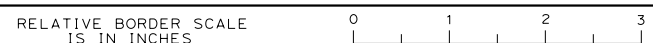
MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

ATTACHMNET J-2 SHEET 5 OF 79 NO SCALE

X-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
CONSULTANT FUNCTIONAL SUPERVISOR
CALCULATED/DESIGNED BY
CHECKED BY
REVISOR
DATE
REVISION

USERNAME => pwsvc  
 DGN FILE => 0700000191ca004.dgn



UNIT 0000 PROJECT NUMBER & PHASE 07000001911

BORDER LAST REVISED 7/2/2010

LAST REVISION DATE PLOTTED => 21-MAR-2014 00:00:00 TIME PLOTTED => 13:04



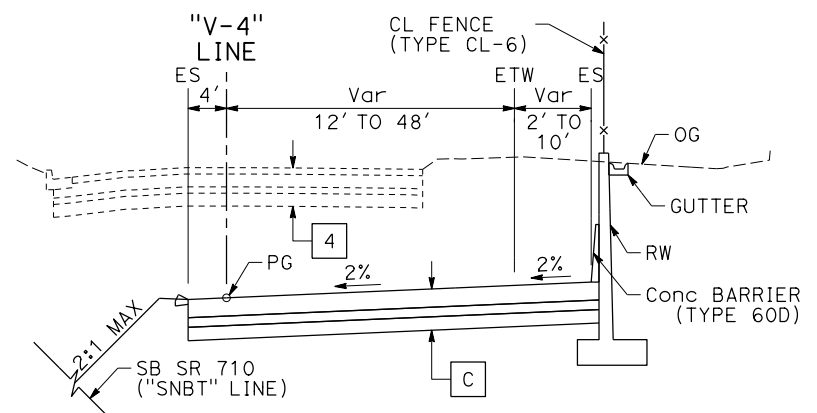
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07	LA	710	26.7/32.1T		XXX

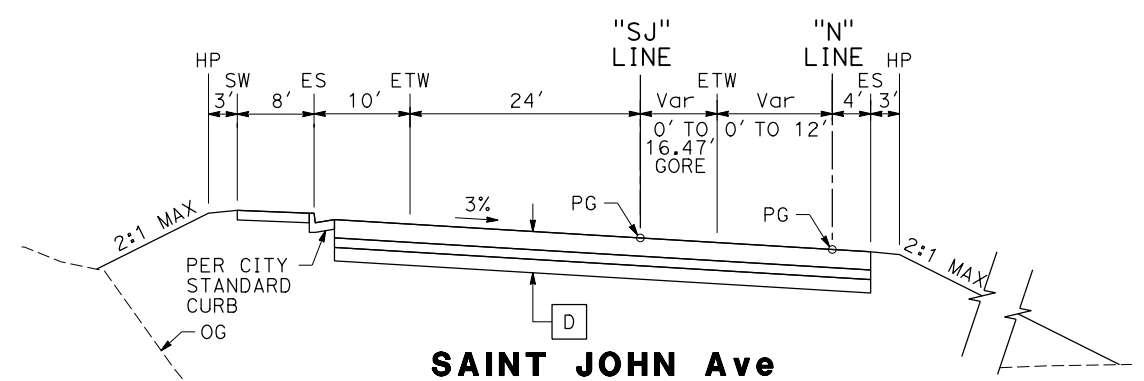
REGISTERED CIVIL ENGINEER	DATE
PLANS APPROVAL DATE	

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

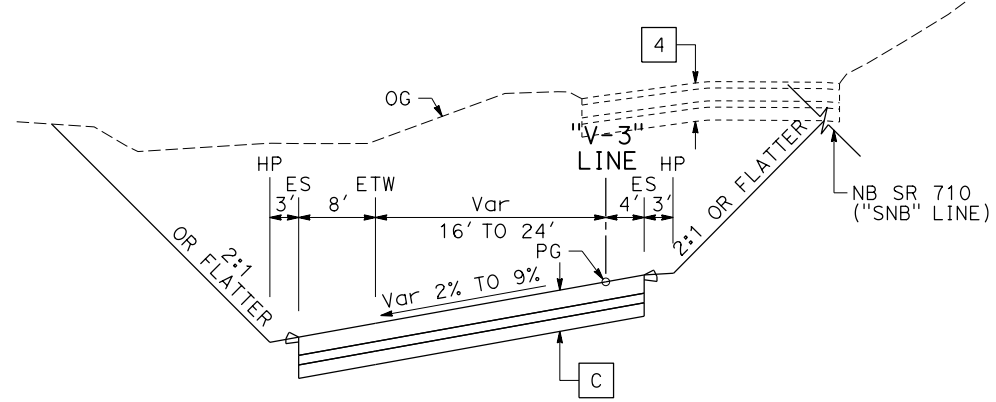
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707	METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012
--	--



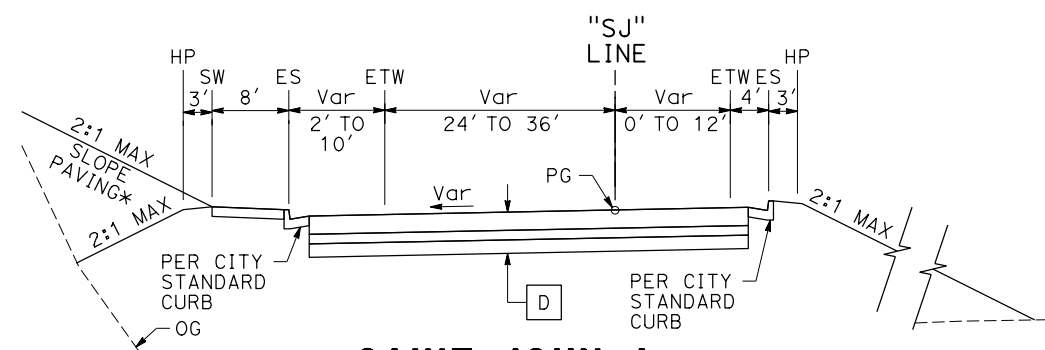
**NB OFF-RAMP TO VALLEY Blvd**  
"V-4" 441+05.00 TO "V-4" 451+70.00



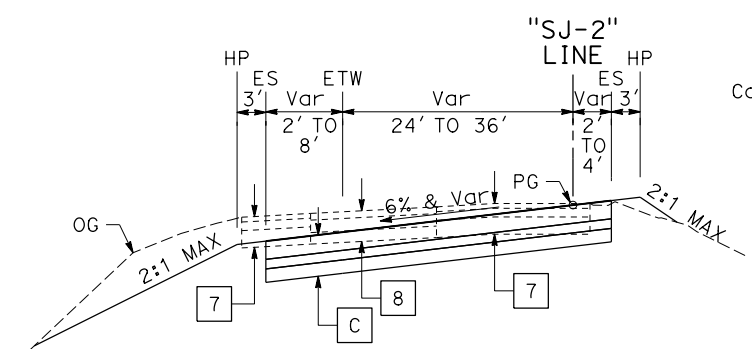
**SAINT JOHN Ave**  
"SJ" 31+79.80 TO "SJ" 33+75.07



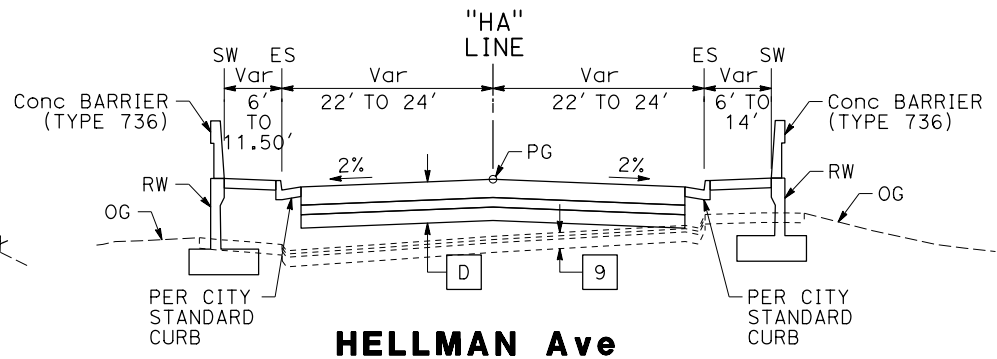
**SB ON-RAMP FROM VALLEY Blvd**  
"V-3" 437+30.00 TO "V-3" 450+19.88



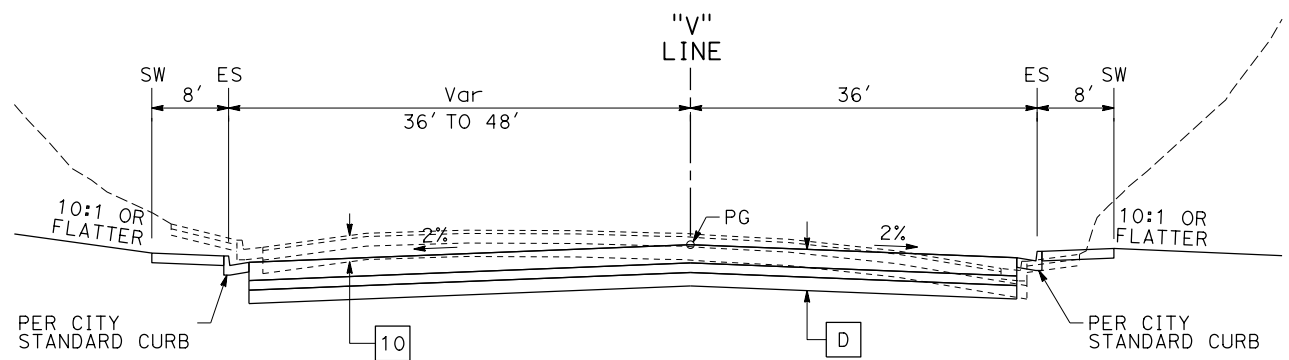
**SAINT JOHN Ave**  
\* "SJ" 10+00.00 TO "SJ" 13+50.00  
"SJ" 10+45.00 TO "SJ" 31+79.80  
"SJ" 33+75.07 TO "SJ" 42+24.29



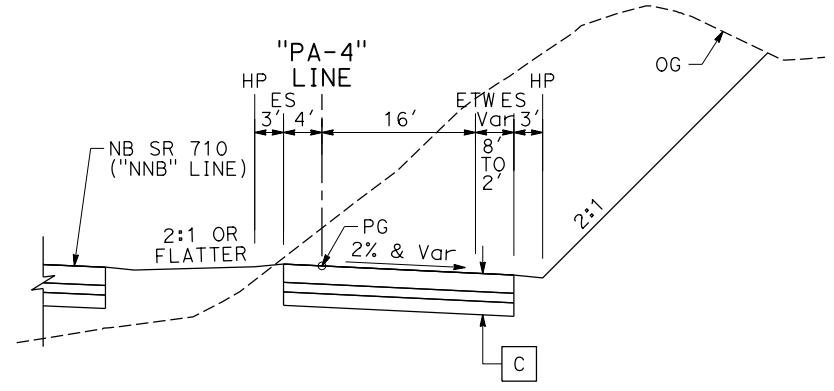
**SB OFF-RAMP TO SAINT JOHN Ave**  
"SJ-2" 767+99.30 TO "SJ-2" 776+90.00



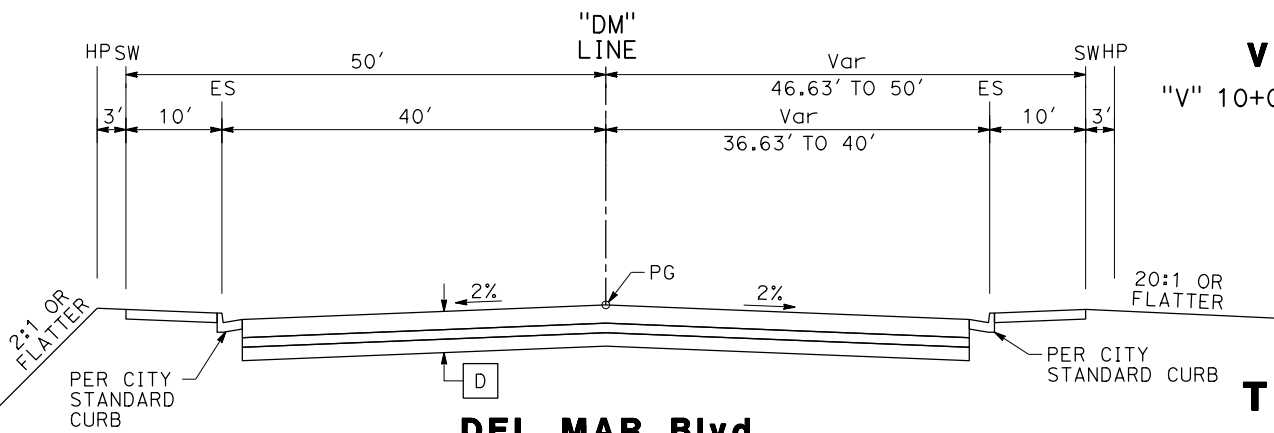
**HELLMAN Ave**  
"HA" 05+50.00 TO "HA" 14+50.00



**VALLEY Blvd**  
"V" 10+00.00 TO "V" 19+20.70



**NB OFF-RAMP TO PASADENA Ave**  
"PA-4" 737+30.00 TO "PA-4" 743+38.35



**DEL MAR Blvd**  
"DM" 06+25.00 TO "DM" 11+62.00

**TYPICAL CROSS SECTIONS**  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

ATTACHMNET J-2 SHEET 6 OF 79

NO SCALE

X-5

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 CONSULTANT SUPERVISOR  
 CALCULATED/DESIGNED BY  
 CHECKED BY  
 REVISOR BY  
 DATE REVISOR

USERNAME => pwsvc  
 DGN FILE => 0700000191ca005.dgn

RELATIVE BORDER SCALE  
 1 IS IN INCHES

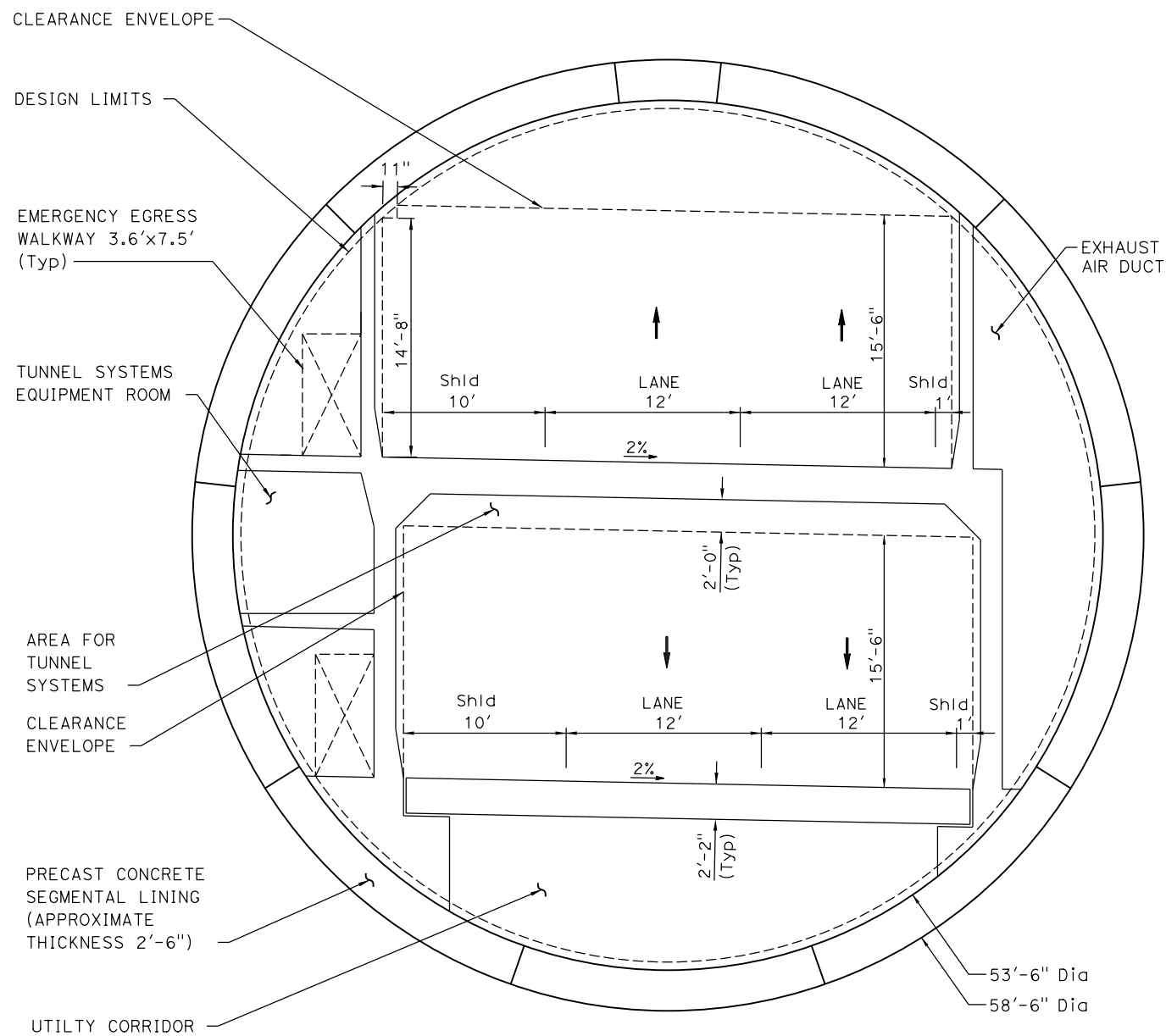
UNIT 0000

PROJECT NUMBER & PHASE

07000001911

DATE PLOTTED => 06-OCT-2014  
 TIME PLOTTED => 17:53

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
JACOBS ASSOCIATES 234 E COLORADO BLVD, SUITE 400 PASADENA, CA 91101			



**TYPICAL SECTION**

ATTACHMNET J-2 SHEET 7 OF 79

**S2.01**

DESIGN OVERSIGHT
SIGN OFF DATE

DESIGNED BY	M. TORSIELLO	DATE	12-19-2013
DRAWN BY	J. TOLES	DATE	12-19-2013
CHECKED BY	S. KLEIN	DATE	2-7-2014
APPROVED	S. DUBNEWYCH	DATE	2-7-2014

X
PROJECT ENGINEER

<b>SR 710 NORTH STUDY</b>	
<b>TUNNEL-TYPICAL SECTION</b>	
BRIDGE NO. TBD	UNIT:
SCALE: 1"=10'	PROJECT NUMBER & PHASE:

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**LEGEND:**

- Exist RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- - - - - TEMPORARY CONSTRUCTION EASEMENT
- - - - - PERMANENT FOOTING EASEMENT
- - - - - UNDERGROUND TUNNEL EASEMENT / UNDERGROUND EASEMENT
- CITY BOUNDARY
- - - - - FAULT ZONE BOUNDARY

**ABBREVIATIONS:**

- TCE TEMPORARY CONSTRUCTION EASEMENT
- PFE PERMANENT FOOTING EASEMENT
- UTE UNDERGROUND TUNNEL EASEMENT
- UE UNDERGROUND EASEMENT

**CURVE DATA**

No. @	R	Δ	T	L
6	425.00'	32°44'44"	124.86'	242.89'
51	3100.00'	19°07'12"	522.10'	1034.50'
59	4023.00'	19°08'16"	678.19'	1343.74'



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

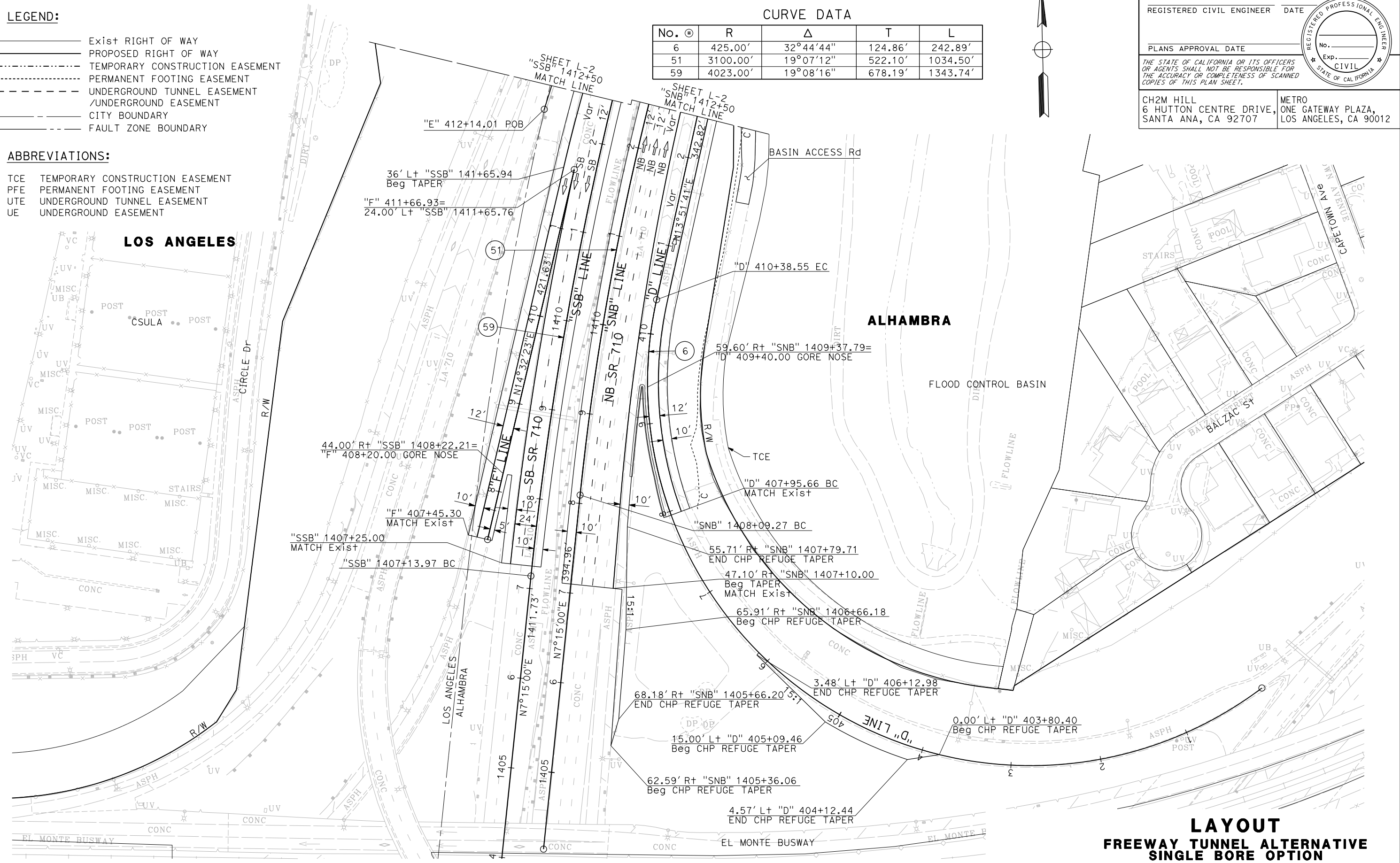
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

ATTACHMNET J-2 SHEET 8 OF 79 SCALE 1"=100'

L - 1

LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 14:49

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. ③	R	Δ	T	L
7	1510.00'	5°45'17"	75.90'	151.67'
8	3064.00'	5°36'20"	150.00'	299.77'
11	1600.00'	10°29'36"	146.93'	293.03'
51	3100.00'	19°07'12"	522.10'	1034.50'
52	4500.00'	2°51'45"	112.43'	224.81'
59	4023.00'	19°08'16"	678.19'	1343.74'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

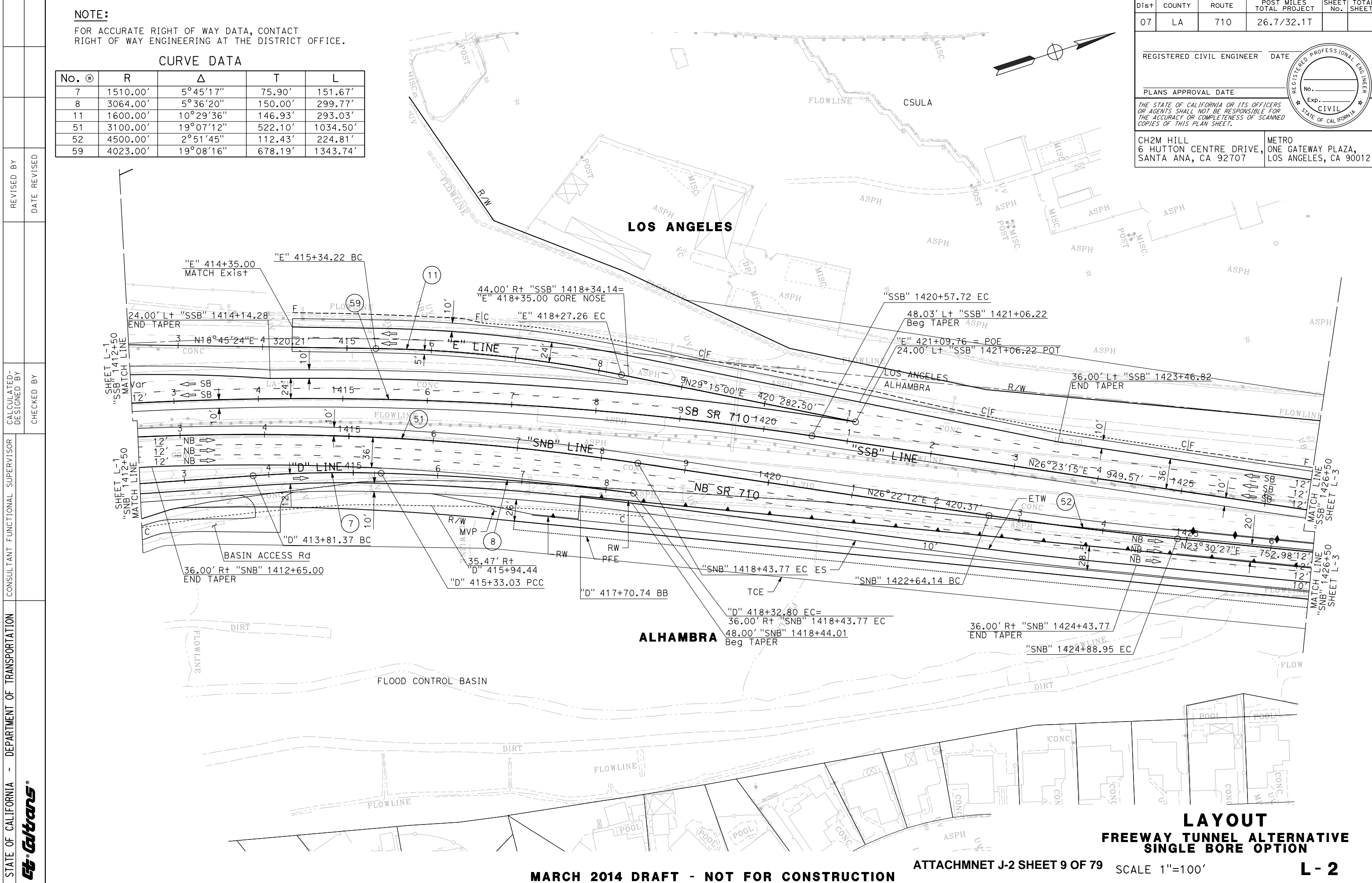
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



**LAYOUT  
FREWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 9 OF 79 SCALE 1"=100'

**L - 2**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**

REVISOR BY DATE

CALCULATED-DESIGNED BY CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR

LAST REVISION DATE PLOTTED => 27-MAR-2014 00-00-00 TIME PLOTTED => 18:43

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. @	R	Δ	T	L
19	375.00'	42°39'36"	146.43'	279.21'
53	3500.00'	26°24'00"	820.92'	1612.69'
56	4100.00'	16°40'08"	600.65'	1192.81'
60	4124.00'	12°36'40"	455.70'	907.71'
63	4100.00'	4°11'25"	149.99'	299.84'
64	1725.00'	20°56'46"	318.87'	630.62'
68	3524.00'	3°21'17"	103.20'	206.34'
69	2400.00'	21°37'01"	458.19'	905.49'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE

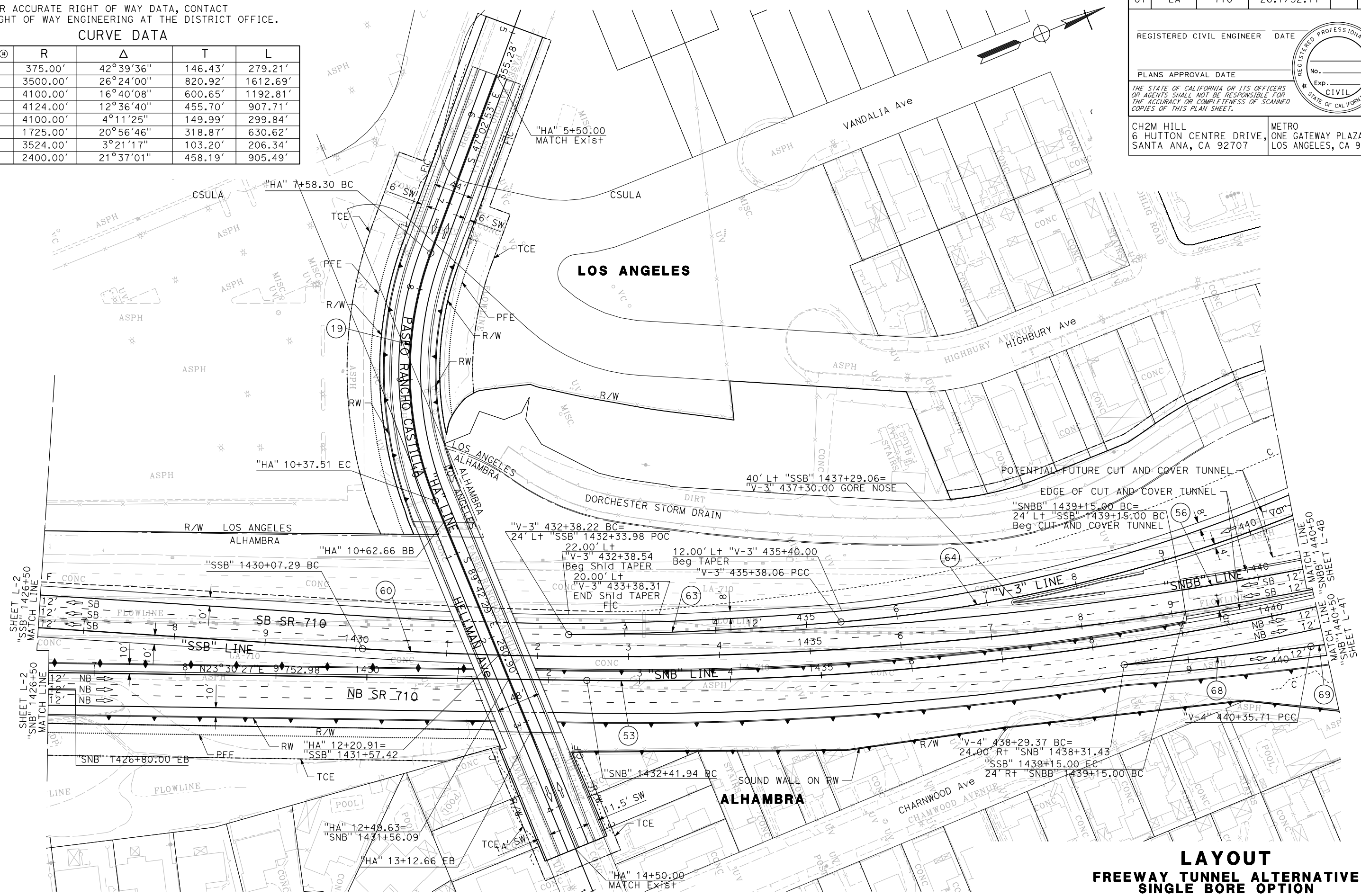
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012

REVISOR: [ ] DATE: [ ]  
DESIGNER: [ ] CHECKED BY: [ ]  
SUPERVISOR: [ ]  
TRANSPORTATION: [ ]  
CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Caltrans



**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT J-2 SHEET 10 OF 79 SCALE 1"=100'

**LAYOUT  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**L-3**

**NOTE:**

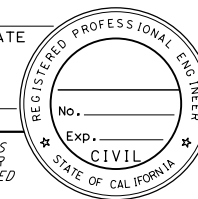
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

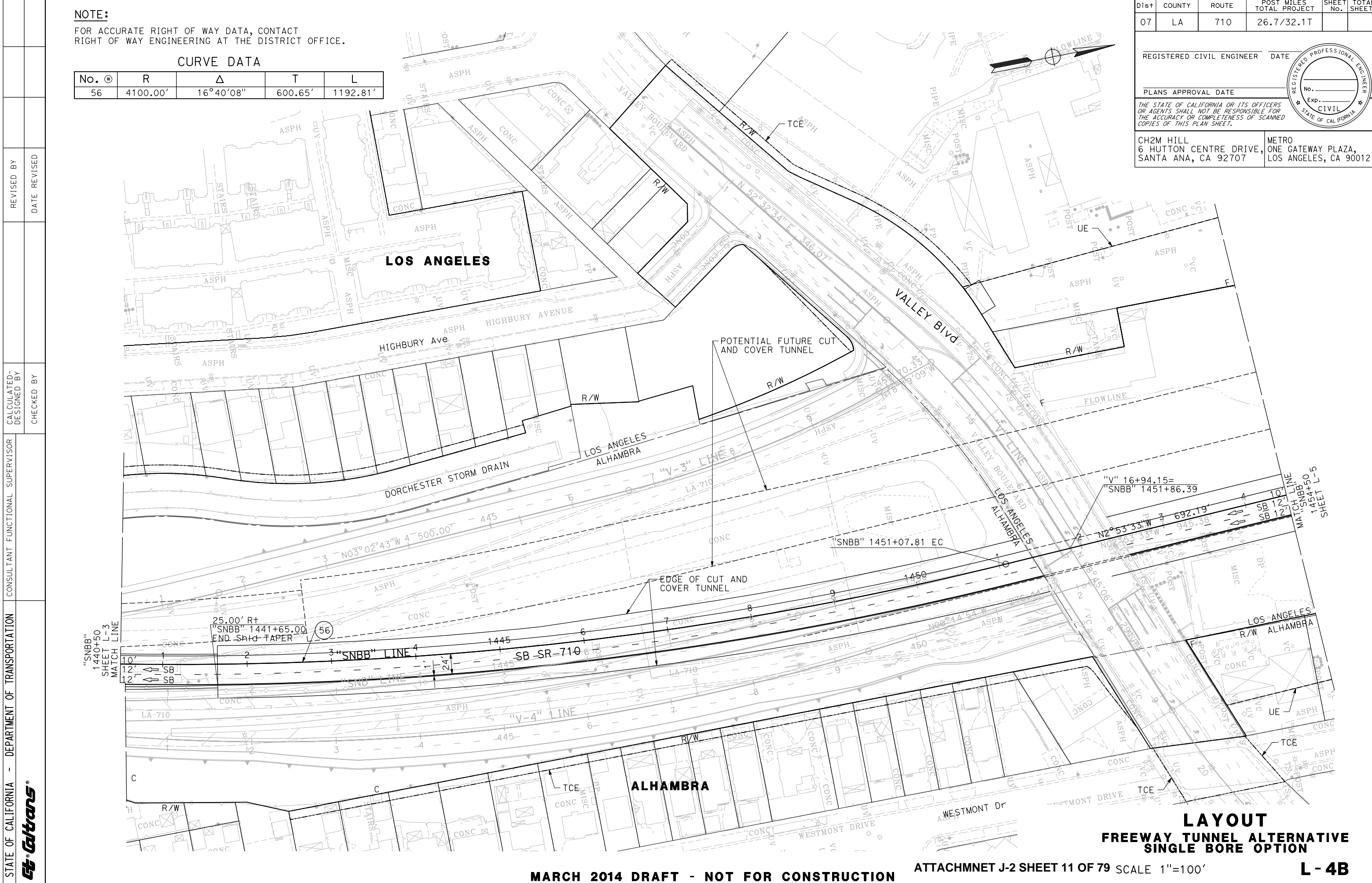
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56	4100.00'	16°40'08"	600.65'	1192.81'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE  
 PLANS APPROVAL DATE  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
 METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED



**LAYOUT  
 FREEWAY TUNNEL ALTERNATIVE  
 SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 11 OF 79 SCALE 1"=100'

**L-4B**

**NOTE:**

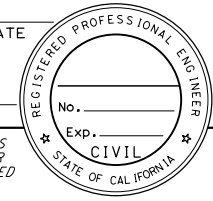
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

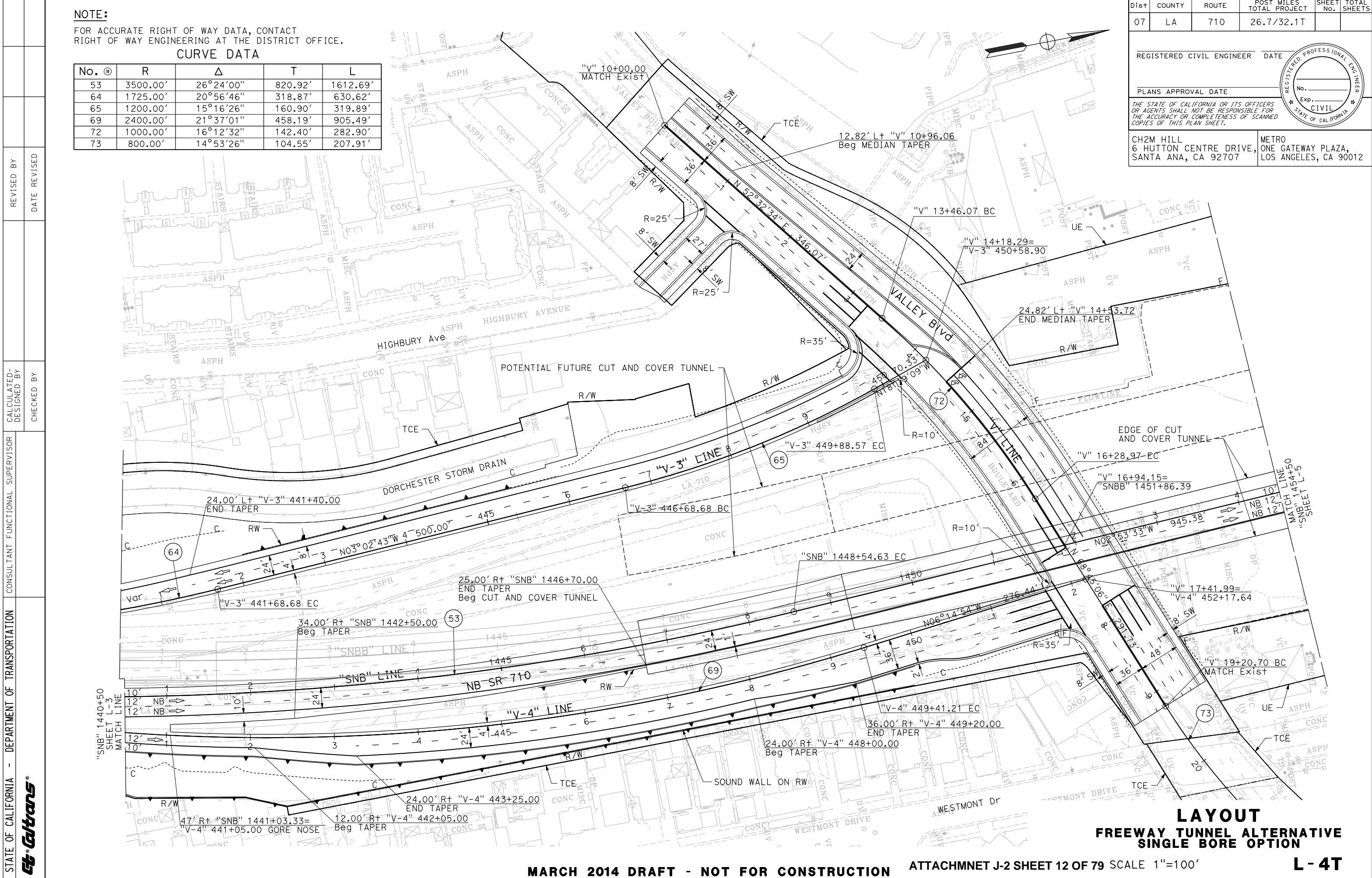
No. Ⓢ	R	Δ	T	L
53	3500.00'	26°24'00"	820.92'	1612.69'
64	1725.00'	20°56'46"	318.87'	630.62'
65	1200.00'	15°16'26"	160.90'	319.89'
69	2400.00'	21°37'01"	458.19'	905.49'
72	1000.00'	16°12'32"	142.40'	282.90'
73	800.00'	14°53'26"	104.55'	207.91'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Caltrans

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 12 OF 79 SCALE 1"=100'

**LAYOUT  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**L-4T**

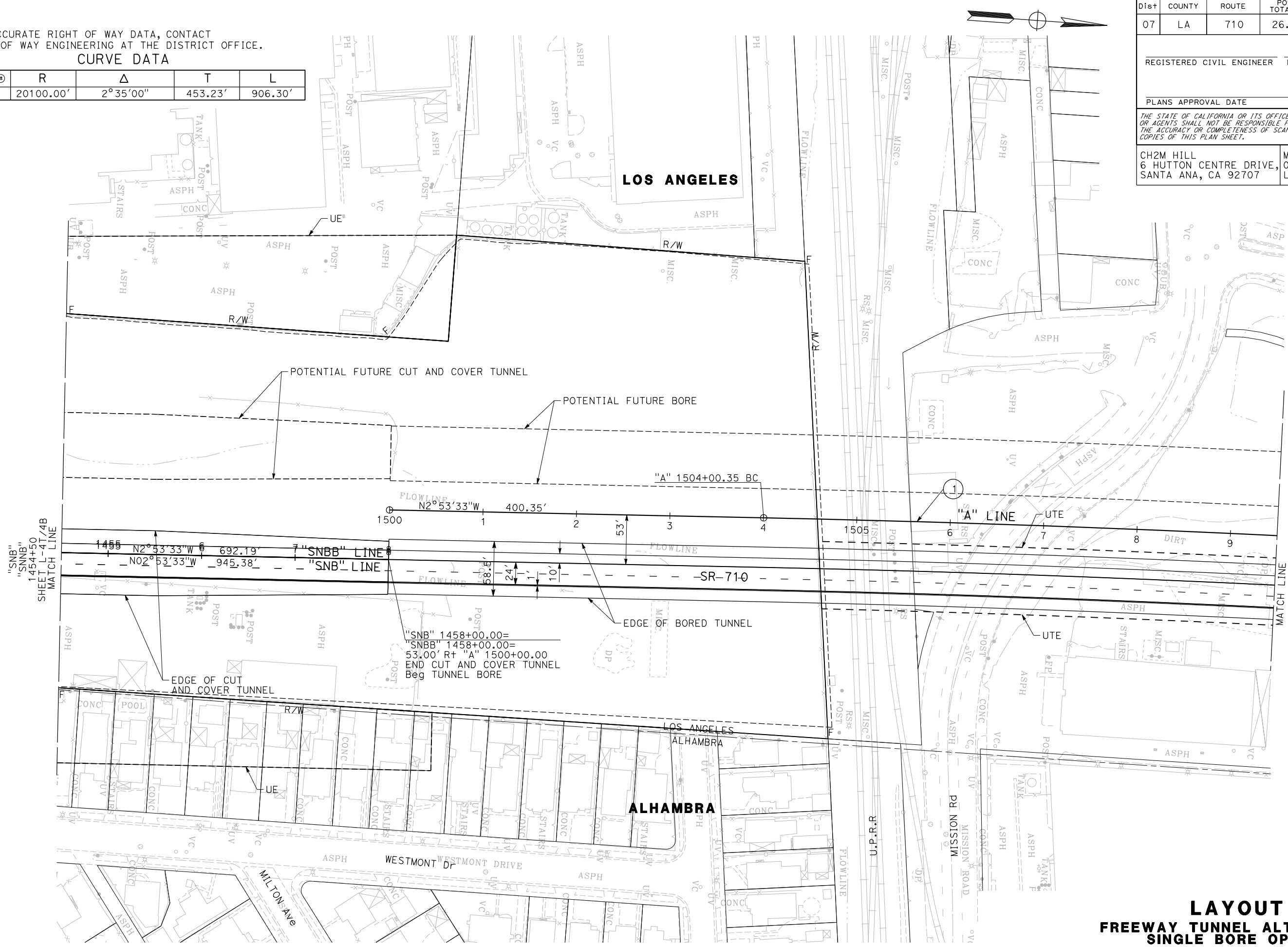
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
 RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. Ⓢ	R	Δ	T	L
1	20100.00'	2°35'00"	453.23'	906.30'



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
 ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



**LAYOUT  
 FREEWAY TUNNEL ALTERNATIVE  
 SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION ATTACHMNET J-2 SHEET 13 OF 79 SCALE 1"=100' L - 5**



**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. $\oplus$	R	$\Delta$	T	L
1	20100.00'	2°35'00"	453.23'	906.30'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

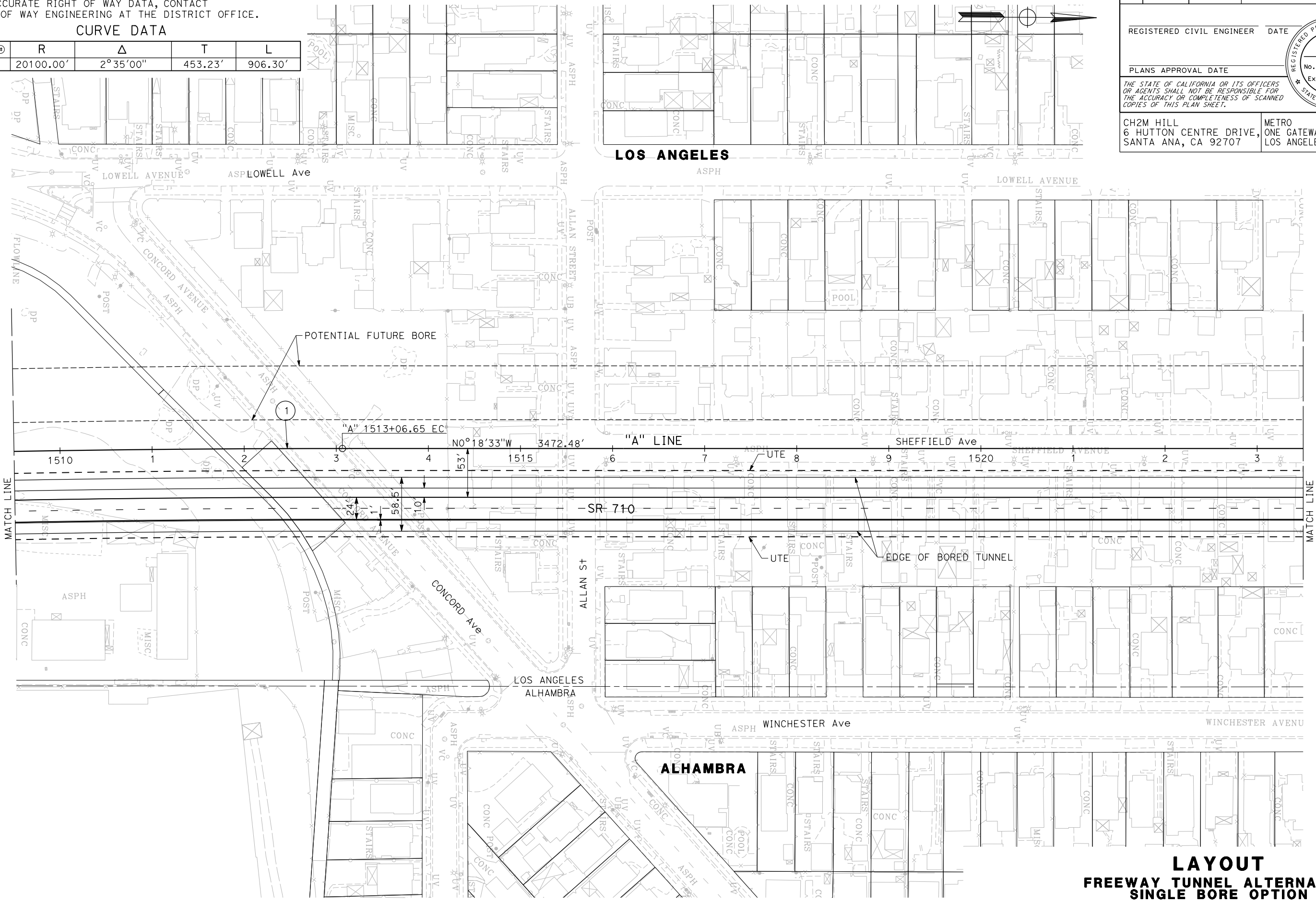
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

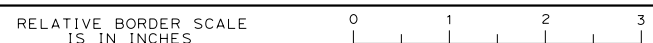
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 14 OF 79 SCALE 1"=100'

**L - 6**

BORDER LAST REVISED 7/2/2010

USERNAME => pwsvc  
DGN FILE => 0700000191ea006.dgn



UNIT 0000

PROJECT NUMBER & PHASE

07000001911

LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 14:50

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

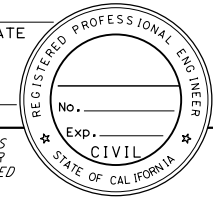
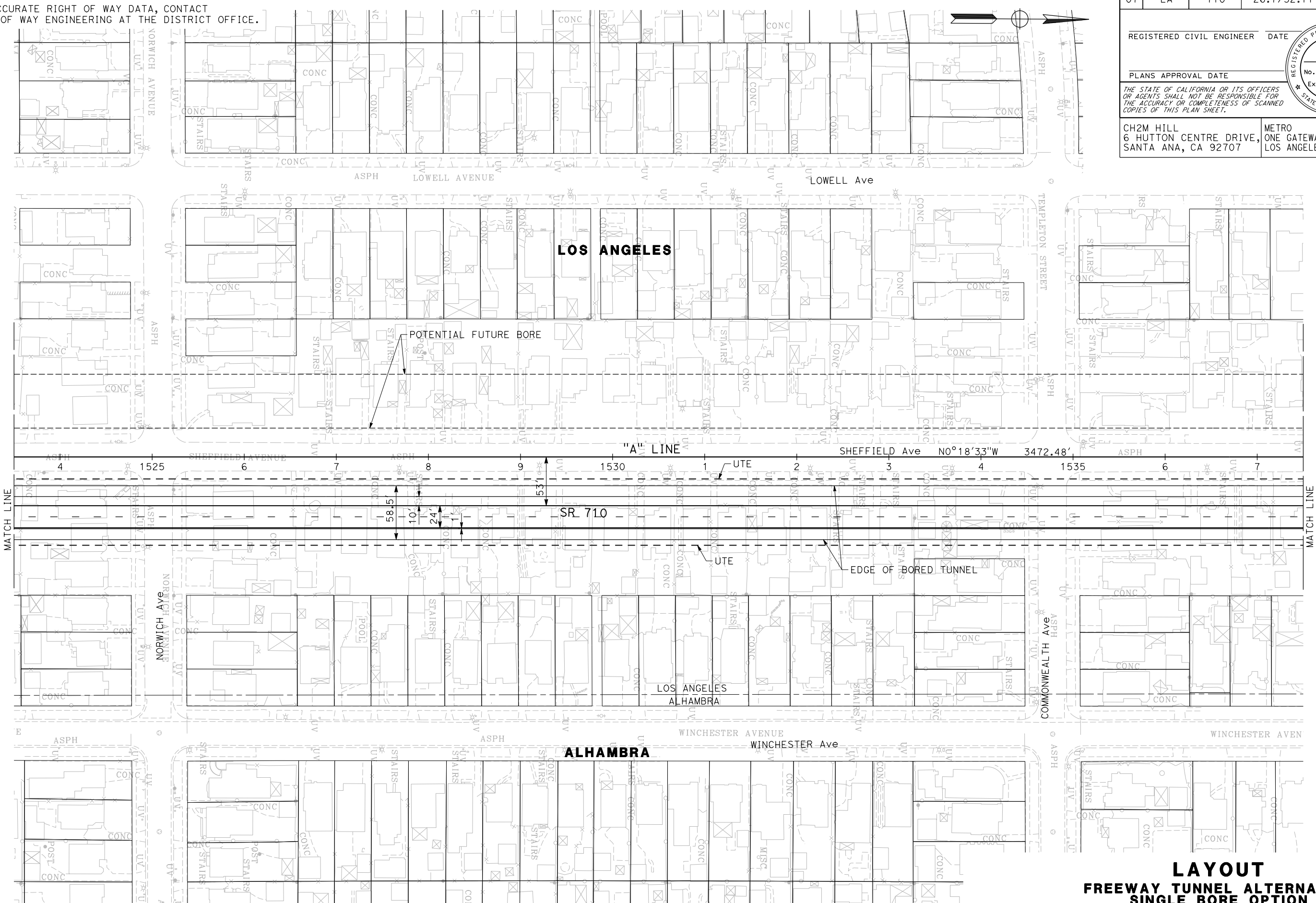
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED

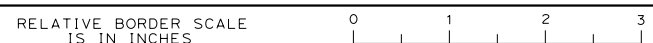
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 15 OF 79 SCALE 1"=100'

**L - 7**

BORDER LAST REVISED 7/2/2010

USERNAME => pwsvc  
DGN FILE => 0700000191ea007.dgn



UNIT 0000

PROJECT NUMBER & PHASE

07000001911

LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 14:49

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

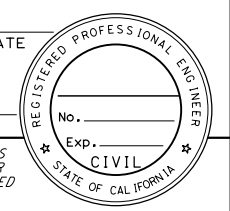
No. $\oplus$	R	$\Delta$	T	L
2	20100.00'	12°03'45"	2123.70'	4231.70'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

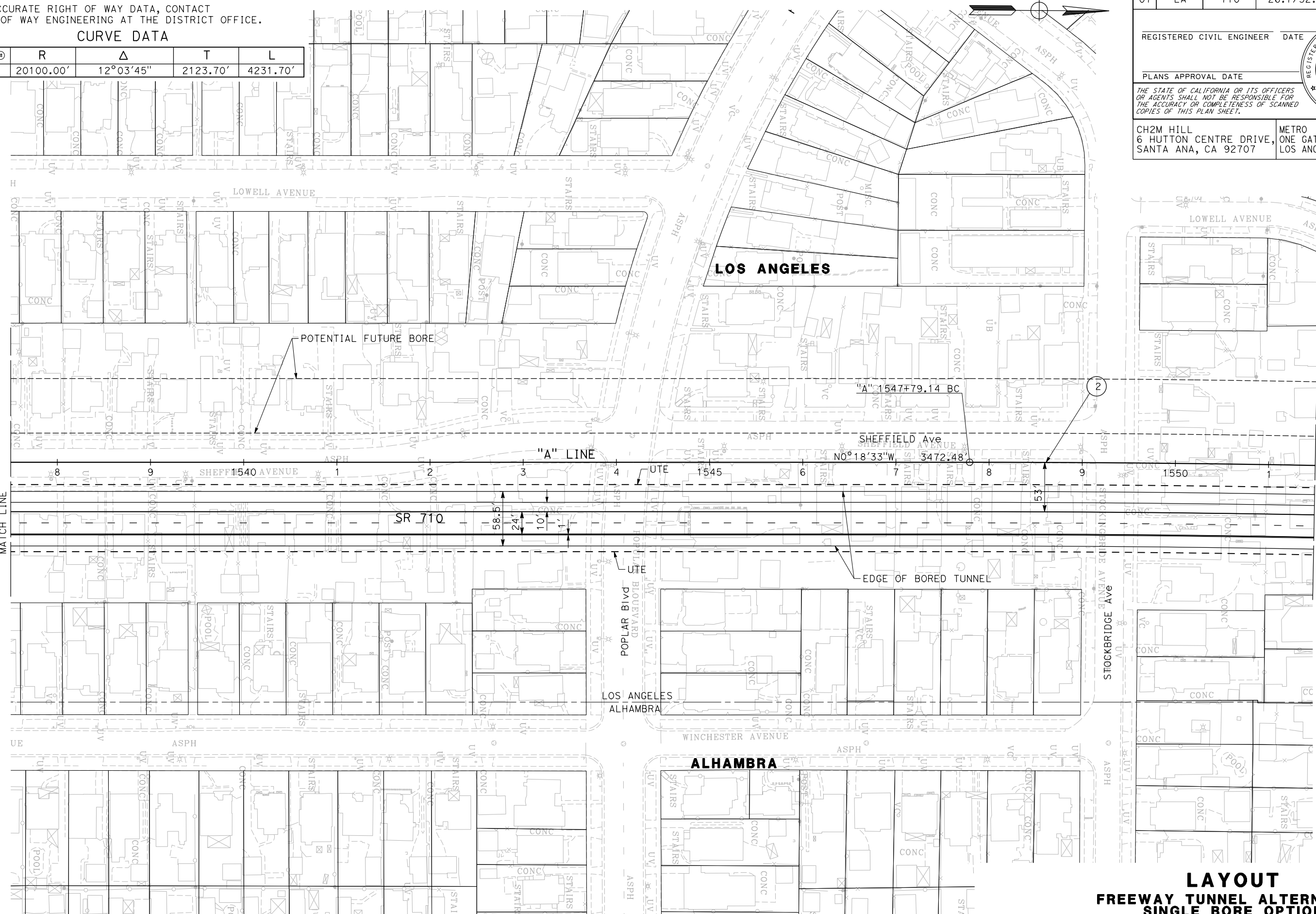
PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, METRO  
SANTA ANA, CA 92707 ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION



**LAYOUT  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 16 OF 79 SCALE 1"=100'

**L - 8**

LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 14:50

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

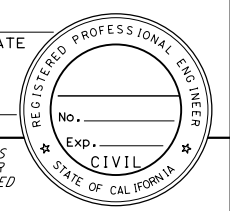
No. Ⓢ	R	Δ	T	L
2	20100.00'	12°03'45"	2123.70'	4231.70'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

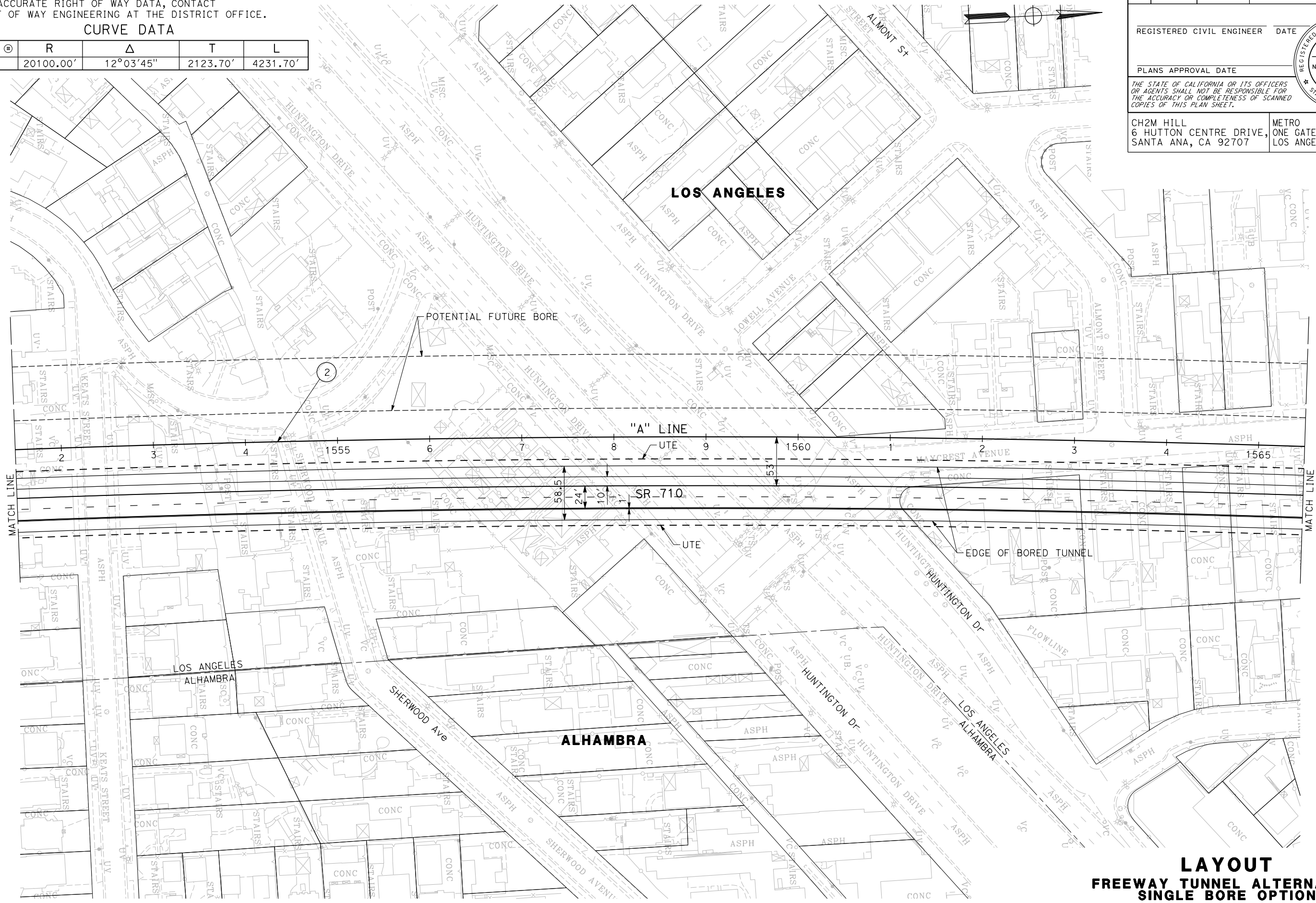
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Et-Caltans



**LAYOUT  
FREWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 17 OF 79 SCALE 1"=100'

**L - 9**

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. ⊕	R	Δ	T	L
2	20100.00'	12°03'45"	2123.70'	4231.70'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

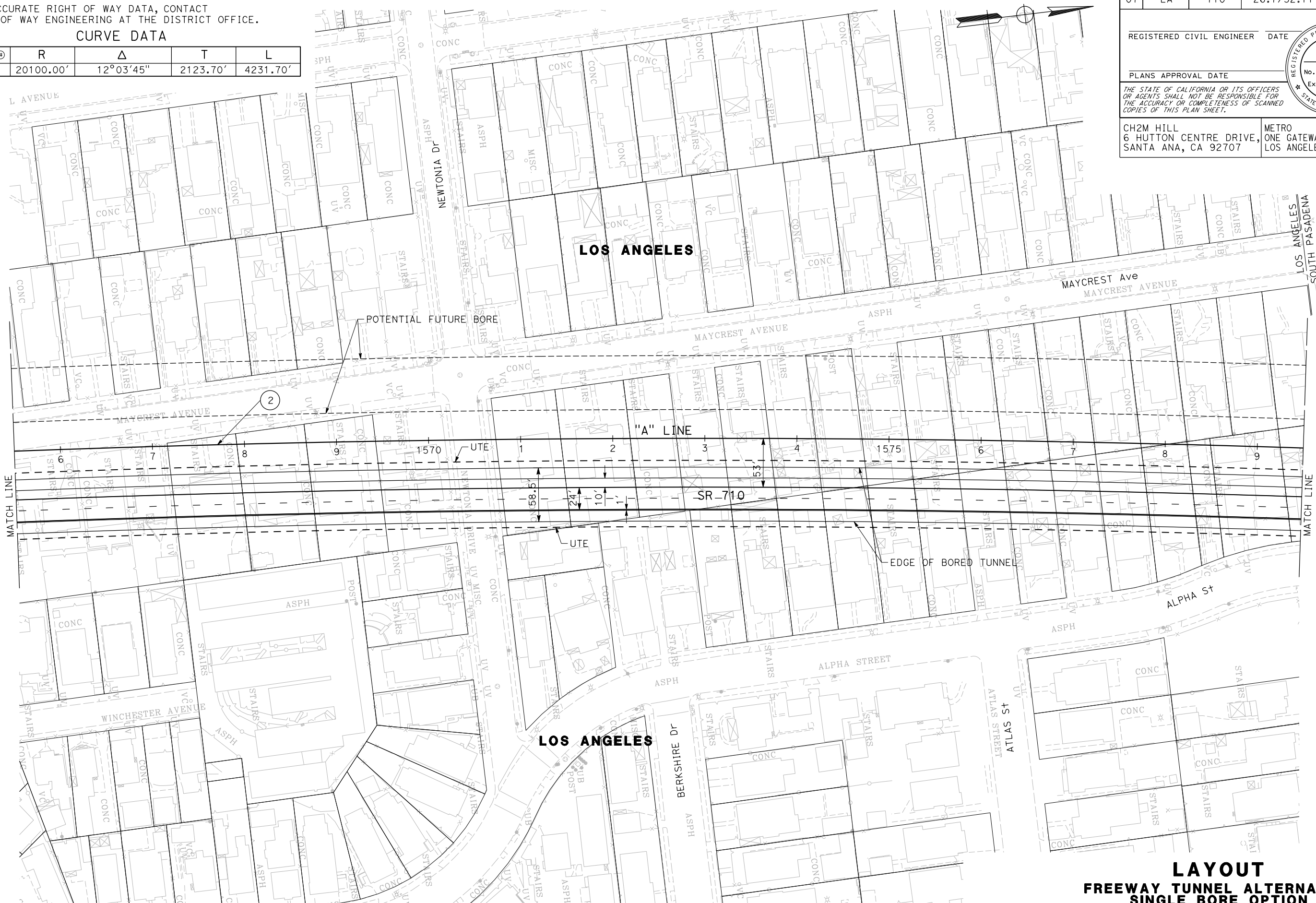
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CONSULTANT FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISOR BY

DATE REVISED



**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT J-2 SHEET 18 OF 79 SCALE 1"=100'

**LAYOUT  
FREWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**L-10**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 14:50

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. @	R	Δ	T	L
2	20100.00'	12°03'45"	2123.70'	4231.70'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

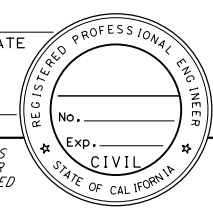
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

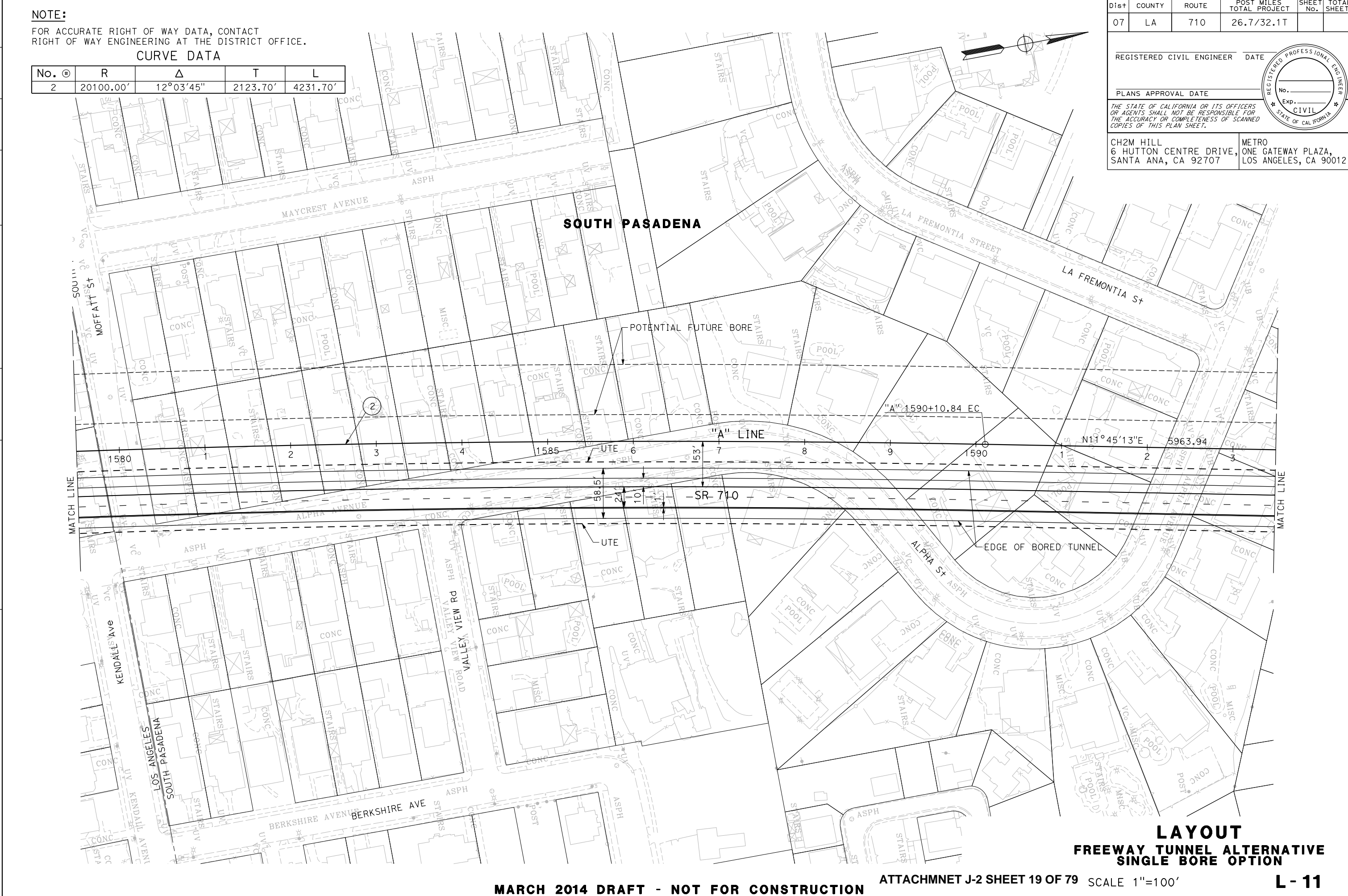
CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Ettrans



**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 19 OF 79 SCALE 1"=100'

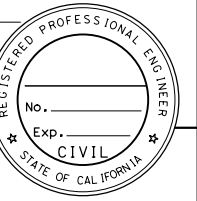
**LAYOUT  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**L - 11**

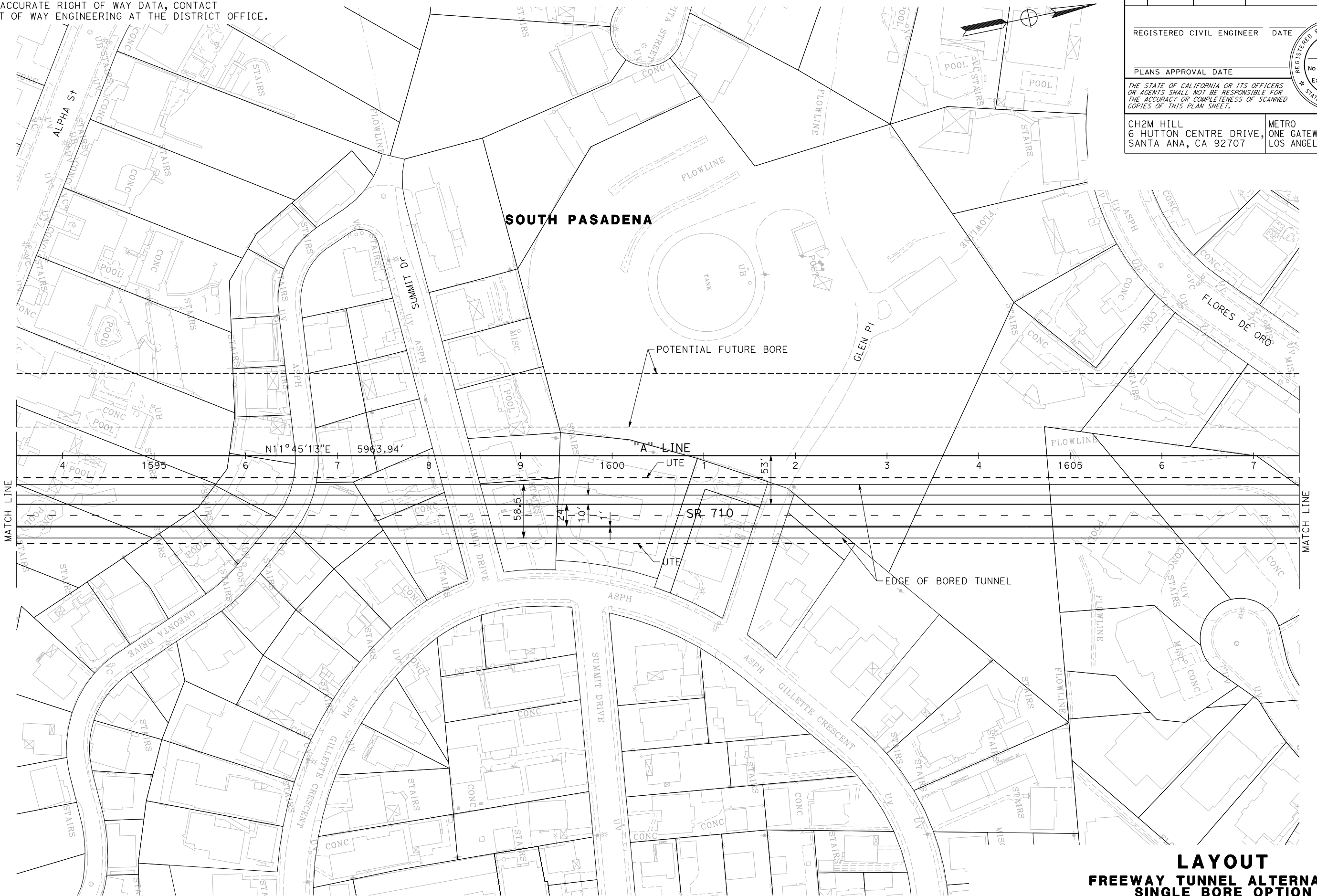
**NOTE:**  
 FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
 RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
 PLANS APPROVAL DATE \_\_\_\_\_  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
 6 HUTTON CENTRE DRIVE, ONE GATEWAY PLAZA,  
 SANTA ANA, CA 92707 LOS ANGELES, CA 90012



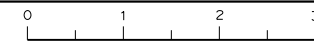
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT J-2 SHEET 20 OF 79

SCALE 1"=100'

**L-12**



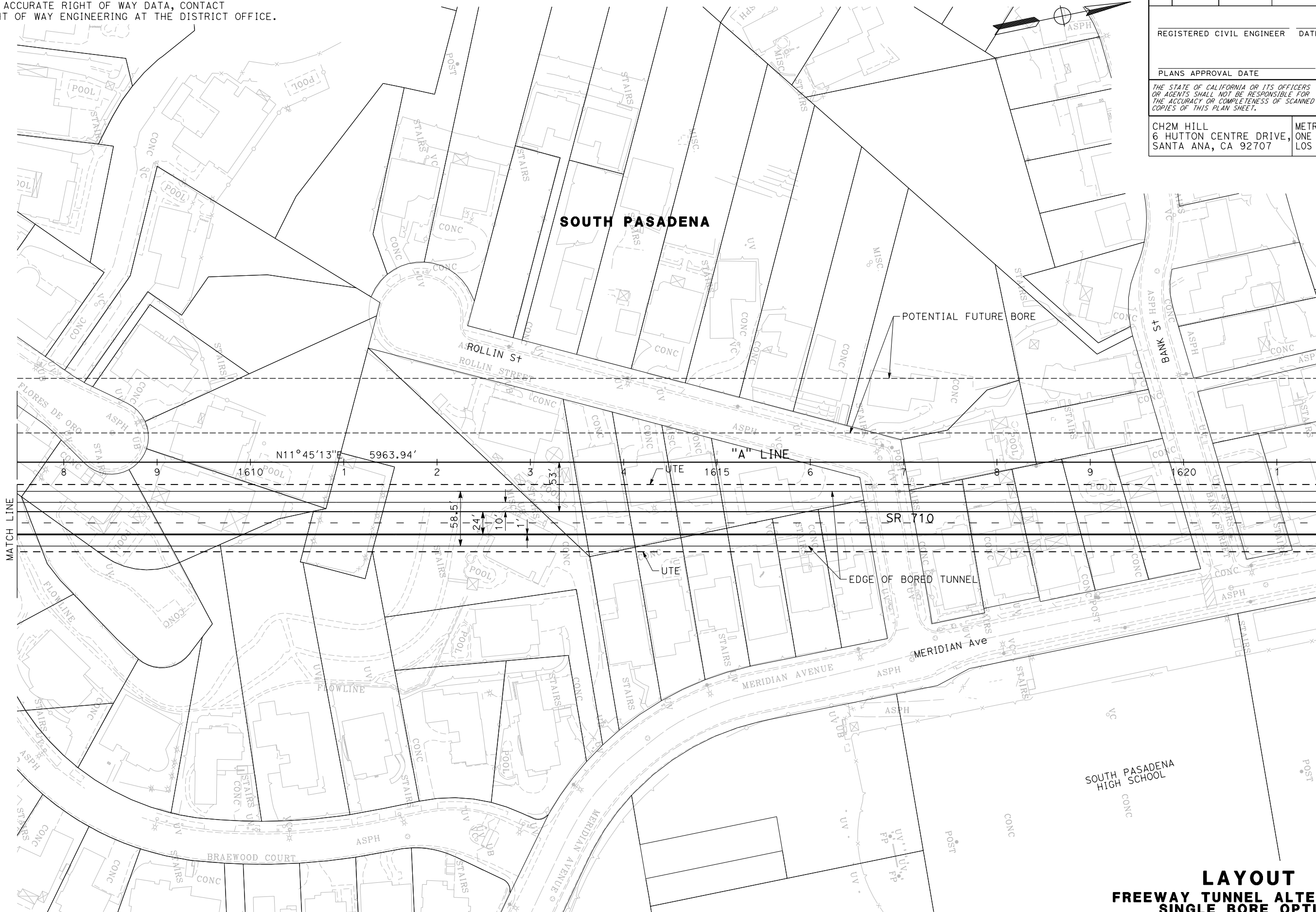
**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
No. \_\_\_\_\_  
Exp. \_\_\_\_\_  
CIVIL  
STATE OF CALIFORNIA

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707  
METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 21 OF 79 SCALE 1"=100'

**LAYOUT  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**L - 13**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 14:50



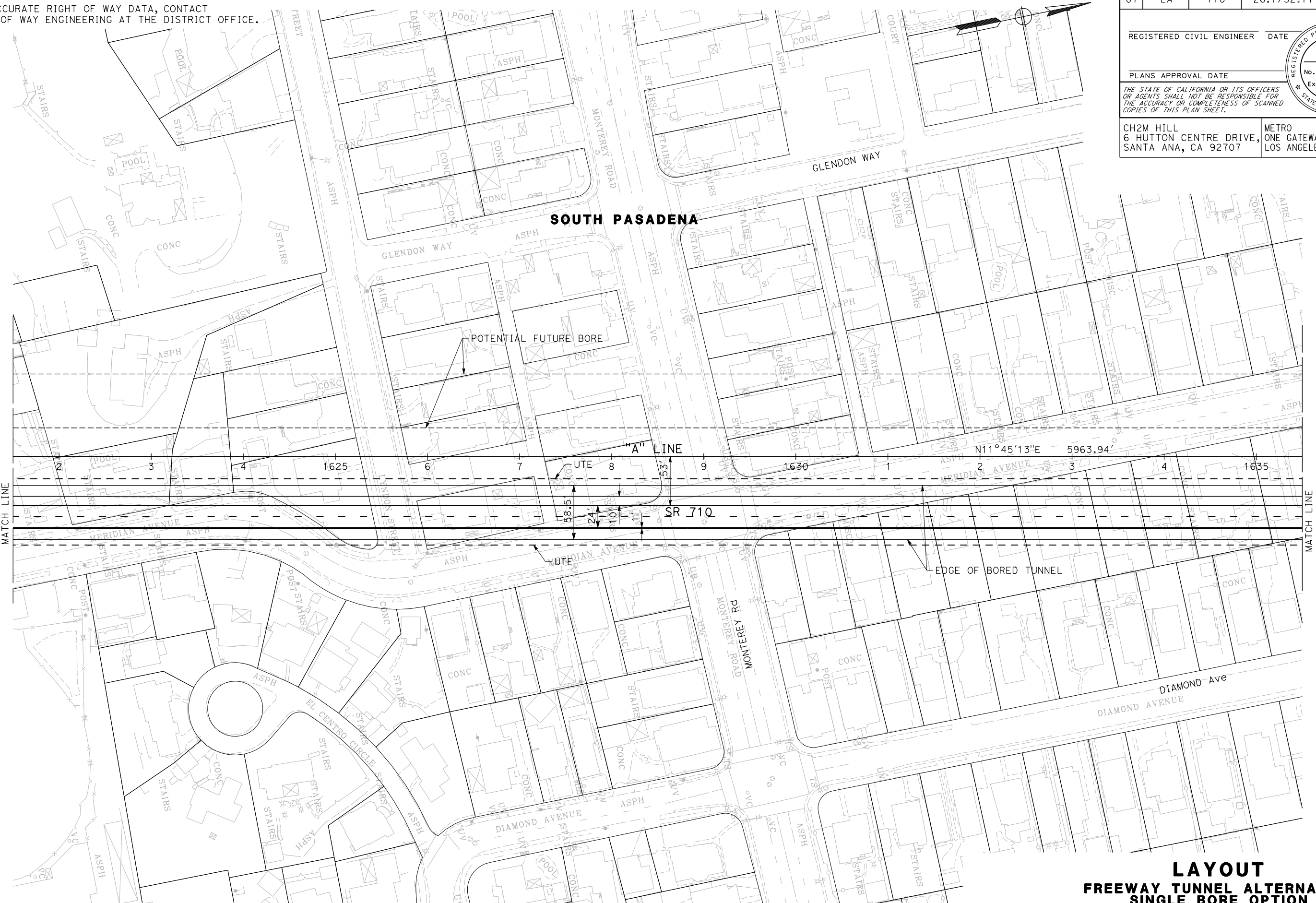
**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED

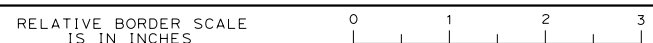
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT J-2 SHEET 22 OF 79 SCALE 1"=100'

**L - 14**

BORDER LAST REVISED 7/2/2010

USERNAME => pwsvc  
DGN FILE => 0700000191ea014.dgn



UNIT 0000

PROJECT NUMBER & PHASE

07000001911

LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 14:51

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

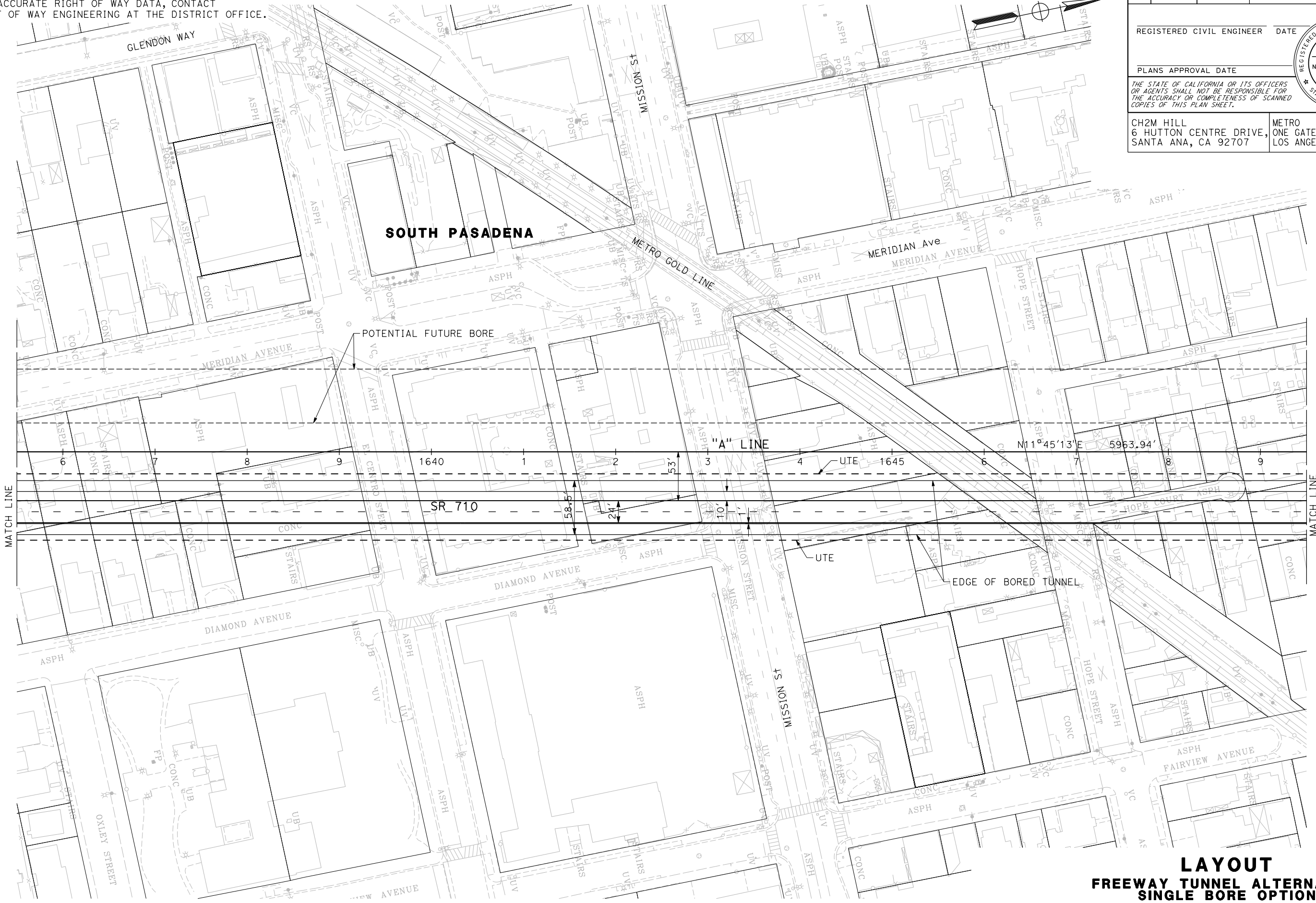
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION ATTACHMENT J-2 SHEET 23 OF 79 SCALE 1"=100' L - 15**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 14:50

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. ③	R	Δ	T	L
3	20100.00'	12°37'46"	2224.31'	4430.59'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

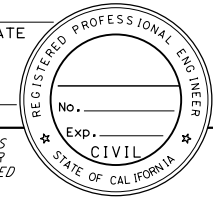
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

**Caltrans**

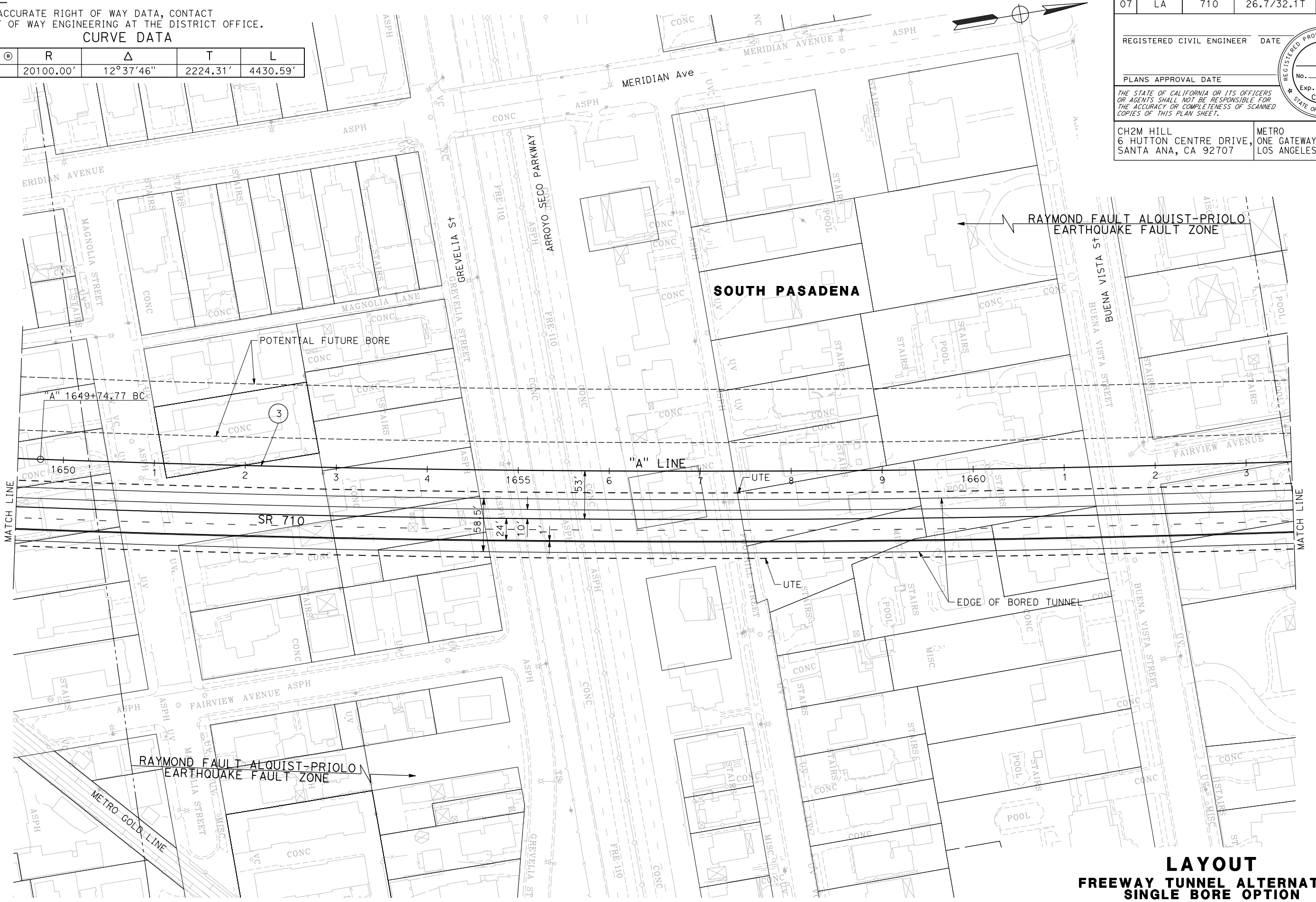
CONSULTANT FUNCTIONAL SUPERVISOR

CALCULATED/DESIGNED BY

CHECKED BY

REVISOR BY

DATE REVISED



**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 24 OF 79 SCALE 1"=100'

**LAYOUT  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**L-16**

BORDER LAST REVISED 7/2/2010

USERNAME => pwsvc  
DGN FILE => 0700000191ea016.dgn

RELATIVE BORDER SCALE IS IN INCHES

UNIT 0000

PROJECT NUMBER & PHASE

07000001911

LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 14:51

**NOTE:**

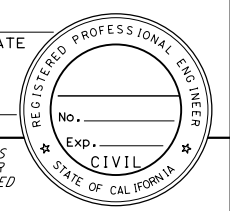
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. +	R	Δ	T	L
3	20100.00'	12° 37' 46"	2224.31'	4430.59'

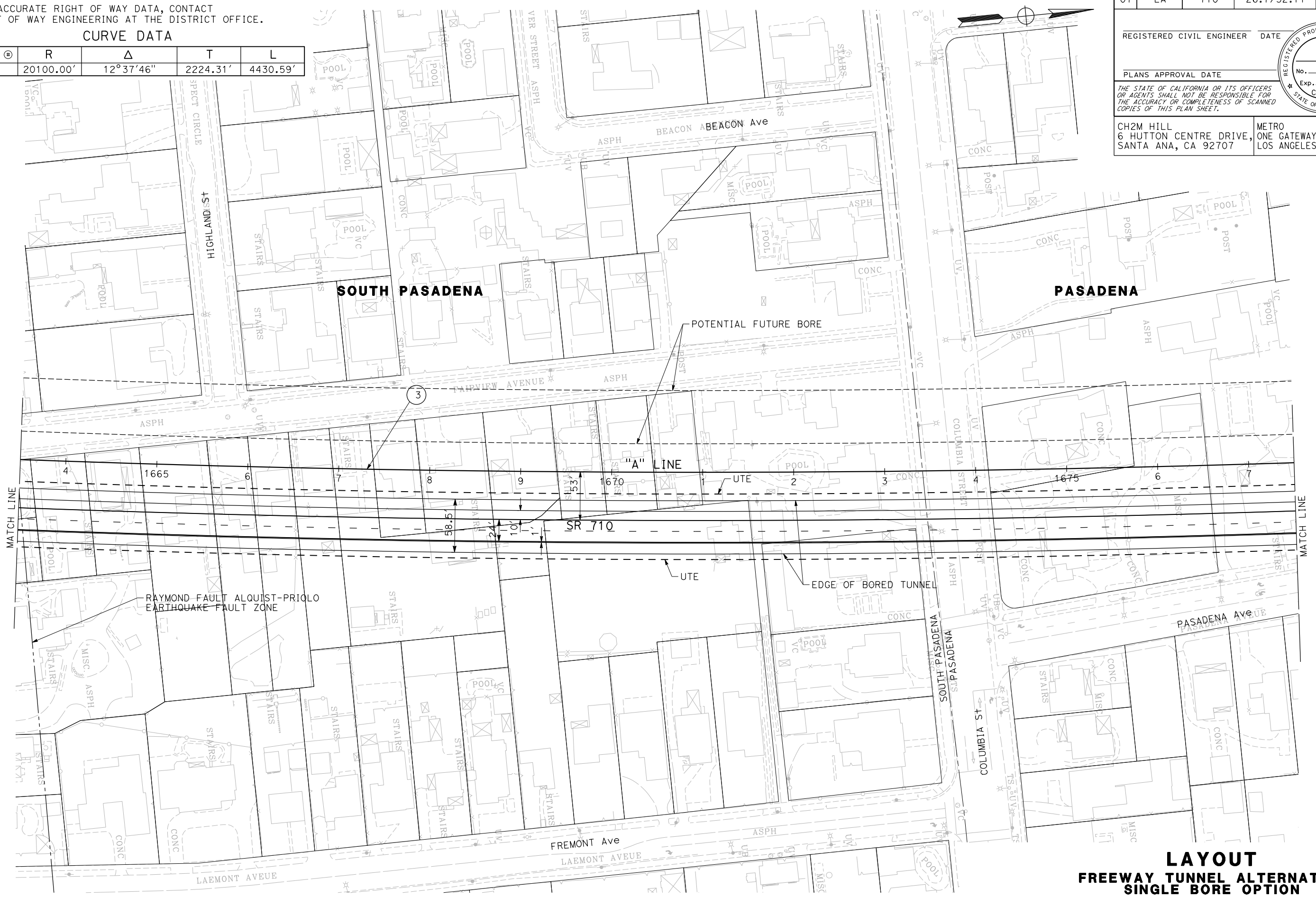
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
 PLANS APPROVAL DATE \_\_\_\_\_  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
 METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED



**LAYOUT  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 25 OF 79 SCALE 1"=100'

**L - 17**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 14:50

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

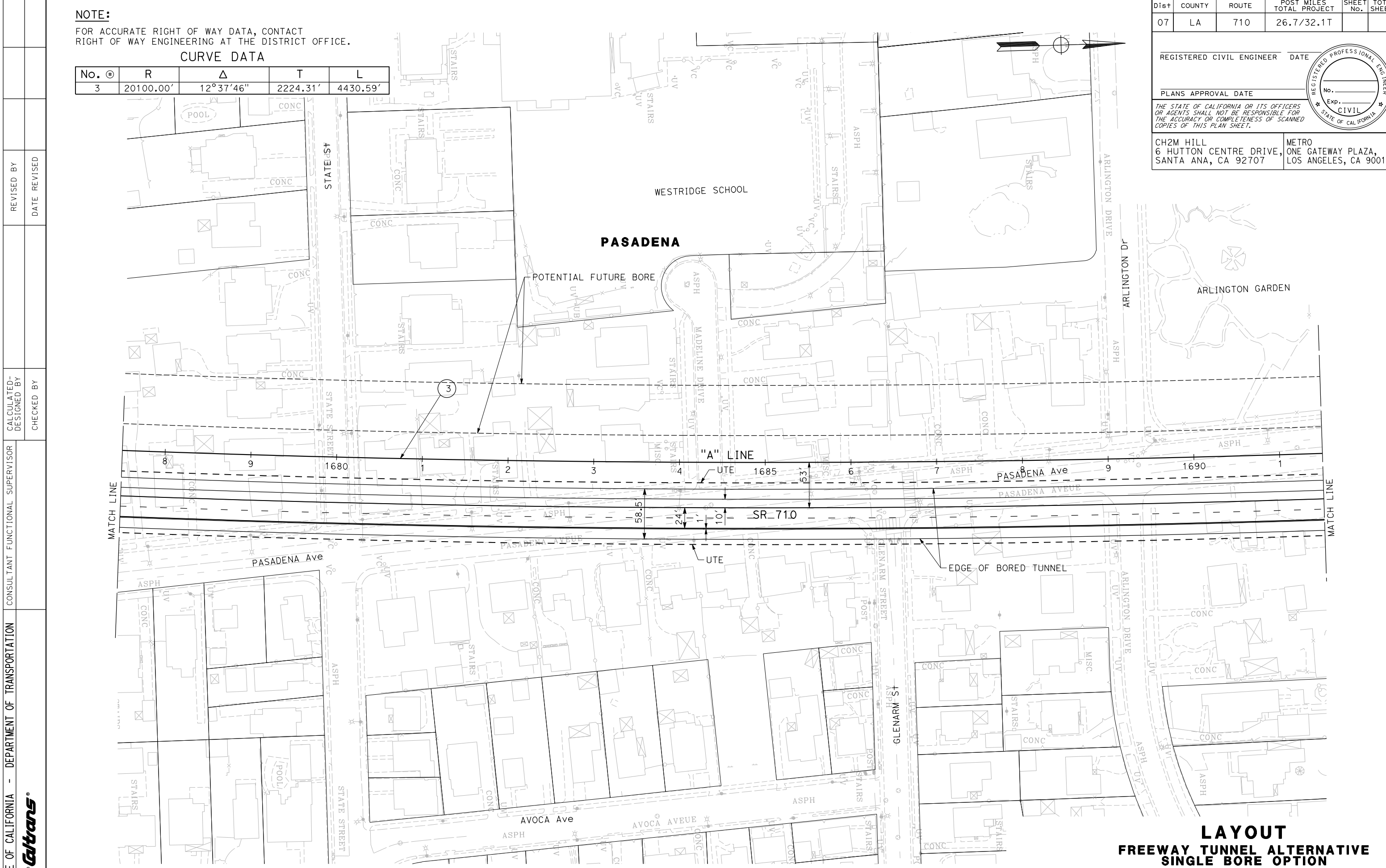
No. ⊕	R	Δ	T	L
3	20100.00'	12° 37' 46"	2224.31'	4430.59'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
 PLANS APPROVAL DATE \_\_\_\_\_  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
 METRO  
 ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED/DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

**LAYOUT  
 FREEWAY TUNNEL ALTERNATIVE  
 SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 26 OF 79 SCALE 1"=100'

**L - 18**

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. Ⓢ	R	Δ	T	L
3	20100.00'	12° 37' 46"	2224.31'	4430.59'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE

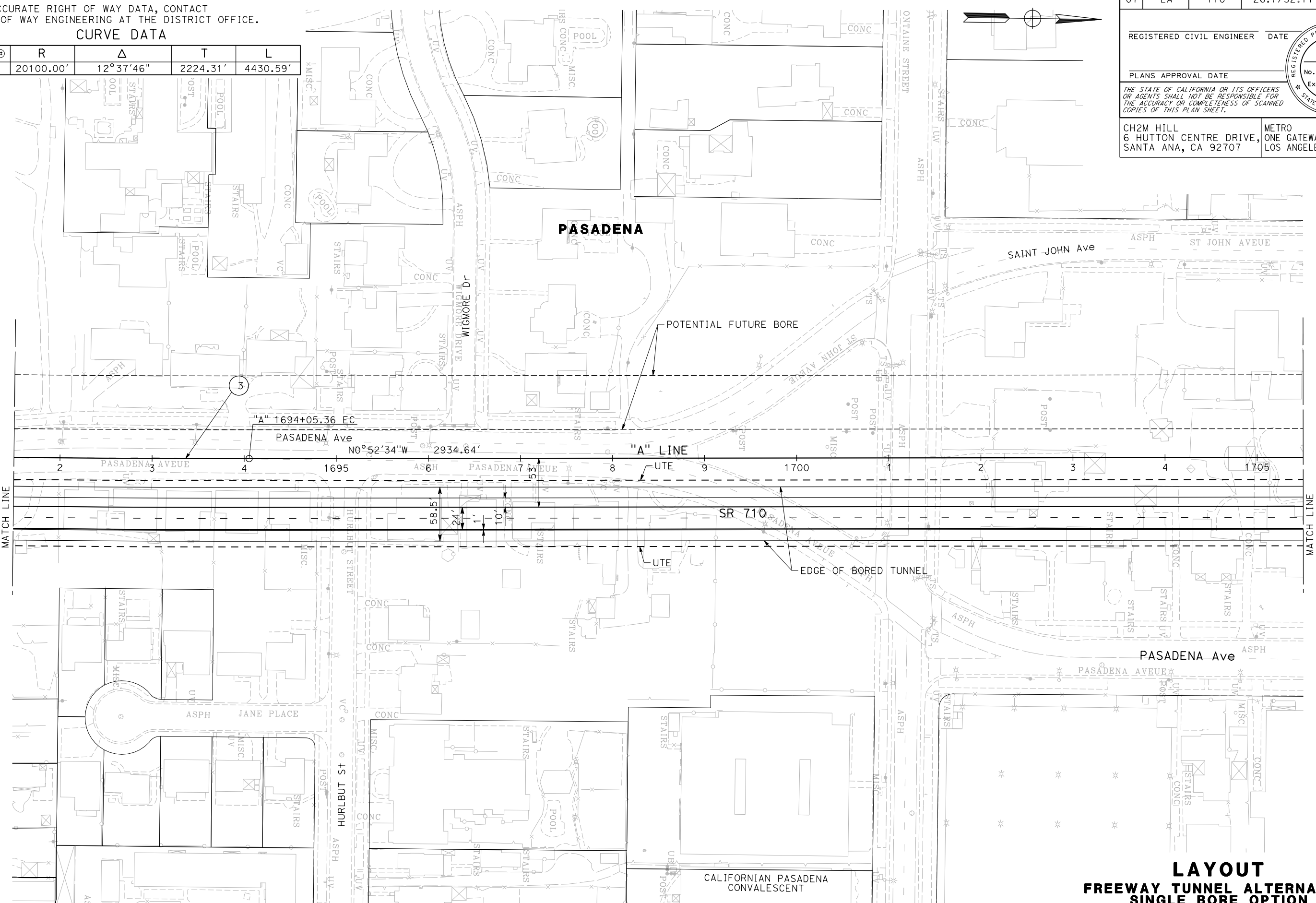


PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Caltrans

REVISED BY  
DATE REVISED

CALCULATED-DESIGNED BY  
CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR

DEPARTMENT OF TRANSPORTATION

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 27 OF 79 SCALE 1"=100'

**L - 19**

BORDER LAST REVISED 7/2/2010

USERNAME => pwsvc  
DGN FILE => 0700000191ea019.dgn

RELATIVE BORDER SCALE IS IN INCHES

UNIT 0000

PROJECT NUMBER & PHASE

07000001911

LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 14:51

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. Ⓢ	R	Δ	T	L
45	2000.00'	5°00'24"	87.44'	174.76'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

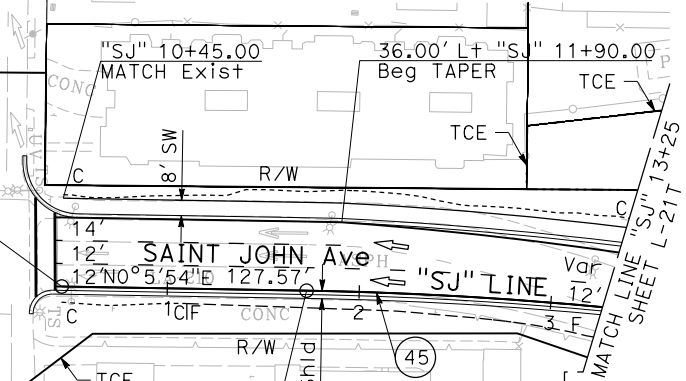
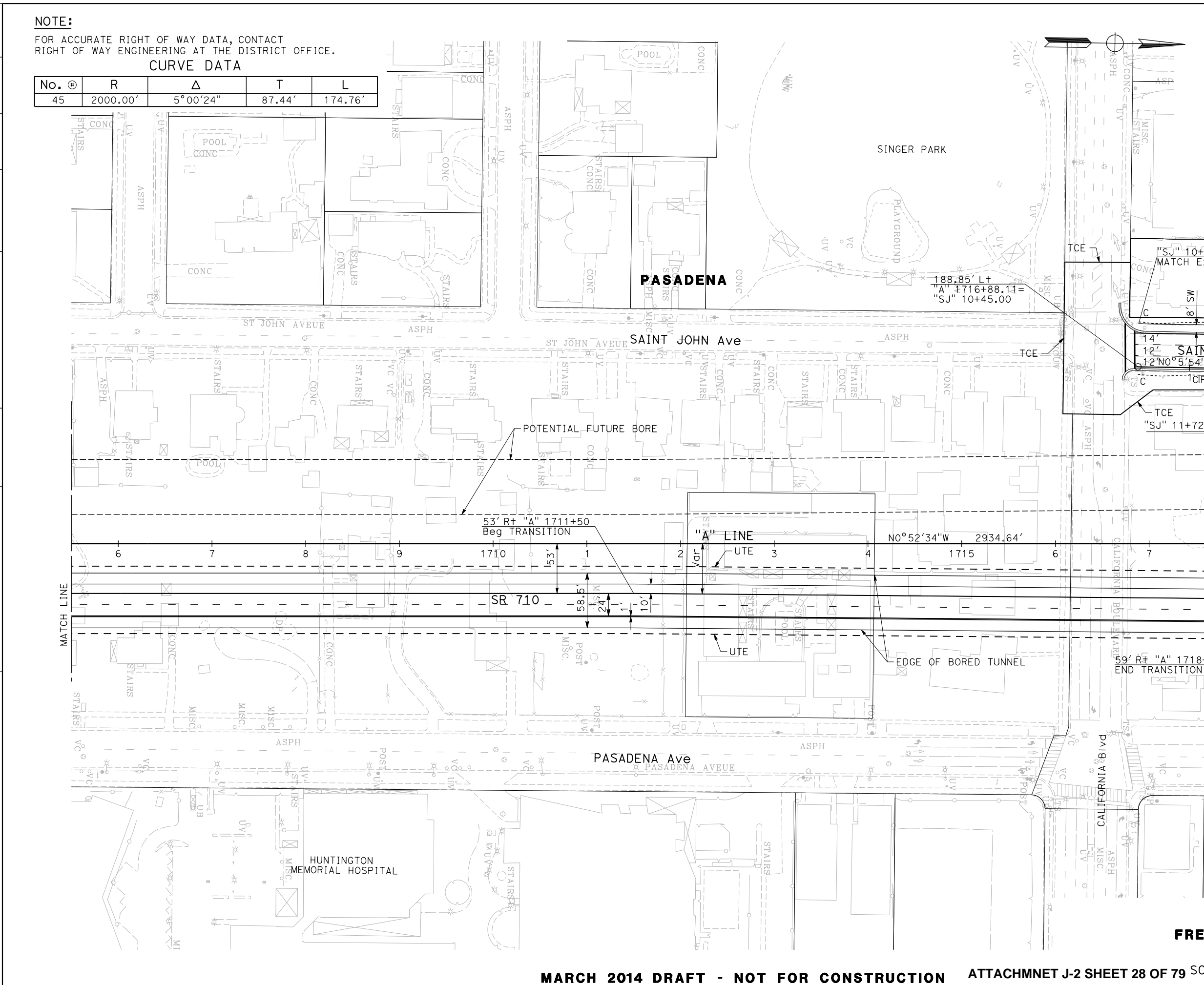
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
Et-Caltans



**LAYOUT  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION ATTACHMNET J-2 SHEET 28 OF 79 SCALE 1"=100' L-20**

LAST REVISION DATE PLOTTED => 06-OCT-2014 00-00-00 TIME PLOTTED => 17:11

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. ⊕	R	Δ	T	L
33	4500.00'	4°17'30"	168.61'	337.06'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

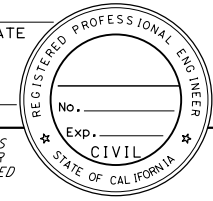
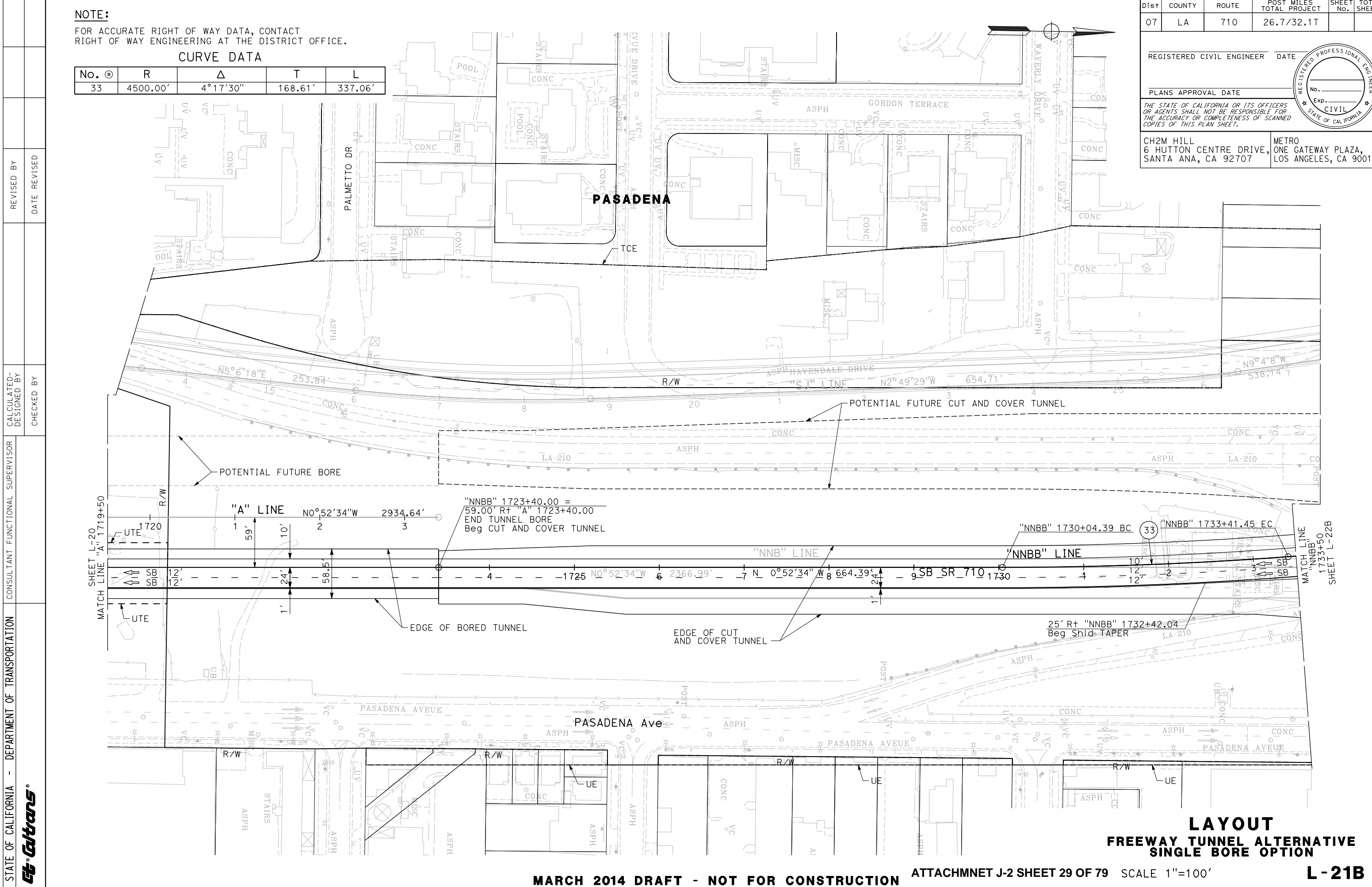
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CONSULTANT FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

**LAYOUT**  
**FREWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION** ATTACHMNET J-2 SHEET 29 OF 79 SCALE 1"=100'

**L-21B**

LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 14:49



**NOTE:**

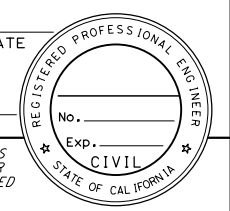
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. @	R	Δ	T	L
45	2000.00'	5°00'24"	87.44'	174.76'
46	2000.00'	7°55'47"	138.62'	276.80'
47	1000.00'	6°14'39"	54.54'	108.98'

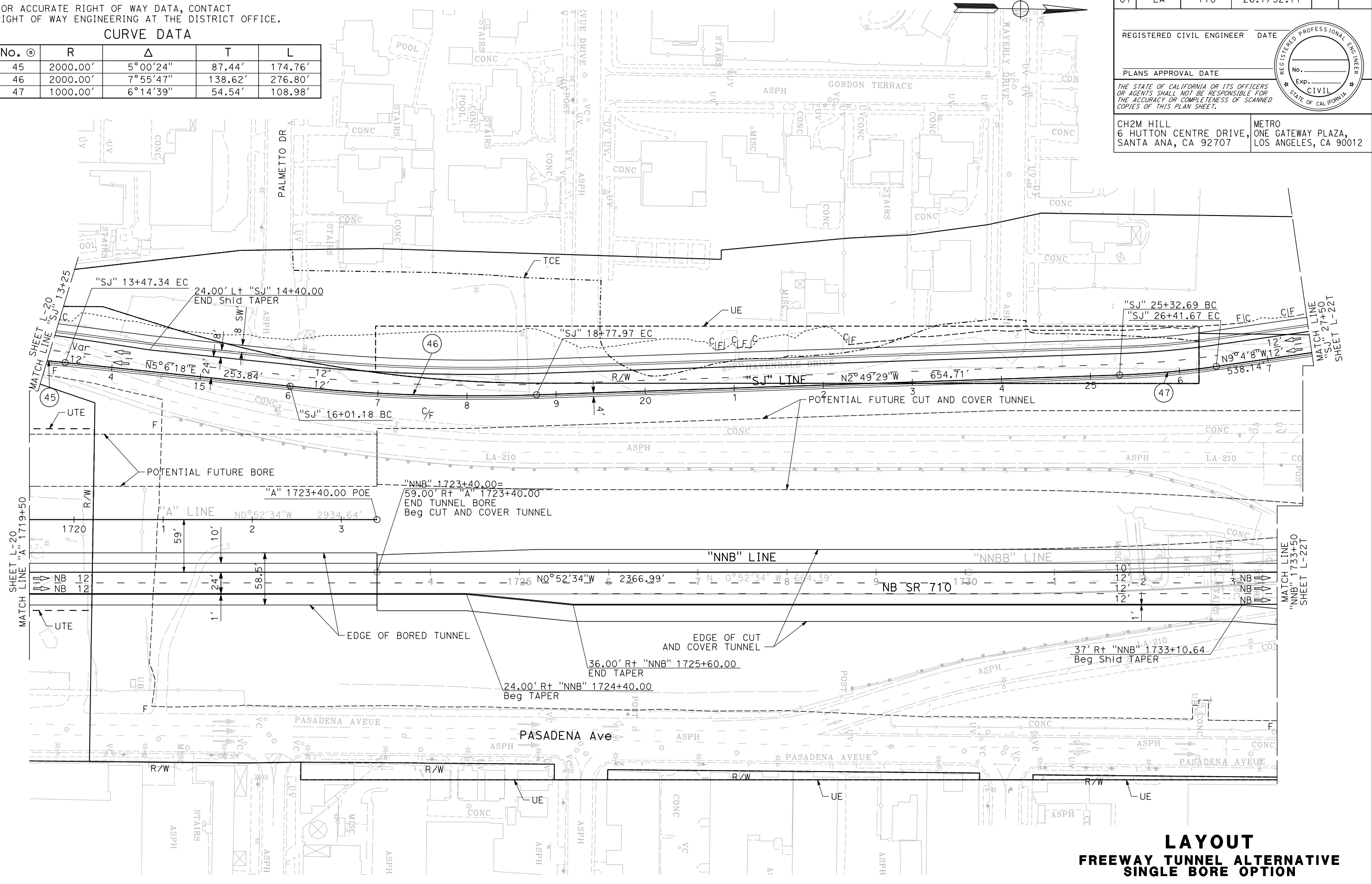
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
 PLANS APPROVAL DATE \_\_\_\_\_  
 THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, METRO  
SANTA ANA, CA 92707 ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 Et Caltrans  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISOR BY  
 DATE REVISED



**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 30 OF 79 SCALE 1"=100'

**LAYOUT  
 FREEWAY TUNNEL ALTERNATIVE  
 SINGLE BORE OPTION**

**L-21T**

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. ⊕	R	Δ	T	L
13	4976.00'	1°26'15"	62.42'	124.84'
34	5855.00'	4°17'30"	219.38'	438.55'
37	5000.00'	4°51'05"	211.81'	423.36'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

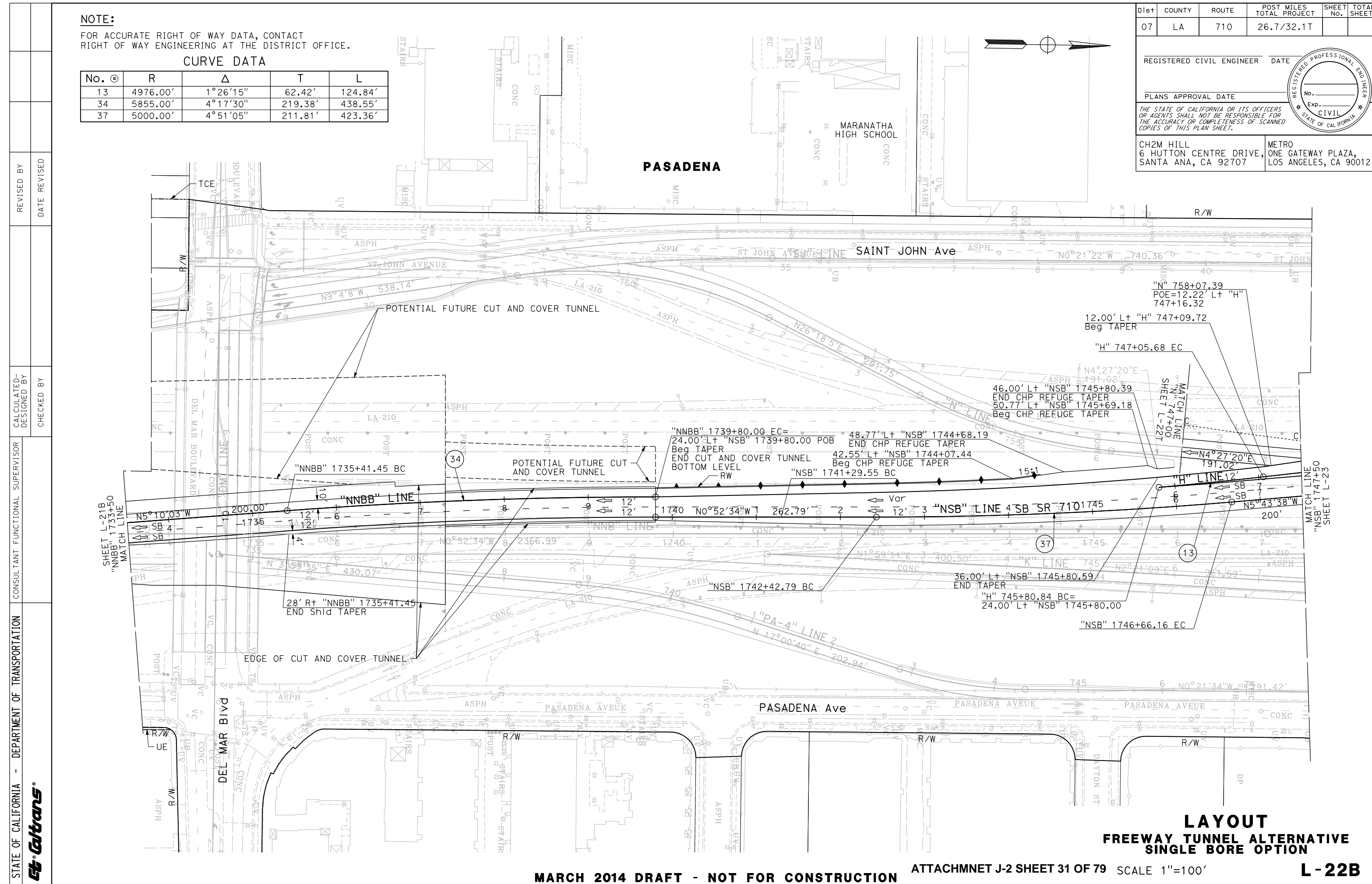
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CONSULTANT FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISOR BY

DATE REVISED



**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 31 OF 79 SCALE 1"=100'

**LAYOUT  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**L-22B**

LAST REVISION DATE PLOTTED => 25-APR-2014  
00-00-00 TIME PLOTTED => 13:08

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. @	R	Δ	T	L
29	500.00'	35°22'13"	159.43'	308.66'
30	12000.00'	9°50'59"	1034.01'	2062.93'
48	2000.00'	8°42'46"	152.36'	304.13'
49	625.00'	21°50'45"	120.62'	238.30'
108	850.00'	13°01'04"	96.98'	193.12'
109	500.00'	17°22'21"	76.39'	151.60'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

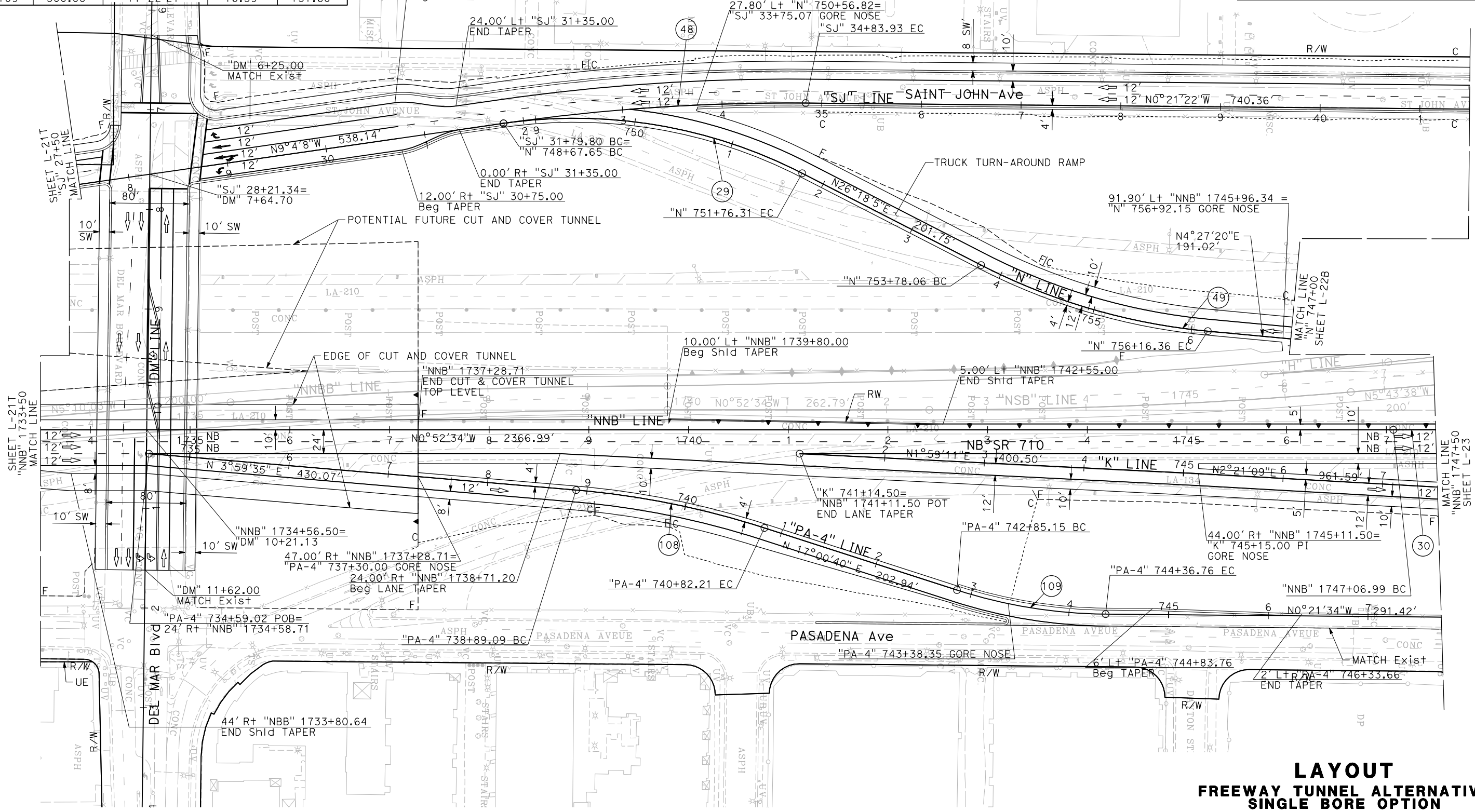
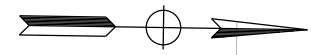
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



**LAYOUT  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 32 OF 79 SCALE 1"=100'

**L-22T**



LAST REVISION DATE PLOTTED => 06-OCT-2014 00-00-00 TIME PLOTTED => 17:16

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. @	R	Δ	T	L
14	5000.00'	3°44'59"	163.68'	327.24'
15	3000.00'	2°10'18"	56.86'	113.71'
23	800.00'	32°30'24"	233.23'	453.88'
24	562.00'	17°23'10"	85.93'	170.54'
26	12024.00'	1°53'22"	198.29'	396.54'
27	1212.00'	14°35'34"	155.18'	308.69'
30	12000.00'	9°50'59"	1034.01'	2062.93'
39	8985.00'	17°51'07"	413.58'	826.57'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

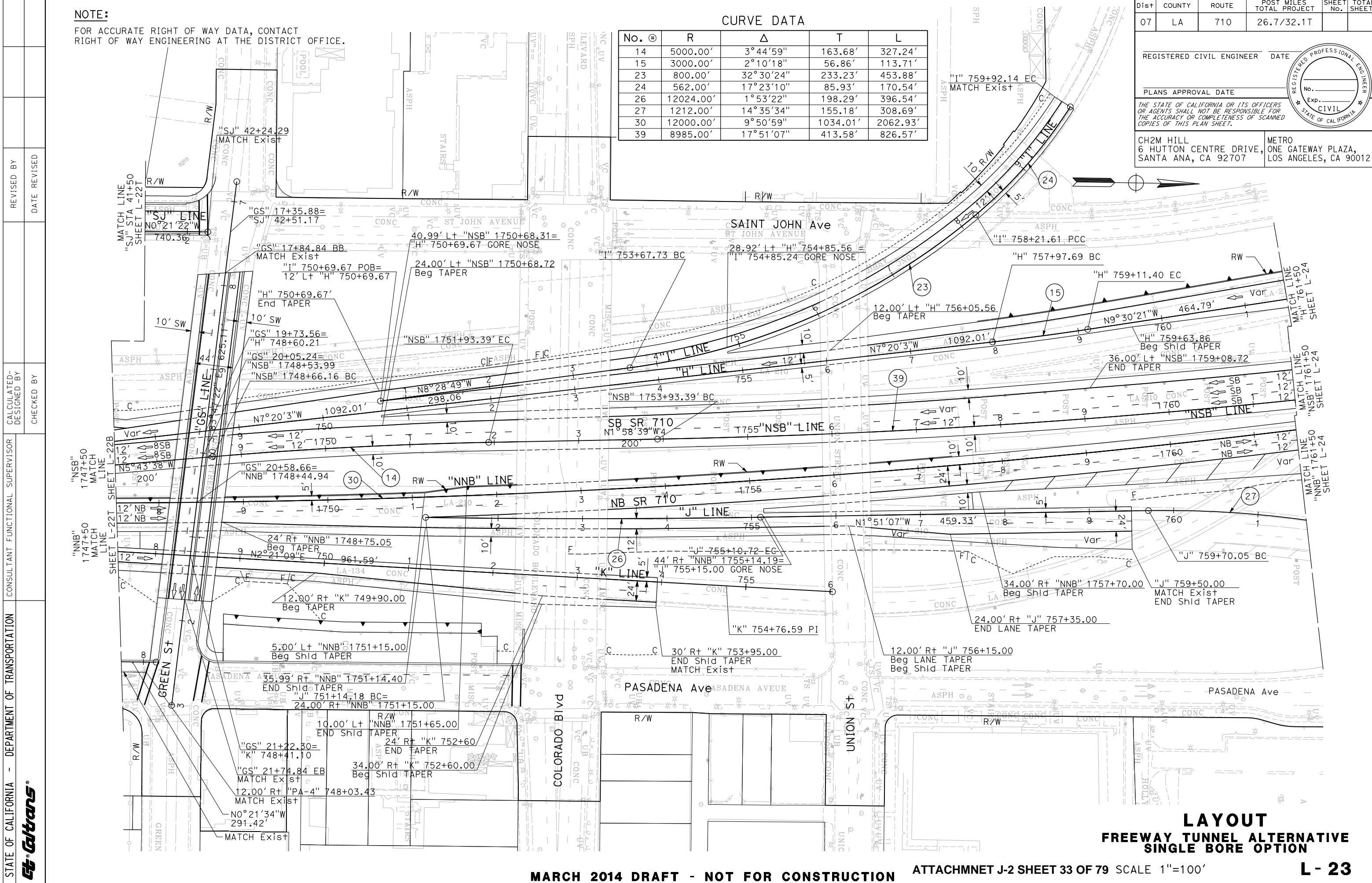
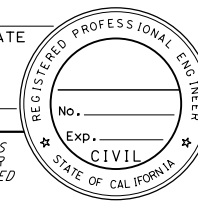
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 33 OF 79 SCALE 1"=100'

**LAYOUT  
FREWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**L-23**

**NOTE:**

FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. Ⓡ	R	Δ	T	L
16	964.00'	8°55'38"	75.25'	150.20'
27	1212.00'	14°35'34"	155.18'	308.69'
30	12000.00'	9°50'59"	1034.01'	2062.93'
38	9000.00'	12°34'52"	992.11'	1976.23'
39	8985.00'	17°51'07"	413.58'	826.57'
41	1900.00'	10°11'34"	169.45'	338.01'
42	8937.00'	3°54'8"	304.44'	608.65'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

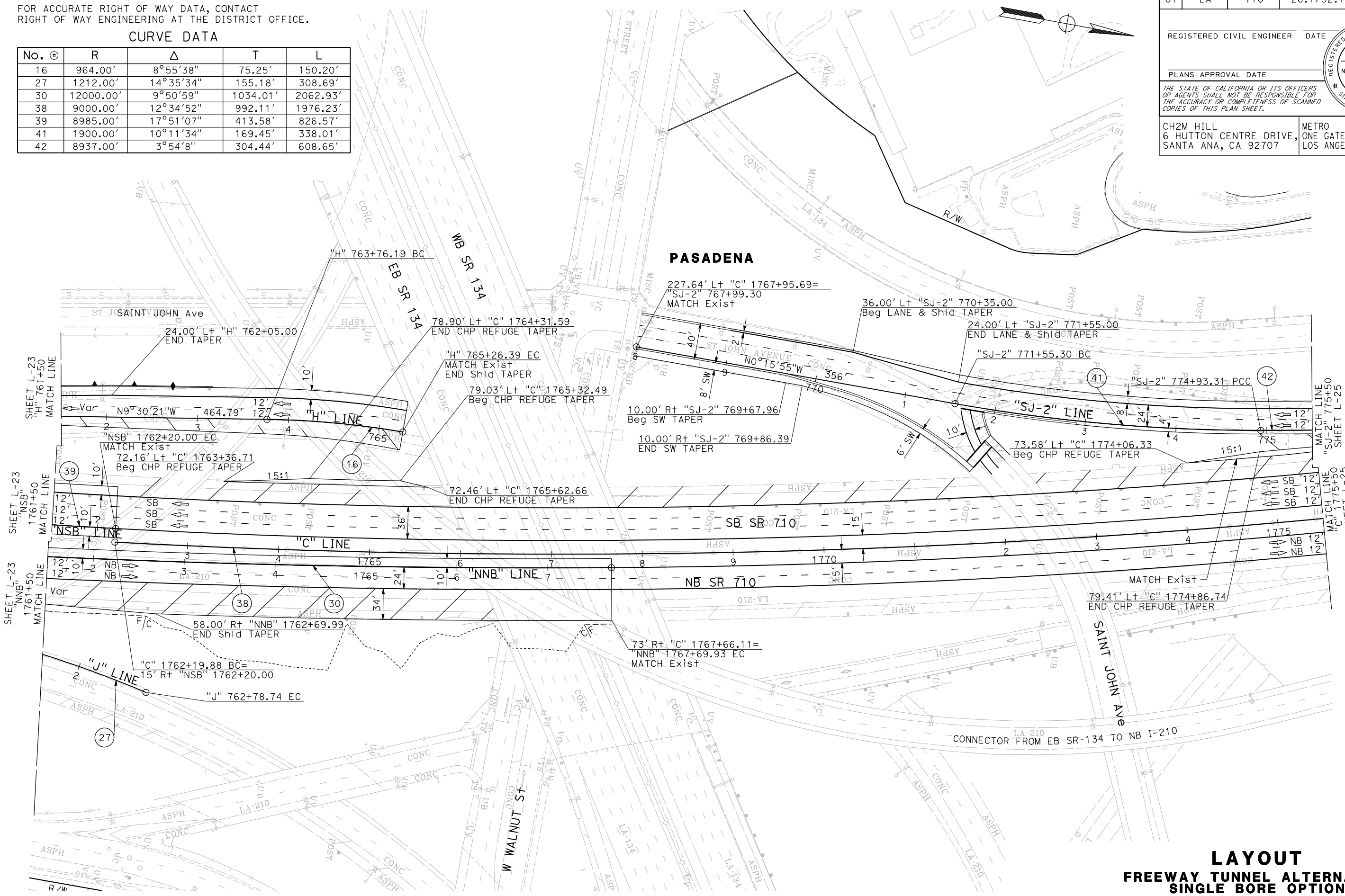
CONSULTANT FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISOR BY

DATE REVISED



**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMENT J-2 SHEET 34 OF 79

SCALE 1"=100'

**LAYOUT  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**L-24**

LAST REVISION DATE PLOTTED => 21-APR-2014 00:00:00 TIME PLOTTED => 16:14

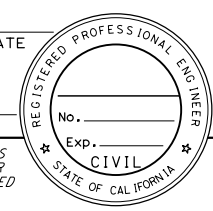
**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

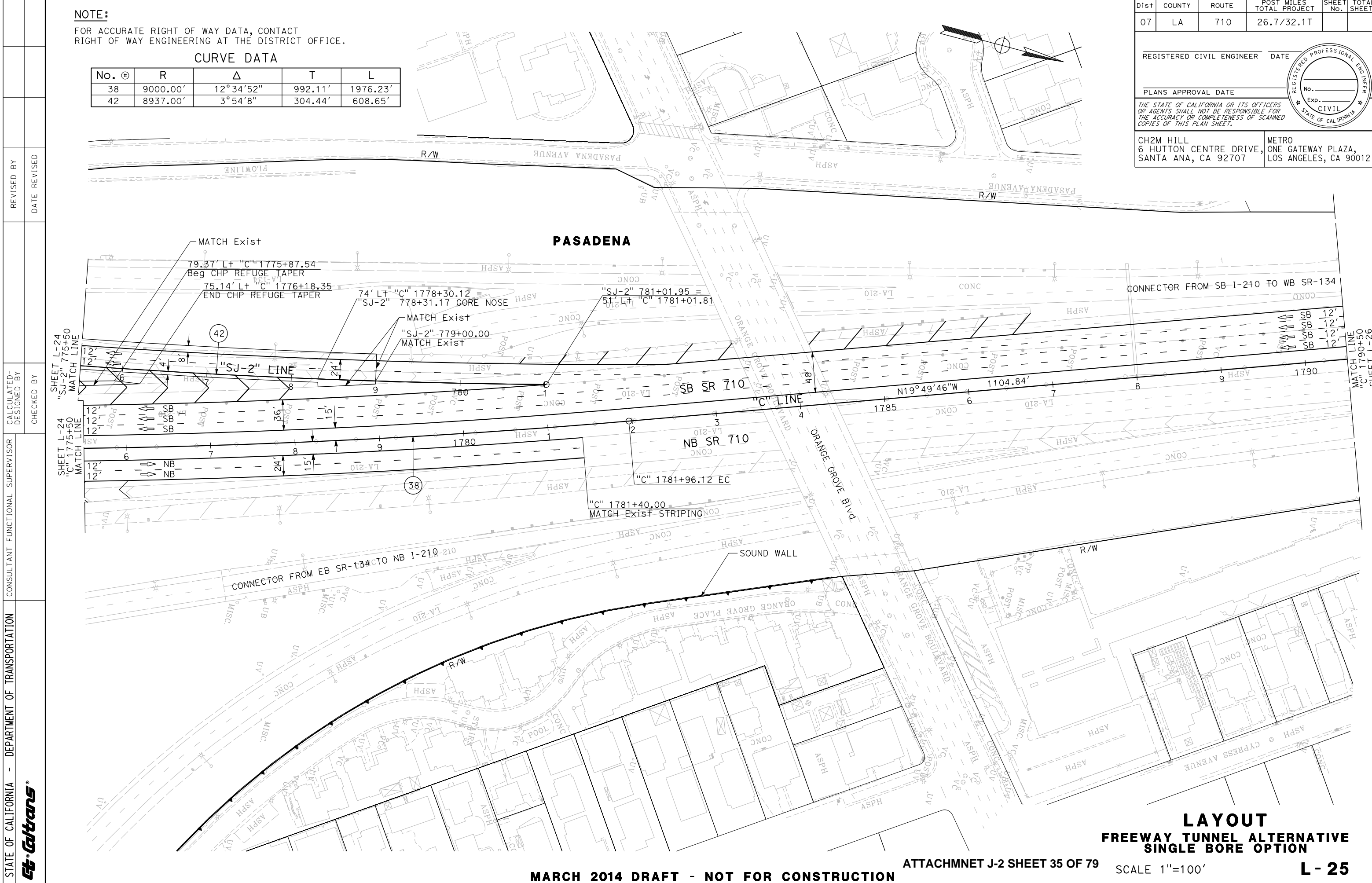
No. Ⓢ	R	Δ	T	L
38	9000.00'	12°34'52"	992.11'	1976.23'
42	8937.00'	3°54'8"	304.44'	608.65'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_  
PLANS APPROVAL DATE \_\_\_\_\_  
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.



CH2M HILL  
6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707  
METRO  
ONE GATEWAY PLAZA, LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
 Et-Caltans  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISOR BY  
 DATE REVISED

**LAYOUT  
FREWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

ATTACHMNET J-2 SHEET 35 OF 79 SCALE 1"=100'

**L - 25**

LAST REVISION DATE PLOTTED => 17-SEP-2014  
 00-00-00 TIME PLOTTED => 10:32

**NOTE:**  
FOR ACCURATE RIGHT OF WAY DATA, CONTACT  
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

**CURVE DATA**

No. Ⓢ	R	Δ	T	L
40	3000.00	23°59'12"	637.30	1255.93

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		

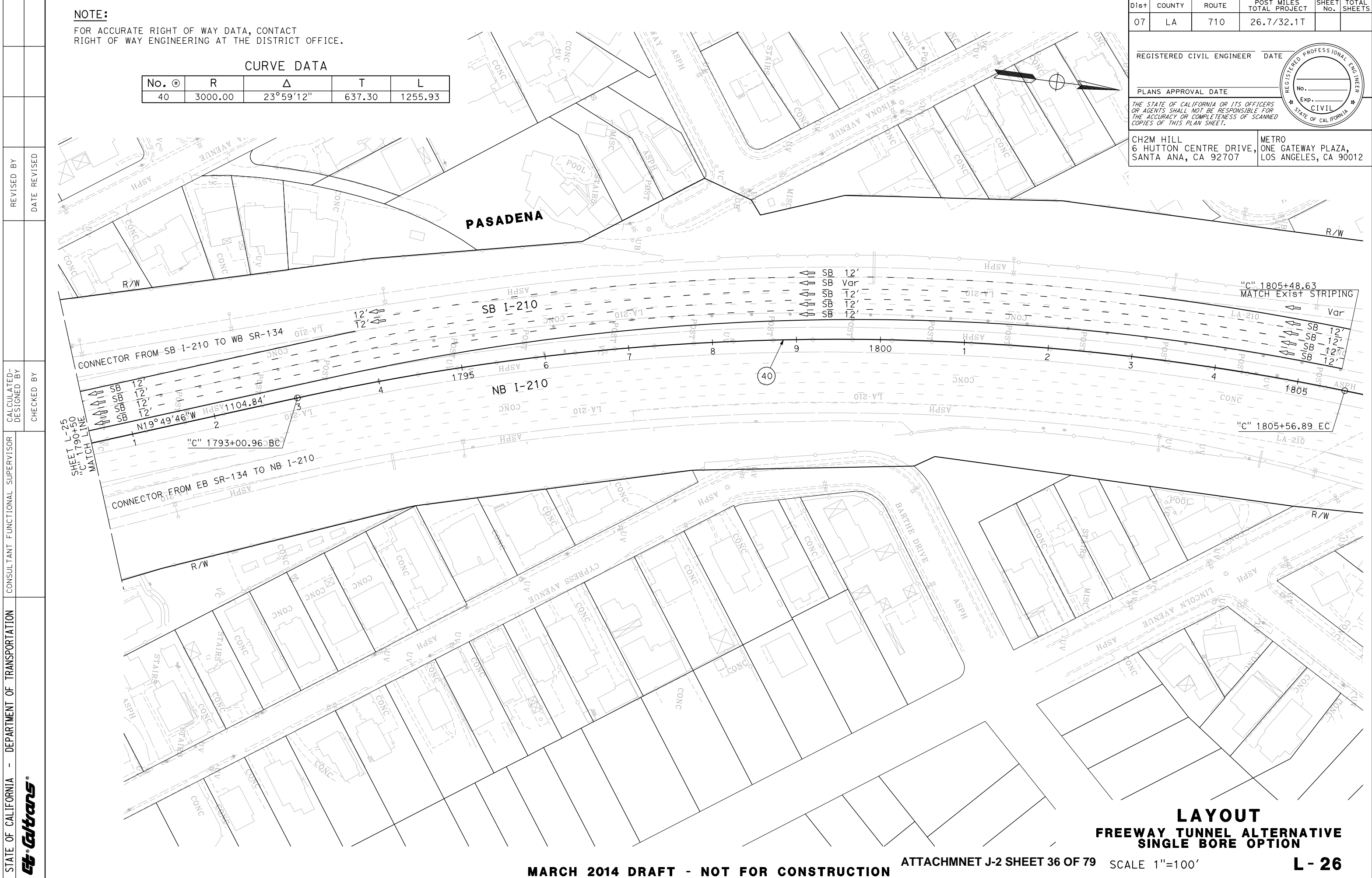
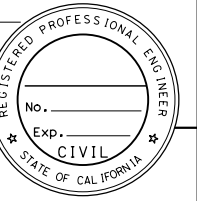
REGISTERED CIVIL ENGINEER DATE \_\_\_\_\_

PLANS APPROVAL DATE \_\_\_\_\_

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

REVISOR BY: \_\_\_\_\_ DATE REVISOR: \_\_\_\_\_

CALCULATED/DESIGNED BY: \_\_\_\_\_ CHECKED BY: \_\_\_\_\_

CONSULTANT FUNCTIONAL SUPERVISOR: \_\_\_\_\_

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

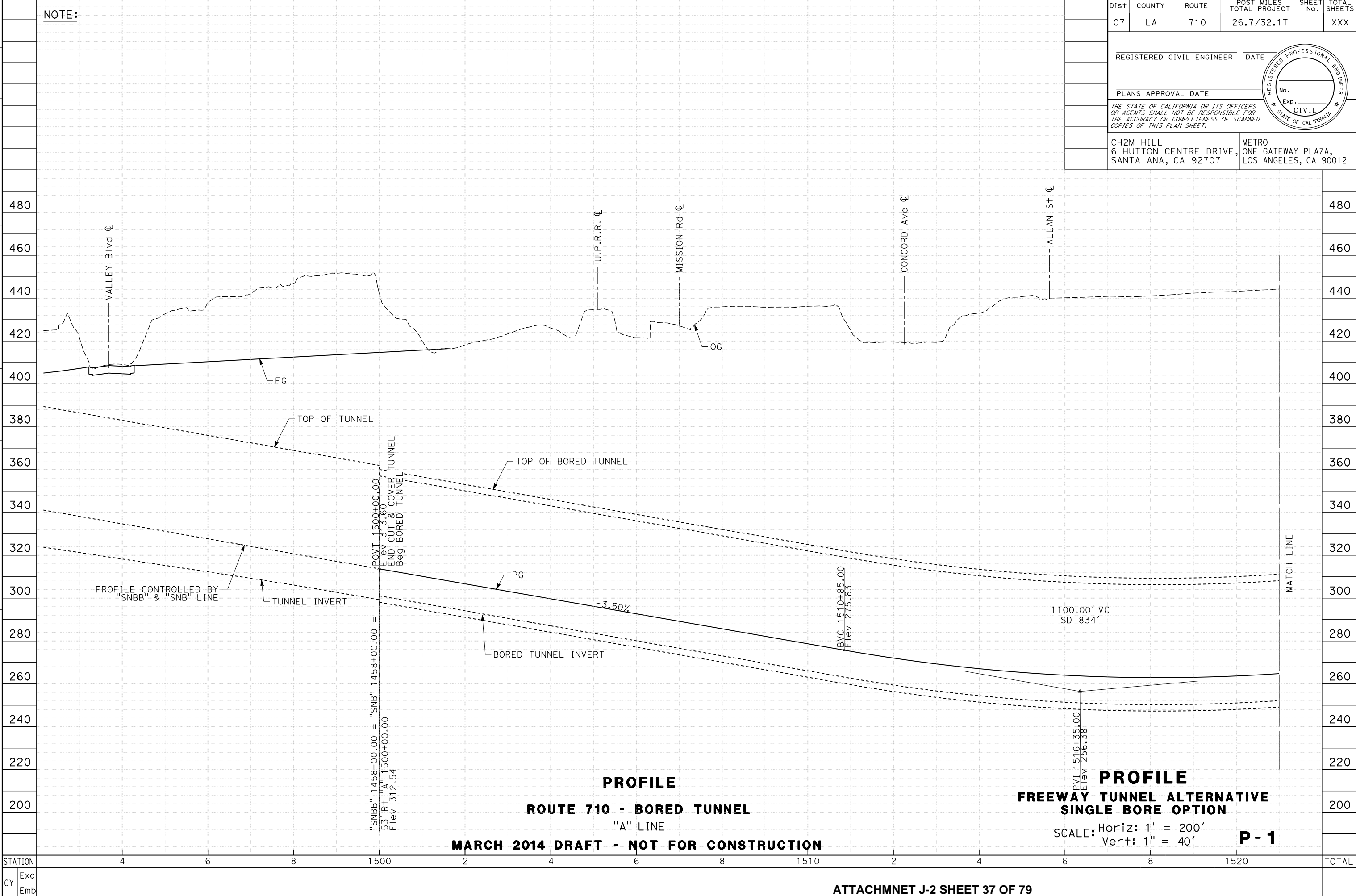
ATTACHMNET J-2 SHEET 36 OF 79 SCALE 1"=100'

**LAYOUT  
FREWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**L - 26**

LAST REVISION DATE PLOTTED => 21-APR-2014  
00-00-00 TIME PLOTTED => 15:09

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED



NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**PROFILE**  
**ROUTE 710 - BORED TUNNEL**  
 "A" LINE

**PROFILE**  
**FREEWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**  
 SCALE: Horiz: 1" = 200'  
 Vert: 1" = 40'

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

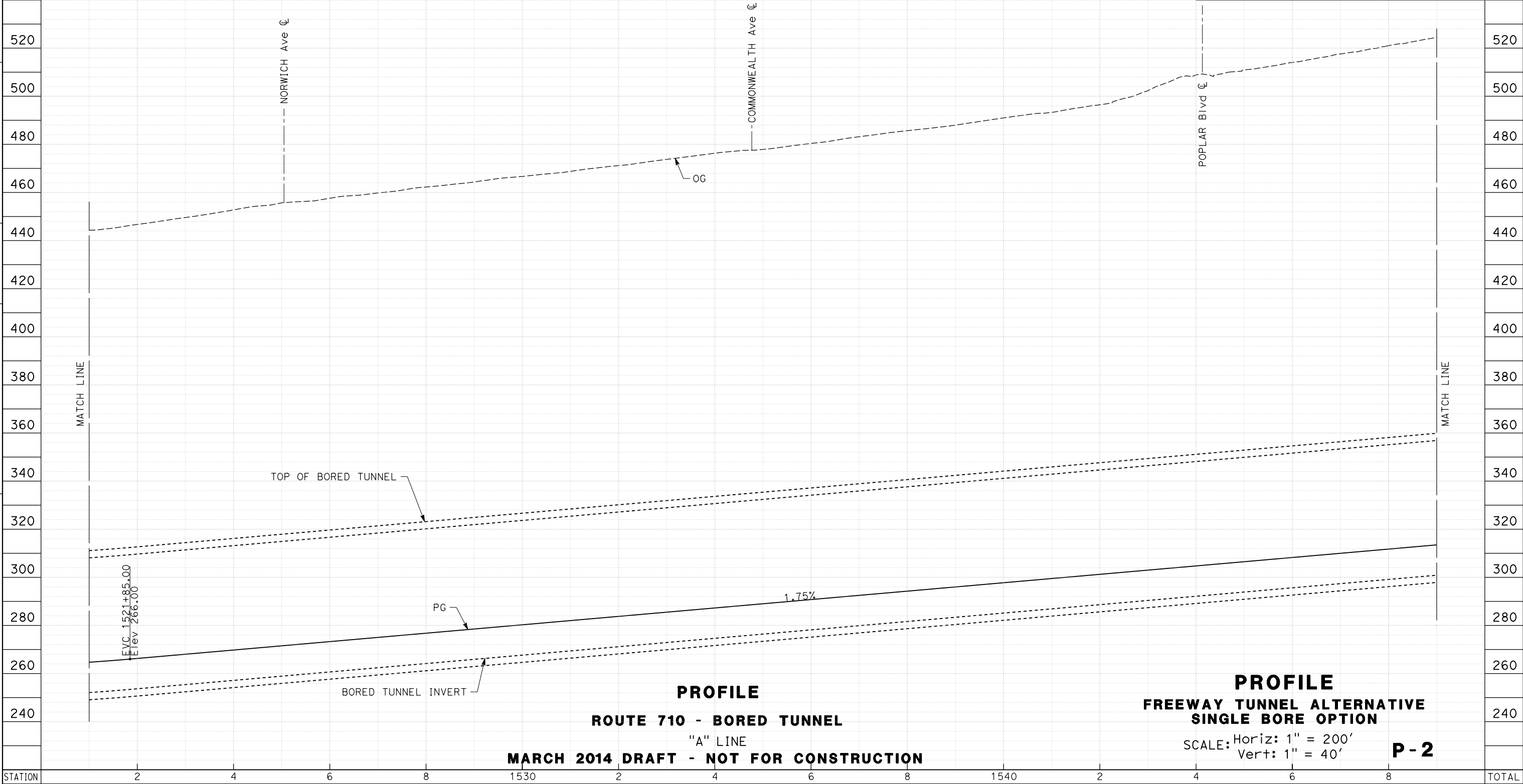
**P - 1**



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



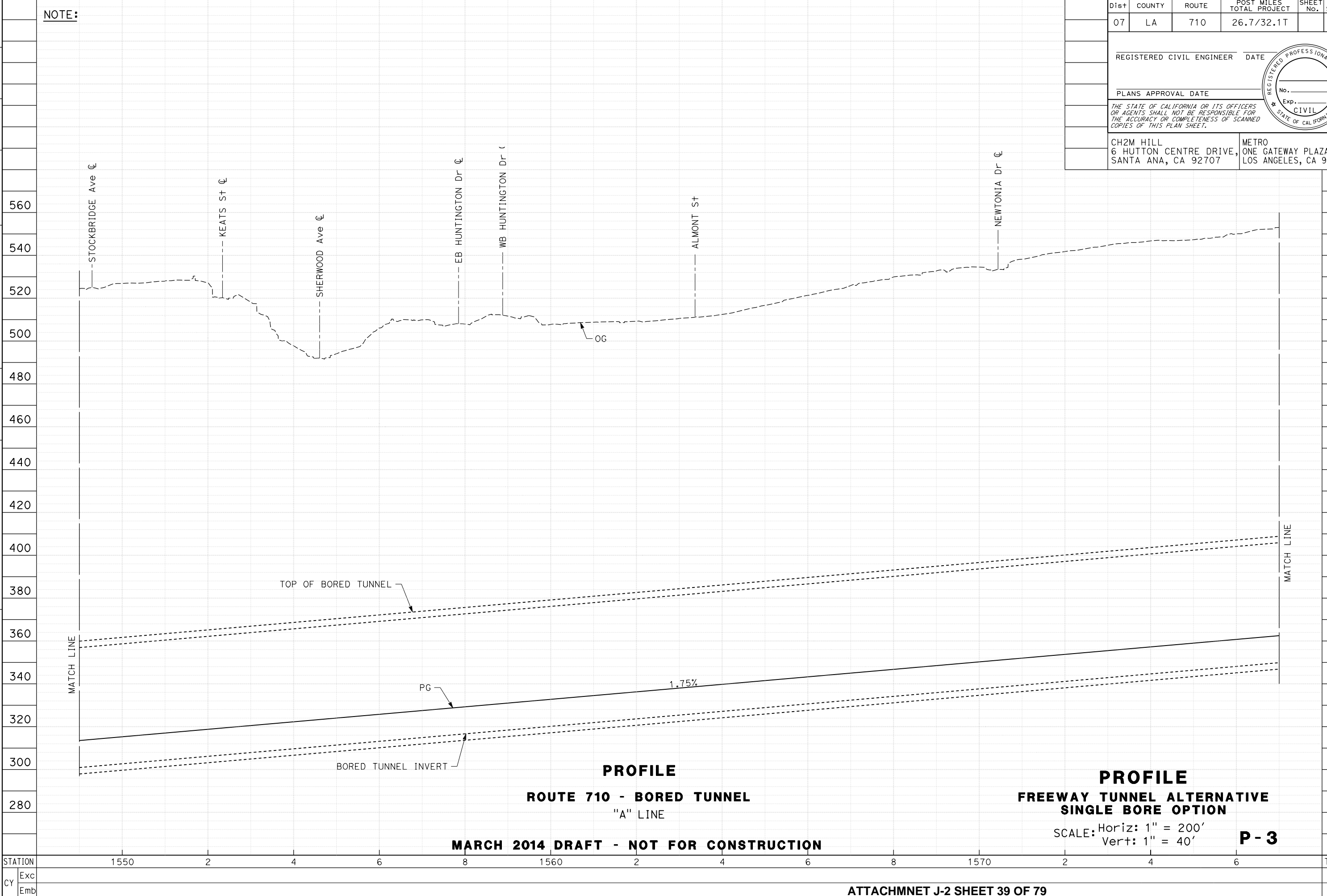
**PROFILE**  
**ROUTE 710 - BORED TUNNEL**  
 "A" LINE  
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE**  
**FREEWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**  
 SCALE: Horiz: 1" = 200'  
 Vert: 1" = 40'  
**P - 2**

STATION	2	4	6	8	1530	2	4	6	8	1540	2	4	6	8	TOTAL
Exc															
Emb															

ATTACHMNET J-2 SHEET 38 OF 79

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED



NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER			DATE		
PLANS APPROVAL DATE			No.		
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.			* CIVIL * STATE OF CALIFORNIA		
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		

**PROFILE**

**ROUTE 710 - BORED TUNNEL**  
 "A" LINE

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

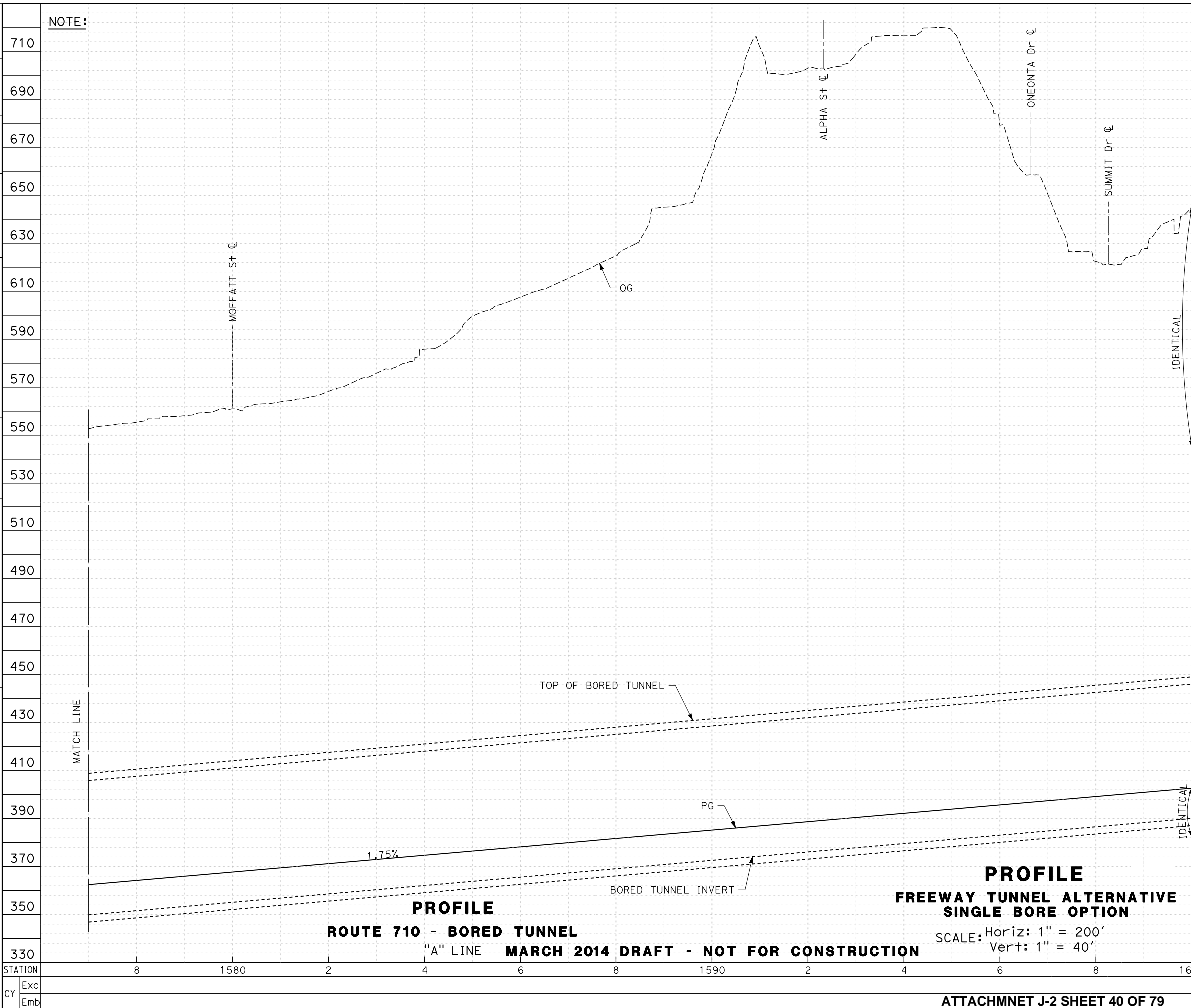
**PROFILE**

**FREEWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**

SCALE: Horiz: 1" = 200'  
 Vert: 1" = 40'

**P - 3**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED



NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
710	REGISTERED CIVIL ENGINEER DATE				
690	PLANS APPROVAL DATE				
670	THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.				
650	CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707		METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**PROFILE**

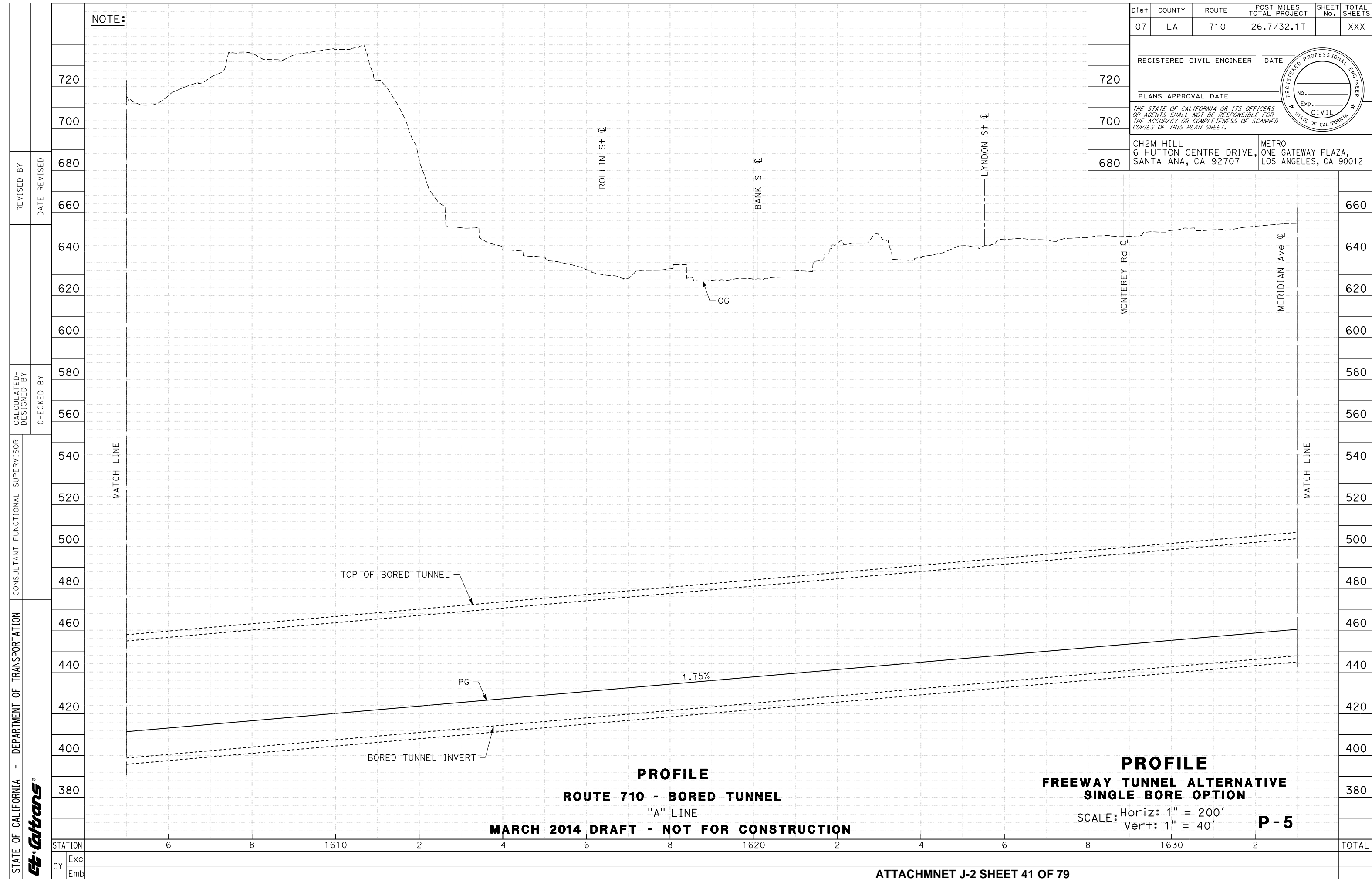
**FREEWAY TUNNEL ALTERNATIVE  
 SINGLE BORE OPTION**

**P-4**

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



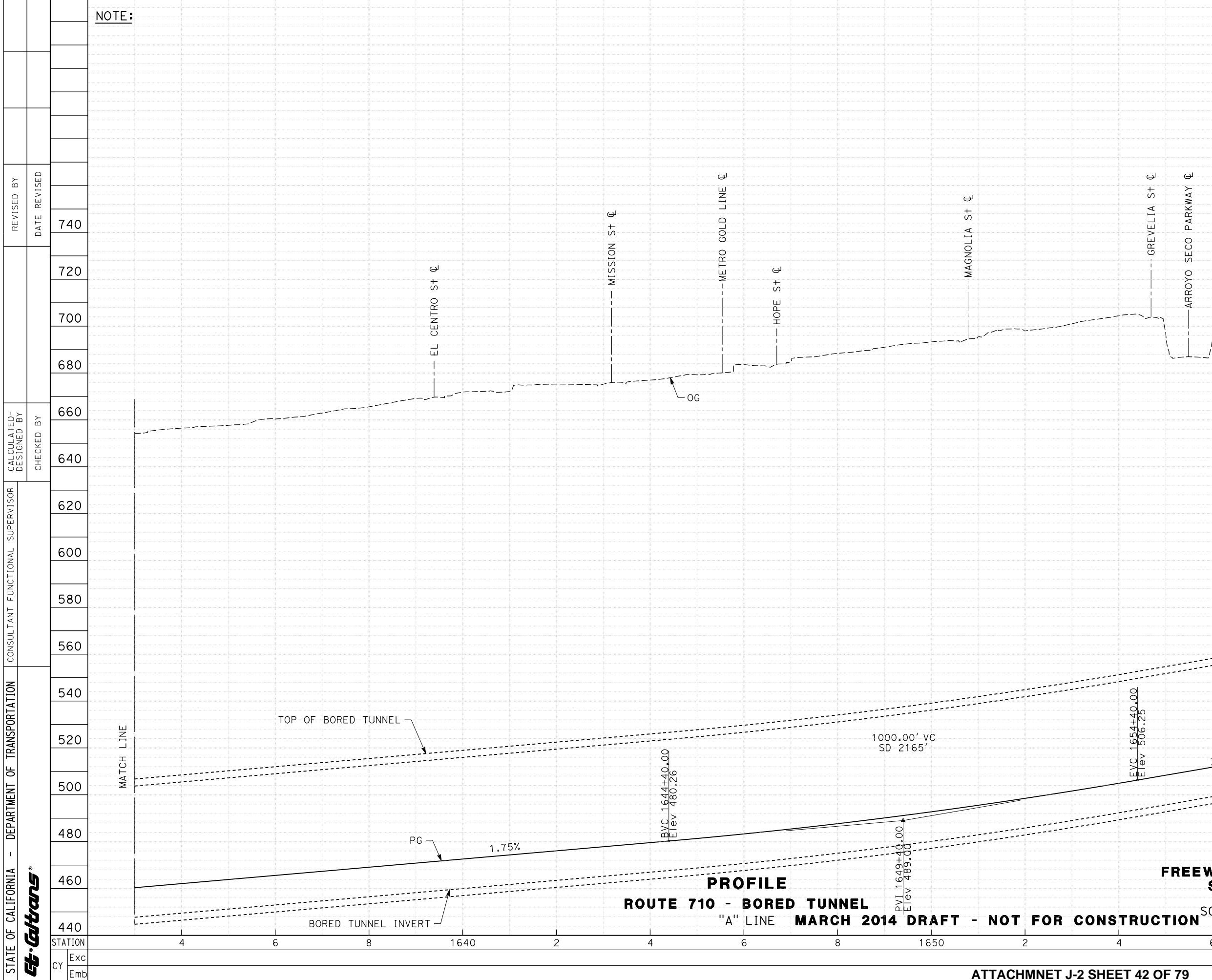
NOTE:



**PROFILE**  
**ROUTE 710 - BORED TUNNEL**  
 "A" LINE  
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

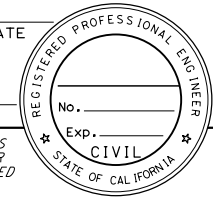
**PROFILE**  
**FREEWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**  
 SCALE: Horiz: 1" = 200'  
 Vert: 1" = 40'

**P-5**



NOTE:

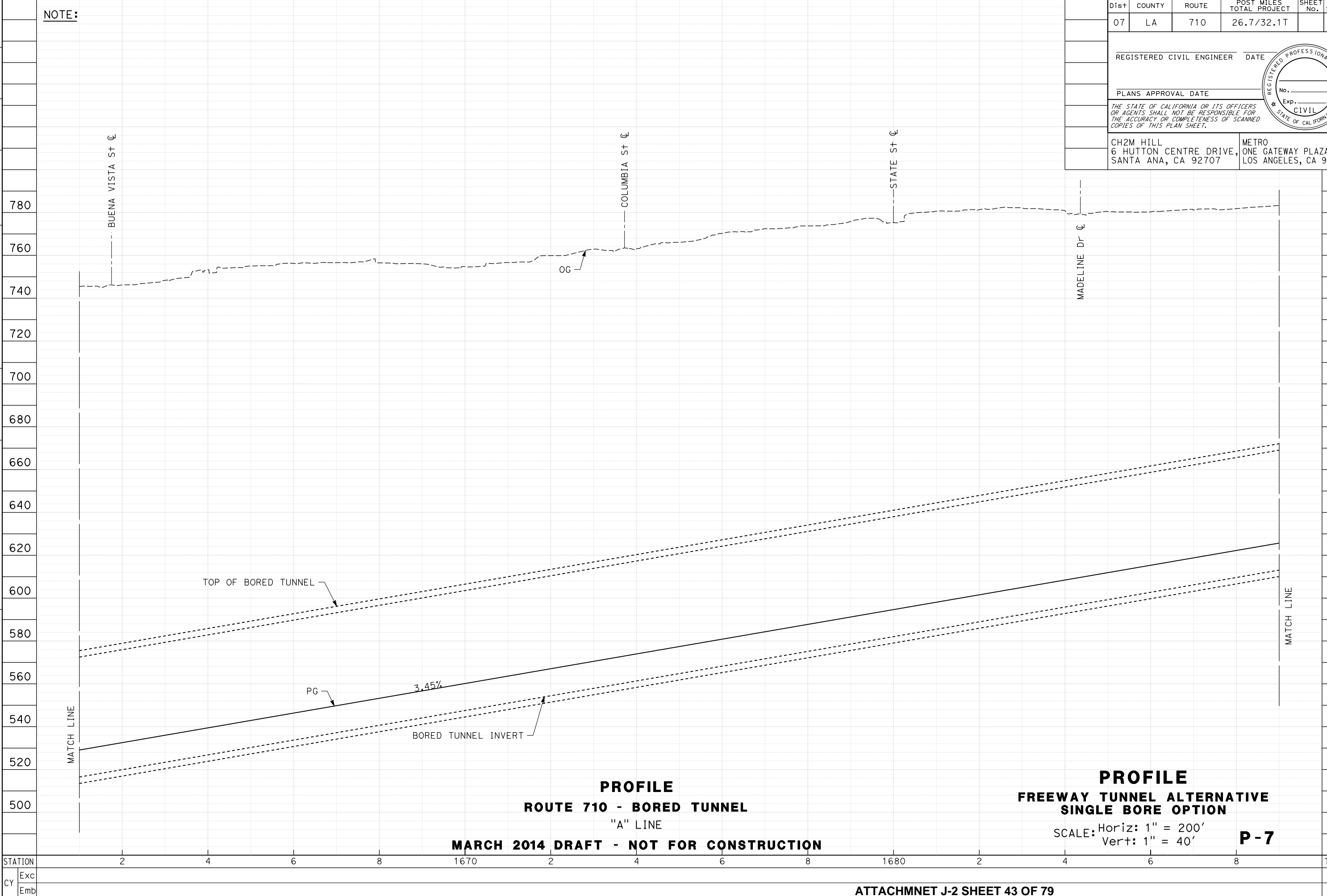
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	REVISOR	DATE	740
	CALCULATED-DESIGNED BY	CHECKED BY	DATE	720
Exc	CY	STATION	Exc	700
			Emb	680
Exc	CY	STATION	Exc	660
			Emb	640
Exc	CY	STATION	Exc	620
			Emb	600
Exc	CY	STATION	Exc	580
			Emb	560
Exc	CY	STATION	Exc	540
			Emb	520
Exc	CY	STATION	Exc	500
			Emb	480
Exc	CY	STATION	Exc	460
			Emb	440
TOTAL			Exc	740
TOTAL			Emb	720
TOTAL			Exc	700
TOTAL			Emb	680
TOTAL			Exc	660
TOTAL			Emb	640
TOTAL			Exc	620
TOTAL			Emb	600
TOTAL			Exc	580
TOTAL			Emb	560
TOTAL			Exc	540
TOTAL			Emb	520
TOTAL			Exc	500
TOTAL			Emb	480
TOTAL			Exc	460
TOTAL			Emb	440

**PROFILE**  
**ROUTE 710 - BORED TUNNEL**  
**"A" LINE MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**  
**SCALE: Horiz: 1" = 200'**  
**Vert: 1" = 40'**  
**P - 6**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
*Caltrans*  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED



NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



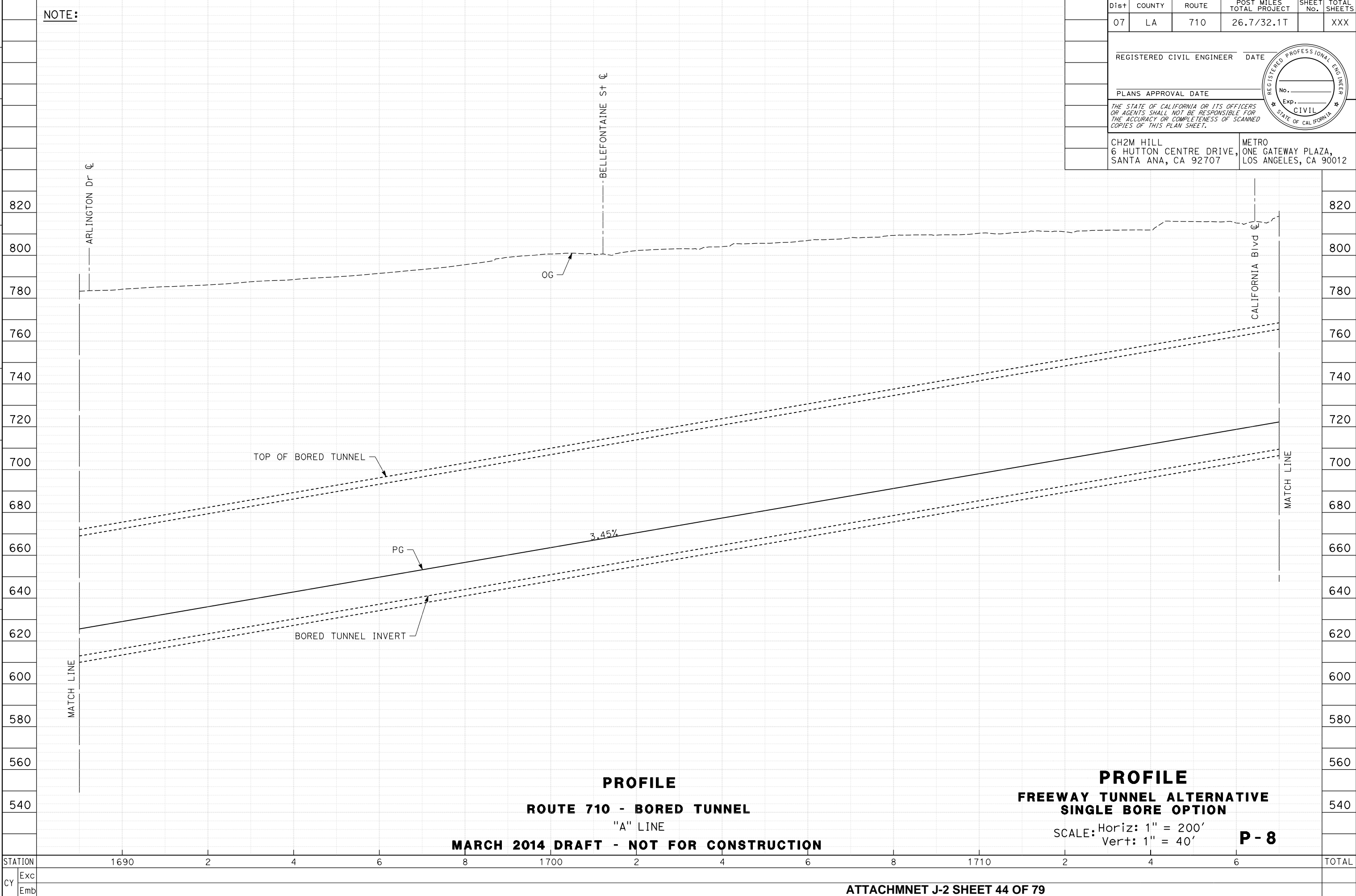
**PROFILE**  
**ROUTE 710 - BORED TUNNEL**  
 "A" LINE

**PROFILE**  
**FREEWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**  
 SCALE: Horiz: 1" = 200'  
 Vert: 1" = 40'

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**P-7**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED



NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER				DATE	
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**PROFILE**

**ROUTE 710 - BORED TUNNEL**

"A" LINE

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE**

**FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

SCALE: Horiz: 1" = 200'  
Vert: 1" = 40'

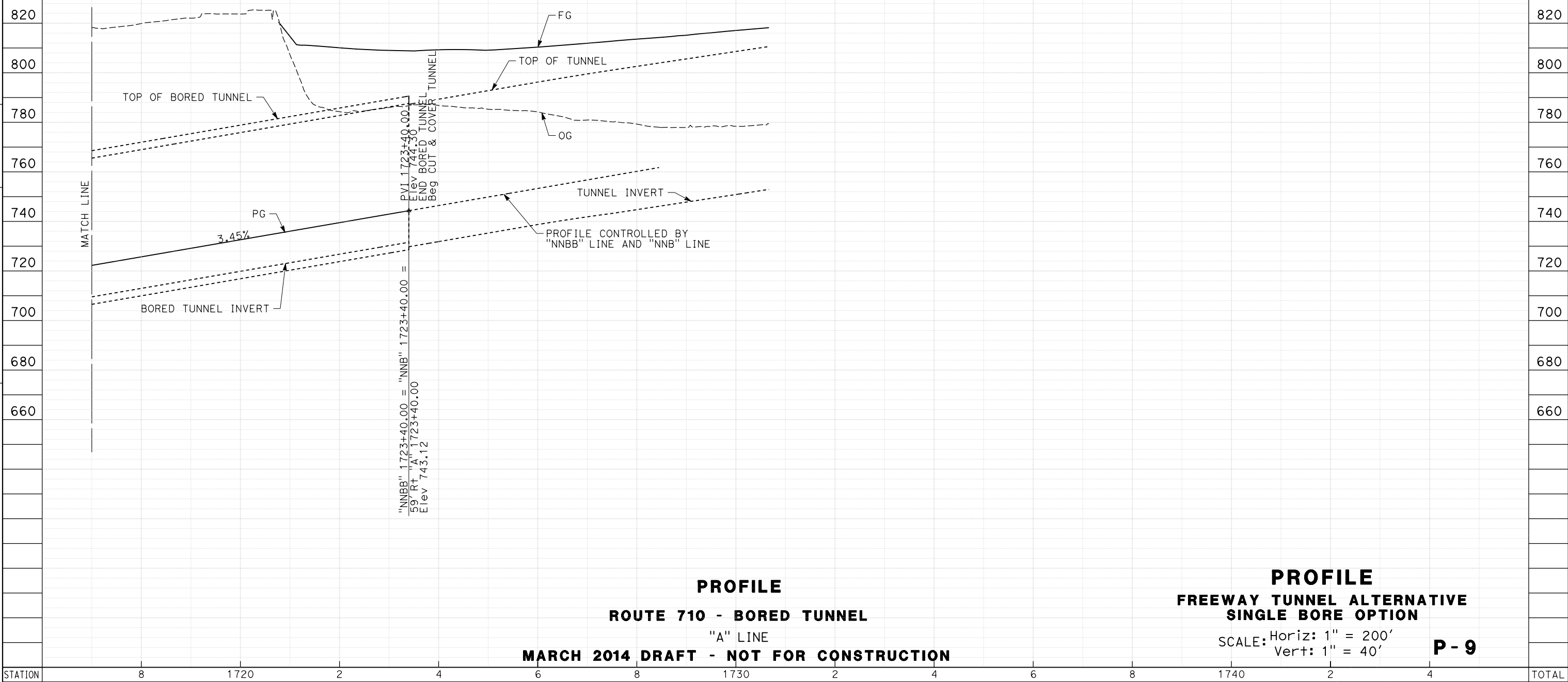
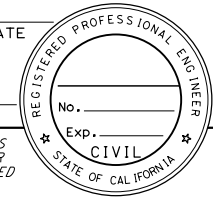
**P - 8**

ATTACHMNET J-2 SHEET 44 OF 79

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR	DATE
<b>Caltrans</b>		CHECKED BY	DATE	

NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**PROFILE**  
**ROUTE 710 - BORED TUNNEL**  
**"A" LINE**  
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE**  
**FREEWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**  
 SCALE: Horiz: 1" = 200'  
 Vert: 1" = 40'

**P - 9**

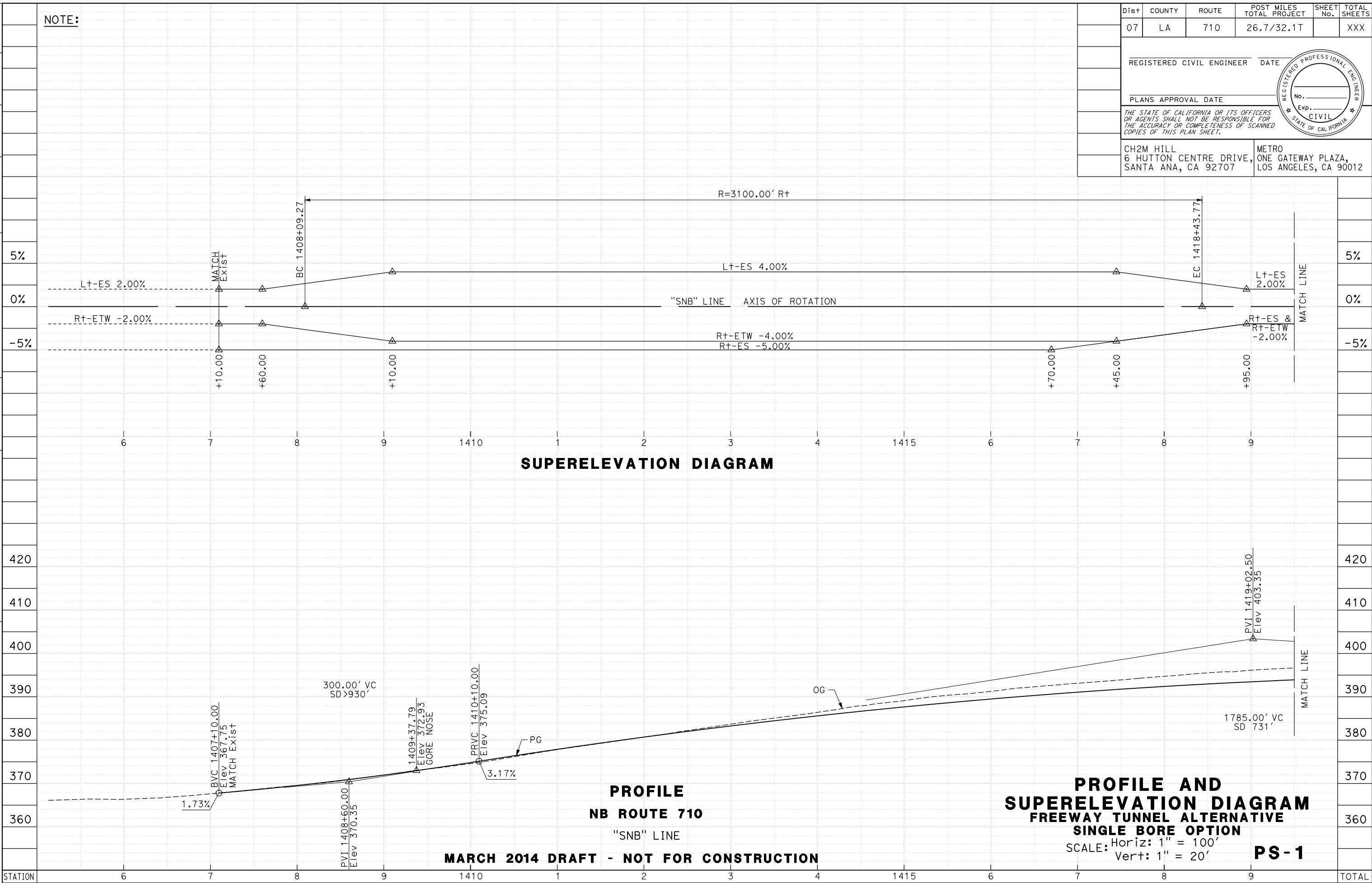
STATION	8	1720	2	4	6	8	1730	2	4	6	8	1740	2	4	TOTAL
Exc															
Emb															



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



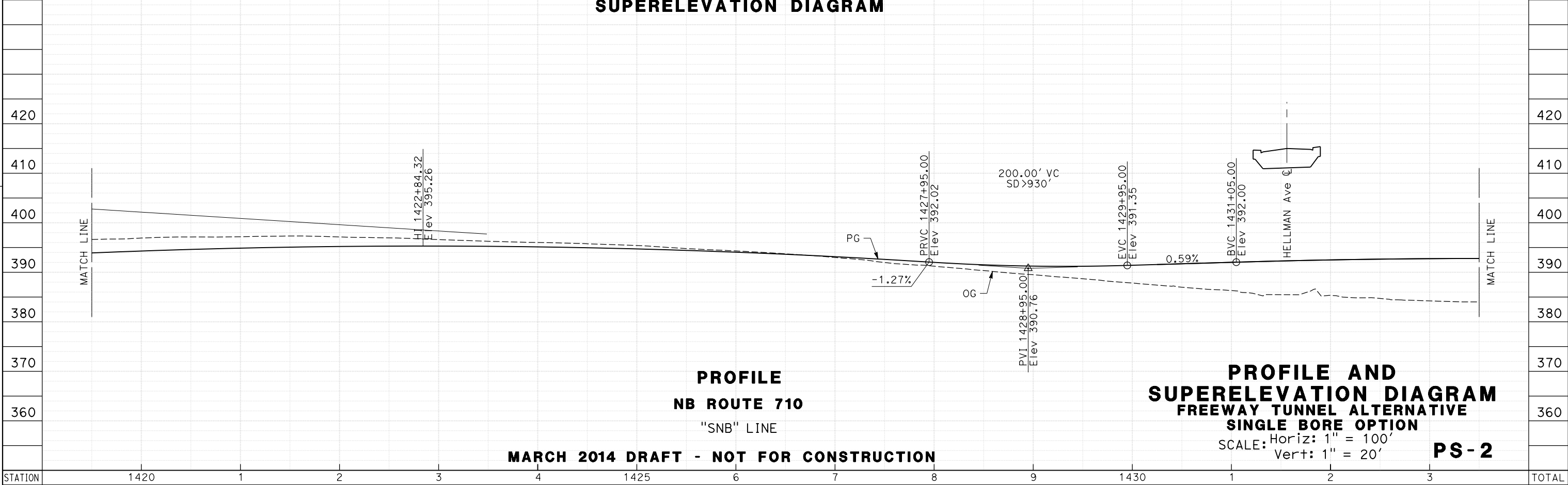
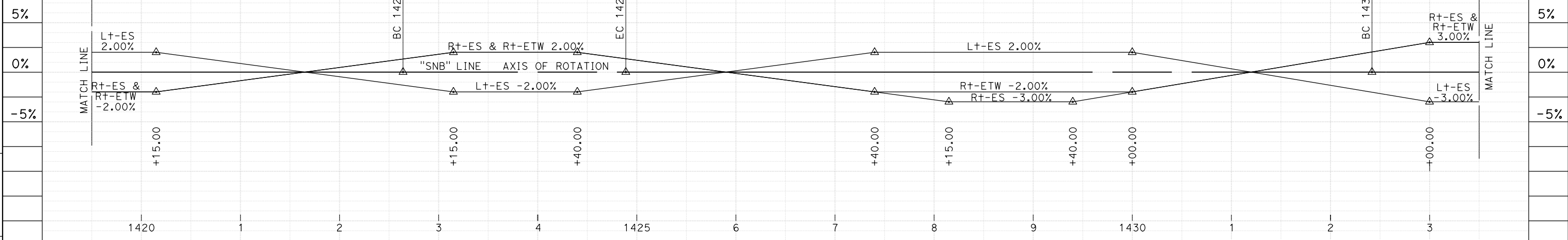
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED
Exc			
Emb			

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 14:50

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'  
**PS-2**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED

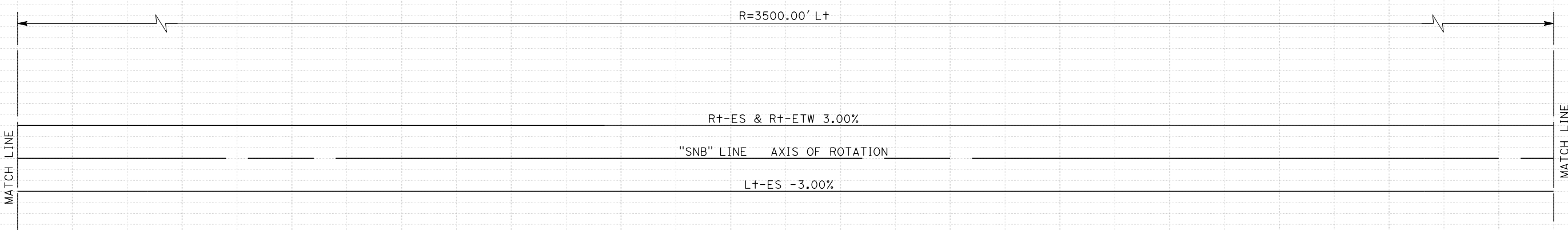
STATION	1420	1	2	3	4	1425	6	7	8	9	1430	1	2	3	TOTAL
Exc															
Emb															

LAST REVISION DATE PLOTTED => 21-MAR-2014  
 00-00-00 TIME PLOTTED => 14:50

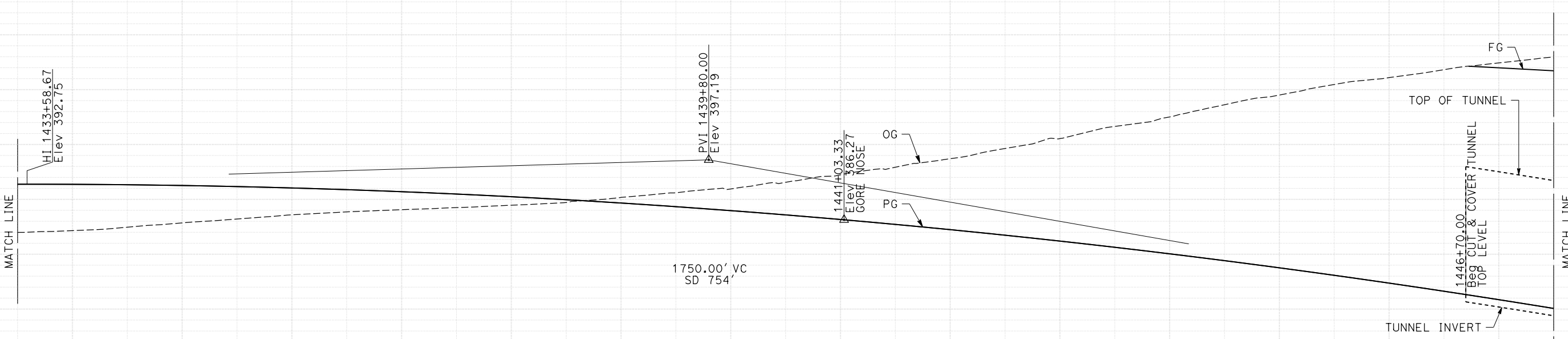
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE  
NB ROUTE 710  
"SNB" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

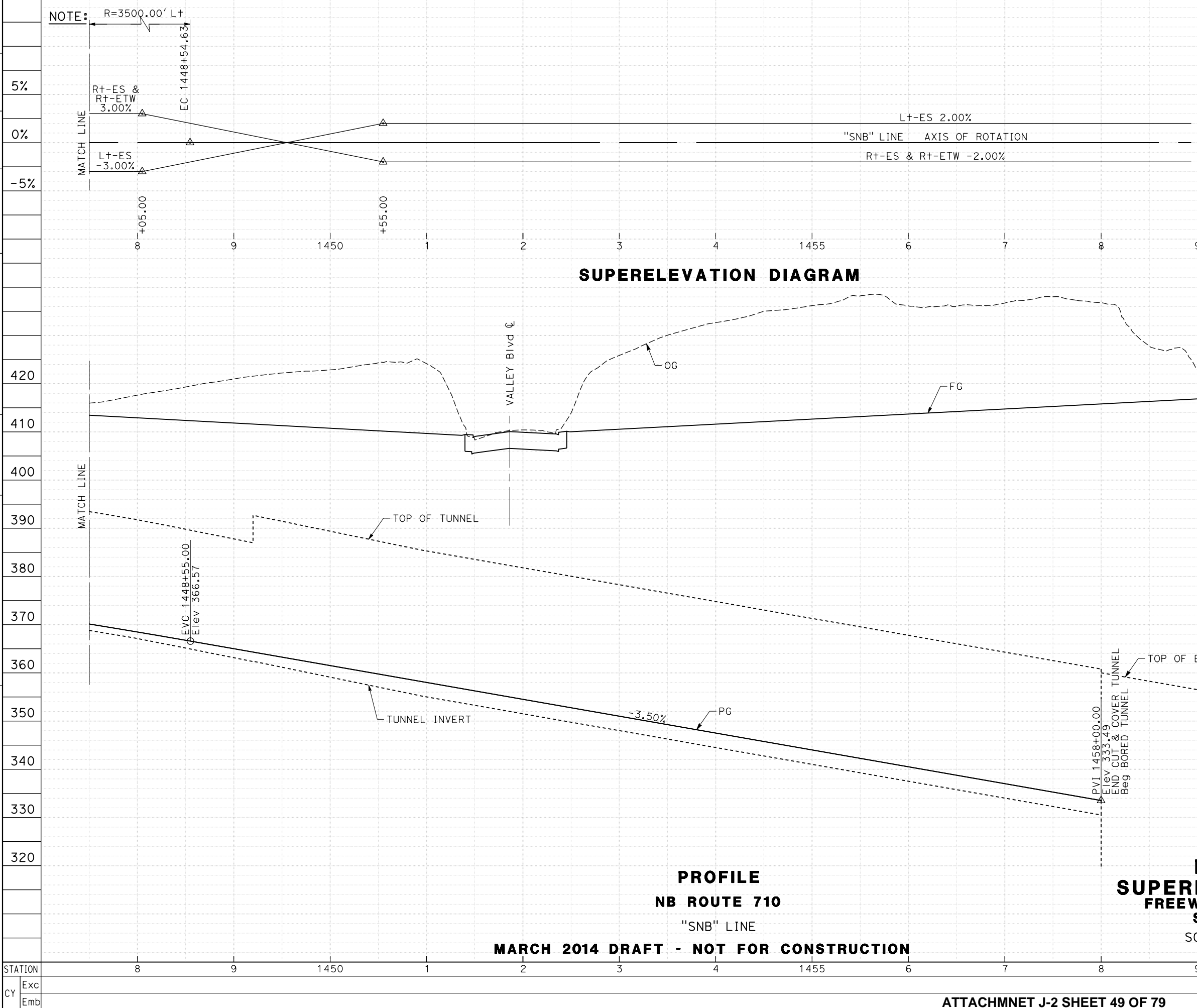
**PS-3**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED
STATION	Exc	Emb	

4	1435	6	7	8	9	1440	1	2	3	4	1445	6	7	TOTAL
---	------	---	---	---	---	------	---	---	---	---	------	---	---	-------

ATTACHMNET J-2 SHEET 48 OF 79

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISOR BY  
 DATE REVISOR  
 STATION  
 CY Exc  
 Emb



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**SUPERELEVATION DIAGRAM**

**PROFILE  
NB ROUTE 710  
"SNB" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'

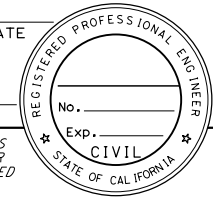
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PS-4**

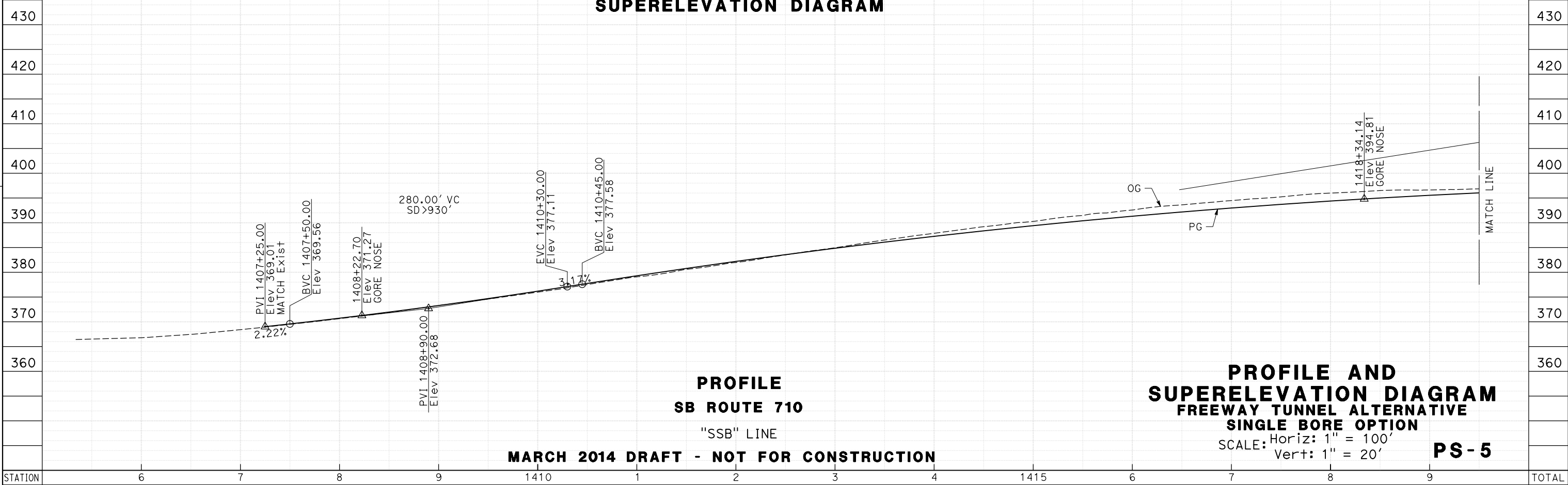
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISION  
 STATION  
 CY Exc  
 Emb

NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**SUPERELEVATION DIAGRAM**



**PROFILE  
SB ROUTE 710**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'  
**PS-5**

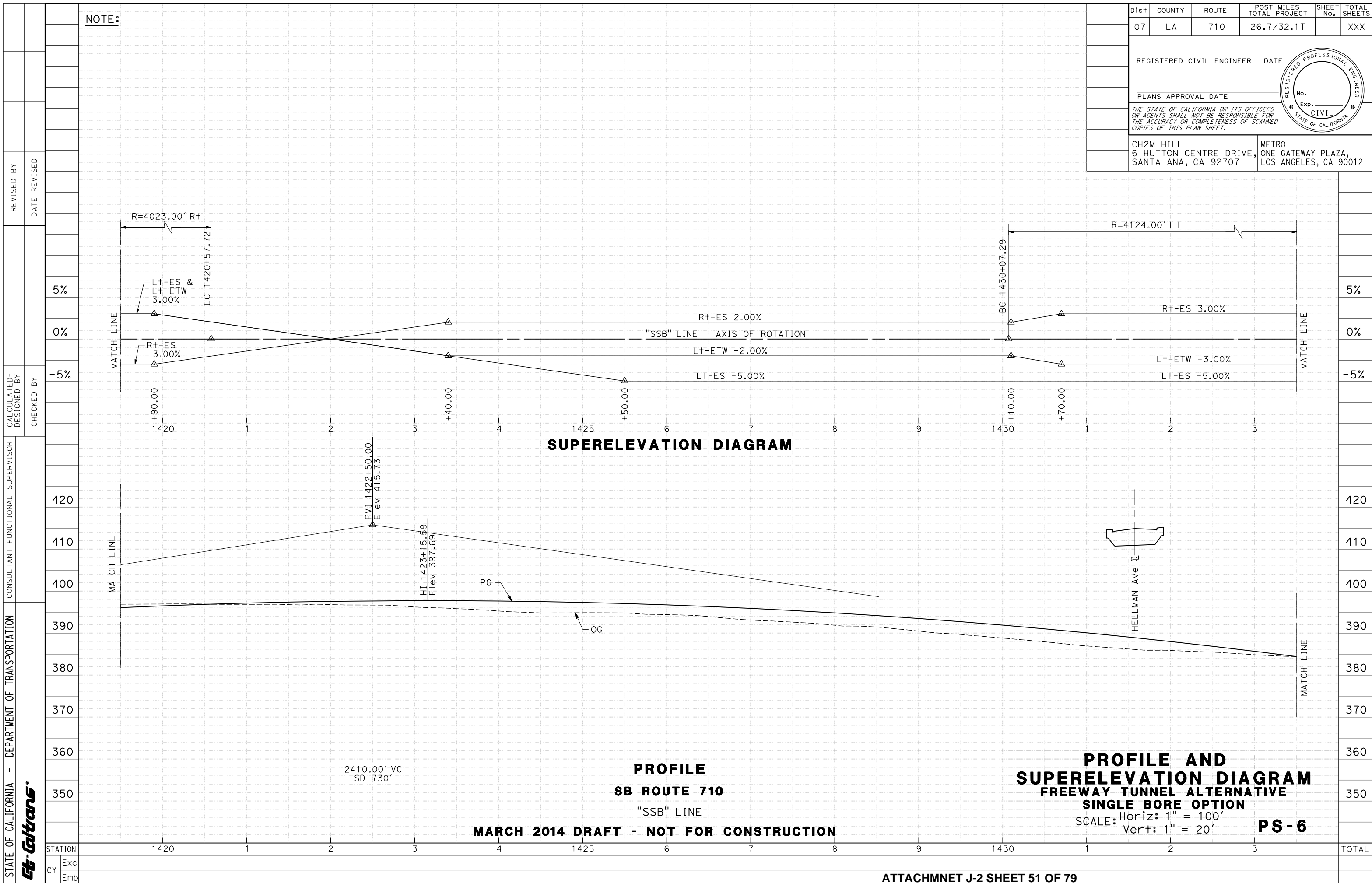
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 14:50

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



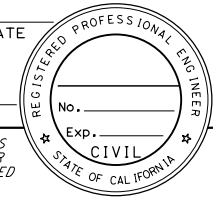
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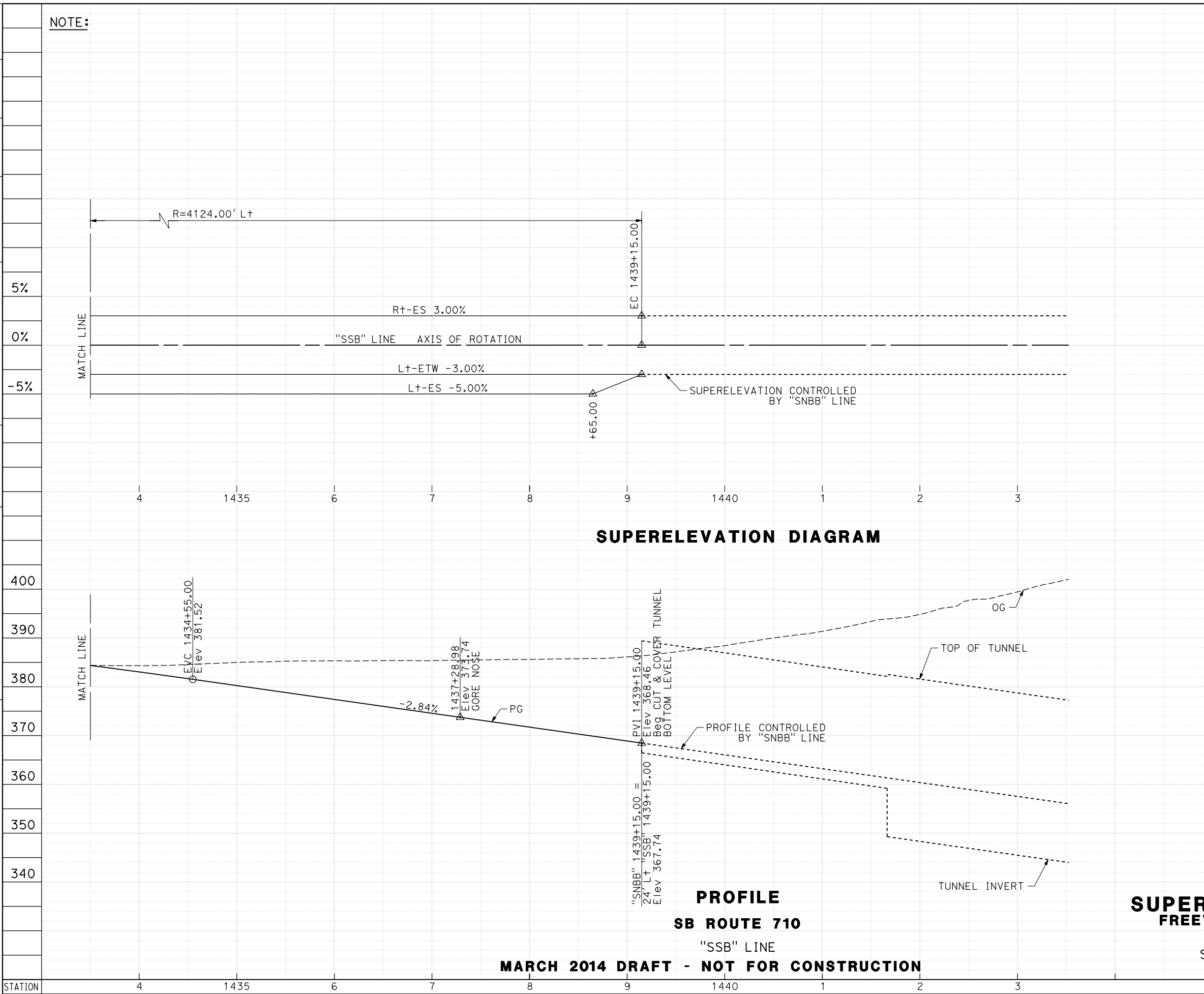
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR	DATE
<b>Caltrans</b>		CHECKED BY		
Exc	Emb			

STATION	1420	1	2	3	1425	6	7	8	9	1430	1	2	3	TOTAL
Exc														
Emb														


LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 14:51

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		

NOTE:



**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20' **PS-7**

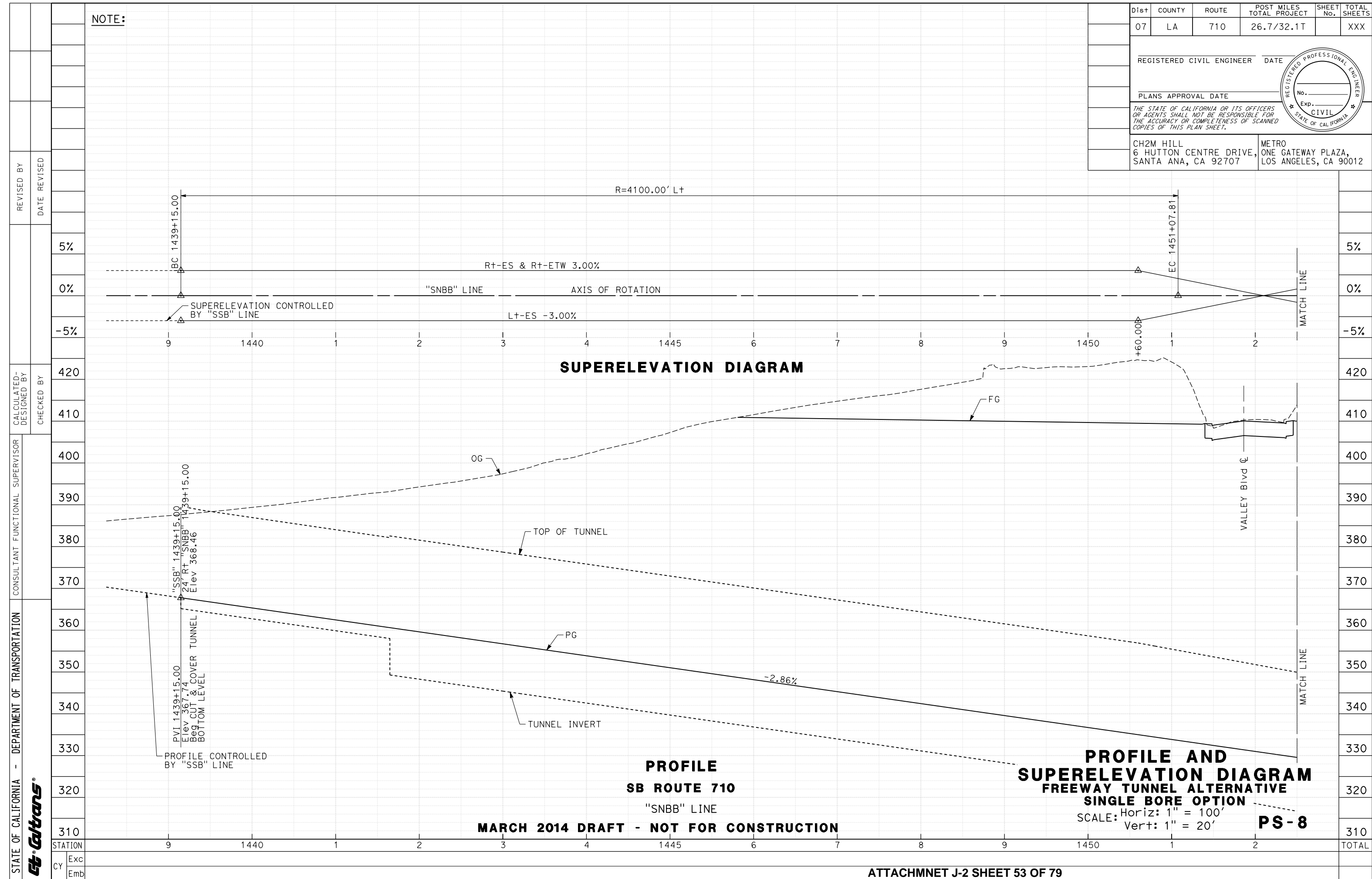
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR	DATE
		CHECKED BY		
CY	Exc	Emb		

STATION	4	1435	6	7	8	9	1440	1	2	3	TOTAL

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**

**PROFILE  
SB ROUTE 710**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

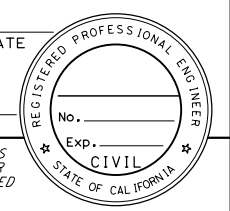
**PS-8**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE
<b>Caltrans</b>					
Exc					
Emb					

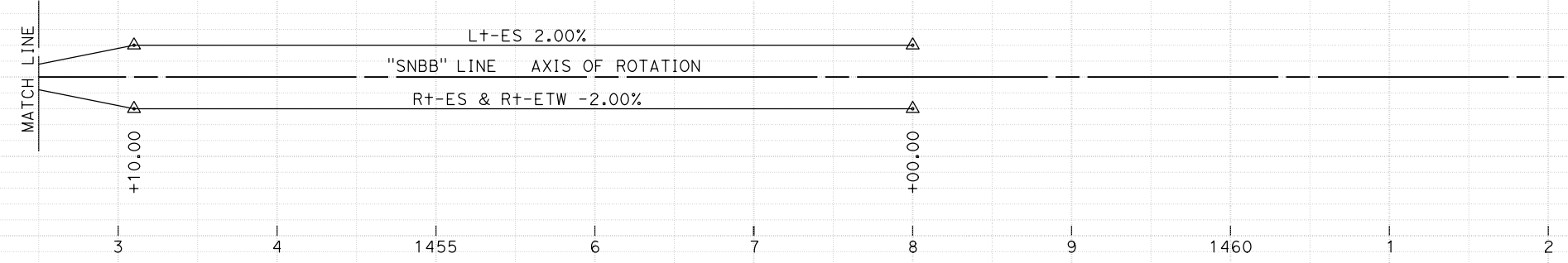
LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 14:49



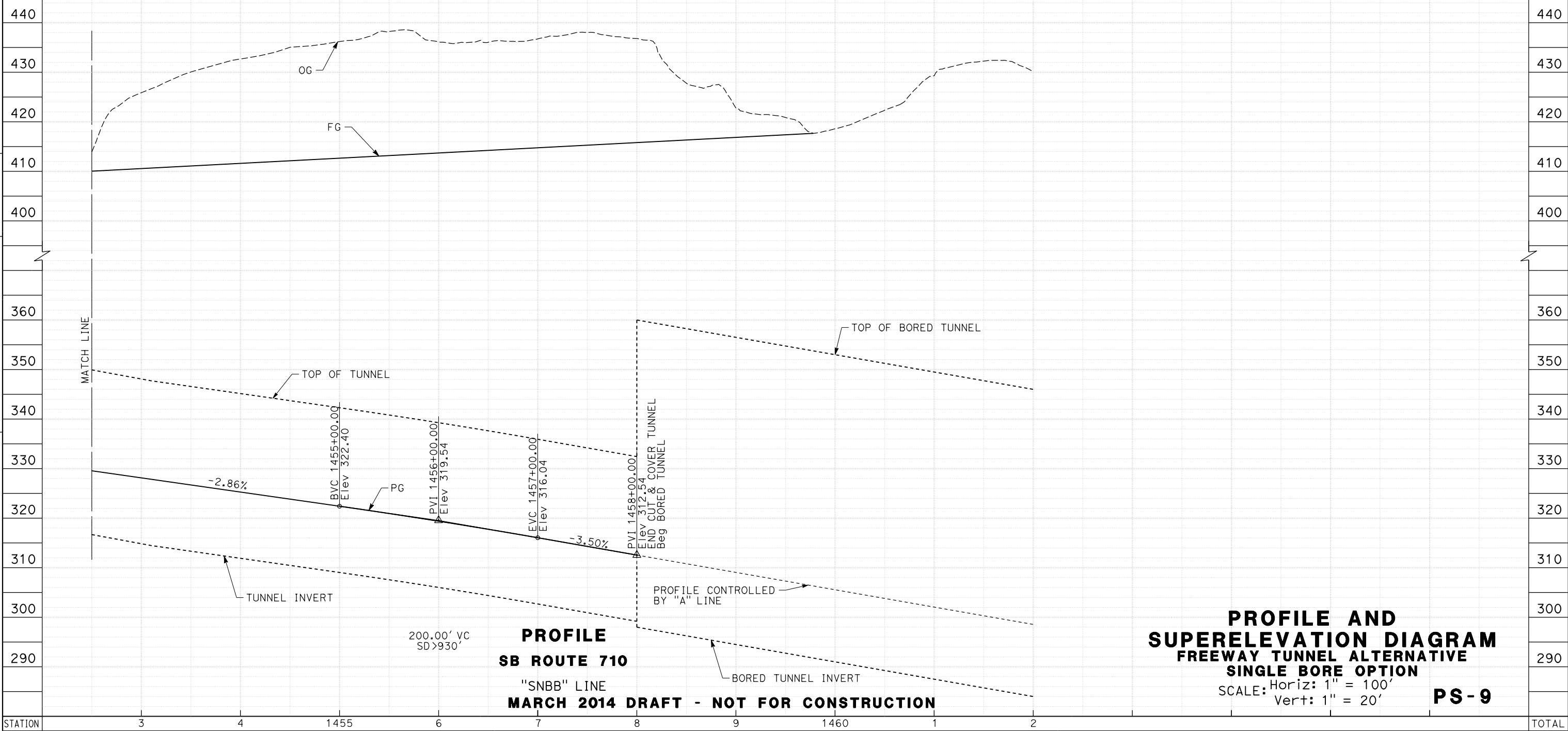
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
5%	REGISTERED CIVIL ENGINEER DATE				
0%	PLANS APPROVAL DATE				
-5%	<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>				
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**NOTE:**



**SUPERELEVATION DIAGRAM**



**PROFILE  
SB ROUTE 710  
"SNBB" LINE  
MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-9**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED
Exc			
Emb			

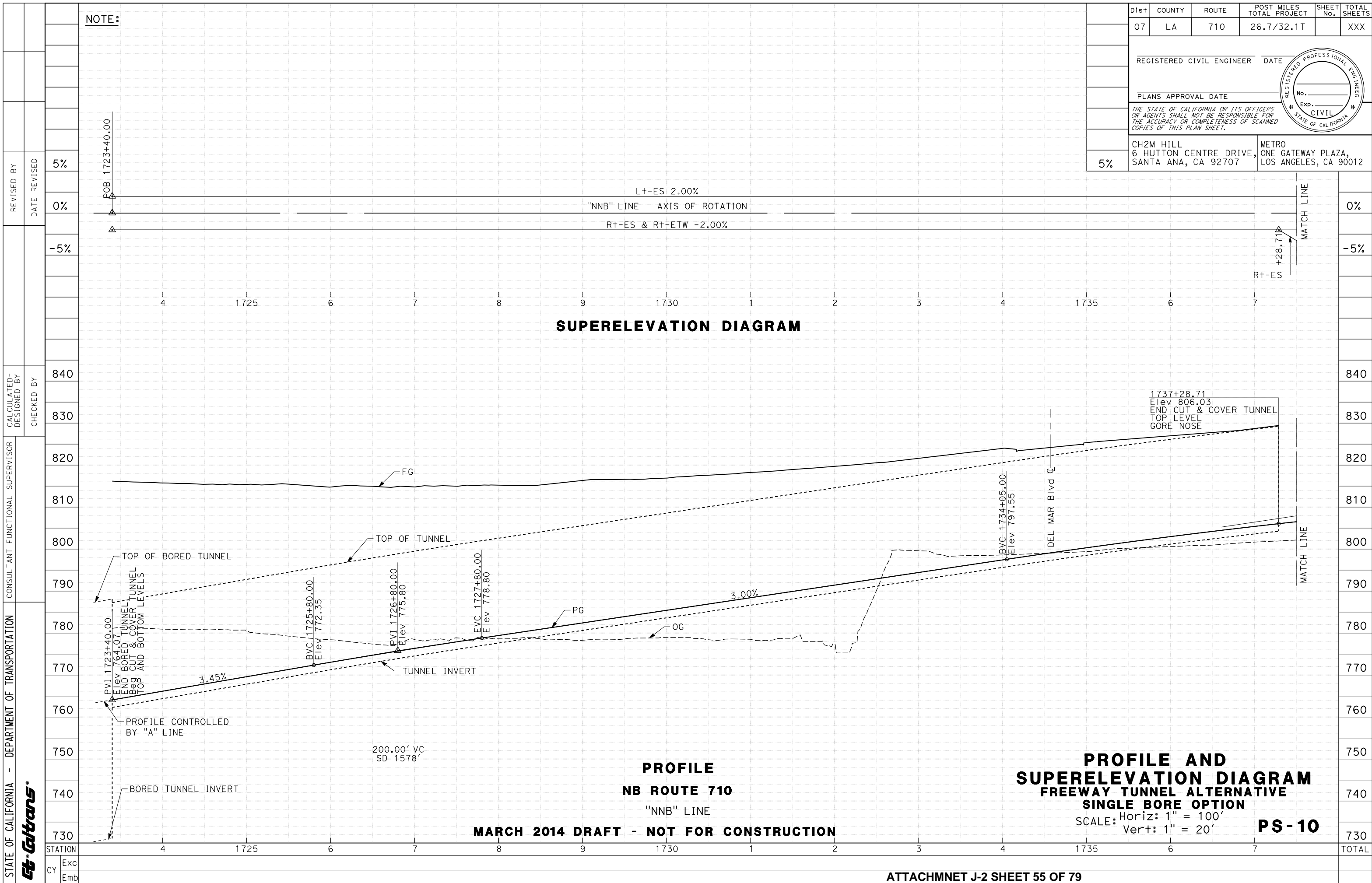
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430	
420	
410	
400	
360	
350	
340	
330	
320	
310	
300	
290	
TOTAL	

LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 14:50

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**

**PROFILE  
NB ROUTE 710  
"NNB" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

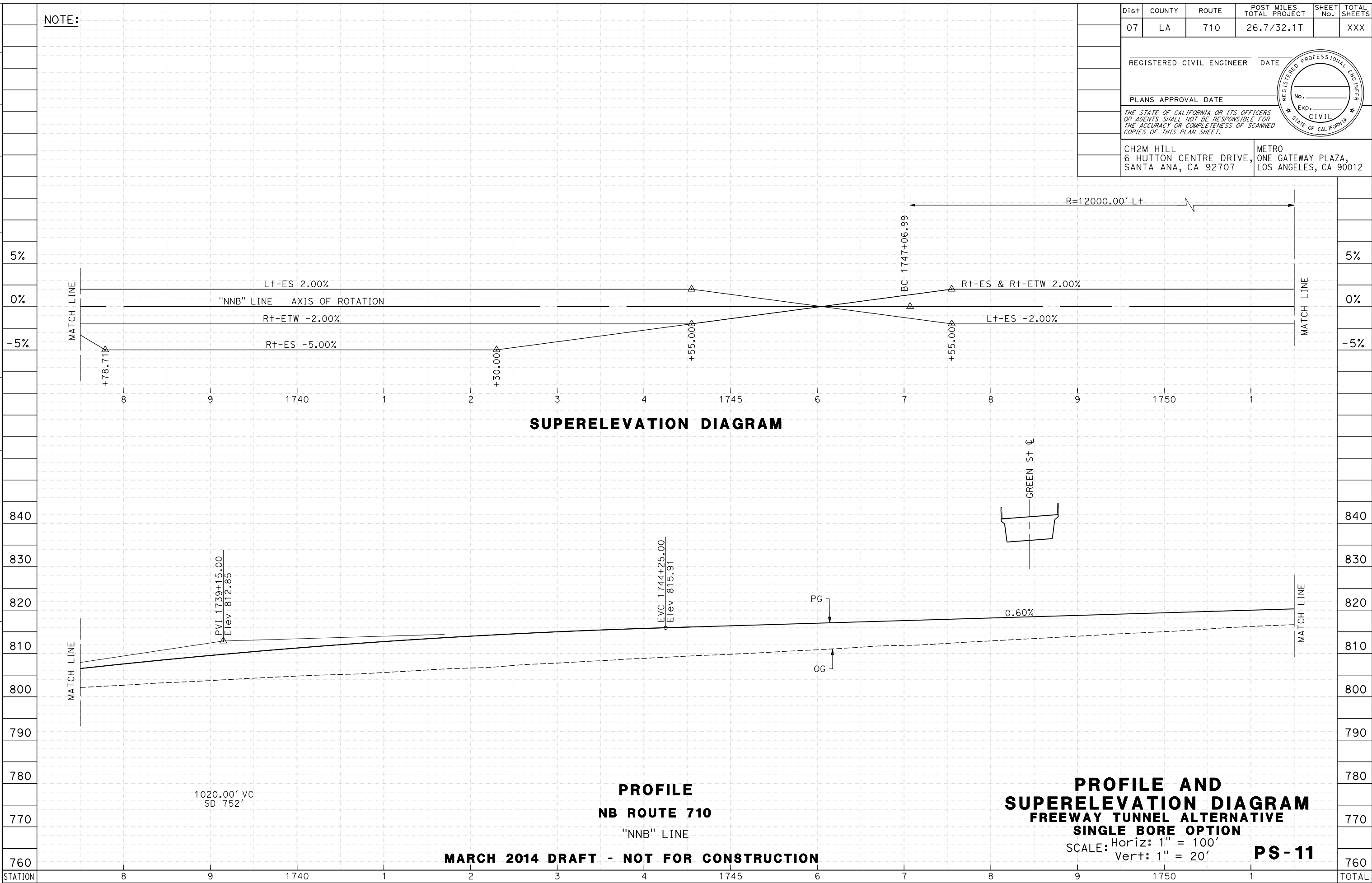
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PS-10**

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**

**PROFILE  
NB ROUTE 710  
"NNB" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-11**

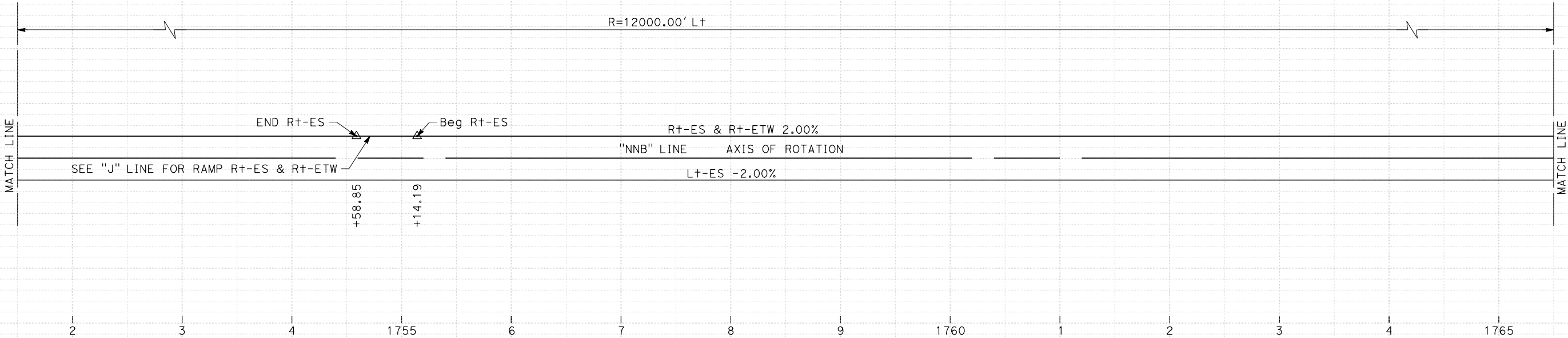
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE
Exc	Emb				

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 14:49

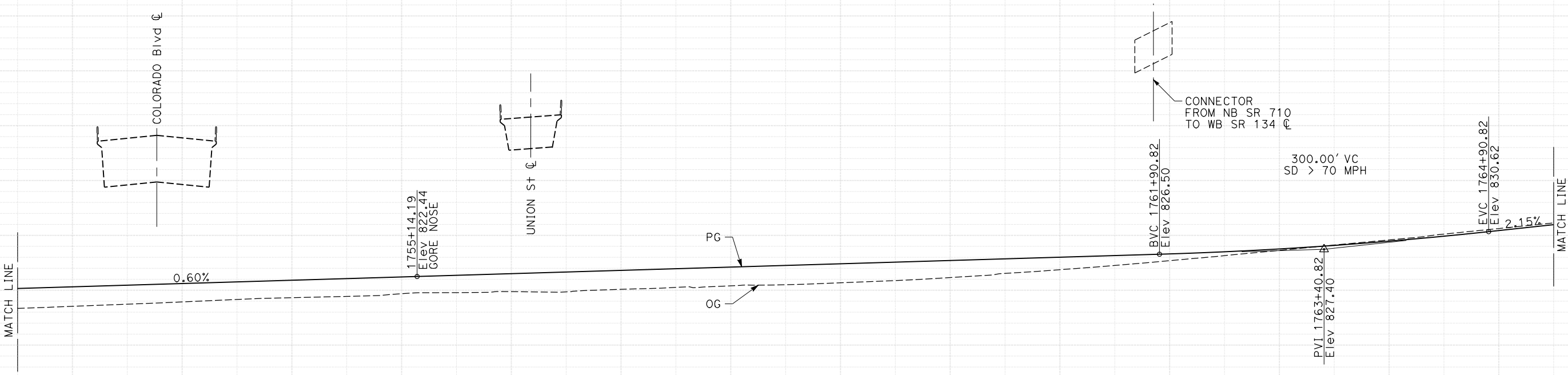
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE  
NB ROUTE 710**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

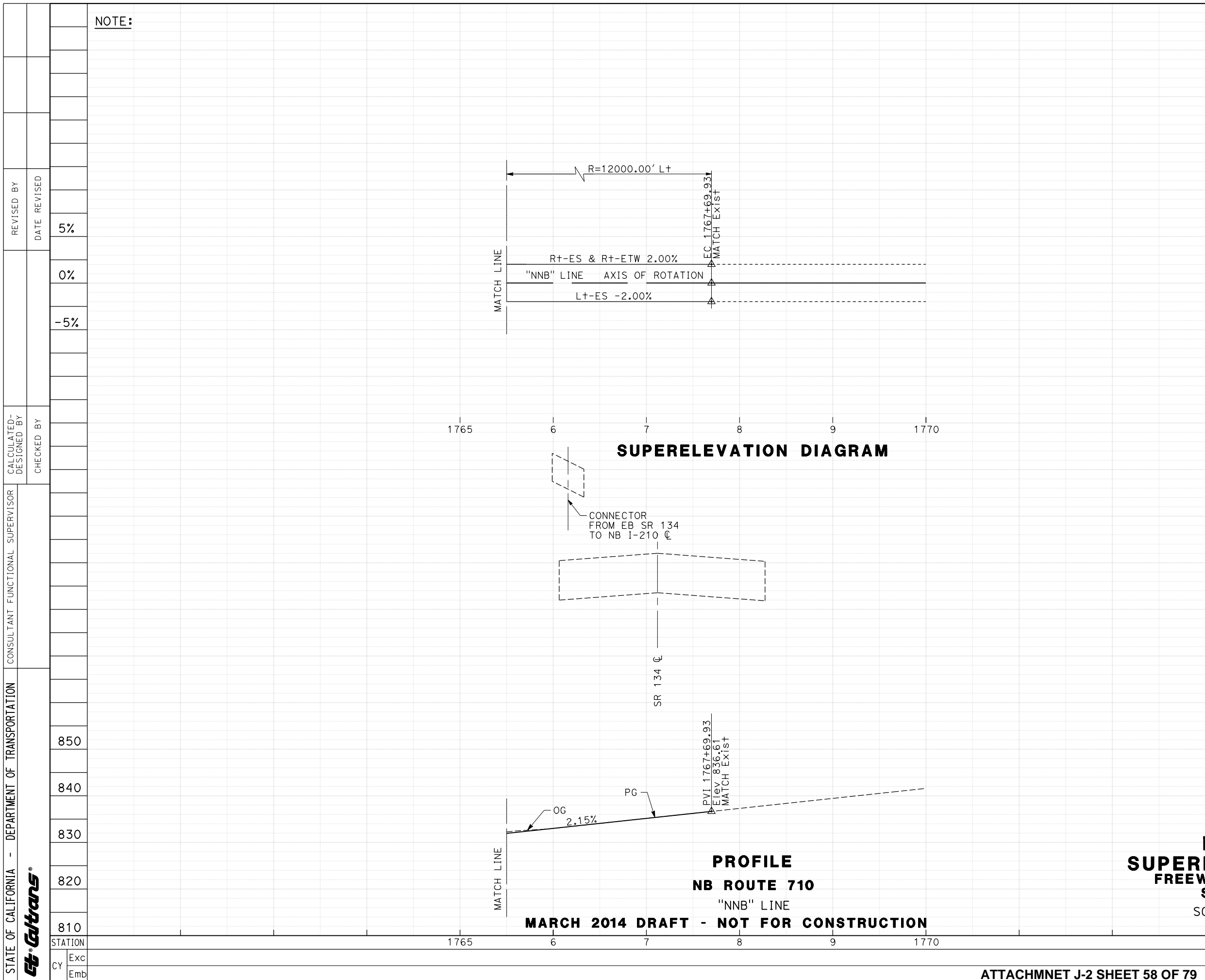
**PS-12**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY	DATE
<b>Caltrans</b>		CHECKED BY		
Exc	Emb			

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



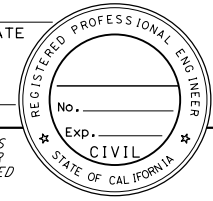
**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-13**

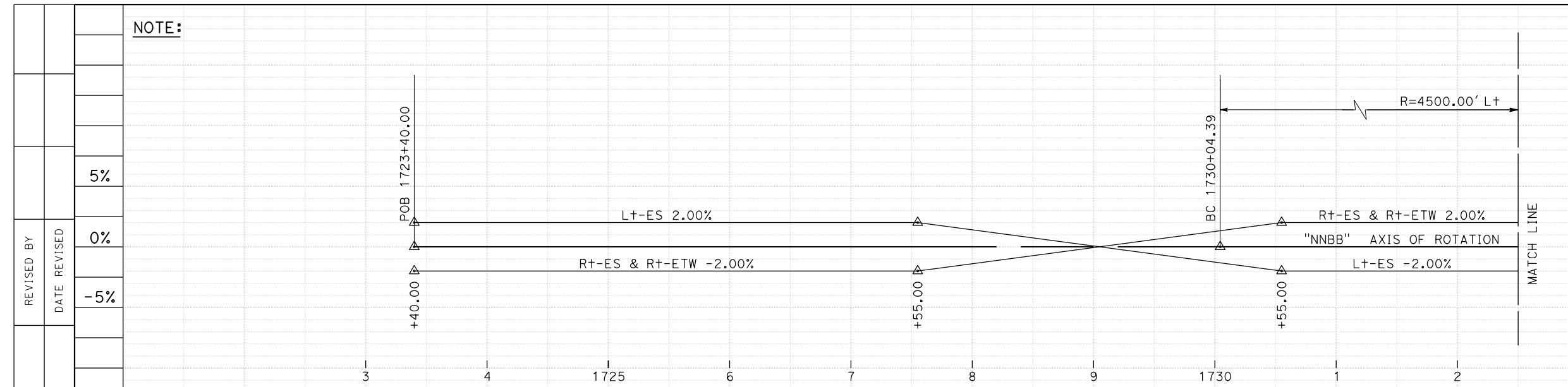
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	REVISOR	DATE	REVISION
CALCULATED-DESIGNED BY			
	CHECKED BY		
CONSULTANT FUNCTIONAL SUPERVISOR			
STATION			
CY	Exc		
	Emb		

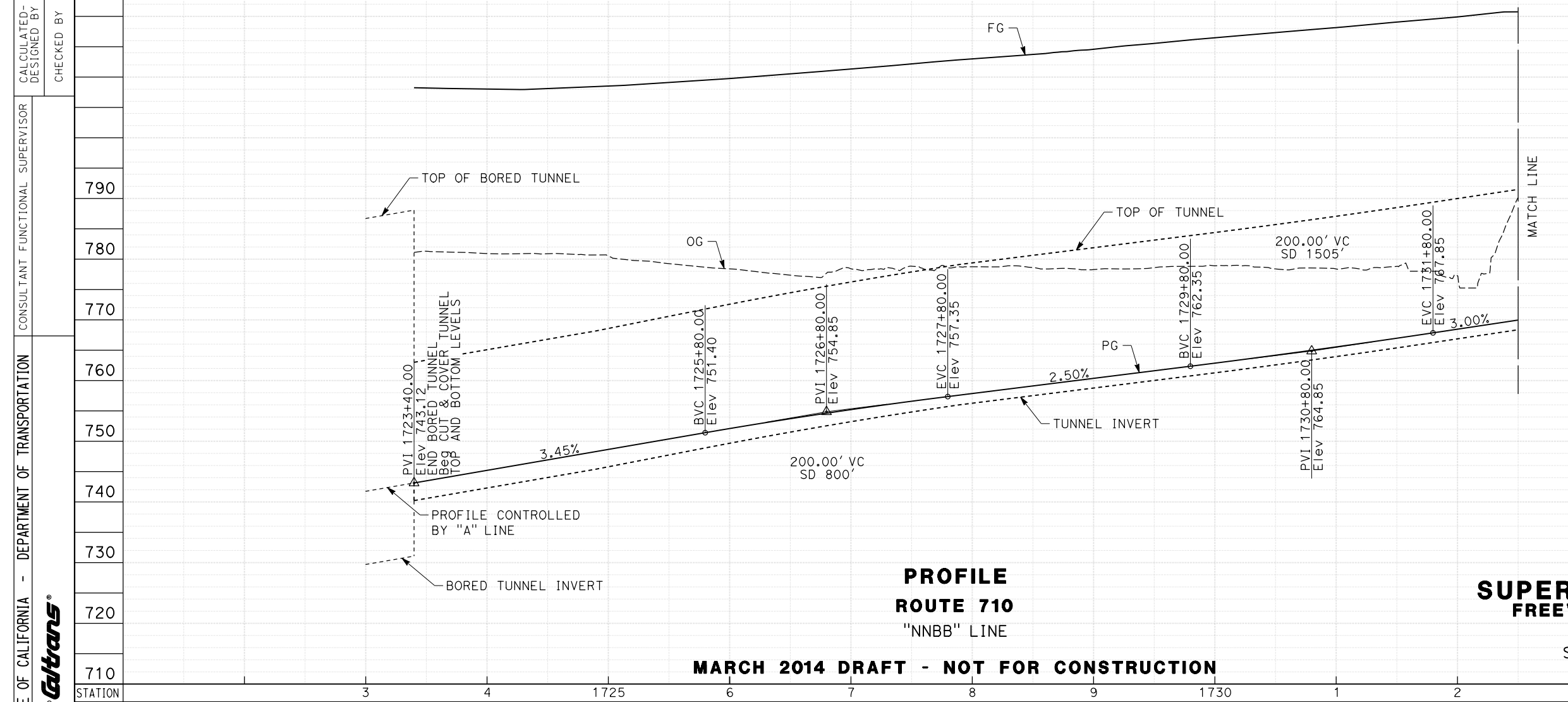
LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 14:50

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
5%	CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707		METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		

NOTE:



**SUPERELEVATION DIAGRAM**




**PROFILE  
ROUTE 710  
"NNBB" LINE**

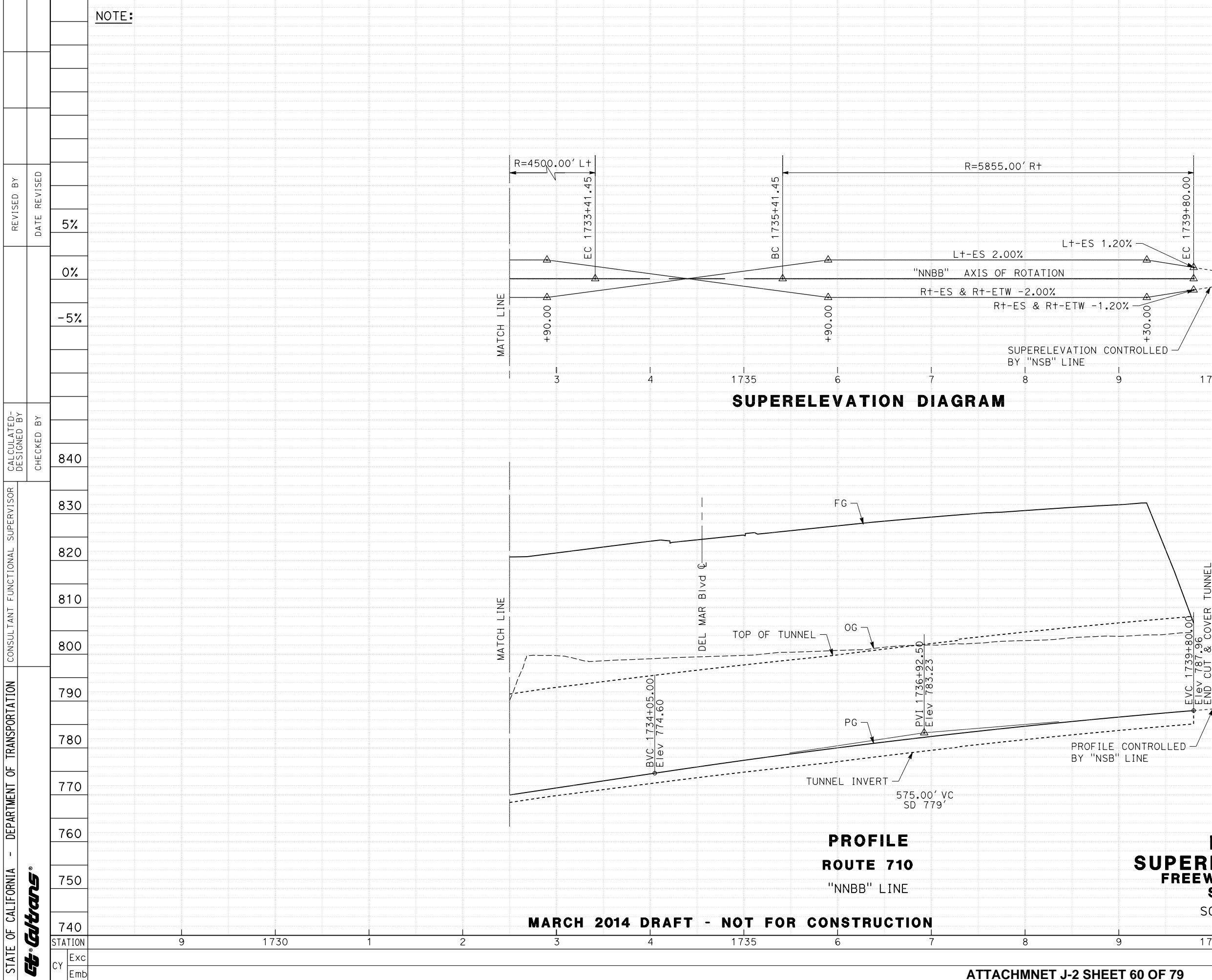
**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-14**

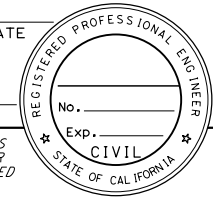
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR	DATE	PERCENT
					
Exc					
Emb					



NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



REVISOR	REVISION	DATE	BY	BY
	5%			
	0%			
	-5%			
CALCULATED-DESIGNED BY	CHECKED BY			
840				
830				
820				
810				
800				
790				
780				
770				
760				
750				
740				
STATION	9	1730	1	2
Exc				
Emb				

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

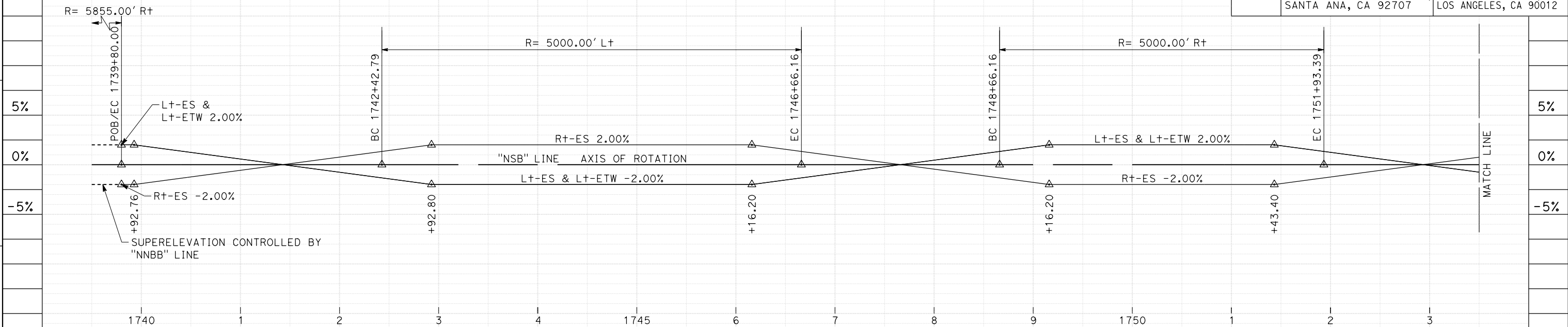
**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'

**PS-15**

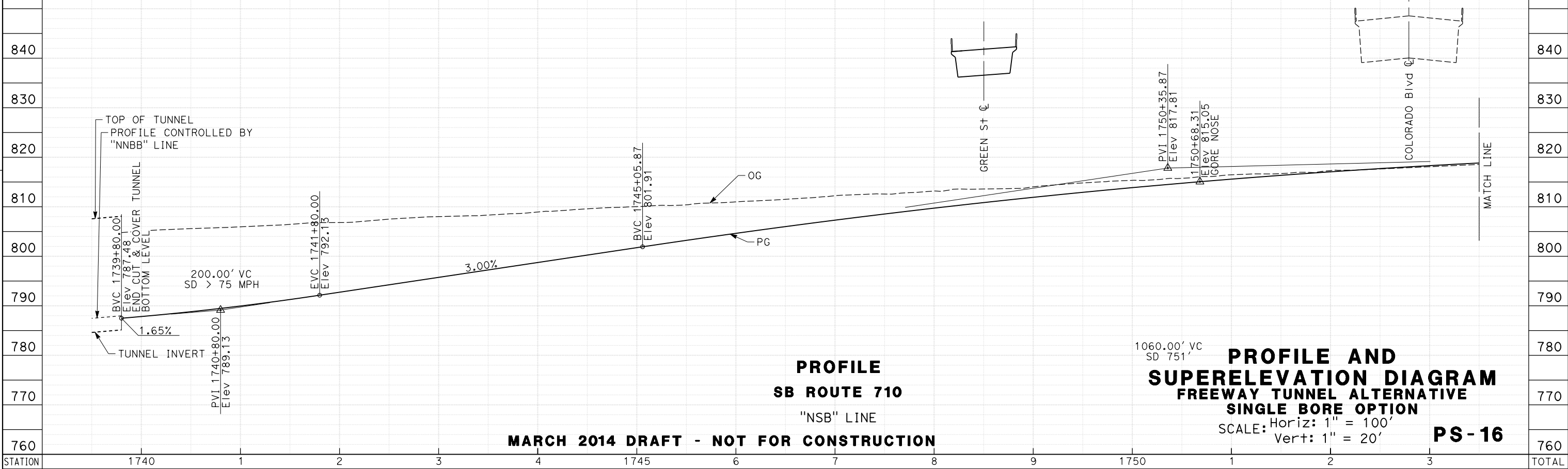
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE  
SB ROUTE 710  
"NSB" LINE**

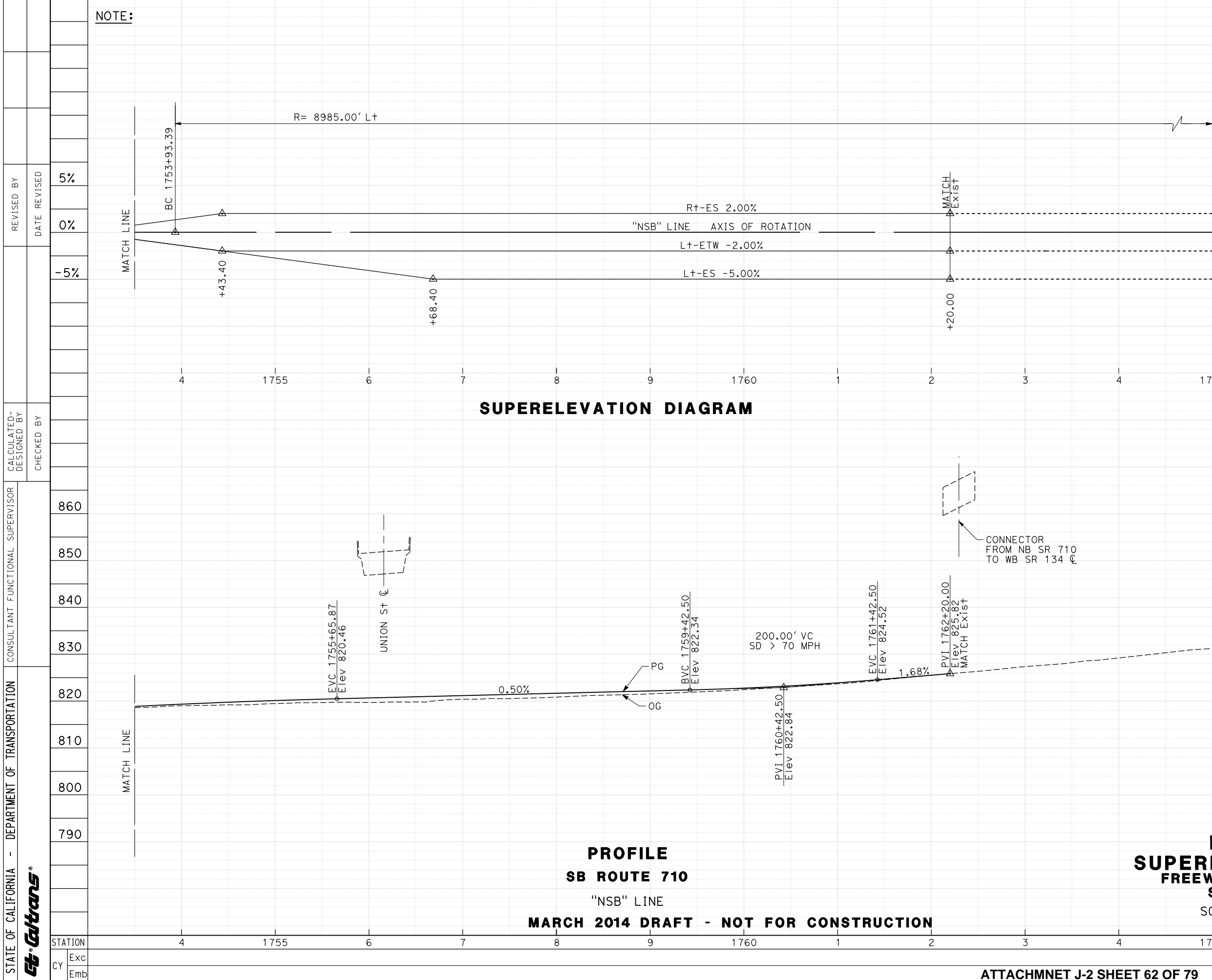
**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PS-16**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY	DATE
Exc		CHECKED BY		
Emb				





NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**SUPERELEVATION DIAGRAM**

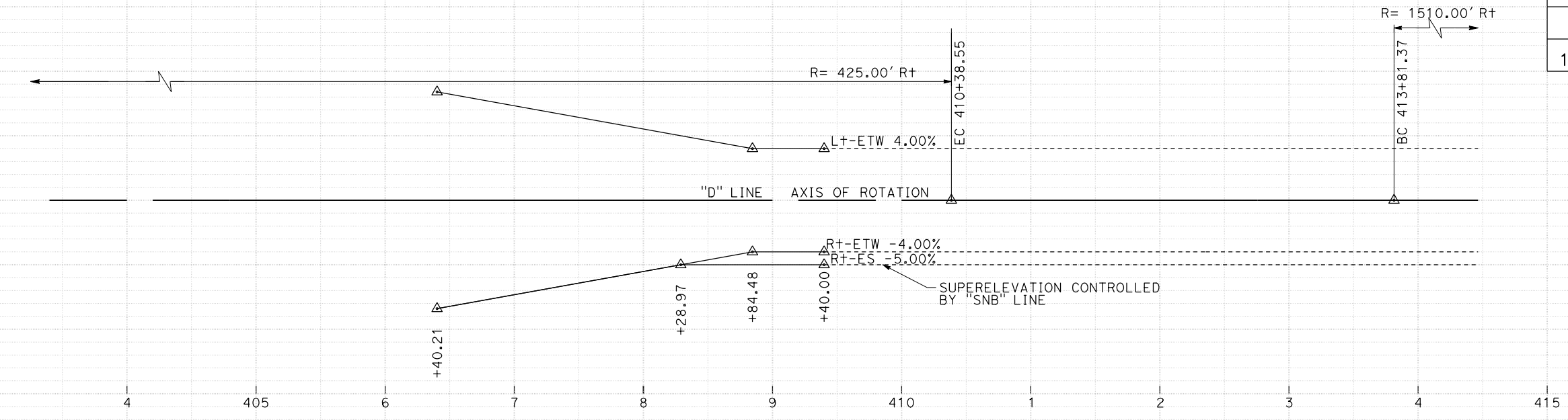
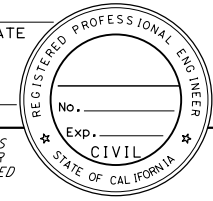
**PROFILE  
SB ROUTE 710  
"NSB" LINE  
MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'  
PS-17**

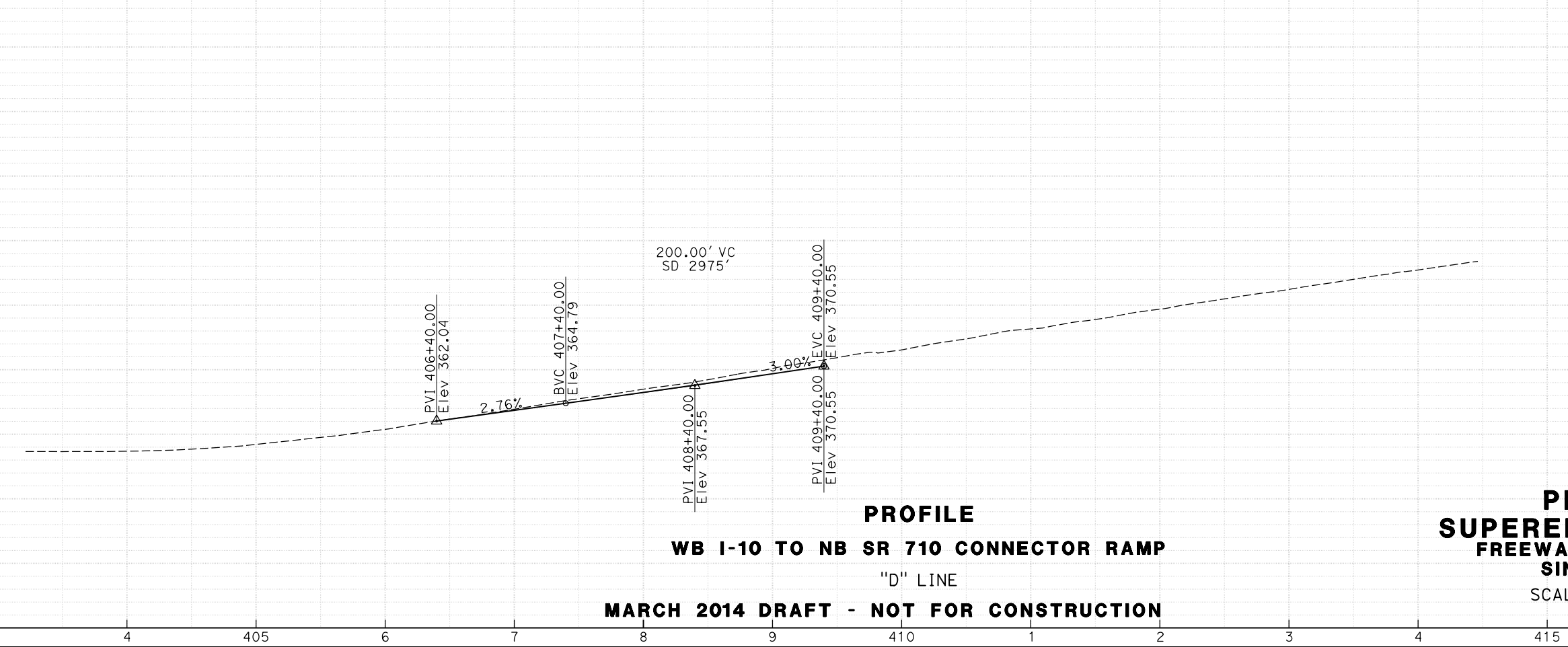
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**SUPERELEVATION DIAGRAM**



**PROFILE**

**WB I-10 TO NB SR 710 CONNECTOR RAMP**

"D" LINE

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

**PROFILE AND SUPERELEVATION DIAGRAM  
 FREEWAY TUNNEL ALTERNATIVE  
 SINGLE BORE OPTION**

SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'

**PS-18**

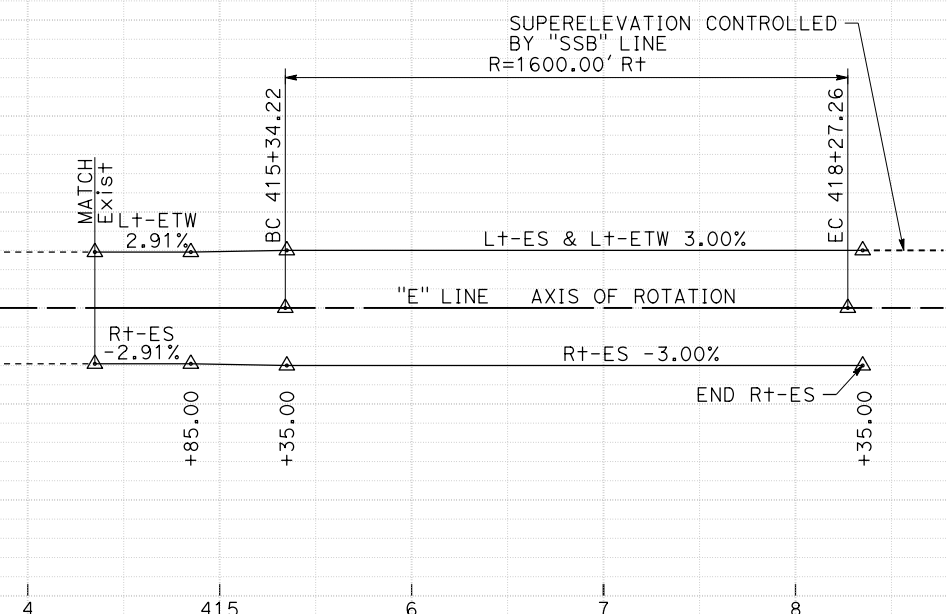
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Exc													
Emb													

LAST REVISION DATE PLOTTED => 21-MAR-2014  
 00-00-00 TIME PLOTTED => 14:49

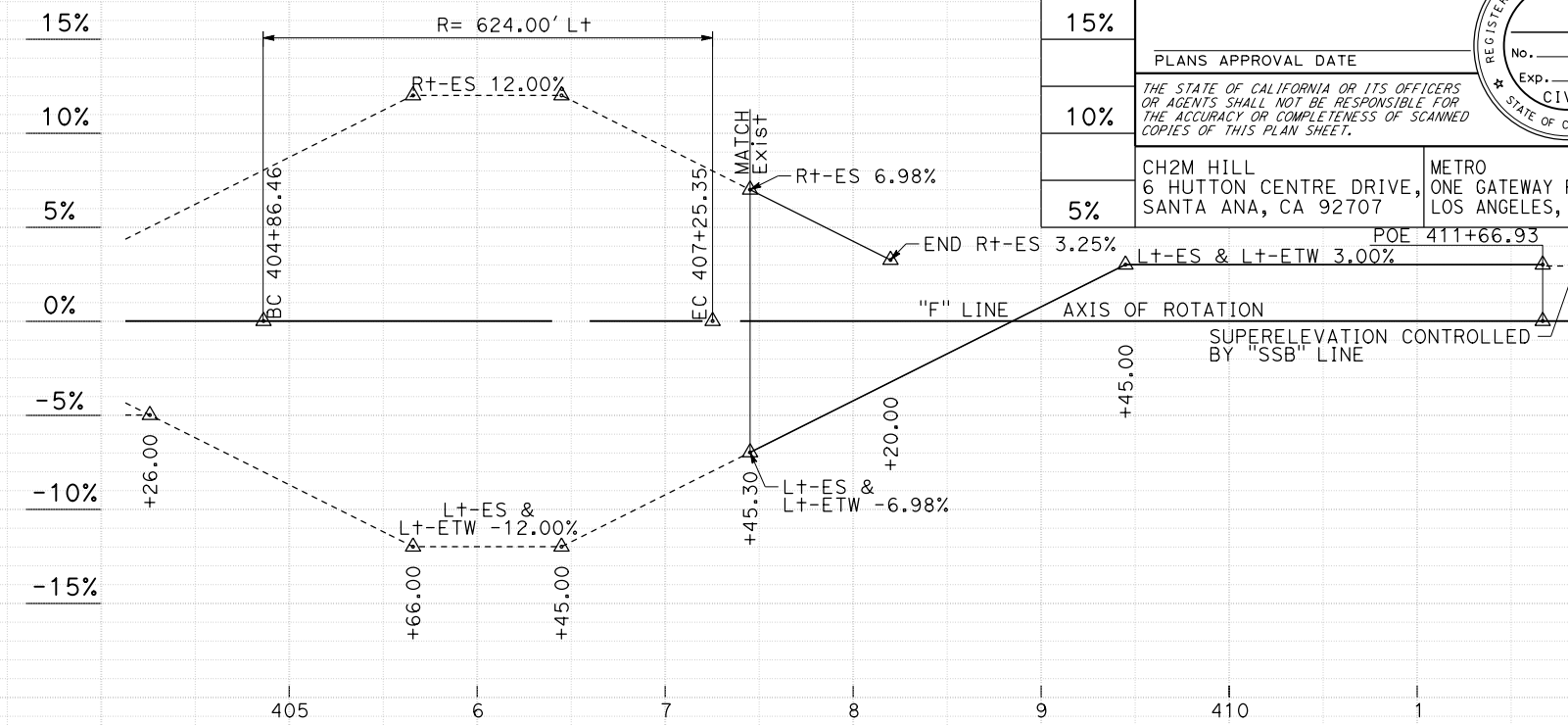
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED

NOTE:

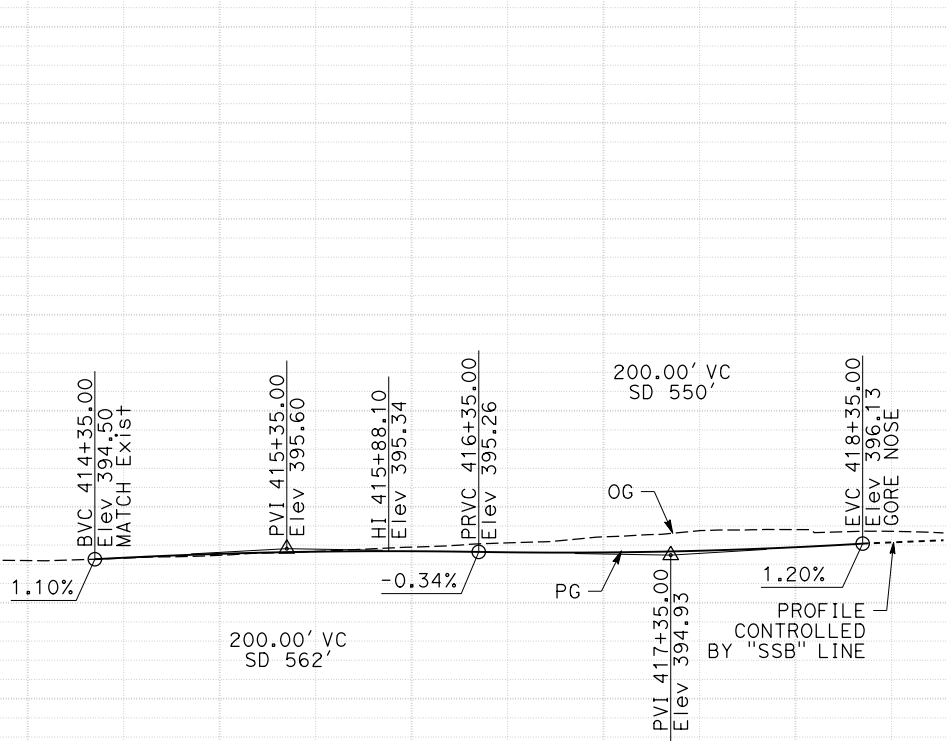
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



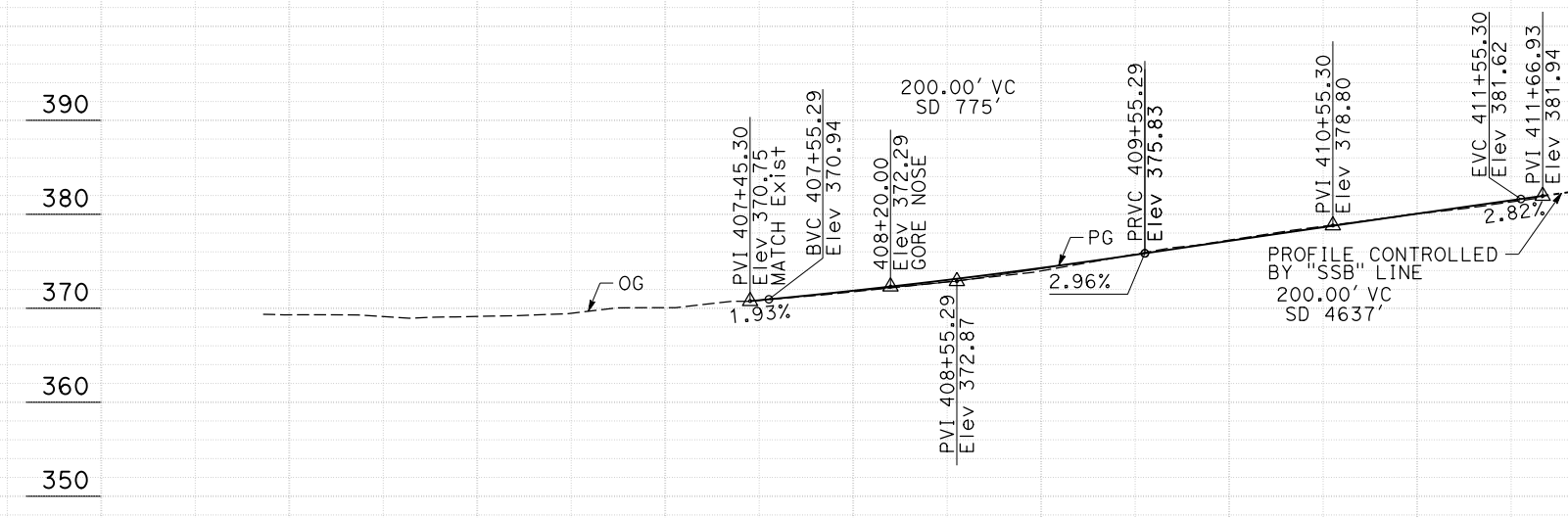
**SUPERELEVATION DIAGRAM**



**SUPERELEVATION DIAGRAM**



**PROFILE**  
 SB SR 710 TO WB I-10 CONNECTOR RAMP  
 "E" LINE



**PROFILE**  
 SB I-710 TO WB I-10 CONNECTOR RAMP  
 "F" LINE

**PROFILE AND SUPERELEVATION DIAGRAM**  
 FREEWAY TUNNEL ALTERNATIVE  
 SINGLE BORE OPTION  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'

**PS-19**

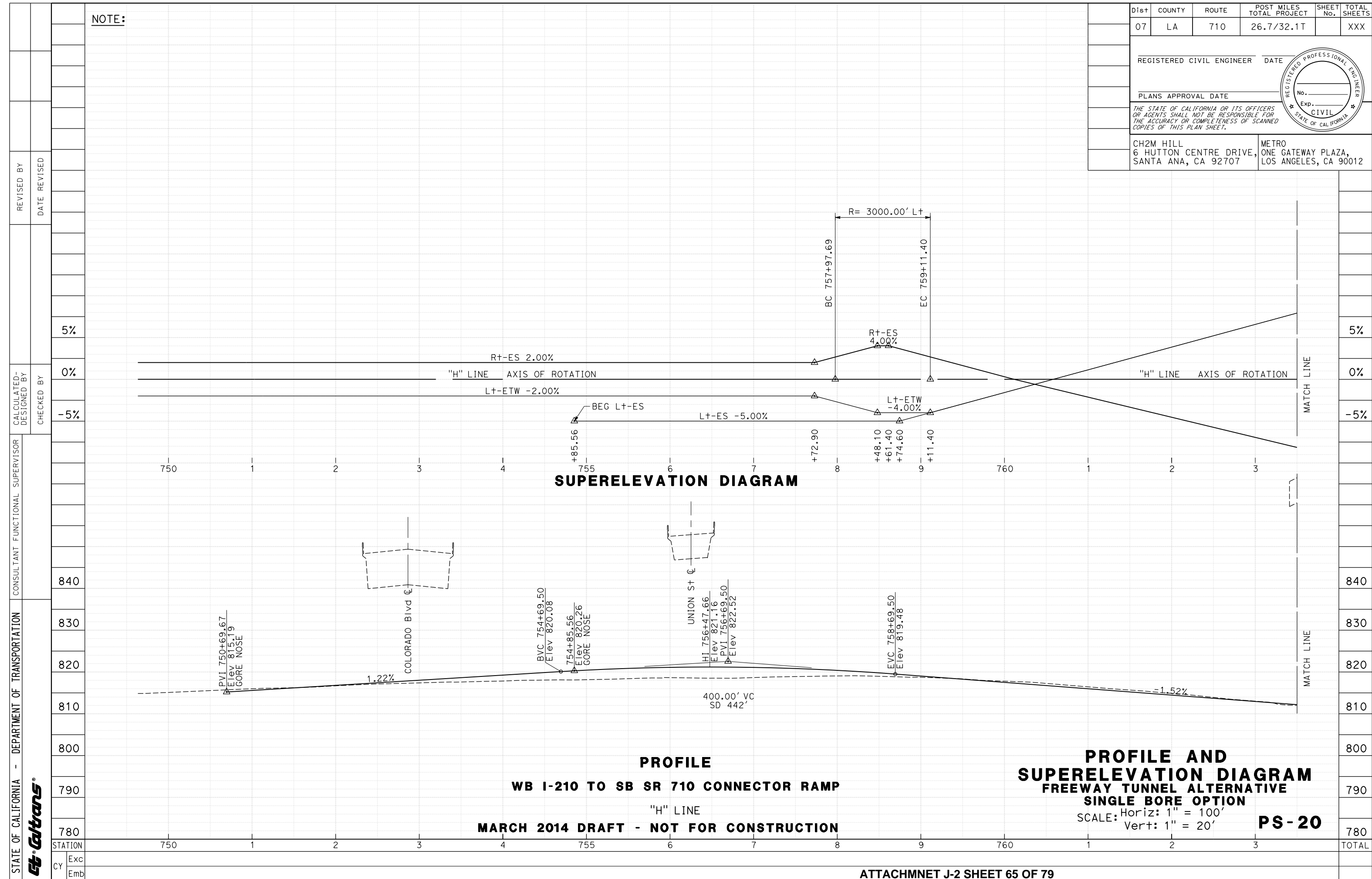
MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

LAST REVISION DATE PLOTTED => 21-MAR-2014  
 00-00-00 TIME PLOTTED => 14:50

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



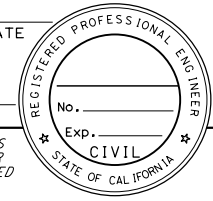
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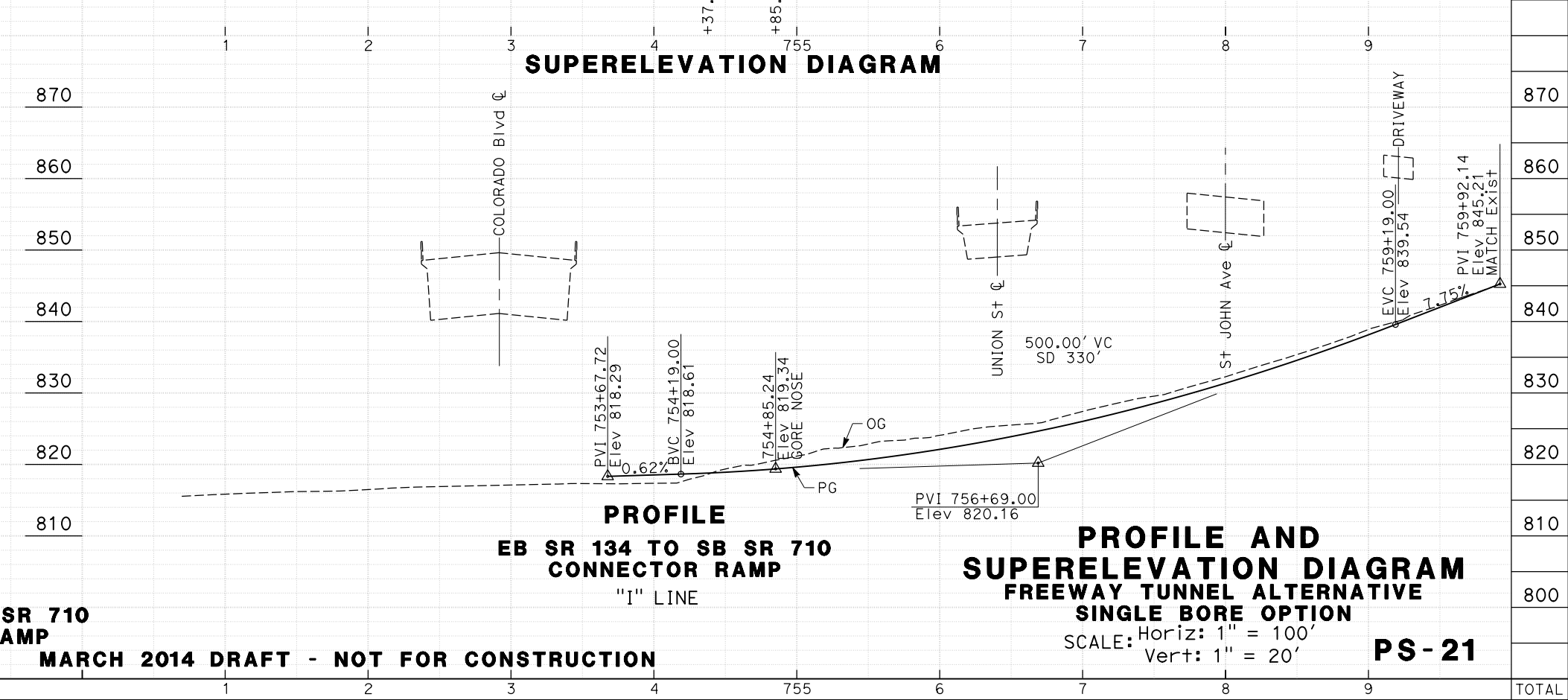
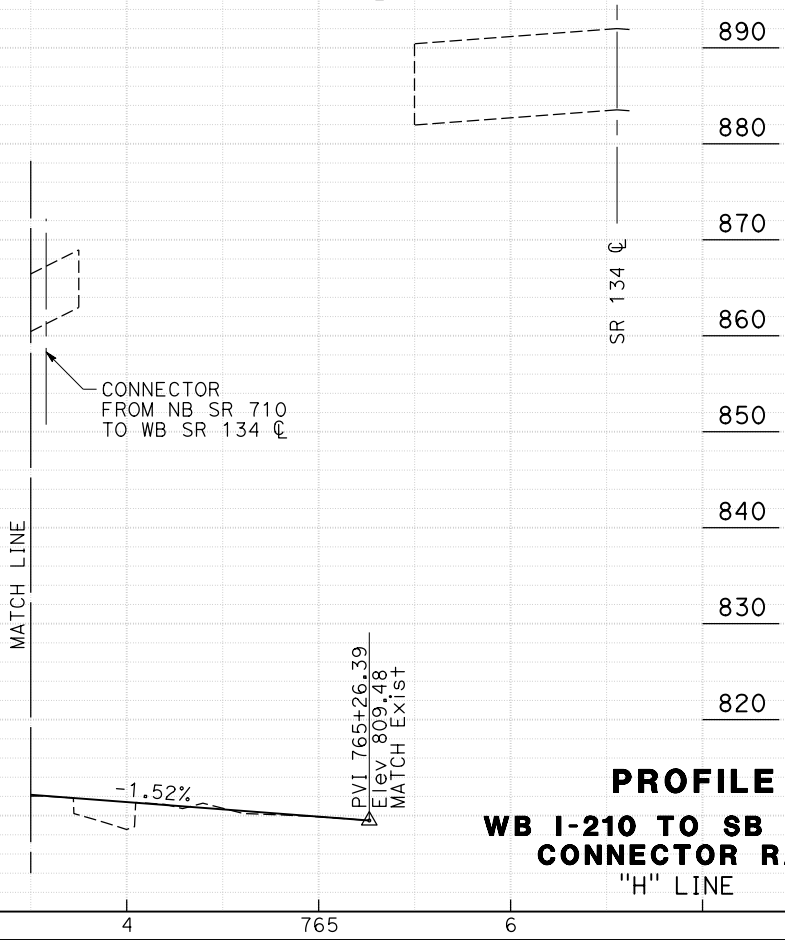
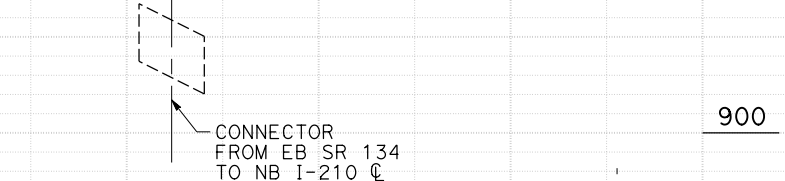
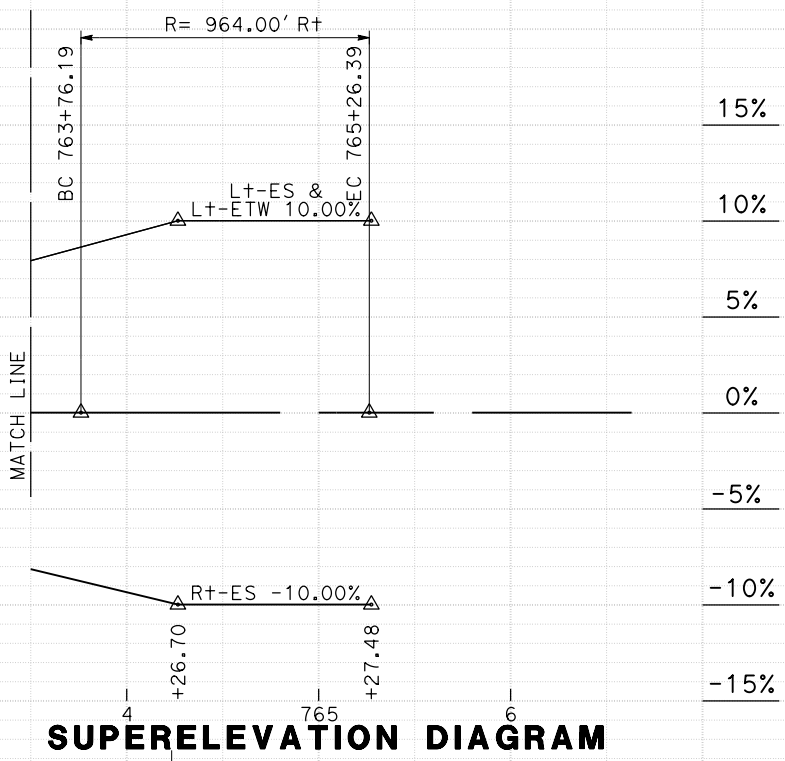
**PROFILE**  
**WB I-210 TO SB SR 710 CONNECTOR RAMP**  
 "H" LINE  
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'  
**PS-20**

LAST REVISION DATE PLOTTED => 21-MAR-2014  
 00-00-00 TIME PLOTTED => 14:50

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T	XXX	
REGISTERED CIVIL ENGINEER		DATE			
PLANS APPROVAL DATE					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		

NOTE:



**PROFILE**  
WB I-210 TO SB SR 710  
CONNECTOR RAMP  
"H" LINE

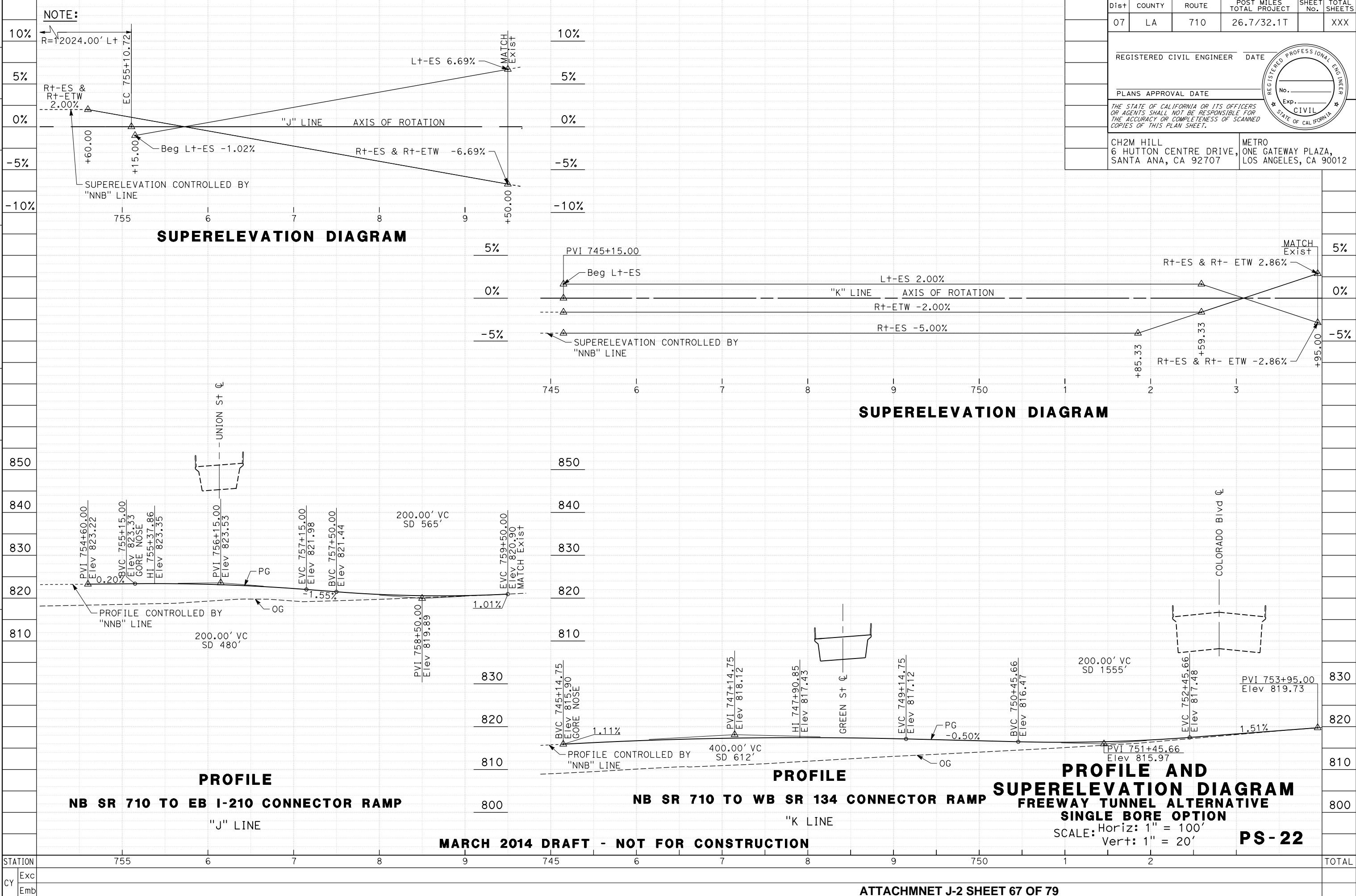
**PROFILE**  
EB SR 134 TO SB SR 710  
CONNECTOR RAMP  
"I" LINE

**PROFILE AND  
SUPERELEVATION DIAGRAM**  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-21**

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION  
**Caltrans**  
 CONSULTANT FUNCTIONAL SUPERVISOR  
 CALCULATED-DESIGNED BY  
 CHECKED BY  
 REVISED BY  
 DATE REVISED



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

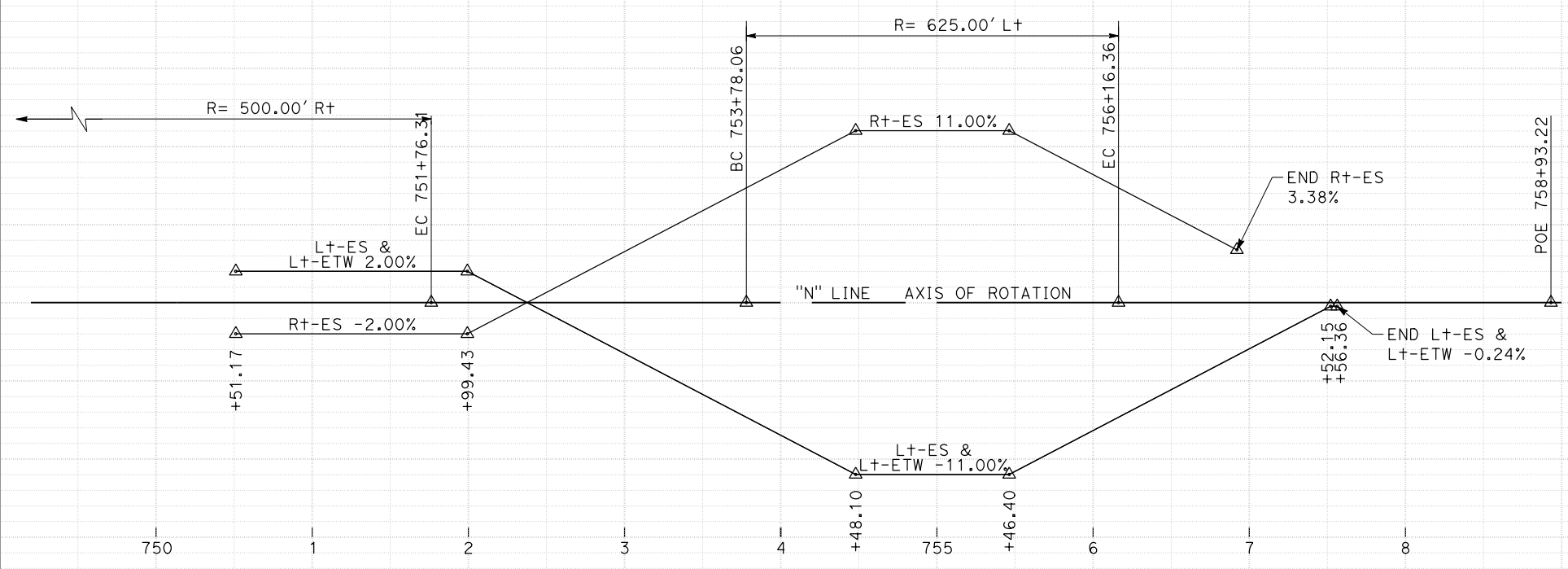
SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'

PS-22

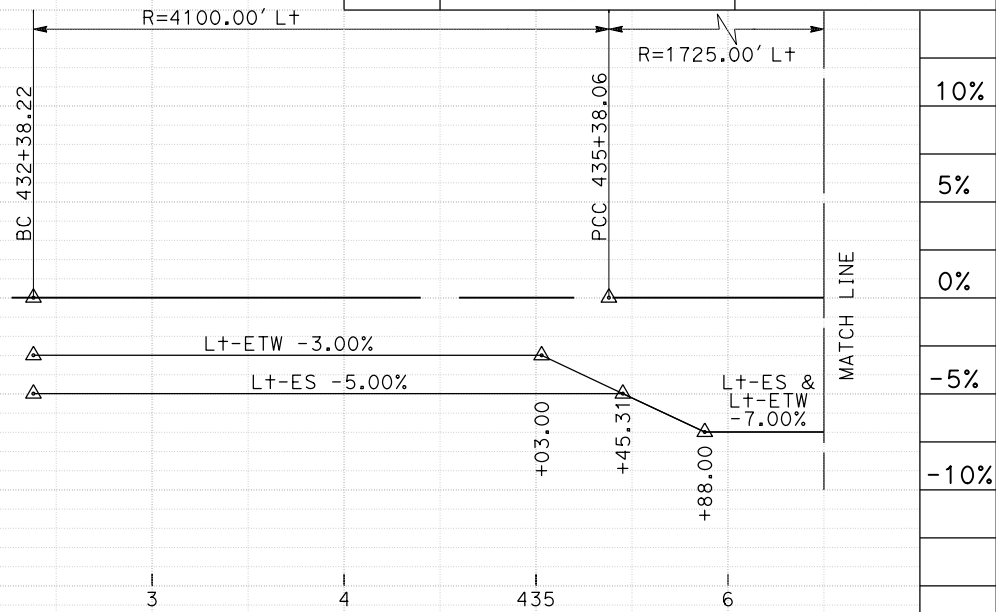
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



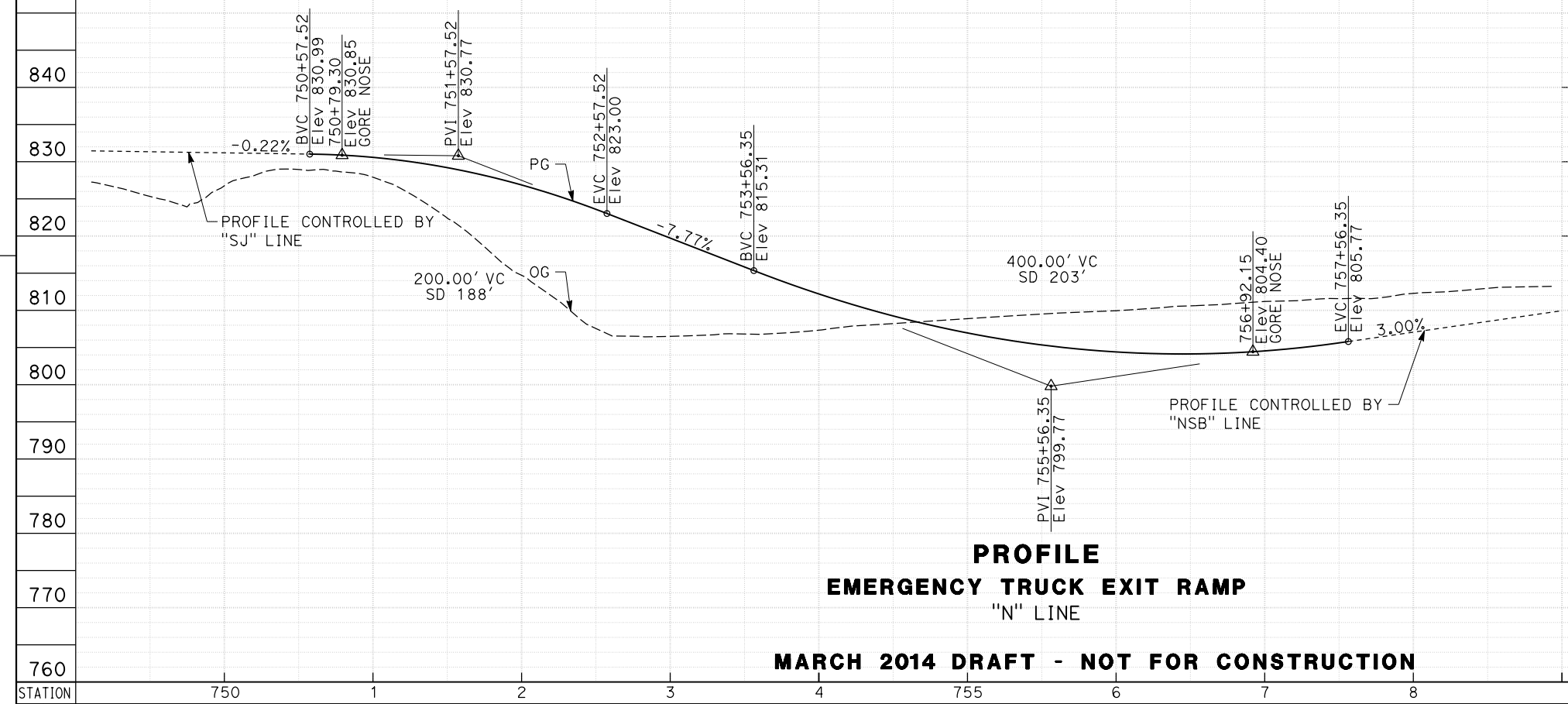
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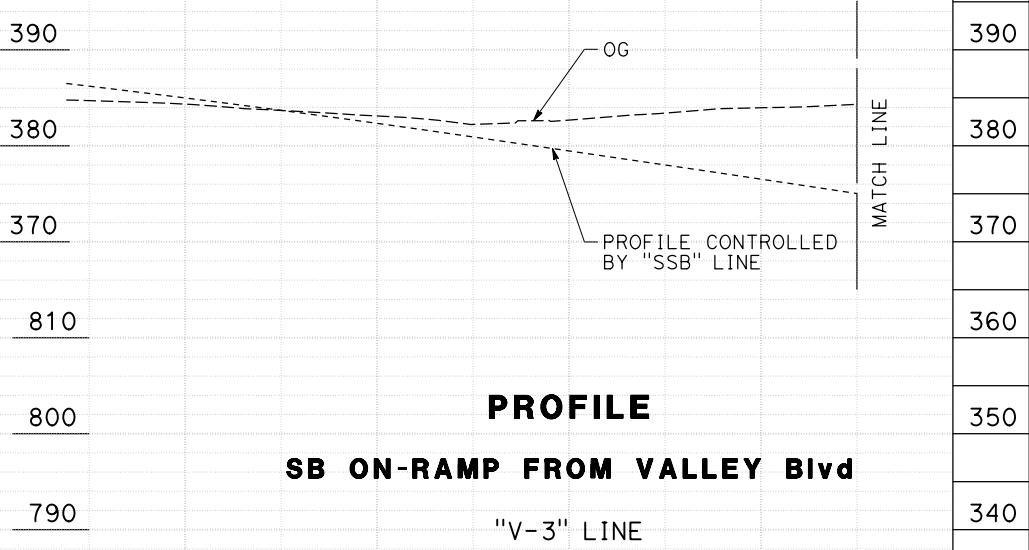
**SUPERELEVATION DIAGRAM**



**SUPERELEVATION DIAGRAM**



**PROFILE  
EMERGENCY TRUCK EXIT RAMP  
"N" LINE**



**PROFILE  
SB ON-RAMP FROM VALLEY Blvd  
"V-3" LINE**

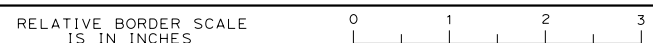
**PROFILE AND SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-23**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR
Exc		CHECKED BY	DATE REVISED
Emb			

USERNAME => pwsvc  
DGN FILE => 0700000191fb023.dgn



ATTACHMENT J-2 SHEET 68 OF 79

UNIT 0000 PROJECT NUMBER & PHASE 07000001911

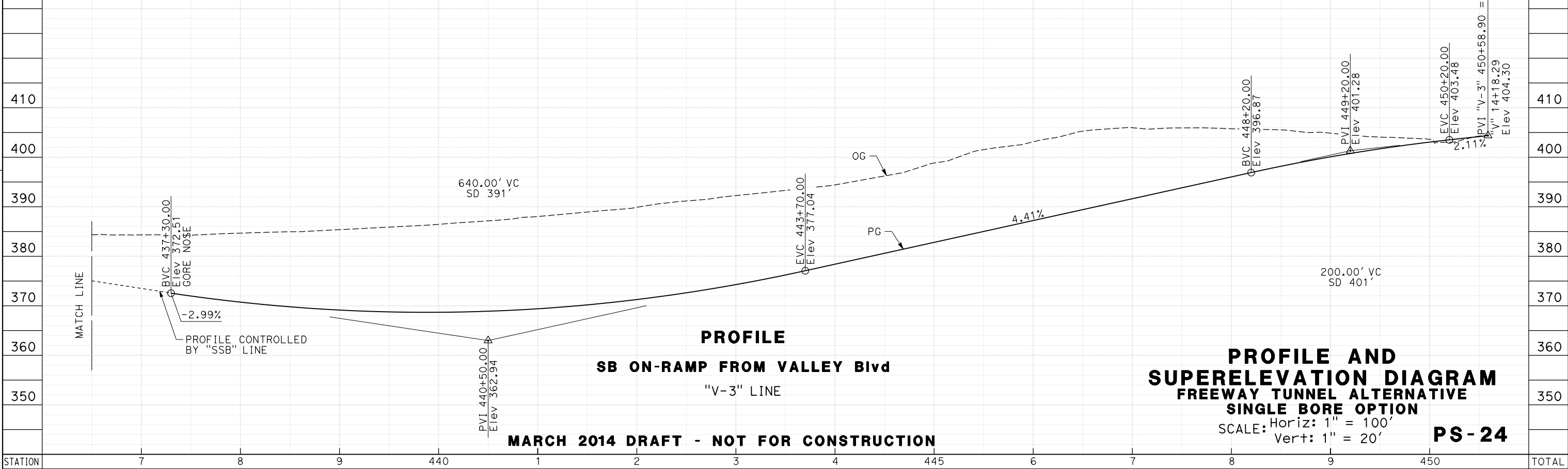
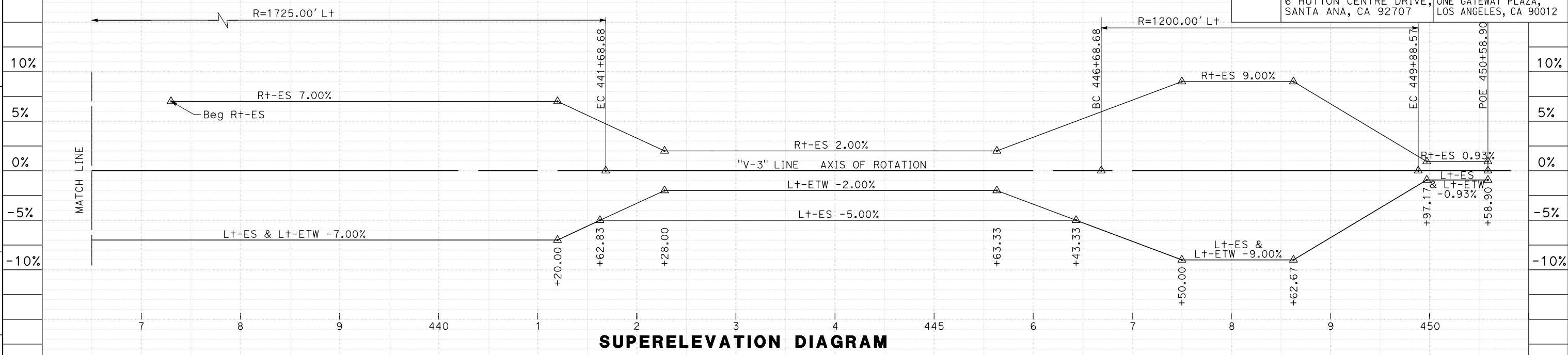
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LAST REVISION DATE PLOTTED => 21-MAR-2014  
00-00-00 TIME PLOTTED => 14:50

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'  
**PS-24**

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE
<b>Caltrans</b>					
Exc	Emb				

ATTACHMENT J-2 SHEET 69 OF 79

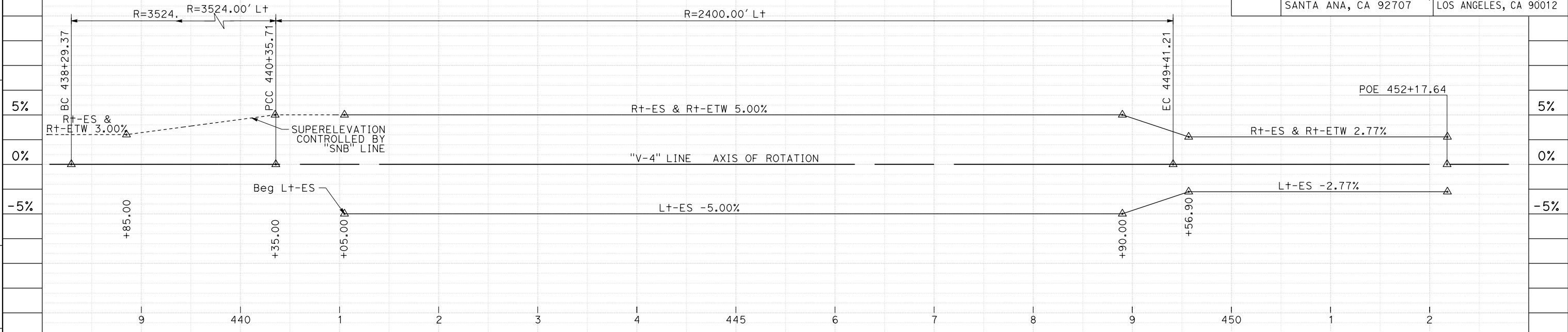
LAST REVISION DATE PLOTTED => 27-MAR-2014 00-00-00 TIME PLOTTED => 17:44



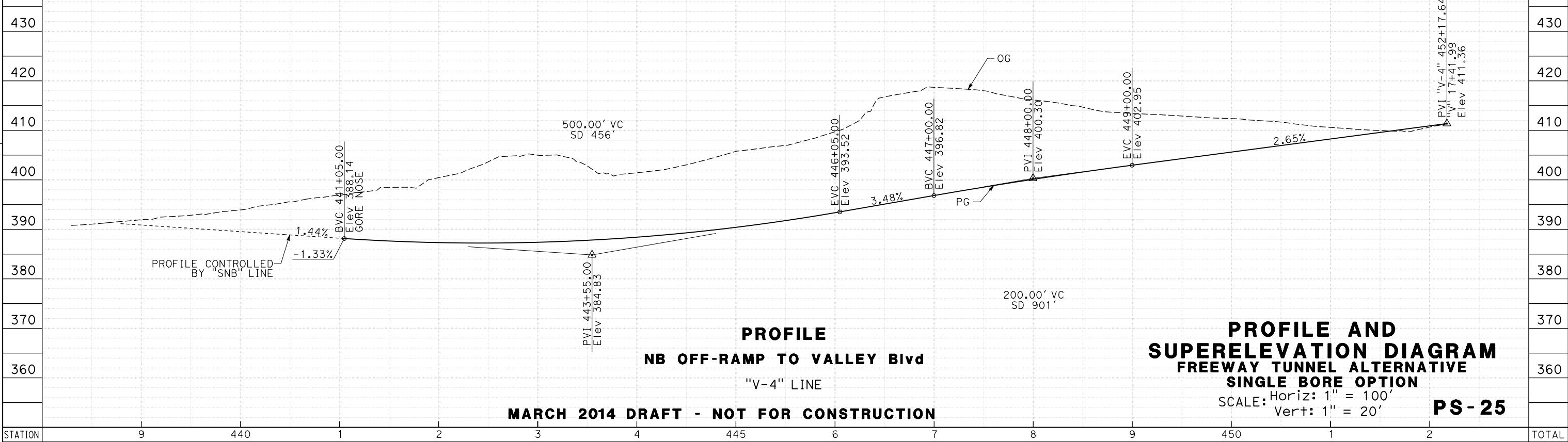
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER		DATE			
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**  
NB OFF-RAMP TO VALLEY Blvd  
"V-4" LINE

**PROFILE AND SUPERELEVATION DIAGRAM**  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

**PS-25**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR BY
<b>Caltrans</b>		CHECKED BY	DATE REVISED
Exc			
Emb			

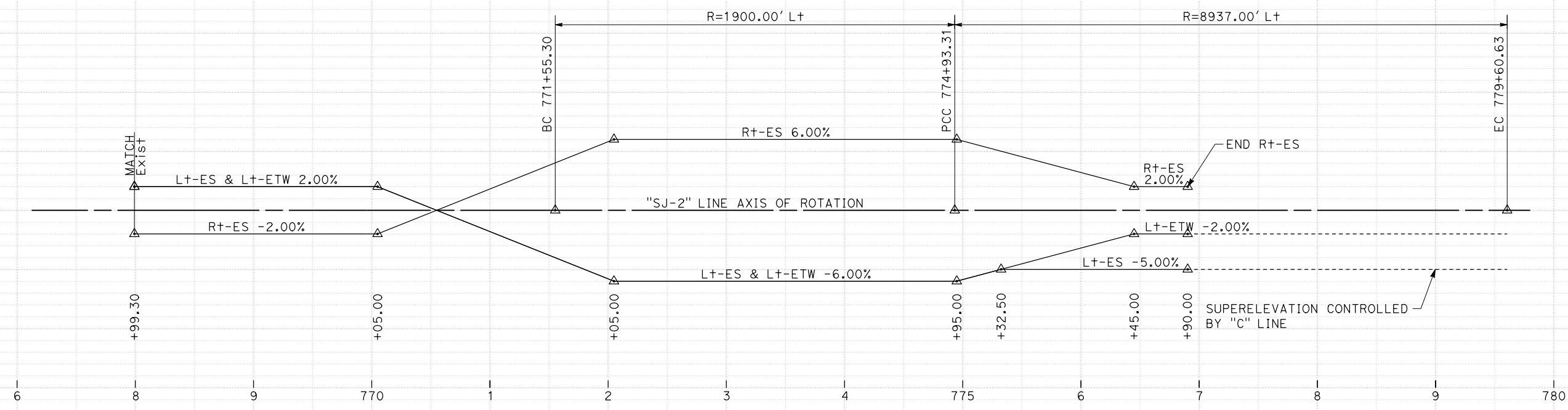
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CY															

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 14:50

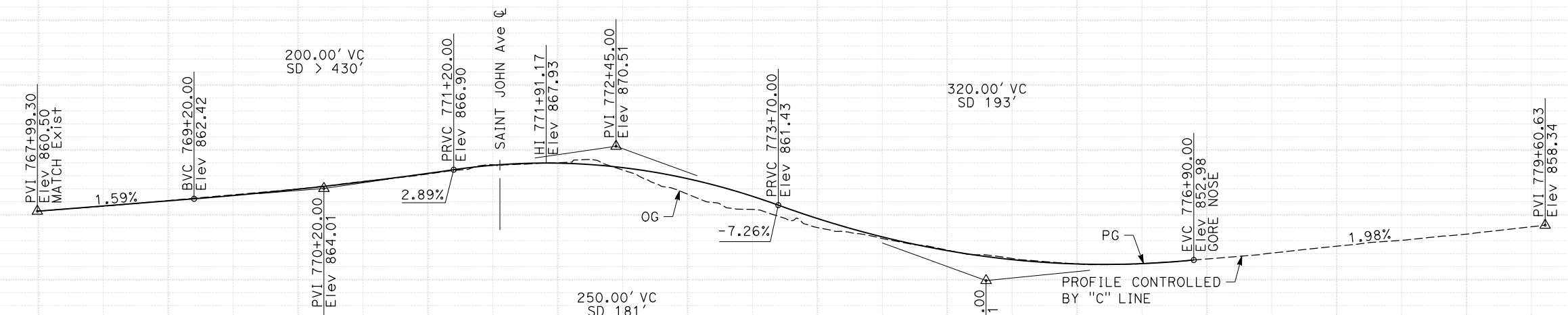
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE**

**SB OFF-RAMP TO SAINT JOHN Ave**

"SJ-2" LINE

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-26**

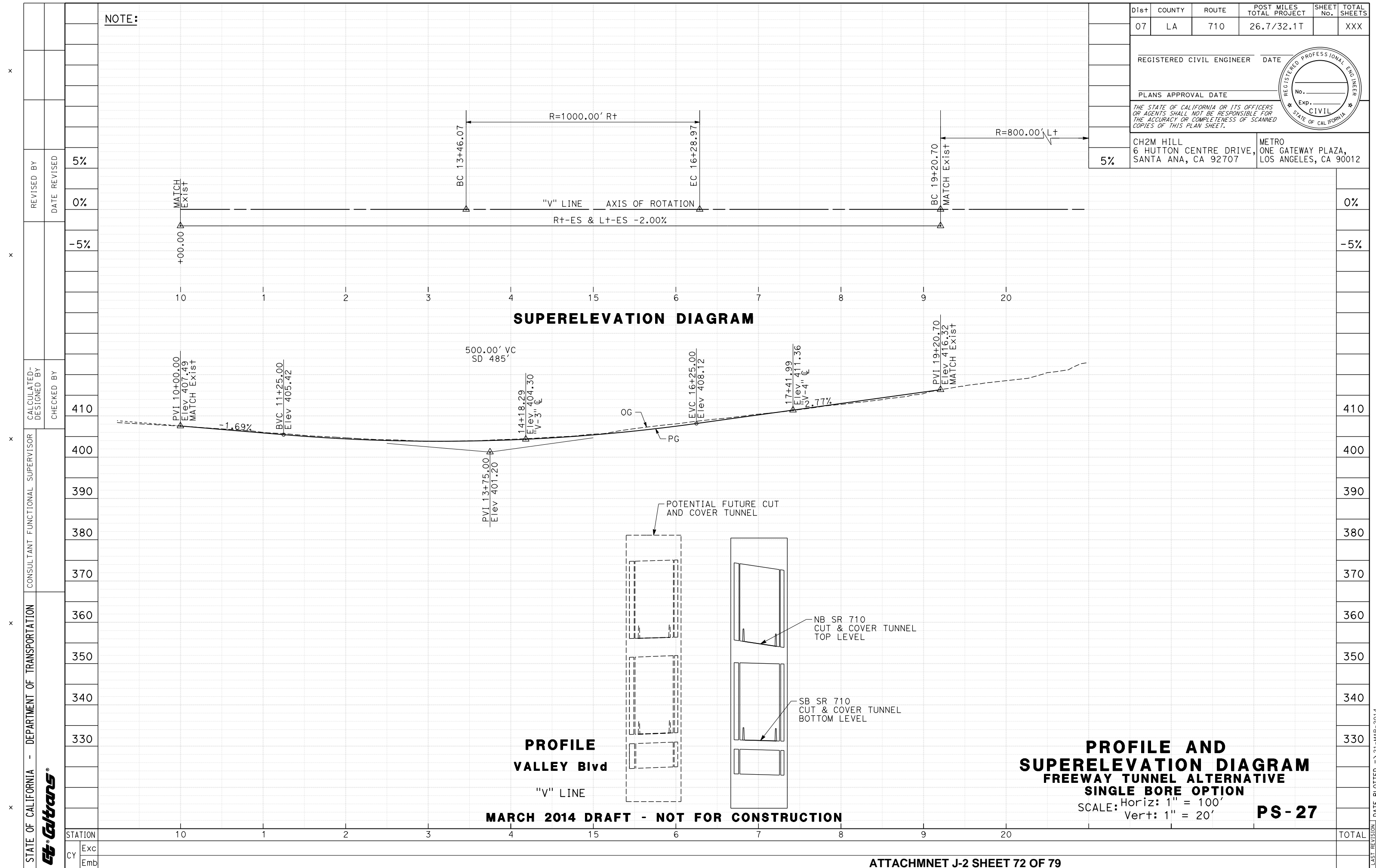
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE
Exc	Emb				

STATION	6	8	9	770	1	2	3	4	775	6	7	8	9	780	TOTAL
CY															

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**  
 SCALE: Horiz: 1" = 100'  
 Vert: 1" = 20'  
**PS-27**

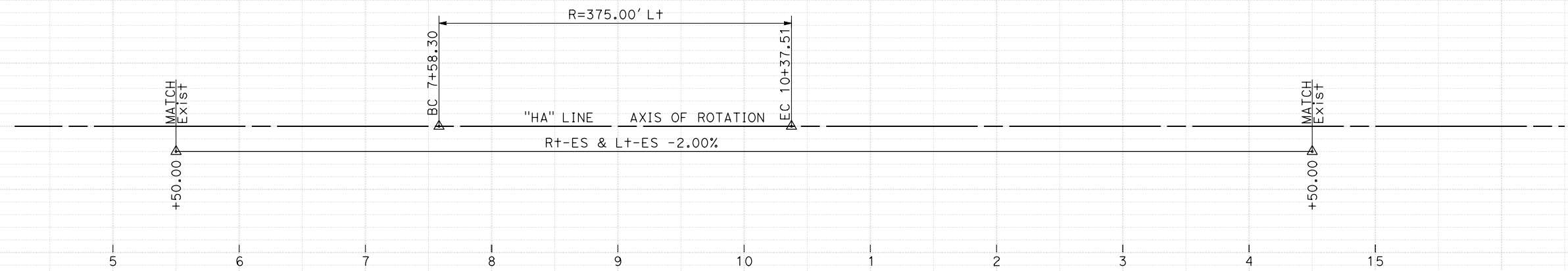
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CHECKED BY	410
Exc	Emb		

REVISOR	DATE	REVISION
5%		
0%		
-5%		
10		
1		
2		
3		
4		
15		
6		
7		
8		
9		
20		
TOTAL		

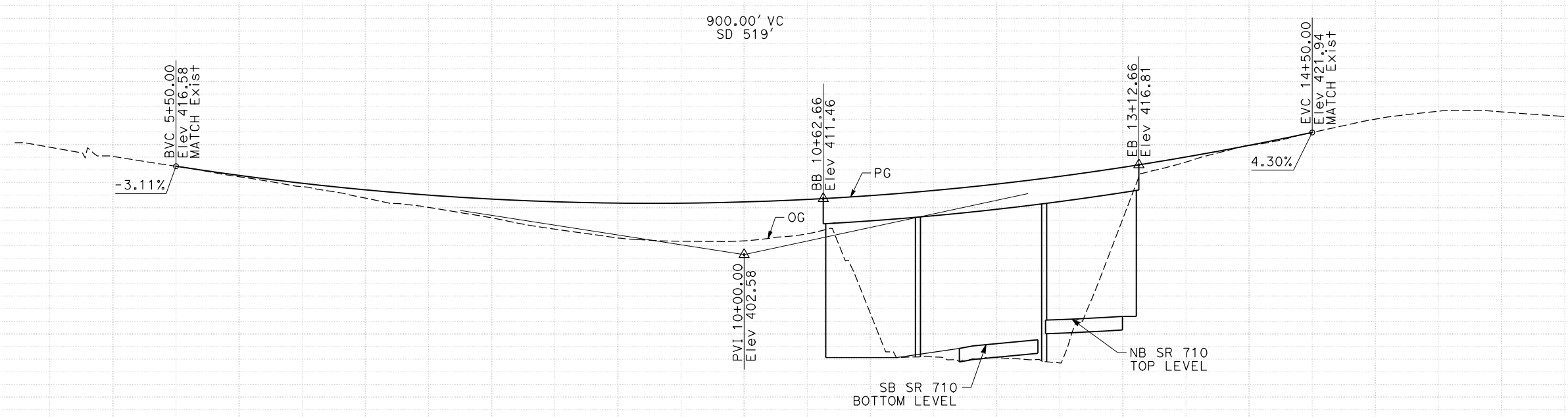
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



NOTE:



**SUPERELEVATION DIAGRAM**



**PROFILE  
HELLMAN Ave**

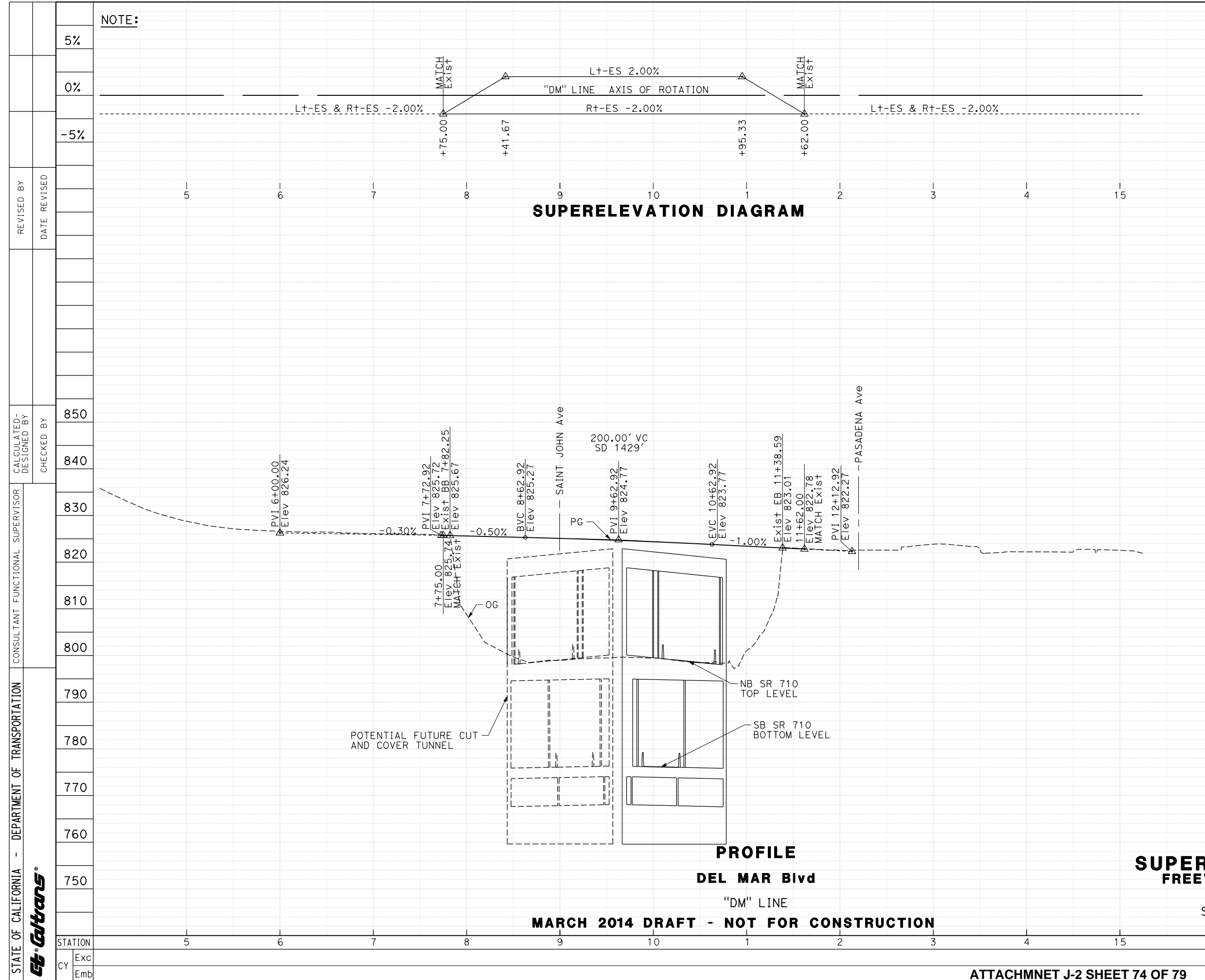
**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

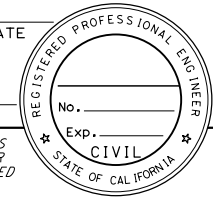
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-28**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CHECKED BY	REVISOR BY	DATE
<b>Caltrans</b>	440			
	430			
	420			
	410			
	400			
	390			
	380			
	370			
	360			
STATION				
CY	Exc			
	Emb			



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
5%	REGISTERED CIVIL ENGINEER DATE				
0%	PLANS APPROVAL DATE				
-5%	THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.				
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**SUPERELEVATION DIAGRAM**

**PROFILE  
DEL MAR Blvd**

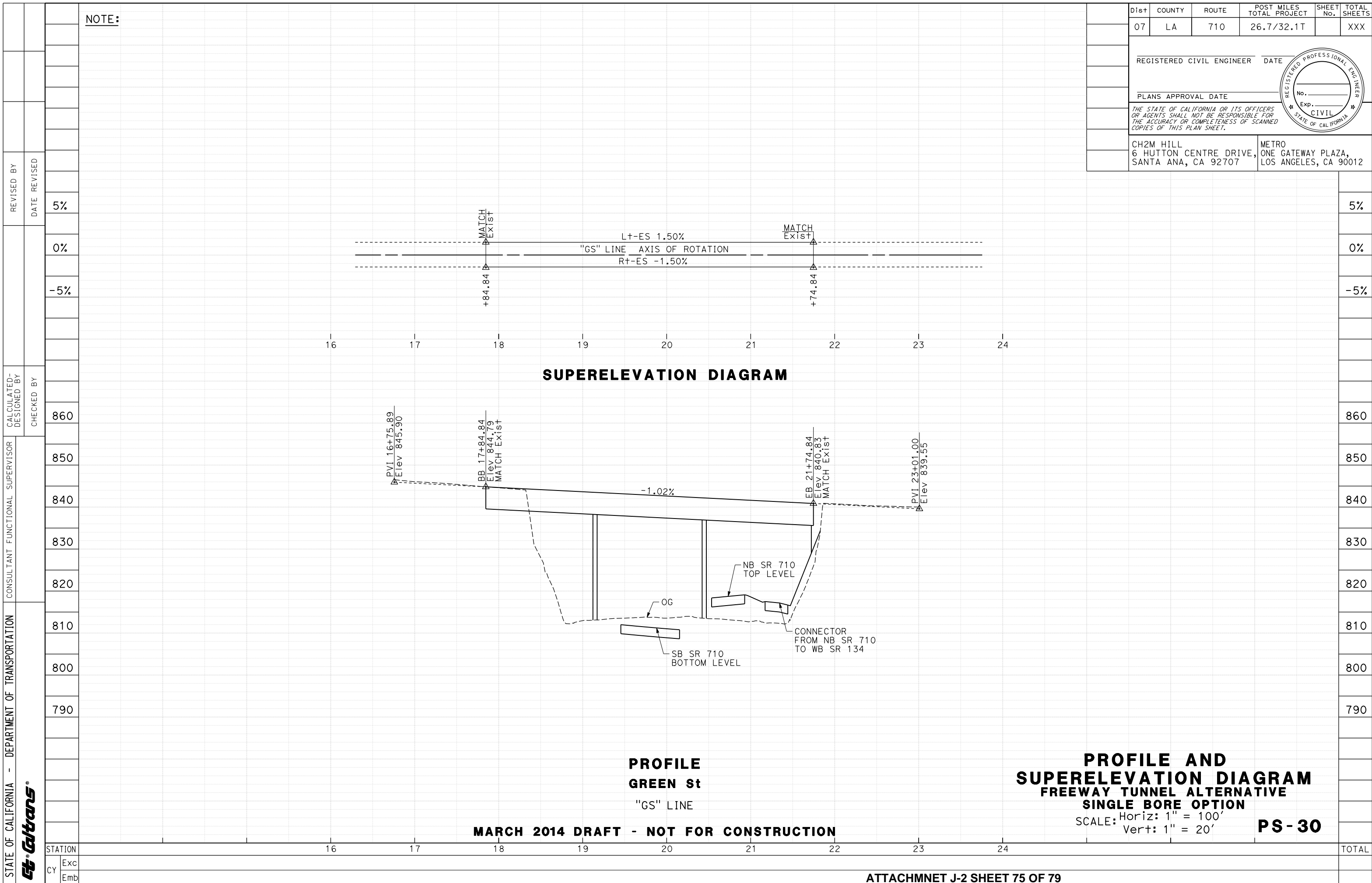
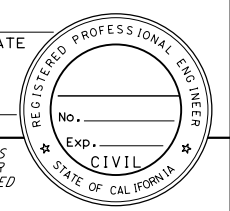
**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20' **PS-29**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 14:50

NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER				DATE	
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**PROFILE**  
GREEN St  
"GS" LINE

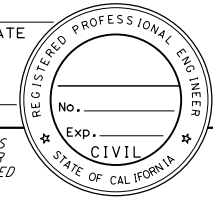
**PROFILE AND SUPERELEVATION DIAGRAM**  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS - 30**

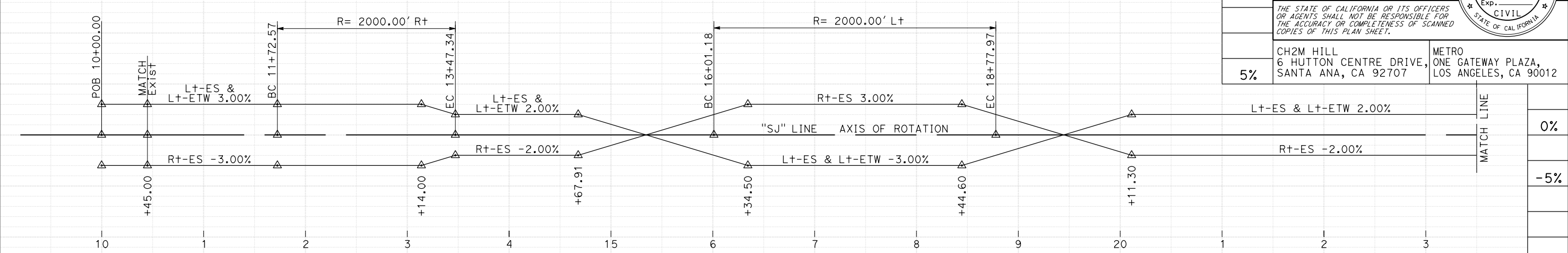
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

STATION	16	17	18	19	20	21	22	23	24	TOTAL
Exc										
Emb										

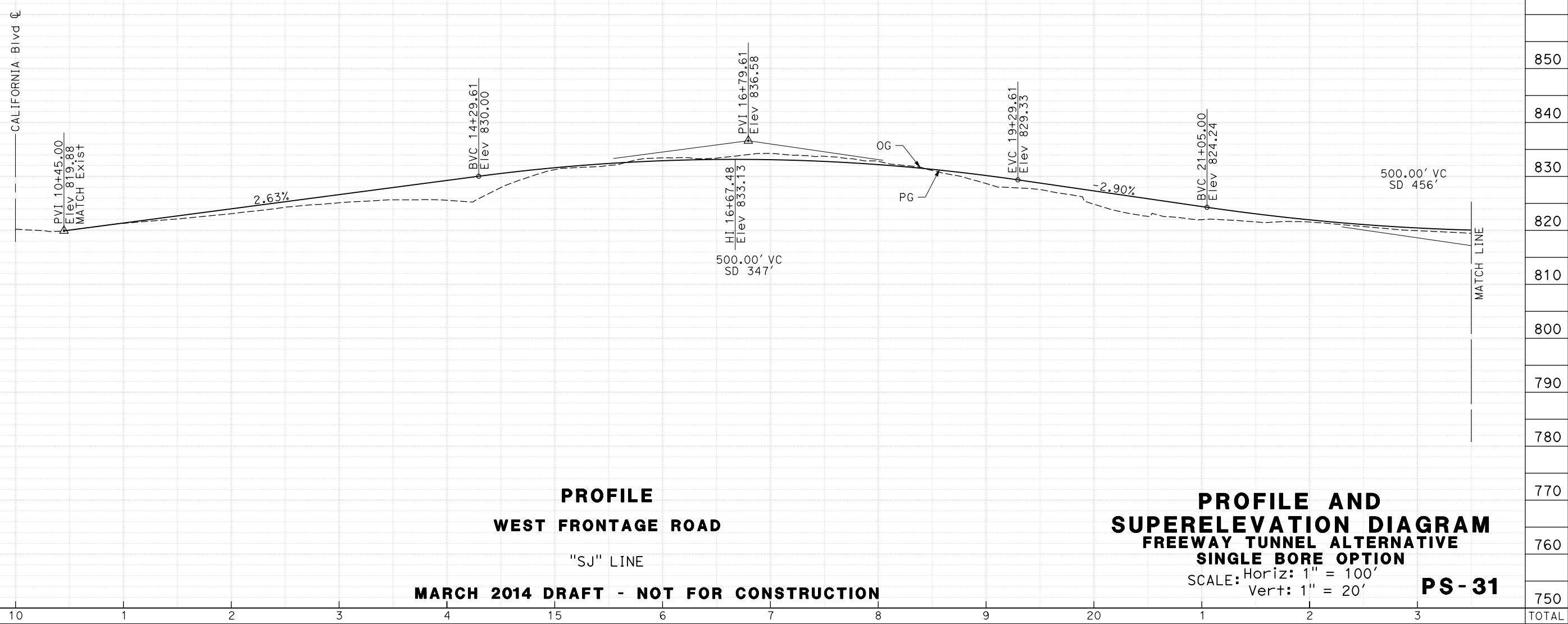
ATTACHMNET J-2 SHEET 75 OF 79

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		

NOTE:



### SUPERELEVATION DIAGRAM



### PROFILE WEST FRONTAGE ROAD

"SJ" LINE

MARCH 2014 DRAFT - NOT FOR CONSTRUCTION

### PROFILE AND SUPERELEVATION DIAGRAM FREEWAY TUNNEL ALTERNATIVE SINGLE BORE OPTION

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

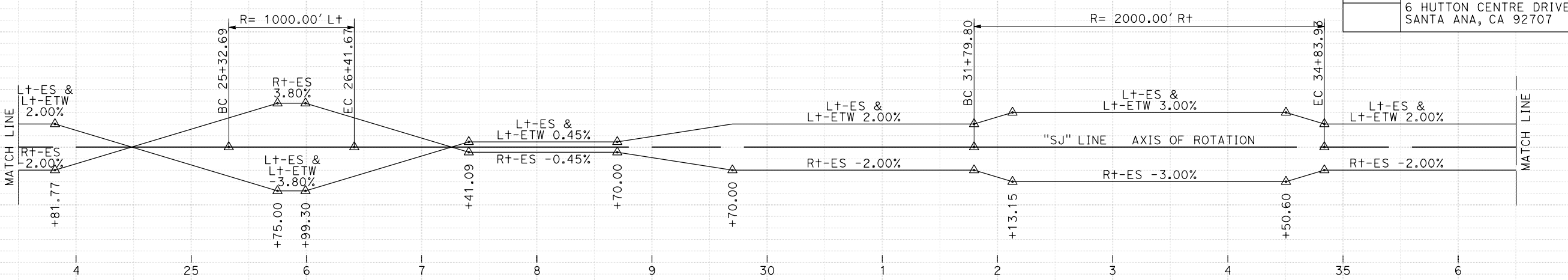
**PS-31**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	REVISOR	DATE	REVISION
CALCULATED/DESIGNED BY	CHECKED BY		
CONSULTANT FUNCTIONAL SUPERVISOR			
STATION	Exc		
	Emb		

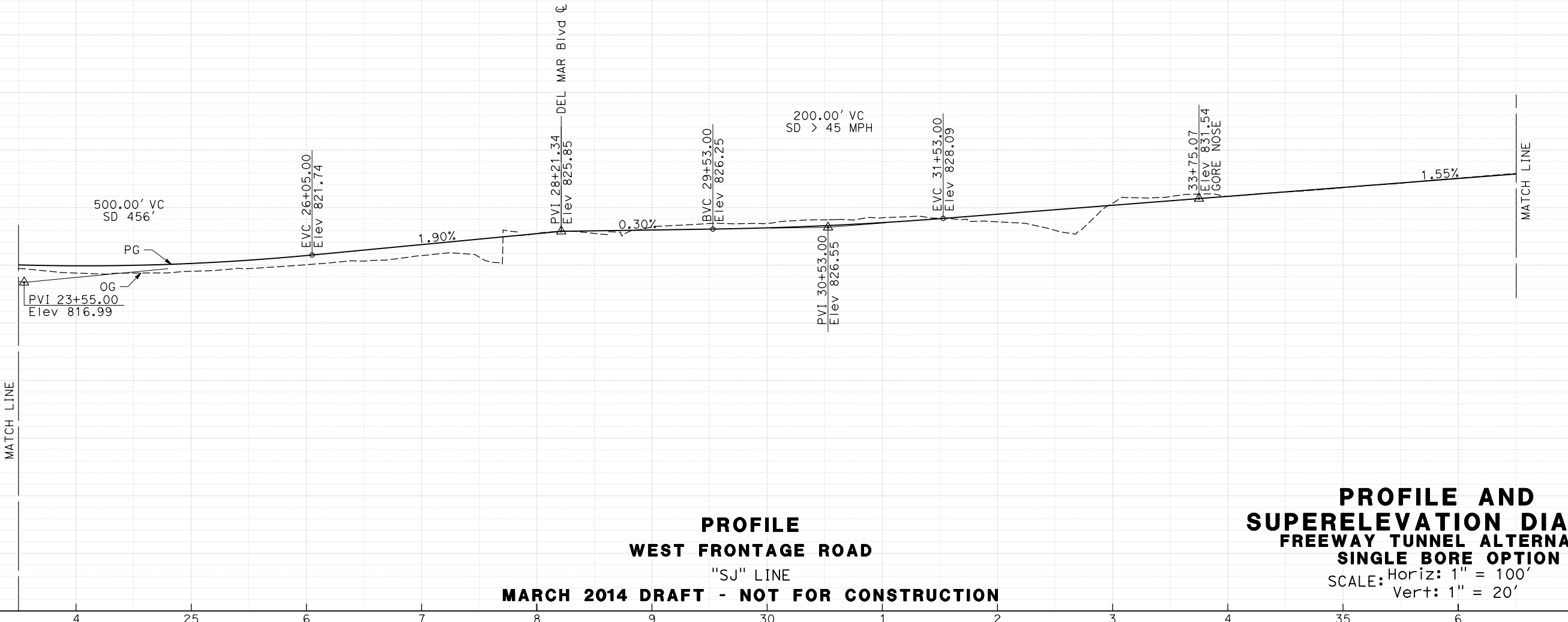
ATTACHMNET J-2 SHEET 76 OF 79

NOTE:

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX
REGISTERED CIVIL ENGINEER					DATE
PLANS APPROVAL DATE					
<small>THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.</small>					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		



**SUPERELEVATION DIAGRAM**



**PROFILE  
WEST FRONTAGE ROAD  
"SJ" LINE**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

**PS-32**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	CONSULTANT FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISOR	DATE
<b>Caltrans</b>		CHECKED BY	DATE	
CY	Exc	Emb		

STATION	4	25	6	7	8	9	30	1	2	3	4	35	6	7	TOTAL
5%															5%
0%															0%
-5%															-5%

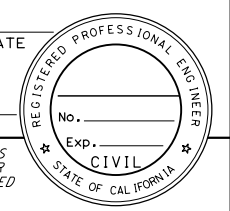


Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T		XXX

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

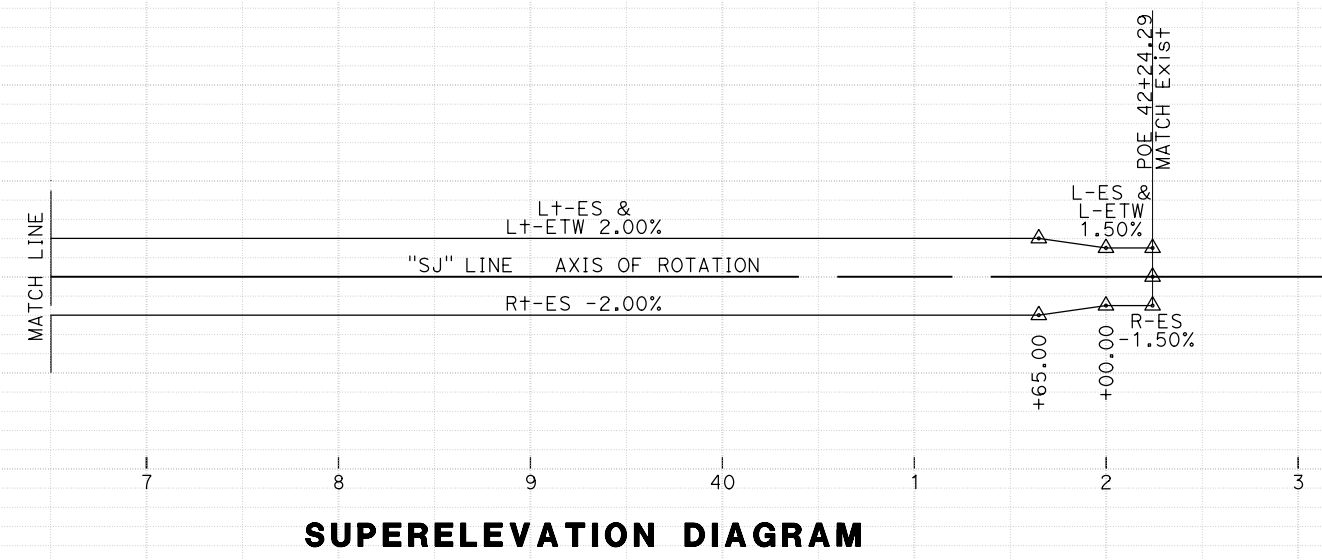


CH2M HILL  
6 HUTTON CENTRE DRIVE,  
SANTA ANA, CA 92707

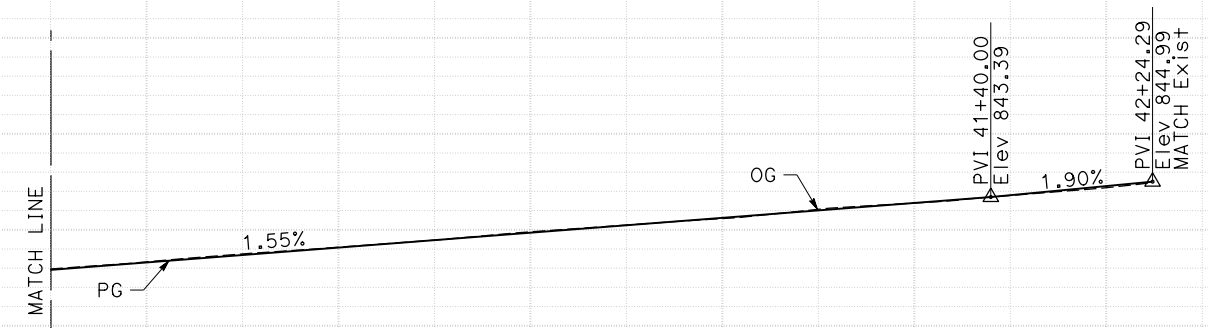
METRO  
ONE GATEWAY PLAZA,  
LOS ANGELES, CA 90012

NOTE:

5%  
0%  
-5%



**SUPERELEVATION DIAGRAM**




**PROFILE**  
**WEST FRONTAGE ROAD**  
"SJ" LINE

**PROFILE AND SUPERELEVATION DIAGRAM**  
**FREEWAY TUNNEL ALTERNATIVE**  
**SINGLE BORE OPTION**  
SCALE: Horiz: 1" = 100'  
Vert: 1" = 20' **PS-33**

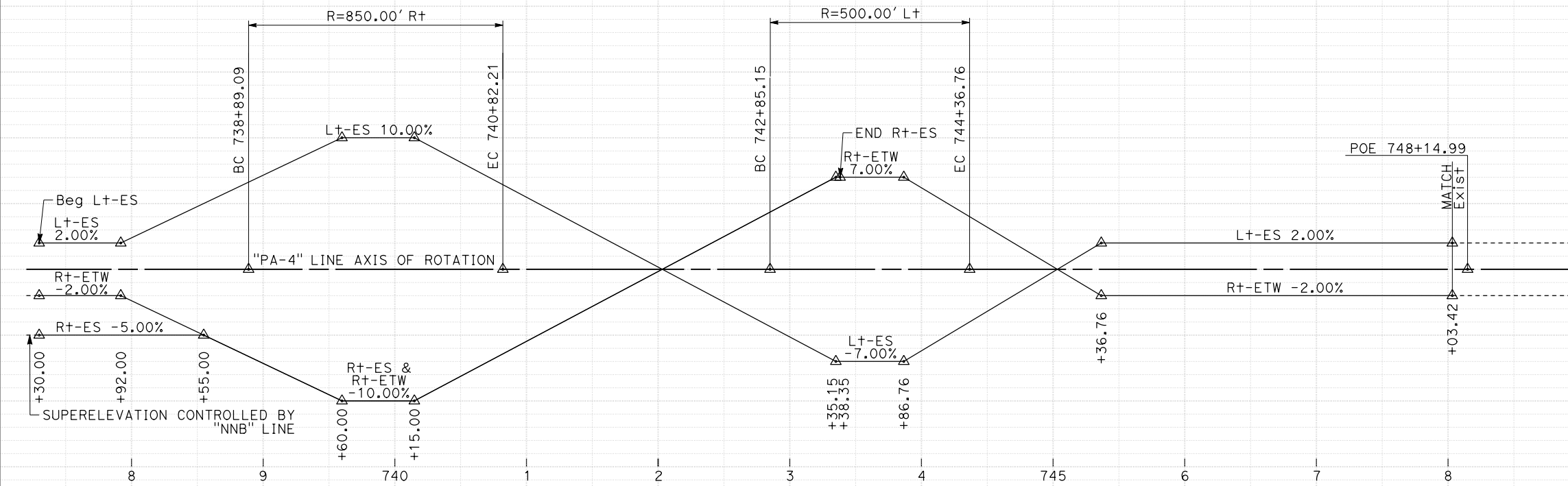
**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

STATION	7	8	9	40	1	2	3	TOTAL
Exc								
Emb								

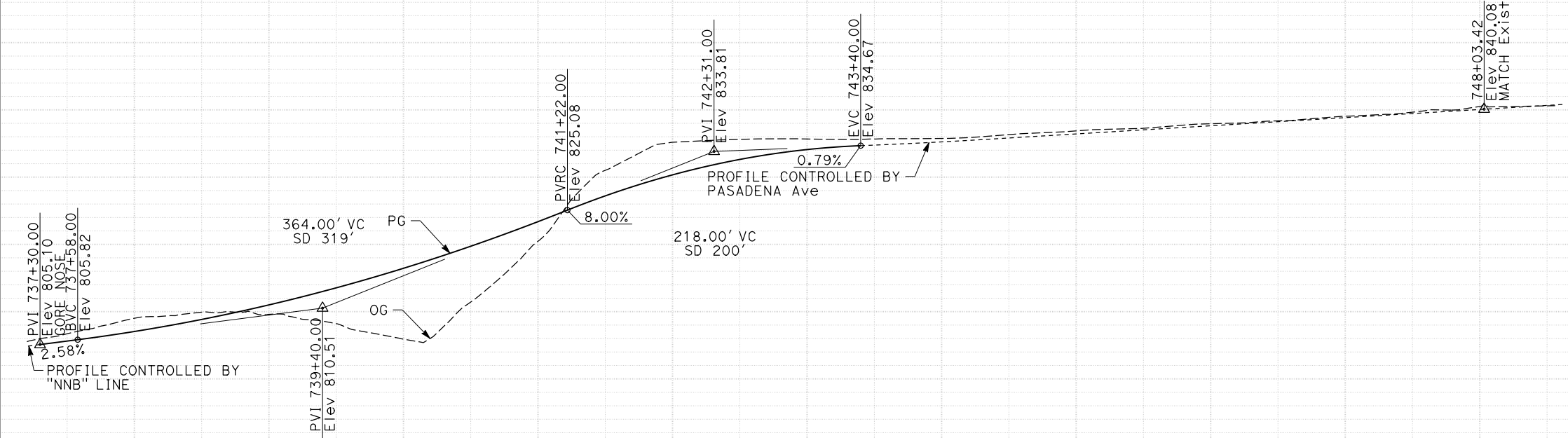
LAST REVISION DATE PLOTTED => 21-MAR-2014 00-00-00 TIME PLOTTED => 14:50

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	710	26.7/32.1T	XXX	
REGISTERED CIVIL ENGINEER DATE					
PLANS APPROVAL DATE					
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.					
					
CH2M HILL 6 HUTTON CENTRE DRIVE, SANTA ANA, CA 92707			METRO ONE GATEWAY PLAZA, LOS ANGELES, CA 90012		

NOTE:



**SUPERELEVATION DIAGRAM**




**PROFILE  
SB ROUTE 710**

**PROFILE AND  
SUPERELEVATION DIAGRAM  
FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**MARCH 2014 DRAFT - NOT FOR CONSTRUCTION**

SCALE: Horiz: 1" = 100'  
Vert: 1" = 20'

**PS-34**

STATE OF CALIFORNIA	DEPARTMENT OF TRANSPORTATION	CONSULTANT	FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISOR	DATE	REVISION
								

STATION	Exc	Emb	TOTAL
8			
9			
740			
1			
2			
3			
4			
745			
6			
7			
8			
9			
750			
1			

ATTACHMNET J-2 SHEET 79 OF 79

**Attachment K-1  
TSM/TDM Alternative  
Advance Planning Study Reports**

---





SR 710 North Study

ATTACHMENT K-1a

Task 7.2 Advance Planning Study Report

---

# State Route 710 North Study Advance Planning Study Report SR 710 Connector Underpass

TSM/TDM Intersection and Local Street Improvement Alternative  
T-1: 710 Connector from Valley Boulevard to Mission Road

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

June 2014

**CH2MHILL**®

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017





## SR 710 North Study

PREPARED FOR: Metropolitan Transportation Authority  
COPY TO: Caltrans Study Team  
PREPARED BY: CH2M HILL Team  
DATE: June 6, 2014  
PROJECT NUMBER: 428908

### SR 710 Connector Underpass

#### TSM/TDM Intersection and Local Street Improvement Alternative T-1: 710 Connector from Valley Boulevard to Mission Road

#### Table of Contents

	<u>Page No.</u>
Project Vicinity Map	2
Design Memorandum	3
<b>Attachments</b>	
A	Consultant Prepared Advance Planning Study (APS) Checklist
B	Advance Planning Study Cost Estimate
C	Advance Planning Study Plan



**Project Vicinity Map**  
**State Route 710 North Study**  
**TSM/TDM Intersection and Local Street Improvement Alternative**  
**T-1: 710 Connector from Valley Boulevard to Mission Road**



## Assumptions Used for SR 710 Connector Underpass – Advance Planning Study

1. The SR 710 Connector Underpass will be an integral part of the State Route (SR) 710 North Study Project. The proposed structure is located along the SR 710 Connector between Valley Boulevard and Mission Road. The proposed bridge will carry three railroad tracks above the SR 710 Connector. The purpose of the proposed SR 710 North Study Project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks.
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes.
  - Minimize environmental impacts.
2. The Transportation System Management/Transportation Demand Management (TSM/TDM) alternative consists of strategies and enhancements to improve operational efficiency and capacity for all modes in the transportation system with lower-cost capital investments and/or lower potential impacts.
  - TSM elements aim to improve the operational efficiency of the existing transportation network
  - TDM elements are oriented toward reducing traffic demand during peak periods.

The improvement of the proposed intersection number T-1 aims to construct a railroad bridge that allows the SR 710 traffic to travel beneath it.
3. At present, the active Union Pacific Railroad (UPRR) tracks are not obstructed by any roadway. The proposed underpass will allow the SR 710 Connector to go under their tracks.
4. There is no known environmentally sensitive area at this location.
5. The proposed structure will be a two-span bridge that is 90 feet long and 100 feet wide. Equal spans of 45 feet will be used.
6. The bridge will be supported on circular multi-column bent and high-seat cantilever abutments. The Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014) recommends cast-in-drilled-hole (CIDH) concrete piles for foundations. Twenty-four inch and 72-inch CIDH concrete piles are proposed for the abutments and bent respectively.
7. Based on the project location, bridge span length, available clearance, and other constraints, a steel deck plate with steel plate girder superstructure is likely the most cost-effective solution and, thus, is recommended for the bridge. The superstructure depth will be 4 feet 6 inches (depth to span ratio of 0.10); ballasted track will provide the necessary profile grade.
8. The entire length of the bridge is on a tangent. The vertical profile of the bridge is defined by a constant descending grade of approximately 0.35 percent.
9. The bridge will support three existing mainline railroad tracks with provision for a future track.
10. The bridge will have a 17 feet 6 inch vertical clearance over the SR 710 Connector which exceeds the standard minimum vertical clearance.
11. A picket hand railing will be provided on the railroad bridge.

12. The bridge design will follow the current AREMA and Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and Seismic Design Criteria. The Acceleration Response Spectrum curve, as will be recommended in the foundation report, will be used for seismic loading in a future phase of design.
13. According to the SPGR, the project site is located in an area with a medium dense sandy layer and shallow groundwater that may potentially liquefy depending on the intensity of the ground shaking. Additional geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.
14. A railroad shoofly is required to construct the underpass. The structure can be built in a single stage after railroad operations have been shifted to the shoofly.
15. Falsework will not be required to build the superstructure.
16. There is an existing storm drain which will be relocated as it interferes with the Abutment 3 of the proposed bridge. Utility coordination has not been performed at the time of this report. Temporary and/or permanent utility relocation will be confirmed at the final design phase. No new utilities are proposed as part of this bridge project.
17. No known hazardous material exists at the bridge site.
18. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
19. The overall bridge construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$12,442,000.

**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

---



# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: June 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710 KP(PM)
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): To be Assigned	Bridge Name(s): SR 710 Connector Underpass	
Total number of bridges in project: <b>Many, only one</b> bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer.  
(Mark **N/A** if not applicable)


- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- Grades or spot elevations of roadway below the structure.
- Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- N/A Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- N/A "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)

# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

- |       |   |  |   |  |
|-------|---|--|---|--|
| 1.    | Has this project been discussed with:   | the OSFP Liaison Engineer?             | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|       |   | the Caltrans District Project Manager? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|       |   | the roadway consultant?                | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/> |   |  |   |  |
| 2.    | Have the Caltrans Structures Maintenance records been reviewed?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | If the records recommend any work for the structure, is it included in the APS?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 3.    | Are there special aesthetic considerations?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 4.    | (Widenings and Modifications)   |  |   |  |
|       | Has this project been reviewed for seismic retrofit requirements?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | Are seismic retrofit requirements included in the APS?  |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 5.    | Any special Railroad requirements?  |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|       | Shoofly required?   |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|       | Cost of shoofly included as a separate item in the project cost estimate?   |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/> |   |  |   |  |
| 6.    | Any special foundation requirements, including scour critical work, special excavation such as Type A, Type D, and/or hazardous or contaminated material?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 7.    | Any special construction requirements, including limited site accessibility or seasonal work?   |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/> |   |  |   |  |
| 8.    | Other items to be included in the cost such as slope paving, approach slabs, and/or adjacent retaining walls?   |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/> |   |  |   |  |
| 9.    | Remove existing bridge?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | Total Deck Area:  |  |   |  |
| <hr/> |   |  |   |  |
| 10.   | Any other unusual or special requirements?  |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/> |   |  |   |  |
| 11.   | Provide and attach a consultant prepared Design Memo to summarize and document any important assumptions, discussions, decisions, unusual items, local agency requirements such as aesthetics, improvements in vicinity of the structure, airspace usage, other obstructions, or any items noted above. | Summary attached?                      | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: June 3, 2014
--	---	--------------------------

**Attachment B**  
**Advance Planning Study Cost Estimate**

---





RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: SR 710 Connector Underpass  
TYPE: Steel Plate Girder Superstructure  
CU: \_\_\_\_\_  
EA: \_\_\_\_\_

BR. No.: \_\_\_\_\_

DISTRICT: 07  
RTE: 710  
CO: LA  
KP: \_\_\_\_\_

LENGTH: 90.00 WIDTH: 100.00 AREA (SQ. FT)= 9,000

**DESIGN SECTION:** \_\_\_\_\_

# OF STRUCTURES IN PROJECT : \_\_\_\_\_

EST. NO. \_\_\_\_\_

PRICES BY : \_\_\_\_\_

COST INDEX: \_\_\_\_\_

QUANTITIES BY: Kyle Sherman

DATE: 6/3/2014

QUANTITIES CHECKED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	BRIDGE DECK DRAINAGE SYSTEM		LF	290	\$ 40.00	\$11,600
2	STRUCTURE EXCAVATION (BRIDGE)		CY	4,030	\$ 45.00	\$181,333
3	STRUCTURE BACKFILL (BRIDGE)		CY	2,504	\$ 50.00	\$125,185
4	24" CIDH CONCRETE PILING		FT	6,800	\$ 160.00	\$1,088,000
5	72" CIDH CONCRETE PILING		FT	700	\$ 1,500.00	\$1,050,000
6	STRUCTURAL CONCRETE, BRIDGE FOOTING		CY	563	\$ 360.00	\$202,667
7	STRUCTURAL CONCRETE, BRIDGE		CY	1,435	\$ 900.00	\$1,291,776
8	STRUCTURAL CONCRETE, APPROACH SLAB	TYPE N	CY	222	\$ 550.00	\$122,222
9	WATERPROOFING (BRIDGE)		SF	9,430	\$ 12.00	\$113,160
10	FURNISH STRUCTURAL STEEL (BRIDGE)		LB	1,791,585	\$ 1.85	\$3,314,432
11	ERECT STRUCTURAL STEEL (BRIDGE)		LB	1,791,585	\$ 0.40	\$716,634
12	BAR REINFORCING STEEL (BRIDGE)		LB	679,578	\$ 0.90	\$611,620
13	MISCELLANEOUS METAL (BRIDGE)		LB	12,951	\$ 5.00	\$64,755
14	PICKET HAND RAILING		LF	300	\$ 150.00	\$45,000
15	BALLAST		CY	496	\$ 40.00	\$19,840
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

**ROUTING**

1. DES SECTION
2. OFFICE OF BRIDGE DESIGN - NORTH
3. OFFICE OF BRIDGE DESIGN - CENTRAL
4. OFFICE OF BRIDGE DESIGN - SOUTH
5. OFFICE OF BRIDGE DESIGN - WEST
6. OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

SUBTOTAL	\$8,958,223
MOBILIZATION ( @ 10 % )	\$995,358
SUBTOTAL BRIDGE ITEMS	\$9,953,581
CONTINGENCIES (@ 25%)	\$2,488,395
BRIDGE TOTAL COST	\$12,441,977
COST PER SQ. FOOT	\$1,382.44
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$12,441,977
FOR BUDGET PURPOSES - SAY	\$12,442,000

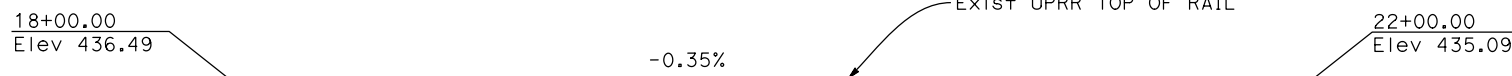
COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



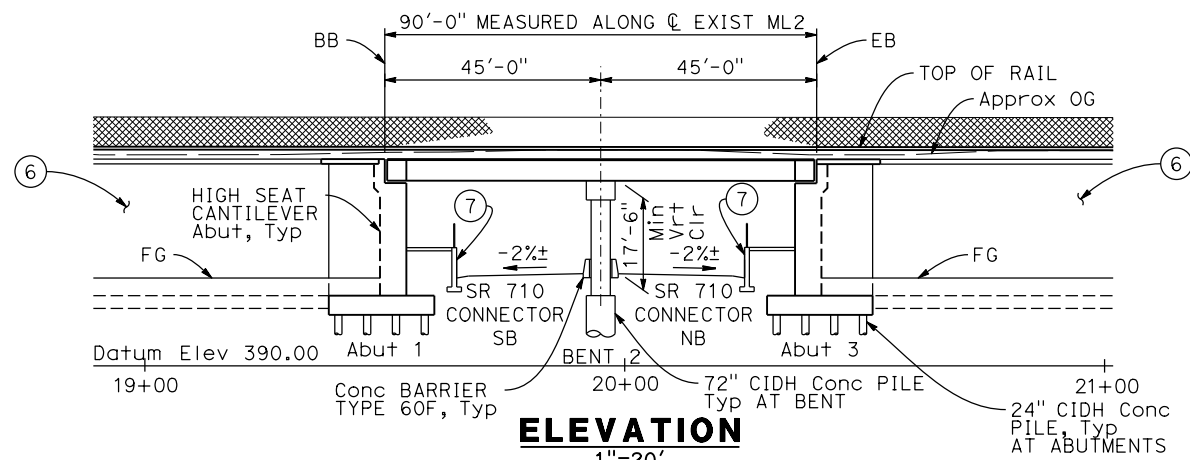
**Attachment C**  
**Advance Planning Study Plan**

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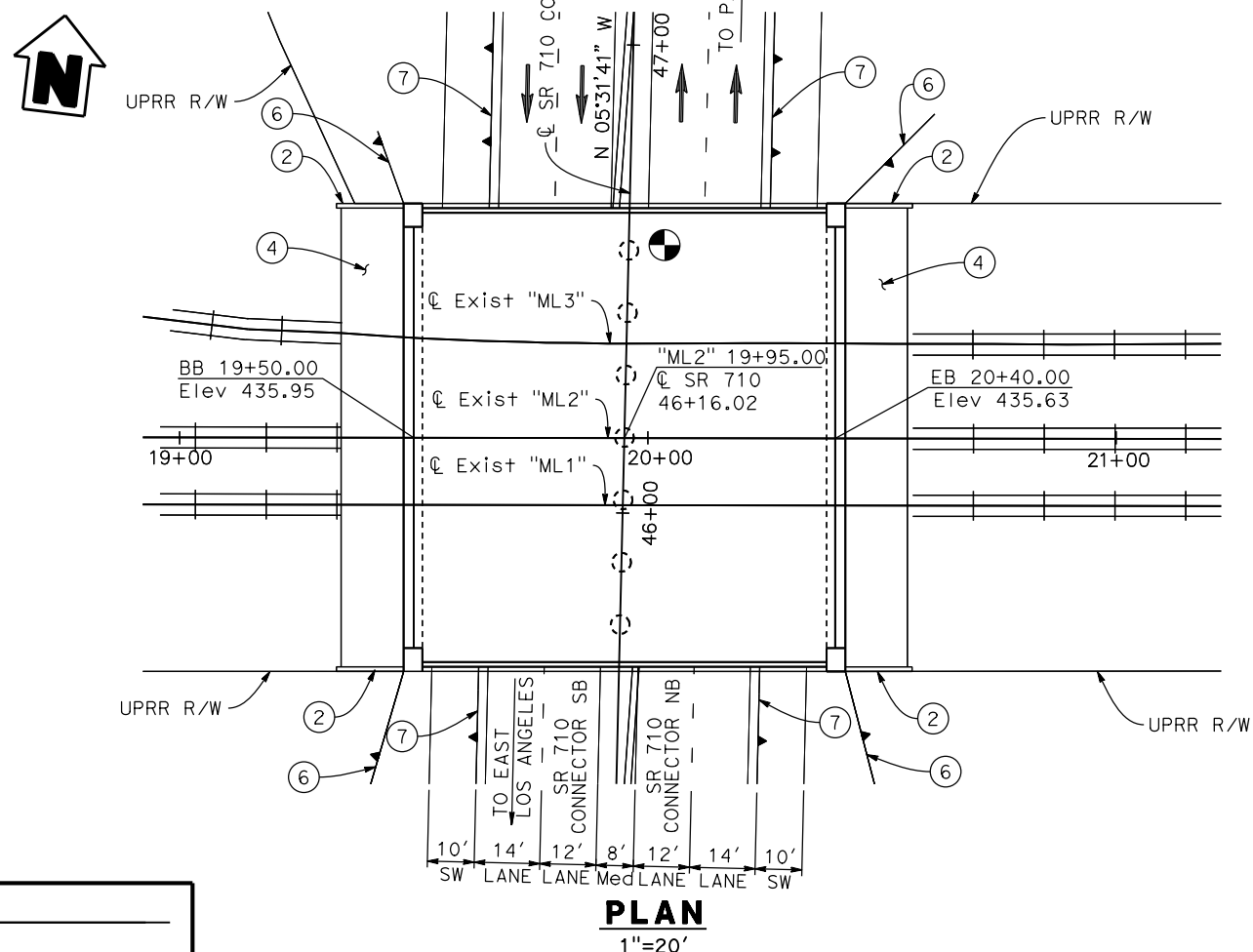




**PROFILE GRADE - TOP OF RAIL (EXIST ML2)**  
NO SCALE



**ELEVATION**  
1"=20'



**PLAN**  
1"=20'

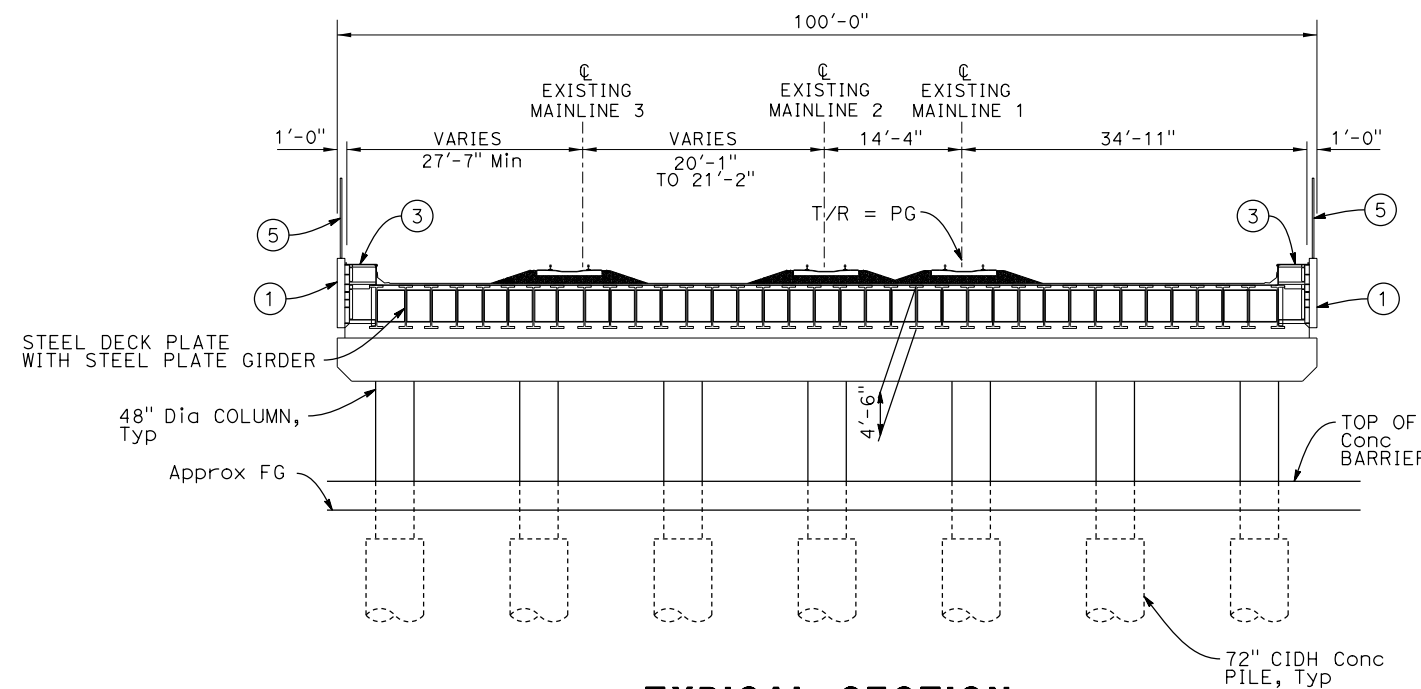
**LEGEND:**

- ① Precast Facade Panels
- ② Wingwall
- ③ Walkway
- ④ Approach Slab
- ⑤ Picket Hand Railing
- ⑥ Railroad Retaining Wall, See Roadway Plans
- ⑦ Roadway Retaining Wall, See Roadway Plans
- ⊕ Denotes Point of Minimum Vertical Clearance
- ← Traffic Lane or Direction

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	

METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012

CH2M HILL  
1000 WILSHIRE BLVD, SUITE 2100  
LOS ANGELES, CA 90017



**TYPICAL SECTION**  
1"=10'

**ABBREVIATION**

T/R TOP OF RAIL  
PG PROFILE GRADE

**NOTE:** SHOOFLY WILL BE REQUIRED TO BUILD THE BRIDGE WHICH IS NOT SHOWN IN THIS PLAN.

DATE OF ESTIMATE	JUNE 2014
BRIDGE REMOVAL	NONE
STRUCTURE DEPTH	4'-6"
LENGTH	90'-0"
WIDTH	100'-0"
AREA	9,000 SF
COST/FT <sup>2</sup> INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	\$ 1,382
TOTAL COST	\$ 12,442,000

DESIGNED BY	K. Sherman	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

PLANNING STUDY	
SR 710 CONNECTOR UNDERPASS	
BRIDGE NO. TBD	UNIT:
SCALE: AS NOTED	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT	
SIGN OFF DATE	





SR 710 North Study

ATTACHMENT K-1b

Task 7.2 Advance Planning Study Report

---

# State Route 710 North Study Advance Planning Study Report Garfield Avenue Bridge (Widen)

TSM/TDM Intersection and Local Street Improvement Alternative  
I-16: Garfield Avenue and Mission Road

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

October 2014

**CH2MHILL®**

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017







## SR 710 North Study

PREPARED FOR: Metropolitan Transportation Authority  
COPY TO: Caltrans Study Team  
PREPARED BY: CH2M HILL Team  
DATE: October 3, 2014  
PROJECT NUMBER: 428908

### Garfield Avenue Bridge (Widen)

#### TSM/TDM Intersection and Local Street Improvement Alternative I-16: Garfield Avenue and Mission Road

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B	Advance Planning Study Cost Estimate
C	Advance Planning Study Plan



**Project Vicinity Map**  
**State Route 710 North Study**  
**TSM/TDM Intersection and Local Street Improvement Alternative**  
**I-16: Garfield Avenue and Mission Road**

## Assumptions Used for Garfield Avenue Bridge (Widen) – Advance Planning Study

1. The proposed Garfield Avenue Bridge (Widen) will be an integral part of the State Route (SR) 710 North Study Project. The proposed structure is located adjacent to the intersection of Garfield Avenue and Mission Road in the city of Alhambra. The existing bridge crosses over a train trench with two railroad tracks. The purpose of the proposed SR 710 North Study Project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks.
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes.
  - Minimize environmental impacts.
2. The Transportation System Management/Transportation Demand Management (TSM/TDM) alternative consists of strategies and enhancements to improve operational efficiency and capacity for all modes in the transportation system with lower-cost capital investments and/or lower potential impacts.

- TSM elements aim to improve the operational efficiency of the existing transportation network.
- TDM elements are oriented toward reducing traffic demand during peak periods.

The improvement of intersection number I-16 at Garfield Avenue and Mission Road aims to add a dedicated 12 feet right turn lane in the northbound direction. This will require the widening of the Garfield Avenue Bridge.

3. The existing Garfield Avenue Bridge (Bridge No. 53C-1669) was built in 1979. It is a 59-foot long, single span reinforced concrete box girder bridge supported on high cantilever abutments with pile foundations.
4. There is no known environmentally sensitive area at this location.
5. The east side of the bridge will be widened 10 feet which will be connected with the existing structure with a closure pour. The final width of the structure will be 94 feet.
6. The bridge widening will be supported on seat-type abutments, same as the existing bridge. The Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014) recommends cast-in-drilled-hole (CIDH) concrete piles for foundations. Thirty-six inch CIDH concrete piles are proposed for the abutments.
7. The assumed order of work includes first removing parts of the existing structure, then constructing the widening, and lastly connecting the existing structure and widening with a concrete closure pour.
8. Based on the project location, existing structure type, bridge span length, available clearance, and other constraints, a precast, voided slab is likely the most cost-effective widening solution and, thus, is recommended for the bridge. The voided slab will be 2 feet 2 inches thick which will have 7 inches cast-in-place deck over it. The total superstructure depth will be 2 feet 9 inches (depth to span ratio of 0.047) with slope matching the existing grade and slope. Precast I-girder can also be used to build the superstructure, but the voided slab will provide minimum superstructure depth without the requirement of the falsework.
9. The entire length of the bridge is on a tangent. The vertical profile of the bridge is defined by a varying ascending grade.

10. Once completed, the bridge will include a 7-ft 2-inch sidewalk and one 13-ft traffic lane, one 11-ft traffic line, and one 10-ft left turn lane in the south travel direction. In the north travel direction there will be a 7-ft sidewalk, one 12-ft right turn lane, two 11-ft traffic lanes, and one 10-ft left turn lane.
11. The bridge will have a 23 feet 4 inches minimum vertical clearance over the railroad. The required minimum vertical clearance per the U.P.R.R. & AREMA Design Manual is 23 feet 4 inches over the railroad.
12. A chain-link railing will be provided on the widened structure.
13. The bridge design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and Seismic Design Criteria. The Acceleration Response Spectrum curve, as will be recommended in the foundation report, will be used for seismic loading in a future phase of design.
14. According to the SPGR, the project site is not located in an area considered to be susceptible to liquefaction. The proposed structure does not need to account for liquefaction in the preliminary design. Additional geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.
15. Falsework will not be required to build the superstructure.
16. On the eastside sidewalk, there is a signal and lighting post and utility line through the sidewalk. Relocation of these utilities will be required. No new utilities are proposed as part of this widening project.
17. There may be asbestos-containing material (ACM) present in the existing bridge and presence of these materials would pose a potential hazardous waste risk as identified in the Phase I Initial Site Assessment Report (CH2M HILL, 2014). The design and construction of the bridge should comply with the applicable environmental requirements of federal, state, and local agencies to remove those ACM during bridge removal process.
18. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
19. The overall bridge construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$393,000.

**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

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# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710 KP(PM)
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): 53C-1669	Bridge Name(s): Garfield Avenue Bridge (Widen)	
Total number of bridges in project: <b>Many, only one</b> bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer.  
(Mark **N/A** if not applicable)

- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- Grades or spot elevations of roadway below the structure.
- Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- N/A Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)


# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

1. Has this project been discussed with:   
 the OSFP Liaison Engineer? Yes  No   
 the Caltrans District Project Manager? Yes  No   
 the roadway consultant? Yes  No
- 
2. Have the Caltrans Structures Maintenance records been reviewed? Yes  No   
 If the records recommend any work for the structure, is it included in the APS? Yes  No
- 
3. Are there special aesthetic considerations? Yes  No
- 
4. (Widenings and Modifications)  
 Has this project been reviewed for seismic retrofit requirements? Yes  No   
 Are seismic retrofit requirements included in the APS? Yes  No
- 
5. Any special Railroad requirements? Yes  No   
 Shoofly required? Yes  No   
 Cost of shoofly included as a separate item in the project cost estimate? Yes  No
- 
6. Any special foundation requirements, including scour critical work, special excavation such as Type A, Type D, and/or hazardous or contaminated material? Yes  No
- 
7. Any special construction requirements, including limited site accessibility or seasonal work? Yes  No
- 
8. Other items to be included in the cost such as slope paving, approach slabs, and/or adjacent retaining walls? Yes  No
- 
9. Remove existing bridge? Yes  No   
 Total Deck Area: 152 sq ft
- 
10. Any other unusual or special requirements? Yes  No
- 
11. Provide and attach a consultant prepared Design Memo to summarize and document any important assumptions, discussions, decisions, unusual items, local agency requirements such as aesthetics, improvements in vicinity of the structure, airspace usage, other obstructions, or any items noted above. Summary attached? Yes  No

5

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: March 21, 2014
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**Attachment B**  
**Advance Planning Study Cost Estimate**

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Revised - December 3, 2007

TSM/TDM Alternative  
I-16: Garfield Avenue and Mission Road

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Garfield Avenue Bridge (Widen) BR. No.: 53C-1669  
TYPE: Precast Concrete Voided Deck Slab Bridge  
CU: \_\_\_\_\_  
EA: \_\_\_\_\_

DISTRICT: 07  
RTE: 710  
CO: LA  
PM: \_\_\_\_\_

LENGTH: 59.00 WIDTH: 10.00 AREA (SF)= 590

**DESIGN SECTION:**

# OF STRUCTURES IN PROJECT : \_\_\_\_\_ EST. NO. \_\_\_\_\_  
PRICES BY : \_\_\_\_\_ COST INDEX: \_\_\_\_\_  
PRICES CHECKED BY : A. Issa DATE: 3/21/2014  
QUANTITIES BY: \_\_\_\_\_ DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	TEMPORARY RAILING	TypeK	LF	119	\$20.00	\$2,380
2	BRIDGE REMOVAL (PORTION)		LS	1	\$35,000.00	\$35,000
3	STRUCTURE EXCAVATION (BRIDGE)		CY	32	\$100.00	\$3,200
4	STRUCTURE BACKFILL (BRIDGE)		CY	21	\$70.00	\$1,470
5	36" CIDH CONCRETE PILING		LF	140	\$350.00	\$49,000
6	STRUCTURAL CONCRETE, BRIDGE		CY	47	\$800.00	\$37,600
7	STRUCTURAL CONCRETE, APPROACH SLAB	TypeN	CY	27	\$720.00	\$19,440
8	FURNISH PRECAST CONCRETE DECK UNIT (50'-60')		EA	2	\$10,000.00	\$20,000
9	ERECT PRECAST CONCRETE DECK UNIT		EA	2	\$2,000.00	\$4,000
10	JOINT SEAL (MR = 1 1/2")		LF	25	\$90.00	\$2,265
11	BAR REINFORCING STEEL (BRIDGE)		LB	5,000	\$1.00	\$5,000
12	STRUCTURAL SHOTCRETE		CY	6	\$800.00	\$4,800
13	CHAIN LINK RAILING	Type 7	LF	119	\$100.00	\$11,900
14	CONCRETE BARRIER	Type 26M	LF	119	\$240.00	\$28,560
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

SUBTOTAL	\$224,615
TIME RELATED OVERHEAD	\$22,462
MOBILIZATION (@ 10 %)	\$27,453
SUBTOTAL BRIDGE ITEMS	\$274,529
CONTINGENCIES (@ 25%)	\$68,632
BRIDGE TOTAL COST	\$343,162
COST PER SQ. FOOT	\$581.63
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	\$50,000
GRAND TOTAL	\$393,162
BUDGET ESTIMATE AS OF	\$393,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$393,000
2	\$393,000
3	\$393,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$393,000
5	\$393,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.



**Attachment C**  
**Advance Planning Study Plan**

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	

METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012

CH2M HILL  
1000 WILSHIRE BLVD, SUITE 2100  
LOS ANGELES, CA 90017

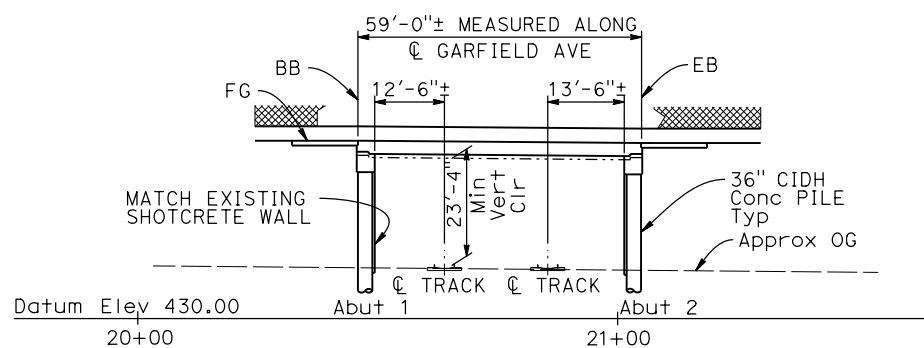
**LEGEND:**

- Indicates Existing Structure
- Indicates New Construction
- ① Paint "GARFIELD AVENUE BRIDGE"
- ② Paint Bridge Number & Year Constructed
- ③ Structure Approach Type N(30S)
- ④ Remove existing concrete barrier & overhang
- Bridge Removal (Portion)
- ⊙ Denotes Point of Minimum Vertical Clearance
- \* Match existing grade & cross slope

Sta 17+00 Elev (459.87 FS)	Sta 17+50 Elev (459.34 FS)	Sta 18+00 Elev (458.82 FS)	Sta 18+50 Elev (458.29 FS)	Sta 19+00 Elev (457.97 FS)	Sta 19+50 Elev (458.17 FS)	Sta 20+00 Elev (458.83 FS)	Sta 20+50 Elev (458.83 FS)	Sta 21+00 Elev (458.34 FS)	Sta 21+50 Elev (456.97 FS)	Sta 22+00 Elev (455.50 FS)
-------------------------------	-------------------------------	-------------------------------	-------------------------------	-------------------------------	-------------------------------	-------------------------------	-------------------------------	-------------------------------	-------------------------------	-------------------------------

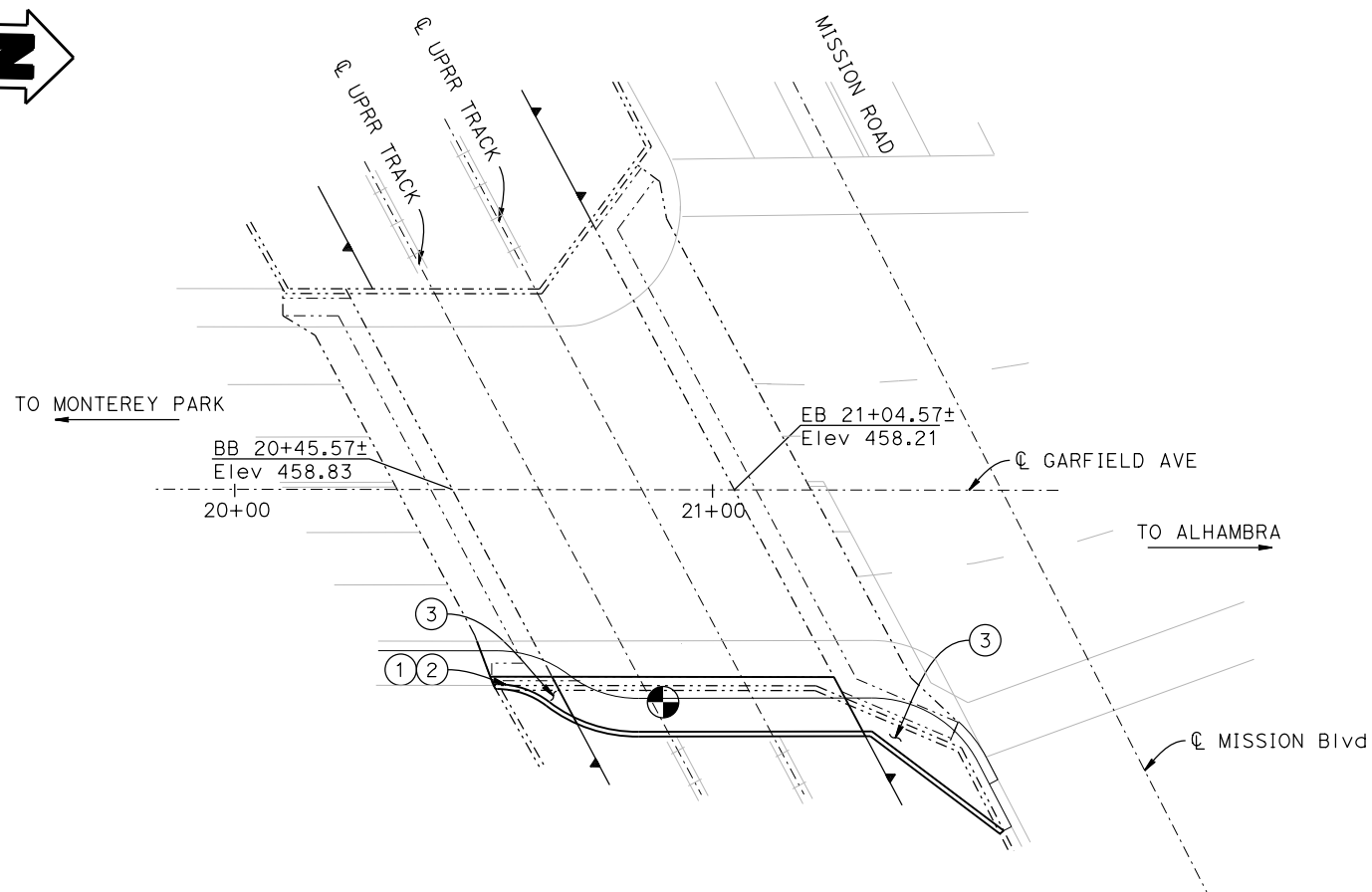
**PROFILE GRADE**

NO SCALE



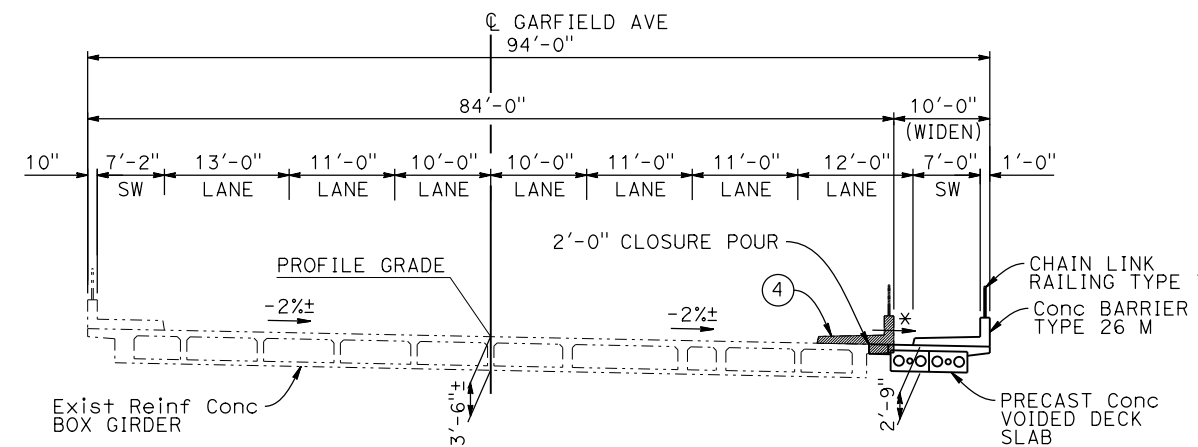
**ELEVATION**

1"=20'



**PLAN**

1"=20'



**TYPICAL SECTION**

1"=10'

DATE OF ESTIMATE	MARCH 2014
BRIDGE REMOVAL	PARTIAL
STRUCTURE DEPTH	2'-9"
LENGTH	59'-0"
WIDTH	10'-0"
AREA	590 SF
COST/FT <sup>2</sup> INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	\$ 582
TOTAL COST	\$ 393,000

DESIGN OVERSIGHT	
SIGN OFF DATE	

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

PLANNING STUDY	
<b>GARFIELD AVENUE BRIDGE (WIDEN)</b>	
BRIDGE NO. 53C-1669	UNIT:
SCALE: AS NOTED	PROJECT NUMBER & PHASE:





**Attachment K-2**  
**Freeway Tunnel Alternative – Dual-Bore Tunnel**  
**Advance Planning Study Reports**

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SR 710 North Study

ATTACHMENT K-2a

Task 7.2 Advance Planning Study Report

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# State Route 710 North Study Advance Planning Study Report Ramona Boulevard Undercrossing (Widen)

## Freeway Tunnel Alternative Dual Bore Option

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

October 2014

**CH2MHILL**®

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017





## SR 710 North Study

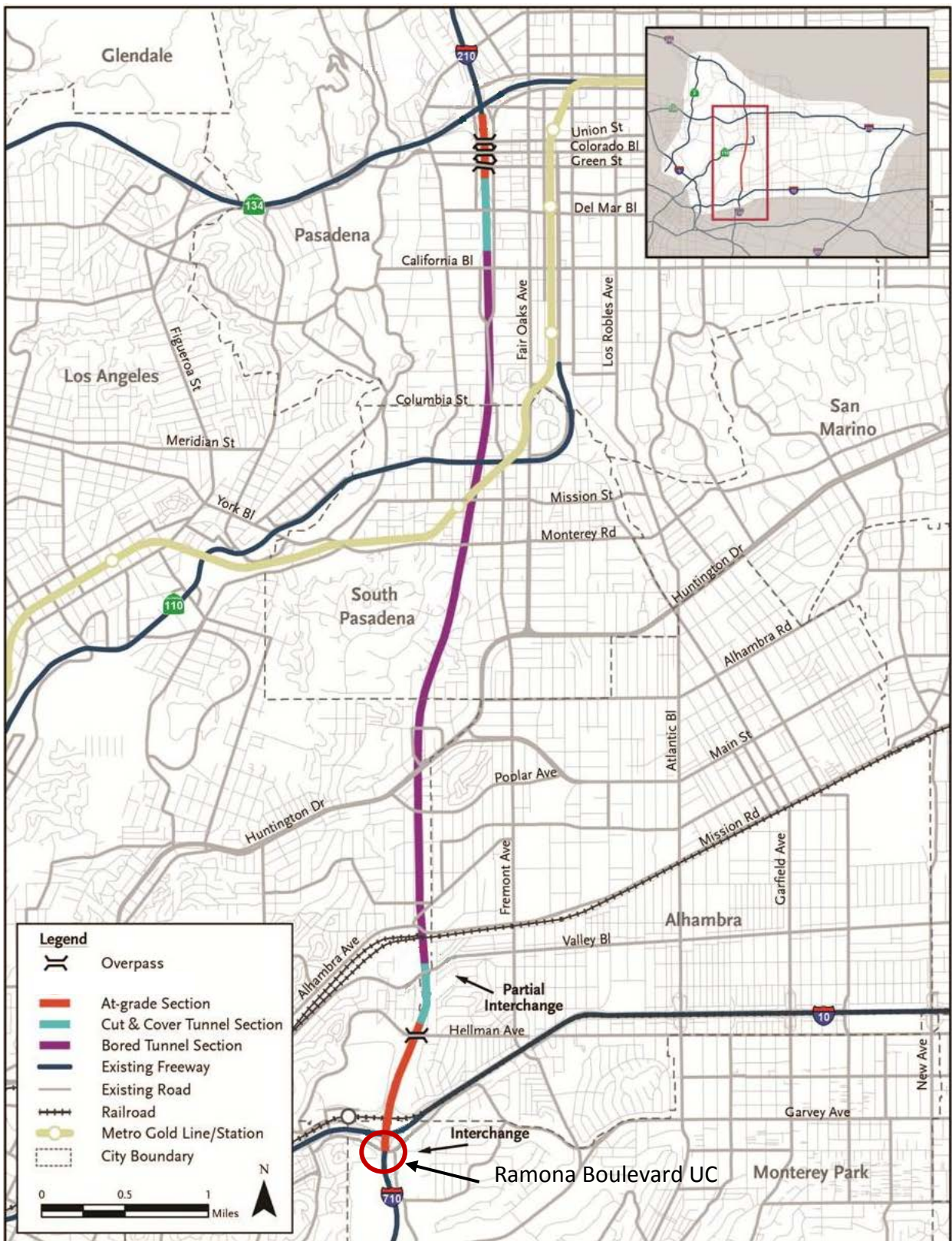
PREPARED FOR: Metropolitan Transportation Authority  
COPY TO: Caltrans Study Team  
PREPARED BY: CH2M HILL Team  
DATE: October 3, 2014  
PROJECT NUMBER: 428908

### Ramona Boulevard Undercrossing (Widen)

#### Freeway Tunnel Alternative Dual Bore Option

#### Table of Contents

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A	Consultant Prepared Advance Planning Study (APS) Checklist
B	Advance Planning Study Cost Estimate
C	Advance Planning Study Plan



**Project Vicinity Map**  
**State Route 710 North Study**  
**Freeway Tunnel Alternative Alignment**  
**Dual Bore Option**

## Assumptions Used for Ramona Boulevard UC (Widen) – Advance Planning Study

1. The proposed Ramona Boulevard Undercrossing (Widen) will be an integral part of the State Route (SR) 710 Gap Closure Project. Ramona Boulevard crosses under the SR 710 Freeway at this location. Only the left bridge will be widened for southbound traffic. The purpose of the proposed project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks.
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes.
  - Minimize environmental impacts.
2. There are two options for the Freeway Tunnel alternative for the future SR 710 corridor:
  - Two full bored tunnels accommodating one direction of traffic in each tunnel (this report is based on this option).
  - One full bored tunnel accommodating both directions of traffic (documented in a separate report).
3. The existing Ramona Boulevard UC (Bridge No. 53-1459) was built in 1961. It was retrofitted for seismic loading in 1998 and the barrier was reconstructed in 1995. The UC consists of two separate structures for northbound (Right Bridge) and southbound (Left Bridge) traffic. Each bridge will be a 185.54-foot long, three-span structure with span lengths of 54, 72, and 54 feet. The left bridge is proposed to be widened on each side of the structure.
4. The existing abutment of the UC is a continuous abutment supporting both bridges. As per as-built plans, foundation piles for the future median widening columns were also installed during the original construction; the median closure was never built. Further investigation will be required to assess the impact of these continuous abutments and the existing piles for the bent columns on the proposed widening. For this study, it is assumed that new abutments, bents, and foundations will be designed for the proposed widenings and the existing construction features in this widening area will be removed as necessary.
5. There is no known environmentally sensitive area at this location.
6. The east side of the left bridge will be widened 17'-7" and the west side widening will vary from 16'-6" to 20'-0".
7. The bridge widening will be supported on single-column bents and seat-type abutments. The Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014) recommends cast-in-drilled-hole (CIDH) piles or steel HP driven piles at the abutments and bents. Steel HP driven piles are proposed in this study which also matches the existing footings.
8. The assumed order of work includes first removing parts of the existing structures, then constructing the new structures, and then connecting the existing structures and widening with concrete closure pours. The median widening will be constructed in first stage and the traffic will be shifted to the east side. Part of existing west side of the bridge deck may need to be used during the widening due to lack of sufficient construction space below.
9. Based on the project location, existing structure type, bridge span length, available clearance, and other constraints, a cast-in-place reinforced concrete box girder bridge is likely the most cost-effective replacement solution and thus is recommended for the bridge replacement. This will match the existing superstructure.

The superstructure depth is 4 feet (depth to span ratio of 0.055) with cross slope matching the existing grade and cross slope.

10. Approximately the first 35 feet of the bridge is on a 2,000-foot horizontal curve and the rest of the bridge is on a tangent alignment. The vertical profile of the bridge is defined by an 800-foot vertical curve with an entrance grade of +3.18 percent and an exit grade of -2.4 percent.
11. The widened southbound bridge will include 10-foot shoulders on each side, four typical 12-foot traffic lanes, and another traffic lane of varying width.
12. The bridge will have a 22 feet 1 inch minimum vertical clearance over Ramona Blvd. The required minimum vertical clearance per the Caltrans Highway Design Manual is 15 feet over a non-freeway facility.
13. The bridge design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and the Caltrans Seismic Design Criteria. The Acceleration Response Spectrum curve, as recommended in the foundation report, will be used for seismic loading in a future phase of design.
14. According to the SPGR, the project site is not located in an area considered to be susceptible to liquefaction. The proposed structure does not need to account for liquefaction in the preliminary design. Additional geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.
15. Falsework will be required to build the superstructure. Minimum falsework clearance of 15 feet over the local traffic lanes will be available.
16. No new utilities are proposed as part of this widening project.
17. There may be asbestos-containing material (ACM) present in the existing bridge and presence of these materials would pose a potential hazardous waste risk as identified in the Phase I Initial Site Assessment Report (CH2M HILL, 2014). The design and construction of the bridge should comply with the applicable environmental requirements of federal, state, and local agencies to remove those ACM during bridge removal process.
18. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
19. The overall bridge construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$2,243,000.



**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

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# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): 53-1459 R/L	Bridge Name(s): Ramona Boulevard UC (Widen)	
Total number of bridges in project : Many, only one bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer. (Mark **N/A** if not applicable)


- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- Grades or spot elevations of roadway below the structure.
- Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- N/A Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)

# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

- |       |   |  |   |  |
|-------|---|--|---|--|
| 1.    | Has this project been discussed with:   | the OSFP Liaison Engineer?             | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|       |   | the Caltrans District Project Manager? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|       |   | the roadway consultant?                | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/> |   |  |   |  |
| 2.    | Have the Caltrans Structures Maintenance records been reviewed?   |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|       | If the records recommend any work for the structure, is it included in the APS?   |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/> |   |  |   |  |
| 3.    | Are there special aesthetic considerations?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 4.    | (Widenings and Modifications)   |  |   |  |
|       | Has this project been reviewed for seismic retrofit requirements?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | Are seismic retrofit requirements included in the APS?  |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 5.    | Any special Railroad requirements?  |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | Shoofly required?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | Cost of shoofly included as a separate item in the project cost estimate?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 6.    | Any special foundation requirements, including scour critical work, special excavation such as Type A, Type D, and/or hazardous or contaminated material?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 7.    | Any special construction requirements, including limited site accessibility or seasonal work?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 8.    | Other items to be included in the cost such as slope paving, approach slabs, and/or adjacent retaining walls?   |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/> |   |  |   |  |
| 9.    | Remove existing bridge?   |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|       | Total Deck Area: Partial  |  |   |  |
| <hr/> |   |  |   |  |
| 10.   | Any other unusual or special requirements?  |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 11.   | Provide and attach a consultant prepared Design Memo to summarize and document any important assumptions, discussions, decisions, unusual items, local agency requirements such as aesthetics, improvements in vicinity of the structure, airspace usage, other obstructions, or any items noted above. | Summary attached?                      | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: March 21, 2014
--	---	-------------------------

**Attachment B**  
**Advance Planning Study Cost Estimate**

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Revised - December 3, 2007

Freeway Tunnel Alternative  
Dual Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Ramona Boulevard UC (Widen) BR. No.: 53-1459 R/L  
TYPE: Reinf Conc Box Girder Bridge  
CU: \_\_\_\_\_  
EA: \_\_\_\_\_

DISTRICT: 07  
RTE: 710  
CO: LA  
PM: \_\_\_\_\_

LENGTH: 185.54 WIDTH: 35.83 AREA (SF)= 6,649

**DESIGN SECTION:** \_\_\_\_\_

# OF STRUCTURES IN PROJECT : \_\_\_\_\_ EST. NO. \_\_\_\_\_  
PRICES BY : \_\_\_\_\_ COST INDEX: \_\_\_\_\_  
PRICES CHECKED BY : A. Issa DATE: 3/21/2014  
QUANTITIES BY: \_\_\_\_\_ DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	TEMPORARY RAILING	Type K	LF	491	\$20.00	\$9,822
2	BRIDGE REMOVAL (PORTION)		LS	1	\$80,000.00	\$80,000
3	STRUCTURE EXCAVATION (BRIDGE)		CY	300	\$100.00	\$30,000
4	STRUCTURE BACKFILL (BRIDGE)		CY	170	\$70.00	\$11,900
5	FURNISH STEEL PILING (HP 14 X 89)		LF	2,485	\$50.00	\$124,250
6	DRIVE STEEL PILE (HP 14 X 89)		EA	71	\$2,000.00	\$142,000
7	STRUCTURAL CONCRETE, BRIDGE FOOTING		CY	99	\$400.00	\$39,600
8	STRUCTURAL CONCRETE, BRIDGE		CY	640	\$800.00	\$512,000
9	STRUCTURAL CONCRETE, APPROACH SLAB	Type N	CY	77	\$720.00	\$55,440
10	STRUCTURAL CONCRETE, APPROACH SLAB	Type R	CY	112	\$1,080.00	\$120,960
11	BAR REINFORCING STEEL (BRIDGE)		LB	181,000	\$1.00	\$181,000
12	SLOPE PAVING (CONCRETE)		CY	159	\$600.00	\$95,468
13	JOINT SEAL (MR = 1 1/2")		LF	72	\$90.00	\$6,450
14	CONCRETE BARRIER	Type 742	LF	491	\$120.00	\$58,930
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

SUBTOTAL	\$1,467,819
TIME RELATED OVERHEAD	\$146,782
MOBILIZATION (@ 10%)	\$179,400
SUBTOTAL BRIDGE ITEMS	\$1,794,001
CONTINGENCIES (@ 25%)	\$448,500
BRIDGE TOTAL COST	\$2,242,502
COST PER SQ. FOOT	\$337.29
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$2,242,502
BUDGET ESTIMATE AS OF	\$2,243,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$2,243,000
2	\$2,243,000
3	\$2,243,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$2,243,000
5	\$2,243,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.



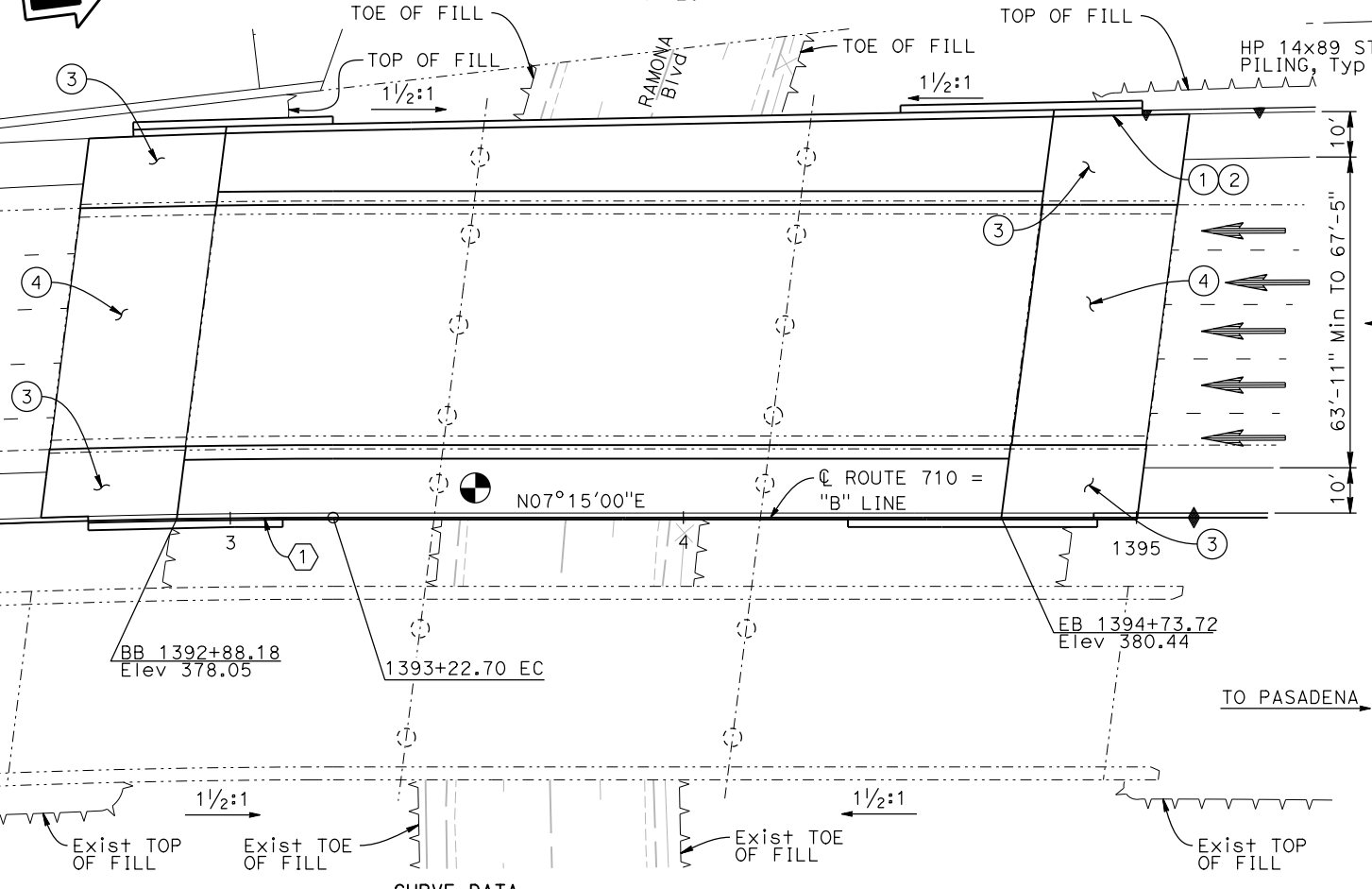
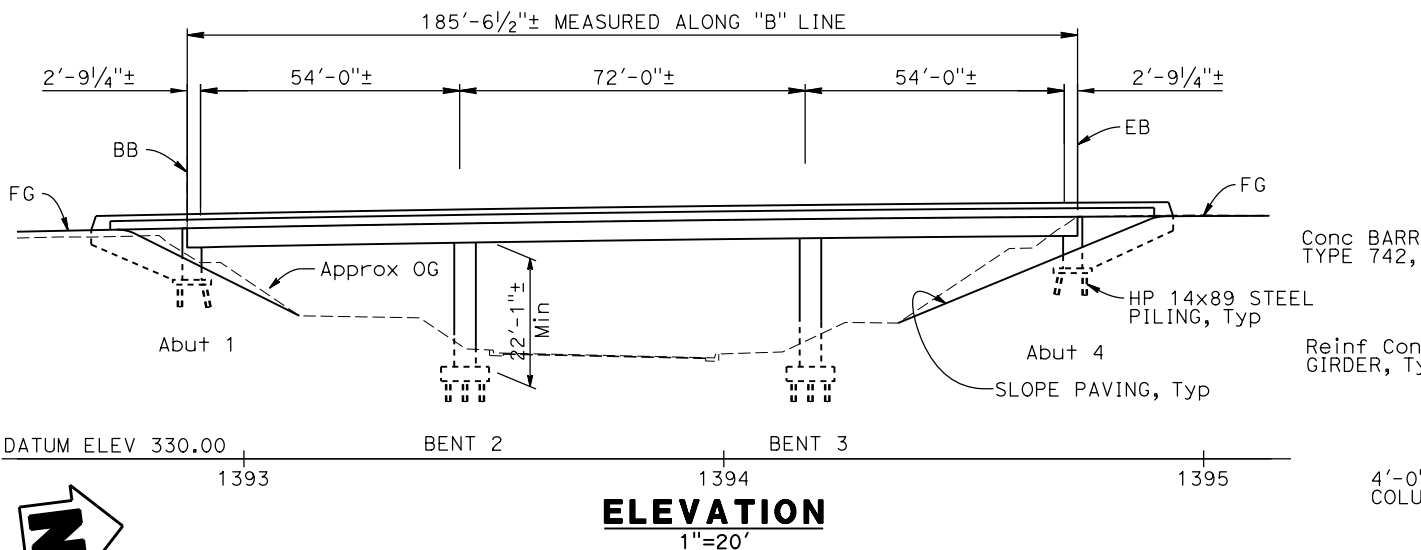
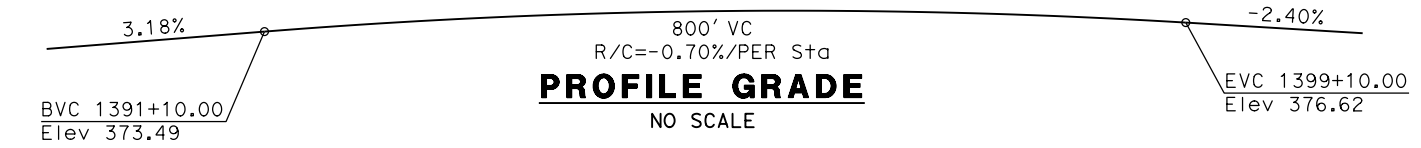


**Attachment C**  
**Advance Planning Study Plan**

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 6 HUTTON CENTRE DRIVE, SUITE 700 SANTA ANA, CA 92707			



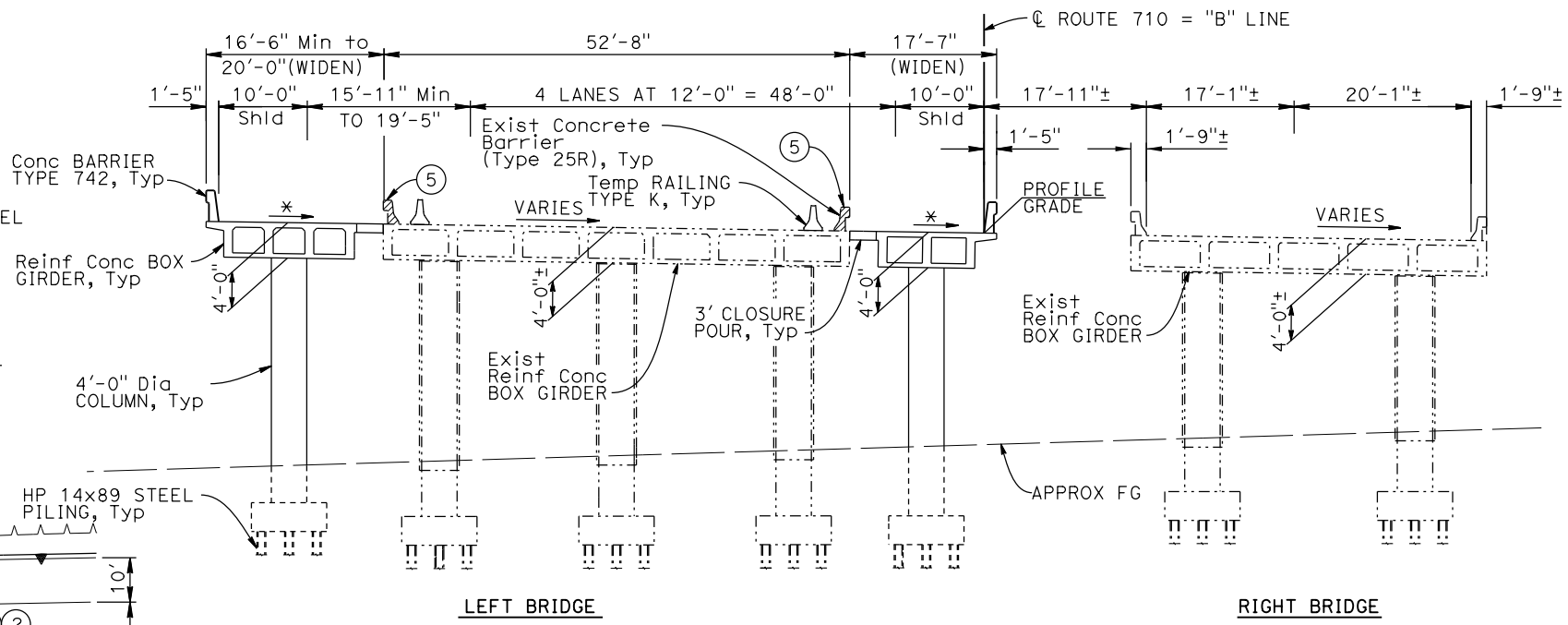
**CURVE DATA**

① "B" LINE

R = 2000.00'  
 Δ = 26°07'21"  
 T = 464.22'  
 L = 912.30'

**LEGEND:**

- Indicates Existing Structure
- Indicates New Construction
- ① Paint "Ramona Blvd UC"
- ② Paint "Bridge No. 53-1459 L" & year constructed
- ③ Structure Approach Type N(30S)
- ④ Structure Approach Type R(30S)
- ⑤ Remove Exist Concrete Barrier (Type 25R)
- ⊙ Denotes Point of Minimum Vertical Clearance
- ▨ Bridge Removal (Portion)
- \* Match Existing Grade & Cross Slope



DATE OF ESTIMATE	MARCH 2014
BRIDGE REMOVAL **	PARTIAL
STRUCTURE DEPTH	4'-0"
LENGTH	185'-6 1/2"
WIDTH	16'-6" TO 20'-0" and 17'-7"
AREA	6,649 SF
COST/FT <sup>2</sup> INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	\$ 337 **
TOTAL COST	\$ 2,243,000

\*\* DURING ORIGINAL CONSTRUCTION OF THE BRIDGE, THE ABUTMENTS WERE MADE CONTINUOUS AND PILES FOR BENT COLUMNS WERE INSTALLED IN THE MEDIAN AREA FOR ANTICIPATED FUTURE WIDENING, BUT THE MEDIAN CLOSURE WAS NEVER BUILT. BRIDGE REMOVAL ITEM INCLUDES REMOVAL OF THIS EXISTING CONSTRUCTION AS NECESSARY IN THE WIDENING AREA TO ACCOMMODATE THE NEW CONSTRUCTION.

**FREeway TUNNEL ALTERNATIVE DUAL BORE OPTION**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah PROJECT ENGINEER	<b>PLANNING STUDY</b>
	<b>RAMONA BOULEVARD UC (WIDEN)</b>
BRIDGE NO. 53-1459 R/L	UNIT:
SCALE: AS NOTED	PROJECT NUMBER & PHASE:





SR 710 North Study

ATTACHMENT K-2b

Task 7.2 Advance Planning Study Report

---

# State Route 710 North Study Advance Planning Study Report Route 710/10 Separation (Widen)

## Freeway Tunnel Alternative Dual Bore Option

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

October 2014

**CH2MHILL®**

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017





# SR 710 North Study

PREPARED FOR: Metropolitan Transportation Authority  
COPY TO: Caltrans Study Team  
PREPARED BY: CH2M HILL Team  
DATE: October 3, 2014  
PROJECT NUMBER: 428908

## Route 710/10 Separation (Widen)

### Freeway Tunnel Alternative Dual Bore Option

#### Table of Contents

	<u>Page No.</u>
Project Vicinity Map	2
Design Memorandum	3

#### Attachments

- A Consultant Prepared Advance Planning Study (APS) Checklist
- B Advance Planning Study Cost Estimate
- C Advance Planning Study Plan



**Project Vicinity Map**  
**State Route 710 North Study**  
**Freeway Tunnel Alternative Alignment**  
**Dual Bore Option**



## Assumptions Used for Route 710/10 Separation (Widen) – Advance Planning Study

1. The proposed Route 710/10 Separation (Widen) will be an integral part of the State Route (SR) 710 North Study Project. The Route 10 crosses under the SR 710 Freeway at this location. The purpose of the proposed project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks.
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes.
  - Minimize environmental impacts.
2. There are two options for the Freeway Tunnel alternative for the future SR 710 corridor:
  - Two full bored tunnels accommodating one direction of traffic in each tunnel (this report is based on this option).
  - One full bored tunnel accommodating both directions of traffic (documented in a separate report).
3. The existing Route 710/10 Separation (Bridge No. 53-1445) was built in 1961. It was retrofitted for seismic loading in 1998 and the barrier was reconstructed in 1995. The separation consists of two separate structures for northbound (Right Bridge) and southbound (Left Bridge) traffic. Each bridge is a six-span structure with varying span lengths. The left bridge is proposed to be widened on each side of the structure, which is 336.88 feet long with span lengths of 38.76, 68.11, 70.48, 62.75, 54.88 and 41.90 feet respectively.
4. The existing abutment of the separation is one continuous structure supporting both bridges. The existing Bents 5 and 6 and Abutment 7 are on spread footings. As per as-built plans, piles for future inside widening columns of Bents 2, 3, and 4 were also installed during the original construction; the median closure was never built. Further investigation will be required to assess the impact of these continuous abutments and the existing piles for the bent columns on the proposed widening. In this study, it is assumed that new abutments, bents, and foundations will be designed for the proposed widening and the existing construction in this widening area will be removed as necessary to accommodate that.
5. There is no known environmentally sensitive area at this location.
6. The east side of the left bridge will be widened 17'-7" and the west side widening will vary from 20'-7" to 28'-1".
7. The bridge widening will be supported on seat-type abutments and single-column bents on the east side and two-column bents on the west side. The Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014) recommends footings with precast concrete driven piles or cast-in-drilled-hole (CIDH) piles for the abutments and bents. Precast concrete driven pile is proposed in this study which also matches the type of existing pile.
8. The assumed order of work includes first removing parts of the existing structures, then constructing the new structures, and then connecting the existing structures and widening with concrete closure pours. The median widening will be constructed in the first stage and traffic will be shifted to the east side. Part of the existing west side of the bridge deck may need to be used during the widening due to lack of sufficient construction space below.
9. The existing bridge has cast-in-place, reinforced concrete box girder superstructure for Spans 1, 2, 5, and 6 and precast, prestressed concrete box girder for Spans 3 and 4. Based on the project location, bridge span length, available clearance, and other constraints, a precast, prestressed concrete box girder is recommended

for all spans. Precast superstructure will facilitate easier construction over Route 10 and provide the required falsework clearance for Span 2. The superstructure depth will be 4 feet (depth to span ratio of 0.056) with cross slope matching the existing grade and cross slope.

10. The station line of the bridge is on a tangent. The profile of the bridge is defined by an 800-ft vertical curve with an entrance grade of +3.18 percent and an exit grade of -2.40 percent.
11. The widened southbound bridge will include a 10-foot shoulder on the west side, two on-ramp traffic lanes of varying width, varying gore area, four typical 12-foot traffic lanes, and an east side shoulder of varying width.
12. The existing bridge has a 15'-0<sup>1</sup>/<sub>2</sub>" minimum vertical clearance over Route 10. The required minimum vertical clearance per the Caltrans Highway Design Manual is 16'-6" over a freeway. Further investigation will be required to verify the impact of low vertical clearance on the bridge widening.
13. The bridge design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and the Caltrans Seismic Design Criteria. The Acceleration Response Spectrum curve, as will be recommended in the foundation report, will be used for seismic loading in a future phase of design.
14. According to the SPGR, the project site is not located in an area considered to be susceptible to liquefaction. The proposed structure does not need to account for liquefaction in the preliminary design. Additional geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.
15. Falsework will not be required on Route 10 to build the superstructure because of precast box-girder superstructure construction.
16. No new utilities are proposed as part of this widening project.
17. There may be asbestos-containing material (ACM) present in the existing bridge and presence of these materials would pose a potential hazardous waste risk as identified in the Phase I Initial Site Assessment Report (CH2M HILL, 2014). The design and construction of the bridge should comply with the applicable environmental requirements of federal, state, and local agencies to remove those ACM during bridge removal process.
18. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
19. The overall bridge construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$4,502,000.

**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

---



# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710 PM
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): 53-1445 R/L	Bridge Name(s): Route 710/10 Separation (Widen)	
Total number of bridges in project : Many, only one bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer. (Mark **N/A** if not applicable)

- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- Grades or spot elevations of roadway below the structure.
- Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- N/A Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)

# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

- |   |  |   |
|---|--|---|
| 1. Has this project been discussed with:  | the OSFP Liaison Engineer?             | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
|   | the Caltrans District Project Manager? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
|   | the roadway consultant?                | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
|   |  |   |
| 2. Have the Caltrans Structures Maintenance records been reviewed?  |  | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| If the records recommend any work for the structure, is it included in the APS?   |  | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
|   |  |   |
| 3. Are there special aesthetic considerations?  |  | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
|   |  |   |
| 4. (Widenings and Modifications)  |  |   |
| Has this project been reviewed for seismic retrofit requirements?   |  | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| Are seismic retrofit requirements included in the APS?  |  | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
|   |  |   |
| 5. Any special Railroad requirements?   |  | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| Shoofly required?   |  | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| Cost of shoofly included as a separate item in the project cost estimate?   |  | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
|   |  |   |
| 6. Any special foundation requirements, including scour critical work, special excavation such as Type A, Type D, and/or hazardous or contaminated material?  |  | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
|   |  |   |
| 7. Any special construction requirements, including limited site accessibility or seasonal work?  |  | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
|   |  |   |
| 8. Other items to be included in the cost such as slope paving, approach slabs, and/or adjacent retaining walls?  |  | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
|   |  |   |
| 9. Remove existing bridge?  |  | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| Total Deck Area: Partial  |  |   |
|   |  |   |
| 10. Any other unusual or special requirements?  |  | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
|   |  |   |
| 11. Provide and attach a consultant prepared Design Memo to summarize and document any important assumptions, discussions, decisions, unusual items, local agency requirements such as aesthetics, improvements in vicinity of the structure, airspace usage, other obstructions, or any items noted above. | Summary attached?                      | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: March 21, 2014
--	---------------------------	-------------------------

**Attachment B**  
**Advance Planning Study Cost Estimate**

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Revised - December 3, 2007

Freeway Tunnel Alternative  
Dual Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_

OUT EST: \_\_\_\_\_

BRIDGE: Route 710/10 Separation (Widen)

BR. No.: 53-1445 L/R

DISTRICT: 07

TYPE: PC/PS Box Girder Bridge

RTE: 710

CU: \_\_\_\_\_

CO: LA

EA: \_\_\_\_\_

PM: \_\_\_\_\_

LENGTH: 336.88      WIDTH: 41.91      AREA (SF)= 14,119

**DESIGN SECTION:** \_\_\_\_\_

# OF STRUCTURES IN PROJECT : \_\_\_\_\_

EST. NO. \_\_\_\_\_

PRICES BY : \_\_\_\_\_

COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : \_\_\_\_\_

A. Issa

DATE: 3/21/2014

QUANTITIES BY: \_\_\_\_\_

DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	TEMPORARY RAILING	Type K	LF	794	\$20.00	\$15,875
2	BRIDGE REMOVAL (PORTION)		LS	1	\$100,000.00	\$100,000
3	STRUCTURE EXCAVATION (BRIDGE)		CY	574	\$100.00	\$57,400
4	STRUCTURE BACKFILL (BRIDGE)		CY	323	\$70.00	\$22,610
5	FURNISH PILING (CLASS 140)		LF	1,575	\$30.00	\$47,250
6	DRIVE PILE (CLASS 140)		EA	45	\$2,000.00	\$90,000
7	FURNISH PILING (CLASS 200)		LF	4,725	\$40.00	\$189,000
8	DRIVE PILE (CLASS 200)		EA	135	\$3,000.00	\$405,000
9	STRUCTURAL CONCRETE, BRIDGE FOOTING		CY	215	\$400.00	\$86,000
10	STRUCTURAL CONCRETE, BRIDGE		CY	846	\$800.00	\$676,800
11	STRUCTURAL CONCRETE, APPROACH SLAB	Type N	CY	90	\$720.00	\$64,800
12	STRUCTURAL CONCRETE, APPROACH SLAB	Type R	CY	122	\$720.00	\$87,840
13	FURNISH PC/PS CONCRETE BOX GIRDER (40'-50')		EA	24	\$9,000.00	\$216,000
14	FURNISH PC/PS CONCRETE BOX GIRDER (50'-60')		EA	12	\$10,000.00	\$120,000
15	FURNISH PC/PS CONCRETE BOX GIRDER (60'-70')		EA	24	\$12,000.00	\$288,000
16	ERECT PC/PS CONCRETE BOX GIRDER		EA	60	\$2,000.00	\$120,000
17	BAR REINFORCING STEEL (BRIDGE)		LB	183,000	\$1.00	\$183,000
18	SLOPE PAVING (CONCRETE)		CY	124	\$600.00	\$74,331
19	JOINT SEAL (MR = 1 1/2")		LF	84	\$90.00	\$7,545
20	CONCRETE BARRIER	Type 742	LF	794	\$120.00	\$95,250
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

SUBTOTAL	\$2,946,701
TIME RELATED OVERHEAD	\$294,670
MOBILIZATION ( @ 10 % )	\$360,152
SUBTOTAL BRIDGE ITEMS	\$3,601,524
CONTINGENCIES (@ 25%)	\$900,381
BRIDGE TOTAL COST	\$4,501,905
COST PER SQ. FOOT	\$318.86
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$4,501,905
BUDGET ESTIMATE AS OF	\$4,502,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: \_\_\_\_\_

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$4,502,000
2	\$4,502,000
3	\$4,502,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$4,502,000
5	\$4,502,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.



**Attachment C**  
**Advance Planning Study Plan**

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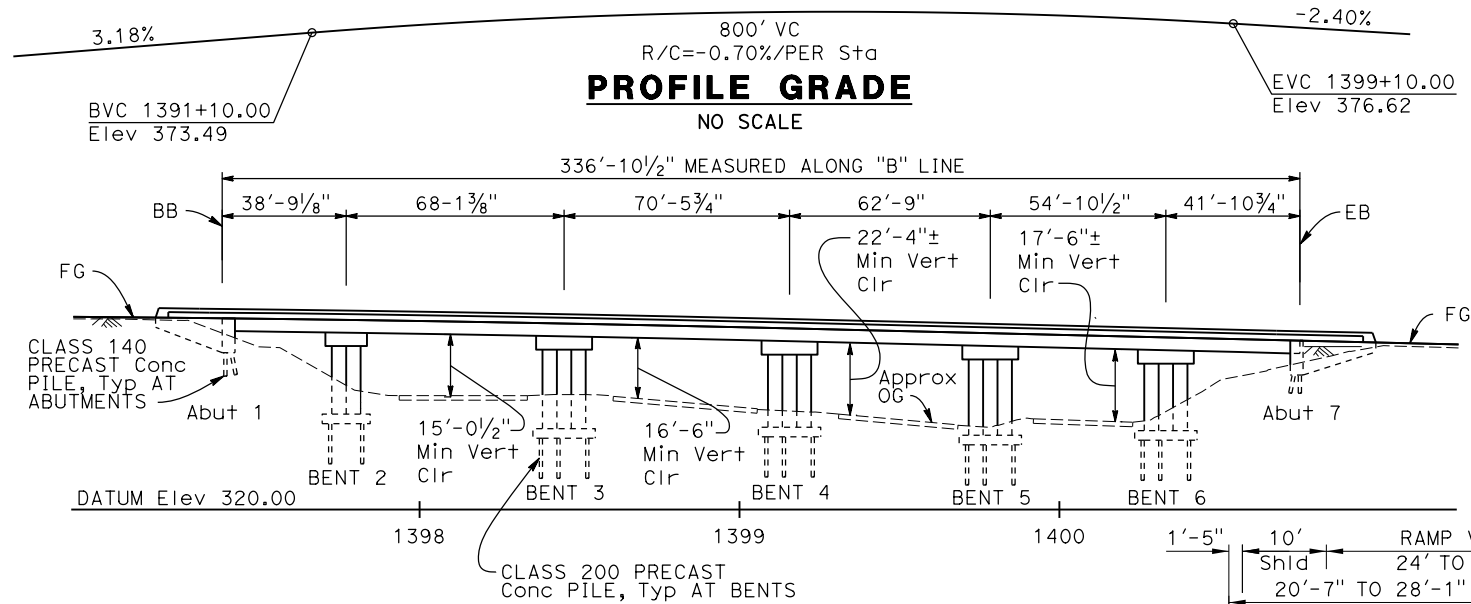
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	

METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012

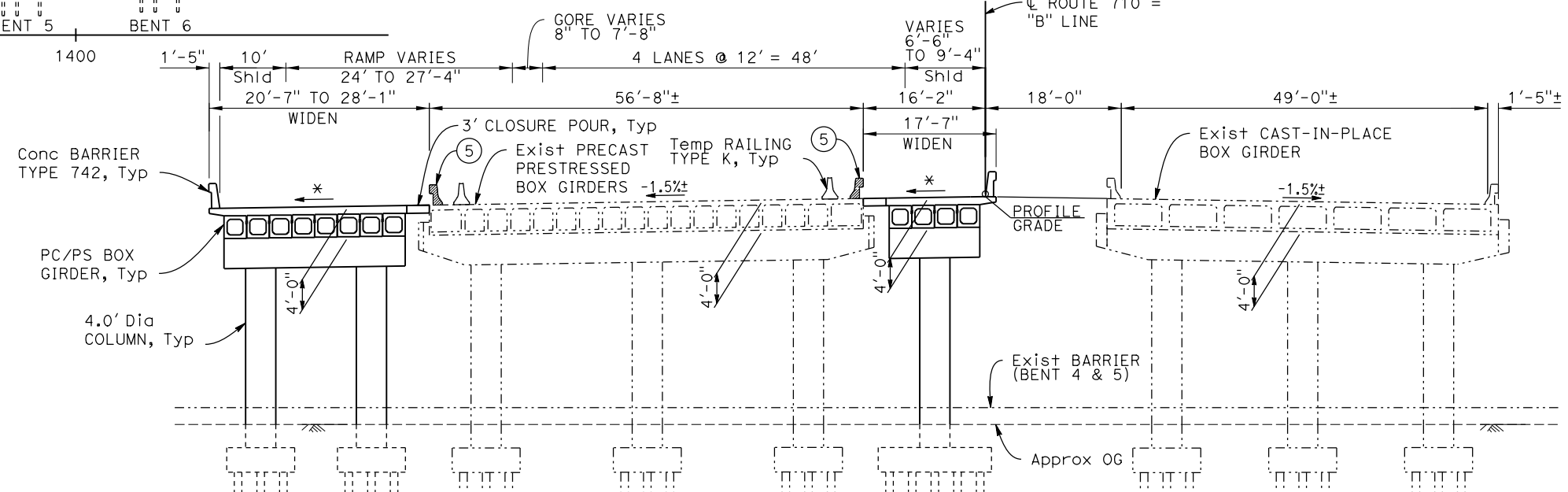
CH2M HILL  
6 HUTTON CENTRE DRIVE, SUITE 700  
SANTA ANA, CA 92707

**LEGEND:**

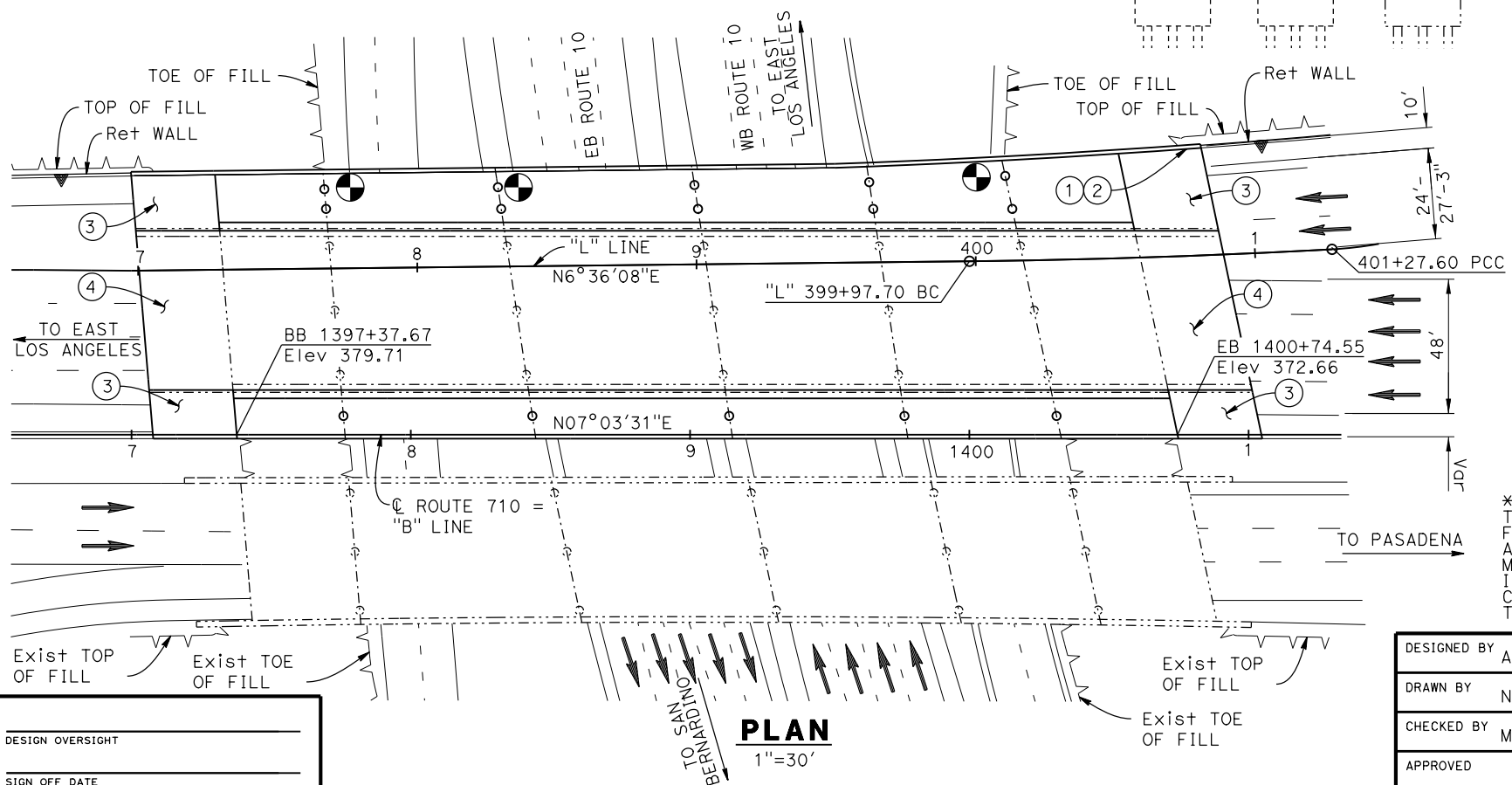
- Indicates Existing Structure
- Indicates New Construction
- ① Paint "Route 710/10 Separation"
- ② Paint "Bridge No. 53-1445 L" & year constructed
- ③ Structure Approach Type N(30S)
- ④ Structure Approach Type R(30S)
- ⑤ Remove Existing Concrete Barrier, (Type 25R)
- Denotes Point of Minimum Vertical Clearance
- ▨ Bridge Removal (Portion)
- \* Match Existing Grade & Cross Slope



**MIRRORED ELEVATION**  
1"=30'



**TYPICAL SECTION**  
1"=10'



**PLAN**  
1"=30'

DATE OF ESTIMATE	MARCH 2014
BRIDGE REMOVAL	PARTIAL
STRUCTURE DEPTH	4'-0"
LENGTH	336'-10 1/2"
WIDTH	20'-7" TO 28'-1" AND 17'-7"
AREA	14,119 SF
COST/FT <sup>2</sup> INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	\$ 319 **
TOTAL COST	\$ 4,502,000

\*\* DURING ORIGINAL CONSTRUCTION OF THE BRIDGE, THE ABUTMENTS WERE MADE CONTINUOUS AND PILES FOR BENT COLUMNS WERE INSTALLED IN THE MEDIAN AREA FOR ANTICIPATED FUTURE WIDENING, BUT THE MEDIAN CLOSURE WAS NEVER BUILT. BRIDGE REMOVAL ITEM INCLUDES REMOVAL OF THIS EXISTING CONSTRUCTION AS NECESSARY IN THE WIDENING AREA TO ACCOMMODATE THE NEW CONSTRUCTION.

**FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

PLANNING STUDY	
<b>ROUTE 710/10 SEPARATION (WIDEN)</b>	
BRIDGE NO. 53-1445 L/R	UNIT:
SCALE: AS NOTED	PROJECT NUMBER & PHASE:





SR 710 North Study

ATTACHMENT K-2c

Task 7.2 Advance Planning Study Report

---

# State Route 710 North Study Advance Planning Study Report Laguna Basin Bridge

## Freeway Tunnel Alternative Dual Bore Option

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

June 2014

**CH2MHILL®**

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017







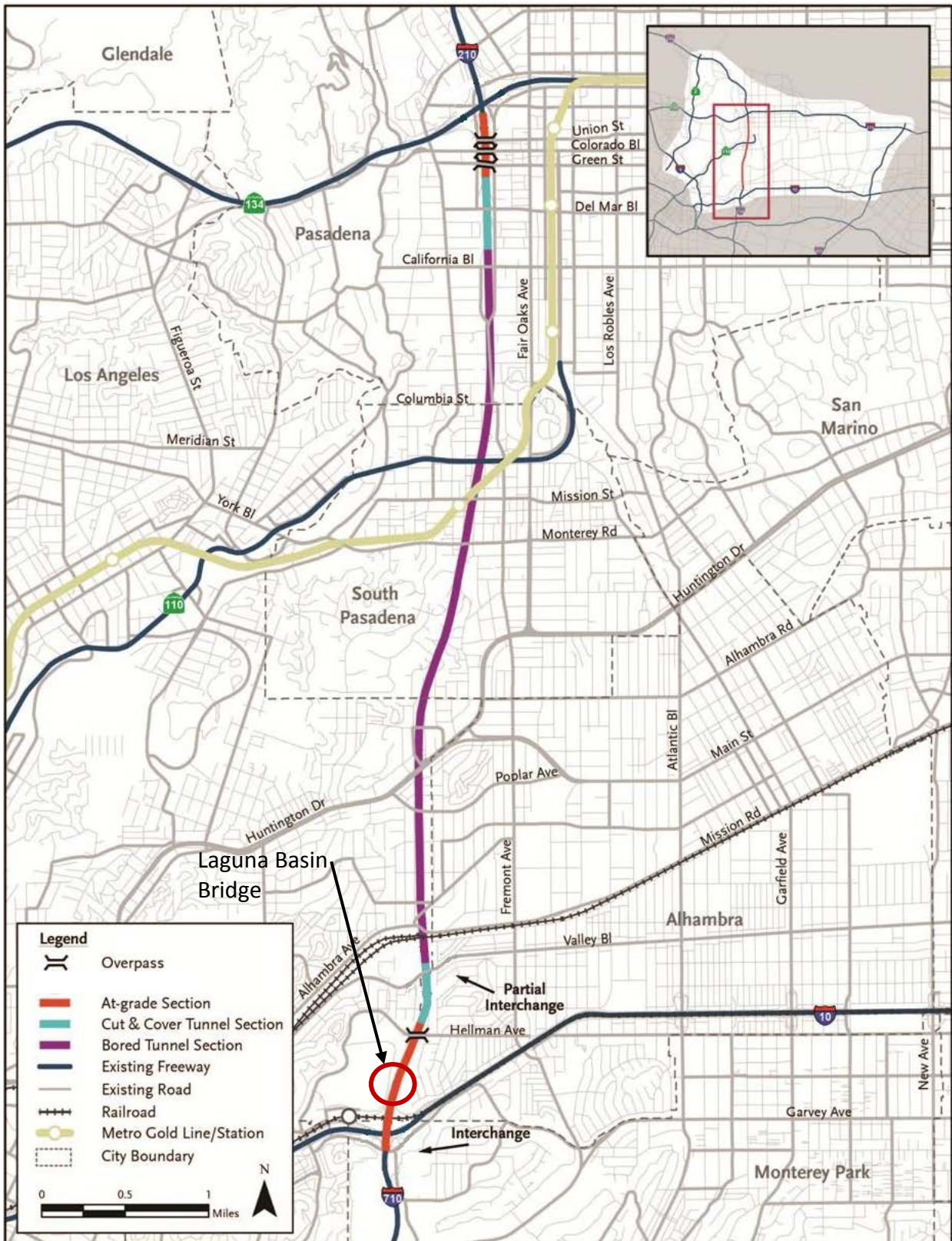
# SR 710 North Study

PREPARED FOR: Metropolitan Transportation Authority  
COPY TO: Caltrans Study Team  
PREPARED BY: CH2M HILL Team  
DATE: June 6, 2014  
PROJECT NUMBER: 428908

## Laguna Basin Bridge Freeway Tunnel Alternative Dual Bore Option

### Table of Contents

	<u>Page No.</u>
Project Vicinity Map	2
Design Memorandum	3
<b>Attachments</b>	
A	Consultant Prepared Advance Planning Study (APS) Checklist
B	Advance Planning Study Cost Estimate
C	Advance Planning Study Plan



## Assumptions Used for Laguna Basin Bridge – Advance Planning Study

1. The proposed Laguna Basin Bridge will be an integral part of the SR 710 North Study Project. Laguna Basin is parallel to the SR 710 Freeway at this location. This bridge will be part of northbound SR 710 and it will allow the new alignment not to encroach upon the Laguna Flood Control Basin with its roadway embankment. The purpose of the proposed project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks.
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes.
  - Minimize environmental impacts.
2. There are two options for this Freeway Tunnel Alternative for the future SR 710 corridor:
  - Two full bored tunnels accommodating one direction of traffic in each tunnel (this report is based on this option).
  - One full bored tunnel accommodating both directions of traffic with provision for another full bored tunnel in the future (documented in separate report).

The Laguna Basin Bridge will have minimum differences between the two options.

3. A 900-foot long, nine-span structure with span lengths of 100 feet is proposed alongside the Laguna Basin. The bridge will have two frames of 485-foot and 415-foot each.
4. There is no known environmentally sensitive area at this location.
5. The width of the structure will be 28 feet 10 inches. The bridge will be supported on circular single-column bents and seat-type abutments. The Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014) recommends cast-in-drilled-hole (CIDH) concrete piles for foundations. Twenty-four-inch and 96-inch CIDH concrete piles are proposed for abutments and bents, respectively.
6. Based on the project location, bridge span length, available clearance, and other constraints, a cast-in-place, prestressed, concrete box girder bridge is likely the most cost-effective solution and thus is recommended for the new bridge. The superstructure depth will be 4 feet (depth to span ratio of 0.040) with a constant cross slope of 2%.
7. The entire length of the bridge will be on a tangent. The preliminary vertical profile of the bridge is defined by a 300-ft vertical curve with an entrance grade of +1.07 percent and an exit grade of -1.20 percent.
8. The bridge will include a 4-foot left shoulder, one typical 12-foot traffic lane, and a 10-foot right shoulder at the beginning. The left shoulder will merge into a northbound lane on embankment within the bridge length.
9. The bridge design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and Seismic Design Criteria. The Acceleration Response Spectrum curve as will be recommended in the foundation report, will be used for seismic loading in a future phase of design.
10. According to the SPGR, the project site is not located in an area considered to be susceptible to liquefaction. The proposed structure does not need to account for liquefaction in the preliminary design. Additional

geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.

11. Falsework will be required to build the superstructure. Falsework clearance is not an issue, as there is no road below the bridge.
12. The design and construction of bridge abutments, bents, and falsework supports near the Laguna Flood Control Basin limits should comply with the applicable environmental requirements of federal, state, and local agencies, which may include seasonal restrictions on construction work and limited access to the construction site.
13. No new utilities are proposed through the bridge.
14. No known hazardous material exists at the bridge site.
15. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
16. The overall bridge construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$9,024,000.

**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

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# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): To be Assigned	Bridge Name(s): Laguna Basin Bridge	
Total number of bridges in project: <b>Many, only one</b> bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer. (Mark **N/A** if not applicable)


- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- Grades or spot elevations of roadway below the structure.
- Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- N/A Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- N/A "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)

# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

1. Has this project been discussed with:   
 the OSFP Liaison Engineer? Yes  No   
 the Caltrans District Project Manager? Yes  No   
 the roadway consultant? Yes  No
- 
2. Have the Caltrans Structures Maintenance records been reviewed? Yes  No   
 If the records recommend any work for the structure, is it included in the APS? Yes  No
- 
3. Are there special aesthetic considerations? Yes  No
- 
4. (Widenings and Modifications)  
 Has this project been reviewed for seismic retrofit requirements? Yes  No   
 Are seismic retrofit requirements included in the APS? Yes  No
- 
5. Any special Railroad requirements? Yes  No   
 Shoofly required? Yes  No   
 Cost of shoofly included as a separate item in the project cost estimate? Yes  No
- 
6. Any special foundation requirements, including scour critical work, special excavation such as Type A, Type D, and/or hazardous or contaminated material? Yes  No
- 
7. Any special construction requirements, including limited site accessibility or seasonal work? Yes  No
- 
8. Other items to be included in the cost such as slope paving, approach slabs, and/or adjacent retaining walls? Yes  No
- 
9. Remove existing bridge? Yes  No   
 Total Deck Area:
- 
10. Any other unusual or special requirements? Yes  No
- 
11. Provide and attach a consultant prepared Design Memo to summarize and document any important assumptions, discussions, decisions, unusual items, local agency requirements such as aesthetics, improvements in vicinity of the structure, airspace usage, other obstructions, or any items noted above. Summary attached? Yes  No

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: March 21, 2014
--	---	-------------------------



**Attachment B**  
**Advance Planning Study Cost Estimate**

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Revised - December 3, 2007

Freeway Tunnel Alternative  
Dual Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Laguna Basin Bridge  
TYPE: CIP/PS Box Girder Bridge  
CU: \_\_\_\_\_  
EA: \_\_\_\_\_

BR. No.: TBD

DISTRICT: 07  
RTE: 710  
CO: LA  
PM: \_\_\_\_\_

LENGTH: 900.00 WIDTH: 28.83 AREA (SF)= 25,950

**DESIGN SECTION:**

# OF STRUCTURES IN PROJECT :

EST. NO. \_\_\_\_\_

PRICES BY :

COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : A. Issa

DATE: 3/21/2014

QUANTITIES BY:

DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	STRUCTURE EXCAVATION (BRIDGE)		CY	6,888	\$100.00	\$688,800
2	STRUCTURE BACKFILL (BRIDGE)		CY	144	\$70.00	\$10,080
3	24" CIDH CONCRETE PILING		LF	700	\$160.00	\$112,000
4	96" CIDH CONCRETE PILING		LF	800	\$2,250.00	\$1,800,000
5	PRESTRESSING CAST-IN-PLACE CONCRETE		LS	1	\$400,000.00	\$400,000
6	STRUCTURAL CONCRETE, BRIDGE FOOTING		CY	67	\$400.00	\$26,800
7	STRUCTURAL CONCRETE, BRIDGE		CY	2,026	\$800.00	\$1,620,800
8	STRUCTURAL CONCRETE, APPROACH SLAB	Type N	CY	62	\$720.00	\$44,640
9	BAR REINFORCING STEEL (BRIDGE)		LB	779,000	\$1.00	\$779,000
10	JOINT SEAL (MR 2")		LF	625	\$150.00	\$93,750
11	JOINT SEAL ASSEMBLY (MR 3")		LF	58	\$200.00	\$11,533
12	JOINT SEAL ASSEMBLY (MR 6")		LF	29	\$550.00	\$15,858
13	CONCRETE BARRIER	Type 742	LF	1,265	\$240.00	\$303,600
14						
15						
16						
17						
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19						
20						
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22						
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25						
26						
27						
28						
29						
30						

SUBTOTAL	\$5,906,862
TIME RELATED OVERHEAD	\$590,686
MOBILIZATION ( @ 10 % )	\$721,950
SUBTOTAL BRIDGE ITEMS	\$7,219,498
CONTINGENCIES (@ 25%)	\$1,804,874
BRIDGE TOTAL COST	\$9,024,372
COST PER SQ. FOOT	\$347.76
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$9,024,372
BUDGET ESTIMATE AS OF	\$9,024,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$9,024,000
2	\$9,024,000
3	\$9,024,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$9,024,000
5	\$9,024,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.



**Attachment C**  
**Advance Planning Study Plan**

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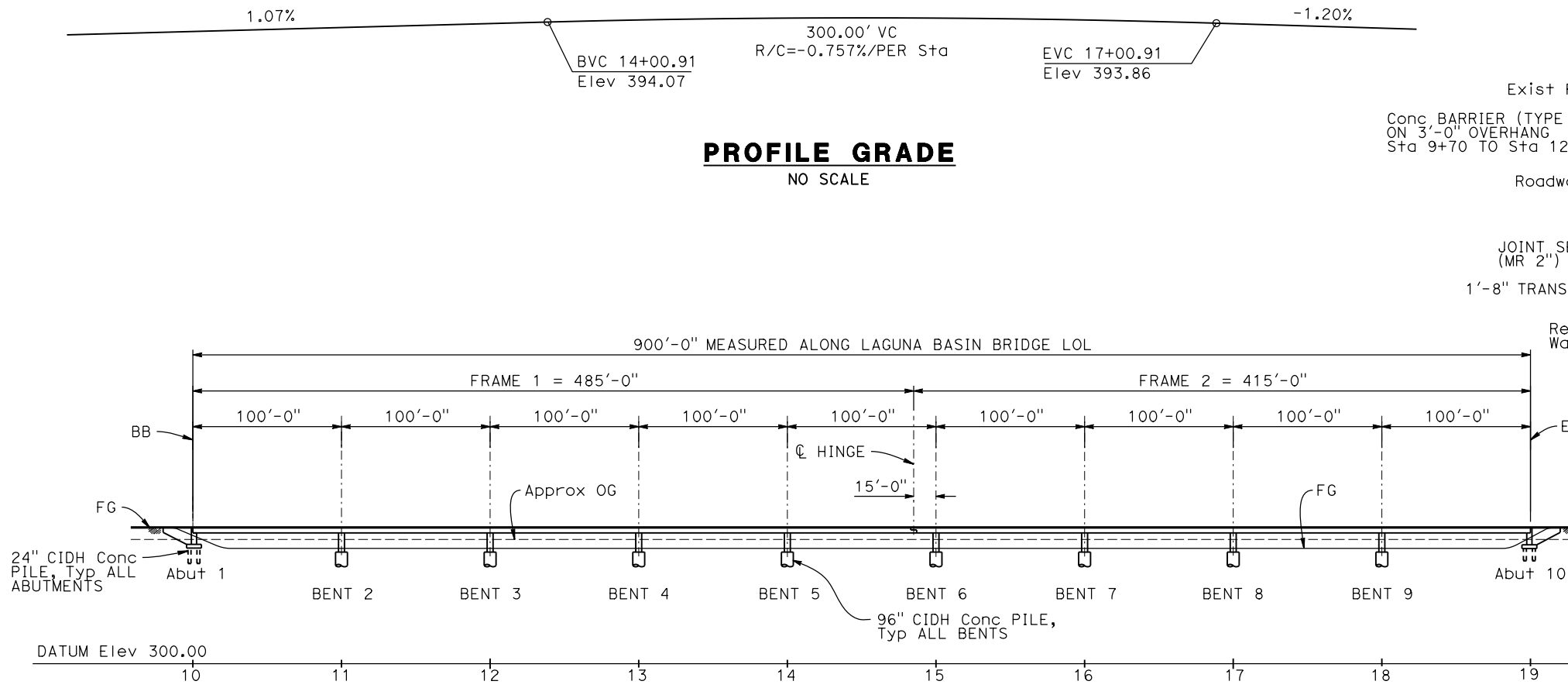
**LEGEND:**

- ① Paint "LAGUNA BASIN BRIDGE"
- ② Paint Bridge Number & Year Constructed
- ③ Structure Approach Type N(30S)

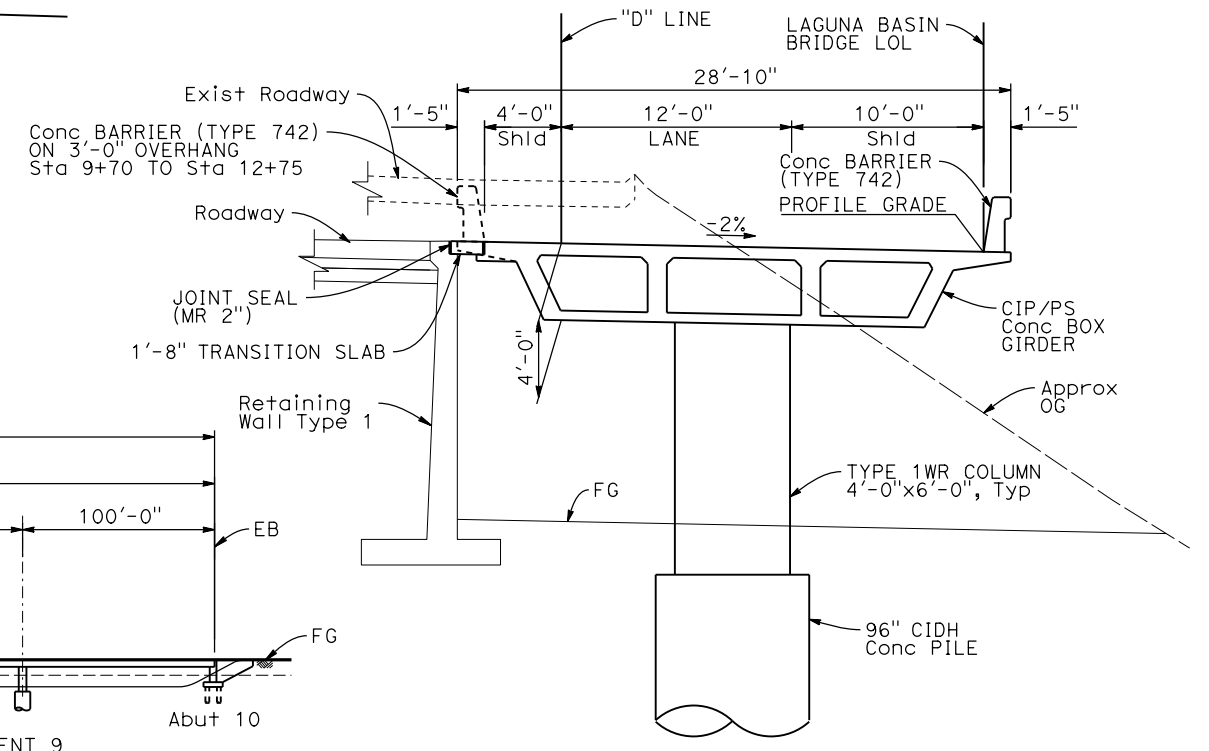
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	

METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012

CH2M HILL  
1000 WILSHIRE BLVD, SUITE 2100  
LOS ANGELES, CA 90017

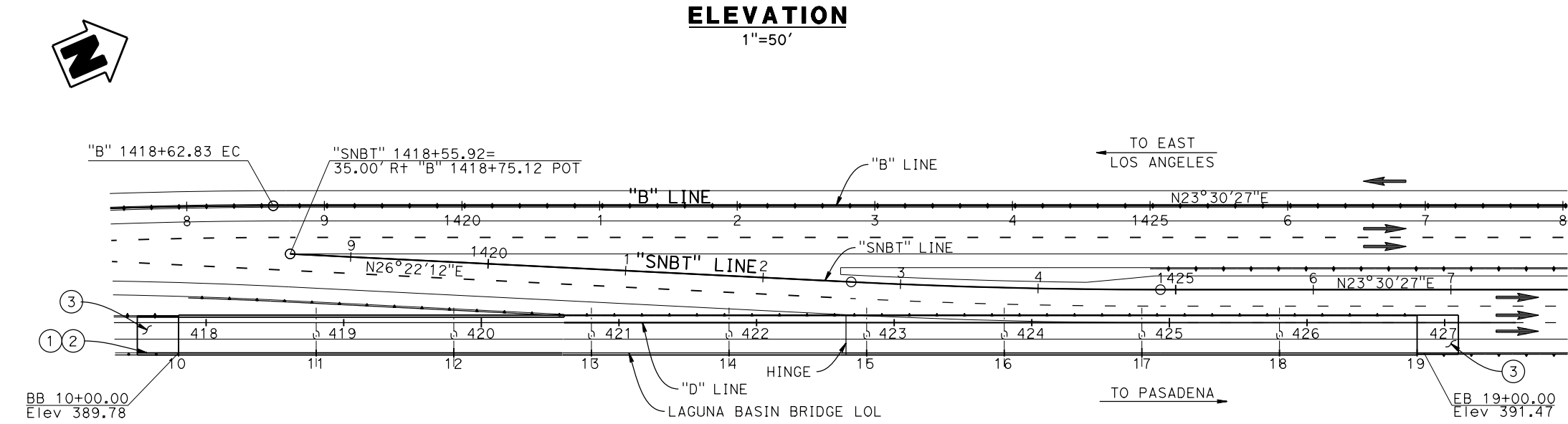


**PROFILE GRADE**  
NO SCALE



**TYPICAL SECTION**  
1" = 5'

DATE OF ESTIMATE	MARCH 2014
BRIDGE REMOVAL	NONE
STRUCTURE DEPTH	4'-0"
LENGTH	900'-0"
WIDTH	28'-10"
AREA	25,950 FT <sup>2</sup>
COST/FT <sup>2</sup> INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	\$ 348
TOTAL COST	\$ 9,024,000



**PLAN**  
1"=50'

**FREWAY TUNNEL ALTERNATIVE DUAL BORE OPTION**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

PLANNING STUDY	
LAGUNA BASIN BRIDGE	
BRIDGE NO. TBD	UNIT:
SCALE: AS NOTED	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT
SIGN OFF DATE







SR 710 North Study

ATTACHMENT K-2d

Task 7.2 Advance Planning Study Report

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# State Route 710 North Study Advance Planning Study Report Hellman Avenue Overcrossing

## Freeway Tunnel Alternative Dual Bore Option

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

October 2014

**CH2MHILL®**

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017





## SR 710 North Study

PREPARED FOR: Metropolitan Transportation Authority  
COPY TO: Caltrans Study Team  
PREPARED BY: CH2M HILL Team  
DATE: October 3, 2014  
PROJECT NUMBER: 428908

### Hellman Avenue Overcrossing Freeway Tunnel Alternative Dual Bore Option

#### Table of Contents

	<u>Page No.</u>
Project Vicinity Map	2
Design Memorandum	3
<b>Attachments</b>	
A	Consultant Prepared Advance Planning Study (APS) Checklist
B	Advance Planning Study Cost Estimate
C	Advance Planning Study Plan



**Project Vicinity Map**  
**State Route 710 North Study**  
**Freeway Tunnel Alternative Alignment**  
**Dual Bore Option**

## Assumptions Used for Hellman Avenue Overcrossing – Advance Planning Study

1. The proposed Hellman Avenue Overcrossing will be an integral part of the SR 710 North Study Project. The proposed structure will cross over the SR 710 Freeway at this location and will replace the existing Hellman Avenue Overcrossing. The purpose of the proposed project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks.
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes.
  - Minimize environmental impacts.
2. There are two options for the Freeway Tunnel Alternative for the future SR 710 corridor:
  - Two full bored tunnels accommodating one direction of traffic in each tunnel (this report is based on this option).
  - One full bored tunnel accommodating both directions of traffic with provision for another full bored tunnel in the future (documented in a separate report).
3. A 240-foot long two-span structure with equal span lengths of 120 feet is proposed over the SR 710 alignment. This bridge will replace the 247-foot long four-span existing bridge (Bridge No. 53-1708), which will be demolished.
4. There is no known environmentally sensitive area at this location.
5. The width of the structure will be 64 feet, the same as the existing structure. The overcrossing will be constructed in two stages. In the first stage, 30.5 feet of the southern side of the bridge will be built and in the second stage the northern 30.5 feet of the bridge will be built. Both structures will be connected with 3-foot concrete closure pour. The construction staging will allow uninterrupted traffic during construction of the bridge.
6. Due to the tall abutment wall requirement, modified slurry walls with tiebacks from tunnel portal excavation are recommended for the abutment. This foundation option will be further evaluated in a future phase of design. The bent will be supported on multiple circular columns. The Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014) recommends cast-in-drilled-hole (CIDH) concrete piles for bent foundations. Seventy-two-inch CIDH concrete piles are proposed for the bent foundations.
7. Based on the project location, the existing structure type, bridge span length, available clearance, and other constraints, a cast-in-place, prestressed, concrete box girder bridge is likely the most cost-effective replacement solution and is thus recommended for the new bridge. The superstructure depth will be 4 feet 9 inches (depth to span ratio of 0.04) with a constant cross slope of 2 percent.
8. The entire length of the bridge will be on a tangent. The profile of the bridge is defined by a 900-foot sag vertical curve with an entrance grade of -3.11 percent and an exit grade of +4.30 percent.
9. The bridge will include a 7-foot sidewalk, a 10-foot shoulder, and a 14-foot traffic lane in each direction of travel.
10. The bridge will have a 17 feet 8 inches minimum vertical clearance over the future SR 710. The required minimum vertical clearance per Highway Design Manual is 16 feet 6 inches over the freeway.

11. A chain link railing will be provided on both sides of the bridge.
12. The bridge design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and Seismic Design Criteria. The Acceleration Response Spectrum curve, as will be recommended in the foundation report, will be used for seismic loading in a future phase of design.
13. According to the SPGR, the project site is not located in an area considered to be susceptible to liquefaction. The proposed structure does not need to account for liquefaction in the preliminary design. Additional geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.
14. Falsework will be required to build the superstructure. Minimum falsework clearance requirement of 15 feet over SR 710 will be available during construction.
15. There are some utilities through the existing bridge, according to the as-built plan. These include telephone lines and a water line. Provisions will be included in the bridge to accommodate those same utilities. Temporary and/or permanent utility relocation may be necessary but will be confirmed at the final design phase.
16. There may be asbestos-containing material (ACM) present in the existing bridge and presence of these materials would pose a potential hazardous waste risk as identified in the Phase I Initial Site Assessment Report (CH2M HILL, 2014). The design and construction of the bridge should comply with the applicable environmental requirements of federal, state, and local agencies to remove those ACM during bridge removal process.
17. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
18. The overall bridge construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$4,399,000.

**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

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# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): To be Assigned	Bridge Name(s): Hellman Avenue Overcrossing	
Total number of bridges in project: <b>Many, only one</b> bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer.  
(Mark **N/A** if not applicable)


- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- Grades or spot elevations of roadway below the structure.
- Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- N/A Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)

# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

1. Has this project been discussed with:   
 the OSFP Liaison Engineer? Yes  No   
 the Caltrans District Project Manager? Yes  No   
 the roadway consultant? Yes  No
- 
2. Have the Caltrans Structures Maintenance records been reviewed? Yes  No   
 If the records recommend any work for the structure, is it included in the APS? Yes  No
- 
3. Are there special aesthetic considerations? Yes  No
- 
4. (Widenings and Modifications)  
 Has this project been reviewed for seismic retrofit requirements? Yes  No   
 Are seismic retrofit requirements included in the APS? Yes  No
- 
5. Any special Railroad requirements? Yes  No   
 Shoofly required? Yes  No   
 Cost of shoofly included as a separate item in the project cost estimate? Yes  No
- 
6. Any special foundation requirements, including scour critical work, special excavation  
 such as Type A, Type D, and/or hazardous or contaminated material? Yes  No
- 
7. Any special construction requirements, including limited site accessibility or seasonal work?  
 Yes  No
- 
8. Other items to be included in the cost such as slope paving, approach slabs, and/or  
 adjacent retaining walls? Yes  No
- 
9. Remove existing bridge? Yes  No   
 Total Deck Area: 15808 sq ft
- 
10. Any other unusual or special requirements? Yes  No
- 
11. Provide and attach a consultant prepared Design Memo to summarize and document any  
 important assumptions, discussions, decisions, unusual items, local agency requirements  
 such as aesthetics, improvements in vicinity of the structure, airspace usage,  
 other obstructions, or any items noted above. Summary attached? Yes  No

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: March 21, 2014
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**Attachment B**  
**Advance Planning Study Cost Estimate**

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Revised - December 3, 2007

Freeway Tunnel Alternative  
Dual Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Hellman Avenue Overcrossing  
TYPE: CIP/PS Box Girder Bridge  
CU: \_\_\_\_\_  
EA: \_\_\_\_\_

BR. No.: TBD

DISTRICT: 07  
RTE: 710  
CO: LA  
PM: \_\_\_\_\_

LENGTH: 240.00 WIDTH: 64.00 AREA (SF)= 15,360

**DESIGN SECTION:** \_\_\_\_\_

# OF STRUCTURES IN PROJECT : \_\_\_\_\_

EST. NO. \_\_\_\_\_

PRICES BY : \_\_\_\_\_

COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : \_\_\_\_\_

A. Issa

DATE: 3/21/2014

QUANTITIES BY: \_\_\_\_\_

DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	STRUCTURE EXCAVATION (BRIDGE)		CY	205	\$100.00	\$20,500
2	STRUCTURE BACKFILL (BRIDGE)		CY	61	\$70.00	\$4,270
3	48" CIDH CONCRETE PILING		LF	1,120	\$500.00	\$560,000
4	72" CIDH CONCRETE PILING		LF	150	\$1,500.00	\$225,000
5	PRESTRESSING CAST-IN-PLACE CONCRETE		LS	1	\$200,000.00	\$200,000
6	STRUCTURAL CONCRETE, BRIDGE		CY	1,320	\$800.00	\$1,056,000
7	STRUCTURAL CONCRETE, APPROACH SLAB	Type N	CY	137	\$720.00	\$98,640
8	BAR REINFORCING STEEL (BRIDGE)		LB	288,000	\$1.00	\$288,000
9	JOINT SEAL (MR = 1 1/2")		LF	128	\$90.00	\$11,520
10	STRUCTURAL SHOTCRETE		CY	49	\$800.00	\$39,200
11	CHAIN LINK RAILING	Type 7	LF	600	\$100.00	\$60,000
12	CONCRETE BARRIER	Type 26M	LF	600	\$240.00	\$144,000
13						
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26						
27						
28						
29						
30						

SUBTOTAL	\$2,707,130
TIME RELATED OVERHEAD	\$270,713
MOBILIZATION ( @ 10 % )	\$330,871
SUBTOTAL BRIDGE ITEMS	\$3,308,714
CONTINGENCIES (@ 25%)	\$827,179
BRIDGE TOTAL COST	\$4,135,893
COST PER SQ. FOOT	\$269.26
BRIDGE REMOVAL (CONTINGENCIES INCL.)	\$263,467
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$4,399,360
BUDGET ESTIMATE AS OF	\$4,399,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: **COST OF SLURRY WALLS WITH TIEBACKS IS NOT INCLUDED IN THIS BRIDGE ESTIMATE**

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$4,399,000
2	\$4,399,000
3	\$4,399,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$4,399,000
5	\$4,399,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.



**Attachment C**  
**Advance Planning Study Plan**

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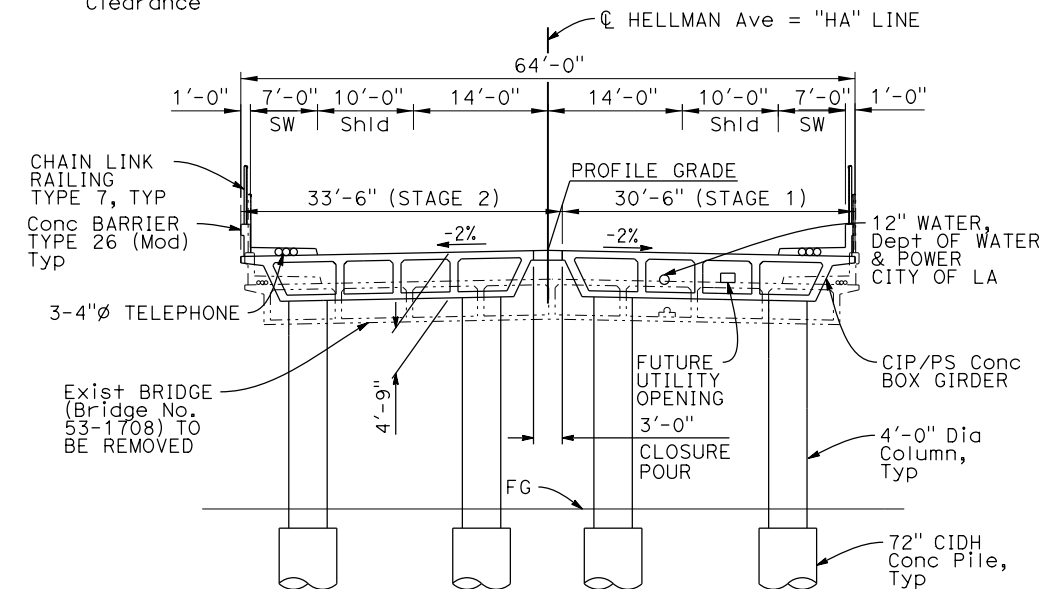
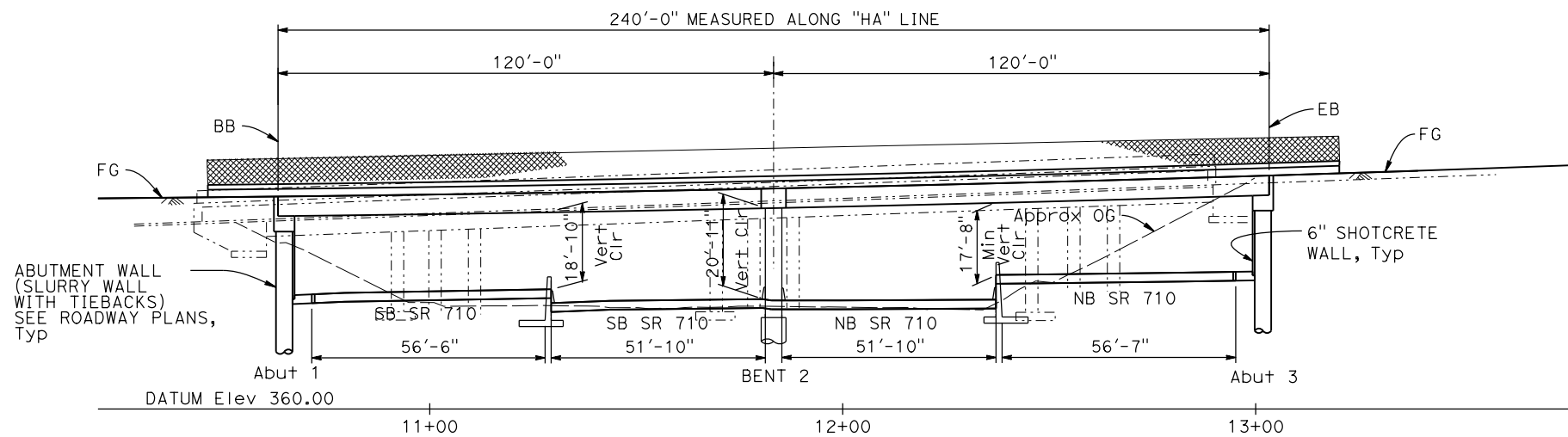
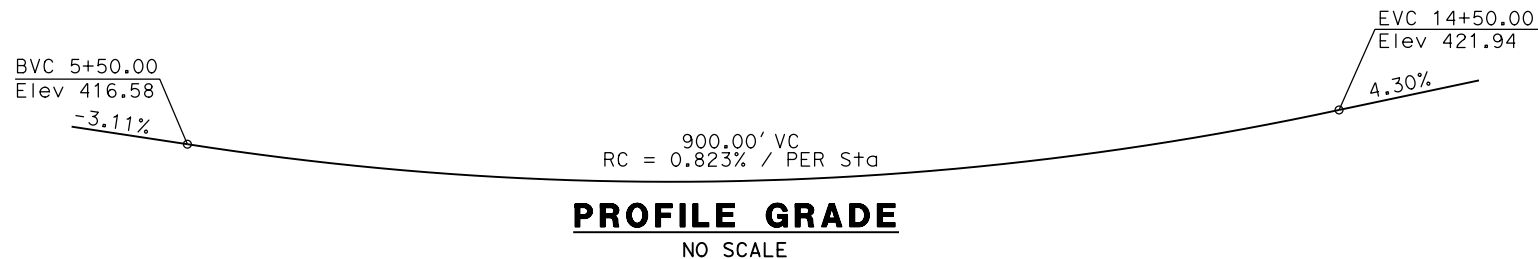
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	

METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012

CH2M HILL  
1000 WILSHIRE BLVD, SUITE 2100  
LOS ANGELES, CA 90017

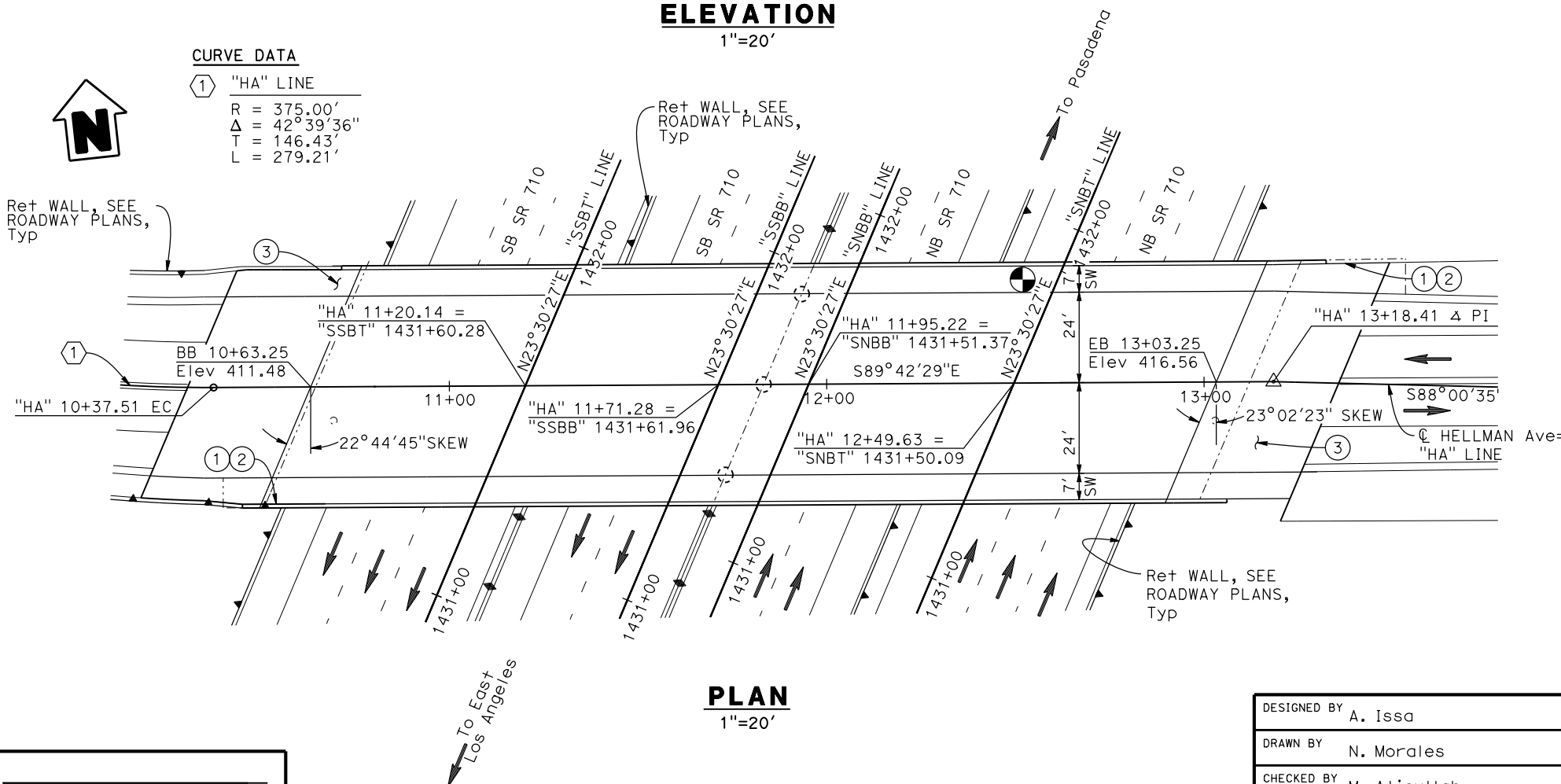
**LEGEND:**

- Indicates Existing Structure
- Indicates New Construction
- ① Paint "HELLMAN AVENUE OVERCROSSING"
- ② Paint Bridge Number & Year Constructed
- ③ Structure Approach Type N(30S)
- ⊕ Denotes Point of Minimum Vertical Clearance



**CURVE DATA**

- ① "HA" LINE
- R = 375.00'
- Δ = 42° 39' 36"
- T = 146.43'
- L = 279.21'



DATE OF ESTIMATE	MARCH 2014
BRIDGE REMOVAL	FULL (15808 SF)
STRUCTURE DEPTH	4'-9"
LENGTH	240'-0"
WIDTH	64'-0"
AREA	15,360 SF
COST/FT <sup>2</sup> INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	\$ 269
TOTAL COST	\$ 4,399,000

\* THE COST OF SLURRY WALL WITH TIEBACKS IS NOT INCLUDED IN THIS BRIDGE ESTIMATE.

**FREWAY TUNNEL ALTERNATIVE DUAL BORE OPTION**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

PLANNING STUDY	
HELLMAN AVENUE OVERCROSSING	
BRIDGE NO. TBD	UNIT:
SCALE: AS NOTED	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT	
SIGN OFF DATE	





SR 710 North Study

ATTACHMENT K-2e

Task 7.2 Advance Planning Study Report

---

# State Route 710 North Study Advance Planning Study Report Valley Boulevard Overcrossing

## Freeway Tunnel Alternative Dual Bore Option

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

June 2014

**CH2MHILL®**

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017





# SR 710 North Study

PREPARED FOR: Metropolitan Transportation Authority  
COPY TO: Caltrans Study Team  
PREPARED BY: CH2M HILL Team  
DATE: June 6, 2014  
PROJECT NUMBER: 428908

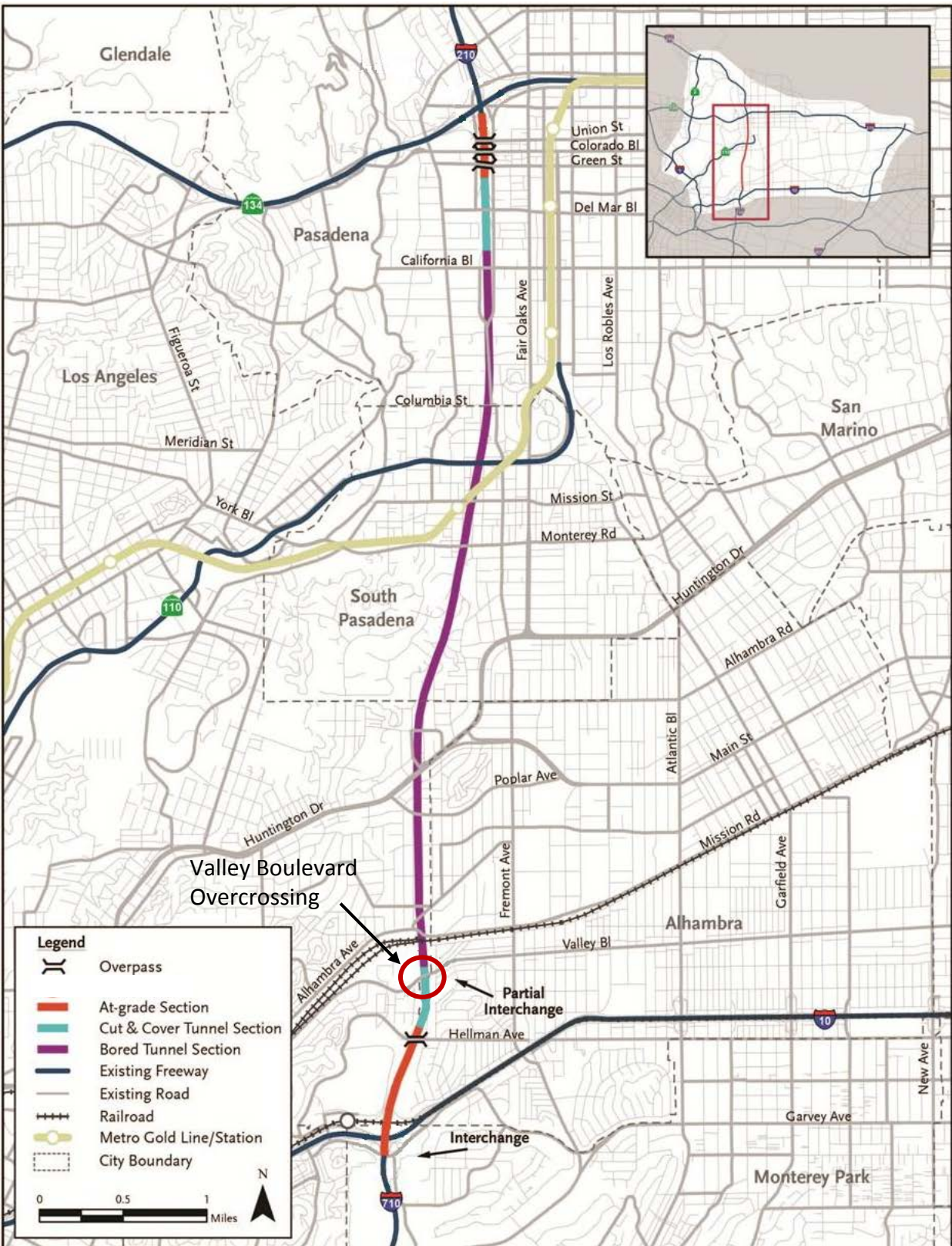
## Valley Boulevard Overcrossing Freeway Tunnel Alternative Dual Bore Option

### Table of Contents

	<u>Page No.</u>
Project Vicinity Map	2
Design Memorandum	3

#### Attachments

- A Consultant Prepared Advance Planning Study (APS) Checklist
- B Advance Planning Study Cost Estimate
- C Advance Planning Study Plan



**Project Vicinity Map**  
**State Route 710 North Study**  
**Freeway Tunnel Alternative Alignment**  
**Dual Bore Option**

## Assumptions Used For Valley Boulevard Overcrossing – Advance Planning Study

1. The proposed Valley Boulevard Overcrossing will be an integral part of the SR 710 North Study Project. Valley Boulevard crosses over the SR 710 Freeway at this location. The purpose of the proposed project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks.
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes.
  - Minimize environmental impacts.
2. There are two options for Freeway Tunnel Alternative for the future SR 710 corridor:
  - Two full bored tunnels accommodating one direction of traffic in each tunnel (this report is based on this option).
  - One full bored tunnel accommodating both directions of traffic with provision for another full bored tunnel in future (documented in separate report).
3. A 232-foot long single-span structure was chosen to avoid a bent between the cut and cover (C&C) tunnels of SR 710 under the bridge. Once the C&C tunnels are constructed, the soil beneath this overcrossing will be filled in to cover the tunnel to a level where the bridge structure will maintain its integrity and that regular bridge inspection can be performed. There will be no vertical clearance issues with the tunnels below.
4. There is no known environmentally sensitive area at this location.
5. The ramps that lead up to the structure on the east side will not be constructed until after the soil has been filled in around the overcrossing.
6. The ultimate width of the structure will be 76 feet. The overcrossing will be constructed in two stages. In the first stage, 43 feet of the westbound side of the bridge will be built and in the second stage the eastbound 30 feet of the bridge will be built. Both structures will be connected with 3-foot concrete closure pour. The staging plan will allow uninterrupted traffic during construction of the bridge. The C&C tunnel below the bridge will be built after the bridge is complete.
7. Due to the required retaining wall height (approximately 85 feet) along the proposed SR 710, slurry wall with tiebacks are recommended at this location based on the Freeway Portal Excavation Support Systems (Jacobs Associates and CH2M HILL, 2013). Rather than terminating the walls at the original grade and lengthening the bridge behind the walls to the slope catch point, the slurry walls will be extended up to the soffit of the superstructure and utilized as the abutment foundations. The bridge will be supported on seat-type abutments resting on slurry wall with tiebacks.
8. Based on the project location, bridge span length, and other constraints, a cast-in-place, prestressed concrete (CIP/PS) box girder bridge is likely the most cost-effective solution and thus is recommended for the bridge. The superstructure depth will be 10 feet 6 inches (depth to span ratio of 0.045) with varying cross slope.
9. The structure begins on a horizontal curve with a radius of 1,000 feet. The curve ends about 108 feet past the abutment and remainder of the structure lies on a tangent. The profile of the bridge is defined by a 500 feet vertical curve for about 108 feet at the beginning with an entrance grade of -1.69 percent and an exit grade of +2.77 percent. The rest of the bridge is on 2.77 percent ascending grade.

10. Since the proposed CIP/PS structure will be on a horizontal curve with a radius less than 2,000 feet, the additional design and detailing requirements in the Caltrans Memo to Designers will be followed in the final design of the structure.
11. The bridge structure will include a 2-foot shoulder, three 11-foot lanes in the eastbound direction, a 6-foot sidewalk, and three 11-foot traffic lanes in the westbound direction. In the final stage of the SR 710 construction after backfilling the area beneath the bridge, the Valley Boulevard will have an 8-foot sidewalk and three typical 12-foot traffic lanes in eastbound direction and an 8-foot sidewalk and four typical 12-foot traffic lanes in westbound direction.
12. The bridge will have a 19 feet 8 inches minimum vertical clearance over the proposed cut and cover tunnel construction of the future SR 710.
13. A chain link railing will be provided on both sides of the structure.
14. The bridge design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and Seismic Design Criteria. The Acceleration Response Spectrum curve, as will be recommended in the foundation report, will be used for seismic loading in a future phase of design.
15. According to the Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014), the project site is not located in an area considered to be susceptible to liquefaction. The proposed structure does not need to account for liquefaction in the preliminary design. Additional geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.
16. Falsework will be required to build the superstructure. Falsework clearance is not an issue, as there will not be any traffic below the bridge during the bridge construction.
17. There are some utilities within the limits of the existing Valley Blvd, which may need to be included on the structure. Utilities through the bridge will be decided in the next phase of design. Temporary and/or permanent utility relocation may be necessary but will be confirmed at the final design phase. A future utility opening is provided in the structure.
18. No known hazardous material exists at the bridge site.
19. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
20. The overall bridge construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$4,607,000.



**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

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# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710 KP(PM)
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): To be Assigned	Bridge Name(s): Valley Boulevard Overcrossing	
Total number of bridges in project: <b>Many, only one</b> bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer. (Mark **N/A** if not applicable)

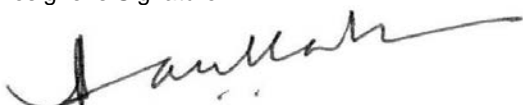
- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- Grades or spot elevations of roadway below the structure.
- Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- N/A "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)

# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

- |       |  |   |   |
|-------|--|---|---|
| 1.    | Has this project been discussed with:  | the OSFP Liaison Engineer?<br>the Caltrans District Project Manager?<br>the roadway consultant? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/><br>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/><br>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| <hr/> |  |   |   |
| 2.    | Have the Caltrans Structures Maintenance records been reviewed?<br>If the records recommend any work for the structure, is it included in the APS?   |   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/><br>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>  |
| <hr/> |  |   |   |
| 3.    | Are there special aesthetic considerations?  |   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>   |
| <hr/> |  |   |   |
| 4.    | (Widenings and Modifications)<br>Has this project been reviewed for seismic retrofit requirements?<br>Are seismic retrofit requirements included in the APS?   |   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/><br>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>  |
| <hr/> |  |   |   |
| 5.    | Any special Railroad requirements?<br>Shoofly required?<br>Cost of shoofly included as a separate item in the project cost estimate?   |   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/><br>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/><br>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| <hr/> |  |   |   |
| 6.    | Any special foundation requirements, including scour critical work, special excavation<br>such as Type A, Type D, and/or hazardous or contaminated material?   |   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>   |
| <hr/> |  |   |   |
| 7.    | Any special construction requirements, including limited site accessibility or seasonal work?  |   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>   |
| <hr/> |  |   |   |
| 8.    | Other items to be included in the cost such as slope paving, approach slabs, and/or<br>adjacent retaining walls?   |   | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>   |
| <hr/> |  |   |   |
| 9.    | Remove existing bridge?<br>Total Deck Area:  |   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>   |
| <hr/> |  |   |   |
| 10.   | Any other unusual or special requirements?   |   | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>   |
| <hr/> |  |   |   |
| 11.   | Provide and attach a consultant prepared Design Memo to summarize and document any<br>important assumptions, discussions, decisions, unusual items, local agency requirements<br>such as aesthetics, improvements in vicinity of the structure, airspace usage,<br>other obstructions, or any items noted above. | Summary attached?   | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>   |

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: March 21, 14
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**Attachment B**  
**Advance Planning Study Cost Estimate**

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Revised - December 3, 2007

Freeway Tunnel Alternative  
Dual Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Valley Blvd Overcrossing (Total Cost)

BR. No.: TBD

DISTRICT: 07

TYPE: CIP/PS Box Girder Bridge

RTE: 710

CU: \_\_\_\_\_

CO: LA

EA: \_\_\_\_\_

PM: \_\_\_\_\_

LENGTH: 232.00      WIDTH: 76.83      AREA (SF)= 17,825

**DESIGN SECTION:** \_\_\_\_\_

# OF STRUCTURES IN PROJECT : \_\_\_\_\_

EST. NO. \_\_\_\_\_

PRICES BY : \_\_\_\_\_

COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : \_\_\_\_\_

A. Issa

DATE: 3/21/2014

QUANTITIES BY: \_\_\_\_\_

DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	TEMPORARY RAILING	Type K	LF	876	\$20.00	\$17,520
2	STRUCTURE EXCAVATION (BRIDGE)		CY	391	\$100.00	\$39,100
3	STRUCTURE BACKFILL (BRIDGE)		CY	79	\$70.00	\$5,530
4	PRESTRESSING CAST-IN-PLACE CONCRETE		LS	1	\$200,000.00	\$200,000
5	STRUCTURAL CONCRETE, BRIDGE		CY	2,577	\$800.00	\$2,061,600
6	STRUCTURAL CONCRETE, APPROACH SLAB	Type N	CY	165	\$720.00	\$118,800
7	DRILL & BOND DOWEL		LF	155	\$25.00	\$3,875
8	JOINT SEAL (MR = 1 1/2")		LF	154	\$90.00	\$13,830
9	BAR REINFORCING STEEL (BRIDGE)		LB	392,000	\$1.00	\$392,000
10	CHAIN LINK RAILING	Type 7	LF	584	\$100.00	\$58,400
11	CONCRETE BARRIER	Type 26M	LF	292	\$240.00	\$70,080
12	CONCRETE BARRIER	Type 742	LF	292	\$120.00	\$35,040
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SUBTOTAL	\$3,015,775
TIME RELATED OVERHEAD	\$301,578
MOBILIZATION ( @ 10 % )	\$368,595
SUBTOTAL BRIDGE ITEMS	\$3,685,947
CONTINGENCIES (@ 25%)	\$921,487
BRIDGE TOTAL COST	\$4,607,434
COST PER SQ. FOOT	\$258.48
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$4,607,434
BUDGET ESTIMATE AS OF	\$4,607,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: **COST OF SECANT PILE WALL IS NOT INCLUDED IN THIS BRIDGE ESTIMATE**

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$4,607,000
2	\$4,607,000
3	\$4,607,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$4,607,000
5	\$4,607,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.

Revised - December 3, 2007

Freeway Tunnel Alternative  
Dual Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Valley Blvd Overcrossing (Stage 1) BR. No.: TBD

TYPE: CIP/PS Box Girder Bridge

DISTRICT: 07

RTE: 710

CU: \_\_\_\_\_

CO: LA

EA: \_\_\_\_\_

PM: \_\_\_\_\_

LENGTH: 232.00 WIDTH: 43.42 AREA (SF)= 10,073

**DESIGN SECTION:** \_\_\_\_\_

# OF STRUCTURES IN PROJECT : \_\_\_\_\_ EST. NO. \_\_\_\_\_

PRICES BY : \_\_\_\_\_ COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : A. Issa DATE: 3/21/2014

QUANTITIES BY : \_\_\_\_\_ DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	TEMPORARY RAILING	Type K	LF	292	\$20.00	\$5,840
2	STRUCTURE EXCAVATION (BRIDGE)		CY	220	\$100.00	\$22,000
3	STRUCTURE BACKFILL (BRIDGE)		CY	42	\$70.00	\$2,940
4	PRESTRESSING CAST-IN-PLACE CONCRETE		LS	1	\$100,000.00	\$100,000
5	STRUCTURAL CONCRETE, BRIDGE		CY	1,499	\$800.00	\$1,199,200
6	STRUCTURAL CONCRETE, APPROACH SLAB	Type N	CY	93	\$720.00	\$66,960
7	DRILL & BOND DOWEL		LF	155	\$25.00	\$3,875
8	JOINT SEAL (MR = 1 1/2")		LF	87	\$90.00	\$7,815
9	BAR REINFORCING STEEL (BRIDGE)		LB	229,000	\$1.00	\$229,000
10	CHAIN LINK RAILING	Type 7	LF	292	\$100.00	\$29,200
11	CONCRETE BARRIER	Type 26M	LF	292	\$240.00	\$70,080
12						
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SUBTOTAL	\$1,736,910
TIME RELATED OVERHEAD	\$173,691
MOBILIZATION (@ 10 %)	\$212,289
SUBTOTAL BRIDGE ITEMS	\$2,122,890
CONTINGENCIES (@ 25%)	\$530,723
BRIDGE TOTAL COST	\$2,653,613
COST PER SQ. FOOT	\$263.45
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$2,653,613
BUDGET ESTIMATE AS OF	\$2,654,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: **COST OF SECANT PILE WALL IS NOT INCLUDED IN THIS BRIDGE ESTIMATE**

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$2,654,000
2	\$2,654,000
3	\$2,654,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$2,654,000
5	\$2,654,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.



Revised - December 3, 2007

Freeway Tunnel Alternative  
Dual Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Valley Blvd Overcrossing (Stage 2) BR. No.: TBD

TYPE: CIP/PS Box Girder Bridge

CU: \_\_\_\_\_

EA: \_\_\_\_\_

DISTRICT: 07

RTE: 710

CO: LA

PM: \_\_\_\_\_

LENGTH: 232.00 WIDTH: 33.42 AREA (SF)= 7,753

**DESIGN SECTION:** \_\_\_\_\_

# OF STRUCTURES IN PROJECT : \_\_\_\_\_ EST. NO. \_\_\_\_\_

PRICES BY : \_\_\_\_\_ COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : A. Issa DATE: 3/21/2014

QUANTITIES BY : \_\_\_\_\_ DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	TEMPORARY RAILING	Type K	LF	584	\$20.00	\$11,680
2	STRUCTURE EXCAVATION (BRIDGE)		CY	171	\$100.00	\$17,100
3	STRUCTURE BACKFILL (BRIDGE)		CY	37	\$70.00	\$2,590
4	PRESTRESSING CAST-IN-PLACE CONCRETE		LS	1	\$100,000.00	\$100,000
5	STRUCTURAL CONCRETE, BRIDGE		CY	1,078	\$800.00	\$862,400
6	STRUCTURAL CONCRETE, APPROACH SLAB	Type N	CY	72	\$720.00	\$51,840
7	DRILL & BOND DOWEL		LF		\$25.00	
8	JOINT SEAL (MR = 1 1/2")		LF	67	\$90.00	\$6,015
9	BAR REINFORCING STEEL (BRIDGE)		LB	163,000	\$1.00	\$163,000
10	CHAIN LINK RAILING	Type 7	LF	292	\$100.00	\$29,200
11	CONCRETE BARRIER	Type 742	LF	292	\$120.00	\$35,040
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SUBTOTAL	\$1,278,865
TIME RELATED OVERHEAD	\$127,887
MOBILIZATION (@ 10 %)	\$156,306
SUBTOTAL BRIDGE ITEMS	\$1,563,057
CONTINGENCIES (@ 25%)	\$390,764
BRIDGE TOTAL COST	\$1,953,822
COST PER SQ. FOOT	\$252.02
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$1,953,822
BUDGET ESTIMATE AS OF	\$1,954,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: **COST OF SECANT PILE WALL IS NOT INCLUDED IN THIS BRIDGE ESTIMATE**

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$1,954,000
2	\$1,954,000
3	\$1,954,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$1,954,000
5	\$1,954,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.

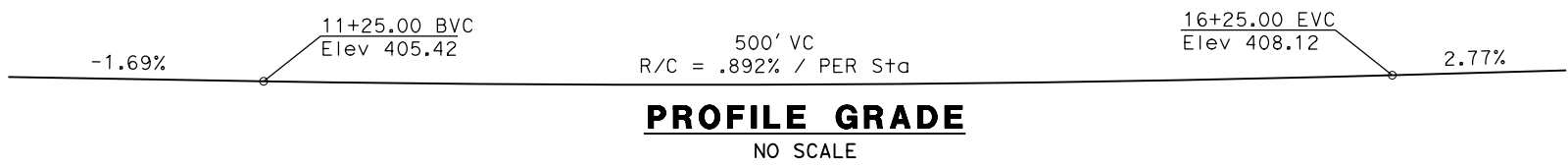


**Attachment C**  
**Advance Planning Study Plan**

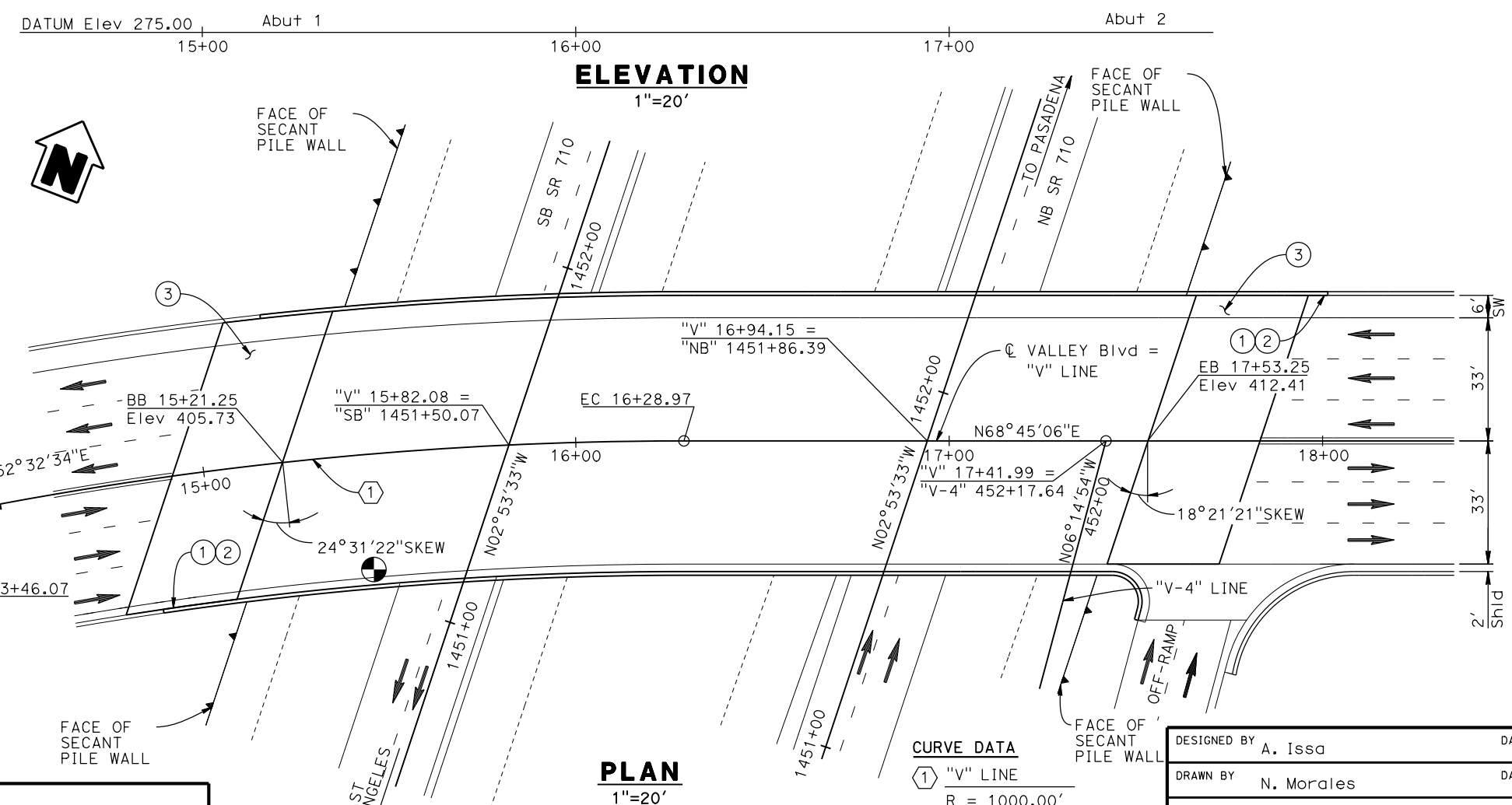
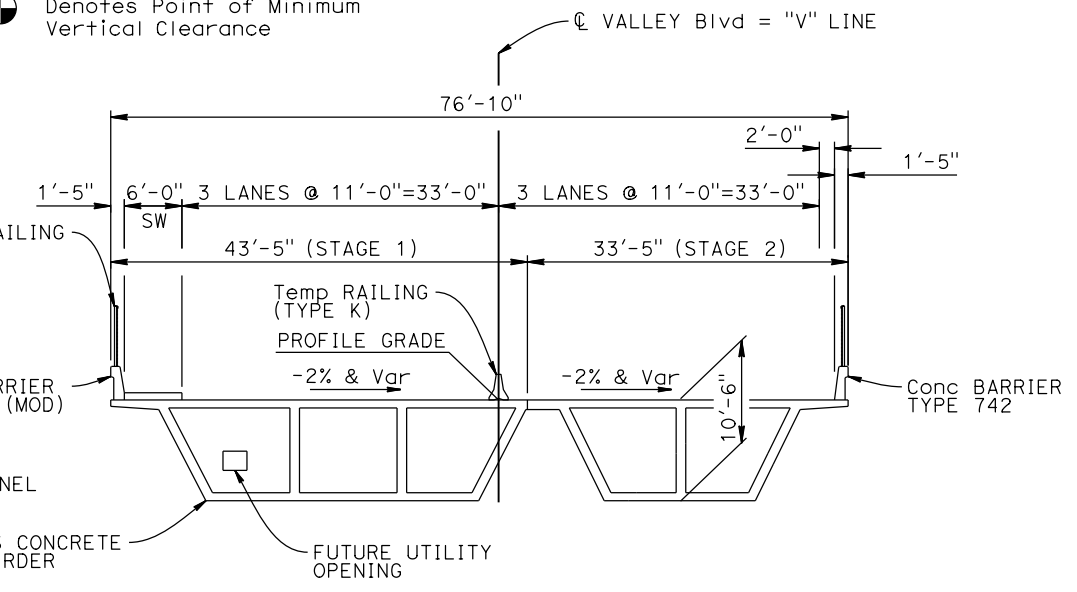
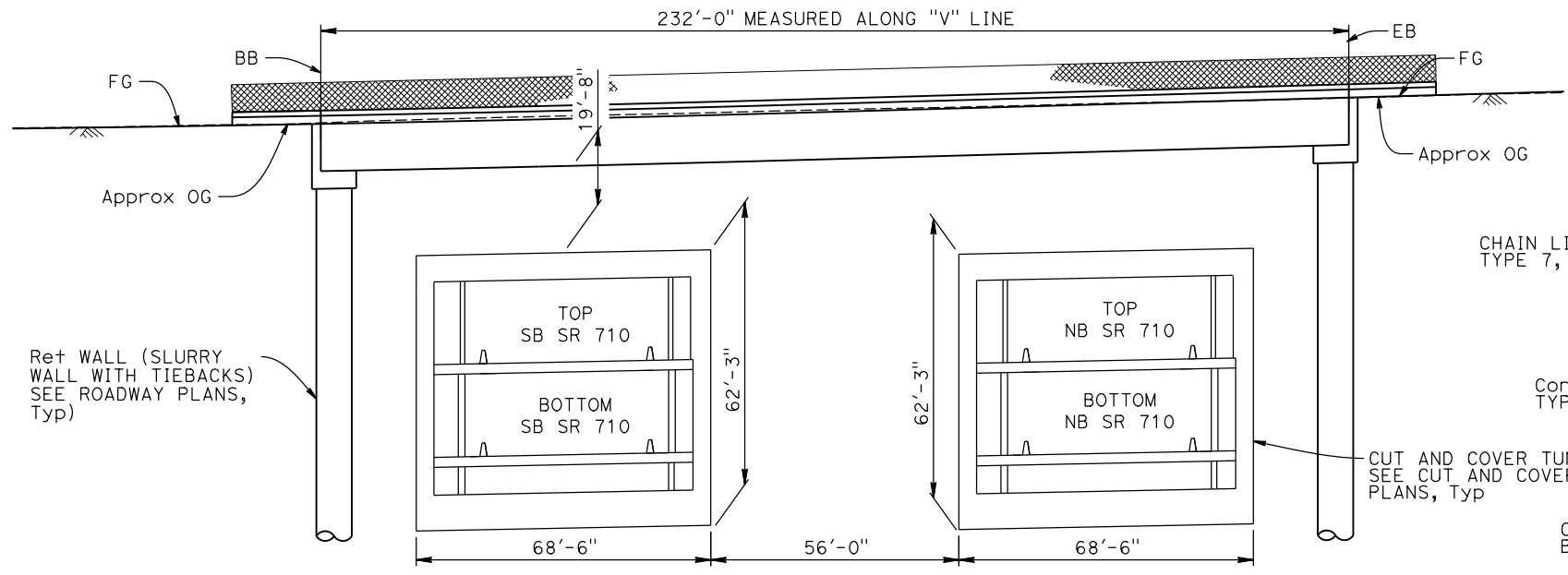
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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



- LEGEND:**
- ① Paint "VALLEY BOULEVARD OVERCROSSING"
  - ② Paint Bridge Number & Year Constructed
  - ③ Structure Approach Type N(30S)
  - ⊙ Denotes Point of Minimum Vertical Clearance



**TYPICAL SECTION**  
1"=10'

DATE OF ESTIMATE	MARCH 2014
BRIDGE REMOVAL	NONE
STRUCTURE DEPTH	10'-6"
LENGTH	232'-0"
WIDTH	76'-10"
AREA	17,825 FT <sup>2</sup>
COST/FT <sup>2</sup> INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	\$ 258
TOTAL COST *	\$ 4,607,000

\* THE COST OF SLURRY WALL WITH TIEBACKS IS NOT INCLUDED IN THIS BRIDGE ESTIMATE.

**NOTE:**  
1. This bridge is being built to facilitate the construction of cut and cover tunnel below for SR 710. As part of the project, this bridge area will be backfilled to bring back to the existing ground level.

**FREEWAY TUNNEL ALTERNATIVE DUAL BORE OPTION**

DESIGN OVERSIGHT	
SIGN OFF DATE	

**CURVE DATA**

① "V" LINE	R = 1000.00'
	Δ = 16°12'32"
	T = 142.40'
	L = 282.90'

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

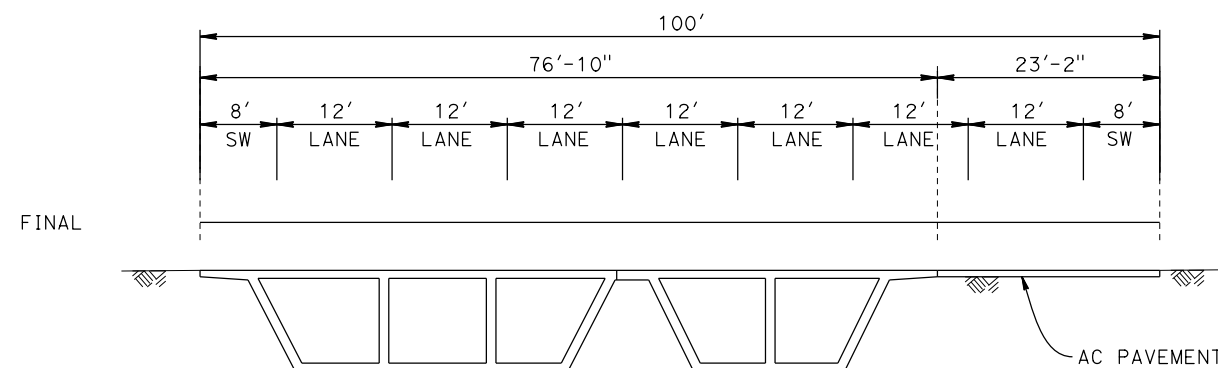
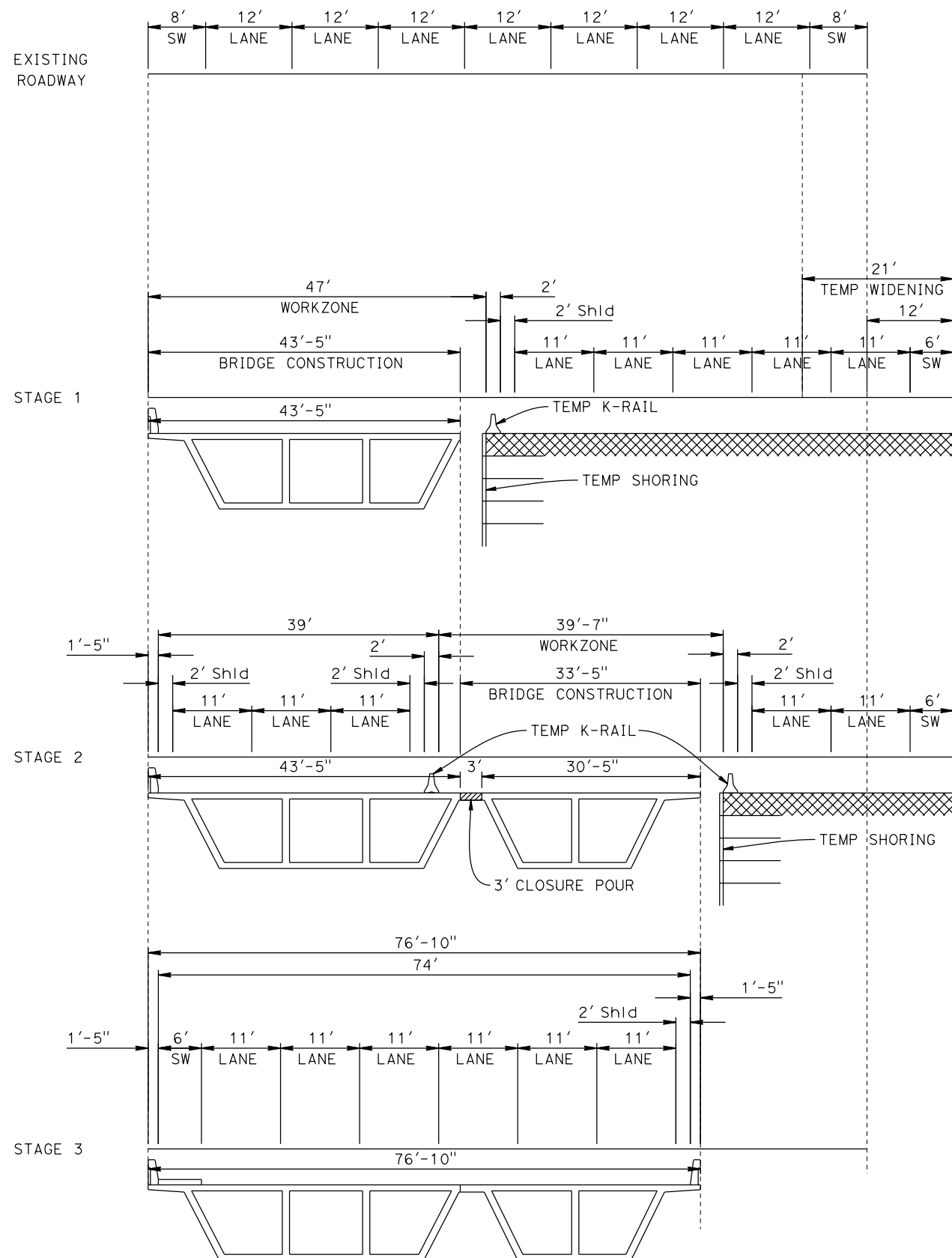
M. Atiqullah  
PROJECT ENGINEER

**PLANNING STUDY**

**VALLEY BLVD OVERCROSSING**

BRIDGE NO.	TBD	UNIT:	
SCALE:	AS NOTED	PROJECT NUMBER & PHASE:	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**NOTE:**  
 NEW BRIDGE TO KEEP VALLEY BLVD OPEN  
 DURING CONSTRUCTION.

**FREWAY TUNNEL ALTERNATIVE  
 DUAL BORE OPTION  
 STAGE CONSTRUCTION**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
 PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>VALLEY BLVD OVERCROSSING</b>	
BRIDGE NO. TBD	UNIT:
SCALE: NO SCALE	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT  
 SIGN OFF DATE



SR 710 North Study

ATTACHMENT K-2f

Task 7.2 Advance Planning Study Report

---

# State Route 710 North Study Advance Planning Study Report Cut and Cover Tunnel (South Portal)

## Freeway Tunnel Alternative Dual Bore Option

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

June 2014

**CH2MHILL®**

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017







# SR 710 North Study

PREPARED FOR: Metropolitan Transportation Authority  
 COPY TO: Caltrans Study Team  
 PREPARED BY: CH2M HILL Team  
 DATE: June 6, 2014  
 PROJECT NUMBER: 428908

## Cut and Cover Tunnel (South Portal)

### Freeway Tunnel Alternative Dual Bore Option

#### Table of Contents

	<u>Page No.</u>
Project Vicinity Map	2
Design Memorandum	3
<b>Attachments</b>	
A	Consultant Prepared Advance Planning Study (APS) Checklist
B	Advance Planning Study Cost Estimate
C	Advance Planning Study Plan





**Project Vicinity Map**  
**State Route 710 North Study**  
**Freeway Tunnel Alternative Alignment**  
**Dual Bore Option**

## Assumptions Used for Cut and Cover Tunnel (South Portal) – Advance Planning Study

1. The proposed Cut and Cover (C&C) Tunnel (South Portal) will be an integral part of the State Route (SR 710) North Study Project. The South Portal C&C Tunnel will begin north of Hellman Avenue and will end north of Valley Boulevard. The purpose of the proposed project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks.
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes.
  - Minimize environmental impacts.
2. There are two options for the Freeway Tunnel alternative for the future SR 710 corridor:
  - Two full bored tunnels accommodating one direction of traffic in each tunnel (this report is based on this option).
  - One full bored tunnel accommodating both directions of traffic with provision for another full bored tunnel in the future (documented in a separate report).
3. The main purpose of the C&C Tunnel system is to serve as the transition of the SR 710 Freeway between the surface level traffic and the full bore tunnel traffic.
4. The current South Portal design provides the following lengths for each route:
  - a. Northbound (NB) direction upper level: 1,130 feet (SNBT Line)
  - b. NB direction lower level: 1,885 feet (SNBB Line)
  - c. Southbound (SB) direction upper level: 1,125 feet (SSBT Line)
  - d. SB direction lower level: 1,765 feet (SSBB Line)
5. The typical two-level C&C Tunnel section will have varying width and height. The width will vary from a minimum 56 feet 10 inches and the height will vary from a minimum 62 feet. The top slab will be 6 feet thick and the bottom slab will be 8 feet thick, while exterior walls will be 4 feet thick. There will be an interior concrete slab dividing the box in the top and bottom levels. In this way, each level will accommodate two lanes of traffic for total four lanes per tunnel section.
6. The width of each single-level C&C Tunnel will also vary along the length. The width will vary from a minimum of 40 feet and the height will be 33 feet.
7. Within the C&C Tunnel section, 6-foot diameter jet fans will be located outside the edge of shoulder as part of the tunnel ventilation system.
8. The C&C Tunnel will also contain a continuous firewall on each deck that shields a 4-foot walkway in case of emergency. These walkways will be located next to the inside shoulder of each tunnel and will be connected via emergency cross-passages.
9. There will be a transition zone where the C&C Tunnel will gradually taper in height with distance from the bored tunnel circular cross section to the cut and cover tunnel's rectangular cross-section. This will help manage the aerodynamic flow of the ventilation system across the two sections.
10. Each traffic level will include a 4-foot inside walkway, a 10-foot inside shoulder, two typical 12-foot traffic lanes, and a 1-foot clear area.

11. A minimum vertical clearance of 16 feet 6 inches will be maintained across the traveled way for traffic and there will be an additional 2 feet 3 inches clearance for signage.
12. The C&C Tunnel design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and Seismic Design Criteria. The Acceleration Response Spectrum curve, as recommended in the foundation report, will be used for seismic loading in a future phase of design.
13. According to the Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014), the tunnel site contains some medium dense saturated granular soil layers that are susceptible to liquefaction. However, these soil layers are present within the top 40 feet below ground surface which will be removed during C&C Tunnel construction as excavation depth will reach approximately 80 to 100 feet below ground surface. The tunnels will then be covered with compacted granular soil which would not be susceptible to liquefaction. The Seismic Hazard Zones Map for the Los Angeles 7.5-Minute Quadrangle (California Division of Mines and Geology, 1999) also indicates that the proposed site is not located in an area where historical occurrence of liquefaction or potential for liquefaction is noted. The proposed structure does not need to account for liquefaction in the preliminary design. Additional geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.
14. Falsework will be required to build the C&C Tunnel. Traffic will not pass under falsework during construction.
15. As-built plans of existing utilities have not been made available yet. Temporary and/or permanent utility relocation, if necessary, will be confirmed in the final design phase after reviewing the as-built utility plans and field investigations.
16. No known hazardous material exists at the tunnel site.
17. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
18. The overall tunnel construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$237,377,000. The cost of tunnel excavation, backfill and construction of the slurry walls with tiebacks is included in the roadway estimate.

**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

---



# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710 KP(PM)
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): To be Assigned	Bridge Name(s): Cut and Cover Tunnel (South Portal)	
Total number of bridges in project: <b>Many, only one</b> bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer. (Mark **N/A** if not applicable)

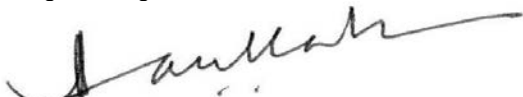
- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- N/A Grades or spot elevations of roadway below the structure.
- N/A Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- N/A Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- N/A "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)

# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

- |       |  |   |  |
|-------|--|---|--|
| 1.    | Has this project been discussed with:<br>the OSFP Liaison Engineer?<br>the Caltrans District Project Manager?<br>the roadway consultant?   | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|       |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|       |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/> |  |   |  |
| 2.    | Have the Caltrans Structures Maintenance records been reviewed?<br>If the records recommend any work for the structure, is it included in the APS?   | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |  |   |  |
| 3.    | Are there special aesthetic considerations?  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |  |   |  |
| 4.    | (Widenings and Modifications)<br>Has this project been reviewed for seismic retrofit requirements?<br>Are seismic retrofit requirements included in the APS?   | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |  |   |  |
| 5.    | Any special Railroad requirements?<br>Shoofly required?<br>Cost of shoofly included as a separate item in the project cost estimate?   | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |  |   |  |
| 6.    | Any special foundation requirements, including scour critical work, special excavation<br>such as Type A, Type D, and/or hazardous or contaminated material?   | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |  |   |  |
| 7.    | Any special construction requirements, including limited site accessibility or seasonal work?  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |  |   |  |
| 8.    | Other items to be included in the cost such as slope paving, approach slabs, and/or<br>adjacent retaining walls?   | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |  |   |  |
| 9.    | Remove existing bridge?<br>Total Deck Area:  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |  |   |  |
| 10.   | Any other unusual or special requirements?   | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/> |  |   |  |
| 11.   | Provide and attach a consultant prepared Design Memo to summarize and document any<br>important assumptions, discussions, decisions, unusual items, local agency requirements<br>such as aesthetics, improvements in vicinity of the structure, airspace usage,<br>other obstructions, or any items noted above. Summary attached? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: March 21, 2014
--	---	----------------------------



**Attachment B**  
**Advance Planning Study Cost Estimate**

---



Revised - December 3, 2007

Freeway Tunnel Alternative  
Dual Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Cut & Cover Tunnel (South Portal) BR. No.: TBD

TYPE: Reinforced Concrete Cut & Cover Tunnels

CU: \_\_\_\_\_

EA: \_\_\_\_\_

DISTRICT: 07

RTE: 710

CO: LA

PM: \_\_\_\_\_

LENGTH: 1,885.00 WIDTH: \_\_\_\_\_ AREA (SF)= \_\_\_\_\_

DESIGN SECTION: \_\_\_\_\_

# OF STRUCTURES IN PROJECT : \_\_\_\_\_ EST. NO. \_\_\_\_\_

PRICES BY : \_\_\_\_\_ COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : A. Issa DATE: 3/21/2014

QUANTITIES BY : \_\_\_\_\_ DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	STRUCTURAL CONCRETE, TUNNEL		CY	151,584	\$800.00	\$121,267,357
2	BAR REINFORCING STEEL (TUNNEL)		LB	45,475,259	\$0.75	\$34,106,444
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

SUBTOTAL	\$155,373,801
TIME RELATED OVERHEAD	\$15,537,380
MOBILIZATION (@ 10%)	\$18,990,131
SUBTOTAL BRIDGE ITEMS	\$189,901,313
CONTINGENCIES (@ 25%)	\$47,475,328
BRIDGE TOTAL COST	\$237,376,641
COST PER SQ. FOOT	
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$237,376,641
BUDGET ESTIMATE AS OF	\$237,377,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: **COST OF EARTHWORK NOT INCLUDED IN THIS ESTIMATE.**

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$237,377,000
2	\$237,377,000
3	\$237,377,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$237,377,000
5	\$237,377,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.

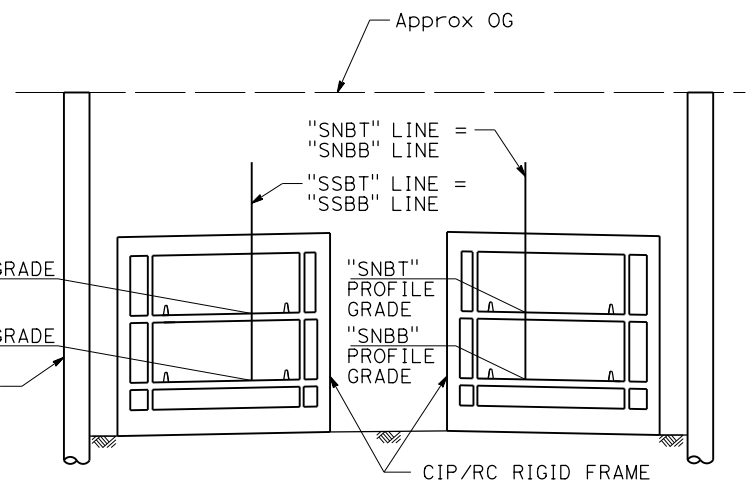
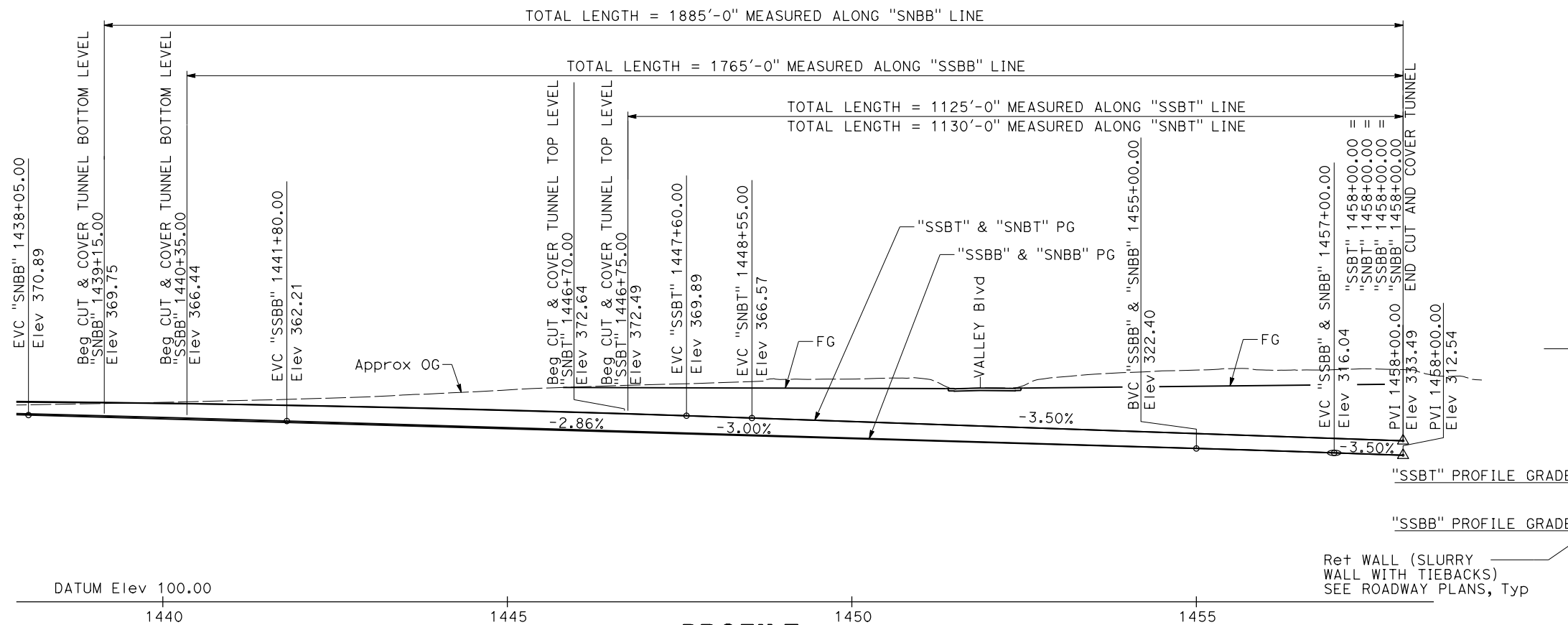


**Attachment C**  
**Advance Planning Study Plan**

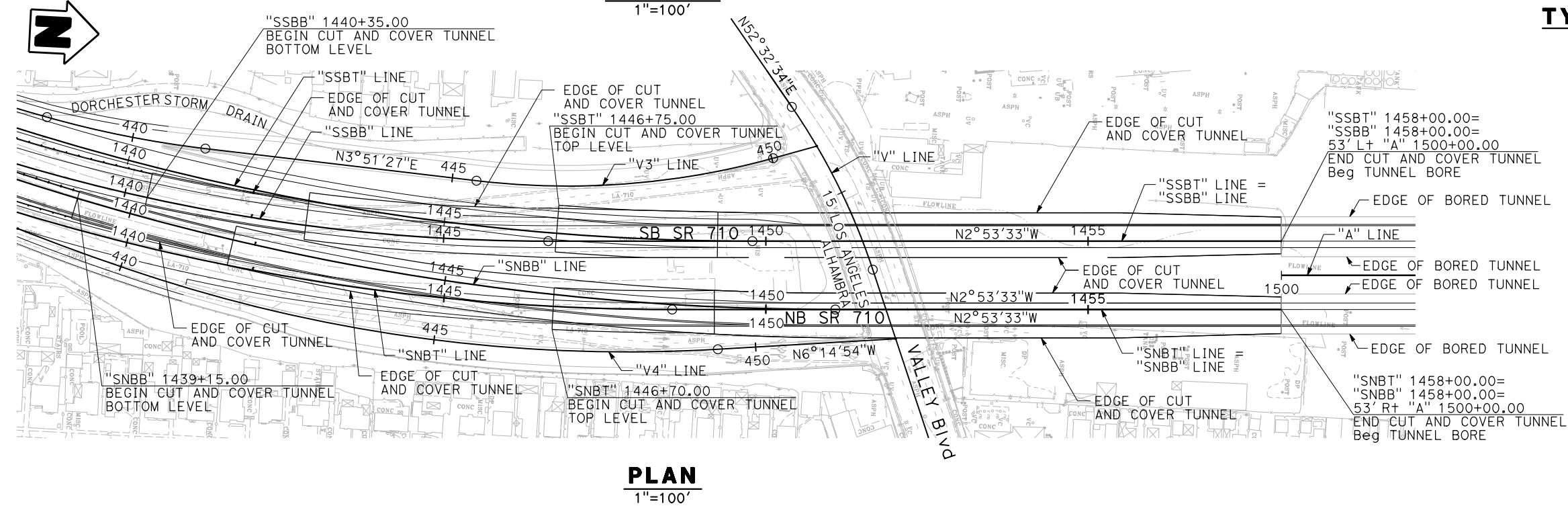
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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**TYPICAL SECTION**  
1"=30'  
(NEAR BORED TUNNEL)



**PLAN**  
1"=100'

DATE OF ESTIMATE	MARCH 2014
BRIDGE REMOVAL	N/A
STRUCTURE DEPTH	VARIES
LENGTH	1130'-0" NB TOP DECK 1885'-0" NB BOTTOM DECK 1125'-0" SB TOP DECK 1765'-0" SB BOTTOM DECK
WIDTH	VARIES
AREA	1,103 SF (AVG, NB) 1,141 SF (AVG, SB)
TOTAL COST*	\$ 237,377,000

\* THE COST OF EARTHWORK IS NOT INCLUDED IN THIS ESTIMATE.

ABBREVIATION:  
VMS Variable Message Sign

**FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**GENERAL PLAN**

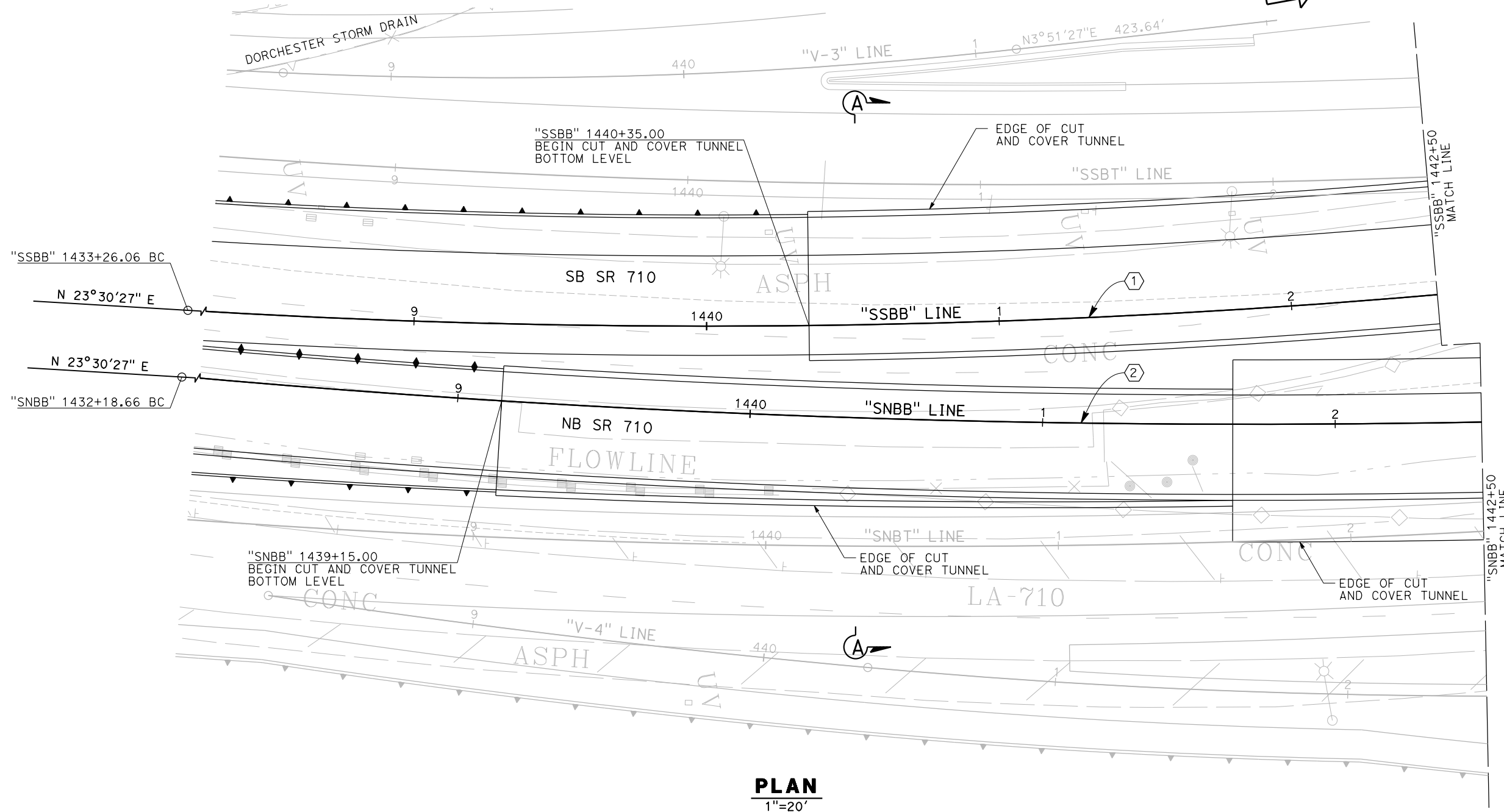
DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	AS SHOWN
PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

CURVE DATA	
① "SSBB" LINE	② "SNBB" LINE
R = 2900.00'	R = 4100.00'
Δ = 26°24'00"	Δ = 26°24'00"
T = 680.19'	T = 961.65'
L = 1336.63'	L = 1889.15'

NOTE:  
1. For Section A-A, see "TYPICAL SECTION No. 1" sheet.

**FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**STRUCTURE PLAN NO. 1  
(BOTTOM LEVEL)**

DESIGN OVERSIGHT
SIGN OFF DATE

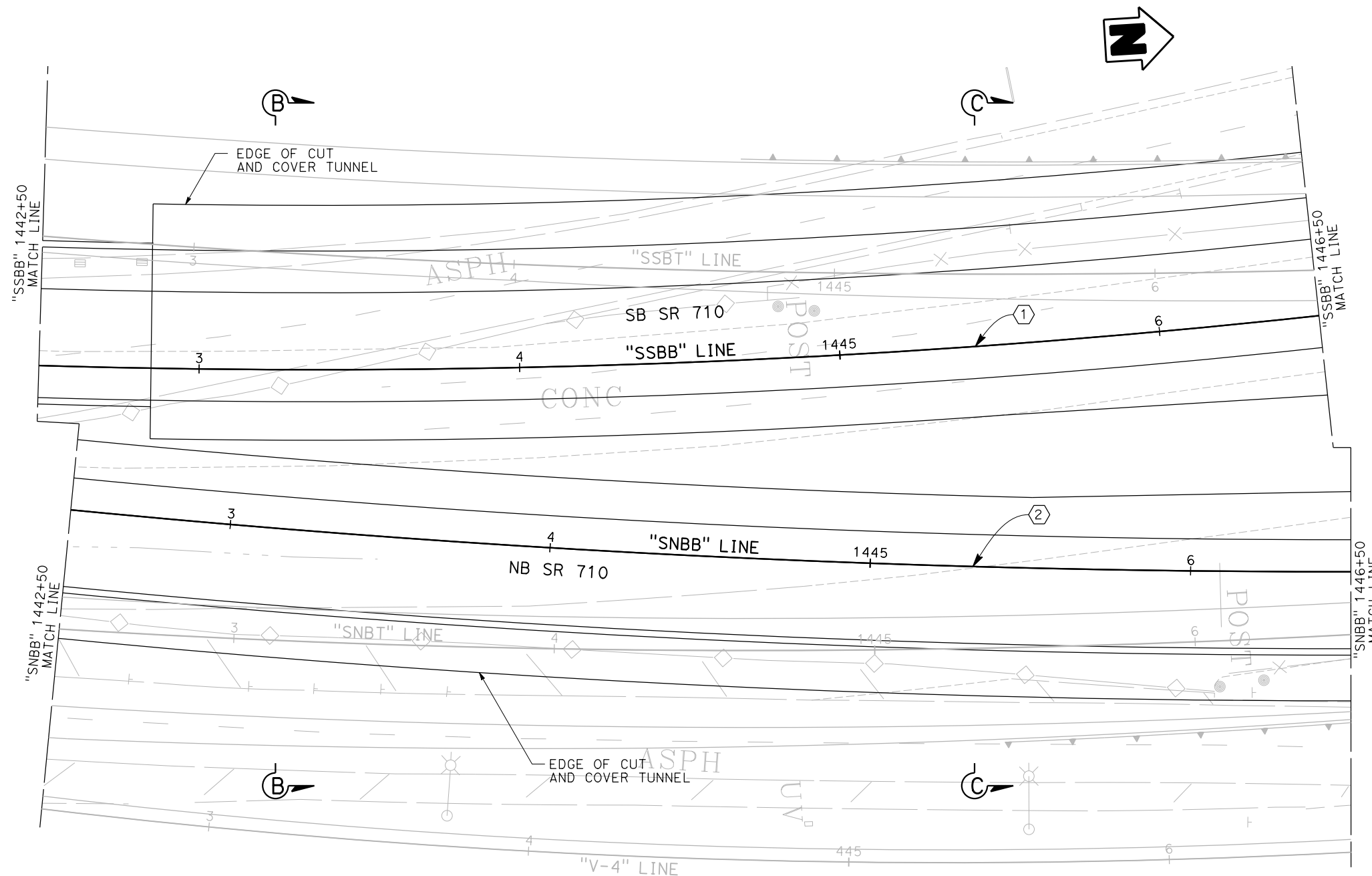
DESIGNED BY A. Issa	DATE 6-6-2014
DRAWN BY R. Munoz	DATE 6-6-2014
CHECKED BY M. Atiqullah	DATE 6-6-2014
APPROVED	DATE

M. Atiqullah  
PROJECT ENGINEER

PLANNING STUDY	
CUT AND COVER TUNNEL (SOUTH PORTAL)	
BRIDGE NO. TBD	UNIT:
SCALE: 1"=20"	PROJECT NUMBER & PHASE:



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



CURVE DATA	
① "SSBB" LINE	② "SNBB" LINE
R = 2900.00'	R = 4100.00'
Δ = 26°24'00"	Δ = 26°24'00"
T = 680.19'	T = 961.65'
L = 1336.63'	L = 1889.15'

**PLAN**  
1"=20'

- NOTES:
- For Section B-B, see "TYPICAL SECTION No. 1" sheet.
  - For Section C-C, see "TYPICAL SECTION No. 2" sheet.

**FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**STRUCTURE PLAN NO. 2  
(BOTTOM LEVEL)**

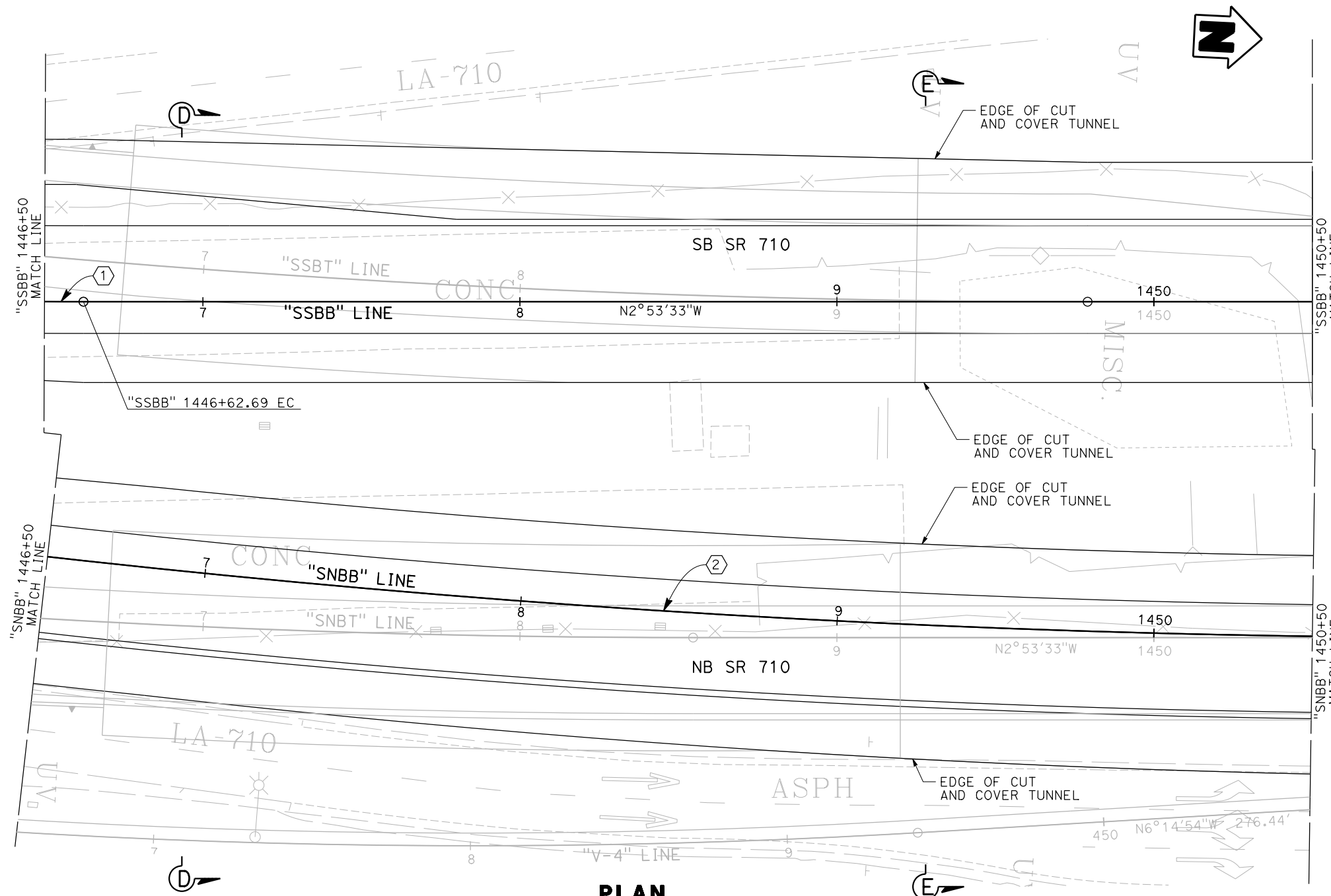
DESIGN OVERSIGHT  
SIGN OFF DATE

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	R. Munoz	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

PLANNING STUDY	
CUT AND COVER TUNNEL (SOUTH PORTAL)	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



- NOTES:
- For Section D-D, see "TYPICAL SECTION No. 2" sheet.
  - For Section E-E, see "TYPICAL SECTION No. 3" sheet.

**FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION  
STRUCTURE PLAN NO. 3  
(BOTTOM LEVEL)**

**CURVE DATA**

① "SSB" LINE	② "SNB" LINE
R = 2900.00'	R = 4100.00'
Δ = 26°24'00"	Δ = 26°24'00"
T = 680.19'	T = 961.65'
L = 1336.63'	L = 1889.15'

**PLAN**  
1"=20'

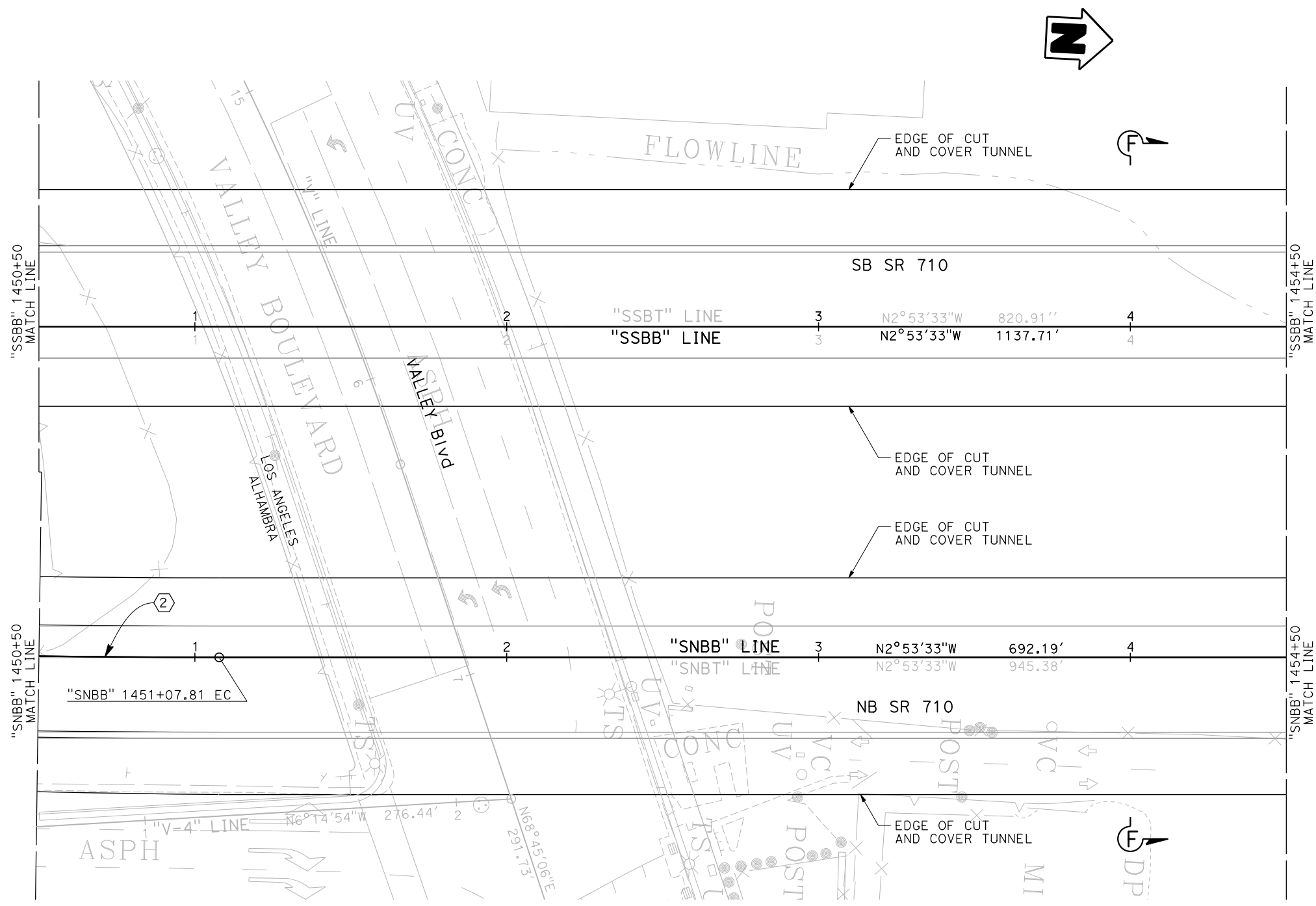
DESIGNED BY A. Issa	DATE 6-6-2014
DRAWN BY R. Munoz	DATE 6-6-2014
CHECKED BY M. Atiqullah	DATE 6-6-2014
APPROVED	DATE

M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO. TBD	UNIT:
SCALE: 1"=20'	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT  
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

NOTE:  
1. For Section F-F, see "TYPICAL SECTION No. 3" sheet.

**FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**STRUCTURE PLAN NO. 4  
(BOTTOM LEVEL)**

DESIGN OVERSIGHT
SIGN OFF DATE

**CURVE DATA**

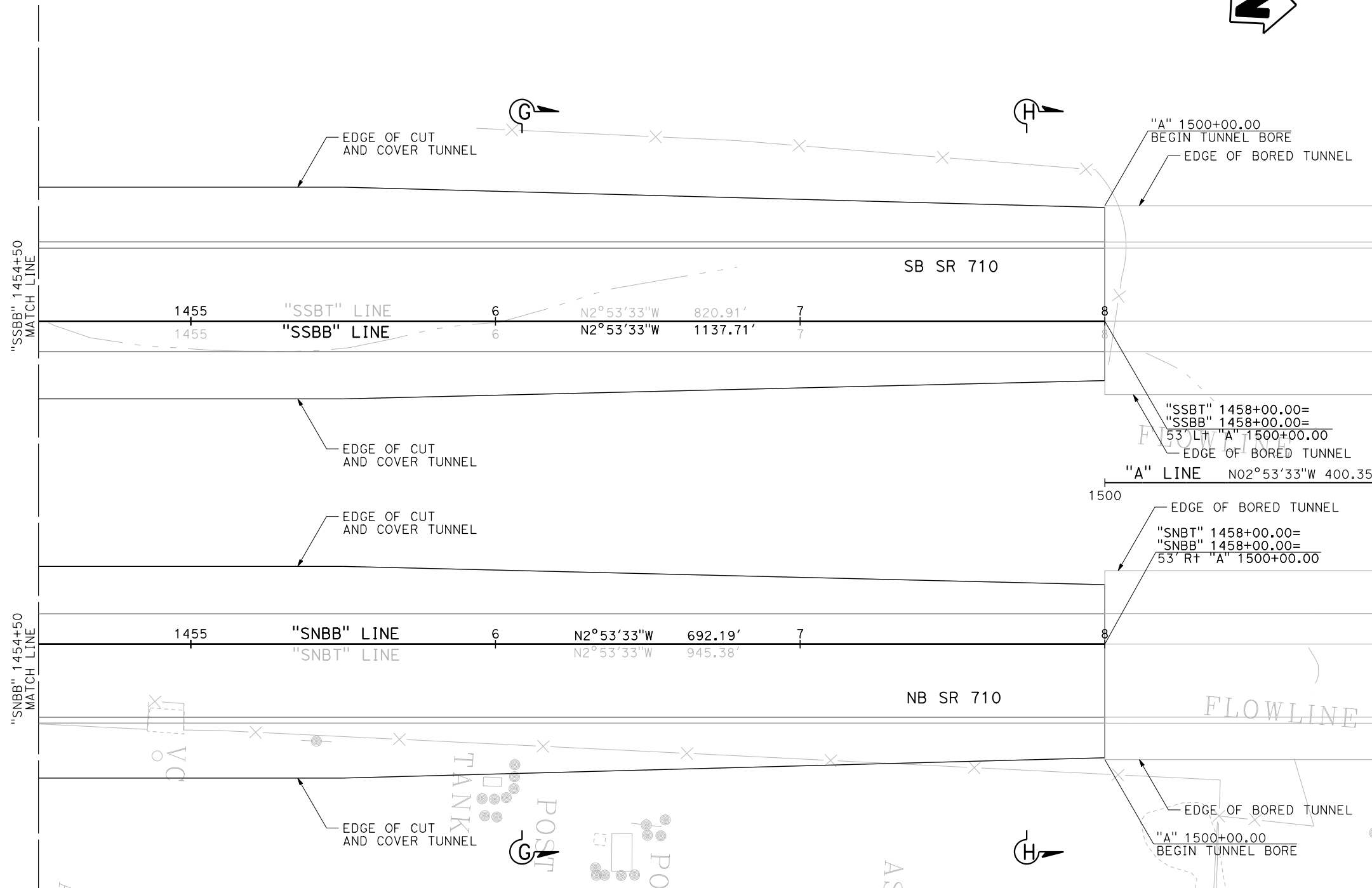
② "SNBB" LINE
R = 4100.00'
Δ = 26°24'00"
T = 961.65'
L = 1889.15'

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	R. Munoz	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

**FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**STRUCTURE PLAN NO. 5  
(BOTTOM LEVEL)**

DESIGN OVERSIGHT
SIGN OFF DATE

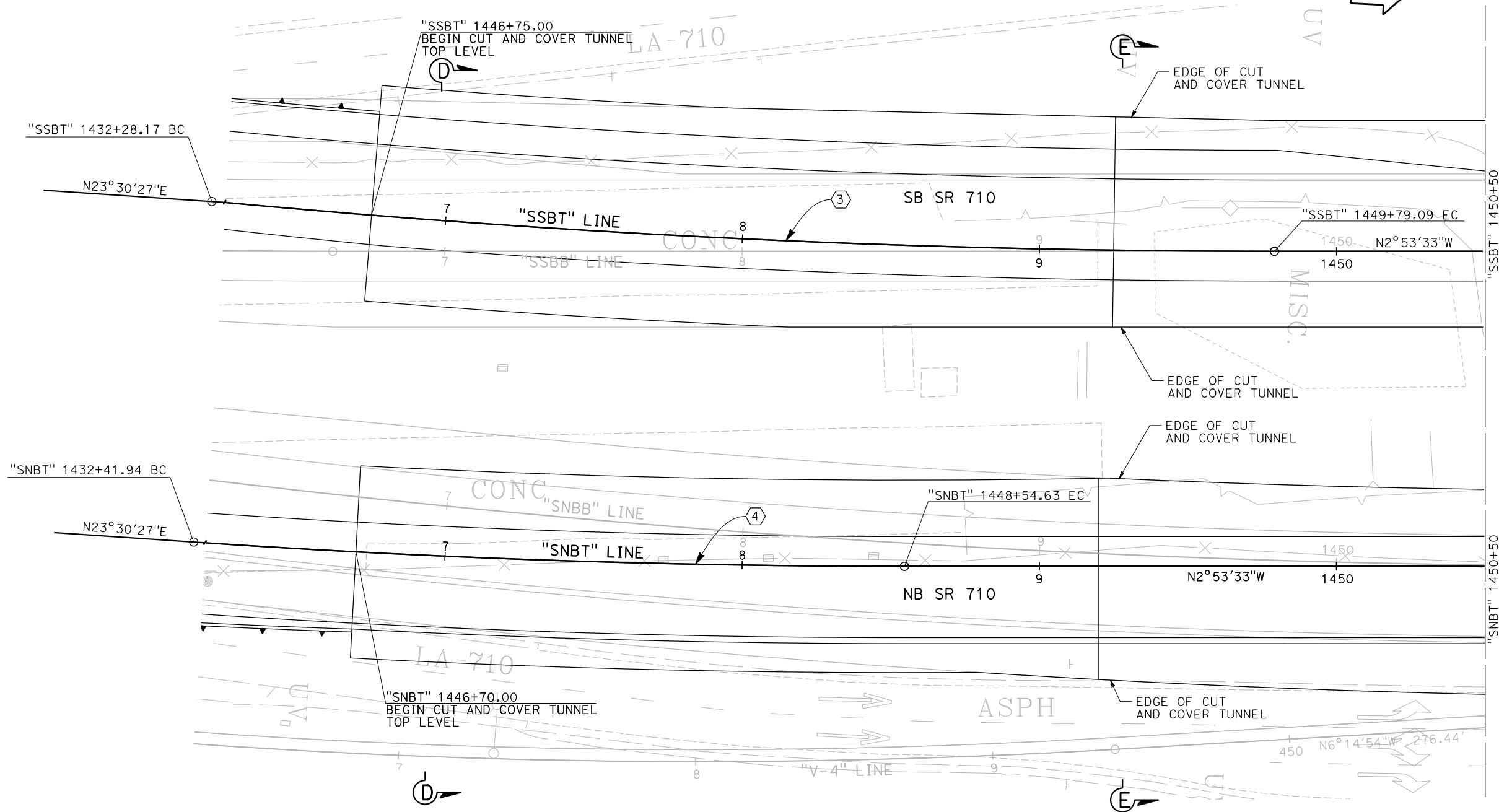
NOTE:  
1. For Sections G-G and H-H, see "TYPICAL SECTION No. 4" sheet.

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	R. Munoz	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

- NOTES:
- For Section D-D, see "TYPICAL SECTION No. 2" sheet.
  - For Section E-E, see "TYPICAL SECTION No. 3" sheet.

**FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION  
STRUCTURE PLAN NO. 6  
(TOP LEVEL)**

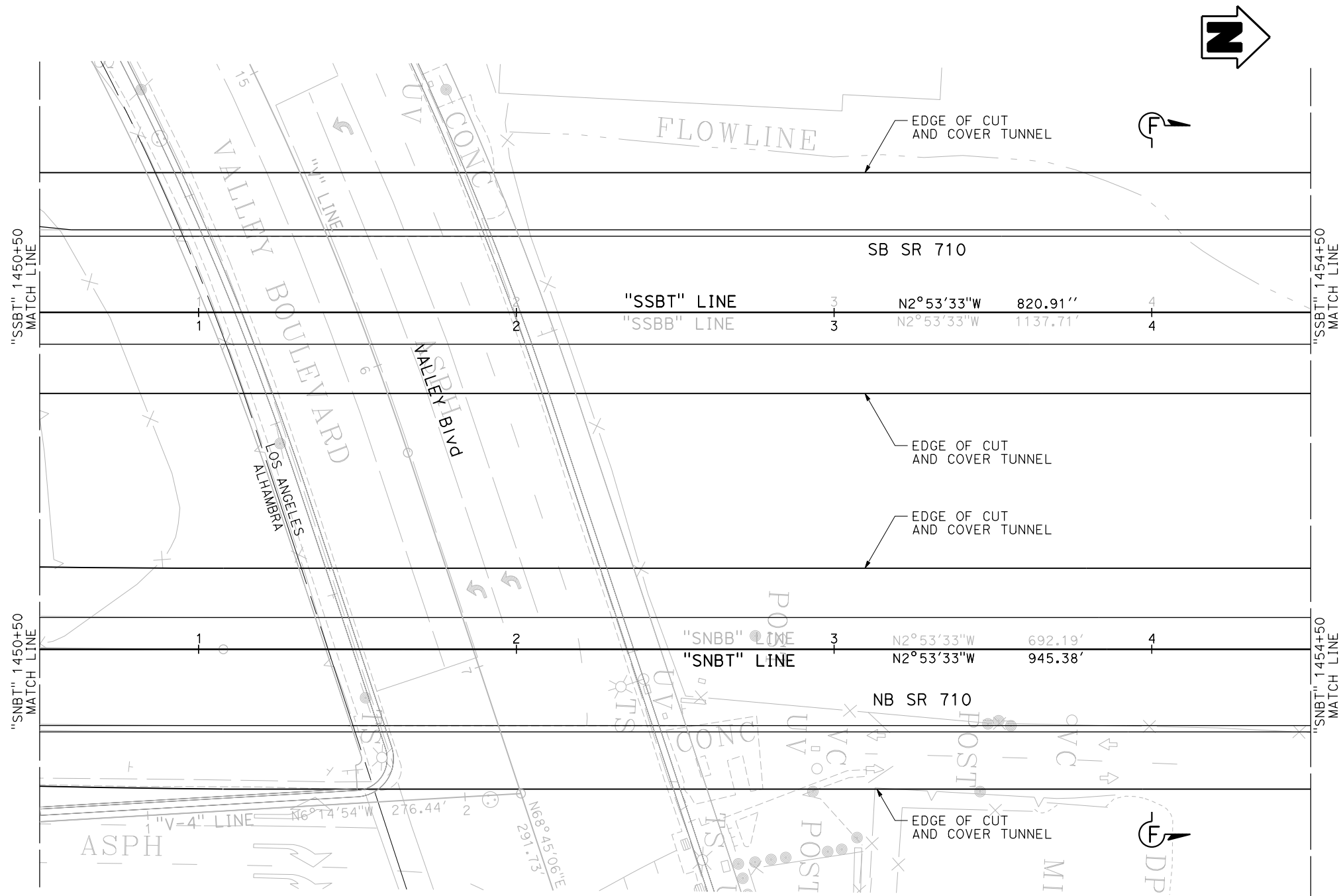
CURVE DATA	
③ "SSBT" LINE	④ "SNBT" LINE
R = 3800.00'	R = 3500.00'
Δ = 26°24'00"	Δ = 26°24'00"
T = 891.28'	T = 820.92'
L = 1750.92'	L = 1612.69'

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah PROJECT ENGINEER		<b>PLANNING STUDY</b>	
		<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO.	TBD	UNIT:	
SCALE:	1"=20'	PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

**FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**  
**STRUCTURE PLAN NO. 7  
(TOP LEVEL)**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

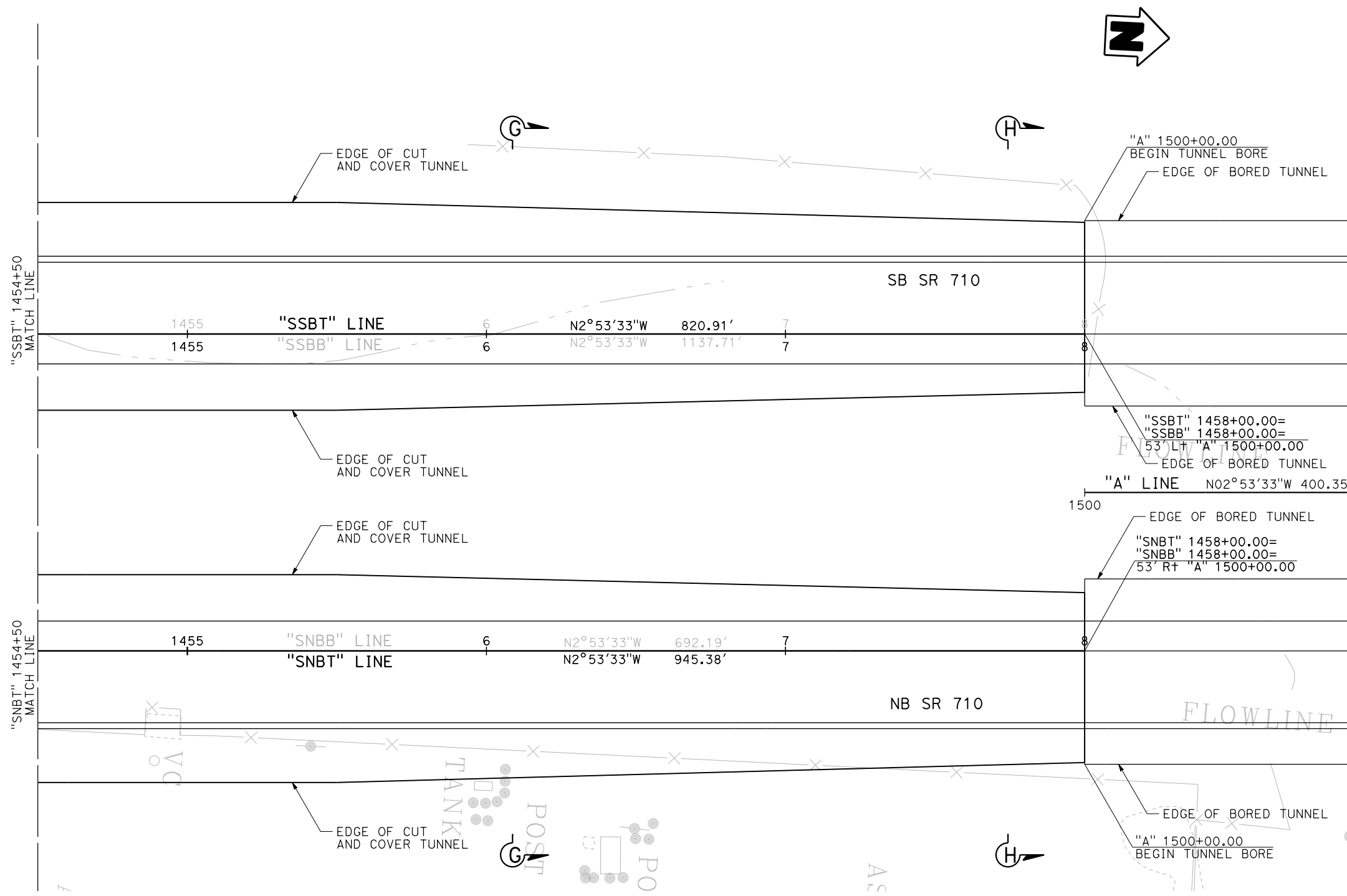
M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

NOTE:  
1. For Section F-F, see "TYPICAL SECTION No. 3" sheet.

DESIGN OVERSIGHT
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

NOTE:  
1. For Sections G-G and H-H, see "TYPICAL SECTION No. 4" sheet.

**FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION  
STRUCTURE PLAN NO. 8  
(TOP LEVEL)**

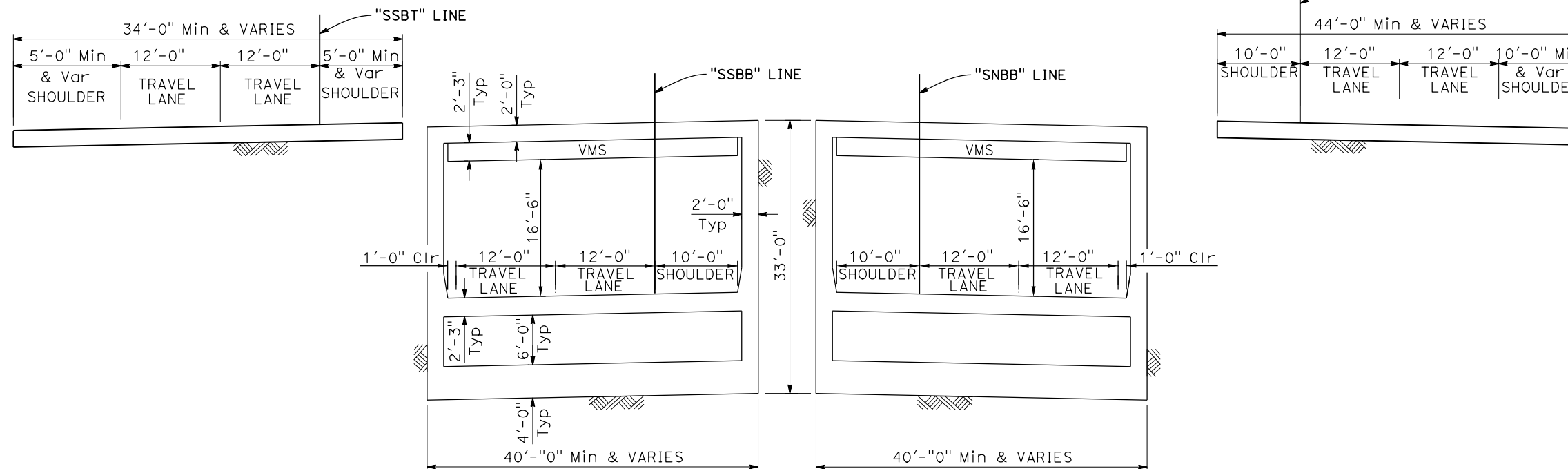
DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

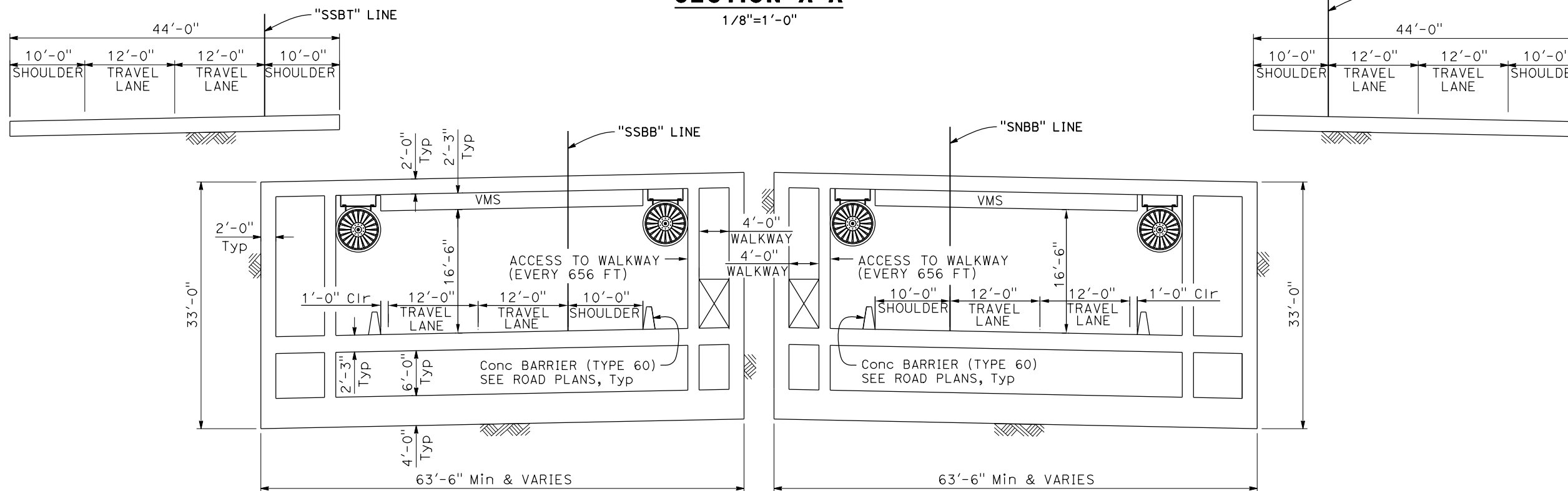
<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION A-A**  
1/8"=1'-0"



**SECTION B-B**  
1/8"=1'-0"

**FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**TYPICAL SECTION NO. 1**

**NOTE:**

- For location of Sections A-A and B-B, see "STRUCTURE PLAN No. 1 (BOTTOM LEVEL)" & "STRUCTURE PLAN No. 5 (TOP LEVEL)" sheets.

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	R. Munoz	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

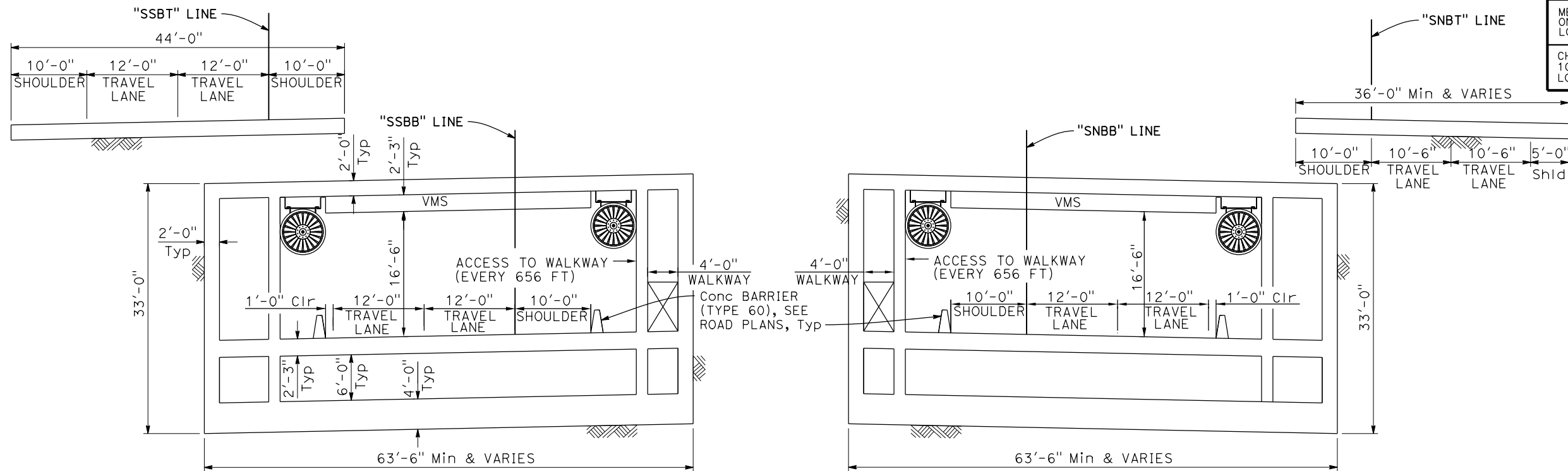
M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO. TBD	UNIT:
SCALE: 1/8"=1'-0"	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT
SIGN OFF DATE

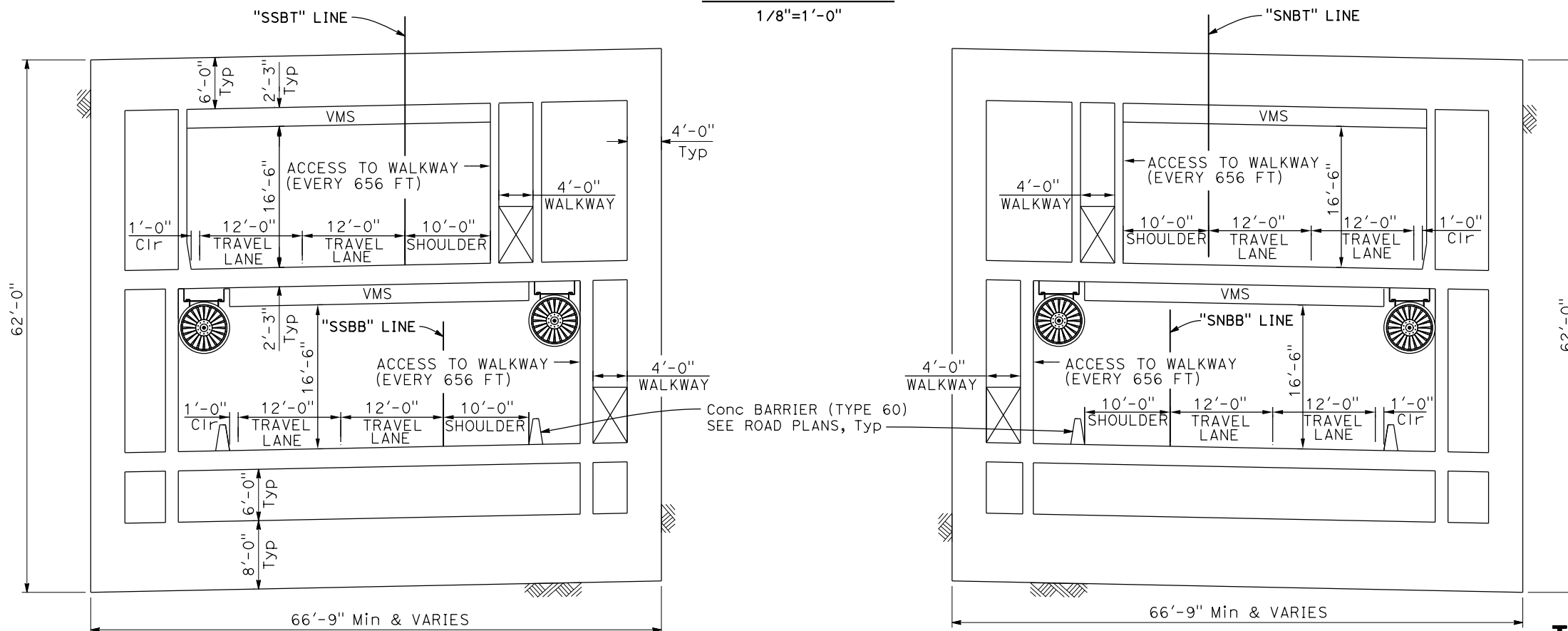


DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION C-C**

1/8"=1'-0"



**SECTION D-D**

1/8"=1'-0"

**TYPICAL SECTION NO. 2**

**FREEWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**NOTE:**

- For location of Sections C-C and D-D, see "STRUCTURE PLAN No. 2 (BOTTOM LEVEL)" & "STRUCTURE PLAN No. 6 (TOP LEVEL)" sheets.

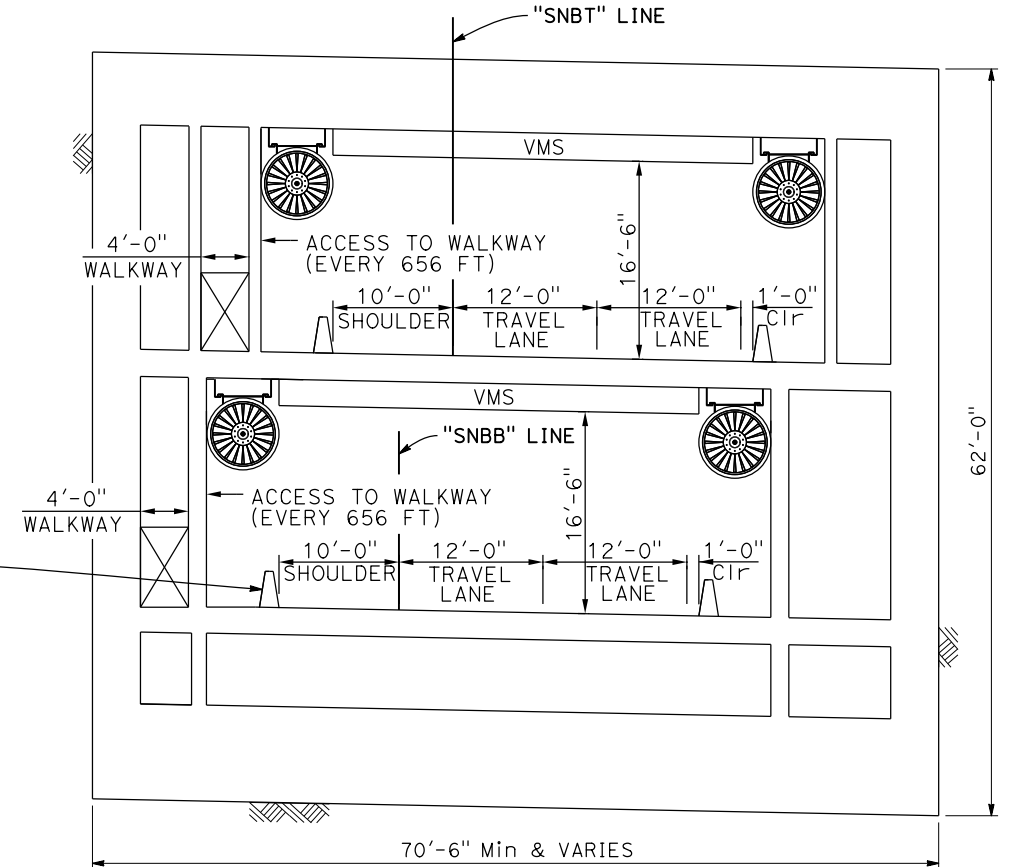
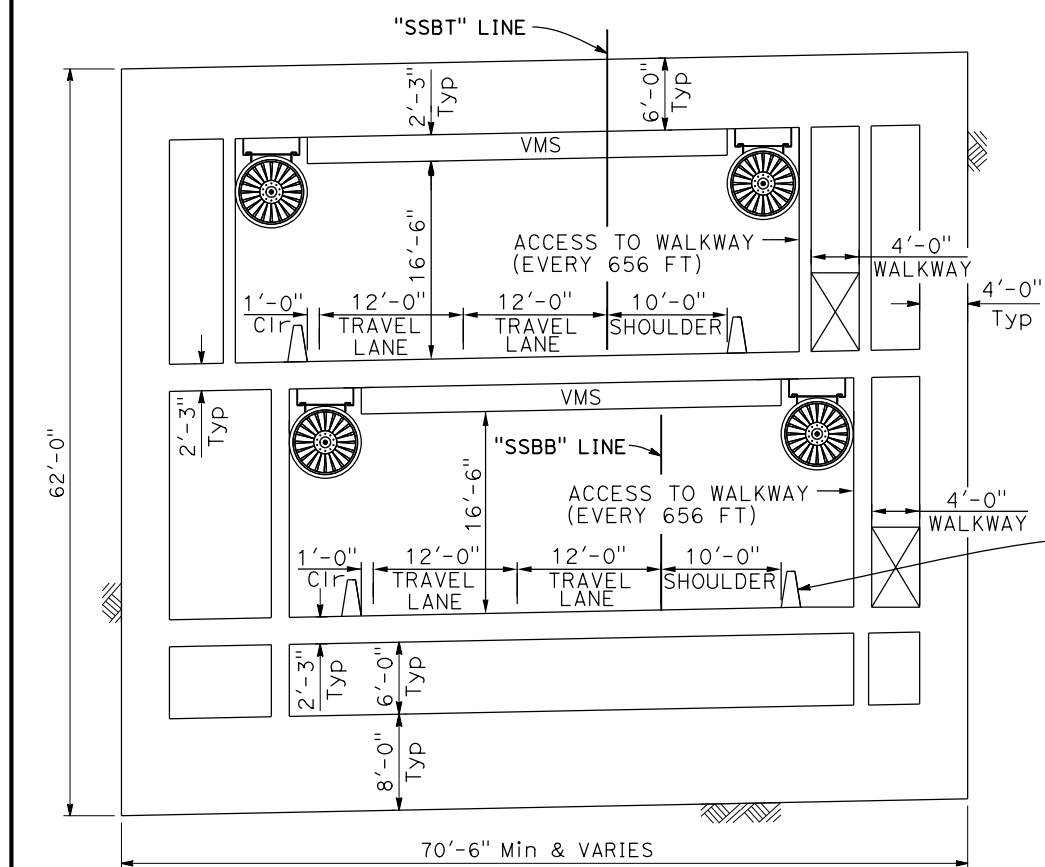
DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO. TBD	UNIT:
SCALE: 1/8"=1'-0"	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT
SIGN OFF DATE

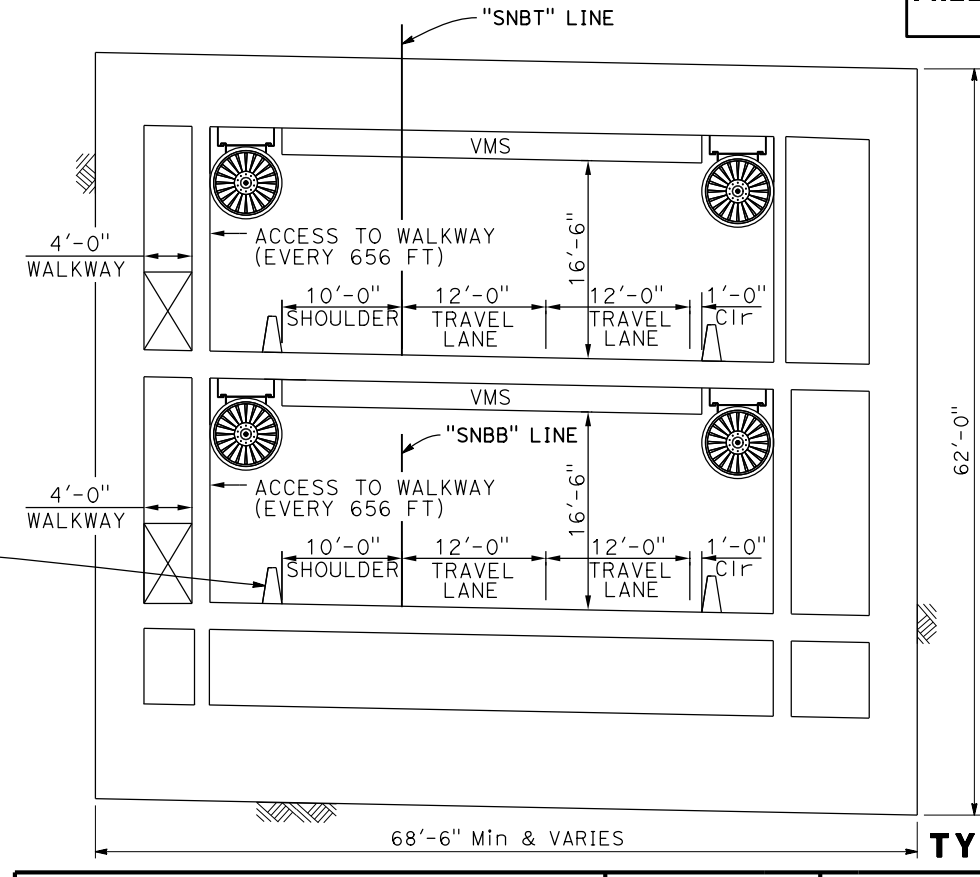
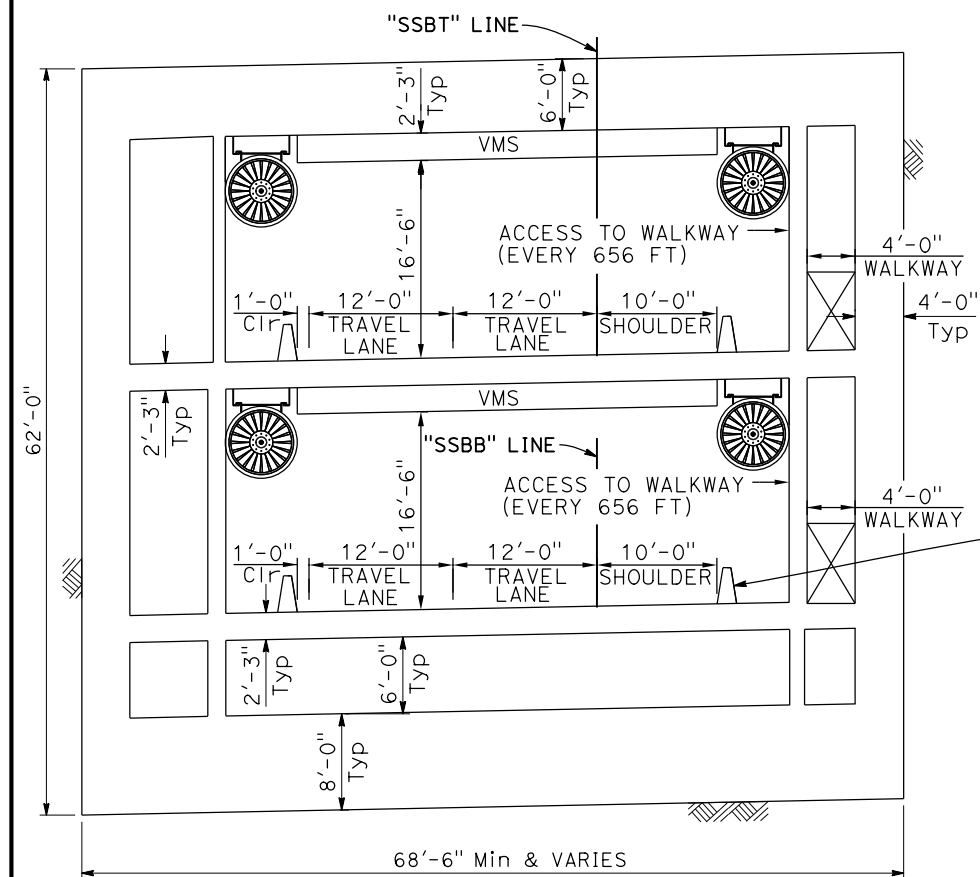
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION E-E**

1/8"=1'-0"

**FREEWAY TUNNEL ALTERNATIVE DUAL BORE OPTION**



**SECTION F-F**

1/8"=1'-0"

**TYPICAL SECTION NO. 3**

**NOTE:**

- For location of Sections E-E and F-F, see "STRUCTURE PLAN No. 3 (BOTTOM LEVEL)" & "STRUCTURE PLAN No. 7 (TOP LEVEL)" sheets.

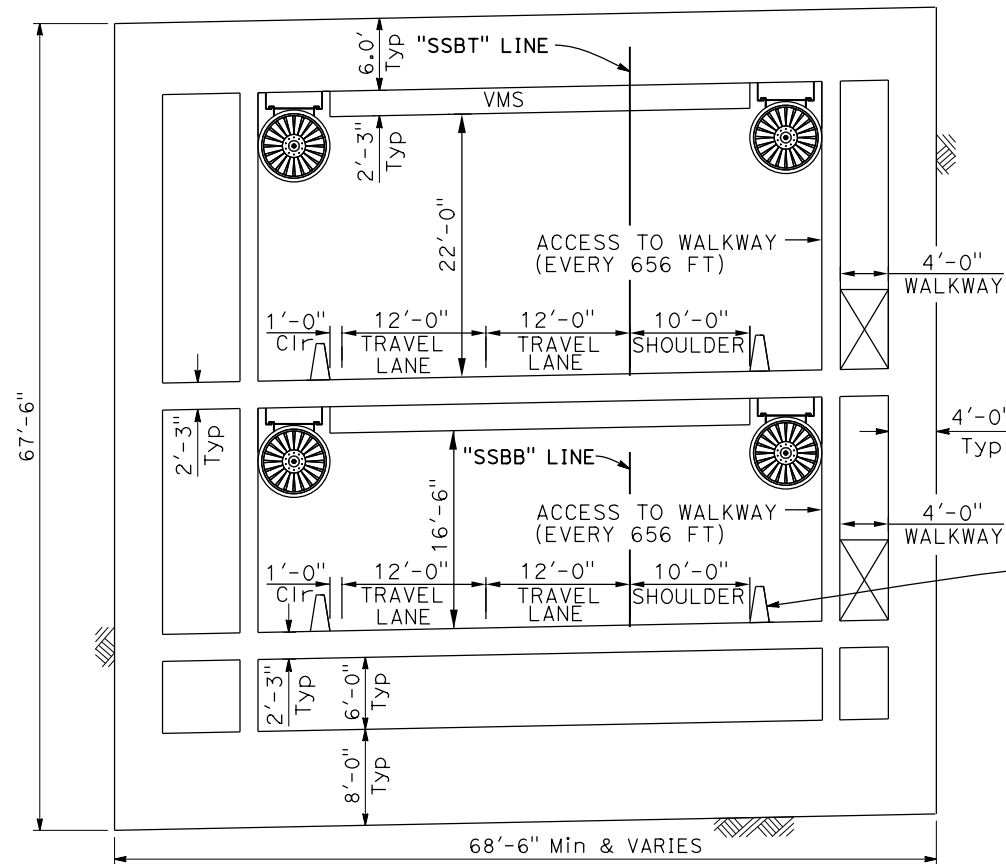
DESIGN OVERSIGHT
SIGN OFF DATE

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah
PROJECT ENGINEER

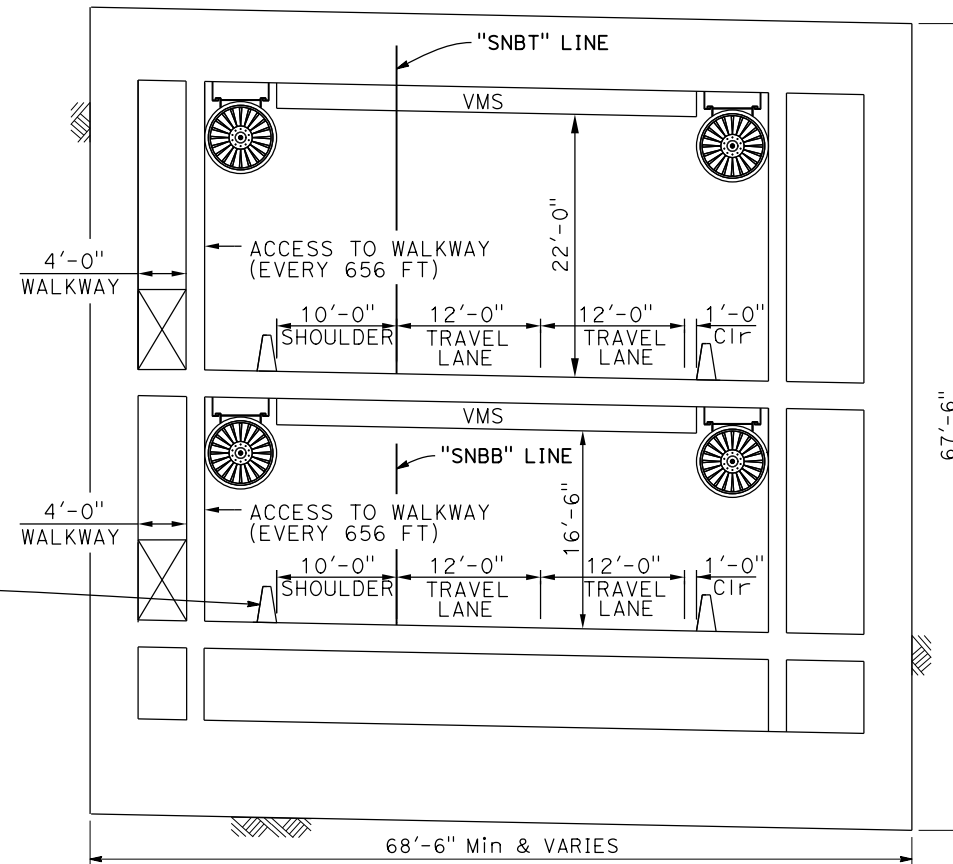
<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO. TBD	UNIT:
SCALE: 1/8"=1'-0"	PROJECT NUMBER & PHASE:

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



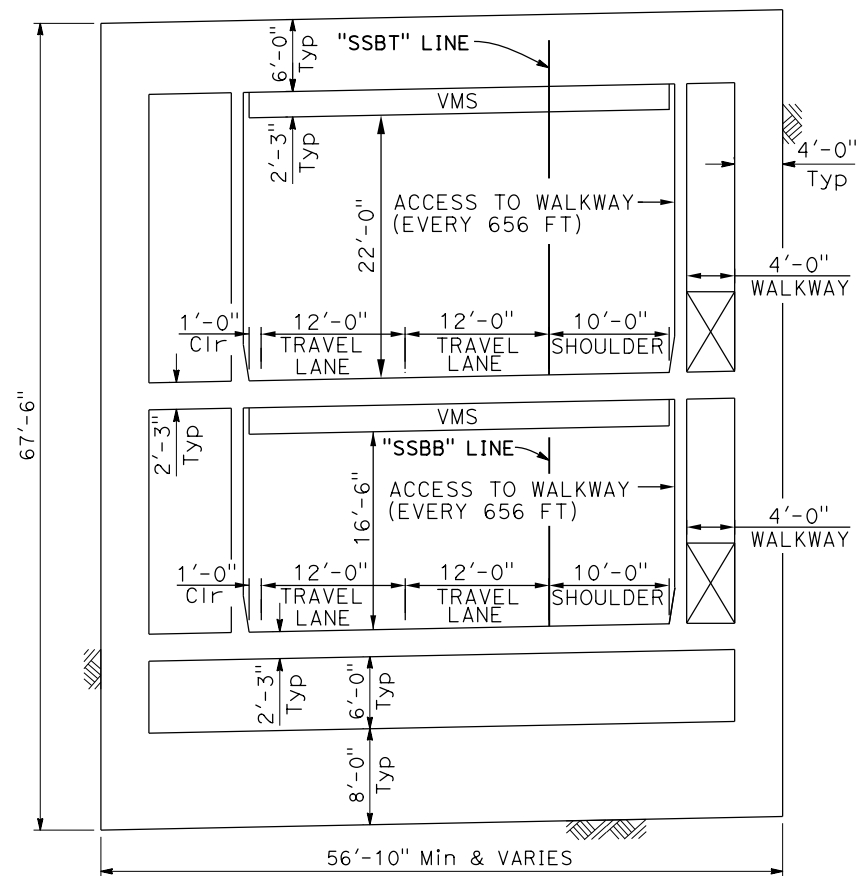
**SECTION G-G**

1/8"=1'-0"



**SECTION H-H**

1/8"=1'-0"



**FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**TYPICAL SECTION NO. 4**

**NOTE:**

- For location of Sections G-G and H-H, see "STRUCTURE PLAN No. 4 (BOTTOM LEVEL)", "STRUCTURE PLAN No. 7 (TOP LEVEL)" & "STRUCTURE PLAN No. 8 (TOP LEVEL)" sheets.

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	R. Munoz	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

**PLANNING STUDY**

**CUT AND COVER TUNNEL (SOUTH PORTAL)**

BRIDGE NO.	TBD	UNIT:	
SCALE:	1/8"=1'-0"	PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT	
SIGN OFF DATE	





SR 710 North Study

ATTACHMENT K-2g

Task 7.2 Advance Planning Study Report

# State Route 710 North Study Advance Planning Study Report Cut and Cover Tunnel (North Portal)

## Freeway Tunnel Alternative Dual Bore Option

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

June 2014

**CH2MHILL®**

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017





## SR 710 North Study

PREPARED FOR: Metropolitan Transportation Authority  
COPY TO: Caltrans Study Team  
PREPARED BY: CH2M HILL Team  
DATE: June 6, 2014  
PROJECT NUMBER: 428908

### Cut and Cover Tunnel (North Portal)

#### Freeway Tunnel Alternative Dual Bore Option

#### Table of Contents

	<u>Page No.</u>
Project Vicinity Map	2
Design Memorandum	3
<b>Attachments</b>	
A	Consultant Prepared Advance Planning Study (APS) Checklist
B	Advance Planning Study Cost Estimate
C	Advance Planning Study Plan



**Project Vicinity Map**  
**State Route 710 North Study**  
**Freeway Tunnel Alternative Alignment**  
**Dual Bore Option**



## Assumptions Used for Cut and Cover Tunnel (North Portal) – Advance Planning Study

1. The proposed Cut and Cover (C&C) Tunnel (North Portal) will be an integral part of the State Route (SR) 710 North Study Project. The North Portal C&C Tunnel will begin north of California Boulevard and end north of Del Mar Boulevard. The purpose of the proposed project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks.
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes.
  - Minimize environmental impacts.
2. There are two options for the Freeway Tunnel alternative for the future SR 710 corridor:
  - Two full bored tunnels accommodating one direction of traffic in each tunnel (this report is based on this option).
  - One full bored tunnel accommodating both directions of traffic with provision for another full bored tunnel in the future (documented in a separate report).
3. The main purpose of the C&C Tunnel system is to serve as the transition of the SR 710 Freeway between the surface level traffic and the full bore tunnel traffic.
4. The current North Portal design provides the following lengths for each route:
  - a. Northbound (NB) & Southbound (SB) direction upper level: 1,389 feet
  - b. NB & SB direction lower level: 1,640 feet
5. The typical two-level C&C Tunnel section will have varying width and height. The width will vary from a minimum 56 feet 10 inches and the height will vary from a minimum 62 feet. The top slab will be 6 feet thick and the bottom slab will be 8 feet thick, while exterior walls will be 4 feet thick. There will be an interior concrete slab dividing the box in the top and bottom levels. In this way, each level will accommodate traffic lanes for a minimum of four total traffic lanes per tunnel section.
6. The width of each single-level C&C Tunnel will also vary along the length. The width will vary from a minimum of 40 feet and the height will be 33 feet.
7. Within the C&C Tunnel section, 6-foot diameter jet fans will be located outside the edge of shoulder as part of the tunnel ventilation system.
8. The C&C Tunnel will also contain a continuous firewall on each deck that shields a 4-foot walkway in case of emergency. These walkways will be located next to the inside shoulder of each tunnel and will be connected via cross-passages.
9. There will be a transition zone where the C&C Tunnel will gradually taper in height with distance from the bored tunnel circular cross section to the cut and cover tunnel's rectangular cross-section. This will help manage the aerodynamic flow of the ventilation system across the two sections.
10. Each deck level will include a 4-foot inside walkway, a 10-foot inside shoulder, two or three typical 12-foot traffic lanes, and a 1-foot clear area.
11. A minimum vertical clearance of 16 feet 6 inches will be maintained inside the tunnel for traffic, and there will be an additional 2 feet 3 inches clearance for signage.

12. The C&C Tunnel design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and Seismic Design Criteria. The Acceleration Response Spectrum curve, as will be recommended in the foundation report, will be used for seismic loading in a future phase of design.
13. According to the Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014), the subsurface material is considered to have a very low potential for liquefaction because of the deep groundwater elevation and the dense soil condition. Moreover, the top 80 to 100 feet of soil layers will be removed during the excavation and will be replaced by compacted granular soil after tunnel construction is completed. The Seismic Hazard Zones Map for Pasadena 7.5-Minute Quadrangle (California Division of Mines and Geology, 1999) also indicates that the proposed site is not located in an area where historical occurrence of liquefaction or potential for liquefaction is noted. The proposed structure does not need to account for liquefaction in the preliminary design. Additional geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.
14. Falsework will be required to build the C&C Tunnel. Traffic will not pass under falsework during construction.
15. As-built plans of existing utilities have not been made available yet. Temporary and/or permanent utility relocation, if necessary, will be confirmed in the final design phase after the as-built utility plans and field investigation results have been reviewed.
16. No known hazardous material exists at the tunnel site.
17. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
18. The overall tunnel construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$313,171,000. The cost of tunnel excavation, backfill and construction of the slurry walls with tiebacks is included in the roadway estimate.

**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

---



# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710 KP(PM)
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): To be Assigned	Bridge Name(s): Cut and Cover Tunnel (North Portal)	
Total number of bridges in project: <b>Many, only one</b> bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer.  
(Mark **N/A** if not applicable)

- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- N/A Grades or spot elevations of roadway below the structure.
- N/A Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- N/A Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- N/A "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)

# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

- |       |   |   |
|-------|---|---|
| 1.    | Has this project been discussed with:   | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
|       | the OSFP Liaison Engineer?  | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
|       | the Caltrans District Project Manager?  | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
|       | the roadway consultant?   | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| <hr/> |   |   |
| 2.    | Have the Caltrans Structures Maintenance records been reviewed?   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
|       | If the records recommend any work for the structure, is it included in the APS?   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| <hr/> |   |   |
| 3.    | Are there special aesthetic considerations?   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| <hr/> |   |   |
| 4.    | (Widenings and Modifications)   |   |
|       | Has this project been reviewed for seismic retrofit requirements?   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
|       | Are seismic retrofit requirements included in the APS?  | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| <hr/> |   |   |
| 5.    | Any special Railroad requirements?  | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
|       | Shoofly required?   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
|       | Cost of shoofly included as a separate item in the project cost estimate?   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| <hr/> |   |   |
| 6.    | Any special foundation requirements, including scour critical work, special excavation such as Type A, Type D, and/or hazardous or contaminated material?   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| <hr/> |   |   |
| 7.    | Any special construction requirements, including limited site accessibility or seasonal work?   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| <hr/> |   |   |
| 8.    | Other items to be included in the cost such as slope paving, approach slabs, and/or adjacent retaining walls?   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
| <hr/> |   |   |
| 9.    | Remove existing bridge?   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |
|       | Total Deck Area:  |   |
| <hr/> |   |   |
| 10.   | Any other unusual or special requirements?  | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| <hr/> |   |   |
| 11.   | Provide and attach a consultant prepared Design Memo to summarize and document any important assumptions, discussions, decisions, unusual items, local agency requirements such as aesthetics, improvements in vicinity of the structure, airspace usage, other obstructions, or any items noted above. |   |
|       | Summary attached?   | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: March 21, 2014
--	---------------------------	-------------------------

**Attachment B**  
**Advance Planning Study Cost Estimate**

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Revised - December 3, 2007

Freeway Tunnel Alternative  
Dual Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Cut & Cover Tunnel (North Portal) BR. No.: TBD

TYPE: Reinforced Concrete Cut & Cover Tunnels

CU: \_\_\_\_\_

EA: \_\_\_\_\_

DISTRICT: 07

RTE: 710

CO: LA

PM: \_\_\_\_\_

LENGTH: 1,640.00 WIDTH: \_\_\_\_\_ AREA (SF)= \_\_\_\_\_

DESIGN SECTION: \_\_\_\_\_

# OF STRUCTURES IN PROJECT : \_\_\_\_\_ EST. NO. \_\_\_\_\_

PRICES BY : \_\_\_\_\_ COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : A. Issa DATE: 3/21/2014

QUANTITIES BY : \_\_\_\_\_ DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	STRUCTURAL CONCRETE, TUNNEL		CY	200,036	\$800.00	\$160,029,037
2	BAR REINFORCING STEEL (TUNNEL)		LB	59,940,889	\$0.75	\$44,955,667
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

SUBTOTAL	\$204,984,704
TIME RELATED OVERHEAD	\$20,498,470
MOBILIZATION (@ 10%)	\$25,053,686
SUBTOTAL BRIDGE ITEMS	\$250,536,860
CONTINGENCIES (@ 25%)	\$62,634,215
BRIDGE TOTAL COST	\$313,171,075
COST PER SQ. FOOT	
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$313,171,075
BUDGET ESTIMATE AS OF	\$313,171,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: **COST OF EARTHWORK NOT INCLUDED IN THIS ESTIMATE.**

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$313,171,000
2	\$313,171,000
3	\$313,171,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$313,171,000
5	\$313,171,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.

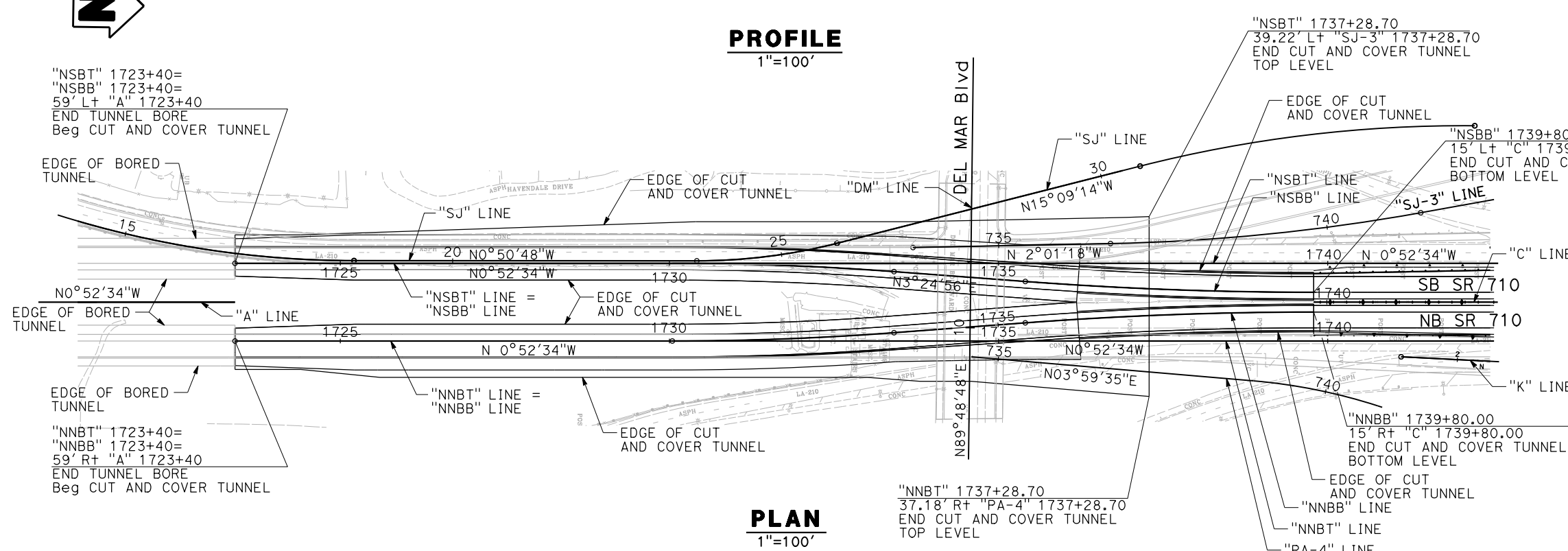
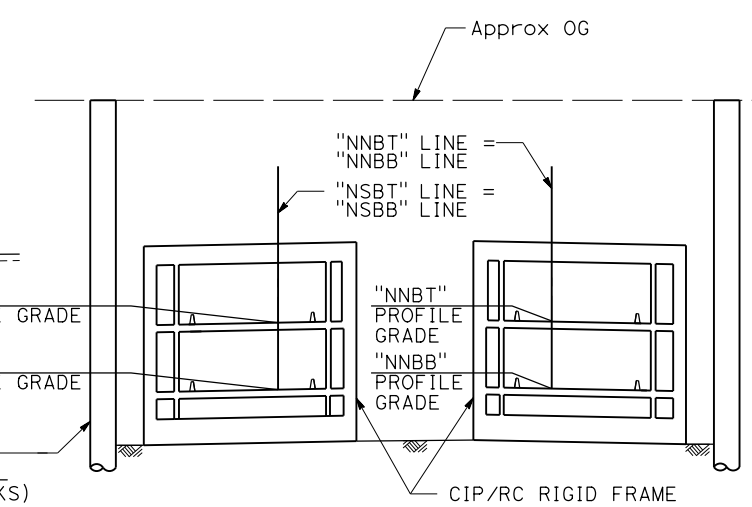
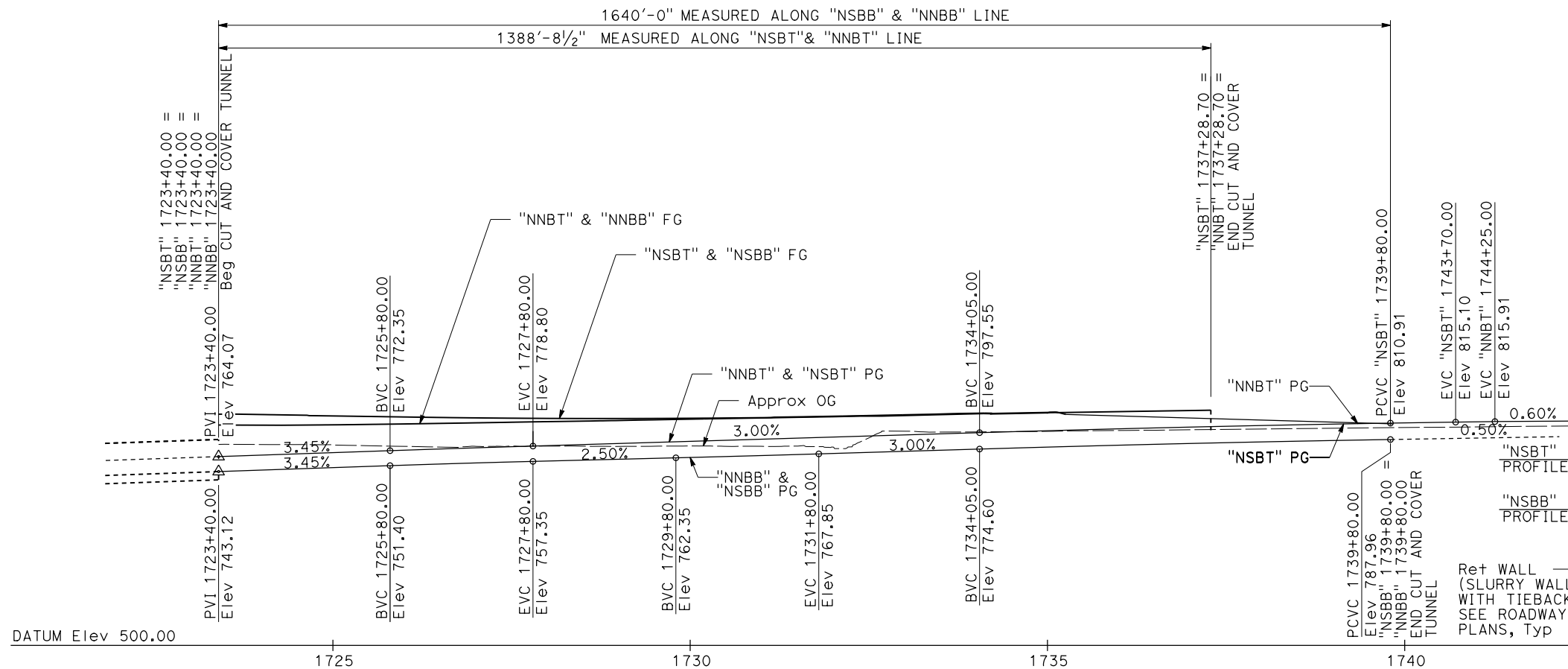


**Attachment C**  
**Advance Planning Study Plan**

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



DATE OF ESTIMATE	MARCH 2014
BRIDGE REMOVAL	N/A
STRUCTURE DEPTH	VARIES
LENGTH	1388'-8 1/2" UPPER LEVEL 1640'-0" LOWER LEVEL
WIDTH	VARIES
AREA	1,639 SF (AVG, NB) 1,639 SF (AVG, SB)
TOTAL COST *	\$ 313,171,000

\*THE COST OF EARTHWORK IS NOT INCLUDED IN THIS ESTIMATE.

ABBREVIATION:  
VMS Variable Message Sign

**FREeway TUNNEL ALTERNATIVE DUAL BORE OPTION**  
**GENERAL PLAN**

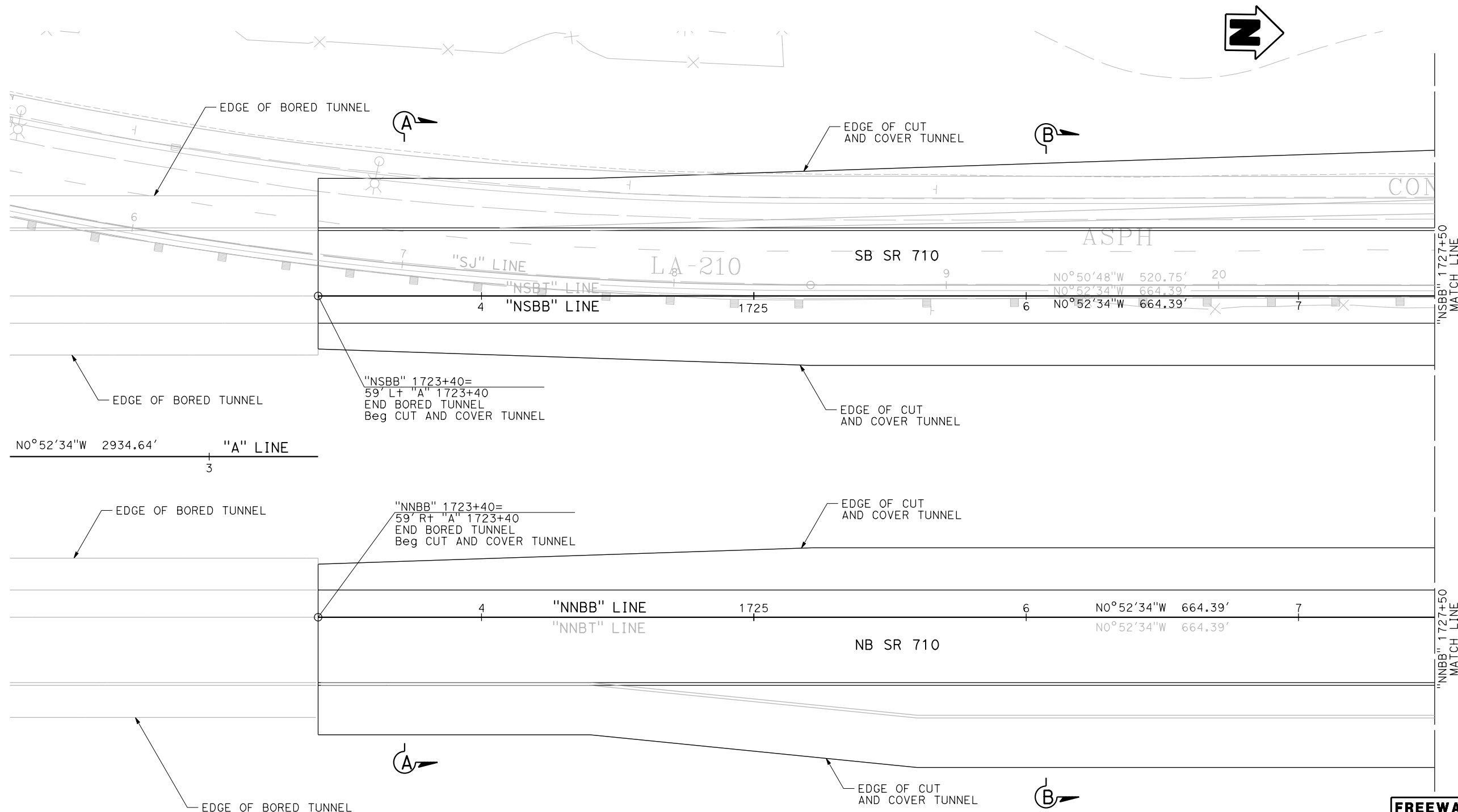
DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah PROJECT ENGINEER		<b>PLANNING STUDY</b>	
		<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
BRIDGE NO.	TBD	UNIT:	
SCALE:	AS SHOWN	PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT

SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**STRUCTURE PLAN NO. 1  
(BOTTOM LEVEL)**

**PLAN**  
1"=20'

NOTE:  
1. For Sections A-A and B-B, see "TYPICAL SECTION No. 1" sheet.

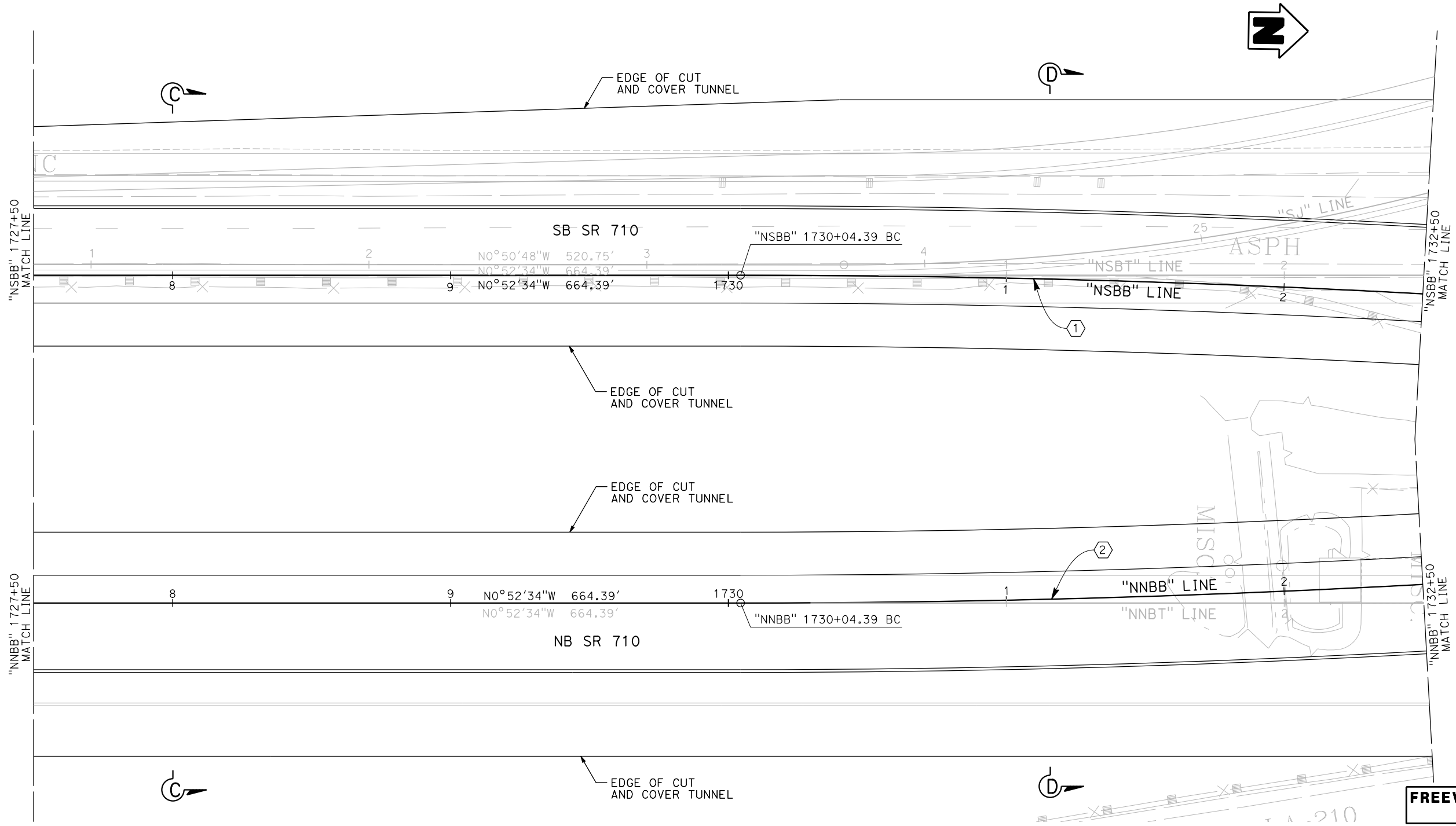
DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	R. Munoz	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

PLANNING STUDY	
CUT AND COVER TUNNEL (NORTH PORTAL)	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



CURVE DATA	
① "NSBB" LINE	② "NNBB" LINE
R = 4500.00'	R = 4500.00'
Δ = 4°17'30"	Δ = 4°17'30"
T = 168.61'	T = 168.61'
L = 337.06'	L = 337.06'

**PLAN**  
1"=20'

NOTE:  
1. For Sections C-C and D-D, see "TYPICAL SECTION No. 2" sheet.

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	R. Munoz	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

**FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**STRUCTURE PLAN NO. 2  
(BOTTOM LEVEL)**

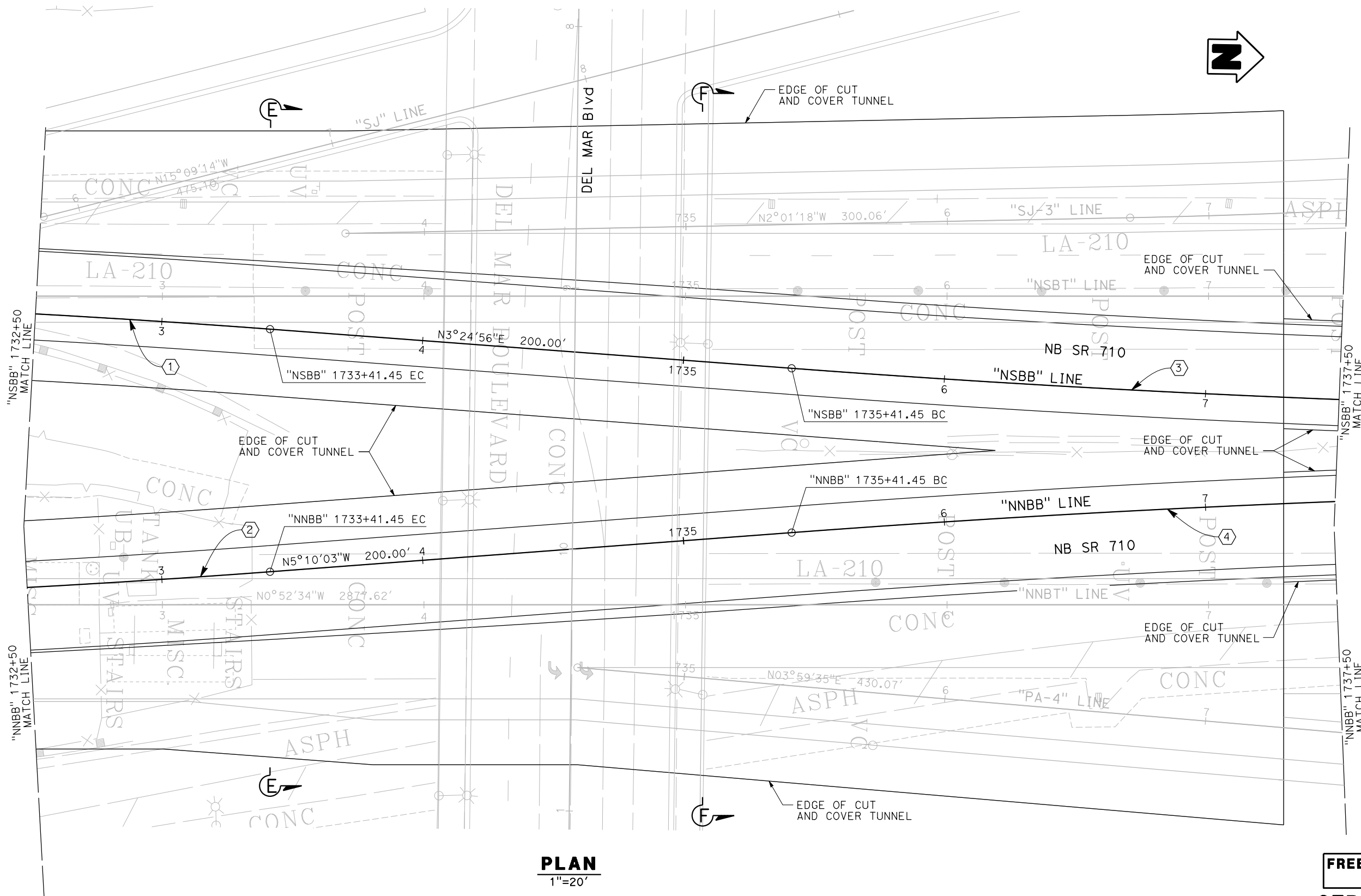
**PLANNING STUDY**

**CUT AND COVER TUNNEL (NORTH PORTAL)**

BRIDGE NO.	TBD	UNIT:	
SCALE:	1"=20'	PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT	
SIGN OFF DATE	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

- NOTES:**
- For Sections E-E, see "TYPICAL SECTION No. 3" sheet.
  - For Sections F-F, see "TYPICAL SECTION No. 4" sheet.

**FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION  
STRUCTURE PLAN NO. 3  
(BOTTOM LEVEL)**

CURVE DATA			
① "NSBB" LINE	② "NNBB" LINE	③ "NSBB" LINE	④ "NNBB" LINE
R = 4500.00'	R = 4500.00'	R = 5855.00'	R = 5855.00'
Δ = 4°17'30"	Δ = 4°17'30"	Δ = 4°17'30"	Δ = 4°17'30"
T = 168.61'	T = 168.61'	T = 219.38'	T = 219.38'
L = 337.06'	L = 337.06'	L = 438.55'	L = 438.55'

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	R. Munoz	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

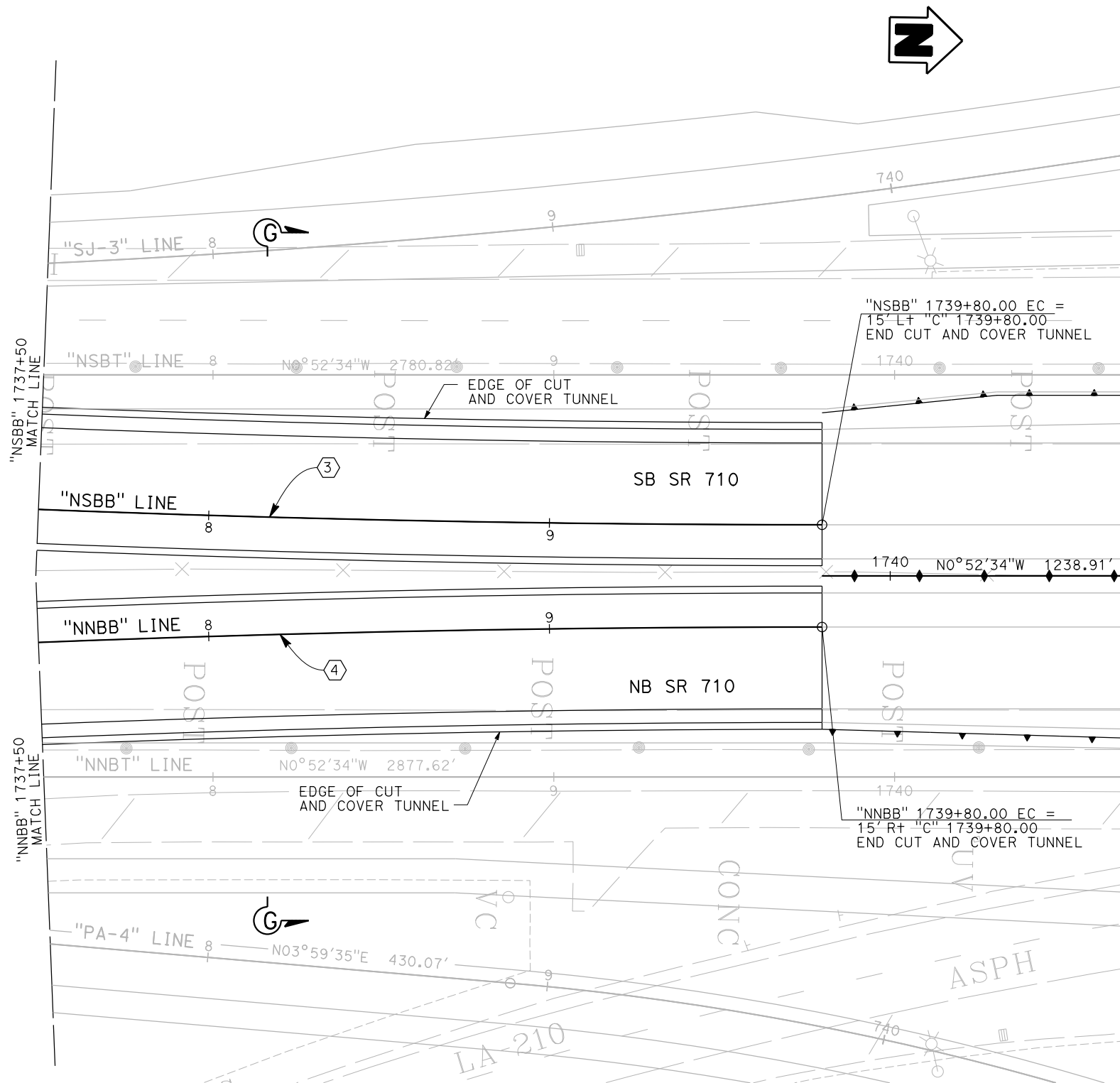
M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
BRIDGE NO. TBD	UNIT:
SCALE: 1"=20'	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT
SIGN OFF DATE



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



NOTE:  
 1. For Section G-G, see "TYPICAL SECTION No. 4" sheet.

**FREeway TUNNEL ALTERNATIVE  
 DUAL BORE OPTION  
 STRUCTURE PLAN NO. 4  
 (BOTTOM LEVEL)**

**CURVE DATA**

③ "NSBB" LINE	④ "NNBB" LINE
R = 5855.00'	R = 5855.00'
Δ = 4°17'30"	Δ = 4°17'30"
T = 219.38'	T = 219.38'
L = 438.55'	L = 438.55'

**PLAN**  
 1"=20'

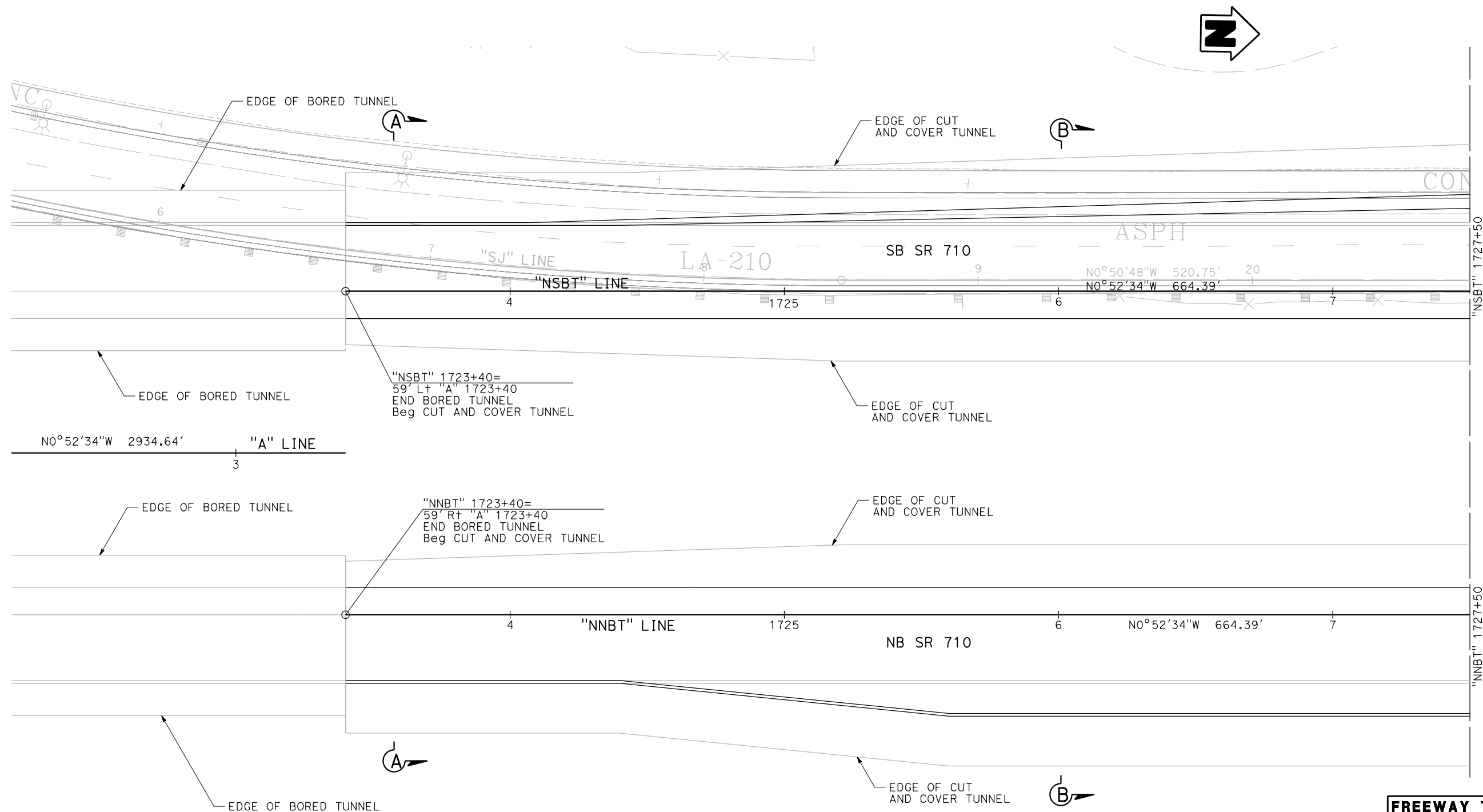
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DRAWN BY	R. Munoz	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
 PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
BRIDGE NO. TBD	UNIT:
SCALE: 1"=20'	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT  
 SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

**FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**STRUCTURE PLAN NO. 5  
(TOP LEVEL)**

**NOTE:**

- For Sections A-A and B-B, see "TYPICAL SECTION No. 1" sheet.

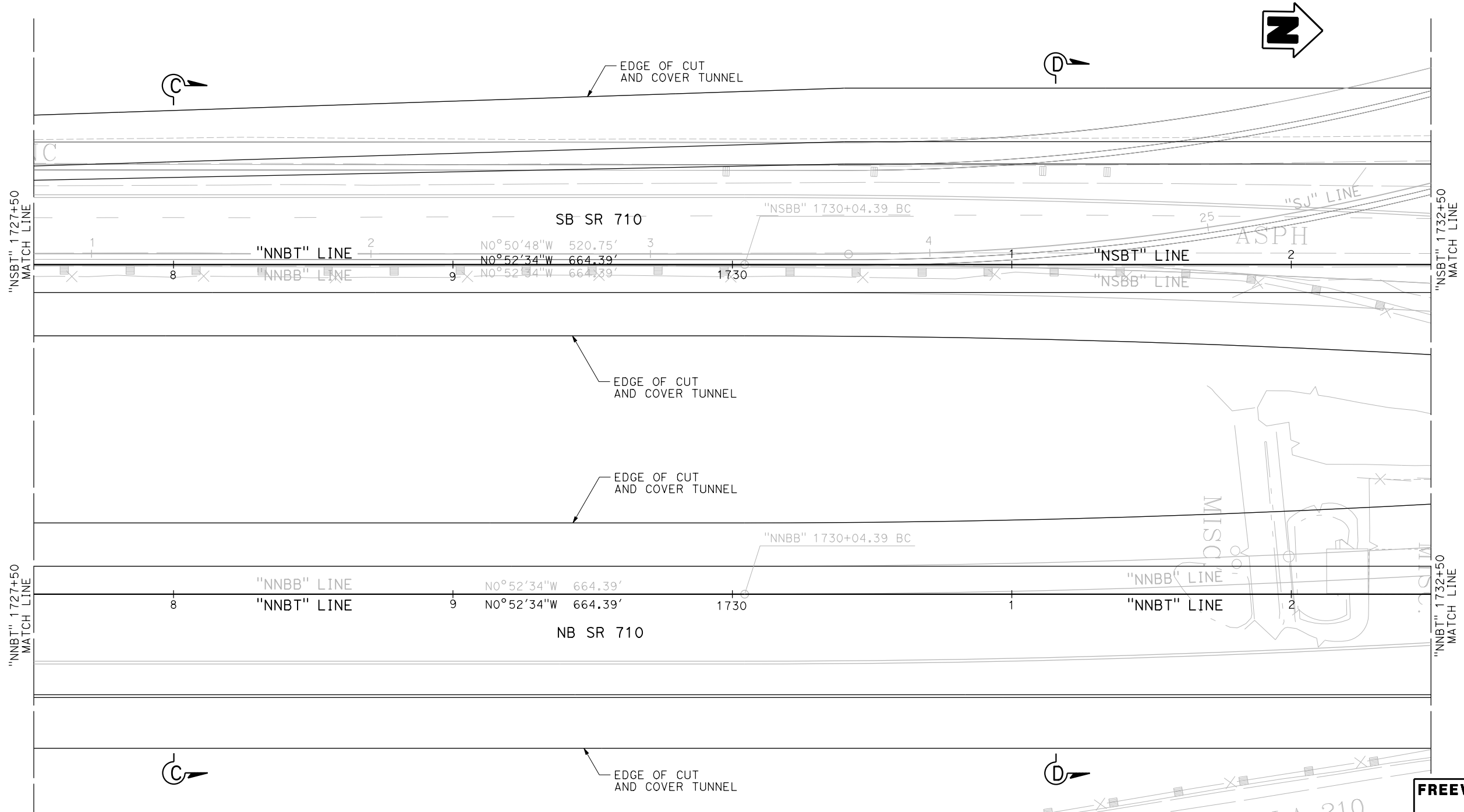
DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

PLANNING STUDY	
CUT AND COVER TUNNEL (NORTH PORTAL)	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT	
SIGN OFF DATE	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

**FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**  
**STRUCTURE PLAN NO. 6  
(TOP LEVEL)**

NOTE:  
1. For Sections C-C and D-D, see "TYPICAL SECTION No. 2" sheet.

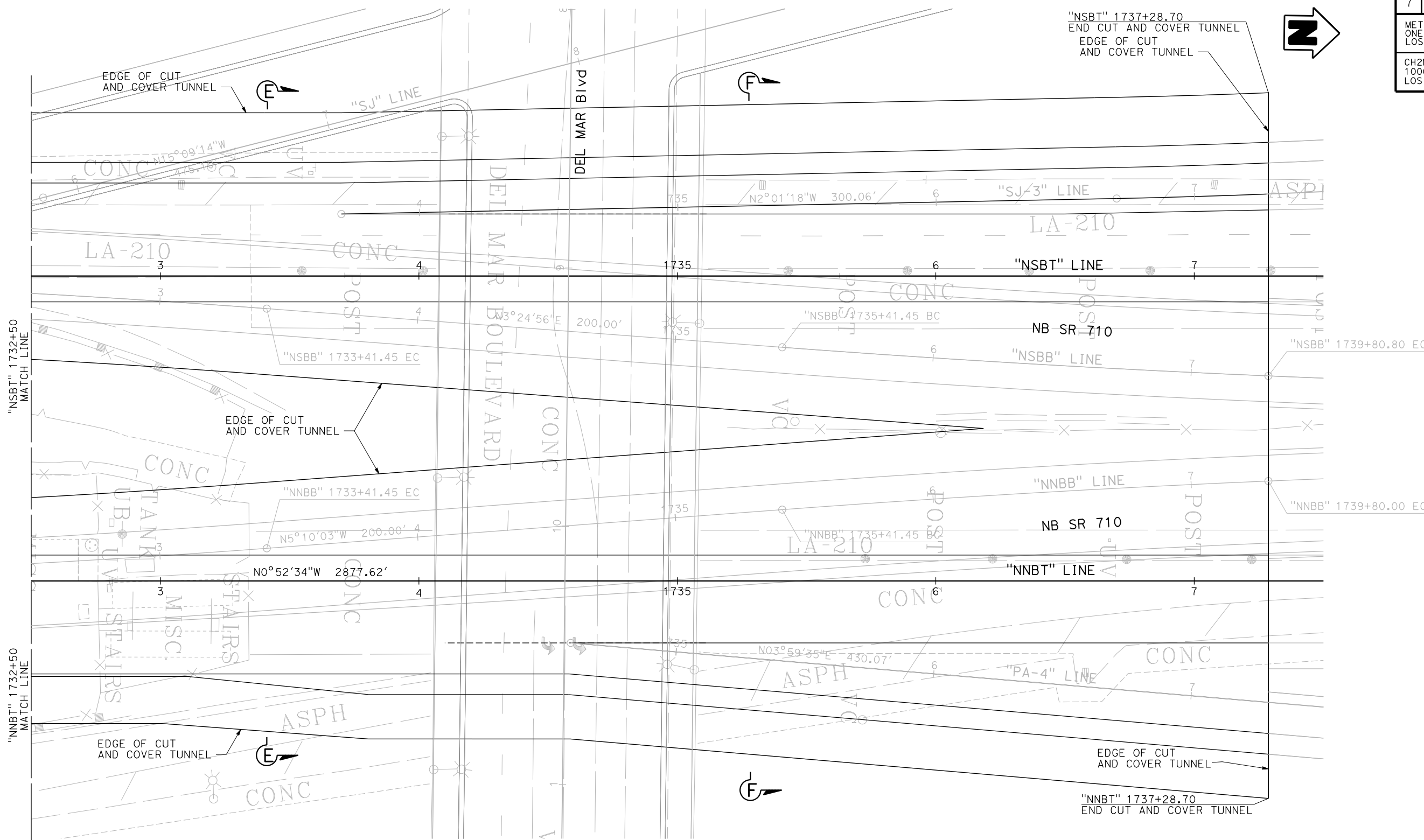
DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

- NOTES:
- For Sections E-E, see "TYPICAL SECTION No. 3" sheet.
  - For Sections F-F, see "TYPICAL SECTION No. 4" sheet.

**FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**STRUCTURE PLAN NO. 7  
(TOP LEVEL)**

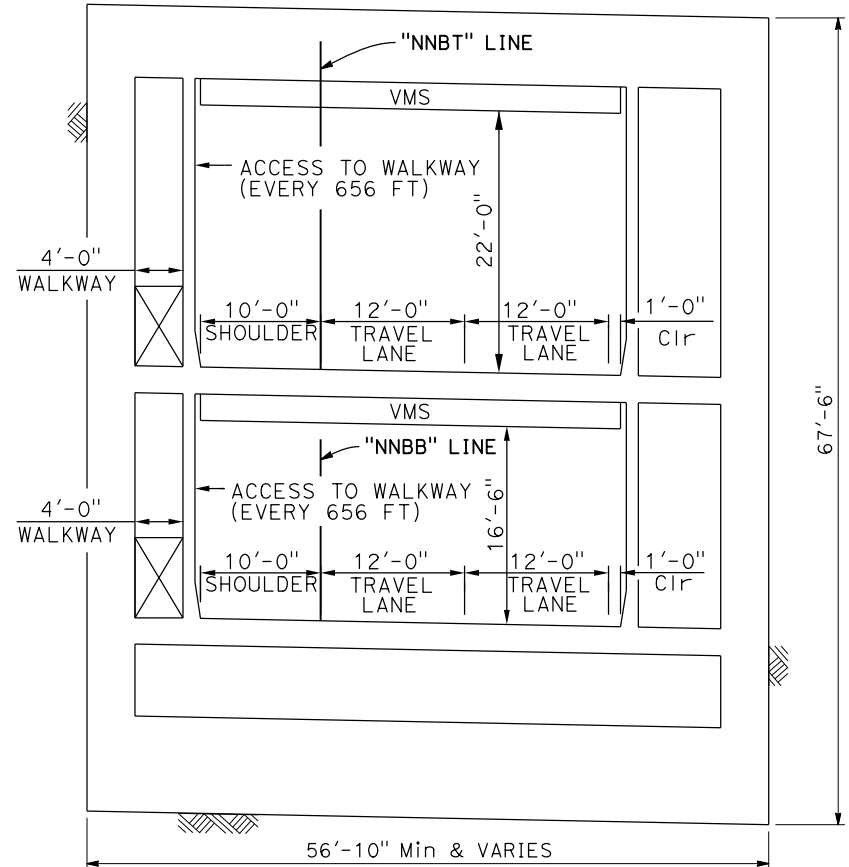
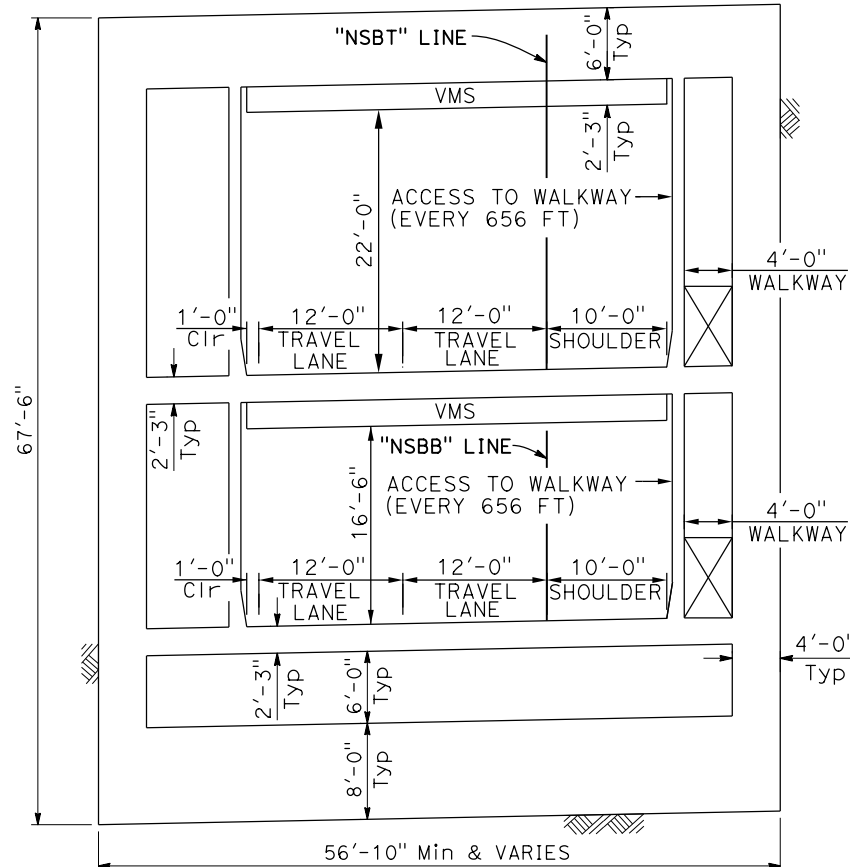
DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

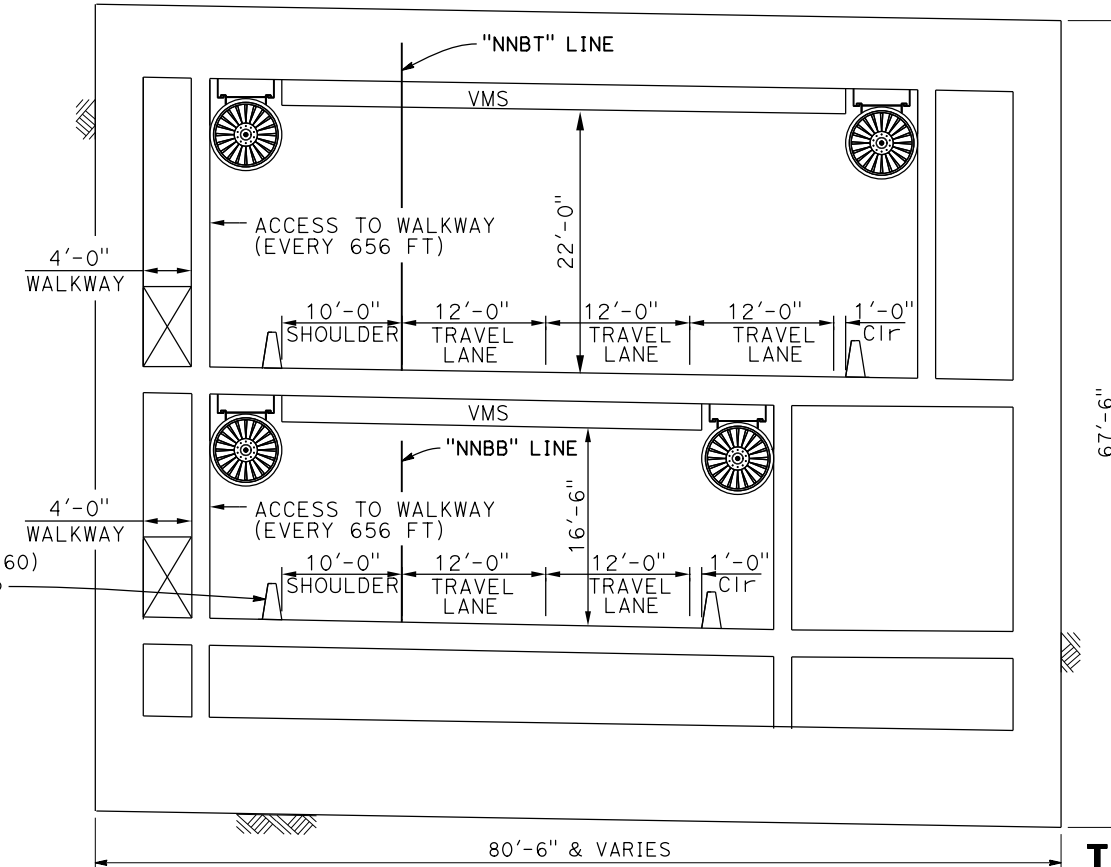
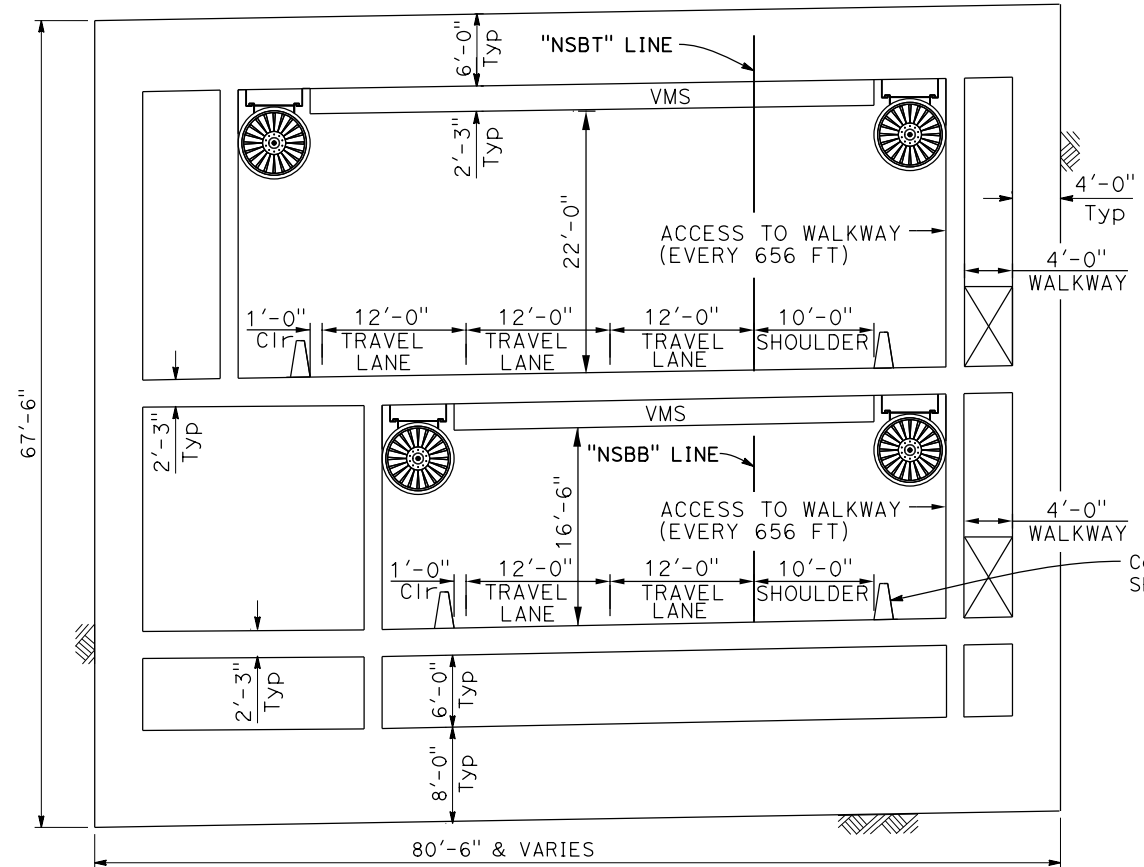
PLANNING STUDY	
CUT AND COVER TUNNEL (NORTH PORTAL)	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION A-A**  
1/8"=1'-0"



**SECTION B-B**  
1/8"=1'-0"

**NOTE:**  
1. For location of Sections A-A and B-B, see "STRUCTURE PLAN No. 1 (BOTTOM LEVEL)" & "STRUCTURE PLAN No. 5 (TOP LEVEL)" sheets.

Conc BARRIER (TYPE 60)  
SEE ROAD PLANS, Typ

**FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**TYPICAL SECTION NO. 1**

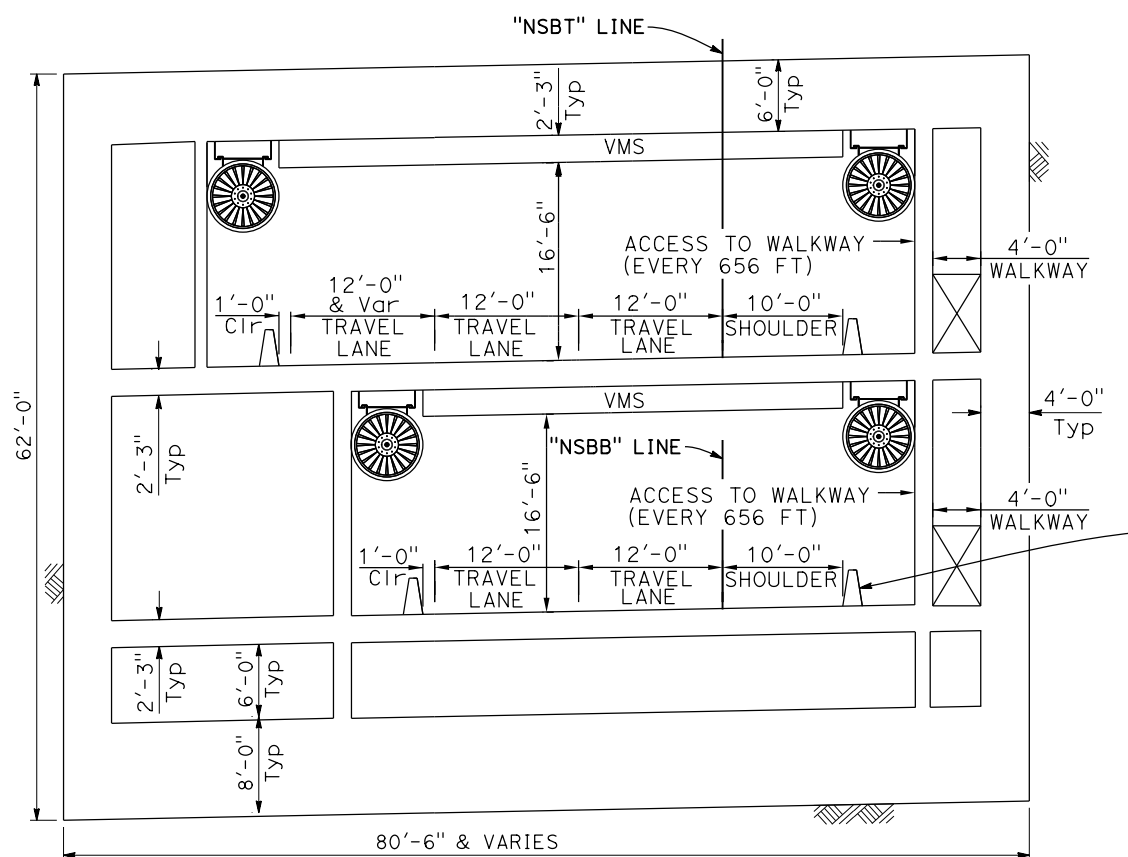
DESIGN OVERSIGHT  
SIGN OFF DATE

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	R. Munoz	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

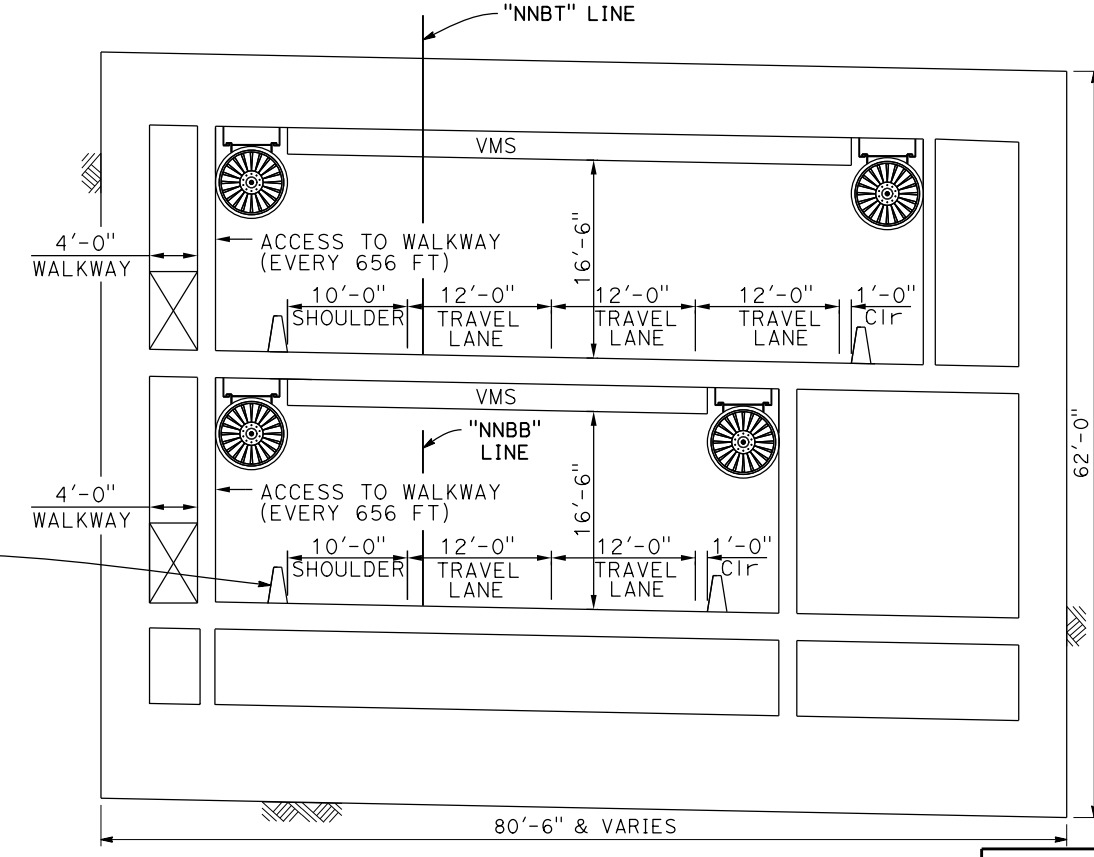
M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1/8"=1'-0"
PROJECT NUMBER & PHASE:	

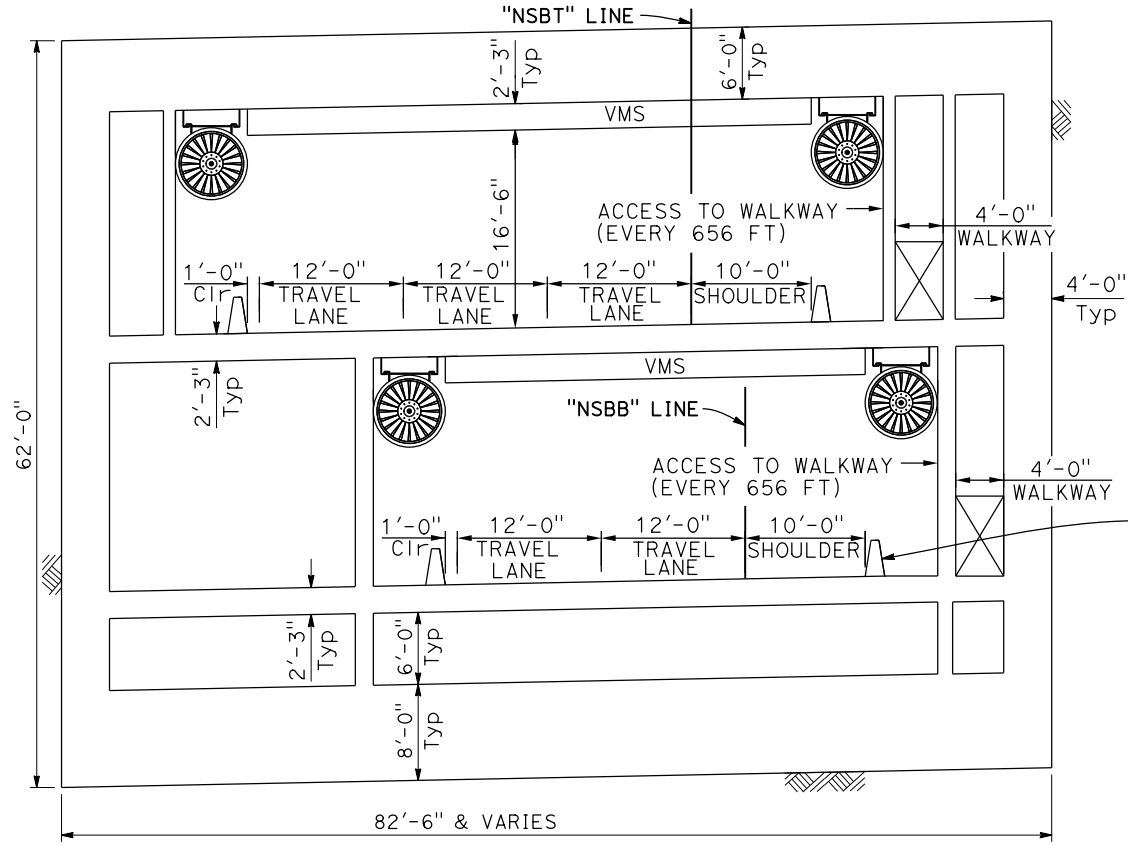
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION C-C**  
1/8"=1'-0"



**SECTION D-D**  
1/8"=1'-0"



**TYPICAL SECTION NO. 2**

DESIGN OVERSIGHT	
SIGN OFF DATE	

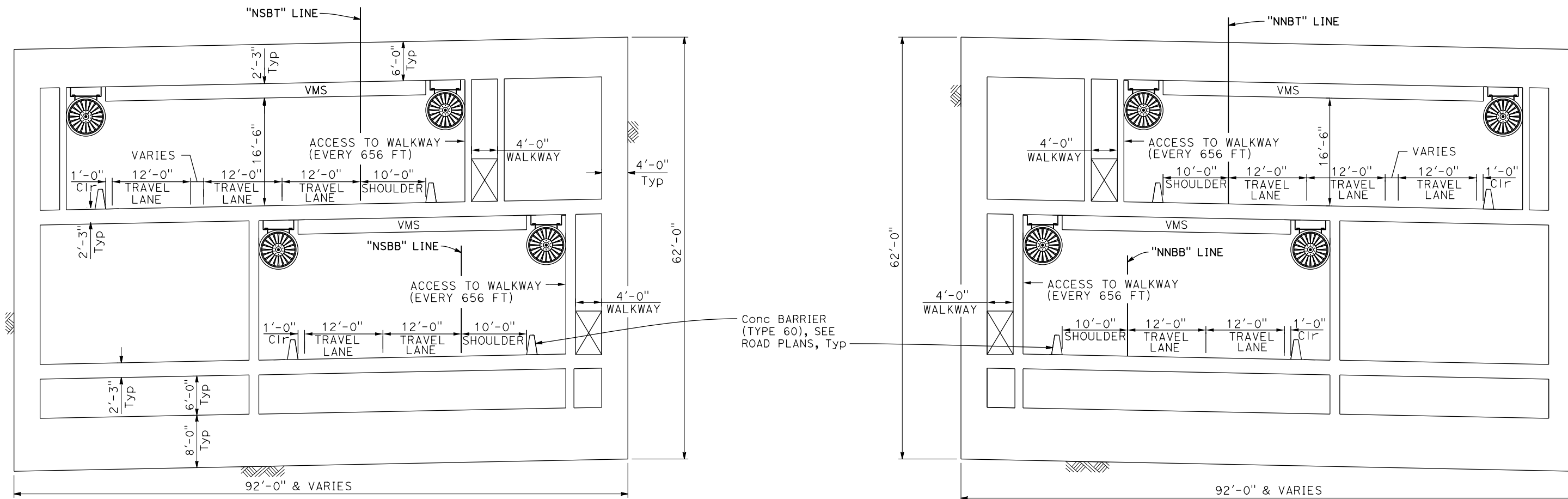
NOTE:  
1. For location of Sections C-C and D-D, see "STRUCTURE PLAN No. 2 (BOTTOM LEVEL)" & "STRUCTURE PLAN No. 6 (TOP LEVEL)" sheets.

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	R. Munoz	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
BRIDGE NO. TBD	UNIT:
SCALE: 1/8"=1'-0"	PROJECT NUMBER & PHASE:

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION E-E**  
1/8"=1'-0"

**FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**TYPICAL SECTION NO. 3**

**PLANNING STUDY**

**CUT AND COVER TUNNEL (NORTH PORTAL)**

BRIDGE NO. TBD UNIT:  
SCALE: 1/8"=1'-0" PROJECT NUMBER & PHASE:

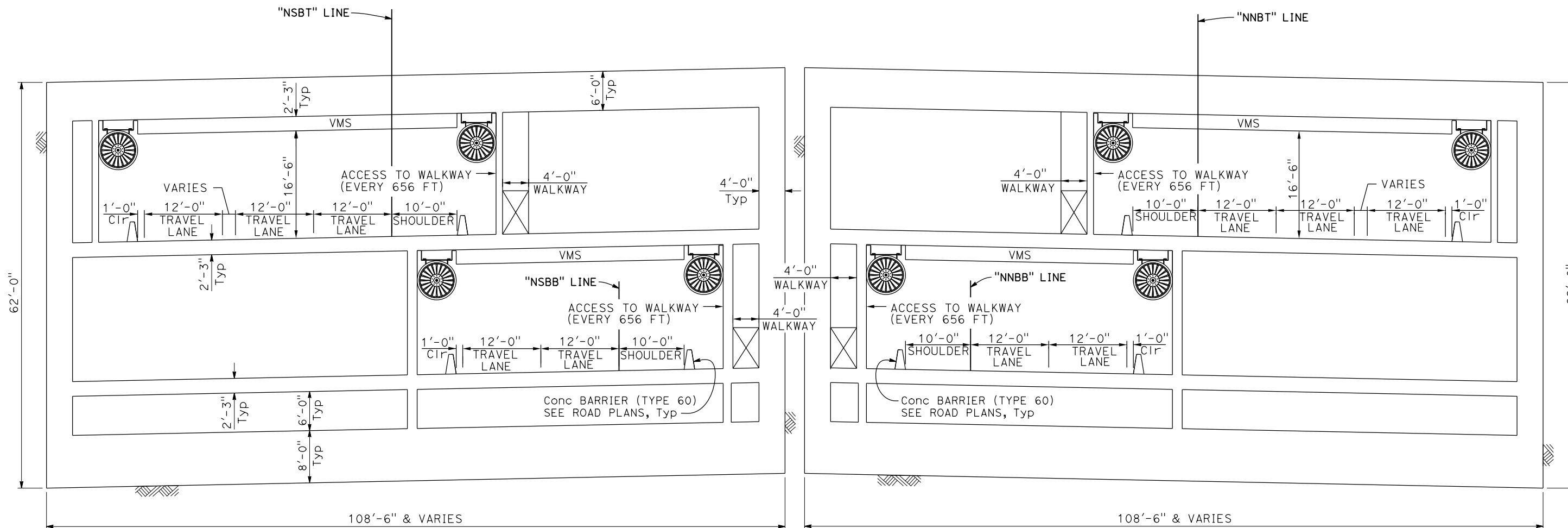
- NOTE:  
1. For location of Section E-E, see "STRUCTURE PLAN No. 3 (BOTTOM LEVEL)" & "STRUCTURE PLAN No. 7 (TOP LEVEL)" sheets.

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	R. Munoz	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

DESIGN OVERSIGHT  
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION F-F**

1/8"=1'-0"

**FREeway TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**TYPICAL SECTION NO. 4**

**PLANNING STUDY**

**CUT AND COVER TUNNEL (NORTH PORTAL)**

BRIDGE NO. TBD	UNIT:
SCALE: 1/8"=1'-0"	PROJECT NUMBER & PHASE:

**NOTE:**

- For location of Section F-F, see "STRUCTURE PLAN No. 3 (BOTTOM LEVEL)" & "STRUCTURE PLAN No. 7 (TOP LEVEL)" sheets.

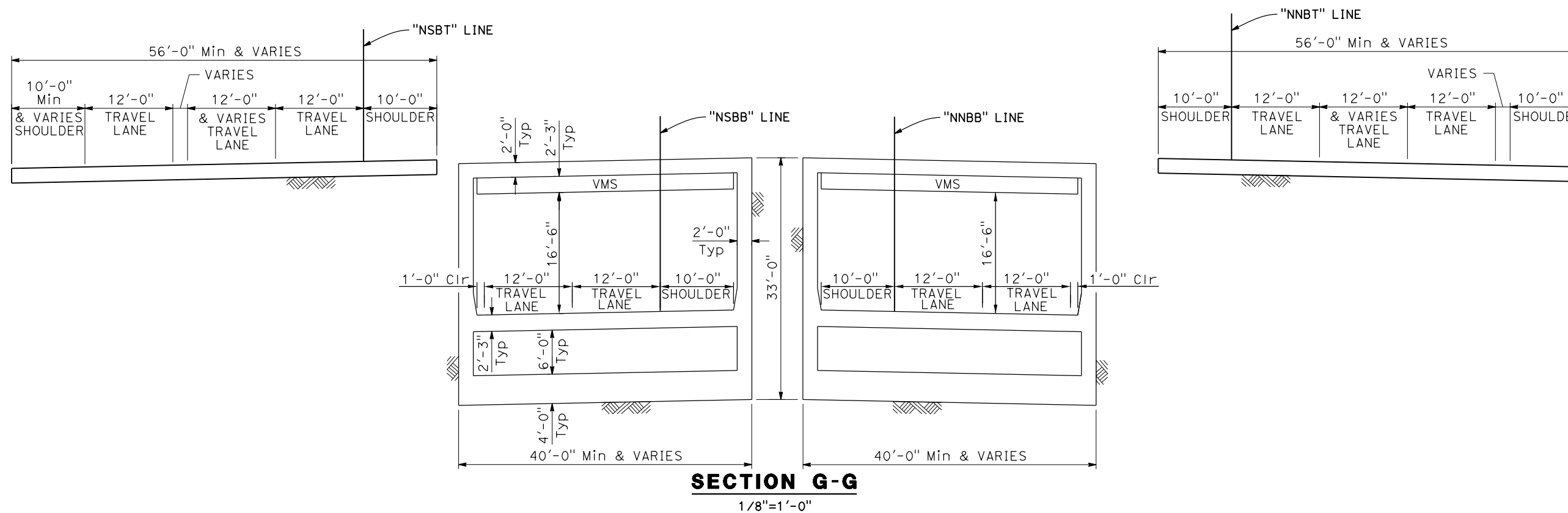
DESIGNED BY A. Issa	DATE 6-6-2014
DRAWN BY R. Munoz	DATE 6-6-2014
CHECKED BY M. Atiqullah	DATE 6-6-2014
APPROVED	DATE

M. Atiqullah  
PROJECT ENGINEER

DESIGN OVERSIGHT
SIGN OFF DATE



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**NOTE:**  
1. For location of Sections G-G, see "STRUCTURE PLAN No. 4 (BOTTOM LEVEL)" sheet.

**FREWAY TUNNEL ALTERNATIVE  
DUAL BORE OPTION**

**TYPICAL SECTION NO. 5**

DESIGNED BY A. Issa	DATE 6-6-2014	M. Atiqullah PROJECT ENGINEER	<b>PLANNING STUDY</b>	
DRAWN BY N. Morales	DATE 6-6-2014		<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
CHECKED BY M. Atiqullah	DATE 6-6-2014		BRIDGE NO. TBD	UNIT:
APPROVED	DATE		SCALE: 1/8"=1'-0"	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT
SIGN OFF DATE





SR 710 North Study

ATTACHMENT K-2h

Task 7.2 Advance Planning Study Report

---

# State Route 710 North Study Advance Planning Study Report Green Street Overcrossing

## Freeway Tunnel Alternative Dual Bore Option

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

October 2014

**CH2MHILL®**

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017





# SR 710 North Study

PREPARED FOR: Metropolitan Transportation Authority  
 COPY TO: Caltrans Study Team  
 PREPARED BY: CH2M HILL Team  
 DATE: October 3, 2014  
 PROJECT NUMBER: 428908

**Green Street Overcrossing**  
**Freeway Tunnel Alternative**  
**Dual Bore Option**

## Table of Contents

	<u>Page No.</u>
Project Vicinity Map	2
Design Memorandum	3
 <b>Attachments</b>	
A Consultant Prepared Advance Planning Study (APS) Checklist	
B Advance Planning Study Cost Estimate	
C Advance Planning Study Plan	



**Project Vicinity Map**  
**State Route 710 North Study**  
**Freeway Tunnel Alternative Alignment**  
**Dual Bore Option**

## Assumptions Used for Green Street Overcrossing – Advance Planning Study

1. The proposed Green Street Overcrossing will be an integral part of the SR 710 North Study Project. The proposed structure crosses over the State Route (SR) 710 Freeway at this location and will replace the existing Green Street Overcrossing. The purpose of the proposed project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks.
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes.
  - Minimize environmental impacts.
2. There are two options for the Freeway Tunnel Alternative for the future SR 710 corridor:
  - Two full bored tunnels accommodating one direction of traffic in each tunnel (this report is based on this option).
  - One full bored tunnel accommodating both directions of traffic with provision for another full bored tunnel in the future (documented in a separate report).
3. A 400-foot long four-span structure with span lengths of 99, 101, 101 and 99 feet is proposed over the SR 710 alignment. This bridge will replace the existing two-span 354-foot long bridge (Bridge No. 53-2263), which will be demolished.
4. There is no known environmentally sensitive area at this location.
5. The width of the structure will be 66 feet, the same as the existing structure. The bridge will be supported on circular, multi-column bents and seat-type abutments. The Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014) recommends cast-in-drilled-hole (CIDH) concrete piles for foundations. Twenty-four inch and 72-inch CIDH concrete piles are proposed for abutments and bents, respectively.
6. Based on the project location, existing structure type, bridge span length, available clearance, and other constraints, a cast-in-place, prestressed, concrete box girder bridge is likely the most cost-effective replacement solution and thus is recommended for the new bridge. The superstructure depth will be 4 feet 3 inches (depth to span ratio of 0.042) with a constant cross slope of 2 percent.
7. The entire length of the bridge will be on a tangent. The vertical profile of the bridge is defined by a constant descending grade of 0.92 percent.
8. The bridge will include a 10-foot sidewalk and two typical 12-foot traffic lanes in the east travel direction and a 10-foot sidewalk, an 8-foot parking facility, and a typical 12-foot traffic lane in the west travel direction.
9. The bridge will have an 18 feet 9 inches minimum vertical clearance over the future SR 710. The required minimum vertical clearance per the Highway Design Manual is 16 feet 6 inches over the freeway.
10. A chain link railing will be provided on both sides of the structure.
11. The bridge design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and Seismic Design Criteria. The Acceleration Response Spectrum curve, as will be recommended in the foundation report, will be used for seismic loading in a future phase of design.

12. According to the SPGR, the project site is not located in an area considered to be susceptible to liquefaction. The proposed structure does not need to account for liquefaction in the preliminary design. Additional geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.
13. Falsework will be required to build the superstructure. Minimum falsework clearance requirement of 15 feet over SR 710 will be available during construction.
14. There are some utilities through the existing bridge according to the as-built plan. These include telephone lines, water lines, and power lines. Provisions will be included in the bridge to accommodate those same utilities, but the opening sizes will be confirmed in the final design phase. Temporary and/or permanent utility relocation may be necessary but will be confirmed in the final design phase.
15. There may be asbestos-containing material (ACM) present in the existing bridge and presence of these materials would pose a potential hazardous waste risk as identified in the Phase I Initial Site Assessment Report (CH2M HILL, 2014). The design and construction of the bridge should comply with the applicable environmental requirements of federal, state, and local agencies to remove those ACM during bridge removal process.
16. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
17. The overall bridge construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$7,523,000.



**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

---



# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710 KP(PM)
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): To be Assigned	Bridge Name(s): Green Street Overcrossing	
Total number of bridges in project: <b>Many, only one</b> bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer.  
(Mark **N/A** if not applicable)


- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- Grades or spot elevations of roadway below the structure.
- Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- N/A Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)

# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

1. Has this project been discussed with:  
the OSFP Liaison Engineer? Yes  No   
the Caltrans District Project Manager? Yes  No   
the roadway consultant? Yes  No
- 
2. Have the Caltrans Structures Maintenance records been reviewed? Yes  No   
If the records recommend any work for the structure, is it included in the APS? Yes  No
- 
3. Are there special aesthetic considerations? Yes  No
- 
4. (Widenings and Modifications)  
Has this project been reviewed for seismic retrofit requirements? Yes  No   
Are seismic retrofit requirements included in the APS? Yes  No
- 
5. Any special Railroad requirements? Yes  No   
Shoofly required? Yes  No   
Cost of shoofly included as a separate item in the project cost estimate? Yes  No
- 
6. Any special foundation requirements, including scour critical work, special excavation  
such as Type A, Type D, and/or hazardous or contaminated material? Yes  No
- 
7. Any special construction requirements, including limited site accessibility or seasonal work?  
Yes  No
- 
8. Other items to be included in the cost such as slope paving, approach slabs, and/or  
adjacent retaining walls? Yes  No
- 
9. Remove existing bridge? Yes  No   
Total Deck Area: 23364 sq ft
- 
10. Any other unusual or special requirements? Yes  No
- 
11. Provide and attach a consultant prepared Design Memo to summarize and document any  
important assumptions, discussions, decisions, unusual items, local agency requirements  
such as aesthetics, improvements in vicinity of the structure, airspace usage,  
other obstructions, or any items noted above. Summary attached? Yes  No

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: March 21, 2014
--	---	----------------------------

**Attachment B**  
**Advance Planning Study Cost Estimate**

---



Revised - December 3, 2007

Freeway Tunnel Alternative  
Dual Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Green Street Overcrossing  
TYPE: CIP/PS Concrete Box Girder Superstructure  
CU: \_\_\_\_\_  
EA: \_\_\_\_\_

BR. No.: TBD

DISTRICT: 07  
RTE: 710  
CO: LA  
PM: \_\_\_\_\_

LENGTH: 400.00 WIDTH: 66.00 AREA (SF)= 26,400

**DESIGN SECTION:** \_\_\_\_\_

# OF STRUCTURES IN PROJECT : \_\_\_\_\_ EST. NO. \_\_\_\_\_

PRICES BY : \_\_\_\_\_ COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : A. Issa DATE: 3/21/2014

QUANTITIES BY: \_\_\_\_\_ DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	STRUCTURE EXCAVATION (BRIDGE)		CY	373	\$100.00	\$37,300
2	STRUCTURE BACKFILL (BRIDGE)		CY	178	\$70.00	\$12,460
3	24" CIDH CONCRETE PILING		LF	1,680	\$160.00	\$268,800
4	72" CIDH CONCRETE PILING		LF	675	\$1,500.00	\$1,012,500
5	PRESTRESSING CAST-IN-PLACE CONCRETE		LS	1	\$400,000.00	\$400,000
6	STRUCTURAL CONCRETE, BRIDGE FOOTING		CY	156	\$400.00	\$62,400
7	STRUCTURAL CONCRETE, BRIDGE		CY	2,126	\$800.00	\$1,700,800
8	STRUCTURAL CONCRETE, APPROACH SLAB	Type N	CY	141	\$720.00	\$101,520
9	JOINT SEAL (MR = 1 1/2")		LF	132	\$90.00	\$11,880
10	BAR REINFORCING STEEL (BRIDGE)		LB	684,000	\$1.00	\$684,000
11	SLOPE PAVING (CONCRETE)		CY	108	\$600.00	\$64,800
12	CHAIN LINK RAILING	Type 7	LF	920	\$100.00	\$92,000
13	CONCRETE BARRIER	Type 26M	LF	920	\$240.00	\$220,800
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

SUBTOTAL	\$4,669,260
TIME RELATED OVERHEAD	\$466,926
MOBILIZATION ( @ 10 % )	\$570,687
SUBTOTAL BRIDGE ITEMS	\$5,706,873
CONTINGENCIES (@ 25%)	\$1,426,718
BRIDGE TOTAL COST	\$7,133,592
COST PER SQ. FOOT	\$270.21
BRIDGE REMOVAL (CONTINGENCIES INCL.)	\$389,400
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$7,522,992
BUDGET ESTIMATE AS OF	\$7,523,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$7,523,000
2	\$7,523,000
3	\$7,523,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$7,523,000
5	\$7,523,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.





**Attachment C**  
**Advance Planning Study Plan**

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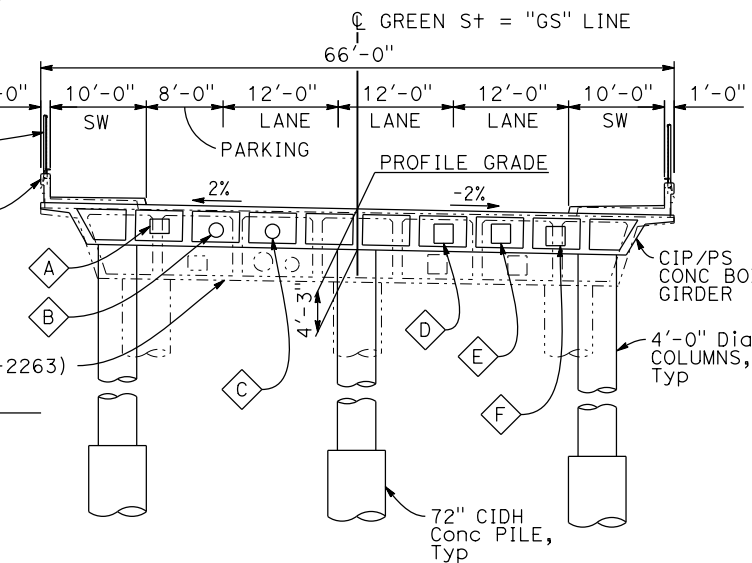
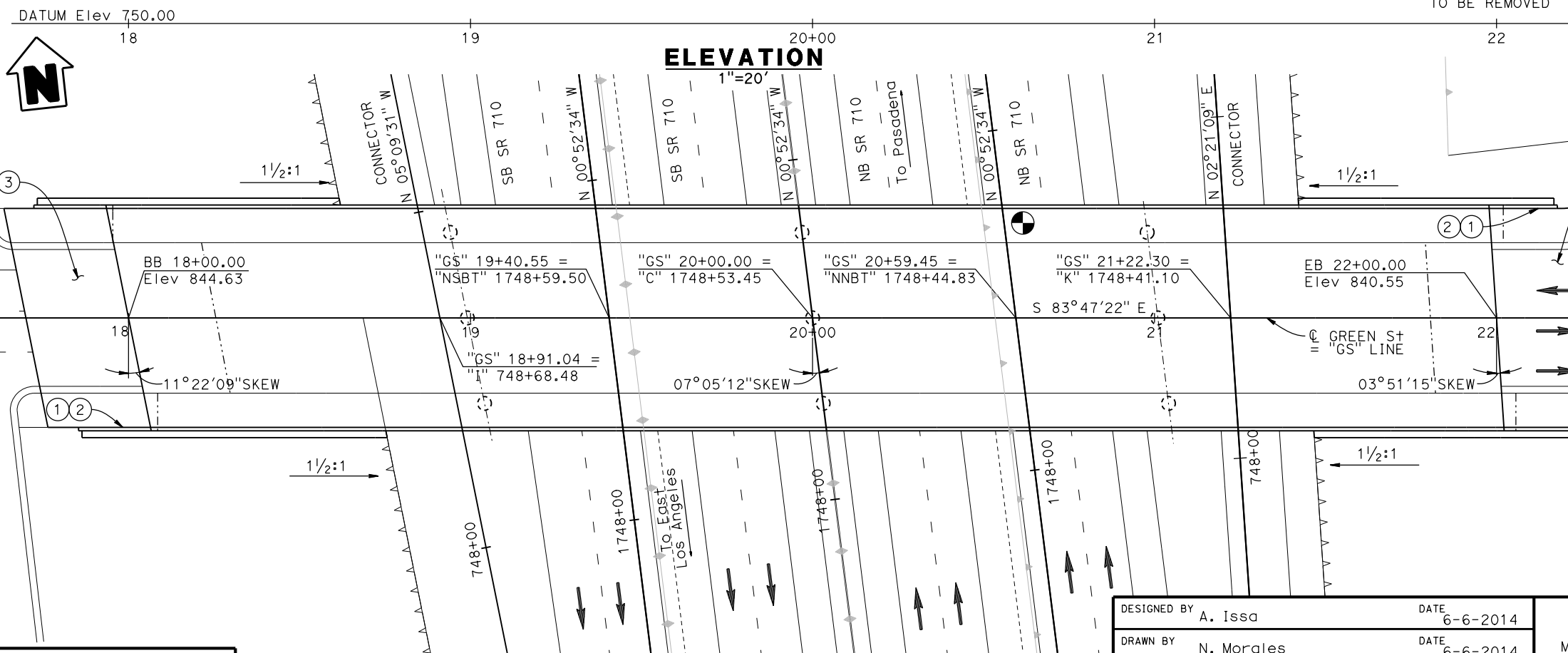
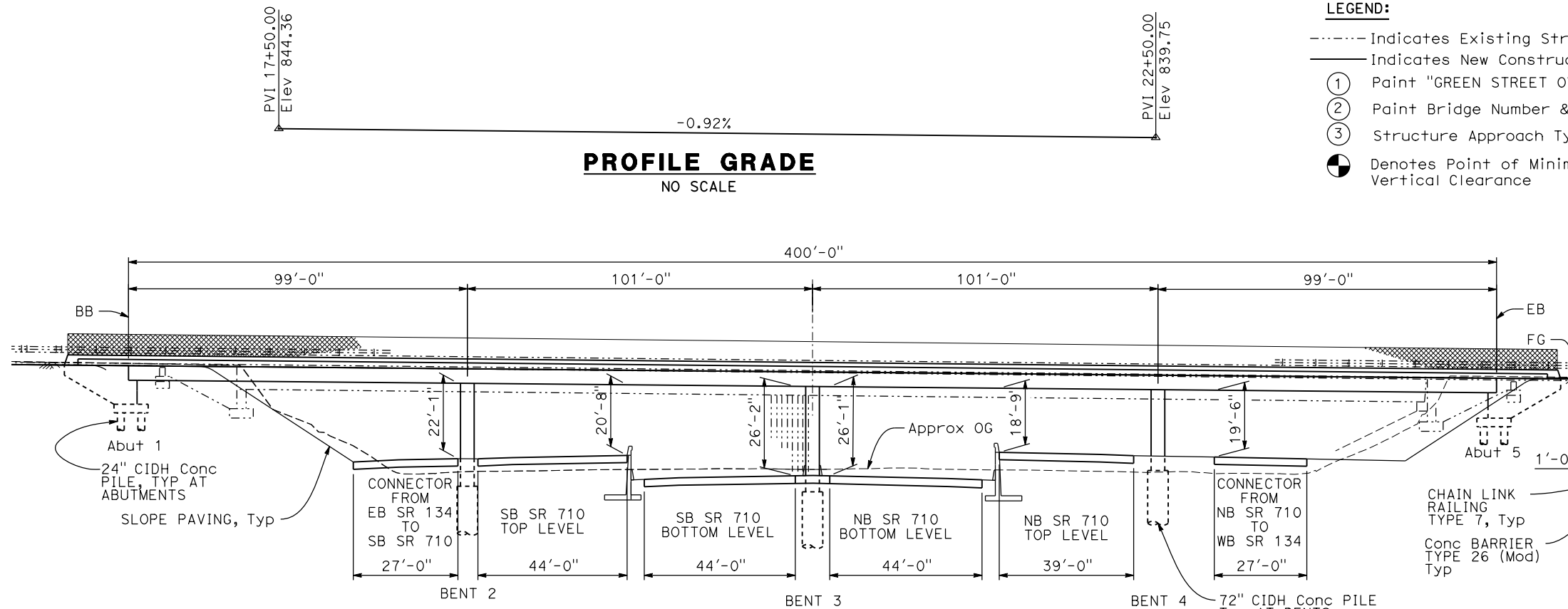
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			

**LEGEND:**

- Indicates Existing Structure
- Indicates New Construction
- ① Paint "GREEN STREET OVERCROSSING"
- ② Paint Bridge Number & Year Constructed
- ③ Structure Approach Type N(30S)
- ⊕ Denotes Point of Minimum Vertical Clearance

**UTILITY OPENINGS**

- ⬡ A 18"x24" OPENING FOR POWER LINE
- ⬡ B 18" OPENING FOR WATER LINE
- ⬡ C 18" OPENING FOR WATER LINE
- ⬡ D 18"x24" OPENING FOR TELEPHONE LINE
- ⬡ E 18"x24" OPENING FOR TELEPHONE LINE
- ⬡ F 18"x24" OPENING FOR TELEPHONE LINE



**TYPICAL SECTION**

DATE OF ESTIMATE	MARCH 2014
BRIDGE REMOVAL	FULL (23364 SF)
STRUCTURE DEPTH	4'-3"
LENGTH	400'-0"
WIDTH	66'-0"
AREA	26,400 SF
COST/FT <sup>2</sup> INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	\$ 270
TOTAL COST	\$ 7,523,000

**FREWAY TUNNEL ALTERNATIVE DUAL BORE OPTION**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>GREEN STREET OVERCROSSING</b>	
BRIDGE NO. TBD	UNIT:
SCALE: AS NOTED	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT  
SIGN OFF DATE

**PLAN**  
1"=20'



**Attachment K-3**  
**Freeway Tunnel Alternative – Single-Bore Tunnel**  
**Advance Planning Study Reports**

---





SR 710 North Study

ATTACHMENT K-3a

Task 7.2 Advance Planning Study Report

---

# State Route 710 North Study Advance Planning Study Report Laguna Basin Bridge

## Freeway Tunnel Alternative Single Bore Option

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

June 2014

**CH2MHILL®**

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017







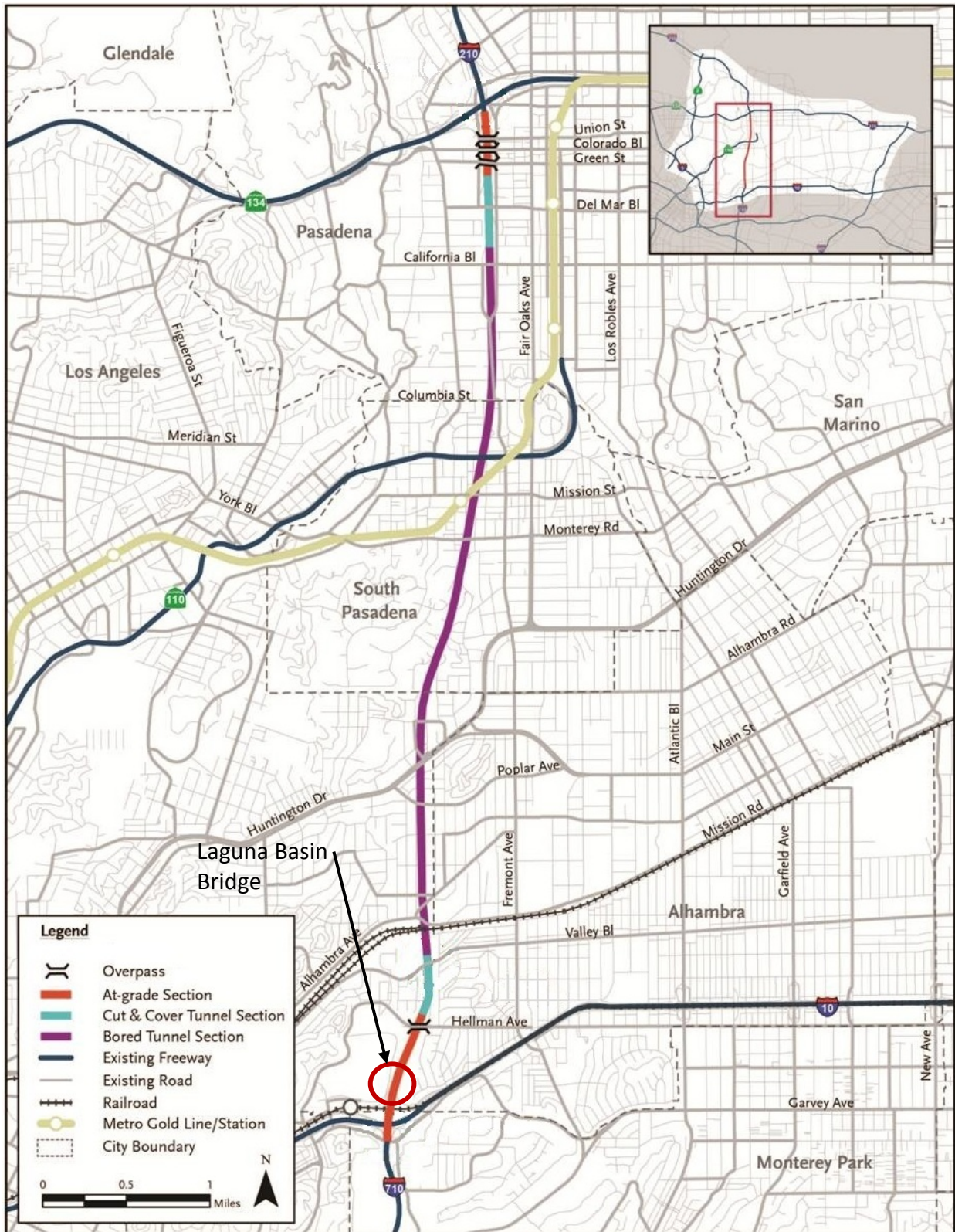
# SR 710 North Study

PREPARED FOR: Metropolitan Transportation Authority  
 COPY TO: Caltrans Study Team  
 PREPARED BY: CH2M HILL Team  
 DATE: June 6, 2014  
 PROJECT NUMBER: 428908

**Laguna Basin Bridge**  
**Freeway Tunnel Alternative**  
**Single Bore Option**

## Table of Contents

	<u>Page No.</u>
<b>Project Vicinity Map</b>	2
<b>Design Memorandum</b>	3
 <b>Attachments</b>	
<b>A Consultant Prepared Advance Planning Study (APS) Checklist</b>	
<b>B Advance Planning Study Cost Estimate</b>	
<b>C Advance Planning Study Plan</b>	



**Project Vicinity Map**  
**State Route 710 North Study**  
**Freeway Tunnel Alternative Alignment**  
**Single Bore Option**

## Assumptions Used for Laguna Basin Bridge – Advance Planning Study

1. The proposed Laguna Basin Bridge will be an integral part of the State Route (SR) 710 North Study Project. Laguna Basin is parallel to the SR 710 Freeway at this location. This bridge will be part of northbound SR 710, and it will prevent the new alignment from encroaching upon the Laguna Flood Control Basin with its roadway embankment. The purpose of the proposed project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks.
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes.
  - Minimize environmental impacts.
2. There are two options for Freeway Tunnel Alternative for the future SR 710 corridor:
  - One full-bored tunnel accommodating both directions of traffic with provision for another full-bored tunnel in future (this report is based on this option).
  - Two full-bored tunnels accommodating one direction of traffic in each tunnel (documented in separate report).

The Laguna Basin Bridge will have minimum differences between the two options.

3. A 900-foot long, nine-span structure with span lengths of 100 feet is proposed alongside the Laguna Basin. The bridge will have two frames of 485-foot and 415-foot each.
4. There is no known environmentally sensitive area at this location.
5. The width of the structure will be 28 feet 10 inches. The bridge will be supported on oblong single-column bents and seat-type abutments. The Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014) recommends cast-in-drilled-hole (CIDH) concrete piles for foundations. Twenty-four-inch and 96-inch CIDH concrete piles are proposed for abutments and bents, respectively.
6. Based on the project location, bridge span length, available clearance, and other constraints, a cast-in-place, prestressed, concrete box girder bridge is likely the most cost-effective solution and thus is recommended for the new bridge. The superstructure depth will be 4 feet (depth to span ratio of 0.040) with a constant cross slope of 2%.
7. The entire length of the bridge will be on a tangent. The preliminary vertical profile of the bridge is defined by a 300-ft vertical curve with an entrance grade of +1.07 percent and an exit grade of -1.20 percent.
8. The bridge will include a 4-foot left shoulder, one typical 12-foot traffic lane, and a 10-foot right shoulder at the beginning. The left shoulder will merge into a northbound lane on embankment within the bridge length.
9. The bridge design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and Seismic Design Criteria. The Acceleration Response Spectrum curve, as will be recommended in the foundation report, will be used for seismic loading in a future phase of design.
10. According to the SPGR, the project site is not located in an area considered to be susceptible to liquefaction. The proposed structure does not need to account for liquefaction in the preliminary design. Additional

geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.

11. Falsework will be required to build the superstructure. Falsework clearance is not an issue, as there is no road below the bridge.
12. The design and construction of bridge abutments, bents, and falsework supports near the Laguna Flood Control Basin limits should comply with the applicable environmental requirements of federal, state, and local agencies, which may include seasonal restrictions on construction work and limited access to the construction site.
13. No new utilities are proposed through the bridge.
14. No known hazardous material exists at the bridge site.
15. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
16. The overall bridge construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$9,043,000.

**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

---



# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): To be Assigned	Bridge Name(s): Laguna Basin Bridge	
Total number of bridges in project: <b>Many, only one</b> bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer. (Mark **N/A** if not applicable)


- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- Grades or spot elevations of roadway below the structure.
- Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- N/A Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- N/A "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)

# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

1. Has this project been discussed with:  
the OSFP Liaison Engineer? Yes  No   
the Caltrans District Project Manager? Yes  No   
the roadway consultant? Yes  No
- 
2. Have the Caltrans Structures Maintenance records been reviewed? Yes  No   
If the records recommend any work for the structure, is it included in the APS? Yes  No
- 
3. Are there special aesthetic considerations? Yes  No
- 
4. (Widenings and Modifications)  
Has this project been reviewed for seismic retrofit requirements? Yes  No   
Are seismic retrofit requirements included in the APS? Yes  No
- 
5. Any special Railroad requirements? Yes  No   
Shoofly required? Yes  No   
Cost of shoofly included as a separate item in the project cost estimate? Yes  No
- 
6. Any special foundation requirements, including scour critical work, special excavation  
such as Type A, Type D, and/or hazardous or contaminated material? Yes  No
- 
7. Any special construction requirements, including limited site accessibility or seasonal work?  
Yes  No
- 
8. Other items to be included in the cost such as slope paving, approach slabs, and/or  
adjacent retaining walls? Yes  No
- 
9. Remove existing bridge? Yes  No   
Total Deck Area:
- 
10. Any other unusual or special requirements? Yes  No
- 
11. Provide and attach a consultant prepared Design Memo to summarize and document any  
important assumptions, discussions, decisions, unusual items, local agency requirements  
such as aesthetics, improvements in vicinity of the structure, airspace usage,  
other obstructions, or any items noted above. Summary attached? Yes  No

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: March 21, 2014
--	---	----------------------------



**Attachment B**  
**Advance Planning Study Cost Estimate**

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Revised - December 3, 2007

Freeway Tunnel Alternative  
Single Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Laguna Basin Bridge BR. No.: TBD

TYPE: CIP/PS Box Girder Bridge

CU: \_\_\_\_\_

EA: \_\_\_\_\_

DISTRICT: 07

RTE: 710

CO: LA

PM: \_\_\_\_\_

LENGTH: 900.00 WIDTH: 28.83 AREA (SF)= 25,950

**DESIGN SECTION:**

# OF STRUCTURES IN PROJECT : \_\_\_\_\_ EST. NO. \_\_\_\_\_

PRICES BY : \_\_\_\_\_ COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : A. Issa DATE: 3/21/2014

QUANTITIES BY : \_\_\_\_\_ DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	STRUCTURE EXCAVATION (BRIDGE)		CY	6,888	\$100.00	\$688,800
2	STRUCTURE BACKFILL (BRIDGE)		CY	144	\$70.00	\$10,080
3	24" CIDH CONCRETE PILING		LF	700	\$160.00	\$112,000
4	96" CIDH CONCRETE PILING		LF	800	\$2,250.00	\$1,800,000
5	PRESTRESSING CAST-IN-PLACE CONCRETE		LS	1	\$400,000.00	\$400,000
6	STRUCTURAL CONCRETE, BRIDGE FOOTING		CY	67	\$400.00	\$26,800
7	STRUCTURAL CONCRETE, BRIDGE		CY	2,026	\$800.00	\$1,620,800
8	STRUCTURAL CONCRETE, APPROACH SLAB	Type N	CY	62	\$720.00	\$44,640
9	BAR REINFORCING STEEL (BRIDGE)		LB	779,000	\$1.00	\$779,000
10	JOINT SEAL (MR 2")		LF	705	\$150.00	\$105,750
11	JOINT SEAL ASSEMBLY (MR 3")		LF	58	\$200.00	\$11,533
12	JOINT SEAL ASSEMBLY (MR 6")		LF	29	\$550.00	\$15,858
13	CONCRETE BARRIER	Type 742	LF	1,265	\$240.00	\$303,600
14						
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21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

SUBTOTAL	\$5,918,862
TIME RELATED OVERHEAD	\$591,886
MOBILIZATION ( @ 10 % )	\$723,416
SUBTOTAL BRIDGE ITEMS	\$7,234,164
CONTINGENCIES (@ 25%)	\$1,808,541
BRIDGE TOTAL COST	\$9,042,705
COST PER SQ. FOOT	\$348.47
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$9,042,705
BUDGET ESTIMATE AS OF	\$9,043,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$9,043,000
2	\$9,043,000
3	\$9,043,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$9,043,000
5	\$9,043,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.



**Attachment C**  
**Advance Planning Study Plan**

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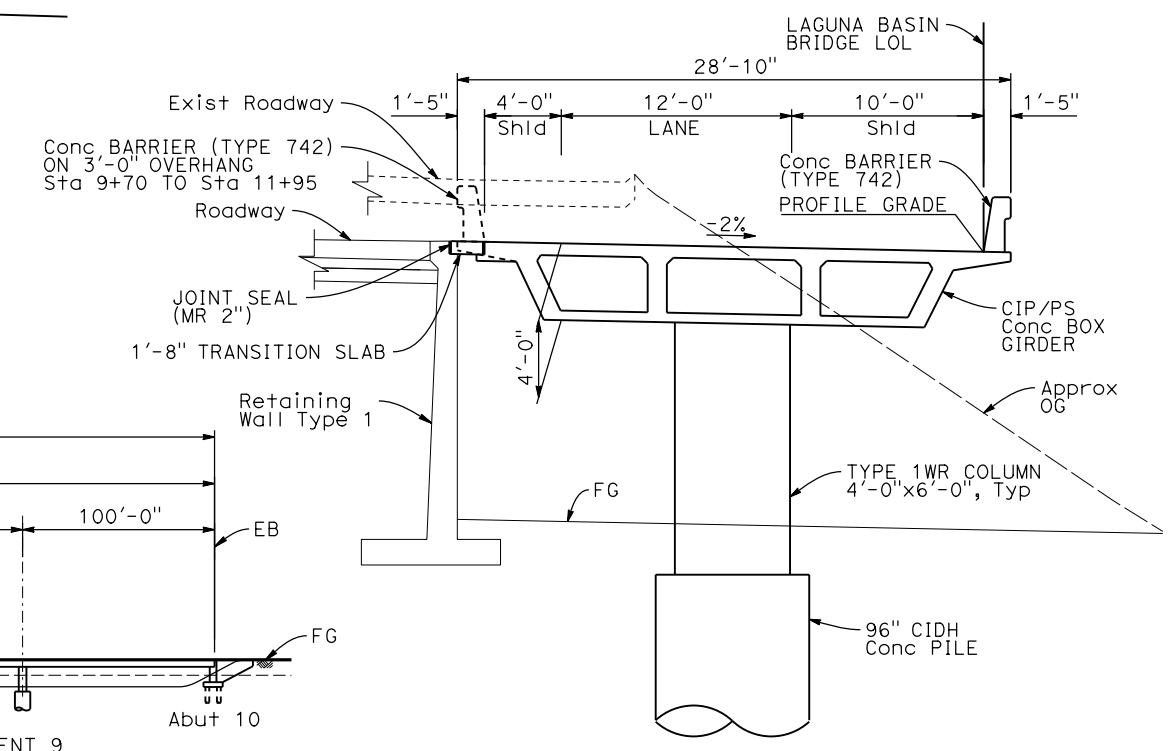
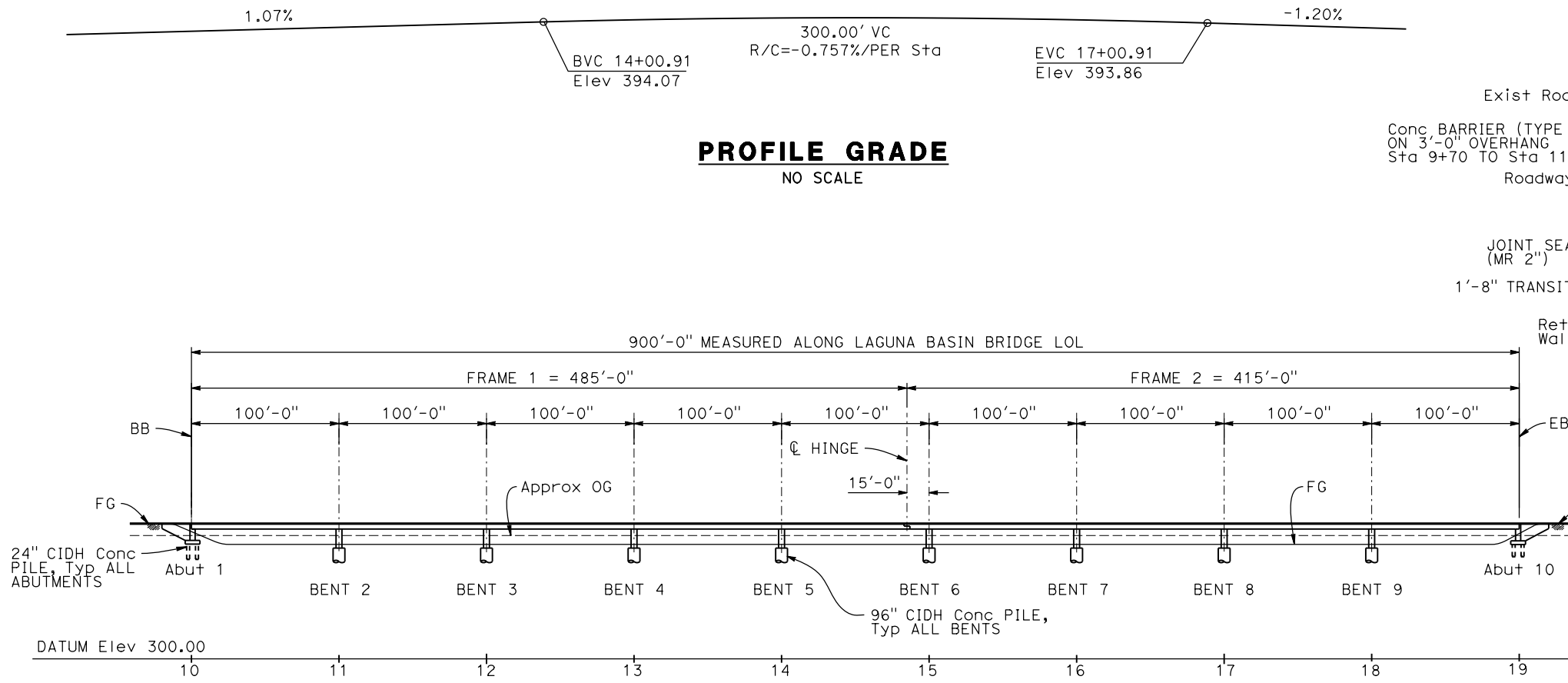
**LEGEND:**

- ① Paint "LAGUNA BASIN BRIDGE"
- ② Paint Bridge Number & Year Constructed
- ③ Structure Approach Type N(30S)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	

METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012

CH2M HILL  
1000 WILSHIRE BLVD, SUITE 2100  
LOS ANGELES, CA 90017



**DATE OF ESTIMATE**      MARCH 2014

**BRIDGE REMOVAL**      NONE

**STRUCTURE DEPTH**      4'-0"

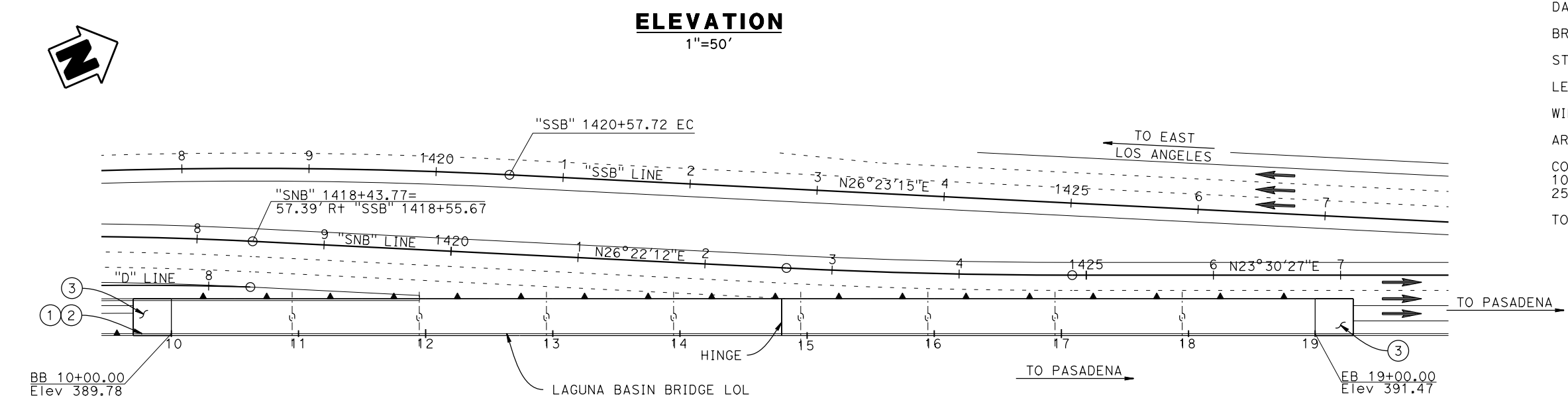
**LENGTH**      900'-0"

**WIDTH**      28'-10"

**AREA**      25,950 FT<sup>2</sup>

**COST/FT<sup>2</sup> INCLUDING 10% MOBILIZATION & 25% CONTINGENCY**      \$ 349

**TOTAL COST**      \$ 9,043,000



**PLAN**  
1"=50'

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah PROJECT ENGINEER	
----------------------------------	--

<b>PLANNING STUDY</b>	
<b>LAGUNA BASIN BRIDGE</b>	
BRIDGE NO. TBD	UNIT:
SCALE: AS NOTED	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT

SIGN OFF DATE







SR 710 North Study

ATTACHMENT K-3b

Task 7.2 Advance Planning Study Report

---

# State Route 710 North Study Advance Planning Study Report Hellman Avenue Overcrossing

## Freeway Tunnel Alternative Single Bore Option

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

October 2014

**CH2MHILL®**

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017





## SR 710 North Study

PREPARED FOR: Metropolitan Transportation Authority  
COPY TO: Caltrans Study Team  
PREPARED BY: CH2M HILL Team  
DATE: October 3, 2014  
PROJECT NUMBER: 428908

### Hellman Avenue Overcrossing Freeway Tunnel Alternative Single Bore Option

#### Table of Contents

	<u>Page No.</u>
Project Vicinity Map	2
Design Memorandum	3
<b>Attachments</b>	
A	Consultant Prepared Advance Planning Study (APS) Checklist
B	Advance Planning Study Cost Estimate
C	Advance Planning Study Plan



**Project Vicinity Map  
State Route 710 North Study  
Freeway Tunnel Alternative Alignment  
Single Bore Option**

## Assumptions Used for Hellman Avenue Overcrossing – Advance Planning Study

1. The proposed Hellman Avenue Overcrossing will be an integral part of the State Route (SR) 710 North Study Project. The proposed structure will cross over the SR 710 Freeway at this location and will replace the existing Hellman Avenue Overcrossing. The purpose of the proposed project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks.
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes.
  - Minimize environmental impacts.
2. There are two options for Freeway Tunnel Alternative for the future SR 710 corridor:
  - One full-bored tunnel accommodating both directions of traffic with provision for another full-bored tunnel in future (this report is based on this option).
  - Two full-bored tunnels accommodating one direction of traffic in each tunnel (documented in separate report).

The Hellman Avenue Overcrossing crosses over the SR 710 roadway alignment for the proposed Single Bore Option. The additional roadway alignment required on the west side for the dual bore tunnel option in the future can't be accommodated under this bridge. This bridge would need replacement to accommodate that option.

3. A 250-foot long, three-span structure with span lengths of 75 ft, 100 ft, and 75 ft is proposed over the SR 710 alignment. This bridge will replace the 247-foot long, four-span existing bridge (Bridge No. 53-1708), which will be demolished.
4. There is no known environmentally sensitive area at this location.
5. The width of the structure will be 64 feet, the same as the existing structure. Due to the tall abutment wall requirement, modified slurry walls with tiebacks from tunnel portal excavation are recommended for the abutment. This foundation option will be further evaluated in a future phase of design. The bent will be supported on multiple circular columns. The bents will be supported on multiple circular columns. The Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014) recommends cast-in-drilled-hole (CIDH) concrete piles for bent foundations. Seventy-two-inch CIDH concrete piles are proposed for the bent foundations.
6. Based on the project location, the existing structure type, bridge span length, available clearance, and other constraints, a cast-in-place, prestressed, concrete box girder bridge is likely the most cost-effective replacement solution and is thus recommended for the new bridge. The superstructure depth will be 4 feet (depth to span ratio of 0.04) with a constant cross slope of 2 percent.
7. The entire length of the bridge will be on a tangent. The profile of the bridge is defined by a 900-ft sag vertical curve with an entrance grade of -3.11 percent and an exit grade of +4.30 percent.
8. The bridge will include a 7-foot sidewalk, a 10-foot shoulder, and a 14-foot traffic lane in each direction of travel.

9. The bridge will have an 18 feet 1 inch minimum vertical clearance over the future SR 710. The required minimum vertical clearance per Highway Design Manual is 16 feet 6 inches over the freeway.
10. A chain link railing will be provided on both sides of the bridge.
11. The bridge design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and Seismic Design Criteria. The Acceleration Response Spectrum curve, as will be recommended in the foundation report, will be used for seismic loading in a future phase of design.
12. According to the SPGR, the material at the bridge site is predominantly dense to very dense sandstone. Thus the liquefaction potential at the site is considered very low. In addition, the site is not included in the map area showing historical occurrence of liquefaction. The proposed structure does not need to account for liquefaction in the preliminary design. Additional geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.
13. Falsework will be required to build the superstructure. Minimum falsework clearance requirement of 15 feet over SR 710 will be available during construction.
14. There are some utilities through the existing bridge, according to the as-built plans. These include telephone lines and a water line. Provisions will be included in the bridge to accommodate these same utilities. Temporary and/or permanent utility relocation may be necessary but will be confirmed at the final design phase.
15. There may be asbestos-containing material (ACM) present in the existing bridge and presence of these materials would pose a potential hazardous waste risk as identified in the Phase I Initial Site Assessment Report (CH2M HILL, 2014). The design and construction of the bridge should comply with the applicable environmental requirements of federal, state, and local agencies to remove those ACM during bridge removal process.
16. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
17. The overall bridge construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$4,872,000.

**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

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# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): To be Assigned	Bridge Name(s): Hellman Avenue Overcrossing	
Total number of bridges in project: <b>Many, only one</b> bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer.  
(Mark **N/A** if not applicable)

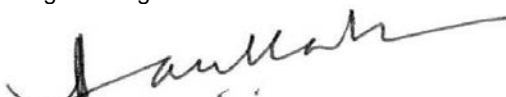
- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- Grades or spot elevations of roadway below the structure.
- Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- N/A Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)

# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

1. Has this project been discussed with:   
the OSFP Liaison Engineer? Yes  No   
the Caltrans District Project Manager? Yes  No   
the roadway consultant? Yes  No
- 
2. Have the Caltrans Structures Maintenance records been reviewed? Yes  No   
If the records recommend any work for the structure, is it included in the APS? Yes  No
- 
3. Are there special aesthetic considerations? Yes  No
- 
4. (Widenings and Modifications)  
Has this project been reviewed for seismic retrofit requirements? Yes  No   
Are seismic retrofit requirements included in the APS? Yes  No
- 
5. Any special Railroad requirements? Yes  No   
Shoofly required? Yes  No   
Cost of shoofly included as a separate item in the project cost estimate? Yes  No
- 
6. Any special foundation requirements, including scour critical work, special excavation  
such as Type A, Type D, and/or hazardous or contaminated material? Yes  No
- 
7. Any special construction requirements, including limited site accessibility or seasonal work?  
Yes  No
- 
8. Other items to be included in the cost such as slope paving, approach slabs, and/or  
adjacent retaining walls? Yes  No
- 
9. Remove existing bridge? Yes  No   
Total Deck Area: 15808 sq ft
- 
10. Any other unusual or special requirements? Yes  No
- 
11. Provide and attach a consultant prepared Design Memo to summarize and document any  
important assumptions, discussions, decisions, unusual items, local agency requirements  
such as aesthetics, improvements in vicinity of the structure, airspace usage,  
other obstructions, or any items noted above. Summary attached? Yes  No

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: March 21, 2014
--	---	----------------------------

**Attachment B**  
**Advance Planning Study Cost Estimate**

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Revised - December 3, 2007

Freeway Tunnel Alternative  
Single Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Hellman Avenue Overcrossing  
TYPE: CIP/PS Box Girder Bridge  
CU: \_\_\_\_\_  
EA: \_\_\_\_\_

BR. No.: TBD

DISTRICT: 07  
RTE: 710  
CO: LA  
PM: \_\_\_\_\_

LENGTH: 250.00 WIDTH: 64.00 AREA (SF)= 16,000

**DESIGN SECTION:** \_\_\_\_\_

# OF STRUCTURES IN PROJECT : \_\_\_\_\_

EST. NO. \_\_\_\_\_

PRICES BY : \_\_\_\_\_

COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : \_\_\_\_\_

A. Issa

DATE: 3/21/2014

QUANTITIES BY: \_\_\_\_\_

DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	STRUCTURE EXCAVATION (BRIDGE)		CY	205	\$100.00	\$20,500
2	STRUCTURE BACKFILL (BRIDGE)		CY	66	\$70.00	\$4,620
3	48" CIDH CONCRETE PILING		LF	1,120	\$500.00	\$560,000
4	72" CIDH CONCRETE PILING		LF	300	\$1,500.00	\$450,000
5	PRESTRESSING CAST-IN-PLACE CONCRETE		LS	1	\$200,000.00	\$200,000
6	STRUCTURAL CONCRETE, BRIDGE		CY	1,365	\$800.00	\$1,092,000
7	STRUCTURAL CONCRETE, APPROACH SLAB	Type N	CY	137	\$720.00	\$98,640
8	BAR REINFORCING STEEL (BRIDGE)		LB	329,000	\$1.00	\$329,000
9	JOINT SEAL (MR = 1 1/2")		LF	128	\$90.00	\$11,520
10	STRUCTURAL SHOTCRETE		CY	49	\$800.00	\$39,200
11	CHAIN LINK RAILING	Type 7	LF	620	\$100.00	\$62,000
12	CONCRETE BARRIER	Type 26M	LF	620	\$240.00	\$148,800
13						
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30						

SUBTOTAL	\$3,016,280
TIME RELATED OVERHEAD	\$301,628
MOBILIZATION ( @ 10 % )	\$368,656
SUBTOTAL BRIDGE ITEMS	\$3,686,564
CONTINGENCIES (@ 25%)	\$921,641
BRIDGE TOTAL COST	\$4,608,206
COST PER SQ. FOOT	\$288.01
BRIDGE REMOVAL (CONTINGENCIES INCL.)	\$263,467
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$4,871,672
BUDGET ESTIMATE AS OF	\$4,872,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: **COST OF SLURRY WALLS WITH TIEBACKS IS NOT INCLUDED IN THIS BRIDGE ESTIMATE**

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$4,872,000
2	\$4,872,000
3	\$4,872,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$4,872,000
5	\$4,872,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.



**Attachment C**  
**Advance Planning Study Plan**

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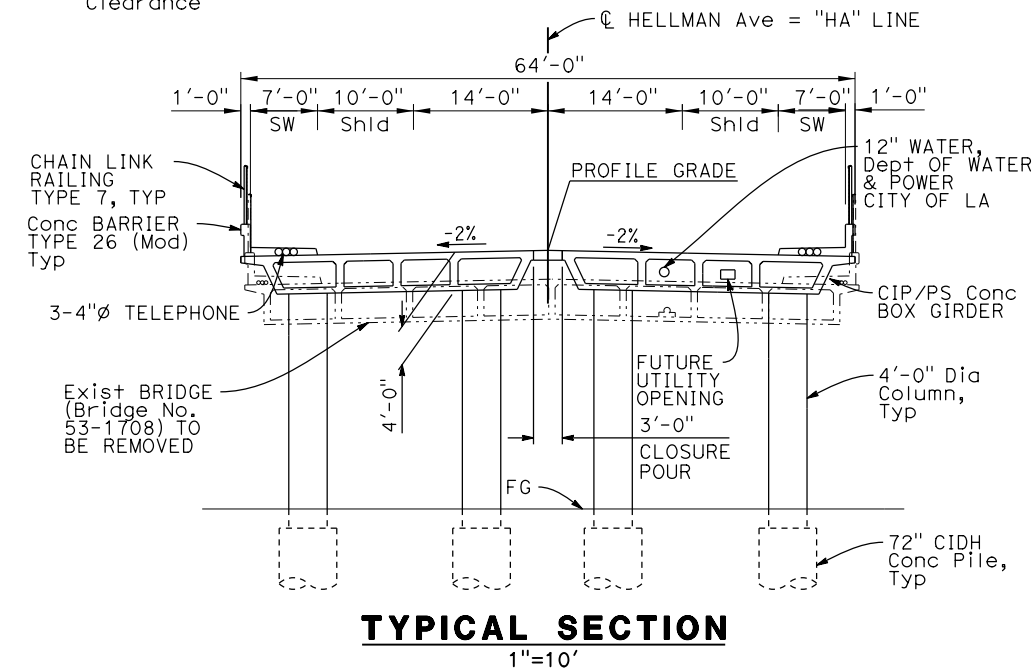
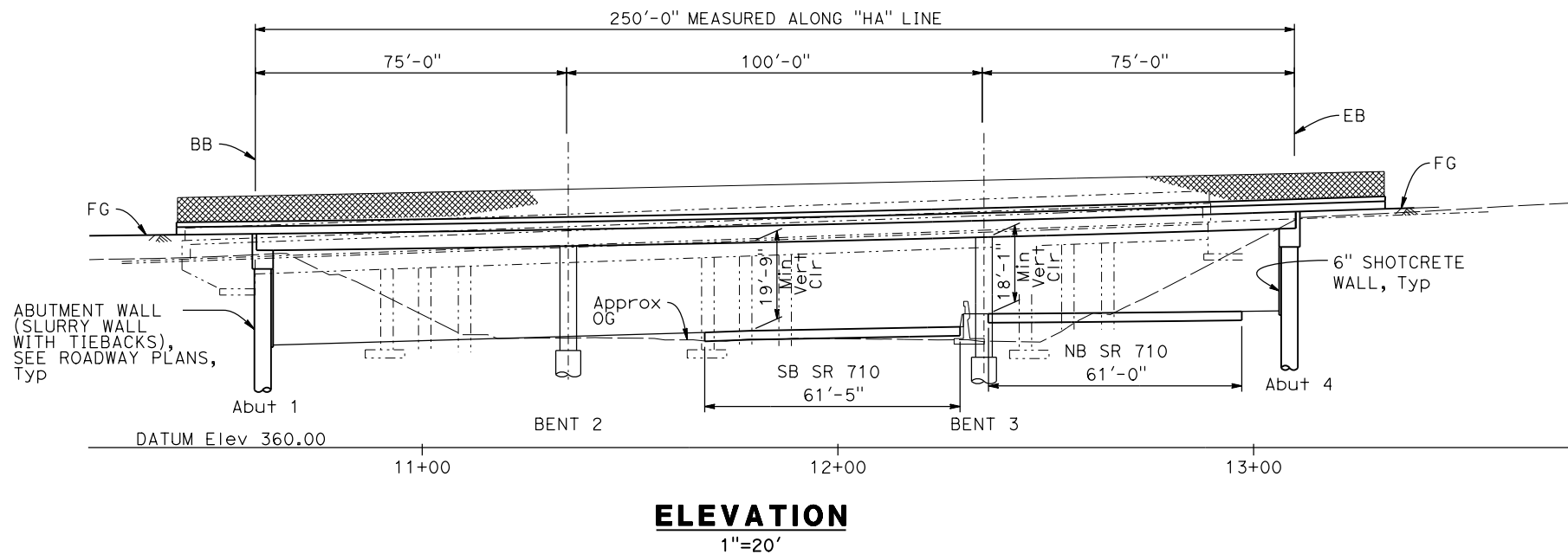
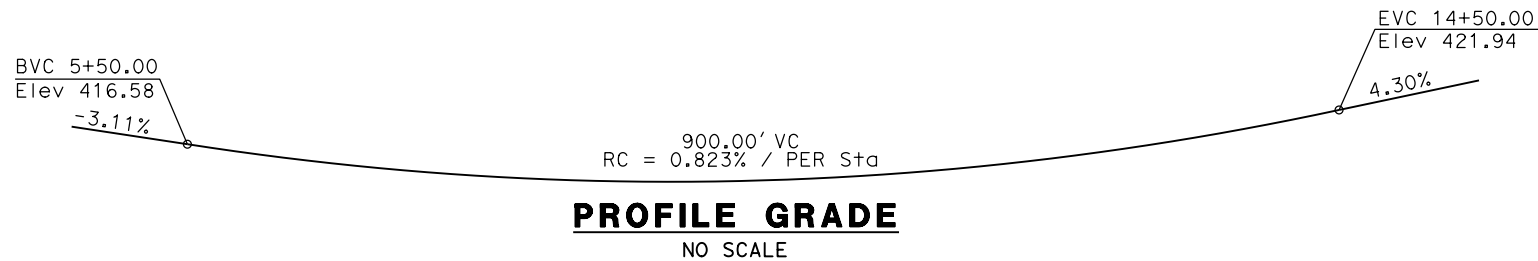
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	

METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012

CH2M HILL  
1000 WILSHIRE BLVD, SUITE 2100  
LOS ANGELES, CA 90017

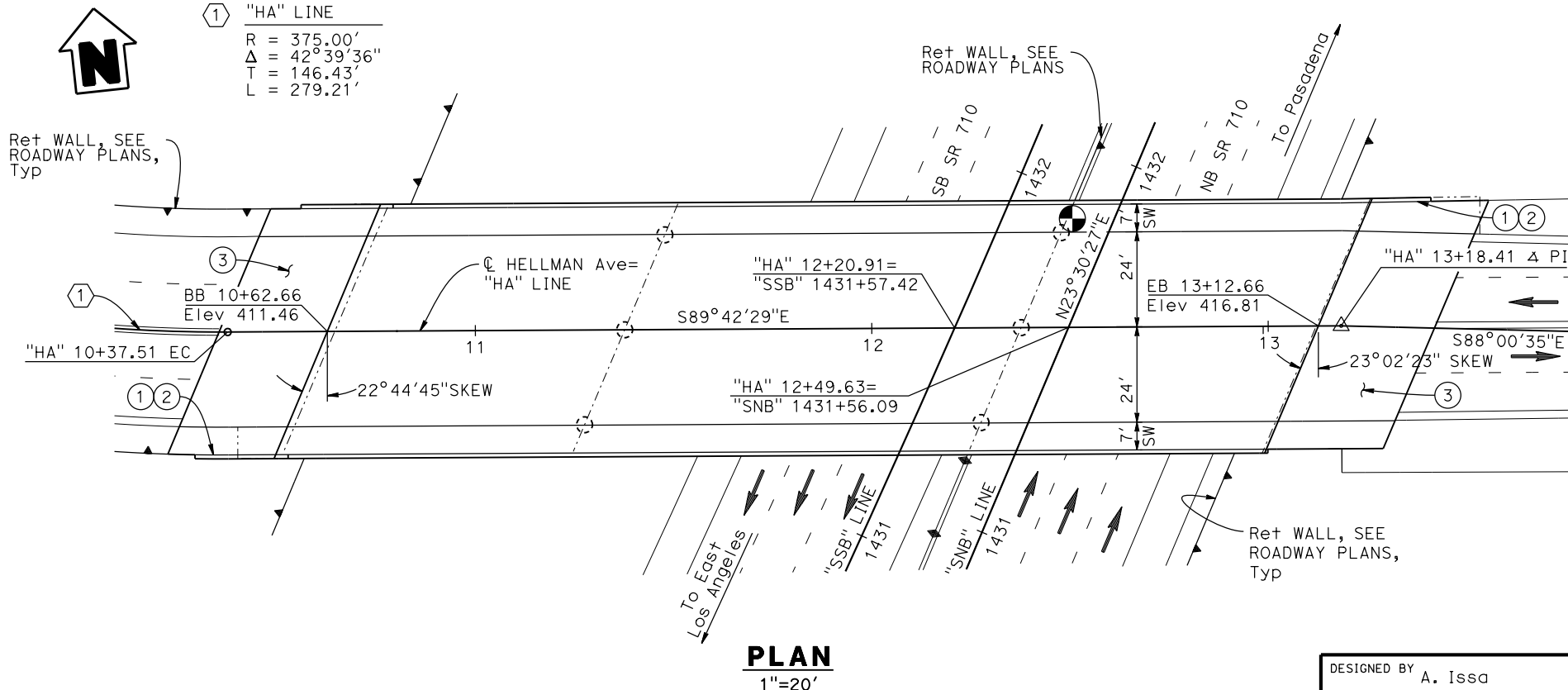
**LEGEND:**

- Indicates Existing Structure
- Indicates New Construction
- ① Paint "HELLMAN AVENUE OVERCROSSING"
- ② Paint Bridge Number & Year Constructed
- ③ Structure Approach Type N(30S)
- ⊕ Denotes Point of Minimum Vertical Clearance



**CURVE DATA**

- ① "HA" LINE
- R = 375.00'
- Δ = 42° 39' 36"
- T = 146.43'
- L = 279.21'



DATE OF ESTIMATE	MARCH 2014
BRIDGE REMOVAL	FULL (15808 SF)
STRUCTURE DEPTH	4'-0"
LENGTH	250'-0"
WIDTH	64'-0"
AREA	16,000 SF
COST/FT <sup>2</sup> INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	\$ 288
TOTAL COST*	\$ 4,872,000

\* THE COST OF THE SLURRY WALL WITH TIEBACKS IS NOT INCLUDED IN THIS BRIDGE ESTIMATE.

**FREEWAY TUNNEL ALTERNATIVE SINGLE BORE OPTION**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

PLANNING STUDY	
HELLMAN AVENUE OVERCROSSING	
BRIDGE NO. TBD	UNIT:
SCALE: AS NOTED	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT	
SIGN OFF DATE	





SR 710 North Study

ATTACHMENT K-3c

Task 7.2 Advance Planning Study Report

---

# State Route 710 North Study Advance Planning Study Report Valley Boulevard Overcrossing

## Freeway Tunnel Alternative Single Bore Option

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

June 2014

**CH2MHILL®**

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017





# SR 710 North Study

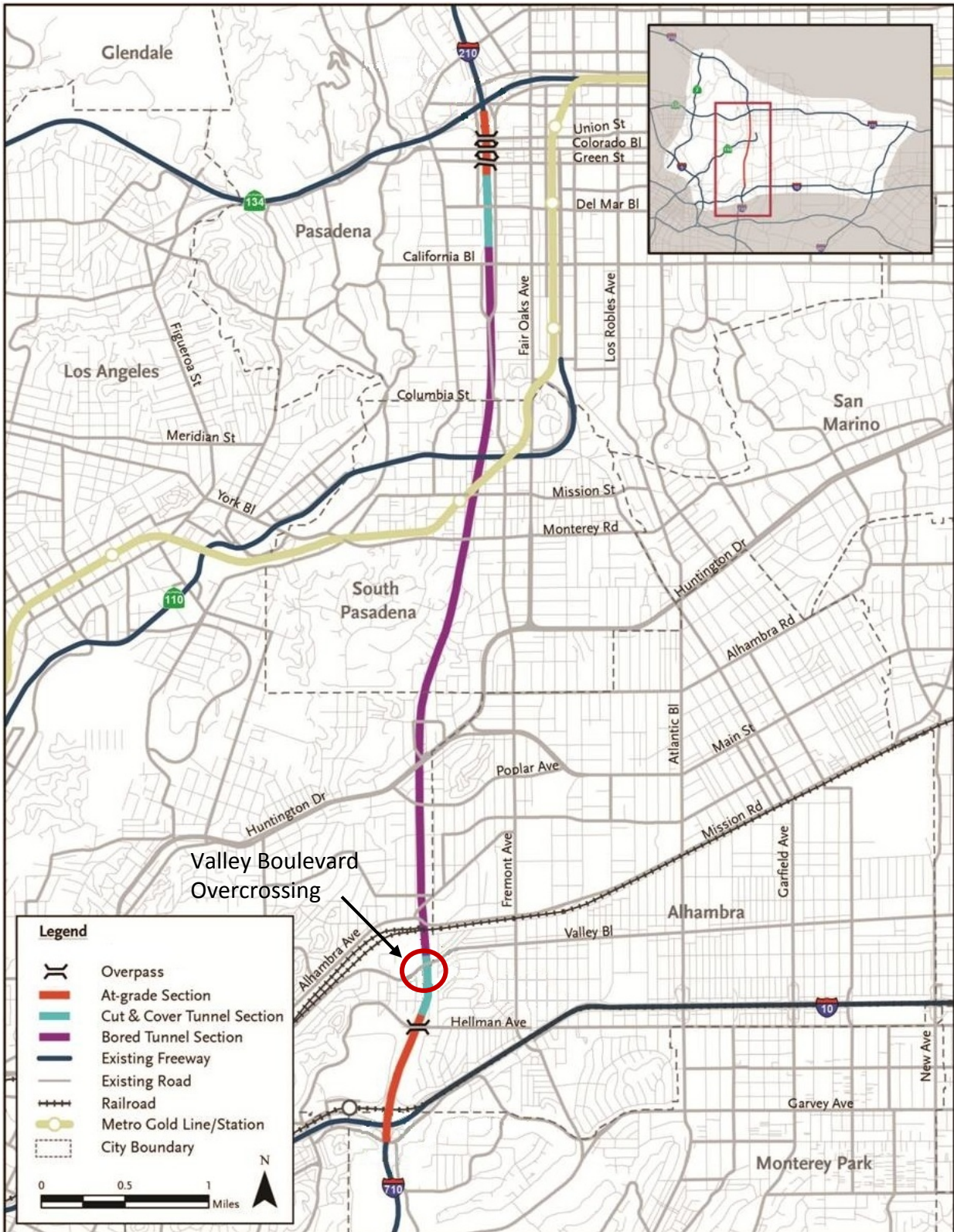
PREPARED FOR: Metropolitan Transportation Authority  
 COPY TO: Caltrans Study Team  
 PREPARED BY: CH2M HILL Team  
 DATE: June 6, 2014  
 PROJECT NUMBER: 428908

## Valley Boulevard Overcrossing

### Freeway Tunnel Alternative Single Bore Option

#### Table of Contents

	<u>Page No.</u>
Project Vicinity Map	2
Design Memorandum	3
<b>Attachments</b>	
A	Consultant Prepared Advance Planning Study (APS) Checklist
B	Advance Planning Study Cost Estimate
C	Advance Planning Study Plan



**Project Vicinity Map  
State Route 710 North Study  
Freeway Tunnel Alternative Alignment  
Single Bore Option**

## Assumptions Used For Valley Boulevard Overcrossing – Advance Planning Study

1. The proposed Valley Boulevard Overcrossing will be an integral part of the State Route (SR) 710 North Study Project. Valley Boulevard crosses over the SR 710 Freeway at this location. The purpose of the proposed project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks.
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes.
  - Minimize environmental impacts.
2. There are two options for Freeway Tunnel Alternative for the future SR 710 corridor:
  - One full-bored tunnel accommodating both directions of traffic with provision for another full-bored tunnel in future (this report is based on this option).
  - Two full-bored tunnels accommodating one direction of traffic in each tunnel (documented in separate report).

This Valley Boulevard Overcrossing with one full-bored tunnel underneath can accommodate another full-bored tunnel on the west side in the future.

3. A 232-foot long, single-span structure was chosen to avoid a bent between the proposed and future SR 710 cut and cover (C&C) tunnels under the bridge. Once the C&C tunnel is constructed, the area beneath this overcrossing will be filled in with soil to cover the tunnel to a level where the bridge structure will maintain its integrity and regular bridge inspections can be carried out. There will be no vertical clearance issues with the tunnels below.
4. There is no known environmentally sensitive area at this location.
5. The ramp that leads up to the structure on the east side will not be constructed until after the soil has been filled in around the overcrossing.
6. The ultimate width of the structure will be 76 feet. The overcrossing will be constructed in two stages. In the first stage 43 feet of the westbound side of the bridge will be built, and in the second stage the eastbound 30 feet of the bridge will be built. Both structures will be connected with 3-foot concrete closure pour. The staging plan will allow uninterrupted local traffic during construction of the bridge. The C&C tunnel below the bridge will be built after the bridge is complete.
7. Due to the required retaining wall height (approximately 85 feet) along the proposed SR 710, slurry walls with tiebacks are recommended at this location based on the Freeway Portal Excavation Support Systems (Jacobs Associates and CH2M HILL, 2013). Rather than terminating the walls at the original grade and lengthening the bridge behind the walls to the slope catch point, the slurry or secant pile walls will be extended up to the soffit of the superstructure and utilized as the abutment foundations. The bridge will be supported on seat-type abutments resting on slurry or secant pile walls.
8. Based on the project location, bridge span length, and other constraints, a cast-in-place, prestressed concrete (CIP/PS) box girder bridge is likely the most cost-effective solution and, thus, is recommended for the bridge. The superstructure depth will be 10 feet 6 inches (depth to span ratio of 0.046) with varying cross slope.

Since vertical clearance below the structure is not an issue, the larger superstructure depth will be used to accommodate the long span length.

9. The structure begins on a horizontal curve with a radius of 1,000 feet. The curve ends about 108 feet past the abutment and remainder of the structure lies on a tangent. The profile of the bridge is defined by a 500 foot vertical curve for about 108 feet at the beginning with an entrance grade of -1.69 percent and an exit grade of +2.77 percent. The rest of the bridge is on 2.77 percent ascending grade.
10. Since the proposed CIP/PS structure will be on a horizontal curve with a radius less than 2,000 feet, the additional design and detailing requirements in the Caltrans Memo to Designers will be followed in the final design of the structure.
11. The bridge structure will include a 2-foot shoulder, three 11-foot lanes in the east travel direction, a 6-foot sidewalk, and three 11-foot traffic lanes in the west travel direction. In the final stage of the SR 710 construction after backfilling the area beneath the bridge, the Valley Boulevard will have an 8-foot sidewalk and three typical 12-foot traffic lanes in east travel direction and an 8-foot sidewalk and four typical 12-foot traffic lanes in west travel direction.
12. The bridge will have a 22 feet 5 inches minimum vertical clearance over the proposed construction of the future SR 710.
13. A chain-link railing will be provided on both sides of the structure.
14. The bridge design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and Seismic Design Criteria. The Acceleration Response Spectrum curve, as will be recommended in the foundation report, will be used for seismic loading in a future phase of design.
15. According to the Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014), the project site is not located in an area considered to be susceptible to liquefaction. The proposed structure does not need to account for liquefaction in the preliminary design. Additional geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.
16. Falsework will be required to build the superstructure. Falsework clearance is not an issue, as there will not be any traffic below the bridge during the bridge construction.
17. There are some utilities within the limits of the existing Valley Blvd, which may need to be included on the structure. Utilities through the bridge will be decided in the next phase of design. Temporary and/or permanent utility relocation may be necessary but will be confirmed at the final design phase. A future utility opening is provided in the structure.
18. No known hazardous material exists at the bridge site.
19. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
20. The overall bridge construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$4,607,000.



**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

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# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710 KP(PM)
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): To be Assigned	Bridge Name(s): Valley Boulevard Overcrossing	
Total number of bridges in project: <b>Many, only one</b> bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer.  
(Mark **N/A** if not applicable)

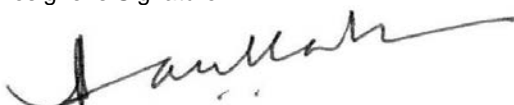
- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- Grades or spot elevations of roadway below the structure.
- Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- N/A "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)

# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

- |   |  |   |  |
|---|--|---|--|
| 1. Has this project been discussed with:  | the OSFP Liaison Engineer?             | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|   | the Caltrans District Project Manager? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|   | the roadway consultant?                | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/>   |  |   |  |
| 2. Have the Caltrans Structures Maintenance records been reviewed?  |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| If the records recommend any work for the structure, is it included in the APS?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/>   |  |   |  |
| 3. Are there special aesthetic considerations?  |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/>   |  |   |  |
| 4. (Widenings and Modifications)  |  |   |  |
| Has this project been reviewed for seismic retrofit requirements?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| Are seismic retrofit requirements included in the APS?  |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/>   |  |   |  |
| 5. Any special Railroad requirements?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| Shoofly required?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| Cost of shoofly included as a separate item in the project cost estimate?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/>   |  |   |  |
| 6. Any special foundation requirements, including scour critical work, special excavation such as Type A, Type D, and/or hazardous or contaminated material?  |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/>   |  |   |  |
| 7. Any special construction requirements, including limited site accessibility or seasonal work?  |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/>   |  |   |  |
| 8. Other items to be included in the cost such as slope paving, approach slabs, and/or adjacent retaining walls?  |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/>   |  |   |  |
| 9. Remove existing bridge?  |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| Total Deck Area:  |  |   |  |
| <hr/>   |  |   |  |
| 10. Any other unusual or special requirements?  |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/>   |  |   |  |
| 11. Provide and attach a consultant prepared Design Memo to summarize and document any important assumptions, discussions, decisions, unusual items, local agency requirements such as aesthetics, improvements in vicinity of the structure, airspace usage, other obstructions, or any items noted above. | Summary attached?                      | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: March 21, 2014
--	---	----------------------------

**Attachment B**  
**Advance Planning Study Cost Estimate**

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Revised - December 3, 2007

Freeway Tunnel Alternative  
Single Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Valley Blvd Overcrossing (Total Cost) BR. No.: TBD

TYPE: CIP/PS Box Girder Bridge

DISTRICT: 07

CU: \_\_\_\_\_

RTE: 710

EA: \_\_\_\_\_

CO: LA

LENGTH: 232.00 WIDTH: 76.83 AREA (SF)= 17,825

**DESIGN SECTION:**

# OF STRUCTURES IN PROJECT :

EST. NO. \_\_\_\_\_

PRICES BY :

COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : A. Issa

DATE: 3/21/2014

QUANTITIES BY:

DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	TEMPORARY RAILING	Type K	LF	876	\$20.00	\$17,520
2	STRUCTURE EXCAVATION (BRIDGE)		CY	391	\$100.00	\$39,100
3	STRUCTURE BACKFILL (BRIDGE)		CY	79	\$70.00	\$5,530
4	PRESTRESSING CAST-IN-PLACE CONCRETE		LS	1	\$200,000.00	\$200,000
5	STRUCTURAL CONCRETE, BRIDGE		CY	2,577	\$800.00	\$2,061,600
6	STRUCTURAL CONCRETE, APPROACH SLAB	Type N	CY	165	\$720.00	\$118,800
7	DRILL & BOND DOWEL		LF	155	\$25.00	\$3,875
8	JOINT SEAL (MR = 1 1/2")		LF	154	\$90.00	\$13,830
9	BAR REINFORCING STEEL (BRIDGE)		LB	392,000	\$1.00	\$392,000
10	CHAIN LINK RAILING	Type 7	LF	584	\$100.00	\$58,400
11	CONCRETE BARRIER	Type 26M	LF	292	\$240.00	\$70,080
12	CONCRETE BARRIER	Type 742	LF	292	\$120.00	\$35,040
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29						
30						

SUBTOTAL	\$3,015,775
TIME RELATED OVERHEAD	\$301,578
MOBILIZATION (@ 10 %)	\$368,595
SUBTOTAL BRIDGE ITEMS	\$3,685,947
CONTINGENCIES (@ 25%)	\$921,487
BRIDGE TOTAL COST	\$4,607,434
COST PER SQ. FOOT	\$258.48
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$4,607,434
BUDGET ESTIMATE AS OF	\$4,607,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: **COST OF SLURRY WALLS WITH TIEBACKS IS NOT INCLUDED IN THIS BRIDGE ESTIMATE**

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$4,607,000
2	\$4,607,000
3	\$4,607,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$4,607,000
5	\$4,607,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.

Revised - December 3, 2007

Freeway Tunnel Alternative  
Single Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Valley Blvd Overcrossing (Stage 1)

BR. No.: TBD

DISTRICT: 07

TYPE: CIP/PS Box Girder Bridge

RTE: 710

CU: \_\_\_\_\_

CO: LA

EA: \_\_\_\_\_

PM: \_\_\_\_\_

LENGTH: 232.00      WIDTH: 43.42      AREA (SF)= 10,073

**DESIGN SECTION:** \_\_\_\_\_

# OF STRUCTURES IN PROJECT : \_\_\_\_\_

EST. NO. \_\_\_\_\_

PRICES BY : \_\_\_\_\_

COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : \_\_\_\_\_

A. Issa

DATE: 3/21/2014

QUANTITIES BY: \_\_\_\_\_

DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	TEMPORARY RAILING	Type K	LF	292	\$20.00	\$5,840
2	STRUCTURE EXCAVATION (BRIDGE)		CY	220	\$100.00	\$22,000
3	STRUCTURE BACKFILL (BRIDGE)		CY	42	\$70.00	\$2,940
4	PRESTRESSING CAST-IN-PLACE CONCRETE		LS	1	\$100,000.00	\$100,000
5	STRUCTURAL CONCRETE, BRIDGE		CY	1,499	\$800.00	\$1,199,200
6	STRUCTURAL CONCRETE, APPROACH SLAB	Type N	CY	93	\$720.00	\$66,960
7	DRILL & BOND DOWEL		LF	155	\$25.00	\$3,875
8	JOINT SEAL (MR = 1 1/2")		LF	87	\$90.00	\$7,815
9	BAR REINFORCING STEEL (BRIDGE)		LB	229,000	\$1.00	\$229,000
10	CHAIN LINK RAILING	Type 7	LF	292	\$100.00	\$29,200
11	CONCRETE BARRIER	Type 26M	LF	292	\$240.00	\$70,080
12						
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29						
30						

SUBTOTAL	\$1,736,910
TIME RELATED OVERHEAD	\$173,691
MOBILIZATION ( @ 10 % )	\$212,289
SUBTOTAL BRIDGE ITEMS	\$2,122,890
CONTINGENCIES (@ 25%)	\$530,723
BRIDGE TOTAL COST	\$2,653,613
COST PER SQ. FOOT	\$263.45
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$2,653,613
BUDGET ESTIMATE AS OF	\$2,654,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: **COST OF SLURRY WALLS WITH TIEBACKS IS NOT INCLUDED IN THIS BRIDGE ESTIMATE**

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$2,654,000
2	\$2,654,000
3	\$2,654,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$2,654,000
5	\$2,654,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.



Revised - December 3, 2007

Freeway Tunnel Alternative  
Single Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Valley Blvd Overcrossing (Stage 2) BR. No.: TBD

TYPE: CIP/PS Box Girder Bridge

DISTRICT: 07

RTE: 710

CU: \_\_\_\_\_

CO: LA

EA: \_\_\_\_\_

PM: \_\_\_\_\_

LENGTH: 232.00 WIDTH: 33.42 AREA (SF)= 7,753

**DESIGN SECTION:**

# OF STRUCTURES IN PROJECT :

EST. NO. \_\_\_\_\_

PRICES BY :

COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : A. Issa

DATE: 3/21/2014

QUANTITIES BY :

DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	TEMPORARY RAILING	Type K	LF	584	\$20.00	\$11,680
2	STRUCTURE EXCAVATION (BRIDGE)		CY	171	\$100.00	\$17,100
3	STRUCTURE BACKFILL (BRIDGE)		CY	37	\$70.00	\$2,590
4	PRESTRESSING CAST-IN-PLACE CONCRETE		LS	1	\$100,000.00	\$100,000
5	STRUCTURAL CONCRETE, BRIDGE		CY	1,078	\$800.00	\$862,400
6	STRUCTURAL CONCRETE, APPROACH SLAB	Type N	CY	72	\$720.00	\$51,840
7	DRILL & BOND DOWEL		LF		\$25.00	
8	JOINT SEAL (MR = 1 1/2")		LF	67	\$90.00	\$6,015
9	BAR REINFORCING STEEL (BRIDGE)		LB	163,000	\$1.00	\$163,000
10	CHAIN LINK RAILING	Type 7	LF	292	\$100.00	\$29,200
11	CONCRETE BARRIER	Type 742	LF	292	\$120.00	\$35,040
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30						

SUBTOTAL	\$1,278,865
TIME RELATED OVERHEAD	\$127,887
MOBILIZATION ( @ 10 % )	\$156,306
SUBTOTAL BRIDGE ITEMS	\$1,563,057
CONTINGENCIES (@ 25%)	\$390,764
BRIDGE TOTAL COST	\$1,953,822
COST PER SQ. FOOT	\$252.02
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$1,953,822
BUDGET ESTIMATE AS OF	\$1,954,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: **COST OF SLURRY WALLS WITH TIEBACKS IS NOT INCLUDED IN THIS BRIDGE ESTIMATE**

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$1,954,000
2	\$1,954,000
3	\$1,954,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$1,954,000
5	\$1,954,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.



**Attachment C**  
**Advance Planning Study Plan**

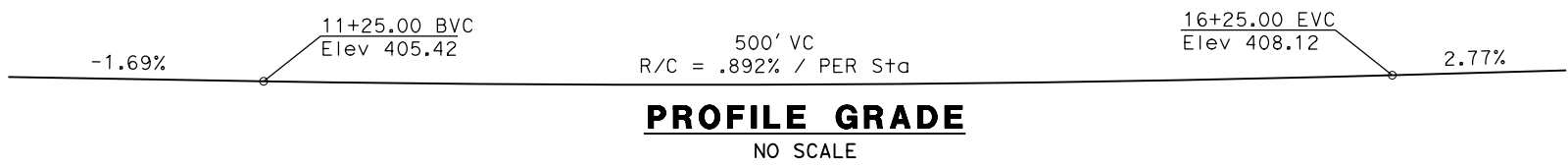
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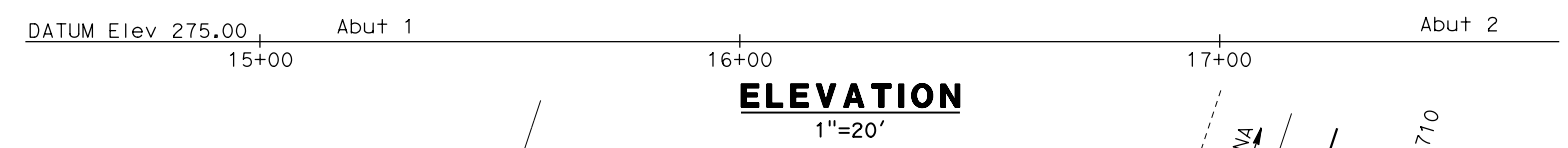
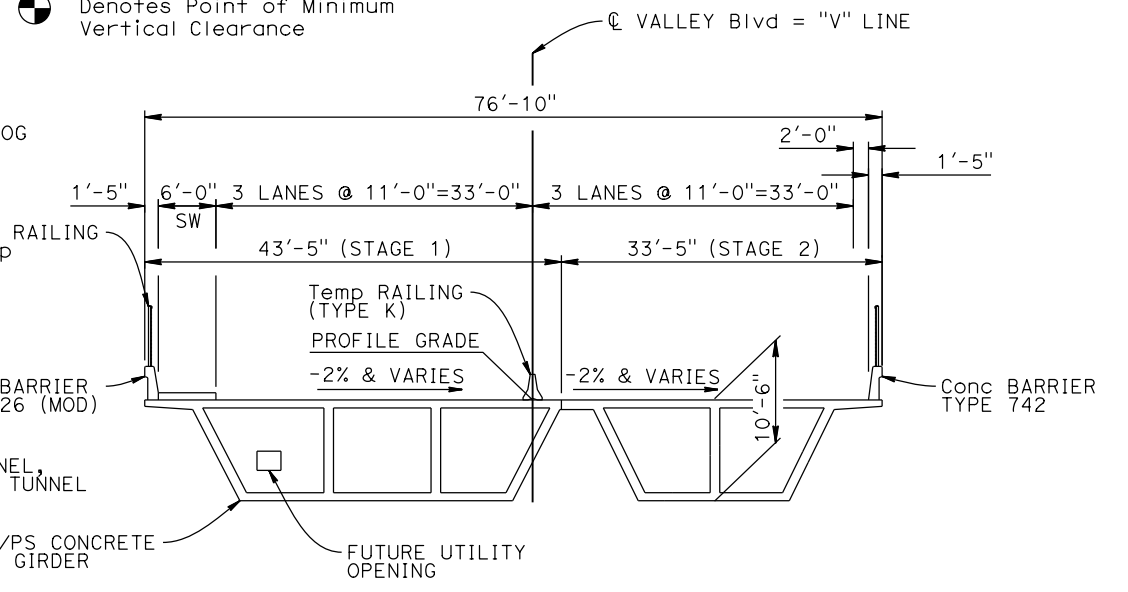
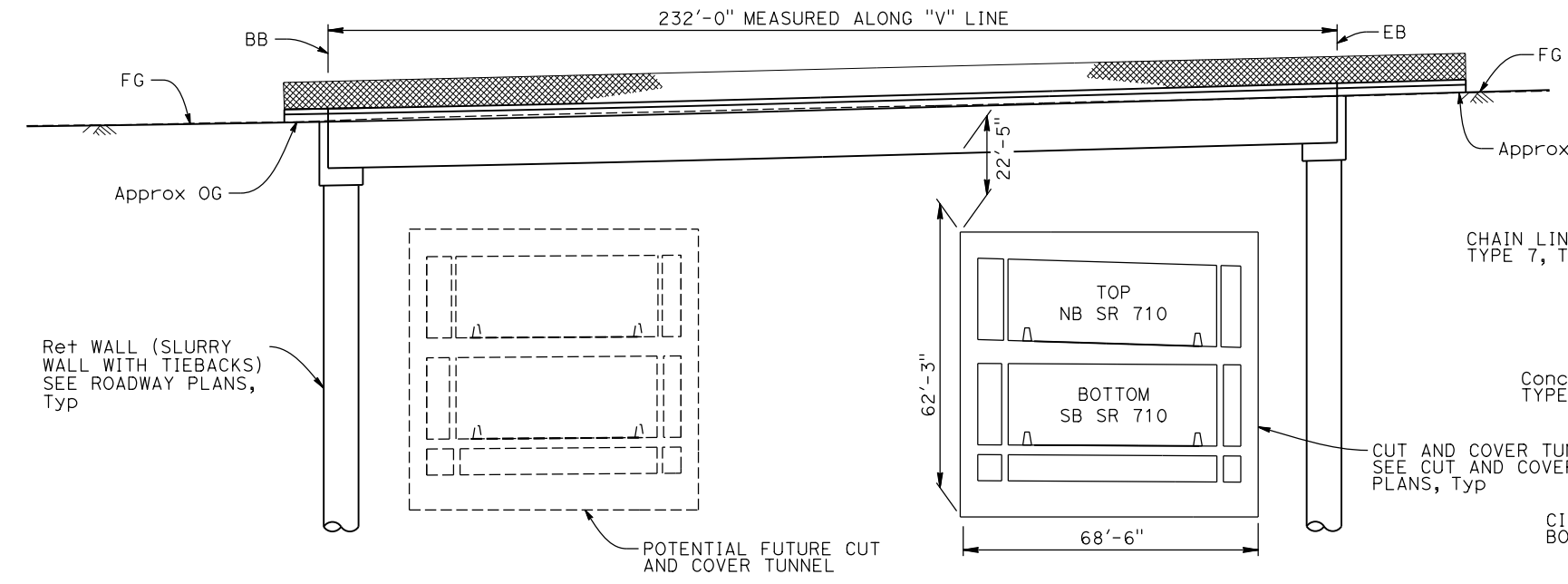
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	

METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012

CH2M HILL  
1000 WILSHIRE BLVD, SUITE 2100  
LOS ANGELES, CA 90017



- LEGEND:**
- ① Paint "VALLEY BOULEVARD OVERCROSSING"
  - ② Paint Bridge Number & Year Constructed
  - ③ Structure Approach Type N(30S)
  - ⊙ Denotes Point of Minimum Vertical Clearance



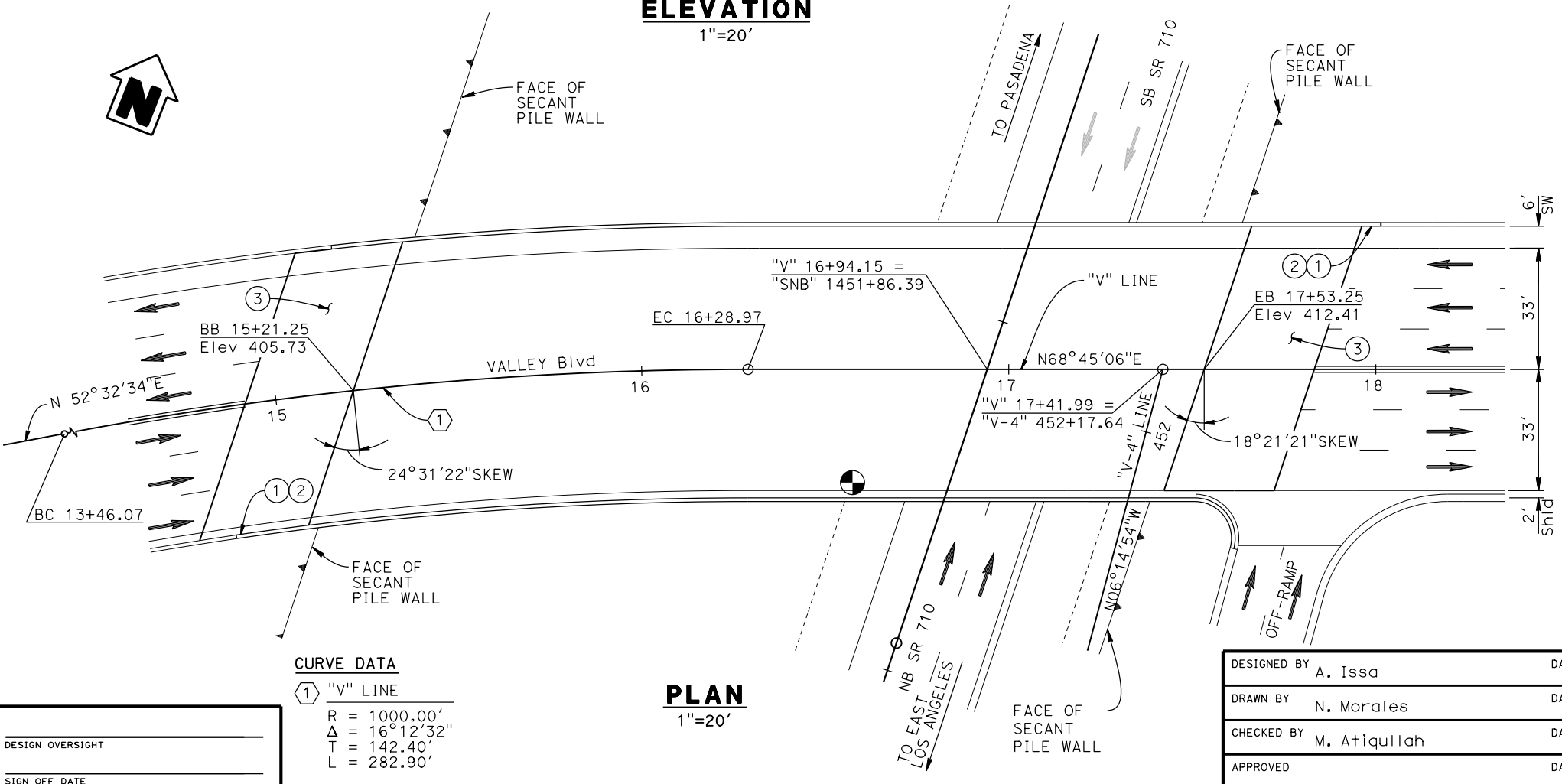
**TYPICAL SECTION**  
1"=10'

DATE OF ESTIMATE	MARCH 2014
BRIDGE REMOVAL	NONE
STRUCTURE DEPTH	10'-6"
LENGTH	232'-0"
WIDTH	76'-10"
AREA	17,825 FT <sup>2</sup>
COST/FT <sup>2</sup> INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	\$ 258
TOTAL COST *	\$ 4,607,000

\* THE COST OF SLURRY WALL WITH TIEBACKS IS NOT INCLUDED IN THIS BRIDGE ESTIMATE.

**NOTE:**

- This bridge is being built to facilitate the construction of cut and cover tunnel below for SR 710. As part of the project, this bridge area will be backfilled to bring back to the existing ground level.



**CURVE DATA**

① "V" LINE	R = 1000.00'
	Δ = 16°12'32"
	T = 142.40'
	L = 282.90'

**PLAN**  
1"=20'

**FREeway TUNNEL ALTERNATIVE SINGLE BORE OPTION**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

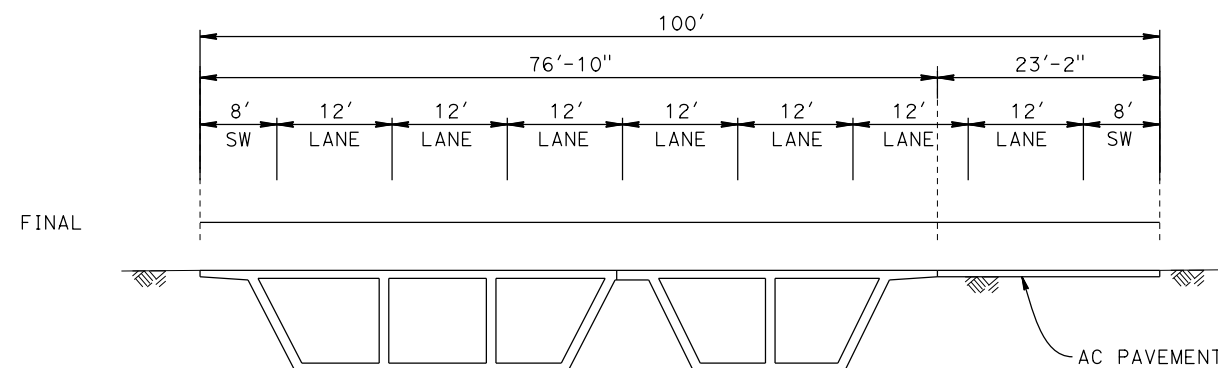
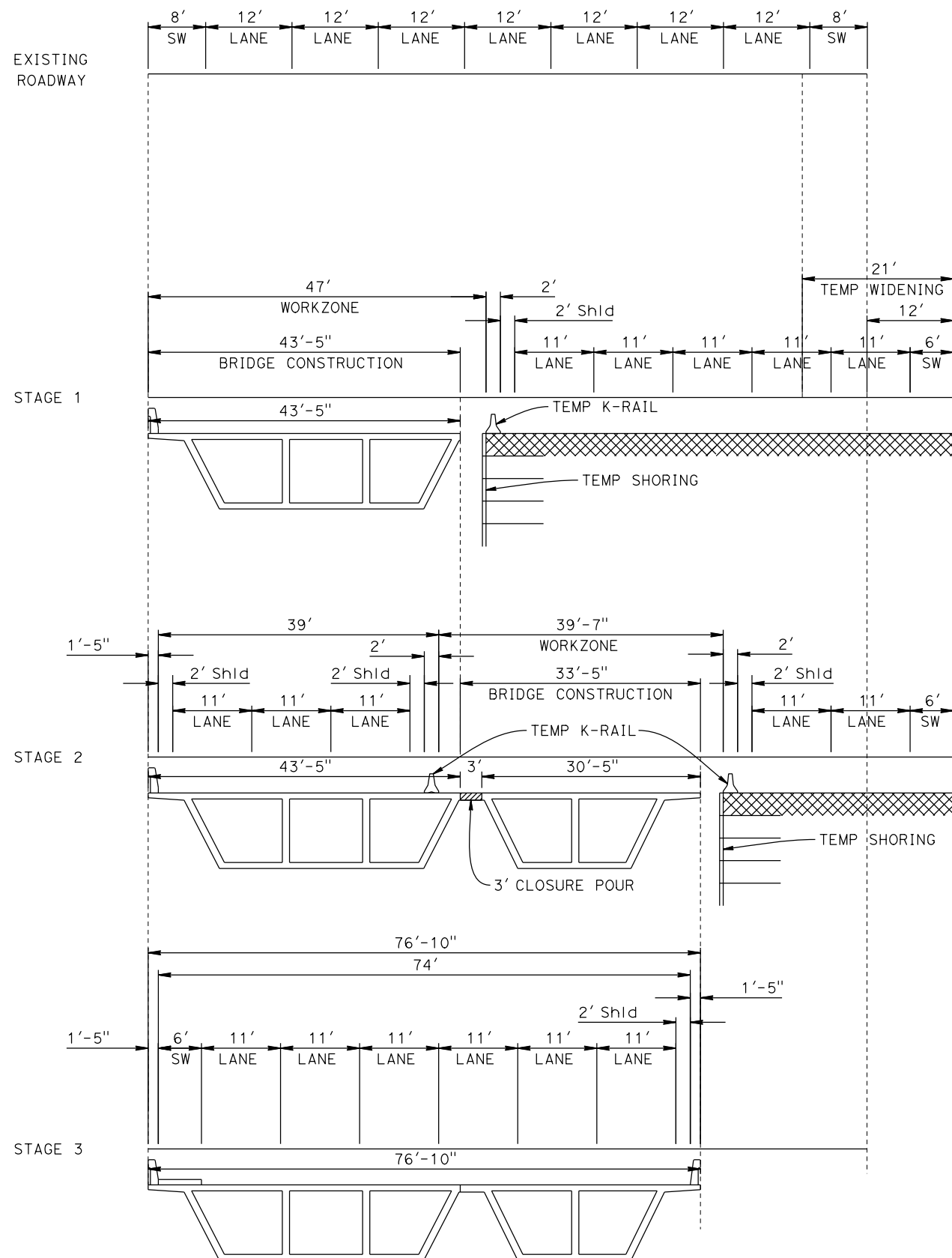
M. Atiqullah  
PROJECT ENGINEER

**PLANNING STUDY**

**VALLEY BLVD OVERCROSSING**

BRIDGE NO.	TBD	UNIT:	
SCALE:	AS NOTED	PROJECT NUMBER & PHASE:	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**NOTE:**  
NEW BRIDGE TO KEEP VALLEY BLVD OPEN  
DURING CONSTRUCTION.

**FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION  
STAGE CONSTRUCTION**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>VALLEY BLVD OVERCROSSING</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	NO SCALE
PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT  
SIGN OFF DATE



SR 710 North Study

ATTACHMENT K-3d

Task 7.2 Advance Planning Study Report

---

# State Route 710 North Study Advance Planning Study Report Cut and Cover Tunnel (South Portal)

## Freeway Tunnel Alternative Single Bore Option

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

June 2014

**CH2MHILL®**

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017







# SR 710 North Study

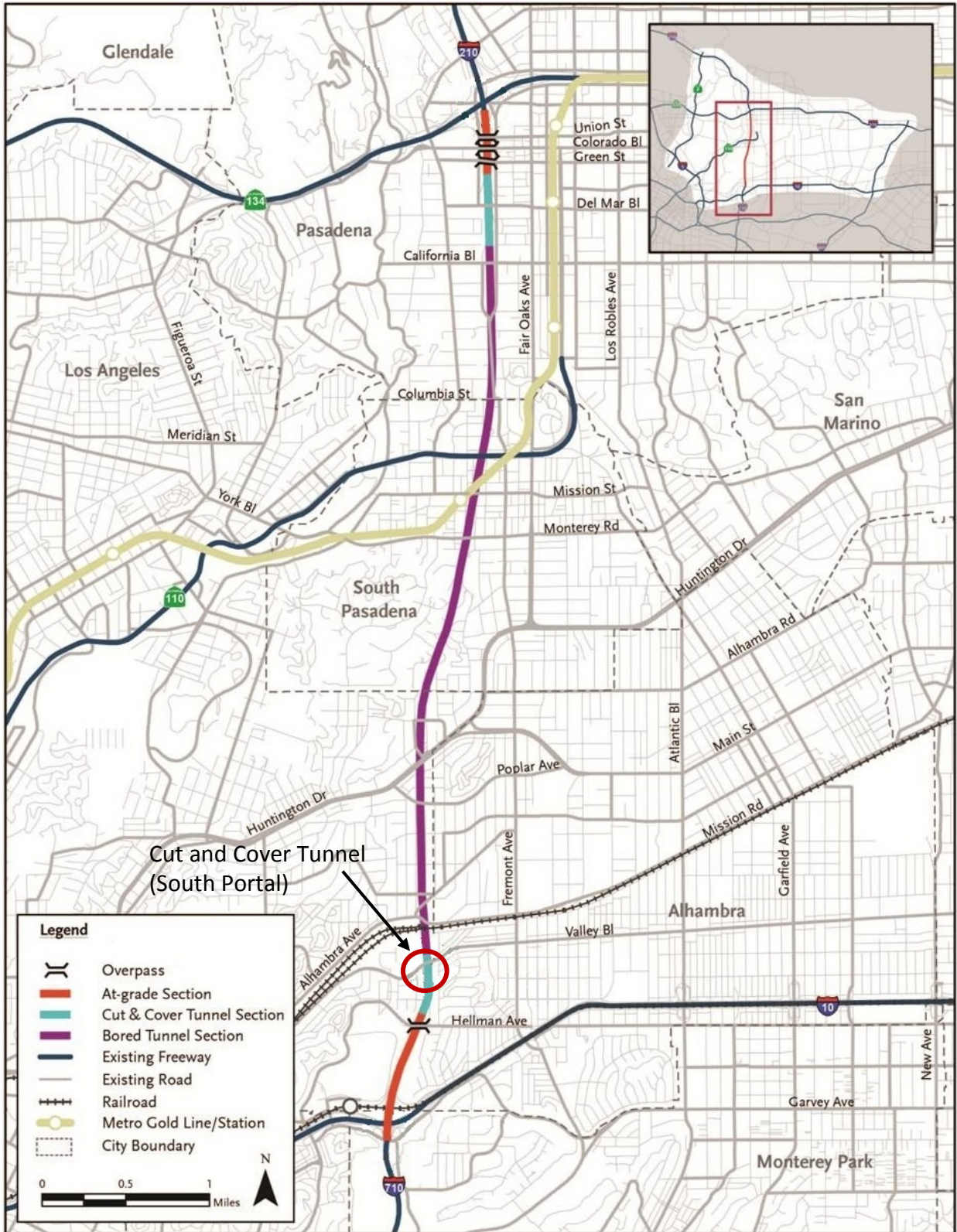
PREPARED FOR: Metropolitan Transportation Authority  
 COPY TO: Caltrans Study Team  
 PREPARED BY: CH2M HILL Team  
 DATE: June 6, 2014  
 PROJECT NUMBER: 428908

**Cut and Cover Tunnel (South Portal)**  
**Freeway Tunnel Alternative**  
**Single Bore Option**

### Table of Contents

	<u>Page No.</u>
Project Vicinity Map	2
Design Memorandum	3
<b>Attachments</b>	
A Consultant Prepared Advance Planning Study (APS) Checklist	
B Advance Planning Study Cost Estimate	
C Advance Planning Study Plan	





**Project Vicinity Map**  
**State Route 710 North Study**  
**Freeway Tunnel Alternative Alignment**  
**Single Bore Option**

## Assumptions Used for Cut and Cover Tunnel (South Portal) – Advance Planning Study

1. The proposed Cut and Cover (C&C) Tunnel (South Portal) will be an integral part of the State Route (SR) 710 North Study Project. The South Portal C&C Tunnel will begin north of Hellman Avenue and will end north of Valley Boulevard. The purpose of the proposed project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes
  - Minimize environmental impacts
2. There are two options for Freeway Tunnel Alternative for the future SR 710 corridor:
  - One full-bored tunnel accommodating both directions of traffic with provision for another full-bored tunnel in future (this report is based on this option).
  - Two full-bored tunnels accommodating one direction of traffic in each tunnel (documented in separate report).
3. The main purpose of the C&C Tunnel system is to serve as the transition of the SR 710 Freeway between the surface level traffic and the full bore tunnel traffic.
4. The current South Portal design provides the following lengths for each route:
  - a. Northbound (NB) direction upper level: 1,130 feet
  - b. Southbound (SB) direction lower level: 1,885 feet
5. The typical two-level C&C Tunnel section will have varying width and height. The width will vary from a minimum 56 feet 10 inches and the height will vary from a minimum 62 feet. The top slab will be 6 feet thick and the bottom slab will be 8 feet thick while the exterior walls will be 4 feet thick. There will be an interior concrete slab dividing the box in the top and bottom levels. In this way, each level will accommodate two lanes of traffic in each direction within the tunnel section.
6. The width of each single-level C&C Tunnel will also vary along the length. The width will vary from a minimum of 40 feet and the height will be 33 feet.
7. Within the C&C Tunnel section, 6-foot diameter jet fans will be located outside the edge of shoulder as part of the tunnel ventilation system.
8. The C&C Tunnel will also contain a continuous firewall on each deck that shields a 4-foot walkway in case of emergency. These walkways will be located next to the inside shoulder of each tunnel and will be connected via emergency cross-passages.
9. There will be a transition zone where the C&C Tunnel will gradually taper in height with distance from the bored tunnel circular cross section to the cut and cover tunnel's rectangular cross-section. This transition zone will manage the aerodynamic flow of the ventilation system across the two sections.
10. Each traffic level will include a 4-foot inside walkway, a 10-foot inside shoulder, two typical 12-foot traffic lanes, and a 1-foot clear area.
11. A minimum vertical clearance of 16 feet 6 inches will be maintained across the traveled way for traffic, and there will be an additional 2 feet 3 inches clearance for signage.

12. The C&C Tunnel design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and Seismic Design Criteria. The Acceleration Response Spectrum curve, as recommended in the foundation report, will be used for seismic loading in a future phase of design.
13. According to the Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014), the tunnel site contains some medium dense saturated granular soil layers that are susceptible to liquefaction. However, these soil layers are present within the top 40 feet below ground surface which will be removed during C&C Tunnel construction as excavation depth will reach approximately 80 to 100 feet below ground surface. The tunnels will then be covered with compacted granular soil which would not be susceptible to liquefaction. The Seismic Hazard Zones Map for the Los Angeles 7.5-Minute Quadrangle (California Division of Mines and Geology, 1999) also indicates that the proposed site is not located in an area where historical occurrence of liquefaction or potential for liquefaction is noted. The proposed structure does not need to account for liquefaction in the preliminary design. Additional geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.
14. Falsework will be required to build the C&C Tunnel. Traffic will not pass under falsework during construction.
15. As-built plans of existing utilities have not been made available yet. Temporary and/or permanent utility relocation, if necessary, will be confirmed in the final design phase after reviewing the as-built utility plans and field investigations.
16. No known hazardous material exists at the tunnel site.
17. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
18. The overall tunnel construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$120,542,000. The cost of tunnel excavation, backfill and construction of the slurry walls with tiebacks is included in the roadway estimate.

**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

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# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710 KP(PM)
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): To be Assigned	Bridge Name(s): Cut and Cover Tunnel (South Portal)	
Total number of bridges in project: <b>Many, only one</b> bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer.  
(Mark **N/A** if not applicable)


- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- N/A Grades or spot elevations of roadway below the structure.
- N/A Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- N/A Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- N/A "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)

# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

- |       |   |  |   |  |
|-------|---|--|---|--|
| 1.    | Has this project been discussed with:   | the OSFP Liaison Engineer?             | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|       |   | the Caltrans District Project Manager? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|       |   | the roadway consultant?                | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/> |   |  |   |  |
| 2.    | Have the Caltrans Structures Maintenance records been reviewed?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | If the records recommend any work for the structure, is it included in the APS?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 3.    | Are there special aesthetic considerations?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 4.    | (Widenings and Modifications)   |  |   |  |
|       | Has this project been reviewed for seismic retrofit requirements?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | Are seismic retrofit requirements included in the APS?  |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 5.    | Any special Railroad requirements?  |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | Shoofly required?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | Cost of shoofly included as a separate item in the project cost estimate?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 6.    | Any special foundation requirements, including scour critical work, special excavation such as Type A, Type D, and/or hazardous or contaminated material?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 7.    | Any special construction requirements, including limited site accessibility or seasonal work?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 8.    | Other items to be included in the cost such as slope paving, approach slabs, and/or adjacent retaining walls?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 9.    | Remove existing bridge?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | Total Deck Area:  |  |   |  |
| <hr/> |   |  |   |  |
| 10.   | Any other unusual or special requirements?  |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/> |   |  |   |  |
| 11.   | Provide and attach a consultant prepared Design Memo to summarize and document any important assumptions, discussions, decisions, unusual items, local agency requirements such as aesthetics, improvements in vicinity of the structure, airspace usage, other obstructions, or any items noted above. | Summary attached?                      | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: March 21, 2014
--	---	-------------------------



**Attachment B**  
**Advance Planning Study Cost Estimate**

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Revised - December 3, 2007

Freeway Tunnel Alternative  
Single Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_

OUT EST: \_\_\_\_\_

BRIDGE: Cut & Cover Tunnel (South Portal)  
TYPE: Reinforced Concrete Cut & Cover Tunnels  
CU: \_\_\_\_\_  
EA: \_\_\_\_\_

BR. No.: TBD

DISTRICT: 07

RTE: 710

CO: LA

PM: \_\_\_\_\_

LENGTH: 1,885.00 WIDTH: \_\_\_\_\_ AREA (SF)= \_\_\_\_\_

DESIGN SECTION: \_\_\_\_\_

# OF STRUCTURES IN PROJECT : \_\_\_\_\_ EST. NO. \_\_\_\_\_

PRICES BY : \_\_\_\_\_ COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : A. Issa DATE: 3/21/2014

QUANTITIES BY: \_\_\_\_\_ DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	STRUCTURAL CONCRETE, TUNNEL		CY	76,976	\$800.00	\$61,580,452
2	BAR REINFORCING STEEL (TUNNEL)		LB	23,092,669	\$0.75	\$17,319,502
3						
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SUBTOTAL	\$78,899,954
TIME RELATED OVERHEAD	\$7,889,995
MOBILIZATION (@ 10%)	\$9,643,328
SUBTOTAL BRIDGE ITEMS	\$96,433,277
CONTINGENCIES (@ 25%)	\$24,108,319
BRIDGE TOTAL COST	\$120,541,596
COST PER SQ. FOOT	
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$120,541,596
BUDGET ESTIMATE AS OF	\$120,542,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: **COST OF EARTHWORK IS NOT INCLUDED IN THIS ESTIMATE.**

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$120,542,000
2	\$120,542,000
3	\$120,542,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$120,542,000
5	\$120,542,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.

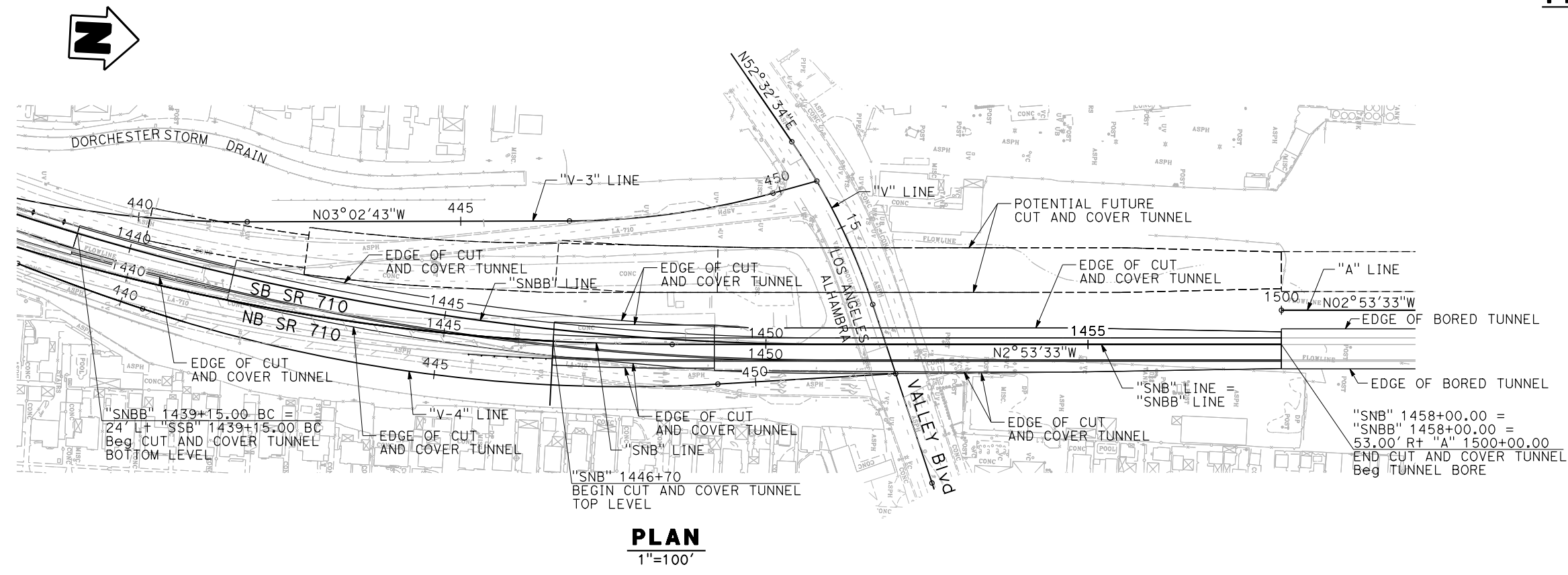
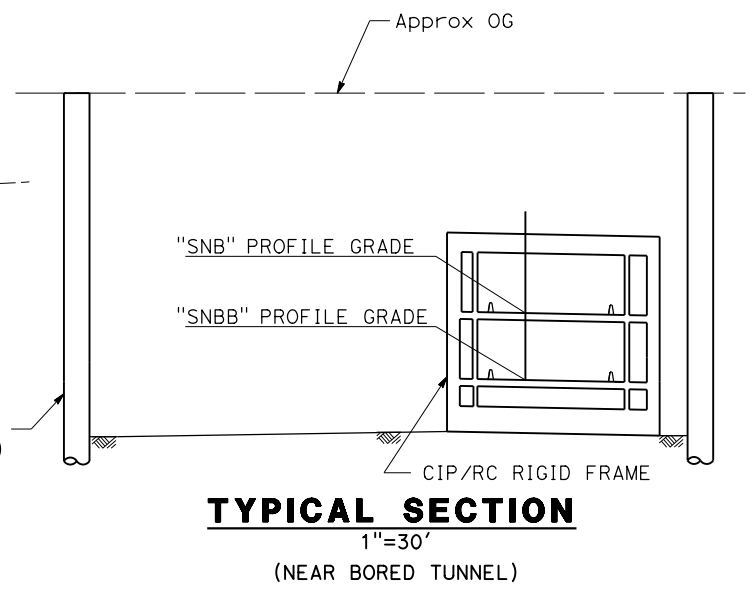
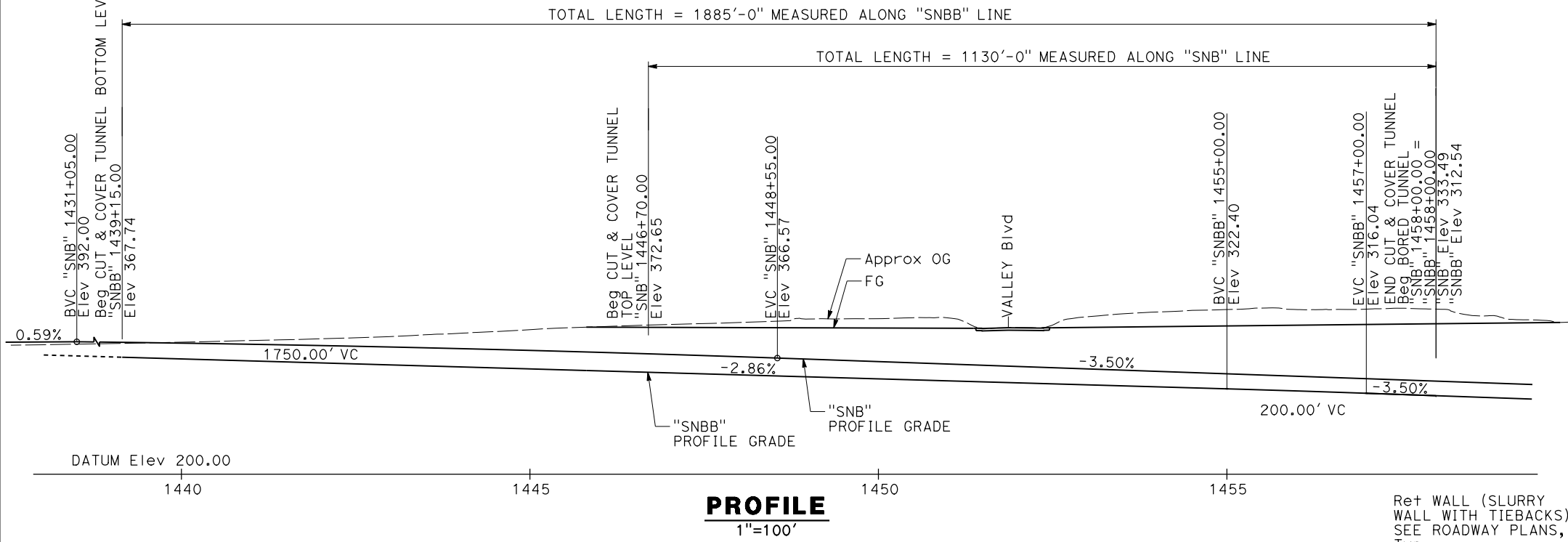


**Attachment C**  
**Advance Planning Study Plan**

---



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



DATE OF ESTIMATE	MARCH 2014
BRIDGE REMOVAL	N/A
STRUCTURE DEPTH	VARIES
LENGTH	1130'-0" TOP DECK 1885'-0" BOTTOM DECK
WIDTH	VARIES
AREA	1,103 SF (AVG)
TOTAL COST*	\$ 120,542,000

\* THE COST OF EARTHWORK IS NOT INCLUDED IN THIS ESTIMATE.

ABBREVIATION:  
VMS Variable Message Sign

**FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION  
GENERAL PLAN**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

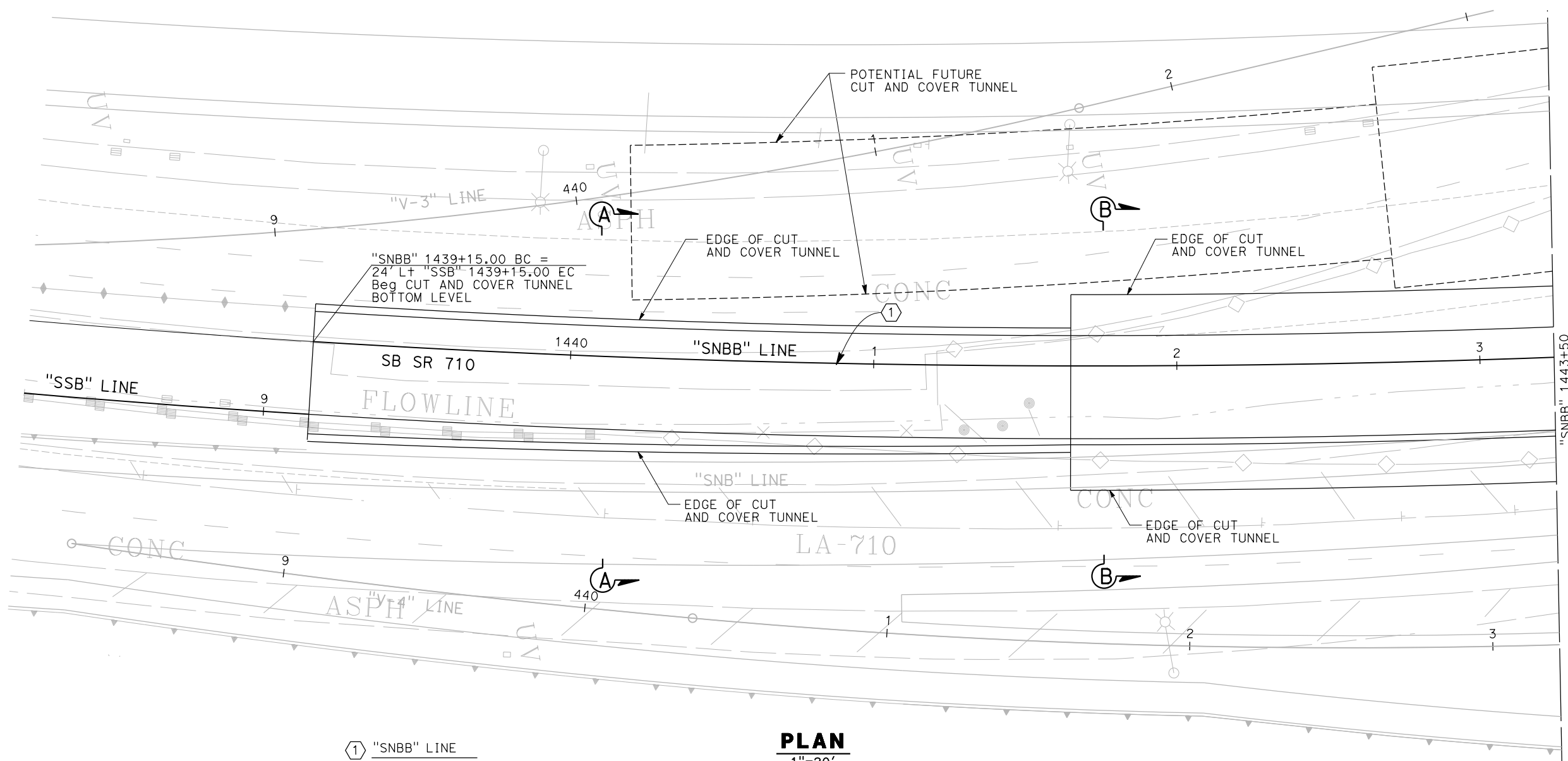
<b>M. Atiqullah</b> PROJECT ENGINEER		<b>PLANNING STUDY</b>	
		<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO.	TBD	UNIT:	
SCALE:	AS SHOWN	PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT	
SIGN OFF DATE	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	

METRO  
ONE GATEWAY PLAZA  
LOS ANGELES, CA 90012

CH2M HILL  
1000 WILSHIRE BLVD, SUITE 2100  
LOS ANGELES, CA 90017



① "SNBB" LINE  
 $R = 4100.00'$   
 $\Delta = 16^\circ 40' 08''$   
 $T = 600.65'$   
 $L = 1192.81'$

**PLAN**  
 1"=20'

**FREeway TUNNEL ALTERNATIVE  
 SINGLE BORE OPTION**

**STRUCTURE PLAN NO. 1  
 (BOTTOM LEVEL)**

**NOTE:**  
 1. For Sections A-A and B-B, see  
 "TYPICAL SECTION No. 1" sheet.

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

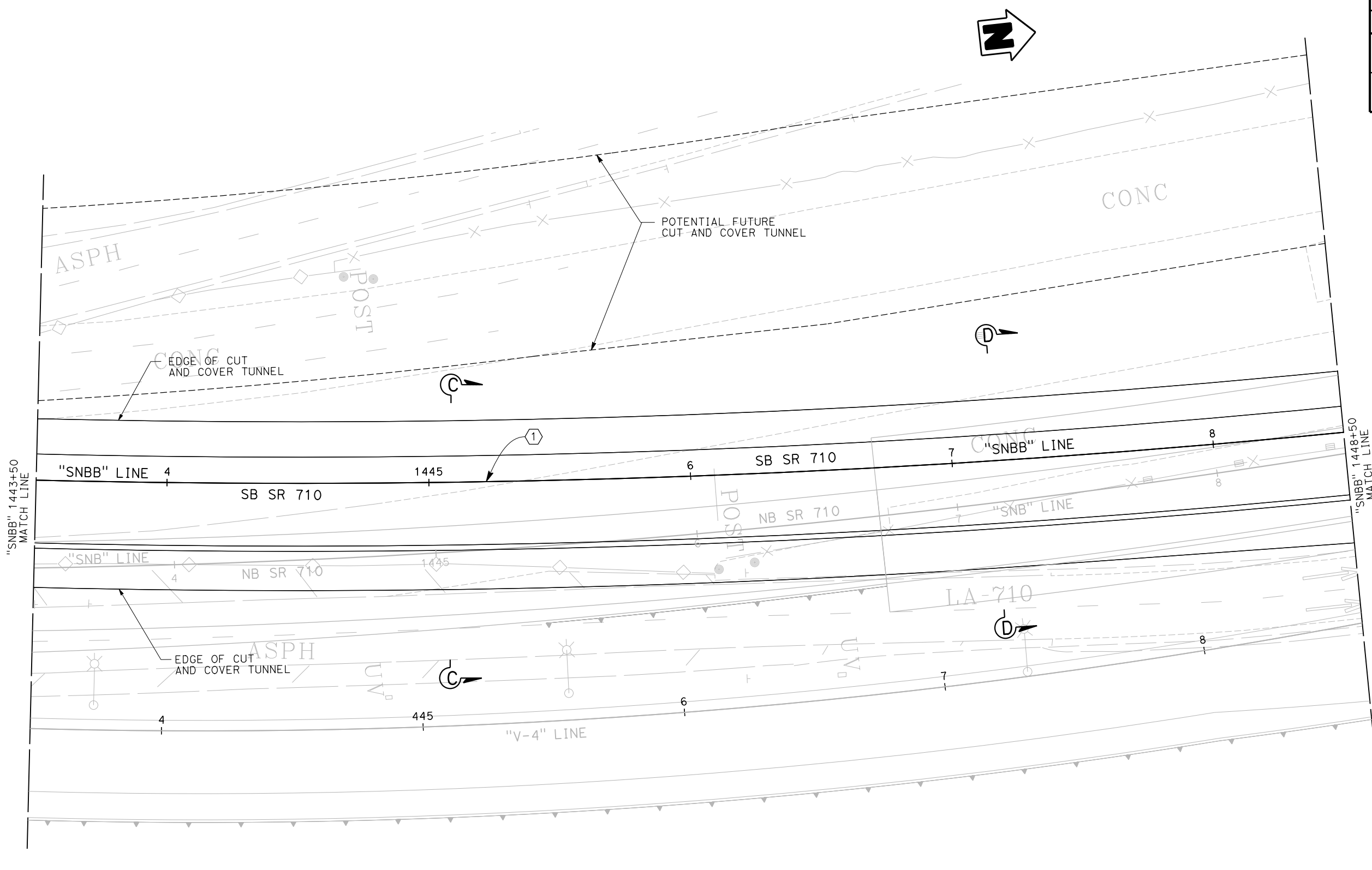
M. Atiqullah  
 PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT
SIGN OFF DATE



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



① "SNBB" LINE  
 R = 4100.00'  
 Δ = 16° 40' 08"  
 T = 600.65'  
 L = 1192.81'

**PLAN**  
 1"=20'

**FREeway TUNNEL ALTERNATIVE  
 SINGLE BORE OPTION**  
**STRUCTURE PLAN NO. 2  
 (BOTTOM LEVEL)**

DESIGN OVERSIGHT
SIGN OFF DATE

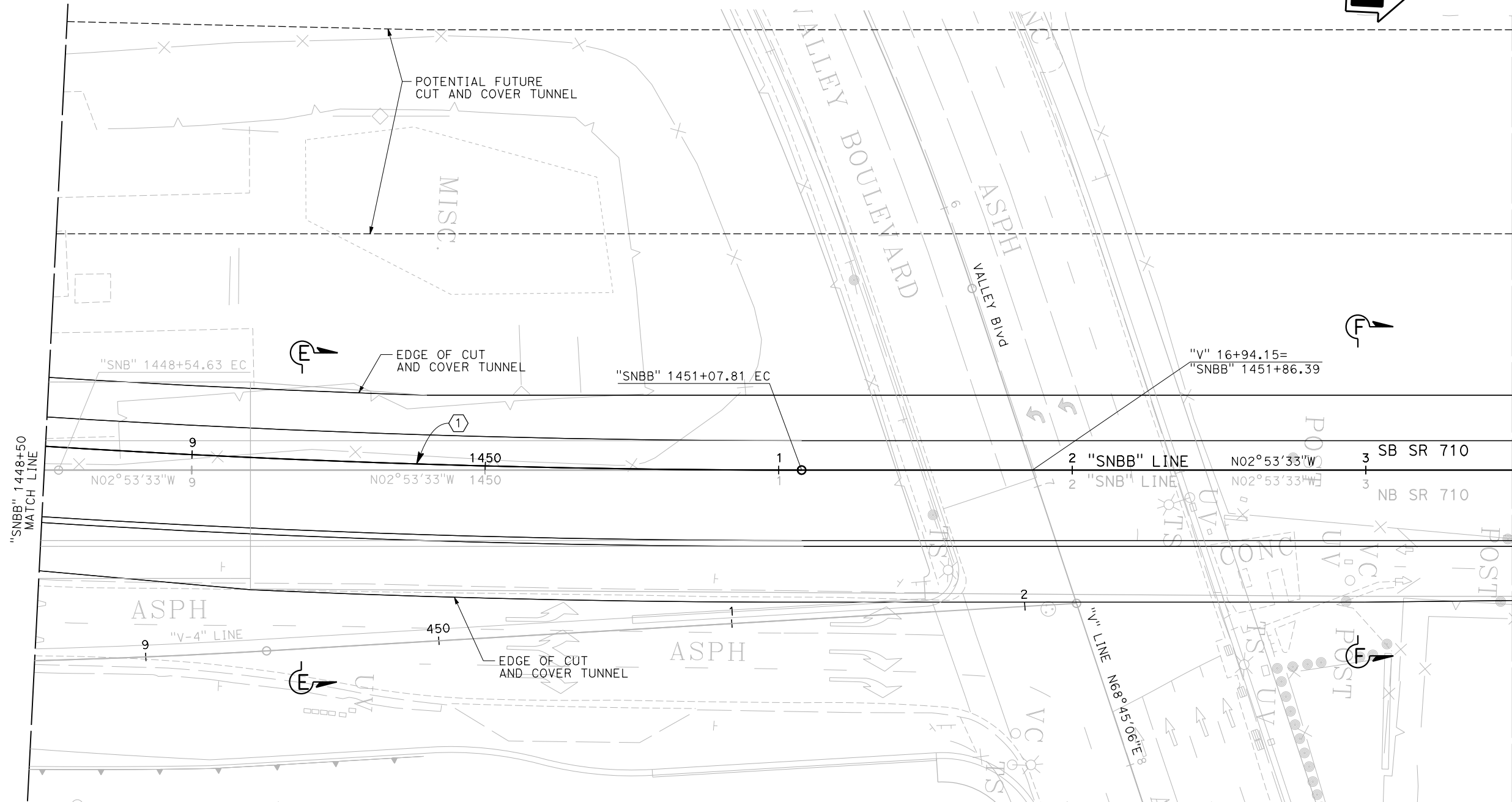
NOTE:  
 1. For Sections C-C and D-D, see "TYPICAL SECTION No. 2" sheet.

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
 PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

① "SNBB" LINE  
 R = 4100.00'  
 Δ = 16°40'08"  
 T = 600.65'  
 L = 1192.81'

**FREEWAY TUNNEL ALTERNATIVE  
 SINGLE BORE OPTION  
 STRUCTURE PLAN NO. 3  
 (BOTTOM LEVEL)**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

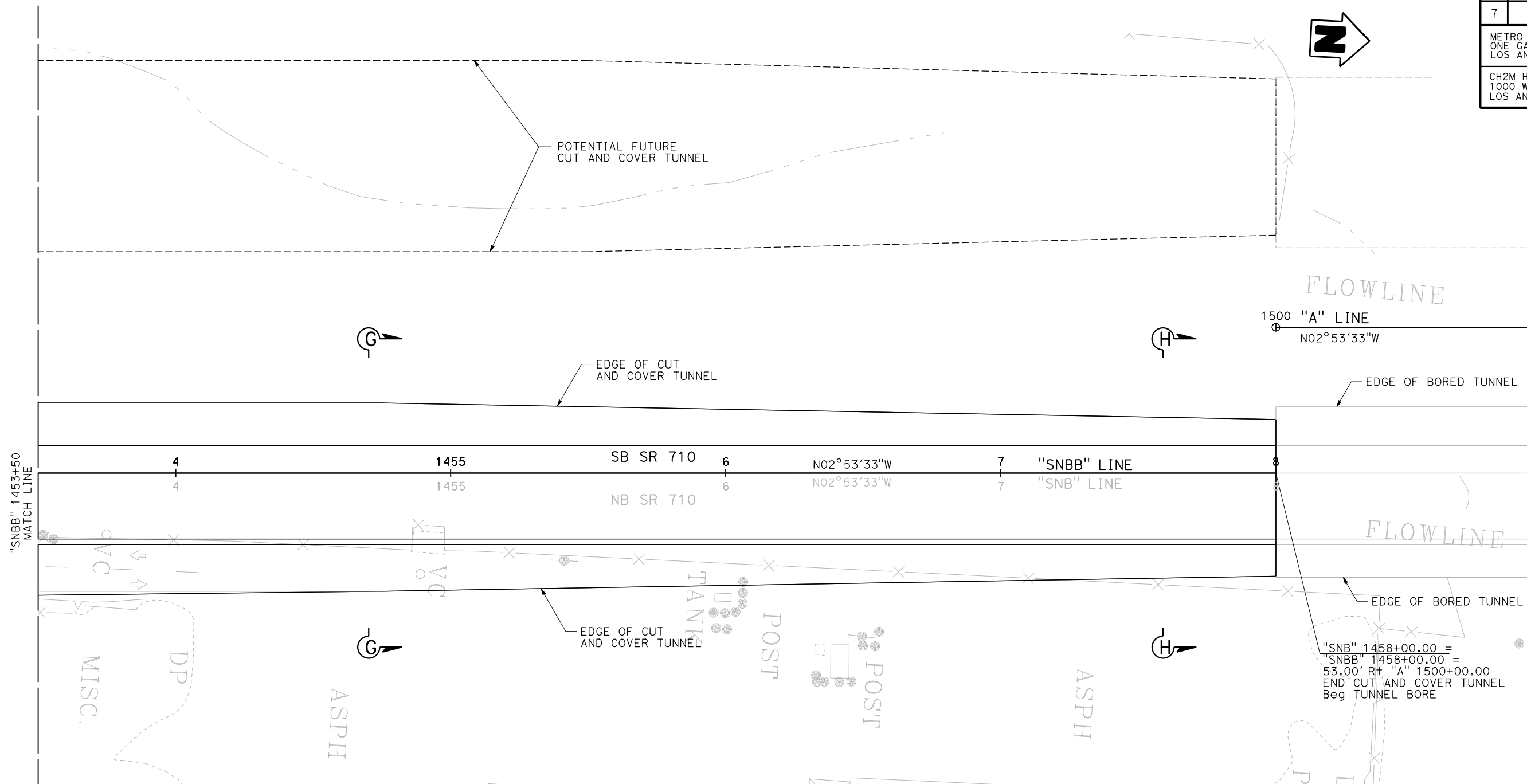
M. Atiqullah  
PROJECT ENGINEER

PLANNING STUDY	
CUT AND COVER TUNNEL (SOUTH PORTAL)	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

NOTE:  
 1. For Sections E-E and F-F, see "TYPICAL SECTION No. 3" sheet.

DESIGN OVERSIGHT
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

**FREeway TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**STRUCTURE PLAN NO. 4  
(BOTTOM LEVEL)**

**NOTE:**  
1. For Sections G-G and H-H, see "TYPICAL SECTION No. 4" sheet.

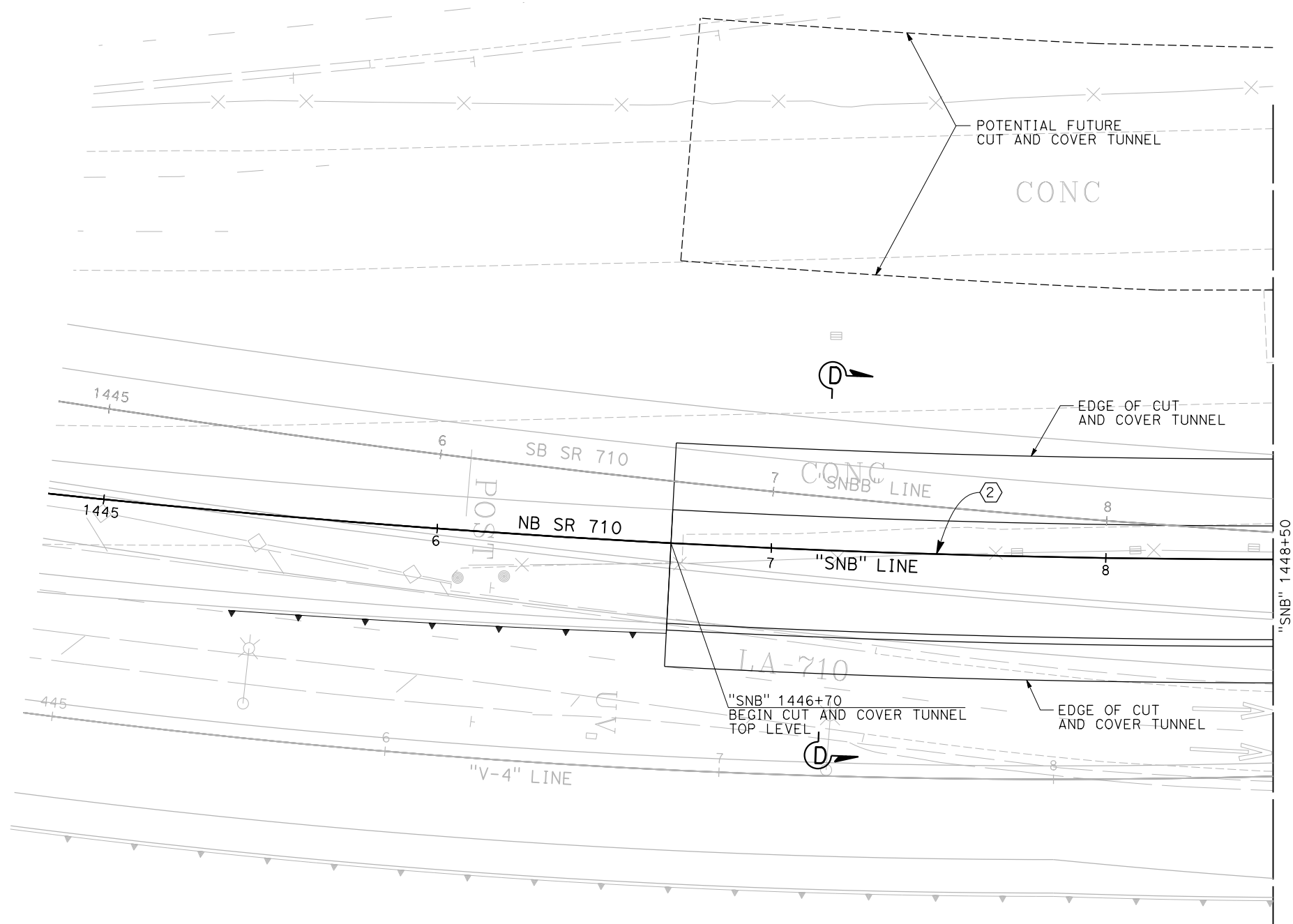
DESIGN OVERSIGHT
SIGN OFF DATE

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

PLANNING STUDY	
CUT AND COVER TUNNEL (SOUTH PORTAL)	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

**CURVE DATA**

② "SNB" LINE  
 R = 3500.00'  
 Δ = 26°24'00"  
 T = 820.92'  
 L = 1612.69'

**NOTE:**

1. For Section D-D, see "TYPICAL SECTION No. 2" sheet.

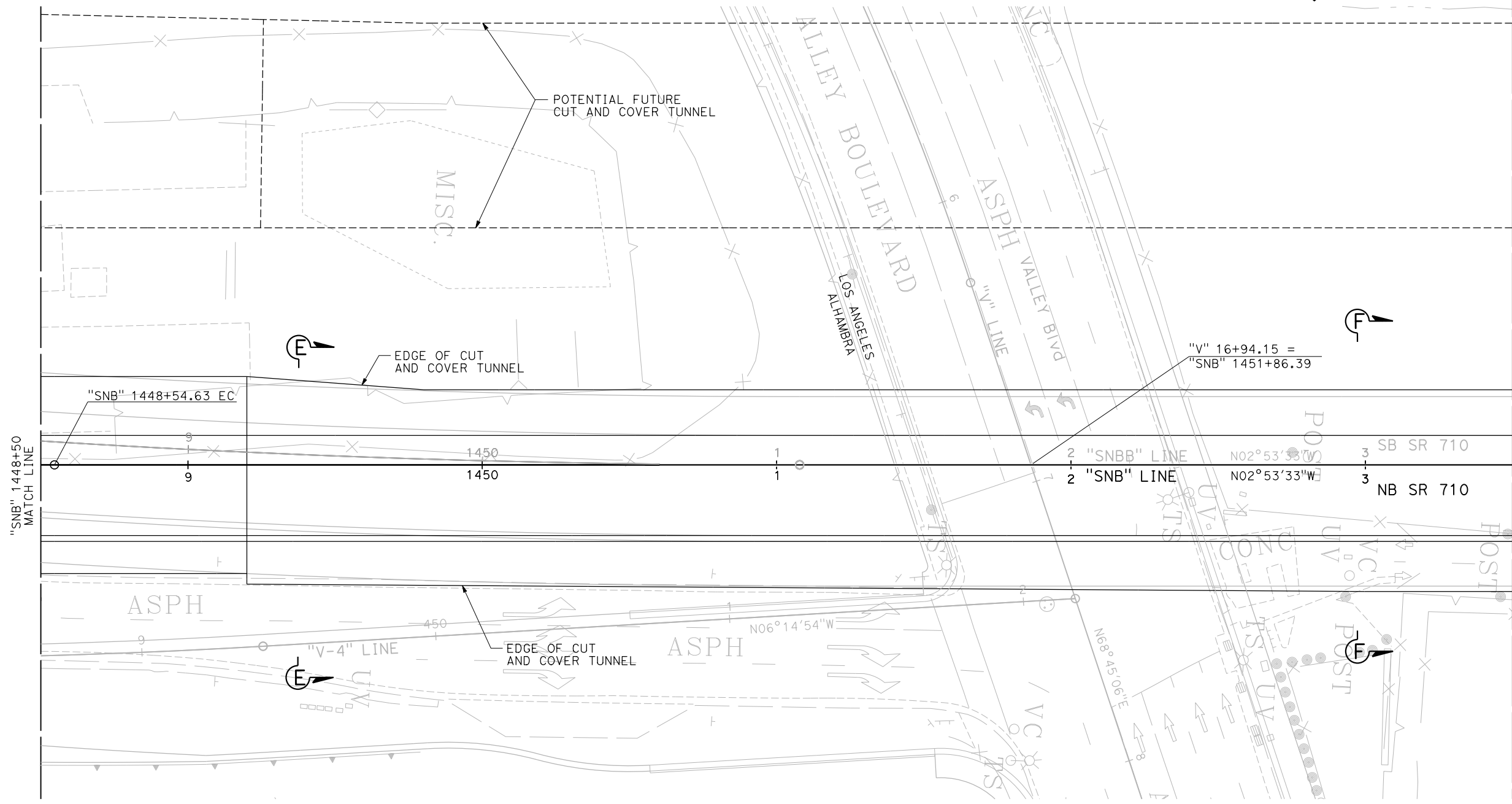
DESIGN OVERSIGHT  
 SIGN OFF DATE

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
 PROJECT ENGINEER

<b>FREEWAY TUNNEL ALTERNATIVE SINGLE BORE OPTION</b>	
<b>STRUCTURE PLAN NO. 5 (TOP LEVEL)</b>	
<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

**FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**STRUCTURE PLAN NO. 6  
(TOP LEVEL)**

**NOTE:**  
1. For Sections E-E and F-F, see "TYPICAL SECTION No. 3" sheet.

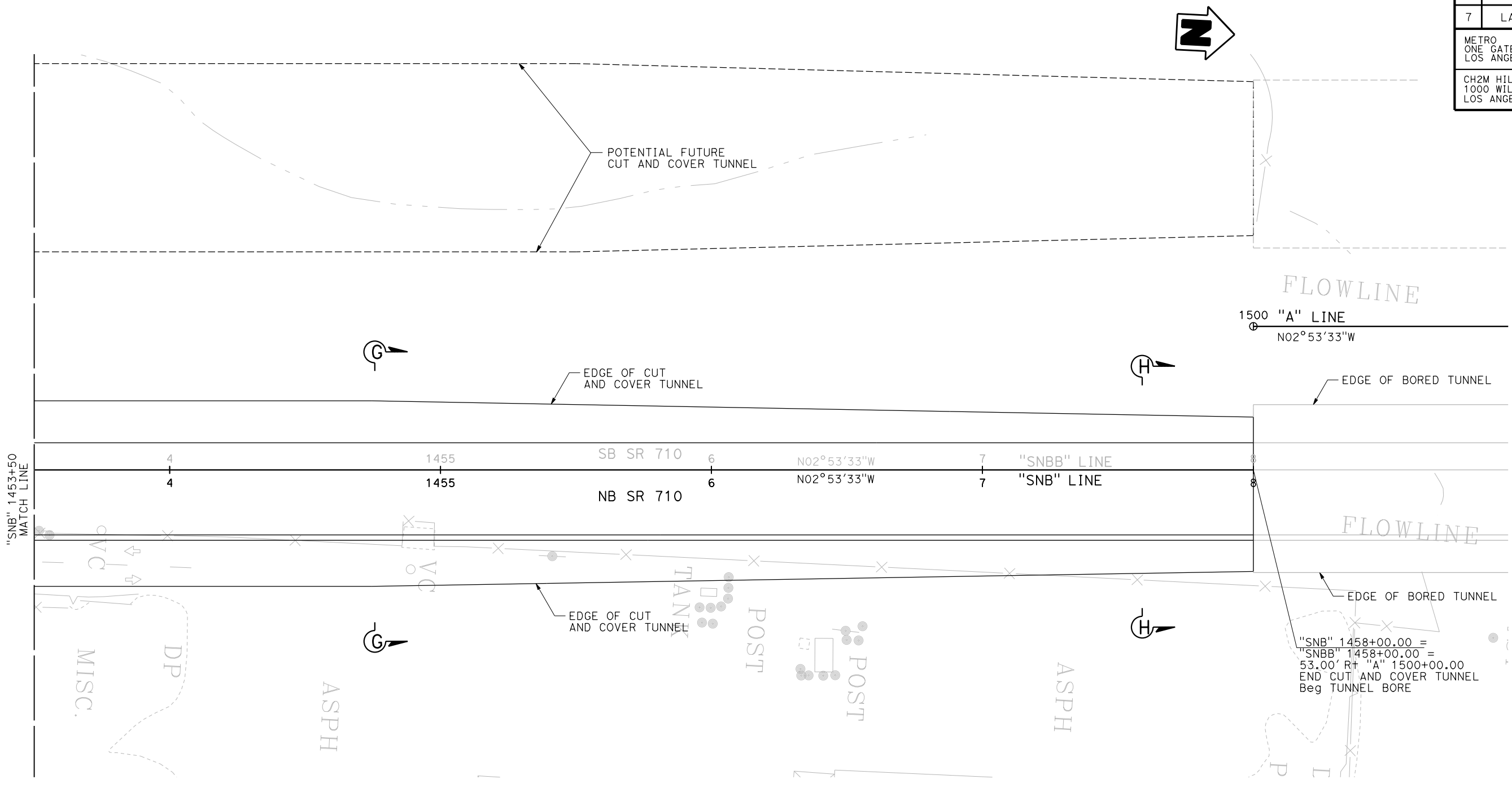
DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

PLANNING STUDY	
CUT AND COVER TUNNEL (SOUTH PORTAL)	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



"SNB" 1453+50  
MATCH LINE

FLOWLINE  
1500 "A" LINE  
N02°53'33"W

POTENTIAL FUTURE  
CUT AND COVER TUNNEL

EDGE OF CUT  
AND COVER TUNNEL

EDGE OF BORED TUNNEL

SB SR 710  
NB SR 710  
N02°53'33"W  
N02°53'33"W

"SNBB" LINE  
"SNB" LINE

FLOWLINE

EDGE OF CUT  
AND COVER TUNNEL

EDGE OF BORED TUNNEL

"SNB" 1458+00.00 =  
"SNBB" 1458+00.00 =  
53.00' R+ "A" 1500+00.00  
END CUT AND COVER TUNNEL  
Beg TUNNEL BORE

MISC.

DP

ASPH

TANK

POST

POST

ASPH

**PLAN**  
1"=20'

**FREWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**STRUCTURE PLAN NO. 7  
(TOP LEVEL)**

NOTE:  
1. For Sections G-G and H-H, see  
"TYPICAL SECTION No. 4" sheet.

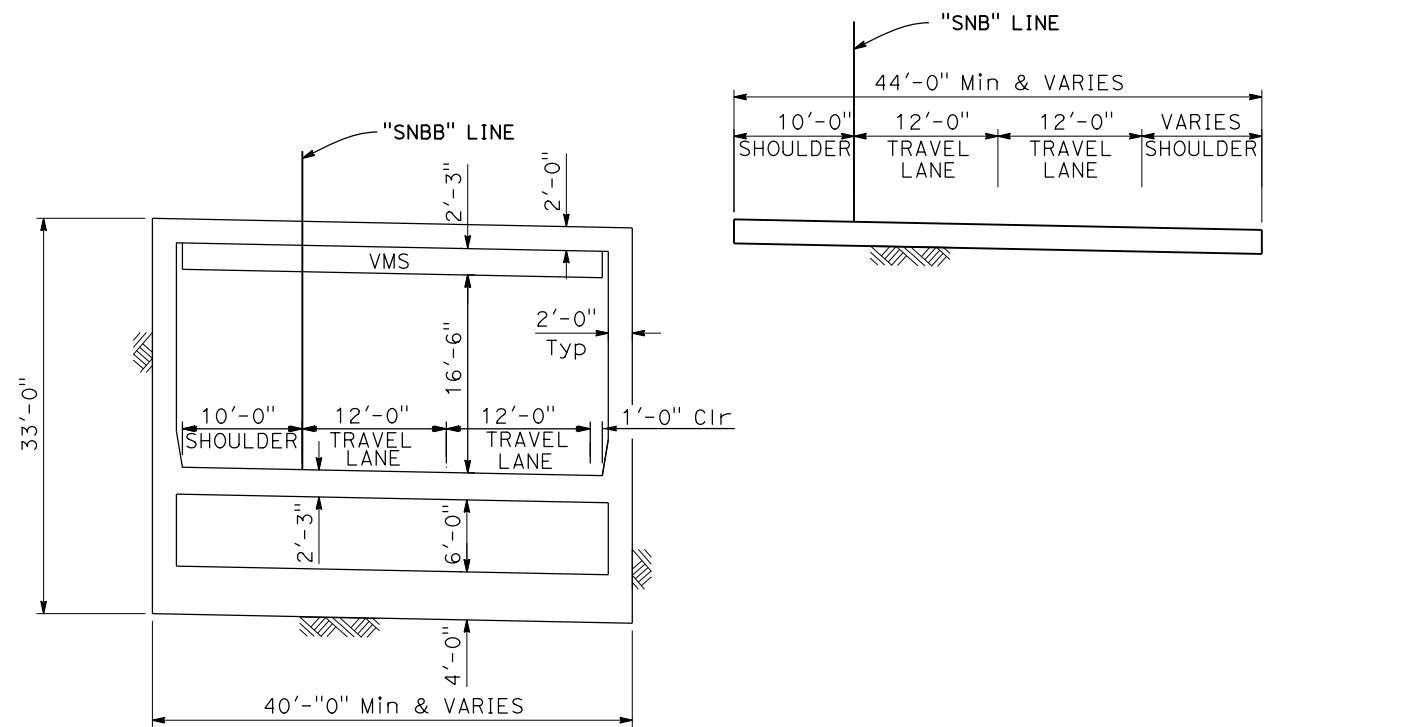
DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

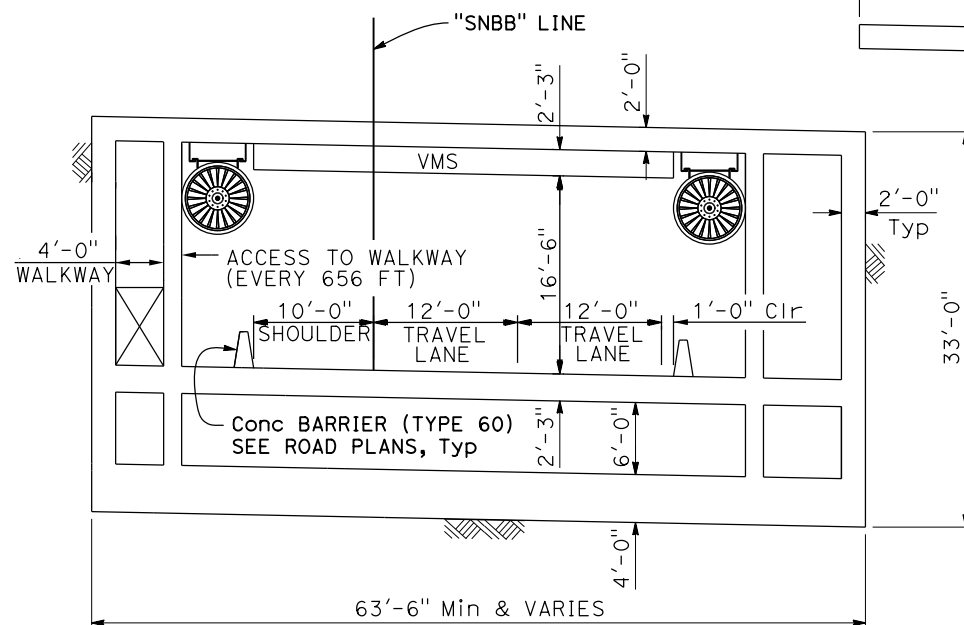
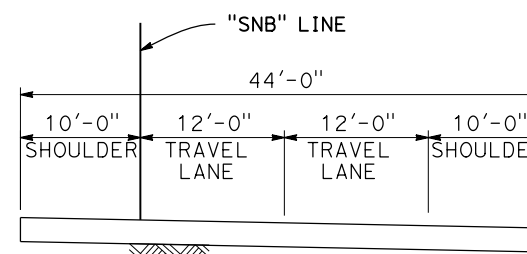
<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION A-A**  
1/8"=1'-0"



**SECTION B-B**  
1/8"=1'-0"

**FREeway TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**TYPICAL SECTION NO. 1**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

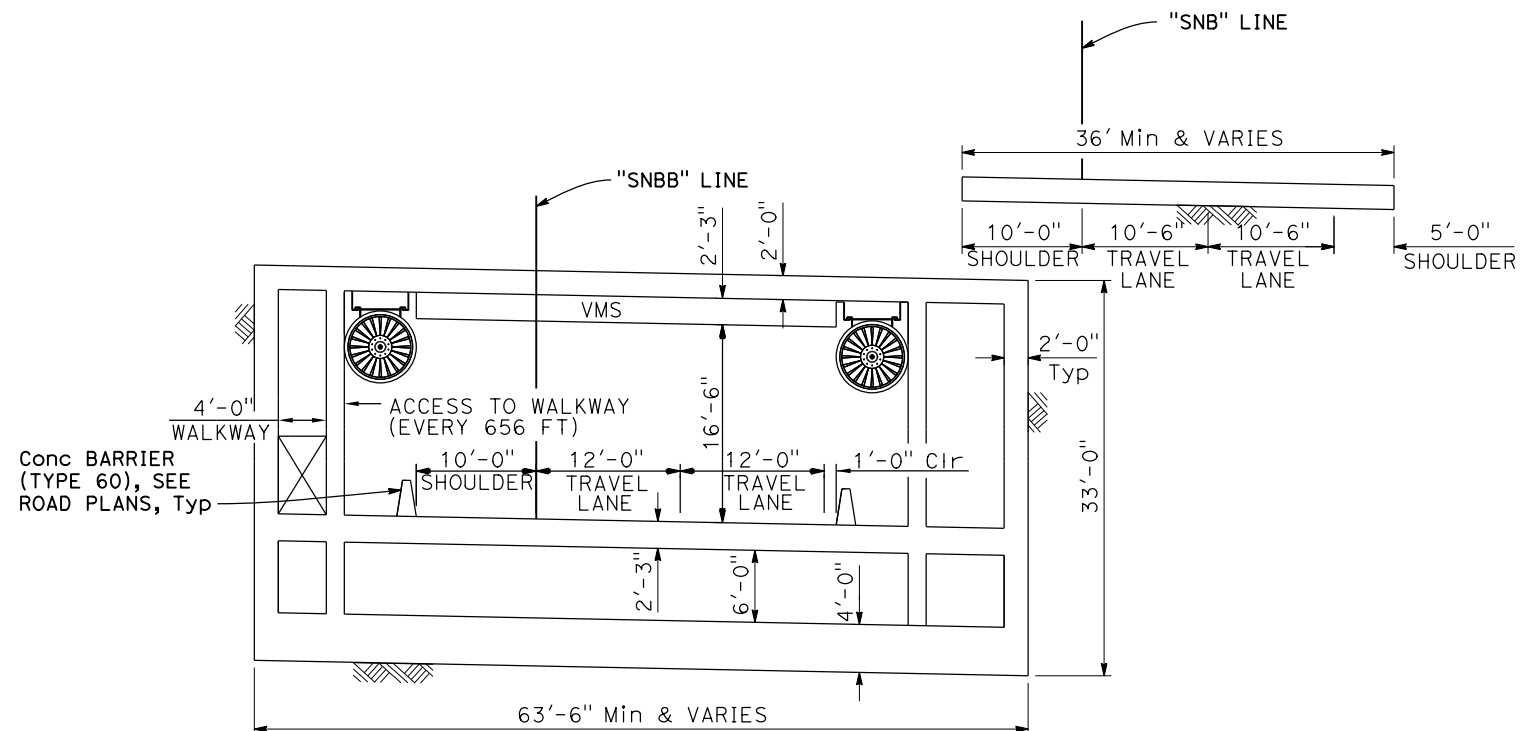
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<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO. TBD	UNIT:
SCALE: 1/8"=1'-0"	PROJECT NUMBER & PHASE:

**NOTE:**

- For location of Sections A-A and B-B, see "STRUCTURE PLAN No. 1 (BOTTOM LEVEL)", AND "STRUCTURE PLAN No. 5 (TOP LEVEL)" sheets.

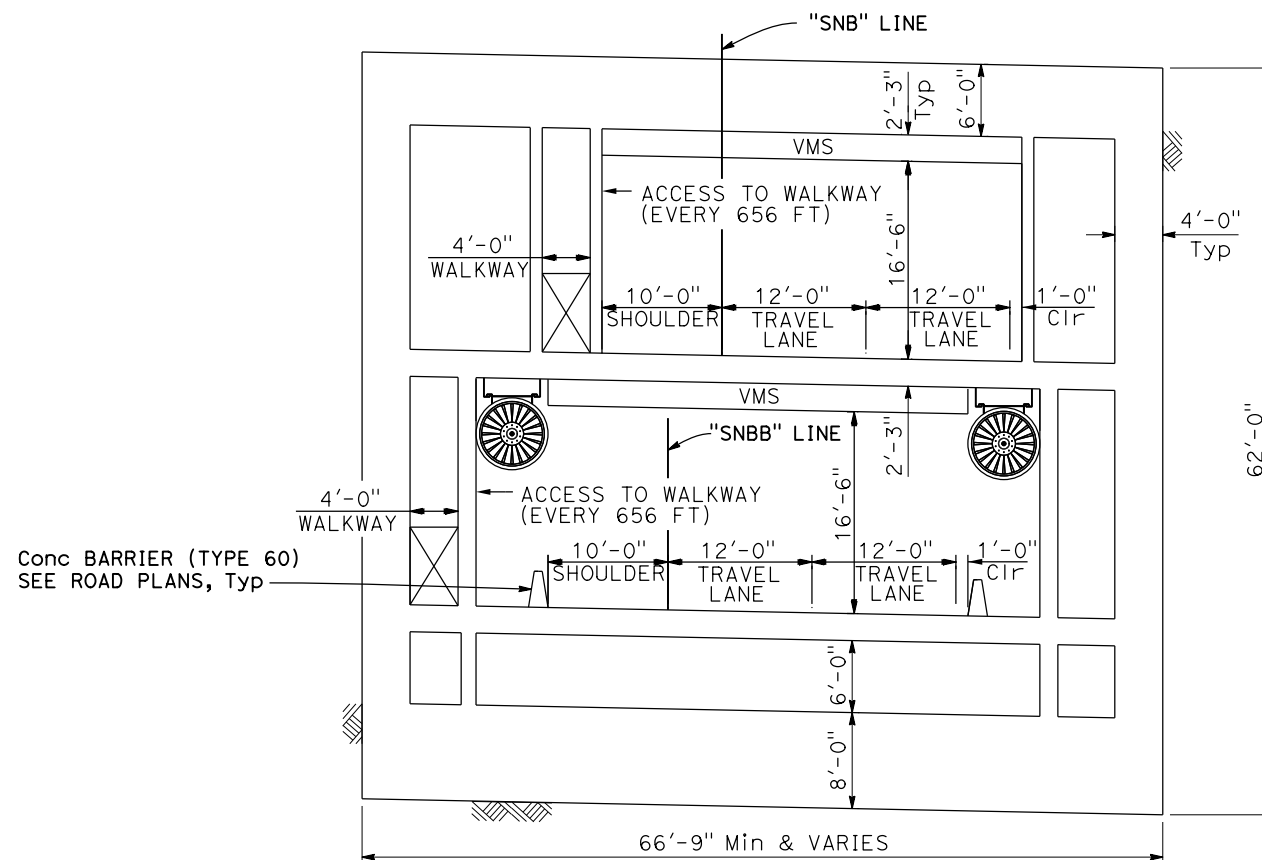
DESIGN OVERSIGHT
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION C-C**

1/8"=1'-0"



**SECTION D-D**

1/8"=1'-0"

**NOTE:**

- For location of Sections C-C and D-D, see "STRUCTURE PLAN No. 2 (BOTTOM LEVEL)" AND "STRUCTURE PLAN No. 6 (TOP LEVEL)" sheets.

**FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**TYPICAL SECTION NO. 2**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

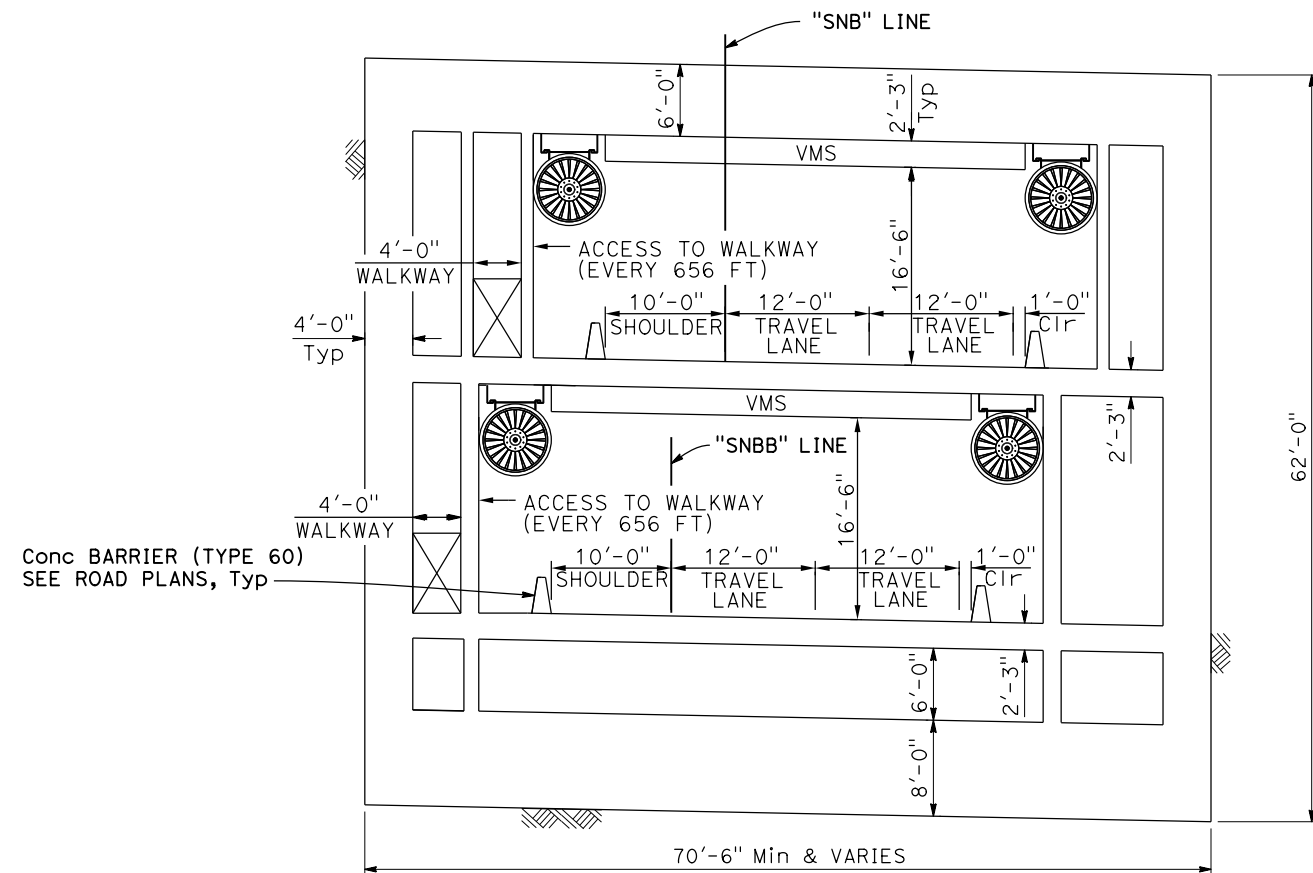
M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1/8"=1'-0"
PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT
SIGN OFF DATE

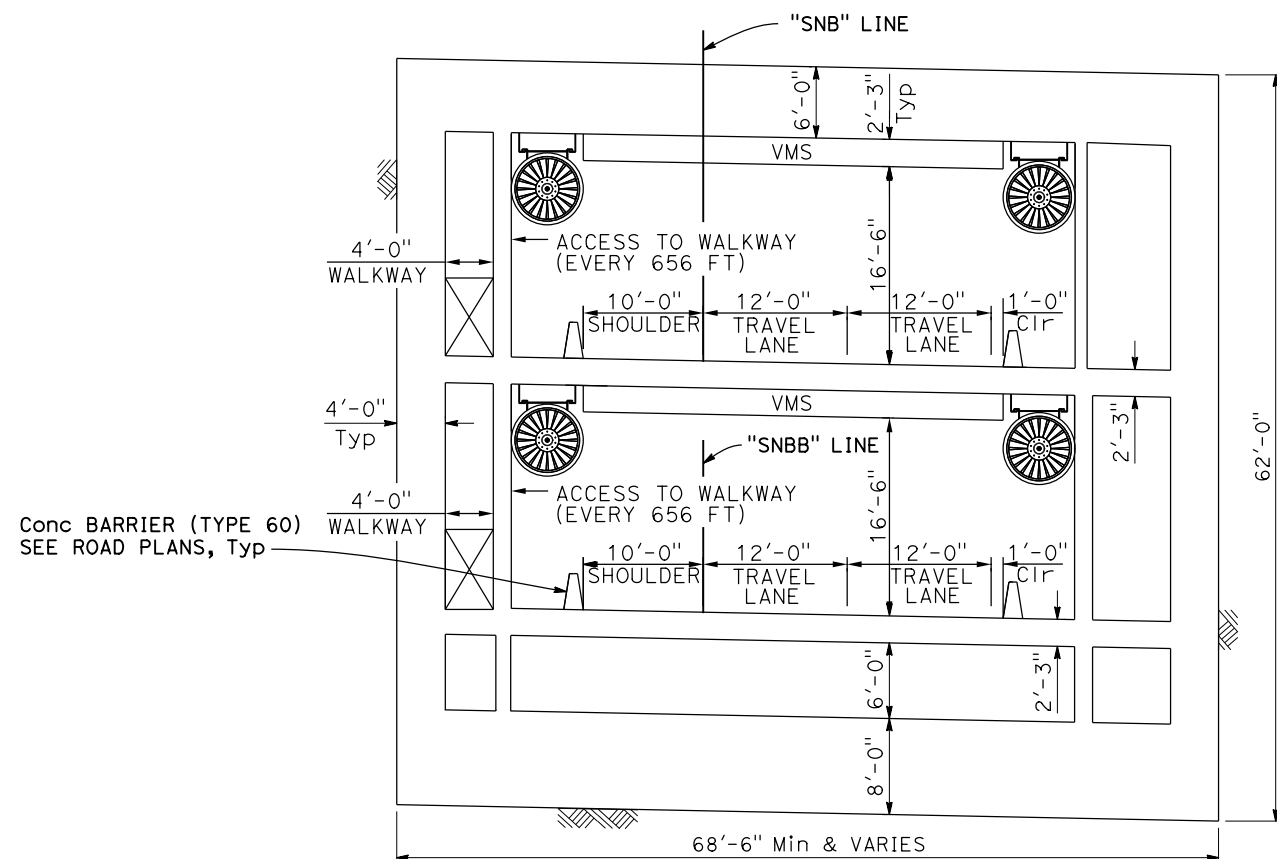


DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION E-E**

1/8"=1'-0"



**SECTION F-F**

1/8"=1'-0"

**NOTE:**

- For location of Sections E-E and F-F, see "STRUCTURE PLAN No. 3 (BOTTOM LEVEL)" & "STRUCTURE PLAN No. 7 (TOP LEVEL)" sheets.

**FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**TYPICAL SECTION NO. 3**

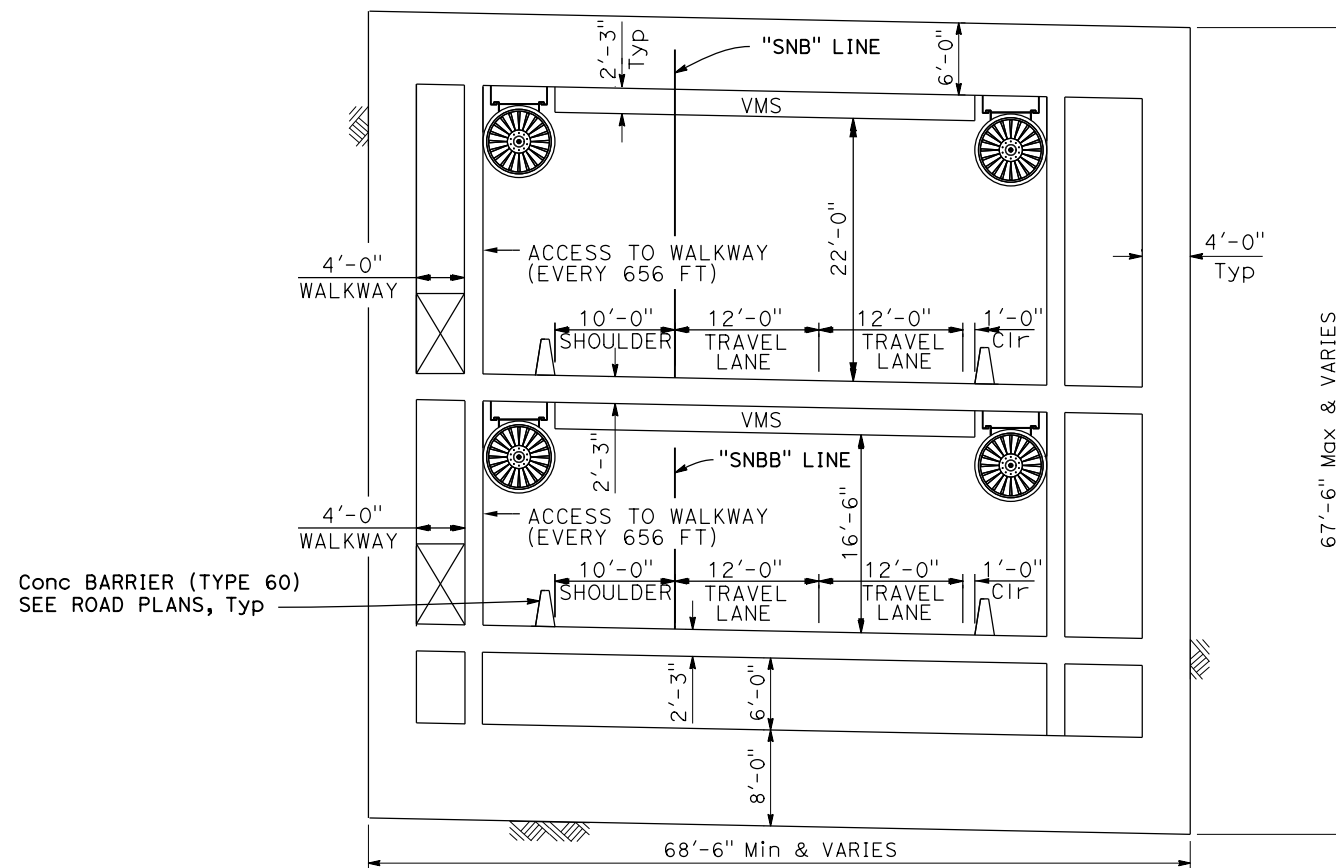
DESIGN OVERSIGHT
SIGN OFF DATE

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

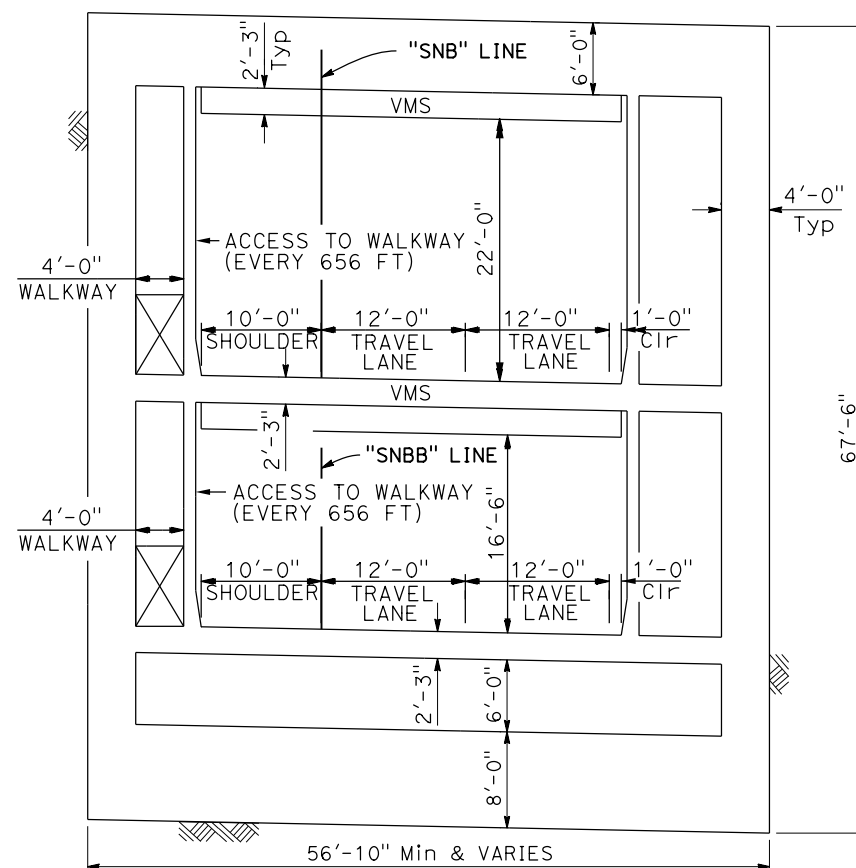
M. Atiqullah
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO. TBD	UNIT:
SCALE: 1/8"=1'-0"	PROJECT NUMBER & PHASE:

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION G-G**  
1/8"=1'-0"



**SECTION H-H**  
1/8"=1'-0"

**NOTE:**

- For location of Sections G-G and H-H, see "STRUCTURE PLAN No. 4 (BOTTOM LEVEL)" & "STRUCTURE PLAN No. 7 (TOP LEVEL)" sheets.

**FREeway TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**TYPICAL SECTION NO. 4**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (SOUTH PORTAL)</b>	
BRIDGE NO. TBD	UNIT:
SCALE: 1/8"=1'-0"	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT
SIGN OFF DATE



SR 710 North Study

ATTACHMENT K-3e

Task 7.2 Advance Planning Study Report

---

# State Route 710 North Study Advance Planning Study Report Cut and Cover Tunnel (North Portal)

## Freeway Tunnel Alternative Single Bore Option

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

June 2014

**CH2MHILL®**

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017





# SR 710 North Study

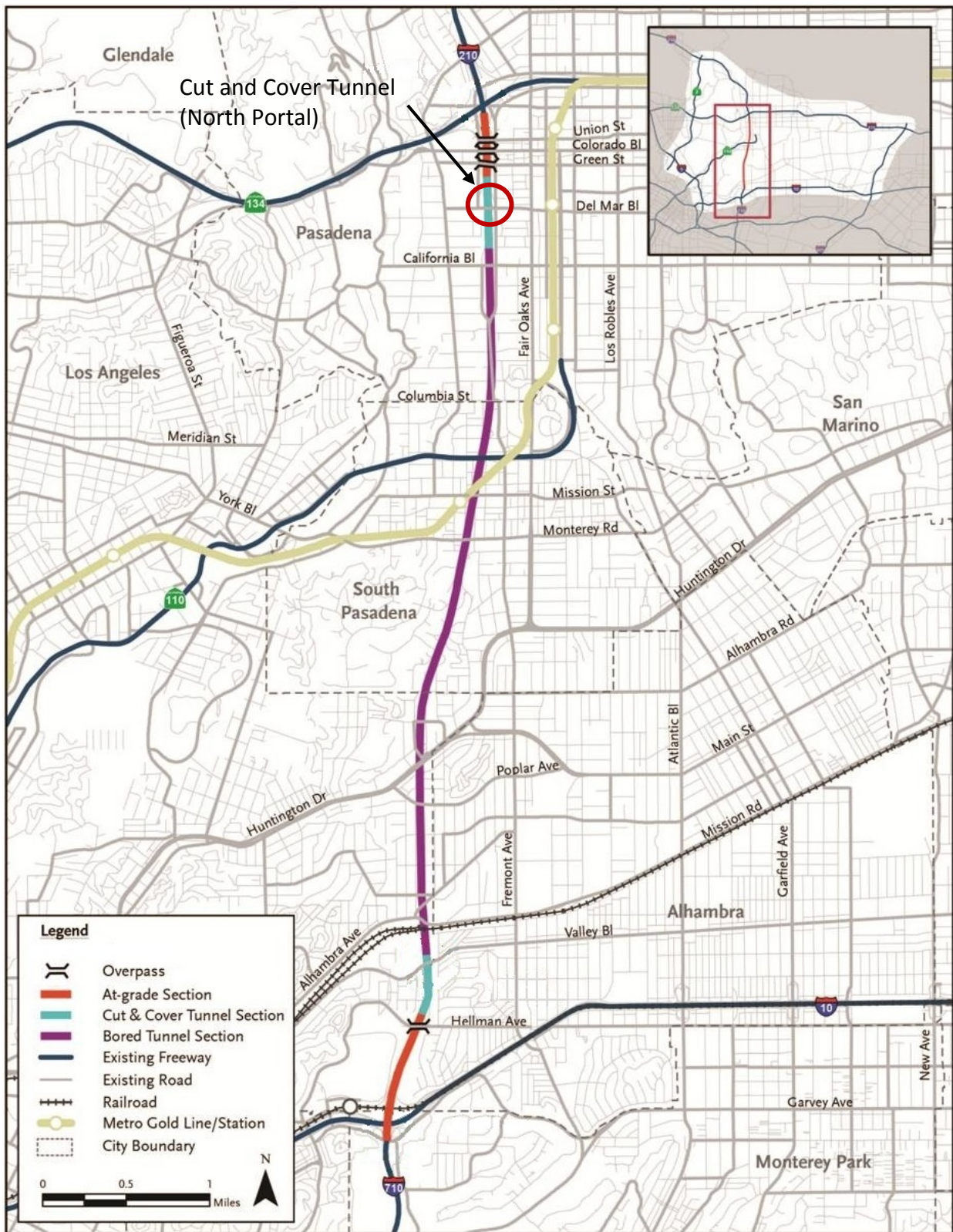
PREPARED FOR: Metropolitan Transportation Authority  
 COPY TO: Caltrans Study Team  
 PREPARED BY: CH2M HILL Team  
 DATE: June 6, 2014  
 PROJECT NUMBER: 428908

**Cut and Cover Tunnel (North Portal)**  
**Freeway Tunnel Alternative**  
**Single Bore Option**

### Table of Contents

	<u>Page No.</u>
Project Vicinity Map	2
Design Memorandum	3
<b>Attachments</b>	
A Consultant Prepared Advance Planning Study (APS) Checklist	
B Advance Planning Study Cost Estimate	
C Advance Planning Study Plan	





**Project Vicinity Map  
 State Route 710 North Study  
 Freeway Tunnel Alternative Alignment  
 Single Bore Option**

## Assumptions Used for Cut and Cover Tunnel (North Portal) – Advance Planning Study

1. The proposed Cut and Cover (C&C) Tunnel (North Portal) will be an integral part of the State Route (SR) 710 North Study Project. The North Portal C&C Tunnel will begin north of California Boulevard and end north of Del Mar Boulevard. The purpose of the proposed project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes
  - Minimize environmental impacts
2. There are two options for Freeway Tunnel Alternative for the future SR 710 corridor:
  - One full-bored tunnel accommodating both directions of traffic with provision for another full-bored tunnel in future (this report is based on this option)
  - Two full-bored tunnels accommodating one direction of traffic in each tunnel (documented in separate report)
3. The main purpose of the C&C Tunnel system is to serve as the transition of the SR 710 Freeway between the surface level traffic and the full-bore tunnel traffic.
4. The current North Portal design provides the following lengths for each route:
  - a. Northbound (NB) direction upper level: 1,389 feet
  - b. Southbound (SB) direction lower level: 1,640 feet
5. The typical two-level C&C Tunnel section will have varying width and height. The width will vary from a minimum 56 feet 10 inches, and the height will vary from a minimum 62 feet. The top slab will be 6 feet thick and the bottom slab will be 8 feet thick, while exterior walls will be 4 feet thick. There will be an interior concrete slab dividing the box in the top and bottom levels. In this way, each level will accommodate traffic lanes for a minimum of four total traffic lanes per tunnel section.
6. The width of each single-level C&C Tunnel will also vary along the length. The width will vary from a minimum of 40 feet and the height will be 33 feet.
7. Within the C&C Tunnel section, 6-ft-diameter jet fans will be located outside the edge of shoulder as part of the tunnel ventilation system.
8. The C&C Tunnel will also contain a continuous firewall on each deck that shields a 4-foot walkway in case of emergency. These walkways will be located next to the inside shoulder of each tunnel and will be connected via cross-passages.
9. There will be a transition zone where the C&C Tunnel will gradually taper in height with distance from the bored tunnel circular cross section to the cut and cover tunnel's rectangular cross-section. This will help manage the aerodynamic flow of the ventilation system across the two sections.
10. Each deck level will include a 4-foot inside walkway, a 10-foot inside shoulder, two or three typical 12-foot traffic lanes, and a 1-foot minimum varying clear area.
11. A minimum vertical clearance of 16 feet 6 inches will be maintained across the traveled way for traffic, and there will be an additional 2 feet 3 inches clearance for signage.

12. The C&C Tunnel design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and Seismic Design Criteria. The Acceleration Response Spectrum curve, as will be recommended in the foundation report, will be used for seismic loading in a future phase of design.
13. According to the Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014), the subsurface material is considered to have a very low potential for liquefaction because of the deep groundwater elevation and the dense soil condition. Moreover, the top 80 to 100 feet of soil layers will be removed during the excavation and will be replaced by compacted granular soil after tunnel construction is completed. The Seismic Hazard Zones Map for Pasadena 7.5-Minute Quadrangle (California Division of Mines and Geology, 1999) also indicates that the proposed site is not located in an area where historical occurrence of liquefaction or potential for liquefaction is noted. The proposed structure does not need to account for liquefaction in the preliminary design. Additional geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.
14. Falsework will be required to build the C&C Tunnel. Traffic will not pass under falsework during construction.
15. As-built plans of existing utilities have not been made available yet. Temporary and/or permanent utility relocation, if necessary, will be confirmed in the final design phase after the as-built utility plans and field investigation results have been reviewed.
16. No known hazardous material exists at the tunnel site.
17. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
18. The overall tunnel construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$155,895,000. The cost of tunnel excavation, backfill and construction of the slurry walls with tiebacks is included in the roadway estimate.



**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

---



# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710 KP(PM)
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): To be Assigned	Bridge Name(s): Cut and Cover Tunnel (North Portal)	
Total number of bridges in project: <b>Many, only one</b> bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer. (Mark **N/A** if not applicable)


- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- N/A Grades or spot elevations of roadway below the structure.
- N/A Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- N/A Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- N/A "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)

# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 2 of 2

## Part B Considerations during the APS design and cost estimate preparation

- |       |   |  |   |  |
|-------|---|--|---|--|
| 1.    | Has this project been discussed with:   | the OSFP Liaison Engineer?             | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|       |   | the Caltrans District Project Manager? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
|       |   | the roadway consultant?                | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/> |   |  |   |  |
| 2.    | Have the Caltrans Structures Maintenance records been reviewed?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | If the records recommend any work for the structure, is it included in the APS?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 3.    | Are there special aesthetic considerations?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 4.    | (Widenings and Modifications)   |  |   |  |
|       | Has this project been reviewed for seismic retrofit requirements?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | Are seismic retrofit requirements included in the APS?  |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 5.    | Any special Railroad requirements?  |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | Shoofly required?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | Cost of shoofly included as a separate item in the project cost estimate?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 6.    | Any special foundation requirements, including scour critical work, special excavation such as Type A, Type D, and/or hazardous or contaminated material?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 7.    | Any special construction requirements, including limited site accessibility or seasonal work?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 8.    | Other items to be included in the cost such as slope paving, approach slabs, and/or adjacent retaining walls?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
| <hr/> |   |  |   |  |
| 9.    | Remove existing bridge?   |  | Yes <input type="checkbox"/>            | No <input checked="" type="checkbox"/> |
|       | Total Deck Area:  |  |   |  |
| <hr/> |   |  |   |  |
| 10.   | Any other unusual or special requirements?  |  | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |
| <hr/> |   |  |   |  |
| 11.   | Provide and attach a consultant prepared Design Memo to summarize and document any important assumptions, discussions, decisions, unusual items, local agency requirements such as aesthetics, improvements in vicinity of the structure, airspace usage, other obstructions, or any items noted above. | Summary attached?                      | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/>            |

Designer: (Printed Name) Mohammed Atiqullah	Designer's Signature: 	Date: March 21, 2014
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**Attachment B**  
**Advance Planning Study Cost Estimate**

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Revised - December 3, 2007

Freeway Tunnel Alternative  
Single Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Cut & Cover Tunnel (North Portal) BR. No.: TBD

TYPE: Reinforced Concrete Cut & Cover Tunnels

CU: \_\_\_\_\_

EA: \_\_\_\_\_

DISTRICT: 07

RTE: 710

CO: LA

PM: \_\_\_\_\_

LENGTH: 1,640.00 WIDTH: \_\_\_\_\_ AREA (SF)= \_\_\_\_\_

DESIGN SECTION: \_\_\_\_\_

# OF STRUCTURES IN PROJECT : \_\_\_\_\_ EST. NO. \_\_\_\_\_

PRICES BY : \_\_\_\_\_ COST INDEX: \_\_\_\_\_

PRICES CHECKED BY : A. Issa DATE: 3/21/2014

QUANTITIES BY : \_\_\_\_\_ DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	STRUCTURAL CONCRETE, TUNNEL		CY	99,551	\$800.00	\$79,641,185
2	BAR REINFORCING STEEL (TUNNEL)		LB	29,865,444	\$0.75	\$22,399,083
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

SUBTOTAL	\$102,040,269
TIME RELATED OVERHEAD	\$10,204,027
MOBILIZATION (@ 10%)	\$12,471,588
SUBTOTAL BRIDGE ITEMS	\$124,715,884
CONTINGENCIES (@ 25%)	\$31,178,971
BRIDGE TOTAL COST	\$155,894,855
COST PER SQ. FOOT	
BRIDGE REMOVAL (CONTINGENCIES INCL.)	
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$155,894,855
BUDGET ESTIMATE AS OF	\$155,895,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: **COST OF EARTHWORK IS NOT INCLUDED IN THIS ESTIMATE.**

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$155,895,000
2	\$155,895,000
3	\$155,895,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$155,895,000
5	\$155,895,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.



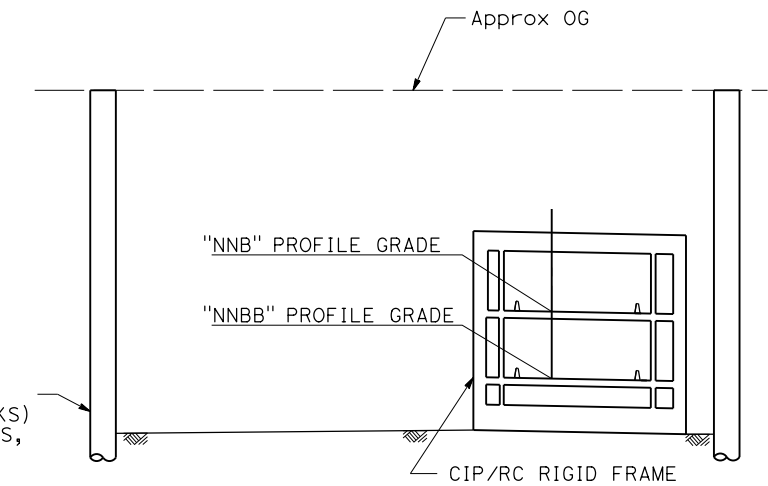
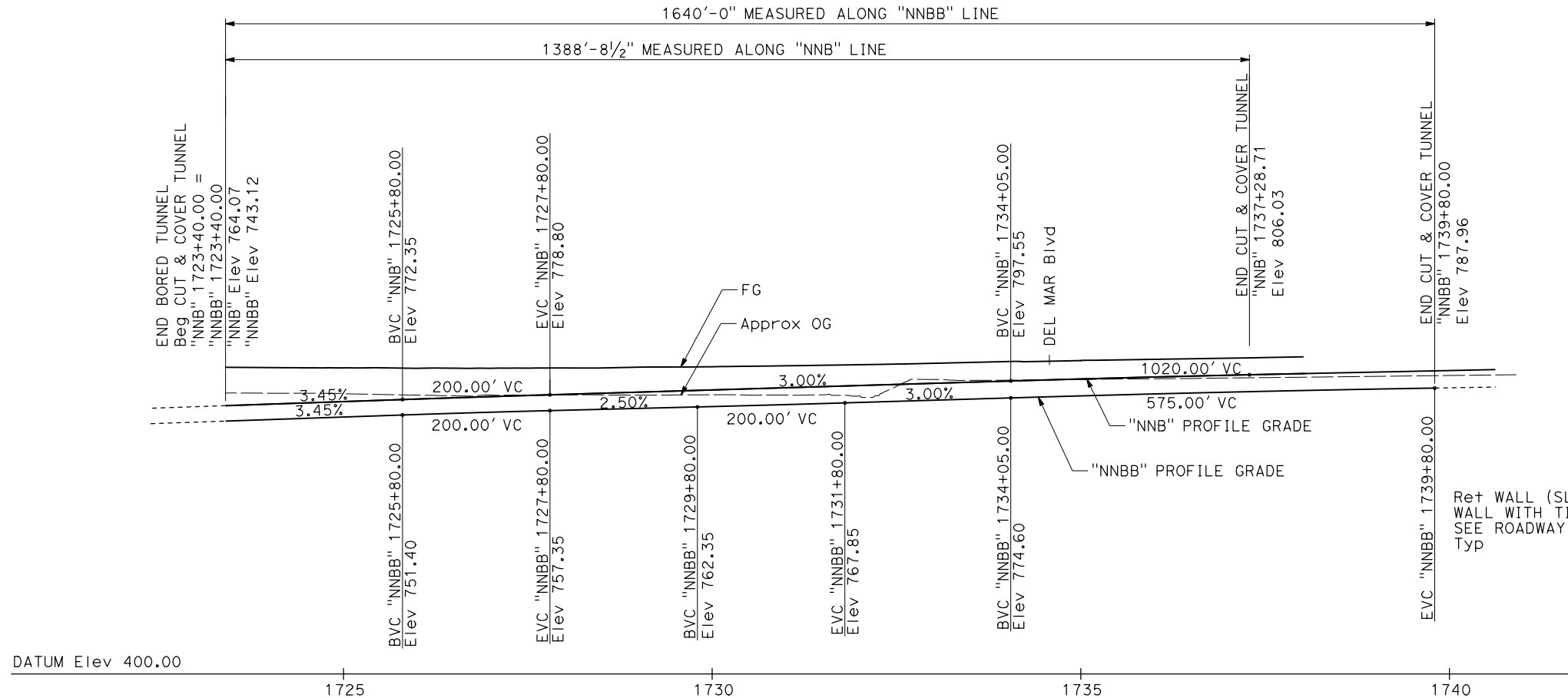


**Attachment C**  
**Advance Planning Study Plan**

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			

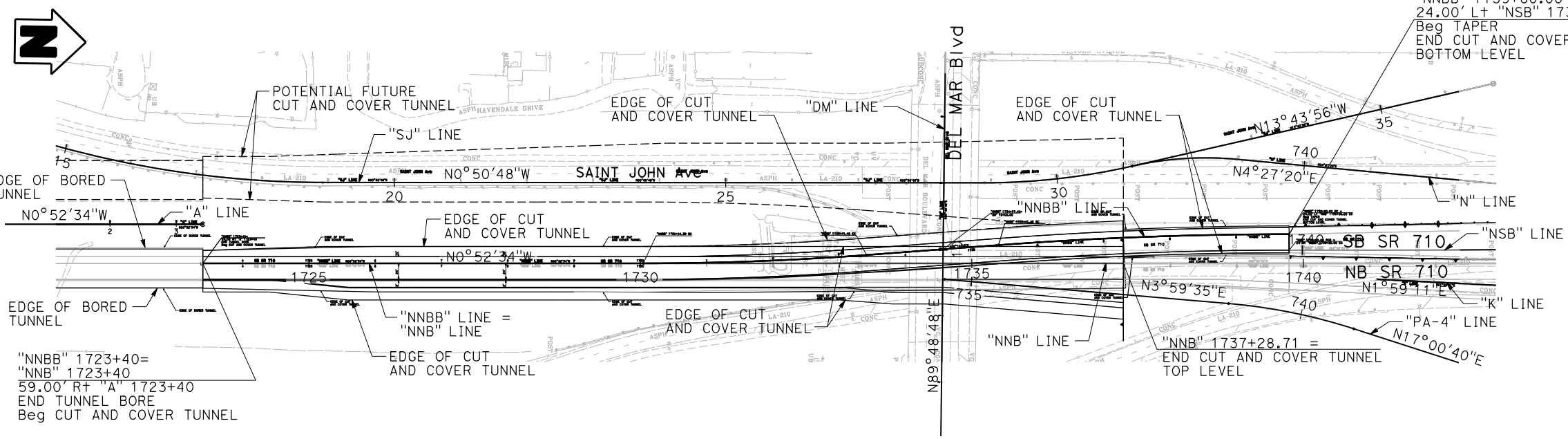


**TYPICAL SECTION**  
1"=30'  
(NEAR BORED TUNNEL)

DATE OF ESTIMATE	MARCH 2014
BRIDGE REMOVAL	N/A
STRUCTURE DEPTH	VARIABLE
LENGTH	1388'-8 1/2" UPPER LEVEL 1640'-0" LOWER LEVEL
WIDTH	VARIABLE
AREA	1,639 SF (AVG)
TOTAL COST*	\$ 155,895,000

\* THE COST OF EARTHWORK IS NOT INCLUDED IN THIS ESTIMATE.

ABBREVIATION:  
VMS Variable Message Sign



**PLAN**  
1"=100'

**FREEWAY TUNNEL ALTERNATIVE SINGLE BORE OPTION**

**GENERAL PLAN**

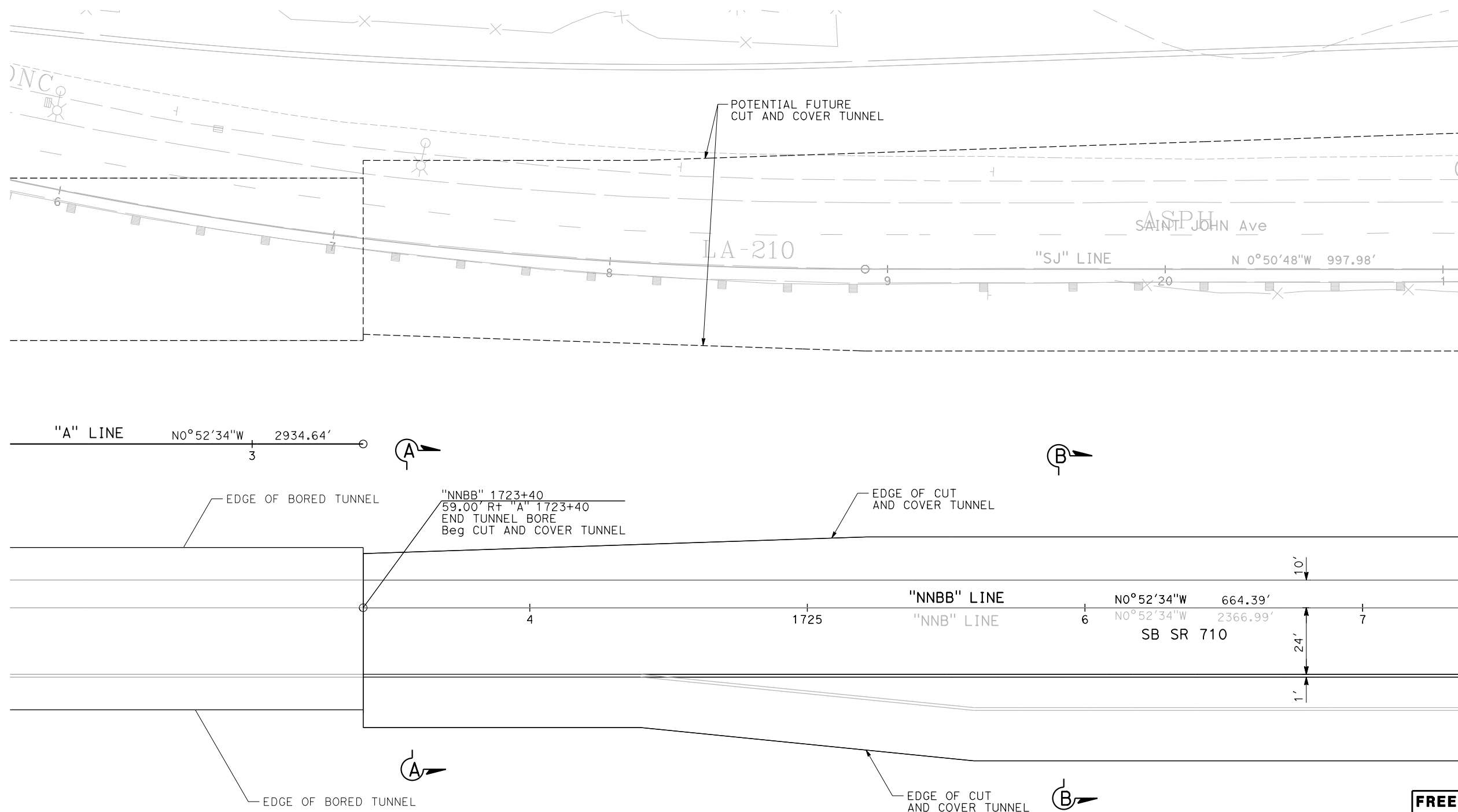
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DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

PLANNING STUDY	
CUT AND COVER TUNNEL (NORTH PORTAL)	
BRIDGE NO. TBD	UNIT:
SCALE: AS SHOWN	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT  
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**FREeway TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**STRUCTURE PLAN NO. 1  
(BOTTOM LEVEL)**

**PLAN**  
1"=20'

NOTE:  
1. For Sections A-A and B-B, see "TYPICAL SECTION No. 1" sheet.

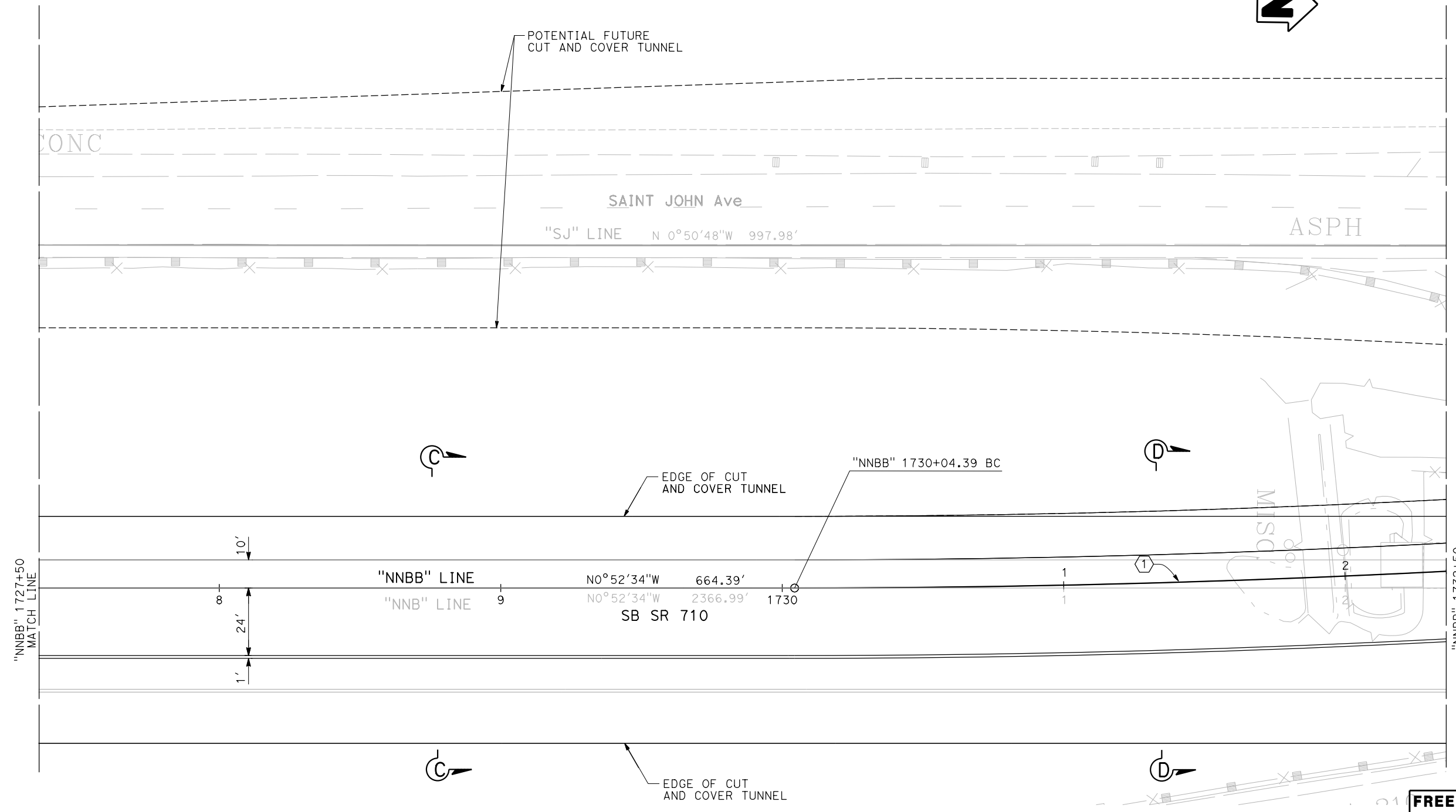
DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

PLANNING STUDY	
CUT AND COVER TUNNEL (NORTH PORTAL)	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT	
SIGN OFF DATE	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**CURVE DATA**

① "NNBB" LINE
R = 4500.00'
Δ = 04°17'30"
T = 168.61'
L = 337.06'

**NOTE:**  
 1. For Sections C-C and D-D, see "TYPICAL SECTION No. 2" sheet.

**PLAN**  
 1"=20'

**FREeway TUNNEL ALTERNATIVE  
 SINGLE BORE OPTION**

**STRUCTURE PLAN NO. 2  
 (BOTTOM LEVEL)**

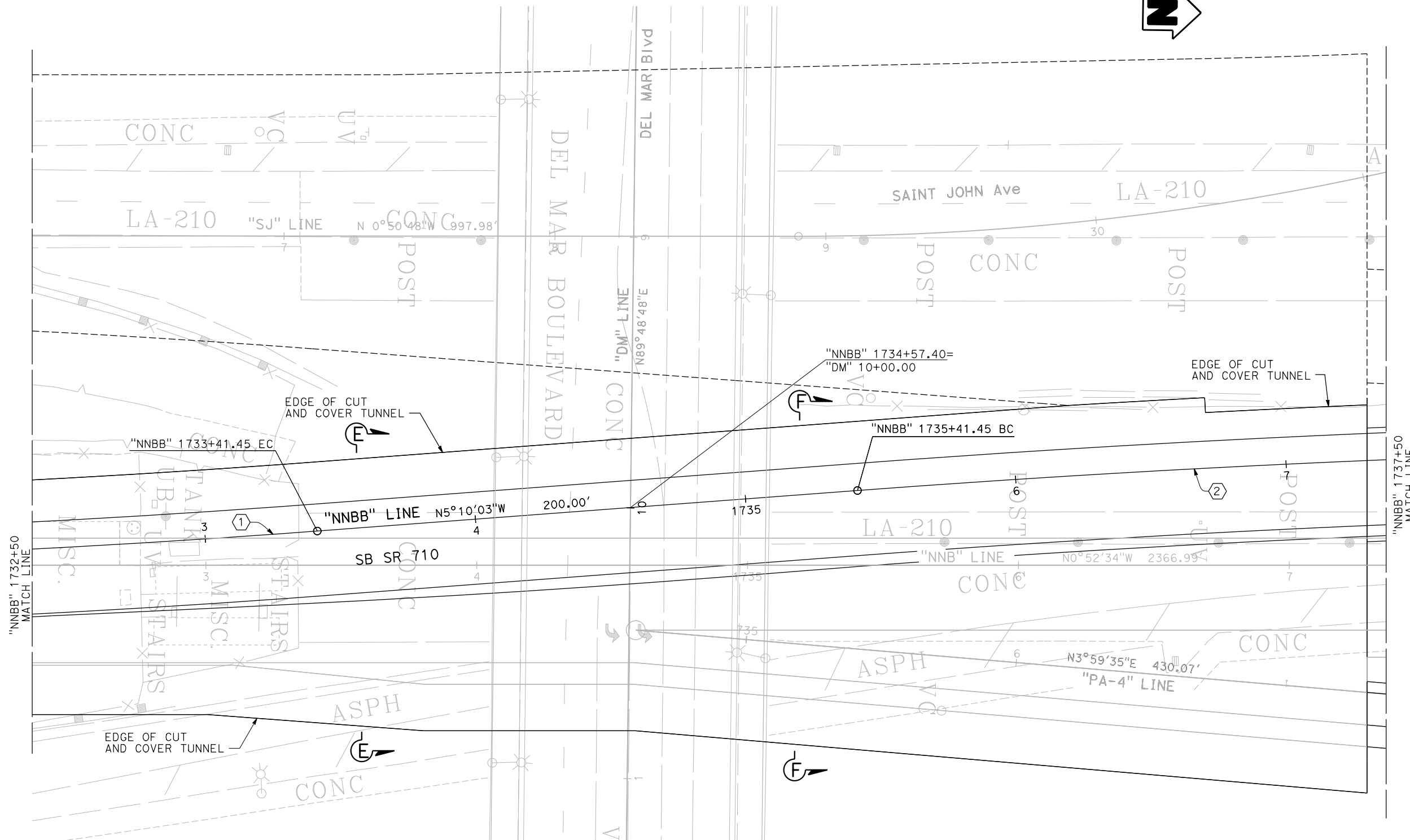
DESIGN OVERSIGHT
SIGN OFF DATE

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
 PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



NOTE:  
 1. For Sections E-E and F-F, see "TYPICAL SECTION No. 3" sheet.

**FREEWAY TUNNEL ALTERNATIVE  
 SINGLE BORE OPTION**

**STRUCTURE PLAN NO. 3  
 (BOTTOM LEVEL)**

CURVE DATA		CURVE DATA	
①	"NNBB" LINE	②	"NNBB" LINE
R = 4500.00'	$\Delta = 04^{\circ}17'30''$	R = 5855.00'	$\Delta = 04^{\circ}17'30''$
T = 168.61'	L = 337.06'	T = 219.38'	L = 438.55'

**PLAN**  
 1"=20'

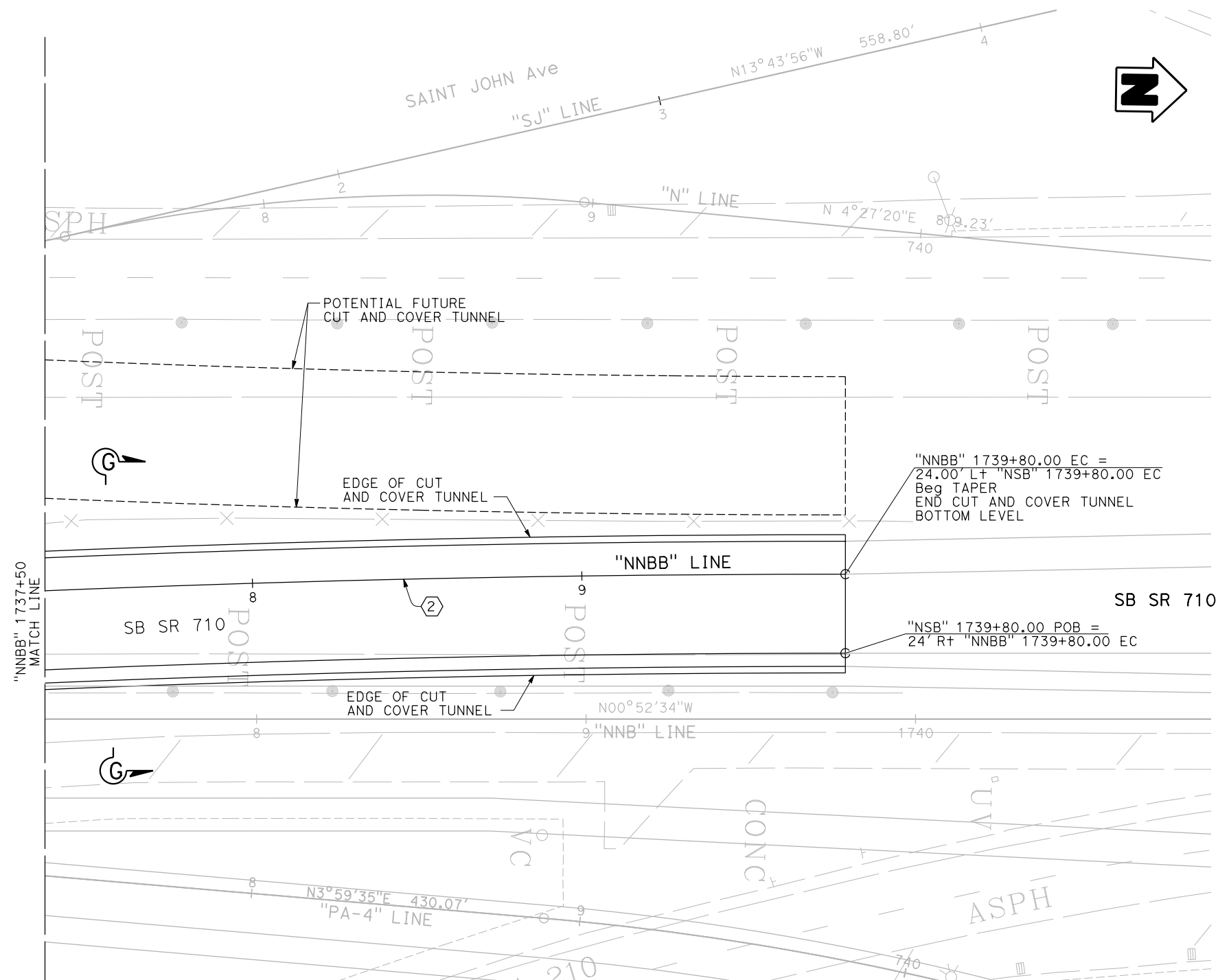
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DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
 PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
BRIDGE NO. TBD	UNIT:
SCALE: 1"=20'	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

**CURVE DATA**

② "NNBB" LINE  
 $R = 5855.00'$   
 $\Delta = 04^{\circ}17'30"$   
 $T = 219.38'$   
 $L = 438.55'$

**NOTE:**  
 1. For Section G-G, see "TYPICAL SECTION No. 4" sheet.

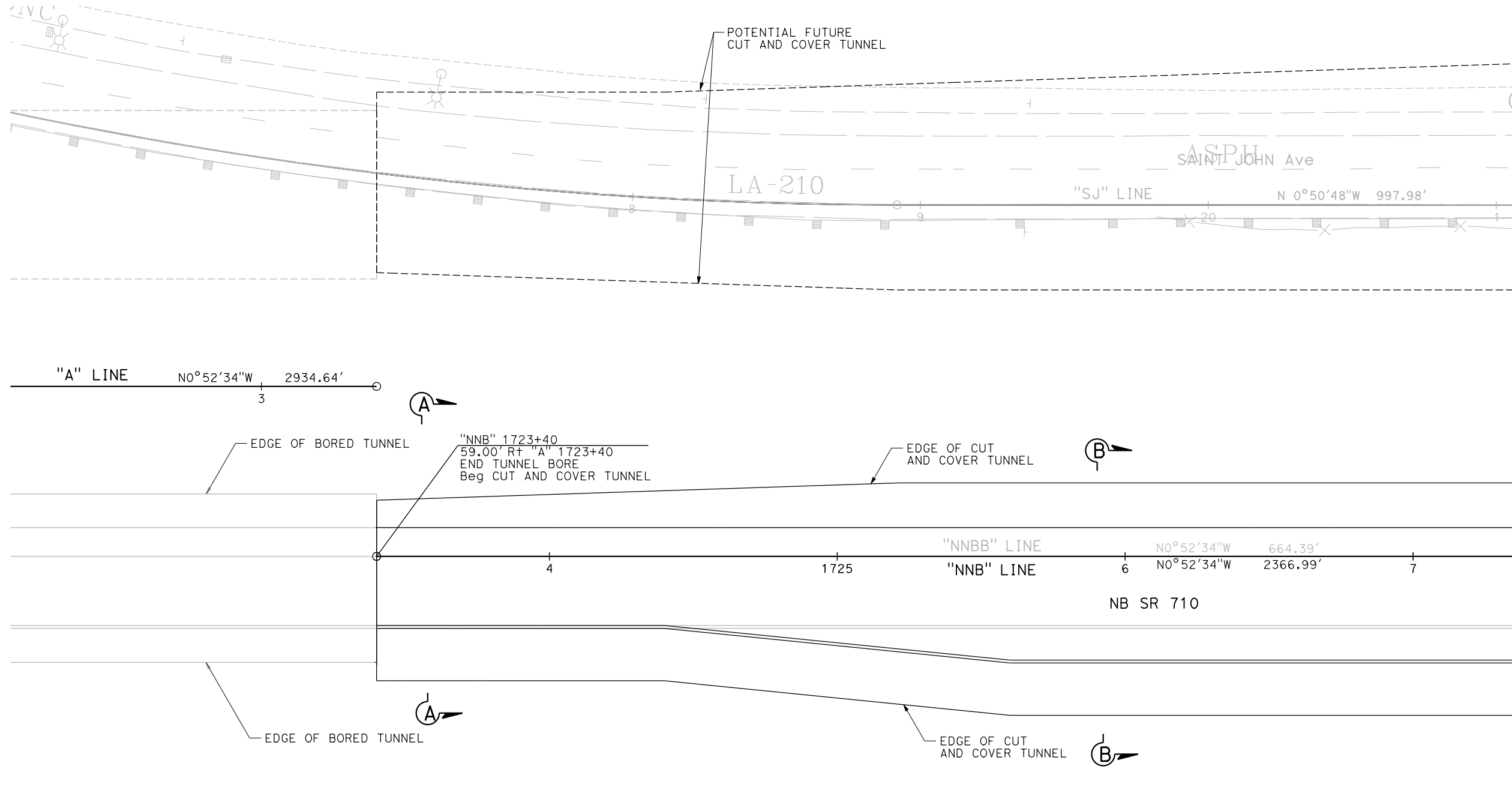
DESIGN OVERSIGHT
SIGN OFF DATE

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

<b>FREEWAY TUNNEL ALTERNATIVE SINGLE BORE OPTION</b>	
<b>STRUCTURE PLAN NO. 4 (BOTTOM LEVEL)</b>	
<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
BRIDGE NO. TBD	UNIT:
SCALE: 1"=20'	PROJECT NUMBER & PHASE:

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

**FREeway TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**  
**STRUCTURE PLAN NO. 5  
(TOP LEVEL)**

NOTE:  
1. For Sections A-A and B-B, see "TYPICAL SECTION No. 1" sheet.

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

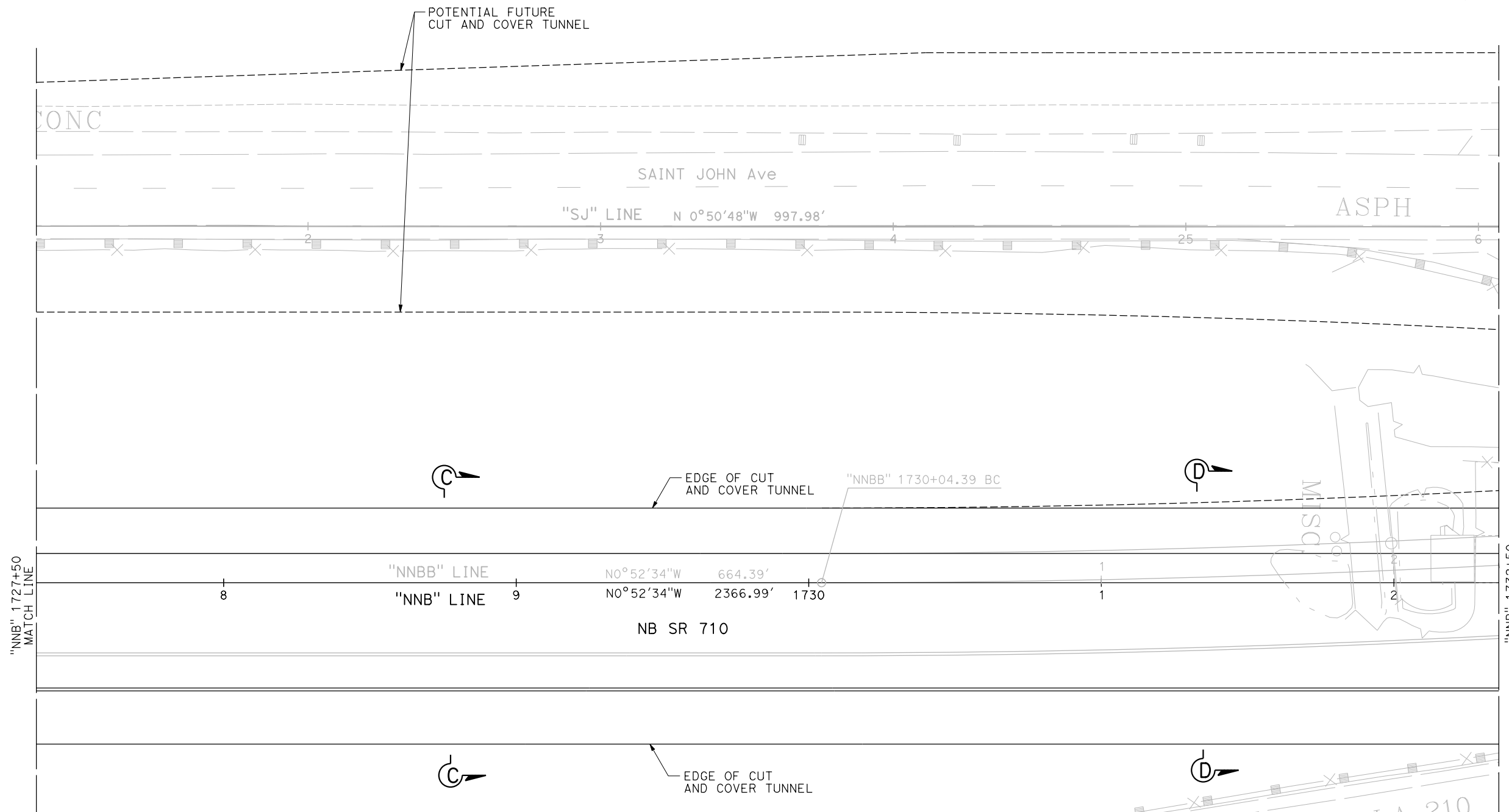
M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT
SIGN OFF DATE



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

**FREWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**  
**STRUCTURE PLAN NO. 6  
(TOP LEVEL)**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

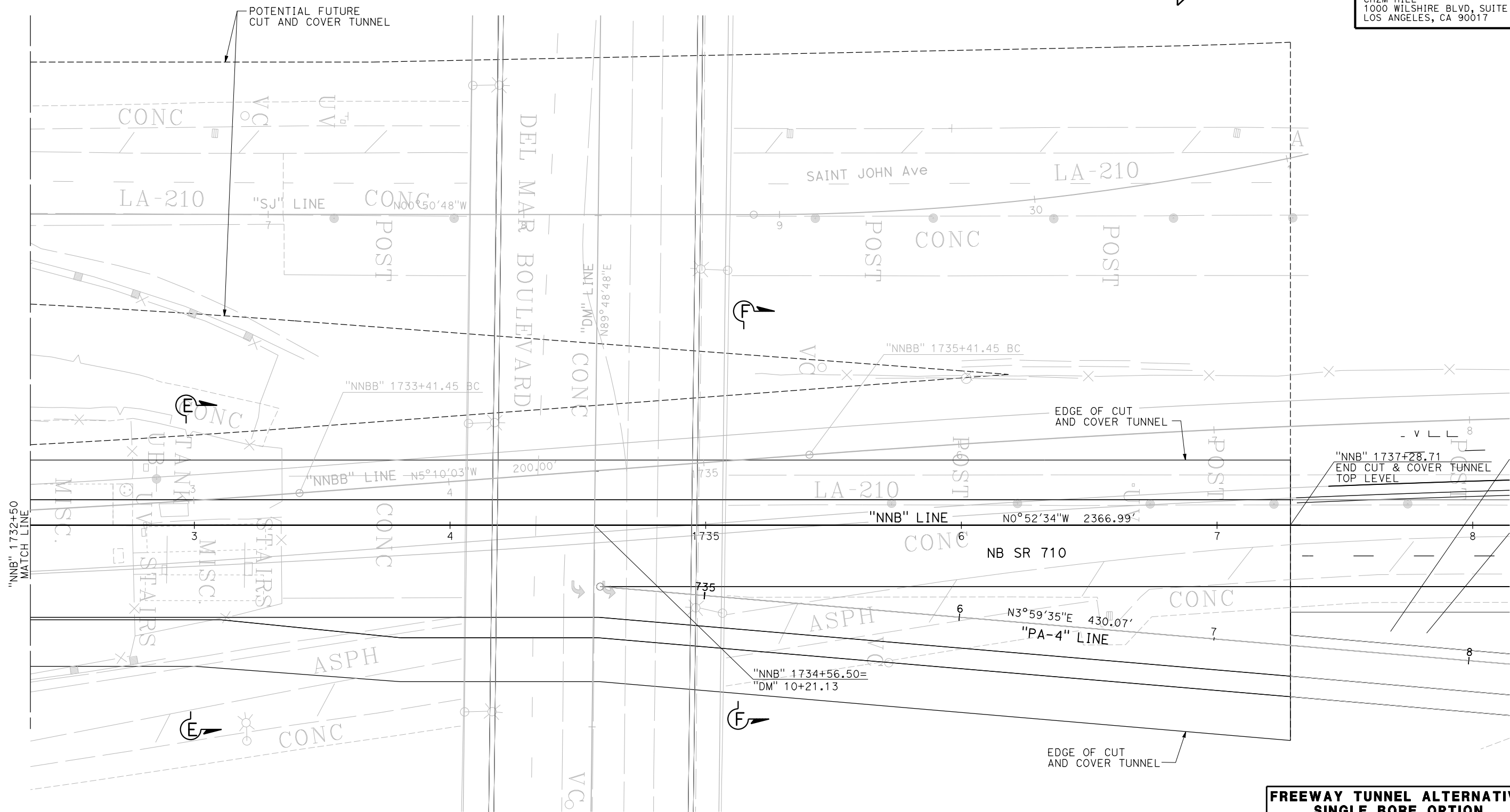
M. Atiqullah  
PROJECT ENGINEER

<b>PLANNING STUDY</b>	
<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

NOTE:  
1. For Sections C-C and D-D, see "TYPICAL SECTION No. 2" sheet.

DESIGN OVERSIGHT
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**PLAN**  
1"=20'

**FREWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION  
STRUCTURE PLAN NO. 7  
(TOP LEVEL)**

**NOTE:**  
1. For Sections E-E and F-F, see "TYPICAL SECTION No. 3" sheet.

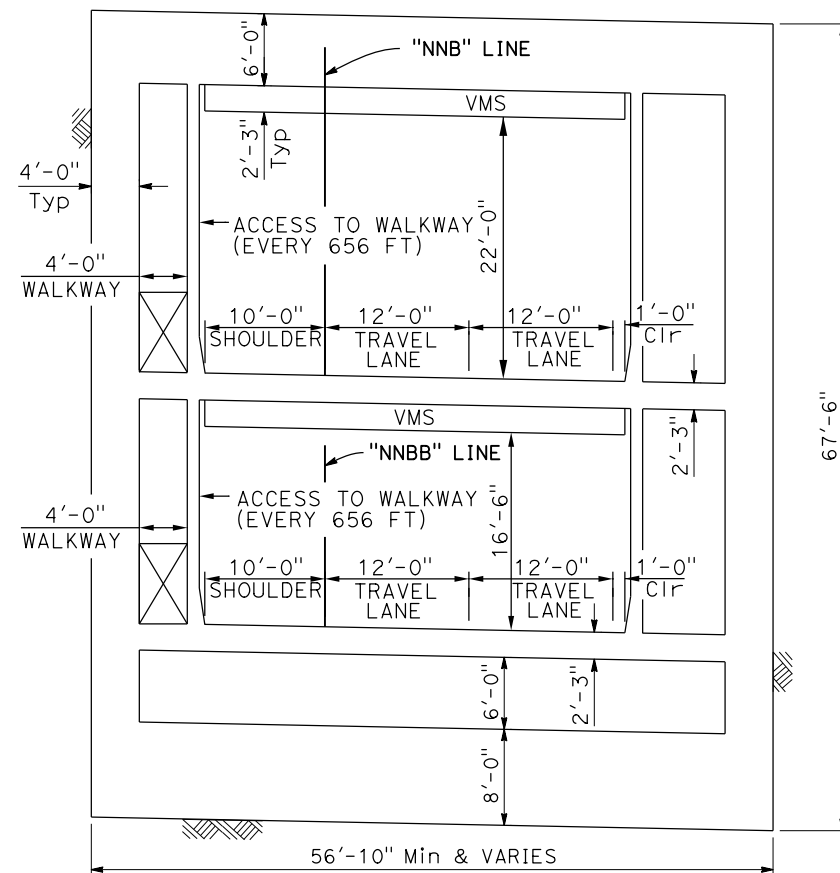
DESIGN OVERSIGHT
SIGN OFF DATE

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

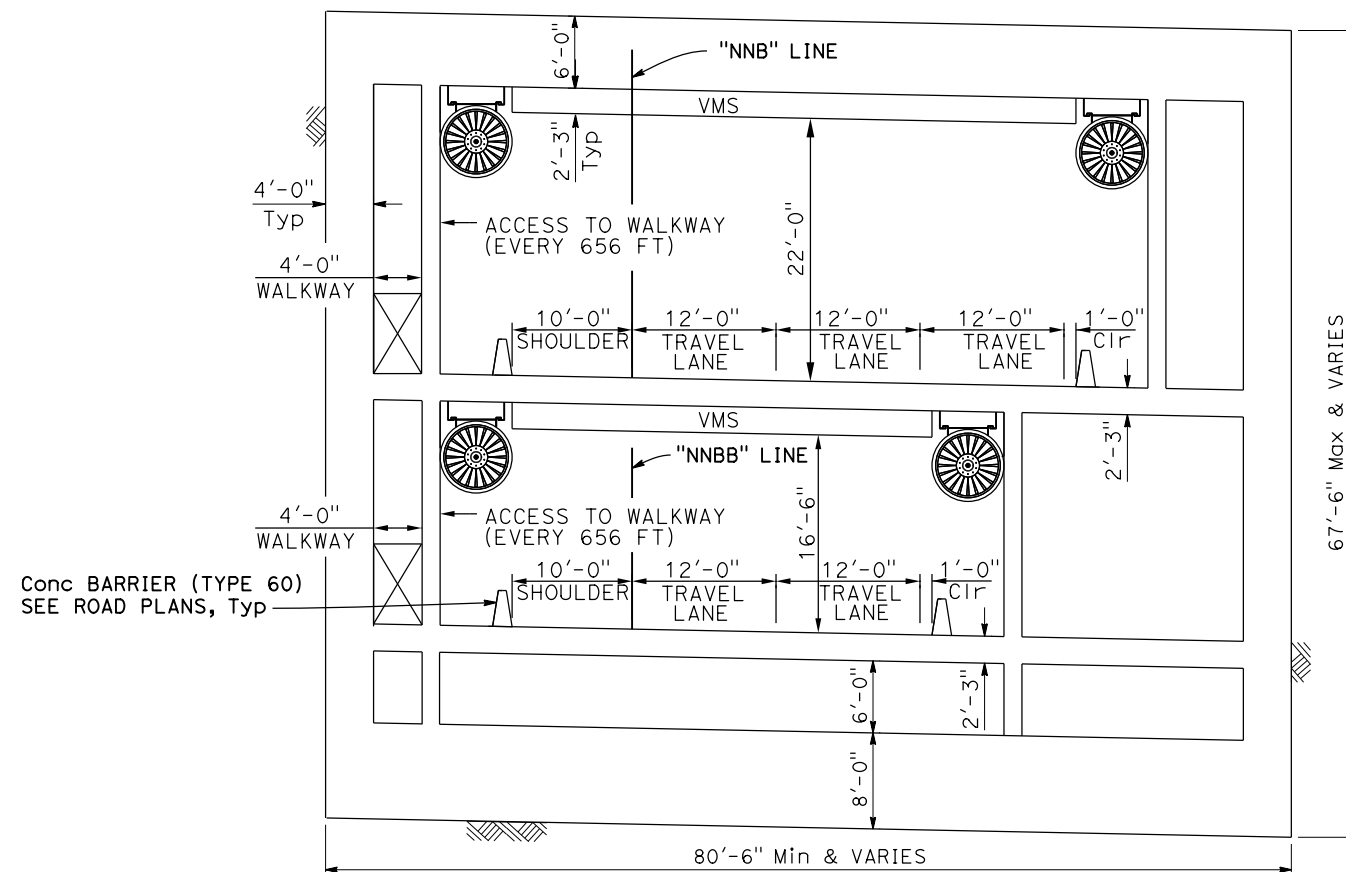
PLANNING STUDY	
CUT AND COVER TUNNEL (NORTH PORTAL)	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1"=20'
PROJECT NUMBER & PHASE:	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION A-A**

1/8"=1'-0"



**SECTION B-B**

1/8"=1'-0"

**NOTE:**

- For location of Sections A-A and B-B, see "STRUCTURE PLAN No. 1 (BOTTOM LEVEL)" & "STRUCTURE PLAN No. 5 (TOP LEVEL)" sheets.

**FREeway TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**TYPICAL SECTION NO. 1**

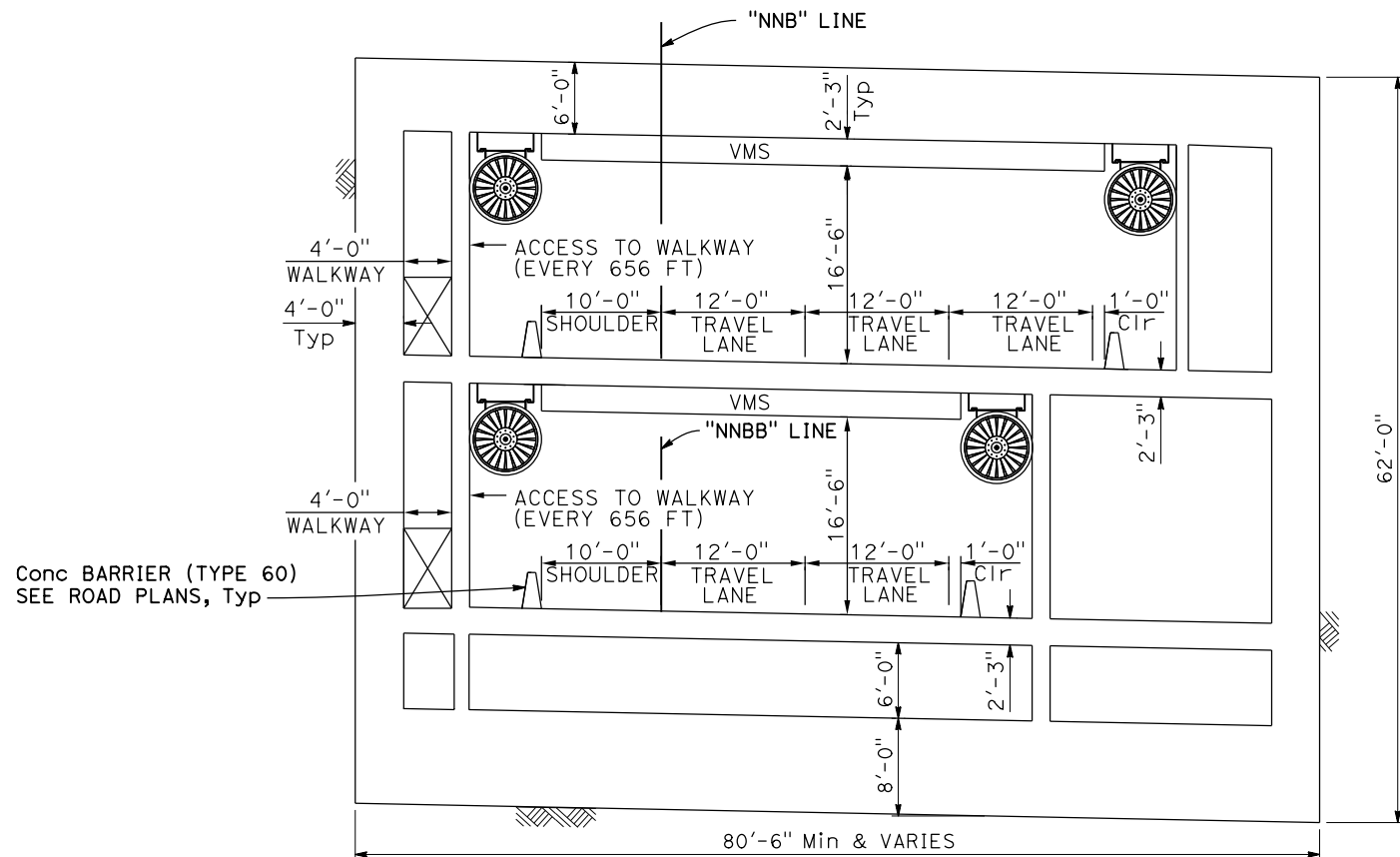
DESIGN OVERSIGHT
SIGN OFF DATE

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah
PROJECT ENGINEER

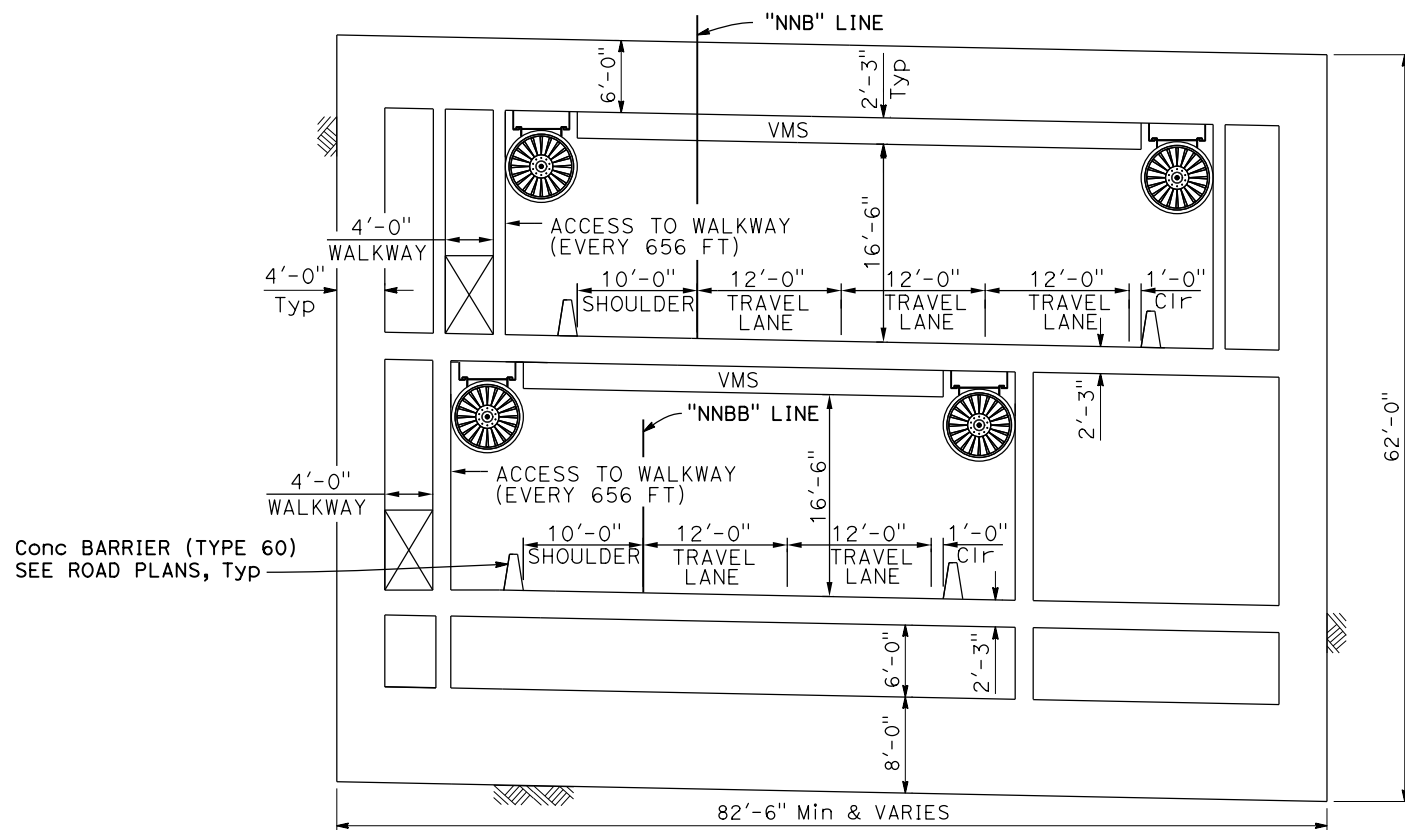
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<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1/8"=1'-0"
PROJECT NUMBER & PHASE:	

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION C-C**

1/8"=1'-0"



**SECTION D-D**

1/8"=1'-0"

**NOTE:**

- For location of Sections C-C and D-D, see "STRUCTURE PLAN No. 2 (BOTTOM LEVEL)" & "STRUCTURE PLAN No. 6 (TOP LEVEL)" sheets.

**FREWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**TYPICAL SECTION NO. 2**

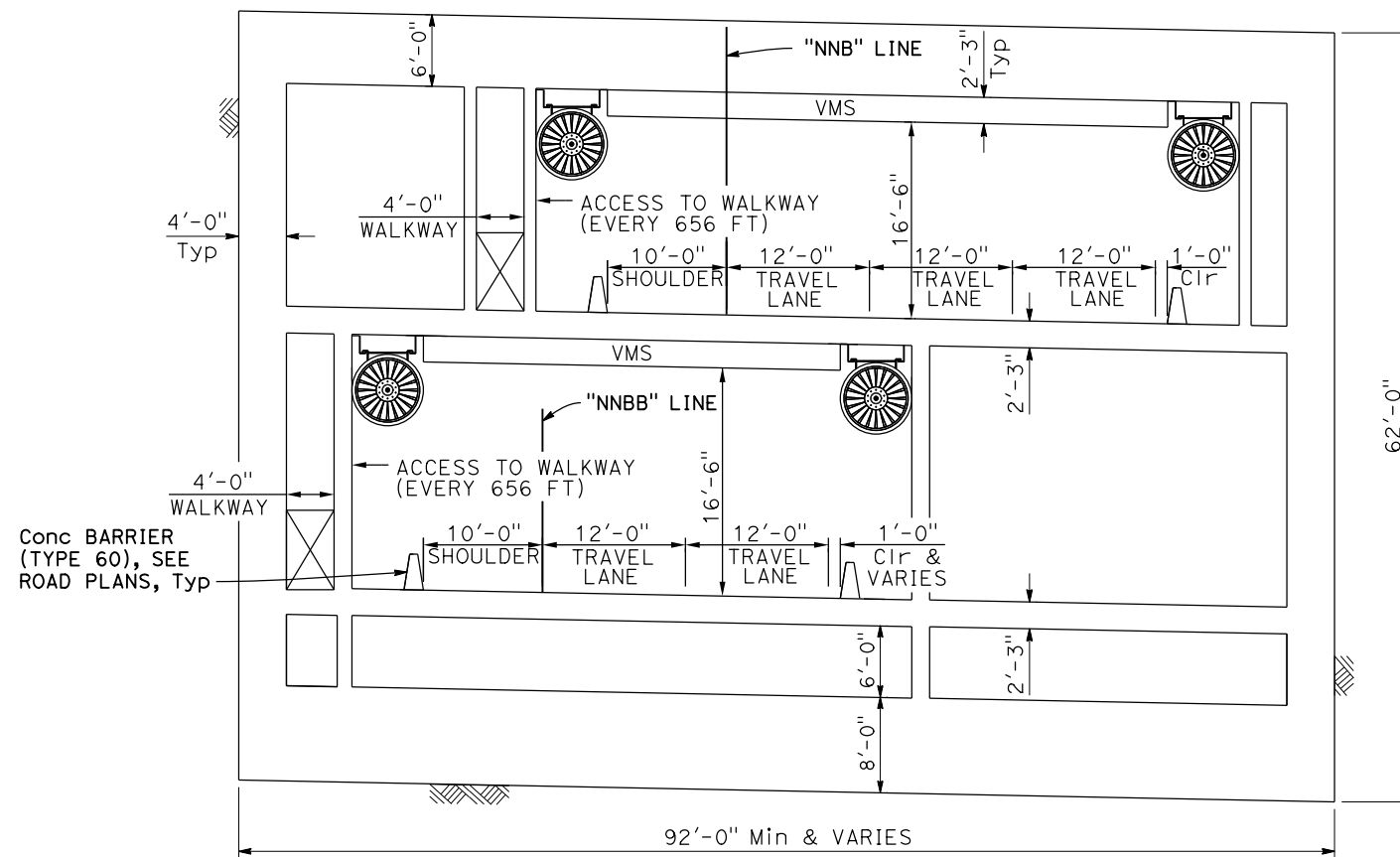
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DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

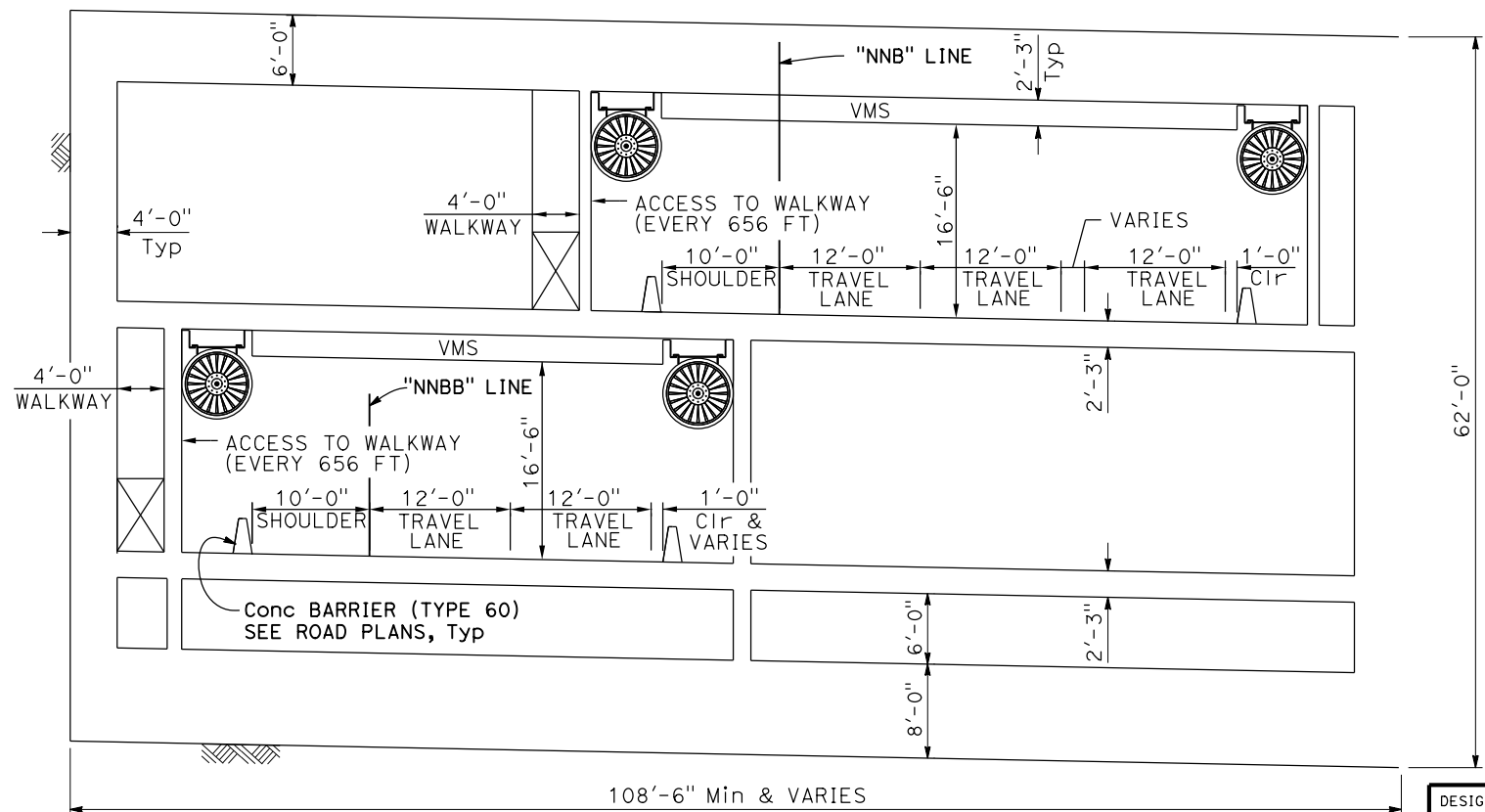
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<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
BRIDGE NO.	TBD
UNIT:	
SCALE:	1/8"=1'-0"
PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT  
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION E-E**  
1/8"=1'-0"



**SECTION F-F**  
1/8"=1'-0"

**NOTE:**

- For location of Sections E-E and F-F, see "STRUCTURE PLAN No. 3 (BOTTOM LEVEL)" & "STRUCTURE PLAN No. 7 (TOP LEVEL)" sheets.

**FREEWAY TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**TYPICAL SECTION NO. 3**

**PLANNING STUDY**

**CUT AND COVER TUNNEL (NORTH PORTAL)**

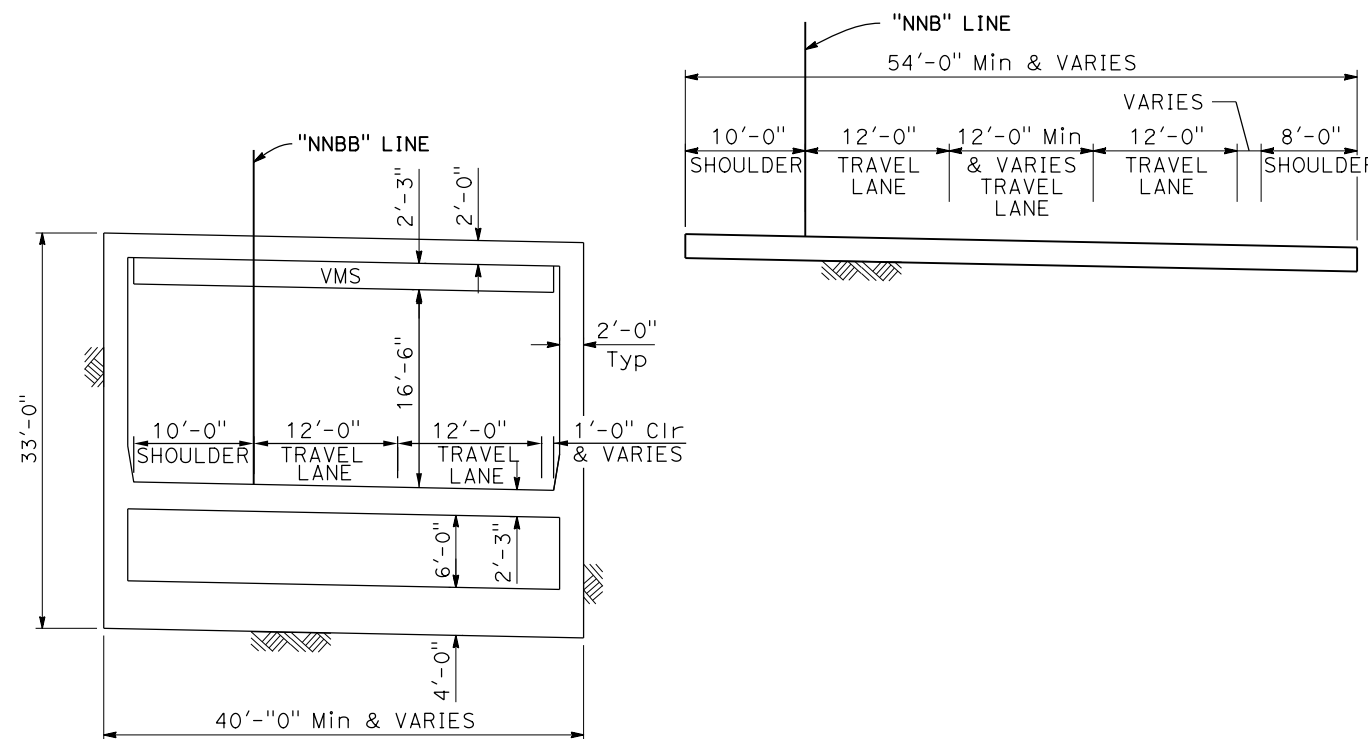
DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

BRIDGE NO.	TBD	UNIT:	
SCALE:	1/8"=1'-0"	PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT  
SIGN OFF DATE

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			



**SECTION G-G**  
1/8"=1'-0"

NOTE:  
1. For location of Section G-G, see "STRUCTURE PLAN No. 4 (BOTTOM LEVEL)" sheet.

**FREeway TUNNEL ALTERNATIVE  
SINGLE BORE OPTION**

**TYPICAL SECTION NO. 4**

DESIGNED BY A. Issa	DATE 6-6-2014	M. Atiqullah PROJECT ENGINEER	<b>PLANNING STUDY</b>	
DRAWN BY N. Morales	DATE 6-6-2014		<b>CUT AND COVER TUNNEL (NORTH PORTAL)</b>	
CHECKED BY M. Atiqullah	DATE 6-6-2014		BRIDGE NO. TBD	UNIT:
APPROVED	DATE		SCALE: 1/8"=1'-0"	PROJECT NUMBER & PHASE:

DESIGN OVERSIGHT  
SIGN OFF DATE



SR 710 North Study

ATTACHMENT K-3f

Task 7.2 Advance Planning Study Report

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# State Route 710 North Study Advance Planning Study Report Green Street Overcrossing

## Freeway Tunnel Alternative Single Bore Option

Prepared for



**Metro**  
Los Angeles County  
Metropolitan Transportation Authority

October 2014

**CH2MHILL®**

1000 Wilshire Boulevard  
Suite 2100  
Los Angeles, CA 90017







# SR 710 North Study

PREPARED FOR: Metropolitan Transportation Authority  
 COPY TO: Caltrans Study Team  
 PREPARED BY: CH2M HILL Team  
 DATE: October 3, 2014  
 PROJECT NUMBER: 428908

**Green Street Overcrossing**  
**Freeway Tunnel Alternative**  
**Single Bore Option**

## Table of Contents

	<u>Page No.</u>
Project Vicinity Map	2
Design Memorandum	3

### Attachments

- A Consultant Prepared Advance Planning Study (APS) Checklist
- B Advance Planning Study Cost Estimate
- C Advance Planning Study Plan



**Project Vicinity Map**  
**State Route 710 North Study**  
**Freeway Tunnel Alternative Alignment**  
**Single Bore Option**

## Assumptions Used for Green Street Overcrossing – Advance Planning Study

1. The proposed Green Street Overcrossing will be an integral part of the State Route (SR) 710 North Study Project. The proposed structure crosses over the SR 710 Freeway at this location and will replace the existing Green Street Overcrossing. The purpose of the proposed project is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:
  - Improve efficiency of the existing regional freeway and transit networks.
  - Reduce congestion on local arterials adversely affected by the lack of a north-south route to accommodate regional traffic volumes.
  - Minimize environmental impacts.
2. There are two options for Freeway Tunnel Alternative for the future SR 710 corridor:
  - One full-bored tunnel accommodating both directions of traffic with provision for another full-bored tunnel in future (this report is based on this option).
  - Two full-bored tunnels accommodating one direction of traffic in each tunnel (documented in separate report).

The Green Street Overcrossing crosses over the SR 710 roadway alignment for the proposed Single Bore Option. The additional roadway alignment required on west side for another full-bored tunnel in future can't be accommodated under this bridge. This bridge will require replacement to accommodate that.

3. A 390-foot long, three-span structure with equal span lengths of 130 feet is proposed over the SR 710 alignment. This bridge will replace the existing two-span 354-foot long bridge (Bridge No. 53-2263), which will be demolished.
4. There is no known environmentally sensitive area at this location.
5. The width of the structure will be 66 ft, the same as the existing structure. The bridge will be supported on circular, multicolumn bents and seat-type abutments. The Structure Preliminary Geotechnical Report (SPGR) (CH2M HILL, 2014) recommends cast-in-drilled-hole (CIDH) concrete piles for foundations. Twenty-four-inch and 84-inch CIDH concrete piles are proposed for abutments and bents, respectively.
6. Based on the project location, existing structure type, bridge span length, available clearance, and other constraints, a cast-in-place, prestressed, concrete box girder bridge is likely the most cost-effective replacement solution and, thus, is recommended for the new bridge. The superstructure depth will be 5 feet 3 inches (depth to span ratio of 0.04) with a constant cross slope of 2 percent.
7. The entire length of the bridge will be on a tangent. The vertical profile of the bridge is defined by a constant descending grade of 1.02 percent.
8. The bridge will include a 10-foot sidewalk and two typical 12-foot traffic lanes in the east travel direction and a 10-foot sidewalk, an 8-foot parking facility, and a typical 12-foot traffic lane in the west travel direction.
9. The bridge will have a 17 feet minimum vertical clearance over the future SR 710. The required minimum vertical clearance per the Highway Design Manual is 16 feet 6 inches over the freeway.
10. A chain-link railing will be provided on both sides of the structure.

11. The bridge design will follow the current Caltrans standards and design guidelines, including Load and Resistance Factor Design (LRFD) Specifications and Seismic Design Criteria. The Acceleration Response Spectrum curve, as will be recommended in the foundation report, will be used for seismic loading in a future phase of design.
12. According to the SPGR, the project site is not located in an area considered to be susceptible to liquefaction. The proposed structure does not need to account for liquefaction in the preliminary design. Additional geotechnical investigation will be performed prior to final design to further assess the liquefaction potential and its impact on bridge performance during design seismic loading.
13. Falsework will be required to build the superstructure. Minimum falsework clearance requirement of 15 feet over SR 710 will be available during construction.
14. There are some utilities through the existing bridge according to the as-built plan. These include telephone lines, water lines, and power lines. Provisions will be included in the bridge to accommodate those same utilities, but the opening sizes will be confirmed in the final design phase. Temporary and/or permanent utility relocation may be necessary but will be confirmed in the final design phase.
15. There may be asbestos-containing material (ACM) present in the existing bridge and presence of these materials would pose a potential hazardous waste risk as identified in the Phase I Initial Site Assessment Report (CH2M HILL, 2014). The design and construction of the bridge should comply with the applicable environmental requirements of federal, state, and local agencies to remove those ACM during bridge removal process.
16. No special aesthetic requirements are available at this stage of design. It is expected that any aesthetic requirements, when available, can be accommodated during the final design phase.
17. The overall bridge construction cost at this phase, including 10 percent mobilization and 25 percent contingency, is \$7,702,000.

**Attachment A**  
**Consultant Prepared Advance Planning Study (APS)**  
**Checklist**

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# Consultant Prepared Advance Planning Study (APS) Checklist

Sheet 1 of 2

Date: March 2014	Consultant Firm (for structures): CH2M HILL	Phone No: 714-429-2000
Designed by: Mohammed Atiqullah		Phone No: 714-435-6025
EA:	County: LA	Rte: 710 KP(PM)
Project Description: Extend State Route 710 (SR 710) in Los Angeles, Alhambra, South Pasadena and Pasadena from Route 10 at south to Route 210 at north, a distance of approximately 7 miles.		
Bridge No(s): To be Assigned	Bridge Name(s): Green Street Overcrossing	
Total number of bridges in project: <b>Many, only one</b> bridge presented in this report		APS Alternative Letter or Number (if more than one):
Purpose of this APS:                      Initial APS Cost & Feasibility <input checked="" type="checkbox"/> Revised scope <input type="checkbox"/> Update cost <input type="checkbox"/>		

## Part A Items to collect and considerations prior to beginning the APS

All items listed in Part A are to be made available and submitted if requested by the Liaison Engineer.  
(Mark **N/A** if not applicable)

- Preliminary profile grade of proposed structure.
- Typical section of the proposed structure. (Including barrier type, sidewalks, cross slope %, etc.)
- Grades or spot elevations of roadway below the structure.
- Typical section of roadway below the structure. (Including shoulders, gutters, embankment slope.)
- Site map: including horizontal alignment of new structure and the roadway below, topo, contours, etc.
- N/A Stage construction or detour plan for traffic on the structure.  
(number of lanes to remain open, Temp Railing, etc.)
- N/A Stage construction or detour plan for the roadway below the structure.  
(falsework openings for each stage and any restrictions.)
- "As Built" plans for existing structures.
- N/A Future widening plans of upper and lower roadway (verify with Route Concept Report).
- Site aerial photograph (at the proposed structure).
- Environmental and/or permit requirements (areas of potential impact, construction windows, etc.)
- Overhead and underground utility plans
- N/A Any other information that you feel is necessary to complete the study. (Other concerns that may affect the APS: local agency requirements such as aesthetics, improvements in vicinity of structure, airspace usage, other obstructions, etc.)





**Attachment B**  
**Advance Planning Study Cost Estimate**

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Revised - December 3, 2007

Freeway Tunnel Alternative  
Single Bore Option

RCVD BY: \_\_\_\_\_

IN EST: \_\_\_\_\_  
OUT EST: \_\_\_\_\_

BRIDGE: Green Street Overcrossing  
TYPE: CIP/PS Concrete Box Girder Superstructure  
CU: \_\_\_\_\_  
EA: \_\_\_\_\_

BR. No.: TBD

DISTRICT: 07  
RTE: 710  
CO: LA  
PM: \_\_\_\_\_

LENGTH: 390.00 WIDTH: 66.00 AREA (SF)= 25,740

**DESIGN SECTION:**

# OF STRUCTURES IN PROJECT : \_\_\_\_\_ EST. NO. \_\_\_\_\_  
PRICES BY : \_\_\_\_\_ COST INDEX: \_\_\_\_\_  
PRICES CHECKED BY : A. Issa DATE: 3/21/2014  
QUANTITIES BY: \_\_\_\_\_ DATE: \_\_\_\_\_

	CONTRACT ITEMS	TYPE	UNIT	QUANTITY	PRICE	AMOUNT
1	STRUCTURE EXCAVATION (BRIDGE)		CY	373	\$100.00	\$37,300
2	STRUCTURE BACKFILL (BRIDGE)		CY	176	\$70.00	\$12,320
3	24" CIDH CONCRETE PILING		LF	1,680	\$160.00	\$268,800
4	84" CIDH CONCRETE PILING		LF	675	\$1,750.00	\$1,181,250
5	PRESTRESSING CAST-IN-PLACE CONCRETE		LS	1	\$300,000.00	\$300,000
6	STRUCTURAL CONCRETE, BRIDGE FOOTING		CY	156	\$400.00	\$62,400
7	STRUCTURAL CONCRETE, BRIDGE		CY	2,172	\$800.00	\$1,737,600
8	STRUCTURAL CONCRETE, APPROACH SLAB	Type N	CY	141	\$720.00	\$101,520
9	JOINT SEAL (MR = 1 1/2")		LF	132	\$90.00	\$11,880
10	BAR REINFORCING STEEL (BRIDGE)		LB	696,000	\$1.00	\$696,000
11	SLOPE PAVING (CONCRETE)		CY	108	\$600.00	\$64,800
12	CHAIN LINK RAILING	Type 7	LF	920	\$100.00	\$92,000
13	CONCRETE BARRIER	Type 26M	LF	920	\$240.00	\$220,800
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

SUBTOTAL	\$4,786,670
TIME RELATED OVERHEAD	\$478,667
MOBILIZATION (@ 10%)	\$585,037
SUBTOTAL BRIDGE ITEMS	\$5,850,374
CONTINGENCIES (@ 25%)	\$1,462,594
BRIDGE TOTAL COST	\$7,312,968
COST PER SQ. FOOT	\$284.11
BRIDGE REMOVAL (CONTINGENCIES INCL.)	\$389,400
WORK BY RAILROAD OR UTILITY FORCES	
GRAND TOTAL	\$7,702,368
BUDGET ESTIMATE AS OF	\$7,702,000

**ROUTING**

- DES SECTION
- OFFICE OF BRIDGE DESIGN - NORTH
- OFFICE OF BRIDGE DESIGN - CENTRAL
- OFFICE OF BRIDGE DESIGN - SOUTH
- OFFICE OF BRIDGE DESIGN - WEST
- OFFICE OF BRIDGE DESIGN SOUTHERN CALIFORNIA

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Escalated Budget Estimate to Midpoint of Construction \***

Escalation Rate per Year

Years Beyond Midpoint	Escalated Budget Est.
1	\$7,702,000
2	\$7,702,000
3	\$7,702,000

Years Beyond Midpoint	Escalated Budget Est.
4	\$7,702,000
5	\$7,702,000

\* Escalated budget estimate is provided for information only, actual construction costs may vary. Escalated budget estimates provided do not replace Departmental policy to update cost estimates annually.



**Attachment C**  
**Advance Planning Study Plan**

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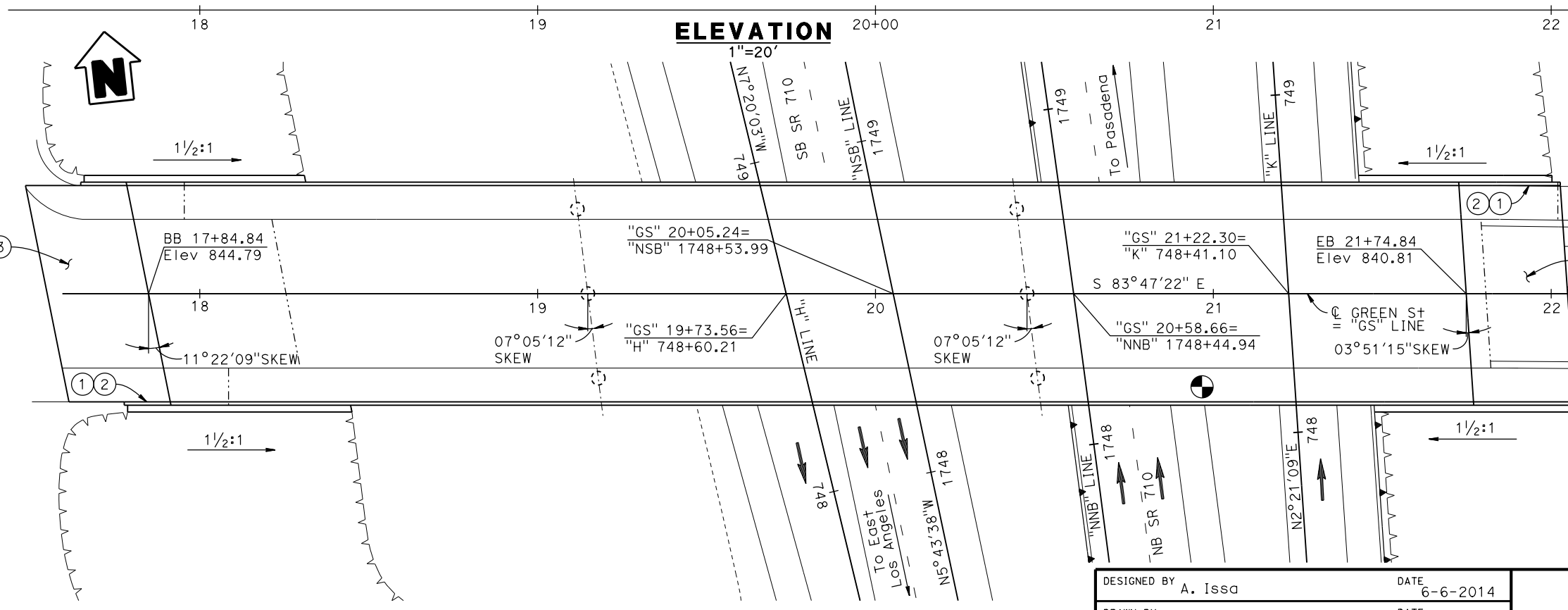
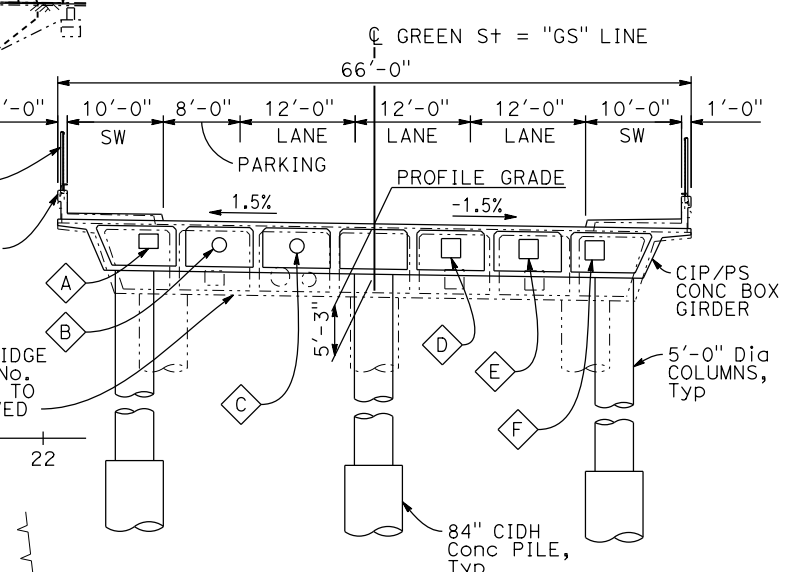
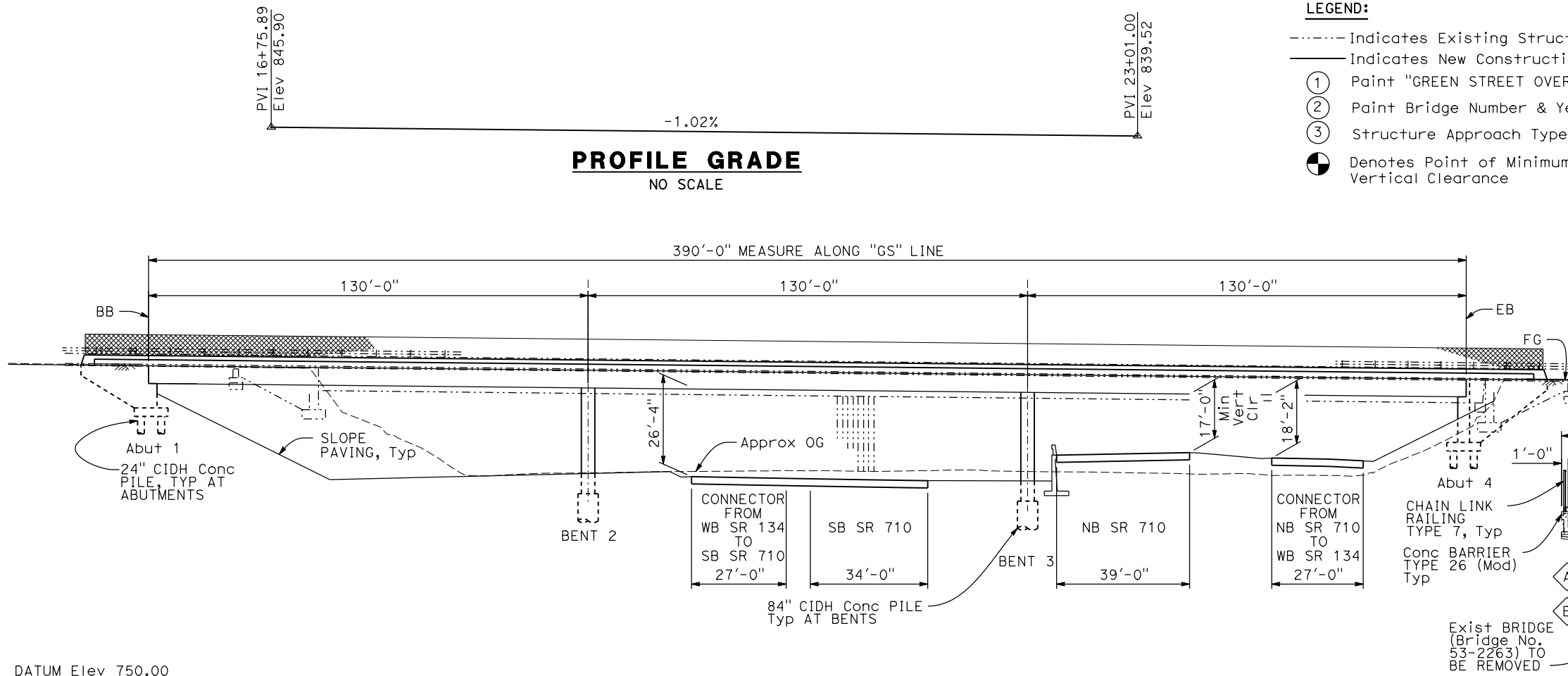
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA	710	
METRO ONE GATEWAY PLAZA LOS ANGELES, CA 90012			
CH2M HILL 1000 WILSHIRE BLVD, SUITE 2100 LOS ANGELES, CA 90017			

**LEGEND:**

- Indicates Existing Structure
- Indicates New Construction
- ① Paint "GREEN STREET OVERCROSSING"
- ② Paint Bridge Number & Year Constructed
- ③ Structure Approach Type N(30S)
- ⊕ Denotes Point of Minimum Vertical Clearance

**UTILITY OPENINGS**

- ⬡ A 18"x24" OPENING FOR POWER LINE
- ⬡ B 18" OPENING FOR WATER LINE
- ⬡ C 18" OPENING FOR WATER LINE
- ⬡ D 18"x24" OPENING FOR TELEPHONE LINE
- ⬡ E 18"x24" OPENING FOR TELEPHONE LINE
- ⬡ F 18"x24" OPENING FOR TELEPHONE LINE



DATE OF ESTIMATE	MARCH 2014
BRIDGE REMOVAL	FULL (23364 SF)
STRUCTURE DEPTH	5'-3"
LENGTH	390'-0"
WIDTH	66'-0"
AREA	25,740 SF
COST/FT <sup>2</sup> INCLUDING 10% MOBILIZATION & 25% CONTINGENCY	\$ 284
TOTAL COST	\$ 7,702,000

**FREEWAY TUNNEL ALTERNATIVE SINGLE BORE OPTION**

DESIGNED BY	A. Issa	DATE	6-6-2014
DRAWN BY	N. Morales	DATE	6-6-2014
CHECKED BY	M. Atiqullah	DATE	6-6-2014
APPROVED		DATE	

M. Atiqullah  
PROJECT ENGINEER

**PLANNING STUDY  
GREEN STREET OVERCROSSING**

BRIDGE NO.	TBD	UNIT:	
SCALE:	AS NOTED	PROJECT NUMBER & PHASE:	

DESIGN OVERSIGHT  
SIGN OFF DATE

**PLAN**  
1"=20'





**Attachment L**  
**Preliminary Cost Estimates (Build Alternatives)**

---



# COST ESTIMATE FOR TSM/TDM ALTERNATIVE

Contract PS4710-2755  
11/14/2014 9:23 AM

**ATTACHMENT L-1**

## PROJECT DESCRIPTION

### STATE ROUTE 710 NORTH STUDY

### TSM/TDM ALTERNATIVE

	Cost in 2014 \$
ROADWAY ITEMS	\$82,000,000
STRUCTURE ITEMS	<u>\$14,000,000</u>
SUBTOTAL CONSTRUCTION	\$96,000,000
RIGHT OF WAY	<u>\$9,000,000</u>
TOTAL COST	\$105,000,000

\*Total costs are in 2014 dollars and will need to be escalated to the actual start of construction year.

# COST ESTIMATE FOR TSM/TDM ALTERNATIVE

Contract PS4710-2755  
11/14/2014 9:23 AM

## I. Roadway Items

<u>Section 1 - Earthwork</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Construction Site Management/SWPPP	1	LS	\$2,417,675	\$2,417,675	
Clearing and Grubbing ( 5% of Total)	1	LS	\$2,642,300	\$2,642,300	
Roadway Excavation	155,257	CY	\$25	\$3,881,429	
Imported Borrow	360	CY	\$15	\$5,400	
	<b><u>Roadway Ex. Cost</u></b>		%		
Hazardous Waste Material/ADL (10% of Road Ex.)	3,881,429	10%		\$388,143	
				<b><u>Total Earthwork</u></b>	<b><u>\$9,334,947</u></b>

<u>Section 2 - Structural Section</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Remove Asphalt Concrete	149,617	SF	\$2	\$299,234	
Remove Concrete (Driveway)	2,361	SF	\$1	\$2,361	
Remove Concrete (X-Gutter)	158	SF	\$3	\$474	
Remove Concrete (Sidewalk)	22,318	SF	\$1	\$22,318	
Remove Concrete (Raised Median)	15,476	LF	\$6	\$92,856	
Remove Concrete (Curb)	19,564	LF	\$10	\$195,640	
Class 3 Aggregate Subbase	2,952	CY	\$33	\$97,417	
Class 2 Aggregate Base	14,698	CY	\$35	\$514,432	
Asphalt Concrete (Type A)	11,473	TON	\$90	\$1,032,529	
Concrete Pavement (Roadway)	4,890	CY	\$500	\$2,445,000	
Concrete Pavement (X-Gutter)	311	SF	\$20	\$6,220	
Concrete Pavement (Sidewalk)	69,875	SF	\$6	\$419,250	
Concrete Pavement (Driveway)	4,657	SF	\$2	\$9,314	
Concrete Curb Ramp	60	EA	\$3,500	\$210,000	
Cold Plane AC/Overlay	51,157	SF	\$2	\$102,314	
Install Raised Median	30,519	SF	\$15	\$457,785	
Concrete Pavement (Islands)	2,863	SF	\$6	\$17,178	
Minor Concrete (Curb)	29,684	LF	\$45	\$1,335,780	
				<b><u>Total Structural Section</u></b>	<b><u>\$7,260,103</u></b>

# COST ESTIMATE FOR TSM/TDM ALTERNATIVE

Contract PS4710-2755  
11/14/2014 9:23 AM

## I. Roadway Items (CONT.)

<u>Section 3 - Drainage</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Unit Cost</u>	<u>Section Cost</u>
Abandon Culvert	456	LF	\$8	\$3,648	
Abandon Inlet	12	EA	\$700	\$8,400	
Remove Pipe	164	LF	\$10	\$1,640	
Remove Inlet	29	EA	\$800	\$23,200	
Cap Inlet	4	EA	\$900	\$3,600	
18" CSP	6	LF	\$100	\$600	
18" RCP	473	LF	\$110	\$52,030	
24" RCP	636	LF	\$125	\$79,500	
30" RCP	29	LF	\$150	\$4,350	
36" RCP	150	LF	\$170	\$25,500	
Drainage Manhole	3	EA	\$6,200	\$18,600	
Inlet	13	EA	\$2,000	\$26,000	
CB (w=3.5')	5	EA	\$2,100	\$10,500	
CB (w = 7')	11	EA	\$2,800	\$30,800	
CB (w = 10')	1	EA	\$3,300	\$3,300	
CB (w = 14')	5	EA	\$3,900	\$19,500	
CB (w = 21')	2	EA	\$5,300	\$10,600	
CB (w = 28')	1	EA	\$6,500	\$6,500	
Tree Box Filter (4'X4')	1	EA	\$13,300	\$13,300	
Tree Box Filter (4'X6')	1	EA	\$14,900	\$14,900	
Tree Box Filter (4'X8')	1	EA	\$16,000	\$16,000	
Tree Box Filter (4'X10')	1	EA	\$20,000	\$20,000	
Tree Box Filter (4'X12')	1	EA	\$24,000	\$24,000	
Tree Box Filter (4'X18')	1	EA	\$33,600	\$33,600	
Tree Box Filter (6'X4')	2	EA	\$13,300	\$26,600	
Tree Box Filter (6'X6')	1	EA	\$17,500	\$17,500	
Tree Box Filter (6'X8')	2	EA	\$22,300	\$44,600	
Tree Box Filter (6'X10')	1	EA	\$28,400	\$28,400	
Tree Box Filter (6'X12')	2	EA	\$33,200	\$66,400	
Tree Box Filter (6'X14')	1	EA	\$35,200	\$35,200	
Tree Box Filter (6'X18')	1	EA	\$41,600	\$41,600	
CB Screen and Insert	8	EA	\$280	\$2,240	
Bioswale	80	LF	\$25	\$2,000	
			<b>Total Drainage Items</b>		<b>\$714,608</b>

# COST ESTIMATE FOR TSM/TDM ALTERNATIVE

Contract PS4710-2755  
11/14/2014 9:23 AM

**I. Roadway Items (CONT.)**

**Section 4 - Specialty Items**

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Highway Planting and Irrigation	1	Route MI	\$100,000	\$118,000	
Retaining Wall (H=0-10 FT)	1,587	LF	\$1,000	\$1,587,000	
Retaining Wall (H=15-20 FT)	38	LF	\$2,850	\$108,300	
Retaining Wall (H=20-30 FT)	389	LF	\$3,850	\$1,497,650	
Concrete Barrier (Type 60D)	396	LF	\$100	\$39,600	
Soundwall	1	LS	\$2,103,542	\$2,103,542	
Guardrail	225	LF	\$25	\$5,625	
Remove Trees	36	EA	\$750	\$27,000	
Shoofly	1	LS	\$5,337,050	\$5,337,050	
Buses (40')	37	EA	\$539,000	\$19,943,000	
				<b>Total Specialty Items</b>	<b>\$30,766,767</b>

**Section 5 - Traffic Items**

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Reversible Lanes Overhead Sign (Cantilever)	19	EA	\$30,000	\$570,000	
Adaptive Signal	8	LS	VAR	\$160,000	
Traffic Signal Modification	15	LS	VAR	\$975,000	
Traffic Signal	2	EA	\$270,000	\$540,000	
Wireless Traffic Signal Communication	4	LS	VAR	\$350,000	
Striping	29	LS	VAR	\$289,144	
Install Video Detection System	21	EA	\$25,000	\$525,000	
Install Arterial CMS	20	EA	\$100,000	\$2,000,000	
Arterial Speed Data Collection	20	EA	\$50,000	\$1,000,000	
Transit Signal Priority	16	EA	\$15,000	\$240,000	
Signal optimization	71	EA	\$10,000	\$710,000	
				<b>Total Traffic Items</b>	<b>\$12,480,054</b>
				<b>SUBTOTAL ROADWAY ITEMS SECTIONS 1-5</b>	<b>\$60,556,479</b>
				<b>SAY</b>	<b>\$61,000,000</b>

Misc. Traffic Items (25% of Section 2) - Loop Detectors, Ramp Metering, Count sta, Traffic control system, TMP)  
 Misc. Removal (7% of Section 2)  
 Miscellaneous (20% of Section 2) - Elec Service for Irrigation, Adjust Utility Covers, Elimination of Pedestrian Push Button  
 Construction Staging (40% of Section 2)

	<u>Quantity</u>	<u>Unit</u>	<u>Cost</u>
Misc. Traffic Items (25% of Section 2) - Loop Detectors, Ramp Metering, Count sta, Traffic control system, TMP)	1	LS	\$1,393,003
Misc. Removal (7% of Section 2)	1	LS	\$383,269
Miscellaneous (20% of Section 2) - Elec Service for Irrigation, Adjust Utility Covers, Elimination of Pedestrian Push Button	1	LS	\$1,114,879
Construction Staging (40% of Section 2)	1	LS	\$2,229,759

# COST ESTIMATE FOR TSM/TDM ALTERNATIVE

Contract PS4710-2755  
11/14/2014 9:23 AM

**I. Roadway Items (CONT.)**

<u>Section 6 - Minor Items</u>	<u>Quantity</u>	<u>Unit</u>	<u>Cost</u>	<u>Section Cost</u>
Minor Items (10% of Rdwy Items)	1	LS	\$3,509,900	
			<b><u>Total Minor Items</u></b>	<b><u>\$3,509,900</u></b>
<u>Section 7 - Mobilization</u>	<u>Quantity</u>	<u>Unit</u>	<u>Cost</u>	<u>Section Cost</u>
Mobilization (10% of Rdwy & Minor Items) (Inc Mob cost)	1	LS	\$4,275,400	
			<b><u>Total Roadway Mobilization</u></b>	<b><u>\$4,275,400</u></b>
<u>Section 8 - Additions</u>	<u>Quantity</u>	<u>Unit</u>	<u>Cost</u>	<u>Section Cost</u>
<i>Supplemental</i>				
Supplemental (10% of Rdwy cost & Minor Items)	1	LS	\$3,861,000	
<i>Contingencies</i>				
Contingencies (25% of Rdwy cost & Minor Items)	1	LS	\$9,650,700	
			<b><u>Total Roadway Additions</u></b>	<b><u>\$13,511,700</u></b>
			<b><u>Subtotal for Sections 6, 7 &amp; 8</u></b>	<b><u>\$21,297,000</u></b>
			<b><u>Subtotal for Sections 1-5</u></b>	<b><u>\$60,556,479</u></b>
			<b><u>TOTAL ROADWAY ITEMS SECTIONS 1-8</u></b>	<b><u>\$81,853,479</u></b>
			<b><u>SAY</u></b>	<b><u>\$82,000,000</u></b>

# COST ESTIMATE FOR TSM/TDM ALTERNATIVE

Contract PS4710-2755  
11/14/2014 9:23 AM

## II. Structure Items

### Section 9 - Structure Items

	I-16: Garfield Ave (Widen)	T-1: SR 710 Underpass		
Bridge Name	Bridge	Bridge		
Structure Type	8'-0"	72'-0"		
Width ft (out to out)	59'-0"	90'-0"		
Span Lengths ft	590 SF	6,480 SF		
Total Area sq. ft	\$665	\$1,458		
Cost Per Sq. Ft (incl. 10% mobilization and 25% contingencies)	\$393,000	\$12,442,000		
Total Cost for Structure				

### Section Cost

**Total Structure Items      \$12,835,000**

### Section 10 - Minor Items

	<u>Quantity</u>	<u>Unit</u>	<u>Cost</u>	<u>Section Cost</u>	<u>Section Cost</u>
Minor Items (5% of Structure Items)	1	LS	\$641,750		
				<b><u>Total Minor Items</u></b>	<b><u>\$641,750</u></b>
				<b><u>TOTAL STRUCTURE ITEMS SECTIONS 9-10</u></b>	<b><u>\$13,476,750</u></b>
				<b><u>SAY</u></b>	<b><u>\$14,000,000</u></b>



# COST ESTIMATE FOR TSM/TDM ALTERNATIVE

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### III. Right of Way Items

<u>Section 11 - Right of Way</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost*</u>	<u>Cost</u>	<u>Section Cost</u>
R/W Acquisition (Residential)	1	LS	\$907,319	\$907,319	
R/W Acquisition (Commercial)	1	LS	\$101,886	\$101,886	
Permanent R/W Easement (Tunnel)	1	LS	\$184,671	\$184,671	
Relocation Costs (RAP)	1	LS	\$215,000	\$215,000	
Clearance/Demolition (Commercial)	18,000	EA	\$7	\$126,000	
Title and Escrow	1	LS	\$62,000	\$62,000	
Real Estate Appraisals	1	LS	\$60,000	\$60,000	
Land Owner Appraisals	1	LS	\$120,000	\$120,000	
Utility Relocation (State Share)	1	LS	\$4,215,675	\$4,215,675	
Utility Protection (State Share)	1	LS	\$79,750	\$79,750	
Damage Cost and/or Cost to Cure	1	LS	\$750	\$750	
Condemnation Cost	1	EA	\$95,000	\$95,000	
Consultant Fees	1	EA	\$206,500	\$206,500	
Depreciated Improvements	1	EA	\$81,800	\$81,800	
Permit Fees	1	LS	\$10,500	\$10,500	
Environmental Fees	1	EA	\$92,750	\$92,750	
Goodwill Loss	1	EA	\$80,000	\$80,000	
Furniture, Fixtures & Equipment Fees (FF&E)	1	EA	\$80,000	\$80,000	
				<b>Total for Section 11</b>	<b>\$6,719,601</b>
<b>Section 12 - Additions</b>		<b>%</b>			
<i>Contingencies</i>					
ROW Contingency (25% of ROW Cost)	\$6,719,601	25%	\$1,679,900		
				<b>Total for Section 12</b>	<b>\$1,679,901</b>
				<b>TOTAL RIGHT OF WAY ITEMS SECTION 11 &amp; 12</b>	<b>\$8,399,502</b>
				<b>SAY</b>	<b>\$9,000,000</b>

\*R/W Acquisition unit costs are averaged.

# COST ESTIMATE FOR BRT ALTERNATIVE

Contract PS4710-2755  
11/14/2014 9:37 AM

ATTACHMENT L-2

## PROJECT DESCRIPTION

### STATE ROUTE 710 NORTH STUDY

### BUS RAPID TRANSIT ALTERNATIVE

	Cost in 2014 \$
ROADWAY ITEMS	\$79,000,000
STRUCTURE ITEMS	\$0
BRT ITEMS	<u>\$49,000,000</u>
SUBTOTAL CONSTRUCTION	\$128,000,000
RIGHT OF WAY	<u>\$11,000,000</u>
TOTAL COST (BRT ALT.)	\$139,000,000
TSM COMPONENTS	<u>\$102,000,000</u>
TOTAL COST* (BRT + TSM)	\$241,000,000

\*Total costs are in 2014 dollars and will need to be escalated to the actual start of construction year.

# COST ESTIMATE FOR BRT ALTERNATIVE

Contract PS4710-2755  
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## I. Roadway Items

<u>Section 1 - Earthwork</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Construction Site BMP (Incl. SWPPP)	1	LS	\$2,000,000	\$2,000,000	
Clearing and Grubbing	3	Acre	\$20,000	\$60,000	
Roadway Excavation	15,700	CY	\$45	\$706,500	
	<b>Roadway Ex. Cost</b>	<b>%</b>		<b>Cost</b>	
Hazardous Waste Material/ADL	1	LS	\$150,000	\$150,000	
				<b>Total Earthwork</b>	<b>\$2,916,500</b>
<u>Section 2 - Structural Section</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	
Remove - Curb, Gutter, Curb Ramps, Sidewalk & Driveway	15,006	CY	\$209	\$3,136,254	
Remove - Crosswalk, Concrete Median, Cross Gutter, Bus Pad	2,183	CY	\$230	\$502,090	
Hot Mix Asphalt (HMA)	33,747	TON	\$80	\$2,699,760	
Cold Plane AC Pvmnt (0.15' MAX)	1,070	SY	\$10	\$10,700	
Class 1 Aggregate Subbase (AS)	22,619	CY	\$30	\$678,570	
Class 2 Aggregate Base (AB)	10,450	CY	\$25	\$261,250	
Concrete Pavement (JPCP)	2,693	CY	\$340	\$915,620	
PCC Overlay	2,112	CY	\$250	\$528,000	
Curb, Gutter, Curb Ramps, Sidewalk & Driveway	11,722	CY	\$366	\$4,290,252	
Lean Concrete Base (Bus Pad)	1,538	CY	\$115	\$176,870	
Concrete Pavement (Bus Pad)	2,553	CY	\$360	\$919,080	
				<b>Total Structural Section</b>	<b>\$14,118,446</b>

# COST ESTIMATE FOR BRT ALTERNATIVE

Contract PS4710-2755  
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**I. Roadway Items (CONT.)**

<u>Section 3 - Drainage</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Unit Cost</u>	<u>Section Cost</u>
Abandon Culvert	40	LF	\$8	\$320	
Remove Inlet	63	EA	\$800	\$50,400	
Cap Inlet	21	EA	\$900	\$18,900	
12" RCP	12	LF	\$80	\$960	
18" RCP	376	LF	\$110	\$41,360	
Inlet	5	EA	\$2,000	\$10,000	
CB (W=7')	70	EA	\$2,800	\$196,000	
CB (W=14')	1	EA	\$3,900	\$3,900	
CB (W=17')	1	EA	\$4,500	\$4,500	
CB (W=20')	1	EA	\$5,100	\$5,100	
CB (W=21')	6	EA	\$5,300	\$31,800	
CB (W=24')	1	EA	\$5,800	\$5,800	
Tree Box Filter (4'X4')	2	EA	\$13,300	\$26,600	
Tree Box Filter (4'X6')	1	EA	\$14,900	\$14,900	
Tree Box Filter (4'X8')	3	EA	\$16,000	\$48,000	
Tree Box Filter (4'X10')	1	EA	\$20,000	\$20,000	
Tree Box Filter (4'X12')	2	EA	\$24,000	\$48,000	
Tree Box Filter (4'X18')	2	EA	\$33,600	\$67,200	
Tree Box Filter (6'X4')	7	EA	\$13,300	\$93,100	
Tree Box Filter (6'X6')	10	EA	\$17,500	\$175,000	
Tree Box Filter (6'X8')	3	EA	\$22,300	\$66,900	
Tree Box Filter (6'X10')	4	EA	\$28,400	\$113,600	
Tree Box Filter (6'X12')	4	EA	\$33,200.00	\$132,800	
Tree Box Filter (6'X14')	6	EA	\$35,200	\$211,200	
Tree Box Filter (6'X16')	3	EA	\$38,400	\$115,200	
Tree Box Filter (6'X18')	7	EA	\$41,600	\$291,200	
CB Screen and Insert	27	EA	\$280	\$7,560	
Bioswale	290	LF	\$25	\$7,250	
			<b><u>Total Drainage Items</u></b>		<b><u>\$1,807,550</u></b>

# COST ESTIMATE FOR BRT ALTERNATIVE

Contract PS4710-2755  
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**I. Roadway Items (CONT.)**

<u>Section 4 - Specialty Items</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Landscaping and Irrigation	1	LS	\$9,196,727	\$9,196,727	
Retaining Wall (H=0-10 FT)	335	CY	\$563	\$188,605	
Wall Aesthetic Treatment (Fracture Fin)	8,970	SF	\$10	\$89,700	
Street Lighting Modifications	1	LS	\$1,005,000	\$1,005,000	
Sound Walls	1	LS	\$1,104,915	\$1,104,915	
			<b><u>Total Specialty Items</u></b>		<b><u>\$11,584,947</u></b>

<u>Section 5 - Traffic Items</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Modify Signalized Intersections	1	LS	\$3,262,200	\$3,262,200	
Transit Signal Priority (TSP)	1	LS	\$2,112,000	\$2,112,000	
			<b><u>Rdwy Pvmt Cost</u></b>		<b><u>%</u></b>
Misc. Traffic Items (25% of Rdwy Pvmt) - Loop Detectors, Ramp Metering, Count sta, Traffic control system, TMP, Signing and Striping)	\$14,118,446	x	25%	\$3,529,612	
Misc. Removal (7% of Rdwy Pvmt)	\$14,118,446	x	7%	\$988,291	
Micellaneous (20% Rdwy Pvmt) - Elec Service for Irrigation, Adjust Utility Covers	\$14,118,446	x	20%	\$2,823,689	
Construction Staging (25% Rdwy Pvmt)	\$14,118,446	x	25%	\$3,529,612	
			<b><u>Total Traffic Items</u></b>		<b><u>\$16,245,404</u></b>
<b><u>SUBTOTAL ROADWAY ITEMS SECTIONS 1-5</u></b>					<b><u>\$46,672,847</u></b>

# COST ESTIMATE FOR BRT ALTERNATIVE

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**I. Roadway Items (CONT.)**

<u>Section 6 - Minor Items</u>	<u>%</u>	<u>Cost</u>	<u>Section Cost</u>
Subtotal Sections 1-5	\$46,672,847 x 15%	\$7,000,928	
		<u>Total Minor Items</u>	<u>\$7,000,928</u>
<u>Section 7 - Mobilization</u>	<u>%</u>	<u>Cost</u>	<u>Section Cost</u>
Relocation Costs (RAP)			
Subtotal Sections 1-5		\$46,672,847	
Minor Items - Section 6		\$7,000,928	
Subtotal Sections 1-6	10% Mobilization (includes 10% of Mob Cost)	\$53,673,775 x	\$5,963,753
		<u>Total Roadway Mobilization</u>	<u>\$5,963,753</u>
<u>Section 8 - Additions</u>	<u>%</u>	<u>Cost</u>	<u>Section Cost</u>
<i>Supplemental</i>			
Subtotal Sections 1-5		\$46,672,847	
Minor Items - Section 6		\$7,000,928	
Subtotal Sections 1-6	10%	\$53,673,775 x	\$5,367,378
<i>Contingencies</i>			
Subtotal Sections 1-5		\$46,672,847	
Minor Items - Section 6		\$7,000,928	
Subtotal Sections 1-6	25%	\$53,673,775 x	\$13,418,444
		<u>Total Roadway Additions</u>	<u>\$18,785,822</u>
		<u>Subtotal for Sections 6, 7 &amp; 8</u>	<u>\$31,750,503</u>
		<u>Subtotal for Sections 1-5</u>	<u>\$46,672,847</u>
		<u>TOTAL ROADWAY ITEMS SECTIONS 1-8</u>	<u>\$78,423,350</u>
		<u>SAY</u>	<u>\$79,000,000</u>



# COST ESTIMATE FOR BRT ALTERNATIVE

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**III. BRT Items**

**Section 11 - BRT Items**

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
20.011 Stations	1	LS	\$8,366,672	\$8,366,672	
20.020 Relocate Bus Shelter	26	EA	\$4,000	\$104,000	
70.04 Vehicles: Bus - 60'	15	EA	\$837,663	\$12,564,945	
70.04 Vehicles: Bus - 45'	14	EA	\$539,000	\$7,546,000	
Onboard Validators	1	LS	\$375,000	\$375,000	
				<b><u>Total BRT Section</u></b>	<b><u>\$28,956,617</u></b>

**Section 12 - BRT Minor Items**

	<u>%</u>	<u>Cost</u>	<u>Section Cost</u>
Subtotal Section 11	\$28,956,617 x 15%	\$4,343,493	
			<b><u>Total Minor Items</u></b>
			<b><u>\$4,343,493</u></b>
			<b><u>Total for Sections 11 &amp; 12</u></b>
			<b><u>\$33,300,110</u></b>



# COST ESTIMATE FOR BRT ALTERNATIVE

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**III. BRT Items (CONT.)**

<u>Section 13 - BRT Mobilization</u>	<u>%</u>	<u>Section Cost</u>
Subtotal Section 11	<u>\$28,956,617</u>	
Minor Items - Section 12	<u>\$4,343,493</u>	
Subtotal Sections 11 & 12	<u>\$33,300,110</u> x	
	10% Mobilization (includes 10% of Mob Cost)	<u>\$3,700,013</u>
<b><u>Total BRT Mobilization</u></b>		<b><u>\$3,700,013</u></b>
<u>Section 14 - BRT Additions</u>	<u>%</u>	<u>Section Cost</u>
<i>Supplemental</i>		
Subtotal Section 11	<u>\$28,956,617</u>	
Minor Items - Section 12	<u>\$4,343,493</u>	
Sum	<u>\$33,300,110</u> x	
	10%	<u>\$3,330,011</u>
<i>Contingencies</i>		
Subtotal Section 11	<u>\$28,956,617</u>	
Minor Items - Section 12	<u>\$4,343,493</u>	
Sum	<u>\$33,300,110</u> x	
	25%	<u>\$8,325,028</u>
<b><u>Total BRT Additions</u></b>		<b><u>\$11,655,039</u></b>
<b><u>Subtotal for Sections 13 &amp; 14</u></b>		<b><u>\$15,355,052</u></b>
<b><u>Subtotal for Sections 11 &amp; 12</u></b>		<b><u>\$33,300,110</u></b>
<b><u>TOTAL BRT ITEMS SECTIONS 11-14</u></b>		<b><u>\$48,655,162</u></b>
<b><u>SAY</u></b>		<b><u>\$49,000,000</u></b>

# COST ESTIMATE FOR BRT ALTERNATIVE

Contract PS4710-2755  
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## IV. Right of Way Items

### Section 15 - Right of Way

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost*</u>	<u>Cost</u>	<u>Section Cost</u>
R/W Acquisition (Fee)	35	SF	\$18,652	\$652,815	
R/W Acquisition (Temp Eastment)	36	SF	\$12,157	\$437,648	
Right of Entry	492	EA	\$395	\$194,500	
Relocation Costs (RAP)	10	SF	\$21,500	\$215,000	
Title & Escrow	38	EA	\$2,921	\$111,000	
Real Estate Appraisals	38	EA	\$3,224	\$122,500	
Land Owner Appraisals	38	EA	\$5,000	\$175,000	
Utility Relocation (State Share)	1	LS	\$1,070,120	\$1,070,120	
Damage Cost and/or Cost to Cure	8	EA	\$39,375	\$315,000	
Condemnation Cost	250	EA	\$2,640	\$649,440	
Consultant Fees	250	EA	\$11,392	\$2,810,000	
Depreciated Improvements	23	EA	\$4,060	\$84,985	
Environmental Fees	35	EA	\$6,250	\$193,000	
Goodwill Loss	8	EA	\$131,250	\$1,050,000	

**Total Right of Way Items      \$8,081,008**

### Section 16 - Additions

		<u>%</u>		<u>Section Cost</u>
<i>Contingencies</i>				
Subtotal Section 15	\$8,081,008			
Sum	\$8,081,008	x 25%	\$2,020,252	

**Total Right of Way Additions      \$2,020,252**

**TOTAL RIGHT OF WAY ITEMS SECTION 15 & 16      \$10,101,260**

**SAY      \$11,000,000**

\*R/W Acquisition unit costs are averaged.

# COST ESTIMATE FOR BRT ALTERNATIVE

Contract PS4710-2755  
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**V. TSM/TDM COSTS**

**Section 17 - TSM/TDM Costs**

	Description	Quantity	Unit	Construction	ROW Cost	ROW	Cost	Section Cost
				Cost		Contingency		
I-1	Broadway/Colorado Blvd	1	LS	\$118,000	\$0	\$0	\$118,000	
I-2	Eagle Rock Blvd/York Blvd	1	LS	\$273,000	\$0	\$0	\$273,000	
I-3	Eastern Ave/Huntington Dr	1	LS	\$119,000	\$0	\$0	\$119,000	
I-8	Fair Oaks Ave/Monterey Rd	1	LS	\$154,000	\$0	\$0	\$154,000	
I-9	Fremont St/Monterey Rd	1	LS	\$505,000	\$79,858	\$19,964	\$604,822	
I-10	Huntington Dr/Fair Oaks Ave	1	LS	\$476,000	\$0	\$0	\$476,000	
I-11	Fremont Ave/Huntington Dr	1	LS	\$30,000	\$0	\$0	\$30,000	
I-13,14,15	Huntington Dr/Atlantic Blvd/Garfield Ave	1	LS	\$424,000	\$470,679	\$117,670	\$1,012,348	
I-16	Garfield Ave/Mission Rd	1	LS	\$665,000	\$195,143	\$48,786	\$908,929	
I-18	San Gabriel Blvd/Huntington Dr	1	LS	\$292,000	\$0	\$0	\$292,000	
I-19	Del Mar Ave/Mission Rd	1	LS	\$550,000	\$385,965	\$96,491	\$1,032,456	
I-22	San Gabriel Blvd/Marshall St	1	LS	\$386,000	\$83,510	\$20,877	\$490,387	
I-24	Huntington Dr/Oak Knoll Ave	1	LS	\$84,000	\$0	\$0	\$84,000	
I-25	Huntington Dr/San Marino Ave	1	LS	\$89,000	\$0	\$0	\$89,000	
I-43	Del Mar Ave/Valley Blvd	1	LS	\$62,000	\$131,500	\$32,875	\$226,375	
I-44	Fremont Ave/Hellman Ave	1	LS	\$68,000	\$0	\$0	\$68,000	
I-45	Eagle Rock Blvd/Colorado Blvd	1	LS	\$90,000	\$0	\$0	\$90,000	
ITS-1	Transit Signal Priority along Rosemead Boulevard	1	LS	\$240,000	\$0	\$0	\$240,000	
ITS-2	Install Video Detection System at SR 110 north of US-101	1	LS	\$25,000	\$0	\$0	\$25,000	
ITS-3	Install Video Detection Systems at Key Locations in Study Area	1	LS	\$500,000	\$0	\$0	\$500,000	
ITS-4	Arterial Speed Data Collection at Key North/South Arterials	1	LS	\$1,000,000	\$0	\$0	\$1,000,000	
ITS-5	Install Arterials CMS at Key Locations in Study Area	1	LS	\$2,000,000	\$0	\$0	\$2,000,000	
ITS-6	Traffic Signal Synchronization on Garfield Avenue	1	LS	\$23,000	\$0	\$0	\$23,000	
ITS-7	Signal Optimization on Del Mar Avenue	1	LS	\$120,000	\$0	\$0	\$120,000	
ITS-8	Signal Optimization on Rosemead Avenue	1	LS	\$160,000	\$0	\$0	\$160,000	
ITS-9	Signal Optimization on Temple City Boulevard	1	LS	\$160,000	\$0	\$0	\$160,000	
ITS-10	Signal Optimization on Santa Anita Avenue	1	LS	\$130,000	\$0	\$0	\$130,000	
ITS-11	Signal Optimization on Peck Road	1	LS	\$140,000	\$0	\$0	\$140,000	
ITS-12	Signal Optimization on Fremont Avenue	1	LS	\$85,000	\$0	\$0	\$85,000	
L-1	Figueroa St from SR 134 to Colorado Blvd	1	LS	\$682,000	\$100,038	\$25,009	\$807,047	
L-2A	Fremont Ave from Huntington Dr to Alhambra Rd	1	LS	\$654,000	\$0	\$0	\$654,000	
L-2C	Fremont Ave from Mission Rd to Valley Blvd	1	LS	\$261,000	\$0	\$0	\$261,000	
L-4	Garfield Ave from Valley Blvd to Glendon Way	1	LS	\$820,000	\$58,500	\$14,625	\$893,125	
L-5	Rosemead Blvd from Lower Azusa Rd to Marshall St	1	LS	\$944,000	\$2,868,251	\$717,063	\$4,529,314	
T-1	Valley Blvd to Mission Rd Connector Road	1	LS	\$49,730,000	\$1,158,717	\$289,679	\$51,178,396	
T-2	Arroyo Seco Parkway Hook Ramps Concept	1	LS	\$7,650,000	\$658,582	\$164,645	\$8,473,227	
T-3	Saint John Ave Extension from Del Mar Ave to California Blvd	1	LS	\$3,692,000	\$528,859	\$132,215	\$4,353,074	
	TSM/TDM Buses	37	EA	\$539,000	\$0	\$0	\$19,943,000	
<b>TOTAL TSM/TDM ITEMS SECTIONS 17</b>								<b>\$101,743,501</b>
<b>SAY</b>								<b>\$102,000,000</b>

# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

Contract PS4710-2755  
11/14/2014 9:31 AM

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## ATTACHMENT L-3

### PROJECT DESCRIPTION STATE ROUTE 710 NORTH STUDY LIGHT RAIL TRANSIT ALTERNATIVE

	Cost in 2014 \$
AERIAL STRUCTURES ITEMS	\$390,000,000
AT GRADE ITEMS	\$50,000,000
DRAINAGE ITEMS	\$10,000,000
LRT TUNNEL & VENTILATION ITEMS	\$1,197,000,000
PARKING LOTS	\$12,000,000
UNDERGROUND STRUCTURE ITEMS	\$306,000,000
YARD AND SHOP ITEMS	<u>\$298,000,000</u>
SUBTOTAL CONSTRUCTION	\$2,263,000,000
RIGHT OF WAY	\$105,000,000
TOTAL COST (LRT ALT.)	\$2,368,000,000
TSM/TDM COMPONENTS	<u>\$52,000,000</u>
TOTAL COST* (LRT + TSM)	\$2,420,000,000

\*Total costs are in 2014 dollars and will need to be escalated to the actual start of construction year.

# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

Contract PS4710-2755  
11/14/2014 9:31 AM

## I. Aerial Structures Items

<u>Section 1 - Sitework</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Construction Site Management/SWPPP	1	LS	\$125,000	\$125,000	
Survey and Layout	1	LS	\$175,000	\$175,000	
Site Demolition	1	LS	\$50,000	\$50,000	
Site Restoration	1	LS	\$50,000	\$50,000	
Asphalt Pavement Restoration	8,600	SY	\$40.00	\$344,000	
Temporary Shoring	1	LS	\$650,000	\$650,000	
CIDH Piles 8' dia.	600	LF	\$2,330	\$1,398,000	
CIDH Piles 10' dia.	1,800	LF	\$2,910	\$5,238,000	
CIDH Piles 12' dia	540	LF	\$3,500	\$1,890,000	
Landscaping	3	EA	\$75,000	\$225,000	
Land Purchase	1	LS	\$5,000,000	\$5,000,000	
				<b>Total Sitework</b>	<b>\$15,145,000</b>

<u>Section 2 - Concrete</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Concrete Curb and Gutter	2,500	LF	\$40	\$100,000	
Concrete Median	4,035	LF	\$115	\$464,025	
Site Concrete	1,075	CY	\$500	\$537,500	
Misc. Cast in Place Concrete	183	CY	\$500	\$91,500	
Sidewalks	100	CY	\$400	\$40,000	
Concrete Columns	4,670	CY	\$1,500	\$7,005,000	
Concrete Bridge Beams	540	CY	\$3,000	\$1,620,000	
Aerial Concrete Structure and Track foundation	14,075	LF	\$8,000	\$112,600,000	
Concrete Structure for Guideway	2,335	CY	\$1,000	\$2,335,000	
				<b>Total Concrete</b>	<b>\$124,793,025</b>

**Subtotal Sections 1 & 2**      **\$139,938,025**

# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

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## I. Aerial Structures Items (CONT.)

<u>Section 3 - Finishes</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Stairs	1	LS	\$1,960,000	\$1,960,000	
Handrails and Fencing	1	LS	\$1,110,000	\$1,110,000	
Signage	1	LS	\$330,000	\$330,000	
Painting	1	LS	\$330,000	\$330,000	
Guardrails	2	EA	\$25,000	\$50,000	
Guardrails	1	EA	\$15,000	\$15,000	
Elevators	6	EA	\$250,000	\$1,500,000	
Escalators	4	EA	\$350,000	\$1,400,000	
Retaining Walls	1,060	CY	\$800	\$848,000	
Soil Nails and Tiebacks at Retaining Walls	1	EA	\$100,000	\$100,000	
Emergency Stair Exit	1	EA	\$100,000	\$100,000	
Grand Pylon	5	EA	\$100,000	\$500,000	
Architectural Steel Trellis	3	EA	\$100,000	\$300,000	
Fare Gates / Emergency Swing Gates	3	EA	\$75,000	\$225,000	
Benches, Trash Receptacles, Bike Racks, Lockers	3	EA	\$50,000	\$150,000	
TC and C Room Finishes	3	EA	\$100,000	\$300,000	
				<b>Total Finishes</b>	<b>\$9,218,000</b>
<u>Section 4 - Traffic</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Traffic Control	1	LS	\$500,000	\$500,000	
New Traffic Poles	3	EA	\$150,000	\$450,000	
New Street Lights	19	EA	\$20,000	\$380,000	
New Decorative Lights	4	EA	\$25,000	\$100,000	
				<b>Total Traffic</b>	<b>\$1,430,000</b>
<u>Section 5 - Specialty Items</u>				<u>Cost</u>	<u>Section Cost</u>
Mechanical Systems	12%	of Sections 1-4		\$18,070,323	
Firesprinkler Systems	5%	of Sections 1-4		\$7,529,301	
Electrical Systems	15%	of Sections 1-4		\$22,587,904	
Security CTVV Systems	5%	of Sections 1-4		\$7,529,301	
				<b>Total Specialty Items</b>	<b>\$55,716,830</b>
<u>LRT Items</u>					
Transit Rail Track Structure - 2 Lines	28150	LF	\$1,000	\$28,150,000	
At Grade Rail Track Structure - 2 Lines	3930	LF	\$1,000	\$3,930,000	
Track Structure - Railway Crossover	1	EA	\$250,000	\$250,000	
Raised Walkway	14075	LF	\$30.00	\$422,250	
Emergency Walkway	14075	LF	\$15.00	\$211,125	
Noise Barrier	28150	LF	\$75.00	\$2,111,250	
Guardrail	28150	LF	\$50.00	\$1,407,500	
				<b>Total LRT</b>	<b>\$36,482,125</b>
				<b>Total Section 5</b>	<b>\$92,198,955</b>
				<b>Subtotal Sections 3, 4 &amp; 5</b>	<b>\$102,846,955</b>

# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

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**I. Aerial Structures Items (CONT.)**

<u>Section 6 - Mobilization</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Mobilization	1	LS	\$1,250,000	\$1,250,000	
				<b><u>Total Mobilization</u></b>	<b><u>\$1,250,000</u></b>
 <u>Section 7 - Additions</u>				<u>Total</u>	
Indirect Costs	20%	of Sections 1-5		\$48,556,996	
Overhead and Markup	15%	of Sections 1-5		\$36,417,747	
Construction Contingency	25%	of Sections 1-5		\$60,696,245	
				<b><u>Total Additions</u></b>	<b><u>\$145,670,988</u></b>
				<b><u>Subtotal for Sections 6 &amp; 7</u></b>	<b><u>\$146,920,988</u></b>
				<b><u>TOTAL AERIAL STRUCTURES ITEMS SECTIONS 1-7</u></b>	<b><u>\$389,705,968</u></b>
				<b><u>SAY</u></b>	<b><u>\$390,000,000</u></b>

# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

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## II. At Grade Items

<u>Section 8 - Sitework</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Construction Site BMP/SWPPP	1	LS	\$35,000	\$35,000	
Survey and Layout	1	LS	\$50,000	\$50,000	
Site Demolition	1	LS	\$25,000	\$25,000	
Site Restoration	1	LS	\$25,000	\$25,000	
Asphalt Pavement	12,000	SY	\$40.00	\$480,000	
Chain Link Fencing	3,136	LF	\$35.00	\$109,760	
Guardrails	2,940	LF	\$50.00	\$147,000	
Striping and Signage	1	LS	\$10,000	\$10,000	
New Utilities	1	LS	\$250,000	\$250,000	
Utility Relocation	250	LF	\$125	\$31,250	
Sump Pump Station - Structure	35	CY	\$1,000	\$35,000	
Sump Pump Station - MEP	1	LS	\$75,000	\$75,000	
TPSS - Equipment	7	EA	\$1,200,000	\$8,400,000	
TPSS - Installation	7	EA	\$500,000	\$3,500,000	
				<b>Total Sitework</b>	<b>\$13,173,010</b>
<u>Section 9 - Concrete</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Site Concrete	200	CY	\$500	\$100,000	
Concrete Curb and Gutter	1,470	LF	\$40	\$58,800	
Concrete V Ditch	170	CY	\$400	\$68,000	
Site Retaining Walls	7,059	CY	\$500	\$3,529,500	
Yard Lead Retaining Walls	7,778	CY	\$500	\$3,889,000	
Misc. Cast in Place Concrete	100	CY	\$500	\$50,000	
Bridge Structure - I-710	1,192	LF	\$7,000	\$8,344,000	
Bridge Structure - Valley Blvd	200	LF	\$7,000	\$1,400,000	
				<b>Total Concrete and Finishes</b>	<b>\$17,439,300</b>
				<b>Subtotal for Sections 8 &amp; 9</b>	<b>\$30,612,310</b>
<u>Section 10 - Mobilization</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Mobilization	1	LS	\$500,000	\$500,000	
				<b>Total Mobilization</b>	<b>\$500,000</b>
<u>Section 11 - Additions</u>				<u>Total</u>	
Indirect Costs	20%	of Section 8 & 9		\$6,122,462	
Overhead and Markup	15%	of Section 8 & 9		\$4,591,847	
Construction Contingency	25%	of Section 8 & 9		\$7,653,078	
				<b>Total Additions</b>	<b>\$18,367,386</b>
				<b>Subtotal for Sections 10 &amp; 11</b>	<b>\$18,867,386</b>
<b>TOTAL AT GRADE ITEMS SECTIONS 8-11</b>					<b>\$49,479,696</b>
<b>SAY</b>					<b>\$50,000,000</b>



# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

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### III. Drainage Items

<u>Section 12 - Drainage</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Remove Culvert	1,282	LF	\$10	\$12,820	
Remove Inlet	14	EA	\$800	\$11,200	
Abandon Culvert	50	LF	\$8	\$400	
Abandon Inlet	3	EA	\$700	\$2,100	
Cap Inlet	5	EA	\$900	\$4,500	
18" RCP	2,130	LF	\$110	\$234,300	
24" RCP	1,094	LF	\$125	\$136,750	
36" RCP	10	LF	\$170	\$1,700	
42" RCP	321	LF	\$210	\$67,410	
60" RCP	140	LF	\$375	\$52,500	
Under Drain	8,450	LF	\$20	\$169,000	
Inlet	36	EA	\$2,000	\$72,000	
CB (W=7')	7	EA	\$2,800	\$19,600	
CB (W=14')	1	EA	\$3,900	\$3,900	
CB (W=21')	2	EA	\$5,300	\$10,600	
CB (W=28')	1	EA	\$6,500	\$6,500	
Tree Box Filter (6'X6')	3	EA	\$17,500	\$52,500	
Tree Box Filter (6'X10')	5	EA	\$28,400	\$142,000	
Tree Box Filter (6'X12')	2	EA	\$33,200	\$66,400	
Tree Box Filter (6'X14')	1	EA	\$35,200	\$35,200	
Media Filter (8'X6')	1	EA	\$38,500	\$38,500	
Media Filter (11'X8')	1	EA	\$64,000	\$64,000	
CB Screen and Insert	1	EA	\$280	\$280	
Bioswale	387	LF	\$25	\$9,675	
Bioretention	3	EA	\$15,400	\$46,200	
South PS Structure (40'X20')	1	LS	\$1,260,000	\$1,260,000	
South PS Equipment and Controls	1	LS	\$1,820,000	\$1,820,000	
PS Outlet Pipe (16" Steel)	150	LF	\$390	\$58,500	
Storage Tank (45'X40'X25'D) LRT	1	LS	\$1,454,665	\$1,454,665	
				<b>Total Drainage</b>	<b>\$5,853,200</b>

#### Notes

1. Stormwater in the elevated segment is assumed draining off before the tunnel section.

<u>Section 13 - Mobilization</u>	<u>Quantity</u>		<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Mobilization (10% of Drainage cost)	5,853,200 x	10%	\$585,320	\$585,320	
				<b>Total Mobilization</b>	<b>\$585,320</b>

#### Section 14 - Additions

			<u>Total</u>	
Indirect Costs	20%	of Section 12	\$1,170,640	
Overhead and Markup	15%	of Section 12	\$877,980	
Construction Contingency	25%	of Section 12	\$1,463,300	
			<b>Total Additions</b>	<b>\$3,511,920</b>
			<b>Subtotal for Sections 13 &amp; 14</b>	<b>\$4,097,240</b>
			<b>TOTAL DRAINAGE ITEMS SECTIONS 12-14</b>	<b>\$9,950,440</b>
			<b>SAY</b>	<b>\$10,000,000</b>

# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

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**IV. LRT Tunnel & Ventilation Items**

<u>Section 15 - LRT Tunnel &amp; Ventilation Items</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
<b>LRT Tunnel System Items</b>					
Mechanical incl. Ventilation	1	LS	\$14,500,000	\$14,500,000	
Electrical	1	LS	\$129,600,000	\$129,600,000	
Instrumentation /Comm	1	LS	\$23,600,000	\$23,600,000	
			<b>Subtotal Tunnel Systems</b>		<b>\$167,700,000</b>
<b>LRT Tunnel Items</b>					
South Portal Development	1	LS	\$9,555,000	\$9,555,000	
Station 1 - Excavation, Support	1	LS	\$28,876,000	\$28,876,000	
Station 2/Crossover - Excavation, Support	1	LS	\$51,361,000	\$51,361,000	
Station 3 - Excavation, Support	1	LS	\$33,152,000	\$33,152,000	
Station 4/Crossover - Excavation, Support	1	LS	\$65,047,000	\$65,047,000	
Northbound Tunnel Excavation	21,186	LF	\$7,142	\$151,309,000	
Southbound Tunnel Excavation	21,186	LF	\$7,142	\$151,309,000	
Instrumentation & Building Protection	1	LS	\$14,344,000	\$14,344,000	
Tunnel Cross Passages - Excav., Supp., & Lining	26	EA	\$1,882,769	\$48,952,000	
Special Seismic Section (San Rafael)	2	EA	\$33,713,500	\$67,427,000	
Special Seismic Section (Raymond)	2	EA	\$28,055,500	\$56,111,000	
			<b>Subtotal Tunnel</b>		<b>\$677,443,000</b>
			<b>Section Total</b>		<b>\$845,143,000</b>
<b>Section 16 - Minor Items</b>					
			<b>Cost</b>		<b>Section Cost</b>
Subtotal Tunnel System Items	\$167,700,000	x 0%	\$0		
			<b>Total Minor Items</b>		<b>\$0</b>
<b>Section 17 - Mobilization</b>					
	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	
Equipment Mobilization	1	LS	\$36,762,000	\$36,762,000	
General Mobilization / De-mobilization	1	LS	\$11,094,000	\$11,094,000	
			<b>Total LRT Tunnel Mobilization</b>		<b>\$47,856,000</b>
			<b>Total Sections 15-17</b>		<b>\$892,999,000</b>
<b>Section 18 - Additions</b>					
<i>Supplemental</i>					
Tunnel System Subtotal	\$167,700,000				
Minor Items - Section 16	\$0				
Sum	\$167,700,000	x 0%	\$0		
<i>Contingencies</i>					
Subtotal Section 15-17	\$892,999,000				
Minor Items - Section 16	\$0				
Sum	\$892,999,000	x 34%	\$303,619,660		
			<b>Total LRT Tunnel Additions</b>		<b>\$303,619,660</b>
			<b>Subtotal for Sections 16, 17 &amp; 18</b>		<b>\$351,475,660</b>
			<b>Subtotal for Section 15</b>		<b>\$845,143,000</b>
			<b>TOTAL LRT TUNNEL ITEMS SECTIONS 15-18</b>		<b>\$1,196,618,660</b>
			<b>SAY</b>		<b>\$1,197,000,000</b>

# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

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## V. Parking Lots

<u>Section 19 - Parking Lots Items</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
<b><u>Civic Center Station</u></b>					
Survey & Layout	1	LS	\$25,000	\$25,000	
Erosion Controls	1	LS	\$25,000	\$25,000	
Storm Drain	1	LS	\$50,000	\$50,000	
Site Retaining Wall	1,100	LF	\$375	\$412,500	
Concrete Curb & Gutter	800	LF	\$40	\$32,000	
Concrete Curb	1,776	LF	\$25	\$44,400	
Concrete Driveways	2	EA	\$5,000	\$10,000	
Asphalt Pavement	2,905	SY	\$40	\$116,200	
Striping & Signage	1	LS	\$6,000	\$6,000	
Site Restoration	1	LS	\$5,000	\$5,000	
Landscaping	70,152	SF	\$3	\$210,456	
Irrigation	70,152	SF	\$2	\$105,228	
Site Lighting	12	EA	\$20,000	\$240,000	
					<b><u>Total Civic Center Station Items</u></b>
					<b><u>\$1,281,784</u></b>
<b><u>Floral Station</u></b>					
Survey & Layout	1	LS	\$3,500	\$3,500	
Erosion Controls	1	LS	\$25,000	\$25,000	
Storm Drain	1	LS	\$75,000	\$75,000	
Site Retaining Wall	960	LF	\$375	\$360,000	
Concrete Curb & Gutter	700	LF	\$40	\$28,000	
Concrete Curb	1,370	LF	\$25	\$34,250	
Concrete Driveways	2	EA	\$5,000	\$10,000	
Asphalt Pavement	6,332	SY	\$40	\$253,280	
Striping & Signage	1	LS	\$12,700	\$12,700	
Site Restoration	1	LS	\$3,500	\$3,500	
Landscaping	8,060	SF	\$3	\$24,180	
Irrigation	8,060	SF	\$2	\$12,090	
Site Lighting	10	EA	\$20,000	\$200,000	
					<b><u>Total Floral Station Items</u></b>
					<b><u>\$1,041,500</u></b>
<b><u>Huntington Station</u></b>					
Survey & Layout	1	LS	\$25,000	\$25,000	
Erosion Controls	1	LS	\$25,000	\$25,000	
Storm Drain	1	LS	\$102,000	\$102,000	
Site Retaining Wall	1,670	LF	\$375	\$626,250	
Concrete Curb & Gutter	1,200	LF	\$40	\$48,000	
Concrete Curb	2,200	LF	\$25	\$55,000	
Concrete Driveways	3	EA	\$5,000	\$15,000	
Asphalt Pavement	11,218	SY	\$40	\$448,720	
Striping & Signage	1	LS	\$22,500	\$22,500	
Site Restoration	1	LS	\$5,000	\$5,000	
Landscaping	14,310	SF	\$3	\$42,930	
Irrigation	14,310	SF	\$2	\$21,465	
Site Lighting	16	EA	\$20,000	\$320,000	
					<b><u>Total Huntington Station Items</u></b>
					<b><u>\$1,756,865</u></b>

# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

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**V. Parking Lots (CONT.)**

**South Pasadena Station**

Survey & Layout	1	LS	\$25,000	\$25,000
Erosion Controls	1	LS	\$25,000	\$25,000
Storm Drain	1	LS	\$65,000	\$65,000
Site Retaining Wall	1,380	LF	\$375	\$517,500
Concrete Curb & Gutter	1,200	LF	\$40	\$48,000
Concrete Curb	1,910	LF	\$25	\$47,750
Concrete Driveways	2	EA	\$5,000	\$10,000
Asphalt Pavement	12,980	SY	\$40	\$519,200
Striping & Signage	1	LS	\$26,000	\$26,000
Site Restoration	1	LS	\$5,000	\$5,000
Landscaping	15,130	SF	\$3	\$45,390
Irrigation	15,130	SF	\$2	\$22,695
Site Lighting	14	EA	\$20,000	\$280,000

**Total South Pasadena Station Items**      **\$1,636,535**

**Alhambra Station**

Survey & Layout	1	LS	\$35,000	\$35,000
Erosion Controls	1	LS	\$25,000	\$25,000
Storm Drain	1	LS	\$80,000	\$80,000
Site Retaining Wall	1,900	LF	\$375	\$712,500
Concrete Curb & Gutter	820	LF	\$40	\$32,800
Concrete Curb	2,380	LF	\$25	\$59,500
Concrete Driveways	2	EA	\$5,000	\$10,000
Asphalt Pavement	12,495	SY	\$40	\$499,800
Striping & Signage	1	LS	\$25,000	\$25,000
Site Restoration	1	LS	\$10,000	\$10,000
Landscaping	10,480	SF	\$3	\$31,440
Irrigation	10,480	SF	\$2	\$15,720
Site Lighting	18	EA	\$20,000	\$360,000

**Total Alhambra Station Items**      **\$1,896,760**

**Total Stations Items Section 19**      **\$7,613,444**

**Section 20 - Additions**

Indirect Costs	20%	of Section 19		\$1,522,689
Overhead and Markup	15%	of Section 19		\$1,142,017
Construction Contingency	25%	of Section 19		\$1,903,361

**Total Additions**      **\$4,568,067**

**TOTAL PARKING LOTS ITEMS SECTION 19 & 20**      **\$12,181,511**

**SAY**      **\$12,000,000**

# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

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## VI. Underground Structures Items

<u>Section 21 - Sitework</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Construction Site BMP/SWPPP	1	LS	\$500,000	\$500,000	
Survey and Layout	1	LS	\$400,000	\$400,000	
Site Demolition	1	LS	\$300,000	\$300,000	
Site Restoration	1	LS	\$50,000	\$50,000	
Temporary Shoring	1	LS	\$500,000	\$500,000	
Earthwork - Excavation and Disposal	815,380	CY	\$15	\$12,230,700	
Earthwork - Backfill and Compaction	314,080	CY	\$10	\$3,140,800	
Earthwork - Launch Shafts	30,000	CY	\$15	\$450,000	
Asphalt Pavement Restoration	555	SY	\$40	\$22,200	
Traffic Control	1	LS	\$500,000	\$500,000	
Landscaping	1	EA	\$75,000	\$75,000	
Tunnel Sump Pumps	1	LS	\$250,000	\$250,000	
				<b>Total Sitework</b>	<b>\$18,418,700</b>

<u>Section 22 - Concrete</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Site Concrete	2,350	CY	\$500	\$1,175,000	
Misc. Cast in Place Concrete	850	CY	\$500	\$425,000	
Concrete Base & Track Foundation	0	CY	\$0	\$0	
Concrete Portal	915	CY	\$800	\$732,000	
Structural Concrete - Station	67,520	CY	\$1,000	\$67,520,000	
Structural Concrete - Train Storage	19,200	CY	\$1,000	\$19,200,000	
				<b>Total Concrete</b>	<b>\$89,052,000</b>

<u>Section 23 - Finishes</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Stairs	18	EA	\$200,000	\$3,600,000	
Handrails & Fencing	5	EA	\$150,000	\$750,000	
Signage	5	EA	\$75,000	\$375,000	
Painting	5	EA	\$75,000	\$375,000	
Grand Pylon	4	EA	\$100,000	\$400,000	
Architectural Steel Trellis	4	EA	\$150,000	\$600,000	
Escalators	24	EA	\$350,000	\$8,400,000	
Elevators	16	EA	\$250,000	\$4,000,000	
Emergency Stair Exit	20	EA	\$100,000	\$2,000,000	
Fare Gates	4	EA	\$75,000	\$300,000	
Benches & Trash Receptacles	4	EA	\$50,000	\$200,000	
TC & C Room Finishes	4	EA	\$300,000	\$1,200,000	
				<b>Total Finishes</b>	<b>\$22,200,000</b>

**Subtotal for Sections 21, 22 & 23**      **\$129,670,700**

# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

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**VI. Underground Structures Items (CONT.)**

**Section 24 - Specialty Items**

**Section Cost**

Firesprinkler Systems (5% of Sections 21-23)	<u>5%</u>	of Sections 21-23	<u>\$6,483,535</u>
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**Total Specialty Items**      **\$6,483,535**

**LRT Items**

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>
Transit Rail Track Structure - 2 Lines	<u>48,170</u>	LF	<u>\$1,000</u>	<u>\$48,170,000</u>
Track Structure - Railway Crossover	<u>2</u>	EA	<u>\$250,000</u>	<u>\$500,000</u>
Evacuation Walkway Handrail	<u>48,170</u>	LF	<u>\$25</u>	<u>\$1,204,250</u>
Gas Sensors	<u>485</u>	EA	<u>\$2,500</u>	<u>\$1,212,500</u>

**Total LRT**      **\$51,086,750**

**Total Section 24**      **\$57,570,285**

**Section 25 - Mobilization**

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>
Mobilization	<u>1</u>	LS	<u>\$5,000,000</u>	<u>\$5,000,000</u>
De-Mobilization	<u>1</u>	LS	<u>\$1,200,000</u>	<u>\$1,200,000</u>

**Total Mobilization**      **\$6,200,000**

**Section 26 - Additions**

			<u>Cost</u>
Indirect Costs	<u>20%</u>	of Section 21-24	<u>\$37,448,197</u>
Overhead and Markup	<u>15%</u>	of Section 21-24	<u>\$28,086,148</u>
Construction Contingency	<u>25%</u>	of Section 21-24	<u>\$46,810,246</u>

**Total Additions**      **\$112,344,591**

**Subtotal for Sections 24, 25 & 26**      **\$176,114,876**

**TOTAL UNDERGROUND STRUCTURES ITEMS SECTIONS 21-26**      **\$305,785,576**

**SAY**      **\$306,000,000**

# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

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## VII. Yard and Shop Items

<u>Section 27 - Sitework</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Construction Site BMP/SWPPP	1	LS	\$70,000	\$70,000	
Survey and Layout	1	LS	\$150,000	\$150,000	
Earthwork	200,490	CY	\$20	\$4,009,800	
Site Demolition	1	LS	\$110,000	\$110,000	
Site Restoration	1	LS	\$75,000	\$75,000	
Asphalt Pavement Restoration	15,225	SY	\$40	\$609,000	
Temporary Shoring	1	LS	\$25,000	\$25,000	
CIDH Piles	90	LF	\$2,910	\$261,900	
Landscaping	9,600.0	SF	\$3	\$28,800	
Irrigation	9,600.0	SF	\$2	\$14,400	
Traffic Control	1	LS	\$75,000	\$75,000	
Site Lighting	21	EA	\$20,000	\$420,000	
Chain Link Fencing	1,974	LF	\$35	\$69,090	
Striping	1	LS	\$23,500	\$23,500	
				<b>Total Sitework</b>	<b>\$5,941,490</b>
<u>Section 28 - Concrete</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Concrete Curb and Gutter	6,700	LF	\$40	\$268,000	
Concrete Curb	920	LF	\$25	\$23,000	
Concrete Driveways	2	EA	\$3,000	\$6,000	
Site Concrete	950	CY	\$500	\$475,000	
Misc. Cast in Place Concrete	150	CY	\$500	\$75,000	
Concrete Columns	275	CY	\$1,500	\$412,500	
Concrete Bridge Beams	170	CY	\$3,000	\$510,000	
Concrete Foundations	7,500	CY	\$800	\$6,000,000	
Concrete pits	500	CY	\$800	\$400,000	
Concrete Slabs	2,000	CY	\$500	\$1,000,000	
Aerial Concrete Structure and Track foundation	1,195	LF	\$8,000	\$9,560,000	
				<b>Total Concrete</b>	<b>\$18,729,500</b>
<u>Section 29 - Finishes</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Stairs	1	LS	\$100,000	\$100,000	
Handrails and Fencing	1	LS	\$50,000	\$50,000	
Signage	1	LS	\$20,000	\$20,000	
Painting	1	LS	\$10,000	\$10,000	
Painting Interior	1	LS	\$50,000	\$50,000	
Painting Exterior	1	LS	\$50,000	\$50,000	
Overhead Doors	20	EA	\$10,000	\$200,000	
Doors and Hardware	50	EA	\$1,500	\$75,000	
Windows	25	EA	\$850	\$21,250	
Skylights	30	EA	\$1,000	\$30,000	
Bathrooms	6	EA	\$15,000	\$90,000	
Shop Offices	2,500	SF	\$75	\$187,500	
				<b>Total Finishes</b>	<b>\$883,750</b>
				<b>Subtotal Sections 27-29</b>	<b>\$25,554,740</b>

# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

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**VII. Yard and Shop Items (CONT.)**

<u>Section 30 - Specialty Items</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
<b>Steel</b>					
Steel Structures	500	TON	\$1,500	\$750,000	
Crane Supports	125	TON	\$1,500	\$187,500	
Steel Stairs & Handrails	1,000	LF	\$50	\$50,000	
Misc. Steel	100	TON	\$1,500	\$150,000	
<b>Thermal &amp; Moisture Protection</b>					
Exterior Enclosures	75,000	SF	\$50	\$3,750,000	
Roofing	145,350	SF	\$15	\$2,180,250	
<b>Equipment &amp; Specialties</b>					
Overhead Cranes	1	LS	\$1,000,000	\$1,000,000	
Hoists	4	EA	\$125,000	\$500,000	
				<b>Subtotal</b>	<b>\$8,567,750</b>
<b>Mechanical Electrical (ME) - Building Maintenance Shops</b>					
Mechanical Systems	12%	of Sections 27-30		\$4,094,699	
Firesprinkler Systems	5%	of Sections 27-30		\$1,706,125	
Electrical Systems	15%	of Sections 27-30		\$5,118,374	
Security CTVV Systems	5%	of Sections 27-30		\$1,706,125	
				<b>Total ME Items</b>	<b>\$12,625,322</b>
<b>LRT Items</b>					
	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Transit Rail Track Structure - 1 Lines	15,655	LF	\$500	\$7,827,500	
Raised Walkway	1,195	LF	\$30	\$35,850	
Emergency Walkway	1,195	LF	\$15	\$17,925	
Noise Barrier	6,390	LF	\$75	\$479,250	
Light Rail Vehicles	36	EA	\$3,800,000	\$136,800,000	
Guardrail	3,390	LF	\$50	\$169,500	
				<b>Total LRT</b>	<b>\$145,330,025</b>
				<b>Total Section 30</b>	<b>\$157,955,347</b>
<b>Section 31 - Mobilization</b>					
	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Mobilization	1	LS	\$3,750,000	\$3,750,000	
				<b>Total Mobilization</b>	<b>\$3,750,000</b>
<b>Section 32 - Additions</b>					
				<u>Cost</u>	
Indirect Costs	20%	of Sections 27-30		\$36,702,018	
Overhead and Markup	15%	of Sections 27-30		\$27,526,514	
Construction Contingency	25%	of Sections 27-30		\$45,877,522	
				<b>Total Additions</b>	<b>\$110,106,054</b>
				<b>Subtotal Sections 30, 31 &amp; 32</b>	<b>\$271,811,401</b>
				<b>TOTAL YARD AND SHOP ITEMS SECTIONS 27-32</b>	<b>\$297,366,141</b>
				<b>SAY</b>	<b>\$298,000,000</b>



# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

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**VIII. Right of Way Items**

**Section 33 - Right of Way**

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost*</u>	<u>Cost</u>
R/W Acquisition (Fee)	50	SF	\$789,979	\$39,498,937
R/W Acquisition (Perm Easement)	137	SF	\$9,652	\$1,322,327
R/W Acquisition (Temp Easement)	13	SF	\$168,607	\$2,191,896
Relocation Costs (RAP)	31	EA	\$259,065	\$8,031,000
Title & Escrow	245	EA	\$3,435	\$841,500
Dual Appraisals	12	EA	\$14,042	\$168,500
Real Estate Appraisals	212	EA	\$3,342	\$708,500
Land Owner Appraisals	212	EA	\$5,448	\$1,155,000
Utility Relocation (State Share)	1	LS	\$2,759,225	\$2,759,225
Utility Protection (State Share)	1	LS	\$283,000	\$283,000
Utility Easement	1	LS	\$1,132,500	\$1,132,500
Damage Cost and/or Cost to Cure	8	EA	\$125,938	\$1,007,500
Condemnation Cost	254	EA	\$6,894	\$1,751,200
Consultant Fees	256	EA	\$11,045	\$2,827,500
Depreciated Improvements	20	EA	\$513,227	\$10,264,535
Permit Fees	4	EA	\$3,500	\$14,000
Environmental Fees	175	EA	\$5,946	\$1,040,559
Goodwill Loss	29	EA	\$162,759	\$4,720,000
Furniture, Fixtures & Equipment Fees (FF&E)	27	EA	\$164,074	\$4,430,000

**Total for Section 33** \$84,147,679

**Section 34 - Additions**

*Contingencies*

Subtotal Section 33	<u>\$84,147,679</u>			
Sum	<u>\$84,147,679</u>	x	<u>25%</u>	<u>\$21,036,920</u>

**Total for Section 34** \$21,036,920

**TOTAL RIGHT OF WAY ITEMS SECTION 33 & 34** \$105,184,599

**SAY** \$105,000,000

# COST ESTIMATE FOR LIGHT RAIL TRANSIT ALTERNATIVE

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**IX. TSM/TDM COSTS**

**Section 35 - TSM/TDM Costs**

	Description	Quantity	Unit	Construction	ROW	ROW	Section Cost
				Cost	Cost	Contingency	
I-1	Broadway/Colorado Blvd	1	LS	\$118,000	\$0	\$0	\$118,000
I-2	Eagle Rock Blvd/York Blvd	1	LS	\$273,000	\$0	\$0	\$273,000
I-3	Eastern Ave/Huntington Dr	1	LS	\$119,000	\$0	\$0	\$119,000
I-8	Fair Oaks Ave/Monterey Rd	1	LS	\$154,000	\$0	\$0	\$154,000
I-9	Fremont St/Monterey Rd	1	LS	\$505,000	\$79,858	\$19,964	\$604,822
I-10	Huntington Dr/Fair Oaks Ave	1	LS	\$476,000	\$0	\$0	\$476,000
I-11	Fremont Ave/Huntington Dr	1	LS	\$30,000	\$0	\$0	\$30,000
I-13,14,15	Huntington Dr/Atlantic Blvd/Garfield Ave	1	LS	\$424,000	\$470,679	\$117,670	\$1,012,348
I-16	Garfield Ave/Mission Rd	1	LS	\$665,000	\$195,143	\$48,786	\$908,929
I-18	San Gabriel Blvd/Huntington Dr	1	LS	\$292,000	\$0	\$0	\$292,000
I-19	Del Mar Ave/Mission Rd	1	LS	\$550,000	\$385,965	\$96,491	\$1,032,456
I-22	San Gabriel Blvd/Marshall St	1	LS	\$386,000	\$83,510	\$20,877	\$490,387
I-24	Huntington Dr/Oak Knoll Ave	1	LS	\$84,000	\$0	\$0	\$84,000
I-25	Huntington Dr/San Marino Ave	1	LS	\$89,000	\$0	\$0	\$89,000
I-43	Del Mar Ave/Valley Blvd	1	LS	\$62,000	\$131,500	\$32,875	\$226,375
I-44	Fremont Ave/Hellman Ave	1	LS	\$68,000	\$0	\$0	\$68,000
I-45	Eagle Rock Blvd/Colorado Blvd	1	LS	\$90,000	\$0	\$0	\$90,000
ITS-1	Transit Signal Priority along Rosemead Boulevard	1	LS	\$240,000	\$0	\$0	\$240,000
ITS-2	Install Video Detection System at SR 110 north of US-101	1	LS	\$25,000	\$0	\$0	\$25,000
ITS-3	Install Video Detection Systems at Key Locations in Study Area	1	LS	\$500,000	\$0	\$0	\$500,000
ITS-4	Arterial Speed Data Collection at Key North/South Arterials	1	LS	\$1,000,000	\$0	\$0	\$1,000,000
ITS-5	Install Arterials CMS at Key Locations in Study Area	1	LS	\$2,000,000	\$0	\$0	\$2,000,000
ITS-6	Traffic Signal Synchronization on Garfield Avenue	1	LS	\$23,000	\$0	\$0	\$23,000
ITS-7	Signal Optimization on Del Mar Avenue	1	LS	\$120,000	\$0	\$0	\$120,000
ITS-8	Signal Optimization on Rosemead Avenue	1	LS	\$160,000	\$0	\$0	\$160,000
ITS-9	Signal Optimization on Temple City Boulevard	1	LS	\$160,000	\$0	\$0	\$160,000
ITS-10	Signal Optimization on Santa Anita Avenue	1	LS	\$130,000	\$0	\$0	\$130,000
ITS-11	Signal Optimization on Peck Road	1	LS	\$140,000	\$0	\$0	\$140,000
ITS-12	Signal Optimization on Fremont Avenue	1	LS	\$85,000	\$0	\$0	\$85,000
L-1	Figueroa St from SR 134 to Colorado Blvd	1	LS	\$682,000	\$100,038	\$25,009	\$807,047
L-2A	Fremont Ave from Huntington Dr to Alhambra Rd	1	LS	\$654,000	\$0	\$0	\$654,000
L-2C	Fremont Ave from Mission Rd to Valley Blvd	1	LS	\$261,000	\$0	\$0	\$261,000
L-3	Atlantic Blvd from Valley Blvd to I-10	1	LS	\$903,000	\$0	\$0	\$903,000
L-4	Garfield Ave from Valley Blvd to Glendon Way	1	LS	\$820,000	\$58,500	\$14,625	\$893,125
L-5	Rosemead Blvd from Lower Azusa Rd to Marshall St	1	LS	\$944,000	\$2,868,251	\$717,063	\$4,529,314
L-8	Fair Oaks from Grevelia St to Monterey St	1	LS	\$828,000	\$0	\$0	\$828,000
T-2	Arroyo Seco Parkway Hook Ramps Concept	1	LS	\$7,659,000	\$658,582	\$164,645	\$8,482,227
T-3	Saint John Ave Extension from Del Mar Ave to California Blvd	1	LS	\$3,732,000	\$528,859	\$132,215	\$4,393,074
	TSM/TDM Buses	37	EA	\$539,000	\$0	\$0	\$19,943,000
<b>TOTAL TSM/TDM SECTIONS 17</b>				<b>\$45,394,000</b>	<b>\$5,560,883</b>	<b>\$1,390,221</b>	<b>\$52,345,105</b>
						<b>TOTAL TSM/TDM ITEMS SECTIONS 35</b>	<b>\$52,345,105</b>
						<b>SAY</b>	<b>\$52,000,000</b>

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (DUAL BORE OPTION)

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ATTACHMENT L-4

## PROJECT DESCRIPTION

### STATE ROUTE 710 NORTH STUDY

### FREEWAY TUNNEL ALTERNATIVE - DUAL BORE OPTION

	Cost in 2014 \$
ROADWAY ITEMS	\$380,000,000
STRUCTURE ITEMS	\$620,000,000
FREEWAY TUNNEL & VENTILATION ITEMS	<u>\$4,570,000,000</u>
SUBTOTAL CONSTRUCTION	\$5,570,000,000
RIGHT OF WAY	<u>\$30,000,000</u>
TOTAL COST* (FREEWAY DUAL BORE ALT.)	\$5,600,000,000
TSM/TDM COMPONENTS	<u>\$50,000,000</u>
TOTAL COST* (FREEWAY DUAL BORE + TSM/TDM)	\$5,650,000,000

\*Total costs are in 2014 dollars and will need to be escalated to the actual start of construction year.

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (DUAL BORE OPTION)

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## I. Roadway Items

### Section 1 - Earthwork

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Construction Site BMP (incl. SWPPP)	1	LS	\$2,000,000	\$2,000,000	
Clearing and Grubbing	24.7	Acre	\$20,000	\$500,000	
Wetland Mitigation	1	LS	\$500,000	\$500,000	
Roadway Excavation	1,296,000	CY	\$18	\$23,328,000	
Imported Borrow	774,000	CY	\$15	\$11,610,000	
		<b><u>Roadway Ex. Cost</u></b>	<b><u>%</u></b>	<b><u>Cost</u></b>	
Hazardous Waste Material/ADL (10% of Road Ex.)	23,328,000 x	10%		\$2,332,800	
				<b><u>Total Earthwork</u></b>	<b><u>\$40,270,800</u></b>

### Section 2 - Structural Section

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Remove Asphalt Concrete	13,104	CY	\$20	\$262,080	
Remove Concrete Pavement	9,889	CY	\$33	\$326,337	
Remove Concrete (Curb & Gutter)	9,322	LF	\$10	\$93,220	
Class 3 Aggregate Subbase	33,075	CY	\$33	\$1,091,475	
Class 2 Aggregate Base	28,875	CY	\$35	\$1,010,625	
Lean Concrete Base	23,655	CY	\$100	\$2,365,500	
Hot Mix Asphalt Concrete (Type A)	53,501	TON	\$90	\$4,815,090	
Concrete Pavement	44,945	CY	\$210	\$9,438,450	
Minor Concrete (Curb)	14,620	LF	\$55	\$804,100	
				<b><u>Total Structural Section</u></b>	<b><u>\$20,206,877</u></b>

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (DUAL BORE OPTION)

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## I. Roadway Items (CONT.)

<u>Section 3 - Drainage</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
9'x8"x14' (2 cells)	995	LF	\$4,670	\$4,646,650	
Abandon Culvert	140	LF	\$8	\$1,120	
Abandon Inlet	3	EA	\$700	\$2,100	
Remove Culvert	7648	LF	\$10	\$76,480	
Remove Inlet	51	EA	\$800	\$40,800	
Cap Inlet	19	EA	\$900	\$17,100	
Adjust Inlet	21	EA	\$1,100	\$23,100	
18" CMP	60	LF	\$100	\$6,000	
18" RCP	904	LF	\$110	\$99,440	
24" RCP	10023	LF	\$125	\$1,252,875	
36" RCP	880	LF	\$170	\$149,600	
48" RCP	565	LF	\$240	\$135,600	
60" RCP	180	LF	\$375	\$67,500	
84" RCP	415	LF	\$600	\$249,000	
96" RCP	26	LF	\$900	\$23,400	
Drainage Manhole	1	EA	\$6,200	\$6,200	
Inlet	142	EA	\$2,000	\$284,000	
CB (w = 14')	1	EA	\$3,900	\$3,900	
CB (w = 24')	2	EA	\$5,800	\$11,600	
Bioswale	980	LF	\$25	\$24,500	
GSRD	2	EA	\$90,600	\$181,200	
South PS Structure (40'x20')	1	LS	\$1,260,000	\$1,260,000	
South PS Equipment and Controls	1	LS	\$1,820,000	\$1,820,000	
Tunnel PS Structure (25'X15')	1	LS	\$1,035,000	\$1,035,000	
Tunnel PS Equipment and Controls	1	LS	\$1,495,000	\$1,495,000	
North PS Structure (35'X26')	1	LS	\$1,575,000	\$1,575,000	
North PS Equipment and Controls	1	LS	\$2,275,000	\$2,275,000	
PS Outlet Pipe (16" Steel)	1973	LF	\$390	\$769,470	
Remove Pump Station	1	LS	\$101,700	\$101,700	
Storage Chamber (792'X110'X30')	1	LS	\$70,041,800	\$70,041,800	
Storage Tank (60'X45'X26') Tunnel	1	LS	\$2,058,200	\$2,058,200	
12"CSP Down Drain	8,100	FT	\$80	\$648,000	
18" CSP	44,730	FT	\$100	\$4,473,000	
Deck Drains	900	EA	\$20	\$18,000	
			<b>Total Drainage Items</b>		<b>\$94,872,335</b>

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (DUAL BORE OPTION)

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**I. Roadway Items (CONT.)**

<b>Section 4 - Specialty Items</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Cost</b>	<b>Cost</b>	<b>Section Cost</b>
Retaining Wall (H=0-10 FT)	2,856	LF	\$1,000	\$2,857,000	
Retaining Wall (H=10-15 FT)	3,201	LF	\$1,700	\$5,443,400	
Retaining Wall (H=15-20 FT)	2,804	LF	\$2,850	\$7,994,250	
Retaining Wall (H=20-30 FT)	2,974	LF	\$3,850	\$11,453,750	
Retaining Wall (H=30-40 FT)	509	LF	\$5,000	\$2,550,000	
Retaining Wall (H=40+ FT)	488	LF	\$6,000	\$2,928,000	
Slurry Wall	27,975	SF	\$230	\$6,434,250	
Soldier Pile & Lagging Wall	26,002	SF	\$110	\$2,860,220	
Soundwalls	1	LS	\$2,438,674	\$2,438,674	
Temporary Shoring	118,430	SF	\$100	\$11,843,000	
Wall Aesthetic Treatment	128,753	SF	\$10	\$1,287,530	
Concrete Barrier	25,667	LF	\$70	\$1,796,690	
Non-Highway Landscaping	7.33	Acre	\$250,000	\$2,000,000	
Bell Tower (with Clock)	1	LS	\$400,000	\$400,000	
				<b>Total Specialty Items</b>	<b>\$62,286,764</b>
<b>Section 5 - Traffic Items</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Cost</b>	<b>Cost</b>	<b>Section Cost</b>
Fiber Optic Communication System	1	LS	\$4,600,000	\$4,600,000	
Overhead Sign (Cantilever)	6	EA	\$125,000	\$750,000	
Overhead Sign (Sign Bridge)	4	EA	\$150,000	\$600,000	
Overhead Sign (Bridge Mounted)	2	EA	\$125,000	\$250,000	
Signalized Intersections	2	EA	\$270,000	\$540,000	
Striping	205,484	LF	\$1	\$205,484	
Pavement Markings	1,145	SF	\$6	\$6,870	
				<b>Rdwy Pvmt Cost</b>	<b>%</b>
Misc. Traffic Items (25% of Section 2) - Loop Detectors, Ramp Metering, Count sta, Traffic control system, TMP)	\$20,206,877	x	25%	\$5,051,719	
Misc. Removal (7% of Section 2)	\$20,206,877	x	7%	\$1,414,481	
Micellaneous (20% of Section 2) - Lighting, Call Box, CCTV, Elec Service for Irrigation	\$20,206,877	x	20%	\$4,041,375	
Construction Staging (40% Section 2)	\$20,206,877	x	40%	\$8,082,751	
				<b>Total Traffic Items</b>	<b>\$25,542,681</b>
				<b>SUBTOTAL ROADWAY ITEMS SECTIONS 1-5</b>	<b>\$243,179,457</b>

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (DUAL BORE OPTION)

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**I. Roadway Items (CONT.)**

<u>Section 6 - Minor Items</u>	%	<u>Cost</u>	<u>Section Cost</u>
Subtotal Sections 1-5	\$243,179,457 x 10%	\$24,317,946	
		<b>Total Minor Items</b>	<b>\$24,317,946</b>
<u>Section 7 - Mobilization</u>	%	<u>Cost</u>	<u>Section Cost</u>
Subtotal Sections 1-5		\$243,179,457	
Minor Items - Section 6		\$24,317,946	
Subtotal Sections 1-6	\$267,497,403 x 10% Mobilization (includes Mob Cost)	\$29,721,934	
		<b>Total Roadway Mobilization</b>	<b>\$29,721,934</b>
<u>Section 8 - Additions</u>	%	<u>Cost</u>	<u>Section Cost</u>
<i>Supplemental</i>			
Subtotal Sections 1-5		\$243,179,457	
Minor Items - Section 6		\$24,317,946	
Subtotal Sections 1-6	\$267,497,403 x 5%	\$13,374,871	
<i>Contingencies</i>			
Subtotal Sections 1-5		\$243,179,457	
Minor Items - Section 6		\$24,317,946	
Subtotal Sections 1-6	\$267,497,403 x 25%	\$66,874,351	
		<b>Total Roadway Additions</b>	<b>\$80,249,222</b>
		<b>Subtotal for Sections 6, 7 &amp; 8</b>	<b>\$134,289,102</b>
		<b>Subtotal for Sections 1-5</b>	<b>\$243,179,457</b>
		<b>TOTAL ROADWAY ITEMS SECTIONS 1-8</b>	<b>\$377,468,559</b>
		<b>SAY</b>	<b>\$380,000,000</b>

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (DUAL BORE OPTION)

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## II. Structure Items

### Section 9 - Structure Items

### Section Cost

	Valley Blvd Overcrossing	Hellman Ave Overcrossing	Existing Del Mar Blvd (Demolition)	Laguna Basin Bridge
Bridge Name	Bridge	Bridge	Bridge	Bridge
Structure Type	77'-0"	64'-0"	-	28'-10"
Width ft (out to out)	232'-0"	240'-0"	-	900'-0"
Span Lengths ft	17,825	15,360	-	25,950
Total Area sq. ft	Secant Pile	Secant & CIDH Pile	-	CIDH Pile
Footing Type (pile/spread)	\$258	\$269	-	\$348
Cost Per Sq. Ft (incl. 10% mobilization and 25% contingencies)	No	No	-	No
Seismic Retrofit Contingency	\$4,607,000	\$4,399,000	\$607,000	\$9,024,000
Total Cost for Structure				

	Green St Overcrossing	Ramona Blvd Undercrossing (Widen)	Route 710/10 Separation (Widen)	
Bridge Name	Bridge	Bridge	Bridge	
Structure Type	66'-0"	35'-10"	41'-11"	
Width ft (out to out)	400'-0"	185'-7"	336'-11"	
Span Lengths ft	26,400	6,649	14,121	
Total Area sq. ft	CIDH Pile	Steel Pile	Precast Pile	
Footing Type (pile/spread)	\$270	\$337	\$319	
Cost Per Sq. Ft (incl. 10% mobilization and 25% contingencies)	No	No	No	
Seismic Retrofit Contingency	\$7,523,000	\$2,243,000	\$4,502,000	
Total Cost for Structure				

	South Cut & Cover Tunnel	North Cut & Cover Tunnel		
Structure Name	Tunnel	Tunnel		
Structure Type	Varies	Varies		
Width ft (out to out)	N/A	N/A		
Span Lengths ft	N/A	N/A		
Total Area sq. ft	Spread	Spread		
Footing Type (pile/spread)	N/A	N/A		
Cost Per Sq. Ft (incl. 10% mobilization and 25% contingencies)	No	No		
Seismic Retrofit Contingency	\$237,377,000	\$313,171,000		
Total Cost for Structure				

**Total Structure Items**      **\$583,453,000**

### Section 10 - Minor Items

**%**      **Cost**

### Section Cost

Subtotal Section 9

\$583,453,000 x 5% = \$29,172,650

**Total Minor Items**      **\$29,172,650**

**TOTAL STRUCTURE ITEMS SECTIONS 9-10**      **\$612,625,650**

SAY      **\$620,000,000**



# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (DUAL BORE OPTION)

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### III. Freeway Tunnel & Ventilation Items

<u>Section 11 - Freeway Tunnel &amp; Ventilation Items</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
<b>Tunnel System Items</b>					
Mechanical Incl. Ventilation	1	LS	\$112,800,000	\$112,800,000	
Electrical	1	LS	\$240,000,000	\$240,000,000	
Instrumentation/Communication	1	LS	\$102,400,000	\$102,400,000	
Operation Control Centers/Portal Buildings	1	LS	\$27,000,000	\$27,000,000	
Fixed Fire Fighting System	1	LS	\$53,900,000	\$53,900,000	
				<b>Subtotal Tunnel Systems</b>	<b>\$536,100,000</b>
<b>Freeway Tunnel Items</b>					
South Portal Development (500' Beyond Bored Tunnel Portal Only)	1	LS	\$117,120,000	\$117,120,000	
North Portal Development (500' Beyond Bored Tunnel Portal Only)	1	LS	\$78,690,000	\$78,690,000	
Northbound Tunnel Excavation & Support	21,780	LF	\$32,989	\$718,499,000	
Southbound Tunnel Excavation & Support	21,780	LF	\$32,989	\$718,499,000	
Instrumentation & Building Protection	1	LS	\$9,975,000	\$9,975,000	
Vehicle Cross Passages - Excav, Supp, Conc.	12	EA	\$5,792,417	\$69,509,000	
Special Seismic Section/Vault Incl. Internal Concrete Structure	1,120	LF	\$150,941	\$169,054,000	
Northbound Roadway Internal Structure	21,780	LF	\$9,697	\$211,201,000	
Southbound Roadway Internal Structure	21,780	LF	\$9,697	\$211,201,000	
South Portal Entrance Hardscaping	91,084	SF	\$23	\$2,094,932	
South Portal Entrance Landscaping	55,695	SF	\$46	\$2,561,970	
North Portal Entrance Hardscaping	233,730	SF	\$23	\$5,375,790	
North Portal Entrance Landscaping	393,217	SF	\$18	\$7,077,906	
South OMC Building Area Hardscaping	8,000	SF	\$23	\$184,000	
South OMC Building Area Landscaping	329,460	SF	\$46	\$15,155,160	
North OMC Building Area Hardscaping	5,000	SF	\$23	\$115,000	
North OMC Building Area Landscaping	359,185	SF	\$18	\$6,465,330	
Shaft from OMC Building to Stacks Reinforced Box	1	EA	\$15,000,000	\$15,000,000	
Infrastructure for Temporary and Permanent Power	1	LS	\$26,400,000	\$26,400,000	
Power Substation	1	LS	\$2,500,000	\$2,500,000	
				<b>Subtotal Freeway Tunnel</b>	<b>\$2,386,678,088</b>
				<b>Section Total</b>	<b>\$2,922,778,088</b>
<b>Section 12 - Minor Items</b>					
		%	<u>Cost</u>		<u>Section Cost</u>
Subtotal Section 11	\$2,922,778,088	x 0%	\$0		
			(Included elsewhere in estimate)	<b>Total Minor Items</b>	<b>\$0</b>
<b>Section 13- Mobilization</b>					
		%	<u>Cost</u>		<u>Section Cost</u>
Equipment Mobilization			\$370,600,000		
General Mobilization / De-mobilization			\$39,006,000		
Tunnel System Subtotal	\$536,100,000				
Minor Items - Section 12	\$0	10% Mobilization			
Subtotal	\$536,100,000	x Cost)	\$59,566,667		
				<b>Total Freeway Tunnel Mobilization</b>	<b>\$469,172,667</b>
				<b>Total Sections 11-13</b>	<b>\$3,391,950,755</b>
<b>Section 14 - Additions</b>					
		%	<u>Cost</u>		<u>Section Cost</u>
<i>Supplemental</i>					
Tunnel System Subtotal	\$536,100,000				
Minor Items - Section 12	\$0				
Sum	\$536,100,000	x 5%	\$26,805,000		
<i>Contingencies</i>					
Subtotal Section 11-13	\$3,391,950,755				
Minor Items - Section 12	\$0				
Sum	\$3,391,950,755	x 34%	\$1,153,263,257		
				<b>Total Freeway Tunnel Additions</b>	<b>\$1,180,068,257</b>
				<b>Subtotal for Sections 12, 13 &amp; 14</b>	<b>\$1,649,240,924</b>
				<b>Subtotal for Section 11</b>	<b>\$2,922,778,088</b>
				<b>TOTAL FREEWAY TUNNEL ITEMS SECTIONS 11-14</b>	<b>\$4,572,019,012</b>
				<b>SAY</b>	<b>\$4,570,000,000</b>

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (DUAL BORE OPTION)

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## IV. Right of Way Items

### Section 15 - Right of Way

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost*</u>	<u>Cost</u>	<u>Section Cost</u>
R/W Acquisition (Fee)	4	SF	\$266,190	\$1,064,758	
R/W Acquisition (Perm Easement)	312	SF	\$5,583	\$1,742,004	
R/W Acquisition (Temp Easement)	47	SF	\$4,721	\$221,875	
Relocation Costs (RAP)	3	EA	\$341,000	\$1,023,000	
Clearance/Demolition (Commercial)	21,100	SF	\$7	\$147,700	
Title & Escrow	368	EA	\$2,167	\$797,500	
Real Estate Appraisals	346	EA	\$2,610	\$903,000	
Land Owner Appraisals	346	EA	\$5,000	\$1,730,000	
Utility Relocation (State Share)	1	LS	\$7,527,750	\$7,527,750	
Utility Protection (State Share)	1	LS	\$457,325	\$457,325	
Damage Cost and/or Cost to Cure	1	LS	\$1,800,000	\$1,800,000	
Condemnation Cost	294	EA	\$4,343	\$1,276,700	
Consultant Fees	366	EA	\$8,283	\$3,031,500	
Depreciated Improvements	2	EA	\$75,250	\$150,500	
Permit Fees	1	LS	\$3,500	\$3,500	
Environmental Fees	303	EA	\$2,385	\$722,541	
Goodwill Loss	2	EA	\$210,000	\$420,000	
Furniture, Fixtures & Equipment Fees (FF&E)	2	EA	\$230,000	\$460,000	
			<b>Total Right of Way Items</b>		<b>\$23,479,653</b>

### Section 16 - Additions

		<u>%</u>		<u>Section Cost</u>
<i>Contingencies</i>				
Subtotal Section 15	\$23,479,653			
Sum	\$23,479,653	x 25%	\$5,869,914	
			<b>Total Right of Way Additions</b>	<b>\$5,869,914</b>

**TOTAL RIGHT OF WAY ITEMS SECTION 15 & 16** **\$29,349,567**

**SAY** **\$30,000,000**

\*R/W Acquisition unit costs are averaged.

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (DUAL BORE OPTION)

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V. TSM/TDM

Section 17 - TSM/TDM

	Description	Quantity	Unit	Construction Cost	ROW Cost	ROW Contingency	Total Cost	Section Cost
I-1	Broadway/Colorado Blvd	1	LS	\$118,000	\$0	\$0	\$118,000	
I-2	Eagle Rock Blvd/York Blvd	1	LS	\$273,000	\$0	\$0	\$273,000	
I-3	Eastern Ave/Huntington Dr	1	LS	\$119,000	\$0	\$0	\$119,000	
I-8	Fair Oaks Ave/Monterey Rd	1	LS	\$154,000	\$0	\$0	\$154,000	
I-9	Fremont St/Monterey Rd	1	LS	\$505,000	\$79,858	\$19,964	\$604,822	
I-10	Huntington Dr/Fair Oaks Ave	1	LS	\$476,000	\$0	\$0	\$476,000	
I-11	Fremont Ave/Huntington Dr	1	LS	\$30,000	\$0	\$0	\$30,000	
I-13,14,15	Huntington Dr/Atlantic Blvd/Garfield Ave	1	LS	\$424,000	\$470,679	\$117,670	\$1,012,348	
I-16	Garfield Ave/Mission Rd	1	LS	\$665,000	\$195,143	\$48,786	\$908,929	
I-18	San Gabriel Blvd/Huntington Dr	1	LS	\$292,000	\$0	\$0	\$292,000	
I-19	Del Mar Ave/Mission Rd	1	LS	\$550,000	\$385,965	\$96,491	\$1,032,456	
I-22	San Gabriel Blvd/Marshall St	1	LS	\$386,000	\$83,510	\$20,877	\$490,387	
I-24	Huntington Dr/Oak Knoll Ave	1	LS	\$84,000	\$0	\$0	\$84,000	
I-25	Huntington Dr/San Marino Ave	1	LS	\$89,000	\$0	\$0	\$89,000	
I-43	Del Mar Ave/Valley Blvd	1	LS	\$62,000	\$131,500	\$32,875	\$226,375	
I-44	Fremont Ave/Hellman Ave	1	LS	\$68,000	\$0	\$0	\$68,000	
I-45	Eagle Rock Blvd/Colorado Blvd	1	LS	\$90,000	\$0	\$0	\$90,000	
ITS-1	Transit Signal Priority along Rosemead Boulevard	1	LS	\$240,000	\$0	\$0	\$240,000	
ITS-2	Install Video Detection System at SR 110 north of US-101	1	LS	\$25,000	\$0	\$0	\$25,000	
ITS-3	Install Video Detection Systems at Key Locations in Study Area	1	LS	\$500,000	\$0	\$0	\$500,000	
ITS-4	Arterial Speed Data Collection at Key North/South Arterials	1	LS	\$1,000,000	\$0	\$0	\$1,000,000	
ITS-5	Install Arterials CMS at Key Locations in Study Area	1	LS	\$2,000,000	\$0	\$0	\$2,000,000	
ITS-6	Traffic Signal Synchronization on Garfield Avenue	1	LS	\$23,000	\$0	\$0	\$23,000	
ITS-7	Signal Optimization on Del Mar Avenue	1	LS	\$120,000	\$0	\$0	\$120,000	
ITS-8	Signal Optimization on Rosemead Avenue	1	LS	\$160,000	\$0	\$0	\$160,000	
ITS-9	Signal Optimization on Temple City Boulevard	1	LS	\$160,000	\$0	\$0	\$160,000	
ITS-10	Signal Optimization on Santa Anita Avenue	1	LS	\$130,000	\$0	\$0	\$130,000	
ITS-11	Signal Optimization on Peck Road	1	LS	\$140,000	\$0	\$0	\$140,000	
ITS-12	Signal Optimization on Fremont Avenue	1	LS	\$85,000	\$0	\$0	\$85,000	
L-1	Figueroa St from SR 134 to Colorado Blvd	1	LS	\$682,000	\$100,038	\$25,009	\$807,047	
L-2A	Fremont Ave from Huntington Dr to Alhambra Rd	1	LS	\$654,000	\$0	\$0	\$654,000	
L-2C	Fremont Ave from Mission Rd to Valley Blvd	1	LS	\$261,000	\$0	\$0	\$261,000	
L-3	Atlantic Blvd from Valley Blvd to I-10	1	LS	\$903,000	\$0	\$0	\$903,000	
L-4	Garfield Ave from Valley Blvd to Glendon Way	1	LS	\$820,000	\$58,500	\$14,625	\$893,125	
L-5	Rosemead Blvd from Lower Azusa Rd to Marshall St	1	LS	\$944,000	\$2,868,251	\$717,063	\$4,529,314	
L-8	Fair Oaks Ave from Grevelia St to Monterey Rd	1	LS	\$828,000	\$0	\$0	\$828,000	
T-2	Arroyo Seco Parkway Hook Ramps Concept	1	LS	\$7,659,000	\$658,582	\$164,645	\$8,482,227	
	TSM/TDM Buses	37	EA	\$539,000	\$0	\$0	\$19,943,000	
<b>TOTAL TSM/TDM SECTIONS 17</b>				<b>\$41,662,000</b>	<b>\$5,032,024</b>	<b>\$1,258,006</b>		<b>\$47,952,031</b>
								<b>SAY \$50,000,000</b>

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (SINGLE BORE OPTION)

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ATTACHMENT L-5

## PROJECT DESCRIPTION

### STATE ROUTE 710 NORTH STUDY

### FREEWAY TUNNEL ALTERNATIVE - SINGLE BORE OPTION

	Cost in 2014 \$
ROADWAY ITEMS	\$320,000,000
STRUCTURE ITEMS	\$320,000,000
FREEWAY TUNNEL & VENTILATION ITEMS	<u>\$2,430,000,000</u>
SUBTOTAL CONSTRUCTION	\$3,070,000,000
RIGHT OF WAY	<u>\$30,000,000</u>
TOTAL COST* (FREEWAY SINGLE BORE ALT.)	\$3,100,000,000
TSM/TDM COMPONENTS	<u>\$50,000,000</u>
TOTAL COST* (FREEWAY SINGLE BORE + TSM/TDM)	\$3,150,000,000

\*Total costs are in 2014 dollars and will need to be escalated to the actual start of construction year.

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (SINGLE BORE OPTION)

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**I. Roadway Items**

<u>Section 1 - Earthwork</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Construction Site BMP (incl. SWPPP)	1	LS	\$2,000,000	\$2,000,000	
Clearing and Grubbing	18.8	Acre	\$20,000	\$380,000	
Roadway Excavation	727,000	CY	\$18	\$13,086,000	
Imported Borrow	587,000	CY	\$15	\$8,805,000	
		<b><u>Roadway Ex. Cost</u></b>	<b><u>%</u></b>	<b><u>Cost</u></b>	
Hazardous Waste Material/ADL (10% of Road Ex.)	13,086,000 x	10%		\$1,308,600	
				<b><u>Total Earthwork</u></b>	<b><u>\$25,579,600</u></b>

<u>Section 2 - Structural Section</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Remove Asphalt Concrete	15,787	CY	\$20	\$315,760	
Remove Concrete Pavement	16,241	CY	\$33	\$535,986	
Remove Concrete (Curb & Gutter)	9,295	LF	\$10	\$92,950	
Class 3 Aggregate Subbase	41,419	CY	\$33	\$1,366,827	
Class 2 Aggregate Base	26,380	CY	\$35	\$923,300	
Lean Concrete Base	12,616	CY	\$100	\$1,261,600	
Hot Mix Asphalt Concrete (Type A)	44,766	TON	\$90	\$4,028,940	
Concrete Pavement	23,970	CY	\$210	\$5,033,700	
Minor Concrete (Curb)	15,329	LF	\$55	\$843,095	
				<b><u>Total Structural Section</u></b>	<b><u>\$14,402,158</u></b>

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (SINGLE BORE OPTION)

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**I. Roadway Items (CONT.)**

<u>Section 3 - Drainage</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Abandon Culvert	20	LF	\$8	\$160	
Abandon Inlet	1	EA	\$700	\$700	
Remove Culvert	3,730	LF	\$10	\$37,300	
Remove Inlet	63	EA	\$800	\$50,400	
Cap Inlet	7	EA	\$900	\$6,300	
Adjust Inlet	8	EA	\$1,100	\$8,800	
18" RCP	450	LF	\$110	\$49,500	
24" RCP	3,621	LF	\$125	\$452,625	
36" RCP	879	LF	\$170	\$149,430	
48" RCP	525	LF	\$240	\$126,000	
60" RCP	190	LF	\$375	\$71,250	
84" RCP	395	LF	\$600	\$237,000	
96" RCP	26	LF	\$900	\$23,400	
Drainage Manhole	1	EA	\$6,200	\$6,200	
Inlet	63	EA	\$2,000	\$126,000	
CB (W=14')	1	EA	\$3,900	\$3,900	
CB (W=24')	2	EA	\$5,800	\$11,600	
Bioswale	740	LF	\$25	\$18,500	
GSRD	2	EA	\$90,600	\$181,200	
South PS Structure (40'X20')	1	LS	\$1,260,000	\$1,260,000	
South PS Equipment and Controls	1	LS	\$1,820,000	\$1,820,000	
Tunnel PS Structure (25'X15')	1	LS	\$1,035,000	\$1,035,000	
Tunnel PS Equipment and Controls	1	LS	\$1,495,000	\$1,495,000	
North PS Structure (35'X26')	1	LS	\$1,575,000	\$1,575,000	
North PS Equipment and Controls	1	LS	\$2,275,000	\$2,275,000	
PS Outlet Pipe (16" Steel)	2010	LF	\$390	\$783,900	
Remove Pump Station	1	LS	\$101,700	\$101,700	
Storage Chamber (792'X110'X30')	1	LS	\$70,041,800	\$70,041,800	
Storage Tank (60'X45'X26') Tunnel	1	LS	\$2,058,200	\$2,058,200	
12"CSP Down Drain	4,050	FT	\$80	\$324,000	
18" CSP	22,390	FT	\$100	\$2,239,000	
Deck Drains	450	EA	\$20	\$9,000	
<b>Total Drainage Items</b>					<b>\$86,577,865</b>

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (SINGLE BORE OPTION)

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**I. Roadway Items (CONT.)**

<u>Section 4 - Specialty Items</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Retaining Wall (H=0-10 FT)	1,867	LF	\$1,000	\$1,867,000	
Retaining Wall (H=10-15 FT)	2,732	LF	\$1,700	\$4,646,100	
Retaining Wall (H=15-20 FT)	2,669	LF	\$2,850	\$7,609,500	
Retaining Wall (H=20-30 FT)	2,027	LF	\$3,850	\$7,803,950	
Retaining Wall (H=30-40 FT)	319	LF	\$5,000	\$1,600,000	
Retaining Wall (H=40+ FT)	381	LF	\$6,000	\$2,286,000	
Slurry Wall	32,983	CY	\$230	\$7,586,090	
Soldier Pile & Lagging Wall	19,249	CY	\$110	\$2,117,390	
Soundwalls	1	LS	\$1,624,298	\$1,624,298	
Temporary Shoring	132,620	SF	\$100	\$13,262,000	
Wall Aesthetic Treatment	97,548	SF	\$10	\$975,480	
Concrete Barrier (Type 60D)	9,995	LF	\$70	\$699,720	
Non-Highway Landscaping	7.26	Acre	\$250,000	\$2,000,000	
Bell Tower (with Clock)	1	LS	\$400,000	\$400,000	

**Total Specialty Items** **\$54,477,528**

<u>Section 5 - Traffic Items</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
Fiber Optic Communication System	1	LS	\$4,600,000	\$4,600,000	
Overhead Sign (Cantilever)	3	EA	\$125,000	\$375,000	
Overhead Sign (Sign Bridge)	5	EA	\$150,000	\$750,000	
Overhead Sign (Bridge Mounted)	2	EA	\$125,000	\$250,000	
Signalized Intersections	2	EA	\$270,000	\$540,000	
Striping	219,974	LF	\$1	\$219,974	
Pavement Markings	1,103	SF	\$6	\$6,618	

<u>Rdwy Pvmt Cost</u>	<u>%</u>	<u>Cost</u>
Misc. Traffic Items (25% of Section 2) - Loop Detectors, Ramp Metering, Count sta, Traffic control system, TMP)	25%	\$3,600,540
Misc. Removal (7% of Section 2)	7%	\$1,008,151
Micellaneous (20% of Section 2) - Lighting, Call Box, CCTV, Elec Service for Irrigation	20%	\$2,880,432
Construction Staging (40% of Section 2)	40%	\$5,760,863

**Total Traffic Items** **\$19,991,578**

**SUBTOTAL ROADWAY ITEMS SECTIONS 1-5** **\$201,028,729**

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (SINGLE BORE OPTION)

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**I. Roadway Items (CONT.)**

<u>Section 6 - Minor Items</u>	<u>%</u>	<u>Cost</u>	<u>Section Cost</u>
Subtotal Sections 1-5	\$201,028,729 x 10%	\$20,102,873	
		<b>Total Minor Items</b>	<b>\$20,102,873</b>
<u>Section 7 - Mobilization</u>	<u>%</u>	<u>Cost</u>	<u>Section Cost</u>
Subtotal Sections 1-5		\$201,028,729	
Minor Items - Section 6		\$20,102,873	
Subtotal Sections 1-6	\$221,131,602 x 10% Mobilization (includes Mob Cost)	\$24,570,178	
		<b>Total Roadway Mobilization</b>	<b>\$24,570,178</b>
<u>Section 8 - Additions</u>	<u>%</u>	<u>Cost</u>	<u>Section Cost</u>
<i>Supplemental</i>			
Subtotal Sections 1-5		\$201,028,729	
Minor Items - Section 6		\$20,102,873	
Subtotal Sections 1-6	\$221,131,602 x 5%	\$11,056,581	
 <i>Contingencies</i>			
Subtotal Sections 1-5		\$201,028,729	
Minor Items - Section 6		\$20,102,873	
Subtotal Sections 1-6	\$221,131,602 x 25%	\$55,282,901	
		<b>Total Roadway Additions</b>	<b>\$66,339,482</b>
		<b>Subtotal for Sections 6, 7 &amp; 8</b>	<b>\$111,012,533</b>
		<b>Subtotal for Sections 1-5</b>	<b>\$201,028,729</b>
		<b>TOTAL ROADWAY ITEMS SECTIONS 1-8</b>	<b>\$312,041,262</b>
		<b>SAY</b>	<b>\$320,000,000</b>



# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (SINGLE BORE OPTION)

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## II. Structure Items

### Section 9 - Structure Items

### Section Cost

	Valley Blvd Overcrossing	Hellman Ave Overcrossing	Del Mar Blvd (Demolition)	Laguna Basin Bridge
Bridge Name	Bridge	Bridge	Bridge	Bridge
Structure Type	76'-10"	64'-0"	-	28'-10"
Width ft (out to out)	232'-0"	250'-0"	-	900'-0"
Span Lengths ft	17,825	16,000	-	25,950
Total Area sq. ft	Secant Pile	Secant & CIDH Pile	-	CIDH Pile
Footing Type (pile/spread)	\$258	\$288	-	\$348
Cost Per Sq. Ft (incl. 10% mobilization and 25% contingencies)	No	No	-	No
Seismic Retrofit Contingency	\$4,607,000	\$4,872,000	\$607,000	\$9,043,000
Total Cost for Structure				

Bridge Name	Green St Overcrossing			
Structure Type	Bridge			
Width ft (out to out)	66'-0"			
Span Lengths ft	390'-0"			
Total Area sq. ft	25,740			
Footing Type (pile/spread)	CIDH Pile			
Cost Per Sq. Ft (incl. 10% mobilization and 25% contingencies)	\$284			
Seismic Retrofit Contingency	No			
Total Cost for Structure	\$7,702,000			

	South Cut & Cover Tunnel	North Cut & Cover Tunnel		
Structure Name	Tunnel	Tunnel		
Structure Type	Tunnel	Tunnel		
Width ft (out to out)	Varies	Varies		
Span Lengths ft	N/A	N/A		
Total Area sq. ft	N/A	N/A		
Footing Type (pile/spread)	Spread	Spread		
Cost Per Sq. Ft (incl. 10% mobilization and 25% contingencies)	N/A	N/A		
Seismic Retrofit Contingency	No	No		
Total Cost for Structure	\$120,542,000	\$155,895,000		

**Total Structure Items      \$303,268,000**

### Section 10 - Minor Items

%

Cost

### Section Cost

Subtotal Section 9

\$303,268,000 x 5% = \$15,163,400

**Total Minor Items      \$15,163,400**

**TOTAL STRUCTURE ITEMS SECTIONS 9-10      \$318,431,400**

**SAY      \$320,000,000**

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (SINGLE BORE OPTION)

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### III. Freeway Tunnel & Ventilation Items

<u>Section 11 - Freeway Tunnel &amp; Ventilation Items</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>	<u>Section Cost</u>
<b>Tunnel System Items</b>					
Mechanical Incl. Ventilation	1	LS	\$56,500,000	\$56,500,000	
Electrical	1	LS	\$120,100,000	\$120,100,000	
Instrumentation & Communication	1	LS	\$73,900,000	\$73,900,000	
Operation Control Centers/Portal Buildings	1	LS	\$27,000,000	\$27,000,000	
Fixed Fire Fighting System	1	LS	\$31,600,000	\$31,600,000	
			<b>Subtotal Tunnel Systems</b>		<b>\$309,100,000</b>
<b>Freeway Tunnel Items</b>					
South Portal Development (500' Beyond Bored Tunnel Portal Only)	1	LS	\$78,792,000	\$78,792,000	
North Portal Development (500' Beyond Bored Tunnel Portal Only)	1	LS	\$48,001,000	\$48,001,000	
Tunnel Excavation & Support	21,780	LF	\$33,411	\$727,683,000	
Instrumentation & Building Protection	1	LS	\$5,954,000	\$5,954,000	
Special Seismic Section/Vault Incl. Internal Concrete Structure	560	LF	\$152,732	\$85,530,000	
Roadway Internal Structure	21,780	LF	\$9,811	\$213,689,000	
Shaft from OMC Building to Stacks Reinforced Box	1	EA	\$15,000,000	\$15,000,000	
South Portal Entrance Landscaping	183,855	SF	\$46	\$8,457,330	
North Portal Entrance Landscaping	749,035	SF	\$18	\$13,482,630	
North Portal Entrance Hardscaping	10,000	SF	\$23	\$230,000	
South OMC Building Area Landscaping	360,940	SF	\$46	\$16,603,240	
South OMC Building Area Hardscaping	8,000	SF	\$23	\$184,000	
North OMC Building Area Landscaping	482,945	SF	\$18	\$8,693,010	
North OMC Building Area Hardscaping	5,000	SF	\$23	\$115,000	
Infrastructure for Temporary and Permanent Power	1	LS	\$26,400,000	\$26,400,000	
Power Substation	1	LS	\$2,500,000	\$2,500,000	
			<b>Subtotal Tunnel</b>		<b>\$1,251,314,210</b>
			<b>Section Total</b>		<b>\$1,560,414,210</b>
<b>Section 12 - Minor Items</b>					
		<u>%</u>	<u>Cost</u>		<u>Section Cost</u>
Subtotal Section 11	\$1,560,414,210	x 0%	\$0		
				<b>Total Minor Items</b>	<b>\$0</b>
<b>Section 13- Mobilization</b>					
		<u>%</u>	<u>Cost</u>		<u>Section Cost</u>
Equipment Mobilization			\$185,300,000		
General Mobilization / De-mobilization			\$23,565,000		
Tunnel System Subtotal	\$309,100,000				
Minor Items - Section 12	\$0				
Subtotal	\$309,100,000	x 10% Mobilization (includes Mob Cost)	\$34,344,444		
			<b>Total Freeway Tunnel Mobilization</b>		<b>\$243,209,444</b>
			<b>Total Sections 11-13</b>		<b>\$1,803,623,654</b>
<b>Section 14 - Additions</b>					
		<u>%</u>	<u>Cost</u>		<u>Section Cost</u>
<i>Supplemental</i>					
Tunnel System Subtotal	\$309,100,000				
Minor Items - Section 12	\$0				
Sum	\$309,100,000	x 5%	\$15,455,000		
<i>Contingencies</i>					
Subtotal Section 11-13	\$1,803,623,654				
Minor Items - Section 12	\$0				
Sum	\$1,803,623,654	x 34%	\$613,232,043		
			<b>Total Freeway Tunnel Additions</b>		<b>\$628,687,043</b>
			<b>Subtotal for Sections 12, 13 &amp; 14</b>		<b>\$871,896,487</b>
			<b>Subtotal for Section 11</b>		<b>\$1,560,414,210</b>
			<b>TOTAL FREEWAY TUNNEL ITEMS SECTIONS 11-14</b>		<b>\$2,432,310,697</b>
			<b>SAY</b>		<b>\$2,430,000,000</b>

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (SINGLE BORE OPTION)

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## IV. Right of Way Items

### Section 15 - Right of Way

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost*</u>	<u>Cost</u>	<u>Section Cost</u>
R/W Acquisition (Fee)	3	SF	\$258,263	\$774,788	
R/W Acquisition (Perm Easement)	208	SF	\$6,288	\$1,307,800	
R/W Acquisition (Temp Easement)	53	SF	\$6,114	\$324,041	
Relocation Costs (RAP)	3	EA	\$341,000	\$1,023,000	
Clearance/Demolition (Commercial)	21,100	SF	\$7	\$147,700	
Title & Escrow	252	EA	\$2,294	\$578,000	
Real Estate Appraisals	245	EA	\$2,645	\$648,000	
Land Owner Appraisals	245	EA	\$5,000	\$1,225,000	
Utility Relocation (State Share)	1	LS	\$5,970,375	\$5,970,375	
Utility Protection (State Share)	1	LS	\$454,625	\$454,625	
Damage Cost and/or Cost to Cure	1	LS	\$1,800,000	\$1,800,000	
Condemnation Cost	185	EA	\$4,696	\$868,700	
Consultant Fees	257	EA	\$8,430	\$2,166,500	
Depreciated Improvements	1	EA	\$150,000	\$150,000	
Permit Fees	1	LS	\$3,500	\$3,500	
Environmental Fees	203	EA	\$2,577	\$523,106	
Goodwill Loss	2	EA	\$210,000	\$420,000	
Furniture, Fixtures & Equipment Fees (FF&E)	2	EA	\$230,000	\$460,000	

**Total Right of Way Items** \$18,845,135

### Section 16 - Additions

	<u>%</u>	<u>Section Cost</u>
<i>Contingencies</i>		
Subtotal Section 15	<u>\$18,845,135</u>	
Sum	<u>\$18,845,135</u> x 25%	<u>\$4,711,284</u>

**Total Right of Way Additions** \$4,711,284

**TOTAL RIGHT OF WAY ITEMS SECTION 15 & 16** \$23,556,419

**SAY** \$30,000,000

\*R/W Acquisition unit costs are averaged.

# COST ESTIMATE FOR FREEWAY TUNNEL ALTERNATIVE (SINGLE BORE OPTION)

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V. TSM/TDM

Section 17 - TSM/TDM

	Description	Quantity	Unit	Construction Cost	ROW Cost	ROW Contingency	Cost	Section Cost
I-1	Broadway/Colorado Blvd	1	LS	\$118,000	\$0	\$0	\$118,000	
I-2	Eagle Rock Blvd/York Blvd	1	LS	\$273,000	\$0	\$0	\$273,000	
I-3	Eastern Ave/Huntington Dr	1	LS	\$119,000	\$0	\$0	\$119,000	
I-8	Fair Oaks Ave/Monterey Rd	1	LS	\$154,000	\$0	\$0	\$154,000	
I-9	Fremont St/Monterey Rd	1	LS	\$505,000	\$79,858	\$19,964	\$604,822	
I-10	Huntington Dr/Fair Oaks Ave	1	LS	\$476,000	\$0	\$0	\$476,000	
I-11	Fremont Ave/Huntington Dr	1	LS	\$30,000	\$0	\$0	\$30,000	
I-13,14,15	Huntington Dr/Atlantic Blvd/Garfield Ave	1	LS	\$424,000	\$470,679	\$117,670	\$1,012,348	
I-16	Garfield Ave/Mission Rd	1	LS	\$665,000	\$195,143	\$48,786	\$908,929	
I-18	San Gabriel Blvd/Huntington Dr	1	LS	\$292,000	\$0	\$0	\$292,000	
I-19	Del Mar Ave/Mission Rd	1	LS	\$550,000	\$385,965	\$96,491	\$1,032,456	
I-22	San Gabriel Blvd/Marshall St	1	LS	\$386,000	\$83,510	\$20,877	\$490,387	
I-24	Huntington Dr/Oak Knoll Ave	1	LS	\$84,000	\$0	\$0	\$84,000	
I-25	Huntington Dr/San Marino Ave	1	LS	\$89,000	\$0	\$0	\$89,000	
I-43	Del Mar Ave/Valley Blvd	1	LS	\$62,000	\$131,500	\$32,875	\$226,375	
I-44	Fremont Ave/Hellman Ave	1	LS	\$68,000	\$0	\$0	\$68,000	
I-45	Eagle Rock Blvd/Colorado Blvd	1	LS	\$90,000	\$0	\$0	\$90,000	
ITS-1	Transit Signal Priority along Rosemead Boulevard	1	LS	\$240,000	\$0	\$0	\$240,000	
ITS-2	Install Video Detection System at SR 110 north of US-101	1	LS	\$25,000	\$0	\$0	\$25,000	
ITS-3	Install Video Detection Systems at Key Locations in Study Area	1	LS	\$500,000	\$0	\$0	\$500,000	
ITS-4	Arterial Speed Data Collection at Key North/South Arterials	1	LS	\$1,000,000	\$0	\$0	\$1,000,000	
ITS-5	Install Arterials CMS at Key Locations in Study Area	1	LS	\$2,000,000	\$0	\$0	\$2,000,000	
ITS-6	Traffic Signal Synchronization on Garfield Avenue	1	LS	\$23,000	\$0	\$0	\$23,000	
ITS-7	Signal Optimization on Del Mar Avenue	1	LS	\$120,000	\$0	\$0	\$120,000	
ITS-8	Signal Optimization on Rosemead Avenue	1	LS	\$160,000	\$0	\$0	\$160,000	
ITS-9	Signal Optimization on Temple City Boulevard	1	LS	\$160,000	\$0	\$0	\$160,000	
ITS-10	Signal Optimization on Santa Anita Avenue	1	LS	\$130,000	\$0	\$0	\$130,000	
ITS-11	Signal Optimization on Peck Road	1	LS	\$140,000	\$0	\$0	\$140,000	
ITS-12	Signal Optimization on Fremont Avenue	1	LS	\$85,000	\$0	\$0	\$85,000	
L-1	Figueroa St from SR 134 to Colorado Blvd	1	LS	\$682,000	\$100,038	\$25,009	\$807,047	
L-2A	Fremont Ave from Huntington Dr to Alhambra Rd	1	LS	\$654,000	\$0	\$0	\$654,000	
L-2C	Fremont Ave from Mission Rd to Valley Blvd	1	LS	\$261,000	\$0	\$0	\$261,000	
L-3	Atlantic Blvd from Valley Blvd to I-10	1	LS	\$903,000	\$0	\$0	\$903,000	
L-4	Garfield Ave from Valley Blvd to Glendon Way	1	LS	\$820,000	\$58,500	\$14,625	\$893,125	
L-5	Rosemead Blvd from Lower Azusa Rd to Marshall St	1	LS	\$944,000	\$2,868,251	\$717,063	\$4,529,314	
L-8	Fair Oaks Ave from Grevelia St to Monterey Rd	1	LS	\$828,000	\$0	\$0	\$828,000	
T-2	Arroyo Seco Parkway Hook Ramps Concept	1	LS	\$7,659,000	\$658,582	\$164,645	\$8,482,227	
	TSM/TDM Buses	37	EA	\$539,000	\$0	\$0	\$19,943,000	
<b>TOTAL TSM/TDM SECTIONS 17</b>				<b>\$41,662,000</b>	<b>\$5,032,024</b>	<b>\$1,258,006</b>		<b>\$47,952,031</b>
								SAY <b>\$50,000,000</b>

**Attachment M**  
**Transportation Management Plan Worksheet and Data Sheet**  
**(Build Alternatives)**

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**TRANSPORTATION MANAGEMENT PLAN DATA SHEET**  
**(Preliminary TMP Elements and Costs)**  
**SR 710 North Study – Transportation System Management/  
Transportation Demand Management Alternative**

Co/Rte/KP	07-LA-710, PM 26.7 to PM 32.1T EA 187900	Alternative No.	TSM/ TDM
Project Limit	The study area for the SR 710 North Study is between State Route 2 (SR2) and Interstate 5, 10, 210 and 605 (I-5, I-10, I-210, and I-605, respectively).		
Project Description	The proposed TSM/TDM Alternative consists of strategies and improvements, such as ITS improvements and local street & intersection geometric improvements, to increase efficiency and capacity for all modes in the transportation system within the study area.		
1) Public Information			
	<input checked="" type="checkbox"/> a. Brochures and Mailers	\$200,000	
	<input checked="" type="checkbox"/> b. Press Release		
	<input checked="" type="checkbox"/> c. Paid Advertising	\$150,000	
	<input type="checkbox"/> d. Public Information Center/Kiosk	\$	
	<input checked="" type="checkbox"/> e. Public Meeting/Speakers Bureau		
	<input type="checkbox"/> f. Telephone Hotline		
	<input checked="" type="checkbox"/> g. Internet		
	<input checked="" type="checkbox"/> h. Others <u>Public meeting rooms</u>	\$50,000	
2) Motorists Information Strategies			
	<input type="checkbox"/> a. Changeable Message Signs (Fixed)	\$	
	<input checked="" type="checkbox"/> b. Changeable Message Signs (Portable)	\$200,000	
	<input checked="" type="checkbox"/> c. Ground Mounted Signs	\$720,000	
	<input type="checkbox"/> d. Highway Advisory Radio	\$	
	<input type="checkbox"/> e. Caltrans Highway Information Network (CHIN)		
	<input type="checkbox"/> f. Others _____	\$	
3) Incident Management			
	<input checked="" type="checkbox"/> a. Construction Zone Enhanced Enforcement Program (COZEEP)	\$24,480	
	<input type="checkbox"/> b. Freeway Service Patrol	\$	
	<input checked="" type="checkbox"/> c. Traffic Management Team		
	<input type="checkbox"/> d. Helicopter Surveillance	\$	
	<input type="checkbox"/> e. Traffic Surveillance Stations (Loop Detector and CCTV)	\$	
	<input type="checkbox"/> f. Others _____	\$	

4) Construction Strategies

<input checked="" type="checkbox"/>	a. Lane Closure Chart	
<input type="checkbox"/>	b. Reversible Lanes	
<input type="checkbox"/>	c. Total Facility Closure	
<input type="checkbox"/>	d. Contra Flow	
<input type="checkbox"/>	e. Truck Traffic Restrictions	\$ _____
<input type="checkbox"/>	f. Reduced Speed Zone	\$ _____
<input checked="" type="checkbox"/>	g. Connector and Ramp Closures	
<input checked="" type="checkbox"/>	h. Incentive and Disincentive	\$0 _____
<input type="checkbox"/>	i. Moveable Barrier	\$ _____
<input type="checkbox"/>	j. Others _____	\$ _____

5) Demand Management

<input type="checkbox"/>	a. HOV Lanes/Ramps (New or Convert)	\$ _____
<input type="checkbox"/>	b. Park and Ride Lots	\$ _____
<input type="checkbox"/>	c. Rideshare Incentives	\$ _____
<input type="checkbox"/>	d. Variable Work Hours	
<input type="checkbox"/>	e. Telecommute	
<input type="checkbox"/>	f. Ramp Metering (Temporary Installation)	\$ _____
<input type="checkbox"/>	g. Ramp Metering (Modify Existing)	\$ _____
<input type="checkbox"/>	h. Others _____	\$ _____

6) Alternative Route Strategies

<input type="checkbox"/>	a. Add Capacity to Freeway Connector	\$ _____
<input type="checkbox"/>	b. Street Improvement (widening, traffic signal... etc)	\$ _____
<input type="checkbox"/>	c. Traffic Control Officers	\$ _____
<input type="checkbox"/>	d. Parking Restrictions	
<input type="checkbox"/>	e. Others _____	\$ _____

7) Other Strategies

<input type="checkbox"/>	a. Application of New Technology	\$ _____
<input type="checkbox"/>	b. Others _____	\$ _____

**TOTAL ESTIMATED COST OF TMP ELEMENTS =** \$1,344,480



Project Notes:

See Attachment: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PREPARED BY \_\_\_\_\_ DATE \_\_\_\_\_  
Melissa De La Peña, CH2M HILL

APPROVAL RECOMMENDED BY \_\_\_\_\_ DATE \_\_\_\_\_  
Ali Bamshad, Caltrans DTM

APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_  
Sam Esquenazi, Caltrans District Traffic  
Manager

## 1. Public Information

Brochures and mailers are recommended for this project to communicate project-related information to businesses and residents in the project area. Information in the mailer would include a description of the project, a description of the need for the project, project schedules, construction information, detour routes, on-street parking removals and possible alternate routes.

Information can be distributed through radio and newspapers to inform the public of upcoming detours and closures. At a minimum, detour/closure information must be submitted to emergency users: police, fire, hospitals, and ambulance. Metro will be responsible for implementing any public information programs.

Cost associated with brochures, mailers, and paid advertising is based on the number produced and distributed, type of mailer produced, graphics, and staff involvement. The estimated cost for this TMP item is:

### Brochures and Mailers Costs

$$(20 \text{ items}) \times (6,250 \text{ copies}) \times (\$1.60 \text{ each for graphics and postage}) = \$200,000$$

### Paid Advertising Costs

$$\text{Lump Sum Estimate} = \$150,000$$

### Internet and Public Meeting Room Costs

$$\text{Lump Sum Estimate} = \$50,000$$

## 2. Motorist Information

Recommendations for this project will include utilizing portable changeable message signs (CMS) and ground-mounted detour signing, in addition to signing and striping modifications. CMSs placed within the construction area and along detour routes will give real-time motorist information, particularly with respect to construction work zones, closures that are in place, and appropriate detours.

Temporary signs will most likely be reused for various detours, on-street parking closures and proposed alternate routes during the project. It is important that these signs be maintained throughout the project and be removed, covered, or modified as the various stages change. The cost associated with the recommended signing strategy will be included in the overall bid for the project construction. The cost for signing along detours, parking closures and alternate routes is estimated below. Project site traffic control will be included as part of the project estimated construction costs.

### Portable Changeable Message Signs

$$(10 \text{ signs}) \times (\$20,000/\text{sign}) = \$200,000$$

### Ground-Mounted Signs (Estimated)

$$(1200 \text{ signs}) \times (\$600/\text{sign}) = \$720,000$$

### 3. Incident Management

Construction Zone Enhancement Enforcement Program (COZEEP) is recommended for this project. This program requires the presence and assistance of California Highway Patrol (CHP) officers to provide traffic-handling enforcement, on-time incident response, and safety coordination when necessary. COZEEP is highly recommended during the weekend closures of the 710 northbound terminus and Valley Boulevard on/off-ramps as well as the weekend closure of the 110 NB off ramp at Fair Oaks, and the 110 SB off ramp at State Street for roadway construction. The estimated COZEEP cost for this project is:

COZEEP: Assume 2 units per night closure

$$(2 \text{ units}) \times (18 \text{ nights}) \times (8 \text{ hours}) \times (\$85/\text{hour}) = \$24,480$$

During construction, local agency coordination staff will monitor local traffic conditions and resolve problems. If Traffic Management issues cannot be resolved by local agency staff, the Resident Engineer will contact the District 7 District Traffic Manager (DTM) and Construction Traffic Manager (CTM) to develop timely recommendations and response regarding:

- Signage along construction area or temporary detours
- Closing/opening of lanes
- Making sure proper messages are shown on the Portable Changeable Message Signs (CMS)

Traffic Management Team (TMT) will be used only for closures that have, or could have significant delays to motorists.

### 4. Construction Strategies

At the estimated time of construction, coordination will be required to ensure that the proposed closures, parking removals, and/or detours for this project are coordinated with all other roadway projects in the area that may be impacted and that potential traffic impacts as a result of this project are adequately addressed.

It is estimated that the construction of this TSM/TDM alternative will be completed in approximately 26 months over four construction stages. (To be determined). No long-term (greater than 55-hour extended weekend) or complete closures are required for the construction of this project.

#### Fair Oaks Avenue and Monterey Road

There will be short-term (overnight) lane closures on Fair Oaks Avenue and Monterey Road for restriping. There will be a temporary loss of on-street parking due to these closures. On Fair Oaks Avenue north of Monterey Road, there will be a temporary loss of five (5) on-street parking spaces, while south of Monterey Road on Fair Oaks Avenue, there will be a temporary loss of one (1) on-street parking space.

Short-term (overnight) lane closures for restriping on Monterey Road west of Fair Oaks Avenue will cause the temporary loss of eight (8) on-street parking spaces while Monterey Road east of Fair Oaks Avenue will have a temporary loss of two (2) on-street parking spaces.

Fair Oaks Avenue and Huntington Drive

Short-term (overnight) closures for construction and restriping related work will impact the outside southbound lane on Fair Oaks Avenue and the outside westbound lane on Huntington Drive. Southbound Fair Oaks Avenue at Huntington Drive will have a temporary loss of five (5) on-street parking spaces, while the south side of Huntington Drive will experience the temporary loss of nineteen (19) on-street parking spaces.

Fremont Avenue and Huntington Drive

A short-term (overnight) closure will occur for the outside southbound lane on Fremont Avenue for roadway widening and restriping. Fremont Avenue north of Huntington Drive will experience a temporary loss of five (5) on-street parking spaces while Fremont Avenue south of Huntington Drive will experience temporary loss of six (6) on-street parking spaces.

The outside eastbound lane of Huntington Drive, west of Fremont Avenue, will be temporarily closed for restriping. There will be short-term (overnight) lane closures on Huntington Drive heading westbound for restriping. These closure will impact the northeast corner of Huntington Drive at Fremont Avenue with the temporary loss of three (3) on-street parking spaces. The southwest corner of Huntington Drive at Fremont Avenue will also experience the temporary loss of four (4) on-street parking spaces.

Huntington Drive, Garfield Avenue and Atlantic Boulevard

Restriping on Huntington Drive will cause short-term (overnight) lane closures. The outside southbound lane on Garfield Avenue north and south of Huntington Drive will experience these daily lane closures for roadway widening and restriping. These closures will require the temporary removal of five (5) on-street parking spaces on the south side of Huntington Drive west of Garfield Avenue.

The restriping of the south side of Huntington Drive between Garfield Avenue and Atlantic Blvd will cause the temporary loss of three (3) on-street parking spaces, and on the north side of Huntington Drive east of Atlantic Blvd, the temporary removal of two (2) on-street parking spaces.

Garfield Avenue and Mission Road

Restriping on Mission Road will cause short-term (overnight) lane closures. The outside southbound lane of Garfield Avenue will be temporarily closed north of Mission Road for roadway widening and restriping. The outside northbound lane of Garfield Avenue south of Mission Road will also be temporarily closed for roadway / bridge widening and striping related work.

Southbound Garfield Avenue, north of Mission Road will permanently lose three (3) on-street parking spaces due to the roadway widening. The El Rancho parking lot at the northwest corner of Garfield Avenue and Mission Road will also permanently lose one (1) parking lot stall due to the roadway widening on Garfield Avenue.

San Gabriel Boulevard and Huntington Drive

Median and striping related work on eastbound Huntington Drive will require short-term (overnight) lane closures. The detour for the eastbound Huntington Drive left turn lane will begin at Rosemead Boulevard.

Southbound San Gabriel Boulevard, south of Huntington Drive will experience a loss of one (1) on-street parking space. Westbound Huntington Drive, west of San Gabriel Boulevard will lose eight (8) on-street parking spaces, while eastbound Huntington Drive, west of San Gabriel Boulevard will temporarily lose ten (10) on-street parking spaces.

Del Mar Avenue and Mission Road

Restriping and roadway widening work on Mission Road, El Monte Street and Del Mar Avenue will require short-term (overnight) closures. Work on Del Mar Avenue north of Mission Rd will require the permanent removal of three (3) on-street parking spaces, while reconfiguration of the property at the southeast corner of Del Mar Avenue and Mission Road will remove an additional three (3) parking lot spaces.

Roadway work on El Monte Street, east of Del Mar Avenue will cause the removal of one (1) on-street parking space, while roadway work on westbound Mission Road, east of Del Mar Avenue will result with the loss of six (6) on-street parking spaces.

The reconfiguration of the property at the south east corner of Del Mar Avenue and Mission Road will have a short-term loss of seven (7) parking lot spaces. Road work on Del Mar Avenue north of Mission Road will temporarily remove three (3) on-street parking spaces.

Road work along Westbound El Monte Street, east of Del Mar Avenue will cause the temporary removal of two (2) on-street parking spaces, while eastbound El Monte Street, east of Del Mar Avenue will lose two (2) on-street parking spaces.

San Gabriel Boulevard and Marshall Street

Short-term (overnight) lane closures will take place on Marshall Street east of San Gabriel Blvd for striping related work. Short-term (overnight) lane closures on San Gabriel Blvd in both directions will occur for restriping and roadway widening.

The Carl's Jr/Green Burrito at corner of Marshall Street and San Gabriel Blvd as part of the roadway widening will temporarily lose twelve (12) spaces in the parking. Roadwork on the segment of San Gabriel Blvd north of Marshall Street will remove five (5) on-street parking spaces in the northbound direction and four (4) on-street parking spaces in the southbound direction.

Del Mar Avenue and Valley Boulevard

Roadway widening on the northwest corner of Del Mar Avenue and Valley Boulevard and restriping on Del Mar Avenue will result in short-term (overnight) lane closures.

Westbound Del Mar Avenue on approach to Valley Blvd will temporarily lose one (1) on-street parking space to roadway widening related work.

Hellman Avenue and Fremont Avenue

Removal of the raised median and existing striping at the intersection of Hellman Avenue and Fremont Avenue will require short-term (overnight) lane closures on Fremont Avenue. No parking impacts will occur during this short-term lane closure at this intersection.

Garfield Avenue at Valley Boulevard – ITS Related Closures

Short-term (overnight) shoulder closure will be necessary at this intersection for adjustments to be made at the traffic signal box.

No lanes or parking impacts will be associated with this closure.

Fremont Avenue at Valley Boulevard – ITS Related Closures

Short-term (overnight) shoulder closure will be necessary at this intersection for adjustments to be made at the traffic signal box.

No lane or parking impacts will be associated with this closure.

Fremont Avenue from Huntington Drive to Alhambra Road

Short-term (overnight) lane closures on Fremont Avenue will be necessary for widening and restriping at Huntington Drive. Northbound Fremont Avenue from Alhambra Road to Huntington Drive will have eighteen (18) on-street parking spaces temporarily removed to accommodate the roadwork. Southbound Fremont Avenue from Huntington Drive to Alhambra Road will also temporarily lose twenty six (26) on-street parking spaces.

Fremont Avenue from Mission Road to Valley Boulevard

Short-term (overnight) lane closures on Fremont Avenue will be necessary for restriping.

There are no parking impacts along Fremont Avenue from Norwood Place to just past Mission Road.

Atlantic Blvd from Interstate 10 to Glendon Way

Short-term (overnight) lane closures will be necessary on Atlantic Blvd for roadway widening and striping related work at the southwest corner of Atlantic Boulevard and Glendon Way. Short-term (overnight) lane closures will be necessary at the intersection of Glendon Way and Norwood Place with Atlantic Boulevard for the construction of the raised medians and restriping of the vehicle lanes.

Northbound Atlantic Blvd will temporarily lose twenty four (24) on-street parking spaces, while southbound Atlantic Blvd will temporarily lose twenty eight (28) on-street parking spaces.

Garfield Avenue from Valley Boulevard to Glendon Way

Short-term (overnight) lane closures will be necessary on Garfield Avenue for roadway widening and striping related work at the southwest corner of Garfield Avenue and Glendon Way. Short-term (overnight) lane closures will be necessary at the intersection of Glendon Way and

Norwood Place with Garfield Avenue for the construction of the raised medians and restriping of the vehicle lanes.

Northbound Garfield Avenue will temporarily lose fourteen (14) on-street parking spaces, while southbound Garfield Avenue will temporary lose fifteen (15) on-street parking spaces.

Fair Oaks Avenue from Monterey Road to Grevelia Street

Short-term (overnight) lane closures will be necessary on Fair Oaks Avenue for striping related work from Monterey Road to Grevelia Street.

Northbound Fair Oaks Avenue, north of Monterey Rd heading to Grevelia Street will temporarily lose fifty (50) on-street parking spaces, while southbound Fair Oaks Avenue, south of Grevelia Street heading to Monterey Road will temporarily lose forty nine (49) on-street parking spaces.

**SPECIAL PROJECTS**

Valley Boulevard to Mission Connector Road

Short-term (overnight) lane closures for roadway construction work at the 710 NB terminus with Valley Boulevard.

Temporary weekend (55-hour extended weekend) closures for roadway construction will take place at the intersection of W. Mission Road and Alhambra Avenue. Detour traffic will be sent eastbound on Mission Road to Westminster Avenue. The Detour will then head northbound on Westminster Avenue approximately 0.4 miles to Concord Avenue, before making a left turn onto Concord Avenue heading south west for approximately 0.3 miles to Allan St. Detour will the make a right turn onto Allan Street heading west for approximately 0.2 miles to Stockbridge Avenue. Detour will then make a left turn heading south for approximately 0.15 miles to Alhambra Avenue. Upon arriving at Alhambra Avenue, then Detour will end. Additionally, temporary weekend closures for roadway construction are anticipated for I-710 northbound terminus and Valley Boulevard on/off-ramps.

Alhambra Avenue west of the proposed Mission Connector Rd will temporarily lose thirteen (13) on-street parking spaces and one (1) yellow commercial loading space. There will be no parking impacts on Mission Road and Valley Blvd.

Fair Oaks Avenue Hook Ramps

Short-term (overnight) lane closures will take place for roadway and striping related construction work on Fair Oaks Avenue from north of State Street to south of Grevelia Street.

Temporary weekend (55-hour extended weekend) closure for roadway construction will take place at the 110 NB off ramp of Fair Oaks Avenue. Vehicles will be detoured on the 110 NB for approximately 0.8 miles to E. Glenarm Street. The detour will then head westbound for approximately 0.2 miles to Fair Oaks Avenue, then the Detour will end.

Temporary weekend (55-hour extended weekend) closure for roadway construction will take place at the 110 SB off ramp of State Street. Vehicle will be detoured approximately 0.2 miles

north of off ramp at E. Glenarm Street heading to head westbound to Railroad Street for approximately 0.05 miles. The detour will then head southbound on Railroad Street for approximately 0.2 miles to Fair Oaks Avenue. Detour will then head south on Fair Oaks Avenue for approximately 0.2 miles to State St.

Short-term (overnight) lane closures for restriping work will take place on the 110 SB far right lane and shoulder. There will be no parking related impacts on Fair Oaks Avenue from Grevelia Street to just past State Street, as well as State Street at the 110 SB off-ramp.

The use of possible incentives and disincentives may be a viable option to implement in the construction contract for this alternative in order to minimize the construction duration. An incentive cost estimate will be developed once a preferred alternative is selected.

5. Demand Management

No demand management techniques have been identified for this alternative.

6. Alternative Route Strategies

No detailed traffic route strategies aside from the ones listed above have been provided to evaluate traffic operations for this alternative.

7. Other Strategies

No new technologies have been identified for this alternative.



**TRANSPORTATION MANAGEMENT PLAN DATA SHEET  
(Preliminary TMP Elements and Costs)  
SR 710 North Study – Bus Rapid Transit Alternative**

Co/Rte/KP 07-LA-710, PM 26.7 to PM 32.1 EA 187900 Alternative No. BRT  
 Project Limit The study area for the SR 710 North Study is between State Route 2 (SR2) and Interstate 5, 10, 210 and 605 (I-5, I-10, I-210, and I-605, respectively).

Project Description The BRT Alternative would provide high-speed, high-frequency bus service through a combination of new, dedicated, and existing bus lanes, and mixed-flow traffic lanes to key destinations between East Los Angeles and Pasadena. The BRT Alternative will also include TSM/TDM Alternative improvements.

1) Public Information

- a. Brochures and Mailers \$360,000
- b. Press Release \_\_\_\_\_
- c. Paid Advertising \$250,000
- d. Public Information Center/Kiosk \$
- e. Public Meeting/Speakers Bureau \_\_\_\_\_
- f. Telephone Hotline \_\_\_\_\_
- g. Internet \_\_\_\_\_
- h. Others Public meeting rooms \$50,000

2) Motorists Information Strategies

- a. Changeable Message Signs (Fixed) \$
- b. Changeable Message Signs (Portable) \$280,000
- c. Ground Mounted Signs \$300,000
- d. Highway Advisory Radio \$
- e. Caltrans Highway Information Network (CHIN) \_\_\_\_\_
- f. Others \$

3) Incident Management

- a. Construction Zone Enhanced Enforcement Program (COZEEP) \$
- b. Freeway Service Patrol \$
- c. Traffic Management Team \_\_\_\_\_
- d. Helicopter Surveillance \$
- e. Traffic Surveillance Stations (Loop Detector and CCTV) \$
- f. Others \$

4) Construction Strategies

<input checked="" type="checkbox"/> a. Lane Closure Chart	
<input type="checkbox"/> b. Reversible Lanes	
<input type="checkbox"/> c. Total Facility Closure	
<input type="checkbox"/> d. Contra Flow	
<input type="checkbox"/> e. Truck Traffic Restrictions	\$ _____
<input checked="" type="checkbox"/> f. Reduced Speed Zone	\$ _____
<input type="checkbox"/> g. Connector and Ramp Closures	
<input checked="" type="checkbox"/> h. Incentive and Disincentive	\$0 _____
<input checked="" type="checkbox"/> i. Moveable Barrier	\$ _____
<input checked="" type="checkbox"/> j. Others _____ Temporary pedestrian walkways/detours	\$ _____

5) Demand Management

<input type="checkbox"/> a. HOV Lanes/Ramps (New or Convert)	\$ _____
<input type="checkbox"/> b. Park and Ride Lots	\$ _____
<input type="checkbox"/> c. Rideshare Incentives	\$ _____
<input type="checkbox"/> d. Variable Work Hours	
<input type="checkbox"/> e. Telecommute	
<input type="checkbox"/> f. Ramp Metering (Temporary Installation)	\$ _____
<input checked="" type="checkbox"/> g. Ramp Metering (Modify Existing)	\$ _____
<input type="checkbox"/> h. Others _____	\$ _____

6) Alternative Route Strategies

<input type="checkbox"/> a. Add Capacity to Freeway Connector	\$ _____
<input type="checkbox"/> b. Street Improvement (widening, traffic signal... etc)	\$ _____
<input type="checkbox"/> c. Traffic Control Officers	\$ _____
<input type="checkbox"/> d. Parking Restrictions	
<input type="checkbox"/> e. Others _____	\$ _____

7) Other Strategies

<input type="checkbox"/> a. Application of New Technology	\$ _____
<input type="checkbox"/> b. Others _____	\$ _____

**TOTAL ESTIMATED COST OF TMP ELEMENTS = \$1,240,000**

Project Notes:

See Attachment: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PREPARED BY \_\_\_\_\_ DATE \_\_\_\_\_

Melissa De La Peña, CH2M HILL

APPROVAL RECOMMENDED BY \_\_\_\_\_ DATE \_\_\_\_\_

Ali Bamshad, Caltrans DTM

APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_

Sam Esquenazi, Caltrans District Traffic  
Manager

## 1. Public Information

Brochures and mailers are recommended for this alternative to communicate alternative-related information to businesses and residents in the project area. Information to the mailer would include a description of the alternative, a description of the need for the alternative, schedules, construction information, detour routes, and possible alternate routes. Brochures may also be distributed to the public at key location including businesses, travel information center, automobile associations, etc.

Information can be distributed through radio, newspapers, billboards, and television ads to inform the public of upcoming detours and closures. News media alerts are effective strategy informing the public of planed roadway construction at no-cost. Paid advertisements can also be used for progress updates and changes to construction schedule or traffic management. At a minimum, detour/closure information must be submitted to emergency users: police, fire, hospitals, and ambulance. Metro will be responsible for implementing any public information programs.

Another traveler information strategy to implement would be a telephone hotline and project web site for this alternative. The toll-free telephone hotline would provide traffic or travel information using prerecorded or real time messages, request/response information, and a link to 511. The web site will provide the plans of the alternative, construction progress, and interactive real-time information.

Public meetings involves presenting to the local residents and businesses information regarding the construction of the alternative. The meeting also allows for the public's input of potential concerns, impacts, and management strategies. In addition, a formation of a community task force made up of various stakeholders that will be impacted by the construction can help with the distribution of information and generate support for the alternative.

Cost associated with brochures, mailers, and paid advertising is based on the number produced and distributed, type of mailer produced, graphics, and staff involvement. The estimated cost for this TMP item is:

### Brochures and Mailers Costs

$$(20 \text{ items}) \times (10,000 \text{ copies}) \times (\$1.80 \text{ each for graphics and postage}) = \$360,000$$

### Paid Advertising Costs

$$\text{Lump Sum Estimate} = \$250,000$$

### Internet and Public Meeting Room Costs

$$\text{Lump Sum Estimate} = \$50,000$$

## 2. Motorist Information

Recommendations for this alternative will include utilizing portable changeable message signs (CMS) and ground-mounted detour signing, in addition to signing and striping modifications. CMSs placed within the construction area and along detour routes will give real-time motorist information, particularly with respect to construction work zones, closures that are in place, and appropriate detours.

Temporary signs will most likely be reused for various detours and proposed alternate routes during construction. It is important that these signs be maintained throughout the construction and be removed, covered, or modified as the various stages change. The cost associated with the recommended signing strategy will be included in the overall bid for the project construction. The cost for signing along detours and alternate routes is estimated below. Project site traffic control will be included as part of the alternative's estimated construction costs.

The proposed traffic control will be in accordance with the current California Manual on Uniform Traffic Control Devices (CA MUTCD) and the required approval from local agencies. Traffic control devices include delineators or channelizers, barricades, and drums as appropriate. Traffic control signage will include advance warning signs, flashing arrow boards, and advance closure message signs. Due to the proposed construction on the SR-60 on-ramps temporary construction area signs and advance warning signs will be installed along the freeway mainline and on all approaches to the interchange.

Portable Changeable Message Signs  
 (14 signs) x (\$20,000/sign) = \$280,000

Ground-Mounted Signs (Estimated)  
 (500 signs) x (\$600/sign) = \$300,000

## 3. Incident Management

During construction, local agency coordination staff will monitor local traffic conditions and resolve problems. If Traffic Management issues cannot be resolved by local agency staff, the Resident Engineer will contact the District 7 District Traffic Manager (DTM) and Construction Traffic Manager (CTM) to develop timely recommendations and response regarding:

- Signage along construction area or temporary detours
- Closing/opening of lanes
- Making sure proper messages are shown on Changeable Message Signs (CMS)

Traffic Management Team (TMT) will be used only for closures that have, or could have significant delays to motorists.

#### 4. Construction Strategies

At the estimated time of construction, coordination will be required to ensure that the proposed closures and/or detours for this alternative are coordinated with all other roadway projects in the area that may be impacted and that potential traffic impacts as a result of this project are adequately addressed.

Based on the preliminary construction schedule and assumptions it is estimated that the construction of the BRT Alternative will be completed in approximately thirteen (13) months for roadway improvements, station installation, traffic signal modifications, street lighting modifications, and SR-60 on-ramps modifications. The BRT construction staging will be developed based on three possible scenarios: street widening, construction of the BRT stations, and intersection widening. Generally, construction will typically occur on one side of the roadway at a time in order to maximize available area for travel lanes and on-street parking when appropriate. The proposed improvements for SR-110 off-ramps at Fair Oaks Avenue will only require temporary lane closures. Three temporary nightly ramp closures are anticipated at the SR-60 on-ramps to reconstruct part of the ramps to accommodate the widened Atlantic Boulevard. Modifications to the SR-60 ramps would include the installation of temporary traffic control, directional, and information signing using static message signs and/or changeable CMS on SR-60 and arterials in the vicinity of the on-ramps to provide notification of the upcoming ramp closure, the anticipated length of the closure, alternative routes to access SR-60 during the closures of the on-ramps. Installation of temporary detour signs to direct traffic to next available on-ramps (east and west of the closed on-ramps and installation of barriers to close the ramps would also be included.

Due to construction occurring within travel lanes and sidewalks, construction staging for the BRT will be divided into two phases. The first phase will typically keep all lanes in one direction open, while the other direction will close down one lane for construction and keep a single lane open to traffic. Once construction has finished on one side of the roadway, the second phase will begin with construction switching to the other side of the roadway using the same configuration as the first phase. The minimum lane widths through all probable stages of construction will be eleven (11") feet.

The construction sequence will begin an overnight closure to restripe the lanes and shift traffic away from the construction area. Traffic control devices will be installed and the construction area will then be closed to vehicle traffic long term. Existing utilities, catch basins, and traffic signals in near proximity to the project site will be also be modified. Pavements, curbs, and sidewalks will be constructed to accommodate the BRT. Temporary pedestrian walkways and/or detours will be provided during these construction stages. At the BRT station locations, the station amenities will also be constructed during this period. Once completed, the construction area will reopen to all traffic.

Existing signal equipment where roadway widening is proposed will need to be relocated and modified during construction. Existing signal equipment includes traffic signals poles, traffic signal priority (TSP) related devices, emergency vehicle preemption devices, controller cabinets, and electrical service points. Modifications to the existing traffic signal equipment will be made in order to meet jurisdiction standards as appropriate. In order to avoid impacts to traffic

operations, proposed traffic signal poles will be installed in their ultimate locations before any cut-over in service occurs. After the new traffic signal poles are installed, a one day cut-over will be scheduled, which consists of installing temporary stops signs at all approaches. The existing traffic signal will then be turned off and reactivated within one day.

Modifications to street light poles and associated electrical work will be necessary where roadway widening is proposed. Modifications include relocation of street light poles, installing of new wiring, conduits, and pull boxes. Modifications to the existing street lighting will be upgraded to meet jurisdiction standards as appropriate.

The use of incentives and disincentives in the construction contract may be necessary for this alternative to help meet and/or exceed the construction duration. This approach should be determined based on the proposed duration of this alternative and its impacts to the surrounding neighborhoods and businesses. An incentive cost estimate will be developed once a preferred alternative is selected.

See Attachment M-1: Transportation System Management/Transportation Demand Management TMP for construction strategies as the BRT Alternative will include TSM/TDM Alternative improvements.

5. Demand Management

Traffic demand management techniques have been identified for this BRT Alternative. Bike facility improvements will include on-street Class III bicycle facilities that support access to transit facilities through the project area, and will also expand the bicycle parking facilities already existing at the Metro Gold Line Stations.

6. Alternative Route Strategies

No detailed traffic detour strategies have been provided to evaluate traffic operations for this BRT alternative.

7. Other Strategies

No new technologies have been identified for this BRT alternative.

**TRANSPORTATION MANAGEMENT PLAN DATA SHEET**  
**(Preliminary TMP Elements and Costs)**  
**SR 710 North Study – Light Rail Transit Alternative**

Co/Rte/KP 07-LA-710, PM 26.7 to PM 32.1 EA 187900 Alternative No. LRT  
 Project Limit The study area for the SR 710 North Study is between State Route 2 (SR2) and Interstate 5, 10, 210 and 605 (I-5, I-10, I-210, and I-605, respectively).  
 Project Description The Light Rail Transit (LRT) Alternative is a 7.5 mile passenger rail line operated along a dedicated guideway with aerial and bored tunnel segments, similar to other Metro light rail lines. The LRT Alternative will also include TSM/TDM Alternative improvements.

## 1) Public Information

<input checked="" type="checkbox"/> a. Brochures and Mailers	\$360,000
<input checked="" type="checkbox"/> b. Press Release	
<input checked="" type="checkbox"/> c. Paid Advertising	\$250,000
<input type="checkbox"/> d. Public Information Center/Kiosk	\$
<input checked="" type="checkbox"/> e. Public Meeting/Speakers Bureau	
<input type="checkbox"/> f. Telephone Hotline	
<input checked="" type="checkbox"/> g. Internet	
<input checked="" type="checkbox"/> h. Others <u>Public meeting rooms</u>	\$50,000

## 2) Motorists Information Strategies

<input type="checkbox"/> a. Changeable Message Signs (Fixed)	\$
<input checked="" type="checkbox"/> b. Changeable Message Signs (Portable)	\$160,000
<input checked="" type="checkbox"/> c. Ground Mounted Signs	\$600,000
<input type="checkbox"/> d. Highway Advisory Radio	\$
<input type="checkbox"/> e. Caltrans Highway Information Network (CHIN)	
<input type="checkbox"/> f. Others _____	\$

## 3) Incident Management

<input checked="" type="checkbox"/> a. Construction Zone Enhanced Enforcement Program (COZEEP)	\$293,760
<input type="checkbox"/> b. Freeway Service Patrol	\$
<input checked="" type="checkbox"/> c. Traffic Management Team	
<input type="checkbox"/> d. Helicopter Surveillance	\$
<input type="checkbox"/> e. Traffic Surveillance Stations (Loop Detector and CCTV)	\$
<input type="checkbox"/> f. Others _____	\$



4) Construction Strategies

- a. Lane Closure Chart
- b. Reversible Lanes
- c. Total Facility Closure
- d. Contra Flow
- e. Truck Traffic Restrictions \$ \_\_\_\_\_
- f. Reduced Speed Zone \$ \_\_\_\_\_
- g. Connector and Ramp Closures
- h. Incentive and Disincentive \$ \_\_\_\_\_
- i. Moveable Barrier \$ \_\_\_\_\_
- j. Others \_\_\_\_\_ \$ \_\_\_\_\_

5) Demand Management

- a. HOV Lanes/Ramps (New or Convert) \$ \_\_\_\_\_
- b. Park and Ride Lots \$ \_\_\_\_\_
- c. Rideshare Incentives \$ \_\_\_\_\_
- d. Variable Work Hours
- e. Telecommute
- f. Ramp Metering (Temporary Installation) \$ \_\_\_\_\_
- g. Ramp Metering (Modify Existing) \$ \_\_\_\_\_
- h. Others \_\_\_\_\_ \$ \_\_\_\_\_

6) Alternative Route Strategies

- a. Add Capacity to Freeway Connector \$ \_\_\_\_\_
- b. Street Improvement (widening, traffic signal... etc) \$ \_\_\_\_\_
- c. Traffic Control Officers \$ \_\_\_\_\_
- d. Parking Restrictions
- e. Others \_\_\_\_\_ \$ \_\_\_\_\_

7) Other Strategies

- a. Application of New Technology \$ \_\_\_\_\_
- b. Others \_\_\_\_\_ \$ \_\_\_\_\_

**TOTAL ESTIMATED COST OF TMP ELEMENTS =** \$1,713,760

Project Notes:

See Attachment: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PREPARED BY \_\_\_\_\_ DATE \_\_\_\_\_  
Melissa De La Peña, CH2M HILL

APPROVAL RECOMMENDED BY \_\_\_\_\_ DATE \_\_\_\_\_  
Ali Bamshad, Caltrans DTM

APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_  
Sam Esquenazi, Caltrans District Traffic  
Manager

## 1. Public Information

Brochures and mailers are recommended for this project to communicate project-related information to businesses and residents in the project area. Information in the mailer would include a description of the project, a description of the need for the project, project schedules, construction information, detour routes, and possible alternate routes.

Information can be distributed through radio and newspapers to inform the public of upcoming detours and closures. At a minimum, detour/closure information must be submitted to emergency users: police, fire, hospitals, and ambulance. Metro will be responsible for implementing any public information programs.

Cost associated with brochures, mailers, and paid advertising is based on the number produced and distributed, type of mailer produced, graphics, and staff involvement. The estimated cost for this TMP item is:

### Brochures and Mailers Costs

$$(20 \text{ items}) \times (10,000 \text{ copies}) \times (\$1.80 \text{ each for graphics and postage}) = \$360,000$$

### Paid Advertising Costs

$$\text{Lump Sum Estimate} = \$250,000$$

### Internet and Public Meeting Room Costs

$$\text{Lump Sum Estimate} = \$50,000$$

## 2. Motorist Information

Recommendations for this project will include utilizing portable changeable message signs (CMS) and ground-mounted detour signing, in addition to signing and striping modifications. CMSs placed within the construction area and along detour routes will give real-time motorist information, particularly with respect to construction work zones, temporary closures that are in place, and appropriate detours.

The temporary signs and portable changeable message signs (CMS) will most likely be reused for various detours and proposed alternate routes during the project. It is important that these signs be maintained throughout the project and be removed, covered, or modified as the various stages change. The cost associated with the recommended signing strategy will be included in the overall bid for the project construction. The cost for signing along detours and alternate routes is estimated below. Project site traffic control will be included as part of the project estimated construction costs.

### Portable Changeable Message Signs

$$(8 \text{ signs}) \times (\$20,000/\text{sign}) = \$160,000$$

### Ground-Mounted Signs (Estimated)

$$(1000 \text{ signs}) \times (\$600/\text{sign}) = \$600,000$$

### 3. Incident Management

Construction Zone Enhancement Enforcement Program (COZEEP) is recommended for this project for segments of the LRT construction that encroaches on Caltrans Right of Way. This program requires the presence and assistance of California Highway Patrol (CHP) officers to provide traffic-handling enforcement, on-time incident response, and safety coordination when necessary. COZEEP is highly recommended during traffic staging changeovers. The estimated COZEEP cost for this project is:

COZEEP: Assume 2 units per night closure

$$(6 \text{ units}) \times (72 \text{ nights}) \times (8 \text{ hours}) \times (\$85/\text{hour}) = \$293,760$$

During construction, local agency coordination staff will monitor local traffic conditions and resolve problems. If Traffic Management issues cannot be resolved by local agency staff, the Resident Engineer will contact the District 7 District Traffic Manager (DTM) and Construction Traffic Manager (CTM) to develop timely recommendations and response regarding:

- Signage along construction area or temporary detours
- Closing/opening of lanes
- Making sure proper messages are shown on Changeable Message Signs (CMS)

Traffic Management Team (TMT) will be used only for closures that have, or could have significant delays to motorists.

### 4. Construction Strategies

At the estimated time of construction, coordination will be required to ensure that the proposed closures and/or detours for this LRT project are coordinated with all other roadway projects in the area that may be impacted and that potential traffic impacts as a result of this LRT project are adequately addressed.

It is estimated that the construction for this LRT project will be completed in approximately 36 to 48 months (To be determined). No long-term (greater than 55-hour extended weekend closure) or complete closures are required for construction of this LRT project. For portions of the elevated alignment that crosses the 60, the 710, and other roadways, overnight closures will be required for placement of the K-rails adjacent to the median or construction of the bridge deck falsework. Other than these overnight closures, the roadways below the aerial alignment will remain open. The falsework would be designed so there are no vertical clearance issues.

Mednik Avenue from First Street to Floral Drive will be reduced to one lane in each direction for construction of the median and the columns supporting the LRT alignment, as in the ultimate condition. Duration: Permanent

For the construction of the Floral Station, parking will be prohibited for a duration of 4 months on Floral Drive between Dangler Avenue and Mednik Avenue to allow the traffic lanes to be shifted to accommodate the construction. The sidewalk on the north side of Floral Drive between Dangler Avenue and Mednik Avenue will also be closed for a duration of 2 years.

The construction of the elevated LRT Alignment in the 710 right of way will have occasional short term (overnight) closures on the outside southbound lane in order to allow construction equipment /materials to be brought on site.

During the construction of the Cal State Los Angeles Station, Circle Drive will be the access route for construction equipment/materials and may be blocked occasionally as equipment is transported.

The #1 lane of eastbound Valley Boulevard will be closed for the duration of 4 months with vehicle traffic shifted to the south to allow for the installation of columns to support the falsework erected during bridge deck construction.

All Underground Stations will require the following:

Utility relocations will require 6 months of daytime short-term closures for a single lane and its adjacent sidewalk on weekdays from 9 am to 3 pm. Drilling of piles to support temporary roadway deck will require daytime closures of one lane and its adjacent sidewalk from 9 am to 3 pm for approximately 32 working days per station for the Alhambra and South Pasadena LRT Stations, and approximately 50 working days for the Huntington and Fillmore LRT Stations.

Cross streets such as Mission at Fair Oaks, California at Raymond, and the southbound right turn lane from Fair Oaks to Huntington may also be impacted during the construction.

Installation of the roadway deck will require consecutive weekend (Friday 10 pm to Monday 5 am) full-term road closures, up to 9 consecutive weekends for the Alhambra and South Pasadena LRT Stations, and 13 consecutive weekends for the Huntington and Fillmore LRT Stations.

The temporary roadway deck will be in place with all lanes open for approximately, 3-4 years. The removal of the deck upon conclusion of all construction activities will have the same impact as constructing it. (Full weekend closures, same duration)

Depending on the results of the settlement analysis and building conditions, the curb lanes and sidewalks of the roadways along the tunnel alignment may be closed during the day from 9 am to 3 pm for grouting. Duration: 2 weeks per location

See Attachment M-1: Transportation System Management/Transportation Demand Management TMP for construction strategies as the LRT Alternative will include TSM/TDM Alternative improvements.

## 5. Demand Management

Traffic demand management techniques have been identified for this LRT Alternative. Bike facility improvements will include on-street Class III bicycle facilities that support access to transit facilities through the project area, and will also expand the bicycle parking facilities already existing at the Metro Gold Line Stations.

## 6. Alternative Route Strategies

No detailed traffic route strategies have been provided to evaluate traffic operations for this LRT Alternative.

7. Other Strategies

No new technologies have been identified for this LRT Alternative.

**TRANSPORTATION MANAGEMENT PLAN DATA SHEET**  
**(Preliminary TMP Elements and Costs)**  
**SR 710 North Study – Freeway Dual Tunnel Alternative**

Co/Rte/KP	07-LA-710, PM 26.7 to PM 32.1T EA 187900	Alternative No.	FWY- Dual Tunnel
Project Limit	The study area for the SR 710 North Study is between State Route 2 (SR2) and Interstate 5, 10, 210 and 605 (I-5, I-10, I-210, and I-605, respectively).		

The alignment for the Freeway Dual Tunnel Alternative starts at the existing southern stub of SR 710 in Alhambra, just north of I-10, and connects to the existing northern stub of SR 710, south of the I-210/SR 134 interchange in Pasadena. The dual-bore design variation includes two tunnels that independently convey northbound and southbound vehicles. The Freeway Dual Tunnel Alternative will also include TSM/TDM Alternative improvements.

Project Description	The alignment for the Freeway Dual Tunnel Alternative starts at the existing southern stub of SR 710 in Alhambra, just north of I-10, and connects to the existing northern stub of SR 710, south of the I-210/SR 134 interchange in Pasadena. The dual-bore design variation includes two tunnels that independently convey northbound and southbound vehicles. The Freeway Dual Tunnel Alternative will also include TSM/TDM Alternative improvements.		
1) Public Information			
	<input checked="" type="checkbox"/> a. Brochures and Mailers	\$360,000	
	<input checked="" type="checkbox"/> b. Press Release		
	<input checked="" type="checkbox"/> c. Paid Advertising	\$250,000	
	<input type="checkbox"/> d. Public Information Center/Kiosk	\$	
	<input checked="" type="checkbox"/> e. Public Meeting/Speakers Bureau		
	<input type="checkbox"/> f. Telephone Hotline		
	<input checked="" type="checkbox"/> g. Internet		
	<input checked="" type="checkbox"/> h. Others <u>Public meeting rooms</u>	\$50,000	
2) Motorists Information Strategies			
	<input type="checkbox"/> a. Changeable Message Signs (Fixed)	\$	
	<input checked="" type="checkbox"/> b. Changeable Message Signs (Portable)	\$240,000	
	<input checked="" type="checkbox"/> c. Ground Mounted Signs	\$480,000	
	<input type="checkbox"/> d. Highway Advisory Radio	\$	
	<input checked="" type="checkbox"/> e. Caltrans Highway Information Network (CHIN)		
	<input type="checkbox"/> f. Others _____	\$	
3) Incident Management			
	<input checked="" type="checkbox"/> a. Construction Zone Enhanced Enforcement Program (COZEEP)	\$97,920	
	<input type="checkbox"/> b. Freeway Service Patrol	\$	
	<input checked="" type="checkbox"/> c. Traffic Management Team		
	<input type="checkbox"/> d. Helicopter Surveillance	\$	
	<input type="checkbox"/> e. Traffic Surveillance Stations (Loop Detector and CCTV)	\$	
	<input type="checkbox"/> f. Others _____	\$	

4) Construction Strategies

<input checked="" type="checkbox"/> a. Lane Closure Chart	
<input type="checkbox"/> b. Reversible Lanes	
<input type="checkbox"/> c. Total Facility Closure	
<input type="checkbox"/> d. Contra Flow	
<input type="checkbox"/> e. Truck Traffic Restrictions	\$ _____
<input type="checkbox"/> f. Reduced Speed Zone	\$ _____
<input checked="" type="checkbox"/> g. Connector and Ramp Closures	
<input checked="" type="checkbox"/> h. Incentive and Disincentive	\$0 _____
<input type="checkbox"/> i. Moveable Barrier	\$ _____
<input type="checkbox"/> j. Others _____	\$ _____

5) Demand Management

<input type="checkbox"/> a. HOV Lanes/Ramps (New or Convert)	\$ _____
<input type="checkbox"/> b. Park and Ride Lots	\$ _____
<input type="checkbox"/> c. Rideshare Incentives	\$ _____
<input type="checkbox"/> d. Variable Work Hours	
<input type="checkbox"/> e. Telecommute	
<input type="checkbox"/> f. Ramp Metering (Temporary Installation)	\$ _____
<input type="checkbox"/> g. Ramp Metering (Modify Existing)	\$ _____
<input type="checkbox"/> h. Others _____	\$ _____

6) Alternative Route Strategies

<input type="checkbox"/> a. Add Capacity to Freeway Connector	\$ _____
<input type="checkbox"/> b. Street Improvement (widening, traffic signal... etc)	\$ _____
<input type="checkbox"/> c. Traffic Control Officers	\$ _____
<input type="checkbox"/> d. Parking Restrictions	
<input type="checkbox"/> e. Others _____	\$ _____

7) Other Strategies

<input type="checkbox"/> a. Application of New Technology	\$ _____
<input type="checkbox"/> b. Others _____	\$ _____

**TOTAL ESTIMATED COST OF TMP ELEMENTS =** \$1,477,920



Project Notes:

See Attachment: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PREPARED BY \_\_\_\_\_ DATE \_\_\_\_\_  
Melissa De La Peña, CH2M HILL

APPROVAL RECOMMENDED BY \_\_\_\_\_ DATE \_\_\_\_\_  
Ali Bamshad, Caltrans DTM

APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_  
Sam Esquenazi, Caltrans District Traffic  
Manager

## 1. Public Information

Brochures and mailers are recommended for this project to communicate project-related information to businesses and residents in the project area. Information to the mailer would include a description of the project, a description of the need for the project, project schedules, construction information, detour routes, and possible alternate routes. Brochures may also be distributed to the public at key location including businesses, travel information center, automobile associations, etc.

Information can be distributed through radio, newspapers, billboards, and television ads to inform the public of upcoming detours and closures. News media alerts are effective strategy informing the public of planed roadway construction at no-cost. Paid advertisements can also be used for progress updates and changes to construction schedule or traffic management. At a minimum, detour/closure information must be submitted to emergency users: police, fire, hospitals, and ambulance. Metro will be responsible for implementing any public information programs.

Public meetings involves presenting to the local residents and businesses information regarding the project construction. The meeting also allows for the public's input of potential concerns, impacts, and management strategies. In addition, a formation of a community task force made up of various stakeholders that will be impacted by the construction can help with the distribution of information and generate support for the project.

Cost associated with brochures, mailers, and paid advertising is based on the number produced and distributed, type of mailer produced, graphics, and staff involvement. The estimated cost for this TMP item is:

### Brochures and Mailers Costs

$$(20 \text{ items}) \times (10,000 \text{ copies}) \times (\$1.80 \text{ each for graphics and postage}) = \$360,000$$

### Paid Advertising Costs

$$\text{Lump Sum Estimate} = \$250,000$$

### Internet and Public Meeting Room Costs

$$\text{Lump Sum Estimate} = \$50,000$$

## 2. Motorist Information

Recommendations for this project will include utilizing portable and fixed changeable message signs (CMS) and ground-mounted detour signing, in addition to signing and striping modifications. CMSs placed within the construction area and along detour routes will give real-time motorist information, particularly with respect to construction work zones, closures that are in place, and appropriate detours.

Temporary signs will most likely be reused for various detours and proposed alternate routes during the project. It is important that these signs be maintained throughout the project and be removed, covered, or modified as the various stages change. The cost associated with the

recommended signing strategy will be included in the overall bid for the project construction. The cost for signing along detours and alternate routes is estimated below. Project site traffic control will be included as part of the project estimated construction costs.

Portable Changeable Message Signs  
 (12 signs) x (\$20,000/sign) = \$240,000

Ground-Mounted Signs (Estimated)  
 (800 signs) x (\$600/sign) = \$480,000

### 3. Incident Management

Construction Zone Enhancement Enforcement Program (COZEEP) is recommended for this project. This program requires the presence and assistance of California Highway Patrol (CHP) officers to provide traffic-handling enforcement, on-time incident response, and safety coordination when necessary. COZEEP is highly recommended during traffic staging changeovers. The estimated COZEEP cost for this project is:

COZEEP: Assume 4 units per night closure  
 (4 units) x (36 nights) x (8 hours) x (\$85/hour) = \$97,920

During construction, local agency coordination staff will monitor local traffic conditions and resolve problems. If Traffic Management issues cannot be resolved by local agency staff, the Resident Engineer will contact the District 7 District Traffic Manager (DTM) and Construction Traffic Manager (CTM) to develop timely recommendations and response regarding:

- Signage along construction area or temporary detours
- Closing/opening of lanes
- Making sure proper messages are shown on Changeable Message Signs (CMS)

Traffic Management Team (TMT) will be used only for closures that have, or could have significant delays to motorists.

### 4. Construction Strategies

At the estimated time of construction, coordination will be required to ensure that the proposed closures and/or detours for this alternative are coordinated with all other roadway projects in the area that may be impacted and that potential traffic impacts as a result of this alternative are adequately addressed.

The construction strategy for the Dual Bore Option (Freeway Tunnel Alternative) will be divided into the North Portal and the South Portal. The construction of the South Portal will be comprised of three stages and the North Portal will be comprised of four stages. The stages at the North and South Portal do not necessarily coincide during construction. Preparation for the North

and South Portal pits will begin in Stage 3 of the construction. The tunnel boring machine (TBM) at the North Portal will bore the tunnel north to south, while the TBM at the South Portal will bore the tunnel south to north once the North/South Portal stages are complete. Stages that require restriping of the roadway will result in overnight closures. All other closures are anticipated to be long term closures. The completion of the construction for the Dual Bore Tunnel Freeway Alternative is approximately five (5) years.

#### South Portal: Stage 1

During Stage 1, construction on the mainline and ramps at the South Portal for the Dual Bore Tunnel Option will begin. Northbound (NB) and Southbound (SB) mainline lanes on the 710 freeway will be shifted towards the existing outside shoulders, while the mainline median and pavement is constructed south of the Hellman Ave Overcrossing (OC) Bridge.

Construction at the outer portion of the NB and SB mainline ramps will require the following closures; the on-ramp from the Eastbound (EB) El Monte Busway ramp, the on-ramp from Westbound (WB) I-10, the on-ramp from EB I-10, and the on-ramp from Ramona Blvd. Temporary pavement to shift the ramps outward will be laid to clear the portal width.

As part of Phase 1 work in Stage 1, vehicle traffic for each direction on the Hellman Ave OC Bridge will be shifted to the Northside of the bridge and reduced to one lane in each direction to allow for the widening of the Southside of the bridge.

Vehicle traffic on Valley Blvd as part of Phase 1 work in Stage 1, will also be shifted to the south and maintained with two (2) lanes in each direction to allow for the construction of the Valley Blvd OC Bridge and sidewalk.

As part of Phase 2 work in Stage 1, vehicle traffic for each direction on the Hellman Ave OC Bridge will be shifted to the Southside of the bridge and kept at one lane in each direction to allow for construction of the retaining wall and the widening of the Northside of the bridge.

Westbound vehicle traffic on Valley Blvd as part of Phase 2 work in Stage 1, will be shifted to the north while the EB direction will remain in its location from Phase 1. Two (2) lanes will be maintained in each direction to allow for the on-going construction of the Valley Blvd OC Bridge. The total duration of Stage 1 through Phase 1 and 2 work is approximately six (6) months.

#### South Portal: Stage 2

During Stage 2 construction on the mainline and ramps at the South Portal for the Dual Bore Tunnel option will continue with the NB and SB mainline lanes of the 710 freeway being shifted towards the median on temporary and permanent pavement constructed in Stage 1. Portions of the on-ramp from WB I-10, and the on-ramp from Ramona Blvd will also be constructed during this stage. Construction at the NB and SB ramps will require the closure of the following ramps; the on-ramp from the EB El Monte Busway, the on-ramp from WB I-10, the off-ramp to WB I-

10, the off-ramp to the EB I-10, the on-ramp from EB I-10, and the off-ramp to the WB El Monte Busway.

As part of Phase 1 work in Stage 2, vehicle traffic for WB Valley Blvd will be shifted to the south to accommodate sidewalk construction on the Northside of the Valley Blvd OC Bridge. EB Valley Blvd traffic will be shifted to the north onto permanent pavement constructed in the previous stage.

Upon completion of the Valley Blvd OC Bridge, the boring portal will be constructed and the boring operation will begin.

As part of Phase 1 work in Stage 2, the NB off-ramp and SB on-ramp from Valley Blvd to I-710 will remain operational.

During Phase 2 work in Stage 2, the NB off-ramp and SB on-ramp from Valley Blvd to I-710 will be closed to construct the remaining portion of the ramps. The total duration of Stage 2 work is approximately eleven (11) months.

### South Portal: Stage 3

During Stage 3 construction on the mainline and ramps at the South Portal for the Dual Bore Tunnel option, the majority of the mainline and ramps will have received permanent striping. Construction and striping completion at the ramps will require the opening of the following ramps; on-ramp from the EB El Monte Busway, on-ramp from WB I-10, off-ramp to WB I-10, off-ramp to the EB I-10, on-ramp from EB I-10, on-ramp from Ramona Blvd, and the off-ramp to the WB El Monte Busway.

Construction will occur on the portion of the SB I-710 on-ramp from WB I-10 Freeway reducing the ramp to a single lane service.

The NB off-ramp and SB on-ramp from the newly constructed Valley Blvd OC Bridge to I-710 freeway will open for traffic after receiving permanent striping in Stage 3.

The remaining portion of the mainline median and permanent pavement will also be constructed and permanently striped for traffic north of Hellman Ave OC Bridge. The duration of work for Stage 3 of the South Portal is approximately seven (7) months.

### North Portal: Stage 1

During Stage 1 construction on the mainline and ramps at the North Portal for the Dual Bore Tunnel Option, SB I-210 mainline lanes at off-ramp to Saint John Ave will be restriped and shifted towards the median onto the existing shoulder.

Vehicle traffic on Saint John Ave will be restriped and shifted to the east maintaining two lanes of traffic, while the intersection at SB I-210 to Saint John Ave will be constructed. Temporary pavement will be laid for the extension of Saint John Ave between Del Mar Blvd and California Blvd. The total duration of Stage 1 is approximately two (2) months.

North Portal: Stage 2

During Stage 2 construction on the mainline and ramps at the North Portal for the Dual Bore Tunnel Option, construction will begin on the NB and SB mainline and ramps. SB I-210 will be restriped to direct traffic to exit at the off-ramp to Del Mar Blvd. Construction of the Boring Portal and the commencement of the boring operation will begin during this stage.

Vehicle traffic will begin on the temporary pavement extension of Saint John Ave built in Stage 1.

Construction will begin at the Green St OC, which will require the street closure of Green St at the intersection of Green St and Pasadena Ave, and Green St and Saint John Ave. EB Green St will be restriped to a dual right to route traffic to Saint John Ave, while the SB left turn striping from Saint John Ave to Green St will need to be removed.

The NB I-210 will be restriped to maintain vehicle access from the on-ramp of Del Mar Blvd, and the off-ramps to WB SR-134 and EB I-210.

The Pasadena Ave on-ramp south of Del Mar Blvd to NB I-210 will be closed for vehicle traffic in Stage 2.

Construction preparation of the Colorado Blvd and Union St OC Bridges and mainline will require the closure of the EB SR-134 connector ramp and the EB I-210 off-ramp to SB I-210 and California Blvd.

Construction will begin during Stage 2 at the Colorado Blvd OC Bridge, which will require the street closure of WB Colorado Blvd at the intersection of Colorado Blvd and Pasadena Ave, and EB Colorado Blvd at the intersection of Colorado Blvd and Saint John Ave. EB Colorado Blvd will be restriped to a dual right turn to route traffic to Saint John Ave, while WB Colorado Blvd will be restriped to a dual right turn to route traffic to Pasadena Ave. The Colorado Blvd OC Bridge construction will not overlap with the Green St and Union St OC Bridge construction to minimize the traffic impact due to street closures.

Construction will begin at the Union St OC Bridge in Stage 2, which will require the street closure of WB Union St at the intersection of Union St and Pasadena Ave. WB Union St will be restriped to a dual right to route traffic to Pasadena Ave. The Union St OC Bridge construction will not overlap with the Green St and Colorado Blvd OC Bridge construction to minimize the traffic impact due to street closures.

SB I-210 off-ramp to Saint John Ave will be restriped to permanent striping and opened to vehicle traffic during Stage 2. The total duration of Stage 2 is approximately seventeen (17) months.

North Portal: Stage 3

During Stage 3 construction on the mainline and ramps at the North Portal for the Dual Bore Tunnel Option, construction will continue on the NB and SB mainline and ramps. On-going construction from Stage 2 will keep the EB SR-134 connector ramp to SB I-210 closed, along with the WB I-210 off-ramp to SB I-210. SB I-210 will be restriped to direct traffic to exit to Saint John Ave, as I-210 will be closed south of the intersection. Traffic will be directed to the temporary extension of Saint John Ave constructed in Stage 2 between Del Mar Blvd and California Blvd.

Construction preparation for the Del Mar Blvd OC Bridge will require the following closures; the closure of the NB I-210 Ramp from Pasadena Ave south of Del Mar Blvd, the closure of the NB I-210 on-ramp from Del Mar Blvd and off-ramp to WB SR-134 and EB I-210, and the closure of the SB I-210 off-ramp to Del Mar Blvd. Construction will begin at the Del Mar Blvd OC Bridge, which will require the street closure of WB Del Mar Blvd at the intersection of Del Mar Blvd and Pasadena Ave. WB Through traffic will be eliminated and directed to a right turn onto Pasadena Ave.

Construction at the Del Mar Blvd OC Bridge, will also require the street closure of EB Del Mar Blvd at the intersection of Del Mar Blvd and Saint John Ave. EB through lane on Del Mar Ave will be restriped as a right turn lane to guide vehicle to the temporary extension of Saint John Ave. The total duration of Stage 3 is approximately fourteen (14) months.

North Portal: Stage 4

During Stage 4 construction of the mainline and ramps at the North Portal for the Dual Bore Tunnel Option, the NB and SB mainline and ramps will be opened with permanent striping while the final extension of Saint John Ave will be constructed north and south of the Del Mar Blvd OC Bridge.

As part of Phase 1 of Stage 4, Traffic will be maintained to provide access to temporary Saint John Ave extension between Del Mar Blvd and California Blvd, while the existing Saint John Ave between Green St and Del Mar Blvd is striped to a single lane in the Southbound direction.

As part of Phase 2 of Stage 4, the temporary Saint John Ave extension between Del Mar Blvd and California Blvd will be removed, and traffic will be moved to the permanent striped pavement of Saint John Ave's extension south of Green Street, and the permanent striped pavement of the Saint John Ave extension between Del Mar Blvd and California Blvd.

Close out work on Stage 4 will include the construction of the southern leg at the intersection of Saint John Ave and Green Street. This construction till completion will require one (1) lane to be maintained for the SB direction from the intersection. The total duration of Stage 4 is approximately four (4) months.

Tunnel work preparation will begin approximately midway through the portal stages. Preparation work includes constructing slurry walls, excavation of overburden and rock, installing secant pile ground imp, installing tie backs, inverted mud slabs, and mobilization of the TBMs and equipment. The total duration of the tunnel work preparation is approximately twelve (12) months.

Once the TBMs are set at each portal, construction of the bore tunnel, shell, and grout will commence. The double deck roadway structure will be installed inside the tunnel section, as well as the mechanical and electrical systems for the bore tunnel. Fault reinforcement will be done at the North Portal and the construction of the backfill cut & cover sections, and exhaust air structure will begin. Testing and commission of the dual bore freeway tunnel will take place after construction. The total duration for the dual bore tunnel construction is approximately 36 months.

The use of incentives and disincentives in the construction contract are recommended for this project to minimize the construction duration. An incentive cost estimate will be developed once a preferred alternative is selected.

See Attachment M-1: Transportation System Management/Transportation Demand Management TMP for construction strategies as the Freeway Dual Bore Alternative will include TSM/TDM Alternative improvements.

5. Demand Management

No demand management techniques have been identified for the Freeway Dual Tunnel alternative during construction period.

6. Alternative Route Strategies

No detailed traffic detour strategies have been provided to evaluate traffic operations for Freeway Dual Tunnel Alternative.

7. Other Strategies

No new technologies have been identified for Freeway Dual Tunnel Alternative.



**TRANSPORTATION MANAGEMENT PLAN DATA SHEET**  
**(Preliminary TMP Elements and Costs)**  
**SR 710 North Study – Freeway Single Tunnel Alternative**

Co/Rte/KP	07-LA-710, PM 26.7 to PM 32.1T EA 187900	FWY- Single Tunnel
Project Limit	Alternative No. _____ The study area for the SR 710 North Study is between State Route 2 (SR2) and Interstate 5, 10, 210 and 605 (I-5, I-10, I-210, and I-605, respectively).	
Project Description	The alignment for the Freeway Single Tunnel Alternative starts at the existing southern stub of SR 710 in Alhambra, just north of I-10, and connects to the existing northern stub of SR 710, south of the I-210/SR 134 interchange in Pasadena. The single-bore design variation includes one tunnel that carries both northbound and southbound vehicles. The Freeway Single Tunnel Alternative will also include TSM/TDM Alternative improvements.	
1) Public Information		
<input checked="" type="checkbox"/>	a. Brochures and Mailers	\$360,000
<input checked="" type="checkbox"/>	b. Press Release	
<input checked="" type="checkbox"/>	c. Paid Advertising	\$250,000
<input type="checkbox"/>	d. Public Information Center/Kiosk	\$
<input checked="" type="checkbox"/>	e. Public Meeting/Speakers Bureau	
<input type="checkbox"/>	f. Telephone Hotline	
<input checked="" type="checkbox"/>	g. Internet	
<input checked="" type="checkbox"/>	h. Others <u>Public meeting rooms</u>	\$50,000
2) Motorists Information Strategies		
<input type="checkbox"/>	a. Changeable Message Signs (Fixed)	\$
<input checked="" type="checkbox"/>	b. Changeable Message Signs (Portable)	\$240,000
<input checked="" type="checkbox"/>	c. Ground Mounted Signs	\$480,000
<input type="checkbox"/>	d. Highway Advisory Radio	\$
<input checked="" type="checkbox"/>	e. Caltrans Highway Information Network (CHIN)	
<input type="checkbox"/>	f. Others _____	\$
3) Incident Management		
<input checked="" type="checkbox"/>	a. Construction Zone Enhanced Enforcement Program (COZEEP)	\$97,920
<input type="checkbox"/>	b. Freeway Service Patrol	\$
<input checked="" type="checkbox"/>	c. Traffic Management Team	
<input type="checkbox"/>	d. Helicopter Surveillance	\$
<input type="checkbox"/>	e. Traffic Surveillance Stations (Loop Detector and CCTV)	\$
<input type="checkbox"/>	f. Others _____	\$

4) Construction Strategies

<input type="checkbox"/>	a. Lane Closure Chart	
<input type="checkbox"/>	b. Reversible Lanes	
<input type="checkbox"/>	c. Total Facility Closure	
<input type="checkbox"/>	d. Contra Flow	
<input type="checkbox"/>	e. Truck Traffic Restrictions	\$ _____
<input type="checkbox"/>	f. Reduced Speed Zone	\$ _____
<input checked="" type="checkbox"/>	g. Connector and Ramp Closures	
<input checked="" type="checkbox"/>	h. Incentive and Disincentive	\$0 _____
<input type="checkbox"/>	i. Moveable Barrier	\$ _____
<input type="checkbox"/>	j. Others _____	\$ _____

5) Demand Management

<input type="checkbox"/>	a. HOV Lanes/Ramps (New or Convert)	\$ _____
<input type="checkbox"/>	b. Park and Ride Lots	\$ _____
<input type="checkbox"/>	c. Rideshare Incentives	\$ _____
<input type="checkbox"/>	d. Variable Work Hours	
<input type="checkbox"/>	e. Telecommute	
<input type="checkbox"/>	f. Ramp Metering (Temporary Installation)	\$ _____
<input type="checkbox"/>	g. Ramp Metering (Modify Existing)	\$ _____
<input type="checkbox"/>	h. Others _____	\$ _____

6) Alternative Route Strategies

<input type="checkbox"/>	a. Add Capacity to Freeway Connector	\$ _____
<input type="checkbox"/>	b. Street Improvement (widening, traffic signal... etc)	\$ _____
<input type="checkbox"/>	c. Traffic Control Officers	\$ _____
<input type="checkbox"/>	d. Parking Restrictions	
<input type="checkbox"/>	e. Others _____	\$ _____

7) Other Strategies

<input type="checkbox"/>	a. Application of New Technology	\$ _____
<input type="checkbox"/>	b. Others _____	\$ _____

**TOTAL ESTIMATED COST OF TMP ELEMENTS =** \$=1,477,920

Project Notes:

See Attachment: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PREPARED BY \_\_\_\_\_ DATE \_\_\_\_\_

Melissa De La Peña, CH2M HILL

APPROVAL RECOMMENDED BY \_\_\_\_\_ DATE \_\_\_\_\_

Ali Bamshad, Caltrans DTM

APPROVED BY \_\_\_\_\_ DATE \_\_\_\_\_

Sam Esquenazi, Caltrans District Traffic  
Manager

## 1. Public Information

Brochures and mailers are recommended for this alternative to communicate alternative-related information to businesses and residents in the project area. Information to the mailer would include a description of the alternative, a description of the need for the alternative, schedules, construction information, detour routes, and possible alternate routes. Brochures may also be distributed to the public at key location including businesses, travel information center, automobile associations, etc.

Information can be distributed through radio, newspapers, billboards, and television ads to inform the public of upcoming detours and closures. News media alerts are effective strategy informing the public of planned roadway construction at no-cost. Paid advertisements can also be used for progress updates and changes to construction schedule or traffic management. At a minimum, detour/closure information must be submitted to emergency users: police, fire, hospitals, and ambulance. Metro will be responsible for implementing any public information programs.

Public meetings involves presenting to the local residents and businesses information regarding the construction of the BRT alternative. The meeting also allows for the public's input of potential concerns, impacts, and management strategies. In addition, a formation of a community task force made up of various stakeholders that will be impacted by the construction can help with the distribution of information and generate support for the alternative.

Cost associated with brochures, mailers, and paid advertising is based on the number produced and distributed, type of mailer produced, graphics, and staff involvement. The estimated cost for this TMP item is:

### Brochures and Mailers Costs

(20 items) x (10,000 copies) x (\$1.80 each for graphics and postage) = \$360,000

### Paid Advertising Costs

Lump Sum Estimate = \$250,000

### Internet and Public Meeting Room Costs

Lump Sum Estimate = \$50,000

## 2. Motorist Information

Recommendations for this alternative will include utilizing portable and fixed changeable message signs (CMS) and ground-mounted detour signing, in addition to signing and striping modifications. CMSs placed within the construction area and along detour routes will give real-time motorist information, particularly with respect to construction work zones, closures that are in place, and appropriate detours.

Temporary signs will most likely be reused for various detours and proposed alternate routes during construction. It is important that these signs be maintained throughout the project area and be removed, covered, or modified as the various stages change. The cost associated with the recommended signing strategy will be included in the overall bid for the construction. The cost for signing along detours and alternate routes is estimated below. Project site traffic control will be included as part of the alternative's estimated construction costs.

Portable Changeable Message Signs

$$(12 \text{ signs}) \times (\$20,000/\text{sign}) = \$240,000$$

Ground-Mounted Signs (Estimated)

$$(800 \text{ signs}) \times (\$600/\text{sign}) = \$480,000$$

### 3. Incident Management

Construction Zone Enhancement Enforcement Program (COZEEP) is recommended for this project. This program requires the presence and assistance of California Highway Patrol (CHP) officers to provide traffic-handling enforcement, on-time incident response, and safety coordination when necessary. COZEEP is highly recommended during traffic staging changeovers. The estimated COZEEP cost for this project is:

COZEEP: Assume 4 units per night closure

$$(4 \text{ units}) \times (36 \text{ nights}) \times (8 \text{ hours}) \times (\$85/\text{hour}) = \$97,920$$

During construction, local agency coordination staff will monitor local traffic conditions and resolve problems. If Traffic Management issues cannot be resolved by local agency staff, the Resident Engineer will contact the District 7 District Traffic Manager (DTM) and Construction Traffic Manager (CTM) to develop timely recommendations and response regarding:

- Signage along construction area or temporary detours
- Closing/opening of lanes
- Making sure proper messages are shown on Changeable Message Signs (CMS)

Traffic Management Team (TMT) will be used only for closures that have, or could have significant delays to motorists.

### 4. Construction Strategies

At the estimated time of construction, coordination will be required to ensure that the proposed closures and/or detours for this alternative are coordinated with all other roadway projects in the area that may be impacted and that potential traffic impacts as a result of this alternative are adequately addressed.

The construction strategy for the Single Bore Option (Freeway Tunnel Alternative) will be divided into the North Portal and the South Portal. The construction of the South Portal will be comprised of three stages and the North Portal will be comprised of four stages. The stages at the North and South Portal do not necessarily coincide during construction. Preparation for the North and South Portal pits will begin at Stage 3 of the construction. The tunnel boring machine (TBM) at the North Portal will bore the tunnel north to south, while the TBM at the South Portal will bore the tunnel south to north once the North/South Portal stages are complete. . Stages that require restriping of the roadway will result in overnight closures. All other closures are anticipated to be long term closures. The completion of the construction of the Single Bore Tunnel Freeway Alternative is approximately four (4) to five (5) years.

#### South Portal Stage 1:

During Stage 1, construction on the mainline and ramps at the South Portal for the Single Bore Tunnel Option will begin. Northbound (NB) mainline lanes on the 710 freeway will be shifted towards the existing median, while Southbound (SB) mainline lanes will shifted towards the existing outside shoulder. Construction at the ramps will require the closure of the Eastbound (EB) El Monte Busway ramp and the Westbound (WB) I-10 connector ramp. Both on and off ramps to Valley Blvd will be shifted to accommodate the South Portal width.

As part of Phase 1 work in Stage 1, vehicle traffic for each direction on the Hellman Ave OC Bridge will be shifted to the Northside of the bridge and reduced to one lane in each direction to allow for the widening of the Southside of the bridge. Vehicle traffic on Valley Blvd OC Bridge as part of Phase 1 work in Stage 1, will also be shifted to the south and maintained with two (2) lanes in each direction to allow for the construction of the Valley Blvd OC Bridge and sidewalk.

As part of Phase 2 work in Stage 1, vehicle traffic for each direction on the Hellman Ave OC Bridge will be shifted to the Southside of the bridge and kept at one lane in each direction to all for the widening of the Northside of the bridge. Westbound vehicle traffic on Valley Blvd OC Bridge as part of Phase 2 work in Stage 1, will be shifted to the north while the EB direction will remain in its location from Phase 1. Two (2) lanes will be maintained in each direction to allow for the on-going construction of the Valley Blvd OC Bridge. The total duration of Stage 1 is approximately six (6) months.

#### South Portal: Stage 2

During Stage 2 construction on the mainline and ramps at the South Portal for the Single Bore Tunnel option, NB mainline lanes on the 710 freeway will be shifted towards the outside shoulder constructed in Stage 1, while SB mainline lanes will shifted towards the towards the median constructed in Stage 1 south of the Hellman Ave OC Bridge, and shifted towards the existing outside shoulder north of Hellman Ave OC Bridge. Construction at the ramps will require the closure of the on-ramp from the EB El Monte Busway, on-ramp from WB I-10, off-ramp to WB I-10, off-ramp to the EB I-10 and off-ramp to the WB El Monte Busway.

As part of Phase 1 work in Stage 2, vehicle traffic for WB Valley Blvd will be shifted to the south to accommodate sidewalk construction on the Northside of the bridge. The NB off-ramp

and SB on-ramp from Valley Blvd to I-710 will be closed to construct the remaining portion of the ramps during a short term closure, as part of Phase 2 work in Stage 2. Boring Portal will be constructed at Phase 2 of Stage 2 to prep for boring operations. The total duration of Stage 2 is approximately ten (10) months.

### South Portal: Stage 3

During Stage 3 construction on the mainline and ramps at the South Portal for the Single Bore Tunnel option, the majority of the mainline and ramps will receive permanent striping. Construction and striping completion at the ramps will require the opening of the on-ramp from the EB El Monte Busway, on-ramp from WB I-10, off-ramp to WB I-10, off-ramp to the EB I-10, on-ramp from EB I-10, and the off-ramp to the WB El Monte Busway. The NB off-ramp and SB on-ramp from the newly constructed Valley Blvd OC Bridge to I-710 freeway will open after receiving permanent striping in Stage 3. The total duration of Stage 3 is approximately nine (9) months.

### North Portal: Stage 1

During Stage 1 construction on the mainline and ramps at the North Portal for the Single Bore Tunnel Option, SB I-210 mainline lanes at off-ramp to Saint John Ave will be restriped and shifted towards the median onto the existing shoulder.

Vehicle traffic on Saint John Ave will be restriped and shifted to the east, while construction takes place to construct the intersection at SB I-210 to Saint John Avenue. Temporary pavement will be laid for the extension of Saint John between Del Mar Blvd and California Blvd. The total duration of Stage 1 is approximately three (3) months.

### North Portal: Stage 2

During Stage 2 construction on the mainline and ramps at the North Portal for the Single Bore Tunnel Option, construction will begin on the NB and SB mainline and ramps. SB I-210 will be restriped to direct traffic to exit at the off-ramp to Del Mar Blvd. Vehicle traffic will begin on the temporary pavement extension of Saint John Ave built in Stage 1, between Del Mar Blvd and California Blvd. Construction of the Boring Portal and the commencement of the boring operation will begin during this stage.

Construction will begin at the Green Street OC Bridge, which will require the street closure of Green St at the intersection of Green St and Pasadena Ave, and Green St and Saint John Ave. EB Green St will be restriped to a dual right to route traffic to Saint John Ave, while the SB left turn striping from Saint John Ave to Green St will need to be removed.

The NB I-210 will be restriped to maintain vehicle access from the on-ramp of Del Mar Blvd, and the off-ramps to WB SR-134 and EB I-210. The Pasadena Ave on-ramp south of Del Mar Blvd to NB I-210 will be closed for vehicle traffic in Stage 2.

Construction preparation of the Colorado Blvd and Union St OC Bridges will require the closure of the EB SR-134 connector ramp to SB I-210 and California Blvd. Construction will begin during Stage 2 at the Colorado Blvd OC Bridge, which will require the street closure of WB Colorado Blvd at the intersection of Colorado Blvd and Pasadena Ave, and EB Colorado Blvd at the intersection of Colorado Blvd and Saint John Ave. EB Colorado Blvd will be restriped to a dual right to route traffic to Saint John Ave, while the WB Colorado Blvd will be restriped to a double right to route traffic to Pasadena Ave. The Colorado Blvd OC Bridge construction will not overlap with the Green St and Union St OC Bridge constructions in order to minimize the traffic impacts due to street closures.

Construction will begin at the Union St OC Bridge, which will require the street closure of WB Union St at the intersection of Union St and Pasadena Ave, and EB Colorado Blvd at the intersection of Colorado Blvd and Saint John Ave. WB Union St will be restriped to a double right to route traffic to Pasadena Ave. The Union St OC Bridge construction will not overlap with the Green St and Colorado Blvd OC Bridge construction to minimize the traffic impact due to street closures. SB I-210 off-ramp to Saint John Avenue will be restriped and opened to vehicle traffic during Stage 2. The total duration of Stage 2 is approximately sixteen (16) months.

#### North Portal: Stage 3

During Stage 3 construction on the mainline and ramps at the North Portal for the Single Bore Tunnel Option, construction will continue on the NB and SB mainline and ramps. On-going construction will keep the EB SR-134 connector ramp to SB I-210 closed from Stage 2, along with the WB I-210 off-ramp to SB I-210. SB I-210 will be restriped to direct traffic to exit off-ramp to Saint John Ave, as I-210 will be closed south of the intersection.

Construction preparation for the Del Mar Blvd OC Bridge will require the following closures; the closure of the NB I-210 Ramp from Pasadena Avenue south of Del Mar Blvd, the closure of the NB 210 on-ramp from Del Mar Blvd and off-ramp to WB SR-134 and EB I-210, and the closure of the SB I-210 off-ramp to Del Mar Blvd.

Construction will begin at the Del Mar Blvd OC Bridge, which will require the street closure of WB Del Mar Blvd at the intersection of Del Mar Blvd and Pasadena Ave. WB Through traffic will be eliminated and directed to right turns onto Pasadena Ave. Construction at the Del Mar Blvd OC Bridge, will require the street closure of EB Del Mar Blvd at the intersection of Del Mar Blvd and Saint John Ave. EB through lane on Del Mar Blvd will be restriped as a right turn lane to guide vehicles to the temporary extension of Saint John Ave. The total duration of Stage 3 is approximately fourteen (14) months.

#### North Portal: Stage 4

During Stage 4 construction on the mainline and ramps at the North Portal for the Single Bore Tunnel Option, the NB and SB mainline and ramps will be opened with permanent striping while



the final extension of Saint John Ave will be constructed north and south of the Del Mar Blvd OC Bridge.

As part of Phase 1 of Stage 4, Traffic will be maintained to provide access to temporary Saint John Ave extension between Del Mar Blvd and California Blvd, while the existing Saint John Ave between Green St and Del Mar Blvd is striped to a single lane in the Southbound direction.

As part of Phase 2 of Stage 4, the temporary Saint John Ave extension between Del Mar Blvd and California Blvd will be removed, and traffic will be moved to the permanent striping of Saint John Ave extension south of Green Street, and the permanent striping of the Saint John Ave extension between Del Mar Blvd and California Blvd.

Close out work for Stage 4 is the construction of the southern leg of the Saint John Ave and Green Street intersection. This construction till completion will require one (1) lane to be maintained for the SB direction at the intersection. The total duration of Stage 4 is approximately four (4) months.

Tunnel work preparation will begin approximately midway through the portal stages. Preparation work includes constructing slurry walls, excavation of overburden and rock, installing secant pile ground imp, installing tie backs, inverted mud slabs, and mobilization of the TBMs and equipment. The total duration of the tunnel work preparation is approximately nine (9) months.

Once the TBMs are set at each portal, construction of the bore tunnel, shell, and grout will commence. The double deck roadway structure will be installed inside the tunnel section, as well as the mechanical and electrical systems for the bore tunnel. Fault reinforcement will be done at the North Portal and the construction of the backfill cut & cover sections, and exhaust air structure will begin. Testing and commission of the single bore freeway tunnel will take place after construction. The total duration for the single bore tunnel construction is approximately 37 months.

The use of incentives and disincentives in the construction contract are recommended for this alternative to minimize the construction duration. An incentive cost estimate will be developed once a preferred alternative is selected.

See Attachment M-1: Transportation System Management/Transportation Demand Management TMP for construction strategies as the Freeway Single Bore Alternative will include TSM/TDM Alternative improvements.

#### 5. Demand Management

No demand management techniques have been identified for the Freeway Single Tunnel alternative during construction period.

#### 6. Alternative Route Strategies

No detailed traffic detour strategies have been provided to evaluate traffic operations for this Freeway Single Tunnel Alternative.

7. Other Strategies

No new technologies have been identified for this Freeway Single Tunnel Alternative.

**Attachment N**  
**Right-of-Way Data Sheets (Build Alternatives)**

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ATTACHMENT N-1

To: **Date** October 23, 2014  
**Dist** 07 **Co** LA **Rte** SR710 **PM** 26.5 – 32.6  
**Attention:** **EA** 187900  
**Project Description:** SR-710 North Study

**Subject:** **Right of Way Data** **Alternate No.:** Transportation System Management/Transportation Demand Management (TSM/TDM)

This Alternate meets the criteria for a Design/Build project: Yes  No

1. **Right of Way Cost Estimate:** To be entered into PMCS COST RW1-5 Screens.  
 • Does not include potential cost of compliance with Roberti Bill SB-86 Government Code Section 54235

	Current Value Future Use	Escalation Rate		Escalated Value*
<b>A. Total Acquisition Cost:</b> Acquisition, including Excess Lands, Damages, and Goodwill. Project Permit Fees.	\$ <u>2,021,176.00</u>	<u>2.36</u> %		\$ <u>2,167,679.00</u>
<b>B. Utility Relocation</b> (Metro Share)	\$ <u>4,295,425.00</u>	<u>2.36</u> %		\$ <u>4,606,775.00</u>
<b>C. Relocation Assistance</b>	\$ <u>215,000.00</u>	<u>2.36</u> %		\$ <u>230,584.00</u>
<b>D. Clearance/Demolition</b>	\$ <u>126,000.00</u>	<u>2.36</u> %		\$ <u>135,133.00</u>
<b>E. Title and Escrow</b>	\$ <u>62,000.00</u>	<u>2.36</u> %		\$ <u>66,494.00</u>
<b>F. Total Estimated Cost</b>	\$ <u>6,719,601.00</u>			\$ <u>7,206,665.00</u>
<b>G. Construction Contract Work</b>	\$ <u>None Shown</u>			\$ _____

\*Escalated to 3 years

2. **Current Date of Right of Way Certification** Will depend on Alternative

3. **Parcel Data:** To be entered into PMCS EVNT RW Screen.

Type	Dual/Appr	Utilities	RR Involvements
X <u>1</u>	<u>N/A</u>	U4-1 <u>69</u>	None _____
A <u>28</u>	<u>N/A</u>	-2 <u>0</u>	C&M Agrmt _____
B <u>1</u>	<u>N/A</u>	-3 <u>0</u>	Svc Contract _____
C <u>9</u>	<u>N/A</u>	-4 <u>0</u>	Design _____
D <u>3</u>	<u>N/A</u>	U5-7 <u>69</u>	Const. _____
E <u>XXXX</u>		-8 <u>138</u>	Lic/RE/Clauses/ _____
F <u>XXXX</u>		-9 <u>69</u>	

Total 42

\* Total includes units that are a part of larger condominium or multi-unit plaza that may not be affected by partial acquisition.

Misc. R/W Work
RAP Displ _____
Clear/Demo _____
Const Permits _____
Condemnation _____

Areas: R/W 23,643 sf No. Excess Parcels 0  
 TCE 32,571 sf  
 PE 9,945 sf

Entered PMCS Screens \_\_\_/\_\_\_/\_\_\_ by \_\_\_\_\_

Entered AGRE Screen (Railroad data only) \_\_\_/\_\_\_/\_\_\_ by \_\_\_\_\_

4. Are there any major items of construction contract work? Yes  No  (If "Yes," explain.)

5. Provide a general description of the right of way and excess lands required (zoning, use, major improvements, critical or sensitive parcels, etc...) No right of way required.

*The TSM/TDM alternative would improve the capacity of the existing transportation system by implementing a number of local street and intersection improvements as well as Active Traffic Management technologies and strategies. These improvements would require partial fee acquisitions and temporary construction easements throughout the study are cities/communities of Pasadena, South Pasadena, Alhambra, Rosemead, San Gabriel, Eagle Rock, El Sereno, Glassell Park and Atwater Village. Most of the acquisitions required would affect commercial properties but a few residential properties will be impacted as well. Of note, a single full acquisition of a vacant commercial property in the City of Pasadena will be required.*

6. Is there an effect on assessed valuation? Yes  Not Significant  No  (If "Yes," explain.)

7. Are utility facilities or rights of way affected?  
Yes  No  (If "Yes," attach Utility Information Sheet, Exhibit 4-EX-5.)  
The following checked items may seriously impact lead time for utility relocation:  
 Longitudinal policy conflict(s)  
 Environmental concerns impacting acquisition of potential easements  
 Power lines operating in excess of 50 KV and substations  
(See attached Exhibit 4-EX-5 for explanation.)

8. Are Railroad facilities or rights of way affected?  
Yes  No  (If "Yes," attach Railroad Information Sheet, Exhibit 4-EX-6.)

*A new overpass will need to be constructed over a UPRR corridor (Alhambra Subdivision) near Alhambra Ave/Mission Rd. and Lowell Ave. Additionally, an existing overpass crossing the same corridor at Mission Rd. and Garfield Ave. will need to be widened. Aerial easements will need to be obtained from UPRR for both.*

*\*Note regarding RR involvements, Page 1:*

*UPRR will require design approval of overpass improvements. No accurate estimate of acquisition costs can be made until plats and legals for the proposed right of way are provided to their engineering department.*

9. Were any previously unidentified sites with hazardous waste and/or material found?  
Yes  None Evident  (If "Yes," attach memorandum per R/W Manual, Chapter 4, Section 4.01.10.00.)

10. Are RAP displacements required? Yes  No  (If "Yes," provide the following information.)  
No. of single family \_\_\_\_\_ No. of business/nonprofit 1  
No. of multi-family \_\_\_\_\_ No. of farms \_\_\_\_\_

Based on Draft/Final Relocation Impact Statement/Study dated 10/23/2014, it is anticipated that sufficient replacement housing (will/will not) be available without Last Resort Housing.

*There are no residential displacements anticipated for this project.*

11. Are there Material Borrow and/or Disposal Sites required? Yes  No  (If "Yes," explain.)

12. Are there potential relinquishments and/or abandonments? Yes  No  (If "Yes," explain.)  
*Right of Way acquired under the Streets and Highways Act may be relinquished to local government agencies if not needed for the proposed alternative.*

13. Are there any existing and/or potential airspace sites? Yes  No  (If "Yes," explain.)

14. Indicate the anticipated Right of Way schedule and lead time requirements. (Discuss if district proposes less than PMCS lead-time and/or if significant pressures for project advancement are anticipated.)

Based on the R/W requirements on Page 1 of this Data Sheet, R/W will require a lead-time of N/A months from the date regular appraisals can begin to project certification.

In any event, RW Maps will require N/A months from Final Maps to project certification.

*Project Certification Schedule has not been established at this time.*

15. Is it anticipated that Caltrans staff will perform all Right of Way work? Yes  No  (If "No," discuss.)

*It is anticipated that Caltrans and Metro will contract out Right of Way acquisition work with Caltrans oversight.*

Evaluation Prepared By:

Right of Way: Name James L. Overcamp, Jr., SR/WA Date October 23, 2014

Railroad: Name James L. Overcamp Jr., SR/WA Date June 27, 2014

Utilities: Name Paul Spiteri (D'Leon Consulting Engineers) Date June 10, 2014

The Right of Way Data Sheets were completed by a consultant. I have reviewed the right of way information contained in this Project Report and the Right of Way Data Sheets attached hereto, and find the data to be in compliance as to form and procedures only. No inferences or assertions are made as to the validity of the data or values implied by the R/W Data Sheets.

\_\_\_\_\_  
Branch Chief  
R/W Project Coordination,  
Planning & Management

\_\_\_\_\_  
Date

(Form #)

1. Name of utility companies involved in project:

*Cable: AT&T, Level3 Communications, Time Warner Cable*  
*Electric: City of Los Angeles, Pasadena and Southern California Edison*  
*Gas: Southern California Gas*  
*Sewer: City of Alhambra, Los Angeles, Pasadena, South Pasadena, and County Sanitation Districts of Los Angeles*  
*Water: City of Alhambra, Los Angeles, Pasadena, South Pasadena, Metropolitan Water District*

2. Types of facilities and agreements required:

*Facilities impacted include cable, electric, gas, sewer and water.*  
*Utility relocation agreements will be required for these facilities.*

3. Is any facility a longitudinal encroachment in existing or proposed access controlled right of way? Explain.

*No, all facilities can be serviced, maintained, and operated without being accessed from the through-traffic roadways or ramps. The utility can be serviced without interfering with highway users. They do not adversely affect the safety, design, construction, maintenance or stability of any highway.*

Disposition of longitudinal encroachment(s):

- Relocation required.
- Exception to policy needed.
- Other. Explain.

4. Additional information concerning utility involvements on this project, i.e., long lead-time materials, growing or species seasons, customer service seasons (no transmission tower relocations in summer).

*The electrical facilities are not high voltage and we expect to be of readily available materials.*  
*The telecom facilities we expect to be of readily available materials.*

5. PMCS Input Information

Total estimated cost of State's obligation for utility relocation on this project:

\$ 4,295,425.00

**Note: Total estimated cost to include any Department obligation to relocate longitudinal encroachments in access controlled right of way and acquire any necessary utility easements.**

		<u>Utility Involvements</u>	
<u>U4</u>		<u>U5</u>	
-1	<u>69</u>	-7	<u>69</u>
-2	<u>0</u>	-8	<u>138</u>
-3	<u>0</u>	-9	<u>69</u>
-4	<u>0</u>		

Prepared By:

Paul Spiteri (D'Leon Consulting Engineers) April 17, 2014  
 Right of Way Utility Estimator Date



(Form #)

1. Describe railroad facilities or right of way affected.

*A new underpass will need to be constructed under a UPRR corridor (Alhambra Subdivision) near Alhambra Ave/Mission Rd. and Lowell Ave. Additionally, an existing overpass crossing the same corridor at Mission Rd. and Garfield Ave. will need to be widened.*

2. When branch lines or spurs are affected, would acquisition and/or payment of damages to business and/or industries served by the railroad facility be more cost effective than construction of a facility to perpetuate the rail service? Yes \_\_\_\_\_ No \_\_\_\_\_ (If yes, explain)

*N/A*

3. Discuss types of agreements and right required from the railroads. Are grade crossings requiring service Contracts or grade separations requiring construct and maintenance agreements involved?

*UPRR will require design approval of underpass improvements. Amendment to C&M agreement will be required for existing overpass. C&M agreement will likely be required for the new proposed grade separation as well. Easements will need to be obtained from UPRR for both.*

4. Remarks (non-operating railroad right of way involved?):

*N/A*

5. PMCS Input Information

<u>RR Involvements</u>	
None	_____
C&M Agreement	_____ <i>1</i> _____
Service Contract	_____
Design	_____ <i>1</i> _____
Const.	_____
Lic/RE/Clauses	_____ <i>2</i> _____

James L. Overcamp, Jr., SR/WA

Prepared By:

June 27, 2014

Date

ATTACHMENT N-2

To: **Date** October 23, 2014  
**Dist** 07 **Co** LA **Rte** SR710 **PM** R26.5 – R32.6  
**Attention:** **EA** 187900  
**Project Description:** SR-710 North Study

**Subject:** **Right of Way Data** **Alternate No.:** Bus Rapid Transit (BRT) with TSM/TDM

This Alternate meets the criteria for a Design/Build project: Yes  No

1. **Right of Way Cost Estimate:** To be entered into PMCS COST RW1-5 Screens.  
 • Does not include potential cost of compliance with Roberti Bill SB-86 Government Code Section 54235

	Current Value Future Use	Escalation Rate	Escalated Value*
<b>A. Total Acquisition Cost:</b> Acquisition, including Excess Lands, Damages, and Goodwill. Project Permit Fees.	\$ <u>8,706,064.00</u>	<u>2.36</u> %	\$ <u>9,337,114.00</u>
<b>B. Utility Relocation</b> (Metro Share)	\$ <u>5,365,545.00</u>	<u>2.36</u> %	\$ <u>5,754,461.00</u>
<b>C. Relocation Assistance</b>	\$ <u>430,000.00</u>	<u>2.36</u> %	\$ <u>461,168.00</u>
<b>D. Clearance/Demolition</b>	\$ <u>126,000.00</u>	<u>2.36</u> %	\$ <u>135,133.00</u>
<b>E. Title and Escrow</b>	\$ <u>173,000.00</u>	<u>2.36</u> %	\$ <u>185,540.00</u>
<b>F. Total Estimated Cost</b>	\$ <u>14,800,609.00</u>		\$ <u>15,873,416.00</u>
<b>G. Construction Contract Work</b>	\$ <u>None Shown</u>		\$ _____

\*Escalated to 3 years

2. **Current Date of Right of Way Certification** Will depend on Alternative

3. **Parcel Data:** To be entered into PMCS EVNT RW Screen.

Type	Dual/Appr	Utilities	RR Involvements
X <u>1</u>	<u>N/A</u>	U4-1 <u>41</u>	None _____
A <u>552</u>	<u>N/A</u>	-2 <u>0</u>	C&M Agrmt _____
B <u>1</u>	<u>N/A</u>	-3 <u>0</u>	Svc Contract _____
C <u>21</u>	<u>N/A</u>	-4 <u>0</u>	Design _____
D <u>5</u>	<u>N/A</u>	U5-7 <u>41</u>	Const. _____
E <u>XXXX</u>		-8 <u>82</u>	Lic/RE/Clauses/ _____
F <u>XXXX</u>		-9 <u>41</u>	
Total <u>580</u>			Misc. R/W Work _____
			RAP Displ _____

\* Total includes units that are a part of larger condominium or multi-unit plaza that may not be affected by partial acquisition.

Clear/Demo \_\_\_\_\_  
 Const Permits \_\_\_\_\_  
 Condemnation \_\_\_\_\_

Areas: R/W 35,303.1 sf No. Excess Parcels 0  
 TCE 58,908 sf  
 PE 9,945 sf

Entered PMCS Screens \_\_\_/\_\_\_/\_\_\_ by \_\_\_\_\_

Entered AGRE Screen (Railroad data only) \_\_\_/\_\_\_/\_\_\_ by \_\_\_\_\_

4. Are there any major items of construction contract work? Yes  No  (If "Yes," explain.)

5. Provide a general description of the right of way and excess lands required (zoning, use, major improvements, critical or sensitive parcels, etc...) No right of way required.

*The BRT Alternative would provide high-speed, high-frequency bus service through a combination of new, dedicated, and existing bus lanes, and mixed-flow traffic lanes to key destinations between East Los Angeles and Pasadena. The proposed route length is approximately 12 mi. Partial fee acquisitions and temporary construction easements will be required at various points along the proposed route to facilitate widening of existing street rights of way, street improvements and additional bus stations. These acquisitions are primarily slivers, and will affect both commercial and residential properties. Only one displacement is anticipated; a medium sized restaurant that is under construction as of the time of this report. Because of street widening, a number of commercial and residential driveways will need to be repaired. While it is anticipated that the construction contractor will perform this work as part of their contract, rights of entry will need to be obtained from property owners in order to gain access to the property to perform the work.*

*The TSM/TDM component would improve the capacity of the existing transportation system by implementing a number of local street and intersection improvements as well as Active Traffic Management technologies and strategies. These improvements would require partial fee acquisitions and temporary construction easements throughout the study are cities/communities of Pasadena, South Pasadena, Alhambra, Rosemead, San Gabriel, Eagle Rock, El Sereno, Glassell Park and Atwater Village. Most of the acquisitions required would affect commercial properties but a few residential properties will be impacted as well.*

6. Is there an effect on assessed valuation? Yes  Not Significant  No  (If "Yes," explain.)

7. Are utility facilities or rights of way affected?  
Yes  No  (If "Yes," attach Utility Information Sheet, Exhibit 4-EX-5.)  
The following checked items may seriously impact lead time for utility relocation:  
 Longitudinal policy conflict(s)  
 Environmental concerns impacting acquisition of potential easements  
 Power lines operating in excess of 50 KV and substations  
(See attached Exhibit 4-EX-5 for explanation.)

8. Are Railroad facilities or rights of way affected?  
Yes  No  (If "Yes," attach Railroad Information Sheet, Exhibit 4-EX-6.)

9. Were any previously unidentified sites with hazardous waste and/or material found?  
Yes  None Evident  (If "Yes," attach memorandum per R/W Manual, Chapter 4, Section 4.01.10.00.)

10. Are RAP displacements required? Yes  No  (If "Yes," provide the following information.)  
No. of single family \_\_\_\_\_ No. of business/nonprofit 1  
No. of multi-family \_\_\_\_\_ No. of farms \_\_\_\_\_

Based on Draft/Final Relocation Impact Statement/Study dated 10/23/2014, it is anticipated that sufficient replacement housing (will/will not) be available without Last Resort Housing.

*There are no residential displacements anticipated for this project.*

11. Are there Material Borrow and/or Disposal Sites required? Yes  No  (If "Yes," explain.)

12. Are there potential relinquishments and/or abandonments? Yes  No  (If "Yes," explain.)

*Right of Way acquired under the Streets and Highways Act may be relinquished to local government agencies if not needed for the proposed alternative.*

13. Are there any existing and/or potential airspace sites? Yes  No  (If "Yes," explain.)

14. Indicate the anticipated Right of Way schedule and lead time requirements. (Discuss if district proposes less than PMCS lead-time and/or if significant pressures for project advancement are anticipated.)

Based on the R/W requirements on Page 1 of this Data Sheet, R/W will require a lead-time of N/A months from the date regular appraisals can begin to project certification.

In any event, RW Maps will require NA months from Final Maps to project certification.

*Project Certification Schedule has not been established at this time.*

15. Is it anticipated that Caltrans staff will perform all Right of Way work? Yes  No  (If "No," discuss.)  
*It is anticipated that Caltrans and Metro will contract out Right of Way acquisition work with Caltrans oversight.*

Evaluation Prepared By:

Right of Way: Name James L. Overcamp, Jr., SR/WA Date October 23, 2014

Railroad: Name James L. Overcamp, Jr., SR/WA Date June 27, 2014

Utilities: Name Paul Spiteri (D'Leon Consulting Engineers) Date June 11, 2014

The Right of Way Data Sheets were completed by a consultant. I have reviewed the right of way information contained in this Project Report and the Right of Way Data Sheets attached hereto, and find the data to be in compliance as to form and procedures only. No inferences or assertions are made as to the validity of the data or values implied by the R/W Data Sheets.

---

Branch Chief  
R/W Project Coordination,  
Planning & Management

---

Date

(Form #)

1. Name of utility companies involved in project:

*Cable: AT&T, Freedom Telecommunications, Mpower Communications, Nextg Networks, Sprint, Sunesys, Time Warner Cable, Verizon Wireless, and XO Communications*  
*Electric: City of Los Angeles, and Southern California Edison*  
*Gas: Southern California Gas*  
*Sewer: City of Monterey Park, Alhambra, Pasadena, San Marino, South Pasadena, and County Sanitation Districts of Los Angeles*  
*Storm Drain: County of Los Angeles Department of Public Works*  
*Water: City of Alhambra, Pasadena, San Marino, South Pasadena, Metropolitan Water District, Valley Water Company*

2. Types of facilities and agreements required:

*Electric and Telecommunications/Cable facilities will be impacted by the pole relocations. Utility relocation agreements will be required for these facilities.*

3. Is any facility a longitudinal encroachment in existing or proposed access controlled right of way? Explain.

*No, all facilities can be serviced, maintained, and operated without being accessed from the through-traffic roadways or ramps. The utility can be serviced without interfering with highway users. They do not adversely affect the safety, design, construction, maintenance or stability of any highway.*

Disposition of longitudinal encroachment(s):

- Relocation required.
- Exception to policy needed.
- Other. Explain.

4. Additional information concerning utility involvements on this project, i.e., long lead-time materials, growing or species seasons, customer service seasons (no transmission tower relocations in summer).

*The electrical facilities are not high voltage and we expect to be of readily available materials. The telecom facilities we expect to be of readily available materials.*

5. PMCS Input Information

Total estimated cost of State's obligation for utility relocation on this project:  
 \$ 5,365,545.00

**Note: Total estimated cost to include any Department obligation to relocate longitudinal encroachments in access controlled right of way and acquire any necessary utility easements.**

<u>Utility Involvements</u>			
U4	U5		
-1	41	-7	41
-2	0	-8	82
-3	0	-9	41
-4	0		

Prepared By:

Paul Spiteri (D'Leon Consulting Engineers) February 14, 2014

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION  
**RAILROAD INFORMATION SHEET**

EXHIBIT  
4-EX-6  
BRT with TSM/TDM

(Form #)

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1. Describe railroad facilities or right of way affected.

*For the TSM/TDM component, a new underpass will need to be constructed under a UPRR corridor (Alhambra Subdivision) near Alhambra Ave/Mission Rd. and Lowell Ave. Additionally, an existing overpass crossing the same corridor at Mission Rd. and Garfield Ave. will need to be widened.*

2. When branch lines or spurs are affected, would acquisition and/or payment of damages to business and/or industries served by the railroad facility be more cost effective than construction of a facility to perpetuate the rail service? Yes \_\_\_\_\_ No \_\_\_\_\_ (If yes, explain)

N/A

3. Discuss types of agreements and right required from the railroads. Are grade crossings requiring service Contracts or grade separations requiring construct and maintenance agreements involved?

*UPRR will require design approval of underpass improvements. Amendment to C&M agreement will be required for existing overpass. C&M agreement will likely be required for the new proposed grade separation as well. Easements will need to be obtained from UPRR for both.*

4. Remarks (non-operating railroad right of way involved?):

N/A

5. PMCS Input Information

RR Involvements

None	_____
C&M Agreement	_____ 1 _____
Service Contract	_____
Design	_____ 1 _____
Const.	_____
Lic/RE/Clauses	_____ 2 _____

James L. Overcamp, Jr., SR/WA

Prepared By:

June 27, 2014

Date

ATTACHMENT N-3

**'To:** Date October 23, 2014  
**Attention:** Dist 07 Co LA Rte SR710 PM R26.5 - R32.6  
 EA 187900  
 Project Description: SR-710 North Study

**Subject: Right of Way Data** Alternate No.: Light Rail Transit (LRT) with TSM/TDM

This Alternate meets the criteria for a Design/Build project: Yes  No

**1. Right of Way Cost Estimate:** To be entered into PMCS COST RW1-5 Screens.

- Does not include potential cost of compliance with Roberti Bill SB-86 Government Code Section 54235

	Current Value Future Use	Escalation Rate	Escalated Value*
<b>A. Total Acquisition Cost:</b> Acquisition, including Excess Lands, Damages, and Goodwill. Project Permit Fees	\$ <u>72,588,163.00</u>	<u>2.36</u> %	\$ <u>77,849,644.00</u>
<b>B. Utility Relocation (Metro Share)</b>	\$ <u>8,097,400.00</u>	<u>2.36</u> %	\$ <u>8,684,332.00</u>
<b>C. Relocation Assistance</b>	\$ <u>8,126,000.00</u>	<u>2.36</u> %	\$ <u>8,715,005.00</u>
<b>D. Clearance/Demolition</b>	\$ <u>0.00</u>	<u>2.36</u> %	\$ <u>0.00</u>
<b>E. Title and Escrow</b>	\$ <u>897,000.00</u>	<u>2.36</u> %	\$ <u>962,018.00</u>
<b>F. Total Estimated Cost</b>	\$ <u>89,708,563.00</u>		\$ <u>96,210,999.00</u>
<b>G. Construction Contract Work</b>	\$ <u>None Shown</u>		\$ _____

\*Escalated to 3 years

**2. Current Date of Right of Way Certification** Will depend on Alternative

**3. Parcel Data:** To be entered into PMCS EVNT RW Screen.

Type	Dual/Appr	Utilities	RR Involvements
X <u>1</u>	<u>N/A</u>	U4-1 <u>10</u>	None _____
A <u>205</u>	<u>N/A</u>	-2 <u>52</u>	C&M Agrmt _____
B <u>5</u>	<u>N/A</u>	-3 <u>0</u>	Svc Contract _____
C <u>60</u>	<u>11</u>	-4 <u>6</u>	Design <u>1</u>
D <u>23</u>	<u>2</u>	U5-7 <u>68</u>	Const. _____
E <u>XXXX</u>		-8 <u>136</u>	Lic/RE/Clauses/ <u>1</u>
F <u>XXXX</u>		-9 <u>68</u>	_____

Total 294

\* Total includes units that are a part of larger condominium or multi-unit plaza that may not be affected by partial acquisition.

Misc. R/W Work	
RAP Displ	<u>74</u>
Clear/Demo	<u>0</u>
Const Permits	_____
Condemnation	_____

Areas: R/W 816,206 sf No. Excess Parcels 0  
 TCE 421,712 sf  
 PE 657,005 sf

Entered PMCS Screens \_\_\_/\_\_\_/\_\_\_ by \_\_\_\_\_

Entered AGRE Screen (Railroad data only) \_\_\_/\_\_\_/\_\_\_ by \_\_\_\_\_



4. Are there any major items of construction contract work? Yes  No  (If "Yes," explain.)

5. Provide a general description of the right of way and excess lands required (zoning, use, major improvements, critical or sensitive parcels, etc...) *No right of way required.*

*The LRT Alternative would include passenger rail operated along a dedicated guideway, similar to other Metro light rail lines. The LRT alignment is approximately 7.5 mi long, with 3 mi of aerial segments and 4.5 mi of bored tunnel segments. The acquisition of subterranean easements will be required along the bored tunnel segments as well as aerial easements along the aerial segments. Some partial and full fee acquisitions as well as temporary construction easements will be required primarily at proposed station sites.*

*Many of the properties requiring subterranean easements along the bored tunnel segment are residential, although some commercial and industrial properties will be affected as well. Partial and full fee acquisitions will primarily affect commercial properties at the proposed station sites with a few industrial properties impacted as well. Some notable properties that will need to be acquired in full are:*

- *One (1) Administrative building of a Bioscience Company located on Caltrans owned parcel*
- *One (1) Wells Fargo Bank*
- *One (1) Rite Aid Pharmacy*
- *One (1) Pet Smart store*
- *One (1) Dry Cleaner*
- *Various "mom & pop" service related businesses*
- *Two (2) office buildings*

*The TSM/TDM component would improve the capacity of the existing transportation system by implementing a number of local street and intersection improvements as well as Active Traffic Management technologies and strategies. These improvements would require partial fee acquisitions and temporary construction easements throughout the study area cities/communities of Pasadena, South Pasadena, Alhambra, Rosemead, San Gabriel, Eagle Rock, El Sereno, Glassell Park and Atwater Village. Most of the acquisitions required would affect commercial properties but a few residential properties will be impacted as well.*

6. Is there an effect on assessed valuation? Yes  Not Significant  No  (If "Yes," explain.)

7. Are utility facilities or rights of way affected?

Yes  No  (If "Yes," attach Utility Information Sheet, Exhibit 4-EX-5.)

The following checked items may seriously impact lead time for utility relocation:

- Longitudinal policy conflict(s)
- Environmental concerns impacting acquisition of potential easements
- Power lines operating in excess of 50 KV and substations

(See attached Exhibit 4-EX-5 for explanation.)

8. Are Railroad facilities or rights of way affected?

Yes  No  (If "Yes," attach Railroad Information Sheet, Exhibit 4-EX-6.)

9. Were any previously unidentified sites with hazardous waste and/or material found?

Yes  None Evident  (If "Yes," attach memorandum per R/W Manual, Chapter 4, Section 4.01.10.00.)

10. Are RAP displacements required? Yes  No  (If "Yes," provide the following information.)

No. of single family 0 No. of business/nonprofit 74  
No. of multi-family 0 No. of farms 0

Based on Draft/Final Relocation Impact Statement/Study dated 10/23/2014, it is anticipated that sufficient replacement housing (will/will not) be available without Last Resort Housing.

*There are no residential displacements anticipated for this project.*

11. Are there Material Borrow and/or Disposal Sites required? Yes  No  (If "Yes," explain.)

12. Are there potential relinquishments and/or abandonments? Yes  No  (If "Yes," explain.)

*Right of Way acquired under the Streets and Highways Act may be relinquished to local government agencies if not needed for the proposed alternative.*

13. Are there any existing and/or potential airspace sites? Yes  No  (If "Yes," explain.)

*The aerial portion of the alignment will cross over Interstate 10 and State Route 60.*

14. Indicate the anticipated Right of Way schedule and lead time requirements. (Discuss if district proposes less than PMCS lead-time and/or if significant pressures for project advancement are anticipated.)

Based on the R/W requirements on Page 1 of this Data Sheet, R/W will require a lead-time of N/A months from the date regular appraisals can begin to project certification.

In any event, RW Maps will require N/A months from Final Maps to project certification.

*Project Certification Schedule has not been established at this time.*

15. Is it anticipated that Caltrans staff will perform all Right of Way work? Yes  No  (If "No," discuss.)

*It is anticipated that Caltrans and Metro will contract out Right of Way acquisition work with Caltrans oversight.*

Evaluation Prepared By:

Right of Way: Name: James L. Overcamp, Jr., SR/WA Date: October 23, 2014

Railroad: Name: James L. Overcamp, Jr., SR/WA Date: June 26, 2014

Utilities: Name: Paul Spiteri (D'Leon Consulting Engineers) Date: June 26, 2014

The Right of Way Data Sheets were completed by a consultant. I have reviewed the right of way information contained in this Project Report and the Right of Way Data Sheets attached hereto, and find the data to be in compliance as to form and procedures only. No inferences or assertions are made as to the validity of the data or values implied by the R/W Data Sheets.

---

Branch Chief  
R/W Project Coordination,  
Planning & Management

---

Date

(Form #)

1. Name of utility companies involved in project:

*Telecom: AT&T, Level3 Communications, Crown Castle, Charter Communications, Verizon Wireless*  
*Electric: City of Los Angeles, Pasadena and Southern California Edison*  
*Gas: Southern California Gas*  
*Sewer: City of Alhambra, Los Angeles, Pasadena, South Pasadena, and County Sanitation Districts of Los Angeles*  
*Water: City of Alhambra, Los Angeles, Pasadena, South Pasadena, California Water Service*

2. Types of facilities and agreements required:

*Facilities impacted include cable, electric, gas, sewer and water.*  
*Utility relocation agreements will be required for these facilities.*

3. Is any facility a longitudinal encroachment in existing or proposed access controlled right of way? Explain.

*Yes, there are facilities that cannot be serviced, maintained, and operated without being accessed from the through-traffic roadways or ramps.*

Disposition of longitudinal encroachment(s):

- Relocation required.
- Exception to policy needed.
- Other. Explain.

4. Additional information concerning utility involvements on this project, i.e., long lead-time materials, growing or species seasons, customer service seasons (no transmission tower relocations in summer).

*There are several high risk utility conflicts, including a high voltage overhead power line and several gas mains.*

5. PMCS Input Information

Total estimated cost of State's obligation for utility relocation on this project:

\$ 8,097,400.00

**Note: Total estimated cost to include any Department obligation to relocate longitudinal encroachments in access controlled right of way and acquire any necessary utility easements.**

		<u>Utility Involvements</u>	
<u>U4</u>		<u>U5</u>	
-1	<u>10</u>	-7	<u>68</u>
-2	<u>52</u>	-8	<u>136</u>
-3	<u>0</u>	-9	<u>68</u>
-4	<u>6</u>		

Prepared By:

Paul Spiteri (D'Leon Consulting Engineers) June 26, 2014

Right of Way Utility Estimator

Date

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION  
**RAILROAD INFORMATION SHEET**

EXHIBIT  
4-EX-6  
LRT with TSM/TDM

(Form #)

1. Describe railroad facilities or right of way affected.

*Bored tunnel to be constructed under a UPRR corridor (Alhambra Subdivision). A Service Contract will be required for Plan Review.*

*Additionally, an existing overpass crossing the same corridor at Mission Rd. and Garfield Ave. will need to be widened. An aerial easement will need to be obtained from UPRR .*

*The proposed alignment will cross over the existing Metro Gold Line at S. Fair Oaks Ave. between Columbia St. and W. Glenarm St.*

*An aerial guideway will be constructed over the Metrolink San Bernardino Line near the intersection of I-10 and SR-710.*

2. When branch lines or spurs are affected, would acquisition and/or payment of damages to business and/or industries served by the railroad facility be more cost effective than construction of a facility to perpetuate the rail service? Yes \_\_\_\_\_ No \_\_\_\_\_ (If yes, explain)

N/A

3. Discuss types of agreements and right required from the railroads. Are grade crossings requiring service Contracts or grade separations requiring construct and maintenance agreements involved?

*Underground and aerial easements will be required from railroad. Engineering review and Service Contract may be required. No grade crossings are anticipated with current design.*

4. Remarks (non-operating railroad right of way involved?):

N/A

5. PMCS Input Information

RR Involvements

None	_____
C&M Agreement	_____
Service Contract	_____
Design	<u>1</u>
Const.	_____
Lic/RE/Clauses	<u>1</u>

James L. Overcamp, Jr., SR/WA  
Prepared By:

June 27, 2014  
Date

ATTACHMENT N-4

To: **Date** October 23, 2014  
**Dist** 07 **Co** LA **Rte** SR710 **PM** R26.5-R32.6  
**Attention:** **EA** 187900  
**Project Description:** SR-710 North Study

**Subject:** **Right of Way Data** **Alternate No.:** Freeway Tunnel – Dual-Bore with TSM/TDM

This Alternate meets the criteria for a Design/Build project: Yes  No

1. **Right of Way Cost Estimate:** To be entered into PMCS COST RW1-5 Screens.  
 • Does not include potential cost of compliance with Roberti Bill SB-86 Government Code Section 54235

	Current Value Future Use	Escalation Rate	Escalated Value*
<b>A. Total Acquisition Cost:</b> Acquisition, including Excess Lands, Damages, and Goodwill. Project Permit Fees.	\$ <u>14,729,976.00</u>	<u>2.36</u> %	\$ <u>15,797,664.00</u>
<b>B. Utility Relocation</b> (Metro Share)	\$ <u>11,669,500.00</u>	<u>2.36</u> %	\$ <u>12,515,352.00</u>
<b>C. Relocation Assistance</b>	\$ <u>1,118,000.00</u>	<u>2.36</u> %	\$ <u>1,199,037.00</u>
<b>D. Clearance/Demolition</b>	\$ <u>147,700.00</u>	<u>2.36</u> %	\$ <u>158,406.00</u>
<b>E. Title and Escrow</b>	\$ <u>846,500.00</u>	<u>2.36</u> %	\$ <u>907,858.00</u>
<b>F. Total Estimated Cost</b>	\$ <u>28,511,676.00</u>		\$ <u>30,578,317.00</u>
<b>G. Construction Contract Work</b>	\$ <u>None Shown</u>		\$ _____

\*Escalated to 3 years

2. **Current Date of Right of Way Certification** Will depend on Alternative

3. **Parcel Data:** To be entered into PMCS EVNT RW Screen.

Type	Dual/Appr	Utilities	RR Involvements
X <u>3</u>	<u>N/A</u>	U4-1 <u>36</u>	None _____
A <u>348</u>	<u>N/A</u>	-2 <u>0</u>	C&M Agrmt _____
B <u>12</u>	<u>N/A</u>	-3 <u>72</u>	Svc Contract _____
C <u>22</u>	<u>N/A</u>	-4 <u>7</u>	Design _____
D <u>3</u>	<u>N/A</u>	U5-7 <u>115</u>	Const. _____
E <u>XXXX</u>		-8 <u>230</u>	Lic/RE/Clauses/ _____
F <u>XXXX</u>		-9 <u>115</u>	
Total <u>388</u>			<u>Misc. R/W Work</u>
			RAP Displ _____
			Clear/Demo _____
			Const Permits _____
			Condemnation _____

\* Total includes units that are a part of larger condominium or multi-unit plaza that may not be affected by partial acquisition.

Areas: R/W 105,158 sf No. Excess Parcels 1  
 TCE 707,663 sf  
 PE 1,816,927 sf

Entered PMCS Screens \_\_\_/\_\_\_/\_\_\_ by \_\_\_\_\_

Entered AGRE Screen (Railroad data only) \_\_\_/\_\_\_/\_\_\_ by \_\_\_\_\_

4. Are there any major items of construction contract work? Yes  No  (If "Yes," explain.)

5. Provide a general description of the right of way and excess lands required (zoning, use, major improvements, critical or sensitive parcels, etc...) No right of way required.

*The alignment for this Freeway Tunnel Alternative starts at the existing southern stub of SR 710 in Alhambra, just north of I-10, and connects to the existing northern stub of SR 710, south of the I-210/SR 134 interchange in Pasadena. The alignment will require the acquisition of subterranean easements for the construction of a bored tunnel along 4.2 miles of the route. Additionally, some property will also need to be acquired in fee along the at-grade segments (1.4 miles) and the cut-and-cover tunnel segments (.7 miles). Some temporary construction easements will need to be obtained along the at-grade and cut-and-cover segments as well.*

*The majority of properties requiring subterranean easements along the bored tunnel segment are residential. The properties requiring partial or full fee acquisitions and temporary construction easements have industrial, commercial, service, transportation, utility, and public uses. Of particular note are a service station and an administrative building belonging to a bioscience company that will need to be acquired.*

*The TSM/TDM component would improve the capacity of the existing transportation system by implementing a number of local street and intersection improvements as well as Active Traffic Management technologies and strategies. These improvements would require partial fee acquisitions and temporary construction easements throughout the study area cities/communities of Pasadena, South Pasadena, Alhambra, Rosemead, San Gabriel, Eagle Rock, El Sereno, Glassell Park and Atwater Village. Most of the acquisitions required would affect commercial properties but a few residential properties will be impacted as well.*

6. Is there an effect on assessed valuation? Yes  Not Significant  No  (If "Yes," explain.)

7. Are utility facilities or rights of way affected?  
Yes  No  (If "Yes," attach Utility Information Sheet, Exhibit 4-EX-5.)

The following checked items may seriously impact lead time for utility relocation:

- Longitudinal policy conflict(s)
- Environmental concerns impacting acquisition of potential easements
- Power lines operating in excess of 50 KV and substations

(See attached Exhibit 4-EX-5 for explanation.)

8. Are Railroad facilities or rights of way affected?  
Yes  No  (If "Yes," attach Railroad Information Sheet, Exhibit 4-EX-6.)

9. Were any previously unidentified sites with hazardous waste and/or material found?  
Yes  None Evident  (If "Yes," attach memorandum per R/W Manual, Chapter 4, Section 4.01.10.00.)

10. Are RAP displacements required? Yes  No  (If "Yes," provide the following information.)

No. of single family \_\_\_\_\_ No. of business/nonprofit 2  
No. of multi-family \_\_\_\_\_ No. of farms \_\_\_\_\_

Based on Draft/Final Relocation Impact Statement/Study dated 10/23/2014, it is anticipated that sufficient replacement housing (will/will not) be available without Last Resort Housing.

*There are no residential displacements anticipated for this project.*

11. Are there Material Borrow and/or Disposal Sites required? Yes  No  (If "Yes," explain.)  
*Two potential sites in the city of Irwindale have been identified for disposal of the earth removed from the tunnel. One of these sites is close enough to a railroad to consider rail cars for transporting the earth, the other would require moving the material by truck.*
12. Are there potential relinquishments and/or abandonments? Yes  No  (If "Yes," explain.)  
*Right of Way acquired under the Streets and Highways Act may be relinquished to local government agencies if not needed for the proposed alternative.*
13. Are there any existing and/or potential airspace sites? Yes  No  (If "Yes," explain.)
14. Indicate the anticipated Right of Way schedule and lead time requirements. (Discuss if district proposes less than PMCS lead-time and/or if significant pressures for project advancement are anticipated.)  
  
Based on the R/W requirements on Page 1 of this Data Sheet, R/W will require a lead-time of N/A months from the date regular appraisals can begin to project certification  
  
In any event, RW Maps will require N/A months from Final Maps to project certification.  
  
*Project Certification Schedule has not been established at this time.*
15. Is it anticipated that Caltrans staff will perform all Right of Way work? Yes  No  (If "No," discuss.)  
*It is anticipated that Caltrans and Metro will contract out Right of Way acquisition work with Caltrans oversight.*

Evaluation Prepared By:

Right of Way:	Name	<u>James L. Overcamp, Jr., SR/WA</u>	Date	<u>October 23, 2014</u>
Railroad:	Name	<u>James L. Overcamp, Jr., SR/WA</u>	Date	<u>October 23, 2014</u>
Utilities:	Name	<u>Paul Spiteri (D'Leon Consulting Engineers)</u>	Date	<u>June 11, 2014</u>

The Right of Way Data Sheets were completed by a consultant. I have reviewed the right of way information contained in this Project Report and the Right of Way Data Sheets attached hereto, and find the data to be in compliance as to form and procedures only. No inferences or assertions are made as to the validity of the data or values implied by the R/W Data Sheets.

\_\_\_\_\_  
Branch Chief  
R/W Project Coordination,  
Planning & Management

\_\_\_\_\_  
Date



(Form #)

1. Name of utility companies involved in project:

*Cable: AT&T, Level3 Communications, Time Warner Cable*  
*Electric: City of Los Angeles, Pasadena and Southern California Edison*  
*Gas: Southern California Gas*  
*Sewer: City of Alhambra, Los Angeles, Pasadena, South Pasadena, and County Sanitation Districts of Los Angeles*  
*Storm Drain: County of Los Angeles Department of Public Works*  
*Water: City of Alhambra, Los Angeles, Pasadena, South Pasadena, Metropolitan Water District*

2. Types of facilities and agreements required:

*Facilities impacted include cable, electric, gas, sewer, and water.*  
*Utility relocation agreements will be required for these facilities.*

3. Is any facility a longitudinal encroachment in existing or proposed access controlled right of way? Explain.

*Yes, there are facilities that cannot be serviced, maintained, and operated without being accessed from the through-traffic roadways or ramps.*

Disposition of longitudinal encroachment(s):

- Relocation required.
- Exception to policy needed.
- Other. Explain.

4. Additional information concerning utility involvements on this project, i.e., long lead-time materials, growing or species seasons, customer service seasons (no transmission tower relocations in summer).

*The electrical facilities are not high voltage and we expect to be of readily available materials.*  
*The telecom facilities we expect to be of readily available materials.*  
*A significant facility requiring consideration is an approximately 550' length of 60" water main.*

5. PMCS Input Information

Total estimated cost of State's obligation for utility relocation on this project:  
 \$ 11,669,500.00

**Note: Total estimated cost to include any Department obligation to relocate longitudinal encroachments in access controlled right of way and acquire any necessary utility easements.**

U4		<u>Utility Involvements</u>	
		U5	
-1	36	-7	115
-2	0	-8	230
-3	72	-9	115
-4	7		

Prepared By:

Paul Spiteri (D'Leon Consulting Engineers) June 11, 2014  
 Right of Way Utility Estimator Date

(Form #)

---

1. Describe railroad facilities or right of way affected.

*Bored tunnel to be constructed under a UPRR corridor (Alhambra Subdivision) and under the Metro Gold Line near Meridian Ave. and Mission St. Additionally, an existing overpass at Mission Rd. and Garfield Ave. will need to be widened.*

2. When branch lines or spurs are affected, would acquisition and/or payment of damages to business and/or industries served by the railroad facility be more cost effective than construction of a facility to perpetuate the rail service? Yes \_\_\_\_\_ No \_\_\_\_\_ (If yes, explain)

N/A

3. Discuss types of agreements and right required from the railroads. Are grade crossings requiring service Contracts or grade separations requiring construct and maintenance agreements involved?

*Tunnel Easements will be required from railroad. Engineering review and Service Contracts may be required as well as real estate clauses.No grade crossings are anticipated with current design. Amendment to C&M agreement and new easement will be required for existing overpass.*

4. Remarks (non-operating railroad right of way involved?):

N/A

5. PMCS Input Information

RR Involvements

None	_____
C&M Agreement	_____ 2 _____
Service Contract	_____
Design	_____ 2 _____
Const.	_____
Lic/RE/Clauses	_____ 2 _____

James L. Overcamp, Jr., SR/WA

Prepared By:

June 27, 2014

Date

ATTACHMENT N-5

To: \_\_\_\_\_ Date June 27, 2014  
 Attention: \_\_\_\_\_ Dist 07 Co LA Rte SR710 PM R26.5-R32.6  
 EA 187900  
 Project Description: SR-710 North Study

Subject: **Right of Way Data** Alternate No.: Freeway Tunnel – Single-Bore with TSM/TDM

This Alternate meets the criteria for a Design/Build project: Yes  No

1. **Right of Way Cost Estimate:** To be entered into PMCS COST RW1-5 Screens.  
 • Does not include potential cost of compliance with Roberti Bill SB-86 Government Code Section 54235

	Current Value Future Use	Escalation Rate	Escalated Value*
<b>A. Total Acquisition Cost:</b> Acquisition, including Excess Lands, Damages, and Goodwill.			
Project Permit Fees.	\$ <u>11,875,035.00</u>	<u>2.36</u> %	\$ <u>12,735,783.00</u>
<b>B. Utility Relocation (Metro Share)</b>	\$ <u>10,109,425.00</u>	<u>2.36</u> %	\$ <u>10,842,197.00</u>
<b>C. Relocation Assistance</b>	\$ <u>1,118,000.00</u>	<u>2.36</u> %	\$ <u>1,199,037.00</u>
<b>D. Clearance/Demolition</b>	\$ <u>147,700.00</u>	<u>2.36</u> %	\$ <u>158,406.00</u>
<b>E. Title and Escrow</b>	\$ <u>627,000.00</u>	<u>2.36</u> %	\$ <u>672,447.00</u>
<b>F. Total Estimated Cost</b>	\$ <u>23,877,160.00</u>		\$ <u>25,607,870.00</u>
<b>G. Construction Contract Work</b>	\$ <u>None Shown</u>		\$ _____

\*Escalated to 3 years

2. **Current Date of Right of Way Certification** Will depend on Alternative

3. **Parcel Data:** To be entered into PMCS EVNT RW Screen.

Type	Dual/Appr	Utilities	RR Involvements
X <u>3</u>	<u>N/A</u>	U4-1 <u>77</u>	None _____
A <u>238</u>	<u>N/A</u>	-2 <u>0</u>	C&M Agrmt <u>2</u>
B <u>15</u>	<u>N/A</u>	-3 <u>21</u>	Svc Contract _____
C <u>20</u>	<u>N/A</u>	-4 <u>8</u>	Design <u>2</u>
D <u>3</u>	<u>N/A</u>	U5-7 <u>106</u>	Const. _____
E <u>XXXX</u>		-8 <u>212</u>	Lic/RE/Clauses/ <u>2</u>
F <u>XXXX</u>		-9 <u>106</u>	_____
Total <u>279</u>			<u>Misc. R/W Work</u> RAP Displ <u>2</u>
* Total includes units that are a part of larger condominium or multi-unit plaza that may not be affected by partial acquisition.			
Clear/Demo _____			
Const Permits _____			
Condemnation _____			

Areas: R/W 77,724 sf No. Excess Parcels 1  
 TCE 688,205 sf  
 PE 826,997 sf

Entered PMCS Screens \_\_\_\_/\_\_\_\_/\_\_\_\_ by \_\_\_\_\_  
 Entered AGRE Screen (Railroad data only) \_\_\_\_/\_\_\_\_/\_\_\_\_ by \_\_\_\_\_

4. Are there any major items of construction contract work? Yes  No  (If "Yes," explain.)

5. Provide a general description of the right of way and excess lands required (zoning, use, major improvements, critical or sensitive parcels, etc...) No right of way required.

*The alignment for the Freeway Tunnel Alternative starts at the existing southern stub of SR 710 in Alhambra, just north of I-10, and connects to the existing northern stub of SR 710, south of the I-210/SR 134 interchange in Pasadena. The alignment will require the acquisition of subterranean easements for the construction of a bored tunnel along 4.2 miles of the route. Additionally, some property will also need to be acquired in fee along the the at-grade segments (1.4 miles) and the cut-and-cover tunnel segments (.7 miles). Some temporary constructions easements will need to be obtained along the at-grade and cut-and-cover segments as well.*

*The majority of properties requiring subterranean easements along the bored tunnel segment are residential. The properties requiring partial or full fee acquisitions and temporary construction easements have industrial, commercial, service, transportation, utility, and public uses. Of particular note are a service station and an administrative building belonging to a bioscience company that will be to be acquired.*

*The TSM/TDM component would improve the capacity of the existing transportation system by implementing a number of local street and intersection improvements as well as Active Traffic Management technologies and strategies. These improvements would require partial fee acquisitions and temporary construction easements throughout the study area cities/communities of Pasadena, South Pasadena, Alhambra, Rosemead, San Gabriel, Eagle Rock, El Sereno, Glassell Park and Atwater Village. Most of the acquisitions required would affect commercial properties but a few residential properties will be impacted as well.*

6. Is there an effect on assessed valuation? Yes  Not Significant  No  (If "Yes," explain.)

7. Are utility facilities or rights of way affected?  
Yes  No  (If "Yes," attach Utility Information Sheet, Exhibit 4-EX-5.)

The following checked items may seriously impact lead time for utility relocation:

- Longitudinal policy conflict(s)  
 Environmental concerns impacting acquisition of potential easements  
 Power lines operating in excess of 50 KV and substations

(See attached Exhibit 4-EX-5 for explanation.)

8. Are Railroad facilities or rights of way affected?  
Yes  No  (If "Yes," attach Railroad Information Sheet, Exhibit 4-EX-6.)

9. Were any previously unidentified sites with hazardous waste and/or material found?  
Yes  None Evident  (If "Yes," attach memorandum per R/W Manual, Chapter 4, Section 4.01.10.00.)

10. Are RAP displacements required? Yes  No  (If "Yes," provide the following information.)

No. of single family \_\_\_\_\_ No. of business/nonprofit 2  
No. of multi-family \_\_\_\_\_ No. of farms \_\_\_\_\_

Based on Draft/Final Relocation Impact Statement/Study dated 10/23/2014, it is anticipated that sufficient replacement housing (will/will not) be available without Last Resort Housing.

*There are no residential displacements anticipated for this project.*

11. Are there Material Borrow and/or Disposal Sites required? Yes  No  (If "Yes," explain.)

*Two potential sites in the city of Irwindale have been identified for disposal the of earth removed from the tunnel. One of these sites is close enough to a railroad to consider rail cars for transporting the earth, the other would require moving the material by truck.*

12. Are there potential relinquishments and/or abandonments? Yes  No  (If "Yes," explain.)

*Right of Way acquired under the Streets and Highways Act may be relinquished to local government agencies if not needed for the proposed alternative.*

13. Are there any existing and/or potential airspace sites? Yes  No  (If "Yes," explain.)

14. Indicate the anticipated Right of Way schedule and lead time requirements. (Discuss if district proposes less than PMCS lead-time and/or if significant pressures for project advancement are anticipated.)

Based on the R/W requirements on Page 1 of this Data Sheet, R/W will require a lead-time of N/A months

from the date regular appraisals can begin to project certification.

In any event, RW Maps will require N/A months from Final Maps to project certification.

*Project Certification Schedule has not been established at this time.*

15. Is it anticipated that Caltrans staff will perform all Right of Way work? Yes  No  (If "No," discuss.)

*It is anticipated that Caltrans and Metro will contract out Right of Way acquisition work with Caltrans oversight.*

Evaluation Prepared By:

Right of Way: Name: James L. Overcamp, Jr., SR/WA Date: June 27, 2014

Railroad: Name: James L. Overcamp, Jr., SR/WA Date: June 27, 2014

Utilities: Name: Paul Spiteri (D'L'eon Consulting Engineers) Date: June 11, 2014

The Right of Way Data Sheets were completed by a consultant. I have reviewed the right of way information contained in this Project Report and the Right of Way Data Sheets attached hereto, and find the data to be in compliance as to form and procedures only. No inferences or assertions are made as to the validity of the data or values implied by the R/W Data Sheets.

\_\_\_\_\_  
Branch Chief  
R/W Project Coordination,  
Planning & Management

\_\_\_\_\_  
Date

(Form #)

1. Name of utility companies involved in project:

*Cable: AT&T, Level3 Communications, Time Warner Cable*  
*Electric: City of Los Angeles, Pasadena and Southern California Edison*  
*Gas: Southern California Gas*  
*Sewer: City of Alhambra, Los Angeles, Pasadena, South Pasadena, and County Sanitation Districts of Los Angeles*  
*Storm Drain: County of Los Angeles Department of Public Works*  
*Water: City of Alhambra, Los Angeles, Pasadena, South Pasadena, Metropolitan Water District*

2. Types of facilities and agreements required:

*Facilities impacted include cable, electric, gas, sewer, storm drain and water.*  
*Utility relocation agreements will be required for these facilities.*

3. Is any facility a longitudinal encroachment in existing or proposed access controlled right of way? Explain.

*Yes, there are facilities that cannot be serviced, maintained, and operated without being accessed from the through-traffic roadways or ramps.*

Disposition of longitudinal encroachment(s):

- Relocation required.
- Exception to policy needed.
- Other. Explain.

4. Additional information concerning utility involvements on this project, i.e., long lead-time materials, growing or species seasons, customer service seasons (no transmission tower relocations in summer).

*The electrical facilities are not high voltage and we expect to be of readily available materials.*  
*The telecom facilities we expect to be of readily available materials.*  
*A significant facility requiring consideration is an approximately 550' length of 60" water main.*

5. PMCS Input Information

Total estimated cost of State's obligation for utility relocation on this project:  
 \$ 10,109,425.00

**Note: Total estimated cost to include any Department obligation to relocate longitudinal encroachments in access controlled right of way and acquire any necessary utility easements.**

U4		<u>Utility Involvements</u>	
		U5	
-1	<u>77</u>	-7	<u>106</u>
-2	<u>0</u>	-8	<u>212</u>
-3	<u>21</u>	-9	<u>106</u>
-4	<u>8</u>		

Prepared By:

Paul Spiteri (D'Leon Consulting Engineers) April 17, 2014  
 Right of Way Utility Estimator Date

(Form #)

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1. Describe railroad facilities or right of way affected.

*Bored tunnel to be constructed under a UPRR corridor (Alhambra Subdivision) and under the Metro Gold Line near Meridian Ave. and Mission St. Additionally, an existing overpass at Mission Rd. and Garfield Ave. will need to be widened.*

2. When branch lines or spurs are affected, would acquisition and/or payment of damages to business and/or industries served by the railroad facility be more cost effective than construction of a facility to perpetuate the rail service? Yes \_\_\_\_\_ No \_\_\_\_\_ (If yes, explain)

N/A

3. Discuss types of agreements and right required from the railroads. Are grade crossings requiring service Contracts or grade separations requiring construct and maintenance agreements involved?

*Tunnel Easements will be required from railroad. Engineering review and Service Contracts may be required as well as real estate clauses. No grade crossings are anticipated with current design. Amendment to C&M agreement and new easement will be required for existing overpass.*

4. Remarks (non-operating railroad right of way involved?):

N/A

5. PMCS Input Information

<u>RR Involvements</u>	
None	
C&M Agreement	<u>2</u>
Service Contract	
Design	<u>2</u>
Const.	
Lic/RE/Clauses	<u>2</u>

James L. Overcamp, Jr., SR/WA

Prepared By:

June 27, 2014

Date



**Attachment O  
Project Risk Register  
(2014 – In Progress)**

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# Project Risk Register

DIST- EA 07-02755					Project Name: SR 710 North Study			Project Manager: Yoga Chandran					Date Created:	Last Updated:			
					Co - Rte - PM: DRAFT			Telephone: 714-435-6111									
ITEM	ID #	Status	Threat / Opportunity	Category	Date Risk Identified	Risk Description	Root Causes	Primary Objective	Overall Risk Rating	Cost/Time Impact Value	Risk Owner	Risk Trigger	Strategy	Response Actions w/ Pros & Cons	Adjusted Cost/Time Impact Value	WBS Item	Status Date and Review Comments
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)
1	07-02755-01	Retired	Threat	ENV	11/21/11	Outreach Consultant not on Board; This could delay decision making during initial stages of Alternative Analyses	Delay in selection and negotiations	TIME	Probability 5=Very High (60-99%) <b>Med</b> Impact 2 =Low		Metro	Outreach consultant came on board late, almost 3 months after technical team was engaged	TRANSFER	Planned accordingly on work activities. Mitigated through close coordination	Could impact schedule and budget		
2	07-02755-02	Active	Threat	ENV	11/21/11	Stakeholders may drive to evaluate multitude and wide range of Alternatives; potential for evaluating alternatives for political reasons	Stakeholders need to understand the root cause of traffic congestion; it is possible to keep some alternatives to satisfy stakeholders	SCOPE	Probability 4=High (40-59%) <b>High</b> Impact 8 =High		Consultant	Opponents wanting to delay the project; ask to add alternatives satisfy certain stakeholder group	MITIGATE	Develop strategy to evaluate wide range of alternatives	Could impact schedule and budget; coordinate with client to avoid such a situation or ensure full range of alternatives to cover the possibilities		
3	07-02755-03	Active	Threat	ENV	11/21/11	Obtaining timely feedback from stakeholder committees	Considering various committees engaged, obtaining timely feedback is challenging	TIME	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med		Metro, Caltrans	Inadequate time for review by stakeholders and client	MITIGATE	Hold partnering meeting with client to expedite review. Caltrans to perform over-the-shoulder review prior to official submittal. Seek feedback from stakeholder committees during meetings	Cause re-do due to delayed comments. Impact to schedule and budget		
4	07-02755-04	Active	Threat	ENV	11/21/11	Establishing a consistent evaluation criteria	Considering the multi-modal evaluation, comparison of evaluation of screening criteria is difficult	SCOPE	Probability 2=Low (10-19%) <b>Med</b> Impact 4 =Med		Consultant	Criteria that compares freeway travel to transit may not get stakeholder buyoff	MITIGATE	Develop performance comprehensive performance measures. Develop 3-level screening criteria. Select higher performing alternatives for first level and then select more detailed criteria to compare different			
5	07-02755-05	Active	Threat	ENV	11/21/11	Evaluation of cultural resources impact (Section 106)	Considering the historic nature of many neighborhoods, documenting all of the cultural impacts is comprehensive	QUALITY	Probability 3=Med (20-39%) <b>High</b> Impact 8 =High		Consultant	Not identifying the resources due to large study and/or impact area	MITIGATE	Perform evaluation in two steps. Initially to identify based on known resources; At the next level perform focused study to identify potential additional resources. Reach out to resource agencies for information.			
6	07-02755-06	Active	Threat	ENV	11/21/11	The methodology for travel demand forecasting will be challenged especially for tolling elements.	Considering the controversy surrounding the traffic projections, opponents will target the complex methodology for forecasting as a means of challenging the document.	TIME	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med		Consultant	Stakeholder challenges push to change the methodology	MITIGATE	Early in the process establish methodology to be used and get concurrence. Maintain communication with technical leaders at SCAG, Metro and Caltrans to confirm process. Document extensively.			
7	07-02755-07	Active	Threat	ENV	11/21/11	Evaluation of health impacts due to traffic	Stakeholders may demand HIA, which is not budgeted for; The methodology is not widely accepted and may have both cost and schedule implications	TIME	Probability 2=Low (10-19%) <b>Med</b> Impact 4 =Med			Public and opponents requesting for HIA evaluation	MITIGATE	Involve Caltrans and Metro to agree to methodology. Manage expectations and present the approach to TAC early on. Drive to maintain the level of analyses required per standard of practice			
8	07-02755-08	Retired	Threat	ENV	12/07/11	Traffic modeling methodology. Using 2008 RTP model for part 1 and 2012 Model for Parts 2 and 3	The results of the alternatives may be different and may lead to challenge	TIME	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Public may demand revisiting alternative analyses if results are markedly different when switching from 2008 RTP model to 2012 RTP model - The results are consistent; slightly lower increase	MITIGATE	Traffic modeling supports the selected alternatives.			

# Project Risk Register

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					Co - Rte - PM: DRAFT			Telephone: 714-435-6111									
ITEM	ID #	Status	Threat / Opportunity	Category	Date Risk Identified	Risk Description	Root Causes	Primary Objective	Overall Risk Rating	Cost/Time Impact Value	Risk Owner	Risk Trigger	Strategy	Response Actions w/ Pros & Cons	Adjusted Cost/Time Impact Value	WBS Item	Status Date and Review Comments
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)
9	07-02755-09	Retired	Threat	ENV	12/07/11	Availability of 2012 RTP Model	It is possible that the model may be released later than expected thus not being available for use for Parts 2 and 3	SCOPE	High Probability 4=High (40-59%) Impact 8 =High			The release may be later than August 2012	MITIGATE	This might delay the analyses and/or validation for the 2012 model. Have implication of delaying overall outcome. Will create schedule and budget issues			
10	07-02755-10	Retired	Threat	ENV	12/07/11	Reliability of 2012 RTP Model	The model may require substantial modifications to produce replicable, reasonable results. Tolling is a particular area of risk.	TIME	Low Probability 2=Low (10-19%) Impact 2 =Low			Model results from alternatives evaluation are not consistent.	MITIGATE	Modeling effort is complete. It did take additional effort to accomplish this task			
11	07-02755-11	Active	Threat	ENV	05/23/13	Future model releases (6.2 and beyond) will not be used but project opponents may demand the "latest & greatest".	SCAG releases new versions (Check formula on rating)	SCOPE	Low Probability 3=Med (20-39%) Impact 8 =High			SCAG releases new model version	MITIGATE	Monitor SCAG progress on new releases. Consider sensitivity tests with new model releases if practical. Document rationale for staging with version 6.1.			
12	07-02755-12	Retired	Threat	ENV	12/07/11	Too many alternatives chosen for evaluation	Extends timeline and budget	SCOPE	Med Probability 3=Med (20-39%) Impact 4 =Med			Stakeholders may not agree with the alternatives selected	MITIGATE	Need to establish good basis for selecting initial alternatives and developing screening criteria. If additional alternatives are added, may need to communicate to Metro.			
13	07-02755-13	Active	Threat	ENV	12/07/11	Evaluation of the impact on Air Quality	Controversial and dependent on methodology selected	TIME	Med Probability 3=Med (20-39%) Impact 4 =Med			Differences in opinion on the selection of sensitive receptors for Part 2. Also methodology used for evaluation.	MITIGATE	Communicate appropriate level of effort and methodology. Ensure that hot spots and sensitive areas are chosen appropriately and communicated to stakeholders.			
14	07-02755-14	Active	Threat	ENV	12/07/11	Different agenda b/w local, state and federal agencies	Local agencies may have opposing views and agendas due to perceived impact to the local community	TIME	High Probability 5=Very High (60-99%) Impact 16 =Very High			Provide competing feedback for consideration	MITIGATE	Manage different agendas by focusing on the basic need and purpose. Avoidance depends on the thoroughness' in developing the P&N for this project.			
15	07-02755-15	Active	Threat	ENV	12/07/11	Portal Aesthetics	If tunnel is chosen, community concerns about appearance at either portals; Community not satisfied with the concepts presented at portals.	SCOPE	Low Probability 3=Med (20-39%) Impact 2 =Low			Appearance not consistent with the surroundings	MITIGATE	Ensure that initial rendering take into account the surrounding community feedback and the historic vocabulary. Also allowed for modification during final design			
16	07-02755-16	Active	Threat	ENV	12/07/11	Timely documentation of community meetings	Considering the importance of the meetings, it is important to document community meetings on a timely manner	TIME	Low Probability 2=Low (10-19%) Impact 2 =Low			Minutes and notes not distributed on time	MITIGATE	Follow up with outreach team to obtain notes from each meeting. Distribute to team to ensure that these are being captured in the approach. Discuss summary of key point in subsequent meetings			

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17	07-02755-17	Active	Threat	ENV	12/07/11	Timely review of technical documents by Metro and partnering agencies	Providing quick turnaround time for technical documents	TIME	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Delays in feedback from Metro, Caltrans, CalFire or Stakeholders	MITIGATE	During chartering meeting, will need to obtain buy off from agencies to adhere to established review timelines. Hold briefing meetings ahead of time to facilitate quick reviews. Consider over the shoulder reviews.			
18	07-02755-18	Active	Threat	ENV	12/07/11	Timely review by Caltrans functional units of technical documents	Providing quick turnaround time for technical documents	TIME	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Delays in feedback from Metro, Caltrans, CalFire or Stakeholders	MITIGATE	During chartering meeting, will need to obtain buy off from agencies to adhere to established review timelines. Hold briefing meetings ahead of time to facilitate quick reviews. Consider over the shoulder reviews.			
19	07-02755-19	Retired	Threat	ENV	12/07/11	Engaging Agency Technical team members in Part 1	Considering the duration and aggressive schedule, need to have the reviewers in close coordination with the design team	TIME	Probability 2=Low (10-19%) <b>Med</b> Impact 4 =Med			Some agency functional leads not fully engaged (CHP, CalFire)	MITIGATE	Continue with PDT and team meetings with agency staff to ensure they are informed and engaged. Communicate with Agency leads to ensure timely responses			
20	07-02755-20	Active	Threat	ENV	12/07/11	Engaging Agency Technical team members in Part 2	Considering the duration and aggressive schedule, need to have the reviewers in close coordination with the design team	TIME	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Some agency functional leads not fully engaged (CalFire and CHP)	MITIGATE	Continue with PDT and team meetings with agency staff to ensure they are informed and engaged. Communicate with Agency leads to ensure timely responses. Encourage technical leads to be in close coordination with			
21	07-02755-21	Active	Threat	ENV	12/11/11	Environmental justice issues in certain communities	Some communities within the study area indicated not being consulted for decisions related to project issues	QUALITY	Probability 2=Low (10-19%) <b>Med</b> Impact 4 =Med			Complaints from stakeholders on lack of involvement	AVOID	Coordinate with outreach to ensure that all stakeholders are involved and their concerns are brought to the technical team			
22	07-02755-22	Active	Threat	ENV	12/11/11	Decisions not made quickly	Delays overall schedule	TIME	Probability 2=Low (10-19%) <b>Med</b> Impact 4 =Med			Key decisions on alternatives or methodologies not made on time	MITIGATE	Communicate with client PM on critical issues in obtaining directions and/or decisions on key milestones and/or on major decisions; implement change control			
23	07-02755-23	Active	Threat	ENV	12/11/11	Difficulty demonstrating the need of the project; not accepting project purpose	Stakeholders not agreeing to the need of the project could delay finalizing the purpose and need statement; major community concern	TIME	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Stakeholders continue to challenge the project purpose and need	MITIGATE	Provide good backup information to support the project need. The data should be verified and be validated to support the developed need.	Schedule extended due to potential back and forth. Budget could be impacted		
24	07-02755-24	Retired	Threat	ENV	12/11/11	Time to perform analyses for Part 1	Considering aggressive schedule, timeline to perform a thorough analyses could be challenging	QUALITY	Probability 2=Low (10-19%) <b>Med</b> Impact 4 =Med			Inadequate time to perform required analyses	MITIGATE	Plan ahead on the required methodology and the analyses that needs to be performed.			

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	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)
25	07-02755-25	Active	Threat	ENV	12/11/11	Time to perform analyses for Part 2	Considering aggressive schedule, timeline to perform a thorough analyses could be challenging	QUALITY	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Inadequate time to perform required analyses	MITIGATE	Plan ahead on the required methodology and the analyses that needs to be performed. Ensure critical path items are completed as planned. Increase staff capacity, if needed.			
26	07-02755-26	Active	Threat	ENV	12/11/11	Air quality dispersion at portals	Concerns about elevated level of contaminated air at the portals for tunnels	SCOPE	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Stakeholders may not agree with effectiveness of the system.	MITIGATE	Design should minimize additional impacts to surrounding community. Will need to educate the public on the effectiveness of treatment. May require a workshop and/or additional work to justify the benefits. Need to			
27	07-02755-27	Active	Threat	ENV	12/11/11	Maintaining legal defensibility	Considering the potential for legal challenges, risk exists regardless of the outcome	QUALITY	Probability 3=Med (20-39%) <b>High</b> Impact 8 =High			Potential and/or actual law suit	ACCEPT	Law suit is unavoidable, however, all decisions to be made should be based on facts and proper backup document. Communicate with legal team where necessary. Engage both Metro and CT legal team.			
28	07-02755-28	Retired	Threat	ENV	12/11/11	Availability of project data for environmental study is insufficient for Part 1	Considering the aggressive schedule, some of the studies need to be performed ahead of the information available causing some risk	TIME	Probability 2=Low (10-19%) <b>High</b> Impact 8 =High			Need for proper base mapping during Part 1	MITIGATE	Use existing data such as from Caltrans or other means for Part 1.			
29	07-02755-29	Retired	Threat	ENV	12/11/11	Availability of project survey data in time for Part 2	Considering the aggressive schedule, some of the studies need to be performed ahead of the information available causing some risk	TIME	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Need for proper survey during Part 2	MITIGATE	Begin mapping early to facilitate data availability for Part 2.			
30	07-02755-30	Retired	Threat	ENV	12/11/11	Native American concerns	Unanticipated Native American concerns	SCOPE	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Finding native American resources late in the delivery process	AVOID	Perform through investigation of the potential resources within project footprint.			
31	07-02755-31	Retired	Threat	ENV	12/14/11	Section 4f	Unable to avoid 4f issues	SCOPE	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Impact to 4(f) resources	AVOID	Close coordination between design and env. Team to address 4(f) concerns			
32	07-02755-32	Active	Threat	ENV	04/30/12	CEQA/NEPA differences accounted for in same document	Slightly different approaches and requirements	QUALITY	Probability 3=Med (20-39%) <b>Low</b> Impact 2 =Low			Inconsistent documentation	MITIGATE	Thorough documentation to ensure issues adequately addressed			

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	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)
33	07-02755-33	Active	Threat	ENV	05/23/12	GHG and sustainable communities	Project not meeting Senate Bill requirement	SCOPE	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Potential for project elements to increase GHG effects	MITIGATE	Communicate project outcome to stakeholders. Find if possible appropriate mitigation measures			
34	07-02755-34	Active	Threat	ENV	05/23/12	Educating public related to port truck traffic	Public misperceptions	SCOPE	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Public concern regarding truck traffic and air quality	MITIGATE	Continue to educate the public			
35	07-02755-35	Active	Threat	ENV	04/09/13	New alternatives required to avoid, mitigate or minimize impact.	Stakeholder demand	SCOPE	Probability 3=Med (20-39%) <b>High</b> Impact 8 =High			High risk that project opponents develop "community" alternative and insist that we evaluate it.	MITIGATE	Consider set of alternatives in study. Minimize potential for new alternatives to be introduced.			
36	07-02755-36	Retired	Threat	ENV	04/09/13	Availability of project data and mapping at the beginning of the environmental study is insufficient	Unable to obtain existing data	QUALITY	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Not enough time to collect data	AVOID	Engage staff to reach out to various agencies to collect data. Could add cost to delivery			
37	07-02755-37	Active	Threat	ENV	04/09/13	New information after Environmental Document is completed may require re-evaluation or a new document (i.e. utility relocation beyond document coverage)	Delayed responses from agencies or improper coordination by team members	TIME	Probability 2=Low (10-19%) <b>High</b> Impact 8 =High			Potential gaps in environmental document	AVOID	Close coordination with team members. Aggressively follow up with agencies for information			
38	07-02755-38	Active	Threat	ENV	04/09/13	Design changes require additional Environmental analysis	Changes due to stakeholder concerns/feedback	SCOPE	Probability 2=Low (10-19%) <b>Med</b> Impact 4 =Med			Some stakeholders not being happy with the design details	MITIGATE	Early and frequent communication of design to stakeholders.			
39	07-02755-39	Retired	Threat	ENV	04/09/13	Project may impact a Scenic Highway	Potential impact to SR 110	TIME	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Impact to SR 110	AVOID	Avoid impact to SR 110			
40	07-02755-40	Active	Threat	ENV	04/09/13	Unanticipated noise impacts	Some noise receptors are not identified during evaluation.	QUALITY	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Sensitive receptors not identified and/or analyses show unexpected results	MITIGATE	Perform thorough evaluation			

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41	07-02755-41	Retired	Threat	ENV	04/09/13	Unanticipated cumulative impact issues	Significant cumulative impacts identified	COST	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Significant impacts	MITIGATE	Implement adequate mitigation measures			
42	07-02755-42	Retired	Threat	ENV	04/09/13	Environmental clearance for power generation or transmission facilities required.	Power distribution routes included as part of ED	TIME	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Provide power supply for TBM	TRANSFER	Evaluate other avenues to address power supply; transfer the impact analyses to power agencies to be done separately.			
43	07-02755-43	Active	Opportunity	ENV	04/09/13	P3 or DB team develops option that reduces overall project cost	Options suggested for cost savings purposes	SCOPE	Probability 2=Low (10-19%) <b>High</b> Impact 8 =High			P3 or DB develops options that reduces overall project costs	TRANSFER	Transfer to next phase .			
44	07-02755-44	Active	Threat	ENV	04/09/13	Traffic analysis could identify impacts on freeway segments/interchanges outside of project limits that require extensive improvements	Increased traffic on freeways and local streets	TIME	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Traffic analyses indicates significant impacts on freeways or local streets	TRANSFER	Ensure adequate mitigation measures are included for each alternative			
45	07-02755-45	Retired	Threat	ENV	04/09/13	Project could be deemed stationary source and subject to AQMD review	Portal Structure ventilation	TIME	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			AQMD permit required for ventilation at portal structure	MITIGATE	Early coordination with AQMD. Permits to be addressed during final design; Not an issue for PA/ED			
46	07-02755-46	Active	Threat	ENV	04/09/13	Traffic congestion near portals and on haul routes	Outcome of traffic study	QUALITY	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			High traffic volume at portals	MITIGATE	Refine alternatives to address			
47	07-02755-47	Active	Threat	ENV	04/09/13	Impacts to local business	Due to construction phasing	COST	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Interference due to construction activities	MITIGATE	Increased communication and implement mitigation in accordance with guidelines			
48	07-02755-48	Active	Threat	ENV	04/09/13	Contaminant released to environment	During construction	COST	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Hazardous gases exposed	TRANSFER	Contractor to implement good practice			



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49	07-02755-49	Retired	Threat	ENV	04/09/13	Impact to sensitive receptors (hospitals, historic structures)	Study impacts to these resources	QUALITY	Probability 2=Low (10-19%)			Not all sensitive receptors identified	AVOID	Perform thorough analyses				
									<b>Low</b>									
									Impact 2 =Low									
50	07-02755-50	Active	Threat	ENV	04/09/13	Excessive noise complaints during construction shut job down	Noise level high	COST	Probability 4=High (40-59%)			Complaints from community	TRANSFER	Contractor to address				
									<b>Med</b>									
									Impact 2 =Low									
51	07-02755-51	Active	Threat	ENV	04/09/13	Air pollution during construction results in complaints/job shut down	Improper construction practice	COST	Probability 4=High (40-59%)			Bad construction practice	TRANSFER	Contractor to address during construction				
									<b>Med</b>									
									Impact 2 =Low									
52	07-02755-52	Active	Threat	ENV	04/10/13	Unforeseen formal NEPA/404 consultation is required	Impact to five acres of wetlands	TIME	Probability 2=Low (10-19%)			New impacts identified	AVOID	Performing thorough analysis				
									<b>Med</b>									
									Impact 4 =Med									
53	07-02755-53	Active	Threat	ENV	04/10/13	Preparation of Environmental Reevaluation to address project changes identifies new significant and/or exacerbates existing significant impacts	Changes to alternatives	SCOPE	Probability 2=Low (10-19%)			New alternative or major revisions introduced after release of DED	AVOID	By considering potential variation for each alternative. Frequent communication with stakeholders				
									<b>High</b>									
									Impact 16 =Very High									
54	07-02755-54	Active	Threat	CON	04/10/13	Encounter unknown cultural resources or human remains during construction	Delays to construction activities	COST	Probability 2=Low (10-19%)			Unanticipated resources identified during construction	TRANSFER	Implement steps to address such situation during construction				
									<b>High</b>									
									Impact 16 =Very High									
55	07-02755-55	Retired	Threat	ENV	05/22/13	Determination about which other projects are in our no-build models	Uncertainties related to funding, planning, policy or other consideration	SCOPE	Probability 2=Low (10-19%)			Encounter challenged project decisions	MITIGATE	Have back up of a consensus group opinion (SCAG, Caltrans, Metro); The project list was coordinated with CT/Metro/SCAG				
									<b>Low</b>									
									Impact 2 =Low									
56	07-02755-56	Active	Threat	ENV	05/23/13	Hauling & distribution of trucks	Hauling might use local streets	SCOPE	Probability 2=Low (10-19%)			Local streets used for hauling material	AVOID	Look to use freeways for hauling of material.				
									<b>Med</b>									
									Impact 4 =Med									

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57	07-02755-57	Retired	Threat	ENV	04/09/13	Bridge is a habitat to bats or other species requiring mitigation or seasonal construction	Bat habitat	SCOPE	Low			Bridges identified with bat or other species habitat	MITIGATE	No bats noted in any of the bridges			
									Probability 2=Low (10-19%)								
									Impact 2 =Low								
58	07-02755-58	Retired	Threat	ENV	06/06/13	Eliminating freeway surface route	Some stakeholders may want the surface route completed	COST	Low			Stakeholders raising concern that this was eliminated too early without providing proper evaluation	MITIGATE	Provide adequate documentation of the reasons for eliminating and address these clearly in ED; Legislation also eliminates the surface route			
									Probability 2=Low (10-19%)								
									Impact 2 =Low								
59	07-02755-59	Active	Threat	EXT	04/09/13	Landowners unwilling to sell	Doesn't want to move	TIME	Med			Cannot get agreement on price	TRANSFER	Implement condemnation process			
									Probability 3=Med (20-39%)								
									Impact 4 =Med								
60	07-02755-60	Active	Threat	EXT	04/09/13	Political factors or support for project changes	Changes to local elected officials and/or to Metro Board	TIME	High			New members suggesting different directions for study	MITIGATE	Educate new members about the study. Outreach to keep on top of these in favor and those not in favor			
									Probability 3=Med (20-39%)								
									Impact 8 =High								
61	07-02755-61	Active	Threat	EXT	04/09/13	Increase in material cost due to market forces	Increased construction activity	COST	Med			Cost escalation	ACCEPT	Accept this as a potential			
									Probability 3=Med (20-39%)								
									Impact 4 =Med								
62	07-02755-62	Active	Threat	EXT	04/09/13	Permits or agency actions delayed or take longer than expected	Busy with concurrent project timelines	TIME	Med			Too many concurrent studies	MITIGATE	Engage reviewers early and allow for over the shoulder review			
									Probability 3=Med (20-39%)								
									Impact 4 =Med								
63	07-02755-63	Active	Threat	EXT	04/09/13	Pressure to deliver project on an accelerated schedule	Take advantage of political climate	COST	Med			Expedite delivery to take advantage of political climate	ACCEPT	Ensure that processes not skipped. Adequate quality and reviews done on documents; With the schedule extension, the pressure is less			
									Probability 3=Med (20-39%)								
									Impact 4 =Med								
64	07-02755-64	Active	Threat	EXT	04/09/13	Measure R funds reallocated to a different project	Funds not available	COST	High			Funds transferred to other projects	ACCEPT	Find other sources of funding			
									Probability 2=Low (10-19%)								
									Impact 16 =Very High								

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65	07-02755-65	Active	Threat	EXT	04/09/13	Third party claims for damages	Potential damage due to construction	COST	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Construction related damages	TRANSFER	Enforce good monitoring and construction practices			
66	07-02755-66	Active	Opportunity	DESIGN	12/07/11	Intermediate Ventilation Stacks	Community is concerned that stacks could disperse bad quality air and also be an eyesore	SCOPE	Probability 1=Very Low (1-9%) <b>Low</b> Impact 2 =Low			Stakeholder opposition due to additional impacts	AVOID	Minimize or avoid impacts by eliminating the intermediate stacks. Either build a separate tunnel for ventilation or build the system in to the tunnel section			
67	07-02755-67	Active	Threat	DESIGN	12/11/11	Change in state and federal requirements	Additional requirement and/or different guidelines may be implemented causing additional work	SCOPE	Probability 3=Med (20-39%) <b>High</b> Impact 8 =High			The regulations and or requirements change	MITIGATE	Team need to address each change on a case by case basis. Evaluate both schedule and budget impacts. Communicate to Client PM			
68	07-02755-68	Active	Threat	DESIGN	12/11/11	Fault rupture hazard	Depending on alignment, the tunnel could be subjected to rupture during a major earthquake on the Raymond Fault (tunnel settlement and noise vibration?)	SCOPE	Probability 2=Low (10-19%) <b>Med</b> Impact 4 =Med			Some of the alternatives will cross an active fault	MITIGATE	Appropriate methods should be implemented for each of the facility to address fault crossing. An educational workshop might be necessary to communicate the risk and/or benefit to the public			
69	07-02755-69	Active	Threat	DESIGN	12/11/11	Public concern regarding emergencies in the tunnel	Considering the confined space, access to motorist during emergency is a concern	SCOPE	Probability 4=High (40-59%) <b>Med</b> Impact 2 =Low			Response during fire, accidents and/or other cases	MITIGATE	Provide for necessary F-L-S system in accordance with regulatory requirements. Communicate and coordinate with client and fire marshal to ensure their expectations are met. Additional			
70	07-02755-70	Retired	Threat	DESIGN	12/11/11	Long lead time to collect geotechnical data	Considering the depth of each borings, the drilling could take a long time to complete	TIME	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med					Work completed			
71	07-02755-71	Retired	Threat	DESIGN	12/11/11	Hazardous waste impacts	Few superfund sites identified within the study area.	COST	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Continue to review	ACCEPT	Continue to review data; Suoerfund sites does not affect the selected alternatives			
72	07-02755-72	Retired	Threat	DESIGN	12/11/11	Groundwater impacts	Impacts due to tunneling and groundwater resources	COST	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Communities concerned with drawdown of GWT that could impact aquifers	MITIGATE	Implement and require good tunnel construction practice			

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73	07-02755-73	Retired	Threat	DESIGN	12/11/11	Permitting for field exploration	Timeline to obtain permits could take a long time to obtain	TIME	Med					Completed			
									Probability 3=Med (20-39%)								
									Impact 4 =Med								
74	07-02755-74	Active	Opportunity	DESIGN	05/23/12	Development at portals	Use of portal areas	QUALITY	Med			Public concern for portal areas	MITIGATE	Look for opportunities for optimal use			
									Probability 3=Med (20-39%)								
									Impact 4 =Med								
75	07-02755-75	Active	Threat	DESIGN	04/09/13	Changes to materials/geotechnical/foundation	Design feature	COST	Med			Refine Foundations	MITIGATE	Address as they become available			
									Probability 2=Low (10-19%)								
									Impact 4 =Med								
76	07-02755-76	Active	Threat	DESIGN	04/09/13	Unforeseen design exceptions required	Too many physical constraints	SCOPE	Med			Change to design requested	MITIGATE	Communicate early with D& and HQ staff. Explore options to mitigate each exception or provide good justification			
									Probability 2=Low (10-19%)								
									Impact 4 =Med								
77	07-02755-77	Active	Threat	DESIGN	04/09/13	New or revised design standard	New standards released	SCOPE	Med			New standards	ACCEPT	Modify design			
									Probability 2=Low (10-19%)								
									Impact 4 =Med								
78	07-02755-78	Active	Threat	DESIGN	04/09/13	Unprecedented TBM design	Largest diameter TBM in the world	COST	Med			Will be the largest diameter TBM	ACCEPT	Watch construction at Alaskan Way and implement lessons learned. Slightly larger than Alaskan Way Tunnel; larger tunnels are being considered in Europe.			
									Probability 3=Med (20-39%)								
									Impact 4 =Med								
79	07-02755-79	Active	Threat	DESIGN	04/09/13	P3 or DB team develops option that requires additional design exceptions	Changes to design	SCOPE	High			Changes to design	TRANSFER	All changes by P3 team to be completed post ED			
									Probability 2=Low (10-19%)								
									Impact 8 =High								
80	07-02755-80	Active	Threat	DESIGN	04/09/13	Caltrans may require fixing non-standard features of existing system interchanges at I-10 or I-210	Change to existing interchanges	COST	High			Reconfigure interchanges	MITIGATE	Design exceptions			
									Probability 2=Low (10-19%)								
									Impact 16 =Very High								

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81	07-02755-81	Active	Threat	DESIGN	04/09/13	Project design to full standard may be too expensive to fund through public funds or tolling	Caltrans requesting to meet full standards	COST	Probability 4=High (40-59%) <b>High</b> Impact 8 =High			Designing for full standards	MITIGATE	Discuss an alternative without compromising safety and performance			
82	07-02755-82	Retired	Threat	DESIGN	05/23/13	Chance our current design negatively impacts the hydraulics of the flood control basin near the 10/710 interchange	Hydraulic study has not been finalized	TIME	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Hydraulic study results	MITIGATE	Current design does not have negative impacts			
83	07-02755-83	Active	Threat	DESIGN	05/23/13	Freeway tunnel cross section	Not meeting freeway standards	TIME	Probability 3=Med (20-39%) <b>High</b> Impact 8 =High			Constraints with meeting freeway standard	MITIGATE	Prepare fact sheets documenting the reasons for using the tunnel section. The reason should indicate that tunnels are to be evaluated on a case by case basis. Also include that risk evaluation for the suggested section			
84	07-02755-84	Active	Threat	DES	04/09/13	Hazardous materials in existing structure or surrounding soil; lead paint, contaminated soil, asbestos pipe, asbestos bearings and shims	Identified potential presence	COST	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Structures designated for demolition could have hazardous material	MITIGATE	Study for the presence of hazardous material			
85	07-02755-85	Active	Threat	DES	04/09/13	Special railroad requirements are necessary including an extensive geotechnical report for temporary shoring system adjacent to tracks	Work within RR right of way	TIME	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Excavation within or adjacent to RR r/w	TRANSFER	Coordinate with RR agency to determine appropriate methods; Transfer to final design.			
86	07-02755-86	Retired	Threat	DES	04/09/13	Access to adjacent properties is necessary to resolve constructability requirements	Constructability access	COST	Probability 3=Med (20-39%) <b>Low</b> Impact 2 =Low			properties needed for construction	MITIGATE	Identify and incorporate as part of design and ED			
87	07-02755-87	Retired	Threat	DES	04/09/13	Existing structures planned for modification not evaluated for seismic retrofit, and structural capacity	Not identified during design	QUALITY	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Identify structures needing retrofit	AVOID	No structures beyond those needing modifications identified as part of this study. No further action required			
88	07-02755-88	Active	Threat	DES	04/09/13	Verify that all seasonal constraints and permitting requirements are identified and incorporated in the project schedule	Identify schedule implications	TIME	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Identify all permitting requirements	TRANSFER	List these to be obtained by contractor			

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89	07-02755-89	Active	Opportunity	DES	04/09/13	Unforeseen aesthetic requirements	Identify appropriate requirement for aesthetics	TIME	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Stakeholders asking for different aesthetics	TRANSFER	Place the aesthetics requirement to be done after the ED			
90	07-02755-90	Active	Threat	DES	12/11/11	Cost estimate	Development of the overall project cost could be challenged by stakeholders.	COST	Probability 4=High (40-59%) <b>High</b> Impact 4 =Med			Stakeholders not agreeing on the developed cost	MITIGATE	Ensure that appropriate level of details provided for the basis of the estimate. Show comparison to actual bids that are similar to this project			
91	07-02755-91	Active	Threat	DES	12/11/11	Railroad coordination	Inadequate coordination with railroad agencies may cause concerns over any of the alternatives that cross over railroads	QUALITY	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Railroad concerns not appropriately addressed.	MITIGATE	Identify conflicts and begin coordination with RR agencies early to understand their requirements.			
92	07-02755-92	Active	Threat	R/W	12/07/11	Right-of-way Impacts	Impact to R/W could be significant and has the potential for project opposition	COST	Probability 2=Low (10-19%) <b>Med</b> Impact 4 =Med			Residents showing opposition depending on impact. May drive for changing alternatives and/or adding variations leading to additional level of effort.	MITIGATE	Consider r/w impact during alternative development. Try to avoid or minimize impact where possible. Minimize impact to sensitive areas			
93	07-02755-93	Active	Threat	R/W	04/09/13	Utility relocation requires more time than planned; could be outside of footprint	Complex utility relocation	TIME	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Agency coordination delays utility relocation	TRANSFER	Pass the responsibility to post ED activity			
94	07-02755-94	Active	Threat	R/W	04/09/13	Resolving objections to Right of Way appraisal takes more time and/or money	Market fluctuations	COST	Probability 2=Low (10-19%) <b>Med</b> Impact 4 =Med			Not agreeing on appraised value	TRANSFER	This activity is done post ED. Transfer to later phase			
95	07-02755-95	Active	Threat	R/W	04/09/13	Need for "Permits to Enter" not considered in project schedule development	New impact areas	TIME	Probability 2=Low (10-19%) <b>Med</b> Impact 4 =Med			New areas identified for survey/investigation	TRANSFER	Address the need and work closely with agencies to obtain permits			
96	07-02755-96	Active	Threat	R/W	04/09/13	Condemnation process takes longer than anticipated	Acquisition	TIME	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Takes too long to get an agreement	TRANSFER	Transfer to next phase of design for consideration			

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97	07-02755-97	Active	Threat	R/W	11/21/11	Acquisition of parcels controlled by a State or Federal Agency may take longer than anticipated	Acquisition	TIME	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Takes too long to get an agreement	TRANSFER	Transfer to final design phase			
98	07-02755-98	Active	Threat	R/W	04/09/13	Discovery of hazardous waste in the right of way phase	Acquisition	COST	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Not identified during Phase 1.	TRANSFER	Transfer to final design phase			
99	07-02755-99	Active	Threat	R/W	04/09/13	Seasonal requirements during utility relocation	Agency constraints	TIME	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Restrictions due to sensitive habitats	TRANSFER	Transfer to final design phase			
100	07-02755-100	Active	Threat	R/W	04/09/13	Expired temporary construction easements	Not tracking easement paperwork	TIME	Probability 2=Low (10-19%) <b>High</b> Impact 8 =High			Access not in place for construction	TRANSFER	Transfer to final design phase			
101	07-02755-101	Active	Threat	R/W	05/23/13	BMPs for non-freeway alternatives	Space requirements for BMPs causes more property acquisition	COST	Probability 3=Med (20-39%) <b>Low</b> Impact 4 =Med			Didn't evaluate BMPs for non freeway alternatives yet	ACCEPT	Will need to comply with water permits for other alternatives or EIR could be questioned. Ensure the BMPs are located within study disturbed area			
102	07-02755-102	Active	Threat	CON	04/09/13	Permit work window time is insufficient	Time not adequate to complete construction	TIME	Probability 3=Med (20-39%) <b>High</b> Impact 8 =High			Costly delays	TRANSFER	Transfer to final design phase			
103	07-02755-103	Active	Threat	CON	04/09/13	Change requests due to differing site conditions	Unforeseen site conditions	COST	Probability 4=High (40-59%) <b>Med</b> Impact 2 =Low			Different site conditions	TRANSFER	Transfer to final design/construction phase			
104	07-02755-104	Active	Threat	CON	04/09/13	Unidentified utilities	Insufficient as-built documentation	COST	Probability 3=Med (20-39%) <b>High</b> Impact 8 =High			Encounter utilities not shown on plans	TRANSFER	Contact utility companies; have an extensive verification process			

# Project Risk Register

DIST- EA 07-02755					Project Name: SR 710 North Study			Project Manager: Yoga Chandran					Date Created:	Last Updated:				
					Co - Rte - PM: DRAFT			Telephone: 714-435-6111										
ITEM	ID #	Status	Threat / Opportunity	Category	Date Risk Identified	Risk Description	Root Causes	Primary Objective	Overall Risk Rating	Cost/Time Impact Value	Risk Owner	Risk Trigger	Strategy	Response Actions w/ Pros & Cons	Adjusted Cost/Time Impact Value	WBS Item	Status Date and Review Comments	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	
105	07-02755-105	Active	Threat	CON	04/09/13	Buried man-made objects/unidentified hazardous waste	Insufficient documentation	COST	Probability 2=Low (10-19%)	8 =High		Encounter unknown materials during construction	TRANSFER	To be addressed during final design/construction				
									<b>High</b>									
									Impact 8 =High									
106	07-02755-106	Active	Threat	CON	04/09/13	Dewatering is required due to change in water table	Inadequate characterization	COST	Probability 2=Low (10-19%)	4 =Med		Different water elevation	MITIGATE	Implement appropriate exploration prior to construction				
									<b>Med</b>									
									Impact 4 =Med									
107	07-02755-107	Active	Threat	CON	04/09/13	Electrical power lines not seen and in conflict with construction	Oversight during design	COST	Probability 3=Med (20-39%)	4 =Med		Incorrect plans	MITIGATE	Extensive utility research				
									<b>Med</b>									
									Impact 4 =Med									
108	07-02755-108	Active	Threat	CON	04/09/13	Street or ramp closures not coordinated with local community	Lack of coordination	TIME	Probability 2=Low (10-19%)	4 =Med		Local community not informed and causes concerns	TRANSFER	Coordinate with local agencies and communities during final design/construction				
									<b>Med</b>									
									Impact 4 =Med									
109	07-02755-109	Retired	Threat	CON	04/09/13	Insufficient or limited construction or staging areas	Construction difficulty	COST	Probability 2=Low (10-19%)	2 =Low		No space for staging and storage	TRANSFER	Address space for construction during planning stages; Staging areas identified for each alternative				
									<b>Low</b>									
									Impact 2 =Low									
110	07-02755-110	Active	Threat	CON	04/09/13	Changes during construction require additional coordination with resource agencies	Unforeseen changes	TIME	Probability 2=Low (10-19%)	4 =Med		Change triggers additional impacts not identified in the FED	TRANSFER	Ensure that the ED addresses all potential impacts and minimize the need for changes that requires resource agency involvement; transfer to construction				
									<b>Med</b>									
									Impact 4 =Med									
111	07-02755-111	Active	Threat	CON	04/09/13	Delay in demolition due to sensitive habitat requirements or other reasons	Too restrictive or unclear requirements	TIME	Probability 3=Med (20-39%)	4 =Med		Inadequate description on the requirements	MITIGATE	Ensure that all requirements are properly identified in the document including specifications				
									<b>Med</b>									
									Impact 4 =Med									
112	07-02755-112	Active	Threat	CON	04/09/13	Long lead time for utilities caused by design and manufacture of special components (steel towers or special pipe)	Delay in construction time	TIME	Probability 3=Med (20-39%)	4 =Med		Improper planning for long lead items	MITIGATE	Consider the long lead items to ensure that they are accounted for in construction staging and phasing				
									<b>Med</b>									
									Impact 4 =Med									



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	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)
113	07-02755-113	Active	Threat	CON	04/09/13	Power loss/brownouts during construction, delays providing power to TBMs	No power to drive TBM	TIME	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Loss of power	MITIGATE	Coordinate with power agency. Plan for backup plan if feasible			
114	07-02755-114	Active	Threat	CON	04/09/13	Permits restrict working hours, making schedule duration longer	Stakeholder concerns of construction impacts	COST	Probability 3=Med (20-39%) <b>Med</b> Impact 4 =Med			Restricted time for construction activities	MITIGATE	Identify critical items requiring longer construction window and implement good outreach to obtain permission and/or provide mitigation			
115	07-02755-115	Active	Threat	CON	04/09/13	Adverse Environmental Impacts during construction (noise dust, vibration, etc.)	Not following proposed mitigation	COST	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Complaints from community	TRANSFER	Ensure contractor follows the mitigation measures listed in the FED; transfer to contractor			
116	07-02755-116	Active	Threat	CON	04/09/13	Earthquake during construction	Active earthquake	TIME	Probability 1=Very Low (1-9%) <b>Low</b> Impact 4 =Med			Earthquake activity	MITIGATE	Address probability of earthquake during design and address accordingly.			
117	07-02755-117	Active	Threat	CON	04/09/13	Settlement/Damage to existing structures/utilities	Not accounted for during construction	COST	Probability 2=Low (10-19%) <b>Low</b> Impact 2 =Low			Settlements of facilities	MITIGATE	Address during design and provide proper mitigation measures			
118	07-02755-118	Active	Threat	CON	04/09/13	Major TBM Equipment Failure (main bearing, bull gear, etc.)	Machine failure	TIME	Probability 3=Med (20-39%) <b>High</b> Impact 8 =High			Breakdown of components of TBM machine and assembly	MITIGATE	Have a plan to repair quickly and back on service			
119	07-02755-119	Active	Threat	CON	04/09/13	TBM Stuck, squeezing, or swelling ground	Difficult site conditions	COST	Probability 3=Med (20-39%) <b>High</b> Impact 8 =High			Difficult soil conditions	MITIGATE	provide adequate characterization to handle differing site conditions. Plan for contingency during construction.			
120	07-02755-120	Active	Threat	CON	04/09/13	Excavation and support deformation/failure in hand mined sections (cross passages/seismic section)	Difficult mining or different site conditions	QUALITY	Probability 3=Med (20-39%) <b>High</b> Impact 8 =High			Excessive settlement at the surface	MITIGATE	Perform analysis for SEM method and implement best construction practice. Include active monitoring during construction			

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						Co - Rte - PM: DRAFT			Telephone: 714-435-6111								
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121	07-02755-121	Retired	Threat	CON	04/09/13	Insufficient disposal sites for muck	Sites not available	TIME	Low			Inadequate capacity for disposal	AVOID	Site identified in Irwindale			
									Probability 1=Very Low (1-9%)								
									Impact 2 =Low								
122	07-02755-122	Active	Threat	CON	04/09/13	Delays due to the transport of large/heavy loads to the construction site	During construction	TIME	Med			Space and clearance to bring construction material from port, including TBM components	TRANSFER	To be addressed by the contractor. May need fabricating yard on site			
									Probability 3=Med (20-39%)								
									Impact 4 =Med								
123	07-02755-123	Active	Threat	PM	04/09/13	Lack of coordination/communication among team members	Inconsistent message and delivery	QUALITY	Med			Inconsistency among team members	MITIGATE	Ensure team members are coordinated and informed of changes on a regular basis. Hold regular internal team meetings and periodic meetings with client			
									Probability 2=Low (10-19%)								
									Impact 4 =Med								
124	07-02755-124	Active	Threat	PM	04/09/13	Unresolved project conflicts not escalated in a timely manner	Decisions takes too long	TIME	High			Decisions not made on time	MITIGATE	Address with client/agency quickly. Elevate to client upper management for discussion.			
									Probability 2=Low (10-19%)								
									Impact 8 =High								
125	07-02755-125	Active	Threat	PM	04/09/13	Unanticipated escalation in right of way values or construction cost	R/W Acquisition	COST	Med			Cost of acquisition is more than planned	ACCEPT	Include escalation in estimates. Provide for contingency.			
									Probability 3=Med (20-39%)								
									Impact 4 =Med								
126	07-02755-126	Active	Threat	PM	04/09/13	Local agency support not attained	Opposition to alternative(s)	TIME	High			Stakeholder opposition	ACCEPT	Regardless of the alternative selected, stakeholder and/or local agency either support and/or oppose. A thorough outreach effort is necessary to mitigate the opposition			
									Probability 3=Med (20-39%)								
									Impact 8 =High								
127	07-02755-127	Retired	Threat	PM	04/09/13	Public awareness/campaign not planned	Is in place	TIME	Low			In place					
									Probability 1=Very Low (1-9%)								
									Impact 1 =Very Low								
128	07-02755-128	Active	Threat	PM	04/09/13	Insufficient amount of qualified bidders	To be addressed at a later stage	COST	Med			Not enough bidders	TRANSFER	Implement industry outreach to figure out interested bidders. Final design phase.			
									Probability 2=Low (10-19%)								
									Impact 4 =Med								

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	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)
129	07-02755-129	Active	Threat	PM	04/09/13	Bids higher than budgeted	High bids	COST	Probability 2=Low (10-19%)			Funds not available to cover bids	MITIGATE	Negotiate with lowest bidder to figure out best approach to construct the project. Need a good cost estimate			
									High								
									Impact 8 =High								
130	07-02755-130	Active	Threat	PM	04/09/13	Schedule longer than expected not related to ground conditions (e.g. TBM delivery delayed)	Delivery of TBM	TIME	Probability 3=Med (20-39%)			Delivery of TBM delayed	MITIGATE	Build appropriate float in schedule. Keep track of progress on the development of the TBM machine.			
									Med								
									Impact 4 =Med								
131	07-02755-131	Active	Threat	PM	04/09/13	Schedule longer than expected related to ground conditions	Slow progress on tunnel boring advances	TIME	Probability 3=Med (20-39%)			Progress is slower than estimated due to difficult ground conditions	MITIGATE	Adequate characterization of subsurface conditions to allow for proper planning on the advance rate. Implement appropriate measures to account for ground conditions			
									Med								
									Impact 4 =Med								
132	07-02755-132	Active	Threat	PM	04/09/13	Bonding requirements limits number of bidders	High bonding requirement	COST	Probability 3=Med (20-39%)			Too few interested bidders	MITIGATE	Based on industry forums, setup requirement that protects the owner, while allowing bidders interest.			
									Med								
									Impact 4 =Med								
133	07-02755-133	Active	Threat	ORG	05/23/12	Internal "red tape" causes delay getting approvals, decisions	Decisions takes too long	TIME	Probability 2=Low (10-19%)			Critical decisions are not made on time	MITIGATE	Engage appropriate management staff to ensure decisions are made on time. Elevate if necessary			
									High								
									Impact 8 =High								
134	07-02755-134	Active	Threat	ORG	05/23/12	Functional units not available, overloaded	Too many concurrent project reviews	TIME	Probability 2=Low (10-19%)			Functional units managing multiple reviews at the same time	MITIGATE	Coordinate with Caltrans to ensure that staff assigned to this project are dedicated. The consultant team is to submit deliverables on time to help with the review process			
									Med								
									Impact 4 =Med								
135	07-02755-135	Active	Threat	ORG	05/23/12	Funding changes for fiscal year	Budget or payment issues	QUALITY	Probability 2=Low (10-19%)			Funding not available to meet delivery	MITIGATE	Communicate with client on the spending plan and coordinate to allocate funding from other sources			
									Med								
									Impact 4 =Med								



**Attachment P**  
**Stormwater Data Report – Appendix E**

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Long Form - Storm Water Data Report



Dist-County-Route: 07-LA-710  
 Post Mile Limits: PM 26.7/32.1T  
 Project Type: New Roadway Construction  
 Project ID (or EA): 0700000191  
 Program Identification: 20.XX.075.600, 20.30.010.680, 20.XX.025.700  
 Phase:  PID  
            PA/ED  
            PS&E

Regional Water Quality Control Board(s): Los Angeles Region 4

Is the Project required to consider Treatment BMPs? Yes  No   
 If yes, can Treatment BMPs be incorporated into the project? Yes  No

If No, a Technical Data Report must be submitted to the RWQCB at least 30 days prior to the projects RTL date. List RTL Date: \_\_\_\_\_

Total Disturbed Soil Area: 21.3 to 93.0 ac Risk Level: 2  
 Estimated: Construction Start Date: June 1, 2019 Construction Completion Date: June 1, 2024  
 Notice of Intent (NOI) Date to be submitted: April 30, 2019

Erosivity Waiver Yes  Date: \_\_\_\_\_ No   
 Notification of ADL reuse (if Yes, provide date) Yes  Date: \_\_\_\_\_ No   
 Separate Dewatering Permit (if yes, permit number) Yes  Permit # T.B.D. No

*This Report has been prepared under the direction of the following Licensed Person. The Licensed Person attests to the technical information contained herein and the date upon which recommendations, conclusions, and decisions are based. Professional Engineer or Landscape Architect stamp required at PS&E.*

[Signature] [Signature] 12/4/14  
 Tianpeng Guo, Registered Project Engineer Derek Higa, Caltrans Designated Oversight Representative Date

I have reviewed the stormwater quality design issues and find this report to be complete, current and accurate:

[Signature] 12/9/14  
 John Lee, Project Manager Date

[Signature] 12-11-14  
 Roger Castillo, Designated Maintenance Representative Date

[Signature] 12.12.14  
 Ron Russak, Designated Landscape Architect Representative Date

[Signature] 12/12/2014  
 [Stamp Required for PS&E only] Shirley Pak, District/Regional Design SW Coordinator or Designee Date





**Attachment Q**  
**Draft Environmental Document**  
**(under separate cover) – *To be provided***

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