

California High-Speed Train Project



# Request for Proposal for Design-Build Services

RFP No.: HSR 11-16  
Design Criteria

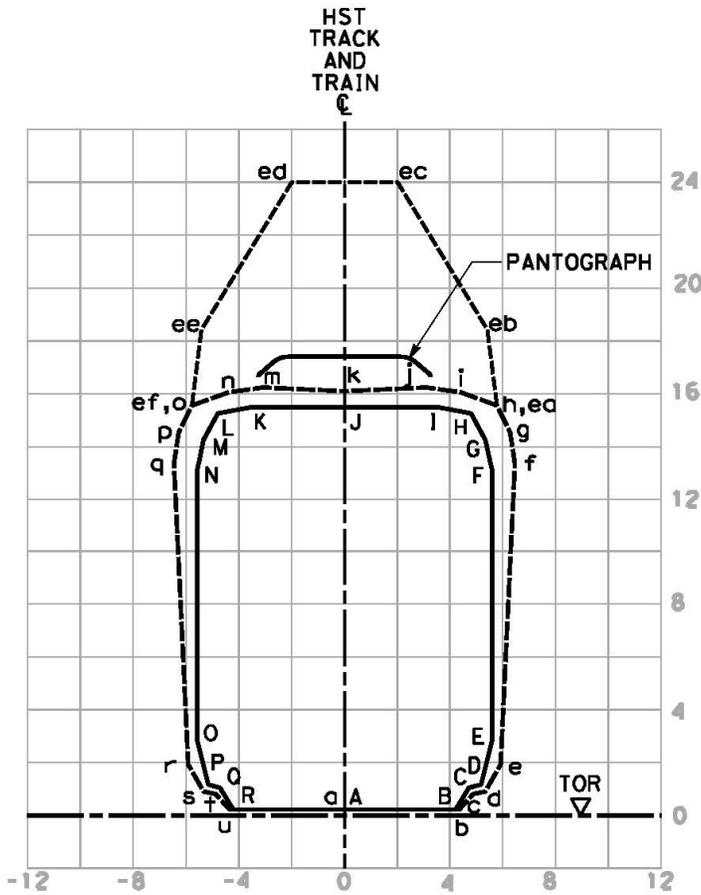
DC-03 Trackway Clearances  
Appendixes 3.A through 3.H

**Note:**

For additional changes to the Design Criteria, see the *Addenda Change Log for Addendum No. 5*.



## Appendix 3.A: High-Speed Equipment Only, Static Envelope and Dynamic Envelope, Tangent Track



**LEGEND**

- VEHICLE BODY STATIC ENVELOPE
- VEHICLE BODY DYNAMIC ENVELOPE
- ..... ELECTRICAL ENVELOPE

Tangent Track		
Point ID	Horizontal Distance from TCL (feet)	Vertical Distance from TOR (feet)
<b>Vehicle Body Static Envelope</b>		
A	0.000	0.229
B, R	±4.208	0.229
C, Q	±4.708	1.042
D, P	±5.167	1.167
E, O	±5.583	2.833
F, N	±5.583	13.083
G, M	±5.333	14.250
H, L	±4.792	15.250
I, K	±3.500	15.500
J	±0.000	15.500
<b>Vehicle Body Dynamic Envelope</b>		
a	0.000	0.229
b, u	±4.354	0.229
c, t	±4.875	0.792
d, s	±5.333	0.896
e, r	±5.917	1.927
f, q	±6.458	13.354
g, p	±6.271	14.527
h, o	±5.771	15.552
i, n	±4.385	16.042
j, m	±3.083	16.229
k	0.000	16.083

Point ID	Horizontal Distance from TCL (feet)	Vertical Distance from TOR (feet) (See Note 6)	
		Open Sections	In Tunnels
<b>Electrical Envelope</b>			
ea, ef	±5.771	15.552	15.552
eb, ee	±5.417	18.417	18.417
ec, ed	±2.000	24.000	22.333

**Notes:**

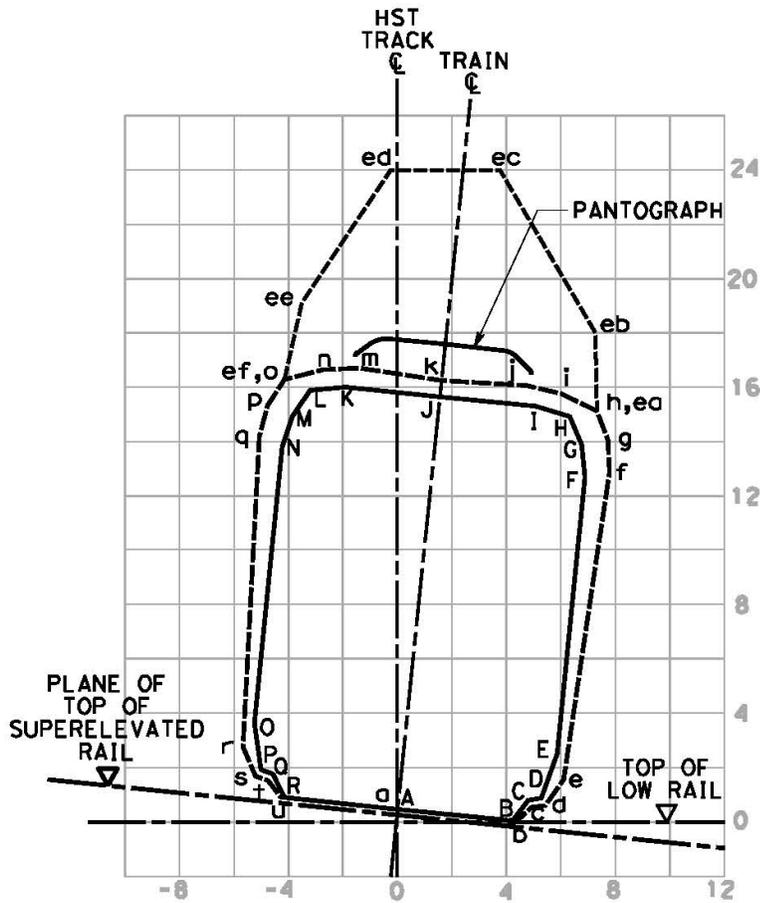
1. Definition of the envelopes:
  - a. The Vehicle Body Static Envelope defines the maximum shape and dimensions for any vehicle which may be operated on dedicated tracks of the high-speed railroad.
  - b. The Vehicle Body Dynamic Envelope takes the static envelope to the physical limits of motion under the maximum conceivable forces combined with the maximum allowable limits of wear and deficiencies including, for clearance purposes, motion due to track deficiencies and misalignments.
  - c. The Pantograph is shown as it would be positioned with its center at its nominal elevation of 17.417 feet from TOR, see OCS Standard and Directive Drawings.
  - d. The Electrical Envelope is the allowable space for overhead electrical equipment.

10/26/2012 ADDENDUM 5 - RFP HSR 11-16

2. The Vehicle Body Static and Dynamic Envelopes are based on a combination of in-service high-speed passenger equipment, Association of American Railroads (AAR) Plate C and International Union of Railways (UIC) GC Gauge.
3. The Vehicle Body Static Envelope includes tolerances in the manufacture of the vehicle itself, but no allowances for any motion of the vehicle on the railroad or allowances for uneven wear of components.
4. The Vehicle Body Dynamic Envelope includes the vertical, lateral, and sway motion limits with the maximum allowable limits of wear and deficiencies such as deflated airbags and broken springs under the maximum conceivable forces. For purposes of defining clearances, this dynamic envelope also includes the effects of track conditions and alignment deviations.
5. The total movements assumed in the development of the Vehicle Body Dynamic Envelope are:
  - a. Lateral expansion: 3.50 inches
  - b. Downward expansion: 4.50 inches
  - c. Upward expansion: 6.75 inches
  - d. Angular movement: 3.00 degrees – rotated about centerline at a point 16.5 inches above TOR
6. The Electrical Envelope is lower in tunnel sections than in open air sections, however, the width is the same for both cases.
7. The width of the swept path of the vehicle body increases on curves due to mid-car and end-car overhang.
8. The location of the points on the widened swept path of the vehicle body is determined by adding 550/radius (in feet) to the horizontal dimensions for points D, E, F, G, H, I, K, L, M, N, O, P, d, e, f, g, h, i, n, o, p, q, r, and s. The vertical dimensions do not change.
9. Points A, B, C, Q, R, a, b, c, t, and u need not be shifted as they relate to components that are on the vehicle at or near the bogie positions or attached to the structure.
10. Widening may be neglected on tracks with radii of 10,000 feet or larger.
11. Widening shall be calculated before calculating the position of the section due to the effects of superelevation.
12. As an example, the increased dimensions for these points for a curve of 950 feet radius are given in the following table: (That radius is the internal radius of a standard No. 11 turnout.)

<b>950 feet Radius (For other radii, take static values for horizontal distance and add 550/Radius.)</b>					
<b>Point ID</b>	<b>Horizontal Distance from TCL (feet)</b>	<b>Vertical Distance from TOR (feet)</b>	<b>Point ID</b>	<b>Horizontal Distance from TCL (feet)</b>	<b>Vertical Distance from TOR (feet)</b>
<b>Vehicle Body Static Envelope</b>			<b>Vehicle Body Dynamic Envelope</b>		
A	0.000	0.229	a	0.000	0.229
B, R	±4.208	0.229	b, u	±4.354	0.229
C, Q	±4.708	1.042	c, t	±4.875	0.792
D, P	±5.746	1.167	d, s	±5.912	0.896
E, O	±6.162	2.833	e, r	±6.496	1.927
F, N	±6.162	13.083	f, q	±7.037	13.354
G, M	±5.912	14.250	g, p	±6.850	14.527
H, L	±5.371	15.250	h, o	±6.350	15.552
I, K	±4.079	15.500	i, n	±4.964	16.042
J	±0.000	15.500	j, m	±3.083	16.229
			k	0.000	16.083

### Appendix 3.B: High-Speed Equipment Only, Static Envelope and Dynamic Envelope Swept Path of Vehicle Rotated for Superelevation



**LEGEND**

- VEHICLE BODY STATIC ENVELOPE
- VEHICLE BODY DYNAMIC ENVELOPE
- ELECTRICAL ENVELOPE

Point ID	Horizontal Distance from TCL (feet)	Vertical Distance from TOR (feet) (See Note 5)	
		Open Sections	In Tunnels
<b>Electrical Envelope</b>			
ea	7.322	15.132	15.132
eb	7.258	18.018	18.018
ec	3.750	24.000	22.333
ed	-0.250	24.000	22.333
ee	-3.520	19.111	19.111
ef	-4.161	16.926	16.926

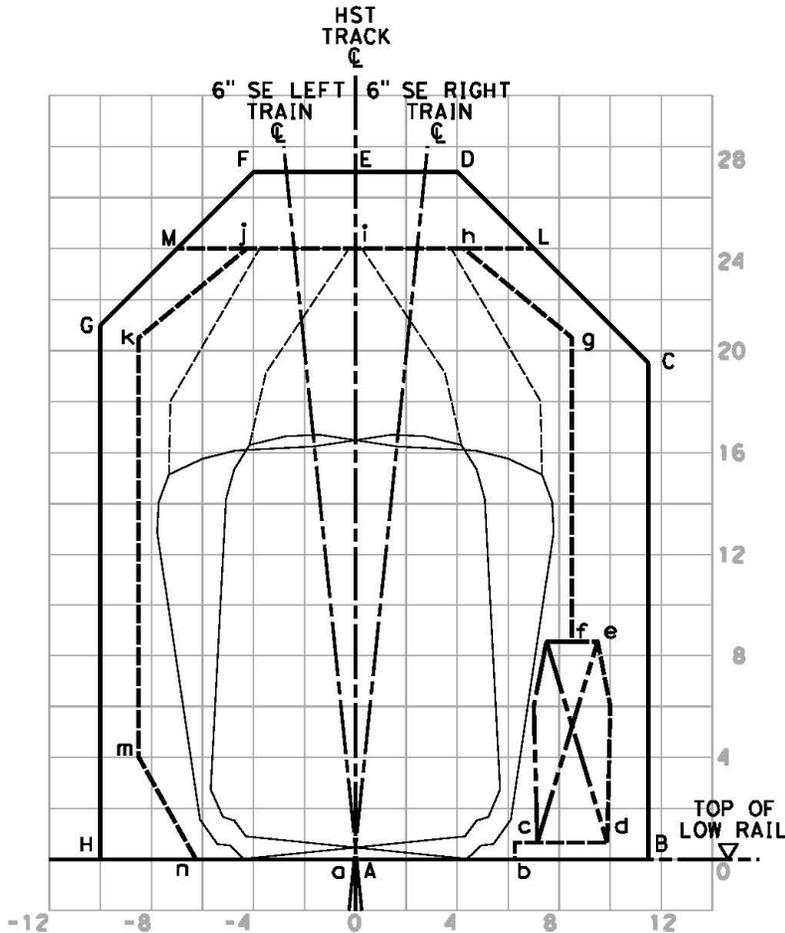
Superelevated, No Widening (Values for 6 inches superelevation tabulated. See notes for method of calculation for other values.)		
Point ID	Horizontal Distance from TCL (feet)	Vertical Distance from TOR (feet)
<b>Vehicle Body Static Envelope (Without Increase in the Horizontal Dimension for the Effect of Small Radii)</b>		
A	0.035	0.465
B	4.222	0.041
C	4.801	0.799
D	5.270	0.877
E	5.853	2.493
F	6.886	12.691
G	6.755	13.877
H	6.317	14.926
I	5.057	15.305
J	1.575	15.658
K	-1.907	16.011
L	-3.217	15.893
M	-3.857	14.953
N	-4.224	13.817
O	-5.257	3.619
P	-5.011	1.919
Q	-4.567	1.749
R	-4.152	0.890
<b>Vehicle Body Dynamic Envelope (Without Increase in the Horizontal Dimension for the Effect of Small Radii)</b>		
a	0.035	0.465
b	4.367	0.031
c	4.924	0.538
d	5.409	0.595
e	6.093	1.562
f	7.784	12.876
g	7.713	14.063
h	7.322	15.132
i	5.993	15.759
j	4.716	16.077
k	1.634	16.243
m	-1.419	16.699
n	-2.733	16.644
o	-4.161	16.296
p	-4.762	15.327
q	-5.067	14.179
r	-5.680	2.755
s	-5.204	1.671
t	-4.758	1.521
u	-4.297	0.909

10/26/2012 ADDENDUM 5 - RFP HSR 11-16

Notes:

1. The tables in this appendix give the position of points on the static and dynamic outlines of the vehicle rotated for 6 inches superelevation and without widening for the effects of curve radius. See the following notes for the method of calculation of the position of these points.
2. Determine the widened and rotated swept path of the vehicle as follows:
  - a. Enlarge the width of the vehicle based on the radius of the curve. See Appendix 3.A notes 8, 9, and 10 for method of development of envelope due to curve radius.
  - b. Determine the angle of rotation from the applied superelevation as follows: The angle of rotation is  $\arcsin(\text{superelevation}/59.5 \text{ inches})$
  - c. Rotate the section by this angle about the point of rotation: The point of rotation for superelevation for both the static envelope and the dynamic envelope is the top inside corner of the inside rail of the curve, located at the track profile elevation and 28.25 inches (2.354 feet) offset from the track centerline.
3. The angle is 5.78756 degrees, or 5 deg 47 min 15 sec for 6 inches superelevation.
4. Points ec and ed do not rotate. They shift laterally a distance of 3.5 times the superelevation. For 6 inches superelevation, this distance is 21 inches or 1.75 feet.
5. The Electrical Envelope is lower in tunnel sections than in open air sections, however, the width is the same for both cases.
6. The Pantograph is shown as it would be positioned with its center at its nominal elevation of 17.417 feet, see OCS Standard and Directive Drawings.

### Appendix 3.C: High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section



**LEGEND**

- STRUCTURE GAUGE
- - - - - FIXED EQUIPMENT ENVELOPE
- WALKWAY ENVELOPE
- VEHICLE BODY DYNAMIC ENVELOPE
- · · · · ELECTRICAL ENVELOPE

Open Section		
Point ID	Horizontal Distance from TCL (feet)	Vertical Distance from TOR (feet)
<b>Structure Gauge</b>		
<b>Walkway Side (See Note 3)</b>		
A	0.00	0.00
B	11.50	0.00
C	11.50	19.50
D	4.00	27.00
E	0.00	27.00
<b>Non-Walkway Side</b>		
A	0.00	0.00
H	-10.00	0.00
G	-10.00	21.00
F	-4.00	27.00
E	0.00	27.00
<b>Under Existing Low Overhead Structures</b>		
L	7.00	24.00
M	-7.00	24.00
<b>Fixed Equipment Envelope</b>		
<b>Walkway Side (See Notes 3 &amp; 4)</b>		
a	0.00	0.00
b	6.25	0.00
c	6.25	0.67
d	10.00	0.67
e	10.00	8.17
f	8.50	8.17
g	8.50	20.50
h	4.25	24.00
i	0.00	24.00
<b>Non-Walkway Side</b>		
a	0.00	0.00
n	-6.25	0.00
m	-8.50	4.00
k	-8.50	20.50
j	-4.25	24.00
i	0.00	24.00

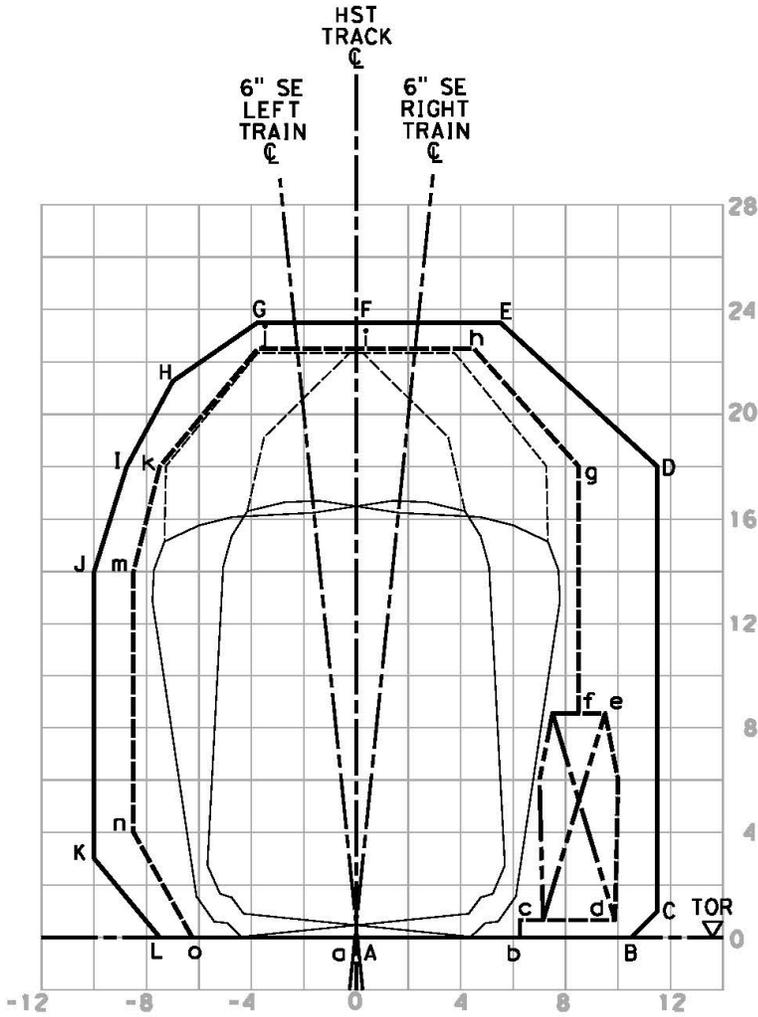
**Notes:**

1. Definition of the envelopes:
  - a. The Structure Gauge defines the minimum distances from track to permanent features such as walls, columns and overhead structures.
  - b. The Fixed Equipment Envelope defines the allowable space for fixtures such as signs, signals, lights, piping and conduits that will be attached to the permanent features defined under Structure Gauge.
  - c. The Walkway Envelope defines a space sufficient for a person to be clear of any track mounted vehicle. The envelope illustrated is 7.50 feet high by 3.00 feet wide with the top 1.50 feet tapering to a width of 2.50 feet. Its precise location may vary depending upon local conditions. Therefore, the location of points b, c, d, e, and f will vary with the location of the walkway.

10/26/2012 ADDENDUM 5 - RFP HSR 11-16

2. The Dynamic Envelopes for 6 inches superelevation each way are shown to illustrate their fit within the Structure Gauge and Fixed Equipment Envelope. See Appendix 3.B for dimensions of these envelopes.
3. Right side dimensions in the figure and table are those that apply to the walkway side regardless of the actual location of the walkway. Left side dimensions in the figure and table are those that apply to the non-walkway side regardless of the actual location of the walkway.
4. Offset to structure on walkway side shall be 12.50 feet or niches shall be provided as required for placement of larger equipment.
5. Structure shall provide sufficient clear distance below TOR for the track form, under track equipment and other fixtures that must pass under the tracks.
6. Widening of sections toward the outside of the curve is not necessary. Widening of sections toward the inside of curves of under 2,400 feet radius shall be the larger of either 0.25 feet or  $550/\text{radius}$  in feet.

### Appendix 3.D: High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels



**LEGEND**

- STRUCTURE GAUGE
- - - - - FIXED EQUIPMENT ENVELOPE
- · - · - WALKWAY ENVELOPE
- VEHICLE BODY DYNAMIC ENVELOPE
- · · · · ELECTRICAL ENVELOPE

In Tunnels		
Point ID	Horizontal Distance from TCL (feet)	Vertical Distance from TOR (feet)
<b>Structure Gauge</b>		
<b>Walkway Side</b> (See Appendix 3.C, Note 3)		
A	0.00	0.00
B	10.50	0.00
C	11.50	1.00
D	11.50	18.00
E	5.50	23.50
F	0.00	23.50
<b>Non-Walkway Side</b>		
A	0.00	0.00
L	-7.50	0.00
K	-10.00	3.00
J	-10.00	14.00
I	-8.75	18.00
H	-7.00	21.25
G	-3.75	23.50
F	0.00	23.50
<b>Fixed Equipment Envelope</b>		
<b>Walkway Side</b> (See Appendix 3.C, Notes 3 & 4)		
a	0.00	0.00
b	6.25	0.00
c	6.25	0.67
d	10.00	0.67
e	10.00	8.17
f	8.50	8.17
g	8.50	18.00
h	4.50	22.50
i	0.00	22.50
<b>Non-Walkway Side</b>		
a	0.00	0.00
o	-6.25	0.00
n	-8.50	4.00
m	-8.50	14.00
k	-7.50	18.00
j	-3.75	22.50
i	0.00	22.50

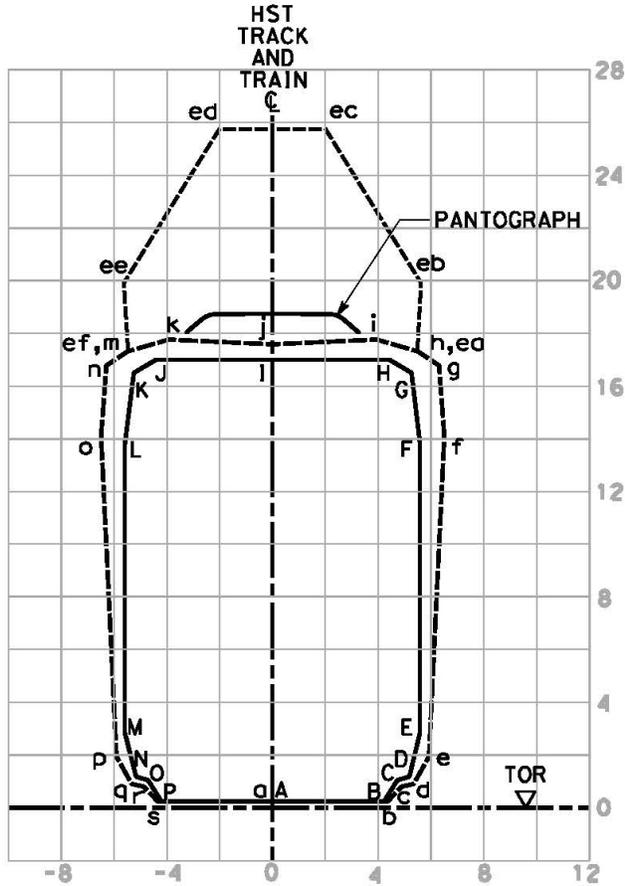
**Notes:**

- See Appendix 3.C, Notes 1 through 6.
- Corner shapes were set to clear a single track circular tunnel with a diameter of 28.50 feet and a two track tunnel with a center wall and a top arc radius of 24.00 feet as shown on the Tunnels Standard and Directive Drawings.

10/26/2012 ADDENDUM 5 - RFP HSR 11-16



### Appendix 3.E: All Passenger Equipment, Static Envelope and Dynamic Envelope, Tangent Track



**LEGEND**

- VEHICLE BODY STATIC ENVELOPE
- - - VEHICLE BODY DYNAMIC ENVELOPE
- · - · ELECTRICAL ENVELOPE

Tangent Track		
Point ID	Horizontal Distance from TCL (feet)	Vertical Distance from TOR (feet)
<b>Vehicle Body Static Envelope</b>		
A	0.000	0.229
B, P	±4.208	0.229
C, O	±4.708	1.042
D, N	±5.167	1.167
E, M	±5.583	2.833
F, L	±5.583	13.833
G, K	±5.250	16.500
H, J	±4.417	17.000
I	0.000	17.000
<b>Vehicle Body Dynamic Envelope</b>		
a	0.00	0.229
b, s	±4.354	0.229
c, r	±4.875	0.792
d, q	±5.333	0.896
e, p	±5.917	1.927
f, o	±6.500	14.104
g, n	±6.292	16.792
h, m	±5.479	17.333
i, k	±3.938	17.771
j	0.000	17.583

Point ID	Horizontal Distance from TCL (feet)	Vertical Distance from TOR (feet) (See Note 6)	
		Open Sections	In Tunnels
<b>Electrical Envelope</b>			
ea, ef	±5.479	17.333	ea, ef
eb, ee	±5.625	19.917	eb, ee
ec, ed	±2.000	25.750	ec, ed

Notes:

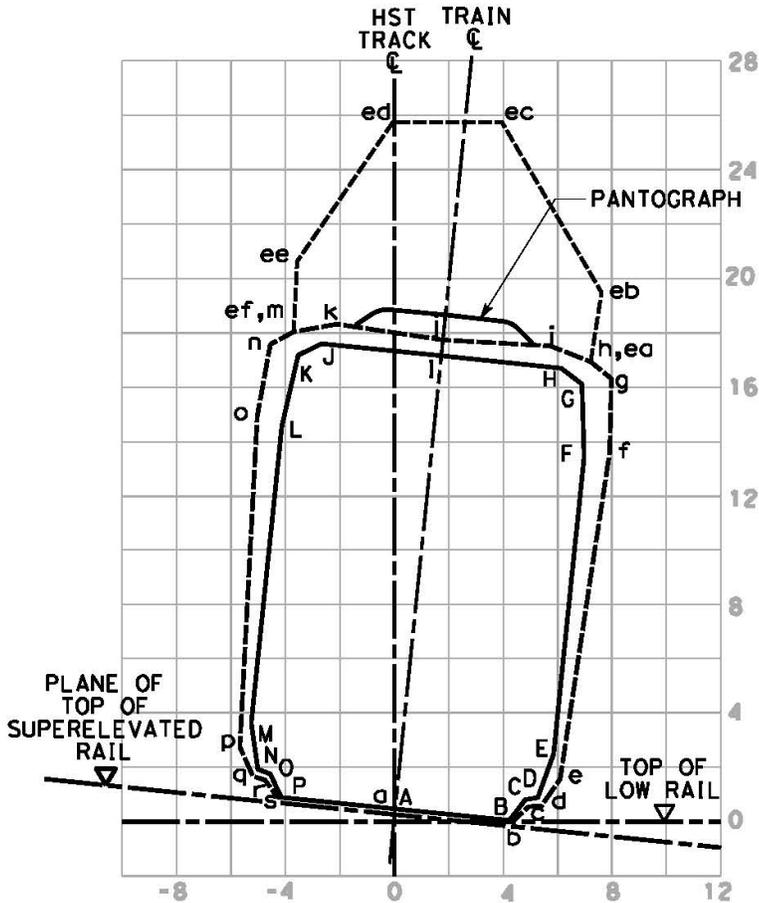
1. Definition of the envelopes:
  - a. The Vehicle Body Static Envelope defines the maximum shape and dimensions for any vehicle which may be operated on tracks that are shared with high speed passenger equipment.
  - b. The Vehicle Body Dynamic Envelope takes the static envelope to the physical limits of motion under the maximum conceivable forces combined with the maximum allowable limits of wear and deficiencies including, for clearance purposes, motion due to track deficiencies and misalignments.
  - c. The Pantograph is shown as it would be positioned with its center at its nominal elevation of 18.75 feet from TOR, see OCS Standard and Directive Drawings.
  - d. The Electrical Envelope is the allowable space for overhead electrical equipment.

10/26/2012 ADDENDUM 5 - RFP HSR 11-16

2. The Vehicle Body Static and Dynamic Envelopes are based on a combination of in-service high-speed passenger equipment, Amtrak's Bi-Level Passenger Car Clearance Diagram with the addition of roof mounted equipment on cab units, and Association of American Railroads (AAR) Plate F.
3. The Vehicle Body Static Envelope includes tolerances in the manufacture of the vehicle itself, but no allowances for any motion of the vehicle on the railroad or allowances for uneven wear of components.
4. The Vehicle Body Dynamic Envelope includes the vertical, lateral, and sway motion limits with the maximum allowable limits of wear and deficiencies such as deflated airbags and broken springs under the maximum conceivable forces. For purposes of defining clearances, this dynamic envelope also includes the effects of track conditions and alignment deviations.
5. The total movements assumed in the development of the Vehicle Body Dynamic Envelope are:
  - a. Lateral expansion: 3.50 inches
  - b. Downward expansion: 4.50 inches
  - c. Upward expansion: 6.75 inches
  - d. Angular movement: 3.00 degrees - rotated about centerline at a point 16.5 inches above TOR
6. The Electrical Envelope is lower in tunnel sections than in open air sections, however, the width is the same for both cases.
7. The width of the swept path of the vehicle body increases on curves due to mid-car and end-car overhang.
8. The width of the swept path of the vehicle body increase is determined by adding 550/radius (in feet) to the horizontal dimensions for points D, E, F, G, H, J, K, L, M, N, d, e, f, g, h, m, n, o, p, and q.
9. Points A, B, C, O, P, a, b, c, r, and s need not be shifted as they relate to components that are on the vehicle at or near the bogie positions or attached to the structure.
10. Widening may be neglected on tracks with radii of 10,000 feet or larger.
11. As an example, the increased dimensions for these points for a curve of 950 feet radius are given in the following table: (That radius is the internal radius of a standard No. 11 turnout.)

950 feet Radius					
Point ID	Horizontal Distance from TCL (feet)	Vertical Distance from TOR (feet)	Point ID	Horizontal Distance from TCL (feet)	Vertical Distance from TOR (feet)
Vehicle Body Static Envelope			Vehicle Body Dynamic Envelope		
A	0.000	0.229	a	0.000	0.229
B, P	±4.208	0.229	b, s	±4.354	0.229
C, O	±4.708	1.042	c, r	±4.875	0.792
D, N	±5.746	1.167	d, q	±5.912	0.896
E, M	±6.162	2.833	e, p	±6.496	1.927
F, L	±6.162	13.833	f, o	±7.079	14.104
G, K	±5.829	16.500	g, n	±6.871	16.792
H, J	±4.996	17.000	h, m	±6.058	17.333
I	0.000	17.000	i, k	±3.938	17.771
			j	0.000	17.583

### Appendix 3.F: All Passenger Equipment, Static Envelope and Dynamic Envelope Swept Path of Vehicle Rotated for Superelevation



**LEGEND**

- VEHICLE BODY STATIC ENVELOPE
- - - VEHICLE BODY DYNAMIC ENVELOPE
- · · ELECTRICAL ENVELOPE

Point ID	Horizontal Distance from TCL (feet)	Vertical Distance from TOR (feet) (See Note 5)	
		Open Sections	In Tunnels
<b>Electrical Envelope</b>			
ea	7.211	16.934	16.934
eb	7.619	19.490	19.490
ec	3.950	25.750	24.250
ed	-0.050	25.750	24.250
ee	-3.576	20.624	20.624
ef	-3.691	18.039	18.039

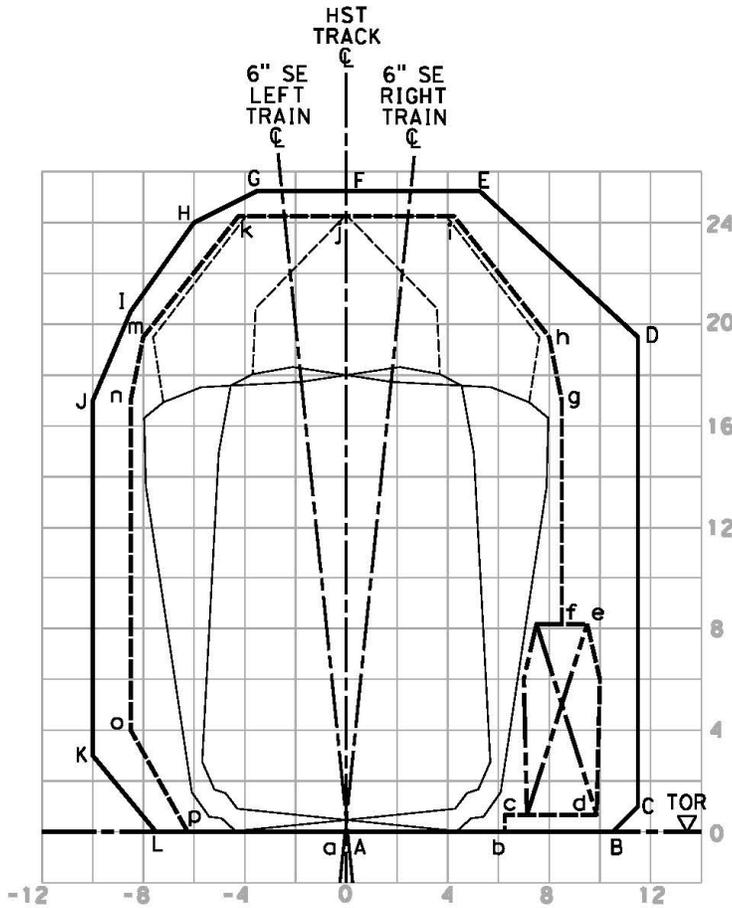
Superelevated, No Widening (Values for 6 inches superelevation tabulated. See notes for method of calculation for other values.)		
Point ID	Horizontal Distance from TCL (feet)	Vertical Distance from TOR (feet)
<b>Vehicle Body Static Envelope</b>		
A	0.035	0.465
B	4.222	0.041
C	4.801	0.799
D	5.270	0.877
E	5.853	2.493
F	6.962	13.437
G	6.899	16.124
H	6.120	16.705
I	1.726	17.151
J	-2.668	17.596
K	-3.547	17.183
L	-4.148	14.563
M	-5.257	3.619
N	-5.011	1.919
O	-4.567	1.749
P	-4.152	0.890
<b>Vehicle Body Dynamic Envelope (Without Increase in the Horizontal Dimension for the Effect of Small Radii)</b>		
a	0.035	0.465
b	4.367	0.031
c	4.924	0.538
d	5.409	0.595
e	6.093	1.562
f	7.901	13.618
g	7.965	16.313
h	7.211	16.934
i	5.722	17.525
j	1.785	17.735
k	-2.113	18.319
m	-3.691	18.039
n	-4.554	17.582
o	-5.032	14.929
p	-5.680	2.755
q	-5.204	1.671
r	-4.758	1.521
s	-4.297	0.909

10/26/2012 ADDENDUM 5 - RFP HSR 11-16

Notes:

1. The tables in this appendix give the position of points on the static and dynamic outlines of the vehicle rotated for 6 inches superelevation and without widening for the effects of curve radius. See the following notes for the method of calculation of the position of these points.
2. Determine the widened and rotated swept path of the vehicle as follows:
  - a. Enlarge the width of the vehicle based on the radius of the curve. See Appendix 3.A notes 8, 9, and 10 for method of development of envelope due to curve radius.
  - b. Determine the angle of rotation from the applied superelevation as follows: The angle of rotation is  $\arcsin(\text{superelevation}/59.5 \text{ inches})$ .
  - c. Rotate the section by this angle about the point of rotation: The point of rotation for superelevation for both the static envelope and the dynamic envelope is the top inside corner of the inside rail of the curve, located at the track profile elevation and 28.25 inches (2.354 feet) offset from the track centerline.
3. The angle is 5.78756 degrees, or 5 deg 47 min 15 sec for 6 inches superelevation.
4. Points ec and ed do not rotate. They shift laterally a distance of 3.9 times the superelevation. For 6 inches superelevation, this distance is 23.4 inches or 1.95 feet.
5. The Electrical Envelope is lower in tunnel sections than in open air sections, however, the width is the same for both cases.
6. The Pantograph is shown as it would be positioned with its center at its nominal elevation of 18.75 feet, see OCS Standard and Directive Drawings.

## Appendix 3.G: All Passenger Equipment, Structure Gauge and Fixed Equipment Envelope, Open Sections



**LEGEND**

- STRUCTURE GAUGE
- FIXED EQUIPMENT ENVELOPE
- WALKWAY ENVELOPE
- VEHICLE BODY DYNAMIC ENVELOPE
- ELECTRICAL ENVELOPE

Open Sections		
Point ID	Horizontal Distance from TCL (feet)	Vertical Distance from TOR (feet)
<b>Structure Gauge</b>		
<b>Walkway Side (See Note 3 &amp; 4)</b>		
A	0.00	0.00
B	11.50	0.00
C	11.50	20.50
D	5.00	27.00
E	0.00	27.00
<b>Non-Walkway Side</b>		
A	0.00	0.00
H	-10.00	0.00
G	-10.00	20.50
F	-5.00	27.00
E	0.00	27.00
<b>Under Existing Low Overhead Structures</b>		
L	6.25	25.75
M	-6.25	25.75
<b>Fixed Equipment Envelope</b>		
<b>Walkway Side (See Notes 1, 3, &amp; 4)</b>		
a	0.00	0.00
b	6.25	0.00
c	6.25	0.67
d	10.00	0.67
e	10.00	8.17
f	8.50	8.17
g	8.50	20.00
h	4.25	25.75
i	0.00	25.75
<b>Non-Walkway Side</b>		
a	0.00	0.00
n	-6.25	0.00
m	-8.50	4.00
k	-8.50	20.00
j	-4.25	25.75

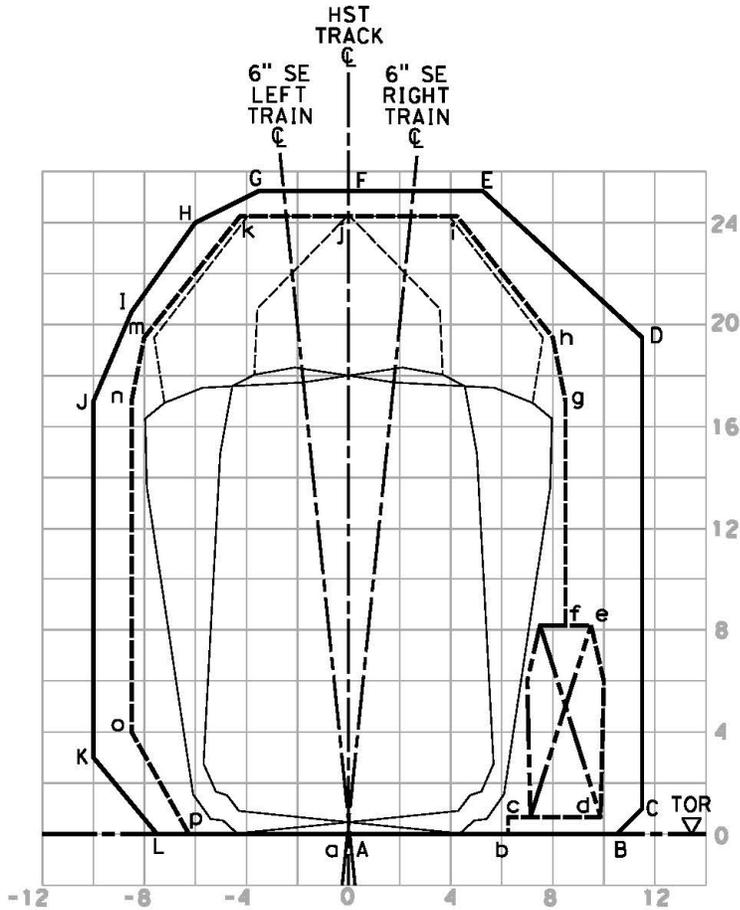
**Notes:**

1. Definition of the envelopes:
  - a. Structure Gauge defines the minimum distances from track to permanent features such as walls, columns and overhead structures.
  - b. Fixed Equipment envelope defines the allowable space for fixtures such as signs, signals, lights, piping and conduits that will be attached to the permanent features defined under Structure Gauge.
  - c. The walkway envelope defines a space sufficient for a person to be clear of any track mounted vehicle. The envelope illustrated is 7.50 feet high by 3.00 feet wide with the top 1.50 feet tapering to a width of 2.50 feet. Its precise location may vary depending upon local conditions. Therefore, the location of points b, c, d, e, and f will vary with the location of the walkway.

10/26/2012 ADDENDUM 5 - RFP HSR 11-16

2. The Dynamic Envelopes for 6 inches superelevation each way are shown to illustrate their fit within the Structure Gauge and Fixed Equipment Envelope. See Appendix 3.F for dimensions of these envelopes.
3. Right side dimensions in the figure and table are those that apply to the walkway side regardless of the actual location of the walkway. Left side dimensions in the figure and table are those that apply to the non-walkway side regardless of the actual location of the walkway.
4. Offset to structure on walkway side shall be 12.50 feet or niches shall be provided as required for placement of larger equipment.
5. Structure shall provide sufficient clear distance below TOR for the track form, under track equipment and other fixtures that must pass under the tracks.
6. Widening of sections toward the outside of the curve is not necessary. Widening of sections toward the inside of curves of under 2,400 feet radius shall be the larger of either 0.25 feet or  $550/\text{radius}$  in feet.

### Appendix 3.H: All Passenger Equipment, Structure Gauge and Fixed Equipment Envelope, In Tunnels



**LEGEND**

- STRUCTURE GAUGE
- FIXED EQUIPMENT ENVELOPE
- WALKWAY ENVELOPE
- VEHICLE BODY DYNAMIC ENVELOPE
- ELECTRICAL ENVELOPE

In Tunnels		
Point ID	Horizontal Distance from TCL (feet)	Vertical Distance from TOR (feet)
<b>Structure Gauge</b>		
<b>Walkway Side</b> (See Appendix 3.G, Note 3)		
A	0.00	0.00
B	10.50	0.00
C	11.50	1.00
D	11.50	19.50
E	5.25	25.25
F	0.00	25.25
<b>Non-Walkway Side</b>		
A	0.00	0.00
L	-7.50	0.00
K	-10.00	3.00
J	-10.00	17.00
I	-8.50	20.50
H	-6.00	24.00
G	-3.25	25.25
F	0.00	25.25
<b>Fixed Equipment Envelope</b>		
<b>Walkway Side</b> (See Appendix 3.G, Notes 3 & 4)		
a	0.00	0.00
b	6.25	0.00
c	6.25	0.67
d	10.00	0.67
e	10.00	8.17
f	8.50	8.17
g	8.50	17.00
h	8.00	19.50
i	4.25	24.25
j	0.00	24.25
<b>Non-Walkway Side</b>		
a	0.00	0.00
p	-6.25	0.00
o	-8.50	4.00
n	-8.50	17.00
m	-8.00	19.50
k	-4.25	24.25
j	0.00	24.25

**Notes:**

- See Appendix 3.G, Notes 1 through 6.
- Corner shapes were set to clear a single track circular tunnel with a diameter of 30.00 feet and a two track tunnel with a center wall and a top arc radius of 24.50 feet as shown on the Tunnels Standard and Directive Drawings.

10/26/2012 ADDENDUM 5 - RFP HSR 11-16