Impact and Control of Reflected Noise from an Overpass Bottom

Supplemental Data

Table S1 Cadna A calibration input parameters table (different overpass bottom materials (steel and RC))

Item	Parameter value	
1. Noise source on road		
(1) Average vehicle speed (measured)		
Road name	Light vehicle (km/h)	Heavy vehicle (km/h)
A. National Freeway No. 1 (Northbound)	90	88
B. National Freeway No.1 (Southbound)	93	88
C. Xiwu Overpass (Northbound)	88	86
D. Xiwu Overpass (Southbound)	96	91
(2) Traffic flow (measured)		
Road name	Traffic flow (vehicle/h)	Heavy vehicle ratio (%)
A. National Freeway No. 1 (Northbound)	3,903	16.3
B. National Freeway No. 1 (Southbound)	4,605	16.0
C. Xiwu Overpass (Northbound)	4,978	1.1
D. Xiwu Overpass (Southbound)	3,722	1.5
(3) Pavement surface corrected value	3 dB is used for model calibration. After correction, the simulation values (L_{eq}/1h) at each measurement site should be close to measurement values.	
2. Road structures		
(1) Basic geometry		

Road name	Number of lanes	Road elevation (m)	Road width (m)
A. National Freeway No. 1 (Northbound)	4	6.2 ~ 7.2	20.1
B. National Freeway No. 1 (Southbound)	4	5.8 ~ 7.1	20.1
C. Xiwu Overpass (Northbound)	3	16.1 ~ 18.8	15.8
D. Xiwu Overpass (Southbound)	3	15.7 ~ 19.1	15.8

3. Civil structures
(1) Buildings
A. Corrected value for building reflection: 2 dB (A) (default value for the model). B. The height of each floor is around 3 m.
(2) Acoustic barriers

Item	Height (m)	Form	Sound absorption coefficient
Embankment section	4	Cement board	Inner side: 0.21 Outer side: 0.21
Bridge section	2 (not including breast wall)	Metal board	Inner side: 0.6 Outer side: 0

4. Sound absorption rate of overpass bottom: Steel: 0; RC: 0.02.

Table S2 Cadna A calibration input parameters table (different overpass heights)

Item	Parameter value	
1. Noise source on road		
(1) Average vehicle speed (measured)		
Road name	Light vehicle (km/h)	Heavy vehicle (km/h)
A. National Freeway No. 1 (Northbound)	88	81
B. National Freeway No.1 (Southbound)	92	83
C. Xiwu Overpass (Northbound)	91	88
D. Xiwu Overpass (Southbound)	92	86
(2) Traffic flow (measured)		
Road name	Traffic flow (vehicle/h)	Heavy vehicle ratio (%)
A. National Freeway No. 1 (Northbound)	2,208	14.3
B. National Freeway No. 1 (Southbound)	2,768	16.3
C. Xiwu Overpass (Northbound)	1,422	4.25
D. Xiwu Overpass (Southbound)	1,629	4.3
(3) Pavement surface corrected value	0 dB is used for model calibration. After correction, the simulation values (L_{eq}/1h) at each measurement site should be close to the measurement values.	
2. Road structures		
(1) Basic geometry		

Road name	Number of lanes	Road elevation (m)	Road width (m)
A. National Freeway No. 1 (Northbound)	2	11.6 ~ 14.2	12.6
B. National Freeway No. 1 (Southbound)	2	11.6 ~ 14.4	12.6
C. Xiwu Overpass (Northbound)	2	13.1 ~ 31.7	12.0
D. Xiwu Overpass (Southbound)	2	19.7 ~ 31.7	12.0

3. Civil structures

(1) Buildings

A. Corrected value for building reflection: 2 dB (A) (default value for the model).
B. The height of each floor is around 3 m.

(2) Acoustic barriers

Item	Height (m)	Form	Sound absorption coefficient
Embankment section	4	Cement board	Inner side: 0.21 Outer side: 0.21
Bridge section	2 (not including breast wall)	Metal board	Inner side: 0.6 Outer side: 0

4. Sound absorption rate of overpass bottom: RC: 0.02.

Table S3 Cadna A calibration input parameters table (overpass crossing the road)

Item	Parameter value	
1. Noise source on road		
(1) Average vehicle speed (measured)		
Road name	Light vehicle (km/h)	Heavy vehicle (km/h)
A. National Freeway No. 1 (Northbound)	105	88
B. National Freeway No.1 (Southbound)	107	85
(2) Traffic flow (measured)		
Road name	Traffic flow (vehicle/h)	Heavy vehicle ratio (%)
A. National Freeway No. 1 (Northbound)	4,560	15.4
B. National Freeway No. 1 (Southbound)	4,287	17.0
(3) Pavement surface corrected value	0 dB is used for model calibration. After correction, the simulation values (L_{eq}/1h) at each measurement point should be close to the measurement values.	

2. Road structures			
(1) Basic geometry			
Road name	Number of lanes	Road elevation (m)	Road width (m)
A. National Freeway No. 1 (Northbound)	4	115.0 ~ 125.5	20.1
B. National Freeway No. 1 (Southbound)	3	115.0 ~ 125.5	16.4

3. Civil structures
(1) Buildings
A. Corrected value for building reflection: 2 dB (A) (default value for the model). B. The height of each floor is around 3 m.
(2) Acoustic barriers

Item	Height (m)	Form	Sound absorption coefficient
Embankment section	2 (not including breast wall)	Metal board	Inner side: 0.21 Outer side: 0.21

4. Sound absorption rate of overpass bottom: RC: 0.02.