

As State highway agencies (SHAs) continue to expand existing highway systems it is likely that they will encounter projects with noise barriers already in place due to previous Federal-aid projects. This memorandum outlines the process for considering the feasibility and reasonableness of replacing or improving existing noise barriers.

The noise analysis process involves determination of existing noise levels and prediction of future noise levels associated with construction of the proposed project. The SHA should conduct the noise analysis for locations with existing noise barriers exactly as they would for any other location and include the existing noise barrier in the analysis. If there are no noise impacts behind the barrier, the process is complete for that noise sensitive area (NSA). If impacts are predicted with the project, further consideration is necessary.

The next step in the assessment is to determine noise levels for impacted NSA(s) with existing noise barriers in a “no barrier” scenario. This is a prediction of the design year noise levels for the NSA(s) without the presence of a barrier. The SHA can then compare the “no barrier” case to the “with barrier” case to determine whether the existing noise barrier(s) satisfies the requirements of the SHA noise policy. If the barrier(s) meet these requirements, no further action is necessary. This approach is acceptable, even though impacts still exist, because the goal of noise abatement is to achieve a substantial reduction in noise levels; not to reduce noise levels below the Noise Abatement Criteria (NAC). In this case, the existing noise barrier achieves an abatement design that is acceptable under the SHA noise policy.

If the existing barrier does not meet the current policy requirements the SHA should retrofit, or replace the existing barrier(s) to satisfy the SHA noise policy requirements.

Examples

For the following examples assume that the SHA has established in the noise policy that 50% of impacted receptors must be feasible (achieve a 5 dB(A) reduction) and that 50% of benefiting receptors must achieve the design goal. The SHA defines benefiting as any receptor that achieves a 5 dB(A) reduction and the design goal is 7 dB(A).

Example 1: The noise analyst prepared a model using the FHWA Traffic Noise Model (TNM) that includes an existing noise barrier. The results of the model indicate there are no noise impacts behind the existing barrier. In this case, no further consideration is necessary.

Example 2: The noise analyst prepared a model using the FHWA TNM that includes an existing noise barrier. The results of the model indicate that design year noise levels at ten of thirty residences behind the existing barrier approach or exceed the Noise Abatement Criteria and require consideration of noise abatement. The results of the analysis are as follows:

Consideration of Existing Noise Barriers in a Type I Noise Analysis FHWA-HEP-12-051

Receiver #	Noise Level w/o Barrier	Noise Level w/Barrier	Reduction from Barrier	Impacted	Benefiting (Y/N)	Feasible (Y/N)	Achieves Design Goal (Y/N)
1	77.5	67.5	10	Y	Y	Y	Y
2	78.6	68.2	10.4	Y	Y	Y	Y
3	74.3	67.1	7.2	Y	Y	Y	Y
4	75.8	67.4	8.4	Y	Y	Y	Y
5	72.6	64.1	8.5	N	Y	Y	Y
6	72.4	65.5	6.9	N	Y	N	Y
7	72.9	65.1	7.8	N	Y	Y	Y
8	74.9	65.8	9.1	N	Y	Y	Y
9	71.3	63.5	7.8	N	Y	Y	Y
10	70.4	62.5	7.9	N	Y	Y	Y
11	70.4	62.1	8.3	N	Y	Y	Y
12	70.9	63.4	7.5	N	Y	Y	Y
13	68.4	62.5	5.9	N	Y	Y	N
14	68.1	62.7	5.4	N	Y	Y	N
15	67.9	62.9	5	N	Y	Y	N
16	67.5	63.1	4.4	N	N	N	N
17	66.4	60.5	5.9	N	Y	Y	N
18	64.5	59.3	5.2	N	Y	-	N
19	64.8	60.1	4.7	N	N	-	N
20	63.8	58.9	4.9	N	N	-	N
21	63.1	59.2	3.9	N	N	-	N
22	62.7	59.4	3.3	N	N	-	N
23	61.8	59.1	2.7	N	N	-	N
24	59.4	55.4	4	N	N	-	N
25	59.8	56.4	3.4	N	N	-	N
26	58.7	56.2	2.5	N	N	-	N
27	69.4	62.3	7.1	N	Y	Y	Y
28	70.1	64.5	5.6	N	Y	Y	N
29	71.6	63.2	8.4	N	Y	Y	Y
30	72.2	66	6.2	Y	Y	Y	N
Total				5	21	19	14

With the barrier, there are 5 impacted receptors. The existing barrier reduces the noise level by 5 dB(A) or more for all 5 impacted receptors, so the existing barrier meets the feasibility requirements of the SHA noise policy. There are 21 benefiting receptors, so at least 11 of these receptors must achieve the design goal to meet the reasonableness requirement. Fourteen (14) benefiting receptors meet the design goal. In this case, the existing barrier performs according to the requirements of the SHA policy, so no further action is required.

Example 3: The noise analyst prepared a model using the FHWA TNM that includes an existing noise barrier. The results of the model indicate that design year noise levels at 10 of 30 residences behind the existing barrier approach or exceed the Noise Abatement Criteria and require consideration of noise abatement. The results of the analysis are as follows:

Receiver #	Noise Level w/o Barrier	Noise Level w/Barrier	Reduction from Barrier	Impacted	Benefiting (Y/N)	Feasible (Y/N)	Achieves Design Goal (Y/N)
1	77.5	72.6	4.9	Y	N	N	N
2	78.6	72.1	6.5	Y	Y	Y	N
3	74.3	67.1	7.2	Y	Y	Y	Y
4	75.8	67.4	8.4	Y	Y	Y	Y
5	72.6	64.1	8.5	N	Y	-	Y
6	72.4	65.5	6.9	N	Y	-	N
7	72.9	65.1	7.8	N	Y	-	Y
8	74.9	65.8	9.1	N	Y	-	Y
9	71.3	63.5	7.8	N	Y	-	Y
10	70.4	65.3	5.1	N	Y	-	N
11	70.4	65.9	4.5	N	N	-	N
12	70.9	66.4	4.5	Y	N	N	N
13	68.4	65.2	3.2	N	N	-	N
14	68.1	63.5	4.6	N	N	-	N
15	67.9	63.9	4	N	N	-	N
16	67.5	63.1	4.4	N	N	-	N
17	66.4	60.5	5.9	N	Y	-	N
18	64.5	59.3	5.2	N	Y	-	N
19	64.8	60.1	4.7	N	N	-	N
20	63.8	58.9	4.9	N	N	-	N
21	63.1	59.2	3.9	N	N	-	N
22	62.7	59.4	3.3	N	N	-	N
23	61.8	59.1	2.7	N	N	-	N
24	59.4	55.4	4	N	N	-	N
25	59.8	56.4	3.4	N	N	-	N
26	58.7	56.2	2.5	N	N	-	N
27	69.4	63.5	5.9	N	Y	-	N
28	70.1	64.5	5.6	N	Y	-	N
29	71.6	65.5	6.1	N	Y	-	N
30	72.2	67	5.2	Y	Y	Y	N
Total				6	15	4	6

With the barrier, there are 6 impacted receptors. The existing barrier reduces the noise level by 5 dB(A) or more for 4 impacted receptors, so the existing barrier meets the feasibility requirements of the SHA noise policy. There are 15 benefiting receptors, so at least 8 of these receptors must achieve the design

goal to meet the reasonableness requirement. Six (6) benefiting receptors meet the design goal. In this case, the existing barrier does not perform according to the requirements of the SHA policy, so further action is necessary.

The SHA should develop a noise abatement design using the FHWA TNM that satisfies the requirements of the SHA noise policy. This abatement design is subject to the requirements of 23 CFR Section 772.13 for feasibility and reasonableness. In this scenario, the SHA should evaluate the new abatement design for cost reasonableness and if the abatement design is otherwise feasible and reasonable the SHA would solicit the view points of the benefited residents and property owners. If the SHA determines that either retrofitting or replacing an existing barrier is not cost reasonable, the existing barrier should remain in place.

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