

Construction Stage Sound Quality Impact Evaluation

1. Noise Sensitive Areas Near the Proposed Action

Noise sensitive areas near the proposed improvements are residences located along the crossroads and frontage roads at the following interchanges: CTH C, STH 142, and CTH E in Kenosha County; CTH KR at the Kenosha/Racine County line; and STH 11, CTH K, CTH G, and 7 Mile Road in Racine County. The estimated number of potential receptors is 200, including an approximately 150-unit mobile home park at the CTH KR interchange.

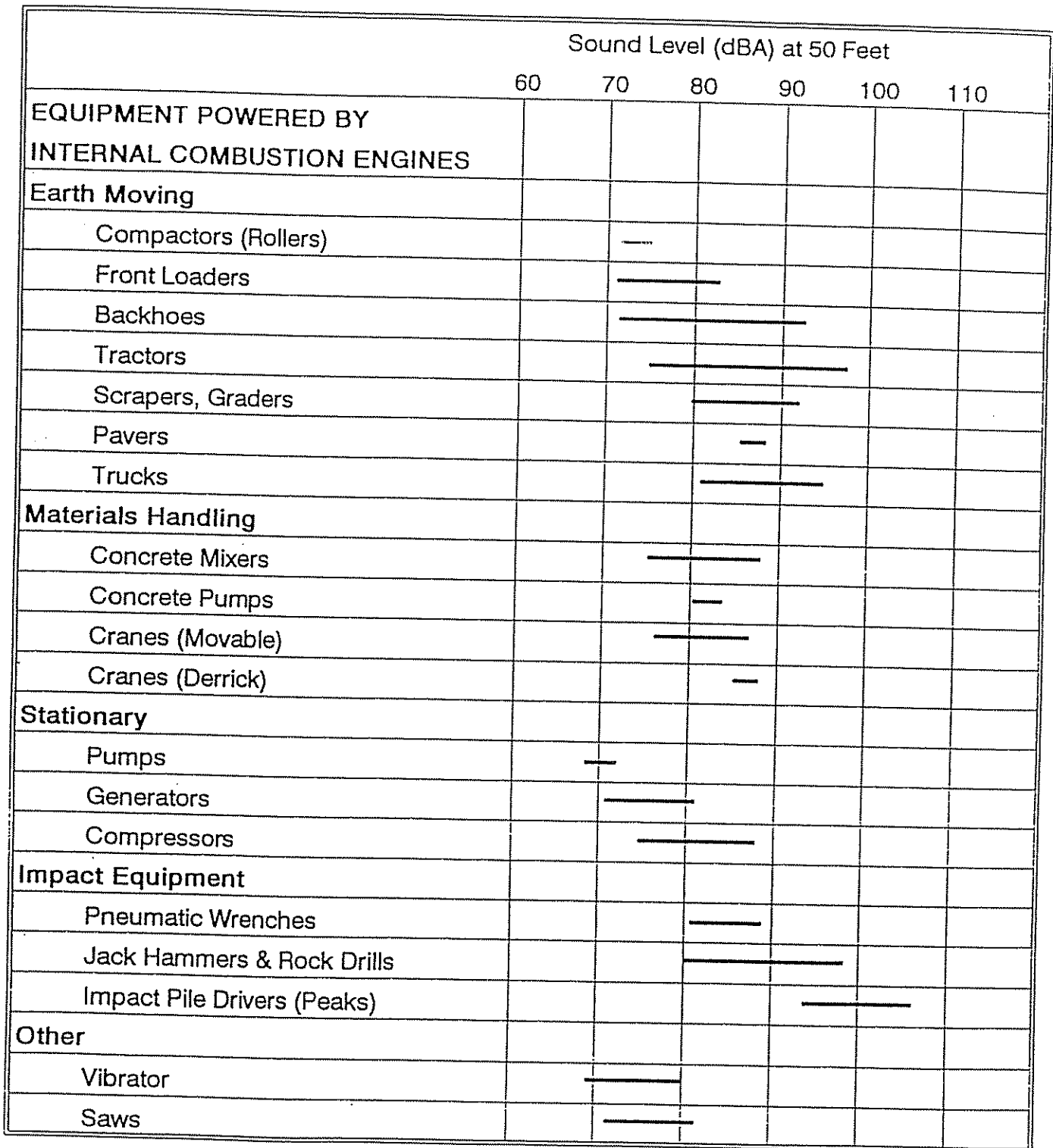
2. Construction Equipment Noise

Typical construction equipment would include dump trucks, graders, bulldozers, chainsaws, and pavement construction equipment. The noise generated by construction equipment varies greatly depending on equipment type, model, make, duration of operation, and specific type of work effort. However, typical noise levels may occur in the 67 to 107 dBA range at a distance of 15 meters (50 feet) from the noise source. Figure 19 shows typical noise levels for a variety of construction equipment. Adverse effects related to construction noise are anticipated to be of a localized, temporary, and transient nature.

3. Construction Stage Noise Abatement Measures

To reduce the potential impact of construction noise, the special provisions for this project will require that motorized equipment be operated in compliance with all applicable local, state, and federal laws and regulations relating to noise levels permissible within and adjacent to the project construction site. At a minimum, the special provisions will require that motorized construction equipment not be operated between 10:00 p.m. and 6:00 a.m. without the prior written approval of the project engineer. All motorized construction equipment will be required to have mufflers constructed in accordance with the equipment manufacturer's specifications or a system of equivalent noise reducing capacity. It will also be required that mufflers and exhaust systems be maintained in good operating condition, free from leaks and holes.

CONSTRUCTION EQUIPMENT SOUND LEVELS



SOURCE: Figure 2-36, Report to the President and Congress on Noise, Prepared by the U.S. EPA, February 1972



General Sound Quality Impact Evaluation

1. Noise Analysis

A traffic noise analysis was completed for this project. The FHWA traffic noise prediction computer program, STAMINA 2.0/OPTIMA, was used to model existing and future (2020) sound levels for both the no-build and recommended build alternative.

Sixty-three representative receptor locations, which represented one hundred and sixty-two properties, were selected to illustrate the noise impact along the project corridor. These locations are shown on Figures 7 through 18. The results of the modeling are shown in the table below.

2. Existing/Future Sound Levels

Due to their proximity to the I-94 freeway, most receptor locations along the corridor are presently exposed to sound levels which approach or exceed the WisDOT/FHWA Noise Abatement Criteria (NAC). The noise analysis indicates that sound levels of 120 residences, 9 motels and 14 commercial properties currently approach or exceed the NAC.

Traffic volume on I-94 will continue to increase whether the Build or No-Build alternative for this project is selected. Sound levels along the freeway will also increase along with the increased traffic volume.

The noise analysis indicates that for both the build and no-build alternative, future sound levels at 123 residences, 10 motels, 1 church, and 14 commercial properties will approach or exceed the NAC.

Impact Summary

Receptor Location or Site Identification (see attached map)	Distance from C/L. of Near Lane to Receptor Site, m	Number of Families or People Typical of this Receptor Site	Sound Level, Leq (dBA)				Impact Evaluation		
			Noise Abatement Criteria (NAC)	No Build Noise Level	Future Noise Level	Existing Noise Level	Difference in Future and Existing Noise Levels (Col. f minus Col. g)	Difference in Future Noise Level and Abatement Criteria (Col. f minus Col. d)	Impact or No Impact
a	b	c	d	e	f	g	h	i	k
R1-CTH C	272m (892 ft)	1C	72	70	70	68	2	-2	N
R2-CTH C	137m (449 ft)	2R	67	73	73	70	3	6	I
R3-CTH C	187m (614 ft)	1R	67	72	72	69	3	5	I
R4-CTH C	272m (892 ft)	2R	67	69	69	66	3	2	I
R5-CTH C	297m (974 ft)	2R	67	69	69	66	3	2	I
R6-CTH C	62m (203 ft)	2R	67	77	77	74	3	10	I
FS-1-CTH C	312m (1,024ft)	1R	67	73	73	69	4	6	I

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a	b	c	d	e	f	g	h	i	k
R7-STH 50	87m (285 ft)	1M	67	76	76	74	2	9	I
R7-STH 50		1C	72	76	76	74	2	4	I
R8-STH 50	167m (548 ft)	1M	67	71	71	69	2	4	I
R9-STH 50	257m (243 ft)	1M	67	69	70	67	3	3	I
FS-2-STH 50	72m (236 ft)	1M	67	76	76	74	2	9	I
FS-2-STH 50		1C	72	76	76	74	2	4	I
R10-STH 50	47m (154 ft)	2R	67	78	78	76	2	11	I
R11-STH 50	472m (1,549ft)	10R	67	65	65	63	2	-2	N
R12-STH 158	107m (351 ft)	1R	67	74	74	71	3	7	I
FS-3-STH 158	127m (417 ft)	9R	67	73	73	70	3	6	I
R13-STH 158	67m (220 ft)	1R	67	76	76	74	2	9	I
FS-4-STH142	77m (253 ft)	2R	67	76	76	73	3	9	I
R14-STH142	117m (384 ft)	1C	72	74	74	71	3	2	I
R15-STH142	292m (958 ft)	1R	67	70	70	67	3	3	I
R16-STH142	317m (1,040ft)	1R	67	69	69	66	3	2	I
R17-STH142	52m (171 ft)	1R	67	78	78	75	3	11	I
R18-CTH E	107m (351 ft)	2R	67	74	74	71	3	7	I
R19-CTH E	77m (253 ft)	3R	67	76	76	73	3	9	I
R20-CTH E	217m (712 ft)	2R	67	71	71	68	3	4	I
R21-CTH E	187m (614 ft)	2R	67	72	72	69	3	5	I
R22-CTH E	317m (1,040ft)	1R	67	70	70	67	3	3	I
R23-CTH E	177m (581 ft)	1R	67	72	72	69	3	5	I
FS-5-CTH E	107m (351 ft)	1R	67	75	75	72	3	8	I
R24-CTH KR	387m (1,270ft)	1R	67	69	69	65	4	2	I
R25-CTH KR	67m (220 ft)	1R	67	77	77	74	3	10	I
FS-6-CTH KR	107m (351 ft)	2R	67	75	75	72	3	8	I
R26-CTH KR	237m (778 ft)	17R	67	70	70	67	3	3	I
R27-CTH KR	257m (843 ft)	1R	67	64	64	60	4	-3	N

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a	b	c	d	e	f	g	h	i	k
R26-CTH KR	237m (778 ft)	17R	67	70	70	67	3	3	I
R27-CTH KR	257m (843 ft)	1R	67	64	64	60	4	-3	N
R27-CTH KR		1C	72	64	64	60	4	-8	N
R28-CTH KR	77m (253 ft)	1R	67	76	76	73	3	9	I
R29-STH 11	92m (302 ft)	3R	67	75	75	72	3	8	I
R30-STH 11	127m (417 ft)	2R	67	74	74	70	4	7	I
R31-STH 11	337m (1,106ft)	1R	67	68	68	65	3	1	I
R31-STH 11		1R	67	68	68	65	3	1	I
R32-STH 11	337m (1,106ft)	1M	67	68	68	65	3	1	I
R32-STH 11		1C	72	68	68	65	3	-4	N
R33-STH 11	107m (351 ft)	1R	67	75	75	72	3	8	I
FS-7-STH 11	307m (1,007ft)	1R	67	69	69	66	3	2	I
FS-8-STH 20	57m (187 ft)	1M	67	78	78	75	3	11	I
FS-8-STH 20		1C	72	78	78	75	3	6	I
R34-STH 20	82m (269 ft)	3C	72	76	76	73	3	4	I
R35-STH 20	77m (253 ft)	3R	67	76	76	74	2	9	I
R36-CTH K	87m (285 ft)	3R	67	76	76	73	3	9	I
R37-CTH K	327m (1,073ft)	2R	67	69	69	66	3	2	I
R38-CTH K	197m (646 ft)	2R	67	72	72	69	3	5	I
R39-CTH K	287m (942 ft)	1R	67	71	72	68	4	5	I
R40-CTH K	67m (220 ft)	3R	67	77	77	75	2	10	I
FS-10-CTH K	402m (1,319ft)	1R	67	74	74	71	3	7	I
R41-CTH G	102m (335 ft)	5R	67	75	75	72	3	8	I
FS-11-CTH G	277m (909 ft)	3R	67	70	70	67	3	3	I
R42-CTH G	507m (1,663ft)	1CH	67	66	66	63	3	-1	I
R43-CTH G	92m (302 ft)	2R	67	76	76	73	3	9	I

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a	b	c	d	e	f	g	h	i	k
R43-CTH G		3C	72	76	76	73	3	4	I
R44-CTH G	67m (220 ft)	3R	67	78	78	75	3	11	I
FS-12-7 MILE	72m (236 ft)	9R	67	77	77	74	3	10	I
FS-12-7 MILE		3C	72	77	77	74	3	5	I
R45-7 MILE	332m (1,089ft)	3R	67	69	70	66	4	3	I
R46-7 MILE	237m (778 ft)	2R	67	71	71	68	3	4	I
R47-7 MILE	97m (318 ft)	1M	67	76	76	73	3	9	I
R48-7 MILE	237m (778 ft)	1R	67	70	70	68	2	3	I
R49-7 MILE	72m (236 ft)	1M	67	77	77	74	3	10	I
R49-7 MILE		3R	67	77	77	74	3	10	I
R49-7 MILE		1R	67	77	77	74	3	10	I
FS-13-27TH ST	72m (236ft)	2M	67	77	77	74	3	10	I
FS-13-27TH ST		1C	72	71	71	68	3	-1	I
R50-27TH ST	107m (351 ft)	1R	67	75	75	72	3	8	I
R51-27TH ST	67m (220 ft)	4R	67	78	78	75	3	11	I

(*) From Wisconsin Administrative Code - TRANS 405.04 (2) (b) (Siting Criteria and Policies), I - Impact, N - No Impact
 Receptors: C - Commercial, CH - Church, M - Motel, R - Residential

3. Noise Abatement Measures

Various methods of noise abatement were investigated for locations where traffic noise impacts occur. Among these were a restriction of truck traffic to certain times of day on I-94, total prohibition of trucks from I-94, modification of horizontal or vertical alignments, acquisition of property to create buffer zones, noise insulation of structures, and noise barriers.

The I-94 freeway is a vital link for local, regional, and interstate commerce. Restriction or prohibition of trucks on the freeway would have a substantial negative effect on the efficient flow of goods and is not considered a feasible abatement measure.

Substantial modification of the vertical or horizontal alignment of I-94 is beyond the scope of this project. Modification of the vertical or horizontal alignment of ramps and frontage

roads will not substantially reduce sound levels along the corridor since the noise impact is caused by I-94 freeway traffic.

Creating a buffer strip would require the acquisition of approximately 200 meter (650 feet) wide strips of land along both sides of I-94 in undeveloped areas. This would remove many hectares of land from the local tax base at a very high cost to the Department and is not considered reasonable.

Funding for noise insulation is only considered when public use or non-profit institutional buildings are exposed to sound levels which may impair their use. No sites meeting this criteria were identified.

Wisconsin Administrative Code TRANS 405 contains criteria for analyzing the reasonability and feasibility of noise barrier construction. Barriers are considered feasible if an eight decibel sound reduction can be achieved. Barriers are considered reasonable if they can be constructed for less than \$30,000 per abutting residence. Two residential areas with the highest potential for meeting these criteria were identified and analyzed.

The first area is a mobile home park located in the southeast quadrant of the CTH KR interchange east of I-94 and south of CTH KR in Kenosha County. The abutting nine homes are approximately 140 meters (462 feet) from the center line of the freeway. An 8-decibel reduction is feasible with a 6- to 7-meter (20- to 23-foot) high noise barrier. The estimated cost for the noise barrier, \$194.00 per square meter (\$18.00 per square foot), would be \$1,314,000, which corresponds to \$146,000 per abutting residence.

The second residential area analyzed consists of four residences located approximately 75 meters (248 feet) west of I-94 and 950 meters (3,117 feet) north of CTH G in Racine County. An 8-decibel reduction would be achieved with a 6- to 7-meter (20- to 23-foot) high noise barrier. The estimated cost for the barrier, \$194.00 per square meter (\$18.00 per square foot), would be \$696,000, or \$174,000 per residence.

Both locations exceed the cost criteria of \$30,000 per abutting residence. All other noise impacted areas will have a higher cost per residence for noise barrier construction. Therefore, noise barrier construction is not considered reasonable.

4. Undeveloped Areas

Several undeveloped areas along the I-94 corridor are exposed to sound levels above the NAC. In order to facilitate proper and compatible land use planning in these areas, WisDOT will notify the governmental agencies with zoning authority of the existing and future sound levels in these areas.