

Appendix D
Noise Data

APWRA

Construction Noise Summary

Construction Phase	Lmax (dBA) at Various Distance from Construction Site (feet)								Leq (dBA) at Various Distance from Construction Site (feet)							
	50	100	200	400	800	1,600	3,200	6,400	50	100	200	400	800	1,600	3,200	6,400
Phase 1 - Decommissioning & Foundation Removal	88	80	72	63	55	46	35	21	83	75	67	59	50	41	30	17
Phase 2 - Laydown, Substations and Switch Yards	89	81	73	65	56	47	36	23	85	76	68	60	51	42	31	18
Phase 3 - Road Construction	91	83	75	66	58	49	38	24	87	79	71	62	54	44	34	20
Phase 4 - WTG Foundations & Batch Plant	95	87	79	71	62	53	42	29	86	78	70	61	53	43	33	19
Phase 5 - WTG Delivery & Installation	84	76	68	60	51	42	31	18	79	71	63	55	46	37	26	12
Phase 6 - Utility Collector Line Installation	86	78	70	61	53	43	33	19	81	73	65	57	48	39	28	15
Phase 7 - Cleanup & Restoration	86	78	70	62	53	44	33	20	82	74	66	58	49	40	29	16

Construction Phase	Distance (feet) to Various Noise Level (dBA)			
	Lmax		Leq	
	70	65	50	45
Phase 1 - Decommissioning & Foundation Removal	235	347	822	1,105
Phase 2 - Laydown, Substations and Switch Yards	261	385	910	1,224
Phase 3 - Road Construction	289	458	1,132	1,522
Phase 4 - WTG Foundations & Batch Plant	436	624	1,033	1,389
Phase 5 - WTG Delivery & Installation	169	268	547	867
Phase 6 - Utility Collector Line Installation	191	283	677	1,074
Phase 7 - Cleanup & Restoration	204	301	750	1,188

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Construction Phase: Decommissioning & Foundation Removal

Noise-Generating Construction Equipment

Equipment Type	Individual Equipment		Combined Equipment		
	SPL Lmax at 50 ft	Acoustic Usage Factor	No. of Pieces	SPL Lmax at 50 ft	SPL Leq at 50 ft
All Other Equipment > 5 HP	85	0.50			
Auger Drill Rig	84	0.20			
Backhoe	78	0.40			
Bar Bender	80	0.20			
Blasting	94	0.01			
Boring Jack Power Unit	83	0.50			
Chain Saw	84	0.20			
Clam Shovel (dropping)	87	0.20			
Compactor (ground)	83	0.20			
Compressor (air)	78	0.40			
Concrete Batch Plant	83	0.15			
Concrete Mixer Truck	79	0.40			
Concrete Pump Truck	81	0.20			
Concrete Saw	90	0.20			
Crane	81	0.16	1	81	73.0
Dozer	82	0.40			
Drill Rig Truck	79	0.20			
Drum Mixer	80	0.50			
Dump Truck	76	0.40	1	76	72.0
Excavator	81	0.40	1	81	77.0
Flat Bed Truck	74	0.40	1	74	70.0
Front End Loader	79	0.40			
Generator	81	0.50			
Generator (<25KVA, VMS signs)	73	0.50			
Gradall	83	0.40			
Grader	85	0.40	1	85	81.0
Grapple (on backhoe)	87	0.40			
Horizontal Boring Hydr. Jack	82	0.25			
Hydra Break Ram	90	0.10			
Impact Pile Driver	101	0.20			
Jackhammer	89	0.20			
Man Lift	75	0.20			
Mounted Impact Hammer (hoe ram)	90	0.20			
Pavement Scarafier	90	0.20			
Paver	77	0.50			
Pickup Truck	75	0.40			
Pneumatic Tools	85	0.50			
Pumps	81	0.50			
Refrigerator Unit	73	1.00			
Rivit Buster/chipping gun	79	0.20			
Rock Drill	81	0.20			
Roller	80	0.20			
Sand Blasting (Single Nozzle)	96	0.20			
Scraper	84	0.40			
Shears (on backhoe)	96	0.40			
Slurry Plant	78	1.00			
Slurry Trenching Machine	80	0.50			
Soil Mix Drill Rig	80	0.50			
Tractor	84	0.40			
Vacuum Excavator (Vac-truck)	85	0.40			
Vacuum Street Sweeper	82	0.10			
Ventilation Fan	79	1.00			
Vibrating Hopper	87	0.50			
Vibratory Concrete Mixer	80	0.20			
Vibratory Pile Driver	101	0.20			
Warning Horn	85	0.05			
Water Jet Deleading	83	0.20			
Welder / Torch	74	0.40			
COMBINED EQUIPMENT (SPL AT 50 FEET)	--	--	5	88.0	83.5

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

Modeled Noise Levels at Varying Distances (Includes Hemispherical Spreading and Atmospheric Absorption)

Molecular Absorption	0.0007	dBA		
Anomalous Excess Attenuation	0.001	dBA		
Ground Type (soft or hard)	soft			
Equivalent Source-Receiver Height (Hs+Hr)/2	6	feet		
FTA Ground Attenuation Factor G	0.643	dBA		
Distance from Construction Site (feet)	Noise Level with Attenuation		Noise Level with Barrier (Levees)	
	Outdoor Leq	Outdoor Lmax	Noise Reduction	Outdoor Leq
100	75	80	0	75
200	67	72	0	67
400	59	63	0	59
800	50	55	0	50
1,600	41	46	0	41
3,200	30	35	0	30
6,400	17	21	0	17

Sound propagation calcs by FTA Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. May 2006.

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

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Construction Phase: Laydown Yards Substations and Switch Yards

Noise-Generating Construction Equipment

Equipment Type	Individual Equipment		Combined Equipment		
	SPL Lmax at 50 ft	Acoustic Usage Factor	No. of Pieces	SPL Lmax at 50 ft	SPL Leq at 50 ft
All Other Equipment > 5 HP	85	0.50			
Auger Drill Rig	84	0.20			
Backhoe	78	0.40			
Bar Bender	80	0.20			
Blasting	94	0.01			
Boring Jack Power Unit	83	0.50			
Chain Saw	84	0.20			
Clam Shovel (dropping)	87	0.20			
Compactor (ground)	83	0.20	1	83	76.0
Compressor (air)	78	0.40			
Concrete Batch Plant	83	0.15			
Concrete Mixer Truck	79	0.40			
Concrete Pump Truck	81	0.20			
Concrete Saw	90	0.20			
Crane	81	0.16			
Dozer	82	0.40	1	82	78.0
Drill Rig Truck	79	0.20			
Drum Mixer	80	0.50			
Dump Truck	76	0.40	1	76	72.0
Excavator	81	0.40			
Flat Bed Truck	74	0.40	1	74	70.0
Front End Loader	79	0.40	1	79	75.0
Generator	81	0.50			
Generator (<25KVA, VMS signs)	73	0.50			
Gradall	83	0.40			
Grader	85	0.40	1	85	81.0
Grapple (on backhoe)	87	0.40			
Horizontal Boring Hydr. Jack	82	0.25			
Hydra Break Ram	90	0.10			
Impact Pile Driver	101	0.20			
Jackhammer	89	0.20			
Man Lift	75	0.20			
Mounted Impact Hammer (hoe ram)	90	0.20			
Pavement Scarafier	90	0.20			
Paver	77	0.50			
Pickup Truck	75	0.40			
Pneumatic Tools	85	0.50			
Pumps	81	0.50			
Refrigerator Unit	73	1.00			
Rivit Buster/chipping gun	79	0.20			
Rock Drill	81	0.20			
Roller	80	0.20			
Sand Blasting (Single Nozzle)	96	0.20			
Scraper	84	0.40			
Shears (on backhoe)	96	0.40			
Slurry Plant	78	1.00			
Slurry Trenching Machine	80	0.50			
Soil Mix Drill Rig	80	0.50			
Tractor	84	0.40			
Vacuum Excavator (Vac-truck)	85	0.40			
Vacuum Street Sweeper	82	0.10			
Ventilation Fan	79	1.00			
Vibrating Hopper	87	0.50			
Vibratory Concrete Mixer	80	0.20			
Vibratory Pile Driver	101	0.20			
Warning Horn	85	0.05			
Water Jet Deleading	83	0.20			
Welder / Torch	74	0.40			
COMBINED EQUIPMENT (SPL AT 50 FEET)	--	--	6	89.1	84.6

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

Modeled Noise Levels at Varying Distances (Includes Hemispherical Spreading and Atmospheric Absorption)

Molecular Absorption	0.0007	dBA		
Anomalous Excess Attenuation	0.001	dBA		
Ground Type (soft or hard)	soft			
Equivalent Source-Receiver Height (Hs+Hr)/2	6	feet		
FTA Ground Attenuation Factor G	0.643	dBA		
	Noise Level with Attenuation		Noise Level with Barrier (Levees)	
Distance from Construction Site (feet)	Outdoor Leq	Outdoor Lmax	Noise Reduction	Outdoor Leq
100	76	81	0	76
200	68	73	0	68
400	60	65	0	60
800	51	56	0	51
1,600	42	47	0	42
3,200	31	36	0	31
6,400	18	23	0	18

Sound propagation calcs by FTA Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. May 2006.

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

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Construction Phase: Road Construction

Noise-Generating Construction Equipment

Equipment Type	Individual Equipment		Combined Equipment		
	SPL Lmax at 50 ft	Acoustic Usage Factor	No. of Pieces	SPL Lmax at 50 ft	SPL Leq at 50 ft
All Other Equipment > 5 HP	85	0.50	1	85	82.0
Auger Drill Rig	84	0.20			
Backhoe	78	0.40			
Bar Bender	80	0.20			
Blasting	94	0.01			
Boring Jack Power Unit	83	0.50			
Chain Saw	84	0.20			
Clam Shovel (dropping)	87	0.20			
Compactor (ground)	83	0.20	1	83	76.0
Compressor (air)	78	0.40			
Concrete Batch Plant	83	0.15			
Concrete Mixer Truck	79	0.40			
Concrete Pump Truck	81	0.20			
Concrete Saw	90	0.20			
Crane	81	0.16			
Dozer	82	0.40	1	82	78.0
Drill Rig Truck	79	0.20			
Drum Mixer	80	0.50			
Dump Truck	76	0.40	1	76	72.0
Excavator	81	0.40	1	81	77.0
Flat Bed Truck	74	0.40	1	74	70.0
Front End Loader	79	0.40	1	79	75.0
Generator	81	0.50			
Generator (<25KVA, VMS signs)	73	0.50			
Gradall	83	0.40			
Grader	85	0.40	1	85	81.0
Grapple (on backhoe)	87	0.40			
Horizontal Boring Hydr. Jack	82	0.25			
Hydra Break Ram	90	0.10			
Impact Pile Driver	101	0.20			
Jackhammer	89	0.20			
Man Lift	75	0.20			
Mounted Impact Hammer (hoe ram)	90	0.20			
Pavement Scarafier	90	0.20			
Paver	77	0.50			
Pickup Truck	75	0.40			
Pneumatic Tools	85	0.50			
Pumps	81	0.50			
Refrigerator Unit	73	1.00			
Rivit Buster/chipping gun	79	0.20			
Rock Drill	81	0.20			
Roller	80	0.20			
Sand Blasting (Single Nozzle)	96	0.20			
Scraper	84	0.40			
Shears (on backhoe)	96	0.40			
Slurry Plant	78	1.00			
Slurry Trenching Machine	80	0.50			
Soil Mix Drill Rig	80	0.50			
Tractor	84	0.40			
Vacuum Excavator (Vac-truck)	85	0.40			
Vacuum Street Sweeper	82	0.10			
Ventilation Fan	79	1.00			
Vibrating Hopper	87	0.50			
Vibratory Concrete Mixer	80	0.20			
Vibratory Pile Driver	101	0.20			
Warning Horn	85	0.05			
Water Jet Deleading	83	0.20			
Welder / Torch	74	0.40			
COMBINED EQUIPMENT (SPL AT 50 FEET)	--	--	8	91.0	87.0

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

Modeled Noise Levels at Varying Distances (Includes Hemispherical Spreading and Atmospheric Absorption)

Molecular Absorption	0.0007	dBA
Anomalous Excess Attenuation	0.001	dBA
Ground Type (soft or hard)	soft	
Equivalent Source-Receiver Height (Hs+Hr)/2	6	feet
FTA Ground Attenuation Factor G	0.643	dBA

Distance from Construction Site (feet)	Noise Level with Attenuation		Noise Level with Barrier (Levees)	
	Outdoor Leq	Outdoor Lmax	Noise Reduction	Outdoor Leq
100	79	83	0	79
200	71	75	0	71
400	62	66	0	62
800	54	58	0	54
1,600	44	49	0	44
3,200	34	38	0	34
6,400	20	24	0	20

Sound propagation calcs by FTA Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. May 2006.
Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

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Construction Phase: WTG Foundations and Batch Plant

Noise-Generating Construction Equipment

Equipment Type	Individual Equipment		Combined Equipment		
	SPL Lmax at 50 ft	Acoustic Usage Factor	No. of Pieces	SPL Lmax at 50 ft	SPL Leq at 50 ft
All Other Equipment > 5 HP	85	0.50			
Auger Drill Rig	84	0.20			
Backhoe	78	0.40			
Bar Bender	80	0.20			
Blasting	94	0.01	1	94	74.0
Boring Jack Power Unit	83	0.50			
Chain Saw	84	0.20			
Clam Shovel (dropping)	87	0.20			
Compactor (ground)	83	0.20	1	83	76.0
Compressor (air)	78	0.40			
Concrete Batch Plant	83	0.15			
Concrete Mixer Truck	79	0.40	1	79	75.0
Concrete Pump Truck	81	0.20			
Concrete Saw	90	0.20			
Crane	81	0.16			
Dozer	82	0.40	1	82	78.0
Drill Rig Truck	79	0.20			
Drum Mixer	80	0.50			
Dump Truck	76	0.40	1	76	72.0
Excavator	81	0.40	1	81	77.0
Flat Bed Truck	74	0.40	1	74	70.0
Front End Loader	79	0.40	1	79	75.0
Generator	81	0.50			
Generator (<25KVA, VMS signs)	73	0.50			
Gradall	83	0.40			
Grader	85	0.40	1	85	81.0
Grapple (on backhoe)	87	0.40			
Horizontal Boring Hydr. Jack	82	0.25			
Hydra Break Ram	90	0.10			
Impact Pile Driver	101	0.20			
Jackhammer	89	0.20			
Man Lift	75	0.20			
Mounted Impact Hammer (hoe ram)	90	0.20			
Pavement Scarafier	90	0.20			
Paver	77	0.50			
Pickup Truck	75	0.40			
Pneumatic Tools	85	0.50			
Pumps	81	0.50			
Refrigerator Unit	73	1.00			
Rivit Buster/chipping gun	79	0.20			
Rock Drill	81	0.20			
Roller	80	0.20			
Sand Blasting (Single Nozzle)	96	0.20			
Scraper	84	0.40			
Shears (on backhoe)	96	0.40			
Slurry Plant	78	1.00			
Slurry Trenching Machine	80	0.50			
Soil Mix Drill Rig	80	0.50			
Tractor	84	0.40			
Vacuum Excavator (Vac-truck)	85	0.40			
Vacuum Street Sweeper	82	0.10			
Ventilation Fan	79	1.00			
Vibrating Hopper	87	0.50			
Vibratory Concrete Mixer	80	0.20			
Vibratory Pile Driver	101	0.20			
Warning Horn	85	0.05			
Water Jet Deleading	83	0.20			
Welder / Torch	74	0.40			
COMBINED EQUIPMENT (SPL AT 50 FEET)	--	--	9	95.5	86.0

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

Modeled Noise Levels at Varying Distances (Includes Hemispherical Spreading and Atmospheric Absorption)

Molecular Absorption	0.0007	dBA		
Anomalous Excess Attenuation	0.001	dBA		
Ground Type (soft or hard)	soft			
Equivalent Source-Receiver Height (Hs+Hr)/2	6	feet		
FTA Ground Attenuation Factor G	0.643	dBA		
Distance from Construction Site (feet)	Noise Level with Attenuation		Noise Level with Barrier (Levees)	
	Outdoor Leq	Outdoor Lmax	Noise Reduction	Outdoor Leq
100	78	87	0	78
200	70	79	0	70
400	61	71	0	61
800	53	62	0	53
1,600	43	53	0	43
3,200	33	42	0	33
6,400	19	29	0	19

Sound propagation calcs by FTA Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. May 2006.

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

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Construction Phase: WTG Delivery & Installation

Noise-Generating Construction Equipment

Equipment Type	Individual Equipment		Combined Equipment		
	SPL Lmax at 50 ft	Acoustic Usage Factor	No. of Pieces	SPL Lmax at 50 ft	SPL Leq at 50 ft
All Other Equipment > 5 HP	85	0.50			
Auger Drill Rig	84	0.20			
Backhoe	78	0.40			
Bar Bender	80	0.20			
Blasting	94	0.01			
Boring Jack Power Unit	83	0.50			
Chain Saw	84	0.20			
Clam Shovel (dropping)	87	0.20			
Compactor (ground)	83	0.20			
Compressor (air)	78	0.40			
Concrete Batch Plant	83	0.15			
Concrete Mixer Truck	79	0.40			
Concrete Pump Truck	81	0.20			
Concrete Saw	90	0.20			
Crane	81	0.16	1	81	73.0
Dozer	82	0.40			
Drill Rig Truck	79	0.20			
Drum Mixer	80	0.50			
Dump Truck	76	0.40			
Excavator	81	0.40	1	81	77.0
Flat Bed Truck	74	0.40	1	74	70.0
Front End Loader	79	0.40			
Generator	81	0.50			
Generator (<25KVA, VMS signs)	73	0.50			
Gradall	83	0.40			
Grader	85	0.40			
Grapple (on backhoe)	87	0.40			
Horizontal Boring Hydr. Jack	82	0.25			
Hydra Break Ram	90	0.10			
Impact Pile Driver	101	0.20			
Jackhammer	89	0.20			
Man Lift	75	0.20			
Mounted Impact Hammer (hoe ram)	90	0.20			
Pavement Scarafier	90	0.20			
Paver	77	0.50			
Pickup Truck	75	0.40			
Pneumatic Tools	85	0.50			
Pumps	81	0.50			
Refrigerator Unit	73	1.00			
Rivit Buster/chipping gun	79	0.20			
Rock Drill	81	0.20			
Roller	80	0.20			
Sand Blasting (Single Nozzle)	96	0.20			
Scraper	84	0.40			
Shears (on backhoe)	96	0.40			
Slurry Plant	78	1.00			
Slurry Trenching Machine	80	0.50			
Soil Mix Drill Rig	80	0.50			
Tractor	84	0.40			
Vacuum Excavator (Vac-truck)	85	0.40			
Vacuum Street Sweeper	82	0.10			
Ventilation Fan	79	1.00			
Vibrating Hopper	87	0.50			
Vibratory Concrete Mixer	80	0.20			
Vibratory Pile Driver	101	0.20			
Warning Horn	85	0.05			
Water Jet Deleading	83	0.20			
Welder / Torch	74	0.40			
COMBINED EQUIPMENT (SPL AT 50 FEET)	--	--	3	84.4	79.1

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

Modeled Noise Levels at Varying Distances (Includes Hemispherical Spreading and Atmospheric Absorption)

Molecular Absorption	0.0007	dBA		
Anomalous Excess Attenuation	0.001	dBA		
Ground Type (soft or hard)	soft			
Equivalent Source-Receiver Height (Hs+Hr)/2	6	feet		
FTA Ground Attenuation Factor G	0.643	dBA		
Distance from Construction Site (feet)	Noise Level with Attenuation		Noise Level with Barrier (Levees)	
	Outdoor Leq	Outdoor Lmax	Noise Reduction	Outdoor Leq
100	71	76	0	71
200	63	68	0	63
400	55	60	0	55
800	46	51	0	46
1,600	37	42	0	37
3,200	26	31	0	26
6,400	12	18	0	12

Sound propagation calcs by FTA Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. May 2006.

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

APWRA

Construction Phase: Utility Collector Line Installation

Noise-Generating Construction Equipment

Equipment Type	Individual Equipment		Combined Equipment		
	SPL Lmax at 50 ft	Acoustic Usage Factor	No. of Pieces	SPL Lmax at 50 ft	SPL Leq at 50 ft
All Other Equipment > 5 HP	85	0.50			
Auger Drill Rig	84	0.20			
Backhoe	78	0.40			
Bar Bender	80	0.20			
Blasting	94	0.01			
Boring Jack Power Unit	83	0.50			
Chain Saw	84	0.20			
Clam Shovel (dropping)	87	0.20			
Compactor (ground)	83	0.20			
Compressor (air)	78	0.40			
Concrete Batch Plant	83	0.15			
Concrete Mixer Truck	79	0.40			
Concrete Pump Truck	81	0.20			
Concrete Saw	90	0.20			
Crane	81	0.16			
Dozer	82	0.40			
Drill Rig Truck	79	0.20			
Drum Mixer	80	0.50			
Dump Truck	76	0.40	1	76	72.0
Excavator	81	0.40			
Flat Bed Truck	74	0.40			
Front End Loader	79	0.40	1	79	75.0
Generator	81	0.50			
Generator (<25KVA, VMS signs)	73	0.50			
Gradall	83	0.40			
Grader	85	0.40			
Grapple (on backhoe)	87	0.40			
Horizontal Boring Hydr. Jack	82	0.25	1	82	76.0
Hydra Break Ram	90	0.10			
Impact Pile Driver	101	0.20			
Jackhammer	89	0.20			
Man Lift	75	0.20			
Mounted Impact Hammer (hoe ram)	90	0.20			
Pavement Scarafier	90	0.20			
Paver	77	0.50			
Pickup Truck	75	0.40			
Pneumatic Tools	85	0.50			
Pumps	81	0.50			
Refrigerator Unit	73	1.00			
Rivit Buster/chipping gun	79	0.20			
Rock Drill	81	0.20			
Roller	80	0.20			
Sand Blasting (Single Nozzle)	96	0.20			
Scraper	84	0.40			
Shears (on backhoe)	96	0.40			
Slurry Plant	78	1.00			
Slurry Trenching Machine	80	0.50	1	80	77.0
Soil Mix Drill Rig	80	0.50			
Tractor	84	0.40			
Vacuum Excavator (Vac-truck)	85	0.40			
Vacuum Street Sweeper	82	0.10			
Ventilation Fan	79	1.00			
Vibrating Hopper	87	0.50			
Vibratory Concrete Mixer	80	0.20			
Vibratory Pile Driver	101	0.20			
Warning Horn	85	0.05			
Water Jet Deleading	83	0.20			
Welder / Torch	74	0.40			
COMBINED EQUIPMENT (SPL AT 50 FEET)	--	--	4	85.8	81.4

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

Modeled Noise Levels at Varying Distances (Includes Hemispherical Spreading and Atmospheric Absorption)

Molecular Absorption	0.0007	dBA
Anomalous Excess Attenuation	0.001	dBA
Ground Type (soft or hard)	soft	
Equivalent Source-Receiver Height (Hs+Hr)/2	6	feet
FTA Ground Attenuation Factor G	0.643	dBA

Distance from Construction Site (feet)	Noise Level with Attenuation		Noise Level with Barrier (Levees)	
	Outdoor Leq	Outdoor Lmax	Noise Reduction	Outdoor Leq
100	73	78	0	73
200	65	70	0	65
400	57	61	0	57
800	48	53	0	48
1,600	39	43	0	39
3,200	28	33	0	28
6,400	15	19	0	15

Sound propagation calcs by FTA Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. May 2006.

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

APWRA

Construction Phase: Restoration and Clean up

Noise-Generating Construction Equipment

Equipment Type	Individual Equipment		Combined Equipment		
	SPL Lmax at 50 ft	Acoustic Usage Factor	No. of Pieces	SPL Lmax at 50 ft	SPL Leq at 50 ft
All Other Equipment > 5 HP	85	0.50			
Auger Drill Rig	84	0.20			
Backhoe	78	0.40			
Bar Bender	80	0.20			
Blasting	94	0.01			
Boring Jack Power Unit	83	0.50			
Chain Saw	84	0.20			
Clam Shovel (dropping)	87	0.20			
Compactor (ground)	83	0.20			
Compressor (air)	78	0.40			
Concrete Batch Plant	83	0.15			
Concrete Mixer Truck	79	0.40			
Concrete Pump Truck	81	0.20			
Concrete Saw	90	0.20			
Crane	81	0.16			
Dozer	82	0.40			
Drill Rig Truck	79	0.20			
Drum Mixer	80	0.50			
Dump Truck	76	0.40			
Excavator	81	0.40	1	81	77.0
Flat Bed Truck	74	0.40			
Front End Loader	79	0.40			
Generator	81	0.50			
Generator (<25KVA, VMS signs)	73	0.50			
Gradall	83	0.40			
Grader	85	0.40	1	85	81.0
Grapple (on backhoe)	87	0.40			
Horizontal Boring Hydr. Jack	82	0.25			
Hydra Break Ram	90	0.10			
Impact Pile Driver	101	0.20			
Jackhammer	89	0.20			
Man Lift	75	0.20			
Mounted Impact Hammer (hoe ram)	90	0.20			
Pavement Scarafier	90	0.20			
Paver	77	0.50			
Pickup Truck	75	0.40			
Pneumatic Tools	85	0.50			
Pumps	81	0.50			
Refrigerator Unit	73	1.00			
Rivit Buster/chipping gun	79	0.20			
Rock Drill	81	0.20			
Roller	80	0.20			
Sand Blasting (Single Nozzle)	96	0.20			
Scraper	84	0.40			
Shears (on backhoe)	96	0.40			
Slurry Plant	78	1.00			
Slurry Trenching Machine	80	0.50			
Soil Mix Drill Rig	80	0.50			
Tractor	84	0.40			
Vacuum Excavator (Vac-truck)	85	0.40			
Vacuum Street Sweeper	82	0.10			
Ventilation Fan	79	1.00			
Vibrating Hopper	87	0.50			
Vibratory Concrete Mixer	80	0.20			
Vibratory Pile Driver	101	0.20			
Warning Horn	85	0.05			
Water Jet Deleading	83	0.20			
Welder / Torch	74	0.40			
COMBINED EQUIPMENT (SPL AT 50 FEET)	--	--	2	86.5	82.5

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

Modeled Noise Levels at Varying Distances (Includes Hemispherical Spreading and Atmospheric Absorption)

Molecular Absorption	0.0007	dBA		
Anomalous Excess Attenuation	0.001	dBA		
Ground Type (soft or hard)	soft			
Equivalent Source-Receiver Height (Hs+Hr)/2	6	feet		
FTA Ground Attenuation Factor G	0.643	dBA		
Distance from Construction Site (feet)	Noise Level with Attenuation		Noise Level with Barrier (Levees)	
	Outdoor Leq	Outdoor Lmax	Noise Reduction	Outdoor Leq
100	74	78	0	74
200	66	70	0	66
400	58	62	0	58
800	49	53	0	49
1,600	40	44	0	40
3,200	29	33	0	29
6,400	16	20	0	16

Sound propagation calcs by FTA Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. May 2006.
Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

APWRA

Operation Noise

Noise-Generating Construction Equipment

Equipment Type	Individual Equipment		Combined Equipment		
	SPL Lmax at 50 ft	Acoustic Usage Factor	No. of Pieces	SPL Lmax at 50 ft	SPL Leq at 50 ft
All Other Equipment > 5 HP	85	0.50			
Auger Drill Rig	84	0.20			
Backhoe	78	0.40			
Bar Bender	80	0.20			
Blasting	94	0.01			
Boring Jack Power Unit	83	0.50			
Chain Saw	84	0.20			
Clam Shovel (dropping)	87	0.20			
Compactor (ground)	83	0.20			
Compressor (air)	78	0.40			
Concrete Batch Plant	83	0.15			
Concrete Mixer Truck	79	0.40			
Concrete Pump Truck	81	0.20			
Concrete Saw	90	0.20			
Crane	81	0.16	1	81	73.0
Dozer	82	0.40			
Drill Rig Truck	79	0.20			
Drum Mixer	80	0.50			
Dump Truck	76	0.40			
Excavator	81	0.40			
Flat Bed Truck	74	0.40	1	74	70.0
Front End Loader	79	0.40			
Generator	81	0.50	1	81	78.0
Generator (<25KVA, VMS signs)	73	0.50			
Gradall	83	0.40			
Grader	85	0.40	1	85	81.0
Grapple (on backhoe)	87	0.40			
Horizontal Boring Hydr. Jack	82	0.25			
Hydra Break Ram	90	0.10			
Impact Pile Driver	101	0.20			
Jackhammer	89	0.20			
Man Lift	75	0.20			
Mounted Impact Hammer (hoe ram)	90	0.20			
Pavement Scarafier	90	0.20			
Paver	77	0.50			
Pickup Truck	75	0.40			
Pneumatic Tools	85	0.50			
Pumps	81	0.50			
Refrigerator Unit	73	1.00			
Rivit Buster/chipping gun	79	0.20			
Rock Drill	81	0.20			
Roller	80	0.20			
Sand Blasting (Single Nozzle)	96	0.20			
Scraper	84	0.40			
Shears (on backhoe)	96	0.40			
Slurry Plant	78	1.00			
Slurry Trenching Machine	80	0.50			
Soil Mix Drill Rig	80	0.50			
Tractor	84	0.40			
Vacuum Excavator (Vac-truck)	85	0.40			
Vacuum Street Sweeper	82	0.10			
Ventilation Fan	79	1.00			
Vibrating Hopper	87	0.50			
Vibratory Concrete Mixer	80	0.20			
Vibratory Pile Driver	101	0.20			
Warning Horn	85	0.05			
Water Jet Deleading	83	0.20			
Welder / Torch	74	0.40			
COMBINED EQUIPMENT (SPL AT 50 FEET)	--	--	4	87.7	83.4

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

Modeled Noise Levels at Varying Distances (Includes Hemispherical Spreading and Atmospheric Absorption)

Molecular Absorption	0.0007	dBA
Anomalous Excess Attenuation	0.001	dBA
Ground Type (soft or hard)	soft	
Equivalent Source-Receiver Height (Hs+Hr)/2	6	feet
FTA Ground Attenuation Factor G	0.643	dBA

Distance from Construction Site (feet)	Noise Level with Attenuation		Noise Level with Barrier (Levees)	
	Outdoor Leq	Outdoor L8	Noise Reduction	Outdoor Leq
100	75	78	0	75
200	67	70	0	67
400	59	62	0	59
800	50	53	0	50
1,600	41	44	0	41
3,200	30	33	0	30
6,400	17	20	0	17

Sound propagation calcs by FTA Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. May 2006.

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

