Appendix H

Hydraulic Analysis

Balance Hydrologics, Inc.®

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June 1, 2018

Mr. Douglas Wiele
Foothill Partners Inc.
1121 White Rock Road, Suite 205
El Dorado Hills, California 95762

RE: Rio Ranch Retail Development 100-Year Floodplain Effects, County of Monterey

Dear Mr. Wiele:

Thank you for extending our firm the opportunity to assist Foothill Partners Inc. with a hydraulic study for the proposed Rio Ranch Retail property located at 3705 Rio Road in unincorporated Monterey County east of California State Route 1. We understand that you received a letter from the Monterey County Water Resources Agency stating that the discretionary permit application has been deemed incomplete and that you are required to provide a Hydraulic Analysis by a registered civil engineer.

Our technical approach was to use the currently-effective Federal Emergency Management Agency (FEMA) model of the north overbank to assess the Base Flood Elevations (BFEs), also known as the 100-year elevations, at the project site in effective and post-fill placement conditions. This allowed us to compare the BFEs and to assess whether the proposed fill placement would raise the BFE more than one foot from pre-fill conditions.

Our assessment is that the proposed fill placement has a minimal effect on the 100-year water surface elevations at the project site and the changes do not propagate upstream or downstream.

The effective FEMA model for the lower section of the Carmel River is a one-dimensional HEC-RAS split reach model with unique reaches describing the main stem Carmel River and the north and south overbanks. Though the main stem reach features levees on either bank, these levees are not FEMA-accredited. As such, the 100-year floodplain is mapped as though the levees do not provide protection. The Flood Insurance Rate Map (FIRM) seen in Figure 1 shows the 100-year extents as mapped by FEMA. The project location is marked by a pin and shows that the parcel is located within the 100-year floodplain. Figure 2 shows the published Flood Insurance Study (FIS) flood profile for the north overbank with the approximate location of the project marked by red vertical bounding lines. Per the FIRM, which rounds elevations to the nearest foot, the BFE at the project site is less than 29 feet at the west edge of the property and increases to approximately 30-31 feet at the eastern edge. While the resolution is low, the flood profiles in Figure 2 confirm that the BFEs are in this range.

In order to holistically capture the risk, the FEMA model includes several runs to describe possible flooding scenarios. These include one run where the levees, though unaccredited, are assumed to hold during the 100-year event and do provide protection up to their crest elevation, one run where the south bank levees hold while the north bank levees breach, and a run where the south bank levees breach while the north bank levees hold. While FEMA does not disclose exactly how these runs were used to map the floodplain shown in the FIRM, a reasonable assumption is that the "worst case scenario" flooding (i.e., the highest water surface elevations) from each of the three scenarios were melded together to create the effective flooding extents. It is therefore appropriate for this analysis to also use the effective run that results in the highest water surface elevations at the project site in order to conservatively assess the impacts of the proposed fill. This run is the scenario where the south levees hold while the north levees breach.

We have used the grading plan provided by C3 Engineering (shown in Figure 3) to update the topographic base for the applicable cross-sections in the above-mentioned model run. A model schematic of the north overbank with the cross-sections labeled is included in Figure 4. Two cross-sections (4966 and 4796) required topographic base updates. While cross-section 4631 was just outside of the grading limits, an ineffective flow area was added to the section to account for the effect of the fill just upstream. No other updates were made to the model (such as to roughness coefficients) in order to isolate the effect of the proposed fill.

Table 1 below lists the model cross-sections that describe the north overbank in the FEMA model, their associated BFEs in effective and post-fill placement conditions, and the difference between the two values. Please note that effective FEMA model was developed using the National Geodetic Vertical Datum of 1929 (NGVD 29). Per the effective Flood Insurance Study (FIS), the conversion between NGVD 29 and the more commonly used North American Vertical Datum of 1988 (NAVD 88) is +2.75 feet. Table 1 reports the values in NAVD 88 so that it can be compared to the values published on the FIRM and in the FIS profiles.

Table 1. Difference in BFE between the effective and post-fill model in the north overbank.

Mode Cross-Section	Effective BFE	Post-Fill BFE	Change
	(ft, NAVD 88)	(ft, NAVD 88)	(ft)
6708	37.62	37.62	0.00
6636	37.10	37.10	0.00
6557	35.06	35.06	0.00
6208	34.97	34.97	0.00
5826	34.79	34.79	0.00
5470	34.01	34.01	0.00
5275	32.75	32.75	0.00
4966	28.47	28.51	+0.04
4796	28.35	28.36	+0.01
4631	28.21	28.21	0.00
4458	28.16	28.16	0.00
4362	28.15	28.15	0.00
4243	28.14	28.14	0.00

The effect of the fill is minimal and does not propagate upstream or downstream of the project. This is, in part, due to the long cross-sections that span the entire north overbank. The cross-sections have more than enough flow area to distribute the effect of the proposed fill.

Obtaining concurrence from the Monterey County Water Resources Agency that the proposed development does not increase the water surface elevation of the BFE more than one foot does not eliminate the need for the property owner to pay flood insurance under the National Flood Insurance Program. In order to remove the property or portions of the property out of the FEMA-designated floodplain, a Conditional Letter of Map Revision Based on Fill (CLORM-F) would need to be submitted to FEMA. This submittal would provide information to, and would be reviewed by, FEMA staff for their determination that the proposed fill placement would comply with the NFIP. Post-construction, final official removal of parts of the property from the SFHA would require subsequent submittal of a LOMR-F application to FEMA. This is generally a routine process that does not require additional hydraulic modeling work as long as the fill is placed in conformance with the configuration used in the CLOMR-F. It is important to note that both submittals carry an application fee and the FEMA review process may take up to several months from the time that they have all the information they may request.

Closing

Thank you again for requesting this analysis. Please do not hesitate to contact Balance if you have any further questions.

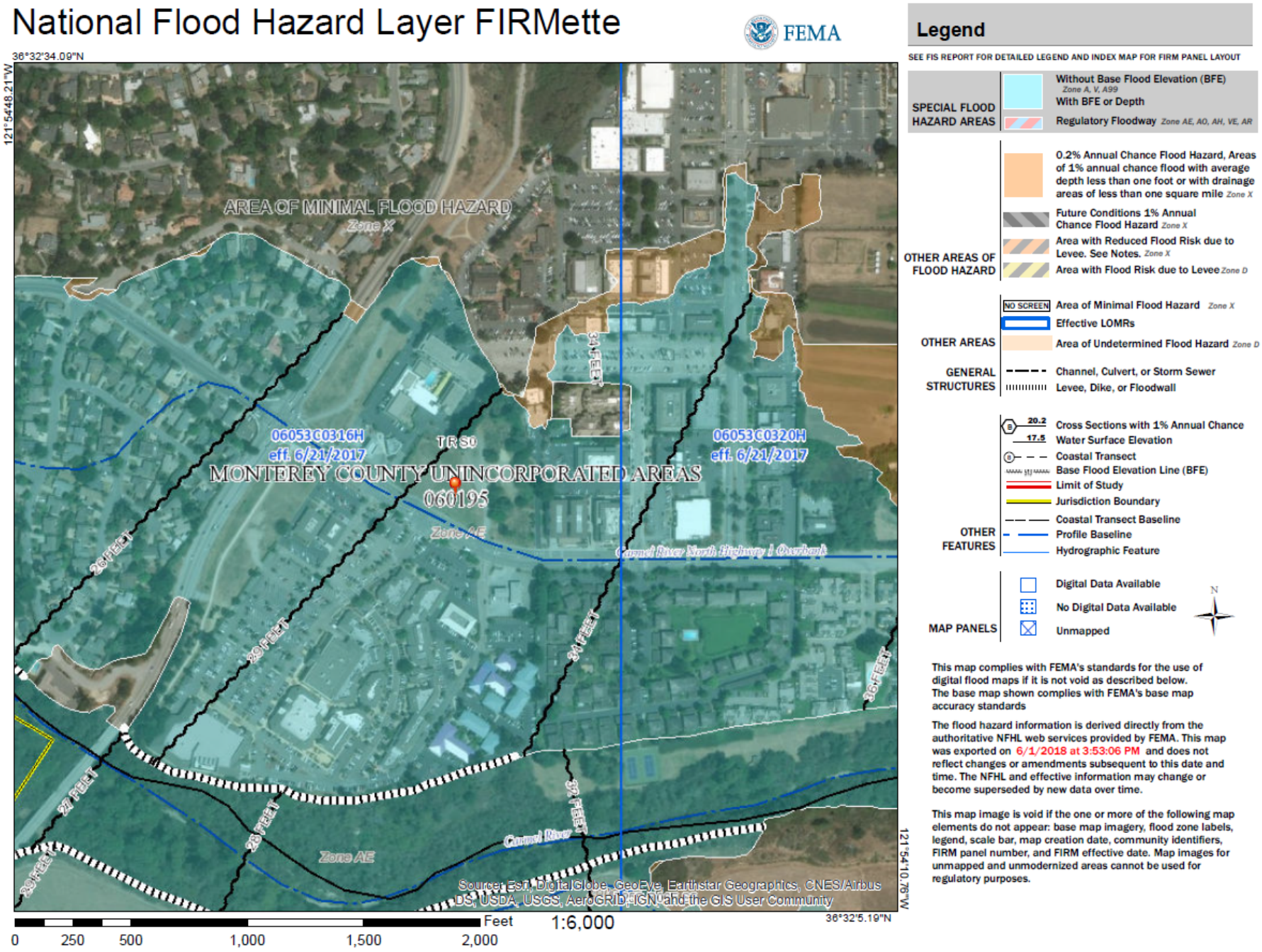
Sincerely,

BALANCE HYDROLOGICS, Inc.

Anna Nazarov, P.E., CFM
Civil Engineer/Hydrologist

Figures: Effective Flood Insurance Rate Map
Effective Flood Insurance Study Profile
Grading Plan Sheet C3
HEC-RAS Model Schematic

cc: Lin Miller, Foothill Associates Inc



Balance Hydrologics, Inc.

Figure 1. Effective Flood Insurance Rate Map, Rio Ranch Retail Hydraulic Assessment, County of Monterey.

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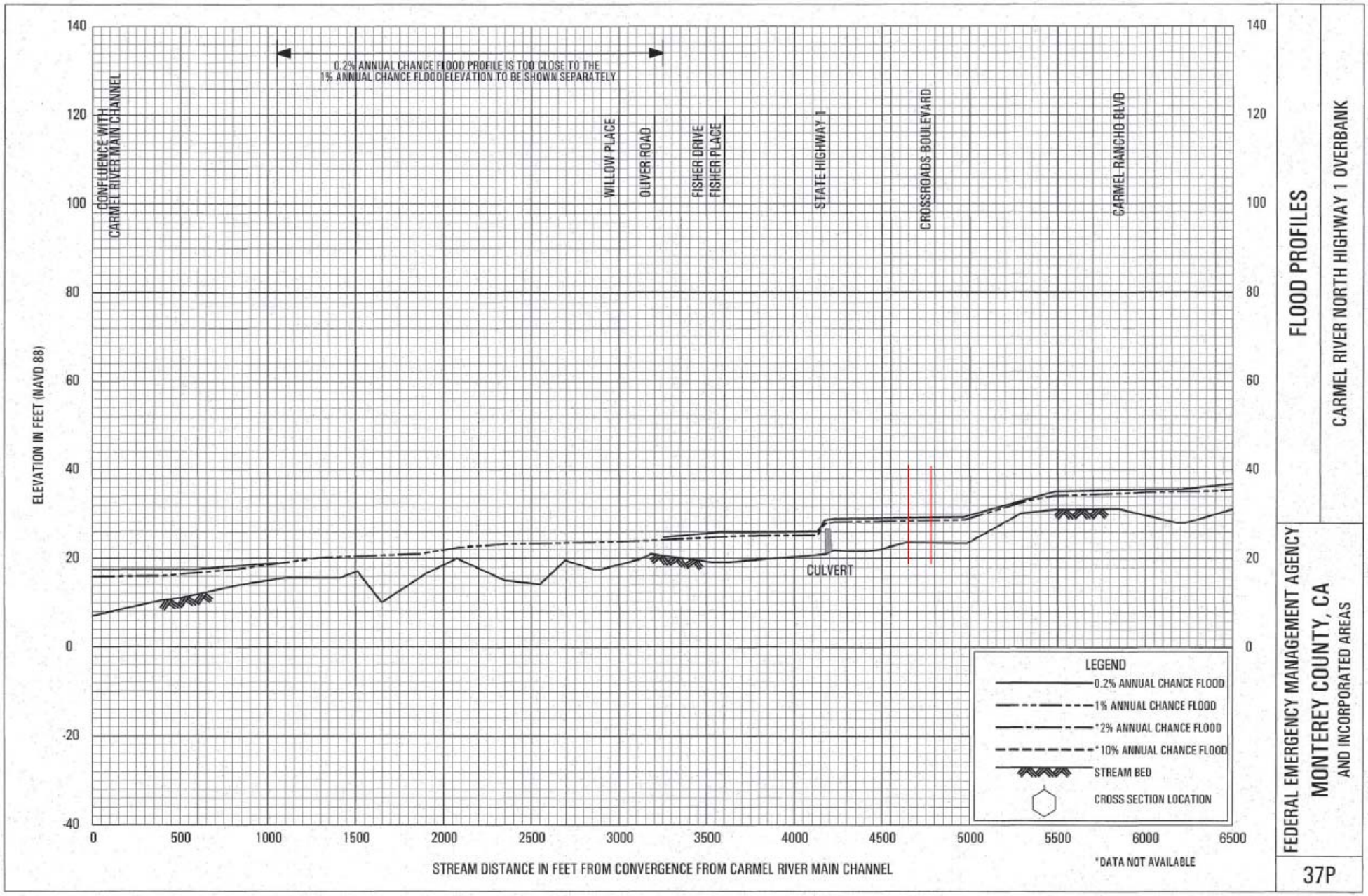

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Figure 2. **Effective Flood Insurance Study Profile, Rio Ranch Retail Hydraulic Assessment, County of Monterey.**

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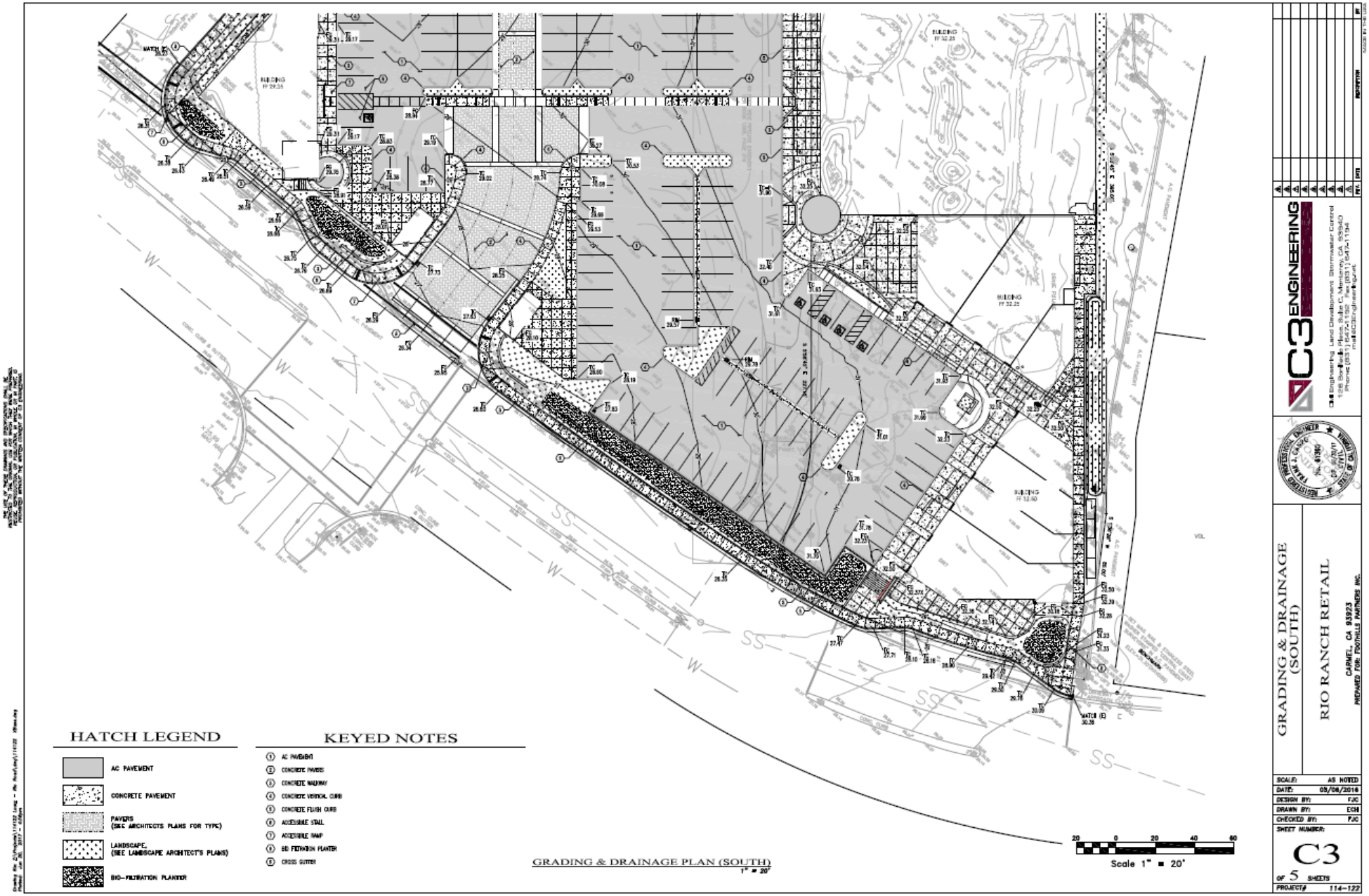

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Figure 3. Grading Plan, Rio Ranch Retail Hydraulic Assessment, County of Monterey.

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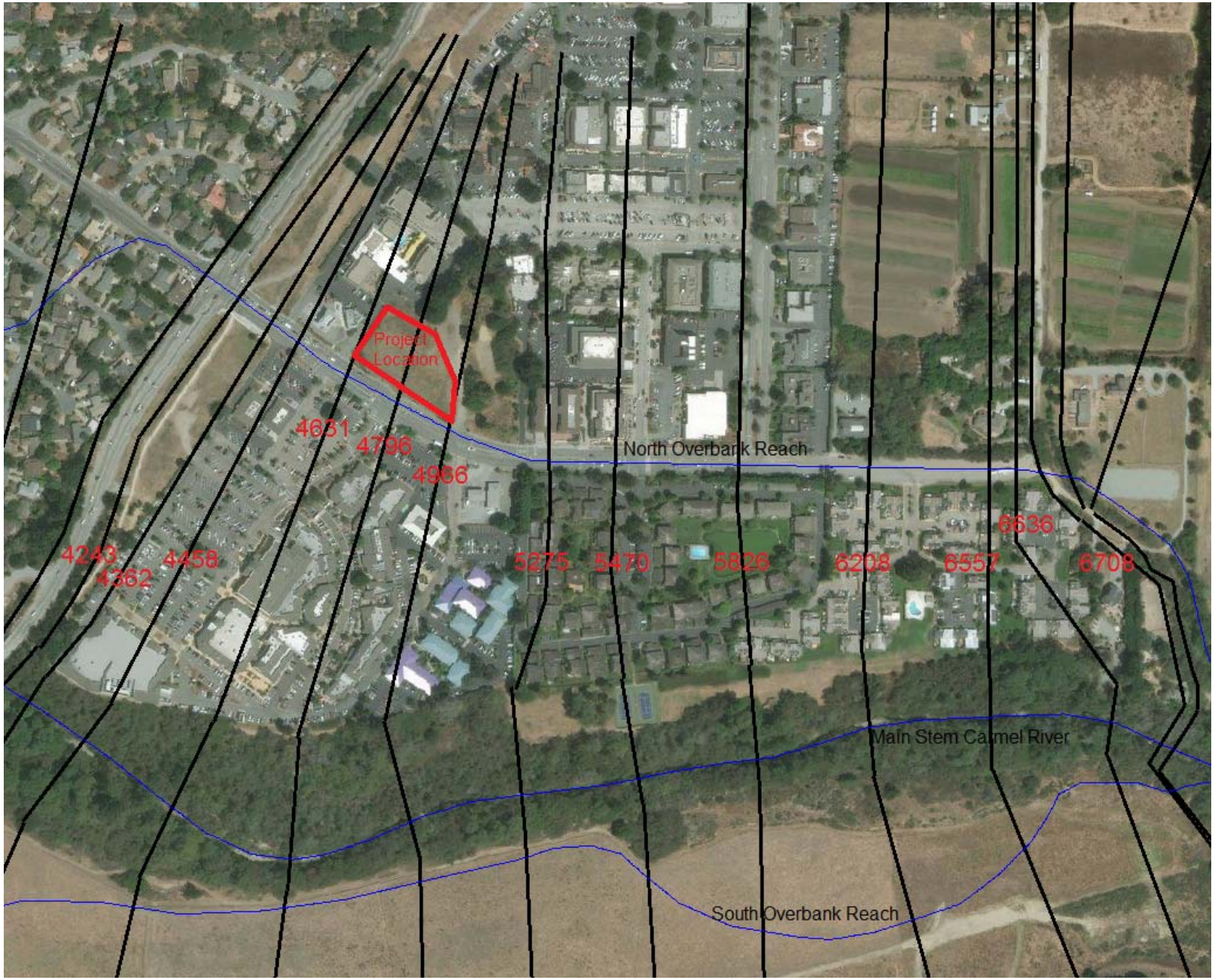

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Figure 4. **HEC-RAS Model Schematic, Rio Ranch Retail Hydraulic Assessment, County of Monterey.**

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Appendix I

HUD DNL Modeling Results

- Freq Weight : A
- Time Weight : FAST
- Level Range : 40-100
- Max dB : 67.8 - 2017/09/05 16:02:05
- Level Range : 40-100
- SEL : 83.3
- Leq : 53.8
-

No.s	Date Time	(dB)
1	2017/09/05 16:02:04	57.4
2	2017/09/05 16:02:05	55.1
3	2017/09/05 16:02:06	56.5
4	2017/09/05 16:02:07	55.3
5	2017/09/05 16:02:08	52.9
6	2017/09/05 16:02:09	53.6
7	2017/09/05 16:02:10	54.0
8	2017/09/05 16:02:11	54.1
9	2017/09/05 16:02:12	54.2
10	2017/09/05 16:02:13	55.2
11	2017/09/05 16:02:14	56.6
12	2017/09/05 16:02:15	59.4
13	2017/09/05 16:02:16	54.5
14	2017/09/05 16:02:17	53.6
15	2017/09/05 16:02:18	54.0
16	2017/09/05 16:02:19	52.7
17	2017/09/05 16:02:20	52.4
18	2017/09/05 16:02:21	52.9
19	2017/09/05 16:02:22	54.3
20	2017/09/05 16:02:23	55.0
21	2017/09/05 16:02:24	54.5
22	2017/09/05 16:02:25	54.3
23	2017/09/05 16:02:26	54.6
24	2017/09/05 16:02:27	54.4
25	2017/09/05 16:02:28	54.3
26	2017/09/05 16:02:29	55.0
27	2017/09/05 16:02:30	56.1
28	2017/09/05 16:02:31	56.4
29	2017/09/05 16:02:32	55.7
30	2017/09/05 16:02:33	55.2
31	2017/09/05 16:02:34	53.7
32	2017/09/05 16:02:35	53.1
33	2017/09/05 16:02:36	52.0
34	2017/09/05 16:02:37	52.5
35	2017/09/05 16:02:38	52.2
36	2017/09/05 16:02:39	52.3
37	2017/09/05 16:02:40	53.3
38	2017/09/05 16:02:41	52.5
39	2017/09/05 16:02:42	52.3
40	2017/09/05 16:02:43	53.0
41	2017/09/05 16:02:44	54.3
42	2017/09/05 16:02:45	52.8
43	2017/09/05 16:02:46	54.8
44	2017/09/05 16:02:47	55.4
45	2017/09/05 16:02:48	55.9
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50	2017/09/05 16:02:53	51.5
51	2017/09/05 16:02:54	51.9
52	2017/09/05 16:02:55	51.4
53	2017/09/05 16:02:56	51.5
54	2017/09/05 16:02:57	51.5
55	2017/09/05 16:02:58	51.1
56	2017/09/05 16:02:59	51.5
57	2017/09/05 16:03:00	53.0
58	2017/09/05 16:03:01	51.3
59	2017/09/05 16:03:02	52.5
60	2017/09/05 16:03:03	52.1
61	2017/09/05 16:03:04	51.7
62	2017/09/05 16:03:05	51.8
63	2017/09/05 16:03:06	52.1
64	2017/09/05 16:03:07	52.0
65	2017/09/05 16:03:08	52.3
66	2017/09/05 16:03:09	52.5
67	2017/09/05 16:03:10	53.0
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69	2017/09/05 16:03:12	52.6
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78	2017/09/05 16:03:21	51.7
79	2017/09/05 16:03:22	51.4
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81	2017/09/05 16:03:24	52.4
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278	2017/09/05	16:06:41	52.9
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283	2017/09/05	16:06:46	54.3

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286	2017/09/05	16:06:49	55.2
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289	2017/09/05	16:06:52	55.4
290	2017/09/05	16:06:53	54.9
291	2017/09/05	16:06:54	56.3
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723	2017/09/05	16:14:06	53.5
724	2017/09/05	16:14:07	53.7
725	2017/09/05	16:14:08	53.2
726	2017/09/05	16:14:09	53.1
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728	2017/09/05	16:14:11	53.4
729	2017/09/05	16:14:12	53.7
730	2017/09/05	16:14:13	54.0
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732	2017/09/05	16:14:15	54.0
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741	2017/09/05	16:14:24	52.5
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744	2017/09/05	16:14:27	54.9
745	2017/09/05	16:14:28	53.2
746	2017/09/05	16:14:29	54.2
747	2017/09/05	16:14:30	57.0
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749	2017/09/05	16:14:32	56.6
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836	2017/09/05 16:15:59	51.8
837	2017/09/05 16:16:00	52.2
838	2017/09/05 16:16:01	55.5
839	2017/09/05 16:16:02	51.9
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843	2017/09/05 16:16:06	50.7
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867	2017/09/05 16:16:30	53.1
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884	2017/09/05	16:16:47	53.4
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886	2017/09/05	16:16:49	52.8
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893	2017/09/05	16:16:56	55.4
894	2017/09/05	16:16:57	53.0
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896	2017/09/05	16:16:59	54.8
897	2017/09/05	16:17:00	52.1
898	2017/09/05	16:17:01	51.7
899	2017/09/05	16:17:02	52.6
900	2017/09/05	16:17:03	53.2

- Freq Weight : A
- Time Weight : FAST
- Level Range : 40-100
- Max dB : 77.0 - 2017/09/05 16:30:18
- Level Range : 40-100
- SEL : 89.6
- Leq : 60.1
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8	2017/09/05 16:25:05	64.2
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10	2017/09/05 16:25:07	60.3
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697	2017/09/05	16:36:34	55.5
698	2017/09/05	16:36:35	57.3
699	2017/09/05	16:36:36	60.0
700	2017/09/05	16:36:37	60.9
701	2017/09/05	16:36:38	62.3
702	2017/09/05	16:36:39	62.6
703	2017/09/05	16:36:40	59.8
704	2017/09/05	16:36:41	62.2
705	2017/09/05	16:36:42	59.5
706	2017/09/05	16:36:43	62.4
707	2017/09/05	16:36:44	63.3
708	2017/09/05	16:36:45	63.4
709	2017/09/05	16:36:46	64.2
710	2017/09/05	16:36:47	60.7
711	2017/09/05	16:36:48	59.8
712	2017/09/05	16:36:49	58.9
713	2017/09/05	16:36:50	58.5
714	2017/09/05	16:36:51	58.1
715	2017/09/05	16:36:52	60.1
716	2017/09/05	16:36:53	60.6
717	2017/09/05	16:36:54	62.1
718	2017/09/05	16:36:55	59.9
719	2017/09/05	16:36:56	60.5
720	2017/09/05	16:36:57	60.2
721	2017/09/05	16:36:58	61.7
722	2017/09/05	16:36:59	60.2
723	2017/09/05	16:37:00	58.5
724	2017/09/05	16:37:01	60.8
725	2017/09/05	16:37:02	59.7
726	2017/09/05	16:37:03	59.0
727	2017/09/05	16:37:04	60.7
728	2017/09/05	16:37:05	57.0
729	2017/09/05	16:37:06	55.5
730	2017/09/05	16:37:07	55.0
731	2017/09/05	16:37:08	54.1
732	2017/09/05	16:37:09	53.2
733	2017/09/05	16:37:10	52.0
734	2017/09/05	16:37:11	52.4
735	2017/09/05	16:37:12	56.6
736	2017/09/05	16:37:13	57.2
737	2017/09/05	16:37:14	58.6
738	2017/09/05	16:37:15	59.5
739	2017/09/05	16:37:16	63.9
740	2017/09/05	16:37:17	68.3
741	2017/09/05	16:37:18	60.8
742	2017/09/05	16:37:19	55.1
743	2017/09/05	16:37:20	52.4
744	2017/09/05	16:37:21	52.3
745	2017/09/05	16:37:22	54.1
746	2017/09/05	16:37:23	55.1
747	2017/09/05	16:37:24	54.3
748	2017/09/05	16:37:25	56.8
749	2017/09/05	16:37:26	57.9
750	2017/09/05	16:37:27	60.6
751	2017/09/05	16:37:28	60.7
752	2017/09/05	16:37:29	58.2
753	2017/09/05	16:37:30	57.7
754	2017/09/05	16:37:31	57.9
755	2017/09/05	16:37:32	56.9
756	2017/09/05	16:37:33	57.3
757	2017/09/05	16:37:34	58.4
758	2017/09/05	16:37:35	57.1
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760	2017/09/05	16:37:37	59.9
761	2017/09/05	16:37:38	56.2
762	2017/09/05	16:37:39	57.3
763	2017/09/05	16:37:40	58.9
764	2017/09/05	16:37:41	59.0
765	2017/09/05	16:37:42	60.1
766	2017/09/05	16:37:43	58.0
767	2017/09/05	16:37:44	57.3
768	2017/09/05	16:37:45	57.4
769	2017/09/05	16:37:46	57.6
770	2017/09/05	16:37:47	59.8
771	2017/09/05	16:37:48	61.0
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773	2017/09/05	16:37:50	62.5
774	2017/09/05	16:37:51	60.2
775	2017/09/05	16:37:52	60.3
776	2017/09/05	16:37:53	58.1
777	2017/09/05	16:37:54	53.1
778	2017/09/05	16:37:55	51.7

779	2017/09/05 16:37:56	51.7
780	2017/09/05 16:37:57	50.5
781	2017/09/05 16:37:58	50.9
782	2017/09/05 16:37:59	52.3
783	2017/09/05 16:38:00	52.0
784	2017/09/05 16:38:01	52.5
785	2017/09/05 16:38:02	51.0
786	2017/09/05 16:38:03	51.0
787	2017/09/05 16:38:04	51.3
788	2017/09/05 16:38:05	52.1
789	2017/09/05 16:38:06	52.3
790	2017/09/05 16:38:07	51.5
791	2017/09/05 16:38:08	51.4
792	2017/09/05 16:38:09	51.4
793	2017/09/05 16:38:10	50.5
794	2017/09/05 16:38:11	50.4
795	2017/09/05 16:38:12	51.3
796	2017/09/05 16:38:13	52.0
797	2017/09/05 16:38:14	52.6
798	2017/09/05 16:38:15	55.5
799	2017/09/05 16:38:16	58.2
800	2017/09/05 16:38:17	58.3
801	2017/09/05 16:38:18	61.2
802	2017/09/05 16:38:19	59.3
803	2017/09/05 16:38:20	59.9
804	2017/09/05 16:38:21	61.3
805	2017/09/05 16:38:22	64.0
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807	2017/09/05 16:38:24	63.9
808	2017/09/05 16:38:25	62.5
809	2017/09/05 16:38:26	61.3
810	2017/09/05 16:38:27	60.7
811	2017/09/05 16:38:28	59.6
812	2017/09/05 16:38:29	58.3
813	2017/09/05 16:38:30	57.3
814	2017/09/05 16:38:31	57.6
815	2017/09/05 16:38:32	55.8
816	2017/09/05 16:38:33	55.6
817	2017/09/05 16:38:34	56.7
818	2017/09/05 16:38:35	60.6
819	2017/09/05 16:38:36	61.9
820	2017/09/05 16:38:37	67.5
821	2017/09/05 16:38:38	65.5
822	2017/09/05 16:38:39	62.7
823	2017/09/05 16:38:40	60.4
824	2017/09/05 16:38:41	60.8
825	2017/09/05 16:38:42	60.8
826	2017/09/05 16:38:43	59.8
827	2017/09/05 16:38:44	59.5
828	2017/09/05 16:38:45	59.3
829	2017/09/05 16:38:46	57.1
830	2017/09/05 16:38:47	57.2
831	2017/09/05 16:38:48	56.7
832	2017/09/05 16:38:49	56.8
833	2017/09/05 16:38:50	55.8
834	2017/09/05 16:38:51	54.0
835	2017/09/05 16:38:52	52.9
836	2017/09/05 16:38:53	51.7
837	2017/09/05 16:38:54	53.0
838	2017/09/05 16:38:55	54.2
839	2017/09/05 16:38:56	52.7
840	2017/09/05 16:38:57	53.0
841	2017/09/05 16:38:58	53.1
842	2017/09/05 16:38:59	51.5
843	2017/09/05 16:39:00	51.8
844	2017/09/05 16:39:01	51.5
845	2017/09/05 16:39:02	54.2
846	2017/09/05 16:39:03	55.1
847	2017/09/05 16:39:04	56.8
848	2017/09/05 16:39:05	58.5
849	2017/09/05 16:39:06	58.8
850	2017/09/05 16:39:07	58.9
851	2017/09/05 16:39:08	59.2
852	2017/09/05 16:39:09	59.7
853	2017/09/05 16:39:10	59.5
854	2017/09/05 16:39:11	60.0
855	2017/09/05 16:39:12	60.5
856	2017/09/05 16:39:13	60.1
857	2017/09/05 16:39:14	59.6
858	2017/09/05 16:39:15	59.4
859	2017/09/05 16:39:16	58.3
860	2017/09/05 16:39:17	59.0
861	2017/09/05 16:39:18	59.6
862	2017/09/05 16:39:19	61.7
863	2017/09/05 16:39:20	62.5
864	2017/09/05 16:39:21	64.6
865	2017/09/05 16:39:22	63.2
866	2017/09/05 16:39:23	62.4
867	2017/09/05 16:39:24	61.8
868	2017/09/05 16:39:25	64.8
869	2017/09/05 16:39:26	61.5
870	2017/09/05 16:39:27	58.1
871	2017/09/05 16:39:28	58.0
872	2017/09/05 16:39:29	57.5
873	2017/09/05 16:39:30	59.2
874	2017/09/05 16:39:31	58.8
875	2017/09/05 16:39:32	60.0
876	2017/09/05 16:39:33	57.0
877	2017/09/05 16:39:34	56.5

878	2017/09/05	16:39:35	52.5
879	2017/09/05	16:39:36	51.6
880	2017/09/05	16:39:37	51.9
881	2017/09/05	16:39:38	51.9
882	2017/09/05	16:39:39	51.9
883	2017/09/05	16:39:40	51.9
884	2017/09/05	16:39:41	52.7
885	2017/09/05	16:39:42	52.6
886	2017/09/05	16:39:43	53.3
887	2017/09/05	16:39:44	52.9
888	2017/09/05	16:39:45	52.8
889	2017/09/05	16:39:46	53.4
890	2017/09/05	16:39:47	55.8
891	2017/09/05	16:39:48	51.9
892	2017/09/05	16:39:49	51.9
893	2017/09/05	16:39:50	52.2
894	2017/09/05	16:39:51	52.3
895	2017/09/05	16:39:52	54.6
896	2017/09/05	16:39:53	53.2
897	2017/09/05	16:39:54	54.1
898	2017/09/05	16:39:55	56.0
899	2017/09/05	16:39:56	58.0
900	2017/09/05	16:39:57	60.5

- Freq Weight : A
- Time Weight : FAST
- Level Range : 40-100
- Max dB : 70.5 - 2017/09/05 17:05:34
- Level Range : 40-100
- SEL : 80.4
- Leq : 50.9
-

No.s	Date Time	(dB)
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2	2017/09/05 16:52:10	52.8
3	2017/09/05 16:52:11	50.7
4	2017/09/05 16:52:12	55.4
5	2017/09/05 16:52:13	50.9
6	2017/09/05 16:52:14	49.7
7	2017/09/05 16:52:15	49.1
8	2017/09/05 16:52:16	49.0
9	2017/09/05 16:52:17	48.7
10	2017/09/05 16:52:18	50.8
11	2017/09/05 16:52:19	51.4
12	2017/09/05 16:52:20	47.2
13	2017/09/05 16:52:21	48.2
14	2017/09/05 16:52:22	48.4
15	2017/09/05 16:52:23	49.3
16	2017/09/05 16:52:24	48.2
17	2017/09/05 16:52:25	48.0
18	2017/09/05 16:52:26	47.9
19	2017/09/05 16:52:27	50.8
20	2017/09/05 16:52:28	50.7
21	2017/09/05 16:52:29	49.8
22	2017/09/05 16:52:30	49.0
23	2017/09/05 16:52:31	50.7
24	2017/09/05 16:52:32	49.7
25	2017/09/05 16:52:33	48.8
26	2017/09/05 16:52:34	48.9
27	2017/09/05 16:52:35	49.5
28	2017/09/05 16:52:36	54.5
29	2017/09/05 16:52:37	55.0
30	2017/09/05 16:52:38	53.1
31	2017/09/05 16:52:39	52.2
32	2017/09/05 16:52:40	51.7
33	2017/09/05 16:52:41	51.5
34	2017/09/05 16:52:42	56.1
35	2017/09/05 16:52:43	55.2
36	2017/09/05 16:52:44	51.4
37	2017/09/05 16:52:45	54.2
38	2017/09/05 16:52:46	48.6
39	2017/09/05 16:52:47	49.0
40	2017/09/05 16:52:48	48.0
41	2017/09/05 16:52:49	49.0
42	2017/09/05 16:52:50	52.7
43	2017/09/05 16:52:51	49.9
44	2017/09/05 16:52:52	48.4
45	2017/09/05 16:52:53	50.1
46	2017/09/05 16:52:54	50.4
47	2017/09/05 16:52:55	47.7
48	2017/09/05 16:52:56	50.2
49	2017/09/05 16:52:57	51.6
50	2017/09/05 16:52:58	47.4
51	2017/09/05 16:52:59	47.5
52	2017/09/05 16:53:00	46.8
53	2017/09/05 16:53:01	47.2
54	2017/09/05 16:53:02	53.9
55	2017/09/05 16:53:03	52.1
56	2017/09/05 16:53:04	51.9
57	2017/09/05 16:53:05	52.0
58	2017/09/05 16:53:06	51.0
59	2017/09/05 16:53:07	52.0
60	2017/09/05 16:53:08	52.4
61	2017/09/05 16:53:09	51.0
62	2017/09/05 16:53:10	49.5
63	2017/09/05 16:53:11	50.3
64	2017/09/05 16:53:12	48.2
65	2017/09/05 16:53:13	47.8
66	2017/09/05 16:53:14	47.6
67	2017/09/05 16:53:15	48.0
68	2017/09/05 16:53:16	48.4
69	2017/09/05 16:53:17	48.3
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83	2017/09/05 16:53:31	53.8
84	2017/09/05 16:53:32	50.8
85	2017/09/05 16:53:33	47.4

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96	2017/09/05	16:53:44	47.7
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98	2017/09/05	16:53:46	49.1
99	2017/09/05	16:53:47	47.2
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101	2017/09/05	16:53:49	46.8
102	2017/09/05	16:53:50	47.5
103	2017/09/05	16:53:51	46.9
104	2017/09/05	16:53:52	47.1
105	2017/09/05	16:53:53	47.6
106	2017/09/05	16:53:54	47.1
107	2017/09/05	16:53:55	47.7
108	2017/09/05	16:53:56	46.7
109	2017/09/05	16:53:57	47.9
110	2017/09/05	16:53:58	47.2
111	2017/09/05	16:53:59	46.7
112	2017/09/05	16:54:00	47.4
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143	2017/09/05	16:54:31	45.1
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146	2017/09/05	16:54:34	47.6
147	2017/09/05	16:54:35	53.2
148	2017/09/05	16:54:36	59.1
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224	2017/09/05	16:55:52	52.3
225	2017/09/05	16:55:53	55.5
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233	2017/09/05	16:56:01	52.9
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235	2017/09/05	16:56:03	51.8
236	2017/09/05	16:56:04	49.0
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660	2017/09/05 17:03:08	47.5
661	2017/09/05 17:03:09	52.8
662	2017/09/05 17:03:10	49.6
663	2017/09/05 17:03:11	47.1
664	2017/09/05 17:03:12	47.9
665	2017/09/05 17:03:13	47.3
666	2017/09/05 17:03:14	47.2
667	2017/09/05 17:03:15	47.1
668	2017/09/05 17:03:16	47.4
669	2017/09/05 17:03:17	48.6
670	2017/09/05 17:03:18	47.4
671	2017/09/05 17:03:19	47.6
672	2017/09/05 17:03:20	50.1
673	2017/09/05 17:03:21	48.7
674	2017/09/05 17:03:22	48.9
675	2017/09/05 17:03:23	48.6
676	2017/09/05 17:03:24	49.5
677	2017/09/05 17:03:25	47.9
678	2017/09/05 17:03:26	47.1
679	2017/09/05 17:03:27	55.5

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684	2017/09/05	17:03:32	47.6
685	2017/09/05	17:03:33	50.2
686	2017/09/05	17:03:34	51.4
687	2017/09/05	17:03:35	49.4
688	2017/09/05	17:03:36	47.5
689	2017/09/05	17:03:37	46.5
690	2017/09/05	17:03:38	46.5
691	2017/09/05	17:03:39	48.4
692	2017/09/05	17:03:40	47.0
693	2017/09/05	17:03:41	46.3
694	2017/09/05	17:03:42	47.6
695	2017/09/05	17:03:43	45.9
696	2017/09/05	17:03:44	49.1
697	2017/09/05	17:03:45	46.4
698	2017/09/05	17:03:46	45.8
699	2017/09/05	17:03:47	45.7
700	2017/09/05	17:03:48	47.3
701	2017/09/05	17:03:49	48.4
702	2017/09/05	17:03:50	47.9
703	2017/09/05	17:03:51	46.6
704	2017/09/05	17:03:52	47.2
705	2017/09/05	17:03:53	47.7
706	2017/09/05	17:03:54	48.1
707	2017/09/05	17:03:55	47.0
708	2017/09/05	17:03:56	49.5
709	2017/09/05	17:03:57	48.6
710	2017/09/05	17:03:58	48.3
711	2017/09/05	17:03:59	48.4
712	2017/09/05	17:04:00	62.8
713	2017/09/05	17:04:01	48.5
714	2017/09/05	17:04:02	50.2
715	2017/09/05	17:04:03	49.8
716	2017/09/05	17:04:04	48.0
717	2017/09/05	17:04:05	49.4
718	2017/09/05	17:04:06	47.7
719	2017/09/05	17:04:07	48.4
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723	2017/09/05	17:04:11	47.0
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725	2017/09/05	17:04:13	48.9
726	2017/09/05	17:04:14	47.9
727	2017/09/05	17:04:15	48.0
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729	2017/09/05	17:04:17	46.2
730	2017/09/05	17:04:18	46.0
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732	2017/09/05	17:04:20	47.1
733	2017/09/05	17:04:21	46.6
734	2017/09/05	17:04:22	45.1
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741	2017/09/05	17:04:29	46.8
742	2017/09/05	17:04:30	48.7
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744	2017/09/05	17:04:32	47.3
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746	2017/09/05	17:04:34	48.6
747	2017/09/05	17:04:35	51.7
748	2017/09/05	17:04:36	48.3
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750	2017/09/05	17:04:38	48.3
751	2017/09/05	17:04:39	45.6
752	2017/09/05	17:04:40	45.6
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754	2017/09/05	17:04:42	58.1
755	2017/09/05	17:04:43	51.5
756	2017/09/05	17:04:44	47.4
757	2017/09/05	17:04:45	47.9
758	2017/09/05	17:04:46	48.4
759	2017/09/05	17:04:47	48.3
760	2017/09/05	17:04:48	50.0
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762	2017/09/05	17:04:50	48.5
763	2017/09/05	17:04:51	48.7
764	2017/09/05	17:04:52	63.2
765	2017/09/05	17:04:53	56.0
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767	2017/09/05	17:04:55	49.0
768	2017/09/05	17:04:56	48.0
769	2017/09/05	17:04:57	46.3
770	2017/09/05	17:04:58	46.2
771	2017/09/05	17:04:59	46.0
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773	2017/09/05	17:05:01	44.8
774	2017/09/05	17:05:02	47.4
775	2017/09/05	17:05:03	47.4
776	2017/09/05	17:05:04	46.1
777	2017/09/05	17:05:05	45.8
778	2017/09/05	17:05:06	45.4

779	2017/09/05	17:05:07	47.9
780	2017/09/05	17:05:08	45.5
781	2017/09/05	17:05:09	44.9
782	2017/09/05	17:05:10	45.2
783	2017/09/05	17:05:11	46.6
784	2017/09/05	17:05:12	47.0
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786	2017/09/05	17:05:14	50.1
787	2017/09/05	17:05:15	46.5
788	2017/09/05	17:05:16	46.3
789	2017/09/05	17:05:17	47.7
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791	2017/09/05	17:05:19	47.0
792	2017/09/05	17:05:20	46.2
793	2017/09/05	17:05:21	47.9
794	2017/09/05	17:05:22	48.9
795	2017/09/05	17:05:23	49.8
796	2017/09/05	17:05:24	47.8
797	2017/09/05	17:05:25	48.6
798	2017/09/05	17:05:26	47.2
799	2017/09/05	17:05:27	48.0
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801	2017/09/05	17:05:29	48.9
802	2017/09/05	17:05:30	48.9
803	2017/09/05	17:05:31	48.1
804	2017/09/05	17:05:32	47.8
805	2017/09/05	17:05:33	47.6
806	2017/09/05	17:05:34	51.5
807	2017/09/05	17:05:35	47.2
808	2017/09/05	17:05:36	49.3
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810	2017/09/05	17:05:38	46.4
811	2017/09/05	17:05:39	45.9
812	2017/09/05	17:05:40	46.5
813	2017/09/05	17:05:41	48.6
814	2017/09/05	17:05:42	48.1
815	2017/09/05	17:05:43	47.4
816	2017/09/05	17:05:44	45.7
817	2017/09/05	17:05:45	46.7
818	2017/09/05	17:05:46	45.5
819	2017/09/05	17:05:47	46.0
820	2017/09/05	17:05:48	46.0
821	2017/09/05	17:05:49	46.8
822	2017/09/05	17:05:50	45.1
823	2017/09/05	17:05:51	46.2
824	2017/09/05	17:05:52	45.7
825	2017/09/05	17:05:53	46.3
826	2017/09/05	17:05:54	47.4
827	2017/09/05	17:05:55	46.8
828	2017/09/05	17:05:56	48.4
829	2017/09/05	17:05:57	49.7
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832	2017/09/05	17:06:00	47.8
833	2017/09/05	17:06:01	47.1
834	2017/09/05	17:06:02	47.4
835	2017/09/05	17:06:03	47.0
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837	2017/09/05	17:06:05	47.0
838	2017/09/05	17:06:06	46.0
839	2017/09/05	17:06:07	46.5
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841	2017/09/05	17:06:09	46.4
842	2017/09/05	17:06:10	48.1
843	2017/09/05	17:06:11	47.1
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845	2017/09/05	17:06:13	48.7
846	2017/09/05	17:06:14	48.7
847	2017/09/05	17:06:15	50.1
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849	2017/09/05	17:06:17	47.4
850	2017/09/05	17:06:18	48.8
851	2017/09/05	17:06:19	48.7
852	2017/09/05	17:06:20	46.4
853	2017/09/05	17:06:21	46.4
854	2017/09/05	17:06:22	46.2
855	2017/09/05	17:06:23	45.5
856	2017/09/05	17:06:24	47.3
857	2017/09/05	17:06:25	46.5
858	2017/09/05	17:06:26	45.1
859	2017/09/05	17:06:27	47.9
860	2017/09/05	17:06:28	45.1
861	2017/09/05	17:06:29	45.6
862	2017/09/05	17:06:30	48.0
863	2017/09/05	17:06:31	46.6
864	2017/09/05	17:06:32	46.2
865	2017/09/05	17:06:33	53.0
866	2017/09/05	17:06:34	45.4
867	2017/09/05	17:06:35	46.6
868	2017/09/05	17:06:36	47.2
869	2017/09/05	17:06:37	47.5
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871	2017/09/05	17:06:39	47.7
872	2017/09/05	17:06:40	48.6
873	2017/09/05	17:06:41	49.0
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875	2017/09/05	17:06:43	47.8
876	2017/09/05	17:06:44	46.9
877	2017/09/05	17:06:45	46.6

878	2017/09/05	17:06:46	47.2
879	2017/09/05	17:06:47	46.7
880	2017/09/05	17:06:48	46.2
881	2017/09/05	17:06:49	47.3
882	2017/09/05	17:06:50	46.6
883	2017/09/05	17:06:51	46.6
884	2017/09/05	17:06:52	48.3
885	2017/09/05	17:06:53	47.5
886	2017/09/05	17:06:54	47.4
887	2017/09/05	17:06:55	47.1
888	2017/09/05	17:06:56	47.5
889	2017/09/05	17:06:57	47.4
890	2017/09/05	17:06:58	48.9
891	2017/09/05	17:06:59	48.9
892	2017/09/05	17:07:00	52.3
893	2017/09/05	17:07:01	57.3
894	2017/09/05	17:07:02	56.4
895	2017/09/05	17:07:03	54.7
896	2017/09/05	17:07:04	58.6
897	2017/09/05	17:07:05	56.0
898	2017/09/05	17:07:06	57.6
899	2017/09/05	17:07:07	57.9
900	2017/09/05	17:07:08	55.2

- Freq Weight : A
- Time Weight : FAST
- Level Range : 40-100
- Max dB : 76.9 - 2017/09/05 17:25:43
- Level Range : 40-100
- SEL : 93.6
- Leq : 64.1
-

No.s	Date Time	(dB)
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2	2017/09/05 17:23:38	50.3
3	2017/09/05 17:23:39	51.7
4	2017/09/05 17:23:40	55.1
5	2017/09/05 17:23:41	58.3
6	2017/09/05 17:23:42	60.7
7	2017/09/05 17:23:43	61.6
8	2017/09/05 17:23:44	61.1
9	2017/09/05 17:23:45	60.4
10	2017/09/05 17:23:46	62.8
11	2017/09/05 17:23:47	65.0
12	2017/09/05 17:23:48	68.0
13	2017/09/05 17:23:49	70.3
14	2017/09/05 17:23:50	68.2
15	2017/09/05 17:23:51	67.7
16	2017/09/05 17:23:52	65.4
17	2017/09/05 17:23:53	65.8
18	2017/09/05 17:23:54	70.9
19	2017/09/05 17:23:55	66.3
20	2017/09/05 17:23:56	64.8
21	2017/09/05 17:23:57	65.8
22	2017/09/05 17:23:58	67.4
23	2017/09/05 17:23:59	71.5
24	2017/09/05 17:24:00	68.3
25	2017/09/05 17:24:01	67.3
26	2017/09/05 17:24:02	68.1
27	2017/09/05 17:24:03	61.6
28	2017/09/05 17:24:04	57.1
29	2017/09/05 17:24:05	58.9
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38	2017/09/05 17:24:14	67.8
39	2017/09/05 17:24:15	69.0
40	2017/09/05 17:24:16	67.2
41	2017/09/05 17:24:17	66.0
42	2017/09/05 17:24:18	65.1
43	2017/09/05 17:24:19	62.3
44	2017/09/05 17:24:20	62.0
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46	2017/09/05 17:24:22	66.8
47	2017/09/05 17:24:23	69.1
48	2017/09/05 17:24:24	64.0
49	2017/09/05 17:24:25	61.4
50	2017/09/05 17:24:26	60.2
51	2017/09/05 17:24:27	64.7
52	2017/09/05 17:24:28	70.4
53	2017/09/05 17:24:29	65.5
54	2017/09/05 17:24:30	61.5
55	2017/09/05 17:24:31	58.7
56	2017/09/05 17:24:32	56.4
57	2017/09/05 17:24:33	57.9
58	2017/09/05 17:24:34	63.7
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61	2017/09/05 17:24:37	59.3
62	2017/09/05 17:24:38	58.4
63	2017/09/05 17:24:39	56.8
64	2017/09/05 17:24:40	54.9
65	2017/09/05 17:24:41	56.6
66	2017/09/05 17:24:42	59.6
67	2017/09/05 17:24:43	62.2
68	2017/09/05 17:24:44	65.0
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73	2017/09/05 17:24:49	53.1
74	2017/09/05 17:24:50	50.1
75	2017/09/05 17:24:51	49.2
76	2017/09/05 17:24:52	49.6
77	2017/09/05 17:24:53	49.9
78	2017/09/05 17:24:54	50.5
79	2017/09/05 17:24:55	52.1
80	2017/09/05 17:24:56	56.1
81	2017/09/05 17:24:57	59.2
82	2017/09/05 17:24:58	63.2
83	2017/09/05 17:24:59	66.5
84	2017/09/05 17:25:00	72.3
85	2017/09/05 17:25:01	74.0

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88	2017/09/05	17:25:04	60.6
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90	2017/09/05	17:25:06	63.8
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93	2017/09/05	17:25:09	53.2
94	2017/09/05	17:25:10	51.7
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98	2017/09/05	17:25:14	50.0
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101	2017/09/05	17:25:17	46.4
102	2017/09/05	17:25:18	46.9
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106	2017/09/05	17:25:22	52.4
107	2017/09/05	17:25:23	55.4
108	2017/09/05	17:25:24	58.4
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111	2017/09/05	17:25:27	52.8
112	2017/09/05	17:25:28	50.8
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119	2017/09/05	17:25:35	50.0
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121	2017/09/05	17:25:37	50.0
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123	2017/09/05	17:25:39	56.4
124	2017/09/05	17:25:40	60.3
125	2017/09/05	17:25:41	63.7
126	2017/09/05	17:25:42	70.5
127	2017/09/05	17:25:43	76.6
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130	2017/09/05	17:25:46	60.5
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132	2017/09/05	17:25:48	58.9
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136	2017/09/05	17:25:52	55.7
137	2017/09/05	17:25:53	56.0
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139	2017/09/05	17:25:55	58.3
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184	2017/09/05	17:26:40	63.1

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623	2017/09/05	17:33:59	53.8
624	2017/09/05	17:34:00	51.0
625	2017/09/05	17:34:01	50.2
626	2017/09/05	17:34:02	51.0
627	2017/09/05	17:34:03	51.5
628	2017/09/05	17:34:04	52.8
629	2017/09/05	17:34:05	54.8
630	2017/09/05	17:34:06	57.9
631	2017/09/05	17:34:07	59.5
632	2017/09/05	17:34:08	60.2
633	2017/09/05	17:34:09	59.2
634	2017/09/05	17:34:10	54.9
635	2017/09/05	17:34:11	52.7
636	2017/09/05	17:34:12	51.1
637	2017/09/05	17:34:13	50.8
638	2017/09/05	17:34:14	53.3
639	2017/09/05	17:34:15	56.4
640	2017/09/05	17:34:16	58.1
641	2017/09/05	17:34:17	61.3
642	2017/09/05	17:34:18	61.9
643	2017/09/05	17:34:19	60.1
644	2017/09/05	17:34:20	61.3
645	2017/09/05	17:34:21	61.8
646	2017/09/05	17:34:22	62.4
647	2017/09/05	17:34:23	65.5
648	2017/09/05	17:34:24	71.8
649	2017/09/05	17:34:25	72.2
650	2017/09/05	17:34:26	70.5
651	2017/09/05	17:34:27	66.2
652	2017/09/05	17:34:28	70.1
653	2017/09/05	17:34:29	67.7
654	2017/09/05	17:34:30	66.0
655	2017/09/05	17:34:31	68.7
656	2017/09/05	17:34:32	69.3
657	2017/09/05	17:34:33	69.7
658	2017/09/05	17:34:34	67.1
659	2017/09/05	17:34:35	68.7
660	2017/09/05	17:34:36	67.2
661	2017/09/05	17:34:37	68.4
662	2017/09/05	17:34:38	67.6
663	2017/09/05	17:34:39	67.7
664	2017/09/05	17:34:40	65.5
665	2017/09/05	17:34:41	65.4
666	2017/09/05	17:34:42	64.2
667	2017/09/05	17:34:43	65.0
668	2017/09/05	17:34:44	67.1
669	2017/09/05	17:34:45	67.4
670	2017/09/05	17:34:46	65.4
671	2017/09/05	17:34:47	65.7
672	2017/09/05	17:34:48	72.3
673	2017/09/05	17:34:49	67.5
674	2017/09/05	17:34:50	66.9
675	2017/09/05	17:34:51	64.2
676	2017/09/05	17:34:52	63.2
677	2017/09/05	17:34:53	62.9
678	2017/09/05	17:34:54	62.0
679	2017/09/05	17:34:55	62.8

680	2017/09/05 17:34:56	61.3
681	2017/09/05 17:34:57	62.8
682	2017/09/05 17:34:58	63.0
683	2017/09/05 17:34:59	59.7
684	2017/09/05 17:35:00	56.4
685	2017/09/05 17:35:01	54.3
686	2017/09/05 17:35:02	51.9
687	2017/09/05 17:35:03	50.4
688	2017/09/05 17:35:04	49.3
689	2017/09/05 17:35:05	49.5
690	2017/09/05 17:35:06	50.5
691	2017/09/05 17:35:07	50.9
692	2017/09/05 17:35:08	52.6
693	2017/09/05 17:35:09	52.2
694	2017/09/05 17:35:10	51.7
695	2017/09/05 17:35:11	52.4
696	2017/09/05 17:35:12	53.1
697	2017/09/05 17:35:13	53.7
698	2017/09/05 17:35:14	56.2
699	2017/09/05 17:35:15	58.6
700	2017/09/05 17:35:16	60.0
701	2017/09/05 17:35:17	65.3
702	2017/09/05 17:35:18	71.4
703	2017/09/05 17:35:19	67.3
704	2017/09/05 17:35:20	62.1
705	2017/09/05 17:35:21	60.3
706	2017/09/05 17:35:22	62.3
707	2017/09/05 17:35:23	64.4
708	2017/09/05 17:35:24	64.8
709	2017/09/05 17:35:25	66.2
710	2017/09/05 17:35:26	66.2
711	2017/09/05 17:35:27	66.4
712	2017/09/05 17:35:28	66.3
713	2017/09/05 17:35:29	65.5
714	2017/09/05 17:35:30	63.6
715	2017/09/05 17:35:31	62.6
716	2017/09/05 17:35:32	60.7
717	2017/09/05 17:35:33	58.8
718	2017/09/05 17:35:34	56.6
719	2017/09/05 17:35:35	53.7
720	2017/09/05 17:35:36	52.9
721	2017/09/05 17:35:37	52.3
722	2017/09/05 17:35:38	52.2
723	2017/09/05 17:35:39	57.1
724	2017/09/05 17:35:40	59.5
725	2017/09/05 17:35:41	59.7
726	2017/09/05 17:35:42	62.9
727	2017/09/05 17:35:43	63.4
728	2017/09/05 17:35:44	62.5
729	2017/09/05 17:35:45	62.6
730	2017/09/05 17:35:46	60.5
731	2017/09/05 17:35:47	57.0
732	2017/09/05 17:35:48	55.4
733	2017/09/05 17:35:49	56.5
734	2017/09/05 17:35:50	58.7
735	2017/09/05 17:35:51	58.9
736	2017/09/05 17:35:52	57.5
737	2017/09/05 17:35:53	55.6
738	2017/09/05 17:35:54	60.1
739	2017/09/05 17:35:55	65.0
740	2017/09/05 17:35:56	64.0
741	2017/09/05 17:35:57	59.5
742	2017/09/05 17:35:58	57.1
743	2017/09/05 17:35:59	56.9
744	2017/09/05 17:36:00	58.7
745	2017/09/05 17:36:01	60.7
746	2017/09/05 17:36:02	62.9
747	2017/09/05 17:36:03	68.9
748	2017/09/05 17:36:04	71.4
749	2017/09/05 17:36:05	66.4
750	2017/09/05 17:36:06	66.6
751	2017/09/05 17:36:07	70.5
752	2017/09/05 17:36:08	70.3
753	2017/09/05 17:36:09	68.3
754	2017/09/05 17:36:10	67.7
755	2017/09/05 17:36:11	66.6
756	2017/09/05 17:36:12	67.4
757	2017/09/05 17:36:13	67.1
758	2017/09/05 17:36:14	66.3
759	2017/09/05 17:36:15	66.5
760	2017/09/05 17:36:16	65.8
761	2017/09/05 17:36:17	67.3
762	2017/09/05 17:36:18	68.4
763	2017/09/05 17:36:19	73.2
764	2017/09/05 17:36:20	72.9
765	2017/09/05 17:36:21	67.5
766	2017/09/05 17:36:22	65.7
767	2017/09/05 17:36:23	61.0
768	2017/09/05 17:36:24	58.9
769	2017/09/05 17:36:25	58.7
770	2017/09/05 17:36:26	59.9
771	2017/09/05 17:36:27	62.0
772	2017/09/05 17:36:28	64.4
773	2017/09/05 17:36:29	69.7
774	2017/09/05 17:36:30	69.6
775	2017/09/05 17:36:31	64.4
776	2017/09/05 17:36:32	59.4
777	2017/09/05 17:36:33	55.1
778	2017/09/05 17:36:34	53.6

779	2017/09/05 17:36:35	51.6
780	2017/09/05 17:36:36	53.1
781	2017/09/05 17:36:37	54.5
782	2017/09/05 17:36:38	56.2
783	2017/09/05 17:36:39	59.5
784	2017/09/05 17:36:40	63.1
785	2017/09/05 17:36:41	65.7
786	2017/09/05 17:36:42	67.4
787	2017/09/05 17:36:43	64.7
788	2017/09/05 17:36:44	64.3
789	2017/09/05 17:36:45	66.9
790	2017/09/05 17:36:46	69.2
791	2017/09/05 17:36:47	63.5
792	2017/09/05 17:36:48	63.6
793	2017/09/05 17:36:49	62.9
794	2017/09/05 17:36:50	59.6
795	2017/09/05 17:36:51	54.5
796	2017/09/05 17:36:52	51.6
797	2017/09/05 17:36:53	51.6
798	2017/09/05 17:36:54	48.3
799	2017/09/05 17:36:55	48.0
800	2017/09/05 17:36:56	46.6
801	2017/09/05 17:36:57	46.6
802	2017/09/05 17:36:58	46.4
803	2017/09/05 17:36:59	46.9
804	2017/09/05 17:37:00	46.9
805	2017/09/05 17:37:01	47.2
806	2017/09/05 17:37:02	48.1
807	2017/09/05 17:37:03	48.4
808	2017/09/05 17:37:04	48.4
809	2017/09/05 17:37:05	47.7
810	2017/09/05 17:37:06	48.3
811	2017/09/05 17:37:07	48.3
812	2017/09/05 17:37:08	50.8
813	2017/09/05 17:37:09	53.5
814	2017/09/05 17:37:10	55.9
815	2017/09/05 17:37:11	58.2
816	2017/09/05 17:37:12	60.1
817	2017/09/05 17:37:13	61.7
818	2017/09/05 17:37:14	59.7
819	2017/09/05 17:37:15	56.4
820	2017/09/05 17:37:16	55.1
821	2017/09/05 17:37:17	54.4
822	2017/09/05 17:37:18	54.4
823	2017/09/05 17:37:19	56.0
824	2017/09/05 17:37:20	57.7
825	2017/09/05 17:37:21	61.4
826	2017/09/05 17:37:22	65.5
827	2017/09/05 17:37:23	68.2
828	2017/09/05 17:37:24	69.0
829	2017/09/05 17:37:25	68.4
830	2017/09/05 17:37:26	68.6
831	2017/09/05 17:37:27	67.7
832	2017/09/05 17:37:28	62.4
833	2017/09/05 17:37:29	60.4
834	2017/09/05 17:37:30	62.0
835	2017/09/05 17:37:31	61.7
836	2017/09/05 17:37:32	64.3
837	2017/09/05 17:37:33	63.9
838	2017/09/05 17:37:34	59.3
839	2017/09/05 17:37:35	60.3
840	2017/09/05 17:37:36	57.4
841	2017/09/05 17:37:37	58.4
842	2017/09/05 17:37:38	61.1
843	2017/09/05 17:37:39	63.3
844	2017/09/05 17:37:40	63.4
845	2017/09/05 17:37:41	57.8
846	2017/09/05 17:37:42	53.0
847	2017/09/05 17:37:43	50.8
848	2017/09/05 17:37:44	48.3
849	2017/09/05 17:37:45	48.6
850	2017/09/05 17:37:46	48.0
851	2017/09/05 17:37:47	48.1
852	2017/09/05 17:37:48	49.0
853	2017/09/05 17:37:49	49.4
854	2017/09/05 17:37:50	50.8
855	2017/09/05 17:37:51	50.0
856	2017/09/05 17:37:52	51.9
857	2017/09/05 17:37:53	52.6
858	2017/09/05 17:37:54	56.1
859	2017/09/05 17:37:55	59.6
860	2017/09/05 17:37:56	68.7
861	2017/09/05 17:37:57	67.3
862	2017/09/05 17:37:58	60.5
863	2017/09/05 17:37:59	54.5
864	2017/09/05 17:38:00	52.6
865	2017/09/05 17:38:01	55.2
866	2017/09/05 17:38:02	57.0
867	2017/09/05 17:38:03	58.4
868	2017/09/05 17:38:04	60.4
869	2017/09/05 17:38:05	61.3
870	2017/09/05 17:38:06	63.3
871	2017/09/05 17:38:07	63.0
872	2017/09/05 17:38:08	63.3
873	2017/09/05 17:38:09	63.0
874	2017/09/05 17:38:10	61.7
875	2017/09/05 17:38:11	61.4
876	2017/09/05 17:38:12	66.6
877	2017/09/05 17:38:13	68.3

878	2017/09/05	17:38:14	62.7
879	2017/09/05	17:38:15	60.3
880	2017/09/05	17:38:16	61.5
881	2017/09/05	17:38:17	59.5
882	2017/09/05	17:38:18	58.9
883	2017/09/05	17:38:19	58.0
884	2017/09/05	17:38:20	60.6
885	2017/09/05	17:38:21	61.8
886	2017/09/05	17:38:22	62.2
887	2017/09/05	17:38:23	59.6
888	2017/09/05	17:38:24	52.8
889	2017/09/05	17:38:25	49.4
890	2017/09/05	17:38:26	46.8
891	2017/09/05	17:38:27	46.8
892	2017/09/05	17:38:28	46.1
893	2017/09/05	17:38:29	45.8
894	2017/09/05	17:38:30	46.3
895	2017/09/05	17:38:31	48.6
896	2017/09/05	17:38:32	51.6
897	2017/09/05	17:38:33	52.3
898	2017/09/05	17:38:34	52.8
899	2017/09/05	17:38:35	53.1
900	2017/09/05	17:38:36	54.4

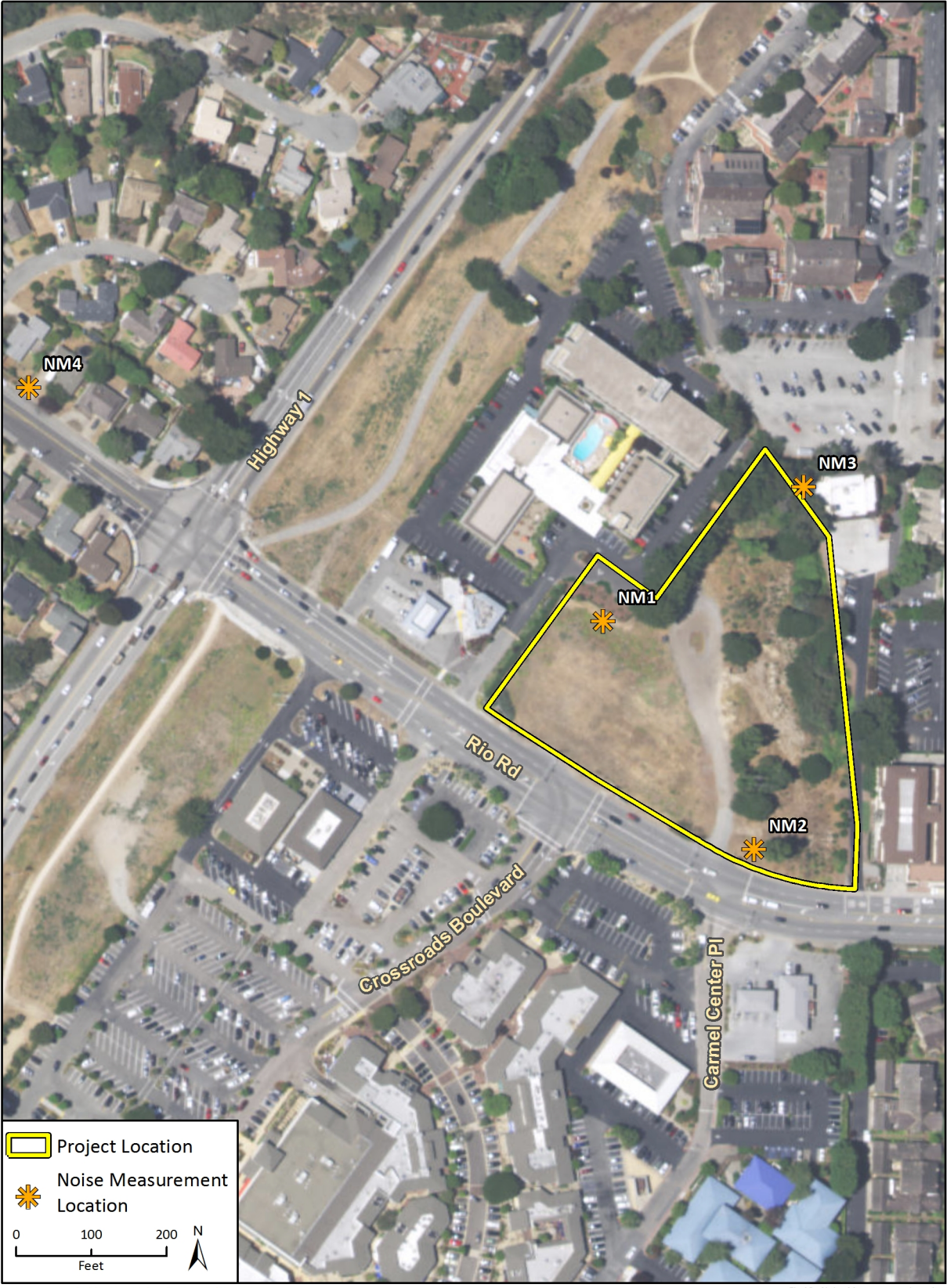

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Fig 13a Noise Measurement Location

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/22/2017
Case Description: Site Prep

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Residences	Residential	60.1	60.0	60.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Scraper	No	40		83.6	80.0	0.0
Grader	No	40	85.0		80.0	0.0
Tractor	No	40	84.0		80.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Scraper	79.5	75.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	80.9	76.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	79.9	75.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	80.9	80.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Inn	Residential	53.8	53.8	53.8

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)

Scraper	No	40	83.6	110.0	0.0
Grader	No	40	85.0	110.0	0.0
Tractor	No	40	84.0	110.0	0.0

Results

Equipment	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Scraper	76.7	72.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	78.2	74.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	77.2	73.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	78.2	78.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/22/2017
Case Description: Grading

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Residences	Residential	60.1	60.0	60.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Backhoe	No	40		77.6	80.0	0.0
Grader	No	40	85.0		80.0	0.0
Dozer	No	40		81.7	80.0	0.0
Tractor	No	40	84.0		80.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Backhoe	73.5	69.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	80.9	76.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	77.6	73.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	79.9	75.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	80.9	80.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Inn	Residential	53.8	53.8	53.8

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)

Description	Impact Device	Usage (%)	Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Backhoe	No	40	77.6	110.0		0.0
Grader	No	40	85.0	110.0		0.0
Dozer	No	40	81.7	110.0		0.0
Tractor	No	40	84.0	110.0		0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Backhoe	70.7	66.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	78.2	74.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	74.8	70.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	77.2	73.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	78.2	78.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/22/2017
Case Description: Building Construction

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Residences	Residential	60.1	60.0	60.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Welder / Torch	No	40	74.0	80.0		0.0
Welder / Torch	No	40	74.0	80.0		0.0
Backhoe	No	40	77.6	80.0		0.0
Crane	No	16	80.6	80.0		0.0
All Other Equipment > 5 HP	No	50	85.0	80.0		0.0
All Other Equipment > 5 HP	No	50	85.0	80.0		0.0
Welder / Torch	No	40	74.0	80.0		0.0
Generator	No	50	80.6	80.0		0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Noise Limits (dBA) Day Leq	Noise Limits (dBA) Evening Lmax	Noise Limits (dBA) Evening Leq	Noise Limits (dBA) Night Lmax	Noise Limits (dBA) Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Noise Limit Exceedance (dBA) Day Leq	Noise Limit Exceedance (dBA) Evening Lmax	Noise Limit Exceedance (dBA) Evening Leq	Noise Limit Exceedance (dBA) Night Lmax	Noise Limit Exceedance (dBA) Night Leq
Welder / Torch	69.9	65.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	69.9	65.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	73.5	69.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	76.5	68.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	80.9	77.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	80.9	77.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	69.9	65.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	76.5	73.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	80.9	82.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A

**** Receptor #2 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Inn	Residential	53.8	53.8	53.8

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Welder / Torch	No	40		74.0	110.0	0.0
Welder / Torch	No	40		74.0	110.0	0.0
Backhoe	No	40		77.6	110.0	0.0
Crane	No	16		80.6	110.0	0.0
All Other Equipment > 5 HP	No	50		85.0	110.0	0.0
All Other Equipment > 5 HP	No	50		85.0	110.0	0.0
Welder / Torch	No	40		74.0	110.0	0.0
Generator	No	50		80.6	110.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Noise Limits (dBA) Day Leq	Noise Limits (dBA) Evening Lmax	Noise Limits (dBA) Evening Leq	Noise Limits (dBA) Night Lmax	Noise Limits (dBA) Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Noise Limit Exceedance (dBA) Day Leq	Noise Limit Exceedance (dBA) Evening Lmax	Noise Limit Exceedance (dBA) Evening Leq	Noise Limit Exceedance (dBA) Night Lmax	Noise Limit Exceedance (dBA) Night Leq
Welder / Torch	67.2	63.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	67.2	63.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	70.7	66.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	73.7	65.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	78.2	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	78.2	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	67.2	63.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	73.8	70.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	78.2	79.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/22/2017
Case Description: Paving

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Residences	Residential	60.1	60.0	60.0

Equipment

Description	Impact Device	Spec Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Welder / Torch	No	40	74.0	80.0		0.0
Welder / Torch	No	40	74.0	80.0		0.0
Backhoe	No	40	77.6	80.0		0.0
Drum Mixer	No	50	80.0	80.0		0.0
Paver	No	50	77.2	80.0		0.0
Pavement Scarafier	No	20	89.5	80.0		0.0
Roller	No	20	80.0	80.0		0.0
Roller	No	20	80.0	80.0		0.0
Tractor	No	40	84.0	80.0		0.0

Results

	Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Welder / Torch	69.9	65.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	69.9	65.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	73.5	69.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Drum Mixer	75.9	72.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	73.1	70.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	85.4	78.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	75.9	68.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	75.9	68.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Tractor	79.9	75.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	85.4	82.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Inn	Residential	53.8	53.8	53.8

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Welder / Torch	No	40	74.0	110.0		0.0
Welder / Torch	No	40	74.0	110.0		0.0
Backhoe	No	40	77.6	110.0		0.0
Drum Mixer	No	50	80.0	110.0		0.0
Paver	No	50	77.2	110.0		0.0
Pavement Scarafier	No	20	89.5	110.0		0.0
Roller	No	20	80.0	110.0		0.0
Roller	No	20	80.0	110.0		0.0
Tractor	No	40	84.0	110.0		0.0

Results

	Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Welder / Torch	67.2	63.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	67.2	63.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	70.7	66.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Drum Mixer	73.2	70.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	70.4	67.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	82.7	75.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	73.2	66.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	73.2	66.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	77.2	73.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A															
	Total	82.7	79.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A															

DNL Calculator

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Guidelines

- To display the Road and/or Rail DNL calculator(s), click on the "Add Road Source" and/or "Add Rail Source" button(s) below.
- All Road and Rail input values must be positive non-decimal numbers.
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- All checkboxes that apply must be checked for vehicles and trains in the tables' headers.
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- **Note #2:** DNL Calculator assumes roadway data is always entered.

DNL Calculator

Site ID	Site 1 Existing Conditions
Record Date	12/16/2017
User's Name	SL

Road # 1 Name:	**Rio Rd**

Road #1

Vehicle Type	Cars	Medium Trucks	Heavy Trucks
Effective Distance	85	85	85
Distance to Stop Sign			
Average Speed	25	25	25
Average Daily Trips (ADT)	10564	334	222
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	58.1665	53.1657	64.7471
Calculate Road #1 DNL	65.8709	Reset	

Road # 2 Name: **Via Nona Marie**

Road #2

Vehicle Type	Cars	Medium Trucks	Heavy Trucks
Effective Distance	265	265	265
Distance to Stop Sign			
Average Speed	35	35	35
Average Daily Trips (ADT)	2413	76	51
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	47.2689	42.2515	50.9519
Calculate Road #2 DNL	52.906	Reset	

Road # 3 Name:	SR 1

Road #3

Vehicle Type	**Cars** ☑	**Medium Trucks** ☑	**Heavy Trucks** ☑
Effective Distance	1040	1040	1040
Distance to Stop Sign			
Average Speed	45	45	45
Average Daily Trips (ADT)	14181	448	299
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	48.2365	43.2322	49.7261
Calculate Road #3 DNL	52.5809	Reset	

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Ignore (http://browser-update.org/block-ignore-browser-update-warning.html)

Add Road Source | Add Rail Source

Airport Noise Level	
Loud Impulse Sounds?	○ **Yes** ○ **No**
Combined DNL for all Road and Rail sources	**66.3456**
Combined DNL including Airport	**N/A**
Site DNL with Loud Impulse Sound	

Calculate

Mitigation Options

If your site DNL is in Excess of 65 decibels, your options are:

- **No Action Alternative**: Cancel the project at this location
- **Other Reasonable Alternatives**: Choose an alternate site
- **Mitigation**
    - **Contact your Field or Regional Environmental Officer (/programs/environmental-review/hud-environmental-staff-contacts/)**
    - Increase mitigation in the building walls (only effective if no outdoor, noise sensitive areas)
    - Reconfigure the site plan to increase the distance between the noise source and noise-sensitive uses
    - Incorporate natural or man-made barriers. See ***The Noise Guidebook (/resource/313/hud-noise-guidebook/)***
    - Construct noise barrier. See the **Barrier Performance Module (/programs/environmental-review/bpm-calculator/)**

Tools and Guidance

Day/Night Noise Level Assessment Tool User Guide (/resource/3822/day-night-noise-level-assessment-tool-user-guide/)

Day/Night Noise Level Assessment Tool Flowcharts (/resource/3823/day-night-noise-level-assessment-tool-flowcharts/)

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- **Note #2:** DNL Calculator assumes roadway data is always entered.

DNL Calculator

Site ID	Site 1 Existing +Project
Record Date	12/16/2017
User's Name	SL

Road # 1 Name:	**Rio Rd**

Road #1

Vehicle Type	Cars	Medium Trucks	Heavy Trucks
Effective Distance	85	85	85
Distance to Stop Sign			
Average Speed	25	25	25
Average Daily Trips (ADT)	9291	293	196
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	57.6088	52.5969	64.2062
Calculate Road #1 DNL	65.3262	Reset	

Road # 2 Name:	Via Nona Marie

Road #2

Vehicle Type	Cars	Medium Trucks	Heavy Trucks
Effective Distance	265	265	265
Distance to Stop Sign			
Average Speed	35	35	35
Average Daily Trips (ADT)	2537	80	53
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	47.4866	42.4743	51.119
Calculate Road #2 DNL	53.0885	Reset	

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Ignore (http://browser-update.org/block-ignore-browser-update-warning.html)

Road # 3 Name:	SR 1

Road #3

Vehicle Type	Cars	Medium Trucks	Heavy Trucks
Effective Distance	1040	1040	1040
Distance to Stop Sign			
Average Speed	45	45	45
Average Daily Trips (ADT)	12388	391	261
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	47.6494	42.6412	49.1358
Calculate Road #3 DNL	51.9918	Reset	

Add Road Source | Add Rail Source

Airport Noise Level	
Loud Impulse Sounds?	Yes No
Combined DNL for all Road and Rail sources	**65.8332**
Combined DNL including Airport	**N/A**
Site DNL with Loud Impulse Sound	

Calculate

Mitigation Options

If your site DNL is in Excess of 65 decibels, your options are:

- **No Action Alternative**: Cancel the project at this location
- **Other Reasonable Alternatives**: Choose an alternate site
- **Mitigation**
    - **Contact your Field or Regional Environmental Officer (/programs/environmental-review/hud-environmental-staff-contacts/)**
    - Increase mitigation in the building walls (only effective if no outdoor, noise sensitive areas)
    - Reconfigure the site plan to increase the distance between the noise source and noise-sensitive uses
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Note: HUD updated the Calculator December 12, 2017. If you used the Calculator prior to December 12, you may need to clear your cache to perform an accurate calculation. **View instructions to clear your cache (https://support.google.com/accounts/answer/32050)**.

Guidelines

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- **Note #2:** DNL Calculator assumes roadway data is always entered.

DNL Calculator

Site ID	Site 1 Cumulative
Record Date	12/22/2017
User's Name	SL

Road # 1 Name:	**Rio Rd**

Road #1

Vehicle Type	Cars	Medium Trucks	Heavy Trucks
Effective Distance	85	85	85
Distance to Stop Sign			
Average Speed	25	25	25
Average Daily Trips (ADT)	11894	376	250
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	58.6815	53.6801	65.263
Calculate Road #1 DNL	66.3866	Reset	

Road # 2 Name: **Via Nona Marie**

Road #2

Vehicle Type	Cars	Medium Trucks	Heavy Trucks
Effective Distance	265	265	265
Distance to Stop Sign			
Average Speed	35	35	35
Average Daily Trips (ADT)	3325	105	70
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	48.6613	43.6552	52.3272

Calculate Road #2 DNL	54.2871	Reset	

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Ignore (http://browser-update.org/block-ignore-browser-update-warning.html)

Road # 3 Name: SR 1 (north)

Road #3

Vehicle Type	**Cars**	**Medium Trucks**	**Heavy Trucks**
Effective Distance	1040	1040	1040
Distance to Stop Sign			
Average Speed	45	45	45
Average Daily Trips (ADT)	16720	528	352
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	48.9518	43.9458	50.4348
Calculate Road #3 DNL	53.2927	Reset	

Add Road Source | Add Rail Source

Airport Noise Level	
Loud Impulse Sounds?	**Yes** **No**
Combined DNL for all Road and Rail sources	**66.9122**
Combined DNL including Airport	**N/A**

Site DNL with Loud Impulse Sound	

Calculate

Mitigation Options

If your site DNL is in Excess of 65 decibels, your options are:

- **No Action Alternative**: Cancel the project at this location
- **Other Reasonable Alternatives**: Choose an alternate site
- **Mitigation**
  - **Contact your Field or Regional Environmental Officer (/programs/environmental-review/hud-environmental-staff-contacts/)**
  - Increase mitigation in the building walls (only effective if no outdoor, noise sensitive areas)
  - Reconfigure the site plan to increase the distance between the noise source and noise-sensitive uses
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- **Note #2:** DNL Calculator assumes roadway data is always entered.

DNL Calculator

Site ID	Site 1 Cumulative + project
Record Date	12/22/2017
User's Name	SL

Road # 1 Name:	**Rio Rd**

Road #1

Vehicle Type	Cars	Medium Trucks	Heavy Trucks
Effective Distance	85	85	85
Distance to Stop Sign			
Average Speed	25	25	25
Average Daily Trips (ADT)	11448	362	241
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	58.5155	53.5153	65.1038
Calculate Road #1 DNL	66.2261	Reset	

Road # 2 Name: **Via Nona Marie**

Road #2

Vehicle Type	Cars	Medium Trucks	Heavy Trucks
Effective Distance	265	265	265
Distance to Stop Sign			
Average Speed	35	35	35
Average Daily Trips (ADT)	2556	81	54
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	47.519	42.5282	51.2001

Calculate Road #2 DNL	53.1566	Reset

Road # 3 Name:	**SR 1 (north)**

Road #3

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Update browser (http://browser-update.org/update-browser.html#24:www.hudexchange.info)
Ignore (http://browser-update.org/block-ignore-browser-update-warning.html)

Vehicle Type	Cars	Medium Trucks	Heavy Trucks
Effective Distance	1040	1040	1040
Distance to Stop Sign			
Average Speed	45	45	45
Average Daily Trips (ADT)	17195	543	362
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	49.0735	44.0674	50.5565
Calculate Road #3 DNL	53.4144	Reset	

Add Road Source | Add Rail Source

Airport Noise Level	
Loud Impulse Sounds?	Yes No
Combined DNL for all Road and Rail sources	**66.7197**
Combined DNL including Airport	**N/A**

Site DNL with Loud Impulse Sound	

Calculate

Mitigation Options

If your site DNL is in Excess of 65 decibels, your options are:

- **No Action Alternative**: Cancel the project at this location
- **Other Reasonable Alternatives**: Choose an alternate site
- **Mitigation**
  - **Contact your Field or Regional Environmental Officer (/programs/environmental-review/hud-environmental-staff-contacts/)**
  - Increase mitigation in the building walls (only effective if no outdoor, noise sensitive areas)
  - Reconfigure the site plan to increase the distance between the noise source and noise-sensitive uses
  - Incorporate natural or man-made barriers. See ***The Noise Guidebook (/resource/313/hud-noise-guidebook/)***
  - Construct noise barrier. See the **Barrier Performance Module (/programs/environmental-review/bpm-calculator/)**

Tools and Guidance

Day/Night Noise Level Assessment Tool User Guide (/resource/3822/day-night-noise-level-assessment-tool-user-guide/)

Day/Night Noise Level Assessment Tool Flowcharts (/resource/3823/day-night-noise-level-assessment-tool-flowcharts/)

DNL Calculator

The Day/Night Noise Level Calculator is an electronic assessment tool that calculates the Day/Night Noise Level (DNL) from roadway and railway traffic. For more information on using the DNL calculator, view the **Day/Night Noise Level Calculator Electronic Assessment Tool Overview (/programs/environmental-review/daynight-noise-level-electronic-assessment-tool/)**.

Guidelines

- To display the Road and/or Rail DNL calculator(s), click on the "Add Road Source" and/or "Add Rail Source" button(s) below.
- All Road and Rail input values must be positive non-decimal numbers.
- All Road and/or Rail DNL value(s) must be calculated separately before calculating the Site DNL.
- All checkboxes that apply must be checked for vehicles and trains in the tables' headers.
- **Note #1:** Tooltips, containing field specific information, have been added in this tool and may be accessed by hovering over all the respective data fields (site identification, roadway and railway assessment, DNL calculation results, roadway and railway input variables) with the mouse.
- **Note #2:** DNL Calculator assumes roadway data is always entered.

DNL Calculator

Site ID	Site 2 Existing
Record Date	12/16/2017
User's Name	SL

Road # 1 Name:	**Rio Rd**

Road #1

Vehicle Type	**Cars** ☑	**Medium Trucks** ☑	**Heavy Trucks** ☑
Effective Distance	58	58	58

Distance to Stop Sign			
Average Speed	25	25	25
Average Daily Trips (ADT)	8759	277	184
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	59.8426	54.8429	66.4217

Calculate Road #1 DNL | 67.5459 | Reset

Road # 2 Name: SR 1

Road #2

Vehicle Type	**Cars** ☑	**Medium Trucks** ☑	**Heavy Trucks** ☑
Effective Distance	105	105	105
Distance to Stop Sign			
Average Speed	45	45	45
Average Daily Trips (ADT)	11362	359	239
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	62.2116	57.208	63.691

Calculate Road #2 DNL | 66.5509 | Reset

Add Road Source | Add Rail Source

Airport Noise Level	
Loud Impulse Sounds?	Yes No
Combined DNL for all Road and Rail sources	**70.0484**
Combined DNL including Airport	**N/A**
Site DNL with Loud Impulse Sound	

Calculate

Mitigation Options

If your site DNL is in Excess of 65 decibels, your options are:

- **No Action Alternative**: Cancel the project at this location
- **Other Reasonable Alternatives**: Choose an alternate site
- **Mitigation**
  - **Contact your Field or Regional Environmental Officer (/programs/environmental-review/hud-environmental-staff-contacts/)**
  - Increase mitigation in the building walls (only effective if no outdoor, noise sensitive areas)
  - Reconfigure the site plan to increase the distance between the noise source and noise-sensitive uses
  - Incorporate natural or man-made barriers. See ***The Noise Guidebook (/resource/313/hud-noise-guidebook/)***
  - Construct noise barrier. See the **Barrier Performance Module (/programs/environmental-review/bpm-calculator/)**

Tools and Guidance

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assessment-tool-flowcharts/)

DNL Calculator

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Guidelines

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- All Road and Rail input values must be positive non-decimal numbers.
- All Road and/or Rail DNL value(s) must be calculated separately before calculating the Site DNL.
- All checkboxes that apply must be checked for vehicles and trains in the tables' headers.
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- **Note #2:** DNL Calculator assumes roadway data is always entered.

DNL Calculator

Site ID	Site 2 Existing + Project
Record Date	12/18/2017
User's Name	SL

Road # 1 Name:	**Rio Rd**

Road #1

Vehicle Type	**Cars** ☑	**Medium Trucks** ☑	**Heavy Trucks** ☑
Effective Distance	58	58	58

Distance to Stop Sign			
Average Speed	25	25	25
Average Daily Trips (ADT)	10574	334	223
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	60.6605	55.6555	67.2565
Calculate Road #1 DNL	68.3771	Reset	

Road # 2 Name: **SR-1**

Road #2

Vehicle Type	**Cars** ☑	**Medium Trucks** ☑	**Heavy Trucks** ☑
Effective Distance	105	105	105
Distance to Stop Sign			
Average Speed	45	45	45
Average Daily Trips (ADT)	11628	367	245
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	62.3121	57.3038	63.7987
Calculate Road #2 DNL	66.6546	Reset	

Add Road Source | Add Rail Source

Airport Noise Level	
Loud Impulse Sounds?	Yes No
Combined DNL for all Road and Rail sources	**70.5881**
Combined DNL including Airport	**N/A**
Site DNL with Loud Impulse Sound	

Calculate

Mitigation Options

If your site DNL is in Excess of 65 decibels, your options are:

- **No Action Alternative**: Cancel the project at this location
- **Other Reasonable Alternatives**: Choose an alternate site
- **Mitigation**
  - **Contact your Field or Regional Environmental Officer (/programs/environmental-review/hud-environmental-staff-contacts/)**
  - Increase mitigation in the building walls (only effective if no outdoor, noise sensitive areas)
  - Reconfigure the site plan to increase the distance between the noise source and noise-sensitive uses
  - Incorporate natural or man-made barriers. See ***The Noise Guidebook (/resource/313/hud-noise-guidebook/)***
  - Construct noise barrier. See the **Barrier Performance Module (/programs/environmental-review/bpm-calculator/)**

Tools and Guidance

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DNL Calculator

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Note: HUD updated the Calculator December 12, 2017. If you used the Calculator prior to December 12, you may need to clear your cache to perform an accurate calculation. **View instructions to clear your cache (https://support.google.com/accounts/answer/32050)**.

Guidelines

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- All Road and Rail input values must be positive non-decimal numbers.
- All Road and/or Rail DNL value(s) must be calculated separately before calculating the Site DNL.
- All checkboxes that apply must be checked for vehicles and trains in the tables' headers.
- **Note #1:** Tooltips, containing more information, are used throughout the tool and may be accessed by hovering over all the respective data fields (site identification, roadway and railway assessment, DNL calculation results, roadway and railway input variables) with the mouse.
- **Note #2:** DNL Calculator assumes roadway data is always entered.

Your web browser (Chrome 44) is out of date. Update your browser for more security, speed and the best experience on this site.
Update browser (http://browser-update.org/update-browser.html#2.2.0:www.hudexchange
Ignore (http://browser-update.org/block-ignore-browser-update-warning.html)

DNL Calculator

Site ID	Site 2 Cumulative
Record Date	12/28/2017
User's Name	SL

Road # 1 Name:	Rio Rd

Road #1

Vehicle Type	Cars	Medium Trucks	Heavy Trucks
Effective Distance	58	58	58
Distance to Stop Sign			
Average Speed	25	25	25
Average Daily Trips (ADT)	9994	316	210
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	60.4155	55.4149	66.9957
Calculate Road #1 DNL	68.1196	Reset	

Road # 2 Name:	SR 1 (South)

Road #2

Vehicle Type	Cars	Medium Trucks	Heavy Trucks
Effective Distance	105	105	105
Distance to Stop Sign			
Average Speed	45	45	45
Average Daily Trips (ADT)	14706	464	310
Night Fraction of ADT	15	15	15
Road Gradient (%)			2

Vehicle DNL	63.332	58.3223	64.8207
Calculate Road #2 DNL	67.6754	Reset	

Add Road Source | Add Rail Source

Airport Noise Level	
Loud Impulse Sounds?	Yes No
Combined DNL for all Road and Rail sources	**70.8975**
Combined DNL including Airport	**N/A**
Site DNL with Loud Impulse Sound	

Calculate

Mitigation Options

If your site DNL is in Excess of 65 decibels, your options are:

- **No Action Alternative**: Cancel the project at this location
- **Other Reasonable Alternatives**: Choose an alternate site
- **Mitigation**
  - **Contact your Field or Regional Environmental Officer (/programs/environmental-review/hud-environmental-staff-contacts/)**
  - Increase mitigation in the building walls (only effective if no outdoor, noise sensitive areas)
  - Reconfigure the site plan to increase the distance between the noise source and noise-sensitive uses
  - Incorporate natural or man-made barriers. See ***The Noise Guidebook (/resource/313/hud-noise-guidebook/)***

- Construct noise barrier. See the **Barrier Performance Module (/programs/environmental-review/bpm-calculator/)**

Tools and Guidance

Day/Night Noise Level Assessment Tool User Guide (/resource/3822/day-night-noise-level-assessment-tool-user-guide/)

Day/Night Noise Level Assessment Tool Flowcharts (/resource/3823/day-night-noise-level-assessment-tool-flowcharts/)

DNL Calculator

The Day/Night Noise Level Calculator is an electronic assessment tool that calculates the Day/Night Noise Level (DNL) from roadway and railway traffic. For more information on using the DNL calculator, view the **Day/Night Noise Level Calculator Electronic Assessment Tool Overview (/programs/environmental-review/daynight-noise-level-electronic-assessment-tool/)**.

Note: HUD updated the Calculator December 12, 2017. If you used the Calculator prior to December 12, you may need to clear your cache to perform an accurate calculation. **View instructions to clear your cache (https://support.google.com/accounts/answer/32050)**.

Guidelines

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- All Road and/or Rail DNL value(s) must be calculated separately before calculating the Site DNL.
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- **Note #1:** Tooltips, containing field specific information, have been added in this tool and may be accessed by hovering over all the respective data fields (site identification, roadway and railway assessment, DNL calculation results, roadway and railway input variables) with the mouse.
- **Note #2:** DNL Calculator assumes roadway data is always entered.

DNL Calculator

Site ID	Site 2 Cumulative
Record Date	12/22/2017
User's Name	SL

Road # 1 Name:	**Rio Rd (west)**

Road #1

Vehicle Type	Cars	Medium Trucks	Heavy Trucks
Effective Distance	58	58	58
Distance to Stop Sign			
Average Speed	25	25	25
Average Daily Trips (ADT)	10792	341	227
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	60.7491	55.7456	67.3337
Calculate Road #1 DNL	68.4566	Reset	

Road # 2 Name: **SR 1 (south)**

Road #2

Vehicle Type	Cars	Medium Trucks	Heavy Trucks
Effective Distance	105	105	105
Distance to Stop Sign			
Average Speed	45	45	45
Average Daily Trips (ADT)	14972	473	315
Night Fraction of ADT	15	15	15
Road Gradient (%)			2
Vehicle DNL	63.4099	58.4057	64.8902
Calculate Road #2 DNL	67.7496	Reset	

Add Road Source Add Rail Source	
Airport Noise Level	
Loud Impulse Sounds?	Yes No
Combined DNL for all Road and Rail sources	**71.1031**
Combined DNL including Airport	**N/A**
Site DNL with Loud Impulse Sound	
Calculate	

Mitigation Options

If your site DNL is in Excess of 65 decibels, your options are:

- **No Action Alternative**: Cancel the project at this location
- **Other Reasonable Alternatives**: Choose an alternate site
- **Mitigation**
  - **Contact your Field or Regional Environmental Officer (/programs/environmental-review/hud-environmental-staff-contacts/)**
  - Increase mitigation in the building walls (only effective if no outdoor, noise sensitive areas)
  - Reconfigure the site plan to increase the distance between the noise source and noise-sensitive uses
  - Incorporate natural or man-made barriers. See ***The Noise Guidebook (/resource/313/hud-noise-guidebook/)***
  - Construct noise barrier. See the **Barrier Performance Module (/programs/environmental-review/bpm-calculator/)**

Tools and Guidance

Tools and Guidance

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Vibration Analysis

PPV (in/sec) = PPV {ref} * (25/D)^1.5

Where PPV = Peak Particle Velocity
{ref} = PPV at the reference distance of 25 feet
D = distance to the receptor

Equipment = Large Dozer

PPV{ref} =	0.089	in/sec
D =	80	feet
PPV at receptor =	***0.016***	***in/sec***

PPV is 1.7x to 6x larger than RMS velocity
Assume typical conversion factor of 4 PPV:RMS

Therefore estimated RMS velocity =	***0.004***	***in/sec***
Receptor Lv =	***72***	***VdB***

Equipment = Loaded truck

PPV{ref} =	0.076	in/sec
D =	80	feet
PPV at receptor =	***0.013***	***in/sec***

PPV is 1.7x to 6x larger than RMS velocity
Assume typical conversion factor of 4 PPV:RMS
School Building

Therefore estimated RMS velocity =	***0.003***	***in/sec***
Receptor Lv =	***70***	***VdB***

Source: Chapter 12 Noise and Vibration During Construction in *Transit Noise and Vibration Assessment, April 1995*
Harris Miller Miller & Hanson, Inc.
Prepared For: USDOT Federal Transit Administration

Vibration Source Levels For Construction Equipment

Equipment		PPV at 25 ft (in/sec)	Approximate Lv at 25 feet *
Impact Pile Driv	upper range	1.518	112
	typical	0.644	104
Sonic Pile Drive	upper range	0.734	105
	typical	0.17	93
drop (slurry wall		0.202	94
Hydromill	in soil	0.008	66
(slurry wall	in rock	0.017	75
Vibratory Roller		0.21	94
Hoe Ram		0.089	87
	large	0.089	87
Bulldozer	small	0.003	58
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79

* RMS Velocity in decibels VdB with Vref of 1E-6 in/sec and PPV:RMS of ~4

Criterion

US Bureau of Mines, 1971	
PPV, in/sec	Degree of Damage
<2	Safe
2 - 4	Plaster Cracking
4 - 7	Minor Damage
>7	Major Damage

Canmet, Bauer, and Calder, 1977		
Equipment	PPV Threshold, in/sec	Type of Damage
Rigid Mercury Switches	0.5	Trip Out
House	2	Cracked Plaster
Concrete Block	8	Crack in Block
Cased Drill Holes	15	Horizontol Offset
Pumps, Compressors	40	Shaft Misalignment

Human Response Criteria

Level, Lv in VdB	Equivalent Noise Level, dBA		Human Response
	Low freq (30Hz)	Hi Freq (60 Hz)	
65	25	40	Approximate threshold of perception, low-freq inaudible, but mid-freq excessive for sleeping
75	35	50	Approx. dividing line between barely perceptible and clearly perceptible. Annoying vibration for most people. Low-freq acceptable for sleeping areas.
85	45	60	Vibration acceptable only if no more than 2 events/day for residential uses. Low-freq annoying in sleeping areas; mid-freq unacceptable for sensitive uses, including schools and churches.
90	50	65	Difficulty with tasks such as reading computer screens. Generally annoying for commercial uses.

Impact Criteria

Land Use	Lv in VdB		
	Frequent Events (70+/day)	Occasional Events (30-70)	Infrequent (<30 events/day)
Category 1: Vibration Sensitive	65	65	65
Concert Halls	65	65	65
TV Studios	65	65	65
Recording Studios	65	65	65
Category 2: Residences, hotels, sleeping areas	72	75	80
Auditoriums	72	80	80
Theaters	72	80	80
Category 3: Institutional with primarily daytime use only	75	78	83