MTA Responses to Noise and Vibration Questions Submitted by Mary Anne Hoffman

MTA Comment: It should be noted that the MTA will be performing additional noise analysis for the Final Environmental Impact Statement. This analysis will reflect the refined alignment that results from the completion of preliminary engineering and will reflect more precise alignment design, track design and vehicle specifications. In addition these noise impact assessments would reflect the use of planned mitigation. Noise measurements would also be taken at more locations in the corridor.

1. **Not a single sound measurement was taken within the Town of Chevy Chase**. The 60 dBA of ambient noise attributed to the Town was synthesized from two uncharacteristic points elsewhere: the intersection of Montgomery Avenue with East-West Highway ("B") and near Connecticut Avenue at the intersection of the Columbia Country Club with Jones Bridge Road ("N-10A"). The interpolation within the Town was justified because of "similar traffic and geographic conditions" that prevail both along the Capital Crescent Trail within the Town and at these two sampled points. We do not believe that this is correct. If measured in accordance with the *FTA Handbook*, ambient day-night L_{dn} noise in the Town of Chevy Chase would be less than 50 dBA, not 60.

MTA Response: The Purple Line alignment runs along the Interim Georgetown Branch Trail which borders the Town of Chevy Chase. It is not necessary that noise measurements be collected within the Town of Chevy Chase borders. However, what is critical is that noise measurements be taken along noise-sensitive sites located in the immediate vicinity of the Purple Line alignment. This is the standard procedure described by FTA. Twenty-four noise readings were collected at Site "N-B" and Site "N-10A" both reasonably acceptable locations adjacent to the Purple Line corridor. Site "N-B" is a balcony of the Riviera building, approximately 70-75 feet from the Town of Chevy Chase northern boundary. At both of these locations, measured 24-hour day-night (L_{dn}) noise levels were in the 59 to 61 dBA range. Day-night noise levels in this range are considered consistent with quiet ambient noise conditions in suburban neighborhoods. Day-night noise levels of less than 50 dBA can only occur in areas where there is an absence of human activity. With a population of over 900,000 people, Montgomery County does not qualify as a county lacking human activity. Therefore, the Town's estimate that the noise level within the Town would be less than 50 dBA is not correct.

The noise analysis findings completed at both of these representative sites yielded no impacts from line operations. Projected noise levels under the three LRT options (Low, Medium and High Investment LRT) in the AA/DEIS resulted in L_{dn} levels of 52/53 dBA. Under the FTA impact criteria project noise levels would need to reach an L_{dn} level of 58 dBA to enter the low end of the "Moderate Impact" threshold range. As a result, the project-generated noise levels are estimated to be 5 to 6 dBA below the minimum noise level to result in a noise impact. Moreover, to ensure no impacts occur along the Interim Georgetown Branch Trail and other noise sensitive segments within the Purple Line corridor, train skirts and retaining

walls were mandated and integrated as part of the project design. Together, these abatement measures will ensure a quiet operation with no noise impacts to the Town of Chevy Chase.

2. **The 24 hour L_{dn} values cited for parks are suspiciously loud**. The lowest residential value measured, an L_{dn} of 53 dBA, is remarkably high. We therefore have concerns about the calibration of the microphones employed by the contractor providing the noise analysis.

MTA Response: All noise monitoring equipment used in this analysis, whether owned or rented, is calibrated annually by a certified acoustic laboratory. The calibration certificates for the equipment are attached. Furthermore, prior to starting a noise measurement at each noise monitoring site a manual calibration using a pure tone calibrator (also calibrated annually) is performed to ensure accurate collection of noise monitoring data at each location. An L_{dn} level between 50 to 60 dBA is typical of suburban communities. Moreover, L_{dn} levels in excess of 70 dBA are typical of noise levels in urban areas and in areas adjacent to busy highways.

FTA requirements for parks and other non-sleeping land uses are different than land uses involving sleep such as residences, hospitals, and hotels where nighttime sensitivity to noise is assumed to be of the utmost importance. The FTA impact criteria sets noise level limits based on land use type. Residential properties are categorized as FTA Category 2 - Land Use Activities where a day/night noise level (L_{dn}) matrix must be determined to assess and evaluate if the project noise generates an impact. Parks are not places where people sleep, and therefore there is no sensitivity to noise at night, consequently FTA differentiates these types of uses under a separate category. These uses are described in the table below as Category 1 Land Use Activities where 24-hour day/night noise levels are not used in establishing and evaluating impact. Instead the peak-hour equivalent noise level or L_{eq} (1hr) dBA is the noise matrix used in establishing impact. Therefore all noise measurements and impact assessments completed for parks used peak hour L_{eq} levels.

Moderate and severe impact thresholds for both L_{eq} and L_{dn} land use categories are established using the second table shown below.

FTA Land Use Categories and Metrics for Transit Noise

Land Use Category	Noise Metric (dBA)	Description of Land Use Category
1	Outdoor $L_{eq}(h)$*	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land used as outdoor amphitheaters, parks and concert pavilions, as well as National Historic Landmarks with significant outdoor use.
2	Outdoor **L_{dn}**	**Residences and buildings where people normally sleep.** This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor $L_{eq}(h)$*	Institutional land uses with primary daytime and evening use. This category includes schools, libraries, and churches where it is important to avoid interference with such activities as speech, meditation, and

		concentration on reading material.

Source: FTA, Transit Noise and Vibration Impact Assessment, Final Report, May 2006.

* L_{eq} for the noisiest hour of transit-related activity during hours of noise sensitivity.

FTA Noise Impact Criteria: Noise Levels Defining Impact for Transit Projects

Existing Noise Exposure* $L_{eq}(h)$ or L_{dn} (dBA)	Project Noise Impact Exposure, * $L_{eq}(h)$ or L_{dn} (dBA)					
	Category 1 or 2 Sites			Category 3 Sites		
	No Impact	Moderate Impact	Severe Impact	No Impact	Moderate Impact	Severe Impact
<43	<Ambient+10	Ambient+ 10 to 15	<Ambient+15	<Ambient+15	Ambient+ 10 to 15	>Ambient+20
43	<52	52-58	>58	<57	57-63	>63
44	<52	52-58	>58	<57	57-63	>63
45	<52	52-58	>58	<57	57-63	>63
46	<53	53-59	>59	<58	58-64	>64
47	<53	53-59	>59	<58	58-64	>64
48	<53	53-59	>59	<58	58-64	>64
49	<54	54-59	>59	<59	59-64	>64
50	<54	54-59	>59	<59	59-64	>64
51	<54	54-60	>60	<59	59-65	>65
52	<55	55-60	>60	<60	60-65	>65
53	<55	55-60	>60	<60	60-65	>65
54	<55	55-61	>61	<60	60-66	>66
55	<56	56-61	>61	<61	61-66	>66
56	<56	56-62	>62	<61	61-67	>67

FTA Noise Impact Criteria: Noise Levels Defining Impact for Transit Projects

Existing Noise Exposure* $L_{eq}(h)$ or L_{dn} (dBA)	Project Noise Impact Exposure, * $L_{eq}(h)$ or L_{dn} (dBA)					
	Category 1 or 2 Sites			Category 3 Sites		
	No Impact	Moderate Impact	Severe Impact	No Impact	Moderate Impact	Severe Impact
57	<57	57-62	>62	<62	62-67	>67
58	<57	57-62	>62	<62	62-67	>67
59	<58	58-63	>63	<63	63-68	>68
60	<58	58-63	>63	<63	63-68	>68
61	<59	59-64	>64	<64	64-69	>69
62	<59	59-64	>64	<64	64-69	>69
63	<60	60-65	>65	<65	65-70	>70
64	<61	61-65	>65	<66	66-70	>70
65	<61	61-66	>66	<66	66-71	>71
66	<62	62-67	>67	<67	67-72	>72
67	<63	63-67	>67	<68	68-72	>72
68	<63	63-68	>68	<68	68-73	>73
69	<64	64-69	>69	<69	69-74	>74
70	<65	65-69	>69	<70	70-74	>74
71	<66	66-70	>70	<71	71-75	>75
72	<66	66-71	>71	<71	71-76	>76
73	<66	66-71	>71	<71	71-76	>76
74	<66	66-72	>72	<71	71-77	>77

FTA Noise Impact Criteria: Noise Levels Defining Impact for Transit Projects

Existing Noise Exposure* $L_{eq}(h)$ or L_{dn} (dBA)	Project Noise Impact Exposure, * $L_{eq}(h)$ or L_{dn} (dBA)					
	Category 1 or 2 Sites			Category 3 Sites		
	No Impact	Moderate Impact	Severe Impact	No Impact	Moderate Impact	Severe Impact
75	<66	66-73	>73	<71	71-78	>78
76	<66	66-74	>74	<71	71-79	>79
77	<66	66-74	>74	<71	71-79	>79
>77	<66	66-75	>75	<71	71-80	>80

Source: Transit Noise and Vibration Impact Assessment, FTA May 2006

Note: L_{dn} is used for land use where nighttime sensitivity is a factor; L_{eq} during the hour of maximum transit noise exposure is used for land use involving only daytime activities

The Town is correct that these noise levels appear to be high because they are in fact peak-hour (loudest hour) L_{eq} (1 hr dBA) noise levels. Day-night (L_{dn}) noise levels are derived from a formula which summarizes and weights daytime (Lday) and nighttime (Lnight) L_{eq} levels. The daytime time period covers 7AM to 10PM and night time covers 10 PM to 7 AM. Before determining the L_{dn} level the nighttime noise levels are further adjusted (weighted) to apply a nighttime 10 decibel adjustment to account for greater sensitivity to noise at night. The details are described in the FTA manual, available on line at http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf .

3. **The *Technical Report* appears to assume single-tracking, where MTA assumes double-tracking**. A head-way of 6 minutes means 10 trains per hour, not 20 trains per hour. The noise reaching the Town would thereby be +3 dBA higher than claimed in the *Technical Report*. Since the noise model has not been available to the Town, we would appreciate your ruling out the possibility of this simple error.

MTA Response: All noise calculations were derived assuming line operations from a two track system. Line operations and noise level estimates were made on a hourly basis. The noise level estimates were derived based on headways and travel speeds that varied throughout the day and from station to station. The Town's claim that the noise reaching the Town of Chevy Chase would be 3 DBA higher than projected by MTA is incorrect.

4. **The *Technical Report* confuses a noise mitigation strategy** (walls next to the train) **with eliminating noise *per se***, ignoring oblique reflections and diffraction from walls, thus understating noise emissions by 4dB(A) and overstating noise suppression by 1 or 2 dB(A).

MTA Response: Most of the noise generated from LRT operations is caused by the friction from the wheels pressing down on the rails as the train moves along. Any potential

reflections of noise generated by the train as it moves along will be reflected downward towards the track bed by the vehicle skirt panels. In addition, even in the absence of the vehicle skirts, a two-car train will result in very little reflection of sound because it passes by a given receptor point for such a short duration. A minimum train length of four cars would be necessary to generate enough wheel/rail sound energy for reflections and then refractions of sound to occur over the top of the retaining walls. In either case, the vehicle skirts provide abatement directly at the noise source (the wheel/rail interface) by preventing sound reflections from occurring by directing the wheel/rail sound energy to the sound absorbing ground track bed below; thus preventing the reflection and refraction phenomenon from occurring.

5. **The *Technical Report* assumes markedly quieter trains than the manufacturers themselves specify**. We could not tell what model and vendor of light rail vehicle was assumed for the source of noise emissions, but noise levels cited by the report are far lower than light-rail manufacturers (Bombardier FLEXITY, Kawasaki LRV Series 100) provide in their specification data.

MTA Response: The FTA standard reference Sound Exposure Level (SEL) of 82 dBA for a commuter rail car was used for the LRT noise level calculations. The noise level from the actual light rail vehicles selected later in the design process are expected to be lower than the type of rail vehicle used in MTA's current noise analysis. Once again, the noise analysis carried out is a conservative estimate in terms of potential noise impacts.

6. **The *Technical Report* does not appear to account for noise from** braking**,** decelerating, accelerating, cross-overs, turning, canyon effects from Bethesda buildings, and focusing effects from entering the tunnel. In aggregate, these emissions will add several decibels unaccounted for in the Technical Report.

MTA Response: **MTA's** noise level estimates were made on an hourly basis, using varying hourly line operation train speeds and headways throughout the Purple Line corridor. Noise analysis assumed the most conservative set of assumptions. Wheel squeal was accounted for in areas where it was a factor. Since the Georgetown Branch right-of-way is a former freight railroad alignment, it does not have any sharp turns that could generate wheel squeal. Trains were assumed to be operating at free flowing speeds provided between any two given proposed train stations. The potential net effect of accounting for decelerating as a train enters a train station would result in lower noise levels than the free-flowing operating speed assumed in our calculations. Similarly the potential noise effect of train acceleration as the train leaves a train station would be lower than the free-flow speed assumed in the noise calculations. There will be no canyon effect because the vehicle skirts will trap the sound and direct the sound energy wards the higher sound absorbing ground bed. Lastly, the sound propagation assumptions employed by the FTA methodology are generally considered conservative and tend to result in the over-prediction of noise exposure.

7. The *Technical Report* assumes that trains run down the center of the ROW rather than on a track, which understates noise reaching the Town by 3 to 4 dBA if the tracks are, aligned South and the Trail North.

MTA Response: The noise analysis calculations used a conservative set of assumptions as described above in Response #6 above. Within the Interim Georgetown Branch Trail section

there is no significant distance between two tracks. The area is fairly tight and the two tracks sit very close to each other. Modeling the resultant noise from each track or a combined centerline would result in no difference in total noise level. The near track contributes more than the far track as a resultant noise level would be the exactly the same as that determined using a single center-line (rail track) source. Noise levels are added logarithmically resulting in much lower noise contribution from the far track versus the near track. The bottom line is that modeling one track or modeling two tracks will generate noise levels which are within several tenths of a decibel of each other. Additionally, the standard FTA procedure acceptable for estimating transit noise calls for determining noise level contribution for two peak conditions referred to as "the day level (Lday)" and "the night level (Lnight)" and then adding these two levels together to establish the L_{dn} level. The method employed by the MTA consultant is far more accurate than the simple standard method. This more vigorous method (described in the FTA appendix, but not necessary for analysis) requires determining the noise levels for each hour operation and from those levels computing the Lday and Lnight noise levels and then the resultant day/night L_{dn} Level. The noise levels and impact assessment estimated using this procedure is more precise than the FTA standard method.

8. The treatment of vibration and low-frequency noise is insufficient.

MTA Response: Low frequency noise is a phenomenon which sometimes occurs in longer trains. The two to three-car trains (most likely two 90 foot cars, or three 60 foot cars) projected for use along the Purple Line corridor are too short for low frequency noise to occur. The pass-by duration time interval past a given location will be too short for this type of vibration to occur. The standard FTA vibration calculation procedure is very conservative.

There were vibration impacts projected along the Interim Georgetown Branch Trail at receptor sites "N-B", "N-8", and "N-10A". These are mentioned and described in the noise report. Impacts occur at these locations because train speeds are assumed high (about 40 mph) and the distance between receptor and train tracks was determined to be 40 feet or less. Within the impacted area estimated vibration levels were just above the FTA 72 VdB impact threshold and would not have resulted in any impact along the entire length of the Interim Georgetown Branch Trail if LRT travel speeds were restricted to a maximum of 30 mph along the trail. Moreover, if the more accurate (and longer) exterior building façade to centerline of the alignment distance had been used the projected vibration impact would have likely disappeared. However, the vibration levels reported in the technical report were purposely conservative, until further refinement and finalization in the proposed alignment and line operation travel speeds are developed and more precise vibration level estimates can be made. Finally, if in the final design, projections of vibration levels above the FTA acceptable limits persist, various vibration mitigation measures will be considered and evaluated for the dampening effectiveness. Recommended vibration mitigation measures would then be integrated as part of the Purple Line project definition similar to those already committed to for mitigating line operation noise.

Attachments

A. 24 Hour Noise Monitoring Data Collected at Site "N-10A" Columbia Country Club, Montgomery County, Maryland

Date	**Time**	L_{eq} **(1 hr) dBA**
10/4/07	12-1 AM	54.1
10/4/07	1-2	53.5
10/4/07	2-3	54.3
10/4/07	3-4	55.1
10/4/07	4-5	54.4
10/4/07	5-6	54.4
10/4/07	6-7	54.1
10/4/07	7-8	58.6
10/4/07	8-9	57.5
10/4/07	9-10	56.5
10/4/07	10-11	57.6
10/4/07	11-12	55.4
10/4/07	12-1 PM	57.1
10/4/07	1-2	54.5
10/4/07	2-3	55.5
10/4/07	3-4	59.8
10/4/07	4-5	56.6
10/3/07	5-6	50.4
10/3/07	6-7	50.8
10/3/07	7-8	53.5
10/3/07	8-9	54.4
10/3/07	9-10	54.3
10/3/07	10-11	55.6
10/3/07	11 PM -12 midnight	54.1
Peak L_{eq} (1-hr)		59.8
L Day*		56.2
L Night*		54.4
Day/Night L_{dn} Level*		61.1

***** "L Day", "L Night" and "Day/Night L_{dn}" values are derived noise level descriptors.

B. 24 Hour Noise Monitoring Data Collected at Site "N-B"
4242 East West Highway, Bethesda, Maryland

Date	**Time**	L_{eq} **(1 hr) dBA**
10/16/07	12-1 AM	48.9
10/16/07	1-2	45.9
10/16/07	2-3	45.9
10/16/07	3-4	44.9
10/16/07	4-5	48
10/16/07	5-6	51.8
10/16/07	6-7	55.3
10/16/07	7-8	57.5
10/16/07	8-9	59.2
10/16/07	9-10	57
10/16/07	10-11	57.5
10/16/07	11-12	57.4
10/16/07	12-1 PM	57.3
10/15/07	1-2	57
10/15/07	2-3	62.2
10/15/07	3-4	57.9
10/15/07	4-5	58
10/15/07	5-6	59.1
10/15/07	6-7	59.3
10/15/07	7-8	57.2
10/15/07	8-9	55.6
10/15/07	9-10	54.9
10/15/07	10-11	53.1
10/15/07	11 PM -12 midnight	51.2
Peak L_{eq} (1-hr)		62.9
L Day*		58.2
L Night*		50.8
Day/Night L_{dn} Level*		59.3

* "L Day", "L Night" and "Day/Night L_{dn}" values are derived noise level descriptors.

C. Equipment Calibration Certificates

Please note that the certificate dates shown are the start of the valid time period. So a certificate dated April 24, 2007 is valid through April 24, 2008. All short-term and long-term noise measurements along the Crescent Trail segment were collected in October 2007.

West Caldwell Calibration Laboratories Inc.

Certificate of Calibration

for

MICROPHONE

Manufactured by:	BRUEL & KJAER
Model No:	4155
Serial No:	1394626
Calibration Recall No:	15687

Submitted By:

Customer:	ARTHUR MORRONE
Company:	PARSONS BRINCKERHOFF
Address:	ONE PENN PLAZA
	NEW YORK NY 10119

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Procedure No. 4155 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within (X) see attached Report of Calibration.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, ISO 10012-1 MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25, ISO 9001:2000 and ISO 17025.

Note: With this Certificate, Report of Calibration is included.

Approved by:

Calibration Date: 14-Nov-06

Certificate No: 15687 - 2

Felix Christopher
Quality Manager

West Caldwell Calibration Laboratories, Inc.
uncompromised calibration
1575 State Route 96, Victor, NY 14564, U.S.A.

ISO 9001:2000 Registered Company
Calibration Traceable To N. I. S. T.

Phone: (585) 586-3900 Fax.: (585) 586-4327

West Caldwell Calibration Laboratories Inc.

Certificate of Calibration

for

ACOUSTICAL CALIBRATOR

Manufactured by:	BRUEL & KJAER
Model No:	4231
Serial No:	2412378
Calibration Recall No:	15687

Submitted By:

Customer:	ARTHUR MORRONE
Company:	PARSONS BRINCKERHOFF
Address:	ONE PENN PLAZA
	NEW YORK NY 10119

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Procedure No. 4231 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within (X) see attached Report of Calibration.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, ISO 10012-1 MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25, ISO 9001:2000 and ISO 17025.

Note: With this Certificate, Report of Calibration is included.

Approved by:

Calibration Date: 14-Nov-06

Certificate No: 15687 - 3

Felix Christopher
Quality Manager

West Caldwell Calibration Laboratories, Inc.
uncompromised calibration
1575 State Route 96, Victor, NY 14564, U.S.A.

ISO 9001:2000 Registered Company
Calibration Traceable To N. I. S. T.

ACCREDITATION ISO/IEC 17025
ACCREDITED
1533.01

Phone: (585) 586-3900 Fax.: (585) 586-4327

West Caldwell Calibration Laboratories Inc.

Certificate of Calibration

for

MODULAR PRECISION SOUND LEVEL METER

Manufactured by:	BRUEL & KJAER
Model No:	2231
Serial No:	1178130
Calibration Recall No:	15687

Submitted By:

Customer:	ARTHUR MORRONE
Company:	PARSONS BRINCKERHOFF
Address:	ONE PENN PLAZA
	NEW YORK NY 10119

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Procedure No. 2231 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within (X) see attached Report of Calibration.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, ISO 10012-1 MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25, ISO 9001:2000 and ISO 17025.

Note: With this Certificate, Report of Calibration is included.

Calibration Date: 14-Nov-06

Certificate No: 15687 - 1

QA Doc. #1051 Rev. 2.0 10/1/01

Certificate Page 1 of 1

Approved by:

Felix Christopher
Quality Manager

West Caldwell Calibration Laboratories, Inc.
uncompromised calibration
1575 State Route 96, Victor, NY 14564, U.S.A.

ISO 9001:2000 Registered Company
Calibration Traceable To N. I. S. T.
ACCREDITED

Phone: (585) 586-3900 Fax.: (585) 586-4327

West Caldwell Calibration Laboratories Inc.

Certificate of Calibration

for

ACOUSTICAL CALIBRATOR

Manufactured by:	BRUEL & KJAER
Model No:	4231
Serial No:	2170008
Calibration Recall No:	16204

Submitted By:

Customer:	ARTHUR MORRONE
Company:	PARSONS BRINCKERHOFF
Address:	ONE PENN PLAZA
	NEW YORK NY 10119

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Procedure No. 4231 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within (X) see attached Report of Calibration.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, ISO 10012-1 MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25, ISO 9001:2000 and ISO 17025.

Note: With this Certificate, Report of Calibration is included.

Approved by:

Calibration Date: 24-Apr-07

Certificate No: 16204 - 5

Felix Christopher
Quality Manager

QA Doc. #1051 Rev. 2.0 10/1/01

West Caldwell Calibration Laboratories, Inc.
uncompromised calibration
1575 State Route 96, Victor, NY 14564, U.S.A.

ISO 9001:2000 Registered Company
Calibration Traceable To N. I. S. T.

Phone: (585) 586-3900 Fax.: (585) 586-4327

West Caldwell Calibration Laboratories Inc.

Certificate of Calibration

for

MICROPHONE

Manufactured by:	BRUEL & KJAER
Model No:	4189
Serial No:	2021255
Calibration Recall No:	16204

Submitted By:

Customer:	ARTHUR MORRONE
Company:	PARSONS BRINCKERHOFF
Address:	ONE PENN PLAZA
	NEW YORK NY 10119

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Procedure No. 4189 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within (X) see attached Report of Calibration.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, ISO 10012-1 MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25, ISO 9001:2000 and ISO 17025.

Note: With this Certificate, Report of Calibration is included.

Approved by:

Calibration Date: 24-Apr-07

Certificate No: 16204 - 4

Felix Christopher
Quality Manager

West Caldwell Calibration Laboratories, Inc.
uncompromised calibration
1575 State Route 96, Victor, NY 14564, U.S.A.

ISO 9001:2000 Registered Company
Calibration Traceable To N. I. S. T.
ACCREDITATION ISO/IEC 17025 ACCREDITED 1533.01

Phone: (585) 586-3900 Fax.: (585) 586-4327

West Caldwell Calibration Laboratories Inc.

Certificate of Calibration

for

INTEGRATING SOUND LEVEL METER

Manufactured by:	BRUEL & KJAER
Model No:	2238
Serial No:	2394977
Calibration Recall No:	16204

Submitted By:

Customer:	ARTHUR MORRONE
Company:	PARSONS BRINCKERHOFF
Address:	ONE PENN PLAZA
	NEW YORK NY 10119

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Procedure No. 2238 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within (X) see attached Report of Calibration.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, ISO 10012-1 MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25, ISO 9001:2000 and ISO 17025.

Note: With this Certificate, Report of Calibration is included.

Approved by:

FC

Calibration Date: 25-Apr-07

Certificate No: 16204 - 2

Felix Christopher
Quality Manager

West Caldwell Calibration Laboratories, Inc.
uncompromised calibration
1575 State Route 96, Victor, NY 14564, U.S.A.
ISO 9001:2000 Registered Company
Calibration Traceable To N. I. S. T.
ACCREDITED
Phone: (585) 586-3900 Fax.: (585) 586-4327

West Caldwell Calibration Laboratories Inc.

Certificate of Calibration

for

MICROPHONE

Manufactured by:	BRUEL & KJAER
Model No:	4188
Serial No:	2407350
Calibration Recall No:	16204

Submitted By:

Customer:	ARTHUR MORRONE
Company:	PARSONS BRINCKERHOFF
Address:	ONE PENN PLAZA
	NEW YORK NY 10119

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Procedure No. 4188 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within (X) see attached Report of Calibration.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, ISO 10012-1 MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25, ISO 9001:2000 and ISO 17025.

Note: With this Certificate, Report of Calibration is included.

Calibration Date: 24-Apr-07

Certificate No: 16204 - 3

Approved by:

FC

Felix Christopher
Quality Manager

West Caldwell Calibration Laboratories, Inc.
uncompromised calibration
1575 State Route 96, Victor, NY 14564, U.S.A.

ISO 9001:2000
Registered Company

Calibration Traceable
To N. I. S. T.

ACCREDITED

Phone: (585) 586-3900 Fax.: (585) 586-4327

West Caldwell Calibration Laboratories Inc.

Certificate of Calibration

for

MODULAR PRECISION SOUND ANALYZER

Manufactured by:	BRUEL & KJAER
Model No:	2260
Serial No:	2001710
Calibration Recall No:	16204

Submitted By:

Customer:	ARTHUR MORRONE
Company:	PARSONS BRINCKERHOFF
Address:	ONE PENN PLAZA
	NEW YORK NY 10119

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Procedure No. 2260 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within (X) see attached Report of Calibration.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, ISO 10012-1 MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25, ISO 9001:2000 and ISO 17025.

Note: With this Certificate, Report of Calibration is included.

Calibration Date: 25-Apr-07

Certificate No: 16204 - 1

Approved by:

Felix Christopher
Quality Manager

West Caldwell Calibration Laboratories, Inc.
uncompromised calibration
1575 State Route 96, Victor, NY 14564, U.S.A.
ISO 9001:2000 Registered Company
Calibration Traceable To N. I. S. T.
ACCREDITATION ISO/IEC 17025 ACCREDITED
Phone: (585) 586-3900 Fax.: (585) 586-4327

West Caldwell Calibration Laboratories, Inc.
uncompromised calibration

ISO 9001:2000
Registered Company

Calibration Traceable
to N.I.S.T.

ACCREDITATION
ISO/IEC 17025
ACCREDITED

1575 State Route 96 Victor NY 14564
Tele: 585 586-3900
Fax: 585 586-4327

1533.01

February 23, 2010

Parsons Brinckerhoff
Attn: Arthur Morrone
One Penn Plaza, 3rd Floor
New York, NY 10119

REF: WCCL CALIBRATION

Dear Mr. Marrone,

As per request we hereby notify the following.
The Sound level Meter kits your company has rented in the past were within calibration.

We have checked the following before the Sound level Meter kits were sent to you.

a. Each instrument was within calibration. (If necessary they were calibrated before shipment.)
b. The Sound level Meter kit functional tested as a system and verified for accuracy at 1kHz and at 94dB sound pressure level.
c. Verified if all document necessary for use of Sound level Meter was included in the kit.

West Caldwell Calibration Laboratories, Inc. is

a. ISO 9001-2008 Registered Company
b. ISO 17025 Accredited Company (A2LA)

The Sound level Meter model 2231 (Bruel & Kjaer) your company has rented meets the following standards.

a. IEC 651 Type 1
b. IEC 804 Type 1
c. ANSI S 1.4-1983 Type 1

If you need any other information please contact us.

Yours Truly

Felix Christopher,
Technical Manager

A:\Parsons Calibration 022210CP.doc

Brüel & Kjær
North America Inc.

February 24, 2010

Parsons, Brinkerhoff, Quade, & Douglas, Inc.
One Penn Plaza
New York, NY 10119

Attn: Mr. Arthur Morrone

Dear Mr. Morrone,

I have researched our records, and the equipment you rented in October 2007 was under current NIST-traceable calibration at the time of the rental.

Here are the calibration dates for each item:

2238-E s/n 2522505 2/27/07

2238-E s/n 2522506 2/27/07

2238-E s/n 2498697 2/28/07

4231 s/n 2560024 1/4/07

4231 s/n 2564440 1/4/07

Please let me know if you need anything further.

Kind Regards,

Russ Turco

Support Engineer, Rental Manager
Bruel & Kjaer North America, Inc.
2815-A Colonnades Court
Norcross, GA 30071

Phone: 800-332-2040 x6954
Web: www.bkhome.com
Email: russ.turco@bksv.com