ATTACHMENT D: SOUND ATTENATION INFORMATION

CRSA ARCHITECTURE · PLANNING · INTERIORS
175 S MAIN STREET, STE 300 · SLC, UTAH 84111 · 801-355-5915 · www.crsa-us.com

MEMORANDUM

To: Kelsey Linquist, SLC Planning

From: John Ewanowski, AIA

April 14, 2020

Re: 4th Avenue Well – Sound Mitigation Strategies

Dear Kelsey,

I want to address the design team's strategies in mitigating sound at the Fourth Avenue Well. We understand the concern – especially on the part of adjacent neighbors – that unacceptable pump motor noise may emit from the facility without proper sound mitigation, causing noise pollution. The Salt Lake Valley Health Department sets maximum permissible sound pressure levels [in decibels dBA], as measured at a receiving property. For Type A single-family residential structures, which completely surround the Fourth Avenue Well site, these receiving maximums are set at:

- Between 10:00 pm and 7:00 am: 5 dBA above ambient sound, not to exceed 50 dBA.[1]
- Between 7:00 am and 10:00 pm: 5 dBA above ambient sound, not to exceed 60 dBA.

When running, the well pump motor will have a near-constant noise, with the following dBA at the respective frequencies:[2]

Octave Band Center Frequency (Hertz)	Sound Pressure Level Measured in a Reverberant Sound Room Per IEEE 85, Corrected to Free Field Conditions Reference: .0002 Dynes/CM² Weighting Network "A"
31.5	---
63	46.0 Decibels
125	58.5 Decibels
250	70.9 Decibels
500	79.2 Decibels
1000	82.5 Decibels
2000	79.4 Decibels
4000	74.9 Decibels
8000	67.1 Decibels
OVERALL	86.0 Decibels

Per this data, the pump motor would be excessively loud if it was sitting outside on the site. However, constructing a building around the pump allows us to reduce sound that will leave the site and enter adjacent receiving properties. We have employed the following strategies to reduce sound to compliant levels:

- Exterior wall construction significantly reduces sound transmission. A wall with a 4 -inch thick brick veneer

1 "Health Regulation #21: Community Noise Pollution Control," Salt Lake Valley Heath Department. Adopted September 6, 1984. Amended August 1, 1991; December 7, 1995; May 3, 2001; August 7, 2009; and August 2, 2012. Under Authority of Section 26A-1-114 Utah Code Ann.
2 See page 3 for full quotation report.

and 8-inch thick concrete masonry unit (CMU) backing has a sound transmission class (STC) rating of 53,[3] which would reduce the overall sound transmission to 33 dBA at the outside face of the wall. It's important to note that this does not include the proposed continuous insulation, 2" air gap between the brick and CMU, and grouted CMU cells, which will further reduce sound transmission and vibration through exterior walls.

- Windows have been eliminated from previous proposals.
- Doors have been minimized from previous proposals. Our basis-of design exterior doors are designed to mitigate sound transmission, with a STC rating of 40, reducing the overall sound transmitted through the door to 46 dBA.[4] The main service door (located on the west side of the building) enters the treatment room that will house the tablet disinfection system and separated from the pump room by a CMU wall and interior door, which will itself have an STC rating between 43-52. This main entrance will be closed prior to technicians entering the pump room. The south-facing double doors will be opened rarely for larger maintenance projects when the pump or well must be directly accessed from the exterior. The pump will rarely be running in scenarios when the pump or well require this type of service. The door lites (glazing within door leaf) are standard 1-inch thick insulated glazing units (1/2" air gap with (2) ¼" thick panes) in the STC-tested door; we plan on using this type of glazing on the pump house doors (with low-e coating on surface #2 and obscuring etch on surface #3).
- Acoustical louvers were selected where the ventilation system brings fresh air into the building and where it expels stale air. These louvers will be located on the north façade, which is further from adjacent properties, faces the park, and is distant from the pump motor. Transfer grilles at the interior CMU wall will further reduce noise that may infiltrate the ductwork. Further noise and vibration reduction strategies in the mechanical system will include baffles, duct insulation, and additional transfer grilles.
- For cooling interior equipment, we are using a ceiling-mounted air-handling unit which will be hyronically cooled by a loop of water from the well. This water will then be returned into the system. The mechanical system creatively uses well water and eliminates the need for a noisy external condenser unit. An electronic unit heater will quietly maintain above-freezing temperatures during the winter, when the pump is shut down.
- The pump motor will be balanced to eliminate vibration. Additionally, it will be mounted on a thick concrete pad to isolate it from adjacent floor slab.
- The design team will be involved through construction to review submittals and periodically visit the site to verify materials are installed as specified. We will test the building envelope's noise reduction near the end of construction and adjust as needed to meet our acoustical goals.
- The envelope design is currently at 75%. We will continue detailing components with acoustical performance as a primary concern.

Please contact the design team with any questions or concerns regarding our sound mitigation on this project.

Sincerely,

John

3 "Technical Notes of Brick Construction #28D: Brick Veneer/Concrete Masonry Walls," The Brick Industry Association, June 2018, accessed online at http://www.gobrick.com/docs/default-source/read-research-documents/technicalnotes/tn28d.pdf?sfvrsn=46.
4 See page 8 for door test data.

MOTOR NOISE QUOTATION

MODEL NO.	CATALOG NO.	ORDER NO.	LINE NO.	PHASE	TYPE	FRAME
DS29				3	HUSI	449

OCTAVE BAND CENTER FREQUENCY (HERTZ)	SOUND PRESSURE LEVELS MEASURED IN A REVERBERANT SOUND ROOM PER IEEE 85, CORRECTED TO FREE FIELD CONDITIONS REFERENCE: .0002 DYNES/CM² WEIGHTING NETWORK 'A'	
	148128	MPI (Ref)
	450.00	HP
	4	POLES
	60	HZ
31.5	---	DECIBELS
63	46.0	DECIBELS
125	58.5	DECIBELS
250	70.9	DECIBELS
500	79.2	DECIBELS
1000	82.5	DECIBELS
2000	79.4	DECIBELS
4000	74.9	DECIBELS
8000	67.1	DECIBELS
OVERALL	86.0	DECIBELS

DISTANCE FROM MAJOR MOTOR SURFACES 1 Meter

DATA IS TYPICAL UNDER NO LOAD,
IN A FREE FIELD PER IEEE-85

DATE: 3/5/2020

SECTION 08348 SOUND CONTROL DOORS

Part 1 – General

1.01 Summary
- A. Section includes:
  1. Acoustical Aluminum Glass Doors and Frames
- B. Related Sections:

1.02 References
- A. ASTM E90–Airborne sound transmission loss, 1/3 octave band data.
- B. ASTM B221–Aluminum-alloy extruded bar, rod, wire, shape, and tube.
- C. ASTM E283–Rate of air leakage through exterior sliding doors, curtain walls, and doors.
- D. ASTM E331–Test method for water penetration by uniform static air pressure difference.
- E. ASTM E413–Classification for rating sound insulation.
- F. ASTM E1425–Determining the acoustical performance of exterior sliding doors and doors.

1.03 System Description
- A. System 3000 Acoustical Glass Door with 1 ¾ inches in thickness and frame depth of 5 1/2 inches (114 mm).
- B. Performance Requirements: All performance criteria and ratings in this section shall be for a primary glass door alone without the use of a secondary door.
  1. Air Infiltration: Accordance with ASTM E283.
  2. Water Resistance: Accordance with ASTM E331.
  3. All aluminum glass doors must meet or exceed the minimum requirements of performance class HC-40 for the design load specified in accordance with ANSI/AAMA 101-88 and the requirements for STC 40 when tested per ASTM E90 and evaluated by E413.
  4. The entire sliding door assembly (framing members, glass, and integral components) shall meet or exceed the value listed (STC 40) when measured in accordance to ASTM E90 and E413. The sound transmission loss shall meet the following allowable deviations:
     a. Three non-continuous 1/3 octave band values may deviate below the specified values as much as three decibels, subject to the provision in 2:
     b. The summation of deviation of decibels from the specified values must not exceed six decibels.

1.04 Quality Assurance
- A. Single Source Responsibility:
  1. Obtain entrances, storefronts, ribbon walls, window walls, curtain walls, window systems, and finish through one source from a single manufacturer.
- B. Provide test reports from AAMA accredited laboratories certifying the performances as specified in 1.03.

1.05 Warranty
- A. Warranted against failure and/or deterioration of metals due to manufacturing process for a period of two (2) years.

Part 2 – Products

2.01 Manufacturers
- A. Acceptable Manufacturers:
  1. Arcadia, Inc., 4620 Andrews Street, North Las Vegas, NV 89081. (702) 644-4668 www.arcadiainc.com
- B. Acceptable Products:
  1. System 3000 Aluminum Acoustical Glass Doors, 5-1/2" depth as designed by Window Technologies, Inc.

2.02 Materials
- A. Extruded Aluminum: 6063-T5 alloy and temper with a minimum wall thickness of 0.125 inch for all frame and sash
- B. extrusions except door rails and stiles, which shall have a nominal metal thickness of 0.110 inch.
- C. Glass shall meet or exceed the requirements of ASTM C-1048 (CAN/CGSB 12.3). In glazing follow the recommendations of FGMA, AAMA, SIGMA, and IGMAC. Cushion the glass with setting blocks and support the glass with gaskets in such a way as to prevent point loads and uneven or excessive pressures.
- D. The acoustical performance and rating of the glass and glazing shall be as a complete glazing system installed in the aluminum frame with the weather-stripping and seals of that system. Acoustic test report data for the glass alone shall not be acceptable.

2.03 Finish
- A. Finish all exposed areas of aluminum and components as indicated.
  1. An Architectural Class II or I color anodic coating conforming with AA-M12C22A34/AA-M12C22A44.
     a. Anodized finish color shall be Colornodic _____. (AB1 Light Champagne, AB2 Champagne, AB3 Light Bronze, AB4 Medium Bronze, AB5 Standard Medium Bronze, AB6 Dark Bronze, AB7 Standard Dark Bronze, AB8 Black.)

(or)
  1. An Architectural Class anodic II or coating conforming with AA-M12C22A31/AA-M12C22A41.
     a. Anodize finish color shall be Colornodic _____ (#11 Clear)

(or)
  1. Fluorocarbon Coating: AAMA 2605.2.
     a. Resin: 70% PVDF Kynar 500/Hylar 5000.
     b. Substrate: cleaned and pretreated with chromium phosphate.
     c. Primer: Manufacturer's standard resin base compatible coating. Dry film thickness.
        (a) Extrusion: Minimum 0.20 mil.
     d. Color Coat: 70% PVDF, dry film thickness.
        (a) Extrusion: 1.0 mil.
     e. Color: As selected by Architect.

2.04 Fabrication
- A. Door, frame, and hardware shall be designed and assembled to provide a continuous exterior water deterrent.
- B. Door corners shall be mechanically fastened and welded to prevent movement of the door joinery.
- C. The door frame and all door rails and stiles shall be filled with MinLead composite, which shall be secured and sealed with expanding foam.
- D. Door lite glass shall be glazed with extruded snap-on glazing stops with a keyed slot for extruded glazing gasket. The design of the door shall facilitate removal of sash panels for re-glazing. In the storefront framing, no exposed fasteners are allowed.
- E. Fabricate frames allowing for minimum clearances and spacing around perimeter to allow for adjustment to plumb, level, true to line installation.

Part 3 – Execution

3.01 Examinations
- A. Examine conditions and verify substrate conditions are acceptable for product installation.

3.02 Installation
- A. Install in accordance with approved shop drawings and manufacturers installation instructions.

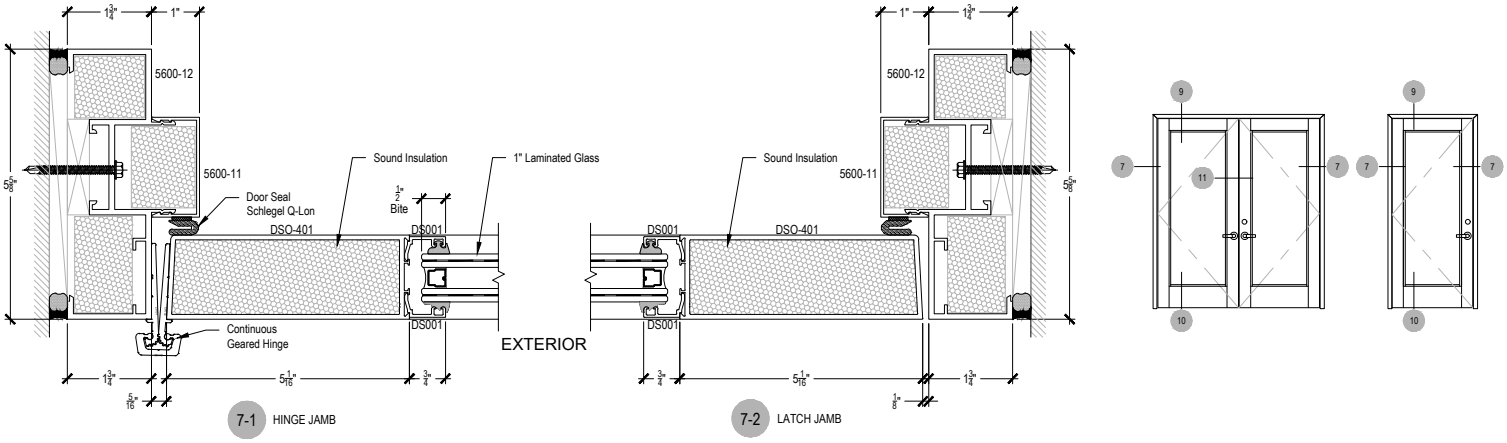
3.03 Field Quality Control
- A. Contractor's responsibility to make all necessary final adjustments to attain normal operation of each door and its mechanical hardware.

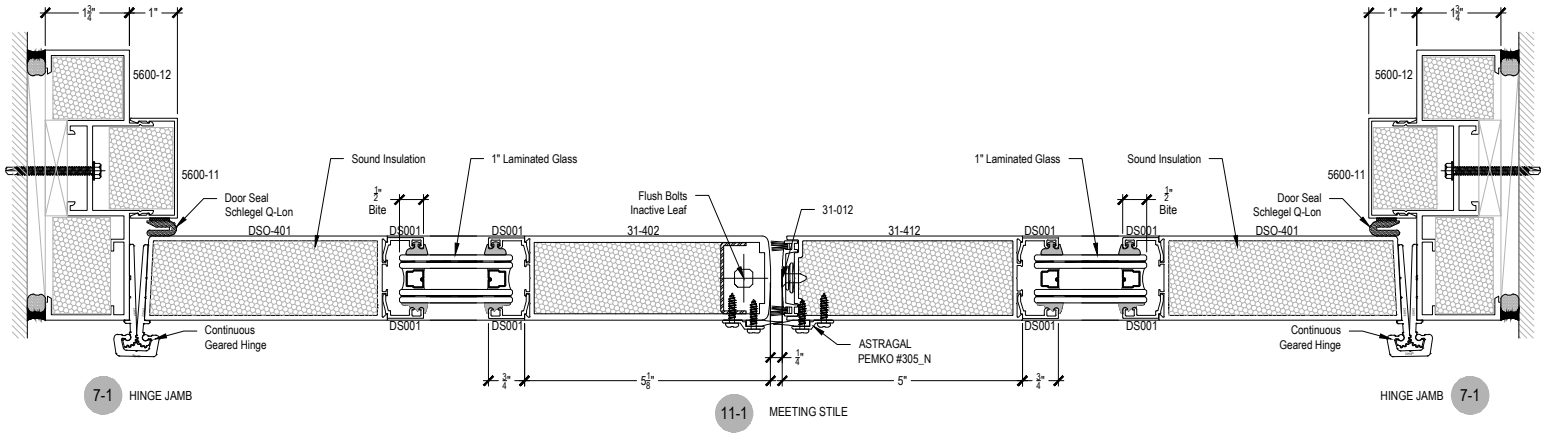
END OF SECTION

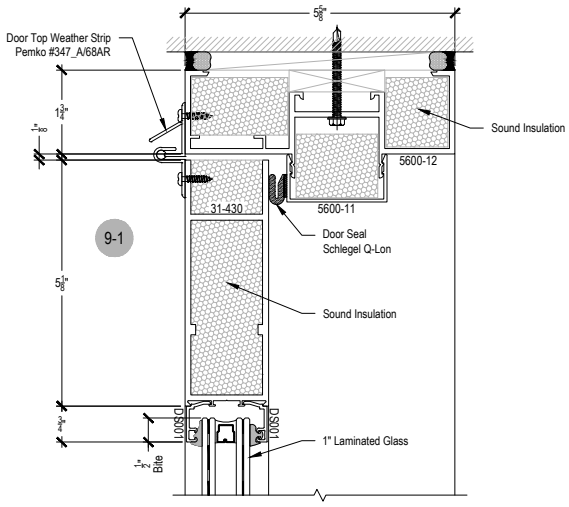
3000 STC Series

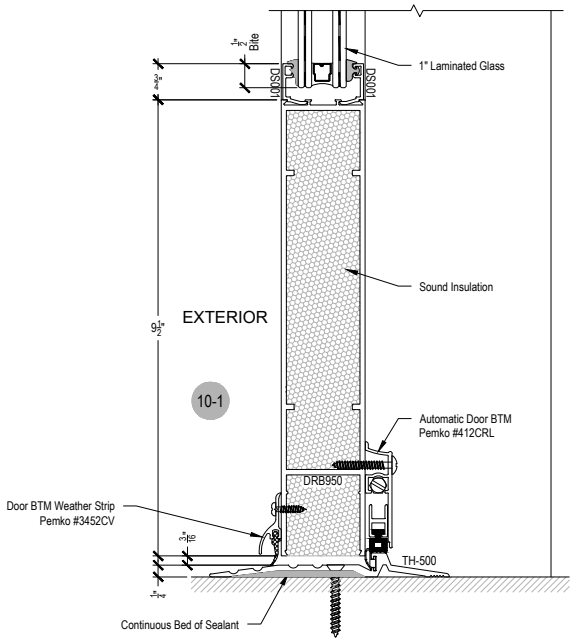
Description:French Doors
Function:Entrance - Acoustic (STC-40)
Detail:ALL
Scale:3" = 1'-0"

Acoustic Swing









TESTING • CALIBRATION • RESEARCH • CONSULTING
1711 Sixteenth Street, Santa Monica, California 90404 (310) 450-1733 Fax: (310) 396-3424

 18 September 1998

REPORT

SOUND TRANSMISSION LOSS TEST NO. TL98-285

CLIENT: WINDOW TECHNOLOGIES
TEST DATE: 17 September 1998

INTRODUCTION

The methods and procedures used for this test conform to the provisions and requirements of ASTM Procedure E90-90, *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions*. Details of the procedure will be furnished upon request. The test chamber source and receiving room volume are 79.9 and 78 cubic meters respectively Western Electro-Acoustic Laboratory is accredited by the United States Department of Commerce, National Institute of Standards and Technology under the National Voluntary Accreditation Program (NVLAP) for this test procedure. This test report relates only to the item(s) tested. Any advertising that utilizes this test report or test data must not imply product certification or endorsement by WEAL, NVLAP, NIST or the U.S. Government.

DESCRIPTION OF TEST SPECIMEN

The test specimen was a Window Technologies Series 3000 stile and rail door assembly with vision light in a 2 x 8 wood buck. The frame was .125 inch (6.4 mm) aluminum and was filled. The specimen was sealed into the test chamber opening with a heavy duct seal putty around the entire perimeter on both sides. The construction of the door is proprietary and is on file at this office. The overall thickness of the door panel was 1-3/4 inches (44.5 mm) and it was hung on a continuous hinge. A Schlage passage latch was used with a 2-3/4 inch (69.9 mm) backset and lever handles. The vision light was nominally 25 inches (0.64 m) wide by 68 inches (1.73 m) high. The glazing was a 1 inch (25.4 mm) thick dual glazed unit and the make up is on file at this office. The unit was sealed into the door panel with aluminum snap in glazing bead with vinyl seal on both sides. The seals consisted of surface mounted stops with a foam-tite and a vinyl bulb seal on the top and sides and an integral threshold stop with a foam-tite and two vinyl bulb seals at the bottom. At the bottom was a surface mount vinyl door sweep and at the top was a surface mount interlocking weather strip seal. On the latch edge were two strips of foam-tite seals facing out parallel to the door panel. The overall dimensions of the door assembly were 42.75 inches (1.09 m) wide by 85 inches (2.16 m) high including the wood buck. The dimensions of the door panel were 35.5 inches (0.90 m) wide by 79-1/8 inches (2.01 m) high. The overall weight of the specimen including the wood buck was 373 lbs. (169 kg). The door was opened and closed five times immediately prior to the test in accordance with Appendix A1.8.3.

SOUND TRANSMISSION LOSS TEST NO. TL98-285

18 September 1998

RESULTS OF THE MEASUREMENTS

One-third octave band sound transmission loss values are tabulated on the attached sheet. ASTM minimum volume requirements are met at 125 Hz and above. The Sound Transmission Class rating determined in accordance with ASTM E-413 was STC-40.

Approved:

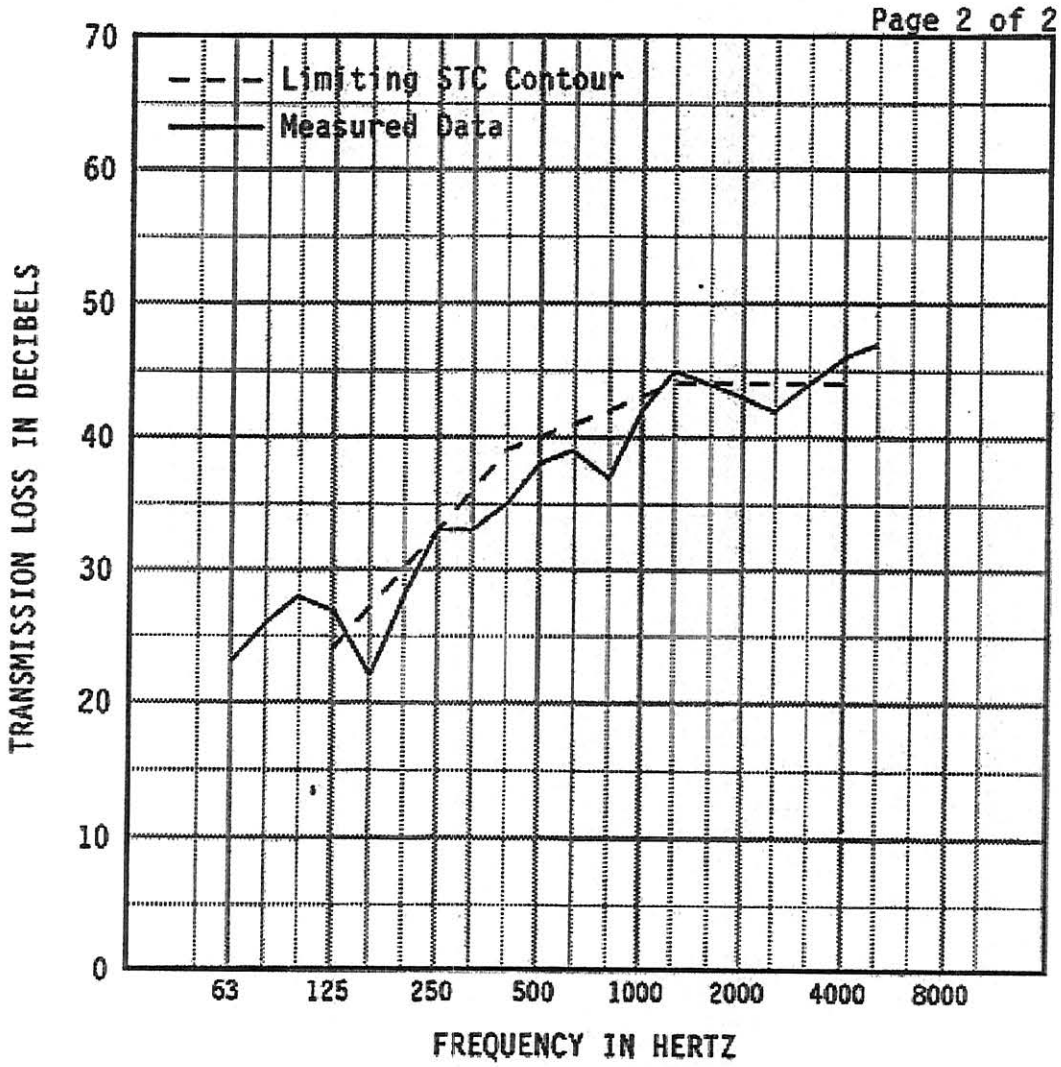
José C Ortega

Respectfully submitted,
Western Electro-Acoustic Laboratory, Inc.

Gary E. Mange

WESTERN ELECTRO-ACOUSTIC LABORATORY, INC.

Report No. TL98-285



1/3 OCT BND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	23	26	28	27	22	28	33	33	35	38
95% Confidence in dB deficiencies	3.63	4.17	2.97	1.87	2.76 (5)	1.53 (2)	0.89 (0)	0.63 (3)	0.72 (4)	0.50 (2)
1/3 OCT BND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	39	37	42	45	44	43	42	44	46	47
95% Confidence in dB deficiencies	0.56 (2)	0.82 (5)	0.53 (1)	0.43	0.66 (0)	0.39 (1)	0.41 (2)	0.28 (0)	0.39	0.59

EWR	OITC
40	33

Specimen Area: 25.234 sq.ft.
Temperature: 75.8 deg. F
Relative Humidity: 58 %
Test Date: 17 September 1998

STC
40 (27)