

TOWN OF SOUTH WINDSOR PLANNING & ZONING COMMISSION

APPLICATION 21-36P, 25 TALBOT LANE SITE PLAN

NOVEMBER 23, 2021

SUPPLEMENTAL COMPLIANCE WITH REGULATIONS

QUESTION: Does Application 21-36P comply with the Town of South Windsor Zoning Regulations?

ANSWER: No. The Application presented fails to comply with Sections 2.1, 4.1.5, 4.1.6, 6.1.5 of the Town of South Windsor Zoning Regulations and Town Ordinance Section 50-61 et seq. Based on the Record, the Town should retain an Independent Traffic Consultant.

Application:

The Project name is "25 Talbot Lane" and the box checked is "Site Plan of Development".

TOWN OF SOUTH WINDSOR ZONING REGULATION

2.1 Compliance with the Provisions of the Regulations

No building, structure or premises shall be used or occupied, and no building or part thereof or other structure shall be erected, raised, moved, placed, reconstructed, extended, enlarged, or altered except in conformity with the regulations herein specified for the district as shown on the official map in which it is located.

4.1.6A Commercial and Industrial Area, Density and Dimensional Requirements.

Table 4.1.6A Commercial and Industrial Area, Density and Dimensional Requirements.

Lot Coverage: Industrial Zone 50%

The Impervious Area on Applicant's Plan is 54%

Attached hereto and marked Exhibit A is the Affidavit of John E. Holowczak dated November 23, 2021.

4.1.5 Traffic Requirements

To provide for the orderly flow of inbound and outbound site generated traffic, and to minimize the inherent conflict between outbound left and inbound left maneuvers, applicants must demonstrate to the Commission's satisfaction that the site generated traffic is able to enter and exit the site safely without disruption to the external traffic flow. On-site queuing provisions must be adequate to prevent site generated traffic from queuing on public streets. Site lines for the existing traffic from the site drive must be satisfactory for the prevailing speed of approaching traffic. The applicant must demonstrate that the design provides for safe and orderly vehicular and pedestrian flow and movement of traffic and minimizes vehicular and pedestrian conflicts. Delivery areas must be located so that normal operations are not impeded or compromised. An engineered traffic report must be provided with the application to demonstrate the adequacy of traffic flow and design.

Attached hereto and marked Exhibit B & C are two the Affidavits of Derrick Butler, both dated November 23, 2021.

6.1.5 Traffic and Circulation Considerations

To assure the smooth flow of traffic to and from sites and to minimize conflicts between pedestrians and motor vehicles, Site Plan design should incorporate the following:

1. On-site queuing provisions must be adequate to prevent site-generated traffic from queuing onto public streets.
2. Site lines for existing traffic from the site drive must be satisfactory for the prevailing speed of approaching traffic.
3. The applicant must demonstrate that the design provides for safe and orderly vehicular and pedestrian flow and movement of traffic and minimizes vehicular and pedestrian conflicts.
4. Delivery areas must be located so that normal business operations are not impeded or compromised.

A traffic report prepared by a professional engineer shall be provided with the application to demonstrate the adequacy of traffic flow and design. This report may be waived where the site-generated traffic is minimal and the Town Engineer concurs that the traffic layout is acceptable.

PARTIAL TRANSCRIPT OF NOVEMBER 9, 2021 SWP&Z HEARING CONCERNING OFFICE OF STATE TRAFFIC ADMINISTRATION APPROVAL

Peter DeMaille-11/9/21 SWP&Z Hearing @ 28 minutes "The State of Connecticut Office of Traffic Administration has already approved the traffic study and its findings and agrees with our traffic engineers at Langan, that the existing road way infrastructure is adequate to support the nominal increase in traffic volume generated by the proposed distribution center, without improvements"

Maximo Polanco (Langan Engineering)-11/9/21 SWP&Z Hearing @ 30 minutes "The Office of Traffic Administration from Connecticut has reviewed our traffic study and agrees with our assessment that the existing infrastructure is adequate to manage the expected nominal increase in traffic by the proposed development"

Attorney James Connor (referring to the Langan Engineering Study)
-11/9/21 SWP&Z Hearing @ 1 hour 2 minutes "This same report has in the process of getting the Office of State Traffic Administration determination for the project because it is considered a major traffic generator that the traffic engineers at OSTA have concurred in the analysis and the extent of the projected impacts on nearby intersections"

Peter DeMaille-11/9/21 SWP&Z Hearing @ 4 hour 45 minutes "Just one thought. Someone suggested a third-party review of the traffic report. Well, the third-party review has been done. The traffic engineers at the Connecticut Office of Traffic Administration have already reviewed the report and they agreed with their analysis they approved that, and they agreed with the findings of the report. There has already been a third-party review in the State of Connecticut."

Maximo Polanco (Langan Engineering)-11/9/21 SWP&Z Hearing @ 4 hour 49 minutes "The buses will have minimal impact on the traffic study"

Commissioner Bernstein -11/9/21 SWP&Z Hearing @ 4 hour 40 minutes "Are you saying that the third-party corroborated?"

Maximo Polanco (Langan Engineering)-11/9/21 SWP&Z Hearing @ 4 hour 49 minutes "Yes"

Office of State Traffic Administration www.ct.gov/osta(<http://www.ct.gov/dot/osta>)

Attached hereto and marked Exhibit D is a copy of the printout of pending applications per the Office of State Traffic Administration.

INDEPENDENT TRAFFIC CONSULTANT

Where the municipality is faced with a project that will generate large amounts of traffic, the agency always wants to review traffic impact, whether or not expressly required by its regulations. The applicant will usually have a traffic expert analyzing traffic congestion, traffic volume (both at the peak and off-peak hours), intersection design, and traffic control devices. In large projects with significant opposition, the opponents will often hire their own traffic expert. While the agency, usually a zoning commission, may compare and rely upon the reports of the traffic consultants for the parties, it may hire its own traffic consultant to review or do an independent study of the proposal. In large projects analyzing the traffic impact is critical. **Connecticut Land Use Law and Practice**, Connecticut Practice Series, Robert A. Fuller, section 14:15

The South Windsor Planning & Zoning Commission has retained an Independent Traffic Consultant in connection with previous Applications.

Section 6.6 Utilities

6.6.1 General Provisions

A. No development plan shall be approved unless:

1. Adequate public utilities, public sanitary sewers or Health Department approved on-site septic systems, and storm drainage are to be provided by the developer or developers.
2. Clear evidence has been furnished of safe and satisfactory means of supplying potable water, on-site septic and fire protection.
3. The proposed utilities, sewers, drainage, potable water supply and fire protection have been shown to be adequate to accommodate reasonably anticipated future development.

B. The developer or developers shall also provide fire hydrants at appropriate locations when public water is available. All Town specifications for furnishing and installation of water systems and hydrants must be met.

C. Where public sewers are available, all sites shall be properly connected to an approved and functioning sanitary sewer system prior to issuance of a Certificate of Occupancy. All sanitary sewerage extensions and connections shall be done in accordance with the specifications in the Public Improvements Specifications manual, the Connecticut Public Health Code regulations, and rules and regulations of the Water Pollution Control Authority.

Attached hereto and marked Exhibit E is the Affidavit of Brian R. Wylie dated November 23, 2021.

TOWN ORDINANCE SEC. 50-61 ET SEQ

Sec. 50-65 Performance standard

In the Residential Receptor's Zone; 55 dBA Day and 45dBA Night are the noise limits.

This property is abutted on 3 sides by a Residential Receptor Zone.

Expert: A person who, through education and/or experience, has developed skill or knowledge in a particular subject so that he or she may form and opinion that will assist the fact-finder. **The Complete Illustrated Book of Development Definitions, Fourth Edition, Routledge Taylor & Francis Group, London and New York, Published 2017**

Derrick Butler is a trucking expert and a resident.

Brian R. Wylie is an engineer and a resident.

John E. Holowczak is an engineer and a resident

CONCLUSION

Application 21-36P does not comply with the Town of South Windsor Zoning Regulations, Sections 2.1, 4.1.5, 4.1.6, 6.1.5 & Town Ordinance Section 50-61 et seq.

BY: 

Attorney John H. Parks
Law Offices of John H. Parks
352 Billings Road
Somers, CT 06071
(860) 749-0797
JURIS # 100823

Exhibit A

TOWN OF SOUTH WINDSOR PLANNING & ZONING COMMISSION

APPLICATION 21-36P, 25 TALBOT LANE SITE PLAN

NOVEMBER 23, 2021

AFFIDAVIT OF JOHN E. HOLOWCZAK


I, John E. Holowczak, being duly sworn depose and say:

1. I am over the age of 18 and I believe in the obligation of an oath.
2. I have personal knowledge of the facts attested to in this affidavit.
3. I have lived in South Windsor for the past 29 years
4. I have been an engineer for the past 35 years
5. My resume is attached hereto and marked Exhibit A
6. I have attended all of the hearings regarding the above-referenced application, listened to all of the speakers
7. I have several years of direct experience in tailoring jet engine exhaust for the attenuation of energy at various portions of the electromagnetic spectrum, including but not limited to acoustic attenuation (audible noise adsorption).
8. It is obvious to me that the addition that a simple 60 foot long wooden fence would not have a significant effect on noise attenuation other than sound reflection.
9. In fact the sound waves would be expected to reflect back again and in all directions off the tractor trailer.
10. A true sound fence would incorporate Helmholtz resonators and other features to absorb sound.
11. These features would need to be tuned to the noise signatures being emitted, which would exist at many different frequencies.
12. Truck engine noise, the crash as the trailer hits the dock, the clang of fork lift trucks as forks sometimes strike or more often bounce as a forklift goes on and off the trailer, etc; each represent different frequency ranges.
13. The roadway directly south of the building that this 12 foot tall wooden fence cannot start right at the building corner due to the driveway depicted south of the building.

14. The said fence could actually serve to channel noise easterly along the southern site border with Edgewood, and, there are no tall trees within the 50 foot proposed tree conservation area at the south end of the easterly property border, as noted on the Applicant's plan (e.g. so no noise attenuation in that area).

15. An Independent Peer Review of the Applicants sound analysis, if one was provided, is warranted, as is an Independent Review of a Construction Noise Abatement Plan.

16. The attached image analysis of the 11/17/2021 version of the site plan for the referenced application indicates that the Impervious Area is 54%, with a nominal error of +3/ -2%. This indicates that approximately 16.4 acres of new impervious coverage is proposed to be introduced.



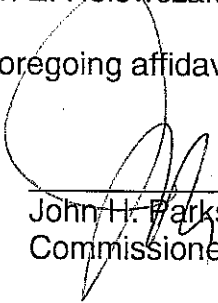
John E. Holowczak

STATE OF CONNECTICUT)

COUNTY OF HARTFORD)

SS SOUTH WINDSOR NOVEMBER 23, 2021

Personally appeared John E. Holowczak, individually and made oath to the truth of the matters contained in the foregoing affidavit, before me.



John H. Parks
Commissioner of the Superior Court

John E. Holowczak
South Windsor, CT 06074

Summary

John is an engineer by training and profession. He holds Bachelor of Science and Master of Science degrees in ceramic engineering, and a major focus of his career has been to take certain minerals found in soils and transform them into components used in energy conversion devices such as engines. His coursework overlaps that of a soil scientist by roughly 15 credit hours of the 30 required by State of CT for a Wetlands Scientist. He has experience in tailoring ceramic materials and components for energy absorption including acoustic (noise) absorption, such as the use of tailored Helmholtz resonators.

Professional Experience

Associate Director – Adv. Materials, United Technologies Research Center East Hartford, CT

- Lead development of fiber/matrix interface coating techniques and novel high temperature matrices for turbine CMCs (materials derived from silica – i.e.. sand).
- Provide technical, strategic partnership and R&D contract development to P&W's CMC Team
- Principal Investigator; U.S. Dept of Energy hybrid ceramic/CMC turbine vane design/demo

Engineer & Project Leader – Ceramic & Coatings, UTRC, East Hartford, CT

- Various roles of increasing responsibility in aerospace materials development & application.
- Lead development of ceramic/ceramic matrix composite hybrid systems for applications including helicopter protection and turbine components.
- Project leader for design, manufacturing development and test of silicon nitride components for small turbine engine applications, including UAV, APU and microturbine applications.
- Coordinate efforts of approx. 30 personnel in multi-company team for design, fabrication and testing of cooled all ceramic turbine vanes.
- Solid Oxide fuel cell development for CO2 free conversion of fuel to electricity
- Develop CMC materials and fabrication techniques for turbine engine exhaust structures including sound absorption.

Research Engineer – Norton/TRW Joint Venture for Heat Engine Ceramics – Northboro, MA

- Develop complex shape fabrication techniques for producing silicon nitride and silicon carbide gas turbine components (derived from silica sand), in a pilot plant manufacturing environment.

AWARDS

- United Technologies Horner Citation – 787 APU Sole Source Contract Win.
- R&D 100 Award (led team) Actively Cooled Monolithic All-Ceramic High Pressure Turbine Vane with Environmental Barrier Coating.

SOCIETIES

- Chair Emeritus of the U.S. Advanced Ceramics Association (trade association)
- Member, American Ceramic Society.

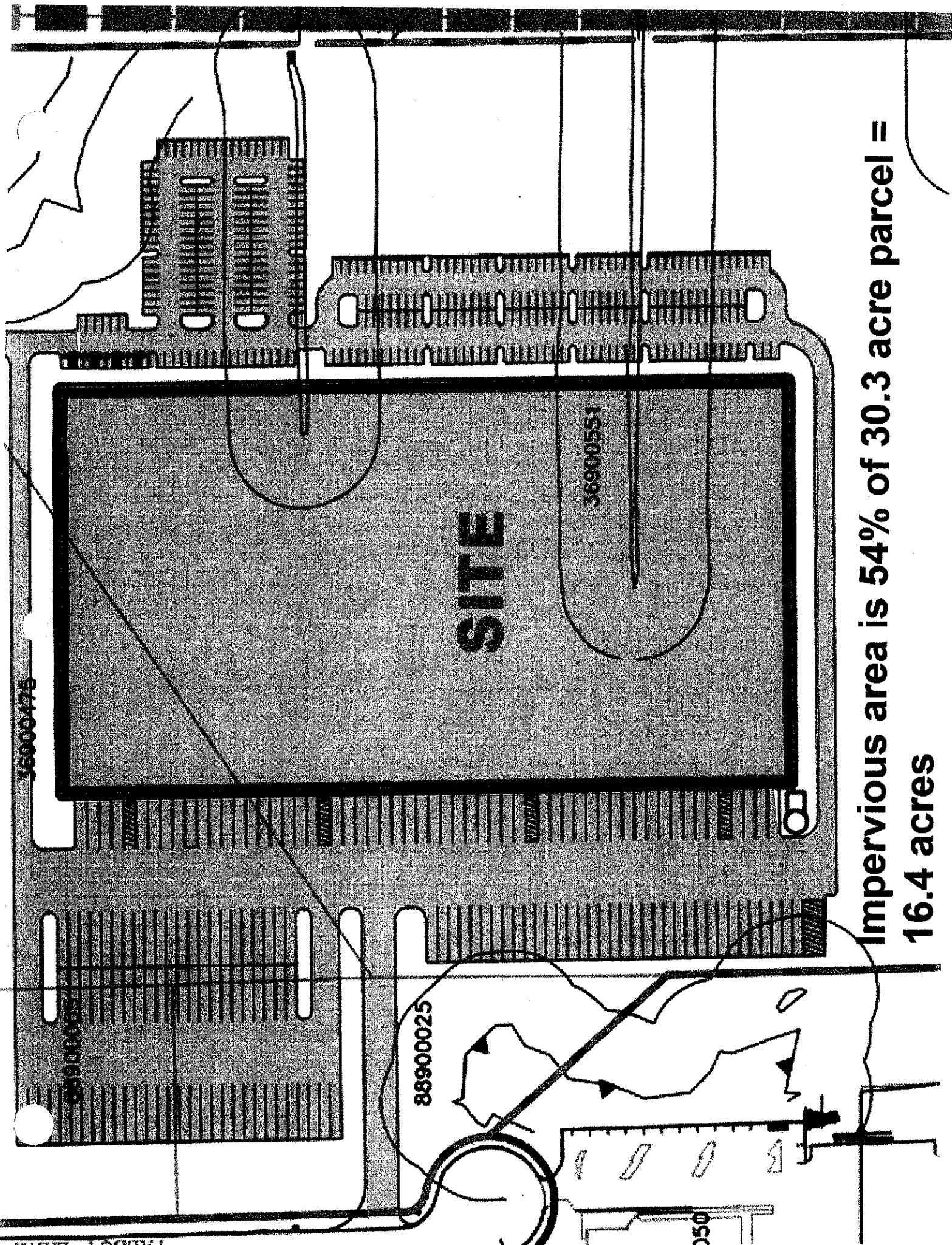
PATENTS

- Hold 33 patents on areas including ceramic armor, ceramic to metal attachments, environmental protection coatings, and CMC component design. Additional patents pending.

EDUCATION

M.S. in Ceramic Science, Rutgers, the State University of New Jersey

B.S. in Ceramic Engineering, Rutgers, the State University of New Jersey



36000475

88900055

88900025

36900551

SITE

Impervious area is 54% of 30.3 acre parcel =
16.4 acres

350

Exhibit B

TOWN OF SOUTH WINDSOR PLANNING & ZONING COMMISSION

APPLICATION 21-36P, 25 TALBOT LANE SITE PLAN

NOVEMBER 23, 2021

AFFIDAVIT OF DERRICK BUTLER

I, Derrick Butler, being duly sworn depose and say:

1. I am over the age of 18 and I believe in the obligation of an oath.
2. I have personal knowledge of the facts attested to in this affidavit.
3. I have lived in South Windsor for the past 32 years
4. I have been in the trucking industry for the past 4 years
5. My resume is attached hereto and marked Exhibit A
6. I have attended all of the hearings regarding the above-referenced application, listened to all of the speakers
7. I have reviewed the Town of South Windsor Zoning Regulations, specifically sections 6.1.5-1 and 6.1.5-3, to which I state the following:

6.1.5-1 Queuing Provisions to prevent site generated traffic from queuing out on public streets

6.1.5-3 Must demonstrate the design provides safe and orderly vehicular and pedestrian flow and movement of traffic minimizes vehicular and pedestrian conflicts.

As I review the site plan, I notice the short driveway (runway), or entrance. This is an unusually short driveway (runway) for a truck terminal or DC. By design there is only room for a maximum of 3 tractor trailer units staged waiting to get access to the site, with out impeding the turn radius needed to enter from Talbot and exit from the trailer yard. This plan does not have sufficient off- road room for queuing, staging trucks (stacked up) waiting for a dock door. The revised queuing sketch is not to scale. It shows room for 4 trucks deep and 2 trucks wide. This is not practical or possible . When applying the correct scale, it shows the actual driveway length from street to fence to be approximately 250' to 260' . Road units are 78' to 80' long giving room for only 3 units in the driveway. The widths shown are two tight to accommodate 2 units side by side. The new queuing sketch shows 3 twelve ft wide lanes to accommodate 2 lanes inbound and 1 lane outbound. Trucks are 8.5ft wide with 1 ft mirrors on each side, making the total width per unit 10.5ft. This gives only a 9" clearance on each side per lane and this is not practical for a high traffic area. It gives insufficient margin for error and does not take any sway angles into consideration for trucks pulling in and through the entrance.

As the site is designed, trucks enter the dock areas and only 1/2 of the loading docks are to the right side. This allows for left-handed normal back in. This means 1/2 of the trucks backing into loading docks will have to turn left at the gate and make a blind side back in as there is not sufficient turn around room at either end of the trailer yard. This blind side situation is something as an industry we try to avoid.

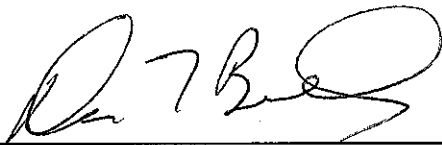
Usually a site with high truck volume provides for a smooth flow from a guard check in post to an easy back in. Yet this plan is based on the opposite for 50% of the inbound traffic. Blind side back-ins also create, delays and congestion. It is risky, takes twice as long because the drivers can't see the rear trailer corners. This risk has the potential for property damage and or pedestrian casualty.

In previous testimony I have listed terminals, and DCS that have planned sufficient runways to ensure all queuing is done off of town roads and within the property.

The new Coke and Amazon buildings on route 30, South Windsor, and both Amazon sites in Windsor located at 100 Helmsford Way and 801 Day Hill Road have adequate room. These sites have queuing space for at least 10 to 15 units inside the property, and have sufficient turn around room or direct access with docks on the left side of the traffic flow for easy back ins.

When the proposed Talbot lane trailer yard is loaded up with dropped trailers and loading docks are in use, all units waiting to get in and out of the site will be backed up on Talbot and Governors. This will create major vehicular and pedestrian conflicts and hazards. Pinch points will be the corners on Talbot to access the site with adjacent driveways, the tight corner of Governors and Talbot, and the corner and driveways at Nutmeg and Governors.

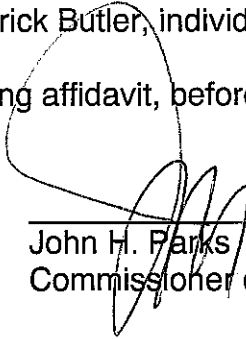
These adverse conditions go against the Town of South Windsor Zoning regulations in 6.1.5 in sections 1 & 3.



 Derrick Butler

STATE OF CONNECTICUT)
) SS SOUTH WINDSOR NOVEMBER 23, 2021
 COUNTY OF HARTFORD)

Personally appeared Derrick Butler, individually and made oath to the truth of the matters contained in the foregoing affidavit, before me.



 John H. Farks
 Commissioner of the Superior Court

-
- OBJECTIVE** To obtain a Management position where my experience and education will benefit the growth and success of an organization.
- EXPERIENCE**
- 2000 - Present **Siracusa Moving & Storage Co., Inc.; New Britain, Connecticut**
Vice President - Special Products Division
- Manage and control daily divisional operation including customer service, claims and collections.
 - Developed national vendor base to enhance growth and strategic initiatives.
- 1998 - 2000 **Siracusa Moving & Storage Co., Inc.; New Britain, Connecticut**
Manager - Commercial Services
- Developed and maintained national account base.
 - Managed projects and acted as liaison between vendors and clients.
- 1996 - 1998 **Hartford Despatch Moving & Storage; East Hartford, Connecticut**
Vice President - Operations
- Planned, organized and controlled the overall operation including local and short-haul moving teams and long-haul independent contractors.
 - Managed and oversaw all daily functions of the 200,000 square foot warehouse and records storage center, and facilities.
 - Organized and managed numerous large scale corporate relocations - over 3.4 million square feet moved.
 - Was responsible for compliance with O.S.H.A., D.O.T., I.R.P. regulations.
 - Managed garage and the upkeep of 100-unit fleet.
- 1995 - 1996 **Hartford Despatch Moving & Storage; East Hartford, Connecticut**
Assistant Vice President
- Commercial moving and warehouse services.
 - Project manager responsible for many of the area's successful corporate facility moves, both office and industrial.
 - Developed and maintained warehouse space and distribution accounts.
 - Under my leadership, Hartford Despatch earned the Connecticut Motor Transport Association Division 3 Safe Fleet Award.
 - Fleet Safety Manager and primary liaison with Allied Van Lines Safety Department.
- 1987 - 1995 **Hartford Despatch Moving & Storage; East Hartford, Connecticut**
Commercial Move Coordinator
- Responsible for development and maintenance of national account base.
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- 1980 - 1987 **Hartford Despatch Moving & Storage; East Hartford, Connecticut**
Intrastate, Interstate Class I Driver and Crew Foreman
- Serviced national accounts such as IBM, Aetna, Travelers, UTC, Union Carbide; Dock Supervisor.
- PROFESSIONAL DEVELOPMENT**
- 1995 **National Moving and Storage Association**
Young Executive, Development Program; Alexandria, Virginia
- 1993 **Connecticut Business and Industrial Association**
O.S.H.A. reporting and compliance seminar; Hartford, Connecticut
- 1992 **Dale Carnegie Marketing and Sales Course; West Hartford, Connecticut**
- EDUCATION**
- 1987 **University of Connecticut; Storrs, Connecticut**
Bachelor of Science
Management and Human Resources

Exhibit C

TOWN OF SOUTH WINDSOR PLANNING & ZONING COMMISSION

APPLICATION 21-36P, 25 TALBOT LANE SITE PLAN

NOVEMBER 23, 2021

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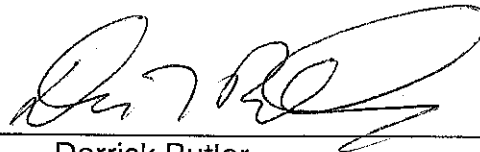
1. I am over the age of 18 and I believe in the obligation of an oath.
2. I have personal knowledge of the facts attested to in this affidavit.
3. I have lived in South Windsor for the past 32 years
4. I have been in the trucking industry for the past 41 years
5. My resume is attached hereto and marked Exhibit A
6. I have attended all of the hearings regarding the above-referenced application, listened to all of the speakers
7. I have reviewed the Town of South Windsor Zoning Regulations, specifically Table 4.1.1A relative to Truck and Freight Terminals, which require a Special Exception and compared it to Warehouses and Distribution Centers, which only requires Site Plan Approval, to which I state the following:

Freight terminal vs warehouse /distribution center

In the last hearing the applicant made comparisons to some older buildings in town being occupied and operated by freight terminals today. For example the Old Dominion terminal at 150 Strong road is the old Yellow Freight/Preston Freight lines building of the 1970's. R&L Freight lines operates out of the old Red Star & Cassarino terminal and facilities from the 1970s. The Dattco terminal is the old RPS terminal from the 1980's. These sites are old trucking terminals from decades ago before the trucking and transportation industry changed. Most of the old terminals are demolished. These few terminals are left from companies that have closed. These few older terminals mentioned are only occupied as some companies moved in and chose to operate in these old facilities rather than upgrade. There should be no comparison to the sites being built up now and the old freight terminals of yesteryear.

These older facilities were the main stay of the old common carriers, most of which no longer exist. These operations like Red Star, Yellow, Ryder, Preston, Mccleans, struggled with profit margins of .04 per dollar before going out of business. Their low cost facilities were nothing more than cement slabs, with tin roofs and loading docks

short term storage, home delivery , pick and pack but majority of use will be truck to truck transfer. For this reason this application should require the special use exception for Truck or freight Terminal.

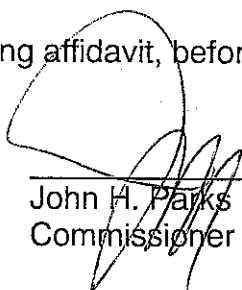


Derrick Butler

STATE OF CONNECTICUT)
)
COUNTY OF HARTFORD)

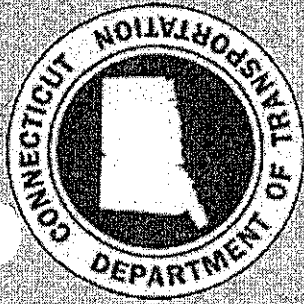
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Commissioner of the Superior Court

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- Planned, organized and controlled the overall operation including local and short-haul moving teams and long-haul independent contractors.
 - Managed and oversaw all daily functions of the 200,000 square foot warehouse and records storage center, and facilities.
 - Organized and managed numerous large scale corporate relocations – over 3.4 million square feet moved.
 - Was responsible for compliance with O.S.H.A., D.O.T., I.R.P. regulations.
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- 1992 **Dale Carnegie Marketing and Sales Course**; West Hartford, Connecticut
- EDUCATION**
- 1987 **University of Connecticut**; Storrs, Connecticut
Bachelor of Science
Management and Human Resources



OFFICE
of the
STATE TRAFFIC ADMINISTRATION
PENDING REVIEWS

Town	REGULATION	OSTA Number	LOCATION
<u>Avon</u>	Major Traffic Generator	004-1804-01	Avon Village Center - Step 3
<u>Barkhamsted</u>	Speed Limit	005-1707-01	West River Road
<u>Bethel</u>	No Through Trucks	009-1511-01	Mansfield Street btw Rte 53 & Fleetwood St
<u>Bloomfield</u>	Major Traffic Generator	011-2103-01	Rye field Village - AD
	Major Traffic Generator	011-1810-01	CREC- Ana Grace Academy of Arts
	Major Traffic Generator	011-1610-01	Bloomfield Senior Housing - Step 2
<u>Bozrah</u>	Major Traffic Generator	013-1710-01	Senior Living Development
<u>Branford</u>	Major Traffic Generator	014-1809-01	Retail Development-244-250 North Main Street-Step 2
	Major Traffic Generator	014-2103-01	Mariner's Landing - AD

Exhibit D

Town	REGULATION	OSTA Number	LOCATION
<u>Shelton</u>	Major Traffic Generator	126-1409-01	Reservoir Corporate Center
	Major Traffic Generator	126-1711-01	Mixed Use Development - Step 3
	Major Traffic Generator	126-1610-01	Big Y - Shelton Retail Center - Partial Opening
<u>Simsbury</u>	Major Traffic Generator	128-1812-01	The Ridge at Talcott Mountain - Partial Opening
<u>South Windsor</u>	Major Traffic Generator	132-2106-01	New Pleasant Valley School - Step 2
	Major Traffic Generator	132-2012-01	240 Ellington Road Land Use Change - Step 3
	Major Traffic Generator	132-2108-02	25 Talbot Lane Industrial Warehouse - AD
	Major Traffic Generator	132-2108-01	Evergreen Walk Expansion (Proposed Grocer) - AD
	Speed Limit	132-1610-01	Varios Roads (8 locations)
	Major Traffic Generator	131-1204-01	BJ's Wholesale Club-Operate w/o full compliance with Cert No. 1824
	Speed Limit	131-1601-01	Oakmont Way and Whistling Straights
<u>Sprague</u>	Regulatory Signs	133-1911-01	Removal fo STOP signs. Route 138 RR grade crossing near intersection with Pa
<u>Stafford</u>	School Zone	134-1604-02	Route 190 (West Stafford Road) vicinity of West Stafford School
	Speed Limit (Town)	134-2110-01	Burbank Road

Exhibit E

TOWN OF SOUTH WINDSOR PLANNING & ZONING COMMISSION

APPLICATION 21-36P, 25 TALBOT LANE SITE PLAN

NOVEMBER 23, 2021

AFFIDAVIT OF BRIAN WYLIE

I, Brian Wylie, being duly sworn depose and say:

1. I am over the age of 18 and I believe in the obligation of an oath.
2. I have personal knowledge of the facts attested to in this affidavit.
3. I have lived in South Windsor for the past 21 years
4. I have been in the engineering industry for the past 29 years
5. My resume is attached hereto and marked Exhibit A
6. I have attended the 11/9/2021 hearing regarding the above-referenced application, and reviewed the minutes from the prior meetings.
7. I have reviewed the Town of South Windsor Zoning Regulations, specifically sections 6.6.5.A and 6.6.5.B, to which I state the following:

6.6.5.A. Design of the storm water management system shall be:

1. Consistent with the standards of the Public Improvement Specifications manual;
2. In accordance with the 2004 Connecticut Stormwater Quality Manual;
3. Consistent with good engineering practices (sealed by a licensed professional engineer); and
4. Based on environmentally sound site planning and engineering techniques.

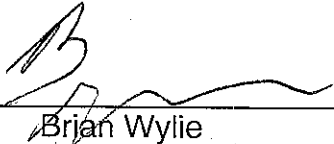
6.6.5.B. Zero net increase of stormwater discharge to the Town's storm drainage system is to be maintained for 2, 10, 25 and 100-year storms, unless it can be demonstrated that there will be no deleterious downstream effects from an increase in stormwater discharge flow. The impacts of increase in postdevelopment stormwater runoff volume must also be determined and mitigated. Potential impacts to receiving water bodies must be assessed and mitigated.

As I review the application and the stormwater report filed by the applicant it appears the application does not meet the requirements of sections 6.6.5.A.1, 6.6.5.A.2, or 6.6.5.B.

6.6.5.B. No analysis of downstream effects has been provided. There are ten pipes/culverts between the property and the Connecticut River. No assessment has been provided for the capacity of these culverts or the retention ponds along the Newberry watercourse. An analysis which incorporates the runoff profile for the rest of the Newberry Brook watershed and the proposed runoff curve for the project should be undertaken to verify the culverts and retention features have sufficient capacity.

The effect of this flow on Newberry Brook and the wetlands west of Main St. has not been assessed or mitigated. Erosion and water level effects need to be understood and mitigated.

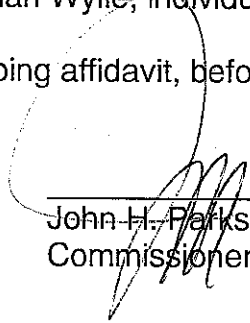
These adverse conditions go against the Town of South Windsor Zoning regulations in 6.6.5.



Brian Wylie

STATE OF CONNECTICUT)
) **SS SOUTH WINDSOR NOVEMBER 23, 2021**
COUNTY OF HARTFORD)

Personally appeared Brian Wylie, individually and made oath to the truth of the matters contained in the foregoing affidavit, before me.



John H. Parks
Commissioner of the Superior Court

Experience

Pratt & Whitney, Raytheon Technologies Corporation, 2000-present.

22 years of experience leading product development teams for multiple programs within Pratt & Whitney. Experience includes:

- Hardware design, development, testing and entrance to production for fielded and new development engine models. Responsible for planning, tracking, and executing designs, communicating with customers, verifying criteria for entrance to production and leading engineering teams.
- New technology maturation for materials and applications within development engine models.
- Software product development and deployment for a new software tool utilized by entire engineering organization.
- Experience on military and commercial engine programs
- Organizational leadership of teams of over 100 engineers, including manpower planning, allocation, and hiring.
- Budget, financial and schedule accountability for project plans spanning several years and multiple millions of dollars.
- Business process development for improved effectiveness of engineering teams.
- Internal audit of processes against AS9100 quality system requirements.

Xerox Corporation, 1993-2000.

Project leadership and product development in the Xerox Desktop Printing division.

- Technical Program Manager for planning and delivery of software and hardware portions of a color printing products, including network print servers. Led development of requirements management process and specification structure for standardized product descriptions within desktop printing division.
- Project Engineer. Managed color printer applications test lab, including test assignments, schedule and resource management, and communication of results and test status to program management. Co-authored system operating description for a color printer. Top-level customer support for color laser printer.
- Testing and functional verification of host and client software for color printer.
- Group Productivity Consultant. Facilitated of quality improvement teams in a computer-based conference facility.

Education

Bachelor of Science in Aerospace Engineering with Mathematics minor, Syracuse University, May 1992. GPA: 3.914.

Master of Engineering in Systems Engineering, Rochester Institute of Technology, May, 2000. GPA: 3.83

Activities

Scoutmaster / Assistant Scoutmaster, Boy Scout Troop 62
Life member, Tau Beta Pi (Engineering Honor Society)

Certifications AS9100D Internal Auditor

November 23, 2021

TO: South Windsor Planning and Zoning Commission

FROM: John Hapkiewicz
Civil Engineer
CT P.E. License No. 20870

RE: Stormwater analysis for PZC Application 21-36P

Dear Commission Members:

The stormwater report and analysis for this application is incomplete per the South Windsor Zoning Regulations, particularly section 6.6.5. This section requires determination and mitigation of the effect of increased volume on downstream watercourses and bodies of water, which has not been provided. There are ten culverts on the drainage course between the property and the Connecticut River, as well as retention ponds and wetlands.

The Stormwater Management Report for this project states:

The proposed stormwater management system as discussed herein and shown on the referenced plans is appropriate for the proposed development on the subject site and should not pose any detrimental impacts to the environment.

However, this statement cannot be made without the required assessment and mitigation.

Sincerely,


John T. Hapkiewicz (Nov 23, 2021 17:44 EST)

John Hapkiewicz
Civil Engineer
CT P.E. License No. 20870

Acoustic Assessment for the fuel cell unit
at Carla's Pasta

Prepared For: Doosan Fuel Cell America Inc.

EXHIBIT B

Point of Contact: Ben Yoon

**Prepared by: Acoustical Technologies Inc.
50 Myrock Avenue
Waterford, CT 06385-3008**

**Subject: Carla's Pasta
Airborne Noise Assessment
50 Talbot Lane**

Author: Carl Cascio

Date: September 24, 2018

Revision: 1

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Summary

This document makes acoustic noise control recommendations that should assist in meeting the acoustic noise concerns during the operation of a Doosan 440 KW fuel cell on the Carla's Pasta site at 50 Talbot Lane in South Windsor, CT. An acoustic assessment plan was developed and executed to acquire acoustic information useful in explaining and mitigating the potential airborne noise issues associated with the future operation of a Doosan 440 KW fuel cell at the site in South Windsor. This has been accomplished and the results show that the acoustic impact of operating the Doosan 440 KW fuel cell is insignificant except for the closest neighbor.

The airborne noise levels expected to be generated by the Doosan fuel cell operating at the South Windsor site were simulated by exciting a set of four co-located speakers at the nominal fuel cell Power and Cooling Module positions. The speakers produced average overall A-weighted sound pressure levels of approximately 93 dBA at 5 meters and 88 dBA at 10 meters (reference 20 microPascals) near the proposed fuel cell location. The airborne noise levels from the speakers were measured at nearby property lines at noise levels from 43 to 85 dBA. Residential measurement locations to the northeast and east were very quiet with levels below 45 dBA with the speakers on. Measurement locations to the north were high because of the short distance from the speakers to the nearby properties along Talbot Lane. Analysis of the speaker data indicated propagation losses from 3 to 42 dB from the fuel cell location to these nearby Industrial Zone property lines. The overall airborne noise estimates are all expected to meet the state and town nighttime 51 dBA requirement at all the residential locations. All of the nearby Industrial Zones properties can meet the state and town 70 dBA requirement for the Industrial Zones locations without any additional noise treatment. Operation of the fuel cell is expected to meet all requirements associated with impulse noise, prominent discrete tones, infrasonic and ultrasonic noise at all of the nearby property lines without additional noise treatment.

Operation of the fuel cell produces airborne noise predominately from the Cooling Module. Because the airborne noise levels due to the Cooling Module are within 2 dB of the 70 dBA Industrial Zone limit at the 30 Talbot Lane location, there is a minor concern that the 70 dBA requirement might be exceeded at the property line nearest the Cooling Module. Measurements indicated only 3 dB of propagation loss between the speaker location at Site B and the 30 Talbot Lane measurement location (driveway 16 meters away). If the Cooling Module happens to be located closer than 11 meters from the adjacent property line the airborne noise level might climb above 70 dBA, particularly if the 30 Talbot Lane measurements were made one foot inside the property line at a few places very near the Cooling Module.

Efforts to reduce the Cooling Module airborne noise at the 30 Talbot Lane location should be directed either at placing the Cooling Module more than 11 meters from the property line or placing the Power Module between the Cooling Module and the property line or by adding a sound barrier treatment to block the Cooling Module's noise from reaching the closest Talbot Lane property. The performance of a commercially available noise barrier, from Acoustical Solutions, called ABBC-EXT-R Sound Curtains was found to provide the necessary mitigation. While the barrier treatment is expected to be successful when deployed in an eight-foot height, a lesser height of six or seven feet will also provide acceptable performance with sufficient margin to ensure the 30 Talbot Lane location meets the 70 dBA noise limit.

Introduction

Acoustical Technologies Inc. was tasked with an assessment of potential acoustic issues associated with fuel cell airborne noise reaching the properties adjacent to the Carla's Pasta site at 50 Talbot Lane in South Windsor, CT (Reference 1). Responding to a request from Donald Emanuel, a site visit was made on November 9, 2017. During the visit, a measurement of the simulated airborne noise levels expected to be produced by a Doosan 440 KW Fuel Cell was made in order to identify potential noise issues. Estimated airborne noise levels along the closest nearby street (Talbot Lane) were just below the state and town noise requirement at one location (30 Talbot Lane). This document provides recommendations for noise control approaches that will mitigate any acoustic noise concerns during the operation of the Doosan 440 KW fuel cell.

The purpose of this effort is to utilize the available acoustic information to mitigate the potential airborne noise issues associated with the operation of a Doosan Fuel Cell at 50 Talbot Lane in South Windsor, CT. The State of Connecticut and the Town of South Windsor Noise Ordinances have been consulted to assess the impact of the estimated acoustic levels. Noise mitigation is probably not required but may be appropriate in order to add margin to the reduction of the airborne noise propagated by the fuel cell to the closest neighbor's property at 30 Talbot Lane directly to the north of the fuel cell location.

Acoustic Measurement Program

Airborne sound pressure measurements and audio tape recordings were conducted at the South Windsor site on and near 50 Talbot Lane on November 9, 2017 during the morning hours. The purpose was to measure both background and airborne noise levels with the four speakers simulating the operation of a Doosan 440 KW fuel cell. Speaker and background airborne noise measurements were taken at each neighbor's property line at thirteen locations surrounding the Carla's Pasta site. Ten measurements were made in the Industrial Zone closest to 50 Talbot Lane. Three measurements were made at the residential properties to the east and northeast (see Table 1). Measurements at 5 and 10 meters from the four speakers' Site A Power Module location were simultaneously taken with a sound level meter and two microphones recording on a digital tape recorder. These tape recorder measurements were repeated for the Cooling Module Site B location. One-third octave and overall airborne noise levels were calculated and reported.

See Figures 1 and 2 below for photographs of similar Fuel Cell Power and Cooling Modules that have been installed at the Mount Sinai Hospital site in Hartford, CT. Figures 3 and 4 provide a Google Map of the Carla's Pasta site with the property line measurement locations identified as P1 through P14. The expected site of the Power Module closest to Talbot Lane is identified in white as Site A. The Cooling Module location is identified as Site B. Figure 5 provides a photograph of the intended Power and Cooling Module locations where the fuel cell hardware will be placed. The photograph shows the speakers at the center of the Site A Power Module location and the two microphones at 5 and 10 meters from the speakers. The Site B speaker was located in the corner formed by the fence and white building. Table 1 provides estimates of future Doosan fuel cell airborne noise at each of the thirteen measurement locations. Column 5 provides the airborne noise estimates for the Site A Power Module location and column 8 provides the airborne noise estimates for the Site B Cooling Module location.

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Figure 1. Doosan Fuel Cell Power Module at the Mount Sinai Hospital Site in Hartford CT

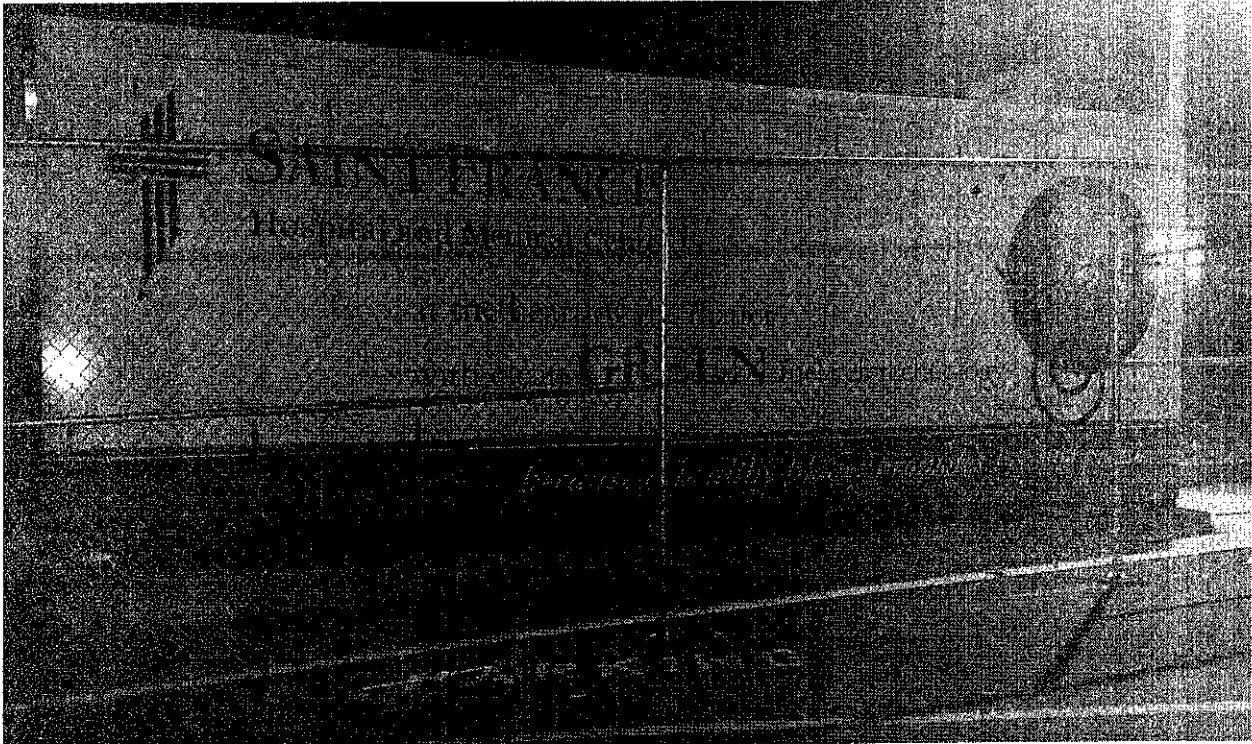
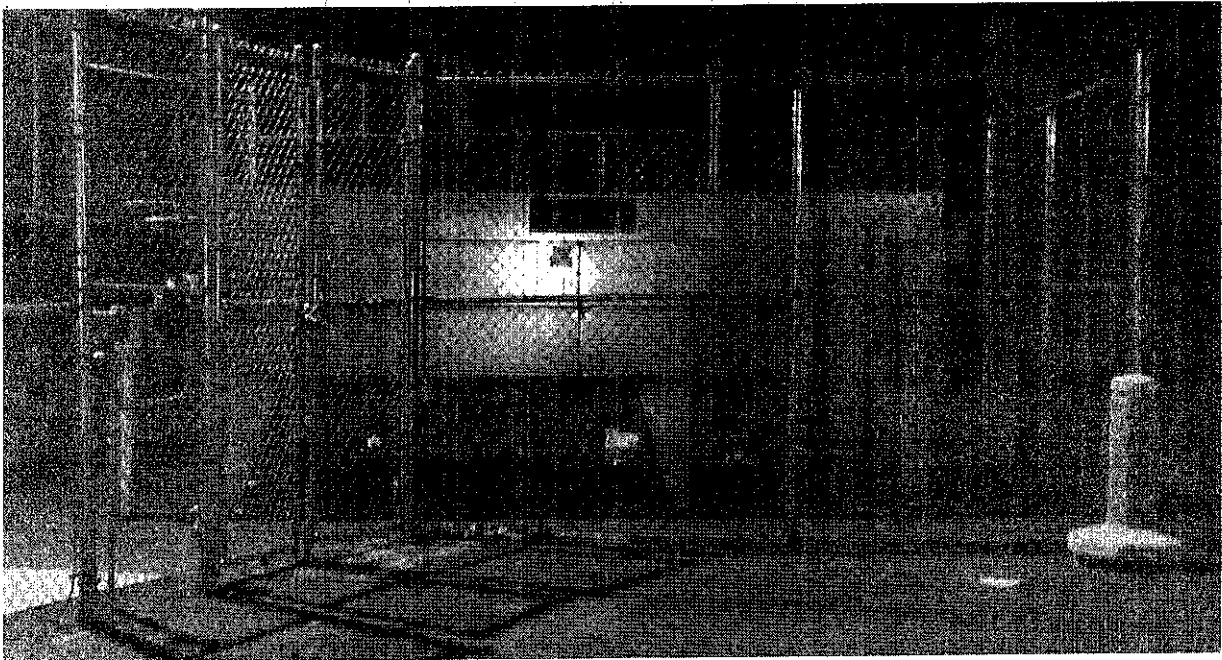


Figure 2. Doosan Fuel Cell Cooling Module at the Mount Sinai Hospital Site in Hartford CT



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Figure 3. Carla's Pasta Site Measurement Locations from Google Maps



Figure 4. Carla's Pasta Site Measurement Locations from Google Maps - Expanded



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Figure 5. Speakers Simulating Airborne Noise at the Power and Cooling Module Locations



Allowable Noise Levels

CT section 22a-69-3.1 (Ref. 2) states that no person shall cause or allow the emission of excessive noise beyond the boundaries of his/her Noise Zone so as to violate any provisions of these Regulations. The Town of South Windsor and the CT noise ordinances have been used to evaluate the noise generated by the Doosan Fuel Cell Power and Cooling Modules. The following subsection discusses the overall noise requirement and discusses the results obtained from the measurements at the Carla's Pasta site in order to determine whether noise controls need to be applied. The Impulse, Prominent Discrete Tones, Infrasonic and Ultrasonic measurements of fuel cell airborne noise showed no acoustic concerns and will not be discussed further as no acoustic treatment is needed.

Overall Sound Pressure Levels

The Connecticut regulation for the control of noise states in *CT section 22a-69-3.5 Noise zone standards (c) No person in a Class C Noise Zone shall emit noise exceeding the levels stated herein and applicable to adjacent Noise Zones:*

Class C emitter to C 70 dBA B 66 dBA A/day 61 dBA A/night 51 dBA

The nearby neighbors are classified as either residential or industrial with the Industrial Zone noise limit at 70 dBA and the Residential Zone noise limit at 61 dBA during the day and 51 dBA at night. Neighboring Industrial Zones properties are along Talbot Lane, Nutmeg Road and

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Governor's Highway and all are expected to meet the Industrial Zones noise requirements. All of the nearby residential locations are expected to meet the nighttime and day time residential airborne noise limits. All the expected maximum values (worse case between the two speaker locations) are shown in Table 2 below. Operation of the Doosan fuel cell may have a minor acoustic impact by approaching 70 dBA at the property adjacent to the Cooling Module at the closest 30 Talbot Lane locations.

Noise Treatment Recommendations

The two separate pieces of the Doosan hardware are shown in Figures 1 and 2 above. Estimates from the Carla's Pasta testing indicate that the fuel cell noise contribution may be about 2 dB below the Industrial Zone noise requirement of 70 dBA at the adjoining property. Mount Sinai airborne noise measurements have indicated that the Cooling Module is the dominant noise source (Ref. 3). Since the Power Module noise levels are at least 7 dB below the Cooling Module, a reduction of the noise level of the Cooling Module of a few dB to improve the margin at the adjoining property will still leave the Cooling Module dominant. As a result, we don't have to be concerned with treating the Power Module. Treatment of the Cooling Module (i.e. reducing its noise by at least 3 dB) should result in at least 2.5 dB less noise at the nearby property lines. If these dBA numbers were exact, the summation of a 62 dBA source from the Power Module and a 65 dBA source from the Cooling Module would result in an airborne noise level of 66.8 dBA at the property line, well below the limit. If we add in the maximum background noise generated by equipment at Carla's Pasta of 64 dBA, the total airborne noise expected at 30 Talbot Lane would be 68.6 dBA, still below the requirement. Given that there is probably some uncertainty in the Cooling Module location more than 3 dB of improvement seems appropriate in order to achieve additional margin in the Cooling Module noise radiation.

The additional margin can be obtained in a number of ways. The two simplest approaches are to move the Cooling Module away from the property boundary or to place the Power Module between the Cooling Module and the property boundary. Distances to the property boundary greater than 11 meters will keep the Cooling Module airborne noise at the property boundary less than 70 dBA. The Power Module is 10 feet tall and 27 feet long while the Cooling Module is only 6 feet tall and 14 feet long. The Power Module is capable of providing more than 6 dB of transmission loss for Cooling Module sound heading toward the property at 30 Talbot Lane. Figure 10 shows the relative sizes of the two modules below. A third approach is to place a transmission loss treatment on the chain link fence surrounding the Cooling Module as shown in Figure 10. The following paragraphs describe the analysis used in designing this barrier noise treatment.

The fuel cell including the Cooling Module will probably be surrounded by an 8-foot-high chain link fence near the property boundary and the second option for noise control would be to attach an acoustic barrier material to the fence. Calculating the acoustic performance of the barrier requires an estimate of the transmission loss through the barrier as well as an estimate of the acoustic leakage over and around the barrier. Typical noise treatments will have at least 20 dB of performance for sound traveling through the treatment. The diffraction over the top of the acoustic barrier has been calculated and the results are shown in the following figures as a function of frequency. Figure 6 looks at the sound diffraction over the top of an 8-foot wall

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showing the performance expected for the nearby properties on Talbot Lane that have distances from the fuel cell of 16 to 168 meters. The curve labeled 16 is for the closest business at 30 Talbot Lane. The curve labeled 168 is for the property across Governor's Highway at the start of Talbot Lane. This second location is expected to be well below the 70 dBA limit without treatment. The spread in performance is small (less than 2 dB) for all the other businesses along Talbot Lane and indicates that the noise treatment should be equally effective. (Closer to the wall is better because the closest property is more in the acoustic shadow provided by the wall.)

One path of noise transmission to consider is the path directly through the barrier. The transmission loss for a one-inch thick material from Acoustical Solutions called ABBC-EXT-R Sound Curtains⁴ is shown in Figure 7 as the Direct Path. The material has great high frequency performance and the lower frequencies still have 10 dB better performance than the diffraction of sound over the barrier. (Increasing the thickness to 2 inches would help the low frequencies.)

Table 1. Estimated South Windsor Overall Sound Pressure Levels in dBA ref. 20 microPascals

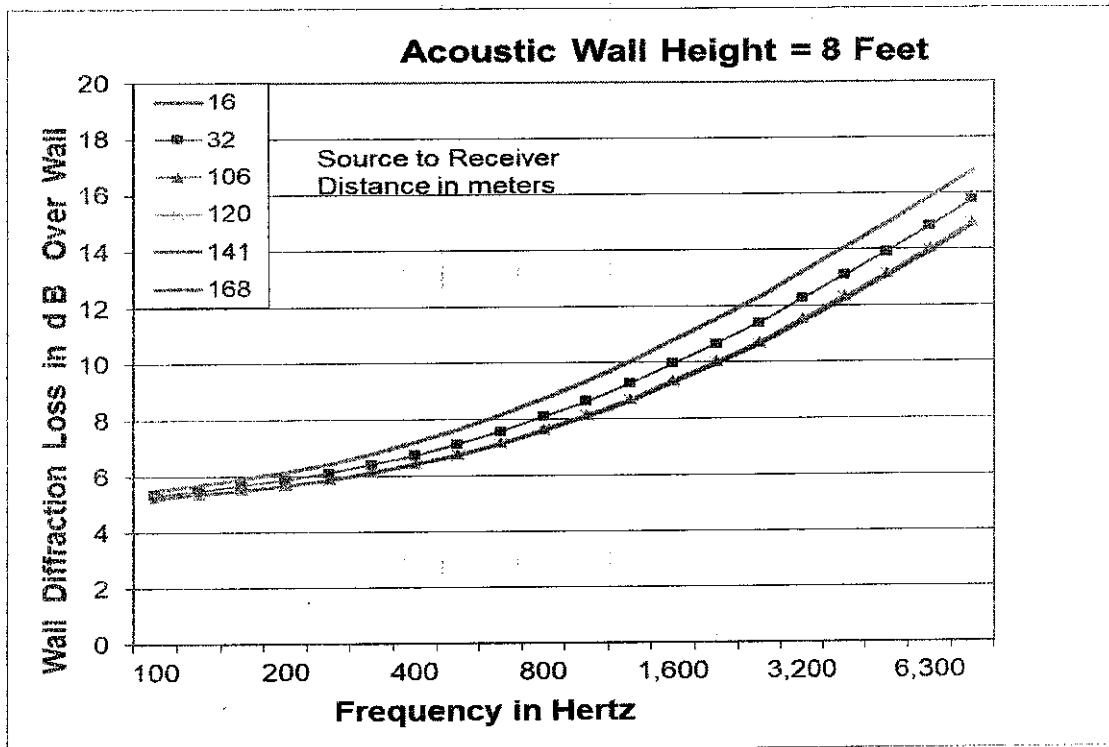
Location	Range in Meters	Speakers at A	Correction	Estimated SPL in dBA	Speakers at B	Correction	Estimated SPL in dBA
P1 - 30 Talbot Lane	15.5/16.5	83.2	17.3	65.9	84.6	16.7	67.9
P2 - 455 Gvrnor HW	107/106	54.9	17.3	37.6	63.6	16.7	46.9
P3 - 441 Gvrnor HW	123/120	50.4	17.3	33.1	50.3	16.7	33.6
P4 - 458 Gvrnor HW	168/167	46	17.3	28.7	51.1	16.7	34.4
P5 - 470 Gvrnor HW	190/191	40	17.3	22.7	-	16.7	<27
P6 - 15 Talbot Lane	138/137	59.4	17.3	42.1	56.7	16.7	40
P7 - 31 Talbot Lane	31.0/33.4	69.6	17.3	52.3	73.4	16.7	56.7
P8 - Industrial Lot	37/39	63	17.3	45.7	59.4	16.7	42.7
P9 - 60 Talbot Lane	138/141	50.5	17.3	33.2	48	16.7	31.3
P10 - 310 Nutmeg Road	132/129	<60	17.3	<52	61.6	16.7	44.9
P11 - 550 Gvrnor HW	372/375	<35	17.3	<31	-	16.7	<32
P12 - 20 Baker Lane	429/432	<35	17.3	<30	-	16.7	<31
P13 - 95 Cody Circle	476/479	<35	17.3	<30	-	16.7	<31

Red indicates locations above the Industrial Zones airborne noise limit of 70 dBA (none exist)

Table 2. Max Expected Airborne Noise Levels Operating the Doosan Fuel Cell (ref. 20 μ PA)

P1	P2	P3	P4	P5	P6	P7	P8
68 dBA	47 dBA	34 dBA	34 dBA	27 dBA	42 dBA	57 dBA	46 dBA
P9	P10	←Industrial	Residential →	P11	P12	P13	P14
36 dBA	52 dBA			<32	<31	<31	<34

Figure 6. Acoustic Diffraction Performance for Different Receiver Locations



To evaluate the ability of this material to provide the 3 dB of performance we are looking for requires the combination of both propagating paths leading to an estimate of the airborne noise level at the property lines on Talbot Lane. This has been done and the results are shown in Figure 8. The calculation starts with the one-third octave airborne noise levels actually measured 10 meters from the Mount Sinai Cooling Module. These levels are then attenuated by the barrier losses shown in Figure 7 to produce a direct and a diffraction component all at 10 meters. These two levels are then attenuated by 3 dB to account for the propagation loss measured at 30 Talbot Lane. The two results are then power summed to provide the estimate of airborne noise at the property line of 30 Talbot Lane as shown in Figure 8. The one-third octave bands are power summed to calculate the overall dBA for each material wall height (the calculated total dBA values are shown in the figure caption). The estimates indicate that all of the three material heights meet the Industrial Zones noise limit. An 8-foot wall height provides the most margin (9.5 dB) while the 7-foot wall has 6.1 dB margin and the 6-foot wall has the lowest margin with

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4.9 dB. Note that the peak airborne noise level falls in the 200 Hertz one-third octave band while a smaller peak shows up in the 630 Hertz band where the highest discrete tone was found. The other locations along Talbot Lane would meet the 70 dBA Industrial Zones airborne noise limit with more than 10 dB of margin.

If it is decided to **not** place the Power Module between the Cooling Module and the property boundary **or** to place the Cooling Module within 11 meters of the boundary, installation of an eight-foot-high acoustic barrier is recommended to mitigate the airborne noise reaching the property line at 30 Talbot Lane. Materials such as the ABBC-EXT-R Sound Curtains from Acoustical Solutions (Reference 4) or equivalent should be sufficient to produce more than 6 dB of sound reduction. An example of the noise treatment installation at Mt Sinai Hospital in Hartford, CT is shown in Figure 9. The ABBC-EXT-R Sound Curtains were hung from two sides of a security fence around the Cooling Module to mitigate the noise at the fuel cell site.

Coverage at Carla's Pasta should extend around the east, west and north sides of the Cooling Module. Looking at Figure 2 and assuming the Carla's Pasta site will have a 2-meter stand-off of the fence from the cooling system, the 5 by 2.5 meter cooling system foot print should have a noise treatment about 8.2 meters in length (27 feet). Locating the entrance gate on the south side will allow the gate and the rest of the south side to remain untreated. See Figure 10 for a sketch of the recommended approach. The east and west sides will have two of the 54-inch-wide noise blanket panels hung from the fence. The north sides will have six panels to complete the three-sided enclosure of the Cooling Module. These side extensions are needed to make the diffraction performance around the side of the treatment a little better than that over the top of the treatment. The length of the necessary treatment would be about 45 feet and with a height of 8 feet giving a surface area of 360 square feet. (Doosan has purchased this material in the past for the Mount Sinai Hospital site in Hartford, CT.) If a fence of height less than 8-feet is chosen, it is acceptable to use a panel of the same height as the fence as long as it is at least 6-feet high.

Discussions with Doosan indicated that the Cooling Module and Power Module would be placed side to side on the Carla's Pasta property with the Cooling Module facing the property line. This arrangement would lead to recommending a barrier acoustic treatment on the fence just around the Cooling Module if the Cooling Module was less than 11 meters from the property line. If the module arrangement shown in Figure 10 could be used, a minimum number of 6 panels would be needed along the north side. If the Cooling Module were placed inside the Power Module no treatment would be needed as the Power Module would provide sufficient attenuation for the acoustic path to 30 Talbot Lane.

Figure 7. The Effect of an Acoustic Barrier on Transmission to Nearby Properties

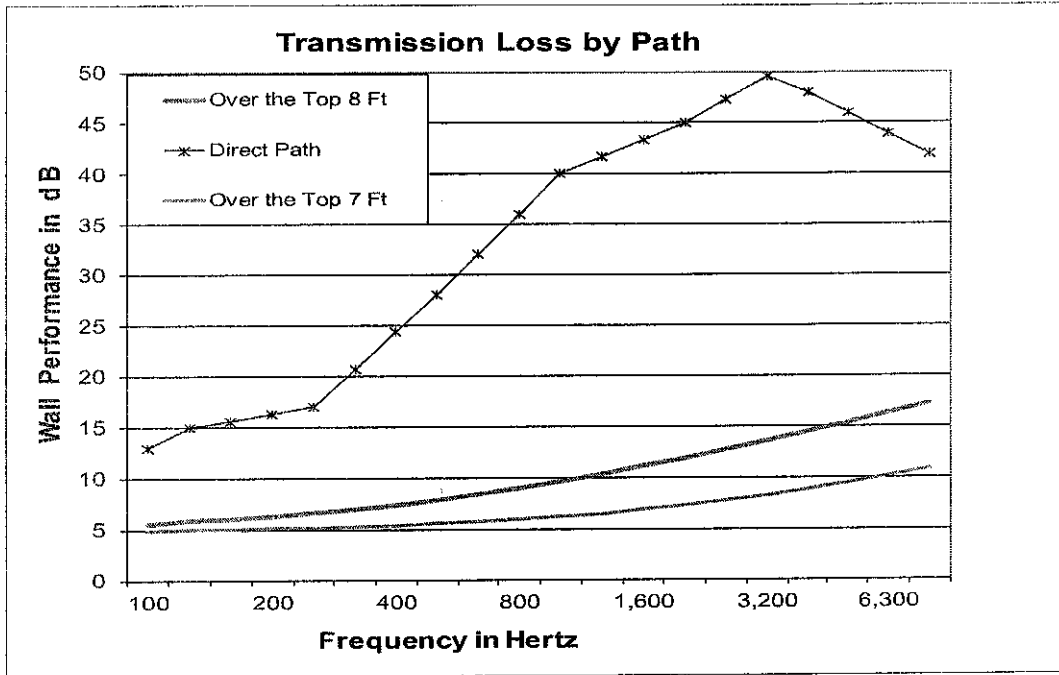
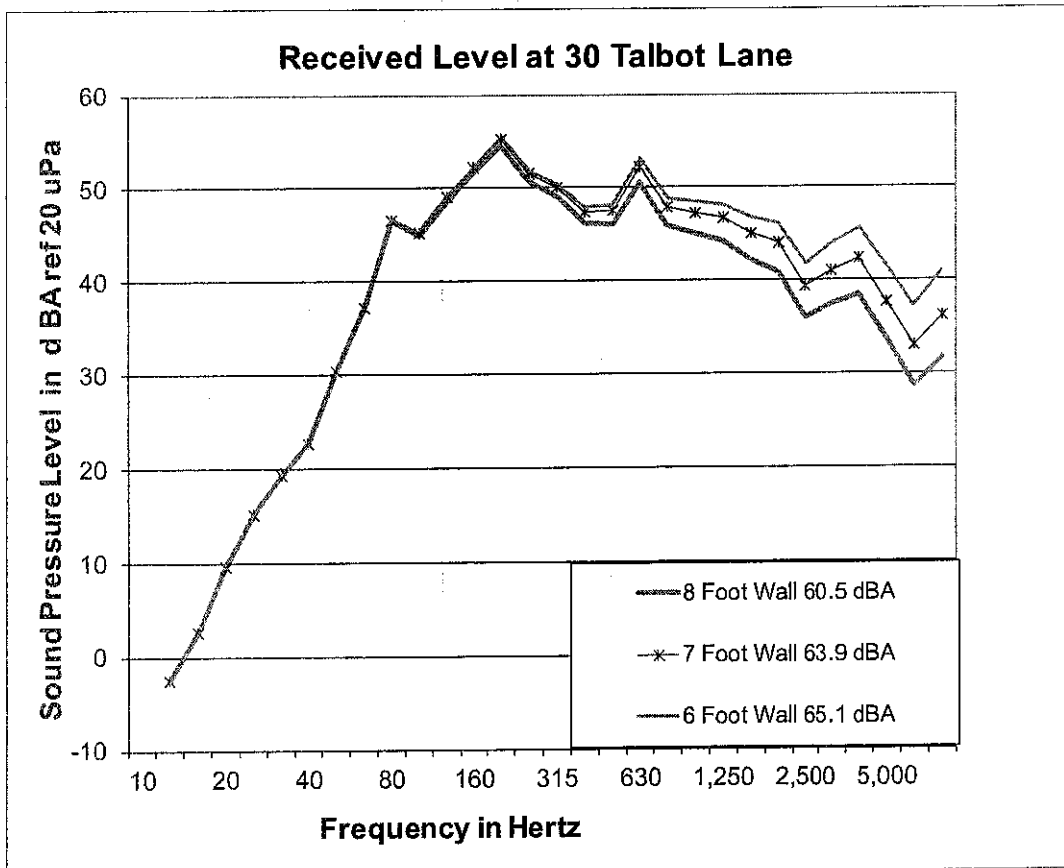


Figure 8 Estimated 30 Talbot Lane Airborne Noise Levels versus Wall Height



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Figure 9. Eight Foot Fence Surrounding Doosan Cooling Module with Noise Treatment

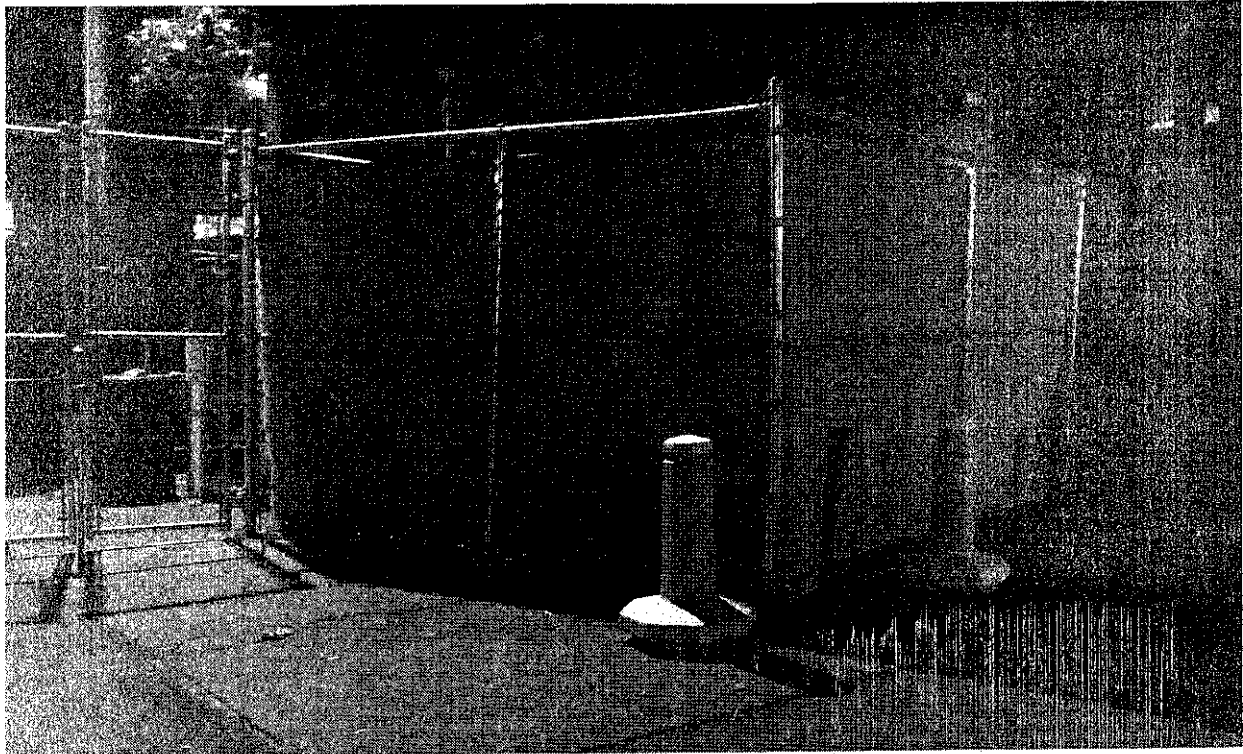
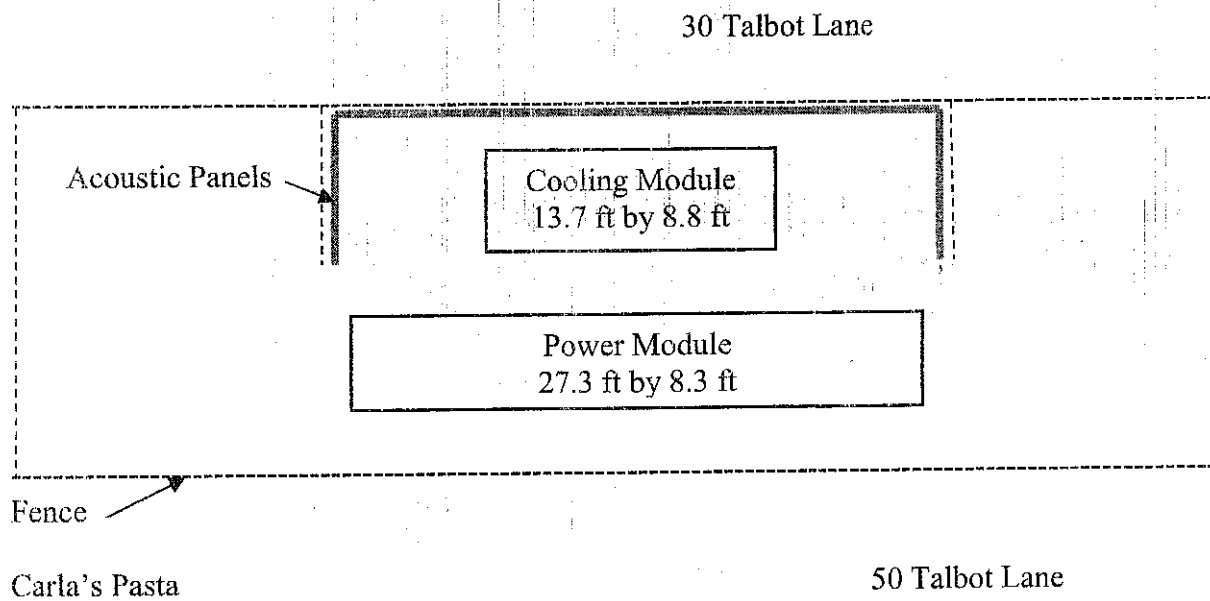


Figure 10. Recommended Noise Treatment Design if Cooling Module is near the Boundary



Conclusions

The purpose of this effort has been to evaluate the acoustical environment at the Carla's Pasta site at 50 Talbot Lane in South Windsor, CT. This has been accomplished and the results show that the acoustic impact on the closest property at 30 Talbot Lane may need to be addressed. Operation of the fuel cell is estimated to meet all of the state and town noise requirements. The closest property on Talbot Lane is expected to be about 2 dB below the Industrial Zone 70 dBA airborne noise limit. An eight-foot-high acoustic barrier as described in this report should mitigate this noise issue if the Cooling Module is too close to the property boundary. As mentioned above, the alternative approach to using sound baffling panels to block the Cooling Module noise would be to reverse the Cooling and Power Module locations. The 10-foot-high Power Module would be effective in blocking the Cooling Module sound propagating north to the 30 Talbot Lane location if the Power Module were beside and located between the Cooling Module and the adjacent property to the north. The Power Module would act as the noise barrier in the northerly direction removing the need for adding a noise treatment to surround the Cooling Module. All of these noise control approaches should remove any acoustic concerns about siting and operating the Doosan 440 KW fuel cell at the Carla's Pasta 50 Talbot Lane site.

References

- 1) 50 Talbot Lane Report, Carl A. Cascio, Acoustical Technologies Inc., September 24, 2018
- 2) CT DE&EP *Noise Control Regulation RCSA Section 22a-69-1 to 22a-69-7.4*
<http://www.ct.gov/dep/lib/dep/regulations/22a/22a-69-1through7.pdf>
- 3) Mount Sinai Rehabilitation Hospital Airborne Noise Assessment, Carl A. Cascio, Acoustical Technologies Inc., January 24, 2017
- 4) <https://acousticalsolutions.com/product/abbc-13-ext-audioseal-exterior-sound-blanket/>

Prepared For: Doosan Fuel Cell America Inc.

Point of Contact: Ben Yoon

**Prepared by: Acoustical Technologies Inc.
50 Myrock Avenue
Waterford, CT 06385-3008**

**Subject: Carla's Pasta
Noise Treatment Recommendations
50 Talbot Lane**

Author: Carl Cascio

Date: September 25, 2018

Revision: 1

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Summary

This document makes a positive acoustic assessment that should assist in meeting any acoustic noise concerns during the operation of a Doosan 440 KW fuel cell located at a Carla's Pasta site near 50 Talbot Lane in South Windsor, CT. An acoustic assessment plan was developed and executed to acquire airborne acoustic information useful in explaining and mitigating the potential airborne noise issues associated with operation of the Doosan 440 KW fuel cell. It is important to show that the airborne noise generated by this fuel cell will not significantly impact the facility's neighbors.

The airborne noise levels expected to be generated by the Doosan fuel cell operating at the South Windsor site were simulated by exciting a set of four co-located speakers at the fuel cell power and cooling module positions. (The cooling module is the dominant noise source.) The four speakers produced an overall airborne noise level that was 16 to 17 dB higher than the levels measured for a similar Doosan fuel cell installed at Mount Sinai Hospital in Hartford, CT. One-third octave band analysis showed the speakers to match or slightly exceed the fuel cell airborne noise levels at frequencies up to 125 Hertz where the airborne noise levels were low and to exceed the fuel cell signature by 15 - 20 dB at higher frequencies where the fuel cell signature was higher in noise level. Airborne noise levels were measured at distances from 5 to 475 meters from the fuel cell location. The speakers produced average overall A-weighted airborne sound pressure levels of approximately 93 dBA at 5 meters and 88 dBA at 10 meters (reference 20 microPascals) at the proposed fuel cell power and cooling module locations. The airborne noise levels from the speakers at nearby property lines were measured at airborne noise levels from 43 to 85 dBA. Residential measurement locations to the northeast and east were very quiet with levels below 45 dBA with the speakers on. Measurement locations to the north were high because of the short distance to the speakers along Talbot Lane. Analysis of the speaker data indicated propagation losses from 3 to 42 dB from the fuel cell location to the nearby Industrial Zone property lines. The source level (71 dBA at 10 meters) from the operation of a Doosan fuel cell at Mount Sinai Hospital in Hartford, CT was then used as a basis for making the Carla's Pasta fuel cell airborne noise estimates near 50 Talbot Lane.

Operation of the Doosan fuel cell should produce noise levels below the Industrial Zone noise limit of 70 dBA at all of the nearby Industrial Zone property lines. The highest expected noise level of 68 dBA will be at the 30 Talbot Lane parking lot due north about 16 meters from the fuel cell cooling module. The other Industrial Zone properties should see levels no higher than about 57 dBA. All of the nearby residential property lines are expected to be below both the day time and night time residential noise limits with expected airborne noise levels below 35 dBA with the fuel cell on. There should be no significant acoustic issues present during operation of the Doosan 440 KW fuel cell. The exact location of the Cooling Module could impact the airborne noise level measured at the closest property line at 30 Talbot Lane. Keeping the location more than 11 meters from the property boundary should keep the airborne noise levels below 70 dBA.

The Connecticut's Noise Code (Reference 1) also calls for review of acoustic issues associated with impulse noise, prominent discrete tones, infrasonic and ultrasonic noise. Operation of the fuel cell is expected to meet all of these noise requirements at all of the nearby property lines.

Introduction

Acoustical Technologies Inc. was tasked as part of a Doosan site permitting process with an assessment of potential acoustic issues associated with fuel cell airborne noise reaching the properties adjacent to the Carla's Pasta site at 50 Talbot Lane in South Windsor, CT. Responding to a request from Donald Emanuel, a site visit was made on November 9, 2017. During the visit, a survey of the airborne noise levels produced by a set of speakers simulating the airborne noise produced by a Doosan Fuel Cell was made in order to identify potential airborne noise issues. Airborne noise measurements were taken to quantify the propagation of the simulated fuel cell airborne noise to the adjacent properties. Background airborne noise levels were also made with the speakers off. This document provides an acoustic assessment to assist in meeting acoustic noise concerns during the permitting process for the siting of a single Doosan fuel cell at 50 Talbot Lane in South Windsor, CT.

Development of the Acoustic Assessment Plan

The purpose of this effort is to acquire acoustic information useful in explaining the potential airborne noise issues associated with the operation of a Doosan 440 KW fuel cell at the Carla's Pasta site near 50 Talbot Lane in South Windsor, CT. The South Windsor site is located in an Industrial Zone near Governor's Highway. This Industrial Zone is surrounded by Residential Zones to the north and east, a restricted commercial zone to the south and a designed residential zone to the west. (The South Windsor zoning map is given below.) It is important to determine whether the airborne noise generated by the Doosan fuel cell will impact these neighbors.

The acoustic impact is assessed in the following way. The fuel cell is yet to be installed so there is no way to measure fuel cell operating airborne noise levels at the new site. The fuel cell airborne noise has been measured at other sites and both overall and one-third octave band airborne noise data of a typical Doosan 400 KW fuel cell are available (Ref. 2). Using this data, a set of four speakers have been programmed through a set of two octave band filters to generate a noise spectrum similar to that of the new fuel cell. (It is assumed that the cooling and fuel module noise in the existing measured units is similar to the new units.) This spectrum will then be played through an audio amplifier to create the electrical voltage necessary to drive the four symmetrical speakers. In order to overcome the potentially high background noise at the site the speaker output will be increased to a level higher than the overall dBA level measured on a fuel cell at a distance of 10 meters. With the speakers on, this approach then follows the traditional "What is the airborne noise level at the neighbor's property line?". The four speakers were turned on and airborne measurements made near the proposed fuel cell location and at several of the neighbor's property lines. This measured site data can also be used to estimate noise levels at other neighbor's property lines. The Town of South Windsor has a Noise Ordinance (Ref. 3) with similar requirements to the State of Connecticut's Noise Code and both have been consulted to assess the impact of the measured and estimated acoustic levels. Because of the closeness of the fuel cell site to the property lines noise mitigation may be recommended if the airborne noise estimated for the fuel cell exceeds the noise requirements at the neighbors' property lines.

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Acoustic Measurement Program

The acoustic data necessary to assess the impact of a single 440 KW Doosan Fuel Cell is described below: Airborne sound pressure measurements and audio tape recordings were conducted at the South Windsor site on and near 50 Talbot Lane on November 9, 2017 during the morning hours. This testing established both background airborne noise levels and simulated airborne noise levels with the speakers operating. The overall A-weighted airborne noise measurements were made with an ExTech model 407780A Digital Sound Level Meter with s/n 140401544 that had been calibrated just prior to and just after the test with a Quest model QC-10 Calibrator (s/n Q19080194). Measurements were taken with A-weighting (frequency filtering that corresponds to human hearing) and with the sound level meter in a Slow response mode. For reference, a noise level increase of 1 dB is equal to an airborne sound pressure increase of 12.2 per cent. The audio tape recordings were made with a Sony Digital Audio Tape Recorder (model TCD-D7 s/n 142000) with microphones on channels 1 and 2. The two PCB microphones (model 130C10 s/n 13286 and 130C10 s/n 11283) were powered by two Wilcoxon P702B power supply/amplifiers (s/n 1992 and 1995 respectively). The PCB microphones were also calibrated prior to and after the test with the same Quest model QC-10 Calibrator. All measurements were made with the microphones at a height above ground between five and six feet. A Hewlett Packard model HP3561A Dynamic Signal Analyzer (s/n 2338A00659) was used to perform A-weighted spectral analysis on the tape-recorded data. The tape-recorded data were also used to verify the ExTech sound level meter overall dBA readings.

At the South Windsor site “speaker on” and background airborne noise measurements were taken at the following thirteen nearby property lines in the Industrial and Residential Zones:

Location	Zone	Type
P1 - 30 Talbot Lane		Industrial
P2 - 455 Governor's Highway		Industrial
P3 - 441 Governor's Highway		Industrial
P4 - 458 Governor's Highway		Industrial
P5 - 470 Governor's Highway		Industrial
P6 - 15 Talbot Lane		Industrial
P7 - 31 Talbot Lane		Industrial
P8 - Industrial Zone Vacant Lot		Industrial
P9 - 60 Talbot Lane		Industrial
P10 - 310 Nutmeg Road		Industrial
P11 - 550 Governor's Highway	A-20	Residential
P12 - 20 Baker Lane	A-20	Residential
P13 - 95 Cody Circle	A-20	Residential

See the Google satellite maps in Figures 1 and 2 for the approximate measurement locations. Measurements near the proposed fuel cell site at positions A and B were simultaneously taken with the ExTech sound level meter and two microphones recording on the digital tape recorder. Figure 3 provides a photograph of the site locations for the power and cooling modules. Site A represents the fuel module that is near Talbot Lane. Site B represents the cooling module that is further from Talbot Lane. At locations A and B, a one-minute record of the acoustic noise was

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stored for the speakers in the “on” condition at the start and at the end of the airborne noise measurements. There is a slight decrease (about 1 dB) in sound output from the speakers as they warm up. One minute of background airborne noise data were also recorded at the two speaker positions before and after the speaker measurements.

Figure 1. South Windsor Carla’s Pasta Site Map from Google Maps



Airborne noise measurements taken outside are corrupted by rain and wind so a day was selected when the winds were 10 miles per hour or less. Table 1 provides the weather data in South Windsor for the acoustic measurements on November 9, 2017. Measurements were taken over the period from 10:20 am until 12:33 pm. The table below shows the temperature and wind speeds in hourly intervals. Wind conditions were very good and the wind did not affect the operating and background airborne noise measurements. Also, there was no rain during the morning of November 9. Trucks parked at Carla’s Pasta with operating cooling systems generated most of the background noise, making measurements at Position 10 very difficult. There were also numerous delivery trucks that interrupted the airborne noise measurements. Motor traffic along Governor’s Highway was heavy and all the measurements were delayed until no traffic was present. (We waited for periods of time when no traffic was either seen or heard at these measurement locations.) Background noise levels at most all of the measurement positions were acceptable with levels from 43 to 61 dBA. Position 10 was as much as 65 dBA when pumping equipment at Carla’s Pasta was operating.

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Figure 2. Doosan Fuel Cell Location for the South Windsor Carla's Pasta Site from Google Maps



Data Analysis

This section analyzes the airborne noise levels measured at the South Windsor site and then estimates the source level and transmission loss to nearby property lines expected during fuel cell operation. These estimated levels will be compared to the limits in the South Windsor and Connecticut noise ordinances. Both background noise levels at the South Windsor site and the measured speaker operating noise levels are reported in Table 2. The background data are used to correct the speaker levels providing estimates of just the speaker noise contribution at each location. Estimated Doosan Fuel Cell equipment operating noise levels are then reported in Table 3. Comparing these South Windsor simulated fuel cell estimates with the town and state noise limits will identify which nearby locations do or do not meet the airborne noise requirements.

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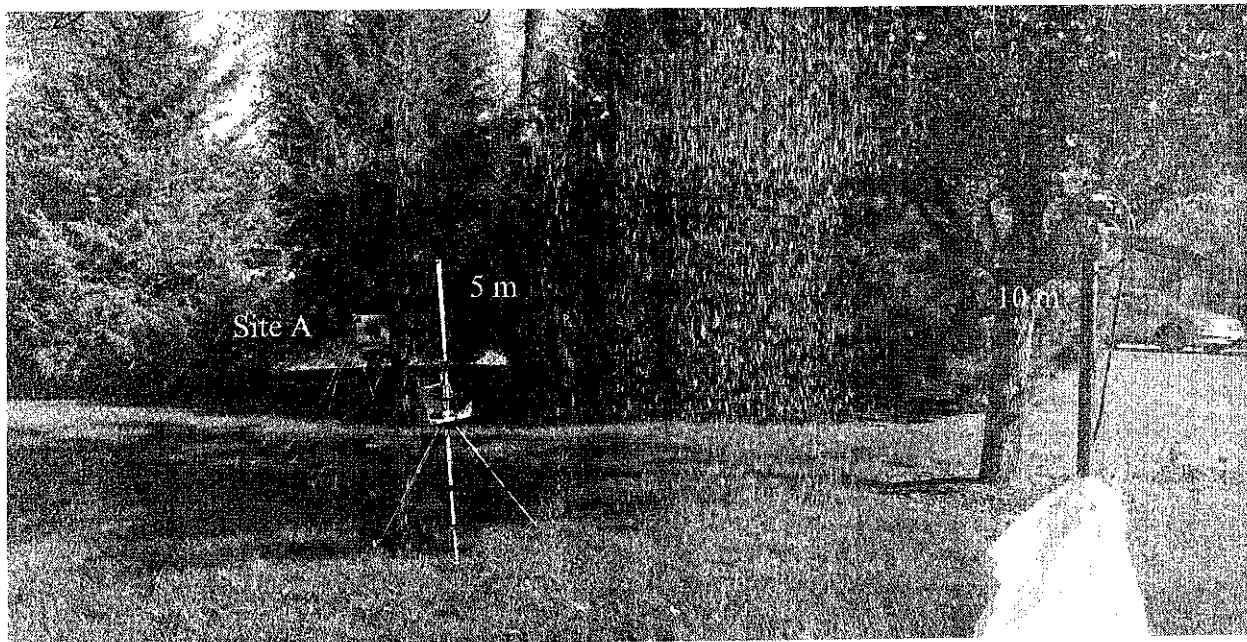
Table 1. South Windsor Weather on November 9, 2017 from www.wunderground.com/weather/us/ct/south-windsor

Time (EST)	Temp. (°F)	Humidity (%)	Dew Point (°F)	Barometer (in HG)	Wind Speed (mph)	Wind Direction	Condition
7:53 AM	30.0	96	28.9	30.28	0.0	Calm	Partly Cloudy
8:53 AM	32.0	96	32.0	30.27	0.0	Calm	Clear
9:32 AM	35.1	92	33.1	30.26	4.6	ENE	Scattered Clouds
9:53 AM	37.0	86	34.5	30.25	3.5	Variable	Scattered Clouds
10:53 AM	42.1	70	39.2	30.21	4.6	NNE	Scattered Clouds
11:53 PM	48.0	61	35.1	30.16	0.0	Calm	Mostly Cloudy
12:53 PM	48.9	54	33.1	30.13	0.0	Calm	Scattered Clouds
1:53 PM	51.1	52	34.0	30.11	3.5	Variable	Partly Cloudy

Figure 3. Speakers Simulating Airborne Noise at the Power and Cooling Module Locations



Figure 4. Speakers and Microphones for a Simulated Airborne Noise Source at Site A



Note: The car seen above “Site A” is in the neighboring parking lot at 30 Talbot Lane

The complete set of overall A-weighted airborne noise levels that were measured in South Windsor are provided in Table 2 for the conditions with the speakers on and off. Figure 5 is a map showing the South Windsor zoning districts in the Carla’s Pasta area. The position locations were calculated using the Pocket Ranger GPS App from the CT State Parks & Forests. The indicated GPS accuracy varied from 3 to 10 meters. The GPS range from the speakers to the microphone locations that are shown in Table 2 were calculated with an application found at <http://www.movable-type.co.uk/scripts/latlong.html> and then checked with Google Maps. The estimates of the range in meters to each location are given in Table 2 and also in Table 3. The first value is the range to the center of the power module site A location and the second value is the range to the center of the cooling module at site B. The closest measurement location for both modules is P1, which is about 16 meters north to the parking lot abutting the Carla’s Pasta property at 30 Talbot Lane. The next closest measurement location is P7, which is about 32 meters north-east to the neighboring property on 31 Talbot Lane. Neighboring industrial properties along Talbot Lane and Governor’s Highway, the first road crossing Talbot, are 106 to 190 meters away. The closest residential properties are 301 to 476 meters away on Edgewood Drive, Governor’s Highway, Baker Lane and Cody Circle. Airborne noise at the residential locations could not be heard when the speakers were operating at Site A. Since the residential noise levels were below 45 dBA and Site B was at a slightly larger distance from the residences, it was not necessary to repeat the measurements with the speakers operating at Site B.

Table 2. Overall Sound Pressure Levels in dBA ref. 20 microPascals measured at Carla's Pasta

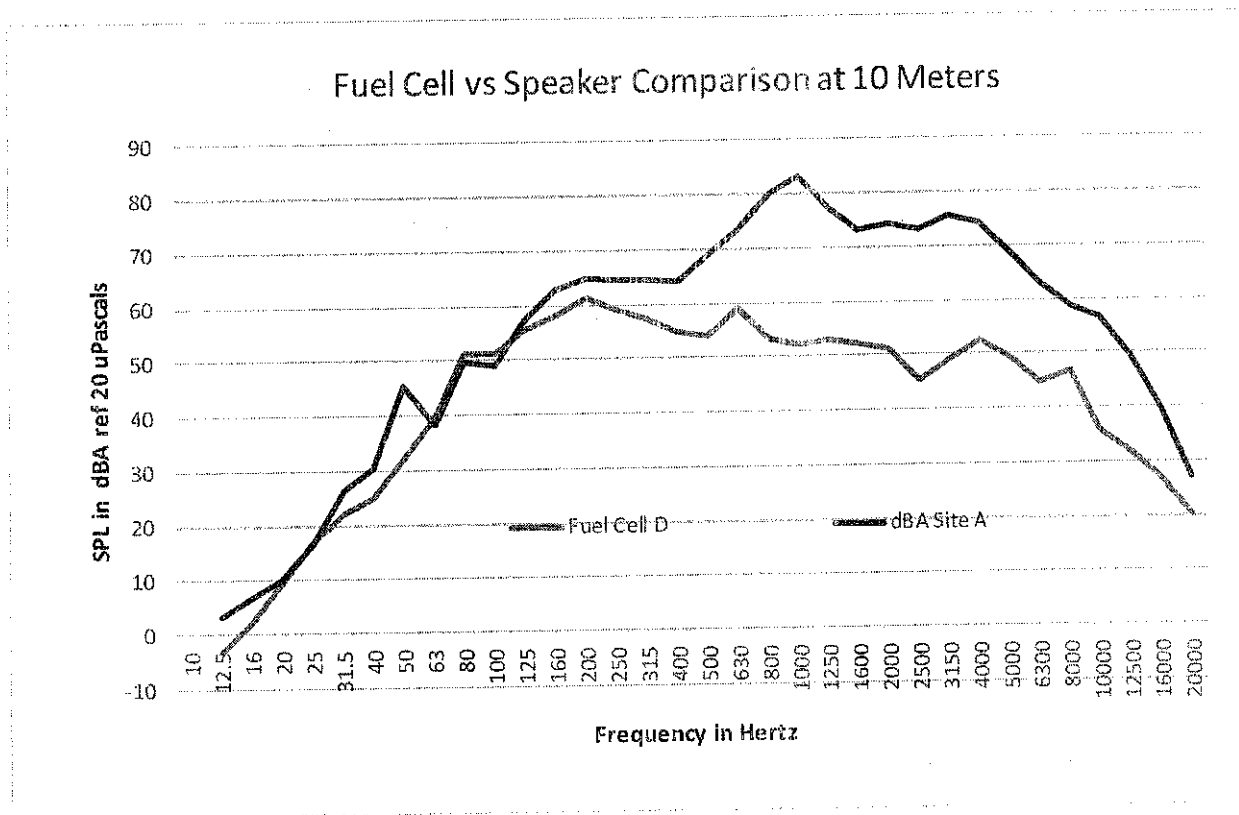
Location	Range in Meters	Speakers Site A	Background	Bkgd Corrected	Speakers Site B	Background	Bkgd Corrected
Pos. at 5 m	5	93.4/91.8	63.9	92.6	94.3/92.4	61.5/59.5	93.3
Pos. at 10 m	10	88.9/87.3	67	88.1	88.1/86.7	61/60.5	87.4
P1 - 30 Talbot Lane	15.5/16.5	83.2	58.5	83.2	84.6	59.4	84.6
P2 - 455 Governor's Highway	107/106	56.5	51.5	54.9	63.8	49.3	63.6
P3 - 441 Governor's Highway	123/120	54.9	53	50.4	56.7	55.6	50.3
P4 - 458 Governor's Highway	168/167	50.2	48.2	46	52.4	46.4	51.1
P5 - 470 Governor's Highway	190/191	50.6	50.2	40	-	-	-
P6 - 15 Talbot Lane	138/137	60.2	52.7	59.4	57.7	50.7	56.7
P7 - 31 Talbot Lane	31.0/33.4	70.2	61.3	69.6	73.5	60.3/57.2	73.4
P8 - Industrial Lot	37/39	63.4	53.3	63	60.7	54.9	59.4
P9 - 60 Talbot Lane	138/141	54	51.4	50.5	50.2	46.2	48
P10 - 310 Nutmeg Road	132/129	>65	>65	<60	65.2	62.7	61.6
P11 - 550 Governor's Highway	372/375	44.3	44.5	<35	-	-	-
P12 - 20 Baker Lane	429/432	44.1	43.8	<35	-	-	-
P13 - 95 Cody Circle	476/479	43	42.7	<35	-	-	-
P-14 116 Edgewood Drive	301/304	-	-	<38	-	-	-

Red indicates locations where we have potential concerns about meeting the noise regulations

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A comparison of the airborne noise produced at 10 meters by the Doosan fuel cell on the Mount Sinai Hospital site with the airborne noise produced by the speakers at the South Windsor site is shown in Figure 6. The speakers roughly match the fuel cell airborne noise for frequencies below 200 Hertz and greatly exceed the fuel cell airborne noise at higher frequencies where the airborne noise levels are the highest. The overall airborne noise levels are 17.3 dB and 16.7 dB higher for the speakers at Site A and Site B locations, respectively, as compared to what is expected from the one Doosan 400 KW fuel cell that was measured at Mount Sinai Hospital in Hartford, CT. The 17.3 and 16.7 dB differences in level will be subtracted from the South Windsor measured levels to estimate the expected fuel cell's acoustic signature at each location. These calculations are displayed in Table 3 below. The 10-meter Mount Sinai airborne noise levels were used with the South Windsor transmission loss data to estimate the expected fuel cell airborne noise from the fuel cell at the Carla's Pasta neighbor's property lines.

Figure 6 The Four Speakers Generate Airborne Noise Well Above That of a Single Fuel Cell



The estimated airborne noise levels to be produced by the Doosan fuel cell are shown in Table 3. For each of the thirteen locations the South Windsor measurements are corrected to account for the higher speaker levels. The fourteenth location is extrapolated using the range data. The fuel cell noise correction at the Site A power module location is estimated to be 17.3 dB because the speaker levels are that much higher than the Mount Sinai fuel cell levels. The speakers at the Site B cooling module were estimated to be 16.7 dB higher. These measurements were taken at various distances from the speakers and then background corrected. Close to the speakers at 30 Talbot Lane the airborne noise values are expected to be approximately 66 to 68 dBA, slightly below the Industrial Zone noise limit. The other nearby Industrial Zone properties are expected

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to be below 57 dBA depending on how close the locations are to the fuel cell. The residential properties are all expected to have airborne noise levels from the fuel cell that are below 35 dBA.

Table 3. Estimated South Windsor Overall Sound Pressure Levels in dBA ref. 20 microPascals

Location	Range in Meters	Speakers at A	Correction	Estimated SPL in dBA	Speakers at B	Correction	Estimated SPL in dBA
P1 - 30 Talbot Lane	15.5/16.5	83.2	17.3	65.9	84.6	16.7	67.9
P2 - 455 Governor's Highway	107/106	54.9	17.3	37.6	63.6	16.7	46.9
P3 - 441 Governor's Highway	123/120	50.4	17.3	33.1	50.3	16.7	33.6
P4 - 458 Governor's Highway	168/167	46	17.3	28.7	51.1	16.7	34.4
P5 - 470 Governor's Highway	190/191	40	17.3	22.7	-	16.7	<27
P6 - 15 Talbot Lane	138/137	59.4	17.3	42.1	56.7	16.7	40
P7 - 31 Talbot Lane	31.0/33.4	69.6	17.3	52.3	73.4	16.7	56.7
P8 -- Industrial Lot	37/39	63	17.3	45.7	59.4	16.7	42.7
P9 - 60 Talbot Lane	138/141	50.5	17.3	33.2	48	16.7	31.3
P10 - 310 Nutmeg Road	132/129	<60	17.3	<52	61.6	16.7	44.9
P11 -- 550 Governor's Highway	372/375	<35	17.3	<31	-	16.7	<32
P12 - 20 Baker Lane	429/432	<35	17.3	<30	-	16.7	<31
P13 -- 95 Cody Circle	476/479	<35	17.3	<30	-	16.7	<31
P-14 116 Edgewood Drive	301/304	<38	17.3	<33	-	16.7	<34

Red indicates locations above the Industrial Zone airborne noise limit of 70 dBA (none expected)

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Allowable Noise Levels

The Connecticut regulation for the control of noise provides in *CT section 22a-69-3* (Ref. 1) the requirements for noise emission in Connecticut. *CT section 22a-69-3.1* states that no person shall cause or allow the emission of excessive noise beyond the boundaries of his/her Noise Zone so as to violate any provisions of these Regulations. The Town of South Windsor has a noise ordinance (Ref. 3) with the same decibel noise limits as the CT Code. These two ordinances will be used to evaluate the noise generated by the Doosan Fuel Cell. Following sections discuss each type of noise using the results obtained from the Mount Sinai fuel cell measurements and the recent airborne noise measurements at the South Windsor site.

The southern part of the South Windsor zoning map is given in Figure 5. As stated above, the South Windsor site at 50 Talbot Lane is located in an Industrial Zone. This site is adjacent to a Rural Residential Zone to the north east, an A-20 Residential Zone to the east and a Multi-Family AA Residential Zone to the south, respectively. The closest measured home is 372 meters away at 550 Governor's Highway in an A-20 Residential Zone. The Mount Sinai Hospital report (Ref. 2) showed that its single fuel cell's airborne noise was estimated to be below the 45 dBA Hartford residential noise limit at about 75 meters from the fuel cell. Using the South Windsor speaker measurements, the airborne noise level expected at a distance of 372 meters at the 550 Governor's Highway property line should be about 30 dBA. Other nearby residential properties are also expected to be well below the night time residential noise limit of 51 dBA for an emitter in an Industrial Zone.

Impulse Noise

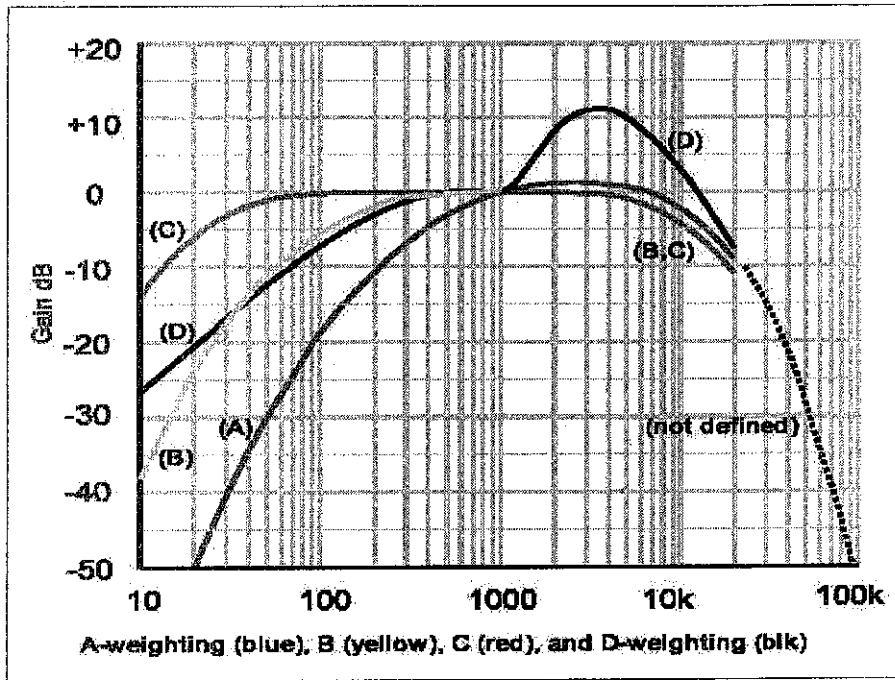
The Connecticut noise code states in *CT section 22a-69-3.2 (part a) Impulse Noise* that no person shall cause or allow the emission of impulse noise in excess of 80 dB peak sound pressure level during the night time to any class A Noise Zone. South Windsor has a similar subsection with Class A Noise Zones as residential. Night time hours are defined as 10 pm to 7 am in both the CT and South Windsor ordinances except for Sunday in South Windsor. Nighttime there extends to 9 am on Sunday morning. *CT section 22a-69-3.2 (part b) Impulse Noise* states that no person shall cause or allow the emission of impulse noise in excess of 100 dB peak sound pressure level at any time to any Noise Zone. South Windsor has a similar subsection.

Impulse noise in excess of 80 dB was not observed on the tape-recorded data during any of the measurements of the Doosan 400 KW fuel cell made at the Mount Sinai Rehabilitation Hospital on 18 January, 2017. This fuel cell design is similar to the unit that will be installed in South Windsor. Given the steady state nature of the fuel cell's noise signature there should be no acoustic issues with the State of Connecticut's and South Windsor's impulse noise requirements.

A few words are in order to discuss the difference between A-weighted and un-weighted impulse noise. A-weighting emphasizes the middle and higher frequencies while reducing the influence of the low frequencies. Figure 7 plots the A-weighting curve versus frequency in blue. Below a frequency of 1 kiloHertz the acoustic level is attenuated by increasing amounts. The reduction is about 10 dB at 200 Hertz, 20 dB at 90 Hertz and 30 dB at 50 Hertz. It also reduces the level at very high frequency being down in level by 10 dB at 20 kiloHertz.

Figure 7. Acoustic Weighting Curves

[http://upload.wikimedia.org/wikipedia/commons/3/39/Acoustic_weighting_curves_\(1\).svg](http://upload.wikimedia.org/wikipedia/commons/3/39/Acoustic_weighting_curves_(1).svg)



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Prominent Discrete Tones

The Connecticut regulation for the control of noise states in *CT section 22a-69-3.3 Prominent discrete tones*: Continuous noise measured beyond the boundary of the Noise Zone of the noise emitter in any other Noise Zone which possesses one or more audible discrete tones shall be considered excessive noise when a level of 5 dBA below the levels specified in section 3 of these Regulations is exceeded. South Windsor’s ordinance does not discuss *Prominent discrete tones*. The CT Regulations establish different noise limits for different land use zones. Residential (homes and condominiums) and hotel uses are in Class A. Schools, parks, recreational activities and services are in Class B. Forestry and related services are in Class C. By my reading of the regulations Carla’s Pasta is a Class C emitter in an Industrial Zone. The noise zone standards in *CT section 22a-69-3.5* state that a Class C emitter cannot exceed the following overall sound pressure levels:

To Class C 70 dBA To Class B 66 dBA To Class A 61 dBA (day) 51 dBA (night)
 The discrete tones limits are 5 dBA lower so that no tone may be higher than the following:

To Class C 65 dBA To Class B 61 dBA To Class A 56 dBA (day) 46 dBA (night)

To address the discrete tone issue we use measured data from the January 18, 2017 testing of a similar Doosan fuel cell. This data does not have A-weighting. The photo in figure 8 plots the

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airborne noise measured 10 meters from the Mount Sinai Cooling Module (Ref. 2) for frequencies from 0 to 1000 Hertz. This curve shows the two largest discrete tones produced by the Doosan Fuel Cell Cooling Module. The first tone is at 86 Hertz at a level of 65 dB reference 20 microPascals. The second tone is at 630 Hertz at a level of 56 dB reference 20 microPascals. The A-weighting corrections are -21.5 dB at 86 Hertz and -1.9 dB at 630 Hertz. Incorporating these corrections gives A-weighted levels of 44 dBA at 86 Hertz and 54 dBA at 630 Hertz both at a distance of 10 meters from the Cooling Module. The minimum transmission loss to the residential property lines on Edgewood Avenue is at least 46 dB so the maximum possible discrete tone would be about 8 dBA at the nearest residential property line. This level is well below the 46 dBA night time requirement in a Residential Zone. The minimum transmission loss to the Industrial Zone property lines next to the Carla's Pasta site is at least 3 dB so the maximum possible discrete tone would be 51 dBA at the 30 Talbot Lane property line. This level is below the 61 dBA requirement in an Industrial Zone. Operating the Doosan fuel cell should produce airborne noise levels well below the CT discrete tone requirement at all the property lines. There should be no acoustic issue with the CT discrete tone noise requirements.

Infrasonic and Ultrasonic Noise

The Connecticut regulation for the control of noise states in *CT section 22a-69-3.4 Infrasonic and Ultrasonic* that no person shall emit beyond his/her property infrasonic or ultrasonic sound in excess of 100 dB at any time. 100 dB with respect to the reference of 20 microPascals is a sound pressure of 2 Pascals or 0.00029 psi. Infrasonic sounds are sound pressure fluctuations below a frequency of 20 Hertz. Ultrasonic sounds are sound pressure fluctuations at frequencies above 20,000 Hertz. South Windsor's ordinance does not discuss Infrasonic or Ultrasonic Noise.

Narrow bandwidth sound pressure spectrums in dB reference 20 microPascals at the 10-meter Cooling Module location given in Reference 3 can be used to compare with these Infrasonic and Ultrasonic noise requirements. Mount Sinai Hospital airborne noise data were processed in the 0 to 100 Hertz and 0 to 100,000 Hertz frequency ranges. The bandwidth of each data point is 0.375 Hertz for the 100 Hertz range and 375 Hertz for the 100,000 Hertz frequency range. The infrasonic noise for frequencies up to 20 Hertz is shown in Figure 9. The maximum band level at 10 meters is 57 dB reference 20 microPascals for one fuel cell. The entire 20 Hertz band can be power summed and equals a value of 66 dB reference 20 microPascals, well below the requirement at 10 meters. The ultrasonic noise for frequencies up to 100 KiloHertz is given in Figure 10. The maximum band level at 10 meters is 20dB reference 20 microPascals for one fuel cell. The entire 80 KiloHertz band from 20 to 100 kiloHertz has been power summed and equals a value of 31 dB ref. 20 microPascals. Both of these infrasonic and ultrasonic noise levels will fall well below the 100 dB limit at a distance 10 meters from the Fuel Cell. The airborne noise level at all the Industrial Zone property lines will be at least 3 dB lower. The noise levels at the residential neighbors will be much lower based on the analysis in the previous section and there should be no issue with either infrasonic or ultrasonic noise at any of the neighboring properties.

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Figure 8. Discrete Tones Produced by the Fuel Cell Cooling Module (0 dBV = 88.6 dB re20μPa)



It should be noted that while the spectrum analysis covers frequencies up to 100 kiloHertz, the microphone sensors lose some sensitivity above 25 kiloHertz. The flat response below a frequency of 25 kiloHertz changes to a gradual roll off that reduces the amplitudes at higher frequencies. Fortunately, the measured noise levels are very low at 20 kiloHertz and decrease with higher frequencies and thus, no ultrasonic acoustic issues are expected above 25 kiloHertz.

Overall Sound Pressure Levels

The Connecticut regulation for the control of noise states in *CT section 22a-69-3.5 Noise zone standards (a) No person in a Class C Noise Zone shall emit noise exceeding the levels below:*

Class	Emitter to	C 70 dBA	B 66 dBA	A/day 61 dBA	A/night 51 dBA
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South Windsor's noise ordinance uses the same dBA values as the CT ordinance. Carla's Pasta is in an Industrial Zone that is surrounded by Residential Zones to the north, east and south. Other zones to the west are too far away to be affected by noise from the Carla's Pasta site. The nearby neighbors are classified as either residential or industrial with a residential noise limit of 61 dBA during the day and 51 dBA at night. The noise limit at the Industrial Zone locations is 70 dBA.

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Figure 9. Infrasonic Noise from the Fuel Cell Cooling Module (0 dBV = 88.6 dB re 20 μ Pa)

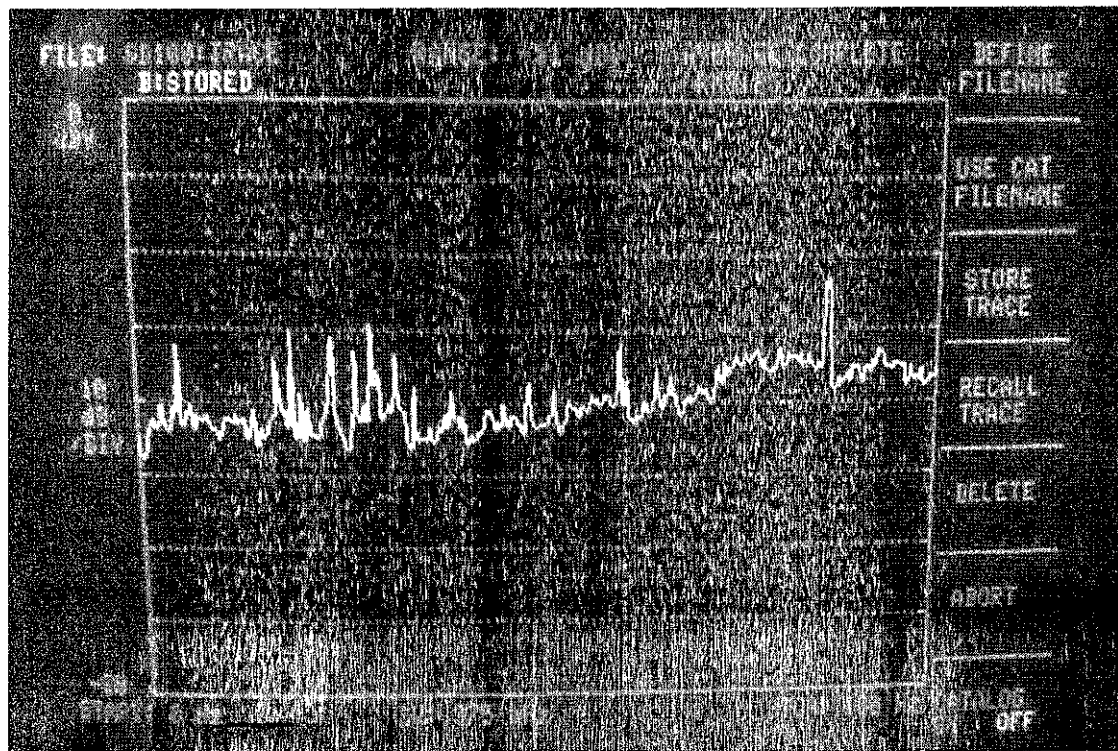
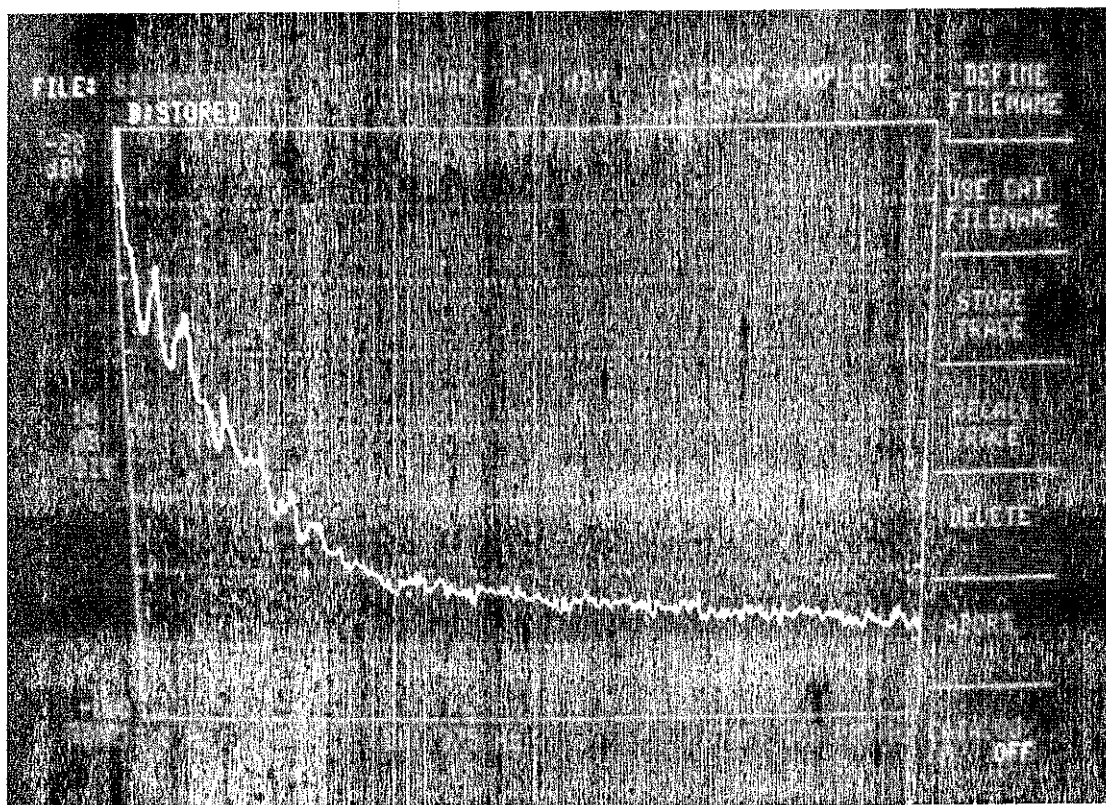


Figure 10. Ultrasonic Noise from the Fuel Cell Cooling Module (0 dBV = 88.6 dB re 20 μ Pa)



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The estimated overall A-weighted sound pressure level measurements in dBA with respect to the reference 20 microPascals are given in Table 3 above for the measurements made on November 9. The second column gives the approximate distance from the speakers to the measurement location, identified by a P number in Figures 1 and 2. The first number is the approximate distance to the speaker at the site A power module position while the second number is the approximate distance to the site B cooling module position. Column 3 gives the noise levels measured with the speakers “on” at the site A cooling module while column 6 gives the noise levels measured with the speakers “on” at site B. Background levels before the speakers were turned on can be found in Table 2. Background corrections were applied in creating the values in Table 3. The background corrected speaker noise at 5 and 10 meters is also given in Table 2. The airborne noise values in Table 3 with the background noise removed are then corrected to estimate the contribution provided by the new fuel cell at the power and cooling module locations. Column 5 has the site A power module estimate while column 8 has the site B cooling module estimates. Values above the industrial or residential night time noise requirements would be shown in red. None are expected.

Reviewing Table 2 it is clear that the airborne noise levels drop significantly in propagating to the nearby properties as the range increases. The highest property line background corrected speaker level was measured at 85 dBA at 30 Talbot Lane, the property adjacent to the speakers. Note that the P1 level for Site B was about 1 dB higher than the P1 level for Site A even though the speaker source level at Site A was about 1 dB higher. We attribute this to reflection of acoustic energy off the building adjacent to Site B (see figure 3). Since the cooling module will have the fuel module next to it, the measured configuration at Site B is more representative of the expected installation and is used in the expected noise estimates. The 30 Talbot Lane property line should see airborne noise levels no higher than 68 dBA due to the fuel cell operating. The residential properties should all be lower than 35 dBA. Because of the increasing loss with distance to the remaining Industrial Zone property lines the expected fuel cell noise levels will fall below 58 dBA for the other Industrial Zone properties. All the expected maximum values (worse case between speaker locations) are shown in Table 4 below. All of the property line estimates will meet the 70 dBA Industrial Zone and 51 dBA nighttime residential noise limits.

Table 4. Expected Airborne Noise Levels from Operating a Doosan Fuel Cell (ref. 20 µPA)

P1	P2	P3	P4	P5	P6	P7	P8
68 dBA	47 dBA	34 dBA	34 dBA	27 dBA	42 dBA	57 dBA	46 dBA
P9	P10	←Industrial	Residential ->	P11	P12	P13	P14
36 dBA	52 dBA			<32	<31	<31	<34

Operation of a single Doosan fuel cell will have no acoustic impact at the residential properties adjacent to the Carla’s Pasta site at 50 Talbot Lane. The Industrial Zone property next to Carla’s Pasta at 30 Talbot Lane (very close to the fuel cell) may see airborne noise as much as 1 dB below the Industrial Zone noise limit. The current background noise levels at the Carla’s Pasta site were seen to vary depending on which Carla’s machinery were running. Maximum background airborne noise levels of up to 64 dBA were measured at 30 Talbot Lane and when

Acoustical Technologies Inc.

combined with the noise from the fuel cell could reach 69.5 dBA. Industrial Zone properties further away from the two cooling modules along Talbot Lane, Nutmeg Road and Governor's Highway are expected to be below 58 dBA and those sites would not be affected by the operation of the fuel cell.

The measurement location in the parking lot at 30 Talbot Lane was approximately 16.5 meters from the speaker at Site B. This implies that as long as the Cooling Module is 16.5 meters from the property boundary the airborne noise level due to the Cooling Module will be approximately 68 dBA at the closest point in the adjacent property. The exact location of the Cooling Module with respect to the property boundary is not yet available. As long as the Cooling Module remains more than 11 meters from the property boundary the airborne noise level due to the Cooling Module should be less than 70 dBA. If the distance is 10 meters or less, there may be a few locations along the adjacent property boundary with airborne noise levels above 70 dBA.

Conclusions

The purpose of this effort is to evaluate the acoustical environment at the proposed Carla's Pasta fuel cell site in South Windsor, CT. This has been accomplished and the results show that the operation of a Doosan 440 KW fuel cell can meet all of the State of Connecticut airborne noise requirements on residential property lines to the north, east and south quadrants. Although not tested, residences to the west are also expected to meet all the noise requirements because they are more than 800 meters away from the fuel cell. Operation of a Doosan 440 KW fuel cell can also meet all of the State of Connecticut airborne noise requirements on all the industrial properties adjacent to the Carla's Pasta site at 50 Talbot Lane.

References

- 1) CT DE&EP Noise Control Regulation RCSA Section 22a-69-1 to 22a-69-7.4
<http://www.ct.gov/dep/lib/dep/regulations/22a/22a-69-1through7.pdf>
- 2) Mount Sinai Rehabilitation Hospital Airborne Noise Assessment, Carl A. Cascio, Acoustical Technologies Inc., January 26, 2017
- 3) west_haven_amended_noise_ordinance.pdf
www.ct.gov/deep/lib/deep/air/noise/.../west_haven_amended_noise_ordinance.pdf



**Attachment 11:
Abutters Letter
50 Talbot Lane**

Doosan Fuel Cell America, Inc.
195 Governor's Highway
South Windsor, CT 06074
T - 860 727 2200

October 15, 2018

RE: Petition For a Declaratory Ruling That No Certificate of Environmental Compatibility And Public Need is Required ("Petition") for the Installation of One (1) on-site, 440 kW Fuel Cell at Carla's Pasta Inc., 50 Talbot Lane, South Windsor, CT 06074.

Dear Recipient,

Pursuant to Section 16-50j-40 of the Connecticut Siting Council's (the "Council") Rules of Practice, we are notifying you that Doosan Fuel Cell America, Inc. intends to file a petition for declaratory ruling with the Connecticut Siting Council ("Council") on or about October 9, 2018. The petition will request the Council's approval of the installation of one (1) 440kW fuel cell and ancillary equipment in support of a customer-side, distributed generation project at 50 Talbot Lane South Windsor, CT 06074. The fuel cell will be powered by natural gas and generated electricity will be consumed on-site.

The proposed placement of the fuel cell is located within the parking lot in front of the main Carla's Pasta manufacturing facility. The proposed new construction will be approximately 29 feet long, 8 feet wide and 10 feet high.

If you have any questions regarding the proposed work, please contact any of the following:

Doosan Fuel Cell America, Inc.
Donald Emanuel
195 Governor's Highway
Tel: 860-727-2200
ben.yoon@doosan.com

Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051
Tel: 860-827-2935

Sincerely,
Doosan Fuel Cell America, Inc.

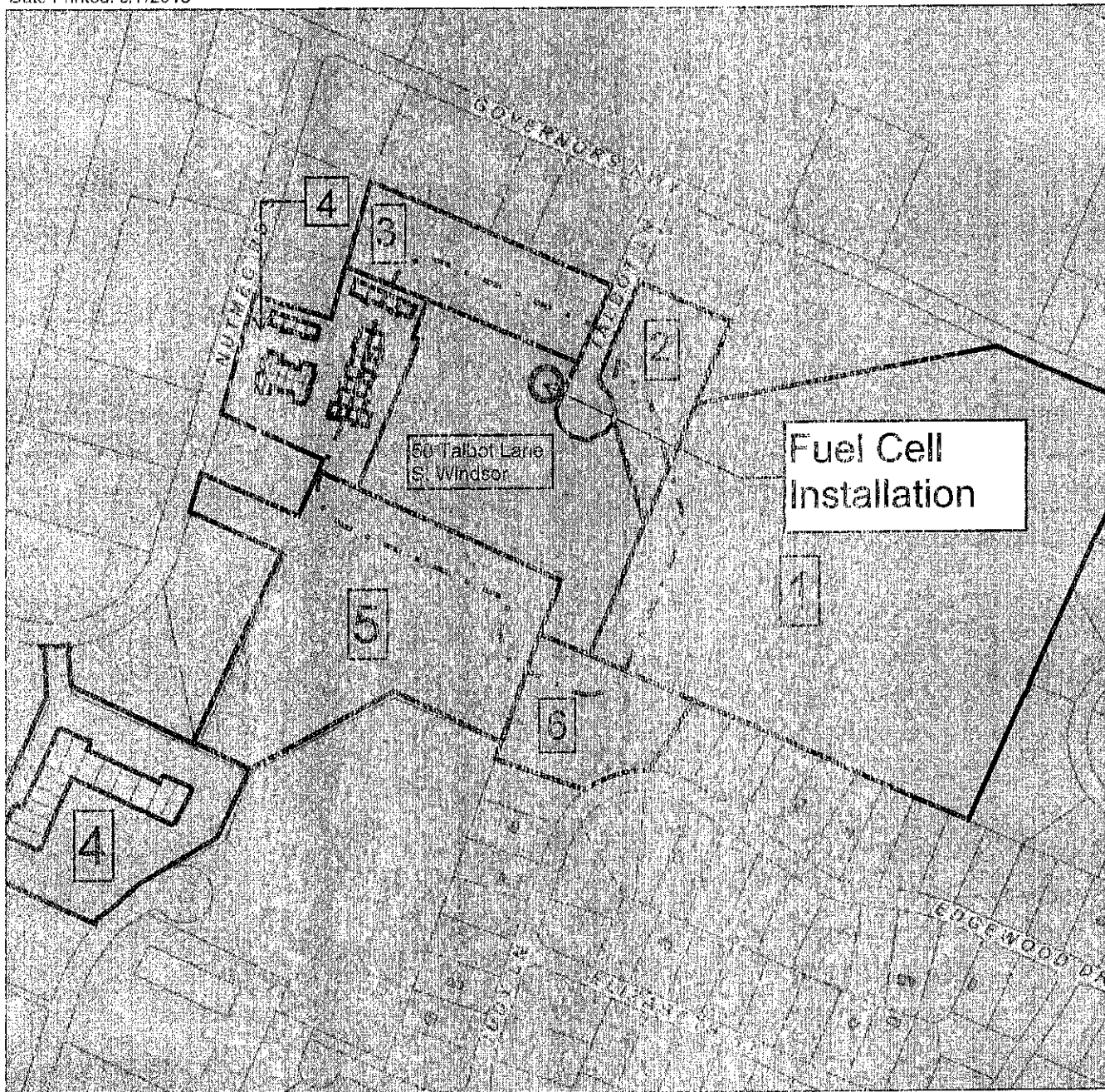
Don Emanuel
Installation Project Manager
Doosan Fuel Cell America, Inc.
195 Governor's Highway
Tel: 860-727-2089
Donald.emmanuel@doosan.com

Town of South Windsor Geographic Information System (GIS)



Carla's Pasta
50 Talbot Lane
South Windsor, CT 06074

Date Printed: 8/7/2018



MAP DISCLAIMER - NOTICE OF LIABILITY

This map is for assessment purposes only. It is not for legal description or conveyances. All information is subject to verification by any user. The Town of South Windsor and its mapping contractors assume no legal responsibility for the information contained herein.

Approximate Scale: 1 inch = 1000 ft

