



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

October 26, 2017

Melanie Bachman, Executive Director/Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06015

Responses to PE1329 Interrogatories

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 West Haven WPCA, 2 Beach Street, West Haven, CT 06516.

Dear Executive Director Bachman,

Please see the attached responses with attachments to questions of Interrogatory – Set 1 posed by the Connecticut Siting Council on 10/12/2017 for PE1329. Doosan is submitting an original and fifteen (15) copies of the aforementioned responses to the Council's office..

If you have any questions, please feel free to contact the Installation Project Manager, Ben Yoon, at 860-727-2487 or at ben.yoon@doosan.com.

Sincerely,

Doosan Fuel Cell America, Inc.

A handwritten signature in dark ink, appearing to read "Patricia Walker", written over a dotted line.

Patricia Walker, Esq.
Associate General Counsel
Doosan Fuel Cell America, Inc.
195 Governor's Highway
Tel: 860-727-2089
Patricia.walker@doosan.com

VIA ELECTRONIC MAIL

October 12, 2017

Patricia Walker, Esq.
Associate General Counsel
Doosan Fuel Cell America, Inc.
195 Governor's Highway
South Windsor, CT 06074

RE: **PETITION NO. 1329** - Doosan Fuel Cell America, Incorporated petition for a declaratory ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for the proposed construction, maintenance and operation of a customer-side 440 kilowatt fuel cell facility to be located at the West Haven Water Pollution Control Authority Complex, 2 Beach Street, West Haven, Connecticut.

Dear Attorney Walker:

The Connecticut Siting Council (Council) requests your responses to the enclosed questions no later than October 26, 2017. To help expedite the Council's review, please file individual responses as soon as they are available.

Please forward an original and 15 copies to this office, as well as send a copy via electronic mail. In accordance with the State Solid Waste Management Plan and in accordance with Section 16-50j-12 of the Regulations of Connecticut State Agencies the Council is requesting that all filings be submitted on recyclable paper, primarily regular weight white office paper. Please avoid using heavy stock paper, colored paper, and metal or plastic binders and separators. Fewer copies of bulk material may be provided as appropriate.

Any request for an extension of time to submit responses to interrogatories shall be submitted to the Council in writing pursuant to §16-50j-22a of the Regulations of Connecticut State Agencies.

Yours very truly,

Melanie Bachman
Executive Director

MB/FC

c: Council Members

Petition No. 1329
Doosan Fuel Cell America, Inc.
2 Beach Street
West Haven, CT
Interrogatories

Along with Interrogatory I, Doosan also received a notice of incomplete application for the following reasons:

A: Not notifying West Haven Zoning Commission.

B: Not notifying two West Haven commissions – Conservation and Open Space and Inland and Wetlands Commission

C: For unclearly marked abutters map.

Please see the following attachments needed to complete the application per your request:

- Attachment 18 is the proof of certified mail to West Haven Zoning Commission sent out on 9/27/2017.
- Attachment 18 also includes proof of certified mail to both Conservation Open Space Commission and Inland Wetlands Commission.
- Attachment 19 is clearly marked abutters map.

Interrogatory 1 Responses

1. Per Petition Attachment 2.2 Site Images; is it Doosan's intent to install the proposed facility on what appears to be a berm? Is further fill needed to elevate the concrete foundations? Please provide a detailed site elevation drawing showing existing and proposed elevations including Federal Emergency Management Administration flood levels.

R1. Detailed site elevation plan is provided in Attachment #20. The FIRM map shows flood elevations between AE12 and AE10 in the area of proposed construction. Doosan shall construct an elevated concrete pad that raises the base of the fuel cell to 12', above the higher of the two flood zones. Further fill and foundations will be needed to raise the pad above the surrounding grade, which varies from 7.1' at the adjacent parking lot to 9.8' at the top of the berm.

2. Will the vegetation shown in the site images be removed? Has the City of West Haven Water Pollution Control Authority expressed concerns about vegetation removal? Is landscaping proposed? If so, provide a landscape plan?

- R2. Vegetation shown in the site image will be removed. The City of West Haven Water Pollution Control Authority did not cast any concern about removing vegetation in the proposed site. Landscaping is not proposed for this site.
3. Submit a revised Attachment 1 Site Plan showing the utility and natural gas connections. Would all the connections be underground?
- R3. Please review attached Site Plan drawings that shows electrical and natural gas connections. Yes, they will be underground, as both electrical and natural gas will be entrenched to the appropriate tie-in points. (See Attachment #21.)
4. Would the installation of the proposed facility impact the existing storm catch basins and piping? If so describe how Doosan would mitigate such impacts.
- R4. The construction of the concrete foundation for the proposed facility will take place adjacent to the existing drain pipes. The foundation for the proposed facility will be supported on helical piles driven into the sand layer, approximately 20' below the existing grade. This construction method will prevent settling of the foundation and not impact the existing drain pipe. Survey and GPR were conducted to verify the location of the existing catch basin and piping.
5. Was this project selected in a Connecticut Department of Energy and Environmental Protection (DEEP) or regional procurement? When? What RFP is the proposed project associated with?
- R5. This project is supported by an LREC incentive from United Illuminating but was not selected in any DEEP or regional procurement and is not associated with any state agency RFP.
6. Would the proposed fuel cell shut down in the event of a power outage? If so, does it have "black start" capability and the ability to automatically restart?
- R6. The proposed fuel cell will not shut down in the event of a power outage. The proposed fuel cell is designed to separate itself from the grid by opening the internal breaker in case of a power outage while continuing to operate in Idle mode to supply its internal loads. Once the grid power is restored, the fuel cell will reconnect to the grid after a 5-minute delay and continue to generate power. The proposed fuel cell does not have a "black start" capability.

7. Could the facility continue operating during a power outage and provide seamless uninterruptable power?
- R7. The Facility is designed to operate parallel to the grid, separate itself from the grid and not feed into the grid in a power outage. It will not serve as a backup generator that will provide seamless uninterruptable power.
8. Describe how the acoustic barrier and fence are integrated. Provide a specification sheet for the sound barrier. If the fence is chain link will it have an anti-climb feature?
- R8. The acoustic barrier will consist of sound absorbing material attached to a chain link fence and draped in galvanized sheet metal to prevent climbing. (*See Attachment 22*)
9. Is the proposed site located within a Coastal Boundary per Connecticut General Statutes Section 22a-94? If yes, provide a map and indicate how the proposed project would affect the Coastal Boundary.
- R9. The proposed facility would be located within a Coast Boundary per Connecticut General Statutes Section 22a-94. (*See Attachment #23*) The host property is an already disturbed location developed with standing construction, and the proposed area is a previously disturbed man-made berm.
10. Provide a table showing state criteria thresholds and projected emissions from the proposed facility for all greenhouse gasses listed in the Regulations of Connecticut State Agencies Section 22a-174-1(49).
- R10. Section 22a-174-1(49) states the following: ““Greenhouse gases” or “GHGs” means the aggregate of the following six component gases: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexa fluoride (SF₆), any hydroflourocarbon (HFC) or any perfluorocarbon (PFC).” There is no defined criteria threshold for these compounds, however Section 22a-174-1(21) provide a method for computing carbon dioxide equivalent emissions “CO₂e”. The proposed facility will have no emissions of SF₆, HFC, and PFC. Emissions of CH₄ and N₂O will be very low and not contribute significantly to the GWP of the proposed facility. Refer to the Table 1 next page for calculation of the proposed facilities Carbon dioxide equivalent emissions.

Table 1. CO₂e emission rates from proposed facility

Emission Type	Projected Emissions	GWP in 40 CFR 98, Table A-1	Projected CO ₂ e
CO ₂	2025 ton/yr	1	2025 ton/yr
CH ₄	<0.02 ton/yr	25	<0.5 ton/yr
N ₂ O	<0.01 ton/yr	298	<3 ton/yr
SF ₆	N/A	22,800	N/A
HFC	N/A	12 to 14,900*	N/A
PFC	N/A	7,390 to 17,340	N/A

11. Provide information regarding available technologies and/or mitigation techniques to reduce greenhouse gas emissions from the proposed facility.

R11. Current control technologies are not commercially available to reduce the greenhouse gas emission from the facility. At this time further research has not been completed by Doosan on technologies or mitigation techniques to reduce greenhouse gas emissions as the proposed facility meets the state criteria for emissions.

12. Table 1 of the Petition states the proposed facility's air emissions rate in pounds of CO₂ per megawatt-hour is 1078 and the Attachment Data Sheet states the pounds of CO₂ per megawatt-hour is 998. Please clarify the difference. Also how does the proposed facility's air emissions rate in pounds of CO₂ per megawatt-hour compare on a percentage basis with the eGRID non-baseload (fossil fuel) emissions rate for the ISO New England, Inc. territory?

R12. The proposed facility's air emissions will be 1,078 pounds of CO₂ per megawatt-hour. The petition attached a data sheet for the latest version of Doosan's Model 400, but this proposed facility will use a prior version of the Model 400. A datasheet for version of Model 400 for the proposed facility is attached. (*See* Attachment #24) The facility will operate in maximum power mode and the emissions rate on the data sheet is for baseload power mode. Air emissions rate in pounds of CO₂ per megawatt-hour of the proposed facility will be 1.2% higher as compared to the 2014 eGrid fossil fuel output emission rates of 1,011.3 lb CO₂/MWh with an Eastern Interconnection grid loss of 4.97% for a total of 1,064 lb/MWh for the NEWE Region.

13. Is methane (CH_4) broken down to zero in the reforming process? Is there some small amount of CH_4 emissions that would still occur?

R13. Methane is broken to less than 2% during the reforming process. Any unconverted methane is subsequently consumed in the reformer burner to provide heat for the reforming reactions, thus no emissions occur.

14. Does the amount of phosphoric acid in the fuel cell comply with the applicable state and federal regulations?

R14. The amount of phosphoric acid in the fuel cell complies with all applicable state and federal regulations. The exact amount of phosphoric acid is proprietary technical information and is less than the 5,000 lb reportable quantity under 40 CFR 117.3.

Attachment 18

- Proof of Mail to West Haven Zoning

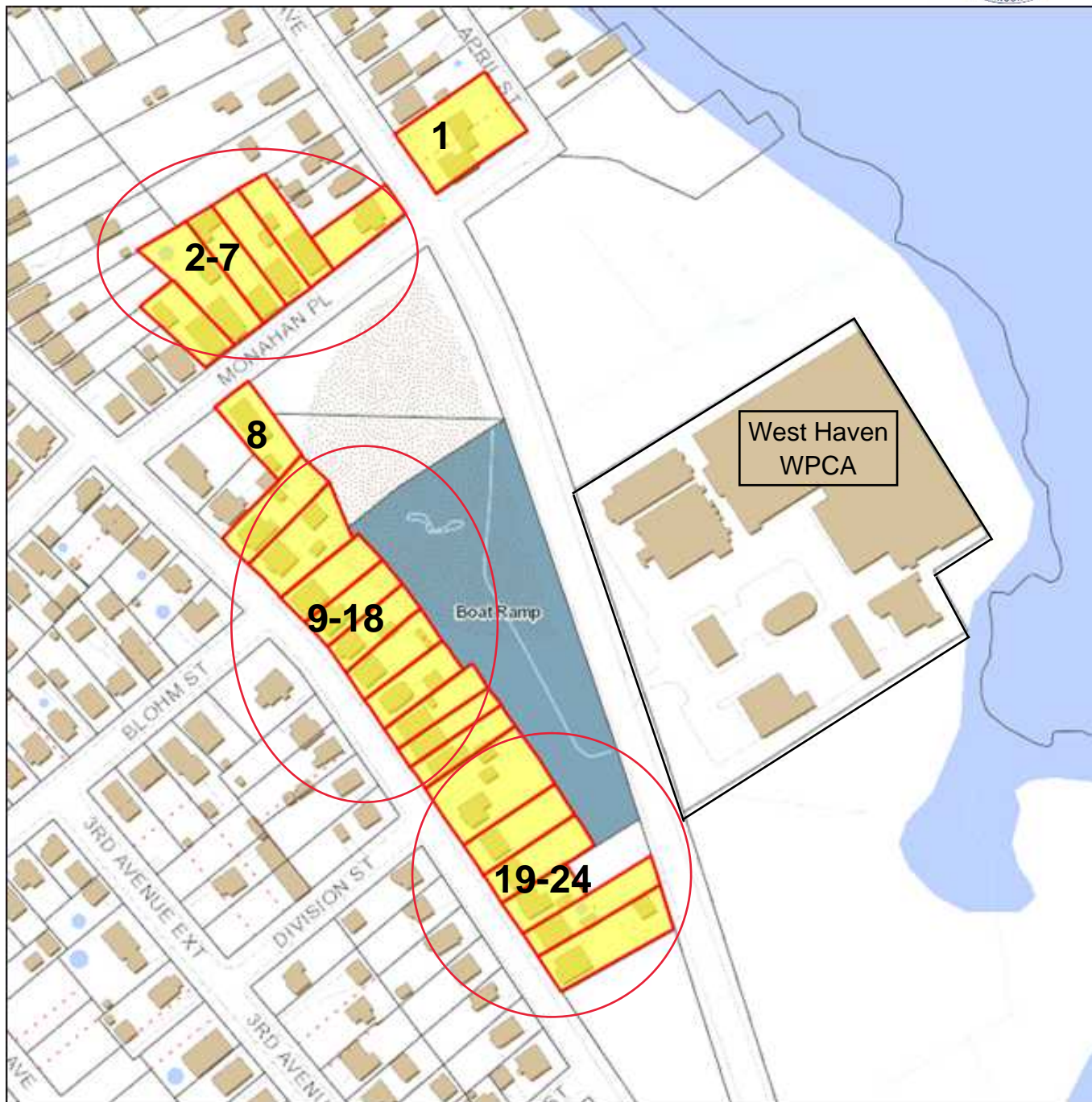
U.S. Postal Service™ CERTIFIED MAIL® RECEIPT Domestic Mail Only	
For delivery information, visit our website at www.usps.com ™.	
WEST HAVEN, CT 06516	
Certified Mail Fee \$3.35	0874 1018
Extra Services & Fees (check box, add fee as appropriate)	
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Total Postage and Fees \$5.29	
Zoning Enforcement Official Catherine Conniff	
City Hall 355 Main Street	
West Haven CT 06516	
PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions	

- Proof of Mail to Inland Wetland Watercourse Agency & Conservation and Open Space Land Commission

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WEST HAVEN, CT 06516	
Certified Mail Fee \$3.35	0874 1018
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Postage \$0.49	10/16/2017
Total Postage and Fees \$5.29	
Sent To Inland Wetland Watercourse Agency	
Street and Apt. No., or PO Box No. 355 Main St.	
City, State, ZIP+4® West Haven CT 06516	
PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions	

City of West Haven

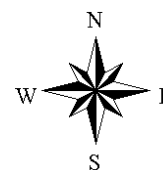
Geographic Information System (GIS)



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 City of West Haven and its mapping contractors assume no legal responsibility for the information contained herein.

Approximate Scale: 1 inch = 200 feet

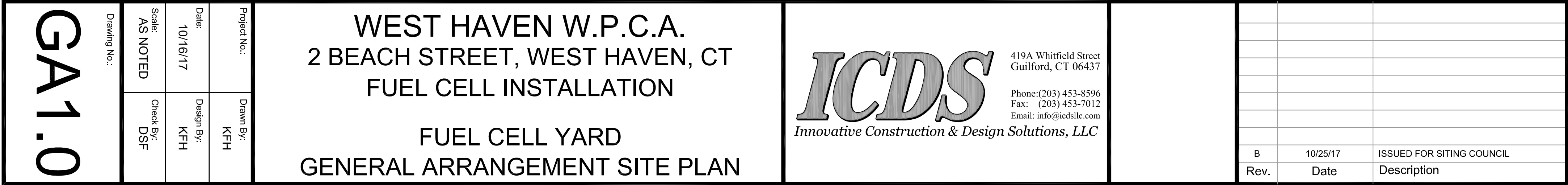


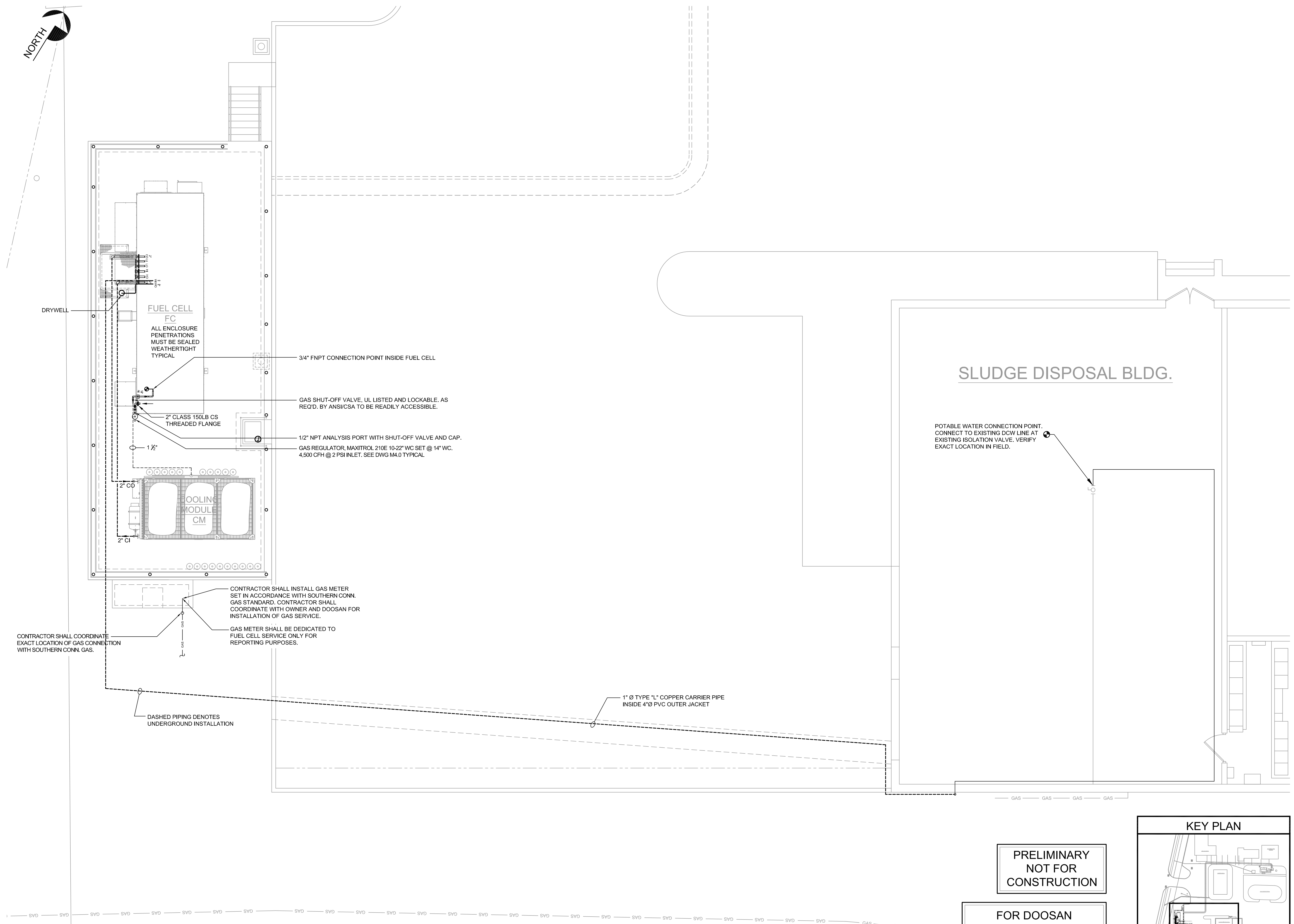
No.	Parcel ID	Site Address	Owner Name	Mailing Address	Mailing City	Mailing	Mailing Zip
1	036-0152-0-0000	1 FIRST AV	IZZO JOHN P & KATHRYN ANN & SV	0001 FIRST AVE	WEST HAVEN	CT	06516- 0000
2	036-0172-0-0000	4 FIRST AV	HARRIS DAVID	4 FIRST AV	WEST HAVEN	CT	06516- 0000
3	036-0167-0-0000	33 MONAHAN PL	LOUIS CAPUTO	33 MONAHAN PL	WEST HAVEN	CT	06516- 0000
4	036-0168-0-0000	31 MONAHAN PL	CARNEY CHARLOTTE A	31 MONAHAN PL	WEST HAVEN	CT	06516- 0000
5	036-0169-0-0000	27 MONAHAN PL	ANGELO MICHAEL R	27 MONAHAN PL	WEST HAVEN	CT	06516- 0000
6	036-0170-0-0000	23 MONAHAN PL	HRIBKO RICHARD A JR & BURZYNSKI	23-25 MONAHAN PL	WEST HAVEN	CT	06516- 0000
7	036-0171-0-0000	17 MONAHAN PL	HALPRIN MICHAEL	17 MONAHAN PL	WEST HAVEN	CT	06516- 0000
8	036-0163-0-0000	36 MONAHAN PL	HOWELL KATHLEEN ANNE & PAUL RICHMOND	36 MONAHAN PL	WEST HAVEN	CT	06516- 0000
9	036-0306-0-0000	149 SECOND AVE	ONEILL PETER C & PAMELA L & SV	0149 SECOND AVE	WEST HAVEN	CT	06516- 0000
10	036-0307-0-0000	145 SECOND AVE	NUMBERG LEE MAN L SR & ELIZA ANN	145 SECOND AVE	WESTHAVEN	CT	06516- 0000
11	036-0308-0-0000	135 SECOND AVE	HARDEN ALLISON	135 SECOND AVE	WEST HAVEN	CT	06516- 0000
12	036-0309-0-0000	133 SECOND AVE	BIHARY JENNIFER & CYRIL & SV	133 SECOND AVE	WEST HAVEN	CT	06516- 0000
13	036-0310-0-0000	131 SECOND AVE	NAN LONGNAN NAN & LI CHUNHUA	131 SECOND AVE	WEST HAVEN	CT	06516- 0000
14	036-0311-0-0000	129 SECOND AVE	ONEILL MARGARET M	129 SECOND AVE	WEST HAVEN	CT	06516- 0000
15	036-0312-0-0000	127 SECOND AVE	SCHULTE BRIAN & REBECCA & SV	127 SECOND AVE	WEST HAVEN	CT	06516- 0000
16	036-0313-0-0000	125 SECOND AVE	CERVONE ANTHONY L	125 SECOND AVE	WEST HAVEN	CT	06516- 0000
17	036-0314-0-0000	123 SECOND AVE	COPPOLA JOHN A & ELONE AS J/T	123 SECOND AVE	WEST HAVEN	CT	06516- 0000
18	036-0315-0-0000	121 SECOND AVE	COSMUS RICHARD N EST OF & RIGHT JESSICA	260 WEST 26TH ST APT 2A	NEW YORK	NY	10001- 0000
19	028-0212-0-0000	115 SECOND AVE	MARRANZINO ANTHONY J & JOANN	115 SECOND AVE	WEST HAVEN	CT	06516- 0000
20	028-0213-0-0000	111 SECOND AVE	HUNT GARY	50 MILTON AVE	WEST HAVEN	CT	06516- 0000
21	028-0214-0-0000	107 SECOND AVE	NOEL B GRANT	107 SECOND AVE	WEST HAVEN	CT	06516- 0000
22a	028-0220-0-0000	103 SECOND AVE	GARCIA ANA L	160 PARK ST	WEST HAVEN	CT	06516- 0000
22b	028-0215-0-0000	103 SECOND AVE	JOSE LUIZ LOPEZ	103 SECOND AVE	WEST HAVEN	CT	06516- 0000
23	028-0216-0-0000	99 SECOND AVE	GARCIA ANA L	99 SECOND AVE	WEST HAVEN	CT	06516- 0000
24	028-0217-0-0000	85 SECOND AVE	MANCINI SHARON R & FRANCO	85 SECOND AVE	WEST HAVEN	CT	06516- 0000

Proof of Mail to 2 more abutters

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Sent to <u>Lopez Jose Luiz</u> Street and Apt. No., or PO Box No. <u>103 Second Ave</u> City, State, ZIP+4® <u>West Haven CT 06516</u> <small>PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions</small>	

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Certified Mail Fee \$3.35 Extra Services & Fees (check box, add fee to postage) <input type="checkbox"/> Return Receipt (hardcopy) \$1.55 <input type="checkbox"/> Return Receipt (electronic) \$0.00 <input type="checkbox"/> Certified Mail Restricted Delivery \$0.00 <input type="checkbox"/> Adult Signature Required \$0.00 <input type="checkbox"/> Adult Signature Restricted Delivery \$0.00 Postage \$0.49 Total Postage and Fees \$5.29	0874 1018 Postmark Here 10/23/2017
Sent to <u>Grant Noel B</u> Street and Apt. No., or PO Box No. <u>107 Second Ave</u> City, State, ZIP+4® <u>West Haven CT 06516</u> <small>PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions</small>	

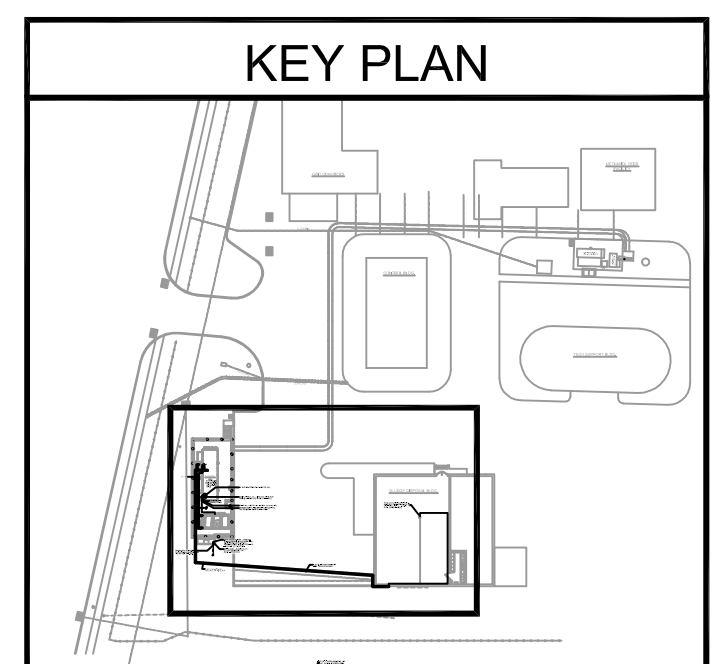




A PARTIAL ELECTRICAL PLAN
SCALE: $\frac{3}{32}" = 1'-0"$

PRELIMINARY
NOT FOR
CONSTRUCTION

FOR DOOSAN
INTERNAL REVIEW
OCT. 16, 2017

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ICDS
Innovative Construction & Design Solutions, LLC

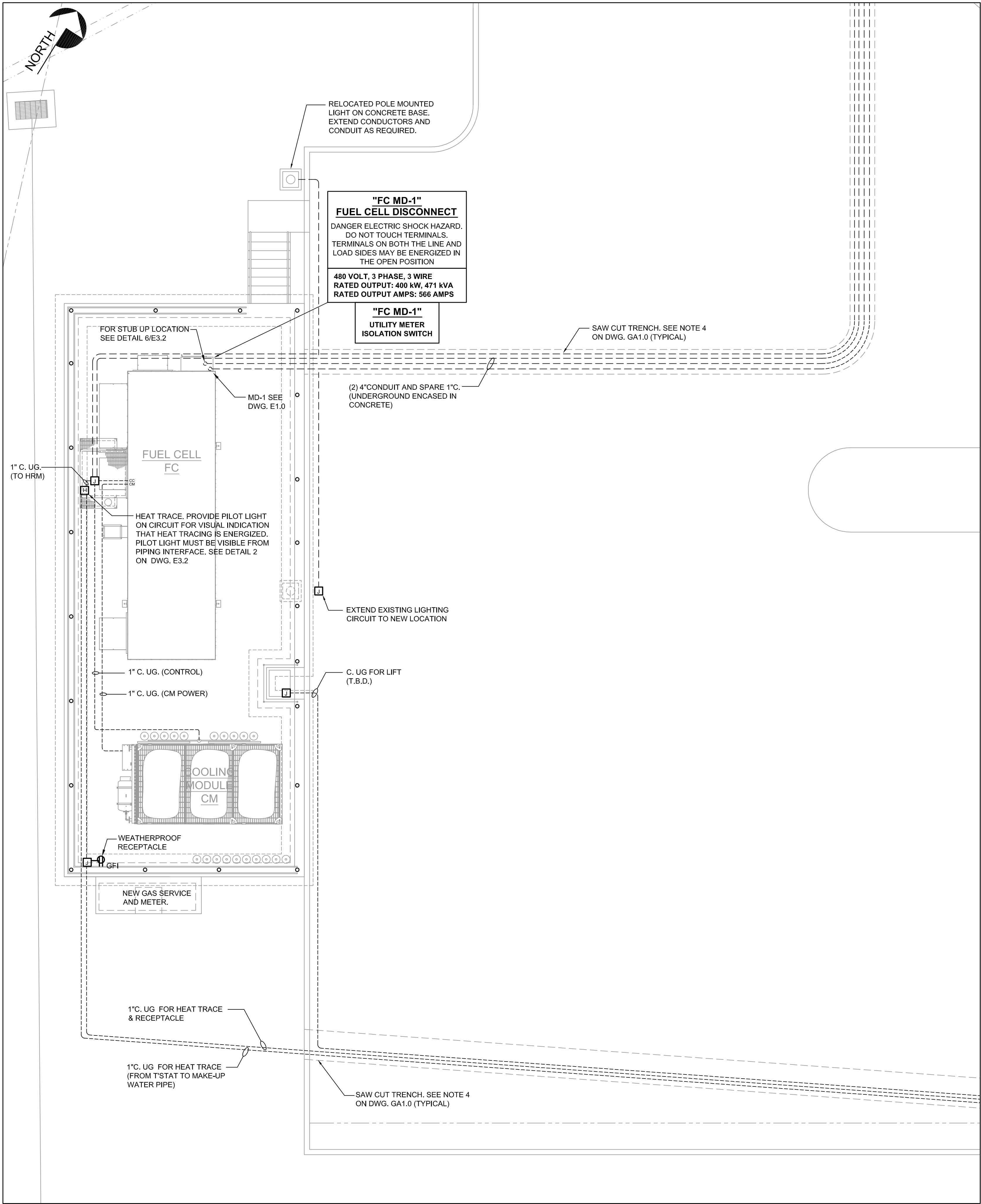
419A Whitfield Street
Gaulford, CT 06437

Phone: (203) 453-8596
Fax: (203) 453-7012
Email: info@icdsllc.com

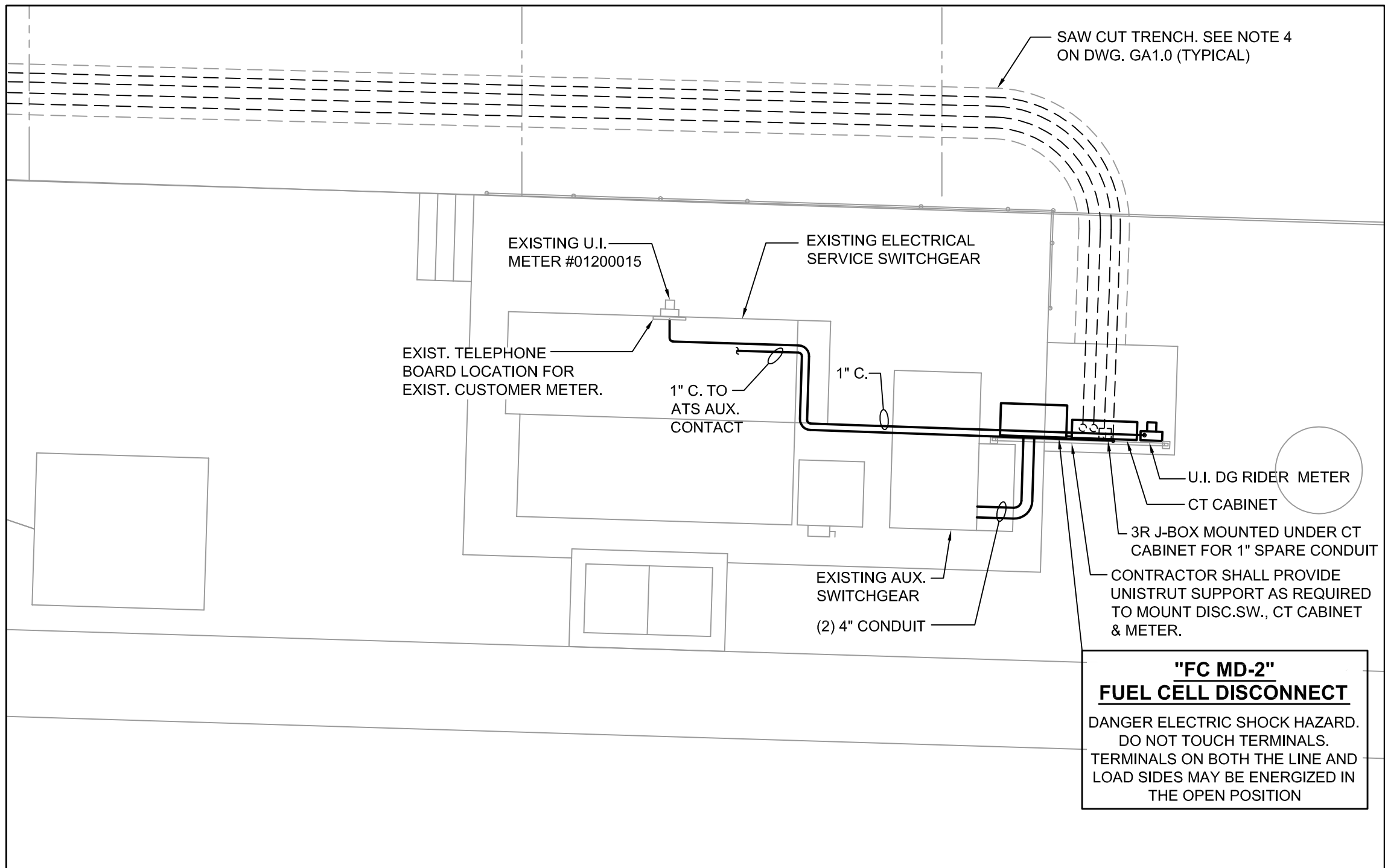
WEST HAVEN W.P.C.A.
2 BEACH STREET, WEST HAVEN, CT
FUEL CELL INSTALLATION

Project No.:	Drawn By: KFH
Date: 10/16/17	Design By: KFH
Scale: AS NOTED	Check By: DSF

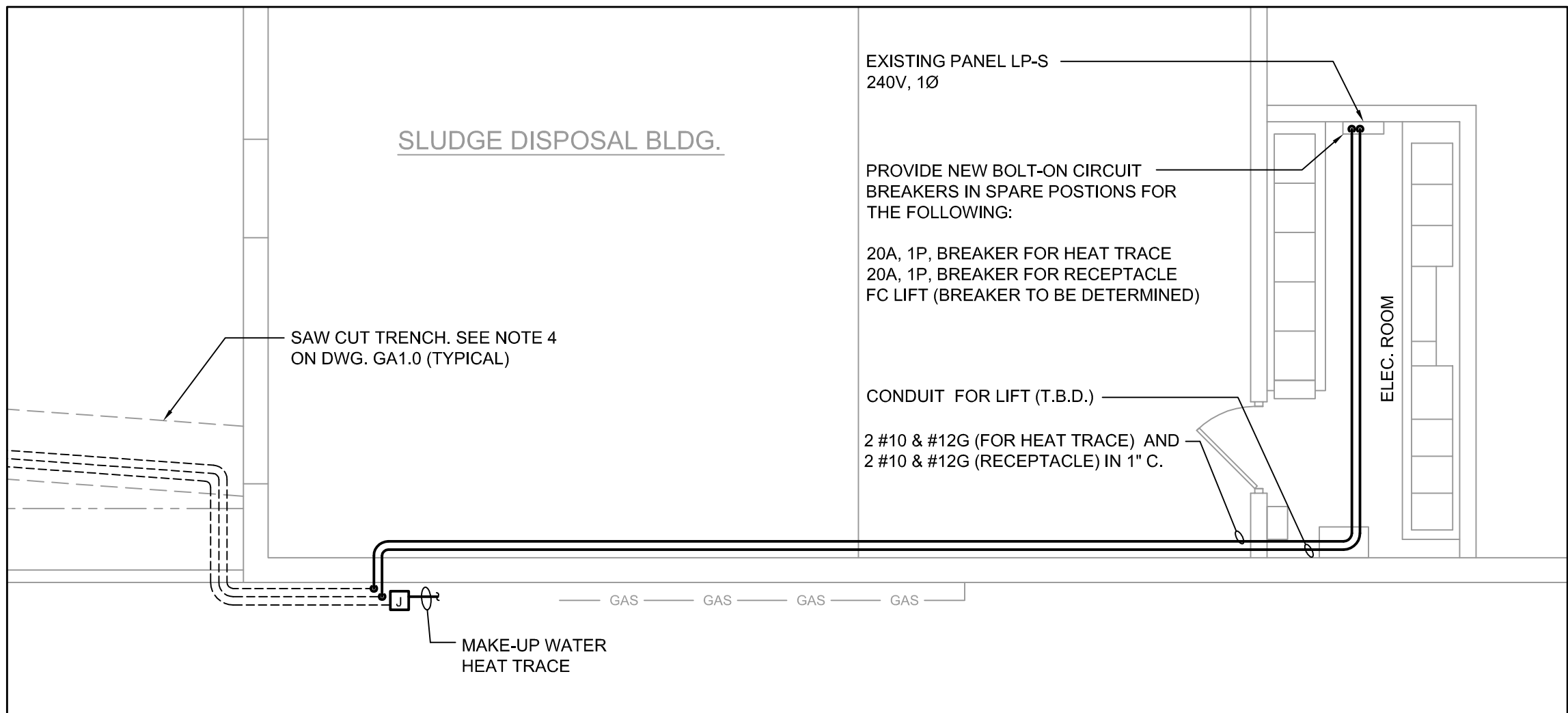
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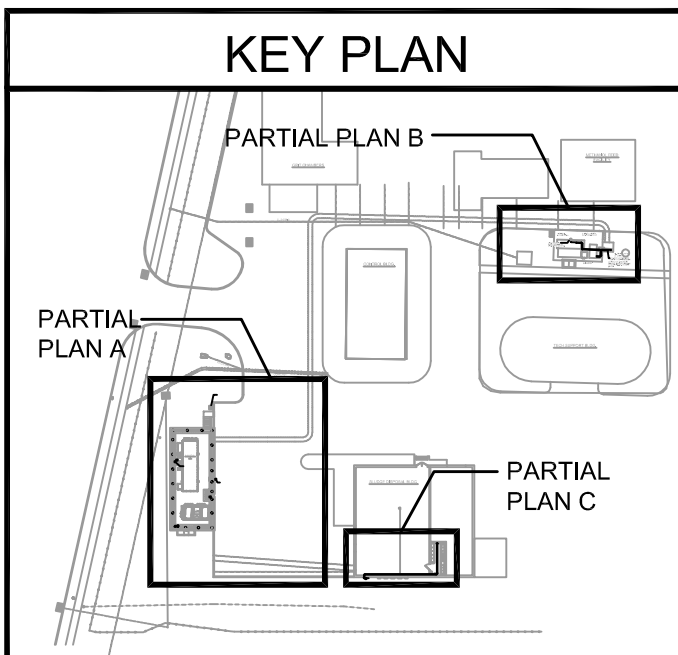
B PARTIAL ELECTRICAL PLAN
SCALE: 3/16" = 1'-0"



C PARTIAL ELECTRICAL PLAN
SCALE: 3/16" = 1'-0"

PRELIMINARY
NOT FOR
CONSTRUCTION

FOR DOOSAN
INTERNAL REVIEW
OCT. 16, 2017



WEST HAVEN W.P.C.A.
2 BEACH STREET, WEST HAVEN, CT
FUEL CELL INSTALLATION
ELECTRICAL
PARTIAL PLANS

Project No.:	Drawn By:
Date:	Design By:
Scale:	Check By:
AS NOTED	DSF

Drawing No.:

E2.0

419A Whitfield Street
Gulfport, CT 06437
Phone: (203) 433-8596
Fax: (203) 433-8512
Email: info@icds.com

ICDS
Innovative Construction & Design Solutions, LLC



ABBC-13EXT AUDIOSEAL COMBINATION BLANKET



DESCRIPTION

The ABBC-13EXT AudioSeal Combination Blanket is an exterior grade barrier backed composite (BBC), consisting of UV and tear resistant vinyl coated polyester facing quilted on 1-inch fiberglass batting with Gore Tenera thread, with a reinforced 1 lb psf mass loaded vinyl barrier bonded to one side.

These blankets are a combination sound blocking and sound absorbing material. These sound attenuation blankets are constructed with grommets cross the top and Velcro along the vertical edges of the blankets for easy installation and layering.

ABBC-13 blankets are commonly used for outdoor acoustical enclosures or sound barriers that require both sound isolation and sound absorption.



TECHNICAL CHARACTERISTICS

Sizing	Up to 54" x 25'
Roll Sizing	54" x 25' long
Weight	1.3 lbs psf
Nominal Thickness	1.08"
Facing Colors	Gray, White, Black, or Tan
Barrier Colors	Gray, Blue, Tan

FEATURES

- Durable exterior grade vinyl coated polyester facing
- Superior UV resistance
- Straight-stitch or diamond quilt patterns
- Wind load: > 120 mph

COMMON APPLICATIONS

- Outdoor Acoustical Enclosures
- Permanent Noise Barriers

SOUND ABSORBING PERFORMANCE

125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	NRC*
.12	.47	.85	.84	.64	.62	.70

*Noise Reduction Coefficient

SOUND BLOCKING PERFORMANCE

125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	STC*
11	16	24	30	35	35	27

*Sound Transmission Loss



COASTAL BOUNDARY
NEW HAVEN, CONNECTICUT

LEGEND

 Coastal Boundary

EXPLANATION

The coastal boundary map shows the extent of lands and coastal waters as defined by Connecticut General Statute within Connecticut's coastal area. The coastal boundary is a continuous line delineated on the landward side by the interior contour elevation of the one hundred year frequency coastal flood zone, as defined and determined by the National Flood Insurance Act, or a one thousand foot linear setback measured from the mean high water mark in coastal waters, or a one thousand foot linear setback measured from the inland boundary of tidal wetlands, whichever is farthest inland; and shall be delineated on the seaward side by the seaward extent of the jurisdiction of the state.

Any regulated activity conducted within the coastal boundary by a municipal agency (i.e., plans of development, zoning regulations, municipal coastal programs and coastal site plan review (i.e., site plans submitted to zoning commission, subdivision or resubdivision plans submitted to planning commission, application for special permit or exception to the zoning or planning commissions or zoning board of appeals, variance submitted to

zoning board of appeals and a referral of a municipal project)) must be conducted in a manner consistent with the requirements of the Connecticut Coastal Management Act (CMA). As the Coastal Boundary is a hybrid of the Coastal Area, all state and federal agency activities must be consistent with the requirements of the CMA. The coastal boundary is a hybrid of the original 1:24,000 version maps prepared by DEP and the revised boundary mapping undertaken by twenty-two coastal towns. This layer therefore does not replace the legal maps and may not be used for legal determinations.

The following twenty-two towns have adopted municipal coastal boundaries: Chester, Clinton, Darien, Deep River, East Haven, Essex, Fairfield, Greenwich, Groton, Guilford, Hamden, Ledyard, Madison, Milford, Old Lyme, Old Saybrook, Stamford and Waterford. The coastal boundary maps for these towns may be at different scales than the original DEP draft maps and may contain minor adjustments to the boundary.

DATA SOURCES

COASTAL BOUNDARY DATA - The original boundary maps were created in 1979 on stable mylar overlay using the 1:24,000-scale US Geological Survey topographic quadrangle maps (mylar film format). The source for tidal wetland maps were the legal 1:24,000 maps (mylar format) adopted by the Commissioner of DEP and transformed to 1:24,000 mylar-scale maps by the Office of Policy and Management (OPM) using an accurate pantograph. OPM similarly converted FEMA's flood insurance maps (various scales) to a 1:24,000 mylar overlay. The inland extent of coastal waters was plotted on 1:24,000 USGS topographic maps following the procedures and sources described in The Boundary Between Saltwater and Freshwater in Connecticut, December 1978 prepared by the State of Connecticut, Department of Environmental Protection, Coastal Area Management Program.

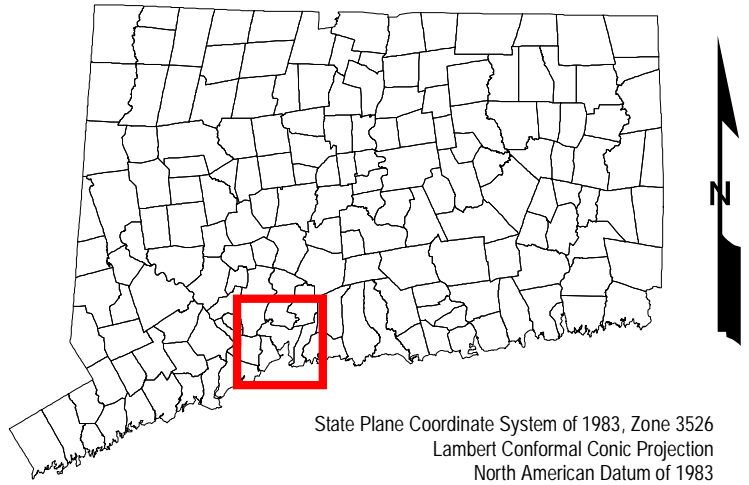
BASE MAP DATA - Based on data originally from 1:24,000-scale USGS 7.5 minute topographic quadrangle maps published between 1969 and 1992. It includes political boundaries, railroads, airports, hydrography, geographic names and geographic places. Streets and street names are from Tele Atlas® copyrighted data. Base map information is neither current nor complete.

RELATED INFORMATION

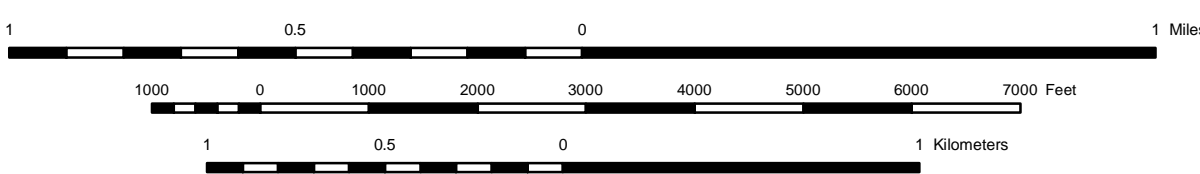
This map is intended to be printed at its original dimensions in order to maintain the 1:24,000 scale (1 inch = 2000 feet).

MAPS AND DIGITAL DATA - Go to the CT ECO website for this map and a variety of others. Go to the DEEP website for the digital spatial data shown on this map.

MAP LOCATION



State Plane Coordinate System of 1983, Zone 20N
Lambert Conformal Conic Projection
North American Datum of 1983



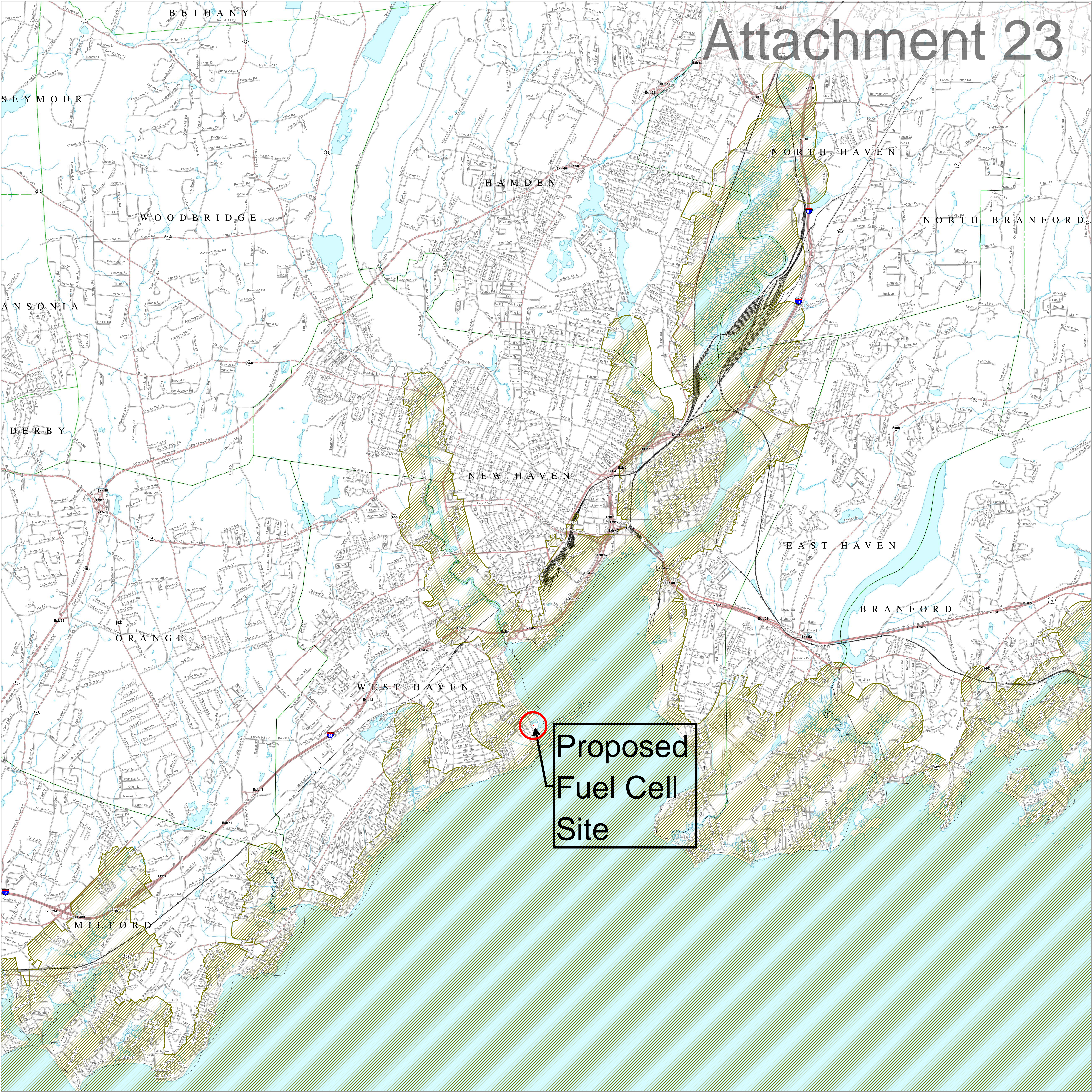
SCALE: 1:24,000 (1 inch = 2000 feet) when map is printed at original size



STATE OF CONNECTICUT
DEPARTMENT OF
ENERGY & ENVIRONMENTAL PROTECTION
79 Elm Street
Hartford, CT 06106-5127

Map created by DEEP
January 2013

Map is not colorfast
Protect from light and moisture





PureCell® Model 400

PURECELL SYSTEM BENEFITS

Energy Security

Proven PAFC fuel cell technology that is setting durability records

Energy Productivity

Increased efficiency and continuous on-site generation reduces energy costs

Energy Responsibility

Ultra-low emissions equals sustainability

PURECELL SYSTEM COMPETITIVE ADVANTAGES

Long Life

Industry leading 10-year cell stack life assures high availability and low service cost

Modular & Scalable

Solutions for multi-megawatt applications to meet growing energy demand

Experience

Most knowledgeable and experienced team in the industry

High Efficiency

Up to 90% total CHP Efficiency

Grid-Independence

Proven performance delivering power when the utility grid fails

Load Following

Capable of dispatching power to match building needs

Small Footprint

Highest power density among clean generation technologies

Flexible Siting

Indoor, outdoor, rooftop, multi-unit

RATED POWER OUTPUT: 440KW, 480VAC/60HZ

Characteristic	Units	Operating Mode	
		Maximum Power ¹	Baseload Power ¹
Electric Power Output ¹	kW/kVA	440/440	400/471
Electrical Efficiency	%, LHV	41%	42%
Peak Overall Efficiency	%, LHV	90%	90%
Gas Consumption	MMBtu/h, HHV (kW)	4.06 (1,190)	3.60 (1,056)
Gas Consumption ²	SCFH (Nm ³ /h)	3,961 (106.1)	3,515 (94.2)
High Grade Heat Output @ up to 250°F ¹	MMBtu/h (kW)	0.76 (223)	0.64 (188)
Low Grade Heat Output @ up to 140°F ¹	MMBtu/h (kW)	0.99 (290)	0.88 (258)

FUEL

Supply..... Natural Gas
Inlet Pressure 10 to 14 in. water (2.5 - 3.5 mbar)

EMISSIONS^{3,4}

NOx 0.01 lbs/MWh (0.006 kg/MWh)
CO 0.02 lbs/MWh (0.009 kg/MWh)
VOC 0.02 lbs/MWh (0.009 kg/MWh)
SO₂..... Negligible
Particulate Matter..... Negligible
CO₂¹ (electric only) 1049 lbs/MWh (476 kg/MWh)
(with full heat recovery) 495 lbs/MWh⁵ (225 kg/MWh)

OTHER

Ambient Operating Temp -20°F to 104°F (-29°C to 40°C)
Sound Level <65 dBA @ 33 ft. (10m)
Water Consumption None (up to 86°F (30°C) Ambient Temp.)
Water Discharge None (Normal Operating Conditions)

CODES AND STANDARDS

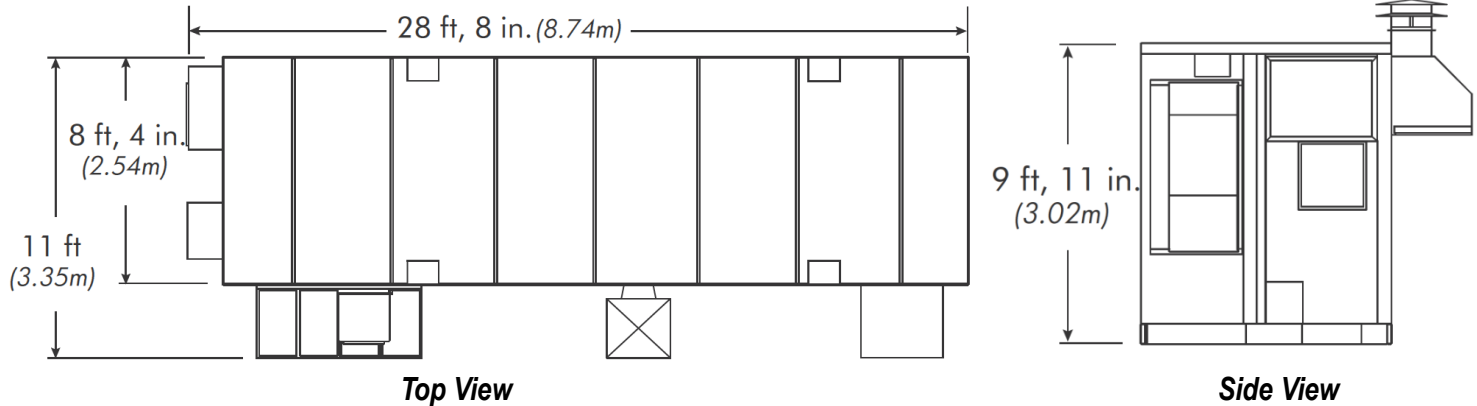
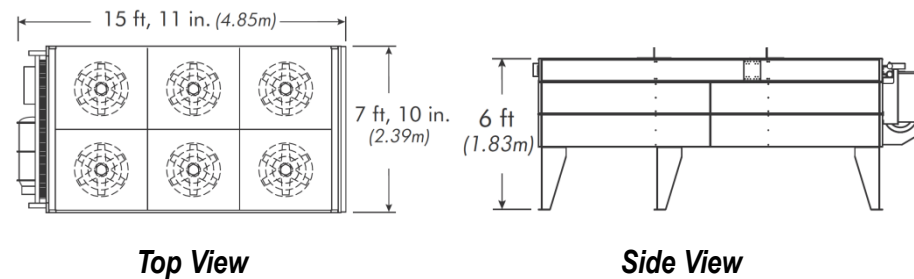
ANSI/CSA FC1-2014: Stationary Fuel Cell Power Systems
UL1741-2010: Inverters for Use With Distributed Energy Resources

NOTES

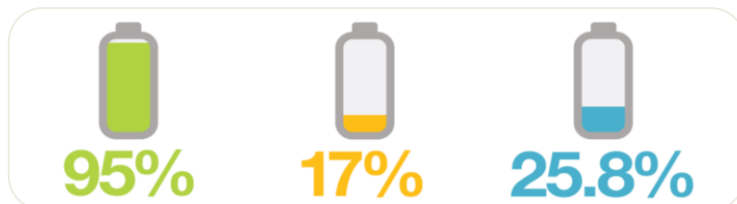
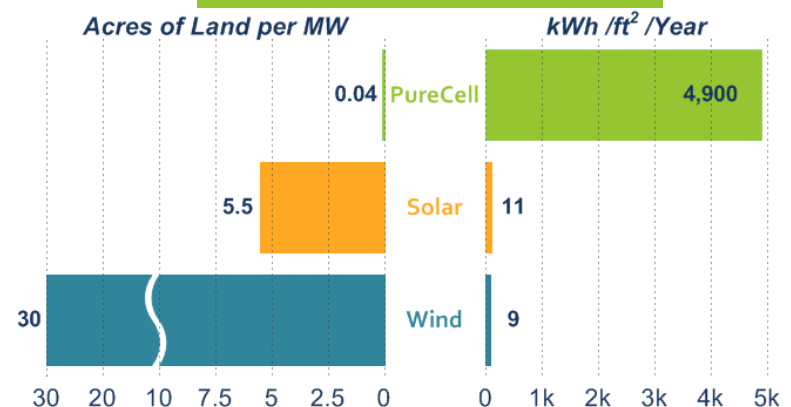
1. Average performance during 1st year of operation.
2. Based on natural gas higher heating value of 1025 Btu/SCF (40.4 MJ/Nm³)
3. Emissions based on 440 kW operation.
4. Fuel cells are exempt from air permitting in many U.S. states.
5. Includes CO₂ emissions savings due to reduced on-site boiler gas consumption



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**SYSTEM DIMENSIONS****Power Module****Cooling Module****PHYSICAL SPECIFICATIONS**

	Power Module	Cooling Module
Length	28' 11" (8.74m)	15' 11" (4.85m)
Width	8' 4" (2.54m)	7' 10" (2.39m)
Height	9' 11" (3.02m)	6' 0" (1.83m)
Weight	57,000 lb (27,216 kg)	3,190lb (1,447 kg)

PURECELL ADVANTAGE**OFFSET 3x MORE CO₂****CAPACITY FACTOR****CO₂ OFFSET****USE LESS LAND**

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