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331 Newman Springs Road, Suite 203
Red Bank, NJ 07701
T: 732.383.1950
F: 732.383.1984
www.maserconsulting.com

May 3, 2017

VIA E-MAIL AND US MAIL

COSTCO Wholesale C/O MG2
45940 Horseshoe Drive
Sterling, VA 20166

Re: Report of Vapor Mitigation System Observation & Testing Services
COSTCO Wholesale (Oceanside, NY)
Daly Boulevard & Hampton Road
Town of Hempstead, Nassau County, New York
MC Project No. 12000271A

To Whom this may concern:

Maser Consulting P.A. (Maser Consulting) is providing this report to summarize the observation and testing of the newly installed subslab Vapor Mitigation System (VMS) for the wholesale food store during redevelopment of the subject site. The objective of the VMS installed below the future building slab is to address the possible presence of harmful vapors resulting from the groundwater which has confirmed contamination of Petroleum Volatile Organic Compounds. The basis of the vapor barrier design is the Liquid Boot® product by Cetco. EAI, Inc. of Jersey City, NJ completed the vapor barrier installation in March and April 2017 which was performed in multiple sections. Quality control smoke testing and thickness testing was performed by EAI, Inc. each day following vapor barrier installation and observed by Maser Consulting. This sequence continued until the foot print of the approximately 158,000 square foot building was completed.

March & April 2017 Inspection of Liquid Boot Application and Smoke Testing

In March and April 2017, Maser Consulting mobilized to the site to perform monitoring of the liquid boot installation and smoke testing at the Proposed COSTCO Wholesale. Following subslab preparation, the vapor remedial system was installed which included placement of Cetco GeoVent as well as a series of four (4) inch diameter polyvinyl chloride (PVC) header pipes which comprise the subslab vapor collection system within 6-inch layer of ¾" clean gravel. The GeoVent product is designed to allow the off-gassing of VOCs into the piping and out from under the building. Above the gravel layer a vapor barrier system was installed to prevent penetration of the VOCs into the building. The Liquid Boot® product was sprayed/applied to a minimum thickness of 40 mils in sections ranging from 4,000 to 24,000 square feet (sq ft) with the edges fastening to the walls of the structure (to portions of the clean/freshly troweled surface).



Following installation, smoke testing and coupon sample collection of the material laid down the previous day was performed at a frequency of approximately 1 per 1,000sqft as a quality control measure to ensure that the system is installed and functioning properly. Prior to smoke testing, the surface was first visually inspected for holes, tears, and potential membrane damage. In accordance with the project specifications the liquid boot barrier consisted of CETCO VI-20 membrane with 40mils of CETCO Liquid Boot 500 applied on top. Therefore, passing coupon samples must measure 60mils minimum.

In total a 187 smoke test holes and coupons were installed and collected through the newly applied Liquid Boot membrane. In each test port location, a small square (approximately 3” x 3”) was cut out of the Liquid Boot/base fabric in order to advance a smoke machine duct and apply low pressure smoke beneath the membrane. Where leaks were observed, the area was repaired/resprayed with Liquid Boot, and re-tested to confirm repair was complete. At the completion of the smoke testing at each location, the hole cut for smoke testing was repaired using Liquid Boot/base fabric per manufacturer’s recommendations.

Following the smoke testing and coupon sample collection the vapor barrier system was protected from potential damage via placement of Ultrashield G-1000 geotextile fabric. The purposed of the geotextile fabric is to protect he vapor barrier from punctures during placement of the building slab. The Vapor Barrier System Testing Log and Site Photographs taken at the time of smoke testing are included as Attachment #1 & 2 to this report.

Observations from the smoke tests are recorded in Table 1 below.

Table 1: COSTCO Wholesale (Oceanside, NY) Smoke Test Results

DATE	DURATION	APPROXIMATE SQUARE FOOTAGE INSTALLED	NO. OF COUPONS COLLECTED	SMOKE TEST RESULTS
03/02/17	8:00-11:30AM	15,500	17	PASSED
03/06/17	7:00-12:00PM	17,000	20	PASSED
03/08/17	7:00-11:00AM	23,000	26	PASSED
03/20/17	7:00-12:00PM	21,000	29	PASSED
03/22/17	7:00-11:00AM	7,000	9	PASSED
03/25/17	7:30-11:30AM	20,000	22	PASSED
03/28/17	8:00-11:00AM	14,000	16	PASSED
03/29/17	7:30-12:30PM	18,000	21	PASSED
03/30/17	7:45-11:45AM	15,000	17	PASSED
04/04/17	8:00-9:00AM	4,200	4	PASSED
04/05/17	7:15-9:15AM	4,000	5	PASSED

During the smoke testing activities, the thickness of the Liquid Boot membrane was performed at 187 locations. The minimum required spray applied membrane thickness per the specifications is 40 mils (0.040” or 1.016mm). Note the vapor barrier consisted of the VI-20 membrane which



measures 20 mils with 40 mils of Liquid Boot 500 sprayed on top. As such, passing coupons were required to measure >60 mils. Areas that did not meet the specified thickness were resprayed. Observations, areas resprayed, and coupon thickness are detailed on the field logs included as Attachment #1 to this report.

Conclusions and Recommendation

The subslab Vapor Mitigation System installation for the proposed COSTCO Wholesale was performed in March and April 2017. Successful smoke testing and thickness testing of the vapor barrier system was performed at a frequency of approximately 1 per 1,000sqft. Subsequent to smoke testing and thickness testing activities, the G-1000 Protection Course fabric was installed atop the Liquid Boot. This completed the subslab vapor mitigation system installation.

Following complete building construction indoor air samples will be collected via the passive vapor mitigation system to verify the effectiveness of this remedial action. Please contact me if you have any questions regarding this review.

Very truly yours,
MASER CONSULTING P.A.

A handwritten signature in black ink, appearing to read 'R. Slager', with a long horizontal flourish extending to the right.

Ryan Slager, P.E., LSRP
Associate, Environmental Services

Enclosures (2)

RJS/ejp

cc: John C. Walton, P.E., Maser Consulting P.A.
Jonathan Jolley, P.E., Maser Consulting P.A



Attachment #1
Vapor Barrier Testing Log



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VAPOR BARRIER SYSTEM TESTING LOG

Project Name: COSTCO OCEANSIDE
 Inspector Name: Ryan Slayur
 Location: Hempstead, Oceanside
 Weather Conditions:

Date: 2/27/17
 Time: 2:30p
 Temperature: 46°F
 Barometric Pressure:

Building Square Footage	<u>160,000</u> 1000 SF +/-
Square Footage for this report	<u>1000 SF +/-</u>

Gallons Used	
Square feet per Gallon	

Coupon Samples Taken	<u>NA</u>
Coupon Samples Under the Specified Thickness	<u>NA</u>
Coupon Sample Marked for Repair	<u>NA</u>

Smoke Test Conducted	<u>NA</u>
Duration of Smoke Test	<u>NA</u>
Number of Areas Needing Repair	<u>NA</u>

Indicate areas marked for repair: (#) Coupon sample repair (^) Smoke test repair (*) Thickness measurement repair

- See Attached map of liquid boot applied area.

Note: Liquid boot 500 applied over VI-20 geomembrane

- VI 20 geomembrane is 20 mil thick (0.5mm)

- Liquid Boot 500 to be applied 60 mil min. thickness (1.5mm)

- Total thickness to be 80 mil or (2.0mm)

- Recommend material not stored outside below 45°F



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VAPOR BARRIER SYSTEM TESTING LOG

Project Name: Costco Ocean side
 Inspector Name: Ryan Skager / Ethan Perro
 Location: Hempstead, NY
 Weather Conditions: Overcast / Windy

Date: 3/2/17
 Time: 8:00 AM
 Temperature: 47°F
 Barometric Pressure: 29.64

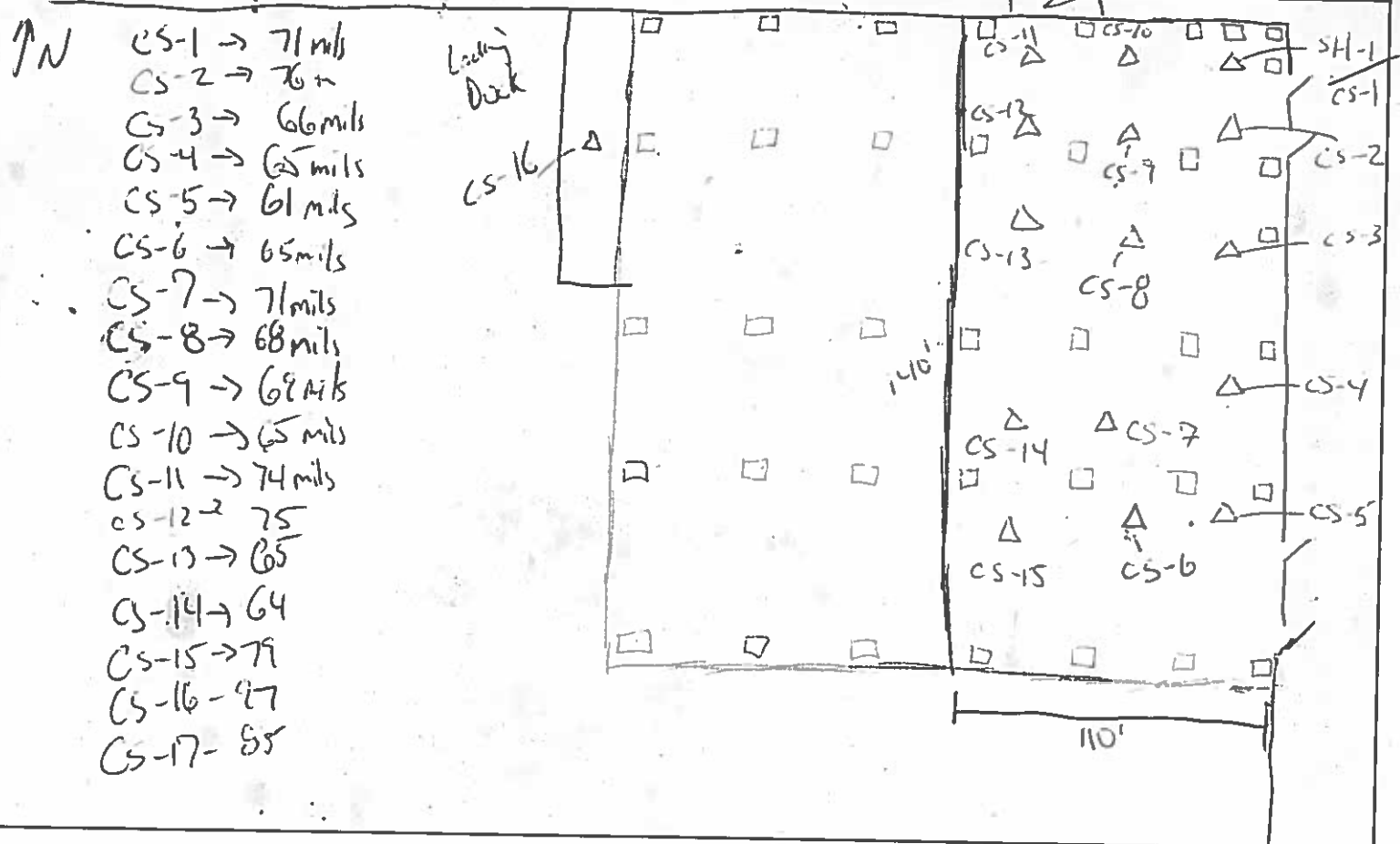
Building Square Footage	
Square Footage for this report	

Gallons Used	
Square feet per Gallon	

Coupon Samples Taken	
Coupon Samples Under the Specified Thickness	
Coupon Sample Marked for Repair	

Smoke Test Conducted	
Duration of Smoke Test	
Number of Areas Needing Repair	

Indicate areas marked for repair: (#) Coupon sample repair (^) Smoke test repair (*) Thickness measurement repair





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VAPOR BARRIER SYSTEM TESTING LOG

Project Name: Costco OceanSide
 Inspector Name: Ethan Kern
 Location: OceanSide, NJ
 Weather Conditions: Sunny

Date: 3/6/17
 Time: 7:00 AM
 Temperature: 30°F High of 45°F
 Barometric Pressure: 30.55

Building Square Footage	155,000
Square Footage for this report	17000 20000 17,000 38 74

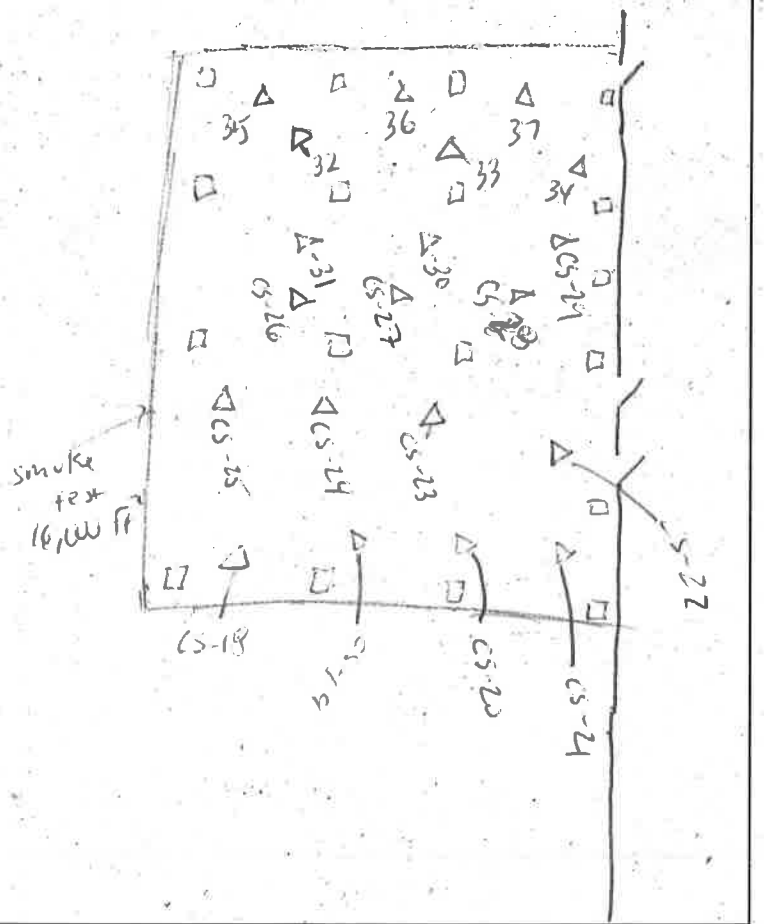
Gallons Used	
Square feet per Gallon	

Coupon Samples Taken	15 20
Coupon Samples Under the Specified Thickness	3
Coupon Sample Marked for Repair	3

Smoke Test Conducted	Yes
Duration of Smoke Test	
Number of Areas Needing Repair	3

Indicate areas marked for repair: (#) Coupon sample repair (^) Smoke test repair (*) Thickness measurement repair

↑N	CS-18	79.5	
	CS-19	39.5	
	CS-20	62.5	
	CS-21	157	→ respunged low fabric
	CS-22	62	
	CS-23	92	
	CS-24	95	
	CS-25	75	
	CS-26	66	
	CS-27	74	respunged
	CS-28	77	respunged
	CS-29	81	
	CS-30	72	
	CS-31	118	
	CS-32	71	
	CS-33	103	
	CS-34	61	
	CS-35	81	
	CS-36	78	
	CS-37	82	





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VAPOR BARRIER SYSTEM TESTING LOG

Project Name: Costco OceanSide
 Inspector Name: Ethan Perco
 Location: Daly Blvd, OceanSide NJ
 Weather Conditions: Rainy

Date: 3/8/17
 Time: 7:00 AM
 Temperature: 47°F High of 56°F
 Barometric Pressure: 29.94

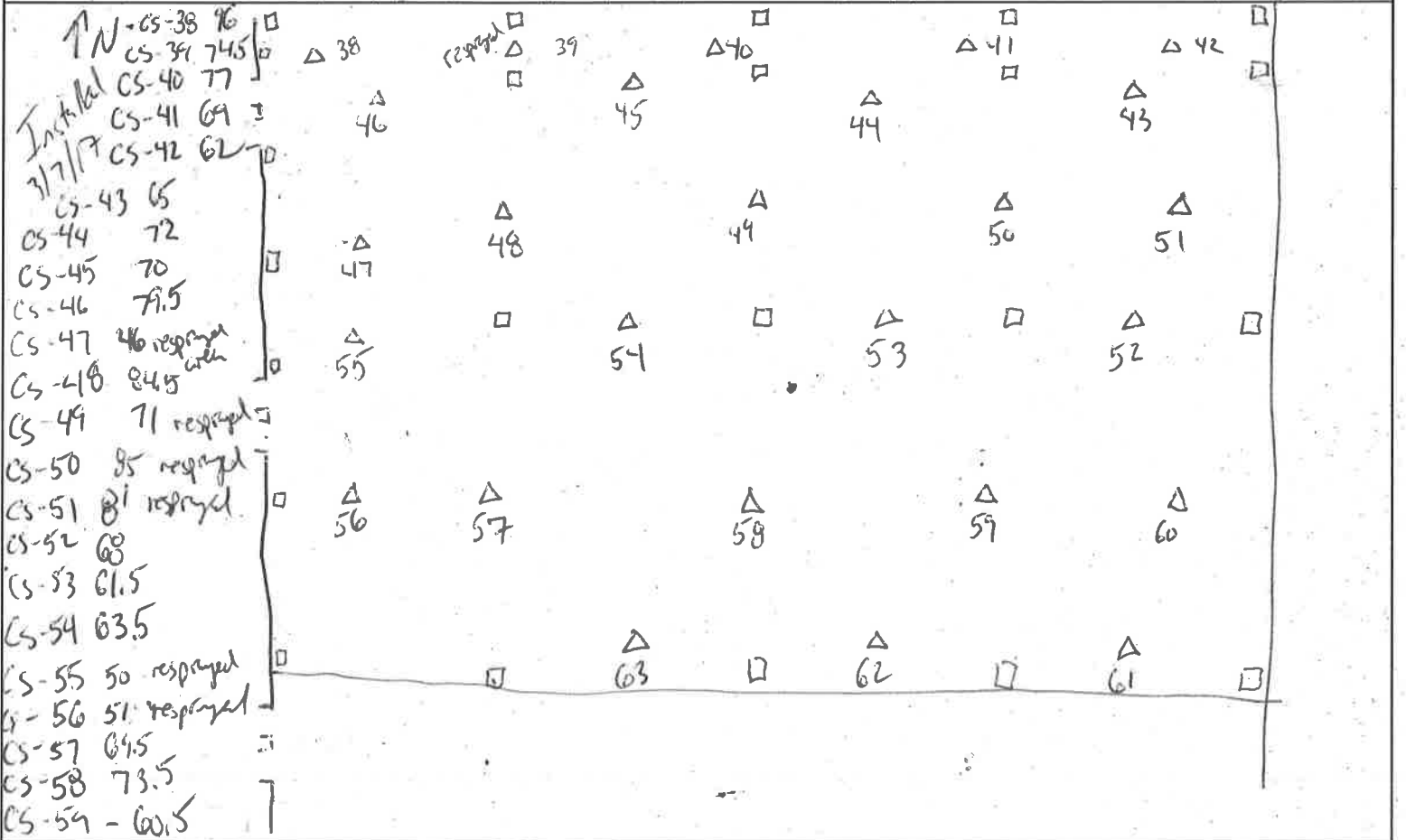
Building Square Footage.	160,000
Square Footage for this report	23,000 24,000 26,000 <small>self self</small>

Gallons Used	
Square feet per Gallon	

Coupon Samples Taken	26
Coupon Samples Under the Specified Thickness	6
Coupon Sample Marked for Repair	6

Smoke Test Conducted	
Duration of Smoke Test	
Number of Areas Needing Repair	6

Indicate areas marked for repair: (#) Coupon sample repair (^) Smoke test repair (*) Thickness measurement repair



CS-60 65.5
 CS-61 65.5
 CS-62 70.5
 CS-63 60.2
 CS-64 65.5



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VAPOR BARRIER SYSTEM TESTING LOG

Project Name: -osteo OceanSide
 Inspector Name: Ethan Perce
 Location: Daly Blvd, OceanSide NJ
 Weather Conditions: Sunny, Cold

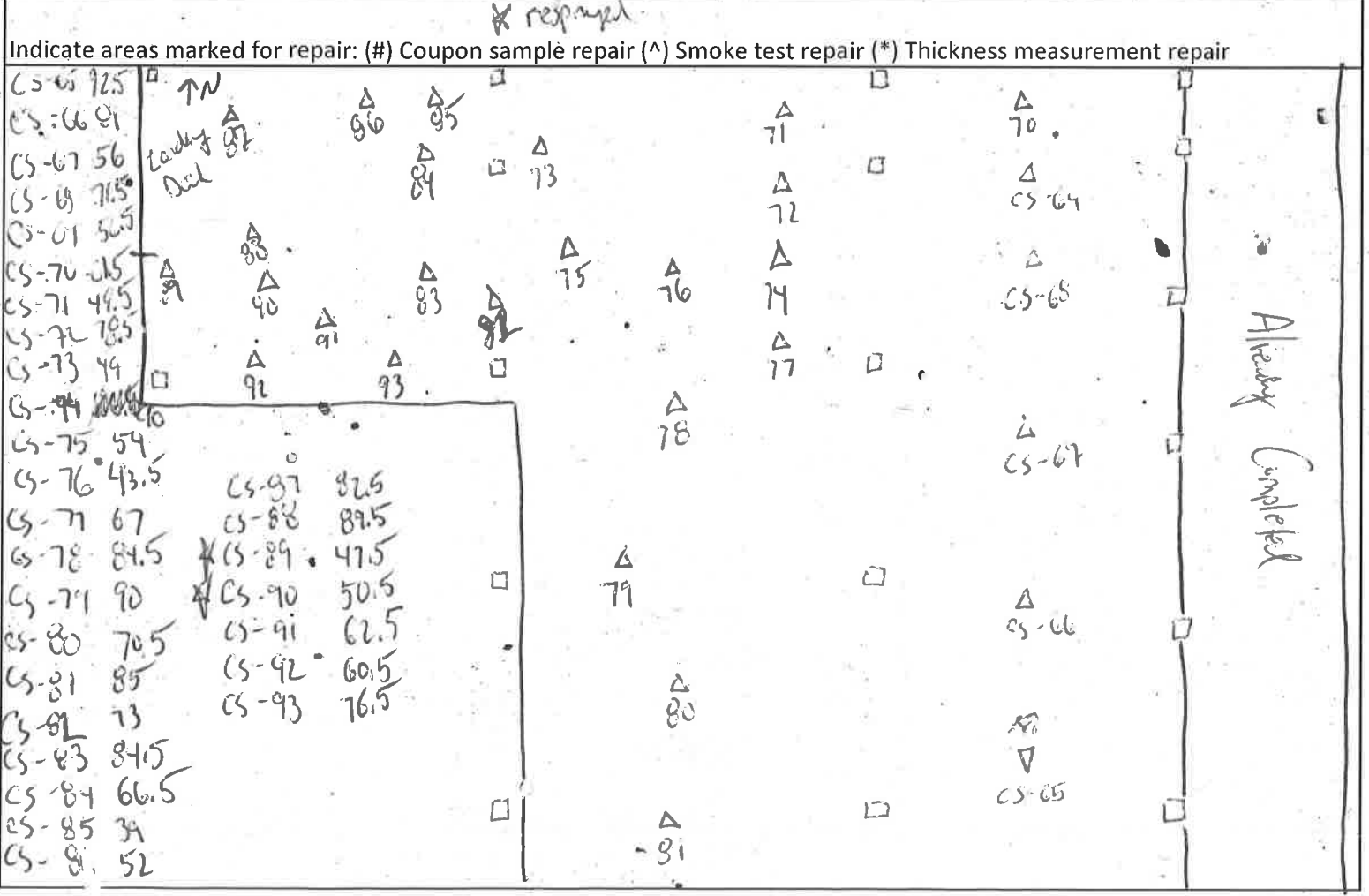
Date: 3/20/17
 Time: 7:00AM
 Temperature: 31°F
 Barometric Pressure: 31.10

Building Square Footage	160,000
Square Footage for this report	approx. 29,000 24,000 <u>21,000 sq ft</u>

Gallons Used	
Square feet per Gallon	

Coupon Samples Taken	29
Coupon Samples Under the Specified Thickness	10
Coupon Sample Marked for Repair	10

Smoke Test Conducted	3/20/17
Duration of Smoke Test	5 hrs
Number of Areas Needing Repair	





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VAPOR BARRIER SYSTEM TESTING LOG

Project Name: <u>Costco Oceanside</u>	Date: <u>3/22/17</u>
Inspector Name: <u>Ethan Perro</u>	Time: <u>7:00 AM</u>
Location: <u>Daly Blvd, Oceanside NY</u>	Temperature: <u>39°F</u>
Weather Conditions: <u>Sunny, Cold, Windy 39°F</u>	Barometric Pressure: <u>30.02</u>

Building Square Footage	<u>160,000</u>
Square Footage for this report	<u>7,000</u>

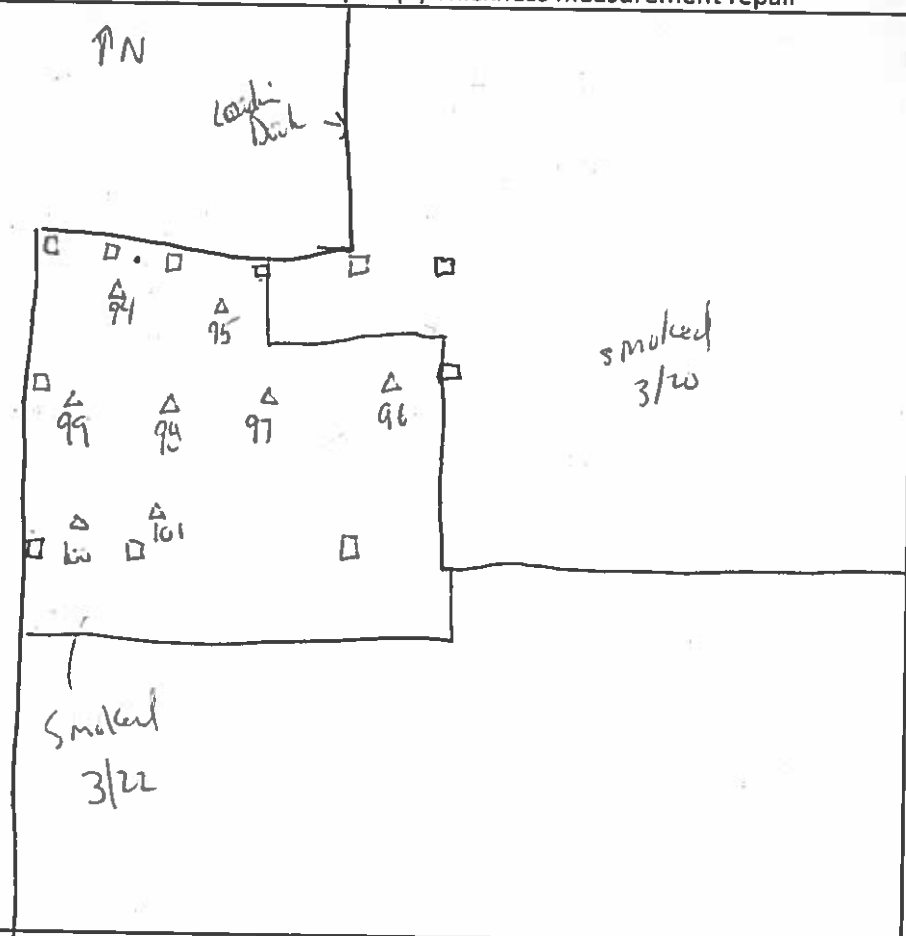
Gallons Used	
Square feet per Gallon	

Coupon Samples Taken	<u>9</u>
Coupon Samples Under the Specified Thickness	<u>1</u>
Coupon Sample Marked for Repair	<u>1</u>

Smoke Test Conducted	<u>3/22/17</u>
Duration of Smoke Test	<u>4 hrs</u>
Number of Areas Needing Repair	<u>1</u>

Indicate areas marked for repair: (#) Coupon sample repair (^) Smoke test repair (*) Thickness measurement repair

- CS-94 90
- CS-95 115
- CS-96 65.5
- CS-97 51 *
- CS-98 97.5
- CS-99 90
- CS-100 14.5
- CS-101 81
- CS-102 90





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VAPOR BARRIER SYSTEM TESTING LOG

Project Name: COSTCO OCEANSIDE /16002267A Date: 3/25/2017
 Inspector Name: DAVE KEIL Time: 0730
 Location: DALY BLVD OCEANSIDE, NY Temperature: 40
 Weather Conditions: OVERCAST, CALM WINDS Barometric Pressure: 30.18
MODERATE HUMIDITY

Building Square Footage	160,000
Square Footage for this report	20,000

Gallons Used	
Square feet per Gallon	

Coupon Samples Taken	22
Coupon Samples Under the Specified Thickness	1
Coupon Sample Marked for Repair	1

Smoke Test Conducted	3/25/2017
Duration of Smoke Test	4 hours
Number of Areas Needing Repair	1

Indicate areas marked for repair: (#) Coupon sample repair (^) Smoke test repair (*) Thickness measurement repair

CS-103 }
 104 } >60ml
 105 }
 106 }
 107 }
 108 }
 109 }
 110 }
 111 } >60ml
 112 }
 113 }
 114 }
 115 }
 116 } >60ml
 117 }
 118 }
 119 }
 120 }

CS-121
 122 } >60ml
 123 }
 124 }

AREA C CS-111 RE-SPRINKLED

23 DRUMS OF LIQUID BAIT WAS PREVIOUSLY
 USED ON THE SUBJECT AREA ON FRIDAY
 3/24/2017



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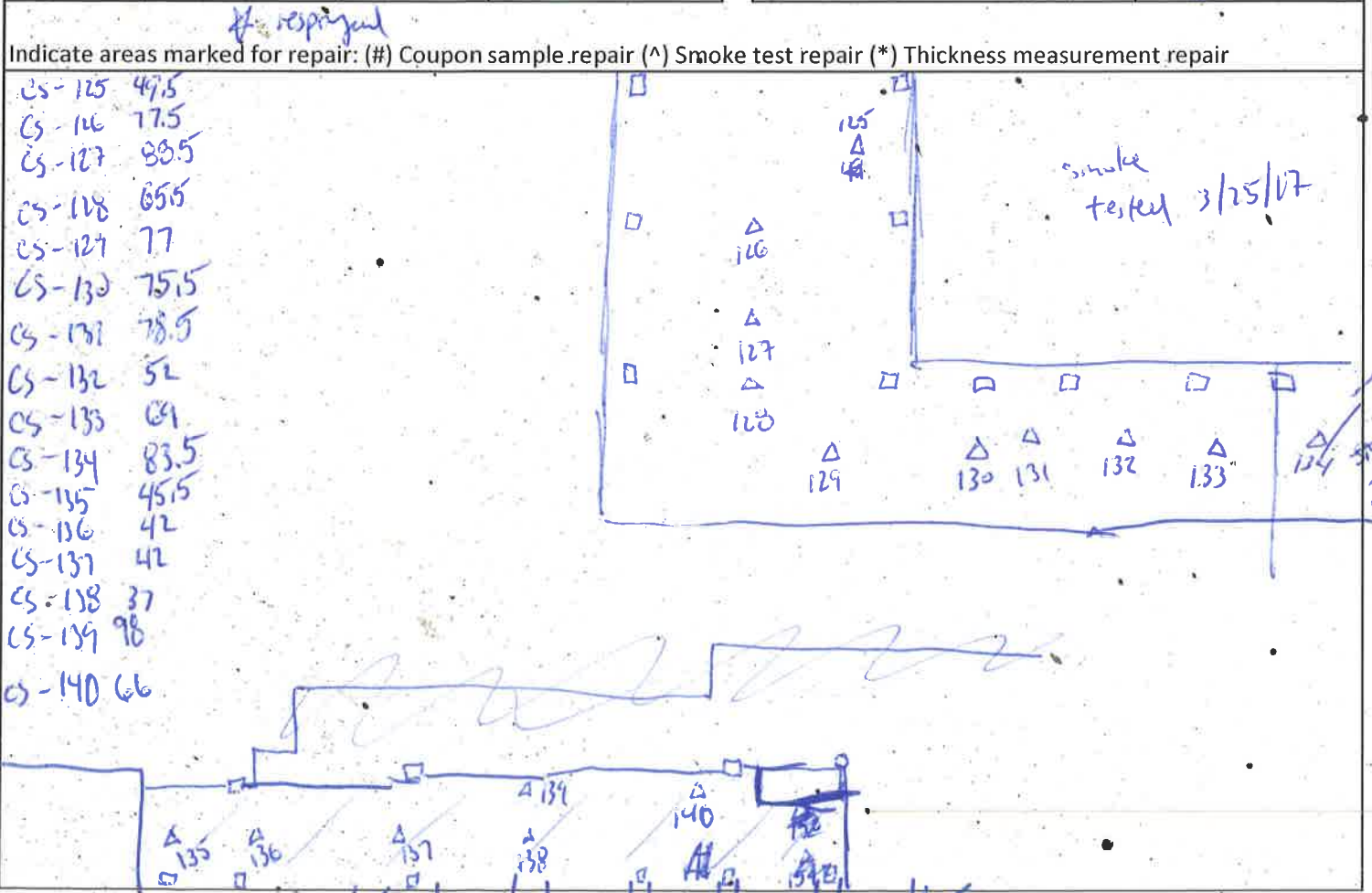
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VAPOR BARRIER SYSTEM TESTING LOG

Project Name: <u>Costco Oceanside</u>	Date: <u>3/28/17</u>
Inspector Name: <u>Ethan Penn</u>	Time: <u>7:00 AM</u>
Location: <u>Daly Blvd., Oceanside NJ</u>	Temperature: <u>45°F</u>
Weather Conditions: <u>Cloudy, Windy</u>	Barometric Pressure: <u>29.94</u>

Building Square Footage	<u>160,000</u>	Gallons Used	
Square Footage for this report	<u>10,000 + 8,000 14,000</u>	Square feet per Gallon	

Coupon Samples Taken	<u>16</u>	Smoke Test Conducted	<u>3/28/17</u>
Coupon Samples Under the Specified Thickness	<u>6</u>	Duration of Smoke Test	<u>3 L/s</u>
Coupon Sample Marked for Repair	<u>6</u>	Number of Areas Needing Repair	<u>6</u>



- CS-125 47.5
- CS-126 77.5
- CS-127 83.5
- CS-128 65.5
- CS-129 77
- CS-130 75.5
- CS-131 78.5
- CS-132 52
- CS-133 69
- CS-134 83.5
- CS-135 45.5
- CS-136 42
- CS-137 42
- CS-138 37
- CS-139 98
- CS-140 66



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VAPOR BARRIER SYSTEM TESTING LOG

Project Name: Custco OceanSide
 Inspector Name: Ethan Perro
 Location: Daly Blvd., OceanSide NJ
 Weather Conditions: Sunny, Windy

Date: 3/29/17
 Time: 7:00 AM
 Temperature: 42°F
 Barometric Pressure: 30.03

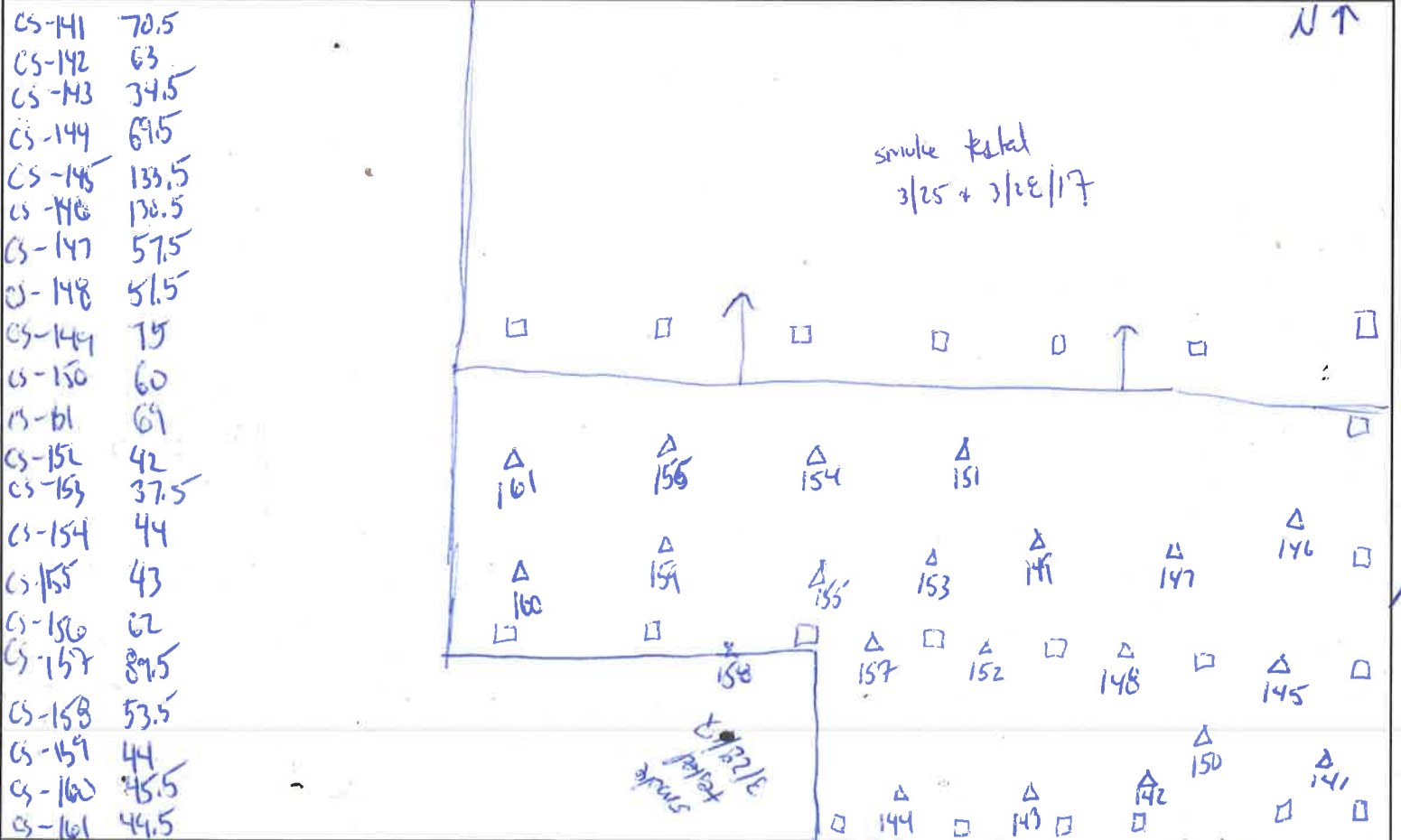
Building Square Footage	<u>160,000</u>
Square Footage for this report	<u>10,000</u>

Gallons Used	
Square feet per Gallon	

Coupon Samples Taken	<u>21</u>
Coupon Samples Under the Specified Thickness	<u>11</u>
Coupon Sample Marked for Repair	<u>11</u>

Smoke Test Conducted	<u>562 3/29/17</u>
Duration of Smoke Test	<u>520</u>
Number of Areas Needing Repair	<u>11</u>

Indicate areas marked for repair: (#) Coupon sample repair (^) Smoke test repair (*) Thickness measurement repair





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VAPOR BARRIER SYSTEM TESTING LOG

Project Name: Costco OceanSide Date: 3/30/17

Inspector Name: Ethan Reed Time: 7:00

Location: Daly Blvd, OceanSide NJ Temperature: 38°F

Weather Conditions: Sunny, Windy, Cold Barometric Pressure: 30.26

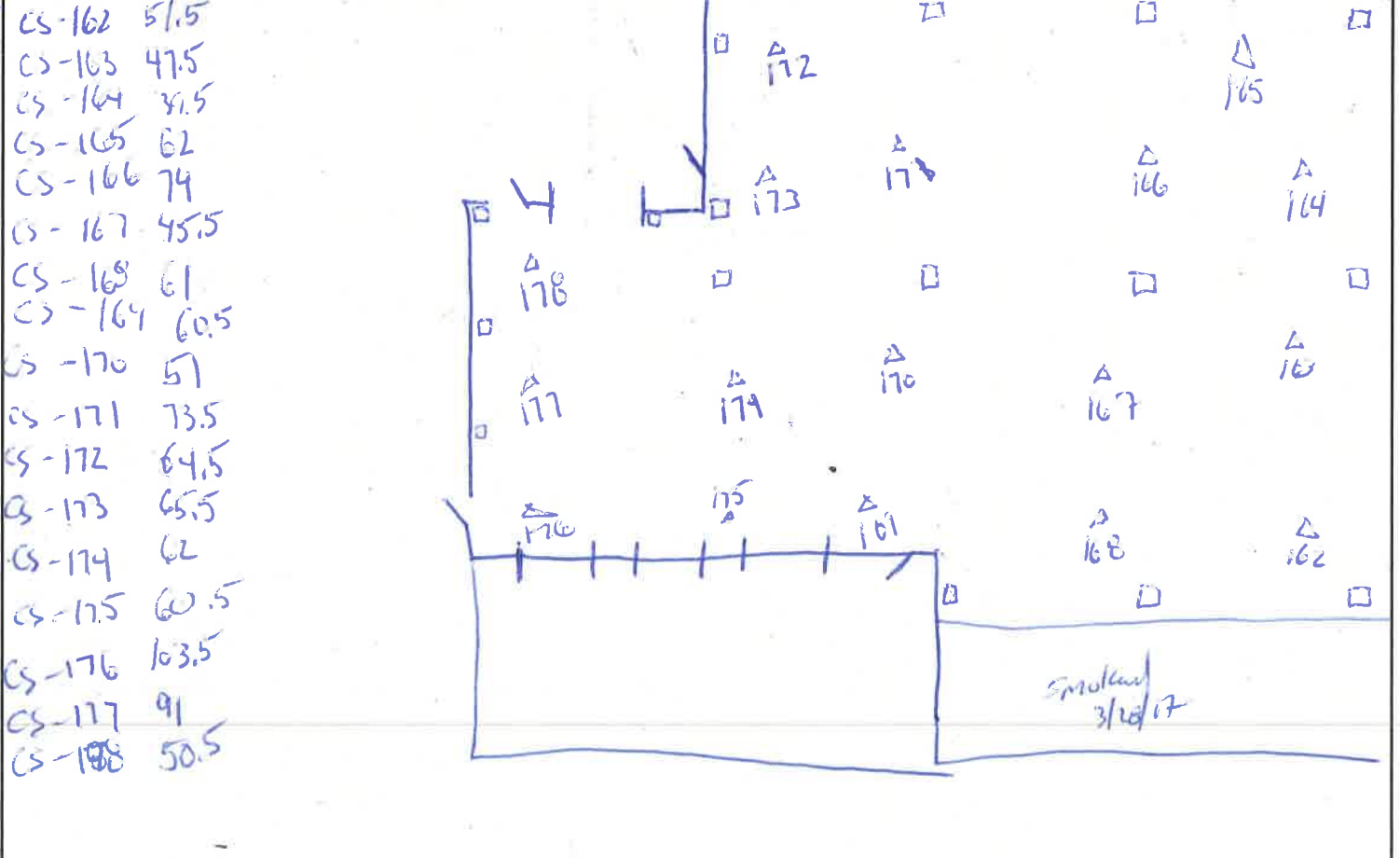
Building Square Footage	<u>160,000</u>
Square Footage for this report	<u>15,600</u>

Gallons Used	
Square feet per Gallon	

Coupon Samples Taken	<u>17</u>
Coupon Samples Under the Specified Thickness	<u>6</u>
Coupon Sample Marked for Repair	<u>5</u>

Smoke Test Conducted	<u>3/30/17</u>
Duration of Smoke Test	<u>4h</u>
Number of Areas Needing Repair	<u>5</u>

Indicate areas marked for repair: (#) Coupon sample repair (^) Smoke test repair (*) Thickness measurement repair





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VAPOR BARRIER SYSTEM TESTING LOG

Project Name: <u>Costco OceanSide</u>	Date: <u>4/4/17</u>
Inspector Name: <u>Ethan Vere</u>	Time: <u>7:00</u>
Location: <u>Daly Blvd, OceanSide, NY</u>	Temperature: <u>49°F</u>
Weather Conditions: <u>Rainy, Overcast</u>	Barometric Pressure: <u>29.65</u>

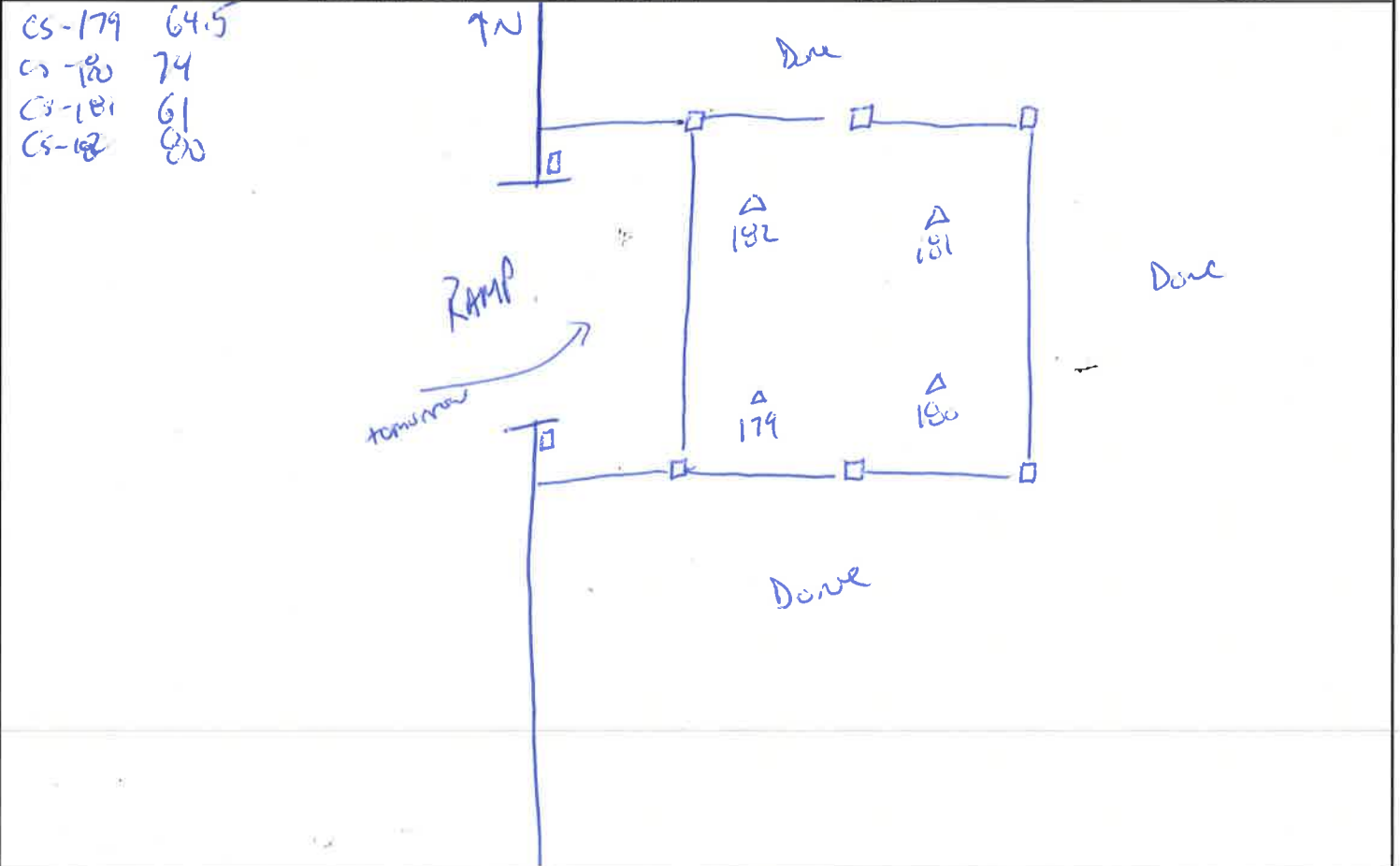
Building Square Footage	<u>160,000</u>
Square Footage for this report	<u>4,200</u>

Gallons Used	
Square feet per Gallon	

Coupon Samples Taken	
Coupon Samples Under the Specified Thickness	
Coupon Sample Marked for Repair	

Smoke Test Conducted	
Duration of Smoke Test	
Number of Areas Needing Repair	

Indicate areas marked for repair: (#) Coupon sample repair (^) Smoke test repair (*) Thickness measurement repair





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VAPOR BARRIER SYSTEM TESTING LOG

Project Name: USFLO OCEANSIDE
 Inspector Name: D. KIL
 Location: 1427 OCEANSIDE, NY
 Weather Conditions: OVERCAST 57°F

Date: APRIL 5, 2017
 Time: 0700
 Temperature: 50°F
 Barometric Pressure: 29.90

Building Square Footage	1000 / 3000
Square Footage for this report	4000

Gallons Used	
Square feet per Gallon	

Coupon Samples Taken	5
Coupon Samples Under the Specified Thickness	1
Coupon Sample Marked for Repair	1

Smoke Test Conducted	4/5/2017
Duration of Smoke Test	2 HOURS
Number of Areas Needing Repair	1

Indicate areas marked for repair: (#) Coupon sample repair (^) Smoke test repair (*) Thickness measurement repair

COUPON LOCATION AT 187 WAS QUANTITATIVELY BELOW 60ml (SF)
 REPAIRING AREA TO ACHIEVE >60ml MEASUREMENT

ml

COUPONS 183 78
 184 62
 185 82
 186 71
 187 58 / REPAIRING TO >60ml



Attachment #2
Site Photographs



Photo #1: Depicts installation of vapor barrier system.



Photo #2: Depicts smoke testing of Liquid Boot Membrane.



Photo #3: Depicts smoke testing of Liquid Boot Membrane.



Photo #4: Depicts G-1000 protective layer.