

# CRITICAL THINKING SKILLS FOR NAVIGATING PUBLIC HEALTH DATA

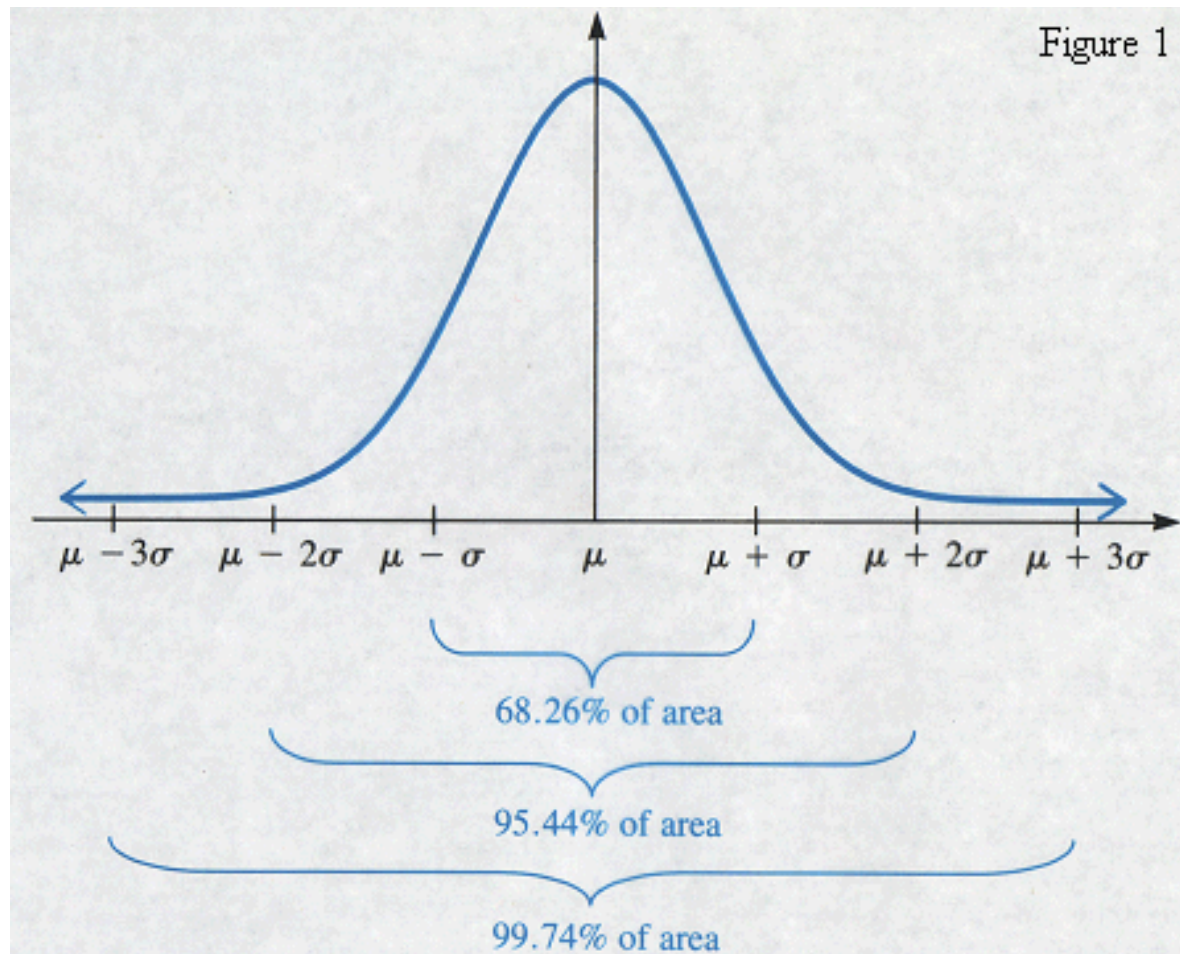
KATHLEEN LANNON RN, MS



# MORE IS NOT ALWAYS BETTER



# NORMAL CURVE





- PLACEBO EFFECT
- “a beneficial effect, produced by a placebo drug or treatment, that cannot be attributed to the properties of the placebo itself and must therefor be due to the patient’s belief in the treatment”
- GOOGLE
- SURROGATE ENDPOINTS
- “a measure of effect of a specific treatment that may correlate with a real clinical endpoint but does not necessarily have a guaranteed relationship” Wikipedia



# INNUMERACY

- **“MARKED BY AN IGNORANCE OF MATHEMATICS AND SCIENTIFIC APPROACH”**
- **Merriam Webster definition on line**
- **John Allen Paulos Innumeracy:Mathematical Illiteracy and its Consequences**

# COMMON WAYS NUMERICAL DATA CAN BE MISLEADING

- 1.ARITHMETICAL ERRORS
- 2.FALSE PER CENTAGES
- 4.FICTITIOUS PRECISION
- 5.INCOMPLETE DATA
- 6.FAULTY COMPARISONS
- 7.IMPROPER SAMPLING
- FAILURE TO ALLOW FOR EFFECT OF CHANCE
- RUSSELL LANGLEY “PRACTICAL STATISTICS”



# INNUMERCY

- DIFFERENCES BETWEEN A MILLION, A BILLION AND A TRILLION
- POPULATION OF THE UNITED STATES
- 1,000,000 MILLION
- 1,000,000,000 BILLION
- 1,000,000,000,000 TRILLION





MILLION SECONDS - <12 DAYS

BILLION SECONDS – ABOUT 32 YEARS

TRILLION SECONDS- 32,000 YEARS

JA PAULOS “THE ODDS ARE YOUR  
INNUMERATE” NY TIMES 1/1/1989



- US POPULATION: 324,459,463
- 9/20/17
- [WWW.WORLDMETERS.INFO/WORLD](http://WWW.WORLDMETERS.INFO/WORLD)  
POPULATIONS

- PUBLIC HEALTH
- BLACK/WHITE THINKING/DATA
- ENGINEERING EXPECT ACCURACY OF
- CLOSE TO 100%(99%)
- HEALTH RELATED ISSUES GRAY THINKING
- COMPLEX INTERACTIONS BOTH KNOWN/
- UNKNOWN FACTORS THRILLED WITH  
ACCURACY OF 95%

# 1. ARITHMETIC ERRORS

- ALLERGIC REACTIONS IN ANTIBIOTICS
- BOSTON GLOBE TWO ANTIBIOTICS SIMILAR %ALLERGIC REACTIONS
- CALCULATED PER PILL!
- ONE WAS DAILY DOSE:ONE THREE TIMES PER DAY



# ARITHMETIC INTERPRETATION

- SHINGLES VACCINE EFFICACY
- 51% EFFICACY
- 67% PREVENTION OF POST HERPETIC NEURALGIA
- GABUTTI ET AL “EVALUATION OF EFFICACY AND EFFECTIVENESS OF LIVE ATTENUATED ZOSTER VACCINE”



# SHINGLES DATA

- >60 YEARS AGE
- VACCINE:19,270
- PLACEBO:19,276
- DURATION 6 MONTHS

95% COMPLETED STUDY



# SHINGLES

- 957 CASES OCCURRED
- 315 IMMUNIZED SUBJECTS
- 642 PLACEBO SUBJECTS
- POST-HERPETIC NEURALGIA
- 107 CASES
- 27 IMMUNIZED SUBJECTS
- 80 PLACEBO GROUP



# SHINGLES STUDY

- 67% OF ALL OR JUST VACCINATED?
- INCIDENCE OF PHN IN THIS STUDY
- 107 IN 957 CASES
- 8.9%





## 2.FALSE PERCENTAGES

### COMMON MISTAKES

#### MILLIS AS A MURDER CAPITAL

- ADDING PERCENTAGES
- DECREASING PERCENTAGES
- HUGE PERCENTAGES
- PERCENTAGES WITH ANY ACTUAL NUMBERS



# 3.FICTITIOUS PRECISION

US POPULATION

STORM SURGE: RANGE INSTEAD OF ONE  
NUMBER



## 4. MISLEADING PRESENTATION

- ANTIBIOTIC EXAMPLE
- DRUG ADS



# 5. INCOMPLETE DATA/INCORRECT DATA

- HOW DO YOU GET TO MY BLACKSMITH'S HOME IN FOXBORO?

“THE GREAT MARGARINE MISTAKE”

- PAUL A. OFFITT “PANDORA'S LAB”
- GOOGLE SAYS I HAVE LYME DISEASE  
MILLIS HAS A LEAD PROBLEM!



# Great Margarine Mistake

- Dietary advice ends up being wrong
- 1901- fats first hydrogenated (makes liquid fats solid and they have a much longer shelf life) “trans fat” does not commonly occur in nature
- 1956 interstate highways allowed development of “fast food chains”
- 1958 Food Additives Amendment



# Great Margarine Mistake

- “a food shall be deemed adulterated if it bears or contains any poisonous or deleterious substance which may render it injurious to health”
- Partially hydrogenated vegetable oils were grandfathered
- 2001 hydrogenation is the fourth largest food manufacturing process in the world



# GOOGLE SAYS I HAVE LYME DISEASE

- ONE POSITIVE ANTIBODY SPIKE ON LYME BLOOD TEST
- WHAT ELSE COULD HAVE CAUSED IT?
- FIRST 5 PAGES OF GOOGLE SAY IT MUST BE LYME

# **Millis Housing Production Plan Health Addendum**

**Prepared for the Town of Millis**  
June 2016





## Housing Determinants



### Lead, Pests, Mold, Mildew, Allergens, and Indoor Pollutants.

**Lead:** Blood lead levels are higher in Millis than the State rate of 3.7 per 1,000 children even though a smaller proportion of the housing stock (62%) contains lead compared to the average of 71% in Massachusetts as a whole.<sup>1</sup> Compliance with state-and-federally mandated screening rates of blood lead in children under the age of 3 (all children must be tested 3 times by this age are also below average at 68% in Millis compared to 77% across the Commonwealth.

Although pests, mold, mildew, allergens, and indoor pollutants were not highlighted as issues through stakeholder engagement with Millis's Health Compliance Officer, lack of a complete town-wide sewer system was. While the Town is partially served by sewer, many Town's residents are served by private septic systems, which is mostly an issue if the systems are not properly maintained and stop treating sewage thoroughly and can then lead to increased nitrates in the environment or by attracting mosquitoes or flies that carry disease to the area. This was not cited as an issue during stakeholder discussions.

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<sup>1</sup> MA Bureau of Environmental Health (BEH) Environmental Public Health Tracking (EPHT) Millis Community Profile.  
<https://matracking.ehs.state.ma.us/> then click "community profile".

**Prevalence of Males and Females with Confirmed Elevated BLLs  $\geq$  10 ug/dL, Screened in 2005 - 2014  
that were between 0 - <36 Months of age**

**Millis - 25021407100**

<b>Year</b>	<b>Case count</b>	<b>Rate per 1,000</b>	<b>95% Confidence Interval</b>	<b>Statistical Significance</b>
2005	NS	NS	NS	NS
2006	0	NC	NC	NC
2007	NS	NS	NS	NS
2008	0	NC	NC	NC
2009	0	NC	NC	NC
2010	0	NC	NC	NC
2011	0	NC	NC	NC
2012	0	NC	NC	NC
2013	0	NC	NC	NC
2014	0	NC	NC	NC
<b>Annual Average</b>	<b>NS</b>	<b>NS</b>	<b>NS</b>	<b>NS</b>

**Statewide**

<b>Year</b>	<b>Case Count</b>	<b>Lead Screening Count</b>	<b>Rate per 1,000</b>	<b>Confidence Interval</b>
2005	1,276	135,251	9.4	8.9 - 10.0
2006	1,183	132,978	8.9	8.4 - 9.4
2007	995	133,825	7.4	7.0 - 7.9
2008	798	135,100	5.9	5.5 - 6.3
2009	650	132,490	4.9	4.5 - 5.3
2010	647	131,827	4.9	4.5 - 5.3
2011	526	125,776	4.2	3.8 - 4.5
2012	524	124,403	4.2	3.9 - 4.6
2013	467	127,461	3.7	3.3 - 4.0
2014	531	125,456	4.2	3.9 - 4.6
<b>Annual Average</b>	<b>759.7</b>	<b>130,457</b>	<b>5.8</b>	<b>5.7 - 6.0</b>

Bureau of  
**BEH**  
 Environmental Health

**Massachusetts Department of Public Health**  
**Childhood Lead Poisoning Prevention Program**

*Screening and Prevalence of Childhood Blood Lead Levels for Children 9 months to  
 less than 4 years of age by Community*

Calendar Year 2015: January 01, 2015- December 31, 2015

Community	Population 9-47 mo. <sup>1</sup>	Total Screened	Percent Screened	Blood Lead Levels <sup>2</sup> (µg/dL)								Confirmed and Unconfirmed ≥5 <sup>3</sup>		Confirmed Elevated ≥10 <sup>4</sup>		Percent Pre-1976 Housing Units <sup>5</sup>
				0-4		5-9		10-24		≥25						
				N	%	N	%	N	%	N	%	N	%	N	%	
METHUEN	1866	1235	66	1218	99	14	1	3	<1	0	0	17	1	3	0	65
MIDDLEBOROUGH	810	572	71	562	98	8	1	NS	NS	0	0	10	2	NS	NS	54
MIDDLEFIELD	13	2	15	NS	NS	0	0	0	0	0	0	0	0	0	0	43
MIDDLETON	195	202	>99	200	99	NS	NS	0	0	0	0	NS	NS	0	0	47
MILFORD	1224	826	67	784	95	35	4	7	1	0	0	42	5	6	1	67
MILLBURY	448	308	69	301	98	NS	NS	NS	NS	0	0	7	2	NS	NS	69
MILLIS	233	175	75	174	99	NS	NS	0	0	0	0	NS	NS	0	0	62
MILLVILLE	85	43	51	39	91	NS	NS	0	0	0	0	NS	NS	0	0	55
MILTON	937	838	89	824	98	10	1	NS	NS	NS	NS	14	2	NS	NS	83
MONROE	0	1	>99	NS	NS	0	0	0	0	0	0	0	0	0	0	68
MONSON	189	135	71	128	95	NS	NS	NS	NS	0	0	7	5	NS	NS	59
MONTAGUE	273	170	62	163	96	6	4	NS	NS	0	0	7	4	NS	NS	77
MONTEREY	35	7	20	7	100	0	0	0	0	0	0	0	0	0	0	54
MONTGOMERY	31	7	23	7	100	0	0	0	0	0	0	0	0	0	0	51
MOUNT WASHINGTON	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63



# Millis



Promoting environmental public health for the protection of health and wellness and the reduction of risks in our air, food, water, soil, and housing for all residents of the Commonwealth.

## About Environmental Public Health Tracking (EPHT)

The Massachusetts Department of Public Health EPHT program has assembled profiles to provide a snapshot of environmental health for Massachusetts communities.

### What information is inside this community profile?

Data for several health and environmental topics are presented in this profile, as well as population information. Terms that might be unfamiliar are in **bold** and defined in a glossary at the end of the profile. For more details about the data displayed here, about the EPHT program, or for more health and environmental data in your community, please visit our website at <http://www.mass.gov/dph/matracking>

### Who can use this community health profile, and what can they use it for?

The community health profiles can be used by anyone who would like to know about environmental public health in Massachusetts communities. Profiles can be used to gather data, guide public health actions, identify high-risk groups, shape policy decisions, or simply inform the curious.

### What is environmental public health?

The word "environment" produces images of the outdoors – trees, grass, and other parts of the natural world. In the field of environmental public health, the environment also includes the man-made spaces that surround us every day – our homes, neighborhoods, schools, and workplaces – all of which contribute to our health.

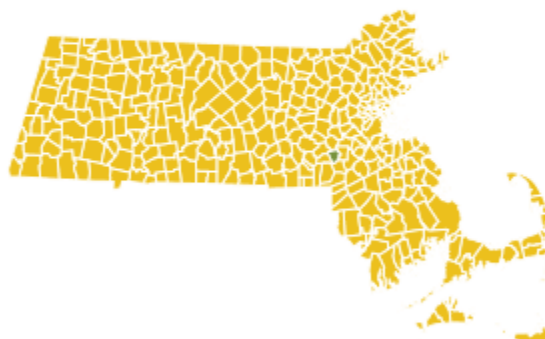
### How can the environment impact my health?

In several ways! Some examples include runny noses and itchy eyes from pollen allergies that occur each spring, asthma attacks triggered by air pollution, and health problems in young children due to consuming old lead-based paint chips and dust.

### Why track environmental public health?

Monitoring different health topics over several years allows us to see trends over time and helps public health scientists better understand how the environment can impact our health.

## Millis's Geography



### Total Area

**12.2** square miles

Office of Geographic Information (MassGIS), 2005

### Total Population

**7,891** people

U.S. Census, 2010



### Percent of Land Use

Agriculture - **8.3%**

Forest - **50.3%**

Open space - **13.6%**

Recreation - **2.1%**

Urban - **24.0%**

Water - **1.7%**

Office of Geographic Information (MassGIS), 2005



# Millis



## Millis's Health

The environment can contribute to the development of **chronic disease**. Chronic illnesses are some of the most common, expensive, and avoidable health problems.

Some links between chronic disease and the environment are well understood – it is common knowledge that smoking cigarettes can cause lung cancer. However, many links between chronic disease and the environment are not well understood. It is very difficult to determine the true cause of an illness. Individual genetics, the natural and built environment, and lifestyle can all play a role in determining whether or not a person develops a chronic disease.

### Childhood Lead Poisoning

Lead paint in older homes is the most common source of lead poisoning. Chipping and peeling paint, and paint disturbed during home remodeling, can release lead dust which is then inhaled or consumed. Lead can cause damage to the brain, kidneys, and nervous system; slow growth and development; and create behavioral problems and learning disabilities in children. The use of lead in household paint was banned in 1978, but lead paint applied before the ban is still present in many older homes across the Commonwealth.

#### Lead Screening



**Statewide: 77%**

Percentage of children 9 to <48 months screened for lead

MDPH BEH Childhood Lead Poisoning Prevention Program (CLPPP), 2014

State and federal regulations are in place to monitor children's lead levels, which are detected with a blood test. Massachusetts requires all children to be tested 3 times by the age of 3 (and again at age 4 if they live in a high-risk community).

#### Confirmed Blood Lead Levels (BLL)



**Statewide: 3.7**

5-year average annual rate per 1,000 children 9 to <48 months with confirmed BLL  $\geq 10$   $\mu$ g/dL

MDPH BEH Childhood Lead Poisoning Prevention Program (CLPPP), 2010 - 2014

CLPPP considers a child with a confirmed blood lead level of 10 **micrograms per deciliter** ( $\mu$ g/dL) or more as elevated and requiring a public health intervention.

#### Lead in Homes



**Statewide: 71%**

Percentage of housing units built before 1978

U.S. Census American Community Survey (ACS), 5-year estimates, 2014

The Massachusetts Lead Law requires that homeowners delead homes built before 1978 that have lead paint where any children under the age of six live. Deleading means that lead hazards in the home such as peeling lead paint are covered or removed. If you have questions about having your home inspected for lead, locating a licensed deleader, or understanding the Lead Law, contact the CLPPP at 1-(800) 532-9571.

**Do you live in a high risk lead community?** A community is considered high risk for childhood lead poisoning based on the number of old houses it has in stock, the percent of low to moderate income families and the number of first time elevated blood lead levels over the past five years. All cities and towns are reassessed for lead risk annually.

Based on these factors, **Millis** was not considered a high risk lead community for 2014.



# Millis



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#### Lead Screening



**Statewide: 76%**

Percentage of children 9 to <48 months screened for lead

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#### Confirmed Blood Lead Levels (BLL)



**Rate is below the state**

**Statewide: 3.6**

5-year average annual rate per 1,000 children 9 to <48 months with confirmed BLL  $\geq 10 \mu\text{g/dL}$

MDPH BEH Childhood Lead Poisoning Prevention Program (CLPPP), 2011 - 2015

CLPPP considers a child with a confirmed blood lead level of 10 **micrograms per deciliter** ( $\mu\text{g/dL}$ ) or more as elevated and requiring a public health intervention.

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# INCOMPLETE DATA

- “DR JICKS LETTER”
- NEW ENGLAND JOURNAL OF MEDICINE
- JANUARY 10<sup>TH</sup> ,1980 P.123
- SAM QUINONES “DREAMLAND”



# INCOMPLETE DATA

- “PLAYING WITH FIRE”
- CHICAGO TRIBUNE
- “INDUSTRY PRODUCED STUDIES THAT CONCLUDED FLAME RETARDANTS PREVENTED DEADLY FIRES, REDUCED POLLUTANTS AND SAVED SOCIETY MILLIONS OF DOLLARS”



## 6. FAULTY COMPARISONS

- “HIGH SCHOOL FOOTBALL:NO LINK TO COGNITIVE DECLINE” PAULINE ANDERSON 7/5/17 MEDSCAPE.COM
- “PLAYING HIGH SCHOOL FOOTBALL IS NOT ASSOCIATED WITH COGNITIVE IMPAIRMENT LATER IN LIFE AND, IN FACT, MAY HELP PREVENT DEPRESSION AND LEAD TO GREATER LIFETIME LEVELS OF PHYSICAL ACTIVITY, NEW RESEARCH SUGGESTS”



# FOOTBALL STUDY

- “ASSOCIATION OF PLAYING HIGH SCHOOL FOOTBALL WITH COGNITION AND MENTAL HEALTH LATER IN LIFE” DESTIPANE ET AL
- JAMA NEUROLOGY 2017 74(8) 898-899
- EDITORIAL ALLISON R KAUP PHD AND KRISTINE YAFFE MD S (CONNECTS STUDY WITH CTE)



# FOOTBALL

- STUDY LOOKED AT MEN AT AGE 65
- CTE
- BU GROUP HAVE STUDIED 202 BRAINS
- 111 PLAYED IN THE NFL ONLY 1 DID NOT SHOW CTE
- AGE AT TIME OF DEATH
  - 40 OR LESS: 8
  - 41-69: 44
  - 70 OR OLDER: 58

# 7.IMPROPER SAMPLING

- WHAT HAPPENED TO FLUMIST?
- MILLIS GYM SMELLS

# WHAT HAPPENED TO FLUMIST?

- LAIV VACCINE
- 2014 RECOMMENDED FOR CHILDREN
- 6 MONTHS TO 8 YEARS
- 2016
- SHOULDN'T BE USED - INEFFECTIVE



# FLUMIST

- GOOD ANTIGEN RESPONSE
- 2004 RANDOMIZED CONTROL STUDY
- 55% REDUCTION IN NUMBER OF FLU CASES IN CHILDREN WHO GOT MIST VERSES CHILDREN WHO GO SHOT
- 2013-2014 FLU SEASON NASAL SPRAY SHOWED NO MEASURABLE EFFECTIVENESS
- AGAINST H1N1 IN KIDS 2-8 WHO GOT MIST IN A YEAR THAT THIS WAS PREDOMINANT CIRCULATING VIRUS

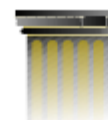
16B0795

Con-Test Analytical Laboratory	Client Fuss & O'Neill EnviroScience, LLC - MA				
Analytical Testing Report	Attention Tim Downey				
Work Order: 16B0795	Project Name Millis, MA				
Report Date: 2/21/2016 7:53:24 AM	Project Number 20160033.A2E				
Note: This is not the original data. Please refer to PDF / Hardcopy report.					
General Method	Analyte	Units			
LAB ID			16B0795-01	16B0795-02	16B0795-03
CLIENT ID			Classroom 6	Gym 02-JH	Modular 03-JH-0218
DATE SAMPLED			18-Feb-16	18-Feb-16	18-Feb-16
DATE RECEIVED			19-Feb-16	19-Feb-16	19-Feb-16
MATRIX			Air	Air	Air
Air Toxics by EPA Compendium Methods	Acetone	µg/m³	4.3	65	12
Air Toxics by EPA Compendium Methods	Benzene	µg/m³	0.56	0.99	0.6
Air Toxics by EPA Compendium Methods	Benzyl chloride	µg/m³	<0.18	<0.18	<0.18
Air Toxics by EPA Compendium Methods	Bromodichloromethane	µg/m³	<0.24	<0.24	<0.24
Air Toxics by EPA Compendium Methods	Bromoform	µg/m³	<0.36	<0.36	<0.36
Air Toxics by EPA Compendium Methods	Bromomethane	µg/m³	<0.14	<0.14	<0.14
Air Toxics by EPA Compendium Methods	1,3-Butadiene	µg/m³	<0.078	<0.078	<0.078
Air Toxics by EPA Compendium Methods	2-Butanone (MEK)	µg/m³	<4.1	<4.1	<4.1
Air Toxics by EPA Compendium Methods	Carbon Disulfide	µg/m³	<1.1	<1.1	<1.1
Air Toxics by EPA Compendium Methods	Carbon Tetrachloride	µg/m³	0.44	0.42	0.52
Air Toxics by EPA Compendium Methods	Chlorobenzene	µg/m³	<0.16	<0.16	<0.16
Air Toxics by EPA Compendium Methods	Chloroethane	µg/m³	<0.093	<0.093	<0.093
Air Toxics by EPA Compendium Methods	Chloroform	µg/m³	0.21	<0.17	<0.17
Air Toxics by EPA Compendium Methods	Chloromethane	µg/m³	1.4	1.5	1.7
Air Toxics by EPA Compendium Methods	Cyclohexane	µg/m³	<0.12	22	<0.12
Air Toxics by EPA Compendium Methods	Dibromochloromethane	µg/m³	<0.30	<0.30	<0.30
Air Toxics by EPA Compendium Methods	1,2-Dibromoethane (EDB)	µg/m³	<0.27	<0.27	<0.27
Air Toxics by EPA Compendium Methods	1,2-Dichlorobenzene	µg/m³	<0.21	<0.21	<0.21
Air Toxics by EPA Compendium Methods	1,3-Dichlorobenzene	µg/m³	<0.21	<0.21	<0.21
Air Toxics by EPA Compendium Methods	1,4-Dichlorobenzene	µg/m³	<0.21	<0.21	<0.21
Air Toxics by EPA Compendium Methods	Dichlorodifluoromethane (Freon 1	µg/m³	3.8	6	2.6
Air Toxics by EPA Compendium Methods	1,1-Dichloroethane	µg/m³	<0.14	<0.14	<0.14
Air Toxics by EPA Compendium Methods	1,2-Dichloroethane	µg/m³	<0.14	<0.14	<0.14
Air Toxics by EPA Compendium Methods	1,1-Dichloroethylene	µg/m³	<0.14	<0.14	<0.14

Air Toxics by EPA Compendium Methods	cis-1,2-Dichloroethylene	µg/m³	<0.14	<0.14	<0.14
Air Toxics by EPA Compendium Methods	trans-1,2-Dichloroethylene	µg/m³	<0.14	<0.14	<0.14
Air Toxics by EPA Compendium Methods	1,2-Dichloropropane	µg/m³	<0.16	<0.16	<0.16
Air Toxics by EPA Compendium Methods	cis-1,3-Dichloropropene	µg/m³	<0.16	<0.16	<0.16
Air Toxics by EPA Compendium Methods	trans-1,3-Dichloropropene	µg/m³	<0.16	<0.16	<0.16
Air Toxics by EPA Compendium Methods	1,2-Dichloro-1,1,2,2-tetrafluoroethane	µg/m³	<0.25	<0.25	<0.25
Air Toxics by EPA Compendium Methods	1,4-Dioxane	µg/m³	<1.3	<1.3	<1.3
Air Toxics by EPA Compendium Methods	Ethanol	µg/m³	29	120	300
Air Toxics by EPA Compendium Methods	Ethyl Acetate	µg/m³	4.5	6.4	2.3
Air Toxics by EPA Compendium Methods	Ethylbenzene	µg/m³	<0.15	0.62	<0.15
Air Toxics by EPA Compendium Methods	4-Ethyltoluene	µg/m³	<0.17	0.2	<0.17
Air Toxics by EPA Compendium Methods	Heptane	µg/m³	<0.14	0.66	0.24
Air Toxics by EPA Compendium Methods	Hexachlorobutadiene	µg/m³	<0.37	<0.37	<0.37
Air Toxics by EPA Compendium Methods	Hexane	µg/m³	<4.9	<4.9	<4.9
Air Toxics by EPA Compendium Methods	2-Hexanone (MBK)	µg/m³	<0.14	<0.14	<0.14
Air Toxics by EPA Compendium Methods	Isopropanol	µg/m³	<3.4	42	6.9
Air Toxics by EPA Compendium Methods	Methyl tert-Butyl Ether (MTBE)	µg/m³	<0.13	<0.13	<0.13
Air Toxics by EPA Compendium Methods	Methylene Chloride	µg/m³	<1.2	<1.2	<1.2
Air Toxics by EPA Compendium Methods	4-Methyl-2-pentanone (MIBK)	µg/m³	<0.14	<0.14	<0.14
Air Toxics by EPA Compendium Methods	Naphthalene	µg/m³	<0.18	0.62	<0.18
Air Toxics by EPA Compendium Methods	Propene	µg/m³	<2.4	<2.4	<2.4
Air Toxics by EPA Compendium Methods	Styrene	µg/m³	<0.15	0.21	<0.15
Air Toxics by EPA Compendium Methods	1,1,2,2-Tetrachloroethane	µg/m³	<0.24	<0.24	<0.24
Air Toxics by EPA Compendium Methods	Tetrachloroethylene	µg/m³	<0.24	820	<0.24
Air Toxics by EPA Compendium Methods	Tetrahydrofuran	µg/m³	<0.10	3.1	<0.10
Air Toxics by EPA Compendium Methods	Toluene	µg/m³	0.46	3.6	1.1
Air Toxics by EPA Compendium Methods	1,2,4-Trichlorobenzene	µg/m³	<0.26	<0.26	<0.26
Air Toxics by EPA Compendium Methods	1,1,1-Trichloroethane	µg/m³	<0.19	<0.19	<0.19
Air Toxics by EPA Compendium Methods	1,1,2-Trichloroethane	µg/m³	<0.19	<0.19	<0.19
Air Toxics by EPA Compendium Methods	Trichloroethylene	µg/m³	<0.19	1.2	<0.19
Air Toxics by EPA Compendium Methods	Trichlorofluoromethane (Freon 11)	µg/m³	1.9	6.3	1.5
Air Toxics by EPA Compendium Methods	1,1,2-Trichloro-1,2,2-trifluoroethane	µg/m³	<1.1	<1.1	<1.1
Air Toxics by EPA Compendium Methods	1,2,4-Trimethylbenzene	µg/m³	0.18	1	<0.17
Air Toxics by EPA Compendium Methods	1,3,5-Trimethylbenzene	µg/m³	<0.17	0.2	<0.17
Air Toxics by EPA Compendium Methods	Vinyl Acetate	µg/m³	<2.5	<2.5	<2.5
Air Toxics by EPA Compendium Methods	Vinyl Chloride	µg/m³	<0.090	<0.090	<0.090
Air Toxics by EPA Compendium Methods	m&p-Xylene	µg/m³	<0.30	2	0.4



**Project:** Clyde Brown Elementary School  
**Location:** 5 Park Road  
 Millis, MA  
**Date:** 2/25/2016



**Sovereign Consulting Inc.**  
 16 Chestnut Street, Suite 52C  
 Foxboro, MA 02035

**PCE Concentrations in Air - All concentrations in  $\mu\text{g}/\text{m}^3$**

Date of Sampling	2/4/2016	2/18/2016		2/22/2016	2/23/2016		
<b>Lab</b>	Contest	Contest	Alpha	Alpha	Alpha	Contest	NET Lab
<b>Duration</b>	4-hr	4-hr	4-hr	4-hr	8-hr	8-hr	8-hr
Gym - Breathing	1,600	820	59.5	0.190	0.210	<0.24	<1.4
Gym - Floor				0.183	0.210	<0.24	<1.4
Gym - 10'				0.197	0.210		
Gym Storage Area	2,600			0.142	0.156		
Main Office	2,500			0.434	0.739	0.64	<1.4
Modular Office		<0.24			<0.136		
Classroom 6		<0.24					
Classroom 14			<0.136				
Classroom 27			<0.136				
Exterior			<0.136				
Cafeteria			0.183	0.190	0.183	<0.24	<1.4
Girls BR				0.414	0.292		
SPED				0.197	0.271		
Library				0.244	0.183	<0.24	<1.4
Gym Intake 1				<0.136	<0.136		
Classroom 10					0.237		
Classroom 5					0.142		

# MILLIS GYM SMELLS

- PERC – TETRACHLOROETHENE-  
PERCHLOROETHYLENE
- HAS ETHER LIKE ODOR –  $\frac{1}{2}$  LIFE IN AIR
- 70-250 DAYS
- OSHA STANDARD 100 PPMV
- 2/14/15 RESULT 1600-2400 UG/M3
- =0.383 PPMV

## 8. FAILURE TO ALLOW FOR CHANCE

- YOU HAD A POSITIVE RESULT ON A “98% ACCURATE TEST FOR CANCER?”
- What are the chances you’re doomed?
- 98% TEST WILL BE POSITIVE IF YOU HAVE CANCER
- 98% TEST WILL BE NEGATIVE IF YOU DON’T HAVE CANCER

# FAILURE TO ALLOW FOR CHANCE

- ASSUME AT TIME OF TESTING 0.5% OR ONE OUT OF TWO HUNDRED PEOPLE WILL ACTUALLY HAVE CANCER
- IS THERE ANY CHANCE THE TEST WAS WRONG?
- ASSUME 10,000 TESTS ARE DONE THAT DAY

- 0.5% OF THOSE TESTED WILL BE TRULY POSITIVE SO 50 PEOPLE WILL BE POSITIVE BUT 98% (49) WILL BE TRULY POSITIVE
- OF THE REMAINING 9,950 TESTED, 2% WILL TEST FALSELY POSITIVE THAT'S 199 PEOPLE
- OF THE TOTAL OF  $199+49=248$  POSITIVE TESTS MOST ARE FALSE POSITIVES



- SO THERE IS ABOUT A 20% CHANCE [49/248]  
THAT YOUR TEST WAS WRONG
- FROM JOHN ALLEN PAULUS
- “THE ODDS ARE YOU’RE INNUMERATE”

Massachusetts  
Department Of  
Public Health



**Health Consultation:  
Evaluation of the Incidence of Brain and  
Other Nervous System Cancers in Medfield,  
Massachusetts and Review of  
Tetrachloroethylene (PCE) in Municipal  
Drinking Water**

**Medfield, Norfolk County, Massachusetts**

Bureau of  
Environmental Health,  
Community Assessment  
Program

**April 2011**



- 2) During the 5-year period from 2002-2006, the incidence of brain and other nervous system cancers in the community of Medfield was approximately as expected among males (4 observed vs. 3 expected) and as expected among females (2 observed vs. 2 expected) when compared to the statewide cancer experience. Although the number of observed diagnoses among males exceeded the number of expected by one, this was likely a result of random fluctuation and represents natural variation. The histology types and age patterns of those individuals diagnosed during this time period appear to be consistent with state and national trends.



# SO WHAT CAN AN IMNUMMERATE BOH MEMBER DO?

- LOOK AT NUMBERS
- DO THEY MAKE SENSE?
- GOOGLE: WHAT ARE THE CHANCES OF GETTING SHINGLES?
- ANSWER: 1 IN 3 DURING LIFETIME
- GOOGLE: WHAT % OF THE POPULATION WILL GET SHINGLES?
- ANSWER: THAT MEANS 95% OF ADULTS ARE AT RISK

To receive *AMA PRA Category 1 Credit™*, you must receive a minimum score of 75% on the post-test.

## Question 1 of 2

Which of the following statements regarding the Affordable Care Act's plan to reduce the risk for readmission to the hospital is *most* accurate?

- ☐ Readmissions have declined across multiple medical causes for admission
- ☐ Readmission rates have declined for HF only
- ☐ Readmission rates have declined for AMI only

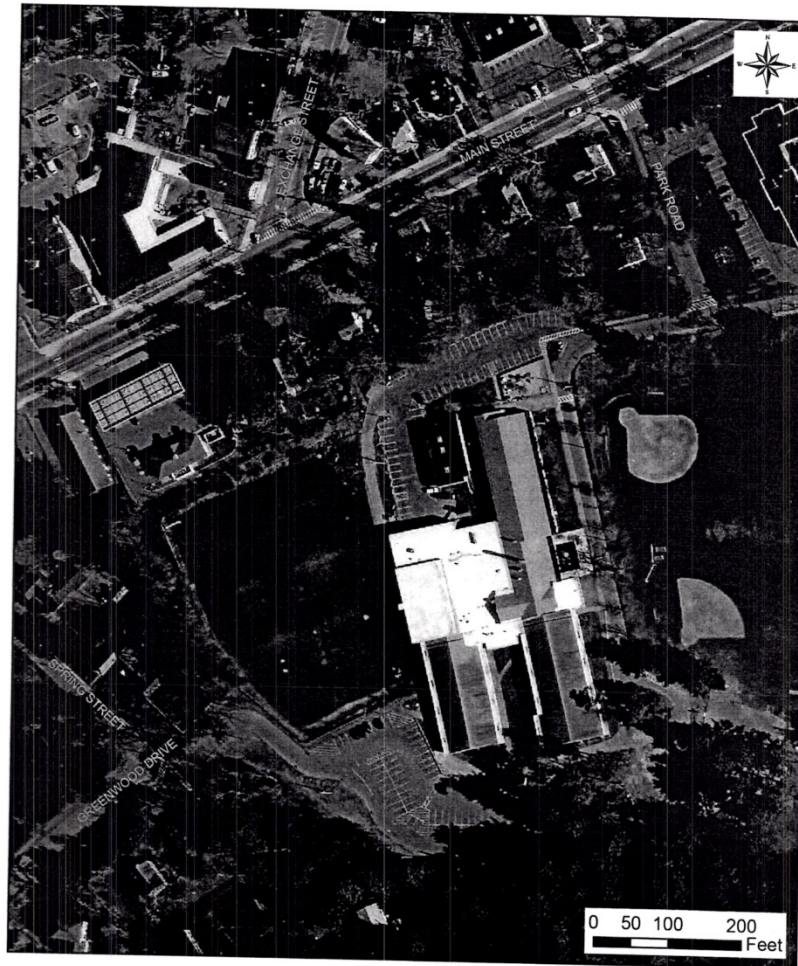


# READ REPORTS

- GETS BETTER WITH TIME
- “THE BOH TAKES SO LONG TO REVIEW THAT DATA”
- WAS THE REPORT COMPLETE AT THE TIME OF SUBMISSION?

HAY BALES, CATCH BASIN SEDIMENT TRAPS, GRAVEL, BOARDS OR OTHER MEANS TO WETLAND RESOURCE AREAS, OR ABUTTING PROPERTIES.

6. ALL DRAINAGE SWALES AND GROUND SURFACES WITHIN THE LIMIT OF WORK SHALL BE PROTECTED.
7. AFTER ANY SIGNIFICANT RAINFALL (GREATER THAN ONE INCH OF RAINFALL WITHIN 24 HOURS), SEDIMENT CONTROL STRUCTURES SHALL BE INSPECTED FOR INTEGRITY. ANY DAMAGE SHALL BE CORRECTED IMMEDIATELY.
8. THE CONTRACTOR SHALL PROVIDE ADDITIONAL TEMPORARY EROSION CONTROL DEVICES WHERE NECESSARY AS DIRECTED BY THE TOWN OF CARVER CONSERVATION AGENT.
9. ALL STOCK PILES SHALL BE PROTECTED AND LOCATED AT LEAST 100- FEET FROM EXISTING WATER BODIES OR WETLANDS, OUTSIDE OF WELL PROTECTION ZONES, AND WITHIN THE LIMIT OF WORK.
10. ANY SEDIMENT TRACKED ONTO PAVED AREAS SHALL BE SWEEPED AT THE END OF EACH WORKING DAY.
11. ALL DEBRIS GENERATED DURING SITE PREPARATION ACTIVITIES SHALL BE LEGALLY DISPOSED OF OFF-SITE.
12. ALL TOPSOIL ENCOUNTERED WITHIN THE WORK AREA SHALL BE STRIPPED TO ITS FULL DEPTH AND STOCKPILED FOR REUSE. EXCESS TOPSOIL SHALL BECOME THE PROPERTY OF THE OWNER AND SHALL BE STOCKPILED AS DIRECTED BY THE OWNER. TOPSOIL PILES SHALL REMAIN SEGREGATED FROM EXCAVATED SUBSURFACE SOIL MATERIALS.
13. TEMPORARY DIVERSION DITCHES, PERMANENT DITCHES, CHANNELS, EMBANKMENTS AND ANY DENUDED SURFACE WHICH WILL BE EXPOSED FOR A PERIOD OF ONE MONTH OR MORE SHALL BE CONSIDERED CRITICAL VEGETATION AREAS. THESE AREAS SHALL BE MULCHED WITH STRAW. MULCH SHALL BE SPREAD UNIFORMLY IN A CONTINUOUS BLANKET OF SUFFICIENT THICKNESS TO COMPLETELY HIDE THE SOIL FROM VIEW.
14. DUST SHALL BE CONTROLLED BY SPRINKLING OR OTHER APPROVED METHODS AS NECESSARY, OR AS DIRECTED BY THE TOWN OF CARVER CONSERVATION AGENT.
15. STRAW BALE CHECK DAMS ARE TO BE PROVIDED ON TWO HUNDRED (200) FOOT SPACINGS WITHIN ALL DRAINAGE SWALES AND DITCHES AND AT UPSTREAM SIDES OF ALL DRAINAGE INLETS.
16. AN EROSION CONTROL BARRIER SHALL BE INSTALLED ALONG THE EDGE OF PROPOSED DEVELOPMENT AS INDICATED ON THE PLAN PRIOR TO COMMENCEMENT OF DEMOLITION OR CONSTRUCTION OPERATIONS.
17. EXTREME CARE SHALL BE EXERCISED SO AS TO PREVENT ANY UNSUITABLE MATERIAL FROM ENTERING THE WETLANDS OR STREAMS.
18. ADDITIONAL HAY BALES SHALL BE LOCATED AS CONDITIONS WARRANT OR AS DIRECTED BY THE TOWN OF MILLIS CONSERVATION AGENT.
19. THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL EROSION AND SEDIMENT CONTROLS AT THE COMPLETION OF SITE CONSTRUCTION, BUT ONLY WHEN DIRECTED BY THE TOWN OF MILLIS CONSERVATION AGENT.
20. MEANS OF EROSION AND SEDIMENT PROTECTION AS NOTED ON THE DRAWINGS INDICATE THE MINIMUM MEANS OF PROTECTION SHALL BE PROVIDED BY THE CONTRACTOR AS



Clyde F. Brown Elementary School  
Millis, Massachusetts

Data Source: MassGIS  
Nitsch Project #11294

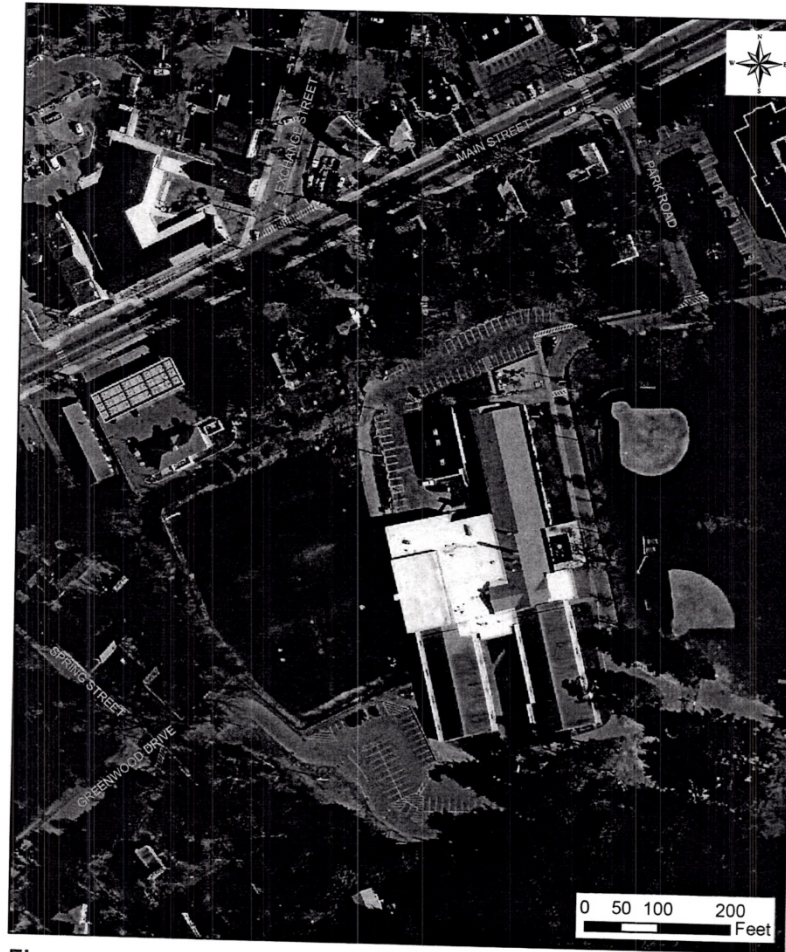






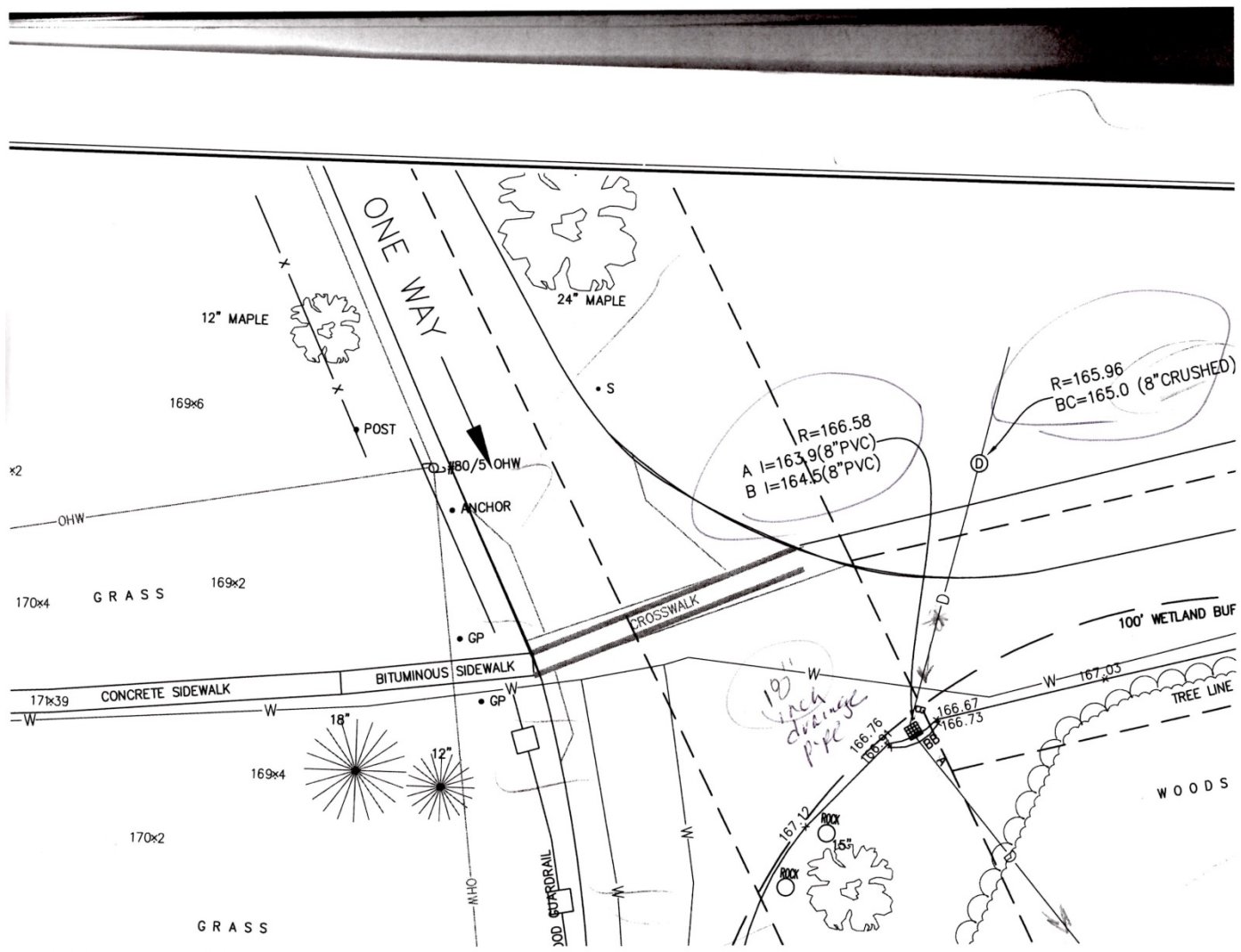
**Figure**  
Clyde F. Brown Elementary School  
Millis, Massachusetts

Data Source: MassGIS  
Nitsch Project #11294



**Figure**  
Clyde F. Brown Elementary School  
Millis, Massachusetts

Data Source: MassGIS  
Nitsch Project #11294







# LEARN FROM ALL THOSE REPORTS

- MILLIS GYM SMELLS
- LESSON: DON'T FORGET COMMON SENSE, YOUR LOCAL KNOWLEDGE, ASK QUESTIONS
- TWO ASSESSMENTS DONE ON INDOOR AIR QUALITY AT SCHOOL 2009/2016
- BOTH FOUND AIR QUALITY COMPRIMISED BY BLOCKING OF VENTILATION VENTS