NEW ENGLAND UPDATE

Growth vs. Groundwater: Region Grapples With Septic Issues

by Ted Cushman

Septic rules have always been a tug of war in New England. State environmental officials increasingly concerned about groundwater pollution caused by residential septic systems are squared off against builders pulling to get new methods of on-site wastewater treatment approved. The stakes are higher where bad soil conditions or high water tables make conventional systems expensive or impossible to build.

But reforms and improving technologies are opening the door for changes. The outcome may be a new compromise in the region: tougher inspection and permitting requirements for conventional systems in sensitive areas, balanced by a greater acceptance of newer, more effective technologies.

Politics heats up. Massachusetts' tough new septic rules have created an uproar in the Bay State, where home sellers must now have on-site systems dug up and inspected before any sale — and fixed if a problem is found. And in Vermont, legislators considering reforms are walking a tightwire: Environmental groups want strict controls on septic effluents, but builders won't support a compromise that doesn't permit alternative systems.

continued

ANISH JANTRANIA

This intermittent sand-filter septic system is part of a pilot project in Gloucester, Mass., where high water tables and dense populations limit the effectiveness of conventional systems.

Welcome to the New England Update

Since we changed our name to the *Journal of Light Construction,* we've grown into a nationwide magazine. But we still have a hard core of loyal readers who remember us as *New England Builder.*

For those readers, we're happy to introduce the *New England Update,* a special section covering current news, business topics, and technical reports of particular interest to contractors in the Northeast. The editors of the *Journal of Light Construction* want to thank our New England readers for your continued support, and we welcome your comments and questions in the months and years to come.

We value your input. To contact the editors, write *New England Update,* RR 2, Box 146, Richmond, VT 05477, or call 802/434-4747.

This month in New England Update:

continued

The hitch is that new systems represent a challenge to local zoning boards. Peg Elmer, co-chair of a Vermont state task force working on septic legislation, notes that many Vermont towns have used septic rules to limit building. But she says, "They're going to have to realize that that isn't a fair or wise way to control growth."

The pollution problem. Much of New England's population depends on septic systems to treat sewage and on wells to provide drinking water. Census figures show that in rural states like New Hampshire, Vermont, and Maine, more than half the population is using on-site septic systems and relying on wells for water. Even urbanized Massachusetts has 1.6 million people on septic systems, and 3.8 million who rely at least in part on groundwater for their drinking water supply.

It's a bad combination, say state officials. Peg Elmer says, "Everyone agrees that we have a lot of failing septic systems." The resulting pollution is a twin threat: Bacterial contamination can cause disease, as can nitrates and phosphates released by septic systems, which also damage natural ecosystems.

According to Dean Spencer, general counsel for the Mass. Department of Environmental Management, nitrates in drinking water are a known cancer threat and also cause developmental problems for young children and pregnant women. Federal drinking water standards allow no more than 10 parts per million (ppm) of nitrogen.

Water treatment plants can achieve federal standards for drinking water purity, notes Spencer, but "source control is much more cost-effective." It's more practical and less expensive to remove the concentrated nitrogen from the sewage before it gets a chance to mix with the groundwater than to remove tiny amounts after the contaminants have been diluted.

Members of the Vermont-based group Builders for Social Responsibility harvest native cattail reeds for an engineered wetland wastewater disposal system.

In Massachusetts, says Spencer, 40% of the streams and lakes are unfit for swimming, and a number of shellfish beds have been closed because of bacterial contamination. "On-site septic systems are the main culprit," he states.

Technology answers the challenge. Properly sized and sited, standard septic-tank and leach-field systems are reasonably effective for eliminating harmful bacteria, according to Massachusetts engineer Anish Jantrania, an expert in on-site wastewater treatment. But he says conventional systems are less effective at eliminating nitrates, because they drain into subsoil where there isn't enough oxygen to support the helpful bacteria that convert the nitrates into harmless compounds.

However, modern new on-site treatment methods, such as recirculating sand filters and constructed wetlands, can sharply reduce nitrates, phosphates, and bacteria in wastewater before it enters the ground. "We can give you an effluent that is practically drinkable," says Jantrania.

In practice, engineers design systems for optimum results based on specific site conditions. "The ability of nature to remove pollutants is limited," says Jantrania. "So we design the system to remove 50% or 75% of the problem, and let nature do the rest."

Whatever the political realities, says Jantrania, the technical realities have changed: "If you're going to regulate growth, wastewater is no longer an excuse." ■

Case in Point: The Ice Dam Cometh

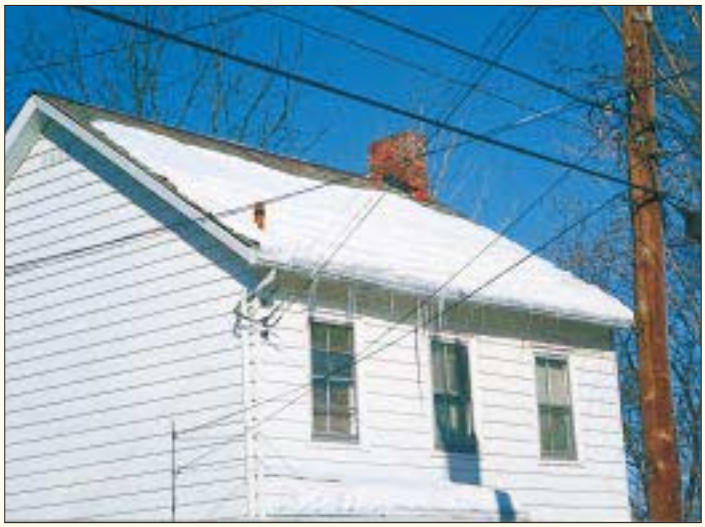
by Dan Friedman

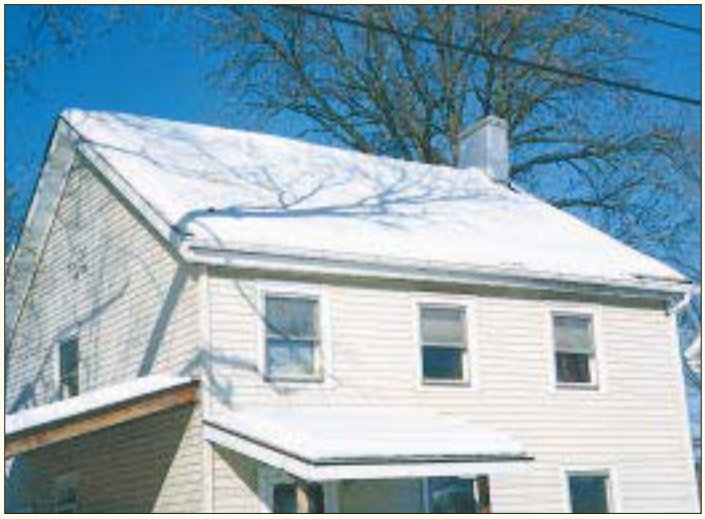
According to Harvard scholar Stephen Jay Gould, the world is currently enjoying a brief warm spell in the midst of a basically cool period. Gould says the glaciers that covered our region 10,000 years ago may return in another 10,000. In a bad northeastern winter, it's not hard to imagine it.

But the vast sheets of ice we see creeping down some of our roofs each year aren't a sign of global freezing. They're evidence of imperfect building design — on a properly vented roof, you seldom see them.

A clear example of this fact is a house in New York on which I recently did some repair work. The house had moisture problems in the attic, which I addressed by installing an aggressive venting system: a ridge vent coupled with plenty of soffit venting. To make the system work correctly, I had to remove solid bridging between the rafters above the plate.

As it happened, the house next door was identical to the one I repaired. Both were built in the 1940s by the same builder. In a side-by-side comparison in late winter, it was easy to see the effects of my work (see photos, above). The roof I fixed was covered with unmelted snow. The house next door had big icicles hanging from the eaves. (What looks like a ridge vent at the top in the picture is actually just a metal ridge cap — and in any case, the house still has the air-blocking solid bridging between the rafters).

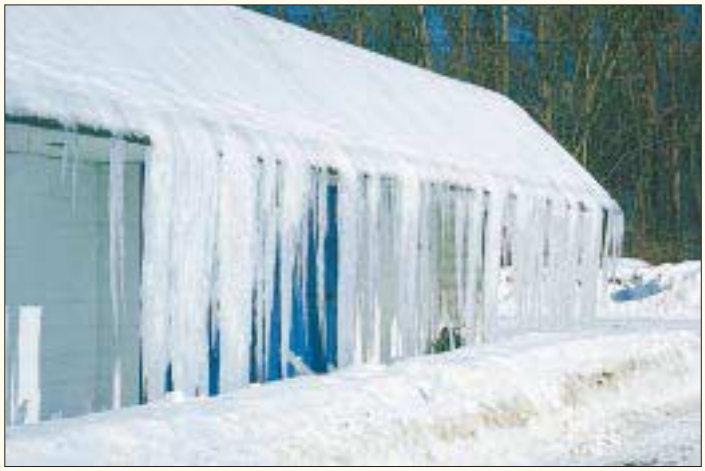




In a rare direct comparison of similar houses with and without proper venting, snow on the unmodified roof has melted, refreezing at the eaves (left). On the same day, the roof next door modified by the author still has its blanket of snow (below, left).

In the correctly ventilated roof, the cold attic is coupled to outdoor air, preventing the melting and refreezing of snow. The other attic is warmed from inside the house, allowing the ice dam effect. (Typically, in such cases, moisture on the attic sheathing is also an issue — as it was in my house before I fixed it.)

Theorists may tell you that roof venting isn't important. But ask anybody who inspects existing housing stock in the Northeast, as I do — they'll have seen countless cases of roof damage caused by unvented attics. The pictures tell the story. ■



Melting and refreezing of rooftop snow is caused by heat leaking from inside the house.

ASHI building inspector Dan Friedman lives in Poughkeepsie, N.Y. He can be reached by e-mail at dfriedman@mhv.net.

Surviving the New England Winter: How Do They Do It?

by Phil Crandlemire

Winter in New England is about four months long. It starts just after Thanksgiving and lasts at least until April. For contractors, that can be a long four months to try to maintain a steady income. How do people handle it? Contractors I talked to gave a variety of answers.

When winter gets rough, many contractors just put down their tools and take up snow removal. It's not uncommon for one person to plow 40 driveways after a storm. At $15 each and an average of ten storms a season, that can add up to $6,000 — not exactly bread and butter, but it can be frosting on the cake.

There is a potential to earn more, but snow plowing is very competitive. Without a reliable customer base, snow plowing will not pay the bills. Still, by managing a fleet of plow trucks and servicing both commercial and residential accounts, some contractors have made snow removal into a viable seasonal side business.

Many carpenters try to schedule their inside work for the cold months — sometimes by offering better deals to customers who will defer inside jobs until winter. But some builders keep working year-round despite the weather. Experienced builder Fred Smiley of Winslow, Maine, says he can carry on even in the worst weather. "Sometimes we have to cover a foundation with tarps to help the concrete to cure, but today's chemical engineering has allowed us to work year-round."

Hard weather can increase the cost of a project, Smiley notes — but if customers are determined to get started, they'll pay the price. Smiley and his crew round out their winter schedule with industrial jobs inside local mills.

C. BATES

When customers are determined to press on with a project, builders adapt to the cold — for a price. With careful planning, some contractors can finish outside work before snow flies, then move indoors for the cold months.

Arthur Turmelle, of Waterville, Maine, has worked year-round since starting a carpentry business when he finished high school 16 years ago. "Winter can be brutal, but you just dress for it and get used to working outside," he said. Like many other carpenters, he tries to schedule his interior work for the winter months. But when he was first starting out, Turmelle confesses, surviving winter was tough — so tough, in fact, that his brother and business partner, Robert Turmelle, left the state for a warmer climate. "The winter drove him out," Arthur says. "But I decided to keep at it and find other ways to make it through the winter."

And that he did. "Someone once told me the three best investments to make would be food, clothing, or shelter; so being a carpenter I decided to invest in shelter." Turmelle began to purchase real estate properties, buying apartment buildings that needed some cosmetic work and rehabbing them into affordable housing. Today he owns and maintains seven buildings, while continuing to manage his carpentry business.

One person who can't move his work inside is siding contractor Michael Barry, of Waterville, Maine. He and his crew keep busy all winter long doing vinyl siding and replacement windows. How does he handle the snow? "We shovel it," he says. ■

Freelance writer Phil Crandlemire runs a landscaping and excavation business in summer and plows snow in the winter in Waterville, Maine.

Design-Builder's Notebook: Supporting a Round Roof

by Andrew DiGiammo

As a design-builder, my smaller projects can sometimes be the most rewarding. Although there isn't as much money to be made, I enjoy solving a challenging problem in a creative way.

A good example is a one-room addition my crew recently completed near the ocean in Massachusetts. The customers wanted a semicircular room with windows facing the water — and the lady of the house didn't want the space overhead cluttered up with any collar ties.

So what would hold up the roof? Without any ties, the weight of the roof would thrust the walls right out. And to complicate matters, we're in a high wind area — the structure had to be stiff.

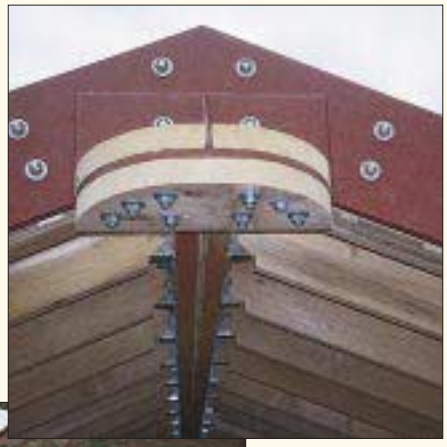
My solution was to fabricate a steel rafter truss spanning the circle at midpoint. All the wood rafters around the rest of the arc meet this truss at the center (see photos). The truss supports their weight, preventing any thrust from developing at the walls.

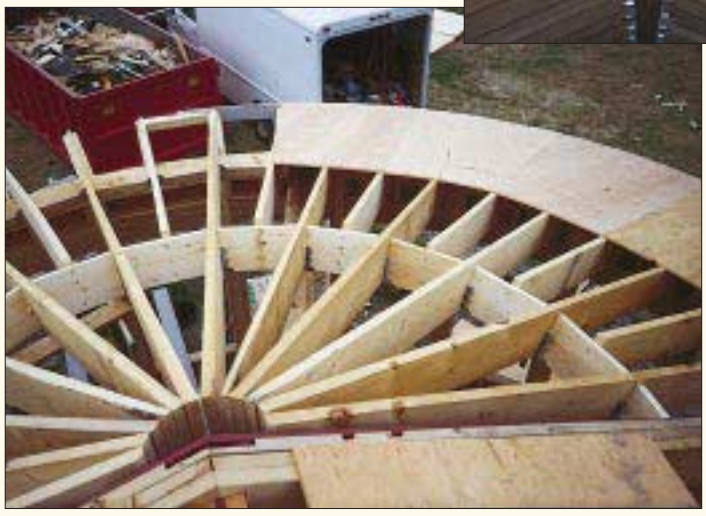
The insulation guys hated this job. I use a big company that sends out an estimator to bid by the square foot, and the installers didn't know what they were in for until they got to the site. I was there to make sure they filled every crevice with fiberglass.

On the other hand, some of my subs got a chance to shine. The plaster on the ceiling came out beautifully, and the custom tile job on the floor is a work of art.

As for the structure, it got its first test right away. A northeaster came up right after we finished — the winds were clocked at 65 mph. I went back to check the work and couldn't find a single crack in the plaster.

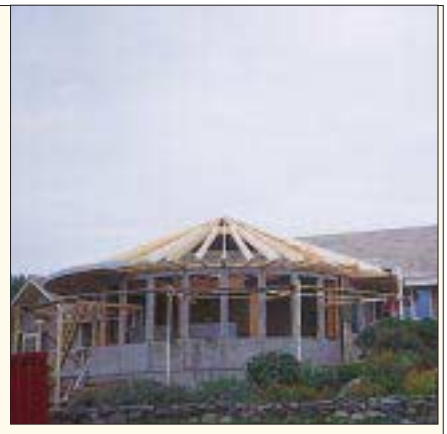
For a job like this, the customer gets a real advantage from hiring a design-builder. Without me, these people would have needed an architect to come up with the idea and an engineer to make shop drawings at $100 an hour. A separate contractor would have probably marked up the price on the steel member. And how long would it have taken the builder to think the thing through again and figure out what he was supposed to do?





JERRY SHAHDAN

To support a round roof without collar ties, the author designed a radial rafter system (left) supported by a custom steel "girder truss" (above).



A custom-designed roof system caps this round addition, built by the author to take full advantage of an oceanfront view.

On jobs like these, you often see an architect come up with an unbuildable design — and the builder either walks away or charges an outrageous price to cover his risk. With divided responsibilities, any misunderstanding can quickly turn into finger-pointing or worse. At the worst, the customers could have gotten discouraged and given up their round-room idea altogether (which would have been a shame).

But as a design-builder, I make sure my drawings represent buildable reality — and as the builder on site, I understand what I had in mind. The customers see their dream come true at a reasonable cost, the job goes smoothly, and I make a fair profit. But best of all, I have a good time doing it. ■

Andrew DiGiammo is a design-builder who plies his trade in southern Mass. and R.I.

IRS Reaches Out to Contractors

Like the rest of the government, the IRS has been told to reinvent itself. For two years, a New England Construction Compliance Team (NECT) has been working to collect and share information among the six New England IRS districts and to "note compliance concerns" in the building industry.

Listening to tax pros. To figure out what is and isn't working — and why — the IRS asked New England accountants attending its "Tax Practitioner Institutes" to fill out a survey about construction industry tax compliance. The accountants gave the agency a pretty clear picture of the typical small construction employer's predicament.

Tax rules are too complicated and time-consuming, the accountants complained. They rated the employee/sub determination and business use of the home as the two most difficult areas, and they said payroll tax procedures were too complex. Asked why contractors don't always make payroll tax deposits on time, the accountants noted the fact that contractors often aren't paid on time by customers.

The high cost of workers compensation insurance and the difficulty of handling employee tax withholding are strong incentives to classify workers as subs, or just to pay in cash and ignore tax reporting completely, the accountants told the IRS team. And they pointed out that lack of basic accounting skills, cash-flow problems, and pressure from other creditors make it hard for builders to make their tax payments on time.

IRS takes action. With two years of study behind them, the six New England IRS district offices have started taking a more unified approach to dealing with the way the construction industry pays (or doesn't pay) its taxes. To deal with contractors' lack of understanding of the more complex tax rules, all the IRS districts are handing out a standard packet for contractors that includes the location and telephone number of the local IRS office, titles of relevant IRS publications, and information on workshops sponsored by the IRS and the Small Business Administration (SBA). And in a test program, new businesses that apply for federal identification numbers will be targeted for "early intervention and education."

"We're not all bad," says Special Agent Richard Sweeney.

Better safe than sorry. If you are doing your best to obey the tax laws, the IRS is trying to make it easier. If you're not sure whether a worker is an employee or a sub, all you have to do is fill out IRS form SS-8, available from any IRS office. The form asks a series of questions about the worker's relationship to your company, and the IRS makes the determination for you. (It's better to know in advance than to get this one wrong — the penalty for misclassifying a worker can be 100% of the back taxes.)

And recognizing that contractors have no free time during the day, the agency is making Revenue Agent Richard Sweeney available from 6 to 10 p.m. weeknights to answer construction-related tax questions (Sweeney's number at the Andover, Mass., IRS Service Center is 508/691-6838).

They're not your pals. In general, the government's reinvention effort is intended to make the bureaucracy more "user-friendly." But don't expect the IRS to turn into your best buddy anytime soon. The agency's main goal is to get their money, and one focus of their current effort is training their own agents to identify targets for audits and penalties. The latest NECT handout for accountants said, "Contractors need to understand that when they are not paid timely by customers, using IRS trust fund taxes to resolve cash-flow problems is not an option." And with regard to what it called "intentional non-compliance," the team said, "If the friendly slogan of the IRS has not worked, maybe a directive needs to be released to become more stern with noncompliant taxpayers."

On the other hand, when *JLC* called Special Agent Sweeney at his Andover number one evening, he was friendly and responsive. Although the IRS assigned him to handle evening calls from contractors in mid-1995, Sweeney says he has yet to get a call from a builder — apparently they don't know he's there. But as a trained IRS agent, Sweeney says he can answer most tax questions and direct builders to other resources if their problem stumps him. And he says he hopes they do call, if only so he can show the IRS's human side. "I'm not a public relations guy, but I'd like to try to improve our image," said Sweeney. "We're not all bad, you know." ■

News Brief: New York State Kills Seismic Code

But Could It Happen Here?

Last fall, New York state considered a proposal by the Fire Protection and Building Code Council to introduce requirements for earthquake-resistant construction into the state's building codes. Opposed by both commercial and residential builder groups, the idea was an immediate flop.

Robert King, the state's new director of regulatory reform under Republican Governor Pataki, has been requiring anyone who puts forward a new rule to supply detailed cost and benefit information. When King asked the Code Council for documentation in support of a new seismic rule, the council sent over a newspaper article saying that New York could be hit by a major quake — insufficient evidence, said King. Then the council sent the regulatory czar a list of all recorded earthquakes in the state going back 400 years, but provided no data on damage that occurred. This too fell short of King's requirements, and the proposal was withdrawn.

New York State Builders Association (NYSBA) director Robert Wiebold was pleased, saying, "You can't make New York state an island of regulations that exceeds everyone in the nation." According to NYSBA's estimates, the proposed requirements would have raised the cost of a typical building by 5%.

The proposal would have had little effect on small builders, however: One- and two-family homes would have been exempt anyway, according to a state official.

How likely is a quake? Rules and regulations aside, should northeastern builders actually worry about a "big one" knocking down the houses they build? The answer, we learned, is a definite "maybe." Unlike California, New England is not near a zone where plates in the earth's crust meet, but small earthquakes happen here fairly often, and there have been large ones in recorded history. While you can't predict when or how hard an earthquake might hit, says geophysicist Waverly Person of the National Earthquake Information Center in Golden, Colo., "If you've had destructive earthquakes in an area, then you're probably going to have them again."

An old news clipping details damage from a 1944 quake that toppled chimneys and damaged a high school gymnasium in Massena, N.Y.

The City of Boston received a federal grant in November of last year to evaluate the possible damage to public buildings in a quake. Government scientists say the city is in the area third most likely in the U.S. to get a serious quake, and a tremor centered on Cape Cod in 1755 knocked a number of Boston buildings to the ground.

A 1989 study said Boston would suffer hundreds of dead, thousands of injuries, and billions of dollars in damage if an equally strong quake struck the area today. The newer study may predict even greater losses, in light of recent earthquake experiences in other areas. For instance, Boston buildings could topple over when underlying soil liquefies, as happened recently in Kobe, Japan. Much of Boston, like Kobe, is built on deep fill in areas reclaimed from the ocean. In an earthquake, soft fill soils turn to mush, the way stiff concrete becomes soupy when hit with a vibrator.

And some buildings that were once thought earthquake-proof probably aren't, according to engineers looking at damage from the Northridge, California, quake of 1994. In that disaster, welded steel frames that were supposed to be flexible and strong cracked at the weld joints (bolted connections survived better).

But what about homes? For residential buildings, the lessons are more encouraging. In both Kobe and Northridge, conventional single-family stick-built homes held up well.

On the other hand, there were some dramatic failures. Engineers voice particular concern over buildings that have three or more stories, or that include long spans carried by steel or engineered wood beams. For such designs, it might be a good idea to have an engineer evaluate the structure for resistance to seismic loading and specify appropriate shearwalls, beams, and connectors.

Unreinforced masonry is another concern: For instance, in the Northridge quake, numbers of brick chimneys toppled over, sometimes sending chunks

of masonry crashing through roofs. (For the record, that has happened in New York, in a 1944 quake in Massena.)

New Hampshire engineer Lou Klotz, a veteran expert in the field who consults with area emergency management agencies, says builders' main concerns should be attaching oil tanks and water heaters to basement walls so they won't tip over, and tying the frame securely to the foundation. Poured concrete basements stand up to quakes much better than other foundation types, said Klotz.

On balance, most New Englanders will probably be better off if a quake strikes while they're at home than if they're at work or out shopping. And New England builders are probably wiser to worry about wind resistance than seismic resistance: Hurricane-force winds are much more likely than an earthquake.

And in fact, building for wind resistance may take care of the quake-proofing. An engineer in Minnesota, which has recently adopted the seismic provisions from the *Uniform Building Code,* says many structures meet those requirements if they're designed for an 80-mph wind. ■

A historic quake in upstate New York rotated these gravestones on their pedestals. In the same way, a moderate quake could make unsecured houses "walk off" their foundations.

WALTER METRONORIS