

Long Island, NY: Vinyl over Stucco



This stucco-covered Long Island home dates back to the 1920s. The retrofit project manager suspected lead paint outside and lack of insulation inside the exterior walls.

Builder Profile

United Way of Long Island
Deer Park, Long Island NY
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Project Home

- Name: Nassau County Stucco
- Location: Long Beach, NY
- Layout: two-story duplex, 2-bdrm 1 bath per floor; 2,120 ft²
- Climate: IECC 4A mixed-humid
- Year Built: 1920s
- Retrofit Completed: not done

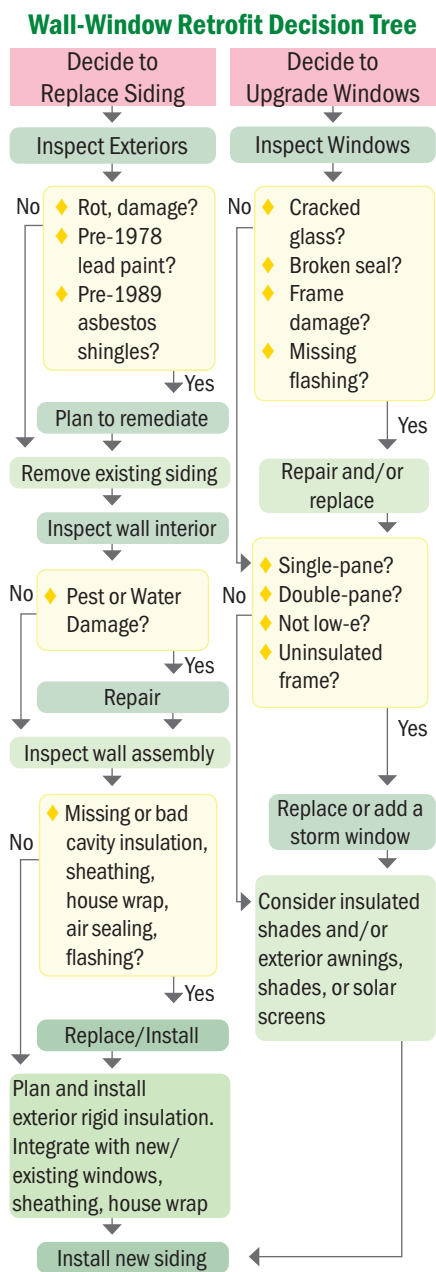
An Italianate style home with stucco exterior and a red tile roof may seem out of place among the colonial homes on Long Island, New York, but for immigrants who came to America to make their fortunes, a large home like this was just what they wanted. Cementitious stucco was also used on Colonial and Georgian style homes in the northeast due to its sturdiness. However, if not maintained, cracks could form in trouble spots around windows and doors and at corners and roof-wall junctures, allowing water to leak in and cause damage to sheathing and framing. Also these older homes were often drafty and cold due to lack of air sealing and insulation.

Rick Wertheim, Vice President of Green Construction for Long Island United Way has done hundreds of renovations and new-construction homes for United Way partner agencies on Long Island and was tasked with looking at renovating the home for a nonprofit that is using it as a group home. Retrofit funding would come from the U.S. Department of Housing and Urban Development (HUD). Wertheim suggested the stucco home for a re-siding retrofit case study effort just underway by the U.S. Department of Energy.

Wertheim initially wanted to remove all of the exterior stucco, as he had done on previous old stucco homes on Long Island, so that he could inspect for and repair any water-damage to the sheathing, which was likely to be board sheathing given the age of the home. He then planned to add new plywood or OSB sheathing where needed, drill and fill through the sheathing to add blown insulation to the wall stud bays, add house wrap, then cover the home with a higher-R-value insulated vinyl siding.

Due to concerns about the potential for the presence of lead paint and asbestos (it was later determined there was no asbestos in the stucco, but very likely lead paint), Wertheim decided to encase the existing stucco in new rigid foam insulation and siding. The DOE team, which included project managers from Pacific Northwest National Laboratory, and building scientists from Building Science Corporation and Earth Advantage, supported this idea. They suggested drilling through the stucco at suspect

The home's 35 windows are double-pane but did not have low-emissivity coatings. The PNNL team recommended adding Low-E storm windows to improve the overall insulation value of the windows and to help reduce the amount of noise brought into the home through the exterior walls, a definite plus in the densely urban location.



areas to test the sheathing and framing for signs of rot or moisture. In addition to drilling, Wertheim mentioned two other ways they noninvasively inspected the walls. “We do a visual inspection at all suspect areas – inside corners, where an eave and cornice come together, where a wall meets a roof, around windows and doors, etc. We look for cracking and do hammer taps to listen for dead spots in the wood. We can also try using an IR camera. An experienced thermographer can sometimes see streaking that might indicate wet wood.” If signs of moisture did appear, these localized areas could be repaired without removing all of the stucco, unless damage was found to be extensive. On this house, Wertheim said they found few signs of moisture problems.

Because they decided not to remove all of the stucco, this changed the insulation approach. If they had removed the stucco and the walls were empty, they would have done drill-and-fill from the exterior as well as foam-insulated vinyl siding. With the stucco left in place, Wertheim said the cementitious stucco would be very difficult to drill through. “A carbide blade wouldn’t last past five holes. Then how would you fill the holes? Tapered plywood? That would be very time consuming and labor intensive.” Wertheim said drill and fill from the interior was an option but would be very disruptive

Pre- and Post-Retrofit Conditions

Phoenix	Pre-Retrofit	Post-Retrofit
Vintage	1949	2022
Wall Assembly	2-story stucco. 2x4 16" oc, some mineral wool cavity insulation, two sheets of tar paper, cementitious stucco.	Cover stucco with rigid foam, tape seams to serve as the air- and water-control layer. Instead of furring strips, use 3.5-inch wafer-head screws, through the foam, into the wood sheathing, to attach the vinyl siding.
Windows	All double pane.	Add exterior low-e storm windows.
Other Retrofits	Enclose 2nd-story porch. Add flood gates to crawl space. Install attic venting.	Project not completed.



The low-sloped hip-roof design has helped the home survive the hurricanes that travel up the Atlantic Coast and may explain why the original clay tile roofing is still intact. The project team decided to wrap the stucco in taped rigid foam then install vinyl siding over top to encase the lead paint and provide a continuous air, water, and thermal barrier around the home.

to the occupants who were going to stay in the house through the renovation. Wertheim noted that the house had some mineral wool insulation in the wall cavities though it had settled over the years. The best approach was to add R-value with exterior rigid foam.

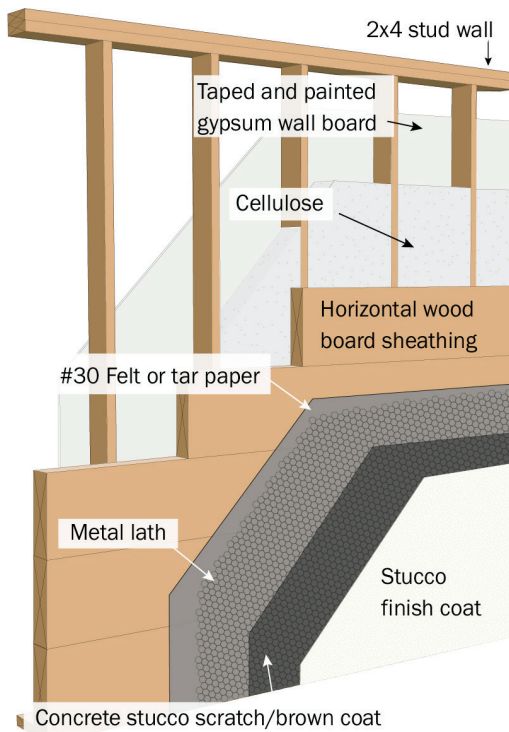
The DOE team suggested several approaches:

1. Cover the existing stucco with a drained EIFS.
2. Install fluid-applied weather barrier over the existing stucco, then rigid foam and vinyl siding.

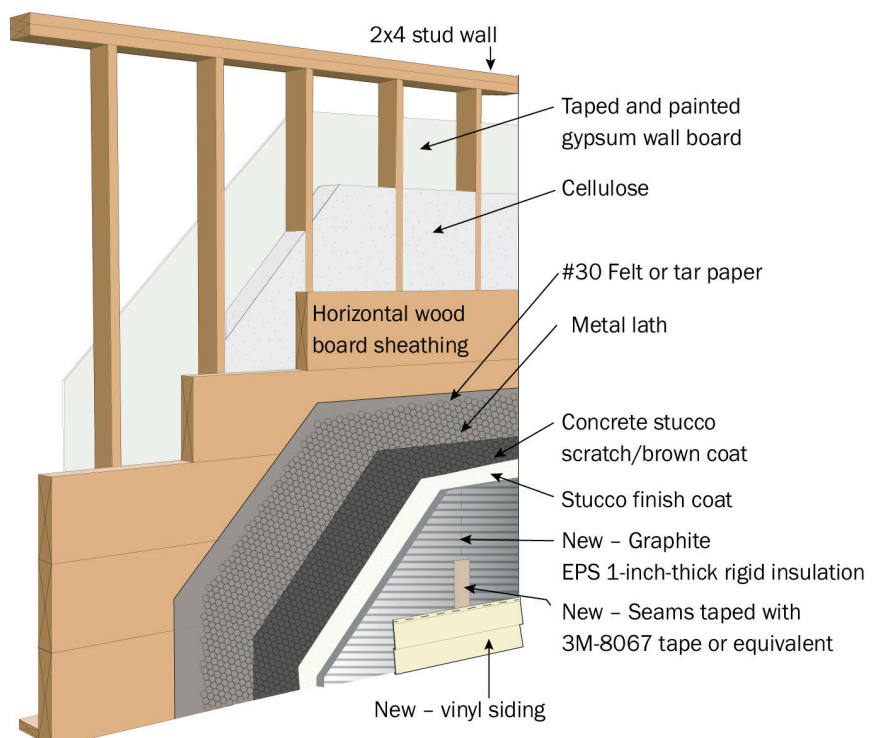
“Insulating and siding over the stucco can be a great time- and cost-saving alternative compared to tearing off the old stucco, as long as we’re reasonably sure there are no big hidden water issues.”
Rick Wertheim, Vice President of Green Construction for Long Island United Way

Long Island Pre- and Post-Retrofit Wall Assembly Details

Pre-Retrofit



Post-Retrofit



3. Install rigid foam over the original stucco, with seams taped to serve as the weather resistant barrier (i.e., air- and water-control layer). Or, put house wrap over the stucco, then rigid foam taped at seams. Then screw the vinyl through the foam to the stucco (risky). Or install flat metal straps screwed through the foam and old stucco into the studs (or board sheathing) using 3-inch screws. Then screw the vinyl to the metal straps.

Wertheim had some concerns about EIFS, primarily cost and finding EIFS contractors on Long Island. He was also concerned about cracking due to impacts from wind-borne debris in the hurricanes that sometimes hit Long Island. Wertheim also expressed concerns about predrilling holes through the stucco to attach metal lathe over the old stucco to attach the EIFS. However, the research team said metal lathe would not be necessary as EIFS assemblies are commonly adhered, not mechanically fastened to the wall.

Wertheim opted for vinyl siding. He considered two installation methods:

- Install 7/16-inch washer-head screws long enough to penetrate through the insulation board, the existing stucco, and into the 1-inch diagonal board sheathing. He noted they would have to predrill every hole to get through the original stucco.
- Or instead use 1x3 furring strips over the graphite EPS. Wertheim said they could attach the furring strips with premium construction adhesive and just five structural screws for every 10 feet, hitting the top plate, bottom plate, and maybe the rim joists. Then attach the vinyl siding to the furring strips with 3/4-inch or 1-inch roofing nails.

The DOE project also included window upgrades. The existing windows had already been upgraded to double-pane vinyl-framed windows. DOE suggested low-e insulated exterior storm windows, and Wertheim hoped to try them as an option for future nonprofit retrofit projects.

Ultimately the agency responsible for the home chose not to go through with the upgrades at this time. However, Wertheim is optimistic that future projects will turn up where foam and vinyl over existing stucco is an option. And, he hopes to try out low-e storm windows on future retrofit and new home projects.

Contractor Expectations and Reactions

What worked well? Installing rigid foam over the existing siding avoided issues with lead paint removal and trying to drill and fill through cement stucco. It would also provide a continuous air, water, and thermal barrier.

How much time did it add to a typical residing job? How many crew? 24 man hours (2 tradesmen + 1 helper = \$2,050. Planned costs were \$100/ft² for materials + \$5/ft² for labor + \$3,000 for siding accessories = \$15,000. Added materials cost for 60 polyiso boards and tape was \$2,500 + \$2,050 for labor = \$4,550 added cost for \$19,550 total.

How much did it cost? Adding insulation, in addition to the new EIFS siding, would cost about \$4,550 for labor + materials. Storm windows would be about \$350/window for labor + materials.

What were the most challenging aspects of the job? How to minimize the need to drill into the cement stucco.

Can you sell this to homeowners? If not, why not? For individuals who intend to own the home for a long time, adding foam at re-siding might make sense. For transient homeowners, I don't think there is enough return on investment to justify it. If I plugged it into my return-on-investment calculator, it would fail the savings-to-investment ratio. You don't get enough savings to justify the investment. In the federal Weatherization Assistance Program (WAP) the SRI has to be one or better. If you spend a dollar and can't get a dollar back, it's a fail. I don't think this would pass.

Could you make a profit at this? If I were in the for-profit world, I would not sell it on payback. I'd sell it on comfort, performance, increased durability, weather resistance, and improved home quality. I'm not going to sell it on green or energy security.

What would you do differently next time? Project did not get funded.

Long Island Project	Siding ¹	Windows ²
Planned Material Cost	\$5,000	
Planned Labor Cost	\$10,000	
Total Planned Cost	\$15,000	
Added Upgrade Material Cost ³	\$2,500	\$6,400
Added Upgrade Labor Cost ³	\$2,050	\$4,800
Upgrade Incremental Cost ³	\$4,550	\$11,200
Total Project Cost with Upgrades ³	\$19,550	\$11,200

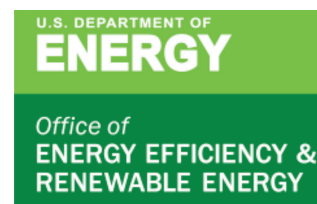
¹ Add stucco over 2 inches polyiso insulation: 60 polyiso boards + tape.

² Exterior storms. 32 windows x \$350/window.

³ Materials and labor costs are estimates. Retrofit was not completed.

Key Take-Aways

- Early buy-in from the sponsoring agency is essential for the success of affordable retrofit projects.
- Installing foam over existing siding is an option that can reduce demolition costs and encapsulate lead paint.
- Installation decisions have to make sense in the local market in terms of costs and contractor and materials availability.
- Work with an architect or designer to draw up details for water management and air sealing.



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Building America Solution Center
bascc.pnnl.gov.