A Green Re-Build/Renovation

Example of a local retrofit project - City of Scottsdale, Arizona

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Following a disastrous flood from an overflowing toilet and a leaking swamp cooler on the roof, we were faced with major repairs...or a major refit. We opted for the latter and embarked on a re-design and re-build of our 1600sf house, which was built - along with tens of thousands just like it - in 1984. The typical builder's "3-Bedrioom" plan simply didn't suit our way of life - so we changed almost everything.

Having lived in our remodeled house for over four years, we have found that our energy consumption has dropped by more than 60% by comparing our APS bills before and after the renovation.

Step one. We made the building envelope (walls, roofs, windows and doors) as energy-efficient as we could within our budget. We replaced the existing leaky sliding aluminum windows with new low-e glass, wood-clad, fiberglass casements by Milgard. We also spray-foamed the underside of the roof and the inside face of gables with 6"-8" of 1/2 lb foam insulation and replaced the asphalt shingles with a standing seam metal roof, which has a high reflectivity Kynar 500™ finish. We also took the air conditioner off the roof and replaced it with a ground level, high efficiency, two-stage 16 SEER heat pump linked to a high efficiency air handler situated in an interior closet. We pioneered the installtion of a PEX-based fire sprinkler system - the first of its kind approved by the City

Step Two. after one year of monitoring energy usage from within our more energy efficient building envelope, we installed a 6.7 kW solar power array on the south-facing roof to generate well over of 95% of our electricity over the course of a year. Such a system is a lot smaller than it would have been had we not achieved a more eficient building envelope. Thus we were able to afford to install PV panels designed for Phoenix temperatures rather than install many more cheaper panels, which only perform well in much lower ambient temperatures.

Standing seam metal roofs enable PV panels to be attached to mounting posts clamped to the standing seams using very strong set-screws. This avoids drilling holes through to the structure beneath, significantly decreasing the risk of rainwater leaks.

A "New Face" to the street.


1600sf house before retrofit


Same house after retrofit


6"-7" Foam insulation to underside of roof surfaces and gable ends plus new HVAC ducts, high-efficiency heat pump and air handler - located on the ground level


Removing asphalt shingles and replacing them with a standing seam metal roof

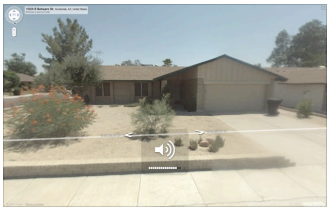

Removing old walls to make interior much more open with plenty of room for family gatherings around the kitchen


Old front entry. Door set back wasting valuable space. Poorly drained. Subject to puddling in downpours.

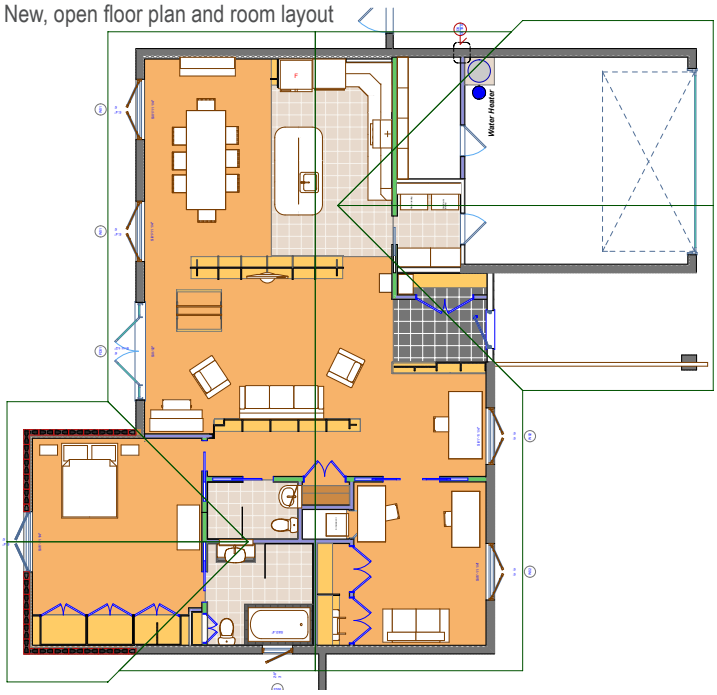

New front entry properly drained with grow boxes for edible plants acting as a boundary encouraging porch use.

Here are some other images showing the house before and after the major re-fit.

Exteriors before the renovation.



New, open floor plan and room layout



Tight interior layout and dark corridors before the renovation