

# The Added Cost of Greening a New Home



A case study of how the LCCTC house would have rated in the National Green Building Standard™ and the costs involved with that rating



## Acknowledgements

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## About the Lancaster County Career and Technology Center

Based on identified occupational needs, the mission of the Lancaster County Career & Technology Center is to prepare high school and adult students to be academically competent, to be occupationally proficient for employment, and to have a sound foundation for continued learning. The Lancaster County Career & Technology Center is accredited by the Commission of the Council on Occupational Education.

## About the NAHB Research Center

Located in Upper Marlboro, Md., the NAHB Research Center promotes innovation in housing technology to improve the quality, durability, affordability, and environmental performance of homes and home building products. Created over 40 years ago as a subsidiary of the National Association of Home Builders (NAHB), the NAHB Research Center has established itself as the source for reliable, objective information and research on housing construction and development issues. Through its various testing and certification services, the Research Center seal is internationally-recognized as a mark of product quality and an assurance of product performance.

## About PATH

The Partnership for Advancing Technology in Housing is a public-private initiative dedicated to accelerating the development and use of technologies that radically improve the quality, durability, energy efficiency, environmental performance, and affordability of America's housing. PATH is supported by the U.S. Department of Housing and Urban Development.

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## The National Green Building Standard™

The National Green Building Standard (NGBS) was approved by the American National Standards Institute (ANSI) in February of 2009. Officially titled ANSI ICC 700-2008, the NGBS was a collaborative effort between the International Code Council® (ICC) and National Association of Home Builders (NAHB®) and is the first nationally recognized green rating system for residential projects; whether new construction, an addition, or the remodel of an existing building. The NGBS's rating system is so comprehensive that it also includes high-rise multifamily buildings, hotels and motels, and subdivision development.

The green practices rated for compliance with the NGBS encompass a thorough spectrum of construction activities. Green initiatives addressed by the standard are organized in six chapters: Lot Design, Preparation, and Development, Resource Efficiency, Energy Efficiency, Water Efficiency, Indoor Environmental Quality, and Operation, Maintenance, and Building Owner Education. A seventh chapter of the standard provides land developers with low (environmental) impact and sustainable strategies for rating the land development and infrastructure design and construction of a project. There are four threshold levels of achievement in the National Green Building Standard – Bronze, Silver, Gold, and Emerald. These, along with the diverse practices/products that can be rated in the NGBS, provide builders with a large degree of flexibility

in meeting various levels of consumer demand for sustainable housing.

The NGBS relates point scores to green home building techniques toward the goal of amassing sufficient points to qualify for a level of achievement within the standard's framework. Meriting each of the level designations – Bronze, Silver, Gold, and Emerald – requires successively more rigor than the preceding level. Table 1 indicates the minimum point thresholds for certification to the National Green Building Standard.

## Project Background

This study re-examines a house that was constructed over the past two years and planned as a Gold-level green home in the Model Green Home Guidelines (Guidelines), a precursor to the National Green Building Standard. The subject plan was initially specified to perform as an ENERGY STAR® qualified house (about 15% more energy efficient than a code minimum house) in Lancaster County PA, then upgraded to also merit the highest rating, Gold, in the Model Green Home Guidelines program.

The home was built by the students of the Lancaster County Career and Technology Center (LCCTC), the area's vocational and technical high school. The sustainable construction of the house supplemented the school's Building Green Community Education Project curriculum. The goal of the project was to design and build a highly-rated green home with new technologies

➤ **Table 1. Rating Scale for National Green Building Standard Certification**

National Green Building Standard Categories	Minimum Points per Achievement Level			
	Bronze	Silver	Gold	Emerald
5. Lot Design, Preparation, and Development	36	66	93	119
6. Resource Efficiency	45	79	113	146
7. Energy Efficiency	30	60	100	120
8. Water Efficiency	14	26	41	60
9. Indoor Environmental Quality	36	65	100	140
10. Operation, Maintenance, and Building Owner Education	8	10	11	12
Additional Points from any Category	50	100	100	100
<b>Total Minimum Points</b>	<b>222</b>	<b>406</b>	<b>558</b>	<b>697</b>

and techniques that would provide the students with practical hands-on construction experience with the new media, as well as, inform public stakeholders of the school and the green message.

## Focus of Current Study

As aforementioned, the selection of practices and products for the LCCTC green house design were based on a green building program other than the National Green Building Standard, the basis used for this current comparison. This report rates the as-built house against the NGBS criteria then presents incremental costs associated with each area of point award. Costs have been developed from bids and invoices rendered during the construction of the house (2006-2009). In some cases, estimates have been generated from other sources, such as cost analysis projects that the NAHB Research Center completed within the last year and R.S. Means<sup>1</sup>. The students provided much of the labor to construct the house without compensation. Where applicable, the cost of labor was estimated. Most frequently, however, the green preference was deemed to require the same labor input as an alternative standard practice, as in applying exterior trim made of cellular PVC versus wood.

See the report titled *Greening a New Home*, prepared by the NAHB Research Center for PATH in January 2008 for the process involved with selecting the green criteria and the advantages of these practices.

## How the House Rated

As was expected, the house constructed by the LCCTC students rated lower on the NGBS scale than it had in the Guidelines. The house had scored at the highest level, gold, in the Guidelines versus the silver level of merit recognized under the NGBS. The lower rating in the new standard indicates that the NGBS is a more rigorous standard for rating green building than the Guidelines had been.

The house did merit the award of 513 points where the minimum required for a silver rating in the NGBS is 406, as supported by the point scale in Table 1. By this measure, the house ranks as 70% of the way to the next level of achievement in the NGBS – Gold. Had the newer green building standard (NGBS) been available at the time that this house was specified, it is likely that the 45 additional points required for a gold rating could easily have been incorporated into its features.

Conversely, there are 107 points, which represent 20% of those achieved, that attribute additional cost to the project without providing an added advantage within the framework of the rating system. Fortunately, the very nature of green building assures that there are other advantages to the features that were selected.

## Cost Methodology

The designed practices and product selections were in place when this cost and rating analysis was undertaken. Many of the selections were initially made to enhance the student's experience with the technology or technique as well as to promote sustainability, so this study is not necessarily a least cost approach to green building, but rather a look at the economics surrounding this particular as-built situation. To enhance a multi-faceted economic view of green building, this evaluation will also present a scenario that could have cut the costs of a silver rating for this house nearly in half, had the identified actions and attendant points been omitted. As words to the wise, this practice of slashing points associated with the highest added incremental expenses is a strategy that is best developed in tandem with an assessment of the interaction of the systems of the house at the planning stage. The lower cost scenario that will be presented, ignores nearly all of the components of the *Energy Efficiency* chapter due to the systems approach integral to the rating which indicates a modeled 60% performance improvement over code minimum (IRC 2006).

When this project was being planned, in 2006, a local builder presented a budget for the 2,712 square foot, 2-story house with a basement foundation, detached garage, and finished basement. The builder's budgeted line items indicated an aggregate cost of \$102 per above-grade square foot of living area, exclusive of land and soft costs. The builder's budget by construction activity (line item) provides the basis for the estimation of the "standard practice" cost in this study. Likewise, the standard specifications for this build were defined by this builder, including its ENERGY STAR qualification.

Many of the products that were used in this house were contributed by manufacturers, distributors, or trade contractors at no cost. The LCCTC students provided uncompensated labor for all products that did not require certified installers. Incremental cost estimates

<sup>1</sup> Reed Construction Data, 2008. *Residential Cost Data*, 27<sup>th</sup> Edition.

were developed from various sources including proposals, internet sites, R.S. Means, cost studies performed by the NAHB Research Center within the past eighteen months for other clients, and invoices rendered. Appendix A contains the *Project Scoring Analysis*<sup>2</sup>, cost estimates, and details.

## No Cost Green

Green building has been broadly defined as the practice of increasing a building's resource efficiency while reducing building impacts on human health and the environment during the building's lifecycle. Many aspects of boosting building resource efficiency can be done at the planning boards, at no additional first cost to the construction budget. Some of the actions that merited points in the NGBS rating system without changing the economics of the LCCTC endeavor were:

1. Selection of an infill lot with access to mass transit and close proximity to community amenities like parks, recreation areas, shopping and religious worship.
2. Planning that retained natural features like mature trees and established storm water runoff swales and catch basins and included minimized site disturbance and demarcation of the sensitive areas during excavation and construction. Landscape plan development that included native plantings not requiring an irrigation system.
3. Topsoil at the excavation was removed and stockpiled and replaced. Areas that were disturbed by excavation for the house were quickly reseeded for erosion control. Silt retention fencing ringed the construction area throughout the build.
4. Detailed layouts and quantity take-off calculations allowed for minimal framing waste and maximized quality. I-joists, engineered sheathing, and roof trusses were used to minimize the total board feet of lumber used to build the house.
5. Vinyl windows and cellular PVC exterior trim minimize the surfaces that required site-applied finishes.
6. Doorways covered by roofs, a sloped final grade from house outward, and good gutter details move water away from the house and enhance the building's durability.
7. Organization of site-generated debris allowed for recycling or re-use.
8. Selection of bio-based, recycled content, and/or materials that required fewer resources to be applied on site.
9. Selection of ENERGY STAR appliances.
10. Selection of a plumbing system and fixtures that minimized water usage by minimizing flow.
11. Sealed HVAC ducts and equipment located in conditioned space. Detached garage is better for indoor air quality.
12. Selection of interior finishes with no- or low-VOCs.

This assessment identified over 200 points that were earned in the NGBS simply by doing some homework and planning at the front end of the project. It is possible to effect and promote good design, select environmentally preferential products at equal cost to others, and implement and maintain best practices. Paying attention to the details outlined would merit nearly 90% of a Bronze level rating in the National Green Building Standard while providing value to the owner and mitigating environmental degradation.

## The LCCTC Costs of Green

Once the LCCTC house was revisited to rank its green features and modeled performance against the NGBS, the question of representative costs for these attributes surfaced. Because of the broad-based stakeholder support of the project and the nature of its initial intent – as a stage for learning skills, conducting research, and community outreach – it is fair to state that many of the sustainable features selected for the project were made for reasons unrelated to strict economics. Thus, these results cover the estimated costs associated with this green house, as specified and built. The cost estimation presented in Table 2 reports direct (“hard”) construction costs. A company might also be expected to incur additional expenses associated with establishing a team and mission statement supporting green building and putting together green indoctrination information for the purchaser/user of their house(s). These types of overhead costs are detailed in Appendix A and are estimated at an additional \$4,560 that is not shown in Table 2.

For this particular house, the additional cost associated with a silver NGBS rating represents nearly 17% of the construction costs; an addition of \$17.00 per finished square foot. These numbers, however, represent the cost of this specific green building while at the same time overstating the actual cost of green building due to the number of points earned above the threshold for the silver rating.

<sup>2</sup> See [www.nahbgreen.org](http://www.nahbgreen.org) for complete details on the National Green Building Standard, verification process, and a user-friendly green rating tool.

➤ **Table 2. Estimated Costs of the LCCTC Green House**

NGBS Chapter	Points Earned	Estimated Cost
<b>CHAPTER 5 – Lot Design, Preparation, and Development</b>	68	6,139
<b>CHAPTER 6 – Resource Efficiency</b>	100	10,655
<b>CHAPTER 7 – Energy Efficiency</b>	163	17,660
<b>CHAPTER 8 – Water Efficiency</b>	60	7,026
<b>CHAPTER 9 – Indoor Environment Quality</b>	111	4,780
<b>CHAPTER 10 – Operation, Maintenance, and Building Owner Education</b>	11	200
<b>Total Points and Costs for LCCTC's NGBS Silver Rating</b>	<b>513</b>	<b>\$46,460</b>

The results in Table 3 indicate the lower costs that might have been attributed to this green building effort if the identified actions and attendant points had been omitted. In this lower cost scenario we have retained all but the tubular skylight of the components of the Energy Efficiency chapter due to the systems approach integral to the rating which indicates a modeled 60% performance improvement over code minimum (IRC 2006).

Strategically approaching point accrual and NGBS rating level could have yielded overall costs that were just below half of those reported as the LCCTC actual, dropping the potential cost to \$25,796. The exercise is meant to point out the flexibility of the standard and the variety of approaches that merit green. No comment on the relative importance of points is intended. In fact, perhaps the cost estimates are high and the more valid approach to cost containment is to retain the features identified above and hone the costs through streamlined design, volume purchase, value engineering and/or similar approaches applied to future projects.

➤ **Table 3. Costs Which Might Have Been Eliminated in the LCCTC Green House**

NGBS Chapter	Points Omitted	Estimated Cost Omitted
<b>CHAPTER 5 – Lot Design, Preparation, and Development</b>		
<b>CHAPTER 6 – Resource Efficiency</b>		
602. Prefinished exterior trim	(5)	(905)
602. Standard roof overhangs	(4)	(623)
602. Cool roof	(3)	(8,396)
604. Recycled content material	- cellulose insulation	(3)
	- flooring	
<b>CHAPTER 7 – Energy Efficiency</b>		
704. Tubular skylight	(2)	(1,400)
<b>CHAPTER 8 – Water Efficiency</b>		
801. Low-flow water closets	(24)	(390)
802. Rainwater catchment and rReuse	(6)	(6,636)
<b>CHAPTER 9 – Indoor Environment Quality</b>		
901. Gasketed fireplace <sup>A</sup>	(7)	(577)
<b>CHAPTER 10 – Operation, Maintenance, and Building Owner Education</b>		
<b>Potential Total Point/Cost Savings – LCCTC</b>	<b>(54)</b>	<b>(20,664)</b>

<sup>A</sup> Technically, if the fireplace were eliminated, there would be a savings of \$2077 while retaining the 7 points, but we do not want to overstate the reduction to green cost here.

## Other Economics of Green Building

The LCCTC house highlights energy features which represent added initial costs equal to approximately 6% of the projected total costs of the originally budgeted ENERGY STAR house. The selections were made because the geothermal heat pump, solar thermal water heater, and the other features that were designed to enhance the energy performance of this house, had been modeled using EnergyGauge<sup>®3</sup> software to result in a 45% energy bill savings.

The LCCTC house is served by PPL Electric Utilities, a government sponsored utility that does not generate power but purchases it off the grid. The utility's ten-year-old rate guarantee, structured on a model that charges lower rates per kilowatt (kWh) for volume thresholds of consumption is due to expire this year and the utility forecasts 30% rate increases based on current costs<sup>4</sup>. Table 4 indicates the simple math associated with the current and projected cost of electricity over the next five years and the amortization of the increased initial costs of high performance equipment in this house based on the usage predicted by the energy model.

In this case, an analysis of the current condition in 2006 might have discouraged added expenditures for energy efficiency equipment based on short term cash flows,

however, three years later the case for energy efficiency indicates an approximate annual savings of \$200 for the energy investment beginning with the second year of ownership. And, the owner has turned what would have been a monthly expense of \$90-120 into an investment in assets, a much more desirable financial strategy. Projects located in regions where utilities have been deregulated will likely be able to replicate this real savings in monthly cash flows scenario from the first day of ownership.

The LCCTC house has a highly sophisticated RainKeeper<sup>TM5</sup> system for rainwater catchment, storage, and reuse as flush, washing machine and irrigation water for the house. The system consists of a large buried storage tank that collects rainwater from the roof. The rainwater is filtered and delivered to fixtures throughout the house via pump and pressure tank, much like well water might be. Table 5 represents the estimated water savings for a family of five occupants. Table 6 presents the five year simple economics of the system.

In the Table 6 scenario, the economics indicate that the green strategy – rainwater catchment and reuse – would have a nominal monthly cost. The net cost is based on the assumption that 100% of the metered water in is attributed to the volume of sewer water out.

➤ **Table 4. Five Year Simple Economics of Energy Efficient HVAC Equipment for the LCCTC House**

Year	2009	2010	2011	2012	2013
<b>Monthly Mortgage Cost for HVAC Features<sup>A</sup></b>	94.80	94.80	94.80	94.80	94.80
<b>Monthly Energy Savings (1,012 kWh)<sup>B</sup></b>	(91.33) <sup>C</sup>	(118.73) <sup>C</sup>	(118.73) <sup>C</sup>	(118.73) <sup>C</sup>	(118.73) <sup>C</sup>
<b>Net Monthly Savings or Expense</b>	<b>3.47</b>	(23.93)	(23.93)	(23.93)	(23.93)
<b>Cumulative Savings or Expense</b>	<b>41.67</b>	(245.51)	(532.66)	(819.81)	(1,106.96)

Note: The tax effect of the additional interest associated with the higher mortgage payment and the state and real estate and transfer taxes associated with the higher cost of the house (for the energy features) have not been included in this proforma for the sake of simplicity. These numbers would have served to increase the aggregated monthly savings based on current tax rates and amortization of the transfer tax.

<sup>A</sup> Estimated added cost of \$17,660 at 5% fixed rate amortized over 30 years.

<sup>B</sup> Energy modeling indicates heating/cooling energy savings between LCCTC and a house built to 2006 IRC code is 60%. Modeling also indicates that lighting/misc., or occupant-controlled loads, are nearly 40% of overall building usage and assumes the same usage in both houses, thus only 45% of the overall usage is estimated as the savings potential.

<sup>C</sup> Current rate structure is \$.1079/kWh for the first 200 kWh, \$.09683 for the next 400 kWh, and \$.09022 for all usage over 800 kWh each month. See footnote 4; the utility forecasts a thirty percent increase in 2010.

<sup>3</sup> University of Central Florida, <http://energygauge.com/>

<sup>4</sup> [http://www.pplelectric.com/NR/rdonlyres/02299D00-1C84-43B9-BB85-4D48F862FE8A/0/EU\\_Rate\\_Brochure\\_2008\\_08\\_26.pdf](http://www.pplelectric.com/NR/rdonlyres/02299D00-1C84-43B9-BB85-4D48F862FE8A/0/EU_Rate_Brochure_2008_08_26.pdf)

<sup>5</sup> <http://www.starkenvironmental.com/a-0-rainwater.html>

➤ **Table 5. Estimated Monthly Water Savings With Rainwater Catchment and Reuse**

Usage or Fixture	Quantity	Note	Water Savings (Gallons)
Water Closets	4 flushes/day/person	A	779
Washing Machine	1 load/day/28 gal. each	B	852
Irrigation/Car Washing	=(180 days*80 gal.*5*.30)/12	C	1,800
<b>Total Estimated Savings</b>			<b>3,431</b>

<sup>A</sup> [www.mwra.state.ma.us/publications/ulftoilets.pdf](http://www.mwra.state.ma.us/publications/ulftoilets.pdf)

[www.tampagov.net/dept\\_WATER/information\\_resources/Saving\\_water/Water\\_use\\_calculator.asp](http://www.tampagov.net/dept_WATER/information_resources/Saving_water/Water_use_calculator.asp)

<sup>B</sup> [www.epa.gov/WaterSense/water/simple.htm](http://www.epa.gov/WaterSense/water/simple.htm); based on high efficiency machine.

<sup>C</sup> [www.epa.gov/WaterSense/water/simple.htm](http://www.epa.gov/WaterSense/water/simple.htm); EPA estimates that 30% of annual usage is outdoors.

[www.ga.water.usgs.gov/edu/qahome.html](http://www.ga.water.usgs.gov/edu/qahome.html); USGS estimates the low end of daily usage at 80 gallons per person. Used the conservative limit to outdoor water usage of 6 months out of the year.

➤ **Table 6. Five Year Simple Economics of a Water Efficient System for the LCCTC House**

Year	2009	2010	2011	2012	2013
Monthly Mortgage Cost for the System <sup>A</sup> (\$)	35.62	35.62	35.62	35.62	35.62
Monthly Water Savings (3,430 gallons) <sup>B</sup> (\$)	(31.36) <sup>C</sup>	(31.36) <sup>C</sup>	(31.36) <sup>C</sup>	(31.36) <sup>C</sup>	(31.36) <sup>C</sup>
Net Monthly Savings or Expense (\$)	4.26	4.26	4.26	4.26	4.26
Cumulative Savings or Expense (\$)	51.12	102.24	153.36	204.48	255.60

<sup>A</sup> Estimated added equipment cost of \$6,636 at 5% fixed rate amortized over 30 years.

<sup>B</sup> Based on usage estimate from Table 5.

<sup>C</sup> Current rate structure is a flat \$35.68 for the first 8,000 gallons and \$4.46 for each 1,000 gallon increment above that number. The sewer is metered by the water in – like amount of sewer out assumed, so the savings includes a \$4.68/1,000 gallon sewer cost. Usage below 8,000 gallons/month might incur greater costs.

## Conclusion

This report took another look at a successful green building project as an exercise in quantifying costs associated with certification in the National Green Building Standard. Because of the timing of the LCCTC start, 2006, it is technically not eligible for NGBS certification as the program only gained official recognition in 2009. Were that not the case, the LCCTC house might have qualified at the Silver level of achievement in the NGBS and could have done so at an added cost of \$46,460, as built.

While identifying and compiling the green building related construction costs of the LCCTC house was the primary focus of this analysis, two simple economic five-year outlooks on expenditures for energy and water efficient equipment indicate very similar outcomes. The energy efficient equipment upgrades, valued at \$17,660, indicate an annual positive cash flow of approximately \$250 starting in year two that might

have occurred at move-in in a deregulated utility environment. By this measure, HVAC efficiency is green and an economic no-brainer!

Using the same simple economics approach, rain water catchment is not supported by the numbers, however, the estimated monthly additional cost of the green approach is less than five dollars. The model presented recognizes more than half of the savings from measuring sewer costs on the water supply side. Without the sewer cost savings the simple economic flow picture would show double the monthly expenses because the water and waste water cost system measures outflow by inflow and, in this case, metered water inflows would be reduced by 28% whereas outflows could be expected to remain the same (approximately 41,000 gallons higher than water demand annually).

# NAHB National Green Building Program

## Green Scoring Tool for the National Green Building Standard, v1.00

### Designer's Report

Project Name - LCCTC					
Project Description - SFD infill					
Scoring Path - Single-Family New Construction					
Square Footage of Dwelling Unit - 2712					
Total points claimed in this Project - 513					
Green level achieved for this Project		Silver			
<b>Point Minimums for this Project:</b> Bronze: 222 Silver: 406 Gold: 558 Emerald: 697			46,460	4,560	Estimated Total Incremental Cost for Green Rated House
<b>CHAPTER 5 - Lot Design, Preparation, and Development</b>			6,139	2,000	Chapter 5 Total
<b>Section 501 - Lot Selection</b>					
<b>Practice 501.1 Lot</b>					
The lot is selected to minimize environmental impact by one or more of the following:					
An infill lot is selected.					
Conditions met		Points Claimed: 4	0		
Documentation Required - None.					
Comments To Verifier - The house is served by a road, plus water and electrical service at the road.					
<b>Practice 501.2 Mass transportation</b>					
A range of mass transportation choices are promoted by one or more of the following:					
Access to mass transit.					
Conditions met		Points Claimed: 3	0		
Documentation Required - Map showing location of transportation relative to the building.					
Comments To Verifier - The Mount Joy Amtrak Station is located 3/4 mile from the home. Parking is available.					
Community resources (6 or more) close by.					
Conditions met		Points Claimed: 3	0		
Documentation Required - Map showing location of community resources relative to building.					
Comments To Verifier - Six or more community resources can be found within a 0.5 mile radius. There is an existing park with tennis courts at 0.4 miles (plus a new park going in across the street), several churches, Wachovia bank, the school (LCCTC) at 0.2 miles which operates a daycare center, a butcher shop, a restaurant, and a hair/nail salon.					
<b>Section 502 - Project Team, Mission Statement, and Goals</b>					
<b>Practice 502.1 Project team, mission statement, and goals</b>					
A knowledgeable team & mission statement is established.					
Conditions met		Points Claimed: 4		2,000	2 people x \$125/hr x 8 hrs spread over the 4 houses that LCCTC plans to build green. Moved to O/H costs
Documentation Required - Project mission statement, goals, and specific team member roles identified.					

	Added Hard Cost	Overhead Cost	Notes
<b>Comments To Verifier</b> - Several working groups were established at the beginning of the project, one of which focused on site design and development. The NAHB Research Center and local stormwater professionals participated in this group, along with all involved LCCTC instructors, school principals, and the school's director. The project's main goal from the start was to be as "green" as possible. Therefore, the intent of 502.1 is met. GET MISSION STATEMENT FROM KIM PATRICK.			
<b>Section 503 - Lot Design</b>			
<b>Practice 503.1 Natural resources</b>			
Natural resources are conserved by one or more of the following:			
<b>Note: To be awarded points allocated for design, the intent of the design must be implemented.</b>			
A natural resources inventory is completed.			Inventory was not formally accounted for; cost calced as 1/2 day's work all 3 professionals.
<b>Conditions met</b> <span style="float: right;"><b>Points Claimed: 5</b></span>	1,500		
Basic training in tree or other natural resource protection is provided for the on-site supervisor.			
<b>Conditions met</b> <span style="float: right;"><b>Points Claimed: 4</b></span>	0		Local and academic advisors informed site supervisor for gratis all parties' time.
<b>Practice 503.2 Slope disturbance</b>			
Slope disturbance is minimized by one or more of the following:			
<b>Note: To be awarded points allocated for design, the intent of the design must be implemented. Points awarded only if there are developable steep slopes on the lot.</b>			
Erosion reduced through use of terracing, retaining walls, landscaping and restabilization.	3,600		Terracing
<b>Conditions met</b> <span style="float: right;"><b>Points Claimed: 6</b></span>			Seeding after rough grade
<b>Practice 503.3 Soil disturbance and erosion</b>			
<a href="#">Soil disturbance and erosion are minimized by one or more of the following: (also see Section 504.3)</a>			
<a href="#">Points must be taken here to claim points in 504.1</a>			
Clearing/grading limits shown on the plan.			
<b>Conditions met</b> <span style="float: right;"><b>Points Claimed: 5</b></span>	0		Clearing and grading limits are included on all plans for every site plan.
<b>Practice 503.4 Storm water management</b>			
Storm water is managed using one or more of the following low impact development techniques:			
<b>Note: To be awarded points allocated for design, the intent of the design must be implemented.</b>			
Natural water/drainage features are preserved.			
<b>Conditions met</b> <span style="float: right;"><b>Points Claimed: 6</b></span>	0		Preserved features were ID'd and planned during nat. res. planning session. 503.1
503.4 Storm water plan used to minimize concentrated flows & simulates natural flows.			
<b>Conditions met</b> <span style="float: right;"><b>Points Claimed: 6</b></span>	2,000		Features were ID'd and planned during nat. res. planning session. 503.1
<b>Practice 503.5 Landscape plan</b>			
<b>Note: To be awarded points allocated for design, the intent of the design must be implemented.</b>			

	Added Hard Cost	Overhead Cost	Notes
(1) A plan to restore/enhance natural vegetation and to ensure denuded areas are quickly vegetated. Points must be taken here to claim points in 801.7.4(3).			Temporary seed covered in 503.2. Planning covered in 503.1
Conditions met Points Claimed: 5	(961)		Native plants cost less than projected package of \$3,200
(7) On-site tree trimmings/grinding used for mulch & cut trees are recycled for lumber or pulp.			
Conditions met Points Claimed: 3	0		Site clearing is scoped to re-claim or -use local flora/fauna
<b>Section 504 - Lot Construction</b>			
<b>Practice 504.2 Trees and vegetation</b>			
<b>Designated trees and vegetation are preserved by one or more of the following:</b>			
Trenching, grading, & compaction avoided in "tree save" areas.			
Conditions met Points Claimed: 4	0		
<b>Practice 504.3 Soil disturbance and erosion</b>			
<u>On-site soil disturbance and erosion are minimized by one or more of the following: (also see Section 503.3)</u>			
Sediment/erosion controls are installed.			
Conditions met Points Claimed: 5	0		Standard practice for builder.
Topsoil stockpiled/stabilized for later use.			
Conditions met Points Claimed: 5	0		Standard practice for builder. Part of excavator's scope.
Total points claimed in Chapter 5 - Lot Design, Preparation, and Development: 68			
Point Minimums for this Chapter: Bronze: 39 Silver: 66 Gold: 93 Emerald: 119			
<b>CHAPTER 6 - Resource Efficiency</b>		10,655	Chapter 6 Total
<b>Section 601 - Quality of Construction Materials and Waste</b>			
<b>Practice 601.2 Material usage</b>			
<b>Points awarded for each system or framing technique implemented.</b>			
Structural systems/advanced framing techniques optimize material usage.			Note: Climate Zone 5 requires R-19 wall insulation or better. House was specified w/2x4 walls and R-13 cellulose with continuous R-6 sheathing. The cost of the foam was covered by the omission of OSB and the difference between R-19 and R-13 fiberglass insulation.
3 or more systems or framing techniques implemented Points Claimed: 9			24" Roof Truss - NC
<i>Documentation Required - List of advanced framing features shown on plans.</i>			
<i>Comments To Verifier - 24" OC roof framing Single top plate walls Right sized or insulated headers (where required) Eliminate headers in non-bearing walls Ladder blocking at interior wall-to-exterior wall intersections Header hangers</i>			
	(338)		2x4 in lieu of 2x6 - saved
<b>Practice 601.3 Building dimensions and layouts</b>			
<b>Building dimensions and layouts are designed to reduce material cuts and waste. This practice is used for a minimum of 80% of the following areas:</b>			
Building dimensions & layouts reduce material cuts & waste in at least 80% of wall area.			
Conditions met Points Claimed: 3	0		Material would have been waste if the adjustment hadn't been made.
<b>Practice 601.4 Framing and structural plans</b>			

	Added Hard Cost	Overhead Cost	Notes
Detailed framing/structural plans, material lists, on-site cut lists for framing/structural materials are provided.			Details are the course material of LCCTC classes. The typical builder could work with vendors and estimating/arch depts. to get these incorporated into plans efficiently.
Conditions met Points Claimed: 4	0		
<b>Practice 601.5 Prefabricated components</b>			
<b>Precut or preassembled components, or panelized or precast assemblies are utilized for a minimum of 90% for the following system or building:</b>			
Precut/preassembled components, panelized, or precast assemblies are utilized for a minimum of 90% of floor, wall, and/or roof system. If points claimed for these systems, points cannot be claimed for Modular or Manufactured home construction.			
Roof system Points Claimed: 4	0		Common practice for house style.
<b>Practice 601.6 Stacked stories</b>			
Stories above grade are stacked.			
1 stacked story Points Claimed: 4	0		Typical house style for region.
Documentation Required - None.			
<b>Practice 601.7 Site applied finishing materials</b>			
601.7(2) Building materials/assemblies do not require additional site applied material for finishing. 12 points max. awarded.			
Total Points Claimed for this Item: 10	905		Azek trim
# of types of materials or assemblies where at least 90% are pre-finished 2 * 5 points	0		Clad windows are a typical specification.
<b>Section 602 - Enhanced Durability and Reduced Maintenance</b>			
<b>Practice 602.1 Exterior Doors</b>			
602.1 Entries at exterior door assemblies are covered.			
Main entrance door + 2 or more additional covered door assemblies Points Claimed: 5	0		Standard design details at front and breezeway
<b>Practice 602.2 Roof overhangs</b>			
Roof overhangs are provided per table (See VRG).			
Conditions met Points Claimed: 4	623		Added 6" at front/rear overhangs and 12" at rake edges.
<b>Practice 602.3 Foundation drainage</b>			
Where required by the ICC IRC or IBC for habitable and usable spaces below grade, exterior drain tile is installed. Mandatory for certification, if applicable.			
Conditions met Points Claimed: 0			
Interior and exterior foundation perimeter drains sloped to discharge to daylight, dry well, or sump pit.			
Conditions met Points Claimed: 4	0		Standard design detail.
<b>Practice 602.4 Drip edge</b>			
Drip edge is installed at all eaves & gable edges.			
Conditions met Points Claimed: 3	0		Standard specification.
<b>Practice 602.5 Roof water discharge</b>			
Gutter/downspout/splash blocks grading carry water a minimum of 5' from perimeter foundation.			
Conditions met Points Claimed: 4	0		Specification part of rainwater storage system.

	Added Hard Cost	Overhead Cost	Notes
<b>Practice 602.6 Finished grade</b>			
Finish grade at all sides is sloped a minimum of 6" (150 mm) of fall within 10'. Mandatory for certification. Positive drainage will be provided at all sides of building as required			
Points Claimed: 0	0		Standard specification.
<b>Practice 602.9 Water-resistive barrier</b>			
Where required by the ICC IRC or IBC, a water-resistive barrier and/or drainage plane system is installed behind exterior veneer and/or siding. Mandatory for certification, if applicable.			
Conditions met			
Points Claimed: 0	0		Standard specification.
<b>Practice 602.10 Ice barrier</b>			
When ice damming is a problem, ice barrier at roof eaves extends at a min. of 24" inside the exterior wall. Mandatory for certification, if applicable.			
Conditions met			
Points Claimed: 0	0		Standard specification.
<b>Practice 602.11 Foundation waterproofing</b>			
Enhanced foundation waterproofing is installed.			
Conditions met			
Points Claimed: 4	1,059		Foundation wall sf of 1196 at .88
<b>Practice 602.13 Roof surfaces</b>			
ENERGY STAR cool roof or landscaped roof is constructed.			
Conditions met			
Points Claimed: 3	8,396		Note: The metal roofing used cost about \$2.50 per sf. Qualifying shingle roofing is available at less than 1/2 that cost.
<b>Section 603 - Reused or Salvaged Materials</b>			
<b>Practice 603.1 Reuse of existing building</b>			
603.1 Existing buildings and structures are reused, modified, or deconstructed in lieu of demolition. 12 points maximum awarded.			
≥1000 and			
Points Claimed: 5	(25)		Charge of \$2,500 plus value of reclaimed materials for salvage company compensation. RSM est. cost of demo w/o profit is 2525.
<b>Practice 603.2 Salvaged materials</b>			
Material and labor cost of salvaged materials is equal to or exceeds 1% of the total construction cost.			
Conditions met			
Points Claimed: 3	(1,600)		Estimated salvage value of the wood from bleacher seats that was used in the kitchen cabinets.
<b>Practice 603.3 Scrap materials</b>			
Central storage area or dedicated bins for sorting and reuse of scrap building material provided.			
Conditions met			
Points Claimed: 4	0		Labor furnished by students might otherwise have cost \$25x2=50. Used scrap.
<b>Section 604 - Recycled-Content Building Materials</b>			
<b>Practice 604.1 Recycled Content</b>			
Building materials w/ recycled content are used for at least 2 minor components.			
≥75%	1,089		Cellulose wall insulation instead of fiberglass
Points Claimed: 3	648		Regopol Floor
Building materials w/ recycled content are used for at least 2 major components.			
25% to <50%			
Points Claimed: 2	0		Fly ash concrete at no added cost.
<b>Section 605 - Recycled Construction Waste</b>			

	Added Hard Cost	Overhead Cost	Notes
<b>Practice 605.1 Construction waste management plan</b>			
Construction waste management plan posted at the jobsite & implemented with a goal of recycling a min. of 50% of construction and land-clearing waste.			Students estimated that 1.5 tons at \$53 were not dumped and \$22.12 was received for recycled metal.
Conditions met Points Claimed: 6	(102)		
<b>Practice 605.3 Recycled construction materials</b>			
Construction materials are recycled offsite.			Students were workforce and plan was indoctrinated early and often.
Minimum of 3 types of materials are recycled Points Claimed: 4	0		3.5 tons of recycled mat'l saved from dump - 1.5 tons drywall, 160 lbs cardboard, 553 lbs. metal. Mat'l saved same amount.
<b>Section 606 - Renewable Materials</b>			
<b>Practice 606.1 Biobased products</b>			
Biobased products are used. 8 points maximum awarded.			
Total Points Claimed for this Item: 6	0		Engineered wood products are typically specified.
<b>Section 607 - Resource-Efficient Materials</b>			
<b>Practice 607.1 Resource-efficient materials</b>			
Products containing fewer materials are used to achieve the same end-use requirements as conventional products.			
2 products Points Claimed: 6	0		Engineered wood products were specified.
Total points claimed in Chapter 6 - Resource Efficiency: 100			
Point Minimums for this Chapter: Bronze: 45 Silver: 79 Gold: 113 Emerald: 146			
<b>CHAPTER 7 - Energy Efficiency</b>	17,660		Chapter 7 Total
<b>Section 701 - Minimum Energy Efficiency Requirements</b>			
<b>Practice 701.3 Mandatory practices: Third-party Review</b>			
A review of the design has been conducted by a third party to confirm that the intent of the Standard with respect to energy provisions has been met.			NAHB RC performed the review in conjunction with other consulting services provided under PATH program. This might cost a builder an hour or two of energy modeling. Est. cost \$150 - 250
Conditions met Points Claimed: 0	0		
<b>Practice 701.4.1 Mandatory practices: HVAC systems</b>			
Space heating/cooling sized per ACCA Manual J.			
Conditions met Points Claimed: 0	0		Part of the HVAC scope.
Radiant/hydronic heating system designed using industry-approved guidelines. Mandatory for certification, if applicable.			
Conditions met Points Claimed: 0			
<b>Practice 701.4.2 Mandatory practices: Duct systems</b>			
Ducts sealed with UL181 tape, mastic, or gaskets. Mandatory for certification, if applicable.			
Conditions met Points Claimed: 0	0		Part of the HVAC scope.
Building cavities are not used as supply ducts. Mandatory for certification.			
Conditions met Points Claimed: 0	0		Part of the HVAC scope.
<b>Practice 701.4.3 Mandatory practices: Insulation and air sealing</b>			

	Added Hard Cost	Overhead Cost	Notes
Insulation is installed in accordance with the manufacturer's instructions or local code. Mandatory for certification. <b>Conditions met</b> <b>Points Claimed: 0</b>	0		Part of Insulation scope.
Shafts opening to unconditioned space are sealed with blocking or flashing; gaps are sealed with caulk or foam. Mandatory for certification. <b>Conditions met</b> <b>Points Claimed: 0</b>	0		
Floors: a) insulation installed to maintain contact w/ subfloor underside, enveloping ductwork & w/out compression or air gaps; b) batt & loose-fill insulation is held in place by permanent attachments. Mandatory for certification, if applicable. <b>Conditions do not apply</b> <b>Points Claimed: 0</b>			
Crawlspace wall insulation permanently attached to the walls. Exposed earth in unvented crawlspaces covered with continuous vapor retarder with overlapping joints that are taped or masticed. Mandatory for certification, if applicable. <b>Conditions do not apply</b> <b>Points Claimed: 0</b>			
Windows and doors: Caulking, gasketing, flashing tape, foam sealant, or weatherstripping forms a complete air barrier. Mandatory for certification. <b>Conditions met</b> <b>Points Claimed: 0</b>	0		Suppliers specification for doors.
Band & rim joists insulated & air sealed. Mandatory for certification, if applicable. <b>Conditions met</b> <b>Points Claimed: 0</b>	0		Insulation scope.
(a) Sill sealer is installed between foundation and sill plate; AND (b) Seal the bottom plate of exterior walls. Mandatory for certification, if applicable. <b>Conditions met</b> <b>Points Claimed: 0</b>	0		Framers scope.
Skylight shafts and knee walls are insulated to the same level as the exterior walls. Mandatory for certification, if applicable. <b>Conditions met</b> <b>Points Claimed: 0</b>	0		Insulation scope.
Code required building envelope insulation and air sealing are not disrupted at exterior architectural features such as stairs & decks. Mandatory for certification, if applicable. <b>Conditions met</b> <b>Points Claimed: 0</b>	0		
Attic access (except unvented attics), knee wall door, or drop-down stair is covered with insulation and gasketed. Mandatory for certification, if applicable. <b>Conditions met</b> <b>Points Claimed: 0</b>	0		Insulation scope.
Recessed light fixtures that penetrate the thermal envelope are airtight, IC-rated, and sealed with gasket, caulk, or foam. Mandatory for certification, if applicable. <b>Conditions met</b> <b>Points Claimed: 0</b>	70		10 ea. recessed lights in 2nd floor ceiling required gaskets
Where ceiling/attic assemblies or designs have eave vents, baffles minimize air movement into or under the insulation. Mandatory for certification, if applicable. <b>Conditions met</b> <b>Points Claimed: 0</b>	0		Insulation scope.
<b>Practice 701.4.4 Mandatory practices: Fenestration</b> <a href="#">Use the ENERGY STAR Window Requirements Tool to determine the window requirements for your zip code.</a>			
NFRC-certified windows, exterior doors, skylights, and tubular daylighting devices (TDDs) are ENERGY STAR, or Table 701.4.4.1 (see VRG). Mandatory for certification.			

		Added Hard Cost	Overhead Cost	Notes
Conditions met	Points Claimed: 0	(2,706)		Saved 123 sf of windows via redesign/removal. At \$22.00sf.
<b>Section 702 - Performance Path</b>				
<b>Practice 702.2 Performance Path combined with points from the Prescriptive Path (section 703).</b>				
		7,976		Cost of solar hot water
A documented analysis shows performance in excess of IECC by at least 15%, 30%, 50%, or 60%.		10,072		Cost of Geothermal--See CALC sheet
	60% Points Claimed: 120	609		Cost of RA-18 and RA-11 Seisco tankless minus 75-gal direct vent water heater NG standard
<b>Section 704 - Additional Practices</b>				
<b>Practice 704.2.1 Lighting &amp; appliances: Hard-wired lighting</b>				
Hard-wired lighting is in accordance with one of the following.				
Minimum of 50% of the total hard-wired lighting fixtures, or the bulbs in those fixtures, qualify as ENERGY STAR® or equivalent	Points Claimed: 4	39		Cost of flourescent bulbs throughout house.
<b>Practice 704.2.4 Lighting &amp; appliances: Skylights</b>				
TDD or a skylight with sealed, insulated, low-E glass installed in all rooms without windows.				
Conditions met	Points Claimed: 2	1,400		2 tubular skylights installed; only one qualified here; cost of mat'l only
<b>Practice 704.2.5 Lighting &amp; appliances: ENERGY STAR® appliances</b>				
ENERGY STAR or equivalent appliance(s) are installed.				
Dishwasher	Points Claimed: 2	0		Comparable to any dishwasher cost.
<b>Practice 704.4 Ducts</b>				
Duct system is sized, designed, and installed in accordance with ACCA Manual D.				
Conditions met	Points Claimed: 5	0		HVAC scope and plan.
Ductwork meets ALL of the following: 1) building cavities are not used as return ductwork; 2) ducts & equipment are within conditioned space; 3) ductwork is not installed in exterior walls.				
Conditions met	Points Claimed: 12	0		HVAC scope and plan.
Return ducts/transfer grilles in all rooms with a door except baths, kitchens, closets, pantries, & laundry.				
Conditions met	Points Claimed: 5	200		Cost is for materials, only, in design that has one central return.
<b>Practice 704.5 HVAC design and installation</b>				
ACCA Manual S used to select heating and/or cooling equipment.		0		HVAC scope.
Conditions met	Points Claimed: 1			
HVAC uses an alternate refrigerant with no HCFCs. Points awarded only until January 20, 2010.				
Conditions met	Points Claimed: 1	0		HVAC scope
<b>Practice 704.6.1 Installation and performance verification</b>				
3rd party inspection verifies ALL of the following, as applicable: ducts per ICC IRC or IMC & ducts are sealed; bldg envelope air sealing installed; insulation installed in accordance w/ 703.1.2; windows, skylights, doors are flashed/caulked/sealed.				Work performed by consultants might cost the same as HERs/EStar inspection of approx. \$350 -500
Conditions met	Points Claimed: 5	0		

	Added Hard Cost	Overhead Cost	Notes
<b>Practice 704.6.2 Third-party testing to verify performance.</b>			
Bldg. env. leakage rate demonstrated by blower door test. The following are required: whole bldg. ventilation provided; fossil fuel furnace & water heater sealed combustion; fireplaces & fuel burning appliances in accordance with Section 901.2			Performance test included above.
Max leakage rate is 4 ACH50 <span style="float: right;">Points Claimed: 6</span>			
Total points claimed in Chapter 7 - Energy Efficiency: 163			
Point Minimums for this Chapter: Bronze: 30 Silver: 60 Gold: 100 Emerald: 120			
<b>CHAPTER 8 - Water Efficiency</b>	7,026		Chapter 8 Total
<b>Section 801 - Indoor and Outdoor Water Use</b>			
<b>Practice 801.1 Indoor hot water usage</b>			
Indoor hot water usage is reduced.			
3(b) Engineered parallel piping (i.e., manifold system) w/ >15 feet to parallel piping system & parallel piping to fixture fittings has max of 8 cups <span style="float: right;">Points Claimed: 6</span>	0		PEX may be less expensive than CPVC or copper due to decreased labor requirement. No credit taken because students provided labor.
<b>Practice 801.2 Water conserving appliances</b>			
<b>ENERGY STAR® or equivalent water conserving appliances are installed.</b>			
ALL dishwashers installed are ENERGY STAR (or equivalent). 2 points awarded per dishwasher.			
1 dishwasher installed <span style="float: right;">Points Claimed: 2</span>	0		EStar DW are available at same cost as non-ES.
<b>Practice 801.4 Showerheads</b>			
The total showerhead flow rate in each shower compartment is per 801.4(1) or 801.4(2) at 80 psi. Showers have automatic compensating valve designed to provide scald protection.			
2 shower compartments comply <span style="float: right;">Points Claimed: 2</span>	0		Can be spec'd at same cost as others.
<b>Practice 801.5 Faucets</b>			
Water-efficient lavatory faucets with 1.5 gpm or less maximum flow rate when tested at 60 psi (414 kPa) in accordance with ASME A112.18.1 are installed.			
3 or more bathrooms (all faucets) <span style="float: right;">Points Claimed: 3</span>	0		Can be spec'd at same cost as others.
ALL lavatory faucets in the home meet the conditions of 801.5.1(1).			
Conditions met <span style="float: right;">Points Claimed: 2</span>	0		Can be spec'd at same cost as others.
<b>Practice 801.6 &amp; 802.2 Toilets &amp; Urinals</b>			
801.6(2) Water closets installed with effective flush volume of 1.28 gallons when tested in accordance w/ ASME A112.19.2 & ASME A112.19.14 & EPA WaterSense <i>Tank-Type High-Efficiency Toilet</i> OR composting or waterless toilets and/or urinals installed.			
3 or more water closets installed <span style="float: right;">Points Claimed: 18</span>	390		Cost difference of 3 low flow closets.
801.6(4) All water closets and all urinals are in accordance with 801.6(2) or 801.6(3), as applicable. <span style="float: right;">Points Claimed: 6</span>			
<b>Practice 801.7 Irrigation systems</b>			

	Added Hard Cost	Overhead Cost	Notes
801.7.4(3) No irrigation is installed and a landscape plan is developed in accordance with 503.5. <b>Points Claimed: 15</b>	0		
<b>Practice 801.8 Rainwater collection &amp; distribution</b>			
Rainwater collection and distribution is provided. <b>Rainwater is collected and used</b> <b>Points Claimed: 6</b>	6,636		Cost of rainwater system which includes a component that uses the rainwater for toilet flushing
Total points claimed in Chapter 8 - Water Efficiency: <b>60</b>			
<b>Point Minimums for this Chapter: Bronze: 14 Silver: 26 Gold: 41 Emerald: 60</b>			
<b>CHAPTER 9 - Indoor Environmental Quality</b>	4,780		Chapter 9 Total
<b>Section 901 - Pollutant Source Control</b>			
<b>Practice 901.1 Space and water heating options</b>			
Air handling/return ducts are not located in the garage, unless in isolated, air-sealed room w/ outside air source. <b>Conditions met</b> <b>Points Claimed: 5</b>	0		
Heat pump air handler is installed. <b>Heat pump air handler in conditioned space</b> <b>Points Claimed: 5</b>	0		
<b>Practice 901.2 Fireplaces and fuel burning appliances (appliances, clothes dryers, water heaters, and furnaces) certification.</b>			
Natural gas & propane fireplaces with power or direct vented have permanent fixed glass fronts or gasketed doors per ANSI Z21.88a/CSA 2.33a or ANSI Z21.50/CSA 2.22. Mandatory, if applicable, for certification. <b>Conditions met</b> <b>Points Claimed: 7</b>	577		Fireplace was specced to cost 923; actual \$1,500 attributable to upgraded features.
Factory-built, wood-burning fireplaces per UL 127 and EPA certified. Mandatory, if applicable, for certification. <b>Conditions do not apply</b> <b>Points Claimed: 0</b>			
Woodstove & fireplace inserts per UL 1482 & per EPA Certification & WAC 173-433-100(3). Mandatory, if applicable, for certification. <b>Conditions do not apply</b> <b>Points Claimed: 0</b>			
Pellet (biomass) stoves/furnaces per ASTM E1509 or EPA certified. Mandatory, if applicable, for certification. <b>Conditions do not apply</b> <b>Points Claimed: 0</b>			
Masonry heaters per ASTM E1602 and ICC IBC, Section 2112.1. Mandatory, if applicable, for certification. <b>Conditions do not apply</b> <b>Points Claimed: 0</b>			
Fireplaces, woodstoves, pellet stoves, or masonry heaters are not installed. Mandatory, if applicable, for certification. <b>Conditions do not apply</b> <b>Points Claimed: 0</b>			
<b>Practice 901.3 Garages</b>			
Where installed in the common wall between the attached garage and conditioned space, the door is tightly sealed and gasketed. <b>There is no attached garage</b> <b>Points Claimed: 0</b>			
A continuous air barrier is provided between walls and ceilings separating the garage space from the conditioned living spaces. <b>There is no attached garage</b> <b>Points Claimed: 0</b>			
A carport is installed, the garage is detached from the building, or no garage is installed. <b>Conditions met</b> <b>Points Claimed: 10</b>	0		Garage is detached and was planned that way. Cost of breezeway estimated at \$6,000.

	Added Hard Cost	Overhead Cost	Notes
<b>Practice 901.4(1) Structural plywood &amp; OSB</b> A minimum of 85% of material within a product group (i.e., wood structural panels, countertops, composite trim/doors, custom woodwork, and/or component closet shelving) is manufactured in accordance with the following.			
Structural use plywood per PS 1 or PS 2. OSB per PS 2. All marked Exposure 1 or Exterior. Mandatory for certification. Conditions met Points Claimed: 0			
<b>Practice 901.4(2) Wood materials</b>			
A minimum of 85% of material within a product group (i.e., wood structural panels, countertops, composite trim/doors, custom woodwork, and/or component closet shelving) is manufactured in accordance with the following. 10 points maximum awarded.			
Total Points Claimed for this Item: 10	0		Planned to comply - selected products with these specs at no added cost.
<b>Practice 901.5 Carpets</b>			
Wall-to-wall carpeting is not installed adjacent to water closets and bathing fixtures. Mandatory for certification. Conditions met Points Claimed: 0	0		
<b>Practice 901.8 Architectural coatings</b>			
At least 85% of site applied interior architectural coatings per either 901.8.1 or 901.8.2.			
Site-applied int. products per: 1) 0 VOC <sub>A</sub> determined by EPA Method 24, 2) CARB Sugg. Ctrl. Measure for Arch. Coatings, 3) GS-11, OR 4) VOC limits in acc. w/: a) 50 g/L flat, b) 100 g/L non flat, c) 350 g/L clear wood varnish, d) 550 g/L clear wood laquer Points Claimed: 5	280		Dulux paint has a \$4 premium per gallon for no-VOC
<b>Section 902 - Pollutant Control</b>			
<b>Practice 902.1 Spot ventilation</b>			
All bathrooms are vented to the outdoors. Minimum ventilation rate = 50 cfm or 20 cfm if continuous operation. Mandatory for certification. Conditions met Points Claimed: 0	0		Standard in HVAC scope
Clothes dryers are vented to the outdoors. Mandatory, if applicable, for certification. Conditions met Points Claimed: 0	0		Standard in HVAC scope
Kitchen exhaust units are ducted outdoors & rate of 100 cfm or 25 cfm if continuous operation. Conditions met Points Claimed: 8	100		Added cost of duct and labor.
<b>Practice 902.1.4 ENERGY STAR® exhaust fans</b>			
Exhaust fans are ENERGY STAR®, as applicable. 6 points maximum awarded.			
Total Points Claimed for this Item: 4	92		Added cost of EStar fans; low sone.
ENERGY STAR® or equivalent fans 2 * 2 points			
<b>Practice 902.2 Building ventilation systems</b>			

	Added Hard Cost	Overhead Cost	Notes
Whole building ventilation systems is implemented per Appendix B.			
<b>Energy-recovery ventilator</b> Points Claimed: 17	2,681		Honeywell ER200 cost of equipment only
MERV filters 8 or greater on central air systems. Designer or installer to verify that equipment can accommodate the greater pressure drop.			
Conditions met Points Claimed: 3	0		
<b>Practice 902.3 Radon control</b>			
<b>Radon control measures are in accordance with ICC IRC Appendix F. See the EPA Map of Radon Zones to find the level of radon potential for your project area.</b>			
Buildings located in Radon Zone 1 have a radon system installed. Mandatory, if applicable, for certification.			
Not applicable (building not located in Zone 1) Points Claimed: 0	0		
Buildings located in Radon Zone 2 have a radon system installed.			
Passive radon system installed Points Claimed: 10	0		Footing drainage provides framework.
<b>Practice 902.4 HVAC system protection</b>			
HVAC system protection measures are performed.			
Prior to occupancy, HVAC supply registers, return grilles, & duct terminations inspected & vacuumed. Coils are inspected/cleaned & the filter is replaced Points Claimed: 3	0		Included in HVAC scope (students in this case).
<b>Practice 902.5 Central vacuum systems</b>			
Central vacuum system is installed and vented to the outside.			
Conditions met Points Claimed: 5	650		Builder reported cost in 2006 bid.
<b>Practice 902.6 Living space contaminants</b>			
The living space is sealed to prevent unwanted contaminants.			
Attic access, knee wall door, or drop down stair is caulked, gasketed, or otherwise sealed Points Claimed: 2			
All penetrations (e.g., top plates, HVAC register boots, recessed can lights) are sealed in the attic/ceiling Points Claimed: 2	0		Scope subtrades with these best practices.
All penetrations (e.g., top plates, HVAC register boots) are sealed in the wall Points Claimed: 2	0		Scope subtrades with these best practices.
All penetrations (e.g., top plates, HVAC register boots) are sealed in the floors Points Claimed: 2	0		Scope subtrades with these best practices.
<b>Section 903 - Moisture Management: Vapor, Rainwater, Plumbing, HVAC</b>			
<b>Practice 903.1 Tile backing materials</b>			
Tile backing materials installed under tiled surfaces in wet areas are in accordance with ASTM C1178, C1278, C1288, or C1325. Mandatory for certification.			
Conditions met Points Claimed: 0	0		
<b>Practice 903.2 Capillary breaks</b>			
A capillary break and vapor retarder are installed at all concrete slabs in accordance with Sections 903.2.1(1) or 903.2.1(2), as modified by Section 903.2.1(3). Mandatory, if applicable, for certification.			
Conditions met Points Claimed: 0	0		
<b>Practice 903.3 Crawlspace</b>			

	Added Hard Cost	Overhead Cost	Notes
Damp-proof walls are provided below finished grade. Joints of vapor retarder overlap a minimum of 6 inches (152 mm) and are taped. Mandatory for certification, if there is a crawlspace that extends below finished grade. <b>Conditions do not apply</b> <b>Points Claimed: 0</b>	0		
<b>Practice 903.4 Moisture control measures</b>			
Walls are not enclosed (e.g. with drywall) if the insulation has a high moisture content. Wet insulation products are dry before enclosing. Mandatory for certification if wet insulation is used. <b>Conditions met</b> <b>Points Claimed: 2</b>	0		
<b>Practice 903.5 Plumbing</b>			
Plumbing distribution lines are not installed in exterior wall cavities. <b>Conditions met</b> <b>Points Claimed: 2</b>	0		
Cold water pipes in unconditioned spaces are insulated OR plumbing is not installed in unconditioned spaces. <b>Plumbing is not in unconditioned spaces</b> <b>Points Claimed: 5</b>	0		
<b>Practice 903.6 Duct Insulation</b>			
All HVAC ducts, plenums, and trunks in unconditioned attics, basements, and crawlspaces are insulated to a minimum of R-8. <b>Conditions met</b> <b>Points Claimed: 2</b>	0		
Total points claimed in Chapter 9 - Indoor Environmental Quality: 111			
<b>Point Minimums for this Chapter: Bronze: 36 Silver: 65 Gold: 100 Emerald: 140</b>			
<b>CHAPTER 10 - Operation, Maintenance, and Building Owner Education</b>	200	2,560	Chapter 10 Total
<b>Section 1001 - Building Owners' Manual for One- and Two-Family Dwellings</b>			
<b>Practice 1001.1 Building Owners' Manual for One- and Two-Family Dwellings</b>			
A building owner's manual is provided. 1 point awarded per 2 items. Points awarded for both mandatory and non-mandatory items. <b>Total Points Claimed for this Item: 5</b>	0	2,560	Cost is based on 1 person 2 weeks to compile and print. Effort should be transferable to all houses constructed.
A green building certificate or placeholder. Mandatory for certification. <b>Points Claimed: 0.5</b>	200		Cost of NGBS Certification. See 701.3 and 704.6.1 for cost of verification.
List of green building features. Mandatory for certification. <b>Points Claimed: 0.5</b>			
Manufacturer's manuals or product data for equipment, fixtures, & appliances. If data sheet is in manual, product manual may be attached to the appliance. Mandatory for certification. <b>Points Claimed: 0.5</b>	0		
Information on local recycling programs <b>Points Claimed: 0.5</b>			
Benefits of energy efficient lighting systems (e.g., CFL bulbs, LEDs) in high usage areas <b>Points Claimed: 0.5</b>			
Local public transportation options <b>Points Claimed: 0.5</b>			
Clearly labeled photos (prior to insulation) of framing with utilities installed <b>Points Claimed: 0.5</b>			
Information on organic pest control, fertilizers, deicers, and cleaning products <b>Points Claimed: 0.5</b>			

	Added Hard Cost	Overhead Cost	Notes
Information on maintaining the building's relative humidity in the range of 30% to 60% <b>Points Claimed: 0.5</b>			
Instructions for inspecting for termite infestation <b>Points Claimed: 0.5</b>			
<b>Section 1002 -Training of Building Owners on Operation and Maintenance for One- and Two-Family Dwellings and Multi-Unit Buildings</b>			
<b>Practice 1002.1 Operation &amp; Maintenance Training for Owners of One- and Two-Family Dwellings &amp; Multi-Unit Buildings</b>			
Owners/occupants are familiarized with the green building practices implemented & the impact of occupants' activities on costs of operating the building. Training is provided regarding ALL equipment operation and control systems including at least ALL of:			
1) HVAC filters, 2) thermostat operation and programming, 3) lighting controls, 4) appliances and settings, 5) water heater settings, AND 6) fan controls <b>Points Claimed: 6</b>			
Total points claimed in Chapter 10 - Operation, Maintenance, and Building Owner Education: <b>11</b>			
<b>Point Minimums for this Chapter: Bronze: 8 Silver: 10 Gold: 11 Emerald: 12</b>			



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