NAHB Secondary Schools Construction Management "Competition in a Box"

NAHB National Association of Home Builders

Student Chapters

Contents

Prepared by: Slattery Consulting, December 2016

Introduction

The Secondary Schools Construction Management Competition (SSCMC) was developed in 2016 by the NAHB Student Chapters to provide value to local Home Builders Associations (HBAs) as well as to high school students interested in residential construction. The SSCMC was developed to be run by local HBAs, following a template that was developed and pilot-tested by consultants working with the staff of NAHB Student Chapters. This SSCMC is a 3-hour competition that involves residential plan-reading and quantity take-off skills. It is separate and distinct from the NAHB national competition for secondary schools and associate degree programs that is run annually at the International Building Show.

The objectives for the Secondary School Construction Management Competition are:

1. To provide high school students with an opportunity to develop and showcase residential plan-reading and quantity take-off skills
2. To provide local HBAs a venue for identifying and interacting with high school students who may wish to enter the residential construction field
3. To expose high school students to the supervisory and management skills needed in residential construction.

This document is addressed to the staff of HBAs, and provides a template for running a SSCMC for students in the local community or region served by the HBA. The appendices contain sample documents to assist in every phase of the competition.

Planning

Planning for the first SSCMC should begin 6-12 months before the anticipated date of the competition. A guide to the timeline is provided in Appendix A.

Identify a "Champion" for the SSCMC — Before the process can get started, someone or preferably, some group within the HBA needs to take ownership of the effort. Determine who has a passion for working to develop the next generation of talent, has organizational and administrative skills, and is willing to embark on a project that could develop into an ongoing, annual outreach effort.

Identify Potential Schools--The planning phase should begin with an identification of local technical high schools, if such a list is not already available. Some detective work may be needed to find the contact information (physical address of the school, email addresses and telephone numbers) for the administrator and construction faculty at these schools. Your state's department of education should be able to help identify the technical high schools within your HBA boundaries. Your state's technical education association may be helpful as well.
Letter of Inquiry--Making the first contact in writing allows you to explain the competition, its scope

and purpose, and explore the school's interest. It is protocol to address the correspondence to the administrator and copy the relevant faculty, since formal approval of outside activities may be required. Be prepared to follow up with telephone calls to determine whether there is interest in the competition. Personal visits to meet the individual faculty member at the schools can be helpful to develop relationships and establish a group of Key Construction Faculty who will assist in generating interest among students. Finally, determine how many schools are committed to participating and how many students from each program might potentially compete. A sample letter of inquiry is provided in Appendix B.

Identify a Target Date—Become familiar with the academic calendar for schools in your area, and get feedback from your Key Construction Faculty on the best time of year—in the fall, students may not have gotten much plan-reading or quantity take-off skills, but spring is busy. Come to consensus on a target date a semester (or about six months) ahead of that date. Consider selecting a date in mid- to late-semester (such as early November in fall semester, or early March in spring semester), avoiding spring and fall break weeks, hunting seasons, other competitions such as SkillsUSA, and other school holidays.

Select a Day, Time and Location—The competition is designed to be run in a half-day format, which may make Saturday morning an ideal time. Your Key Construction Faculty may recommend holding the competition during a school day. The location should be centrally located to the competing teams, have adequate parking or transit access, have adequate classroom-style or round table and chair seating, and have audio-visual equipment.

Recruit Sponsor(s)—A plan sponsor is needed to provide a set of house plans that will be the basis of the plan-reading and quantity take-off questions. The plan sponsor will need to develop a set of questions and answers based on the house plans. A list of the drawing sheets given to the competing teams is provided in Appendix G. A question bank of possible questions and multiple choice answers is provided in Appendix H that can be tailored to fit any set of plans.
Other sponsors may be recruited to provide snacks, prizes, and certificates or plaques for the winning teams. Approximately 4-6 volunteers will be needed the day of the event to act as emcee, act as timer, score the questions, and interact with students and faculty.

Execution

Register Teams-- Send an announcement of the competition and registration form to all Key Construction Faculty. A sample announcement is provided in Appendix C, and sample registration form in Appendix D. The deadline for registration should be 3-4 weeks prior to the competition.

Prepare Teams—Send plans sets and preparation aids containing guidelines about the format and types of problems to the Key Construction Faculty as soon as teams are registered to allow the students to prepare. A PowerPoint presentation titled "Preparation Aids," containing sample problems typical of those asked in the competition is provided as an attachment.
Run the Competition—On the day of the event, volunteers should arrive one hour prior to the students'

arrival time to assure the room is set up, A/V equipment is operational, and snacks and prizes are ready. A sample Agenda is provided in Appendix E. A list of necessary supplies is provided in Appendix F.

The competition consists of five 30-minute rounds containing 10 questions per round. Volunteers should distribute the questions for each round, collect and score the questions for the previous round, and maintain a running score. A sample score sheet is provided in Appendix I.

To occupy faculty and "extra" volunteers, consider having them form impromptu "teams" to answer the questions alongside the students. This can be fun for these adult participants, and will also help identify whether the competition questions are sufficiently challenging but not too difficult, and whether the time frame for each round is sufficient.

End on a Positive Note—While volunteers are scoring the final round and determining the winners, use the time to thank the teams for participating and take the opportunity to emphasize employment opportunities with HBA member firms. Present the awards and take photos for the teams to display at their schools. A volunteer may write a newsletter article for the HBA publication to highlight the event and attract support for future competitions.

After Action Review

Evaluate the Competition—During the competition, distribute evaluation forms to students, faculty, and the HBA sponsors/volunteers. After the competition, study the results of the evaluations to identify strengths and needed improvements for the next competition. Put these ideas to use as planning begins for the next competition. Sample evaluation forms are provided in Appendix J. Study the graded questions from each team to identify questions that were missed by most or all teams. These "bad" questions should be evaluated for improvement—students may need more preparation or examples, or the question may need to be re-worded or removed from the question bank.

Appendix A Timeline

6 months prior	Identify organizing team
6 months prior	Identify potential competitors
6 months prior	Contact school administrators and instructors
2 months prior	Finalize competition date and invite competitors
2 months prior	Select house plans for the problem
1 month prior	Distribute plans and preparation aids
1 month prior	Write questions
	Competition

Appendix B Sample Letter of Inquiry

National Association of Home Builders Secondary Schools Construction Management Competition

Mr. Smith

The Home Builders Association of _____ is organizing a Secondary School Construction Management Competition for students interested in the home building industry. We plan to schedule the competition in the fall (spring) 20XX. The competition will be held locally on a Saturday morning and will test residential plan reading and quantity takeoff skills. We wish to compile a list of contacts at schools in the area that may be interested in entering teams.

This is a new endeavor for the National Association of Home Builders. Please reply to let me know if your school may be interested and who the best contact person would be. If you have any questions, please contact me at xxx-xxx-xxxx or by email _____.

Thank you,

Appendix C Sample Announcement/Invitation

National Association of Home Builders
Secondary Schools
Construction Management Competition

Saturday, November 5, 2016
9:00 A.M. – 12:00 Noon
Doors open at 8:15 A.M.
Pre-competition breakfast 8:30 A.M.

Payne Family Homes
10407 Baur Blvd, Suite B
St. Louis, MO 63132

The National Association of Home Builders (NAHB) is introducing a new competition for secondary schools to allow three-person student teams to demonstrate their ability to apply residential construction management skills to real-world home building problems. St. Louis has been selected as the site for the first competition.

Teams will be given a detailed set of house plans and example quantity takeoff problems four weeks prior to the competition. Students will use the plans to answer questions in each of 5, 30-minute round. Questions will test skills in plan reading and quantity takeoff calculations.

There is no cost to enter, and schools may send more than one team. Teams must register by October 6, 2016 using the attached form to reserve a space. Email the form to ktslat@abc.com.

For more information, contact Kerry Slattery, 314-555-5720, ktslat@abc.com.

NAHB National Association of Home Builders | Student Chapters

Appendix D Sample Registration Form

National Association of Home Builders
Secondary Schools
Construction Management Competition

Team Registration Form

School

Name:	
Address:	

Team Name (if more than one team from school):

Coach

Name:	
Phone:	
Email:	

Team Members

1.	
2.	
3.	

Email to Kerry Slattery, ktslat@abc.com, by October 6, 2016.

NAHB National Association of Home Builders | Student Chapters

Appendix E Agenda

Time	Activity
8:15	Arrive
8:30	Breakfast
8:55	Welcome, Introductions
9:00	Round 1, Start
9:30	Round 2
10:00	Round 3
10:30	Break
10:40	Round 4
11:10	Round 5
11:40	Finish Round 5
11:50	Awards
12:00	Dismiss

Appendix F Supply List

Checklist of competition-day supplies:

Item	Check
Copies of competition question forms	
Copies of answer keys for judges	
Timer (electronic timers available online)	
Name tags and markers	
Highlighters for students	
Pencils for students	
Certificates for students	
Envelopes for certificates	
Awards for top three teams	
Architectural scales for students	
Snacks for attendees	
File folders	
Evaluation forms for students, instructors, volunteers	
Thank you notes for instructors and sponsors	
Camera	

Appendix G Sample House Plan

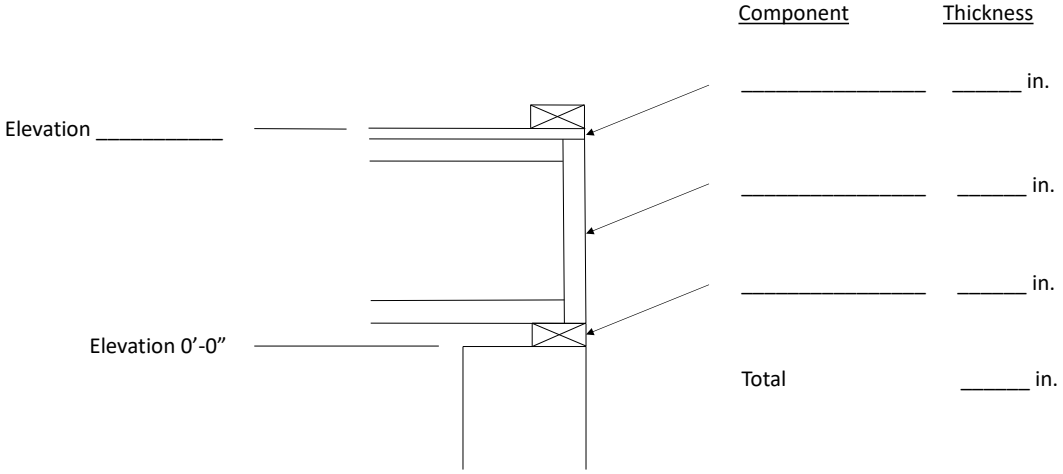
A competition sponsor made a full set of house plans available for a one-story, three bedroom house with a full basement. The full set consisted of 47 sheets which included many options and extensive details. The competition problem was based on the "baseline" model so the following sheets were extracted and provided to competing teams.

Cover Sheet
General Notes
House Footprints
Foundation Details
Foundation Plan
First Floor Plan
Stair Sections
Exterior Elevations, Sections and Roof Plan
Electrical Layout
Five Detail Sheets required to answer selected questions

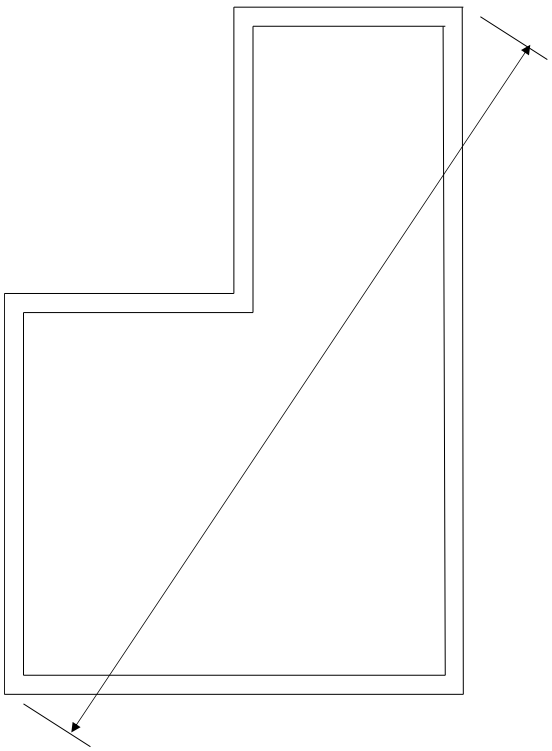
Appendix H Sample Question Bank

General

- What is the area of the first floor?
- Which room has an area of 144 SQ FT?
- General Note 1.1 states "These drawings are based on the 2015 IRC Building Code." What is "IRC"?
- General Note 3.1 states "Compressive strength of concrete at 28 days shall be minimum 2500 PSI" for basement slabs. What does "PSI" mean?
- What is the minimum required width for a lot for this model, (i.e., Elevation A with a 2-car garage) if a 10 foot building setback is required on both sides?
- The Foundation Plan drawing is made using a scale of 1/8" = 1'-0". The size of the actual foundation is _____ times the size of the drawing.
- Below which room is the standard area well with egress window located?
- The house could be generally described as
- If the top of foundation is assumed to be elevation 0'-0", what is the elevation of the top of the main floor line? Verify this by labeling the components with their thicknesses on the sketch provided.



- Sheet 2.1 gives a squaring dimension of 29'-9 1/8" from the upper left to lower right corners in the garage. What would be the squaring dimension from the lower right to the upper left corner at the back of the garage as shown in the attached figure, to the nearest 1/16 inch? Show your work.



Foundation

- What is the minimum soil bearing capacity if not certified by a registered engineer?
- How far must footings be below grade?
- How many anchor bolts are required in the foundation wall on the left side of the house if the maximum spacing is 6 feet? (Show work)
- How many feet of horizontal #4 reinforcing bars are required for the rear foundation wall? (Assume an 8'-10" pour)
- How many square feet of formwork are required to form both surfaces of the rear wall? (Assume an 8'-10" pour)
- How many cubic yards of concrete are required for the garage slab to the nearest 0.1 CU YD? (Show work)
- What total length of #4 rebar is required for one pipe column footing given 2" cover at the ends of each bar? (Show work)

- The basement wall on the rear of the house uses Detail 1 from Sheet 2.0. What is the cross sectional area of the footing in square inches? Subtract the area of the Key using ACTUAL dimensions. (Show work)
- The basement wall on the rear of the house is 40’ long. What quantity of concrete (in cubic yards) is required for a 40’ length of 8'-10" high foundation wall using Detail 1 from Sheet 2.0 as indicated? (Show work)
- How many linear feet of full-height basement wall are needed using a 7'-10" pour? (Do not double count corners. Show work.)

Framing

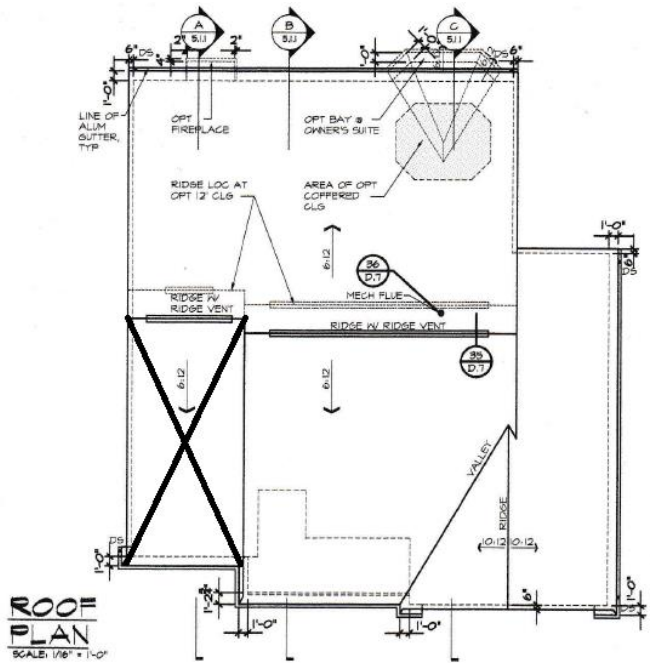
- What sizes are the two steel beams in the basement?
- How many linear feet of interior wall must be framed to enclose the bedroom of the OWNER'S SUITE?
- How wide is the opening from the dining area towards the kitchen?
- What is the thickness of the roof sheathing?
- What is the size of the beam over the garage door?
- How many risers are there on the basement stairway to the first floor for 8 FT basement?
- How many 16d nails are required to attach the sill plate of a 12' long interior braced wall to the floor framing member that is directly below the wall?
- How wide are the 1/2" fiber cement boards used to wrap the porch columns? All 1 x _ composite trim is 3/4" thick.
- How many square feet of drywall are required for the bedroom in the owner's suite (walls and ceiling)? Don't deduct for doors and windows; consider that waste.
- Create a list of the 2x4 pieces required to frame the interior wall for BEDROOM 2 that includes the door in the Table provided. Include a sketch on the attached sheet.

Length	**Number**

Miscellaneous

- What insulation rating is required for exterior walls?
- What insulation rating is required for the ceiling?

- What is the minimum required slope of the finished grade away from the house in inches per foot.
- What kind of roof shingles are used?
- What is the minimum distance from the finished grade to the top of foundation?
- What is the minimum required slope of the garage slab away from the house in PERCENT (%).
- What are the dimensions of the area well?
- What is the total area of the approximately 13' wide section of roof in the front-left corner marked with an X in the attached figure? (Show work.)



- How many risers are on the steps from the mud room/laundry to the garage?
- Estimate the number of I-joist required for the floor if the spacing is 16" O.C. You will order the stock lengths shown and cut to fit in the field. Enter your answers in the Table provided.

Length	Number
12’	
14’	
16’	
18’	
20’	
22’	
24’	
26’	
28’	
30’	

Length	Number
32’	
34’	
36’	
38’	
40’	
42’	
44’	
46’	
48’	
50’	

Miscellaneous

- What is the roof pitch on the garage gable?
- What is the length of the ridge vent?
- What is the total number of devices that detect smoke on the first floor?
- Describe the vapor barrier under the garage slab.
- How much does the W8x13 steel beam in the basement weigh given that it weighs 13 pounds per foot? (Assume a standard 7'-10" pour and show your work.)
- What size is the drain tile sump basin?
- How many ground fault circuit interrupter outlets are required in the conditioned space of the first floor?
- What is the sill height for the 2-3060 SH windows on the LEFT SIDE ELEVATION? Assume that the rough opening is equal to the nominal size of the window.
- How many square feet is the OWNER'S SUITE including the OWNER'S BATH and walk-in closet? (Show work.)
- Create a complete window schedule in the table provided. The window in the owner's bath is listed as an example.

Style	**Quantity**	**Width**	**Height**
Fixed Tempered	1	4’-0”	4’-0”

Appendix I Score Sheet

Each round consisted of 10 questions each worth 2 points. There were five 20-point rounds for a total possible score of 100 points.
Most questions were multiple choice. Teams were awarded 2 points for a correct answer and 0 points for an incorrect answer.
Some multiple questions required teams to show their work. Teams were awarded 1 point for the correct answer and 1 point for showing valid work.
Simple rubrics were developed for complex questions to decide whether to give 0, 1, or 2 points. Bonus points were available for some of these questions.

	Team 1	Team 2	Team 3	Team 4
Round 1				
Round 2				
Round 3				
Round 4				
Round 5				
TOTAL				

NAHB National Association of Home Builders | Student Chapters

RCMC Consulting

Student Evaluation

Program Title: NAHB Secondary Schools Construction Management Competition **Date: 11/5/2016**

We want to develop programs that meet your needs.
Please indicate your reactions to today's program and return before you leave.

Value	Not at all	Somewhat	OK	Very	Outstanding
1. How interesting was the competition?	①	②	③	④	⑤
2. How useful were the example questions and problems?	①	②	③	④	⑤
3. Did you have enough time to prepare for the competition?	①	②	③	④	⑤
4. How did you like working in teams of three?	①	②	③	④	⑤
5. How prepared did you feel for the questions?	①	②	③	④	⑤

Please give us your feedback. Use the back of this sheet if necessary.

6. What did you like most about this competition?

7. What did you like least about this competition?

8. What would you change for future competitions?

About You - Please check one on each row

What year of school are you in? ❍ Junior ❍ Senior ❍ Other

What is your career interest? ❍ Carpenter ❍ Contractor ❍ Architect ❍ Engineer ❍ Other _____

NAHB National Association of Home Builders | Student Chapters

RCMC Consulting

Instructor Evaluation

Program Title: NAHB Secondary Schools Construction Management Competition **Date: 11/5/2016**

We want to develop programs that meet your needs.
Please indicate your reactions to today's program and return before you leave.

Value	Not at all	Somewhat	OK	Very	Outstanding
1. How useful was the competition for student learning?	①	②	③	④	⑤
2. How useful were the example questions and problems?	①	②	③	④	⑤
3. Did you have enough time to prepare for the competition?	①	②	③	④	⑤
4. How did you like having students work in teams of three?	①	②	③	④	⑤
5. Were the questions at the right level for your students?	①	②	③	④	⑤

Please give us your feedback. Use the back of this sheet if necessary.

6. What did you like most about this competition?

7. What did you like least about this competition?

8. What would you change for future competitions?

NAHB National Association of Home Builders | Student Chapters

RCMC Consulting

Sponsor Evaluation

Program Title: NAHB Secondary Schools Construction Management Competition **Date: 11/5/2016**

We want to develop programs that meet your needs.
Please indicate your reactions to today's program and return before you leave.

Value	Not at all	Somewhat	OK	Very	Outstanding
1. How useful was the competition as a means for HBA members to interact with students interested in residential construction?	①	②	③	④	⑤
2. How easy was it to recruit volunteers for the event?	①	②	③	④	⑤
3. Did you have enough notice and information to prepare for the competition?	①	②	③	④	⑤
4. How did you like the competition format?	①	②	③	④	⑤
5. Would you be interested in continuing this competition?	①	②	③	④	⑤

Please give us your feedback. Use the back of this sheet if necessary.

6. What did you like most about this event?

7. What did you like least about this event?

8. What would you change for future competitions?

NAHB National Association of Home Builders | Student Chapters