Getting Started with SkillsUSA & CTE

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I. Introduction to CTE & SkillsUSA

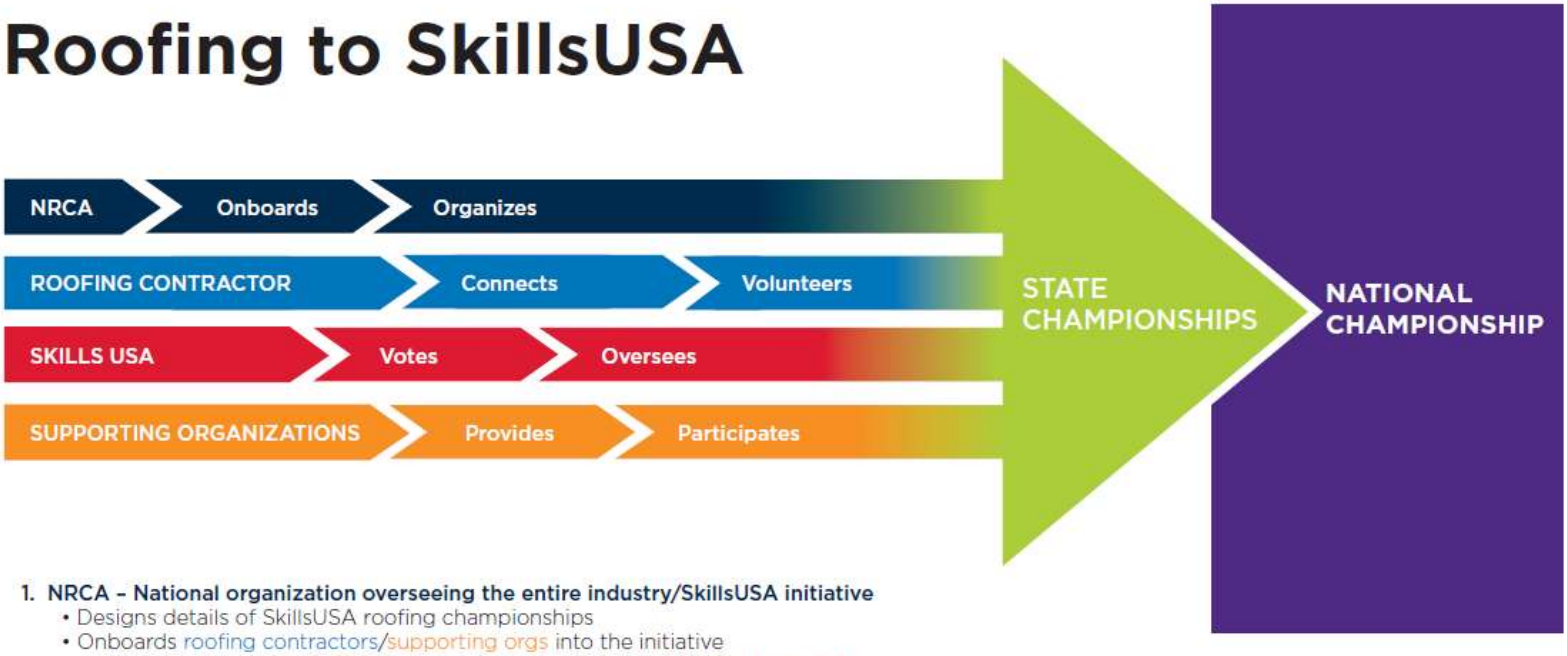
Thank you for your interest in building the future roofing industry workforce. The contents of this kit will empower you to engage with Career and Technical Education (CTE) students and schools, and with SkillsUSA, to create a growing pipeline of students entering the roofing industry.

What is SkillsUSA?

SkillsUSA is a partnership of students, teachers, and industry working together to ensure America has a skilled workforce. There are 330,000 SkillsUSA students and teachers active in the US, representing all types of skills, from construction to culinary arts and many others. The construction industry, including many different crafts, comprises the largest portion of trades represented. SkillsUSA operates on a model of hierarchical competitions, beginning at CTE schools, the winners of which compete in state contests and, ultimately, culminates at the national competition.
Not all CTE schools operate SkillsUSA contests, but many do. Currently the SkillsUSA organization is 137 competitions, 4,696 schools, and 330,000 current students and teachers.

How is NRCA involved with SkillsUSA?

NRCA has partnered with SkillsUSA to add roofing to the Construction/Architecture cluster of SkillsUSA. NRCA designs the contest to help prepare students for jobs as installers, and provides career information to all students about jobs on and off the roof.



1. **NRCA – National organization overseeing the entire industry/SkillsUSA initiative**
   - Designs details of SkillsUSA roofing championships
   - Onboards roofing contractors/supporting orgs into the initiative
   - Connects roofing contractors/supporting orgs to CTE schools and SkillsUSA
   - Organizes materials, prizes and industry presence at the SkillsUSA National Championships

2. **Roofing contractor**
   - Connects with a local CTE school
   - Volunteers to sponsor CTE school (tools and materials; teaching installation skills)
   - Purchases NRCA's TRAC: Thermoplastic for students
   - Provides mockups, tools, materials and prizes for SkillsUSA State Championships

3. **SkillsUSA – Partnership of students, teachers and industry working together to ensure America has a skilled workforce**
   - Partners with CTE schools to connect students to roofing careers
   - Votes contests to be added to or removed from the National Championship
   - Organizes state and regional championships
   - Oversees all aspects of state and national championships

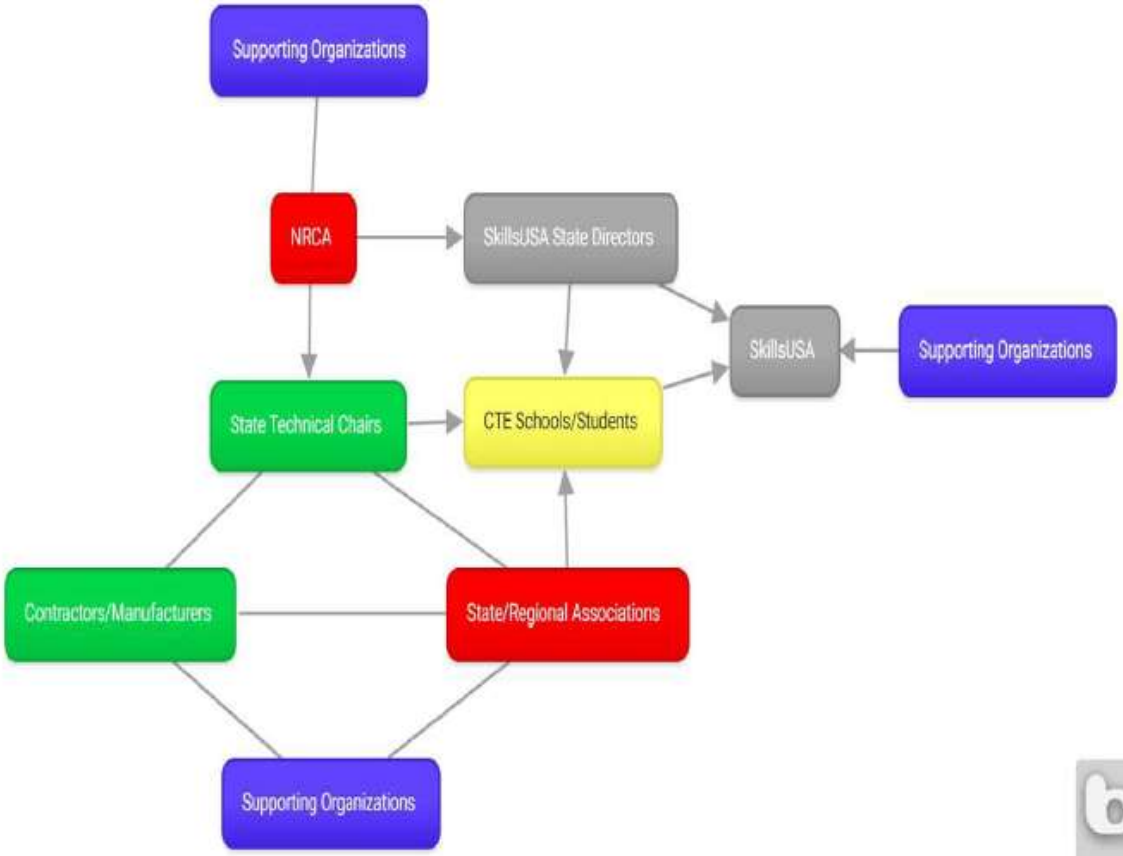
4. **Supporting organizations – regional associations, manufacturers and distributors**
   - Connects with roofing contractors to equip CTE students for SkillsUSA State and National Championships
   - Participates in the SkillsUSA State and National Championships
   - Provides resources for SkillsUSA State and National Championships

NRCA

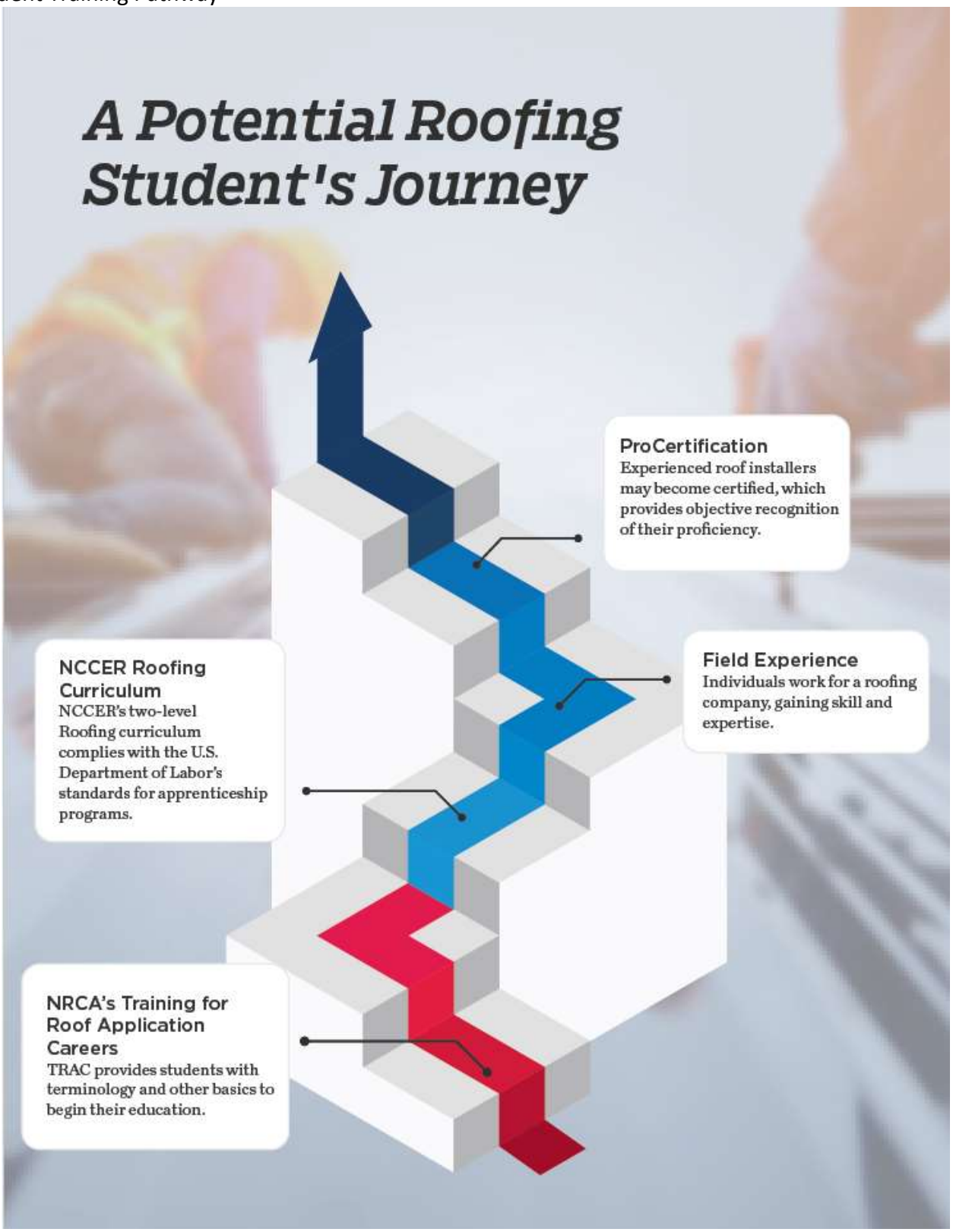
There are four types of organizations (defined in the glossary on the previous page):

1. Supporting organizations
2. Roofing trade associations
3. SkillsUSA organizations
4. Roofing industry
5. CTE schools/industry

How do all the pieces (contractors, regional associations, manufacturers, etc.) all fit together?



Student Training Pathway



II. Glossary & Terms

1. Certification – An official document attesting to a status or level of achievement.
2. Certificate – A document issued to a course participant upon successful completion of a course.
3. Credential – Proof of a person's abilities or experiences including, but not limited to, certifications and certificates.
4. CTE schools (sometimes standalone schools in a district, sometimes the regional location for several High Schools) Schools designed to prepare students for careers in the trades.
5. CTE Teacher – Teachers with expertise in the trades who teach students through a standardized curriculum.
6. CTE State Director – State representative responsible for overseeing trade education in a state. This is the person with authority to add new courses to state-approved curriculum CTE schools can teach (rules for this vary greatly from state-to-state).
7. Curriculum – Standardized coursework designed to be taught in a classroom setting. For the trades, this usually includes in-class and hands-on content.
8. Guidance Counselors – School employees responsible for recommending educational and career pathways for students.
9. NCCER – National Center for Construction Education and Research. NCCER generates curriculum for the construction industry. All courses are designed to meet DOL apprenticeship standards. They include secure tests, detailed performance verifications, lesson plans, PowerPoints, and digital resources.
10. NCCER's Roofing 2nd Edition – Comprehensive roofing curriculum developed in direct partnership with NRCA.*.
11. ProCertification – NRCA's national certification initiative. Designed to allow experienced roof system installers to demonstrate their skills and knowledge Through a standardized skills-based exam.
12. SkillsUSA – National CTE student competition. There are 330,000 SkillsUSA students and teachers active in the US. The construction industry makes up the largest portion of trades represented (carpentry, masonry, electrical, HVAC, plumbing, etc.). Not all CTE schools have SkillsUSA contest, but many do (137 contests nationally, 330,000 current students and teachers).
13. SkillsUSA State Technical Chair – Volunteer from the roofing industry who helps organize the SkillsUSA contest at the state level. Responsibilities include developing relationships with local schools, connecting schools with roofing trainers, organizing material and tool donations to support a school's roofing program, and keeping NRCA informed on issues that arise in state contests.
14. Supporting Organization – A private or public entity that supports SkillsUSA in a capacity other than as a State Technical Chair (i.e., supplying materials, sending trainers to CTE schools, donating money to incentivize SkillsUSA Roofing participants, etc.).
15. TRAC – Training for Roof Application Careers. NRCA's curricula for onboarding brand-new employees. Courses take 35-40 hours to complete and include online modules, hands-on skills training and testing. Available in English and Spanish. One purchase allows unlimited use.
16. Perkins Regional Coordinators – oversee distribution of Perkins grant funding in each state.

III. Getting started with SkillsUSA and CTE in your Area:

Connecting with your local and state Career and Technical Education community is critical to developing a recruiting pipeline to the roofing industry. There are several roles at these schools to understand, and each has a part to help in the effort.

Following are descriptions of the various people with whom you're likely to interact, questions they may ask you (and some answers), and questions you might want to ask them.

A. CTE Entry Administrators

- Role: Entry School Administrators (receptionists, assistants, effectively, gatekeepers)
- Your goal in speaking to them: Create a friendly, professional presence; learn the name of the SkillsUSA representative at the school, if there is one
- Questions you may ask and/or explanations you may provide:
    - Explain you are part of the roofing industry and would like to become involved in the school, teaching and/or donating materials.
    - I'd like to get involved and sponsor efforts to let people know about careers and credentials available in roofing.
    - What construction/architecture programs does this school have?
    - Can I talk to someone who oversees the carpentry or building program?
    - Are there CTE advisory committees in which I could participate?
    - Is this school involved in SkillsUSA and, if so, who is responsible for the SkillsUSA construction cluster?
- Questions you may be asked/answers:
    - How can we get skilled trainers in to teach these students?
        - Express your willingness to teach and/or provide trainers from your company.
    - What courses are available to prepare students for SkillsUSA?
        - NRCA's TRAC: Thermoplastic will prep student, including necessary safety. ; The online portion (20 hours) can be done on cell phones, tablets or computers. The hands-on portion comprises an additional 20 hours.
    - How will we pay for this addition?
        - Intent is for schools and students to carry no cost. Offer to cover the TRAC purchase and enroll students as members of your company, or cover the cost for the school to purchase.
    - How will this benefit the student and school?
        - Students who complete TRAC in its entirety and practice their skills will be prepared for the *SkillsUSA: Commercial Roofing* contest, and will also have earned a credential for completing NRCA's TRAC Thermoplastic program. This will make them valuable for any roofing contractor in the country.

B. CTE School Administrators (Principals, Vice Principals, etc.)

- Role: Oversee school administration including budgets, staffing, credentialing and programming.
- Your goal in speaking to them: Convince leadership of the value to their school of adding a roofing program and supporting a SkillsUSA roofing contest.
- Questions you may ask and/or explanations you may provide:
    - Does your school participate in SkillsUSA?
    - I'd like to work with and sponsor this school to participate in the *Commercial Roofing* contest.
    - What committees could join to raise awareness about careers in roofing, both on and off the roof?
- Questions you may be asked/answers:
    - How will students benefit from roofing program?
        - Students who complete TRAC in its entirety and practice their skills will be prepared for the SkillsUSA: Commercial Roofing contest. They will also have earned a credential for completing NRCA's TRAC Thermoplastic program. This will make them valuable for any roofing contractor in the country.
    - What kind of salary/career pathway is available in roofing?
        - Entry salary for installers starts around 50k per year, an experienced installer makes between 55-60k per year.
        - NRCA's Workforce Recruitment Toolkit includes handouts detailing the potential career ladder and other information about careers in roofing. See Appendix X or https://nrca.net/workforce-recruitment
    - How can this program be added at a minimal cost to the school budget?
        - Schools can connect with NRCA members in their area that use TRAC Thermoplastic as onboarding training for their crews. Members will facilitate delivery of training to prepare students for The SkillsUSA *Commercial Roofing* contest, including scheduling trainers to come in and provide hands-on instruction.
    - What credentials will students earn by completing the training for *SkillsUSA: Commercial Roofing*?
        - Completing NRCA's TRAC Thermoplastic program results in a certificate of completion. Students can use this to secure employment with any commercial contractor in the U.S.
        - NCCER's roofing curriculum has two interim credentials (low-slope roofer, steep-slope roofer) students can earn on their way for a full credential with NCCER.

C. CTE Teachers

- Role: Teachers deliver training and help make sure students have job opportunities when they complete school.
- Your goal in speaking to them: You would like teachers to agrees to help facilitate student's training and preparation for *Commercial Roofing.*
- Questions you may ask and/or explanations you may provide:
    - What kind of roofing training curricula are available to your students?
        - I'd like to offer for trainers from my company to provide roofing training.
    - Where will the money come from for this?
        - The roofing industry is wholly dedicated ensuring schools pay $0 for this program to be added, and will cover the cost to send the state champion to the national championship in Atlanta.
    - What training is available to prepare students for the *SkillsUSA: Commercial Roofing* contest?
    - I'd like to donate time to train the students, (approximately 20 hours hands-on training and assist with the online content) and help them prepare, provide each with a tool bucket for competing, and donate materials for the contest.
    - Do your students participate in the *SkillsUSA: Teamworks* competition?
    - I can help train them on proper asphalt-shingle installation, schedule trainers to come in and donate materials for that effort as well.
- Questions you may be asked/answers:
    - How does this benefit our students?
        - Students who complete the training and practice their skills will be prepared for the *SkillsUSA: Commercial Roofing* contest, and will earn a certificate for completing NRCA's TRAC Thermoplastic program. This will make them valuable candidates for any roofing contractor in the country.
    - What training is available for people entering the roofing industry?
        - Start by getting students through TRAC Thermoplastic, which will provide introductory skills and fundamental safety information; then NCCER's roofing curriculum comprises a two-year apprenticeship program for roofing, developed in partnership with NRCA.
    - How long does it take to complete this training?
        - NCCER's roofing curriculum is approximately 186 class hours in year one and 144 class hours in year two.
        - NRCA's TRAC Thermoplastic program takes about 40 hours – 20 hands-on and 20 online.
    - What certification/credential does a student earn by completing this training:
        - Completing TRAC Thermoplastic earns a certificate of completion. Students can use this to secure employment with any commercial contractor in the U.S.
        - NCCER's roofing curriculum has two interim credentials (low-slope roofer, steep-slope roofer) that students can earn on their way for a full credential with NCCER.
    - Where do the materials come from for this program?

        - Tools and materials may be secured in partnership with roofing manufacturers and contractors. goal is for the schools to pay as close to $0 as possible to adopt this program and prepare students for SkillsUSA.

D. CTE State Directors

- Role: responsible for overseeing CTE school curriculum and sanctioning CTE curriculum.
    - State CTE directors and Perkins Regional Coordinators can be found on https://cte.ed.gov/contact/staff-by-state-responsibility
- Your goal in speaking with them: Your goal is to help them to understand the importance of roofing in the construction industry and gain their support.
- Questions you may ask and/or explanations you may provide:
    - Is there a "Roofing Day" in this state? Are there programs currently in place to teach students about roofing careers, on and off the roof?
    - There is curriculum available for students; what can I do to help get it approved to be taught in CTE schools?
- Questions you may be asked/answers:
    - What training programs are available for people entering the roofing industry?
        - Start by getting students through TRAC: Thermoplastic, which will give introductory skills and fundamental safety information; then NCCER's Roofing which is a two-year apprenticeship program for the industry developed in partnership with NRCA.
    - How long does it take to complete these trainings?
        - NCCER's Roofing v2: 186 class hours in year one, 144 class hours in year two.
        - NRCA's TRAC: Thermoplastic: 40 hours – 20 hands-on, 20 online.
    - What credentials are available to students who complete these training courses?
        - Completion of NRCA's TRAC: Thermoplastic earns a certificate of completion that lives in NRCA's database. Students can use this to secure employment with any commercial contractor in the U.S.
        - NCCER's Roofing v2 has two interim credentials (low-slope roofer, steep-slope roofer) that students can earn on their way for a full credential with NCCER.
    - How do you recommend roofing be added to the CTE schools statewide
        - Start by having a CTE school with a carpentry program add roofing as an elective. Contractors, manufacturers, and regional roofing associations will help with materials, delivery of the training for *SkillsUSA: Commercial Roofing* (NRCA's TRAC: Thermoplastic), then schools can consider adding NCCER's Roofing v2 as a traditional and specialized apprenticeship model for roofing.

E. Guidance Counselors & Parents

- Role: Guidance counselors and, of course, parents advise students on career options.
- Your goal in speaking with them: You want counselors and parents to understand that starting as an installer can lead to a long and lucrative career.
- Questions you may ask:
    - What after-school programs are available to students interested in construction?
    - What committees do you have around careers in the construction industry?
        - How is roofing represented?
        - Can I help be a representative for the roofing industry?
- Questions you may be asked/answers:
    - Why would I recommend any student to enter the roofing industry?
        - Roofing is a moderately recession-proof industry and critical to the most basic survival and functioning of our families and society. There is always a lot of work, and there are plenty of companies around the country looking to hire and develop their employees.
        - Roofing has a high-paying entry-level salary, there are job opportunities around the country, and a new apprenticeship model that prepares students to install on almost any roof system in the world.
    - What is the entry-level salary for an installer?
        - 50k for a new laborer, 60k for an experienced installer (per NRCA's Workforce Development Committee)
    - Roofing is a dirty job and requires heavy labor. Isn't this only an option for men?
        - There are many successful women roof installers.
        - There is a wide range of job opportunities, on roofs and in offices. Students can also seek degrees and/or training in Construction Management, Project Management, and other specialties that will prepare them to be leaders in the roofing industry.
    - I recommend the college route for almost all my students. How does a career in the roofing industry leave the door open for further education?
        - NRCA members are committed to investing between 2-3k in professional development for each of their employees each year. Many employers are even willing to help supplement the cost of continued education for the employees.
    - My school does not have a shop class or a trade program. Where would my students receive the training required to participate in SkillsUSA?
        - Students can be connected directly to a contractor in their area who will train them using TRAC: Thermoplastic, the official training curriculum for the *SkillsUSA: Commercial Roofing* contest. In many cases, the contractor will hire them.
    - What are some ideal long-term goals of people who enter the roofing industry as installers?
        - A great career is the goal. Roofing provides opportunities for good pay, advancement, travel and opportunities to learn many new skills and work on all kinds of projects. There is opportunity in roofing to achieve

certifications through the NRCA ProCertification program. NRCA and NCCER's trainings both help prepare students, and eligibility starts once an installer has been on the job for two years.

F. Students (CTE, High School, Homeschool)

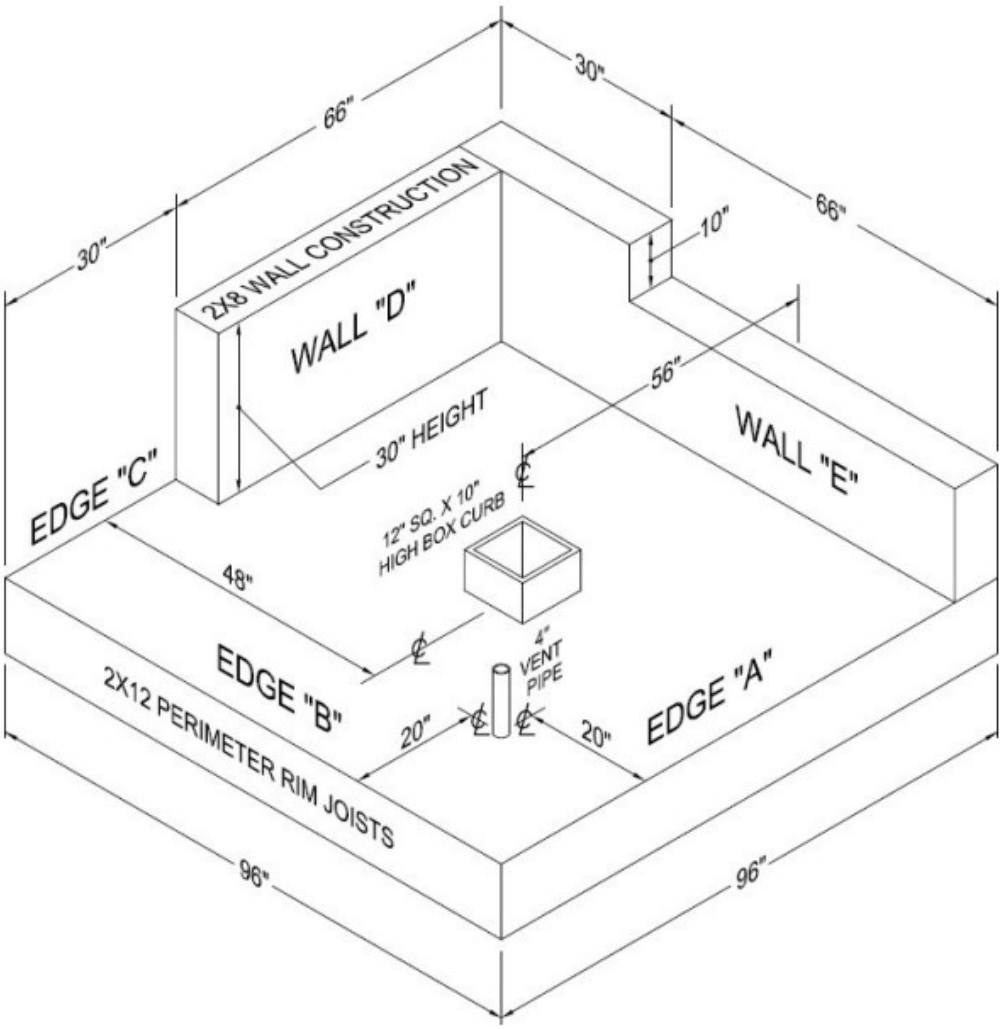
- Your goal in talking to them: Help students understand what career options are available, and how well they pay.
- Questions you may ask:
    - Have you considered a career in construction?
    - Have you considered roofing?
    - Do you know about roofing industry jobs off the roof?
- Questions you may be asked and should be prepared to answer:
    - What's the starting pay?
    - Is there bonus opportunity?
    - What about vacation days?
    - How flexible are you with scheduling?
    - What trainings are available?
    - What certifications are available?
- What is special about a career in the roofing industry?
    - The roofing industry allows for a wide range of lucrative career options. Good installers become foreman, then project managers, estimators, and in many cases business owners. The training for newcomers into the industry has never been better, and the industry is hungry for young and capable workers.
- What kinds of jobs are available in the roofing industry?
    - Apart from jobs on the roof, roofing is a big-ticket sales item. Residential roof systems can cost more than cars, and commercial roofing more than houses. Legal support, engineering and manufacturing are just a few of the support jobs needed to help the roofer.
- What kind of pay is available for different jobs in the industry?
    - New laborers: 50k/year, Journeyman Installers: 60k/year, Foremen: 80k/year, Superintendents: 90k/year, Sales Representatives: 100k/year
- What kind of career advancement is available in the industry?
    - NRCA has a site built just for that: https://careersinroofing.com/resources/

G. Contractors, Manufacturers, Affiliates

- Your goal in talking to them: Company agrees to help donate the materials and trainers needed to grow the SkillsUSA contest in your state: contact CTE and trade schools in their area, help schedule trainers to come in and teach students, help provide contest judges (judges are allowed to coach, so the best judges are good trainers).
- Questions you may ask:
    - What are you doing now to recruit CTE students?
    - What do you know about SkillsUSA?
- Questions you may be asked/answers:
    - What is SkillsUSA?
        - SkillsUSA is a national trade student competition. There are robotics, medical, cosmetology, and construction groups. Each of these hold contests in their states with the winners being invited to the national contest. There are over 330,000 active SkillsUSA students and teachers in the U.S., with over 100,000 students graduating and entering the workforce annually.
    - How does this help address the workforce shortage in the roofing industry?
        - Other trades have relied on SkillsUSA as a pipeline system for new workers since the 1960s. SkillsUSA is the roofing industry's way to improve the perception of the industry, and to directly recruit students committed to entering the trades. As an industry, if we recruit 5% of graduating students it equates to over 5000 new roofers each year.
    - What materials are available to help facilitate conversations with CTE schools?
        - NRCA's Workforce Recruitment Toolkit has handouts detailing the career ladder and other information about careers in roofing, and also a Find a CTE School button that directs to contacts at CTE schools in your state. https://nrca.net/workforce-recruitment
    - What trainings are available to help prepare students for the SkillsUSA contest?
        - Start by getting students through TRAC: Thermoplastic, which will give introductory skills and fundamental safety information; then NCCER's Roofing which is a two-year apprenticeship program for the industry developed in partnership with NRCA.
    - How long does it take to complete these trainings?
        - NCCER's Roofing v2: 186 class hours in year one, 144 class hours in year two.
        - NRCA's TRAC: Thermoplastic: 40 hours – 20 hands-on, 20 online.
    - How can I get access to grant funding by helping with this effort?
        - NRCA's TRAC: Thermoplastic is $399 for members, and allows for unlimited use in perpetuity.
        - NCCER's Roofing, being an apprenticeship program, is a program eligible for funding via the Perkins Grant.

IV. SkillsUSA: *Commercial Roofing* Contest Details:

A. Commercial Roofing Mockup



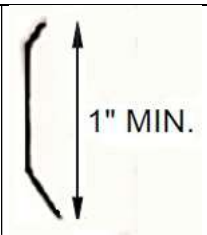
B. Commercial Roofing Materials List:

These are materials required for the Commercial Roofing contest. Industry is charged with getting schools and students these at no cost to the schools or students.

1. Materials to be donated for each student:
    a. Personal Fall Arrest System
        i. Body harness with dorsal d-ring, (no hip or side d-rings allowed)
        ii. Shock absorbing lanyard 3'
        iii. Line, 25'
        iv. Rope grab
        v. Anchor
    b. Thermoplastic exam mockup, per National Roofing Contractors Association, NRCA, design.
    c. All materials as identified on the contestant specification document
    d. Written contestant specifications.
    e. Tools and equipment
        i. Hand tools
            1. Tape measure, 25-foot
            2. Chalk line
            3. Black marker
            4. Utility knife, w/hook and straight blades, retractable
            5. Utility saw, hand-held for insulation
            6. Hammer, claw
            7. Screwdriver, Philips and flat
            8. Wrench, adjustable (8" to 10")
            9. 2" silicone or Teflon seam roller
            10. Seam Probe
            11. Shears (10" blade recommended)
            12. Metal snips (straight or articulated)
            13. 36" wide soft bristle push broom
            14. Paint brush, 3" (disposable chip-brush for adhesive)
            15. Cotton rags, clean and white (for membrane cleaning and general housekeeping)
        ii. Power tools
            1. Power supply cord (UL approved, type SG or SJO heavy duty, to match power tools and distance to power source
            2. 20-amp power supply with ground fault interruption circuitry
            3. Hand-held hot-air welder, min 1600 watt with manual temperature range up to 1,200°f.
                a. 40mm 22° welding nozzle
                b. 20mm welding nozzle
                c. 1 ½" wire brush, brass
                d. Spare heat filament for hot-air gun (or backup hot-air gun)
            4. Variable speed screw gun/driver
                a. ¼" hex bit
                b. #3 Phillips bit

2. Supplied by contestant
    i. Safety glasses or goggles, Z-87 rated, with side guard splash protection
    ii. Hand protection, inclusive
        1. Leather gloves, general hand protection from heat source
        2. Utility cut-resistant gloves, Kevlar or other comparable materials
        3. Chemical resistant as prescribed by Safety Data Sheet, SDS, requirement (typically nitrile)
        4. Leather work shoes: brown, black, or tan
    iii. Tool belt (recommend minimum two pouch with hammer loop)

Material and Supplies (sufficient for one examination on the illustrated mockup below)

10	Lineal feet	Minimum 0.073-inch-thick by 1-inch-wide extruded aluminum termination bar with caulking lip	
120	Square Feet	Minimum 45-mil-thick by 60-inch-wide reinforced TPO or PVC membrane roll	ASTM D 6878 or ASTM D 4434
30	Square Feet	Minimum 45-mil-thick by 18-inch-wide reinforced or nonreinforced TPO or PVC flashing membrane	ASTM D 6878 as required by system manufacturer
5	Pieces	Pre-molded outside corners	Provided by system manufacturer, for parapet wall and curb flashing outside corners
5	Pieces	T-joint covers	Provided by system manufacturer, for t-joints
50	Pieces	Field membrane seam fasteners and plates	Length and type as required by system manufacturer, job-site requirements with consideration for thickness of insulation
50	Pieces	Insulation fasteners and plates.	
50	Pieces	Cap nail fasteners	Optional membrane attachment at curbs or perimeters. Length and type as required by system manufacturer and available mockup conditions.
25	Each	1 ¼-inch corrosion-resistant self-piercing pancake- or round-head screw fasteners	ASTM A153 fasteners for attaching termination bar
1	Gallon	Membrane cleaner solution	As required by the system manufacturer
1	Gallon	Flashing sheet bonding adhesive	Compatible bonding adhesive as required by the system manufacturer. This is typically the same adhesive used to bond field sheets. System manufacturer specifications or available mockup conditions may require additional adhesive.
1	Each	Prefabricated pipe boot flashing, including draw band	As required by system manufacturer
3	Sheet	4’X8’ rigid board insulation 1” min	Typically faced polyisocyanurate insulation,

V. Conclusion

Connecting with your local CTE community through SkillsUSA is the best way to connect with students already interested in a career in the trades. By connecting and supporting roofing training in these schools your company gets the first chance to recruit these future industry leaders. Good luck, and for any tips or updates available please send me an email at jesbenshade@nrca.net.

VI. Appendix

1. SkillsUSA: Commercial Roofing Technical Standards

[DOCUMENT TITLE]

[Document subtitle]

Version 2.1 1/29/23

Commercial roofing knowledge and skill assessment

Purpose

To develop and recognize the contestant's thermoplastic roofing skill competency and to encourage further advancement in this discipline.

Additionally, download and review the General Regulations at: http://updates.skillsusa.org.

Clothing Requirements

Class C: Contest Specific — Manufacturing/Construction Khaki Attire

- Official SkillsUSA khaki short-sleeve work shirt and pants.
- Black, brown or tan leather work shoes.

Note: Safety glasses must have side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 1-888-501-2183.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Safety Requirements

The contest committee is responsible for the health and safety conditions of the venue. The contestant is responsible for adhering to the prerequisite safety protocols and evidenced by satisfactorily passing the contest's safety exam. In addition to passing the written exam the contestant is required to demonstrate the skills at the beginning of the timed exam event.

- Inspection of the work surface for visible deficiencies
- Inspection of personal hand tools
- Inspection and verbal description of the personal fall arrest system
- Donning the personal fall arrest system

Release

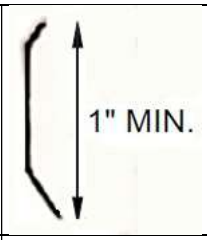
The instructor and the contestant each agree that SkillsUSA Inc., the SkillsUSA Championships technical committee and national judges are released from all responsibility and liability relating to personal injuries resulting from these activities. Contestants will be removed from competition if proper safety protocols cannot be demonstrated and maintained throughout the timed examination.

Equipment

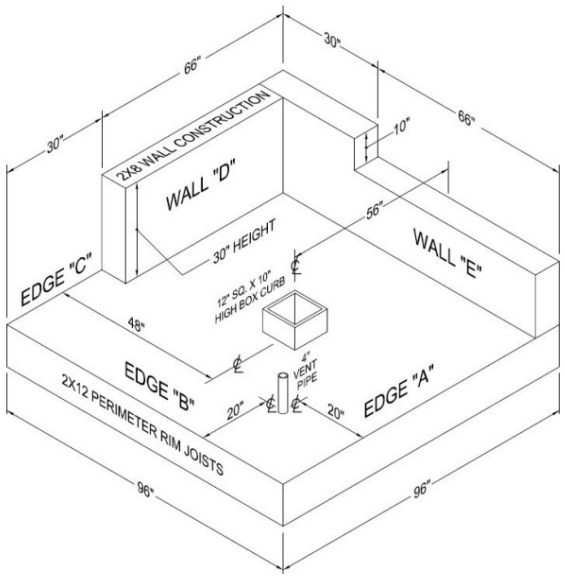
3. Supplied by the contest committee
    a. Personal Fall Arrest System
        i. Body harness with dorsal d-ring, (no hip or side d-rings allowed)
        ii. Shock absorbing lanyard 3'
        iii. Line, 25'
        iv. Rope grab
        v. Anchor
    b. Thermoplastic exam mockup, per National Roofing Contractors Association, NRCA, design.
    c. All materials as identified on the contestant specification document
    d. Written contestant specifications.
    e. Tools and equipment
        i. Hand tools
            1. Tape measure, 25-foot
            2. Chalk line
            3. Black marker
            4. Utility knife, w/hook and straight blades, retractable
            5. Utility saw, hand-held for insulation
            6. Hammer, claw
            7. Screwdriver, Philips and flat
            8. Wrench, adjustable (8" to 10")
            9. 2" silicone or Teflon seam roller
            10. Seam Probe
            11. Shears (10" blade recommended)
            12. Metal snips (straight or articulated)
            13. 36" wide soft bristle push broom
            14. Paint brush, 3" (disposable chip-brush for adhesive)
            15. Cotton rags, clean and white (for membrane cleaning and general housekeeping)
        ii. Power tools
            1. Power supply cord (UL approved, type SG or SJO heavy duty, to match power tools and distance to power source
            2. 20-amp power supply with ground fault interruption circuitry
            3. Hand-held hot-air welder, min 1600 watt with manual temperature range up to 1,200°f.
                a. 40mm 22° welding nozzle
                b. 20mm welding nozzle
                c. 1 ½" wire brush, brass
                d. Spare heat filament for hot-air gun (or backup hot-air gun)
            4. Variable speed screw gun/driver
                a. ¼" hex bit
                b. #3 Phillips bit

4. Supplied by contestant
    i. Safety glasses or goggles, Z-87 rated, with side guard splash protection
    ii. Hand protection, inclusive
        1. Leather gloves, general hand protection from heat source
        2. Utility cut-resistant gloves, Kevlar or other comparable materials
        3. Chemical resistant as prescribed by Safety Data Sheet, SDS, requirement (typically nitrile)
        4. Leather work shoes: brown, black, or tan
    iii. Tool belt (recommend minimum two pouch with hammer loop)

Material and Supplies (sufficient for one examination on the illustrated mockup below)

10	Lineal feet	Minimum 0.073-inch-thick by 1-inch-wide extruded aluminum termination bar with caulking lip	
120	Square Feet	Minimum 45-mil-thick by 60-inch-wide reinforced TPO or PVC membrane roll	ASTM D 6878 or ASTM D 4434
30	Square Feet	Minimum 45-mil-thick by 18-inch-wide reinforced or nonreinforced TPO or PVC flashing membrane	ASTM D 6878 as required by system manufacturer
5	Pieces	Pre-molded outside corners	Provided by system manufacturer, for parapet wall and curb flashing outside corners
5	Pieces	T-joint covers	Provided by system manufacturer, for t-joints
50	Pieces	Field membrane seam fasteners and plates	Length and type as required by system manufacturer, job-site requirements with consideration for thickness of insulation
50	Pieces	Insulation fasteners and plates.	
50	Pieces	Cap nail fasteners	Optional membrane attachment at curbs or perimeters. Length and type as required by system manufacturer and available mockup conditions.
25	Each	1 ¼-inch corrosion-resistant self-piercing pancake- or round-head screw fasteners	ASTM A153 fasteners for attaching termination bar
1	Gallon	Membrane cleaner solution	As required by the system manufacturer
1	Gallon	Flashing sheet bonding adhesive	Compatible bonding adhesive as required by the system manufacturer. This is typically the same adhesive used to bond field sheets. System manufacturer specifications or available mockup conditions may require additional adhesive.
1	Each	Prefabricated pipe boot flashing, including draw band	As required by system manufacturer
3	Sheet	4’X8’ rigid board insulation 1” min.	Typically faced polyisocyanurate insulation,

Thermoplastic Mockup



SCOPE OF THE CONTEST

Thermoplastic Roofing Knowledge Exam

The contest will include the successful completion of a thermoplastic roofing knowledge exam arising from the TRAC Thermoplastic course. This will assess contestant's knowledge of roofing including, but not limited to, weatherproofing, seams, flashing, roof system components, and structural elements of roofs.

Skill Performance

The thermoplastic skills will be performed on an NRCA designed mockup. The installation will comply with accepted national benchmarks. Contestants will be provided with detailed written specifications to install a functional thermoplastic single-ply membrane system.

Contest Guidelines

1. Contestants have a four-hour time limit.
2. Initial demonstration of personal fall arrest system inspection and donning
3. Remains compliant with safety or work stops until remedied, while clock continues to run

Standards and Competencies

1. **Compliance –** Reads specifications to provide a compliant installation regarding fastening patterns, spacing, seaming, flashing, drainage, and safety protocols
   a. Complies with written specifications but free to determine sequences
   b. Complies with standard safety protocols
   c. Complies with power tool operation manual
2. **Preparation -** Readies the deck, materials, and work area for the commencement of installation
   a. Visually inspects the deck and structure to assure conditions meet anticipated requirements for work

b. Determines roof drainage direction, field area, vertical surfaces, penetrations, and flashing requirements
c. Develops installation sequences for assignment
d. Confirms necessary components are present along with the necessary quantity and condition of materials
e. Inspects all tools

3. Sequence – Establishes a plan to complete the specification within the competition parameters
a. Cross references instructions, materials, tools, and mockup
b. Develops a sequence for installation
c. Organizes tools and materials to support sequence within the allotted time.

4. Insulation – Measures, cuts, and fits rigid board insulation according to specification
a. Determines appropriate insulation board surface to interface with roof system
b. Trims boards to install in largest sizes possible within joint-gap tolerances
c. Complies with staggered joint principles
d. Mechanically attaches rigid board to deck according to required fastening patterns

5. **Field -** Measures, cuts, and fits the field membrane sheets according to specification
a. Lays field sheet to accommodate drainage direction
b. Provides field membrane extension up vertical surfaces
c. Establishes appropriate side- and end-lap sizing
d. Creates a splice cut as needed
e. Creates flashing flanges for vertical curb flashing sheet
f. Mechanically attaches sheet with required fasteners. Complies with specification fastening patterns

6. Hot-air Welding – operates the hot-air welder to create weatherproof seams and splices.
a. Selects and affixes appropriate nozzle.
b. Powers up hot-air welder and conducts test welds to determine appropriate welding temperature
c. Calibrates operational temperatures, creates test samples, records date, and temperature
d. Cleans all surfaces for welding with specified membrane cleaner
e. Creates 1 ½" to 2" fully bonded thermoplastic welds by coordination of welder, 2" roller, and body mechanics
f. Probes all welds upon membrane cooling
g. Monitors nozzle for contamination and cleans appropriately

7. Flashing - Fortifies roof transitions at curbs, walls, penetrations, t-joints, inside corners, and outside corners
a. Measure, cuts, fits, flashing membrane and manufactured accessories to fit all transition types
b. Rounds all exposed corners
c. Provides appropriate overlap
d. Complies with drainage pattern
e. Cleans all flashing materials and areas
f. Hot-air welds each as required by specification
g. Adheres flashing membrane to verticals surfaces as specified

8. **Sealants –**Sealants are critical to a weatherproof thermoplastic roof system; however their use is not practical in this competition. Therefore, all candidates will inform their instructors as to when, where, and the specific type each time a sealant is required. Omission will result in a loss of points.
9. **Housekeeping –** maintains a work area and roof surface which promotes the quality and productivity of the process
    a. Protects roofing membrane surfaces from cuts, abrasion, and contamination during the installation.
    b. Keeps tools and materials in accessible locations and out of the direct work area
    c. Keeps waste and debris collected and out of the direct work area

Committee Identified Academic Skills
The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills
- Use fractions to solve practical problems.
- Use proportions and ratios to solve practical problems.
- Measure angles.
- Find surface area and perimeter of two-dimensional objects.
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures.
- Construct three-dimensional models.
- Apply Pythagorean Theorem.
- Make comparisons, predictions and inferences using graphs and charts.
- Find slope of a line.
- Solve practical problems involving complementary, supplementary and congruent angles.
- Solve problems involving symmetry and transformation.

Science Skills
- Use knowledge of work, force, mechanical advantage, efficiency and power.
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices.

Language Arts Skills
- Provide information in conversations and in group discussions.
- Provide information in oral presentations.
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information.
- Demonstrate comprehension of a variety of informational texts.
- Use text structures to aid comprehension.
- Identify words and phrases that signal an author's organizational pattern to aid comprehension.
- Understand source, viewpoint, and purpose of texts.

Connections to National Standards
State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations.
- Geometry.
- Measurement.
- Data analysis and probability.
- Problem solving.
- Communication.
- Connections.
- Representation.

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and function of cells and organisms.
- Understands relationships among organisms and their physical environment.
- Understands the sources and properties of energy.
- Understands forces and motion.
- Understands the nature of scientific inquiry.

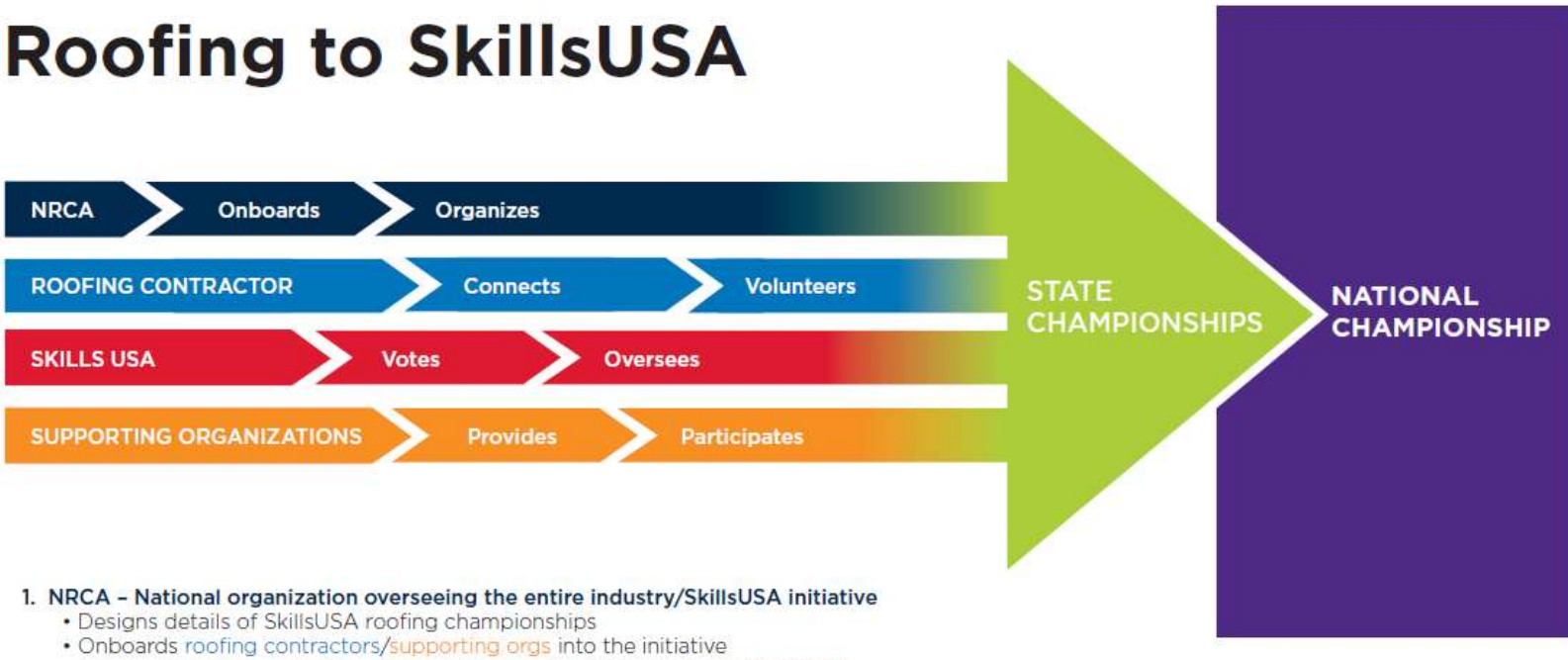
Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

2. Roofing to SkillsUSA_ Relationships/Flowchart



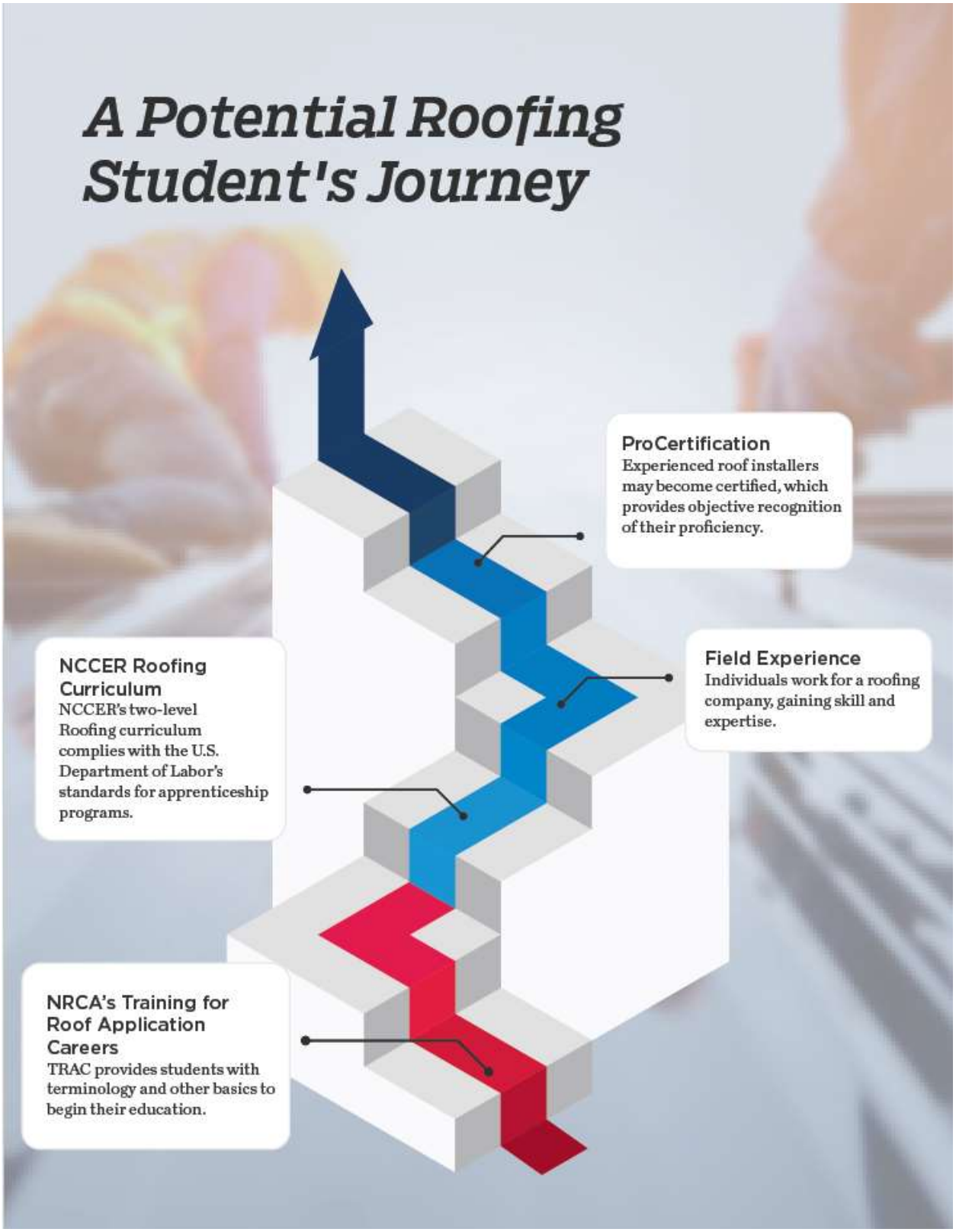
1. **NRCA – National organization overseeing the entire industry/SkillsUSA initiative**
   - Designs details of SkillsUSA roofing championships
   - Onboards roofing contractors/supporting orgs into the initiative
   - Connects roofing contractors/supporting orgs to CTE schools and SkillsUSA
   - Organizes materials, prizes and industry presence at the SkillsUSA National Championships

2. **Roofing contractor**
   - Connects with a local CTE school
   - Volunteers to sponsor CTE school (tools and materials; teaching installation skills)
   - Purchases NRCA's TRAC: Thermoplastic for students
   - Provides mockups, tools, materials and prizes for SkillsUSA State Championships

3. **SkillsUSA – Partnership of students, teachers and industry working together to ensure America has a skilled workforce**
   - Partners with CTE schools to connect students to roofing careers
   - Votes contests to be added to or removed from the National Championship
   - Organizes state and regional championships
   - Oversees all aspects of state and national championships

4. **Supporting organizations – regional associations, manufacturers and distributors**
   - Connects with roofing contractors to equip CTE students for SkillsUSA State and National Championships
   - Participates in the SkillsUSA State and National Championships
   - Provides resources for SkillsUSA State and National Championships

3. Student Training Pathway



4. NRCA's Recruitment Toolkit
    a. FIND YOUR PERFECT ROOFING CAREER

FIND YOUR PERFECT CAREER!

Join the roofing industry and discover the endless opportunities!

JOBS IN THE FIELD

If you love working outdoors, we have roofing industry positions for you, including:

- Foremen
- Technicians
- Journeyman roof mechanics
- Apprentices
- Solar installers
- Entry-level laborers
- Roof inspector
- Construction managers
- Project managers
- Safety professionals
- Estimators
- Superintendents/field leadership

Our industry offers highly competitive wages and benefits packages, comprehensive training programs and great work opportunities!

OFFICE MANAGEMENT

The roofing industry is growing exponentially. Along with this growth is an increasing demand for qualified workers such as:

- Consultants
- Design professionals
- Sales professionals
- Office administration
- Warehouse/maintenance personnel
- Qualified trainer
- Analyst
- Human resources
- Legal
- IT
- Finance
- Drafting
- Procurement
- Logistics
- Architecture

JOBS IN MANUFACTURING AND DISTRIBUTION

Advances in roof system technologies have driven demand for new and innovative products and manufacturing processes, and highly effective distribution and delivery systems. Positions include:

- Engineers
- Sales professionals
- Laboratory scientist
- Forklift operators
- Truck driving professionals
- Industrial maintenance staff
- Warehouse managers
- Production line operators
- Shift managers
- Chemist

For more information, visit www.nrca.net/careers.

NRCA

b. THER IS MORE TO ROOFING THAN THE ROOF

c. ROOFING CAREER PATH