

Construction Trades III

Course Description

This third sequence course for the Architecture and Construction Trades builds on the previous two years knowledge base and technical skills in all aspects of the industry. Learners will continue to be exposed to much deeper understanding of a broad range of architecture and construction careers and cluster foundation knowledge and skills. Again, safety procedures will be reinforced thoroughly with an eye to OSHA and building codes as students are focused more on the workforce after completion. There will be an integrated approach to real world problems including all aspects of the Construction industry such as design plans, foundation, floor systems, wall systems, roof systems, interior and exterior finishes, stairway construction, post and beam construction and concrete construction. Students will continue to develop with progressive levels of competence in the knowledge and skills to use tools and materials efficiently through real world projects. This course provides knowledge and skills for entry-level employment as well as pre-requisite for post-secondary studies in the construction industry.

Construction Trades III

Pacing Guide		
Unit	Topic	Suggested Timing
Unit 1	Energy conservation in the Construction Industry	approx. 3 weeks
Unit 2	Interior and Exterior Finishes	approx. 17 weeks
Unit 3	Stairway, post-and-beam constructions.	approx. 12 weeks
Unit 4	Concrete Construction	approx. 3 weeks

Educational Technology Standards

8.1.12.A.1, 8.1.12.B.2, 8.1.12.C.1, 8.1.12.D.1, 8.1.12.E.1, 8.1.12.F.1

- **Technology Operations and Concepts**
 - Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
- **Creativity and Innovation**
 - Apply previous content knowledge by creating and piloting a digital learning game or tutorial.
- **Communication and Collaboration**
 - Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.
- **Digital Citizenship**
 - Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.
- **Research and Information Literacy**
 - Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.
- **Critical Thinking, Problem Solving, Decision Making**
 - Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

Career Ready Practices

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

CRP1. Act as a responsible and contributing citizen and employee

Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

CRP2. Apply appropriate academic and technical skills.

Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

CRP3. Attend to personal health and financial well-being.

Career-ready individuals understand the relationship between personal health, workplace performance and personal well-being; they act on that understanding to regularly practice healthy diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.

CRP4. Communicate clearly and effectively and with reason.

Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

CRP5. Consider the environmental, social and economic impacts of decisions.

Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.

CRP6. Demonstrate creativity and innovation.

Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

CRP7. Employ valid and reliable research strategies.

Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

CRP9. Model integrity, ethical leadership and effective management.

Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.

CRP10. Plan education and career paths aligned to personal goals.

Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.

CRP11. Use technology to enhance productivity.

Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

CRP12. Work productively in teams while using cultural global competence.

Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Differentiated Instruction

Strategies to Accommodate Students Based on Individual Needs

<u>Time/General</u>	<u>Processing</u>	<u>Comprehension</u>	<u>Recall</u>
<ul style="list-style-type: none"> • Extra time for assigned tasks • Adjust length of assignment • Timeline with due dates for reports and projects • Communication system between home and school • Provide lecture notes/outline 	<ul style="list-style-type: none"> • Extra Response time • Have students verbalize steps • Repeat, clarify or reword directions • Mini-breaks between tasks • Provide a warning for transitions • Reading partners 	<ul style="list-style-type: none"> • Precise step-by-step directions • Short manageable tasks • Brief and concrete directions • Provide immediate feedback • Small group instruction • Emphasize multi-sensory learning 	<ul style="list-style-type: none"> • Teacher-made checklist • Use visual graphic organizers • Reference resources to promote independence • Visual and verbal reminders • Graphic organizers
<u>Assistive Technology</u>	<u>Tests/Quizzes/Grading</u>	<u>Behavior/Attention</u>	<u>Organization</u>
<ul style="list-style-type: none"> • Computer/whiteboard • Tape recorder • Spell-checker • Audio-taped books 	<ul style="list-style-type: none"> • Extended time • Study guides • Shortened tests • Read directions aloud 	<ul style="list-style-type: none"> • Consistent daily structured routine • Simple and clear classroom rules • Frequent feedback 	<ul style="list-style-type: none"> • Individual daily planner • Display a written agenda • Note-taking assistance • Color code materials

Enrichment

Strategies Used to Accommodate Based on Students Individual Needs:

- Adaption of Material and Requirements
- Evaluate Vocabulary
- Elevated Text Complexity
- Additional Projects
- Independent Student Options
- Projects completed individual or with Partners
- Self Selection of Research
- Tiered/Multilevel Activities
- Learning Centers
- Individual Response Board
- Independent Book Studies
- Open-ended activities
- Community/Subject expert mentorships

Assessments

Suggested Formative/Summative Classroom Assessments

- Timelines, Maps, Charts, Graphic Organizers
- Teacher-created Unit Assessments, Chapter Assessments, Quizzes
- Teacher-created DBQs, Essays, Short Answer
- Accountable Talk, Debate, Oral Report, Role Playing, Think Pair, and Share
- Projects, Portfolio, Presentations, Prezi, Gallery Walks
- Homework
- Concept Mapping
- Primary and Secondary Source analysis
- Photo, Video, Political Cartoon, Radio, Song Analysis
- Create an Original Song, Film, or Poem
- Glogster to make Electronic Posters
- Tumblr to create a Blog

Interdisciplinary Connections

English Language Arts

- Journal writing
- Close reading of industry-related content
- Create a brochure for a specific industry
- Keep a running word wall of industry vocabulary

Social Studies

- Research the history of a given industry/profession
- Research prominent historical individuals in a given industry/profession
- Use historical references to solve problems

World Language

- Translate industry-content
- Create a translated index of industry vocabulary
- Generate a translated list of words and phrases related to workplace safety

Math

- Research industry salaries for a geographic area and juxtapose against local cost of living
- Go on a geometry scavenger hunt
- Track and track various data, such as industry's impact on the GDP, career opportunities or among of individuals currently occupying careers

Fine & Performing Arts

- Create a poster recruiting young people to focus their studies on a specific career or industry
- Design a flag or logo to represent a given career field

Science

- Research the environmental impact of a given career or industry
- Research latest developments in industry technology
- Investigate applicable-careers in STEM fields

New Jersey Core Curriculum Content Standards

9.3– Career and Technical Education

Career Cluster: Architecture and Construction (AC)

- 9.3.12.AC.1: Use vocabulary, symbols and formulas common to architecture and construction.
- 9.3.12.AC.2: Use architecture and construction skills to create and manage a project .
- 9.3.12.AC.3: Comply with regulations and applicable codes to establish and manage a legal and safe workplace.
- 9.3.12.AC.4: Evaluate the nature and scope of the Architecture & Construction Career Cluster and the role of architecture and construction in society and the economy.
- 9.3.12.AC.5: Describe the roles, responsibilities, and relationships found in the architecture and construction trades and professions, including labor/management relationships.
- 9.3.12.AC.6: Read, interpret and use technical drawings, documents and specifications to plan a project
- 9.3.12.AC.7: Describe career opportunities and means to achieve those opportunities in each of the Architecture & Construction Career Pathways.

Pathway: Construction (AC-CST)

- 9.3.12.AC-CST.1: Describe contractual relationships between all parties involved in the building process.
- 9.3.12. AC-CST.2: Describe the approval procedures required for successful completion of a construction project
- 9.3.12. AC-CST.3: Implement testing and inspection procedures to ensure successful completion of a construction project
- 9.3.12. AC-CST.4: Apply scheduling practices to ensure the successful completion of a construction project.
- 9.3.12. AC-CST.5: Apply practices and procedures required to maintain jobsite safety.
- 9.3.12. AC-CST.6: Manage relationships with internal and external parties to successfully complete construction projects.
- 9.3.12. AC-CST.7: Compare and contrast the building systems and components required for a construction project.
- 9.3.12. AC-CST.8: Demonstrate the construction crafts required for each phase of a construction project.
- 9.3.12. AC-CST.9: Safely use and maintain appropriate tools, machinery, equipment and resources to accomplish construction project goals.

Pathway: Design/Pre-Construction (AC-DES)

- 9.3.12.AC-DES.1 Justify design solutions through the use of research documentation and analysis of data.
- 9.3.12.ACDEDES.2 Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues.
- 9.3.12.AC-DES.3 Describe the requirements of the integral systems that impact the design of buildings.
- 9.3.12.AC-DES.4 Apply building codes, laws and rules in the project design.
- 9.3.12.ACDES.5 Identify the diversity of needs, values and social patterns in project design, including accessibility standards.
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- 9.3.12.AC-DES.7 Employ appropriate representational media to communicate concepts and project design.
- 9.3.12.ACDES.8 Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.

Pathway: Maintenance/Operations (AC-MO)

- 9.3.12.AC-MO.1 Recognize and employ universal construction signs and symbols to function safely in the workplace.
- 9.3.12.AC-MO.2 Use troubleshooting procedures when solving a maintenance problem in buildings.
- 9.3.12.AC-MO.3 Apply construction skills when repairing, restoring or renovating existing buildings.
- 9.3.12.AC-MO.4 Determine work required to repair or renovate an existing building.
- 9.3.12.AC-MO.5 Plan and practice preventative maintenance activities to service existing buildings.
- 9.3.12.AC-MO.6 Maintain and inspect building systems to achieve safe and efficient operation of buildings.

Common Career Technical Core (CCTC)

Architecture and Construction Career Cluster (AC)

AC 1. Use vocabulary, symbols and formulas common to architecture and construction.

AC 2. Use architecture and construction skills to create and manage a project.

AC 3. Comply with regulations and applicable codes to establish and manage a legal and safe workplace.

AC 4. Evaluate the nature and scope of the Architecture & Construction Career Cluster and the role of architecture and construction in society and the economy.

AC 5. Describe the roles, responsibilities and relationships found in the architecture and construction trades and professions, including labor/management relationships.

AC 6. Read, interpret and use technical drawings, documents and specifications to plan a project.

AC 7. Describe career opportunities and means to achieve those opportunities in each of the Architecture and Construction career pathways.

Construction Career Pathway (AC-CST)

AC-CST 1. Describe contractual relationships between all parties involved in the building process.

AC-CST 2. Describe the approval procedures required for successful completion of a construction project.

AC-CST 3. Implement testing and inspection procedures to ensure successful completion of a construction project.

AC-CST 4. Apply scheduling practices to ensure the successful completion of a construction project.

AC-CST 5. Apply practices and procedures required to maintain jobsite safety.

AC-CST 6. Manage relationships with internal and external parties to successfully complete construction projects.

AC-CST 7. Compare and contrast the building systems and components required for a construction project.

AC-CST 8. Demonstrate the construction crafts required for each phase of a construction project.

AC-CST 9. Safely use and maintain appropriate tools, machinery, equipment and resources to accomplish construction project goals.

Design/Pre-Construction Career Pathway (AC-DES)

AC-DES.1. Justify design solutions through the use of research documentation and analysis of data. AC-DES.2. Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues.

AC-DES.3. Describe the requirements of the integral systems that impact the design of buildings.

AC-DES.4. Apply building codes, laws and rules in the project design.

AC-DES.5. Identify the diversity of needs, values and social patterns in project design, including accessibility standards.

AC-DES.6. Apply the techniques and skills of modern drafting, design, engineering and construction to projects.

AC-DES.7. Employ appropriate representational media to communicate concepts and project design.

AC-DES.8. Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.

Maintenance/Operations Career Pathway (AC-MO)

AC-MO. 1. Recognize and employ universal construction signs and symbols to function safely in the workplace.

AC-MO. 2. Use troubleshooting procedures when solving a maintenance problem in buildings.

AC-MO. 3. Apply construction skills when repairing, restoring or renovating existing buildings.

AC-MO. 4. Determine work required to repair or renovate an existing building.

AC-MO. 5. Plan and practice preventative maintenance activities to service existing buildings.

AC-MO. 6. Maintain and inspect building systems to achieve safe and efficient operation of buildings.

Common Core State Standards (CCSS)

CCSS - English-Language Arts

Key Ideas and Details:

- CCSS.ELA-LITERACY.RST.11-12.1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- CCSS.ELA-LITERACY.RST.11-12.2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
- CCSS.ELA-LITERACY.RST.11-12.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Craft and Structure:

- CCSS.ELA-LITERACY.RST.11-12.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
- CCSS.ELA-LITERACY.RST.11-12.5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
- CCSS.ELA-LITERACY.RST.11-12.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

Integration of Knowledge and Ideas:

- CCSS.ELA-LITERACY.RST.11-12.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
- CCSS.ELA-LITERACY.RST.11-12.8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
- CCSS.ELA-LITERACY.RST.11-12.9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

- CCSS.ELA-LITERACY.RST.11-12.10. By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently

Research to Build and Present Knowledge:

- CCSS.ELA-LITERACY.W.11-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Range of Writing:

- CCSS.ELA-LITERACY.W.11-12.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences

NJSLS - MATHEMATICS

Number and Quantity

N.Q.A.1. Use units as a way to understand problems and to guide the solution of multi-step problems; Choose and interpret units consistently in formulas; Choose and interpret the scale and the origin in graphs and data displays.

N.Q.A.2. Define appropriate quantities for the purpose of descriptive modeling.

N.Q.A.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Algebra

A.REI.B.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

A.CED.A.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R .

A.SSE.A.1. Interpret expressions that represent a quantity in terms of its context.

A.CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions and quadratic functions, and simple rational and exponential functions.

A.REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

A.CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*

Functions

F.LE.A.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

F.LE.B.5. Interpret the parameters in a linear or exponential function in terms of a context

F.BF.A.1. Write a function that describes a relationship between two quantities.

F.BF.A.1a. Determine an explicit expression, a recursive process, or steps for calculation from a context

F.LE.B.5. Interpret the parameters in a linear or exponential function in terms of a context

Geometry

G.CO.A.2. Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

G.CO.A.4. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

G.CO.B.6. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

G.CO.D.12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*

G.CO.D.13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle

G.SRT.B.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

G.GPE.B.6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

G.GPE.B.7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

G.SRT.C.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

<p>Course: Construction Trades III</p> <p>Unit: 4. Heavy Duty Concrete construction.</p> <p>Grade Level: 9-12</p>	<p>Unit Overview: This unit provides knowledge and skills on Heavy Duty Concrete Construction in the Construction Industry</p>
<p>NJSLS: 9.3.12.AC 1,2,6; 9.3.12.AC-CST 3,7; 9.3.12.AC-DES. 1, 3, 8; 9.3.12.AC-MO.3, 6.</p>	
<p>Common Career Technical Core (CCTC): AC 1, 2,6; AC-CST 3,7, AC-DES 1,3,8; AC-MO 3, 6.</p>	
<p>Common Core State Standards (CCSS): ELA-LITERACY.RST.11-12.1; ELA-LITERACY.RST.11-12.2RL.9-10.1; CCSS.ELA-LITERACY.RST.11-12.3; ELA-LITERACY.RST.11-12.10; ELA-LITERACY.W.11-12.10;</p>	
<p>NJSLS Math: N.Q.A.1-3. G.CO.D.13; G.SRT.B.5.; G.GPE.B.6;G.GPE.B.7; G.SQT.C.8., A.REI.B.3; A.CED.A.1, 3, 4; A.SSE.A.1; A.REI.C.6; F.LE.A.2; F.LE.B.5; F.BF.A.1;</p>	

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>4.1. Apply knowledge and skills of foundation design for heavy concrete construction.</p> <p>NJSLS: 9.3.12.AC 1,2,6; 9.3.12.AC-CST 3,7; 9.3.12.AC-DES. 1, 3, 8; 9.3.12.AC-MO.3, 6.</p> <p>CCTC: AC 1, 2,6; AC-CST 3,7, AC-DES 1,3,8; AC-MO 3, 6.</p> <p>CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1</p> <p>NJSLS MATH: N.Q.A.1-3. G.CO.D.13; G.SRT.B.5.; G.GPE.B.6;G.GPE.B.7; G.SQT.C.8., A.REI.B.3; A.CED.A.1, 3, 4;</p>	<p>How does the foundation design for heavy-duty construction impact the structure?</p> <p>Why not use heavy-duty timber?</p>	<p>Explaining the use of piles and micropiles.</p> <p>Explain the concept of caissons.</p> <p>Explain what is spread foundation.</p> <p>Explain the basics of wind turbine foundation.</p> <p>NOCTI TESTING</p>	<p>Workshop Observe molding samples in the workshop.</p> <p>Discuss installation of the all types of molding using students' experiences.</p> <p>Self Study Observe the various types, patterns and sizes of moldings</p> <p>Online Research the design, patterns and shapes, and sizes of the various types of molding.</p> <p>Self-Site visit Observe samples of heavy construction in the community.</p>	<p>Heavy Concrete Construction: "Carpentry" by Leonard Koel.</p> <p>Heavy Concrete, DIY: http://www.diynetwork.com/search/heavy-concrete-</p> <p>Heavy Concrete Construction Videos: https://www.youtube.com/results?search_query=heavy+concrete+construction.</p> <p>Pouring Heavy Foundations: http://crowdercc.com/heavy-foundations.</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
A.SSE.A.1; A.REI.C.6; F.LE.A.2; F.LE.B.5; F.BF.A.1;				
<p>4.2. Understand knowledge and skills of heavy concrete construction formwork.</p> <p>NJSLS: 9.3.12.AC 1,2,6; 9.3.12.AC-CST 3,7; 9.3.12.AC-DES. 1, 3, 8; 9.3.12.AC-MO.3, 6.</p> <p>CCTC: AC 1, 2,6; AC-CST 3,7, AC-DES 1,3,8; AC-MO 3, 6.</p> <p>CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1</p> <p>NJSLS MATH: N.Q.A.1-3. G.CO.D.13; G.SRT.B.5.;</p>	<p>What is heavy concrete construction formwork?</p> <p>Which construction requires heavy concrete construction formwork?</p>	<p>Explaining the use of plywood forms.</p> <p>Explaining foundation and basement forms.</p> <p>Explaining patented ties and waler systems.</p> <p>NOCTI TESTING</p>	<p>Workshop Observe sample of materials for plywood forms.</p> <p>Self study Observe plywood forms in community constructions.</p> <p>Online Research the techniques of installation of plywood forms.</p> <p>Self Site visit Observe samples of heavy construction in the community.</p>	<p>Heavy Concrete Construction: “Carpentry” by Leonard Koel.</p> <p>Heavy Concrete: http://www.diynetwork.com/search/heavy-concrete</p> <p>Heavy Concrete Construction: https://www.youtube.com/results?search_query=heavy+concrete+construction.</p> <p>Heavy Foundations: http://crowdercc.com/heavy-foundations.</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
G.GPE.B.6;G.GPE.B.7; G.SQT.C.8., A.REI.B.3; A.CED.A.1, 3, 4; A.SSE.A.1; A.REI.C.6; F.LE.A.2; F.LE.B.5; F.BF.A.1;				
<p>4.3. Demonstrate knowledge and skills of heavy concrete construction formwork.</p> <p>NJSLS: 9.3.12.AC 1,2,6; 9.3.12.AC-CST 3,7; 9.3.12.AC-DES. 1, 3, 8; 9.3.12.AC-MO.3, 6.</p> <p>CCTC: AC 1, 2,6; AC-CST 3,7, AC-DES 1,3,8; AC-MO 3, 6.</p> <p>CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1</p> <p>NJSLS MATH:</p>	<p>What challenges are faced when working with heavy concrete construction formwork?</p> <p>Which materials are requires heavy concrete construction formwork?</p>	<p>Explain the application of pilaster, column, and beam forms.</p> <p>Explain floor and roof forms.</p> <p>Apply basic principles of formwork construction.</p> <p>Explain stairway forms.</p> <p>NOCTI TESTING</p>	<p>Workshop</p> <p>Observe sample of materials pilaster, column, and beam forms.</p> <p>Classroom</p> <p>Discuss pilaster, column, and beam forms.</p> <p>Self study</p> <p>Observe pilaster, column, and beam forms in community constructions.</p> <p>Online</p> <p>Research the techniques of installation of pilaster,</p>	<p>Heavy Concrete Construction: “Carpentry” by Leonard Koel.</p> <p>Heavy Concrete: http://www.diynetwork.com/search/heavy-concrete</p> <p>Heavy Concrete Construction: https://www.youtube.com/results?search_query=heavy+concrete+construction</p> <p>Heavy Foundations: http://crowdercc.com/heavy-foundations.</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>N.Q.A.1-3. G.CO.D.13; G.SRT.B.5.; G.GPE.B.6;G.GPE.B.7; G.SQT.C.8., A.REI.B.3; A.CED.A.1, 3, 4; A.SSE.A.1; A.REI.C.6; F.LE.A.2; F.LE.B.5; F.BF.A.1</p>			<p>column, and beam forms.</p> <p>Self Site visit Observe samples of heavy construction in the community.</p>	
<p>4.4. Create examples of and apply knowledge and skills of heavy concrete construction formwork.</p> <p>NJSLS: 9.3.12.AC 1,2,6; 9.3.12.AC-CST 3,7; 9.3.12.AC-DES. 1, 3, 8; 9.3.12.AC-MO.3, 6.</p> <p>CCTC: AC 1, 2,6; AC-CST 3,7, AC-DES 1,3,8; AC-MO 3, 6.</p> <p>CCSS: RL.9-10.1; RI.9-</p>	<p>What is heavy concrete construction formwork?</p> <p>Which construction requires heavy concrete construction formwork?</p>	<p>Explaining how to install pre-fabricated forming systems.</p> <p>Explaining how to install concrete slabs on metal decks.</p> <p>NOCTI TESTING</p>	<p>Workshop Observe sample of materials for pre-fabricated forming systems</p> <p>Classroom Discuss plywood forms.</p> <p>Self study Observe pre-fabricated forming systems in community constructions.</p> <p>Self Site visit Observe samples of heavy construction in the community.</p>	<p>Heavy Concrete Construction: “Carpentry” by Leonard Koel.</p> <p>Heavy Concrete: http://www.diynetwork.com/search/heavy-concrete</p> <p>Heavy Concrete Construction: https://www.youtube.com/results?search_query=heavy+concrete+construction.</p> <p>Heavy Foundations: http://crowdercc.com/heavy-foundations.</p>

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<p>10.5; SL.9-10.1</p> <p>NJSLS MATH: N.Q.A.1-3. G.CO.D.13; G.SRT.B.5.; G.GPE.B.6;G.GPE.B.7; G.SQT.C.8., A.REI.B.3; A.CED.A.1, 3, 4; A.SSE.A.1; A.REI.C.6; F.LE.A.2; F.LE.B.5; F.BF.A.1;</p>				
<p>4.5. Apply knowledge and skills to concrete placement for heavy construction.</p> <p>NJSLS: 9.3.12.AC 1,2,6; 9.3.12.AC-CST 3,7; 9.3.12.AC-DES. 1, 3, 8; 9.3.12.AC-MO.3, 6.</p> <p>CCTC: AC 1, 2,6; AC-CST 3,7, AC-DES 1,3,8; AC-MO 3, 6.</p>	<p>In what ways does heavy concrete placement vary among projects?</p> <p>What is heavy-duty concrete placement?</p>	<p>Explain the operations of concrete placement.</p> <p>Explain how to perform concrete test.</p> <p>Explain the effects of weather on concrete.</p> <p>Explain the technique of placing concrete slabs.</p> <p>Explain the science of curing concrete and the removal of forms.</p>	<p>Workshop Observe photos of concrete placement for heavy construction.</p> <p>Online Research heavy-duty concrete placement.</p> <p>Self Site visit Observe samples of heavy construction in the community.</p>	<p>Heavy Concrete Construction: “Carpentry” by Leonard Koel.</p> <p>Heavy Concrete: http://www.diynetwork.com/search/heavy-concrete</p> <p>Heavy Concrete Construction: https://www.youtube.com/results?search_query=heavy+concrete+construction.</p>

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<p>CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1</p>		<p>NOCTI TESTING</p>		<p>Heavy Foundations: http://crowdercc.com/heavy-foundations.</p>
<p>4.6. Apply knowledge and skills to install pre-cast concrete systems.</p> <p>NJSLS: 9.3.12.AC 1,2,6; 9.3.12.AC-CST 3,7; 9.3.12.AC-DES. 1, 3, 8; 9.3.12.AC-MO.3, 6.</p> <p>CCTC: AC 1, 2,6; AC-CST 3,7, AC-DES 1,3,8; AC-MO 3, 6.</p> <p>CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.</p> <p>NJSLS MATH: N.Q.A.1-3. G.CO.D.13; G.SRT.B.5.;</p>	<p>Is pre-cast concrete system durable?</p> <p>What is the difference of pre-cast system from heavy-duty concrete construction?</p>	<p>Explain the science and properties of pre-stressed concrete.</p> <p>Explain the steps in tilt-up construction.</p> <p>Explain lift slap construction.</p> <p>NOCTI TESTING</p>	<p>Workshop Observe sample/photos of pre-cast concrete systems.</p> <p>Discuss installation of pre-cast concrete systems.</p> <p>Online Research pre-cast systems.</p> <p>Self Site visit Observe samples of pre cast systems the community.</p>	<p>Pre cast concrete systems: “Carpentry” by Leonard Koel.</p> <p>Heavy Concrete: http://www.diynetwork.com/search/heavy-concrete</p> <p>Heavy Concrete Construction: https://www.youtube.com/results?search_query=heavy+concrete+construction.</p> <p>Heavy Foundations: http://crowdercc.com/heavy-foundations.</p>

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Unit Vocabulary

Abrasive paper.	Paper or clothe with an abrasive material glued to one side. Used primarily for smoothing wood surfaces.
Acoustical tile	Ceiling tile with small holes and fissures that act as sound traps to reduce the reflection of sound.
Aggregates	Sand and gravel in a concrete mixture.
Anchor bolt	Bolt used to secure sill plates, columns, and girders to concrete or other masonry, it is hooked or has a welded pate at the non-threaded end embedded in the concrete.
Arc welding	Electrical welding procedure in which metal is melted by the heat of an electric arc. Molten metal from the tip of an electrode provides filler at the joint.
Architect	Person qualified and licensed to design and oversee construction of a building.
Asphalt	Petroleum product obtained from crude oil, it is waterproof and is the base for many products used for rood, wall and floor covering.
Backfill	Soil or gravel used to fill the space between the completed foundation wall and the excavated areas on one or both sides of the wall.
Backsplash	Pieces that extend up from a countertop and are fastened to the

Barricade	wall. Structure set up around a construction job to prevent unauthorized persons from entering working areas. Covered barricades also protect the public from falling objects.
Baseboard	Molding placed at the base of a wall and fitted to the floor. Also called base molding.
Batt insulation	Blanket-like sections of mineral fiber material placed between studs.
Bit	Drilling device with a screw point that is held in the jaws of a brace or drill.
Bracket	Projecting L-shaped support for a shelf or any other kind of weight.
Buggy	Two-wheeled conveyance pushed by a single person and used on the job to carry fresh concrete to the point where it is to be placed.
Butt joint	Joint in which one piece butts squarely against another.
Carbide tip	Tungsten carbide metal tip that is braised to the end of each tooth of a circular saw blade and to the cutting edges of masonry drills to prolong sharpness.
Cellulose	Principal substance in the walls of wood cells.
Cement	Ingredient that binds together the sand and gravel in a concrete mixture after water is added.
Circumference	Perimeter of a circle

Crosscutting	Cutting with a saw across the grain of lumber.
Curing concrete	Process of retaining the moisture of freshly placed concrete to ensure proper hydration.
Cut-out stringer	Stringer that has been cut to receive all the treads and risers of a stairway.
Cylinder knob	Doorknob that contains the lock cylinder.
Decay	Disintegration and breakdown of wood caused by t wood destroying fungus. Also called dry rot.
Diagonal brace	Brace placed in a framed wall to increase lateral strength.
Door header	Wood member placed across the top of a rough door or window opening in a framed wall. It supports the weight from structures above the opening. Also called door lintel.
Dormer	Shed or gale framework projecting from the side of a roof to add light, ventilation, and space to an attic area.
Drywall frame	Metal door jamb designed for walls finished off with gypsum board. Legal right of way provision on another person’s property.
Easement	Cavity dug in the ground.
Excavation	Joint extending through the entire thickness of a concrete slab wherever the slab butts against the walls, piers or columns.
Expansion Joint	Expansion joints allow for expansion of a slab due to temperature

	changes.
Façade	Exterior of the front of a building.
Fiberglass	Insulating material made of spun glass fibers.
Flashing	Strips of metal, plastic or asphalts-saturated felt placed at roof areas vulnerable to water leakage and around window and door openings.
Flat slab floor	Concrete slab supported mainly by drop panels over columns.
Floor plans	Drawings in a set of blueprints that give a plan vie of each floor of the building.
Flush door	Door with a flat surface made of a frame covered with plywood or hardboard face panels.
Foam insulation	Plastic chemical foam poured or blown into wall cavities for insulating purposes.
Foundation	The part of a building that rests on and extends into the ground, it provides support fro the structural loads above.
Footing	Base of a foundation system. It bears directly on the soil.
General contractor	Licensed individual or firm that can enter into legal contracts to do construction work, and is in charge of the overall organization and supervision of a construction project.
Ground-electrical	Safety feature to prevent shock due to a fault in an electrical system. It consists of an added ground wire running from a plug or

Gutter	equipment to the ground. Wood or metal trough attached to the eaves to receive water runoff from the roof.
Header joists	Continuous pieces of lumber that are the same size as the floor joists and are nailed into the ends of the floor joists to prevent them from rolling or tipping.
Hollow-core door	Lightweight, less expensive type of flush door.
Hopper	Funnel shaped box used when placing concrete into a form
Interior finish	In carpentry, the application of finish wall covering, molding, cabinets and interior door jambs. Also included are the hanging of doors and installation of finish hardware.
Joint	The place where two pieces of material meet or are joined together.
Joist	Horizontal plank placed on edge to which subfloor and ceiling materials are nailed.
Journeyman	Worker who has completed an apprenticeship training course and passed certification requirements for working in the trades.
Kick plate	Metal or plastic plate mounted at the bottom of a door face to prevent damage from foot pressure against the door.
Level	Line of plane that would be parallel to still water or tool used for leveling and plumbing purposes.

Lintel	Wood, stone or steel member placed across the top of a rough door or window opening.
Lot survey	Survey of a piece of property, usually carried out by a qualified surveyor or engineer.
Masonry	Molded or shaped construction materials such as concrete blocks , bricks, stones, and tiles.
Millwright	Person who installs machinery and other mechanical equipment in mills and factories.
Nailing plates	Metal plates ailed at the joints between truss members.
Open stringer	Stringer that has been cut out to support the treads on the open side of a stairway.
Parapet	Low wall at the edge of a roof.
Partition	Interior wall.
Perlite	Natural volcanic glass material used as a lightweight aggregate to concrete and as loose fill in insulation.
Pile	Long, slender concrete, steel, or wood structural member that penetrates through unstable soil layers until it rests on firm soil.
plank	Lumber over 1” thick and 6” or more in width.
Plumb	Exact vertical perpendicular line.
Plyform	American Plywood Association’s trade name for a reusable

Plywood	material for concrete forms. Product made of wood layers glued and pressed together under high heat and pressure.
Per-hung door	Prefabricated door unit.
Rabbet	Groove cut along the edge of a piece of lumber.
Rail	Horizontal piece of panel door frame.
Reinforcing bars	Deformed steel bars placed in concrete to increase its ability to withstand weight and pressure.
Rough opening	Rough opening in a wall into which a finished door or window unit will be placed.
Saddle	Structure with a ridge sloping in two directions that is placed between the back side of a chimney and the roof sloping towards it.
Sash	Wood or metal frame into which glass panes are st.
Sawhorse	Portable work bench used by carpenters.
Scaffolding	Temporary, braced platforms wet up around building to enable carpenters to complete work that is out of reach from the floor or ground level.
Sheathing	Panels or boards placed on the outside of an exterior framed wall or roof to provide greater insulation, strength and nailing base for finish materials.

Shoring	System used to prevent the sliding or collapsed of the earth banks around an excavation.
Sidewall	Outside wall of a building.
Site	In construction work, the location of a construction project.
Split jamb	Type of jamb used with adjustable pre-hung door units.
Strike board	Straightedge used for spreading concrete.
Stud	Upright wood or steel member that extends from the bottom to the top plates of a framed wall.
Subfloor	Consists of structurally rated panels or boards fastened to the tips of the floor joists.
Template	Wood piece used to lay out and hold in position anchor bolts that must be accurately set into the tips of concrete piers or walls.
Tongue and groove	Boards of planks with a groove in one edge and a tongue on the other edge.
Tread	Horizontal walking surface of the step of a stairway.
Trim	Finish materials such as molding placed around doors and windows and at the top and bottom of the walls.
Underpinning	Wood wall constructed directly over the foundation and below the first floor of the house.

Ventilation	In construction the provisions made in a building to permit war air to escape and to allow the circulation of air in enclosed areas.
Vernier	Graduated scale that gives fractions of a degree on leveling instruments.
Waterboard	Panels product manufactured by combing wood waters sliced from logs with an exterior grade of phenolic resin and hot pressing them into panels.
Web	Truss member that runs between and ties together the top and bottom chords.
Yard lumber	All lumber sold for structural building purposes.
Zoning regulation.	Local regulations that govern the type of buildings and structures that may be erected in different areas of a community. Most zones come under the general categories of residential, commercial, and manufacturing.

Suggested Unit Projects

Choose At Least One

Apply all your knowledge and tools skills to:

- Design and construct a tool box.
- Design and construct a dog house.
- Design and construct a bird house.
- Design and construct an object of your choice but must be approved by the teacher.

If working in groups, each student must be assigned at least one specific part of that project.

Suggested Structured Learning Experiences

At least one District approved site visit to a construction site.