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Pathway: Design/Pre-Construction	Cluster: Architecture and Construction	Course: Blueprint Reading	Grade/Level: 9th-12/Post- Secondary

CTE LESSON PLAN		
(A Danielson-Aligned Lesson Plan Template)		
Lesson Topic	Components of a Blueprint	
Course Learning Outcome It Addresses:	Upon successful completion of the Basic Blueprint Reading, students will be able to: 1. Demonstrate knowledge and skills needed to design and draft projects ranging from two to three dimensional designs for commercial and residential buildings.	
Unit of Study:	Chapter 1: Printreading	
College and Career Readiness Standard/Common Core:	CCSS.ELA-LITERACY.WHST.11-12.2	
	CCSS.MATH.7.G.A.1	
Industry Standards:	ANSI/ASME Y14.2	
21st Century Skill Standards:	<ul> <li>Communication skills</li> <li>Collaboration</li> <li>Social skills</li> <li>Self-direction</li> </ul>	
www.iste.org / ISTE Standards for Educators / ISTE Standard for Learners	ISTE Standards for Educators:	

	<ul><li>6. Facilitator Educators facilitate learning with technology to support student achievement of the 2016 ISTE Standards for Students. Educators:</li><li>a. Foster a culture where students take ownership of their learning goals</li></ul>
	<ul> <li>and outcomes in both independent and group settings</li> <li>ISTE Standards for Learners:</li> <li>1.1 Empowered Learner - Students leverage technology to take an active role in choosing, achieving, and demonstrating competency in their</li> </ul>
	learning goals, informed by the learning sciences.
Interdisciplinary Connections (1a: Demonstrating Knowledge of Content and Pedagogy)	Mathematics, Art
Provide a listing of the subject area(s), in addition to the primary subject area that is incorporated in this lesson.	
Lesson Duration (1e: Designing Coherent Instruction)	1.5 hrs
Class Information (1b: Knowledge of Students)	Contextual Factors
Describe any unique characteristics of the class (considerations may include: special needs, skill level, ELL). Describe how other adults (paraprofessionals, volunteers, co-teachers, resource teachers, etc.) will support student learning, if applicable. Also include any other circumstances an observer should know about.	

<b>Technologies and other Materials or Resources</b> (1d: Demonstrating Knowledge of Resources) List all materials, handouts, resources, and technology tools that are needed by the student or the teacher to execute the lesson. Technologies may include hardware, software, and websites, etc. Materials and resources may include physical resources (e.g. books, manipulatives, supplies, equipment, etc.) and/or people resources (e.g. guest speakers, librarian, etc.).	<ul> <li>Materials:</li> <li>Printreading for Residential and Light Commercial Construction 6th Edition, Proctor and Toenjes</li> <li>Authentic blueprint drawings</li> <li>Cellular phone or laptop with Wifi connection</li> <li>Slide Presentation: CTE 340_Lesson Plan Day 1_RagatR</li> </ul>
Learning Objective(s) (1c: Setting Instructional Outcomes) What will students know and be able to do as a result of this lesson? The statement should be directly observable (use verbs that can be measured). Outcomes should be written in the form of student learning and suggest viable methods of assessment. For English language learners: What language objectives will be addressed?	Given an incomplete layout of a blueprint, students will identify the process and components of a drawing based on an authentic architectural project.
<ul> <li>Assessment Criteria for Success (Formal or Informal) (1f: Assessing Student Learning)</li> <li>How will you and the students assess where the learning objectives, listed above, were met?</li> <li>Each formal or informal assessment should describe how it is aligned to the above objective(s).</li> <li>How and when will you assess student learning throughout the lesson (formative)?</li> <li>How will you and your students know if they have successfully met the outcomes?</li> <li>What are the criteria for mastery of the lesson outcome(s)?</li> <li>Describe any (formative and summative) assessments to be used.</li> </ul>	<ul> <li>"Kahoot!"</li> <li>[kahoot! game is meant to practice and drill students about the content of today's lesson, which are the project delivery systems, professional roles, and components of a blueprint. This will serve as a formative assessment. I will gauge my students' knowledge on their understanding of terms and definitions within this lesson. I will provide explanations for correct answers if needed.]</li> <li>"Blueprint Activity"</li> <li>[This blueprint activity will aim students to the lesson objective which is</li> </ul>
	to identify written information to its respective line in the titleblock or

	particular drawing on the sheet. This will serve as a formative
	assessment and will help me determine if I should revisit concepts from
	our lesson.]
Academic Language: (1a: Demonstrating Knowledge of Content and Pedagogy) What language will students be expected to utilize by the end of the lesson? What key terms are essential? What key terms are essential to develop and extend students' academic language? What opportunities will you provide for students to practice the new language and develop fluency, both written and oral?	<ul> <li>Key Terms: <ol> <li>Design-bid-build: an architectural firm works directly with the owner to design a project</li> <li>Design-bid: a contractor provides the design work and building construction services</li> <li>Owner: the purchaser of a construction project; needs construction services to meet a specific residential or business requirement; discuss initial design and specific building requirements</li> <li>Architect: designs and draws plans for a structure; determines the parameters of the necessary building space based on items, such as property size and shape, desired interior and exterior spaces, and available project budget.</li> <li>Engineer: a professional who designs, builds, or maintains engines, machines, or public works; they structure the central nervous system of the building (MEP - mechanical, electrical, plumbing)</li> <li>Contractor: managers who oversee all the aspects of a project. They arrange and manage the materials, workers, equipment and services needed for completing projects on time and within budget</li> <li>Subcontractor: refers to the practice of bringing in an outside company or individual to perform specific parts of a contract or project. In most cases, a company subcontracts another business to perform a task that cannot be handled internally.</li> </ol></li></ul>

	<ul> <li>9. Computer-aided design (CAD): a way to digitally create 2D drawings and 3D models of real-world products—before they're ever manufactured</li> <li>10. Title block: provides information about the project</li> </ul>
	11. Abbreviation: a letter of series of letters denoting a complete word
	12. Symbol: a pictorial representation of a structural or material component used on a print
	13. Floor plan: a type of drawing that shows you the layout of a home or property from above.
	<ul><li>14. Elevation: a horizontal orthographic projection of a building onto a vertical plane, the vertical plane normally being parallel to one side of the building.</li></ul>
	15. Section: a cut through the body of a building, perpendicular to the horizon line.
	<ol> <li>Details: provide a complete description of a specific part of an object</li> </ol>
	(Differentiation/ELL strategy-provide images with the key terms)
Grouping Strategy (1e: Demonstrating Coherent Instruction)	N/A
Describe how you will group students to facilitate learning of the outcomes of this lesson. What is the rationale for the grouping strategy?	

# Relevance and Anticipatory Set (1a: Demonstrating Knowledge of Content and Pedagogy)

\_\_\_\_\_ minutes How will you set the purpose and help students learn why today's lesson is important to them as learners? How will you pique the interest or curiosity regarding the lesson topic? How will you build on students' prior knowledge?

How will you introduce and explain the strategy/concept or skill?

Provide detailed steps

# <u>INTRO</u>

A. INTRO Method:

- *a. Interest:* Ask students "What's the most fascinating building or structure you have ever seen or enjoy going to could be anywhere in Guam or off island?" (provide wait time 10 seconds, call on students to share their answers)
- b. Need: "And do we know who built it? Or how did they make those buildings and structures come to life? ... We draw it. We need a 2D visual representation of what we expect our 3D real-life model to look like. In doing so, we need to include specifications and details to show what is exactly needed in order to make this building or structure come into existence. Architects, surveyors, and engineers design, so that contractors, subcontractors, and tradesworkers can create. The middle point of everyone involved in the construction process is the blueprint!"
- c. Time: 1.5 hours
- d. Range of Activities: Kahoot!, Think-Write-Review
- *e. Objective*: Given an incomplete layout of a blueprint, students will identify the process and components of a drawing based on an authentic architectural project.

## Agenda

## A. Say:

- 1. Project delivery systems (10 mins)
- 2. Professional roles and responsibilities (10 mins)
- 3. Types of prints (15 mins)
- 4. Written and shape description (15 mins)
- 5. Kahoot! Activity (10 mins)
- 6. Blueprint Assessment (20 mins)
- 7. Think-Write-Review (10 mins)

	<u>Objective</u> A. <i>Say:</i> "Given an incomplete layout of a blueprint, students will identify the process and components of a drawing based on an authentic architectural project."
<ul> <li>Lesson Procedures (1a: Demonstrating Knowledge of Content and Pedagogy</li> <li>1e: Designing Coherent Instruction)</li> <li>The procedures should clearly describe the sequence of learning activities and should identify where and how all materials, technology tools and student-created technology products, and reproducible materials/handouts are utilized in the lesson. Describe the lesson sequence: <ul> <li>How will the lesson launch?</li> <li>How will the material be presented?</li> <li>What questions will be posed to the students? What are the expected responses?</li> <li>How and when will the teacher model?</li> <li>What opportunities will there be for guided practice, group work and individual practice?</li> <li>How and when will you monitor student understanding throughout the lesson?</li> </ul> </li> </ul>	<ul> <li>Project Delivery Systems</li> <li>1. Say: "Before we get into the main topic of the lesson, I want to go over the process that explains how blueprints come into effect. In order to start the design process, an individual or a group needs to provide the concept of what they want and how it will be funded. Now, there are two main types of project delivery systems"</li> <li>2. Show: (Graphic web of the types of project delivery systems)</li> <li>3. Say: "There are two basic types of project delivery systems: Design-bid-build and design-build. Design-bid-build is the most traditional method and requires the owner to contract separately with a designer and a contractor [point to graphics]. The design firm is retained to deliver complete design documents. The owner then solicits bids from contractors to perform the work. Designers and contractors bear no contractual obligation to one another in a Design-Bid-Build arrangement and typically do not collaborate on the subject project. On the other hand, Design-build is a method of project delivery when one entity works under a single contract with the owner, providing both design and construction services. The entity can be a team of designers and builders from separate firms, but there is just one responsible party, one contract, and one unified flow of work from initial design all the way through completion of construction. There are both contractor-led Design-Build as well as architect/designer-led Design-Build collaborations."</li> </ul>
	Professional Roles in the Construction Process

1. Show: (Still referring to the graphic web of professional roles and their tasks) 2. *Identify*: (AP= call on each student to define each professional role) **a**. "The owner is basically the purchaser of a construction project. They need construction services to meet a specific residential or business requirement and discuss initial design and specific building requirements. They can choose either the design-bid-build system or the design-build system depending on their budget and time. b. The architect is responsible for ensuring that the design meets the client's needs and budget. They have more responsibilities which we will get more into later. c. The engineer (usually called the "engineering consultants") is a professional who designs, builds, or maintains engines, machines, or public works; they structure the central nervous system of the building (MEP - mechanical, electrical, plumbing) d. The contractors are the managers who oversee all the aspects of a project. They arrange and manage the materials, workers, equipment and services needed for completing projects on time and within budget e. The subcontractors refers to the practice of bringing in an outside company or individual to perform specific parts of a contract or project. In most cases, a company subcontracts another business to perform a task that cannot be handled internally. Last but not least, you have a trades worker who is a f. skilled worker that specializes in a particular trade

(occupation or field of work). (carpenter, electrician, etc.)"

3. *Say*: "There are definitely more roles involved in this process, but these are the general professionals usually involved."

#### Types of Prints

- Say: "According to Merriam Webster, a blueprint is a photographic print in white on a bright blue ground or blue on a white ground used especially for copying maps, mechanical drawings, and architects' plans
- 2. Identify: "In the past, they had to hand draw blueprints, and if they wanted to make a copy they had to trace over them using translucent paper. To make blueprints nowadays, you could still hand draw them if it is a small project, such as a garage or storage area, but we often use computer-aided design software programs (CAD) such as AutoCAD or Revit for larger scale projects
- 3. Show: [examples of AutoCAD and Revit]
- 4. Say: "The benefits of using AutoCAD include, [AP=students read out each benefit of using CAD benefits from textbook pg.
  - 6]
- a. Consistency uniform line width, symbol depiction, and representation of drawing components
- b. Changeability revisions, additions, and deletions are easily made to the electronic file
- c. Layering a method, similar to using overlays on conventional drawings, in which trade specification

information is added to a base drawing to generate trade-specific drawings such as mechanical plans

- Modeling viewing a building in pictorial form and subjecting the model to engineering tests such as a stress test
- e. Storage drawings stored on electronic media such as compact discs consume less physical storage space than paper drawings
- f. Duplication an unlimited number of prints may be reproduced, each with original quality
- g. information management information about the material used in drawings is stored and updated as drawings are generated or changed, allowing the drafter to extract information for takeoff purposes"

#### Written Description

- 1. *Say*: "Within a blueprint sheet, there are written descriptions. These written descriptions include a title block, descriptive information near a specific item and connected with a learner and terminated by an arrowhead or a dot, specific information that refers to one building condition is noted near its location on the prints, or general information applying to several sheets in the prints is placed in a convenient space [show an authentic blueprint sheet containing the written descriptions"
- Identify: "The best place to begin reading a set of blueprints is the title block - it includes the project name and location, architect's name and office location, architect seal, plan completion date, drafter initials, sheet number/sheet count, name of the sheet and other information as determined by the architect.

3. *Identify*: "Within the plans, it'll also include various abbreviations and symbols. An abbreviation is a letter or series or letters denoting a complete word. [show list of abbreviations]. Symbol is a pictorial representation of a structural or material component used on a print. The US uses ANSI Y32.9 - Graphic symbols for electrical wiring and layout diagrams used in architecture and building construction. This one is a bit tricky because some symbols could slightly vary for every architect. This is why it is crucial to refer to their legend and/or the descriptive information [show legends].

#### Shape Description

- Say: "Alongside those written descriptions are the shape descriptions... Each working drawing is a set of prints representing a part of a building as an orthographic projection.
- 2. *Ask*: "This is a hint for our upcoming lesson; can anyone look for the orthographic projection definition from their textbook and tell me what it is?" [provide wait time]
- 3. Identify:
  - a. So yes, orthographic projection allows individual parts of a building to be shown in their true shape and not distorted for perspective allowances as they would be on pictorial drawings/3D drawings. The most essential working drawings are the following..."
- 4. Identify and show examples:
  - a. "Plot plans are the bird's eye view of the entire property that the building will be built on
  - b. Floor plan is a plan view of a building that shows the arrangement of walls and partitions as they appear in an imaginary horizontal section taken approx 5'-0" above floor level

- c. Reflected ceiling plan is a drawing that shows which items are located on the ceiling of a room or space. It is referred to as a reflected ceiling plan since it is drawn to display a view of the ceiling as if it was reflected onto a mirror on the floor.
- d. An elevation drawing is an orthographic projection drawing that shows one side of the house. The purpose of an elevation drawing is to show the finished appearance of a given side of the house and furnish vertical height dimensions. Four elevations are customarily drawn, one for each side of the house.
- e. Section drawings show what the building would look like if you were to make a vertical cut through a particular part of a building to show a cross section of the structure, and how the spaces inside fit together vertically.
- f. A detail is a scaled plan view, elevation, or section produced at a larger scale to show special features
- g. MEP drawings include all the details regarding HVAC systems, wiring, and piping required to construct a commercial or residential structure. They are necessary for component vendors, equipment manufacturers, and suppliers to understand the mechanical intricacies of a building under construction."

### Kahoot! Game (class)

1. *Say:* "So let's play a review game - since this is our first introduction lesson and activity, this will not be graded, but there will be an incentive for whoever gets the highest score! This will

	go over everything we have just learned and also supplement the next activity"
	2. <i>Show:</i> Login to Kahoot! and provide game code.
	3. Kahoot! Questions
	a. [provide at least 10 questions]
	Blueprint Activity (individual)
	1. Provide students with "Blueprint" worksheet
	2. <i>Say</i> : "I would like you to read and fill-in the title block as well as
	identify shape and written descriptions within this blueprint. If you need
	help, you can refer to the authentic blueprint project.
Instructional Strategy J	Exploration Model: I will be explaining to the students about what a
(13: Demonstrating Knowledge of Content and Pedagogy	down the process and provide examples for a better understanding. If
	needed. I could ask students to "pretend-play" each professional role to
Exploration (Model): How will students explore the new concepts? How will you model or provide explicit instruction?	understand how it would work in real life.
Guided Practice: How will you provide support to students as they apply the new concept? How will you allow them to practice (with teacher support)?	Guided Practice: During the "Kahoot!" activity, I will present various
Independent practice: How will students review and solidify these concepts to	questions regarding the key topics we learned. Questions will include
be able to use this new knowledge? How will you monitor and provide	Identifying the project delivery systems, professional roles and their
teedback?	respective responsibilities, and various written and snape descriptions. If
Provide detailed steps.	guestion I could add more waiting time. If some or more students
	answered a question incorrectly. I would tell them the correct answer
	and explain why it is the correct answer.

	Independent Practice: To review and solidify these concepts, students will do a "Think-Write-Review" activity in which they will jot down everything they have learned while it is still fresh in their minds. They should have at least four key topics (project delivery system, professional roles, written and shape descriptions) and provide the supporting details/exmaples to each. This will allow students who might be struggling with the new information to ask each other for help. They could also use each other to verify the concepts. I will walk around the room and monitor each student.
Differentiation: (1e: Designing Coherent Instruction) What differentiated support will you provide for students whose academic development is below or above the current grade level? What specific differentiation of content, process, products, and/or learning environment do you plan to employ to meet the needs of all of your students? How does your lesson support student differences with regard to linguistic, academic, and cultural diversity? How will your lesson actively build upon the resources that linguistically and culturally diverse students bring to the experience? How will your lesson be supportive for all students, including English Language Learners, and build upon the linguistic, cultural, and experiential resources that they bring to their learning? How will your lesson be designed to promote creative and critical thinking and inventiveness?	DIFFERENTIATION STRATEGIES: A. Content: a. Show: [graphic organizer of the project delivery systems] b. Read: c. Refer to: d. Explain: e. Demonstrate: B. Process: a. Pair Activity: C. Product: a.
	ELL STRATEGIES:         A. Comprehensible Input:         a. Teach vocabulary:         i. Design-bid-build: an architectural firm works         directly with the owner to design a project         ii. Design-bid: a contractor provides the design work         and building construction services

iii.	Owner: the purchaser of a construction project;
	needs construction services to meet a specific
	residential or business requirement; discuss initial
	design and specific building requirements
iv.	Architect: designs and draws plans for a structure;
	determines the parameters of the necessary
	building space based on items, such as property
	size and shape, desired interior and exterior
	spaces, and available project budget.
V.	Engineer: a professional who designs, builds, or
	maintains engines, machines, or public works;
	they structure the central nervous system of the
	building (MEP - mechanical, electrical,
	plumbing)
vi.	Contractor: managers who oversee all the aspects
	of a project. They arrange and manage the
	materials, workers, equipment and services
	needed for completing projects on time and
	within budget
vii.	Subcontractor: refers to the practice of bringing
	in an outside company or individual to perform
	specific parts of a contract or project. In most
	cases, a company subcontracts another business
	to perform a task that cannot be handled
	internally.
viii.	Trades Worker: a skilled worker that specializes
	in a particular trade (occupation or field of work).
ix.	Computer-aided design (CAD): a way to digitally
	create 2D drawings and 3D models of real-world
	products—before they're ever manufactured
Х.	Title block: provides information about the
	project

	xi. Abbreviation: a letter of series of letters denoting a complete word
	xii. Symbol: a pictorial representation of a structural or material component used on a print
	xiii. Floor plan: a type of drawing that shows you the layout of a home or property from above.
	xiv. Elevation: a horizontal orthographic projection of a building onto a vertical plane, the vertical plane normally being parallel to one side of the building.
	xv. Section: a cut through the body of a building, perpendicular to the horizon line.
	xvi. Details: provide a complete description of a specific part of an object
	b. Use Visual Supports: [for every term or role, show an example]
	c Provide context and activate background knowledge
	d. Give explanations or Directions in a Variety of Way
	Accommodations:
<b>Accommodations:</b> (1e: Designing Coherent Instruction) What classroom accommodations do you plan to employ to increase curriculum access for students identified with special education needs or 504? Describe how these accommodations align with the current Individualized Education Plan (IEP) for each student as applicable (avoid using actual names of students).	If certain students need accommodations, I would like to employ extended time on the presentation and activities. I would also like to work one-on-one with the student.
Modifications	Modifications:
(1e: Designing Coherent Instruction)	If certain students need modifications within the lesson, I could have them accomplish a different activity. Instead of the Kahoot! game or blueprint activity, I could work with the student individually (while

What <b>curricular modifications</b> and/or changes in <b>performance standards</b> , if any, do you plan to employ to facilitate the participation of students identified with special education needs?	others are doing independent work) and work with each other to point out terms and their respective images. I could also make flashcards to show what belongs where in the project delivery systems.
Closure (1e: Designing Coherent Instruction) <u>5</u> minutes How will students share or show what they have learned in this lesson? How will you restate the teaching point and clarify key concepts? How will you provide opportunities to extend ideas and check for understanding? How will this lesson lead to the next lesson?	<ul> <li>Summary: <ul> <li>a. "We went over the types of project delivery systems, what kind of professional roles are there in the pre-construction/design phase, types of prints as well as the various shapes and written descriptions. This is the most essential information of blueprint design, so we will definitely dig deeper into every aspect of blueprint drafting moving forward. Going back to the first question I asked when class started, the buildings or structures we enjoy looking at or seeing have always started with an idea and that idea is drawn out through a blueprint."</li> </ul> </li> <li>Extended Practice (if time allotted): <ul> <li>a. <i>Think-Review-Write</i>: I want you to write down what you have learned today, it can be in paragraphs or bullet points. You can write down either facts or concepts on your blueprint or on a separate sheet of paper. You will have 5 minutes to do so.</li> </ul> </li> </ul>
Anticipated Difficulties (1a: Demonstrating Knowledge of Content and Pedagogy) What difficulties or misunderstanding do you anticipate that students may encounter? How will you prevent them from occurring?	Students might be ELL or have an IEP. They might have trouble understanding technical writing. To prevent this from occurring, I could present key terms with examples of objects and pictures, and with cooperative small-group learning, students who are academically advanced can help students who may have trouble understanding the lesson overall.
<b>Reflection on Instruction (4a: Reflecting on Teaching)</b> What evidence did you collect to demonstrate that your students have met or are progressing towards the learning outcome? What changes or adjustments had to be made during the lesson (justify those changes) to ensure students make adequate progress in meeting the learning objective? What changes will have to be made to the next lesson for students to be on pace in meeting the overall goal of the Lesson or Unit?	

Taking good notes about each lesson will help as you develop a formal reflective narrative at the end of the SLO.	