Workforce Readiness Report

August 2024

Executive Summary

In July 2023, NCARB assembled a work group of practitioners and educators to identify the essential knowledge, skills, and abilities (KSAs) needed for entry-level positions in architecture firms. NCARB hired an independent research company, Data Recognition Corporation (DRC), to help define these requirements and ensure the validity of the research. As part of the job analysis process, the work group examined a list of tasks from current job postings for entry-level architecture positions, identified initial knowledge and skill components, conducted a nation-wide validation survey, and refined the essential tasks for a competent entry-level employee based on these findings. This process produced a detailed list of 53 cognitive knowledge, skills, and abilities (KSAs) needed to effectively perform an entry-level role in architecture.

In collaboration with DRC, NCARB conducted a validation survey to assess the importance and relevance of each KSA for entry-level architecture professionals. It asked participants—both licensed and non-licensed—how important, frequently applied, and relevant each KSA was to the role. The survey, conducted in early 2024, had over 2,250 respondents, with 72% of responses from licensed individuals and 28% from non-licensed individuals.

Key Findings From the Job Task Analysis

- Both licensed/experienced and non-licensed/entry-level respondents rated the same nine KSAs as being most important for entry-level roles in architecture. These KSAs included both technical skills and soft skills. Those nine KSAs include the ability to:
    - Use software to create drawings (including both 2D and 3D)
    - Edit drawings based on redline comments
    - Understand the meaning and purpose of common drawing elements included within design and construction drawings
    - Follow instructions to assemble construction drawings
    - Understand common business software applications not specific to architecture
    - Understand the importance of collaborating with others to achieve goals
    - Demonstrate time management and organizational skills
    - Communicate clearly and professionally
    - Take initiative and solve problems independently
- Licensed/experienced respondents and non-licensed/entry level respondents disagreed slightly regarding the importance of five KSAs. For all of these, the licensed/experienced respondents rated each as **more** significant than non-licensed/entry level respondents rated them, with the most important of these KSAs to licensed/experienced professionals being “Recognize the relationship between construction drawing and specifications.”
- Licensed/experienced respondents and non-licensed/entry level respondents agreed on the four KSAs found to be least important, including “Understand different project delivery processes.”
- Many differences were found when comparing firm size, with no overlap between KSAs valued more greatly by large firms versus those valued more greatly by small firms.

KSA Alignment With Community College Architecture Programs

In addition to understanding what knowledge, skills, and abilities are required for an entry-level architecture position, NCARB also wanted to determine how well those KSAs aligned with the Student Learning Outcomes (SLOs) of Associate of Applied Science (AAS) programs in architecture at community

colleges. An analysis comparing the top KSAs with SLOs found that many of the SLOs align with the critical KSAs identified in the job task analysis, including:

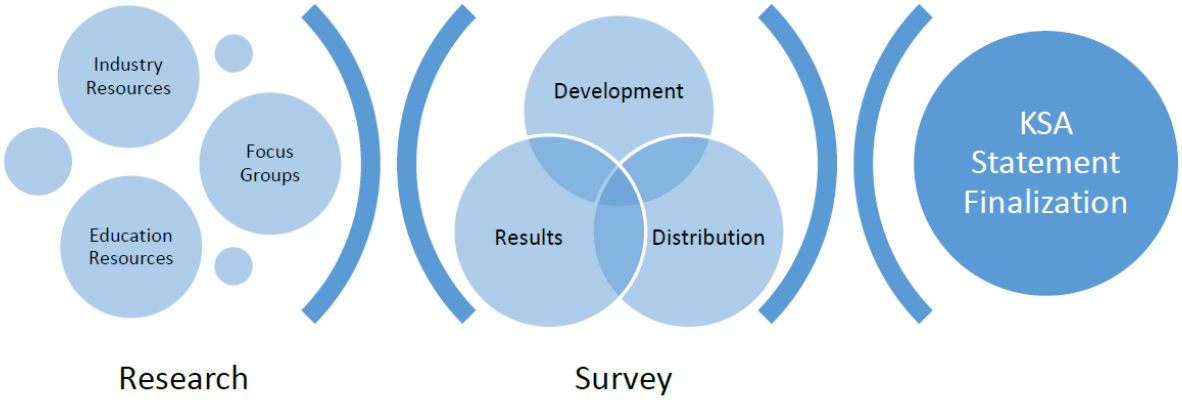
- Using software for development of construction documents
- Understanding building materials
- Developing building designs
- Integrating building systems
- Site and land use
- Demonstrating professional behavior and understanding business communication

Model Framework for Program Competencies

To enhance workforce readiness in architectural education, the work group developed a framework to guide the integration of critical KSAs into academic curricula. This framework is included within this report and is designed for a two-year architecture program divided into four semesters. This structured approach aims to ensure that students develop the essential skills needed for entry-level positions in architecture throughout their education.

Job Task Analysis Overview

In July 2023, NCARB convened a group of practitioners and educators to study what knowledge, skills, and abilities are necessary for those hired by an architecture firm to be effective as entry-level career individuals. NCARB contracted with Data Recognition Corporation (DRC) to explore and define the role of an entry-level employee practicing in the field of architecture. A team of DRC psychometricians and test development professionals working with NCARB volunteers conducted the job analysis through three overarching steps: 1) background research, 2) survey validation, and 3) content finalization.



Workforce Readiness Work Group

NCARB's Workforce Readiness Work Group was composed of 12 participants, including both practitioners and educators within the architecture profession, as follows: 58% of the participants identified as male, 25% identified as female, and one participant did not indicate their gender. 67% of the participants identified as white, 17% as Black or African American, one participant identified as Hispanic or Latino, and one participant did not indicate their race or ethnicity. The participants held degrees ranging across the Associate's, Bachelor's, Master's, and professional degree levels. The participants were also from diverse employment environments (e.g., setting, state/region). Importantly, the participants represented a broad range of experience in architecture, with participants reporting up to 55 years of experience. One participant recently earned their license and three did not hold a license. This range of experience and licensure status contributed to the goal of considering diverse perspectives concerning the role of an entry level architecture professional.

Job Task Analysis

The work group first reviewed a list of tasks compiled from a large sampling of current job postings for entry-level positions in architecture firms. Using this list as a starting point, they worked with DRC to determine which tasks were deemed necessary to be an effective entry-level employee. The job analysis process resulted in a comprehensive list of statements that define the cognitive knowledge, skills, and abilities (KSAs) required to effectively carry out the responsibilities of an entry level architecture professional. See Appendix for the complete list of 53 KSAs.

Definition of Entry-Level Architecture Professional

NCARB and the job analysis panel defined the entry-level architecture professional as someone working in the field of architecture for less than 12 months. This individual is beginning their employment in an architecture firm and does not hold an architecture license. The panel defined the necessary KSAs for successful employment regardless of the educational or experience background of the individual.

Job Task Survey

NCARB and DRC created a validation survey to determine the importance and relevance of each item on the revised list of KSAs, according to both licensed and non-licensed individuals. The survey asked participants to indicate how important each KSA was for the entry-level architecture professional to possess, how often they applied each KSA, and/or how relevant each KSA was to the expected responsibilities of an entry-level architecture professional. The survey was administered in early 2024.

Survey Methodology and Response

We surveyed NCARB Record holders who fell into two important samples within the population: non-licensed/entry level and licensed/experienced. The survey was live for six weeks and had over 2,250 respondents, with 72% from licensed individuals and 28% from non-licensed individuals, as follows:

Experience

- 5 or fewer years of experience: 17%
- More than 5 years of experience: 83%

Firm Size

- <10 employees: 29%
- 10-24 employees: 17%
- 25-49 employees: 11%
- 50+ employees: 40%
- N/A: 3%

Geographic Location

- Midwest: 20%
- Northeast: 22%
- South: 33%
- West: 25%

Gender

- Female: 35%
- Male: 57%
- Nonbinary: 1%
- Prefer not to answer: 7%

Non-Licensed/Entry Level Ratings

Non-licensed and entry-level survey respondents included respondents who have never been licensed in a U.S. jurisdiction and had five or fewer years of experience in the field of architecture. These participants were asked to evaluate the KSAs on scales of importance and frequency.

Licensed/Experienced Ratings

Licensed and/or experienced survey respondents included respondents who are currently or have been previously licensed or who reported more than five years of experience. These participants were asked to evaluate the KSAs on scales of importance and relevance.

Importance Scale

Both groups of survey respondents including licensed/experienced and non-licensed/entry level were asked to indicate how **important** it is that an entry level employee in an architecture firm possess each knowledge /skill, using the following scale:

- Not at all important
- Slightly important
- Moderately important
- Very important

Frequency Scale

Non-licensed and entry level survey respondents were asked to indicate how **frequently** an entry level employee in an architecture firm will use each knowledge area or skill, using the following scale:

- Never
- About once per year or less
- About once per month
- About once per week
- About once per day
- Several times per day

Relevance Scale

Licensed and/or experienced survey respondents were asked to indicate how **relevant** each of the knowledge/skills areas is to the typical tasks that an entry level employee position in an architecture firm must regularly perform, using the following scale:

- Not at all relevant
- Relevant
- Very relevant

Key Findings from the Job Task Analysis

Top Nine KSAs for Entry-Level Architecture Professionals

The Workforce Readiness survey identified nine KSAs that are crucial for entry-level architecture professionals. Licensed/experienced respondents and non-licensed/entry level respondents agreed when ranking these as the most important KSAs, indicating that they are both most relevant to the work that entry-level professionals are asked to conduct and most frequently utilized by existing entry-level professionals in their work:

Technical Skills
Execute changes to 2D and 3D drawings based on redline comments.
Use CAD and/or BIM software to create 2D and 3D drawings as directed.
Understand the meaning and purpose of the variety of drawing elements (lines, hatch patterns, tags, dimensions, etc.) included within design and construction drawings (e.g., perspectives, plans, sections, details, elevations).
Follow instructions to assemble construction drawings, as directed.
Understand common business software applications (e.g., word processing, email, timesheet recording, etc.).

Durable/Soft Skills
Understand the importance of collaborating with others to achieve goals.
Demonstrate time management and organizational skills.
Demonstrate professional verbal and written communication skills.
Demonstrate initiative and autonomous problem-solving skills.

Disagreements of Importance Found in Five KSAs

The survey showed slight disagreements between licensed/experienced respondents and non-licensed/entry level respondents for five KSAs. For all of these, the licensed/experienced respondents rated each as **more** significant than non-licensed/entry level respondents rated them:

Misalignment Between Licensed/Experienced Importance and Non-licensed/Entry Level Relevance Ratings
1. Recognize the relationship between construction drawing and specifications.
2. Understand the process of researching relevant project precedence and information.
3. Understand the implications of site location and orientation on building design choices.
4. Research and document site development restrictions.
5. Understand the client decision points at each project phase.

- Items listed in order of greatest to least importance by licensed/experienced respondents

Shared Understanding of Least Important/Relevant

Licensed/experienced respondents and non-licensed/entry level respondents agreed regarding those KSAs found to be least important. Both groups selected the same four KSAs as least important indicating that they are both least relevant to the work that entry-level professionals are asked to conduct and least frequently utilized by existing entry-level professionals in their work:

Licensed/Experienced and Non-Licensed/Entry Level Agreement of Least Important/Relevant KSAs
1. Understand different project delivery processes.
2. Understand the goals and deliverables of marketing.
3. Describe possible site utilities that may be available based on the site.
4. Understand the elements of the bid procurement process.

- Items listed in order of greatest to least importance by licensed/experienced respondents

Differences Found When Comparing Firm Size

"Though comprising only 7% of all architecture firms, those with 50 or more employees account for more than half of those employed in private practice."—AIA Firm Survey Report 2022

Although important for all firm sizes, respondents employed by large firms (those with more than 25 employees) reported the following KSAs as being of more importance than those employed by smaller firms (those with fewer than 25 employees):

KSAs Valued by Large Firms
1. Use CAD and/or BIM software to create 2D and 3D drawings as directed.
2. Execute changes to 2D and 3D drawings based on redline comments.
3. Understand common business software applications (e.g., word processing, email, timesheet recording, etc.).
4. Follow and apply production standards for various aspects of a project.

- Items listed in order of greatest to least importance by respondents employed by large firms

Respondents employed by small firms (less than 10 employees) reported the following KSAs as being of more importance than respondents employed by larger firms (25 or more employees):

KSAs Valued by Small Firms
1. Integrate existing field data, site, and building conditions into new or revised drawings as directed.
2. Identify discrepancies when comparing construction documents against existing field conditions.
3. Understand the variety and roles of different Authorities Having Jurisdiction (AHJ) that may exist on a project.
4. Understand the goals and deliverables of marketing.
5. Research and document site development restrictions.
6. Understand the elements of the bid procurement process.
7. Follow office standards for relevant business tasks.
8. Read product specifications and cut sheets to inform documentation development.
9. Record field measurements using basic tools (e.g., tape measure, electronic levels, hardware/software).

- Items listed in order of greatest to least importance by respondents employed by small firms

Where No Statistically Significant Differences Were Found

No significant differentiating patterns were observed when evaluating the KSAs across the following demographic characteristics:

- Multi-disciplinary firms vs. architectural services only
- Region of the country differences
- Level of education by respondent

KSA Alignment to Community College Architecture Programs

NCARB completed further analysis to better understand the capabilities of community college architecture program graduates as compared to the skills identified as most critical by firms for entry level employment. A large sampling of Student Learning Outcomes (SLOs) from community colleges offering an Associate of Applied Science (AAS) degree were collected, reviewed, and categorized into like subject areas. The community college learning outcomes were then compared to the list of defined KSAs to determine the level of alignment.

This analysis is intended to serve as a resource and possible framework for academic programs teaching architecture that wish to incorporate more workforce-ready capabilities into their curricula, as well as inform early career professionals whether they are "workforce ready" by comparing their own skills to the list of KSAs.

Primary Student Learning Outcomes

The Student Learning Outcomes most commonly cited as those community colleges say they focus on are:

- Using software for development of construction documents
- Understanding building materials
- Developing building designs
- Integrating building systems
- Incorporating sustainable design strategies
- Site and land use
- Understanding architectural history and theory
- Understanding of the broader AEC industry
- Demonstrating professional behavior and understanding business
- Communication/presentation skills
- Developing a portfolio

Alignment of KSAs with Community College Student Learning Outcomes

Of the learning outcomes found to be most common, the ones highlighted below align with the KSAs the JTA determined were also most important for entry-level employees:

- **Using software for development of construction documents**
- **Understanding building materials**
- **Developing building designs**
- **Integrating building systems**
- Incorporating sustainable design strategies
- **Site and land use**
- Understanding architectural history and theory
- Understanding of the broader AEC industry
- **Demonstrating professional behavior and understanding business**
- **Communication**/presentation skills
- Developing a portfolio

As with every academic program, there is no guarantee that every graduate possesses the knowledge, skills, or abilities on the list of student learning outcomes, just as there is not consistency across community colleges as to how deep they go into this knowledge development. However, this data indicates graduates of community college architecture programs are likely to possess the highlighted skills, which have been deemed valuable for entry level work.

Model Framework for Program Competencies

To promote integration of important workforce readiness skills into architectural curriculum, the workgroup established a framework that can be used to help guide development of academic curriculum. The following utilizes the established KSAs and presents a proposed arrangement within a curriculum. Considering a two-year architecture program consisting of four semesters, the framework proposes:

1. the semester during which a student should initially be **exposed to** this knowledge and/or begin skill development.
2. the semester during which a student should be able to **fully demonstrate** this knowledge/skill.

For each semester, the items are listed in the order of most to least important based on the JTA analysis. This ranked order can also help programs prioritize which KSAs to focus on based on program limitations.

Distribution of KSAs over Four Semesters

Year 1 - Semester 1

Expose	Fully Demonstrate
Execute changes to 2D and 3D drawings based on redline comments.	Understand the importance of collaborating with others to achieve goals.
Understand the importance of collaborating with others to achieve goals.	
Follow instructions to assemble construction drawings, as directed.	
Understand the meaning and purpose of the variety of drawing elements (lines, hatch patterns, tags, dimensions, etc.) included within design and construction drawings (e.g., perspectives, plans, sections, details, elevations).	
Demonstrate time management and organizational skills.	
Demonstrate professional verbal and written communication skills.	
Demonstrate initiative and autonomous problem-solving skills.	
Understand common business software applications (e.g., word processing, email, timesheet recording, etc.)	
Understand an office's culture and values as described and how they are applied to projects and work.	
Describe common building products and materials.	
Research products and materials as directed for consideration on projects.	
Conduct preliminary code and zoning research based on the project program and jurisdiction (e.g., project occupancy, size, construction).	
Understand the purpose of field reports.	

Year 1 - Semester 2

Expose	Fully Demonstrate
Use CAD and/or BIM software to create 2D and 3D drawings as directed.	Describe common building products and materials.
Follow communication protocols with consultants, officials, clients, and others as directed.	
Accurately record relevant and key information during meetings in a clear and useful format.	
Integrate existing field data, site, and building conditions into new or revised drawings as directed.	
Follow office standards for relevant business tasks.	
Record field measurements using basic tools (e.g., tape measure, electronic levels, hardware/software).	
Understand the documentation goals for each phase of design and what software applications can achieve those goals.	
Follow and apply production standards for various aspects of a project.	
Identify basic documentation needs of existing conditions.	
Recognize the relationship between construction drawing and specifications.	
Recognize the key deliverables for each project phase, as directed.	
Understand the process of researching relevant project precedence and information.	
Demonstrate working knowledge of common building components and construction methodologies.	
Understand the roles of other disciplines, consultants, vendors, and contractors in the design and construction of a project.	
Understand the implications of site location and orientation on building design choices.	
Compare basic building assemblies for wood, steel, concrete, and masonry construction.	
Understand how project information is integrated into various project phases.	
Understand the role of specifications in construction documents.	
Research and document site development restrictions.	
Understand the variety and roles of different Authorities Having Jurisdiction (AHJ) that may exist on a project.	
Understand the contractual relationships between the owner, architect, contractor, and consultants.	
Understand the purpose of shop drawings.	
Understand the variations of scopes and services.	
Describe the legal and ethical implications associated with architectural practice.	
Understand different project delivery processes.	
Describe possible site utilities that may be available based on the site.	

Year 2 - Semester 1

Expose	Fully Demonstrate
Identify discrepancies when comparing construction documents against existing field conditions.	Execute changes to 2D and 3D drawings based on redline comments.
Recognize the mechanics and concepts behind basic construction details in the context of design and construction documents.	Use CAD and/or BIM software to create 2D and 3D drawings as directed.
Collect the necessary documents and data as directed to support the work of consultants.	Follow instructions to assemble construction drawings, as directed.
Describe how building systems are integrated into building design.	Understand the meaning and purpose of the variety of drawing elements (lines, hatch patterns, tags, dimensions, etc.) included within design and construction drawings (e.g., perspectives, plans, sections, details, elevations).
Describe basic building systems (Mechanical, Electrical, Plumbing, and Structural) and their properties.	Demonstrate time management and organizational skills.
Read product specifications and cut sheets to inform documentation development.	Demonstrate professional verbal and written communication skills.
Understand the client decision points at each project phase.	Understand common business software applications (e.g., word processing, email, timesheet recording, etc.).
Understand the goals and deliverables of marketing.	Use graphic design software to prepare presentation materials as directed.
	Record field measurements using basic tools (e.g., tape measure, electronic levels, hardware/software).
	Understand the purpose and implications of various project milestones and deliverables.
	Have a fundamental awareness of common building codes.
	Sketch common design and construction drawings (e.g., perspectives, plans, sections, details, elevations) to explain concepts.
	Identify basic documentation needs of existing conditions.
	Understand the process of researching relevant project precedence and information.
	Research products and materials as directed for consideration on projects.
	Demonstrate working knowledge of common building components and construction methodologies.
	Understand the implications of site location and orientation on building design choices.
	Compare basic building assemblies for wood, steel, concrete, and masonry construction.
	Understand the variety and roles of different Authorities Having Jurisdiction (AHJ) that many exist on a project.
	Understand the purpose of shop drawings.
	Describe possible site utilities that may be available based on the site.

Year 2 - Semester 2

Expose	Fully Demonstrate
Understand when time spent at work is directly related to a project or indirectly spent on office overhead.	Demonstrate initiative and autonomous problem-solving skills.
Understand the elements of the bid procurement process.	Follow communication protocols with consultants, officials, clients, and others as directed.
	Accurately record relevant and key information during meetings in a clear and useful format.
	Integrate existing field data, site, and building conditions into new or revised drawings as directed.
	Follow office standards for relevant business tasks.
	Understand the documentation goals for each phase of design and what software applications can achieve those goals.
	Follow and apply production standards for various aspects of a project.
	Understand when time spent at work is directly related to a project or indirectly spent on office overhead.
	Identify discrepancies when comparing construction documents against existing field conditions.
	Understand an office's culture and values as described and how they are applied to projects and work.
	Recognize the relationship between construction drawing and specifications.
	Recognize the key deliverables for each project phase, as directed.
	Understand the roles of other disciplines, consultants, vendors, and contractors in the design and construction of a project.
	Recognize the mechanics and concepts behind basic construction details in the context of design and construction documents.
	Collect the necessary documents and data as directed to support the work of consultants.
	Understand how project information is integrated into various project phases.
	Understand the role of specifications in construction documents.
	Conduct preliminary code and zoning research based on the project program and jurisdiction (e.g., project occupancy, size, construction).
	Describe how building systems are integrated into building design.
	Describe basic building systems (Mechanical, Electrical, Plumbing, and Structural) and their properties.
	Research and document site development restrictions.
	Read product specifications and cut sheets to inform documentation development.
	Understand the contractual relationships between the owner, architect, contractor, and consultants.
	Understand the client decision points at each project phase.
	Understand the variations of scopes of services.
	Describe the legal and ethical implications associated with architectural practice.
	Understand the purpose of field reports.
	Understand the different project delivery processes.
	Understand the goals and deliverables of marketing.
	Understand the elements of the bid procurement process.

Appendix

Knowledge, Skills, and Abilities (KSAs) Required of an Entry-level Employee in an Architecture Firm

I. BUILDING TECHNOLOGY

A. Describe common building products and materials.
B. Demonstrate working knowledge of common building components and construction methodologies.
C. Compare basic building assemblies for wood, steel, concrete, and masonry construction.
D. Recognize the mechanics and concepts behind basic construction details in the context of design and construction document.
E. Describe possible site utilities that may be available based on the site.
F. Describe basic building systems (Mechanical, Electrical, Plumbing, and Structural) and their properties.
G. Describe how building systems are integrated into building design.
H. Research products and materials as directed for consideration on projects.

II. PROJECT DEVELOPMENT & DESIGN PRODUCTION

A. Understand the process of researching relevant project precedence and information.
B. Follow and apply production standards for various aspects of a project.
C. Understand the purpose and implications of various project milestones and deliverables.
D. Understand the documentation goals for each phase of design and what software applications can achieve those goals.
E. Collect the necessary documents and data as directed to support the work of consultants.
F. Read product specifications and cut sheets to inform documentation development.
G. Understand the role of specifications in construction documents.
H. Recognize the relationship between construction drawing and specifications.
I. Understand the meaning and purpose of the variety of drawing elements (lines, hatch patterns, tags, dimensions, etc.) included within design and construction drawings (e.g., perspectives, plans, sections, details, elevations).
J. Use graphic design software to prepare presentation materials as directed.
K. Sketch common design and construction drawings (e.g., perspectives, plans, sections, details, elevations) to explain concepts.
L. Use CAD and/or BIM software to create 2D and 3D drawings as directed.
M. Execute changes to 2D and 3D drawings based on redline comments.
N. Follow instructions to assemble construction drawings, as directed.
O. Identify basic documentation needs of existing conditions.
P. Record field measurements using basic tools (e.g., tape measure, electronic levels, hardware/software).
Q. Integrate existing field data, site, and building conditions into new or revised drawings as directed.
R. Understand the implications of site location and orientation on building design choices.
S. Understand how project information is integrated into various project phases.

T. Understand the client decision points at each project phase.
U. Identify discrepancies when comparing construction documents against existing field conditions.
V. Research and document site development restrictions.
W. Understand the elements of the bid procurement process.
X. Understand the purpose of shop drawings.
Y. Understand the purpose of field reports.
Z. Understand different project delivery methods (e.g., design-bid-build, design-build, construction manager at-risk)

III. PROJECT TEAM

A. Understand the roles of other disciplines, consultants, vendors, and contractors in the design and construction of a project.
B. Understand the contractual relationships between the owner, architect, contractor, and consultants.
C. Understand the importance of collaborating with others to achieve goals.

IV. REGULATORY PROCESS

A. Understand the variety and roles of different Authorities Having Jurisdiction (AHJ) that may exist on a project.
B. Have a fundamental awareness of common building codes.
C. Conduct preliminary code and zoning research based on the project program and jurisdiction (e.g., project occupancy, size, construction).

V. BUSINESS UNDERSTANDING

A. Understand the legal and ethical implications associated with architectural practice.
B. Demonstrate professional verbal and written communication skills.
C. Recognize the key deliverables for each project phase, as directed.
D. Demonstrate time management and organizational skills.
E. Accurately record relevant and key information during meetings in a clear and useful format.
F. Follow communication protocols with consultants, officials, clients, and others as directed.
G. Understand when time spent at work is directly related to a project or indirectly spent on office overhead.
H. Demonstrate initiative and autonomous problem-solving skills.
I. Understand an office's culture and values as described and how they are applied to projects and work.
J. Understand the goals and deliverables of marketing.
K. Understand the variations of scopes of services.
L. Follow office standards for relevant business tasks.
M. Understand common business software applications (e.g., word processing, email, timesheet recording, etc.).