Engaged Active Student Learning: A Tale of Two Active Learning Design Case Studies

by

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Active Learning Classroom Design Case Studies

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Abstract

Active learning, a constructivist approach to learning, can be an effective pedagogical tool. As active learning becomes more ubiquitous and begins to replace some lecture-style content delivery, the built environment should also change. A design case study, “a description of a real artifact or experience that has been intentionally designed” (Boling, 2010, p. 2), was the best fit for the research design, as it these design case studies describe the design and construction process that was undertaken for three active learning space projects. The first two projects described, Haley Center 2213 and Sciences Center 118, are renovations to existing classrooms, and the Design Thinking framework is applied. The second design case study (and third project) is an active learning classroom building called the Mell Classroom Building; the project team used the lessons learned from Haley Center 2213 and Sciences Center 118 to inform design decisions. Major themes that emerged include the benefits of collaboratively working with an interdisciplinary team on small and large scale projects, rather than passing the project from one unit to another; the importance of prototyping new concepts and design ideas on a small scale to allow stakeholders to experience the space, test new concepts, and acquire feedback before scaling up to designing and constructing a new building, and the need for flexibility in both furniture and the future use of space and technology in a building to ensure that it is future-proofed. More active learning classrooms and buildings are being constructed. Working with a collaborative team to prototype space and ensure flexibility can help stakeholders achieve the outcomes they desire.

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List of Abbreviations

EASL	Engaged Active Student Learning
G.B.	Glassboard
IT	Information Technology
OIT	Office of Information Technology
SCALE-UP	Student-Centered Active Learning Environment with Upside-down Pedagogies
SF	Square Feet
TEAL	Technology Enabled Active Learning
VAT	Vinyl Asbestos Tile
VCT	Vinyl Composite Tile

Operational Definitions

Active Learning Ecosystem	All facets of the active learning environment, including classrooms, public gathering spaces, breakout rooms, and any other active learning spaces within the built environment (Scott-Webber, 2015).
Case Study	A case study is a form of inquiry that examines a circumstance or set of experiences within its existing conditions; several sources of data are used (Yin, 1984).
Design Case Study	A design case study describes a designed object or a design process; it is a derivative of case studies and serve as a medium for distributing design precedent so that it does not remain locked forever in a single person's memory (Boling, 2010, Lawson, 2004).
Design Thinking Framework	The Design Thinking framework is a five-step process for working through problem with no concrete answer. The five steps are: *empathize, define, ideate, prototype,* and *test.*
Forensic Design Thinking	When the Design Thinking framework (Brown, 2008) is applied to a situation or set of events or decisions after they have occurred.
Interdisciplinary Active Learning Team	For the purpose of this study, the interdisciplinary active learning team refers to the members of the active learning working group, the facilities management design and construction team, the information technology specialists, and anyone else who collaboratively worked on the three active learning classroom projects.
Prototype	A prototype is the first or one of the first versions of a created object or space and is typically used as a model for future iterations. For the purpose of this study the term prototype refers to a space that is designed and built primarily to test a concept before scaling up to a final building project.

Thick Description	The detailed information the author gives to allow the design cases to be transparent and more easily transferable; details include specification sheets for furniture, finishes, and instructional technology; details on interdisciplinary team members, and design details of the cases.

Chapter 1: Introduction: Design and Learning Spaces

The landscape of higher education is changing. For more than three decades, literature has collected evidence that active learning strategies typically generate better student learning outcomes than traditional lecture-based approaches (Chickering, 1987; Kibble, Bellew, Asmar, & Barkley, 2016; Prince, 2004; Srinath, 2014). Enabling effective teaching and learning is a primary function of colleges and universities (Oblinger, 2005). As innovative methods of teaching and learning emerge, the physical spaces that support those activities must evolve as well. The design of learning spaces in higher education matters. Design choices can affect student learning outcomes (Brooks, 2011; Oblinger, 2006), improve conceptual understanding (Beichner et al., 2007; Dori, Belcher, Besette, Danzinger, McKinney, & Hult, 2003), support scaffolded reasoning (Jonassen, 1996), and affect student attendance (Beichner et al., 2007). Many learning spaces in higher education have not been updated or re-thought since they were built in the mid-twentieth century (Baker, 2012), while advancements in instructional design and innovations such as digital technology have changed the way we could interact with these spaces (Brooks, 2011; Jonassen, 1991, 1995; Powell, Cleveland, Thompson, & Forde, 2012). There is a clear need for updated research to inform the design of updated spaces.

Oblinger (2005) explains the value of learning spaces, the analysis needed to effectively assess the needs of a learning space, design considerations when creating or renovating a learning space, and who should be involved in making these major decisions. The design of learning spaces can communicate the core values of an institution (Oblinger, 2005; Park & Choi, 2014). A lecture hall with fixed seating, all focused on the front of the room, may indicate the value of information transfer from teacher to learner (Oblinger, 2005). A room full of moveable tables and chairs and no front-of-room may communicate a teaching and learning philosophy that embraces a more collaborative approach to learning.

Whether renovating or building new, investing in infrastructure that supports teaching and learning is expensive, and the decisions that are made will likely last for decades (Oblinger, 2005; Park & Choi, 2014). Because new buildings are typically intended to last 50-100 years, they should be designed to be flexible to meet evolving needs; curriculum changes every few years and technology is likely updated annually (NLII White Paper, 2004; Oblinger, 2005; Park & Choi, 2014). Oblinger (2005) outlines a framework for institutions to begin the process of reconsidering classroom design, and advocates investing in more modern, effective, and intentionally designed learning spaces. The framework includes guidelines for team composition, analysis of needs, and design considerations (Oblinger, 2005) (see Figure 1).

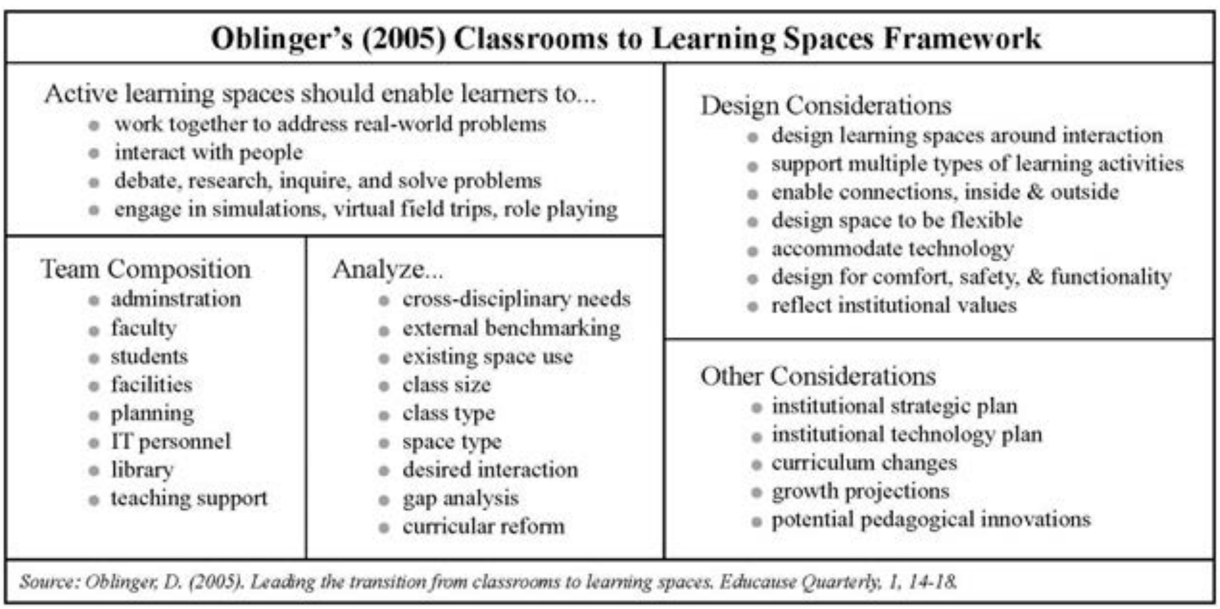


Figure 1. Oblinger's (2005) Classrooms to Learning Spaces Framework

What do learning space designers—specifically in-house university interior designers—need to know about the current state of learning, pedagogy, and classroom design in order to answer Oblinger's (2005) call for more purposefully designed learning space?

The purpose of this study is to use two related cases studies to describe the processes that Auburn University undertook to ultimately design and build an active learning classroom building. The research design uses a design case study approach (Boling, 2010). A design case study is "a description of a real artifact or experience that has been intentionally designed" (Boling, 2010, p. 2), and acts as a vehicle for disbursing design precedent so that others may utilize the knowledge and lessons learned (Boling, 2010, Lawson, 2004). The first design case study uses the Design Thinking framework (Brown, 2008) to describe the design process of the first two *active learning classrooms* on Auburn University's campus. The second design case study describes the process that the University undertook to design the first *active learning classroom building* on Auburn University's campus.

The author is a practicing interior designer and a full-time faculty member in an accredited interior design program at Auburn University. Prior to becoming an educator, she was an in-house interior designer in the Facilities Management department at Auburn University. In that role she worked on over 500 projects, ranging in size from 100 to 208,000 square feet. She was involved in both renovation and new construction projects including numerous learning space design projects. She was a member of the interdisciplinary design team for the new 69,000 square foot active learning classroom building that is the subject of the case study. The classroom building opened in August 2017.

Chapter 2: Literature Review of Active Learning in Contemporary Education

Oblinger (2005) suggests that educational spaces be designed with forethought and planning, rather than as a reaction to an issue or policy. Learning environment design can also place a heavy emphasis on understanding and applying current learning theory—such as constructivism—and using design precedent to make informed design decisions (Applefield & Huber, 2001; Oblinger, 2005).

Goals of Education

Education has been a major factor in shaping societal norms, both in the United States and outside of it; acquiring basic reading and writing skills can be the difference between surviving and thriving in many states and countries (Jacobsen & Rothstein, 2006; Littky & Grabelle, 2004). However, literature acknowledges that education should also prepare people to think critically, to teach them how to find and apply information, and to enable mindful learners to successfully face a variety of situations, people, and challenges (Littky & Grabelle, 2004).

Perkins (1991) supports this idea, and he defines the three goals for education as “retention, understanding, and active use of knowledge and skills” (p. 18). While the goals sound simple, they can be difficult to successfully achieve. In the United States, the educational system has been accused of overemphasizing retention by “teaching to the test” and limiting the process of knowledge application in the classroom (Littky & Grabelle, 2004, p. 32). In response to this criticism, a shift in educational philosophy from behaviorism to cognitivism and ultimately to constructivism, has been significant, and has caused educators and administrators to begin re-thinking best practices for educational delivery (Applefield & Huber, 2001; Cooper, 1993).

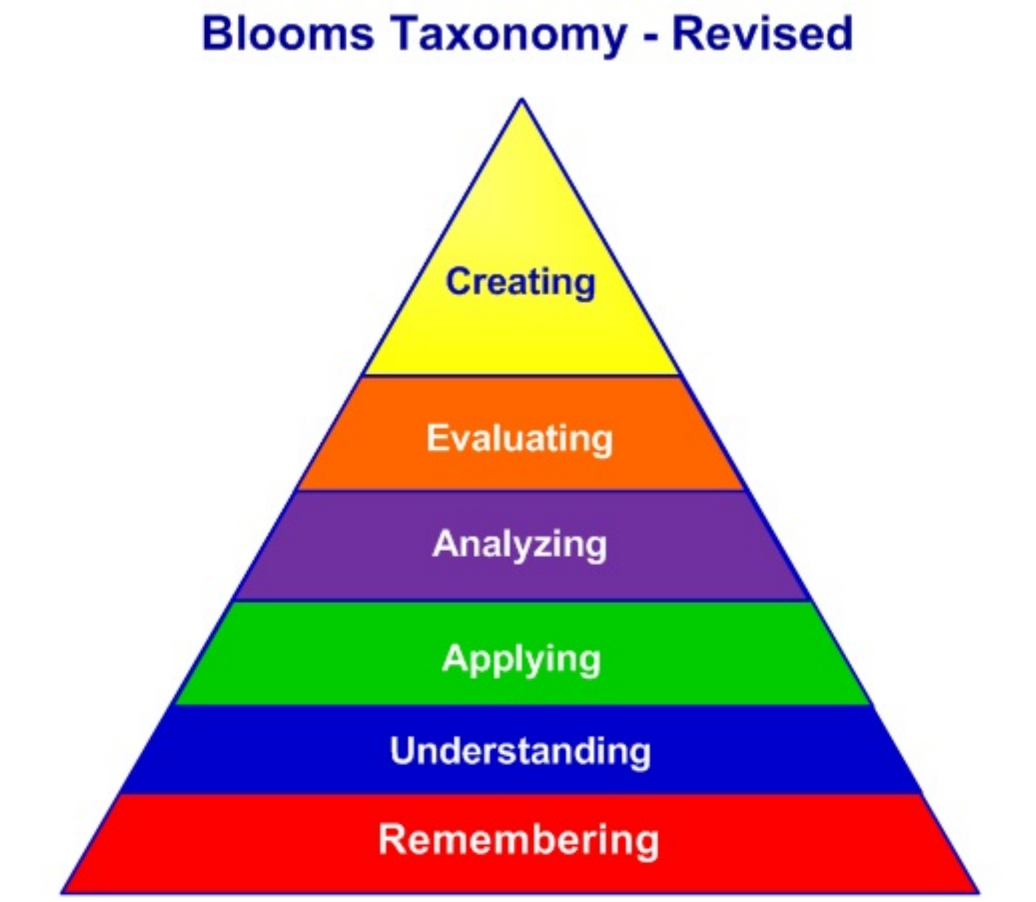
Constructivist Learning Theory

Constructivism. Constructivism is not a new educational philosophy, as its history can be traced to educators such as John Dewey (1859-1952), but constructivism has become progressively more influential over the past four decades and has become increasingly entrenched in the current educational zeitgeist (Applefield & Huber, 2001; Bernauer & Fuller, 2017; Jonassen, 1991). Prior to a more widespread adaptation of constructivism, behaviorism and cognitivism were widely accepted as best practices (Applefield & Huber, 2011; Driscoll, 1994; Jonassen, 1991).

Behaviorism is a positivist epistemology that posits that learning is shown through a change in behavior and can be achieved through selective reinforcement of environmental conditions (Applefield & Huber, 2011; Jonassen, 1991; Skinner, 1938, 1974; Watson, 1928). It privileges the observable behaviors of the learners over any activities of the mind; since the mind is not observable, it is not as important as the visible behavior that is generated from application of a stimulus (Jonassen, 1991; Skinner, 1938, 1974; Watson, 1928). This operant conditioning can easily be applied to both positive and negative behaviors in a classroom. A teacher who rewards the students with the highest test grades or who removes privileges or points from students who have their cell phones out in class are examples of a behaviorist approach to impacting behavior.

Like behaviorism, cognitivism is a positivist epistemology that believes in an objective reality and way of knowing, and that knowledge exists independently from learners (Atkinson & Shiffrin, 1968; Driscoll, 1994; Pribram, Miller, & Galanter, 1960; Wundt, 1897). However, the cognitivist philosophy of education differs from behaviorism in that it is more concerned with what learners remember and the mental processes they undergo. Cognitive theorists believe that the mind is the primary instrument for processing information, and they privilege the study of the mind over the study of conditioned behaviors (Applefield & Huber, 2011; Atkinson & Shiffrin, 1968; Chandler & Sweller, 1991; Jonassen, 1991; Pribram, Miller, & Galanter, 1960). Examples of cognitivist learning activities may include writing a historical timeline from memory, reciting a poem, writing a synopsis of what was covered in the previous class, or classifying types of facts from memory.

Bloom's revised taxonomy, a classification system for levels of cognition, is often used as a tool for assessing cognitive learning (Anderson & Krathwohl, 2001). The taxonomy begins with the most basic step of learning, to *remember,* and grows in complexity as the levels ascend, culminating in *creating ideas* (see Figure 2) (Anderson & Krathwohl, 2001). Behaviorist and cognitivist approaches to learning typically achieve the lower levels of Bloom's revised taxonomy: remember, understand, and apply (Anderson & Krathwohl, 2001). Because the constructivist approach to learning is not based on memorizing and restating facts, constructivist learners typically achieve these lower levels as well as the higher levels of Bloom's revised taxonomy, including analysis, evaluation, and creation of ideas (Anderson & Krathwohl, 2001; Miller & Metz, 2014; Mumtaz & Latif, 2017).



Source: Anderson, L.W., & Krathwohl, D.R. (2001). *A taxonomy for learning, teaching and assessing: A revision of Bloom's taxonomy of educational objectives.* New York: Longman.

Figure 2. Blooms Revised Taxonomy

Constructivist conceptions of learning conclude that knowledge is constructed through personal experiences and reflection, and when something new is encountered, the learner must reconcile the new information with existing beliefs and knowledge (Hrynchak & Batty, 2012; Jonassen, 1991, 1999). Unlike other learning philosophies, in which learners are passive recipients of information, constructivism is an active process in which learners must engage with new knowledge as they build their own understanding (Appleby & Huber, 2001). Understanding is not a conditioned response to stimulus, but rather an outcome of peer engagement, inquiry, exploration, and giving and receiving feedback (Applefield & Huber, 2001; Jonassen, 1991; von Glaserfeld, 1988).

In constructivism, epistemology is internally constructed, and there is no objective reality that can be attained or understood by all; rather, every person's reality is different and the meaning that learners construct is different for each learner (Applefield & Huber, 2001; von Glaserfeld, 1988). This does not mean that a group of students working on an activity will get wildly different answers on the same problem; the differences lie in the way that the knowledge is constructed and assimilated (Applefield & Huber, 2001). Every person has a different set of personal experiences, benchmarks, and methods for seeking, reflecting, and applying inherent knowledge (von Glaserfeld, 1988). Because most learning is distilled through "a process of social negotiation or distributed cognition" (Applefield & Huber, 2001, p. 39), shared meanings are typically constructed, and working with a group can develop deeper learning than solo work (Brown, Ash, Rutherford, Nakagawa, Gordon, & Campione, 1995; Brown & Campione, 1994). Constructivist learning is a social endeavor and is closely related to our interactions with peers, educators, and family; the most successful learners are the ones who utilize these networks and apply them to education (Dewey, 1938; Hein, 1991; Vygotsky, 1978). Working as a group through an open-ended problem, individually performing an experiment and then discussing as a group and working on activities in class as a group are examples of constructivist learning activities.

Types of Constructivism. Moshman (1982) acknowledged three constructivist paradigms: exogenous constructivism, endogenous constructivism, and dialectical constructivism. Exogenous constructivism is closely aligned with realism in that an external reality is formed; in exogenous constructivism, the physical environment that the learner engages with can form a basis for constructing that reality (Applefield & Huber, 2001; Moshman, 1982). In the endogenous constructivist paradigm, learners reflect inward to construct knowledge, and internally parses through the conflict of new information as it relates to their existing schema to arrive at a resolution (Applefield & Huber, 2001; Moshman, 1982; Piaget 1977). Dialectical constructivism is sometimes referred to as social constructivism; it conceives that learners mutually build knowledge when they interact with each other, share and debate their differing viewpoints, and assist others creating meaning (Applefield & Huber, 2001; Moshman, 1982; Rogoff, 1990). While the paradigms differ in the way they approach learning, they are not mutually exclusive. With the emphasis on the value of social connections, dialectical constructivism is the most widely applied of the paradigms. (Applefield & Huber, 2001).

Constructivist Learning. The constructivist approach to learning dissuades learners from passive, rote memorization of facts and stimulates them to achieve higher levels objectives of Bloom's revised taxonomy, including active engagement in analysis, evaluation, and generation of ideas (Anderson & Krathwohl, 2001; Miller & Metz, 2014; Mumtaz & Latif, 2017). Bran (2014) calls this type of learning "deep learning" (p. 133). Deep learning occurs when learners amalgamate new knowledge with existing knowledge, when the learner is intrinsically motivated to construct knowledge, and when the learner adopts a growth mindset—meaning they believe in hard work, an iterative process, and feedback (Bran, 2014, Cooper & Garner, 2012; Dweck, 2008). Bernauer and Fuller (2017) argue that neither the behaviorist or cognitivist approaches to learning offer the most effective way for students to encounter deep learning, but that the constructivism is the most successful approach to activate deep learning.

Deep learning is often approached from an active constructivist viewpoint, where learners interact socially as they grapple with problems, seek feedback, and build upon their existing knowledge base (Bernauer & Fuller, 2017). The traditional lecture-based classroom, which typically supports a more passive, cognitivist approach to learning, may not effectively support this type of active constructivist learning (Mumtaz & Latif, 2017; Rissanen, 2014). Because active constructivist learning has proven to be more effective at achieving deeper learning, transforming learning environments to support this approach is logical.

Currently, the most prolifically used model for instruction in higher education is the lecture-based model, which is principally directed to the students as individuals (Miller & Metz, 2014). The lecture model is primarily based in cognitive and behaviorist philosophies and may encourage students to "binge and purge" knowledge—cramming for a test and repeating the information, resulting in learning without meaning (Gleason et al., 2011). Instructors may assume that because they are imparting knowledge in the classroom, learning is occurring; but as previously discussed, learning is more than memorizing information and ultimately forgetting it—meaningful learning encourages learners to assimilate, apply, appraise, coalesce, and engage with information using their lived experiences and individual contexts (Bernauer & Fuller, 2017; Gleason et al., 2011). If the learning objective is difficult, multi-faceted, or complex, the learning process is compounded. For meaningful learning to occur, learners must revisit ideas, reflect on concepts, and actively engage with the content in order to achieve the best learning outcomes (Dadach, 2013; Dewey, 1938; Hein, 1991; Vygotsky, 1978).

Active Learning

Active learning is not a specific teaching method. It is an approach to instruction that acknowledges that learning is contextual, incremental, and a process, and engages learners with the content by actively involving them in educational activities, which can include discussion, critical thinking exercises, role play, quick writing exercises, and problem solving, among other things (Dewey, 1938; Elliott, Combs, Huelskamp, & Hritz, 2017; Hein, 1991). Active learning is part of the constructivist approach to teaching, meaning that knowledge is constructed using social interaction, external reinforcement, internal reinforcement, and the learner's prior experiences; learners build knowledge individually and collectively by adding to their existing knowledge (Applefield & Huber, 2001; Hein, 1991; Vygotsky, 1978). The learners use previous knowledge, sensory input, and peer interaction to construct meaning and activate learning; because active learning is a social endeavor, and learning is closely related to our interactions with peers, educators, and family, the most successful learners are the ones who utilize these networks and apply them to education (Dewey, 1938; Hein, 1991; Vygotsky, 1978).

Active learning often encourages group work both inside and outside of the classroom; this means that if instructors change the way they approach their educational delivery, the classroom environment should evolve to support these learning activities (Baepler, Walker, & Drissen, 2014; Foote, Knaub, Henderson, Dancy, & Beichner, 2016; Gleason et al., 2011). Because it does not focus on the repetition of facts, but rather on actively grappling with problems and concepts, higher objectives of Bloom's revised taxonomy—such as *apply, analyze,* and *evaluat*e—are achieved by active learning rather than by lecture-based classes that may only achieve the lower objectives such as *understand* and *remember* (Anderson & Krathwohl, 2001; Miller & Metz, 2014; Mumtaz & Latif, 2017).

Jonassen (1995) advocated for higher education to better prepare learners for the "real world by making learning more active and meaningful. Although he did not explicitly call it *active learning,* he supported the idea that learning is constructivist in nature and that active engagement with concepts leads to better outcomes and more highly skilled learners than a passive approach, especially in the context of the 21st century. He created a model of "seven qualities of meaningful learning" (p. 61); he argued that based on social constructivism, higher education should prioritize learning that is active, constructive, collaborative, intentional, conversational, contextualized, and reflective. According to Jonassen (1995), characteristics are not as effective in isolation, but rather are more impactful when applied in combination. Active learning, which involves the learner as a dynamic participant in the learning process, can support all seven aspects of meaningful learning and may lead to better learning outcomes (Gleason et al., 2011; Miller & Metz, 2014). It also has broader implications than learning outcomes; interaction with peers and professors has been found to be one of the most important facets of a successful university experience (Astin, 1994)

Flipped Pedagogy. When restructuring a class from lecture-style to active learning-style, the way that content is delivered to the learners changes, but so does the way the classroom looks. Because the time spent in an active learning class is typically spent on grappling with concepts and solving problems, the majority of the content delivery must happen outside of class (Baepler et al., 2014); this can be called "flipping the classroom" (McDonald, 2013, p. 437). The term *flipped classroom* originated when two high school chemistry teachers in Colorado began flipping their classrooms in 2007 (Bergmann & Sams, 2012). They defined flipping the classroom as "that which is traditionally done in class is now done at home, and that which is traditionally done as homework is now completed in class" (p.13). Flipped classrooms have become more common both in K-12 and higher education (McDonald, 2013).

By delivering content outside of the classroom, and incorporating active learning within the classroom, learners may arrive to class better prepared and ready to tackle problems and critical thinking activities with their group mates (McDonald, 2013; Schlairet, Green, & Benton, 2014; Smith, 2017). Methods for content delivery outside of the classroom include providing learners with videos to watch (taped lectures from the instructor or professional videos by experts) and having learners read passages and complete comprehension quizzes (McDonald, 2013; Smith, 2017). People with busy schedules have the opportunity to take in the content asynchronously and allows people to learn at their own pace—if they need to re-watch a portion of a video, it is possible (McDonald, 2013; Schlairet et al., 2014). This approach also prepares learners to be autonomous and self-directed, and develops critical thinking and decision-making skills (Burns, 2012; Schlairet et al., 2014). Because the learners come to class prepared and with a basic understanding of the material, the time in class can be spent delving more deeply into topics and creating a richer understanding of the content (McDonald, 2013; Smith, 2017).

History of Active Learning. Active learning is not a new idea; it has just recently been given a name (Corrigan, 2013). People have served as apprentices to learn a trade for thousands of years, and have actively participated in gaining knowledge from elders, superiors, and parents and thinking about why and what they're doing since the beginning of humanity—active learning is an instinctive process that humans use to learn things (Corrigan, 2013). Active learning is not even all that new to either. As early as the 1900s, some teachers were using basic active learning strategies to improve student learning (Miller & Metz, 2014).

However, lecture-based instruction was still the most widely accepted educational practice and remained the gold standard of education until the early 2000s, when Beichner, Saul, Allain, Deardorff, and Abbott (2000) began the "SCALE-UP model" at North Carolina State. Beichner et al. (2000) observed that the core curriculum physics classes at NC State were large—often over 100 students in each class. They also observed that most students were not thriving in these large-enrollment classes. To change this, they developed the SCALE-UP model of teaching and classroom design. SCALE-UP was initially an acronym for *Student-Centered Activities for*

Large Enrollment Undergraduate Physics, but since it has become a successful model that other universities have adapted for many different types of classes, the acronym changed to *Student-Centered Active Learning Environment for Undergraduate Programs* before ultimately becoming *Student-Centered Active Learning Environment with Upside-down Pedagogies* (Beichner, 2008; SCALE-UP Site, 2011).

Beichner et al. (2000) used technology, classroom design, and flipped pedagogy to change a large-enrollment undergraduate physics course from lecture-based to active learning-based, and in doing so instigated an educational paradigm shift. The team transformed a large classroom from a traditional forward facing lecture-style classroom into a classroom that looked more like a restaurant, fitted with 11 round tables that each supported nine students. The number nine was chosen so that students could divide into three teams of three; each table had computers for each group and ample writable surfaces on the walls nearby. The classroom is designed to facilitate interaction, both student-student and student-instructor. The instructor is able to freely circulate around the room, engaging with the students, monitoring progress, and answering questions. Class time was primarily spent working on hands-on activities, challenges, problems, simulations, or equations, and any lecture that was given was short and typically given to provide context for the activities in the classroom (Beichner, 2008).

A similar model of active learning-style classrooms was introduced at the Massachusetts Institute of Technology in the mid-2000s; they called their model TEAL, an acronym for *Technology Enabled Active Learning* (Dori, Belcher, Bessette, Danzinger, McKinney, & Hult, 2005). Like the SCALE-UP model, the TEAL model began in a physics class, and was in response to the large enrollment numbers and high failure rates in a challenging class that is typically primarily comprised of freshman (Dori et al., 2005). Like the SCALE-UP model, the

TEAL model was based in constructivist learning theory, and built classrooms that supported active learning (Dori et al., 2005). There was no formal front of room; the model swapped lecture-style desks for 13 round tables that supported nine students each, had writable surfaces for learner use, and embedded the professor's station near the center of the room (Dori et al., 2005). The TEAL model, which was patterned in part after the SCALE-UP model, also integrates passive and active *visualizations* for enhancing experimentation, role play, and problem solving; these resources augment collaborative learning, which was one of the primary goals of the TEAL model (Dori et al., 2005).

SCALE-UP and TEAL are not the only models of active learning. They may be the most well-known due to their longevity and have been the basis of several other active learning models, but they are well over a decade old. Cutting edge when they were conceived, technology evolution and advancements in furniture and finishes technology have made these models outdated.

Various methods of assessment of the active learning model have occured. Some studies suggest that learners enrolled in active learning classes overall perform as well as or better than learners enrolled in the same class delivered lecture-style (Baepler et al., 2014; Beichner & Saul, 2003; Ding, Chabay, Sherwood, & Beichner, 2006; Kramer, Brewe, & O'Brien, 2008). Several studies found that learners tended to perform better overall in active learning classes, as the learners in the active-learning style classes outperformed learners in the lecture-style classes when administered the same tests (Baepler et al., 2014; Beichner, 2008; Beichner & Saul, 2003; Dori et al., 2005; Hake, 1998). It has also been found that students who were enrolled in active learning classes early in their college careers tended to perform better in their later classes, even if the later classes were not active learning classes (Beichner & Saul, 2003; Hake, 1998; Kramer et al, 2008).

Learners also report more positive attitudes towards active learning classes (Baepler et al., 2014; Beichner & Saul, 2003). Beichner & Saul (2003) report that one student commented "I can deal with the lecture class, it's just that I enjoy more…getting more into the interactive projects" (p. 13). When given a choice between taking the same class either lecture-style or active learning-style, learners almost always choose the active learning approach (Alexander et al., 2008; Beichner, 2008; Dori et al., 2005).

There are numerous benefits to active learning, and to learners actively working in groups. Encountering a different perspective or approach to a problem can cause learners to consider multiple viewpoints and problem-solving strategies, which can be beneficial to all levels of students, not just the poor performers (Beichner & Saul, 2003). Also, when a learner working alone encounters a roadblock to solving the problem, they are stuck—but if they're working with a team of learners, the chances of the problem being solved by a variety of brains, experiences, and strengths is much higher (Baepler et al., 2014; Dori et al., 2005). If the instructor has planned the learning activities carefully, students can achieve higher level objectives of Bloom's taxonomy as they synthesize and evaluate others' concepts and ideas (Bernauer & Fuller, 2017; Miller & Metz, 2014; Mumtaz & Latif, 2017). Learning is also reinforced when a person teaches another—a natural side effect of group work (Beichner & Saul, 2003).

Barriers to Active Learning. While active learning has been shown to have many benefits, both intrinsic and extrinsic, there are also significant barriers that prevent colleges and universities from transitioning all of their courses from lecture-style to active learning-style

(Baepler et al., 2014; Bernauer & Fuller, 2017; Miller & Metz, 2014; Mumtaz & Latif, 2017). A major barrier is learner perception. Because it is different from the traditional expectation of a lecture-style class, there can be resistance to change (Barr & Tagg, 1995; Coorey, 2016; Michael & Modell, 2003). Active learning requires effort on the part of the learner, and some learners are not willing to put forth the effort into their education (Barr & Tagg, 1995; Nguyen et al., 2017).

Another barrier is the amount of preparation time an instructor must dedicate to an active learning class. In a lecture-style class, the instructor is the focus, but in an active learning-style class the students and their learning process become foregrounded, and the instructor must alter from the role of *star* to the role of *facilitator* (Michael, 2007). Miller and Metz (2014) called this the transformation from "a sage on the stage to a guide on the side" (p. 246). The role of facilitator can require much more preparation and effort than delivering a lecture comprised of content matching the instructor's expertise. Being a *guide* requires meticulous planning and structuring of activities, and careful execution of them during class time, as well as paying attention to how groups interact, and ensuring that they do not go too far in the wrong direction (Gleason et al., 2011; Powell et al., 2012).

The length of a standard classroom period can also be perceived as a barrier (Michael, 2007). Active learning typically takes more in-class time than lecture-style learning; instead of hearing a concept once and moving on, the learners must engage with the concept and actively grapple with it (LoPresto, 2016). This can take time, and thus sometimes an active learning class cannot cover the amount of content that a lecture-style class can in the same amount of time (Elliott et al., 2017). However, the amount of deep, meaningful learning that occurs in the lecture-style classes may not be as high as the deep, meaningful learning that occurs in an active learning class (Bernauer & Fuller, 2017). Additionally, it can sometimes take an active learning class a little longer to get into the flow of class. Longer class periods would be ideal for active learning classes, but due to university scheduling, may not be attainable (Michael, 2007).

Many of the barriers previously described can be reduced through by appropriate and supportive faculty development classes and workshops (Michael, 2007). The need for faculty development can be barrier in itself, in that it may require buy-in from the institution to expand the faculty development department, offer a broader range of classes and workshops more often, and encourage the institution's faculty to take advantage of the faculty development offerings (Michael, 2007; Moore, Fowler, & Watson, 2007).

The built environment may be the biggest barrier to active learning (Chittum et al., 2017; Espey, 2008). Active learning involves group work and often includes interaction with technology and writable surfaces (Baepler et al., 2014; Chittum, McConnell, & Sible, 2017; Espey, 2008). A lecture-style classroom rarely has the infrastructure and furniture to support this type of learning, and it can be extremely expensive to build (Jonassen & Rohrer-Murphy, 1999; Oblinger, 2005; Park & Choi, 2014).

Transitioning from the more passive learning model of lecture-based instruction to a more active learning model requires buy-in from many stakeholders, including the institution, the faculty, the faculty development team, and the students themselves (Michael, 2007; Oblinger, 2005). Universities are becoming more aware of the value of active learning as a teaching strategy and pedagogical direction (LoPresto, 2016; Miller & Metz, 2014;). Universities are also more aware that in order to attract and retain top tier students, multiple types of spaces that support collaboration and active learning must be implemented into a variety of environments on campus, and not just restrict active learning support to formal classrooms (Crosling, Heagney, & Thomas, 2009; Nguyen et al., 2017)..

General Learning Space Design

The physical environment of a learning space communicates the institution's philosophical approach to learning; fixed seating facing forward to a chalkboard communicates a different philosophy and set of values than a classroom populated with moveable tables and chairs and no evident front of room (Park & Choi, 2014). The major evolution of classroom design occurred many centuries ago—it is only recently beginning to evolve again. In Ancient Greece, learners gathered around their teacher and dialogued; there was no formalized learning space, and the learners and teachers gathered wherever was most logical at the time (Park & Choi, 2014). Formal learning spaces that utilize specific infrastructure have existed since the Middle Ages, when cathedral schools became popular (Graves, 1910). In cathedral schools, the desks would be arranged in two vertical lines, with the learners facing each other; by the fourteenth century this had developed into what we now think of as the lecture-style arrangement of desks, where multiple rows face the same direction—towards the instructor (Park & Choi, 2014). This could be in part because paper and books were rarities, and the instructor would often read to the class from a prized book (Graves, 1910).

The end of the Civil War and the advent of Industrial Revolution dovetailed with increasing child labor laws and a decreased need for children to work in fields; consequently, more children attended school, and more schools and universities were built to accommodate this growing need (Baker, 2012). The layout of the one-room schoolhouse that was popularized in the mid-19th century, was to an extent standardized as schools were rapidly built across America (Baker, 2012; Park & Choi, 2014). The design and layout of the one-room schoolhouse is primarily the same layout used in schools, colleges, and universities today (Baker, 2012; Park & Choi, 2014).

The design of schools at the turn of the 20th century primarily focused on ventilation and adequate light, not on maximizing learning outcomes (Mills, 1915). The fervent building of schools did not slow down, even in the Great Depression. Architects such as Eliel Saarienen, Alvar Aalto, and Richard Neutra designed educational facilities, and began the “open air school” movement, which emphasized large expanses of windows to compliment groups of desks and chairs, rather than rows (Baker, 2012; Brite, 2014). This classroom design was quickly overlooked as World War II began, followed by the post-war construction boom that forfeited design innovation to support the surge in population (Brite, 2014).

Because learning was thought to be a conditioned response to the stimuli that instructors provided, the behaviorists did not give much thought to the physical environment for learning; it was not until the mid-20th century, when different educational philosophies became more popular, that focus was directed toward the learning environment as a variable in student success (Park & Choi, 2014). In the 1970s, researchers began to notice the relationship between student learning outcomes and the built environment; one researcher noted in a revolutionary research review that “in the last decade…increasing numbers of educators have begun to believe that dimensions of the physical environment might have an impact on students’ behavior and attitudes” (Wienstein, 1979, p. 577). It was at this point in time that the “open plan school layout,” which advocated for universal spaces that could be used for anything, were popularized (Horn, 2015, p. 2). Larry Kearns, an architect that specializes in educational design, posits that the that the open plan layout with its universal spaces attempted to support all activities, but because it did not successfully support any activities well, it therefore ultimately failed (Horn, 2015).

After the failure of the open plan school layout, learning space design reverted back to the tried-and-true standard—the lecture-style rows of desks that had emerged in the 14^{th} century (Brite, 2014; Park & Choi, 2014). It was not until the SCALE-UP model, an active learning classroom design, that classroom design began to be a topic of discussion and research again, and the model of the active learning space began to gain serious attention (Beichner & Saul, 2003).

Active Learning Space Design

Classroom and learning space type and design can vary widely across university campuses. They can range from seminar rooms that support a handful of people to large lecture halls that support several hundred people (Espey, 2008). Scholars assert that the environment in which learning occurs matters—it affects student perception, retention, and outcomes (Brooks, 2001; Brown & Long, 2006; Crosling, Heagney, & Thomas, 2009; Espey, 2008).

The SCALE-UP and TEAL active learning models were based on the assumption that space design matters—their models both included classroom renovation along with the curricular re-design (Beichner & Saul, 2003; Dori et al., 2005). However, the physical environment can influence student outcomes (Brooks, 2011; Espey, 2008). Brooks (2011) found that when they controlled for other elements such as class size, demographics, and other factors, the physical environment could positively or negatively affect a student's learning outcomes, as measured by standardized test scores.

Lecture Style vs. Active Learning Classrooms. As previously discussed, lecture-style classrooms primarily support the behaviorist and cognitivist approaches to teaching and learning, and active learning-style classrooms primarily support the constructivist approach (Cooper, 1993; Jonassen & Rohrer-Murphy, 1999). Pedagogical approaches aside, however, there are design issues that exist within lecture style rooms that affect learning (Brooks, 2011; Espey, 2008; Park & Choi, 2014). Traditional lecture-style classrooms, with the rows of individual desks that face forward, are arranged to enable lecture delivery and note taking, not discussion or group activities; even the recent trend of exchanging individual desks for rectangular training tables that support multiple students is almost always oriented in rows that face forward—the only difference is that the students may have more room for note-taking materials (Espey, 2008). With attention spans decreasing, it is important to keep students focused and attentive, which often means incorporating some type of group activity, discussion break, or clicker question every 10-15 minutes, even in lecture-style classes (Bajak, 2014). In an age where technology has rapidly changed the ways that content can be delivered, classrooms may be replete with projectors, document cameras, computers, and accessories like clickers that students can use to actively participate in class; these technologies can provide opportunities for engaging students in active learning, especially if the built environment supports them (Park & Choi, 2014). The environment can support or discourage behavior; if it does not easily support an activity, the likelihood of the activity occurring or being successful is low according to some scholars (Bajak, 2014; Chein, 1954; Park & Choi, 2014).

The seats that a learner chooses in a lecture-style classroom can be critical to their overall learning outcomes. Park and Choi (2014) found that in lecture-style classrooms there are "golden zones" and "shadow zones" (p. 749)—that is, there are seats in lecture-style classrooms that are the most desirable, called golden zones, because of proximity to the instructor, viewpoint of the technology screen(s) and writable surface(s), and the dearth of distractions from other parts of the room. They found that three-quarters of students prefer sitting in these seats, which typically represent about 20% of the total seating in the room. These seats are located in the front of the classroom, directly in front of the instructor. Conversely, the seats located in the back lecture-style classrooms are the least desirable and are called shadow zones; this is because the distance from the instructor, the technology screens, and the writable surfaces can reduce a student's overall understanding of content, and because the students between the shadow zone and the front of the classroom can be distracting and block views of the front. The distance from the instructor and the front of the classroom can also mean that students who sit in the shadow zone are more likely to be distracted by passing notes, playing on phones, or zoning out. Park and Choi (2014) found that students who sat in the shadow zone were less motivated, less likely to participate in class, and more likely to be distracted than students who sat in the golden zone.

According to Park and Choi (2014), there is no front or back of the active learning classroom (and therefore no back of classroom), and lecture is not the primary method of content delivery, in active learning classrooms, there are no golden zones or shadow zones. There are typically clear views to writable surfaces and technology screens, and the instructor is able to circulate around the classroom and engage with all of the students. Park and Choi (2014) found that students in active learning style classrooms are more receptive to diverse points of view, generate more creative ideas, and have better overall attitudes towards learning and attending class than students in the same class with the same professor offered in a lecture-style classroom.

Active learning-style classrooms can take many different shapes. They can resemble the restaurant-like aesthetic of SCALE-UP and TEAL, where large tables that support nine students fill the room (Beichner & Saul, 2003; Dori et al., 2005). They also can be comprised of loose tables and chairs mixed with lounge-style furniture, establishing different zones for different types of interaction to occur, or they can be filled with flexible furniture that can be configured into many different shapes (Schaffauser, 2015). Active learning-style classrooms are more flexible than lecture-style classrooms; they are more likely to support multiple types of teaching styles, pedagogies, and learning activities (Brite, 2014; Oblinger, 2005). They may also support different types of technology more efficiently than other learning spaces because faculty who use active learning-style classrooms may be more likely to utilize a larger variety of technology in their teaching (Coorey, 2016; Oblinger, 2005).

Constructivist Approach. Active learning pedagogy closely aligns with the constructivist approach to education (Applefield & Huber, 2001; Kibble et al., 2016). As mentioned previously, the constructivist approach to education posits that knowledge is constructed in a meaning-making search and is not a conditioned response to stimuli; rather, it is meaningfully constructed within social interactions, and is built upon existing knowledge (Applefield & Huber, 2001; Huber, Waxman, & Clemons, 2017). As Jonassen and Rohrer-Murphy (1999) said, "very little, if any, meaningful activity is accomplished individually" (p.67); therefore, active learning spaces should support social interactions as part of knowledge building.

An important aspect of a successful constructivist active learning environment is supporting the instructor. The constructivist approach is typically not oriented around the instructor, but rather around the students, as they embark on their meaning-making and knowledge construction (Applefield & Huber, 2001). The instructor transitions away from center stage, and into the role of facilitator (Miller & Metz, 2014). When designing constructivist active learning environments, the location of the instructor's station should be carefully considered—it could be embedded in the center of the room or in a corner to help keep viewpoints across the room clear; regardless of specific location, the students are the center of activities in the classroom, not the instructor (Applefield & Huber, 2001; Jonassen & Rohrer-Murphy, 1999).

Human Centered Design

When designing classrooms and learning spaces, moving away from the passive knowledge-transmission model of lecture-style teaching that has been standard since the Middle Ages requires conscious effort and an attempt to understand the humans who will be utilizing the space. This approach, called human centered design, means that the space has been designed for all of the possible users of a space (Cooley, 2000; Greenhouse, 2010). Universal design, the concept that designing for accessibility means designing for everyone—and that everyone benefits when environmental barriers are removed—is a type of human centered design (Bednar, 1977). Universal design can result in outcomes such as lever-style door handles and zero-step door entries. These design innovations benefit the disabled as well as people who have their arms full and need to open a door and children who are learning to walk (Greenhouse, 2010). Human-centered design can also mean designing flexible learning spaces that support a variety of learning and teaching styles. Human-centered design keeps people, and not actions or procedures, at the front of the design process (Brown & Long, 2006). The risk of designing a space tailored to one set of users that excludes other users is a possibility; however a more formalized approach to design, such as a more formalized research practice like design-based research, may support human-centered design by providing more and better data for design decision-making.

Design-Based Research

Design-based research is often qualitative and has little emphasis on empirical data. Because it is often done in a naturalistic setting and may consist of variables that cannot be controlled for, design-based research is grounded in the field of social science research and may require a different approach than might be taken in research in the hard sciences (Babbie, 2013;

Barab & Squire, 2004; Stake, 1995; Yin, 2014). The three major purposes of social science research—exploration, description, and explanation—can also be applied to design-based research (Babbie, 2013; Boling, 2010).

Like other forms of research, design-based research can be quantitative, qualitative, or utilize a mixed methodology approach; in quantitative research, data is typically numerical and can be objectively measured (Babbie, 2013; Orum, Feagin, & Sjoberg, 1991). Qualitative research is based primarily on non-numerical data, such as observations, interviews, and artifact analysis, all of which can be subjectively interpreted, with interpretation often being much richer in meaning than quantitative data (Babbie, 2013). A mixed methodological approach blends both approaches and involves collecting and analyzing both quantitative and qualitative data that examine the same phenomenon (Creamer, 2018; Creswell & Plano Clark, 2018).

As Barab and Squire (2004) observe, design-based research can be messy, convoluted, and meaningful. A challenge can be to depict the process in a way that is significant and conveys the value of the design intervention. There is no single method for approaching design-based research. However, Barab and Squire (2004) posit that there are three features that are typically present: (1) it is interventionist, meaning there is some sort of design outcome or process that is being studied; (2) it occurs in naturalistic contexts, meaning the research does not take place in a laboratory setting, but rather in the setting of the design work; and (3) it is iterative, meaning there are likely many phases or processes that may repeat in an effort to get closer to a resolution or solution. Hoadley (2005) succinctly captured the challenge of design-based research when he commented that “design-based research boils down to trying to understand the world by trying to change it” (p. 46).

Learning space design can be a metaphor for learners today—there is no one-size-fits-all solution because learning is not one-size-fits-all (Gleason et al., 2011; LoPresto & Slater, 2016). By understanding the existing body of knowledge that affect learners, one can begin to examine how more contemporary learning spaces can be assessed in higher education.

Case Studies

One type of research design is the case study (Stake, 1995, Yin, 2014). Case studies are a form of qualitative research and they are one of the most challenging because of the variety of variables that must be considered. Although some consider case study research to be less rigorous methodologically than other forms of research, if executed in a methodological way, it can reveal nuances not otherwise captured in empirical research (Sjoberg, Williams, Vaughan, & Sjoberg, 1991; Yin, 2014). A case study attempts to interpret a phenomenon, set of decisions, or process that occurs within constraints of time or place in a real-life context; the case becomes what Smith (1974) calls a bounded system—meaning that there are boundaries set on the timeframe and the location of variables explored (Stake, 1995; Orum et al., 1991; Yin, 2014).

Case studies can be a valuable tool for design-based research (Groat & Wang, 2013), and can explain links between phenomena and processes, study single or multiple cases in realistic settings, develop design-based theory, and generalize theory to different types of cases (Groat & Wang, 2013; Lang, 1987; Sjoberg et al., 1991).

Design Case Studies

Design can be a learning process. Designers amass “a huge range of precedent which is stored as having affordances that might come in useful some point in design projects” (Lawson, 2004, p. 456). Designers can use this store of knowledge when working on other design projects to make connections and informed decisions based on relevant experiences and precedent, which Oxman (1994) defines as "the unique knowledge embedded in a known design" (p. 146).

A design case study is a derivative of the broader case study approach. Design case studies serve as a medium for distributing design precedent so that it does not remain locked forever in a single person's memory (Boling, 2010, Lawson, 2004). The knowledge can serve other designers in their decision-making processes as they navigate design projects that are similar in size, scale, or intent, or have some other variable that is transferrable to the design case study (Boling, 2010). The design case study can range in complexity and scale, dependent upon the artifact that it is describing; it can be as small as an image of a designed space, and it can be as inclusive as a full-length book that explores the entirety of the process from the origin of the project through completion (Glanz & Lipton, 2003).

As Boling (2010) points out, design cases are primarily used to describe "a real artifact or experience that has been intentionally designed" (p. 2); they are not research on design, analyses, evaluations of outcomes, validation studies, teaching cases, or stimulus-based research. Although design cases may include descriptions of such variables, they are not the principal intent of a design case (Boling, 2010; Boling & Smith, 2008). Design cases can be rigorous; however, because they are based in naturalistic inquiry, the design case does not assume that the efficacy of the content will remain fixed in its utility (Boling, 2010; Lincoln & Guba, 1985).

Standards of rigor are vital in design case studies; without standards, this methodology could become devalued in comparison to other methodologies that may be deemed more rigorous (Boling & Smith, 2008). Nigel Cross (2001) stated that the design community has "to be able to demonstrate that standards of rigor in our intellectual culture at least match those of the others [the sciences and the arts]" (p.3). Rigor is not a dualistic entity, but rather is arbitrated along a continuum; the various and unique facets of the case can affect the dimensions of rigor applied (Smith, 2010).

Design cases, though different in their specific approach, do share some qualities with naturalistic inquiry and action research (Boling & Smith, 2008). Due to the nature of design cases, it is presumed that the reader will judge the relevance of the warranted assertions and it is assumed that authors will be participants in the design cases (Smith, 2010). In design cases, just like in naturalistic inquiry, trustworthiness supplants the customary questions of validity and reliability (Lincoln & Guba, 1985; Smith, 2010). Lincoln and Guba (1985) sum up the question of trustworthiness by asking

> how can an inquirer persuade his or her audiences that the findings of an inquiry are worth paying attention to, worth taking account of? What arguments mounted, what criteria invoked, what questions asked, that would be persuasive on this issue? (p. 290).

Smith (2010) outlines methods for establishing trustworthiness in design cases. These include prolonged engagement with the phenomenon, triangulation of data, persistent observation, researcher reflexivity, peer debriefing, member checks, audit trails, and thick description. Thick description is the detail that allows the reader to fully understand the context and for the design case study to be transparent and more easily transferable to other scenarios or contexts (Ponterotto, 2006). Even so, Smith (2010) makes the point that though design cases do not need to be formulaic to be rigorous, they also do not need to be rigorous to be valuable.

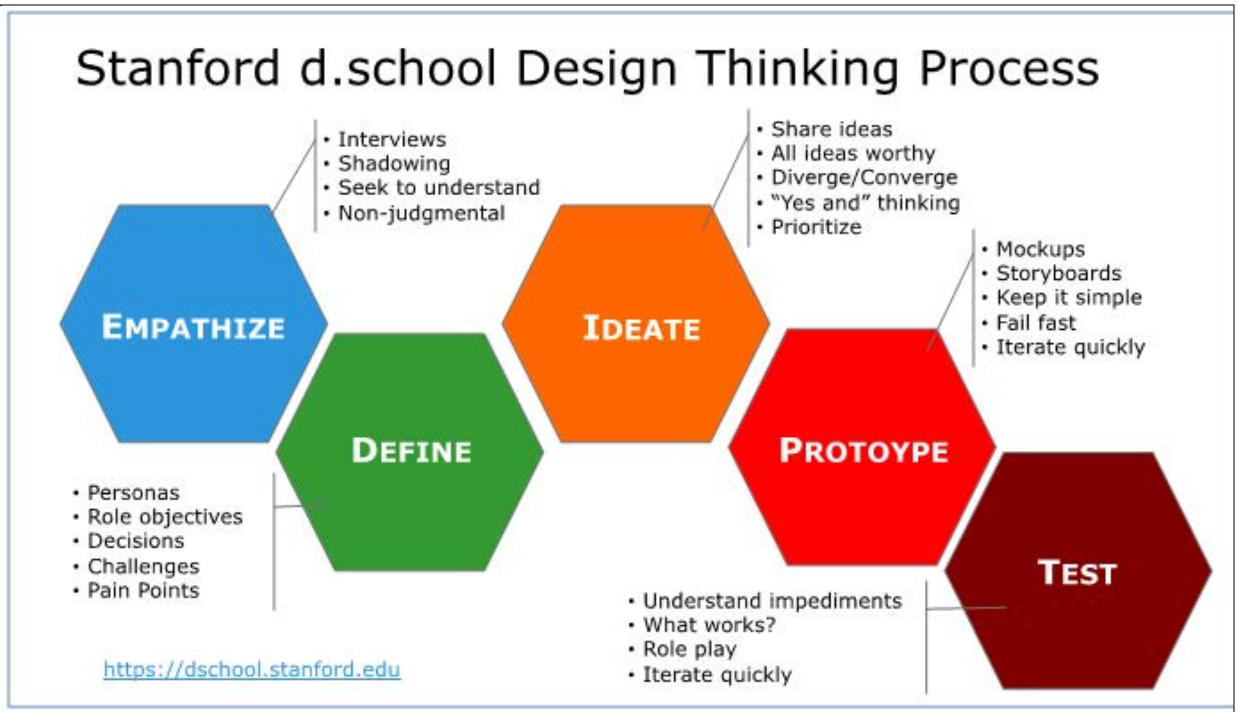
Boling (2010) makes the case for the need for design cases, especially as design problems may become more complex as technology evolves and user needs become more multifaceted and potentially intertwined. Applying precedent is integral to intelligently and effectively practicing design, and the design case is an effective medium for circulating design precedent and specialized knowledge (Boling, 2010; Boling & Smith, 2008). Schramm (1971, cited in Yin, 2014) wrote that

> the essence of a case study, the central tendency among all types of case study, is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result (p. 15).

The design case study method was the best fit for this study, as the purpose of the case studies reported herein is to illuminate the set of decisions that Auburn University executed in the design process of renovating two classrooms to become active learning spaces, and how the two classrooms informed the design process of an active learning classroom building. The design case study, with its emphasis on describing a designed artifact or a design process, is most applicable to describing the design process behind Haley Center 2213, Sciences Center Classroom Building 118, and the Mell Classroom Building. There is little example of design case studies that describe active learning classroom design in recent literature, with the most recent publication over a decade ago. Dori et al. (2005) described the process of developing the TEAL active learning model, which was based on Beichner and Saul's (2003) SCALE-UP active learning model, which was further explained by Beichner et al. (2007). There is little research in active learning classroom design. The case studies in this study aim to fill the gap in existing literature by examining advancements in furniture and classroom instructional technology as well as improvements in personal device capabilities. These case studies document the design process of Auburn University's active learning model, termed the EASL (Engaged Active Student Learning) model.

Chapter 3: Research Design of Two Case Studies, Three Projects

The cases selected for these two case studies were intentionally sampled as they represent the first two active learning classrooms on Auburn University's campus and the new active learning classroom building that they informed. The design case study format for Haley Center 2213 and Sciences Center Classroom Building 118 will be analyzed through forensically adopting of the Design Thinking framework (Brown, 2008). Although the design process did not explicitly follow the Design Thinking framework during the actual process, it provides an excellent lens to understand the project. This application of the Design Thinking framework is similar to the process of forensic accounting, during which a trained professional purposefully reviews and analyze existing data in an effort to interpret a larger story (Pirraglia, 2018).



Source: https.://dschool.stanford.edu

Figure 3. Stanford d.school Design Thinking Process

The interdisciplinary team adapted the Design Thinking framework (Brown, 2008) and created an *Auburn Thinking* framework that informed the process of designing and constructing the Mell Classroom Building. Figure 4 shows the process each design case study underwent along with outcomes from each.

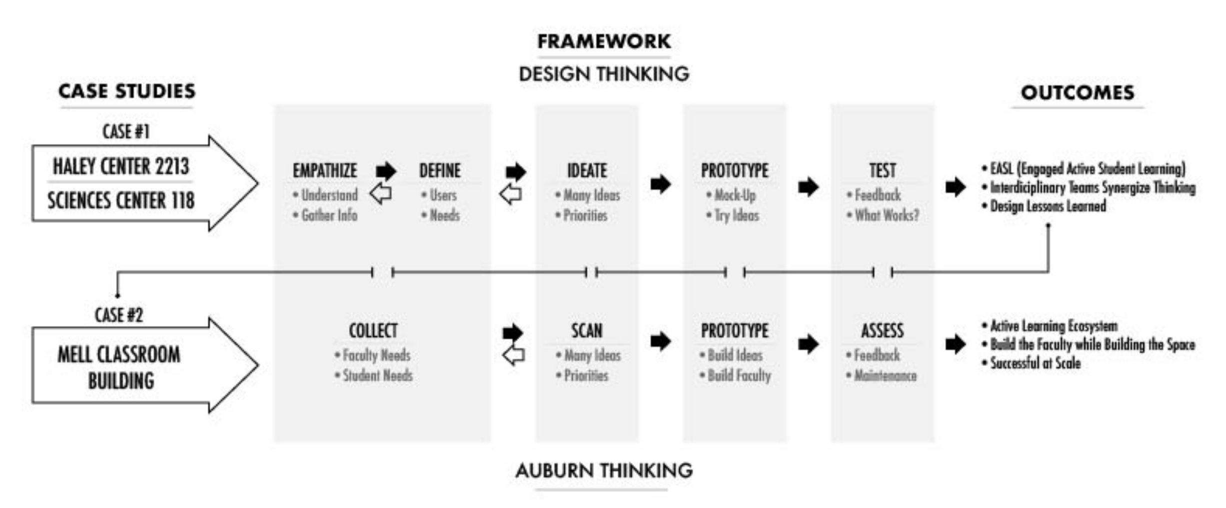


Figure 4. Research Design of Two Design Case Studies

Data Analyzed: Case Study 1

Haley Center 2213 and Sciences Center 118 Data. The design case for Haley Center 2213 and Sciences Center 118 is based on data provided by the institution. Data was collected by the author and other data (such as finalized construction documents) were collected by other members of the interdisciplinary team and shared with the author.

Haley Center 2213 Data. There were two general types of data for Haley Center: 1) data related to project management and 2) data related to the design and design process. Project management data include: the project initiation form, the initial scope document with revisions, the conceptual budget with revisions, meeting notes from various types of administrative and construction meetings, the design and construction conceptual milestone schedule, the actual schedule, purchase requisitions with itemized proposals for all furniture and glassboard, and personal communications (see Appendix A for a detailed list). Design and design process data include existing conditions photographs, a full set of scanned as-built construction documents from the original 1969 construction documentation, a full set of construction documents from the active learning renovation project, several iterations of conceptual furniture floorplans, the finalized furniture floorplan, final installation photographs, and personal communications (see Appendix A for a detailed list).

Haley Center 2213 Project Management Data. The project initiation form details information relevant to the case, including: project initiation date, preferred project completion date, signatures of personnel authorizing the project, conceptual project scope, anticipated cost, contact information of the initiator, and any other pertinent information (i.e. whether the project is tied to the academic schedule, etc.). The initial scope document includes further relevant details such as the date that the scope was created, the scope creator, a list of possible modifications to the space, and the beginnings of a phasing plan. There were two revisions to this document, and those revisions show a more detailed list of demolition and new construction, a furniture budget allowance, and an instructional technology budget allowance.

The conceptual budget has information including the date the budget was created, the approval process it underwent, the line items and allocations, and the fact that it was initially created for an architect/design fee to conduct a feasibility study. The first conceptual budget revision shows the increase from a fees-only feasibility study to a full conceptual project budget, including the following line items: engineering fees, architectural fees, in-house design generation fees, design review fees, in-house construction, maintenance and operations, facilities moving services, furnishings and moveable equipment, and contingencies. The second budget revision shows an increase in the monies allocated to instructional technology.

The meeting notes from various administrative and construction meetings track the progress from inception to installation across the breadth of the project. The design and construction conceptual milestone schedule shows the conceptual project milestone dates, including initial client meeting, 100% design complete, transfer to construction, material buyout, construction complete, punch list complete, financial close-out, and project completion. The actual schedule shows the dates shift 33 days, but still finishing up the punch list prior to the first date of the fall 2013 semester.

The purchase requisitions with itemized proposals show such information as the date the order was placed, the date the itemized proposals were issued, the name of the Auburn University personnel coordinating the furniture package, and the specifications of the furniture ordered including manufacturer name, product name, product dimensions, finishes specified, pricing, discounting applied, quantity, and installing dealer.

The project initiation form, initial scope document with revisions, conceptual budget with revisions, some meeting notes, and the purchase requisitions with itemized proposals were obtained with permission from the central project archive within Auburn University Facilities Management. Other meeting notes were obtained from the author's personal project files.

Personal communications are comprised of emails wherein the author was the sender, the recipient, or was copied. Email content includes communications within the project management team, communications with clients about expectations and process, communications about budgets, and communications about project coordination. Emails were obtained through a key word search of the author's email archive files. Keywords included (but were not limited to) the project number, the project name, "Haley active learning," "incubator classroom," "engaged active student learning," and "EASL." The emails confirmed dates and sequences of decisions, confirmed decision-makers, revealed discussion of the design process, and revealed iterations of ideas that were not documented elsewhere.

Haley Center 2213 Design and Design Process Data. The existing conditions photographs were taken during the scoping phase and prior to construction to document the existing conditions. These photographs show the way the space was being utilized prior to the renovation, the architectural features of the spaces, the instructional technology, the furniture, the furniture layout, the interior finishes, the lighting, the location of doors, and the location and type of writable surfaces. These photographs show how the room was used and proximity and quantity of items such as writable surfaces.

The as-built construction documents from 1969 show that Haley Center 2213 has not substantially changed in layout, finishes, or usage since 1969. The construction documents from the active learning renovation project show all of the construction details, including the demolition plan, the new construction, new electrical plan, finishes plan, and the revised usage of the space.

The iterations of the conceptual furniture floorplans show the design process that was undertaken when conceptually laying out the space, attempting to brainstorm effective active learning furniture options, and the variety of options that were considered. The final furniture plan is a hybrid of many of the iterations, with some substantial changes. The final furniture plan shows the exact location of the tables, the locations of the assigned colors, and the details regarding the ramp and stairs.

Installation photographs show the exact quantity, style, color, and placement of all furniture, wall-mounted glassboard, and instructional technology within the space. They also show the interior finishes including the color of the glassboard, the entry and egress points, the mounting height of the media monitors, and the location of the instructor's station.

The as-built construction documents and construction documentation from the active learning renovation project were obtained with permission from the central project archive within Auburn University Facilities Management. The existing conditions photographs, iterations of conceptual furniture plans, and the final furniture plan were obtained from the author's personal project files.

Personal communications are comprised of emails wherein the author was the sender, the recipient, or was copied. Email content includes communications within the project management team, communications with clients about expectations and process, and communications about design decisions. Emails were obtained through a key word search of the author's email archive files. Keywords included (but were not limited to) the project number, the project name, "Haley active learning," "incubator classroom," "engaged active student learning," and "EASL." The limitation of this method of search is that some relevant information may have not been identified and therefore omitted from this data set. The emails confirmed dates and sequences of decisions, confirmed decision-makers, revealed discussion of the design process, and revealed iterations of ideas that were not documented elsewhere.

Sciences Center 118 Data. There were two general types of data for the Sciences Center: 1) data related to project management and 2) data related to the design and design process. Project management data include: the project initiation form, the initial scope document with a revision, the conceptual budget with a revision, meeting notes from various types of administrative and construction meetings, the design and construction conceptual milestone schedule, the actual schedule, purchase requisitions with itemized proposals for all furniture and glassboard, and personal communications (see Appendix A for a detailed list). Design and design process data include existing conditions photographs, a full set of scanned as-built construction documents from the original 2005 construction documentation, a full set of construction documents from the active learning renovation project, photographs of the site during construction and punch list, several iterations of conceptual furniture floorplans, the finalized furniture floorplan, final installation photographs, and personal communications (see Appendix A for a detailed list).

Sciences Center 118 Project Management Data. The project initiation form details information relevant to the case, including: project initiation date, the preferred project completion date, signatures of personnel authorizing the project, conceptual project scope, anticipated cost, contact information of the initiator, and any other pertinent information (i.e. whether the project is tied to the academic schedule, etc.). The initial scope document includes further relevant details such as the date that the scope was created, the scope creator, a list of possible modifications to the space, and the beginnings of a phasing plan. There was one revision to this document, and that revision shows a more detailed list of demolition and new construction.

The conceptual budget includes information including the date the budget was created, the approval process it underwent, the line items and allocations, and the initial conceptual budget for line items such as engineering fees, in-house construction, maintenance and operations, facilities moving services, furnishings and moveable equipment, and contingencies. The conceptual budget revision shows the increase in those line items and the addition of the following line items: architectural fees, in-house design generation fees, design review fees, IT wiring fees, and instructional technology.

The meeting notes from various administrative and construction meetings track the progress from inception to installation across the breadth of the project. The design and construction conceptual milestone schedule shows the conceptual project milestone dates, including initial client meeting, 100% design complete, transfer to construction, material buyout, construction complete, punch list complete, financial close-out, and project completion. The actual schedule shows the dates shift 12 days, but still finishing up the punch list prior to the first date of the fall 2014 semester.

The purchase requisitions with itemized proposals show such information as the date the order was placed, the date the itemized proposals were issued, the name of the Auburn University personnel coordinating the furniture package, and the specifications of the furniture ordered including manufacturer name, product name, product dimensions, finishes specified, pricing, discounting applied, quantity, and installing dealer.

The project initiation form, initial scope document with revisions, conceptual budget with revisions, some meeting notes, and the purchase requisitions with itemized proposals were obtained with permission from the central project archive within Auburn University Facilities Management. Other meeting notes were obtained from the author's personal project files.

Personal communications are comprised of emails wherein the author was the sender, the recipient, or was copied. Email content includes communications within the project management team, communications about design decisions, communications with clients about expectations and process, communications about budgets, and communications about project coordination. Emails were obtained through a key word search of the author's email archive files. Keywords included the project number, the project name, "Sciences Center 118," "SCC EASL," "active learning SCC," and "new classroom SCC." The emails confirmed dates and sequences of decisions, confirmed decision-makers, revealed discussion behind the budget and other financial issues, and revealed iterations of ideas that were not documented elsewhere.

Sciences Center 118 Design and Design Process Data. The existing conditions photographs were taken during the scoping phase and prior to construction to document the existing conditions. These photographs show the way both of the spaces were being utilized prior to the renovation, the architectural features of the spaces, the instructional technology, the furniture, the furniture layout, the interior finishes, the lighting, the location of doors, location of demising walls, location of windows, and the location and type of writable surfaces. These photographs show how the room was used, how the usage adapted to the existing conditions (such as windows), and proximity and quantity of items such as writable surfaces.

The as-built construction documents from 2005 show that Sciences Center 118 was once two separate spaces: Sciences Center 116, an office space, and Sciences Center 118, a lecture-based classroom. Construction documents from the active learning renovation project show all of the construction details, including the demolition plan, the new construction, new electrical plan, finishes plan, and the revised usage of the space.

Photographs of the site during construction show that the project progressed as planned throughout the various phases of the project. The photographs also document location of electrical systems, columns, IT closets, and other architectural features as they are constructed or demolished.

The iterations of the conceptual furniture floorplans show the design process that was undertaken when conceptually laying out the space, attempting to brainstorm effective active learning furniture options, and the variety of options that were considered. The final furniture plan is a more polished version of one of the iterations, with some substantial changes. The final furniture plan shows the exact location of the tables, locations of the mobile glassboards, locations of the media monitors, the locations of the assigned colors, and the details regarding entry and egress.

Installation photographs show the exact quantity, style, color, and placement of all furniture, wall-mounted glassboard, mobile glassboards, and instructional technology within the space. They also show the interior finishes, the entry and egress points, the signage below the media monitors, the mounting height of the media monitors, and the location of the instructor's table.

The as-built construction documents and construction documentation from the active learning renovation project were obtained with permission from the central project archive within Auburn University Facilities Management. The existing conditions photographs, iterations of conceptual furniture plans, and the final furniture plan were obtained from the author's personal project files.

Personal communications are comprised of emails wherein the author was the sender, the recipient, or was copied. Email content includes communications within the project management team, communications with clients about expectations and process, and communications about design decisions. Emails were obtained through a key word search of the author's email archive files. Keywords included the project number, the project name, "Sciences Center 118," "SCC EASL," "active learning SCC," and "new classroom SCC." The emails confirmed dates and sequences of decisions, confirmed decision-makers, revealed discussion of the design process, and revealed iterations of ideas that were not documented elsewhere.

Analysis: Case Study 2

Mell Classroom Building Data. The design case for the Mell Classroom Building is similar to the previously mentioned design case and is based on a range of data provided by the institution. Some of the data were collected by the author and other data were collected by other members of the design team and shared with the author.

There were three general types of data for Mell Classroom Building: 1) data related to the conceptual project vision, 2) data related to project management and 3) data related to the design and design process. Conceptual project vision data include conceptual 3D color renderings. Project management data include: the project initiation form, the initial scope document, the conceptual budget, meeting notes from various types of administrative and construction meetings, the design and construction milestone schedule, the actual schedule, several iterations of the coordination items checklist, several iterations of the furniture tracking spreadsheets, purchase requisitions with itemized proposals for all furniture and glassboard, and personal communications (see Appendix A for a detailed list). Design and design process data include site plans, a full set of construction documents, photographs of the site during construction, several iterations of conceptual furniture floorplans, several iterations of the furniture specification package, the finalized furniture floorplan, final installation photographs, and personal communications (see Appendix A for a detailed list).

Mell Classroom Building Conceptual Project Vision Data. The conceptual 3D color renderings show the evolution of the ideation for the Mell Classroom Building. Renderings vary in level of detail from abstract to more fully developed. Some of the renderings show the conceptual usage of space, while others show how the site on campus would be impacted by the addition of a large building in a prominent location.

Mell Classroom Building Project Management Data. The project initiation form details information relevant to the case including project initiation date, preferred project completion date, signatures of personnel authorizing the project, conceptual project scope, anticipated cost, contact information of the initiator, and any other pertinent information (i.e. whether the project is tied to the academic schedule, etc.). The initial scope document includes further relevant details such as the date that the scope was created and the scope creator. It also contains an executive summary of the requirements for the building, including a range of gross square footage, the type of framing, not-to-exceed height, and net assignable square feet for classrooms, auditoriums, study, and support space, the conceptual budget range, the conceptual milestone schedule, and the affected university project names and numbers. The scope also states the desire to design to the LEED Gold certification level.

The conceptual budget includes information including the date the budget was created, the approval process it underwent, the line items and allocations, and the budget for line items such as (but not limited to—there are 196 individual line items) architectural, engineering, and design fees, site preparation, bidding costs, construction, project management fees, furnishings and moveable equipment, instructional technology, security, and contingencies.

The meeting notes from various administrative and construction meetings track the progress from inception to installation across the breadth of the project. The coordination items checklist shows the running list of the outstanding items that required coordination, organized by date, person assigned to the task, and type of task.

The design and construction conceptual milestone schedule shows the conceptual project milestone dates, including initial client meeting, 100% design complete, transfer to construction, material buyout, construction complete, punch list complete, financial close-out, and project completion. The actual schedule shows the dates shift approximately a year and a half, with the building opening for the fall 2017 semester rather than the Spring 2016 semester.

The furniture tracking spreadsheets show what furniture was selected, when it was selected, when the selection changed, the budget for each piece, the quantity of each piece, the extended budgeted amount, the anticipated installation date, the installing dealer, the type of truck the furniture should arrive on, and the overall percentage of furniture ordered at any given point in time.

The purchase requisitions with itemized proposals show such information as the date the order was placed, the date the itemized proposals were issued, the name of the Auburn University personnel coordinating the furniture package, and the specifications of the furniture ordered including manufacturer name, product name, product dimensions, finishes specified, pricing, discounting applied, quantity, and installing dealer.

The project initiation form, initial scope document with revisions, conceptual budget with revisions, some meeting notes, and the purchase requisitions with itemized proposals were obtained with permission from the central project archive within Auburn University Facilities Management. Other meeting notes were obtained from the author's personal project files.

Personal communications are comprised of emails wherein the author was the sender, the recipient, or was copied. Email content includes communications within the project management team, communications about design decisions, communications with clients about expectations and process, communications about budgets, and communications about project coordination. Emails were obtained through a key word search of the author's email archive files. Keywords included the project number, the project name, "Mell@RBD," "active learning building," and "new classroom building." The emails confirmed dates and sequences of decisions, confirmed decision-makers, revealed discussion of the budget and budget issues, and revealed iterations of ideas and discussion that were not documented elsewhere.

Mell Classroom Building Design and Design Process Data. The site plans show the existing site location and the proposed site disruption. The site plans also show how the proposed building would interact with the surrounding buildings.

The construction documents from the Mell Classroom Building Project show all of the construction details, including the demolition plan within the existing library space, the new construction both outside of the library space and inside of the library, the electrical plans, the mechanical plans, the plumbing plans, the technology plans, finishes plans, and the furniture plan.

Photographs of the site during construction show that the project progressed as planned throughout the various phases of the project. The photographs also document location of electrical systems, columns, IT closets, and other architectural features as they are constructed or demolished. The photographs additionally document the recesses in the walls where the media monitors were installed behind glassboard.

The iterations of the conceptual furniture floorplans show the design process that was undertaken when conceptually laying out the space, attempting to brainstorm effective active learning furniture options, the different layouts of the public space, and the different layouts of the study rooms. The final furniture plan is a more polished version of one of the iterations, with some substantial changes. The final furniture plan shows the exact location of the furniture, locations of the glassboard, locations of the media monitors, locations of the assigned glassboard colors, and details regarding entry and egress. The furniture specification package shows a thumbnail photograph of every piece of furniture selected, the manufacturer, the style name and number, the quantity, the location where it is installed, and a thumbnail photograph of each finish (i.e. fabric, laminate, wood, etc.) specified.

Installation photographs show the exact quantity, style, color, and placement of all furniture, wall-mounted glassboard, and instructional technology within the spaces. They also show the interior finishes, entry and egress points, architectural features, such as the preserved library exterior façade, and mounting location of the media monitors.

The site plans and furniture specification package, were obtained with permission from the central project archive within Auburn University Facilities Management. The construction documents, photographs taken during construction, iterations of conceptual furniture plans, the final furniture plan, and installation photographs were obtained from the author's personal project files.

Personal communications are comprised of emails wherein the author was the sender, the recipient, or was copied. Email content includes communications within the project management team, communications with clients about expectations and process, and communications about design decisions. Emails were obtained through a key word search of the author's email archive files. Keywords included the project number, the project name, "Mell@RBD," "active learning building," and "new classroom building." The emails confirmed dates and sequences of decisions, confirmed decision-makers, revealed discussion of the design process, and revealed iterations of ideas that were not documented elsewhere.

This breadth of detail is necessary to establish the context in which the design projects were executed. While *thick description* is often used as a tool in ethnographies, case studies, and other qualitative research to go beyond facts to "evoke emotionality and self-feelings" (Denzin, 1989, p. 83) and "build up a clear picture of the individuals and groups in the context of their culture and the setting in which they live" (Holloway, 1997, P. 154), in design case studies the case subject is a design process or designed deliverable (Boling, 2010). The case may "trace the inception of an idea through the process of design to use" (Boling, 2010, p. 2), so contextual information such as the setting, the available data, and thickly described outcomes (in this case, furniture manufacturers and specified finishes, etc.) is necessary. Therefore, the thick description included in the case studies reported here begins with a thorough description of the data gathered and analyzed.

Chapter 4: Findings and Discussion of the Design Case Studies

Haley Center 2213 & Sciences Center Classroom Building 118

The purpose of this design case study is to describe the design process for the first two active learning classrooms implemented on Auburn University's campus. Haley Center 2213 was completed in 2013 and informed the design decisions made for Sciences Center Classroom Building 118; both of these active learning classroom design projects were executed as prototypes to inform the design process of the Mell Classroom Building, an active learning classroom building that opened in August 2017. For the purpose of this study the term prototype refers to a space that is designed and built primarily to test a concept before scaling up to a final building project.

Context

Auburn University. The setting for this design case study is Auburn University. The intent of reporting these facts is to provide context for the reader to assess the utility of these design cases. Auburn is a major land-grant university located in the southeastern United States; it opened in 1856, as the East Alabama Male College (Auburn University History, 2016). Women were allowed to attend Auburn in 1892; it is the oldest 4-year coeducational school in the state (Auburn University History, 2016). Auburn was ranked #103 for the 2017/2018 academic years in the Best Colleges: National Universities Ranking (National University Rankings, 2018).

Total enrollment in the 2017-2018 academic year was 29,776, with 23,964 undergraduates, 4,707 graduate students, and 1,105 professional students; the student to faculty ratio was 19:1 (Auburn University Quick Facts, 2017). The acceptance rate was 77.7%, and the average GPA of accepted students was 3.74 (Auburn University Admission Chances, 2017). Auburn has one of the highest freshman retention rates in the country; this is possibly due to the

Auburn Spirit which permeates campus—all are welcome and people are friendly (Auburn University Quick Facts, 2017; Graduation and Retention, 2017). Auburn has a strong international presence, welcoming over 800 international students and enabling over 800 domestic students traveling abroad yearly (Auburn University Quick Facts, 2017).

The university is comprised of 12 schools and colleges and has more than 140 majors (Auburn University Quick Facts, 2017). Auburn is well known for engineering, agriculture, and business degree tracks, and is home to a nationally ranked interior design program (America's Best, 2017).

Auburn's campus size is 1,841 acres. It has 206 academic buildings, and 427 total buildings (Auburn University Quick Facts, 2017). Many activities occur on campus, including concerts, picnics, and Hey Day, day where everyone wears nametags and greets each other by name in an effort to make everyone feel like they belong, a cherished Auburn tradition dating back to pre-World War Two (Student Government Association, 2016).

In 2016, Auburn University conducted a climate study and major themes such as loving the beauty of Auburn campus, needing to increase the Black/African-American student recruitment/retention, and having more diversity in faculty and staff were identified (Moving Auburn Forward in Unity & Diversity, 2018). None of the 17 recommendations made from the study addressed teaching or learning spaces. The initiation for the active learning projects discussed in this study did not come directly from studies that Auburn has done or initiatives that Auburn has created, but it does support the spirit of the Auburn family, where everyone is welcome, supported, and students can converse freely about a wide variety of topics.

Pepper: *xx%* of spaces are dedicated which would suggest that big classrooms are not a central __ of the campus, and yet the mell bukdlign became part of the central campus and the campus master plan.

These facts about Auburn University provide some context for the design problem presented in these case studies.

Design Problem

Educational buildings are intended to be functional for at least 50-100 years; courses taught often rotate every decade, and technology evolves yearly (Park & Choi, 2014). As the sphere of higher education moves away from positivist objectivist learning theory and toward more application-based constructivist knowledge building, it is imperative that the built environment be flexible enough to transition as well (Zane, 2009).

A team of Auburn University stakeholders determined that investing in active learning spaces would benefit the University long-term. However, formal active learning spaces such as SCALE-UP and TEAL (Beichner & Saul, 2003; Dori et al., 2005) were still in the first few years of operation, and the Auburn stakeholders were not convinced that either model was the most appropriate for the University. Before investing in a new active learning building that would likely last 50-100 years, the stakeholders wanted to ensure that the decisions being made were informed and appropriate for the University. They initially authorized renovating one lecture-style classroom into an active learning-style classroom that would be an "incubator," and would serve as a place to test various furniture styles and instructional technologies. It also provided a space for students and instructors to provide feedback, and for instructors to have a place to retool their existing courses prior to opening a building of active learning classrooms. The classroom selected, Haley Center 2213, was completed in 2013.

Shortly after Haley Center 2213 opened, the College of Sciences and Mathematics expressed an interest in opening an active learning classroom and agreed to let it be a more refined "incubator" classroom. This second classroom was designed by the same design team as Haley Center 2213 and became the second prototype for the active learning classroom building.

The design problems for both classrooms were simple—determine what furniture, finishes, instructional technologies, and layouts worked and which did not, to ultimately inform the design of the active learning classroom building to make it the most efficacious and successful as possible. In order to effectively analyze the data, I used the Design Thinking framework forensically.

Design Thinking. As technology becomes more ubiquitous, human needs become more diverse, and potential tools for solving problems become more readily available, wicked problems also become more pervasive (Rittel, 1972, 1973). Wicked problems are social or cultural challenges that have no concrete definition, rigid boundaries, and no one "right" solution; there are multiple right answers to wicked problems, and there is no template for designers or interdisciplinary teams to use as a guide to solving them (Rittel, 1972, 1973). To solve a wicked problem, the designer or interdisciplinary team must use empathy, critical thinking, abductive reasoning, and other problem-solving skills (Kolko, 2012).

The Design Thinking approach is seen as a process for solving wicked problems (Efeoglu et al., 2013). This approach has three overarching phases: inspiration, ideation, and implementation (Brown, 2008). In the inspiration phase, the problem is defined, constraints are assessed, and resources are analyzed in the search for innovative solutions; the designer may also observe the end users to see how they interact and what their needs are (Brown, 2008). As Brown and Wyatt (2010) point out, what the end user says they want is often not the best solution for the problem; Henry Ford understood this principle when he said “if I asked my customers what they wanted, they’d have said ‘a faster horse’” (quoted in Brown, 2009, p. 38).

In the ideation phase, the designers work on interdisciplinary teams to ideate potential solutions or components to solutions, and create, develop, and evaluate ideas in the quest for a solution (Brown, 2008). Activities include brainstorming, sketching, drawing or building prototypes, and discussing potential solutions with the end users. When the solution is ready to begin to be realized, the implementation phase begins, and production of the design—whether it is a skate or a theater—begins. Often, the design team will work with a communications team to market the product and story behind its inception and ideation (Brown, 2008). The design thinking process is iterative and non-linear; the phases can be repeated as many times as necessary, and do not need to be repeated in order (Efoeglu, et al., 2013; Martin, 2009).

Stanford d.school Design Thinking Process. The Stanford d.school adapted the Design Thinking process into a five-step process that follows the same inspiration/ideation/ implementation arc, but defined the steps a little differently and more fully defined what occurred in each step: empathize, define, ideate, prototype, test (Plattner, 2010; Plattner, Meinel, & Leifer, 2009). Empathy is the heart of the Design Thinking model and is the first step in revised model process. It is what makes the model human-centered and requires that the designer understand their end user and their wants, needs, motivations, and values (Brown, 2009; Martin, 2009; Plattner, 2010). Often the stories that people tell in conversation, or the observable actions that they perform in their day-to-day activities, communicate something different or deeper than what they convey verbally in the design programming phase (Liedka, 2014; Plattner, 2010).

In the Define phase, the designer or team begins to use the information gathered in the Empathize phase to unpack the problem and clarify it, shaping a purposeful problem statement that will guide the process. This is integral to the design process because it begins to develop the parameters of the challenge and amalgamate the data, ensuring that the team is addressing the correct challenge (Liedtka, 2014; Plattner, 2010; Plattner et al., 2009). The Define phase is when the designer or team narrows the scope of the problem to a manageable problem statement; the Ideate phase is when the designer or team opens the floodgates and begins creating potential resolutions for the problem statement; ideation is when the team generates as many solutions as they can, and judgement is deferred until the prototype and test phases (Efeoglu et al., 2013; Plattner, 2010). By not working towards a quota for solutions, the Ideate phase allows for the obvious answers to be proposed, so that the team digs even deeper into the challenge and begins to offer more complex and multifaceted ideas as potential solutions (Efeoglu et al., 2013; Plattner, 2010).

The designer or team will begin the culling process in the Prototype phase; inferior, obvious, and deficient ideas will be tossed out, while potential solutions will be prototyped (Martin, 2009; Plattner, 2010). The term "prototype" does not imply a full-scale model—though it can—but, rather, anything with which there can be interaction; it can be a cardboard mock-up, a role-playing skit, a digital montage, an apparatus that can be broken apart, virtual reality, or even a whiteboard filled with post-it notes (Plattner, 2010; Plattner et al., 2009). The point of the prototype is not to create the final solution, but to begin talking about the solution in a concrete way with the team. We often learn the most when we fail, and in Design Thinking, it is important to fail, fail economically and to fail fast, and understand that prototyping accelerates innovation (Brown, 2009; Long, 2012).

After a few iterations of rapid prototyping, a better prototype using the information from the Prototype phase is created, and the Test phase begins (Plattner, 2010). In the Test phase feedback from the end users is often solicited and creates an opportunity to build more empathy with the end user; however, the main purpose of the test is to ask “why?” and not to ask if the solution is satisfactory; even if it is, it may not be the best solution and could be reworked (Plattner, 2010). The five-phase process, while linear in nature, is iterative, and phases can be revisited as many times as necessary.

Design Thinking Application. Historically, designers have not been involved in the fundamental work of innovation, but rather have been brought in near the end of the process to “make it pretty” (Brown, 2008). When designers are brought into the project or the problem early, they are able to add strategic value in ways previously untapped (Brown, 2008; Liedtka, 2014). The value of aesthetically pleasing design is not discounted, but for something to be a success, it likely needs to be both innovative and attractive. Humans are attracted to design that appeals to both the functional and the emotional facets; for example, the iPod was not the first MP3 player, but it was the first to create a visceral appeal that touched both emotional and functional desires (Brown, 2008; Seitz, 2016).

When the Design Thinking process is applied to the design of a building, the front-end work might be increased as additional steps may be added to the programming and schematics phases. By taking the time to really understand the needs to the end users, the design outcome may be different than the initial conception (Brown, 2009). Though the Design Thinking framework was not explicitly used to execute the Haley Center 2213 and Sciences Center Classroom Building 118 active learning classroom projects, it is the basic process that the projects underwent, and is therefore the forensic lens through which the author has chosen to understand the design case study.

Case Study 1 Project 1 Design Process: Haley Center 2213

Haley Center. Haley Center is considered to be one of the most iconic buildings on Auburn University's campus (Weaver, 2015). Built in 1969 and named after Paul Shields Haley, a 1901 graduate and former Auburn University Board of Trustee member, the 408,652 square foot building is located near the geographical center of campus, and at the epicenter of activity during the week (Carter, 2003; Weaver, 2015). A busy pedestrian pathway on campus, the Haley Center Concourse, is located immediately east of the building. The Auburn University Bookstore is located in the northeast quadrant of Haley Center.

Containing 142 classrooms, Haley Center is the largest classroom building on Auburn's campus (Carter, 2003; Weaver, 2015). The first three floors are primarily classrooms and student-related spaces, such as the Bookstore, with a few administrative areas sprinkled throughout. The upper seven stories are primarily faculty offices and administration areas, and the floors are much smaller in width and depth; floors four through ten have a tower-like appearance, centered on the junction of the four quadrants that comprise the first three floors. The first three floors are organized into a quadrant-grid system, an area colloquially called "quads." Each quad is organized around a centralized block of rooms bisected by hallways and has rooms around the perimeter of the quad. Each quadrant is visually almost identical. Yellow glazed tile is applied to the corridor walls to approximately 48", and white painted concrete block is above the glazed tile. Yellow 9"x9" vinyl asbestos tiles (VAT) comprise the majority of the flooring within the first three stories. The classrooms primarily have concrete block walls with the same yellow VAT floor. Though it sounds uniform, logical, and organized, Haley Center is notoriously difficult to wayfind within (Weaver, 2015).

The types of classrooms housed within Haley Center are primarily lecture-style classrooms that contain the original furniture installed when the building was built. This includes tablet-arm style desks, principally made out of metal, and asbestos chalkboards. There are also a few large auditoriums with fixed seating located in the building.

Visually, Haley Center is the second tallest building on campus; only the football stadium is taller than Haley Center's ten stories. It is built in conventional 1960s institutional architectural style—vertical bands of brick alternate with vertical bands of windows, and much smaller bands of white concrete are located at the top and bottom of both the lower three stories and the seven-story tower. An observation deck is located on the tenth story but is primarily accessed only on campus tours; it is not open to the public.

Team Structure & Stakeholders. Collaborating with interdisciplinary teams is the key to innovative problem solving (Seidel & Fixson, 2013). Auburn understood this early in the process and formed an interdisciplinary active learning space design working group based out of the Office of the Provost that worked in tandem with the design team that was based out of Facilities Management. The working group was initially comprised of the Associate Provost, the Associate Dean of the Library, the IT Manager in the College of Liberal Arts (CLA), several people from Distributed Information Technology and the Office of Information Technology, and a representative of the Student Government Association. The Director of Faculty Development was quickly added to the working group once she was hired in 2014. The interdisciplinary team from Facilities Management was comprised of the University Architect, a Campus Architect, a Campus Interior Designer, the Haley Center Building Coordinator, and the Director of In-House Construction. The two teams began separately, but quickly informally joined to form a larger interdisciplinary team that would eventually guide the design and construction process of the two active learning classrooms. They can be roughly grouped into two categories: academically based members, including the Office of the Provost, the Libraries, and Faculty Development; and project execution based members, including Facilities Management and IT specialists. When referring to the "interdisciplinary team,", unless otherwise stated, the author is referring to the combined teams.

The author served as the Campus Interior Designer on both active learning classroom renovations as well as on the design and construction of the new active learning classroom building. She was an active participant in much of the planning, decision making, and implementation, and thus this is written through that lens.

Design Strategies. The interdisciplinary team understood that the existing lecture-style classroom model was not as successful as it could be, and that it was rooted in the Middle Ages. With the advent of modern instructional technologies, the old system of lecture-based content delivery was not the most effective use of classroom time or infrastructure. In order to "get out of habitual pathways and reconceptualize a different rational view of the world" (von Glasserfield, 1988, p. 84), the team approached the project from a perspective of empathy, creative problem solving, experimentation, and with an open mind. The five-step Design Thinking framework was not explicitly applied to the two classroom renovations, but the same core values of innovative problem solving through empathy and testing ideas were embraced, so the Design Thinking model serves as the framework for describing the process.

Space Acquisition. Before the project could move forward, a space had to be acquired as a site for the project. The CLA IT Manager spearheaded the space acquisition process, and she was the driving force behind implementing an active learning classroom on Auburn University's campus. The CLA IT Manager found a space in the Haley Center that was considered "undesirable." It was an interior classroom with no access to natural light and had not been updated or refreshed in years (see Figure 2 & Appendix B). She took the initiative to relocate the classes that were traditionally conducted in the space, thereby allowing the space to be available for renovation.

Figure 5. Haley Center 2213 Existing Conditions

Empathize. Before any progress could be made on the design of an active learning classroom, the interdisciplinary team realized that in order to succeed they needed to identify their target user population and begin to understand their motivations and desires. They identified the generation commonly called “Millennials,” people born between 1982 and 2004, as the primary users of these classrooms (Wisniewski, 2010). The team acknowledged that they may learn differently. Millennials likely grew up with technology that kept them connected to their parents and to each other and made processes such as researching a term paper a different experience than for previous generations (McGlynn, 2005; Wisniewski, 2010). McGlynn (2005) also points out that the Millennial generation has grown up with more government regulations protecting them than any generation previous, and that parents of Millennials tend to be more protective of their children than other generations; a side effect of this is that Millennials tend to be more sheltered and regulated by their parents, and therefore fewer develop autonomy prior to college. Millennials are expected to excel, and for many Millennials, tutors or coaches are hired to ensure success (McGlynn, 2005). As a result of these variables, many Millennials may expect more individualized instruction and extra assistance in higher education—something that is hard to attain in a lecture-style classroom setting (LoPresto, 2016).

Technology of all types has changed the way that many humans interact in the world, and technology is rapidly changing (Prensky, 2001, 2004). Prensky (2004) states that technology has become "an entire strategy for how to live, survive and thrive in the 21st century" (p. 2); technology has changed the way that people communicate, shop, seek information, and socialize (Prensky, 2004). The Millennial generation does not just approach learning differently—they actually learn differently (Prensky, 2001). The constructivist approach to learning embraces this shift—technology can be useful in assisting learners with actively constructing knowledge by building on their cognitive structure (von Glasserfield, 1988; Wisniewski, 2010). The Auburn interdisciplinary team understood this and began to explore ways to embrace technology and personal technological devices as part of the instructional technology package within the classroom.

The interdisciplinary team also understood that Millennial students were not the only users of the classroom—the instructors, who were often not in the Millennial generation of "digital natives," had to be able to easily utilize and integrate all of the design elements, including the instructional technology, into their teaching, otherwise the classroom would likely be utilized for lecture-style instruction, instead of the active learning-style instruction design intent (Prensky, 2004).

The most common users that are mentioned in the literature are faculty and students; other users who engage with the space, include information technology (IT) specialists, campus maintenance, and other university staff. Design Thinking challenges designers to empathize with all user types. Designing for flexibility and ease of use became a primary objective.

Define. As the interdisciplinary team empathized with the target user groups, they began to more carefully define the parameters of the project. The classroom would serve as a prototype for future classroom design decisions, so it needed to be effective; however, it would also serve as a testing ground, so the team defined their specific objectives for the three major design components: furniture, finishes, and instructional technologies.

The goal of the furniture selection was to test if the SCALE-UP and TEAL models, which included 7’-8’ round tables that supported nine students each, were the best option. The team was concerned that the distance across the table was a little too far for comfortable interaction. They also wanted to determine if groups of nine people at a table were too many. Another objective with the furniture was to identify what power and data options were necessary to include in each table to assist with technology.

The objective for the finishes selection was to determine what type of flooring was preferred for a large, active learning environment, what finishes worked best with a raised access floor, and if acoustics needed to be addressed beyond the standard application of suspended acoustical ceiling and flooring choice. Since learning has been found to be affected by color, the team also wanted to incorporate color into the room via the finishes (Gaines & Curry, 2011).

The purpose of the instructional technology selection was to determine what technologies for active learning exist, what technologies work across multiple operating systems, how to incorporate students' own devices, and how to integrate the instructional technology across the teacher's station and all of the tables.

Ideate. The interdisciplinary team met frequently in informal meetings and emailed even more frequently, brainstorming possible solutions for the objectives. Dozens of ideas for furniture, finishes, and instructional technology were put on the table, and several dozen were drawn up and discussed at length. This process took about nine months, as research into each option was compiled and presented to at least part of the interdisciplinary team. The team sought the advice of experts in each field, and members of the team regularly met with furniture company representatives and other industry-specific experts to learn about new products, interfaces, and then ideate innovate product selection and layout. Many options, especially for furniture selection, were considered—they ranged from non-traditional ideas, such as incorporating sofas and soft seating as classroom furniture, to more traditional layouts restricted to combinations of tables and chairs (see Appendix C). Ultimately the team decided to utilize five completely different table shapes that each supported nine students to see if any shape worked better than the others. Five different colors were chosen to be incorporated into the space to delineate the different pods: yellow, purple, green, blue, and orange. The instructional technology was selected because of its usability and ability to be utilized on multiple platforms.

Prototype. The classroom was renovated over the summer of 2013. The classroom space that was allocated for this renovation was located in the center of the Haley Center. Prior to the renovation, it was a 1199 square foot lecture-style classroom that supported approximately 68 students plus the instructor (see Figure 3) with no access to daylight. Ceiling-mounted pull-down screen, a document camera, and a chalkboard comprised the instructional technology within the space. The floors were vinyl asbestos tile, and the walls were concrete block. The ceiling was a 2’x4’ suspended acoustical ceiling with non-adjustable fluorescent lighting original to the building.

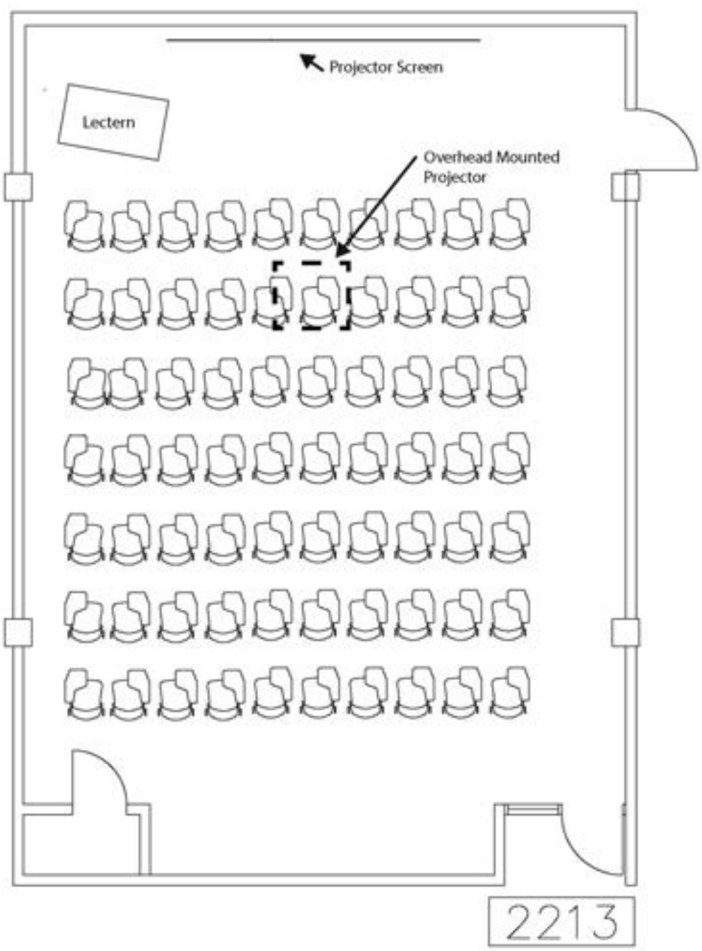


Figure 6. *Haley Center 2213 Existing Conditions Furniture Layout*

After the abatement and renovation, the 1199 square foot classroom remained windowless, and supported 45 students plus the instructor. The instructional technology that was included was media monitors, a document camera, backpainted glassboards, and a system called Barco Clickshare (see Appendix D) that allowed students to use their own devices to connect to the media monitors within the classroom and share their screen. In 2013, when this was specified, types of information technology such as Barco Clickshare were still evolving, and Barco Clickshare was determined to be the most user-friendly product that accomplished the IT team's goals. All of the other options available were much too complicated to be considered.

A Tate raised access floor was installed to support the technology within the classroom; the flooring selected was an Interface carpet tile (see Appendix E), selected because of its 19" x 19" size and the TacTiles glueless installation system, which allowed easy access to the access floor panels. The pattern and color selected were neutral, so that the focus was not on the floor, but rather on the instructional activities and the intentionally placed color elsewhere in the room. The base specified was darker in color so that it did not show scuffs and imperfections from normal wear and tear from a classroom where students were using rolling chairs and tossing bags around on the floor (see Appendix F). The walls were painted a neutral color so as not to distract from the color elsewhere in the space, and the trim was painted a darker color to disguise scuffs and impacts (see Appendix G). A semi-gloss sheen was requested by Facilities Management Maintenance, and was specified for ease in cleaning.

The five tables selected were all fundamentally different from each other and fostered collaboration and communication between table-mates in different manners (see Appendix H and Figure 4). Table Pod A was selected for its similarity to the SCALE-UP and TEAL models. The product selected was Steelcase Akira. Table B was selected because of its ubiquity in conference and board rooms, and the clear sightlines that each student would have with each other. The product selected was Coalesse SW-1. Table C was selected because of its unusual shape and potential for students to creatively divide themselves into different sized groups. The product selected was Izzy+ Dewey. Table D was selected because it allowed each group of 3 to have a defined area for their group work, but still allowed the group of nine to have clear sightlines to each other. The product selected was Izzy+ Clara. Table E was selected because it allowed each group of 3 to have a defined area for their group work and allowed the three groups of three to focus on a specific area when functioning as a large group of nine. The product selected was Coalesse Ballet.

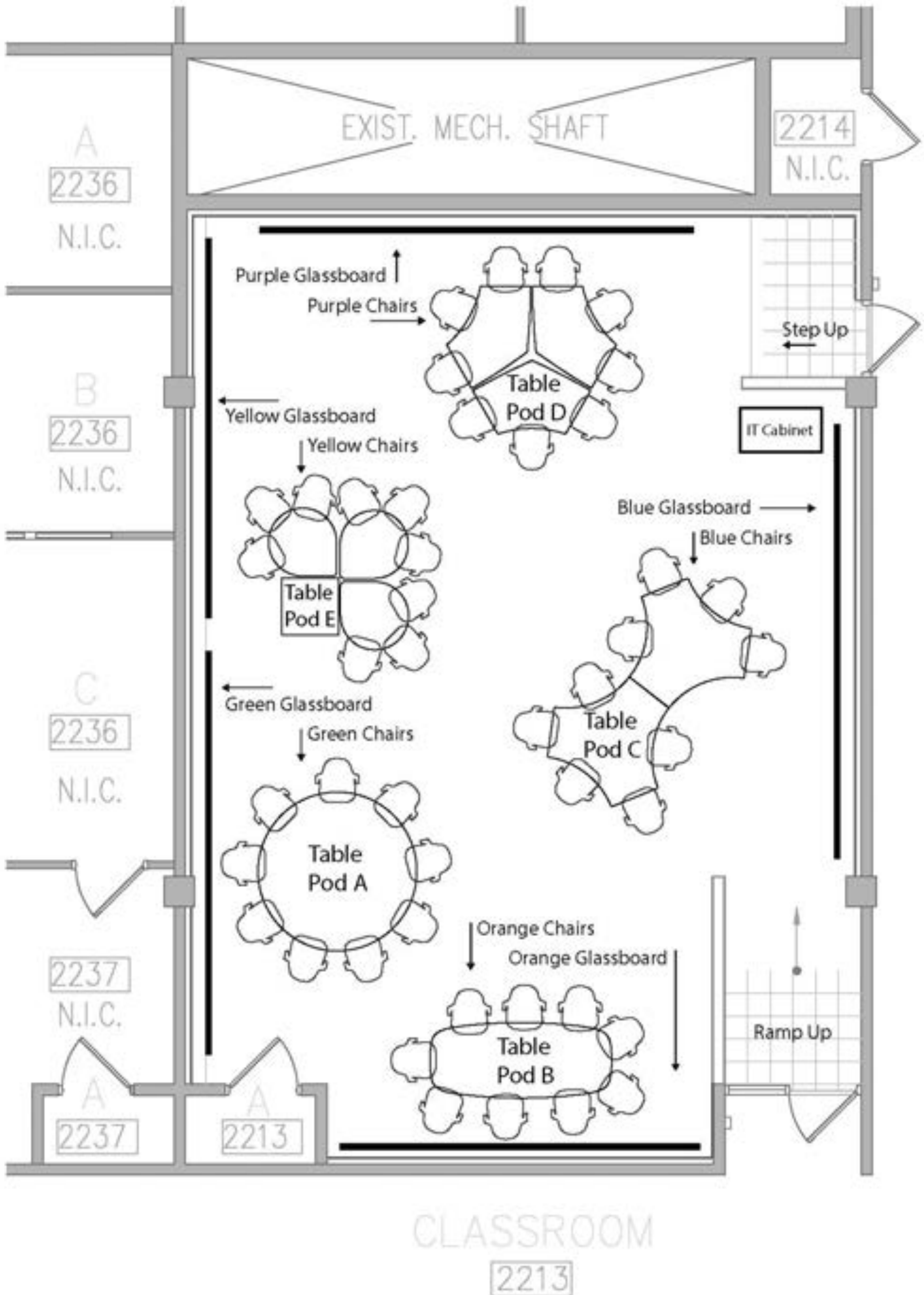


Figure 7. Haley Center 2213 Final Furniture Layout

Because writable surfaces feature heavily in successful active learning spaces (Beichner & Saul, 2003; Bernauer & Fuller, 2017, Dori et al., 2005; Mangram, Haddix, Ochanji, & Masingila, 2015; Ueckert & Gess-Newsome, 2008), writable surfaces were applied to the perimeter of the walls; due to the lack of windows, the number of writable surfaces was able to be maximized. The writable surface was mounted at 36" AFF and extended to 84" AFF. The product chosen for the writable surface was Clarus Glassboard, selected because of its durability, ability to be easily removed and relocated if necessary, and, most importantly, its ability to be backpainted to any paint color selected (see Appendix I). The main color in the room was applied via the writable surfaces. Each of the five tables had a section of writable surface assigned to it; this was communicated by backpainting each table's section of glassboard with a different color. The colors chosen were purple, orange, blue, green, and yellow. They were selected from the chair manufacturer's standard set of polypropylene shell colors, and were chosen for their consistent saturation level and the fact that they represent a range of warm and cool colors.

The color of the glassboard was reinforced by the color of chairs around each table, which coordinated with each other. The chairs, Steelcase Node chairs, were selected because of the wide range of poly shell colors, their ability to be adjustable in height, their casters, and their ability to swivel, which facilitated groupwork (see Appendix J). The Node chairs also had a recessed arm, which provided the function of an arm or elbow rest but was recessed enough that larger people could still comfortably sit in the chair. See Figures 5 and 6 and Appendix K for photos of the installed furniture.

The instructor's station was designed and implemented by Auburn's Classroom Technology group and was custom designed to be smaller than a typical lecture-style classroom lectern which traditionally held all of the classroom technology, including a computer, document camera, and projector controls. Because the active learning classroom contained more technology than a traditional lecture-style classroom, the majority of the technology was housed in either the IT closet that was built during the renovation, or in a stationary cabinet that was located along a far wall in the classroom.

Each table had a media monitor that was located above their assigned glassboard. The IP address associated with each media monitor was located on a sign mounted below the glassboard. The monitors were tied into the various instructional technologies in the room and were ultimately controlled by a panel located on the instructor's station. Because of the Barco Clickshare system, students could use their own devices (smartphones, tablets, computers, etc.) to screen-share to their table's monitor. The instructor could choose to screen-share a table's monitor with the rest of the class or override the student's screen-sharing and share the instructor's screen with the class.

Because of the increased usage of devices in class, a dedicated wireless router was installed for the classroom. This allowed students in Haley Center 2213 to easily connect to Wi-Fi and to connect to the monitors without slowing down the internet connection for the rest of the building. The lighting within the 2'x4' suspended ceiling was adjustable fluorescent and ensured that glare on the monitors was reduced.


Figure 8. View 1 of installed furniture in Haley 2213.


Figure 9. View 2 of installed furniture in Haley 2213.

Typically, when a new design is prototyped for use as a test subject, it is rough, quickly thrown together, and ultimately disposable (Plattner, 2010). It is likely to be re-worked, roughed together again—several times over. However, changing the way a university approaches educational delivery is an enormous challenge with high stakes. It must be done well, and with thoughtful intention at every step. Because the interdisciplinary team was well aware of the stakes at risk on this project, more time and effort were put into the ideation phase to brainstorm innovative solutions and to begin to weed out the least effective or logical potential solutions.

While Haley Center 2213 was not hastily thrown together, it was still an expedited process, the way prototypes typically occur. This classroom had the potential to change the way that Auburn University invested in delivering educational content, and the project took place over the course of a year. While a year may sound like a long time, when seeing it through the lens of the educational facility, where a renovation project may take two to three years, and buildings may not be renovated or substantially changed in 50-100 years, the argument can be made that a project completed in a year could be considered rapid prototyping (Park & Choi, 2014; Plattner, 2010). Additionally, the Mell Classroom Building, for which Haley Center 2213 was a prototype, took six years to design and build. A single year, when compared to six, can be described as rapid.

Test. The first year that Haley Center 2213 operated as an active learning classroom, many observations were made, conversations were had with students and faculty who used the space, and minor adjustments, such as shifting table pods around a bit (possible because of the Tate raised access floor) were made based on the feedback. Examples of this include instructors providing comments on what they witnessed in class as far as table preference, electrical outlet usage, student interaction, and student engagement. This feedback was invaluable and the interdisciplinary team referenced the feedback often throughout the design process of Sciences Center Classroom Building 118.

Lessons Learned. Several mistakes were made during the design process, and many lessons were learned after the classroom had been in use. The most obvious mistake was the mounting height of the media monitors. The media monitors were mounted above the glassboard to allow the maximum amount of writable surface within the classroom. It was determined, however, that the media monitors were mounted too high for the students at the correlating tables to be able to comfortably see the screen without craning their necks. The distance that the media monitors were located also affected how well the students could see smaller pieces of information; for example, if a group was collaboratively working on a spreadsheet, it was difficult to see the relevant information on the media monitor without squinting or standing up and adjusting viewing position. This was addressed in the Sciences Center Classroom Building 118 project.

Based upon feedback from instructors, students, and members of the interdisciplinary teams' personal observations, it was determined that Tables C and E were not as favored as the other three table options. The odd shapes appeared to be too abnormal for users.

The colors selected for the glassboards were also deemed to be a little too saturated—feedback was given that it was hard to see a black dry erase marker, especially on the purple and orange boards. The blue, yellow, and green glassboards were only slightly too saturated. This was addressed in the Sciences Center Classroom Building 118 project.

The light-colored carpet was also a choice that would have been adjusted in hindsight. The intent behind the carpet color was to make the space feel light and airy, even though there were no windows, and to create a uniform wall-floor color so that the glassboard and chair colors were more immersive. The carpet was not well-maintained by the custodial staff; this could be because almost all of the floors in the rest of the building were hard surfaces, and the staff was not used to maintaining a soft surface. Regardless, the carpet began to look dirty and show spills very quickly upon the opening of the space. This was addressed in the Sciences Center Classroom Building 118 project.

Another challenge with implementing an active learning classroom on campus is that some faculty still attempted to lecture in the active learning space. This was addressed through more faculty development offered by the Biggio Center for Teaching and Learning.

Engaged Active Student Learning (EASL)

The process for designing the second active learning classroom on Auburn's campus was similar to the first process but occurred in a more compressed time frame. Because much of the research on active learning history, spatial precedence, and technology and design options had been accomplished during the Haley Center 2213 project, more time and intention was able to be applied to the future of active learning on Auburn's campus.

Naming the Auburn University model of active learning and classroom design was one of the primary decisions that occurred between the Haley Center 2213 active learning classroom project and the subsequent classroom project in Sciences Center Classroom Building 118. The term engaged active student learning (EASL) was coined and is now the branded name for Auburn's approach.

The EASL Approach. Auburn's choice of the acronym EASL was not arbitrary, and it is used to direct Auburn's approach to active learning. One of the main tenets of active learning is engagement. Student engagement, the "degree of attention, curiosity, interest, optimism, and passion" (Abbott, 2016, para. 1) that students demonstrate during learning, is a key predictor of academic success (Gleason et al., 2011; Rissanen, 2014). Not only does engagement predict present academic success, and even levels of satisfaction with their education (Gleason et al., 2011; Miller & Metz, 2014), but the more engaged students are in their education, the more motivated they are to participate in their future education (Khourey-Bowers, 2011; Rissanen, 2014).

The concept of active has multiple meanings in Auburn's acronym "EASL." The impetus to implementing the EASL approach was rooted in active learning pedagogy. According to Odom, Glenn, Sanner, and Cannella (2009), there are three characteristics associated with active learning: (1) learners are earnestly engaged; (2) learners are accountable for their own learning, and at times take responsibility for others' learning; and (3) educators design their classes so that learning is constructed rather than simply transferred from the teacher to the student. The active learning approach that Auburn primarily espouses can be summed up in three words—communication, collaboration, and reflection (Bonwell & Eison, 1991). When making the commitment to increase active learning on campus, Auburn realized that in order to meet Odom et al.'s (2009) criteria and Bonwell and Eison's (1991) attributes, and fully engage in this approach, there must be massive infrastructure changes made to physical learning environments and to faculty development.

Faculty development is also vital to effective active learning (LoPresto, 2016; Peisachovish, Murtha, Philips, & Messinger, 2016). Teaching from an active learning approach is radically different from teaching from a lecture-based approach (Peisachovish et al., 2016). The educator must rework how content is delivered, how students engage with it, and adjust to a different role in the classroom—the faculty member must also be actively engaged in the process; if faculty do not feel supported during such a transition, they will either resist changing or leave the institution (Miller & Metz, 2014; Moore, Fowler, & Watson, 2007). Effectively assisting faculty interested in redesigning their course, while supporting other faculty and their needs, requires a team dedicated to the active learning approach. Because of this, in 2014, Auburn hired an expert in active learning faculty development to lead the faculty development office, Biggio Center for the Enhancement of Teaching & Learning; she became a key stakeholder both in developing faculty and in planning learning environments.

The students themselves are at the heart of the EASL approach. As technology becomes more ubiquitous, attention spans shorter, and metaskills such as problem solving even more important in this robotic age, Auburn recognized that it is vital for higher education to support students in meaningful ways, and not just fall back on the "tried and true" method of lecture-based curriculum (Neumeier, 2012; Nguyen et al., 2017; Papastergiou, 2009).

The type of learning that students engage in while in lecture-based curriculum is often akin to academic bulimia—the students binge on knowledge, cramming before tests, and then regurgitate almost immediately after, not digesting the information (Gleason et al., 2011). Active learning strategies such as case studies, discussion, and Think-Pair-Share (and many other strategies) can help students retain knowledge by helping them develop and strengthen soft skills and critical thinking abilities (Elliott et al., 2017; LoPresto, 2016). Auburn acknowledged that more and more careers are also requiring employees to work in teams, but traditional lecture-based curriculum does not prepare students for the realities of team-based knowledge acquisition and problem-solving they will face in their career (Gleason et al., 2011; Lin, 2017; Wuchty, Jones, & Uzzi, 2007). By implementing active learning strategies such as problem-based learning, team-based learning, and application-based learning, universities are preparing students for the inevitable problem-solving and teamwork that will occur in their careers (Elliott et al., 2017; Kibble et al., 2016; Mennenga & Smyer, 2010; Powell et al., 2012).

Auburn's Engaged Active Student Learning approach to active learning pedagogy is established in application, and not in regurgitating facts (Gleason et al., 2011). The EASL approach can be defined as empowering students to construct learning by providing intentionally designed supportive spaces and faculty enabled to facilitate students' educational journey as they prepare for future careers.

Design Process: Sciences Center Classroom Building 118

Sciences Center Classroom Building. The Sciences Center Classroom Building was built in 2005 as one of three Sciences Center buildings: the Sciences Center Auditorium, the Sciences Center Laboratory Building, and the Sciences Center Classroom Building. It is 33,780 square feet, and primarily houses classrooms with some faculty and administration offices as well. The interior is primarily organized with a main corridor that rooms feed off of. Most rooms have access to natural light. The corridors and most classrooms have sheetrock walls, vinyl composition tile (VCT) floors, and 2'x4' acoustical ceilings. The faculty and administrative spaces are predominantly comprised of sheetrock walls, carpet tile floors, and 2'x4' acoustical ceilings. The exterior of the building is conservative in appearance, with traditional elements such as pediments with keystones over windows, Doric Greek columns, a white architrave that connects to a frieze with triglyphs and metopes, and several terra cotta bas relief insets in the brick façade.

Team Structure & Stakeholders. The interdisciplinary team that worked on the Sciences Center Classroom Building EASL classroom was substantially the same team that worked on the Haley Center EASL classroom, with the notable addition of the recently hired faculty development director, the Director of the Biggio Center for Teaching and Learning, who joined the team shortly after she arrived at the University. A substantial cohort of College of Sciences and Mathematics (COSAM) faculty also provided input throughout the design process.

Design Strategies. Because the interdisciplinary team had recently completed the Haley Center EASL classroom, they used their experiences on the project and lessons learned to inform some of the design decisions for the Sciences Center Classroom Building EASL classroom. The five-step Design Thinking approach can again be retroactively applied to describe the design process, as the same fundamental values of innovative problem solving through empathy and prototyping were again embraced.

Empathize. Before committing to any design decisions, the interdisciplinary team realized they needed to reflect on the successes and failures of the Haley Center EASL classroom. The CLA IT Manager, who had been part of the interdisciplinary team and one of the drivers behind Auburn identifying active learning as the desirable pedagogy to explore and embrace, was able to offer insight into the successes and flaws of the Haley Center EASL classroom; she conducted many of the faculty development workshops before and after the classroom was opened. She was in the unique position to empathize with the University's goals for active learning as a part of the core team, and also as an integral component of the space.

To explore what worked and what did not, members of the interdisciplinary team met several times within the Haley Center EASL space to conduct or attend workshops, discuss plans for the Sciences Center Classroom Building EASL classroom, and review and experience the features of the EASL classroom. Having a working prototype of the space that everyone could experience was integral to making informed decisions for subsequent classrooms and allowed the decision makers and design team to better empathize with users of the space, and manage expectations.

Define. The interdisciplinary team used their experiences within the Haley Center EASL classroom and the feedback that the CLA IT Manager had gathered to begin defining the objectives for the Sciences Center Classroom Building EASL classroom. The objective for the furniture was to implement a single type of table shape, versus the five different shapes that were used previously. The groups of nine that the Haley Center EASL classroom tables supported were determined to be too large, in part by the COSAM team, so the team made the decision to reduce the number of students per table to six. This still allowed for the students to break into groups of three, but also allowed for the students to interact more, and for the instructor to have more intimate conversations with the people at each table.

Another objective for the furniture was to have sightlines across the entirety of the room. Because the room shape for the Sciences Center Classroom Building EASL classroom was ultimately a narrow rectangular shape, the team wanted to ensure that students at each end could at least see each other and each other's writable surfaces. The objective for the finishes was similar to the previous classroom—maintain the best acoustical control while minimizing maintenance and keep most of the finishes neutral so that the color used in the space was not distracting. The objective for the instructional technology was also similar to the previous classroom, but the team wanted to explore a more user-friendly system than Barco Clickshare. The COSAM faculty also requested interactive touch screen monitors.

Ideate. Many different design ideas for furniture, finishes, and instructional technology were discussed, drawn, and ultimately discarded (see Appendix L). There were several design constraints that the solution needed to work around. The first was the increase in the quantity of people supported within the space. The College of Sciences and Mathematics (COSAM) wanted the classroom to support 72 students, an increase from the 45 supported in the Haley Center EASL classroom. The desire to have sightlines across the entirety of the room was another design constraint. Two entrances into the classroom existed, taking up space that could be used for writable surfaces; six windows were present in the south wall, allowing natural light while reducing the wall space for writable surfaces. The users had also requested a large quantity of storage within the room, as many of the instructors in COSAM teach with physical teaching props, including large organic chemistry model kits and objects that physics instructors use to teach fundamental laws of physics.

Several different approaches to the instructional technology package were explored. The CLA IT Manager wanted to avoid utilizing a system that required a component to attach to the student's electronic device; the manager wanted students to be able to access the instructional technology to share their devices' screens to the classroom screens, no matter the operating system and without anything requiring an adaptor or a method for corralling the technology components when not in use.

Prototype. The renovation took place over the summer of 2014, and COSAM provided the space for the classroom renovation. The building selected for the classroom renovation was built in 2005 and houses many classrooms and several offices. Because of the number of students intended to support in this EASL classroom, an approximately 1110 square foot existing lecture - style classroom that supported 48 students, the approximately 796 square foot suite of IT offices next door to it were gutted and combined into a single rectangular room (see Figure 7). The instructional technology in the classroom prior to the renovation included a computer, an overhead projector with a ceiling mounted pull-down screen, a document camera, and a markerboard. The lecture-style classroom had vinyl composite tile, walls with drywall finish, and a 2’x4’ suspended acoustical ceiling with non-adjustable 2’x4’ fluorescent lights. The IT offices had broadloom carpet, walls with drywall finish, and a 2’x4’ suspended acoustical ceiling with non-adjustable 2’x4’ fluorescent lights (see Figures 8 and 9, and Appendix M).

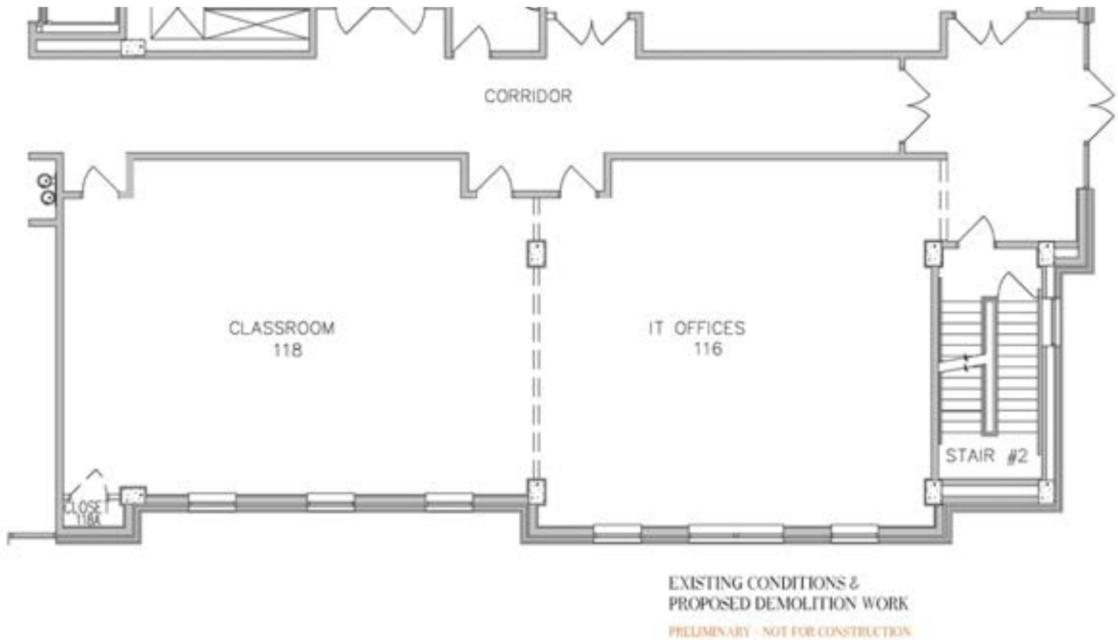


Figure 10. Sciences Center 118 existing conditions floorplan.


Figure 11. Existing IT offices.


Figure 12. Existing lecture-style classroom.

After the renovation, the 1896 SF room had two doors, and retained the six windows along the west side; it supported 72 students plus the instructor (see Figure 10). Two IT closets were built to support the IT infrastructure implemented in the room, and a walk-in closet was built to contain the instructor's teaching tools and kits.

A raised access floor was installed to support the technology within the classroom; the flooring selected was Milliken carpet tile (see Appendix N), chosen because of its 24” x 24” size and the glueless installation system, which allowed easy access to the panels. The pattern and color selected were neutral, so that the focus was not on the floor, but rather on the instructional activities and the intentionally placed color elsewhere in the room. The vinyl base specified was darker in color to disguise any scrapes and scuffs from normal classrooms activity (see Appendix O). The wall paint and trim paint were the same color to allow for a more monochromatic field and to allow the color in the glassboards and chairs to be more prominent (see Appendix P).

The table selected was a trapezoidal shaped-table that was installed long side to long side to make a hexagonal shape, supporting six students. This shape was determined because the hexagon allowed each student to have their own side of the table, which supported the inherent human need to have their own personal space and implied territory (Altman, 1975). The hexagonal table pods had the ability to break apart into their trapezoidal table components, and therefore align in rows, in the event that that table layout was desired. The product selected was Coalesse Akira (see Appendix Q). The chairs were the same as the Haley Center EASL classroom—Steelcase Node chairs, selected because of the wide range of poly shell colors, their ability to be adjustable in height, their casters, and their ability to swivel, which facilitated groupwork easier (see Appendix R). The Node chairs also had a recessed arm, which provided the function of an arm or elbow rest but was recessed enough that larger people could still comfortably sit in the chair.

Writable surfaces were applied to the wall, as in the Haley Center EASL classroom, but there were some space constraints in the Sciences Center Classroom Building that the Haley Center did not incur. The first was the inclusion of windows. Although natural light is typically preferred in interior spaces, windows restricted the amount of wall space dedicated to writable surfaces. Because the integrity and consistency of the exterior of the building had to be preserved, the windows could not be filled in, nor was the team comfortable with installing glassboard over the windows. The other space constraint was the inclusion of the second door, which was required by code due to the larger occupancy. This occupied wall space that could have been used for writable surfaces, and because of the need to include a ramp to accommodate the access floor, took up floor space. The wall-mounted writable surface was mounted at 36" AFF, and extended to 84" AFF, and four mobile glassboards were provided. The glassboard was also installed all the way around the media monitors, so that no possible space was without writable surface.

The solution to providing enough writable surfaces for 12 groups of six students was to incorporate mobile glassboards. Both the mobile glassboards and the wall-mounted glassboards were Clarus Glassboards, again selected because of durability, ability to be easily removed and relocated if necessary, and, most importantly, ability to be backpainted to any paint color selected (see Appendix S).

The color of the glassboard in the Sciences Center Classroom Building EASL classroom was again coordinated with the poly shell of the Steelcase Node chairs. One lesson learned from the Haley Center EASL classroom was that less saturated colors should be chosen to backpaint the glassboard; it was hard to see dry-erase markers on the more saturated colors. The colors chosen for the Sciences Center Classroom Building EASL classroom were much more muted and desaturated. Instead of each of the 12 tables being assigned a different color chair and coordinating glassboard, four colors were selected and applied to three table pods each —this also helped decrease visual clutter in the larger classroom. The colors chosen were blue, green, white, and yellow (see Appendix T and Figures 11 and 12 for installation photos).

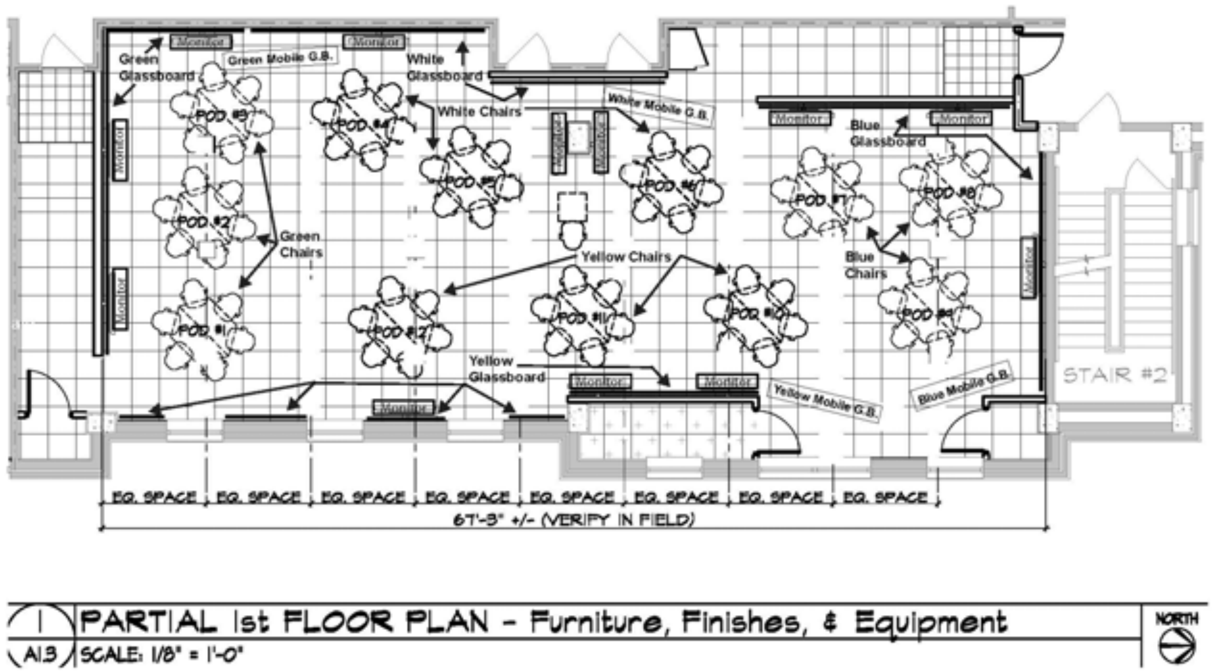


Figure 13. Science Center 118 final installed floorplan.

Another lesson learned in the Haley Center EASL classroom not only involved glassboard, but also instructional technology. It was determined fairly quickly that the media monitors that were mounted above the glassboard were mounted too high. It was almost impossible for anyone sitting close to the glassboard to be able to comfortably see the media monitor. In the Sciences Center Classroom Building EASL classroom, the media monitors were installed at 60" on center, a much lower height. Glassboard surrounded the TV on all four planes, so that no reachable space was wasted; the IP address associated with each media monitor was located on a sign mounted below the glassboard, allowing students to have easy visual access to the information to connect their devices to the screen for screen-sharing (see Appendix U). Mounting the media monitor at eye level was done in part because it was easier to see, but also because the media monitors chosen were touch-screen technology.

Figure 14. View 1 of installed furniture in Sciences Center 118.

Figure 15. View 3 of installed furniture in Sciences Center 118.

The monitors were tied into the various instructional technologies in the room and were ultimately controlled by a panel located on the instructor's station. The instructional technology system specified was Christie Brio, due in part to the ease of use; it allowed students to use their own devices (smartphones, tablets, computers, etc.) to screen-share to their table's monitor without a dongle attachment (see Appendix V). The instructor could choose to screen share a table's monitor with the rest of the class or override the student's screen sharing and share the instructor's screen with the class. Brio also had a whiteboard functionality that allowed the touch screen to be turned into a writable surface with which devices could connect to and interact with. Because of the increased usage of devices in class, a dedicated wireless router was installed for the classroom. This allowed students in Sciences Center Classroom Building 118 to easily connect to Wi-Fi without slowing down the internet connection for the rest of the building.

The instructor's station was smaller and more mobile than the instructor's station implemented in the Haley Center EASL classroom; it was more like a table and less like a large cabinet. A monitor arm held an all-in-one computer monitor. A ceiling-mounted document camera was installed over the instructor's station to save horizontal space. Because the active learning classroom contained more technology than a traditional lecture-style classroom, the majority of the technology, including the teaching computer for the classroom, was housed in the IT closet that was built during the renovation. The 2'x4' suspended ceiling within the classroom housed new adjustable LED lighting that was intentionally switched so that some lights could be turned off to reduce glare on the monitors.

Test. While no formal empirical testing occurred within the Sciences Center Classroom Building 118, this case informed the design of the Mell Classroom Building through the application of feedback from the users—students, faculty, and staff. The interdisciplinary team was able to provide critiques both to the Auburn University design team and the external architecture and design firms that worked on the Mell Classroom Building. Critical feedback included positive reports on the hexagonal pod shape, the decreased need for students to plug in electronics (potentially eliminating the need for power in the tables and therefore the need for a raised access floor), and the desire to interact with the monitors, but not via a touchscreen. By utilizing this space as an ongoing test throughout the Mell Classroom Building design process, the Sciences Center Classroom Building 118 classroom could be used as a tool to dynamically inform the design team, while still operating as a classroom in the College of Sciences and Mathematics.

Lessons Learned. The interdisciplinary team used the lessons learned on the Haley Center 2213 project to inform the Sciences Center Classroom Building 118 project; these lessons included the monitor mounting height and the color saturation of the writable surfaces. However, the Sciences Center Classroom Building 118 project was not without its own issues. Just as in Haley Center 2213, the media monitors provided an opportunity for growth and reflection. The 60” AFF installed height worked well for the space, but the touch-screen technology did not. It was not precise, the ease of use was less than desired, and was ultimately not worth the significant amount of money that was invested into it. This was addressed in the design of the Mell Classroom Building.

Another lesson learned was that faculty teaching style in STEM disciplines were deeply rooted in a lecture-style format, which was different than the Liberal Arts faculty in Haley Center 2213 were. This issue is being addressed by offering more faculty development classes on active learning but will likely always remain a challenge for STEM disciplines with active learning classrooms.

The interdisciplinary team also determined that while the hexagonal table shape worked well, there was no need to include power and data capabilities within the tables, especially since it compromised the flexibility of the space. These findings were revealed through informal conversations with instructors and learners who interacted in the space. Learners did not have a need for a data connection, and when they did, they typically did not have their own data cord for connectivity. With more robust battery life for devices, the needs for power in the table was also diminished.

Present Day. Both Haley Center 2213 and Sciences Center Classroom Building 118 are still in use. The instructional technology, especially in Haley 2213, is now outdated, but the rooms still function as active learning classrooms. An Apple TV for each media monitor was installed in Haley Center 2213 to allow the College-sponsored iPads to be easily used within the classroom. Both of these rooms are fully scheduled every semester and are used after hours by students as study areas. Faculty workshops are often conducted in them during the summer and on school breaks. While their initial purpose was to prototype active learning classrooms and expose faculty and students to active learning environments, their continued usage allows faculty and students other opportunities to engage with EASL spaces outside of the Mell Classroom Building, the active learning classroom building that both projects informed.

Mell Classroom Building

The purpose of this design case study is to describe the design process undertaken for the Mell Classroom Building, the first active learning classroom building constructed on Auburn University's campus. The Mell Classroom Building opened in August 2017. The design process included ideating, designing, and implementing two prototypical active learning classrooms in 2013 and 2014 to better understand the design process and to explore furniture, finishes, and instructional technology options in order to inform the design of the Mell Classroom Building. This design case study can be found in the previous sections.

Method: Design Case Study

The method chosen for this study falls under the broad umbrella of a case study, which Yin (1984) defines as "inquiry that investigates a contemporary phenomenon within its real-life context" (p. 23). More specifically, the method of design case study, which is explained in detail in the literature review section, was chosen because it emphasizes the importance of explaining a designed object or space or a design process (Boling, 2010; Smith, 2010).

Context

Auburn University. Just like the previous case study, the setting for this design case study is Auburn University. Information about Auburn University, including historical information, enrollment number, information about colleges and schools, campus climate, and campus size can be found in the context section of the previous case study

Engaged Active Student Learning Approach. Just as North Carolina State University branded their active learning model SCALE-UP (Student-Centered Active Learning Environment with Upside-Down Pedagogies), and the Massachusetts Institute of Technology brands theirs TEAL (Technology Enabled Active Learning), Auburn University developed an active learning model (see above sections) and branded it EASL (Engaged Active Student Learning) (Beichner 2008; Dori et al., 2005; SCALE-UP Site, 2011). This name was chosen intentionally, as engagement in classes is a predictor of academic success (Gleason et al., 2011); the constructivist pedagogy of active learning is one way of engaging students in the classroom (Kibble et al., 2016). In active learning, the students become active stakeholders in their education, and develop critical thinking and metaskills that they likely would not develop solely in lecture-style instruction (Elliott et al., 2017; LoPresto, 2016). The type of learning that occurs in an active-learning classroom prepares students for the realities of working in a team-based environment by helping them develop the problem-solving skills and ability to navigate team dynamics that they will likely encounter in their future careers (Elliott et al., 2017; Kibble et al., 2016; Mennenga & Smyer, 2010; Powell et al., 2012). The EASL approach uses intentionally designed supportive spaces and qualified faculty to enable students to construct knowledge and actively participate in their educational journey.

Design Problem

The EASL model was so well-received by faculty and students that when Auburn University planned to open a new classroom building in time for the 2017/2018 academic year, stakeholders decided that investing in active learning classroom infrastructure would be more beneficial to the University long-term than investing in lecture-style classrooms. Because more and more faculty were interested in teaching in active learning spaces, the decision was made to make the building an active learning classroom building vs. a lecture-style classroom building.

Because academic buildings are typically designed to last at least 50-100 years, stakeholders wanted to ensure that the decisions made for the Mell Classroom Building would allow for the building to be flexible enough to be effectively *future-proofed,* that is, planning for future change and attempting to minimize the effects (Park & Choi, 2014; Zane, 2009). The prototypical EASL classrooms that were opened in 2013 and 2014, described in the sections above, informed much of the design for the Mell Classroom Building. The design problem for the Mell Classroom Building was to design an active learning classroom building that supported the type of active learning currently implemented, while ensuring that the building was flexible enough to continue to support multiple types of instructional delivery, even as furniture, finishes, and instructional technologies evolve.

Design Process

Team Structure & Stakeholders. The interdisciplinary team that worked on the prototypical EASL classrooms in Haley Center 2213 and Sciences Center Classroom Building 118 evolved after the Sciences Center Classroom Building EASL classroom opened for the 2014/2015 academic year. Because the model for EASL classrooms had been fairly well refined with the Sciences Center Classroom Building EASL classroom, and the Mell Classroom Building would have several architecture and design firms executing the design and construction documents, the need for a formal interdisciplinary team to plan and execute all of the details of design and construction was lessened considerably. The interdisciplinary team evolved into two different teams; the Director of Faculty Development, Associate Dean of the Library, Associate Provost, University Architect, and Auburn University Campus Interior Designer formed a team the author refers to as the *in-house design team;* they worked closely with the architecture and design firms contracted to develop the design and construction documents and specifications for the project. The other interdisciplinary team members, including the Manager of Classroom Technology, Director of Information Technology, and the College of Liberal Arts IT Manager, who became the Learning Spaces & Faculty Development Coordinator, as well as the in-house design team, with the exception of the University Architect, worked with the Auburn University Construction Project Manager on a team the author refers to as the *occupancy planning team*; once construction was underway they planned logistics for ensuring that the building was operational in time for classes to begin.

The author served as the Campus Interior Designer for the design and construction of the Mell Classroom Building. She was an active participant in much of the planning, decision making, and implementation, enabling her to have direct knowledge of the design process and details of the design case.

Site & Design Constraints. In order to be easily accessible to most colleges and departments, the Mell Classroom Building needed to be located in Auburn University's central campus. Because Auburn University has an established campus with buildings dating back to 1846 (Daughtry, 2015), finding a site in central campus to locate the building was difficult. The decision was made to build the Mell Classroom Building directly in front of the existing Ralph Brown Draughon (RBD) Library, located in central campus. The initial plan for the Mell Classroom Building was for it to have 14 classrooms, 14 breakout rooms for small group study, and approximately 17,400 SF of public gathering spaces. It was quickly determined that those numbers were not large enough, due to the current demand for classrooms, breakout rooms, and public gathering space. A road prevented the Mell Building from extending further west, and buildings prevented it from extending north and south. The only other option was east—and into the library.

RBD Library, a 377,000 SF building that contains seating for 4,850, is the biggest library on Auburn's campus. Because the University had recently acquired a location for off-site book storage, many of the existing stacks at RBD were able to be relocated, allowing for space to be utilized in the Mell renovation. The library would also lose existing learning commons space, but gain renovated public gathering areas, and it was determined that a satellite media and digital resource lab would be included in the renovation on the RBD side.

With this design change, the Mell Classroom Building became an attached part of the existing RBD structure. The design decision was made to preserve the iconic front façade of RBD, including the large vertical concrete columns and leaving the large letters on the top of the arcade that spelled out *RALPH BROWN DRAUGHON LIBRARY*. The RBD façade overlooks the grand atrium of the Mell Classroom Building and provides entry into the library side of the active learning classroom building (see Figure 13).

Figure 16. View of former exterior library façade inside the Mell Classroom Building atrium.

Renovating 38,000 square feet of RBD as part of the original 69,000 square feet of new construction added 16 classrooms, 19 breakout rooms, and 9,900 square feet of public gathering space for a total of 26 EASL classrooms, two 166-seat active learning lecture halls, 33 breakout rooms, and 27,300 square feet of public gathering spaces.

Design Strategies. Two mid-size architecture firms from two different major metropolitan areas worked on the architectural and interior finishes package and construction documents; an independent interior designer from a major metropolitan area worked on the furniture package with the Campus Interior Designer. The in-house design team initially met with the contracted architecture and design firms to communicate the vision for the Mell Classroom Building, and to convey the lessons learned from the prototypical EASL classrooms (described in the sections above). The in-house design team regularly met with the contracted architecture and interior design firms during schematic design and design development. Conceptual renderings were produced to ensure the vision was captured correctly and to solicit donors (see Appendix W & Figures 14 and 15). Once the bidding process was completed and the construction phase began, the in-house design team regularly met with the independent interior designer and a representative from one of the architecture firms to put together the furniture package and select finishes for the furniture. The in-house design team was able to use their experiences with the two prototypical EASL classrooms to inform decisions made during schematic design, design development, and furniture selection, and could refine the decisions during the construction phase (see Appendix X for construction photographs).

Figure 17. Conceptual rendering of exterior of Mell Classroom Building.

Figure 18. Conceptual rendering of interior of Mell Classroom Building.

Four main types of active learning spaces were implemented into the Mell Classroom Building: active learning classrooms, active learning lecture halls, breakout rooms, and public gathering spaces. These spaces are discussed below.

Active Learning Classrooms. The EASL classrooms can be categorized into two types: EASL and EASL Lite. The classroom sizes vary from supporting 16 students to supporting 72 (see Figures 16 and 17 for two of the classroom layouts). In EASL classrooms, each table pod has a media monitor associated with it. In EASL Lite classrooms, one to two ceiling-mounted projectors and screens are installed in place of the media monitors. These are the only differences between EASL and EASL Lite classrooms, and this was due to budgetary constraints. However, the EASL Lite classrooms were designed so that when the budget becomes available the media monitors can be installed easily and with very little renovation.

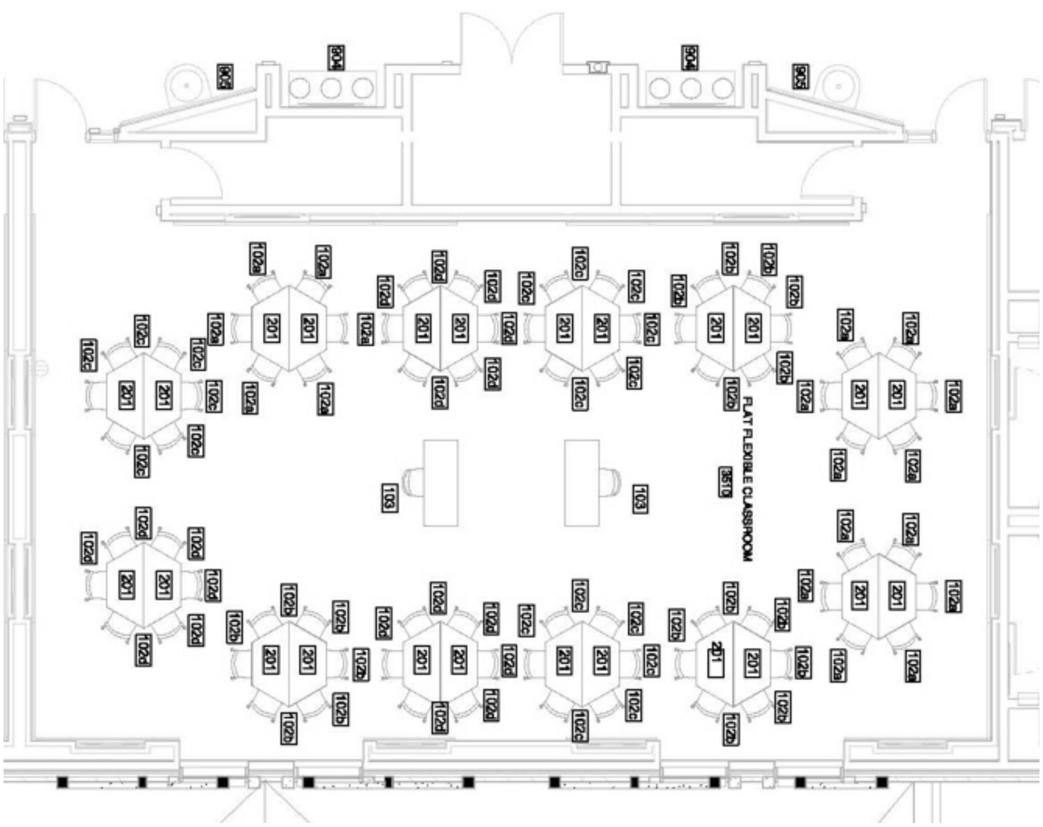


Figure 19. Active learning furniture layout for 72-seat classroom.

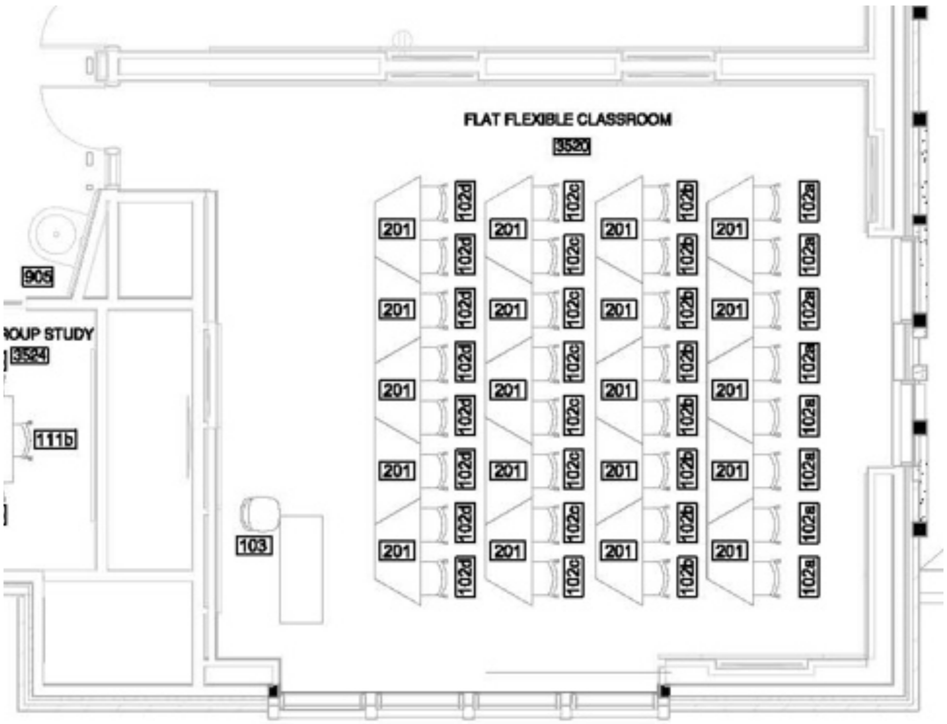


Figure 20. Lecture-style furniture layout for 32-seat classroom.

The furniture chosen for the EASL and EASL Lite classrooms was based on the furniture chosen for the Sciences Center Classroom Building EASL classroom furniture—trapezoidal tables were aligned long edge to long edge to form hexagonal table pods that supported six students each. Both prototypical EASL classrooms included power and data in the table, but it was determined by the interdisciplinary team that if enough power supply was available in the perimeter walls, no power needed to be available at the table. It was also determined by the interdisciplinary team that with the advancement of technology and wireless systems, there was no need to include data at the tables either. This allowed for the tables to be easily moveable and the room to be reconfigured easily. The product selected was the Steelcase Verb tables, chosen because of the rounded corners, which made navigating through clusters of them less dangerous, and the location of legs in the corners, which allowed users to comfortably sit along any of the edges without table legs interfering (see Appendix Y).

The chair chosen for the EASL and EASL Lite classrooms was the Steelcase Shortcut chair (see Appendix Z). It was selected because of its height adjustability, casters, ability to swivel, which allows the user to easily engage in groupwork, and the optional seat cushion. The recessed arm allows for many different shapes of people to comfortably sit in the chair and utilize the elbow rest. A back cut-out allows for airflow, flexibility in the shell, and comfort.

Just as in the prototypical EASL classrooms, color was applied to the space through the chairs and the writable surfaces. In the Mell Classroom Building, the chair color was not incorporated via the poly shell, but rather in the upholstery of the seat cushion. The upholstery color related to the color of the writable surfaces associated with the table pod. Like in the Sciences Center Classroom Building EASL classroom, four colors were chosen and applied to groups of tables; this helped reduce visual clutter in the larger classrooms. The colors chosen for the seat upholstery and the writable surfaces were green, orange, blue, and yellow (see Figure 18 and Appendix AA for installation photographs).

Figure 21. View of installed furniture in the Mell Classroom Building.

Similar to the prototypical EASL classrooms, the writable surfaces were Clarus glassboard, specified because of the ease of maintenance, durability, and the ability to backpaint with any paint color (see Appendix BB). Because writable surfaces are integral to successful active learning spaces (Beichner & Saul, 2003; Bernauer & Fuller, 2017, Dori et al., 2005; Mangram, Haddix, Ochanji, & Masingila, 2015; Ueckert & Gess-Newsome, 2008), writable surfaces were utilized along the perimeter of the wall whenever possible. Students are also encouraged to utilize windows for writable surface, due to a large portion of the classroom walls being windows.

The interdisciplinary team determined in the Sciences Center Classroom Building EASL classroom that the touch screen technology in the media monitors was rarely utilized, and because it was cost-prohibitive, the in-house design team decided to eliminate the use of touch-screen technology. The desire to interact in some way with the media monitor still remained, so the media monitors were placed behind the glassboard, allowing the user to annotate on top of the media monitor without directly affecting it. This was accomplished by building a secondary wall in front of the primary wall and creating a recess in the secondary wall for the media monitor to be installed flush with the face of the secondary wall (see Figure 19). The recess was vented to allow for the heat load of a media monitor. Because the media monitor was flush with the secondary wall, glassboard could be installed with stainless steel standoffs over the media monitor. The glassboard was custom painted to be clear over the face of the media monitor to allow for easy viewing. In the EASL Lite classrooms the same wall construction was built, and the appropriate power and data conduit was installed above the suspended ceiling so that when the opportunity to install media monitors arose, the power and data lines could be easily pulled through. The glassboard in the EASL Lite rooms was fully painted, so when the media monitors are installed, the existing glassboard will need to be relocated elsewhere in the building and replaced with glassboard backpainted with the clear window.

Figure 22. Recess in secondary wall for venting heat load.

The media monitors in the EASL classrooms were tied to the instructional technology and allowed the students to share their screens with their table pod on their dedicated media monitor; the instructor could also simultaneously share a single media monitor's image with all of the media monitors. ShareLink, which is used over Wi-Fi, is the instructional technology utilized in the EASL and EASL Lite classrooms; iOS, macOS, Android, and Windows mobile devices and laptops are supported (see Appendix CC). The instructional technology also allows for overflow sharing of content, so one room with a guest speaker can be connected with multiple other rooms in the building for viewing.

The instructor's station was larger than the instructor's station in the Sciences Center Classroom Building EASL classroom because there were no dedicated closets within each classroom. More IT equipment needed to be housed in the instructor's station. It was typically located near the center of the room along a long wall. A 2'x2' suspended ceiling housed new adjustable LED lighting that was intentionally switched so that some lights could be turned off to reduce glare on the monitors.

Active Learning Lecture Halls. Active learning can occur in large lecture halls, especially if they are intentionally designed. The two identical 166-seat tiered lecture halls in the Mell Classroom Building were designed to support a variety of active learning activities. The fixed tables were designed so that there were two tables per tier. The table on the edge of the tier is narrower than the table in the middle of the tier; the deeper second table allows the first row of students to easily turn around and collaborate with the second row. Power was installed in each of the tiered tables as well. The product selected for the tiered tables was Berco Titan (see Appendix DD).

The chairs selected for the lecture hall were Humanscale World chairs, chosen for their smaller scale while maintaining a generous weight limit, height adjustability, ability to swivel, casters, option to be armless, and option to have a mesh seat and back (see Appendix EE). The small scale and armless option were chosen because of the potential difficulty navigating between two immovable, fixed tables; anything bulky or extraneous would get in the way. Because the lecture hall is intended to be utilized for more active learning, the lack of arms encourages people to assume a more engaged posture, rather than sitting back leisurely in a task chair. The mesh seat and back allow for more airflow around the body, keep liquids from pooling in the seat, and provide a lighter visual across a large room full of seats (see Figure 20 for an installed photo and Figure 21 for a furniture plan).

Figure 23. View of installed furniture in 166-seat lecture hall.

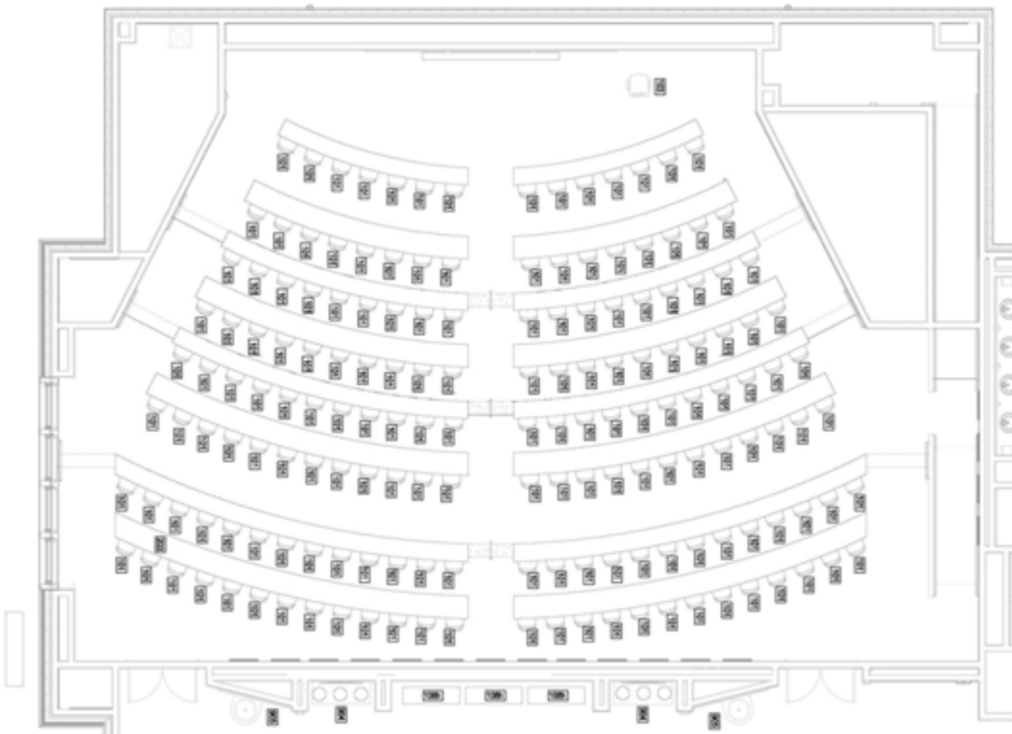


Figure 24. Floorplan of 166-seat lecture hall.

Glassboard is installed at the front of the classroom near the instructor's station, and along the interior wall. Students are encouraged to use the windows on the exterior wall as writable surface.

The instructional technology is primarily located at the front of the classroom. Instructional technology includes a ceiling mounted projector, a projector screen, a document camera, a system that allows a device to be shared with a projector screen (Extron Sharelink), three video cameras for video conferencing and lecture capture, multiple microphones ,and the glassboards.

Breakout Rooms. Providing students a place to gather in small groups and study before or after class, or after hours, is in line with constructivist pedagogy and active learning. Universities are also aware that in order to attract and retain top tier students, multiple types of spaces that support collaboration and active learning must be implemented into a variety of environments on campus, and not just restrict active learning support to formal classrooms (Crosling, Heagney, & Thomas, 2009; Nguyen et al., 2017). Breakout rooms, sometimes called “team rooms” at other universities, are not intended to support individual study, but rather to support collaborative group work; the average capacity for these rooms is four to five, though smaller groups certainly can meet. The 33 breakout rooms included in the Mell Classroom Building vary in size, but on average support six to eight people (see Figure 22 for a typical plan). Each breakout room has tables that allow users to work in large or smaller groups. The table selected is KI Trek, chosen in part to coordinate with the tables in the EASL classrooms (see Appendix FF).

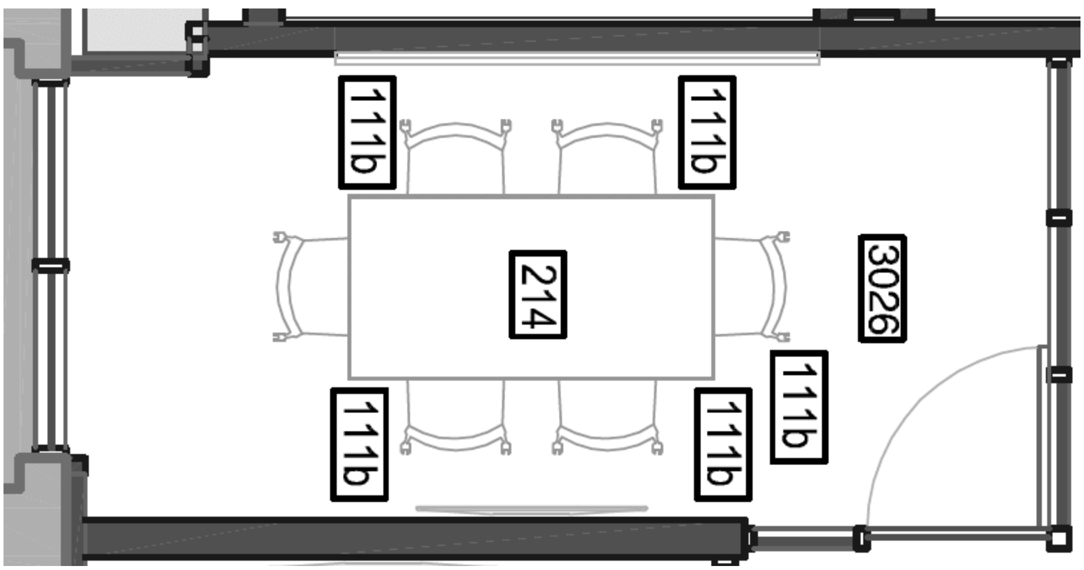


Figure 25. Typical floorplan of breakout room in the Mell Classroom Building.

The chairs, SitOnIt Rio, were selected due to the wide range of poly shell colors, their ability to be adjustable in height, casters, and ability to swivel, which more easily facilitated groupwork (see Appendix GG). The Rio chairs also had a recessed arm, which provided the function of an arm or elbow rest but was recessed enough that larger people could still comfortably sit in the chair. No seat cushion was selected as it was more possible that spills would occur in rooms that were used for studying after hours.

At least one writable surface was included in each breakout room. This allowed the teams to collaborate with a writable surface. The product selected for the writable surface was Steelcase 110 Series, chosen because it was durable, but less expensive than glassboards (see Appendix HH).

Public Gathering Spaces. An integral part to an active learning ecosystem, which is comprised of classrooms and all other active learning spaces within the building, is the public gathering space. A public gathering space is an informal space that gives learners a place to casually meet, collaborate, experiment, hang out, and encounter others randomly (Bardill, Griffiths, Jones, & Fields, 2010; Graetz & Goliber, 2002). As such, the public gathering space also acts as a *third place*. According to Oldenburg's (1989) third place theory, humans need spaces that are not home (first place) or work (second place), but a social place in which to spend time and bond with other people. These places have eight characteristics: they are neutral; they are not ostentatious but rather are somewhat playful in atmosphere; social status does not matter in the space; conversation or collaboration is the primary activity; the space is accessible; the place has *regulars* that frequently hang out; and the space gives you a sense of belonging (Oldenburg, 1989, 2001). Having food or beverage located in a third space is ideal but is not integral. The public gathering space within the Mell Classroom Building is sprinkled throughout the new construction and the renovated library space, but the primary concentration of public gathering furniture is located around the future site of a Panera Bread (see Figures 23-25). At the time of this writing, the final construction is almost complete.

In order to meet different types of needs, work styles, and group sizes, a variety of furniture was selected. There are groups of tables and chairs, bar-height tables and barstools, lounge furniture, banquettes with tables and chairs, and built-in stair seating around the main staircase in the grand atrium (see Appendix II).

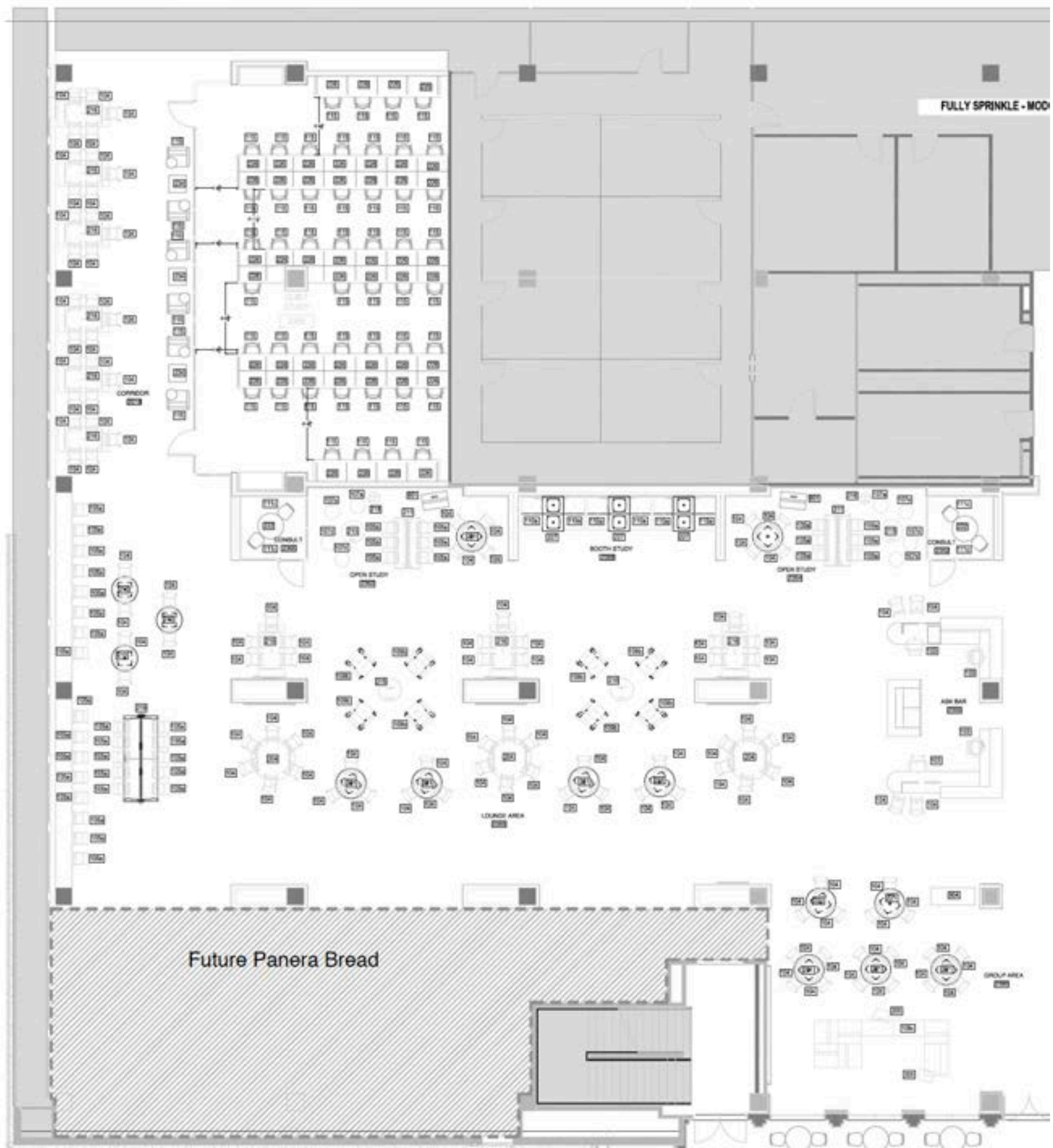


Figure 26. Portion of floorplan of public gathering spaces in the Mell Classroom Building.

Figure 27. View 1 of installed furniture in public gathering spaces.

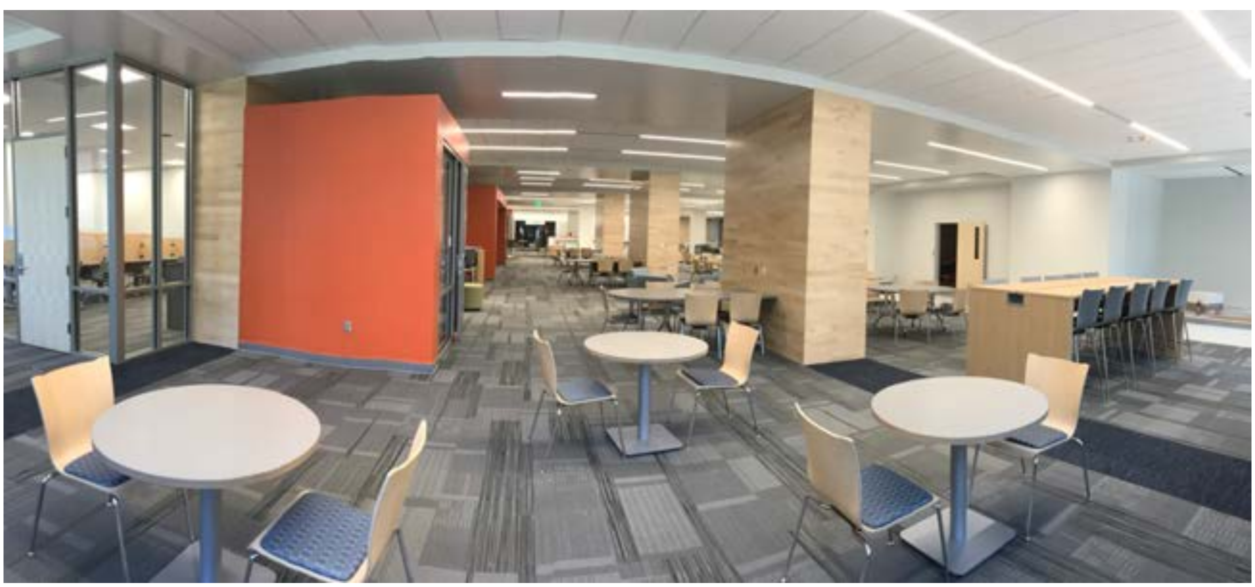


Figure 28. View 2 of installed furniture in public gathering spaces.

Finishes. The finishes chosen for the Mell Classroom Building were selected because of durability, cleanability, and the aesthetic. Carpet was specified for the corridors, classrooms, and parts of the public gathering spaces; the product chosen was a variety of Tandus-Centiva products (see Appendix JJ). The atrium area and parts of the public gathering space were installed with poured terrazzo (see Appendix KK). Porcelain tile was installed in the restrooms and vending machine areas (see Appendix LL). The walls were painted in various field and accent colors to provide wayfinding cues and a cohesive and distinctive aesthetic throughout the building (see Appendix MM). The base was selected to be darker to hide scuffs and normal wear and tear in an actively used space (see Appendix NN).

Data from these design cases were analyzed through an iterative process that progressed from thick description of the cases to discussion of emergent themes.

Discussion

Programming for Active Learning. The process of designing and implementing an active learning classroom versus a lecture style classroom is different. In comparison to a traditional lecture room, there are fewer precedents and research findings upon which to base the design of an active learning classroom. The limits to credible sources from which to inform design decisions may suggest the need for more analytical design thinking, and especially prototyping, in the design process of any individual active learning design project.

In a lecture-style classroom, informed by space planning typicals, the primary programming concerns may involve: 1) locating the front of the room; 2) assessing where will the front-of-room media should be placed; 3) determining how much writable surface will the instructor needs; 4) considering what audio-visual equipment will be installed; 5) determining how many learners does this room needs to support; 6) assessing how many left-handed tablet-arms should be provided.

In an active learning style classroom, where there are fewer space planning typicals available to inform decisions, the programming may involve 1) locating the front of the room; 2) locating the instructor's area in relation to student groups; 3) planning how many learners the room should support; 4) determine how many learners each pod should support; 5) assessing how square feet of table surface each learner needs; 6) assessing how learners will utilize their own devices in the classroom and integrate with the existing instructional technology; 7) ensuring that all pods have equitable writable surface area (understanding that windows, doors, etc. reduce the amount); 8) determining if each pod will have a media monitor, and what capabilities are necessary; 9) planning so that all learners have sightlines to all other learners; 10) assessing space flexibility; and 11) considering what finishes are applied throughout, and whether they sufficiently address acoustics. Active learning style classrooms may have more components to consider and plan for than lecture-style classrooms, and require more time, expertise, and people involved to execute successfully.

Renovating for Active Learning. The process for renovating an existing lecture-style classroom into an active learning classroom is different from designing active learning classrooms in new construction. During a renovation, existing conditions dictate many factors, including the location of the space, size and shape of the room, the ceiling height, the location of doors and windows, the wall type (e.g. concrete block vs. drywall), locations of electrical and data components, the amount of electrical load the room can sustain, and what rooms surround the space. When building new construction, many of the aforementioned factors can be determined by the design team. The Mell Classroom interdisciplinary team was able to determine how many classrooms would be implemented, what size they would be, the ceiling height, how many windows and doors each would have, the wall type, where the electrical and data components would be located, and where the breakout rooms and public gathering spaces were to be located in relation to classrooms.

Interdisciplinary Active Learning Team. Cross-unit collaboration occurred from the inception of the first prototypical project and included a range of stakeholder groups: the provost’s office, the faculty development center, IT, student government, the library, facilities management, design services, and construction services. The variety of experts at the table allowed for multiple perspectives and approaches to contribute, which proved valuable to the process.

The design and construction process of the Haley Center and Sciences Center prototypes allowed the interdisciplinary team to learn how to work together in a lower-stakes environment than they would later experience in designing and building a new classroom building. During the Mell classroom building process, the team regularly met to brainstorm and anticipate problems or challenges before they occurred; some conflicts were circumvented because of the established habit of open communication and collaborative dialogue.

The design goals were more collaboratively developed, informed by perspectives from multiple stakeholders. As a result, users’ needs were integrated holistically and fewer change orders had to be implemented. This approach to design through an interdisciplinary active learning team allowed Auburn to develop a cohesive active learning ecosystem with input from all stakeholder groups.

Rapid Prototyping on an Institutional Timetable. Full scale mockups can be constructed in several way. Sometimes mockups are made with temporary materials such as paper, cardboard, or foam core. Some mockups are made out of prefabricated units in a controlled testing space. In this case, the design team made the intentional decision to build a fully functioning prototype of a classroom. This decision enabled the team to test design performance 1) for a single faculty member and student group across a full semester, 2) between different courses, and 3) between different cohorts in the same course. These tests would begin to establish what worked and what did not specific to Auburn University's needs.

Prototyping with real, rather than simulated, components also allowed the team to implement multiple types of furniture, finishes, and instructional technology in a lower-cost environment, a single classroom at a time, to see how learners, faculty, and staff interacted with them and how well they were used prior to making higher-cost decisions across multiple classrooms.

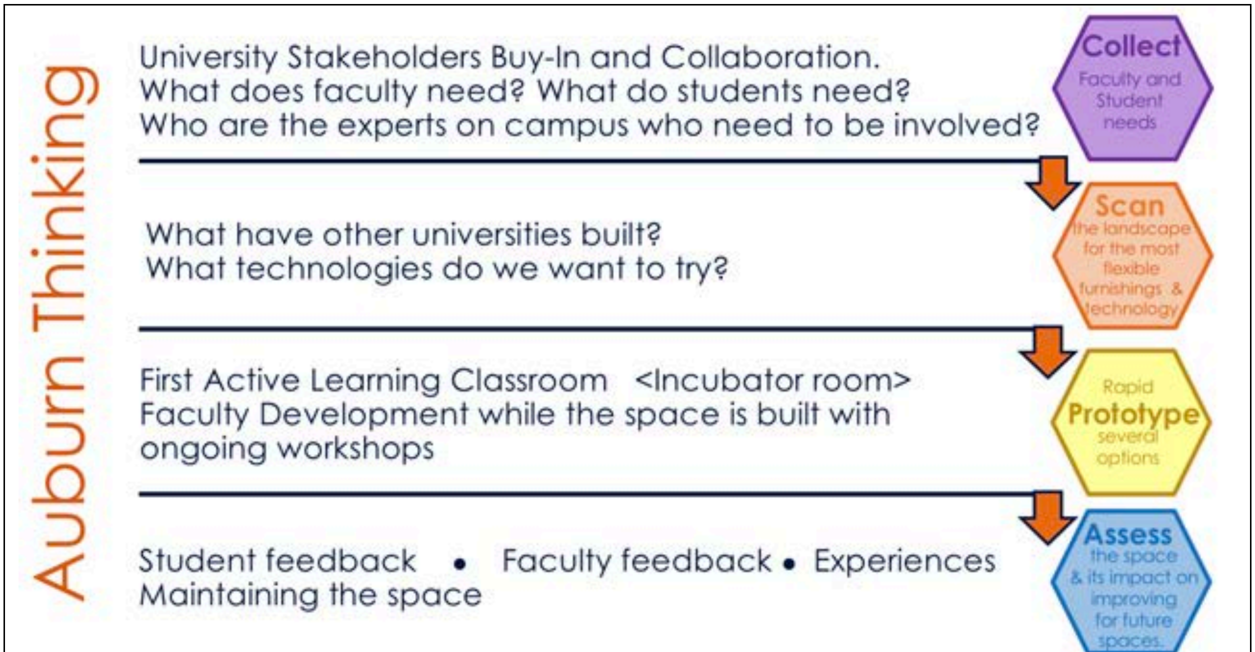
Active Learning Design Take-Aways. The Haley center and Sciences Center prototypes revealed some key take-aways that informed programming changes in the Mell Classroom Building. Media monitor height was adjusted to bring monitors lower, which made the viewing angle more comfortable and ergonomic for a seated user. This lower mounting height also enabled the design team to respond to another user request, which was to be able to interact directly with the screen. At the new, lower height, the monitors were able to be mounted behind a clear, writeable surface – the glassboards. The color saturation of the writeable surfaces throughout the rest of the room was also lowered to improve readability and decrease visual fatigue. The feedback received about pod shape and size informed the furniture choices made throughout the Mell Classroom Building. Furniture arrangements were selected based on their ability to 1) promote conversation between students, 2) provide enough workspace per student in a multi-student configuration, and 3) support good ergonomic fit for a broader average of users.

Co-Developing Space and Talent. The two full-scale prototypes that were designed and implemented prior to the design document phase of the Mell Classroom Building were invaluable tools for simultaneously testing design solutions and developing faculty and staff. The Haley Center and Sciences Center prototypes were used to train faculty and staff in how active learning classrooms work. Training was conducted formally through on-site workshops conducted through the University's Biggio Center for Teaching and Learning. Training was also conducted informally, by providing opportunities for faculty to teach in these active learning classrooms.

Making prototype EASL classrooms available prior to opening the Mell Classroom Building allowed the university to build a cohort of faculty and staff who were comfortable working and learning in new type of environment. Faculty were able to anticipate the opportunities inherent in the new classroom building and test active learning strategies in one of the prototypes before the new building opened. Staff such as Information Technology (IT) specialists, campus maintenance, and other university staff were able to become accustomed to the spaces before dozens became available in the new building. Learners were also able to engage with the room, attend classes, and build awareness among their peers about the new style of learning space.

From Design Thinking to Auburn Thinking. An *Auburn Thinking* model, developed after these projects were completed, provides a framework that could be applied to a variety of situations (Boyd, Gatlin, McCall, & Kuhn, 2016). The Auburn Thinking model is adapted from the Design Thinking model; the five-step process is compressed to four: collect, scan, prototype, and assess (Boyd et al., 2016). The *empathize* step was absorbed into the *collect* step, as the interdisciplinary team empathized with the users while collecting information about their needs.

The team determined that the *define* and *empathize* phases were deeply intertwined, and that the process was both expedited and more beneficial when the two were identified as one phase. The Auburn Thinking model is described in Figure 27, below.



Source: Boyd, D., Gatlin, A.R., McCall, C.P., & Kuhn, W. (2016). *Let them Build It: How Design Thinking Empowers Collaboration.* Presented at Design Interface: Creating Spaces to Experience Learning Conference, Knoxville, TN.

Figure 29. Auburn Thinking framework

The collaborative effort of the interdisciplinary team that worked on both prototypical projects and the new building proved invaluable to achieving the desired outcome. The team was also able to collectively brainstorm solutions to problems before they occurred, anticipate user needs, and troubleshoot issues as they came up. The project differed from typical projects at this institution in that it utilized a cross-unit team throughout the duration, rather than passing the project from one unit to another.

A further refinement of the Auburn Thinking process is shown in Figure 30. In this refinement, the *collect* and *scan* phases combine to create *analyze*, a step in which the interdisciplinary team analyzes user needs and explores available options for furniture and technology simultaneously.

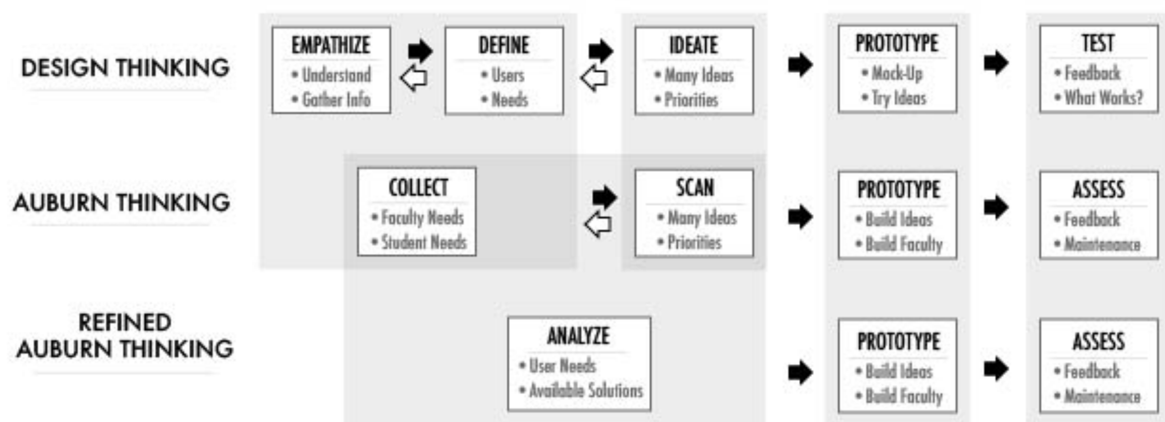


Figure 30. Further refinement of Auburn Thinking framework.

Another recommendation is to prototype a space before scaling up beyond one classroom. By engaging users in a physical space, challenges were able to be identified and addressed differently than if a cardboard or virtual reality prototype had been used. The space is also still an active classroom, providing utility to the university long after a cardboard prototype would have been discarded. What follows next is an analysis of the research design.

Analysis of the Research Design

Generating a rigorous design case and generating a design case that holds value for practicing designers can often be mutually exclusive (Smith, 2010). However, Smith (2010) asserts that this does not have to be the case—that rigor is not binary, but rather is arbitrated along a continuum, and that "design case utility is not contingent on its rigor, but that increasing rigor heightens the likelihood that it will be useful across a broader range of contexts" (p. 10).

Rigor, Validity, and Trustworthiness. In design case studies, trustworthiness encompasses the more conventional standards of validity and reliability (Lincoln & Guba, 1985). They state that the fundamental concern of trustworthiness is establishing how the author "persuade[s] his or her audiences (including self) that the findings of an inquiry are worth paying attention to, worth taking account of" (Lincoln & Guba, 1985, p. 290).

According to Smith (2010), there are several ways to establish trustworthiness in design case studies. These include: prolonged engagement with the phenomenon, data triangulation, member checks, and thick description. This design case study maps to each of these elements of trustworthiness. Because the author was part of the design team, she was engaged in the design process for an extended period of time. She was part of the interdisciplinary team—not from its inception, but very close to it. She had an active role in design decisions that were made on the Haley Center and Sciences Center Classroom Building EASL classroom projects as well as on the Mell Center Classroom Building project. Because of this, much of the information included in this document was obtained due to her prolonged engagement with the design process.

Obtaining data from multiple sources is almost always necessary to establish trustworthiness in a design case (Smith, 2010). Multiple sources of data were triangulated and used to inform this design case: they include the author's firsthand knowledge and experiences, the construction documents for all three projects, the notes, sketches, and process drawings that the author made during the design process of all three projects, and emails and personal communications with interdisciplinary team members and stakeholders. These were referenced and cross-checked to see where they overlapped, where they diverged, and to reinforce the author's firsthand knowledge of the sequence of events, major components, decision makers, members of the team, and their individual contributions. For example, emails and meeting notes were reviewed in detail to establish the sequence of events and participants and cross-checked against the construction documents to confirm the outcome, and notes, sketches, and process drawings were cross-checked against emails and meeting notes to confirm the thought process and intentions behind each iteration of the designs. This design case study is authored by a single member of the interdisciplinary team, so the data were interpreted through her personal biases.

Because this design case study is written by a single member of the interdisciplinary team, the author asked several members of the team to verify certain anecdotes, facts, and assumptions; this included the process for determining that power and data were not necessary in the Mell Classroom Building tables and process by which the Sciences Center 118 classroom renovation project came about. One of the primary members of the interdisciplinary team, the CLA IT Specialist, who is now the Mell Classroom Building Coordinator, provided feedback on a draft of the case. The main items that she addressed included terminology adjustments (i.e. changing "committee" to "working group"), suggestions for reorganization, adding information about faculty involvement in the Sciences Center classroom renovation, and correcting the language used to describe the informational technology. She referenced her own files and emails to confirm accuracy where necessary. By implementing member checking, the author intended to ensure to the best of her ability that the design case is an accurate depiction of the interdisciplinary team's experiences.

The author used thick description to describe the design process and the design features to allow the reader interpret the information and to transfer it to their specific situations (Ponterotto, 2006). The amount of detail provided coupled with the context, allows the reader to interpret the cases in a way that allows them to see the cases' utility (Schwandt, 2001). The additional information in the appendices, including furniture specification information, design diagrams of the three projects, and photos of the completed spaces, contributes to the thick description, and provides thick detail along with context, which is also provided in the cases. By dovetailing several methods to assert trustworthiness, the rigor and utility of this design case are elevated.

Limitations. This design case study is the work of a single individual on an interdisciplinary team. As such, the processes portrayed are filtered through her bias. There were no empirical studies examining the efficacy of the EASL classrooms versus traditional lecture-style classrooms. Another limitation is access to data. There were meetings that the author did not attend, and meeting notes that the author was not privy to. There were also drawings and iterations of drawings that the author did not have access to, either during the time of the design projects or post-hoc. The author also did not interview any of the design team members for any of the case studies.

One of the assumptions is that active learning is a preferred teaching method. This is informed by the literature, which supports the efficacy of active learning styles (Bernauer & Fuller, 2017; Miller & Metz, 2014; Mumtaz & Latif, 2017). The assumption is that the reader is interested in this topic.

There are also limitations regarding the choice of the Design Thinking framework utilized in the Haley Center 2213 and Sciences Center 118 case studies. Incorporating other versions of the Design Thinking framework than only the Stanford d.school version (for example: Brown, 2009; Cross, Dorst, & Roozenburg, 1992; Lietka, 2000; Rowe, 1987) could have produced a different result.

Time was a limitation for this study. Because this research was conducted as part of a doctoral problem, there were significant time factors, including the time allocated for analysis.

This was not a multi-year study, and thus does not report results from several years of post-occupancy evaluation, though that is a possibility for future research, discussed later.

Auburn's specific approach to implementing active learning spaces may not transfer to another institution's needs, desires, and approach, but regardless, appropriately prioritizing goals and desired outcomes to active learning spaces is critical. By establishing both the long and short term objective for active learning spaces, Auburn was able to incrementally achieve the overall goal: open an active learning classroom building that met the needs of the users.

Chapter 5: Conclusion

Learning spaces in higher education are beginning to transition from the more traditionally-based lecture-style approach to a more active learning approach (Chickering, 1987; Kibble, Bellew, Asmar, & Barkley, 2016; Prince, 2004; Srinath, 2014). The goals of education as outlined by Perkins (1991), "retention, understanding, and active use of knowledge and skills" (p. 18), and the shift from behaviorism to cognitivism to constructivism, support this move from lecture-style to active learning-based classes (Applefield & Huber, 2001; Cooper, 1993). Constructivist theory dovetails with active learning in that constructivism posits that knowledge is constructed by the individual through experience and contemplation, and that it is an active process with which the learner engages (Applefield & Huber, 2001; Jonassen, 1991; von Glaserfeld, 1988; Vygotsky, 1978).

Active learning, a type of constructivist learning, engages learners with each other and with the content in the classroom; deep, meaningful learning can occur in the active learning process as the learners explore ideas, compare knowledge, reflect, and participate actively in problem-solving (Dadach, 2013; Dewey, 1938; Gleason et al., 2011; Hein, 1991; Vygotsky, 1978). This approach deviates from the more traditional lecture-style model of teaching, where learners passively sit and receive information during class (Miller & Metz, 2014). The lecture model can easily allow learners to avoid deep, meaningful learning, and instead rely on the "binge and purge" method of learning, in which learners intensely and rapidly acquire information for a test, regurgitate the information, and then often forget much of the information—possibly leading to a lack of meaningful learning (Gleason et al., 2011; Mumtaz & Latif, 2017).

As pedagogy and content delivery in education changes, the built environment that supports those activities must change as well (Beichner & Saul, 2003; Dori et al., 2005; Oblinger, 2005). In lecture-style classrooms, there is almost always a defined front of the room where the instructor resides, any writable surface is often only located at the front of the room for the instructor, the furniture is often aligned in rows facing forward, and the furniture is often oriented towards the individual (Park & Choi, 2014). In active learning classrooms, there is often no distinct front of the room; many writable surfaces may exist throughout the space, and furniture is often oriented in pod-like configurations for groupwork (Beichner & Saul, 2003; Dori et al., 2005). Two models for active learning classrooms that were radical in the way they defined characteristics and established viability for effectively changing the built environment were SCALE-UP (Student-Centered Active Learning Environment with Upside-down Pedagogies), originating at North Carolina State University, and TEAL (Technology Enabled Active Learning), originating at the Massachusetts Institute of Technology (Beichner, 2008; Beichner & Saul, 2003; Dori et al., 2005). These models changed the perception of what an active learning classroom could look like and function as, and as such became inspiration for many classrooms, including the classrooms at Auburn University discussed above.

Human-centered design and the Design Thinking approach gives us a tactic for tackling the renovation or creation of active learning spaces (Brown & Long, 2006). Human-centered design, which places the user at the center of the design solution, gives us empathy for the user, which in the case of the case studies discussed here, includes the students and the faculty who use the space. Human-centered design and the Design Thinking framework was used to explore two active learning design and construction projects on Auburn University's campus: Haley Center 2213 and Sciences Center 118.

In the Haley Center 2213 and Sciences Center 118 case study, the process for ideating, developing, designing, and implementing the first formal active learning classrooms on Auburn University's campus was described. These design projects were renovations that occurred in existing buildings and converted lecture-style classrooms into active learning classrooms, complete with new furniture, writable surfaces, and instructional technology. These classrooms were developed at the first EASL (Engaged Active Student Learning) classrooms on Auburn's campus, and served as prototypes for the Mell Classroom Building, an active learning classroom building.

The second case study described the process for the inception, development, design, and construction of the Mell Classroom Building. The project team used information and lessons learned from the Haley Center 2213 and Sciences Center 118 active learning classroom projects to more effectively design the most appropriate active learning classroom building for Auburn University's campus.

There were several key findings from these case studies. The first is to involve an interdisciplinary team as early in the design process as possible. The collective effort to empathize, define, and ideate problems and brainstorm potential challenges proved invaluable to

Auburn’s process, both on a small scale with the prototypical projects, and on a large scale with the new active learning building. By working collaboratively on the projects from inception to completion, rather than passing the project from department to department as is typical in university construction processes, the final outcome dovetailed with the original intent: to create active learning spaces that supported all of the users.

A second finding is the importance of testing prototypes to ensure the best possible outcome. Without undertaking iterative process of empathizing, ideating, defining, prototyping, and testing that occurred Haley Center 2213 and Sciences Center 118, the Mell classroom Building would have been a much different structure. The lessons learned from one project to the next were invaluable and assisted in making the Mell Classroom Building an overwhelming success. Additionally, the Haley Center and Sciences Center classrooms were able to act as a training ground for faculty while the Mell Classroom Building was being designed and built. They allowed all of the potential users of the new building (learners, educators, staff, etc.) to have an opportunity to engage with the new space typology, have input into what worked and what did not, and provided a space for faculty development to occur. This way, when the new building opened active learning classrooms weren’t completely unfamiliar, which helped with the faculty and students’ transition to the new learning spaces.

A third finding is the need for flexibility in the design of active learning classrooms due to the rapid changes in technology, student learning, and content delivery. When designing an active learning classroom or classroom building, one of the most vital components to the design is the ability to change as needs evolve. This could mean that the furniture is mobile and easily reconfigured, or it could mean that the walls were prepped to install technology behind glassboards in a few years.

New buildings such as the Mell Classroom Building are intended to last decades, but curriculum and teaching styles change, and technology evolves rapidly (NLII White Paper, 2004; Oblinger, 2005; Park & Choi, 2014). The built environment has to be able to support these changing needs in order to remain effective. The way that we interact with technology now is very different than even the way we interacted with it when Haley Center 2213 was designed. New devices and ways of integrating technology into everyday life occur rapidly, and it is difficult to predict what will be invented next or know how it will affect learning. Designing learning spaces to be as flexible as possible is key, as we design spaces that should adapt to future technology and user groups.

Currently, Millennials are the target learners for these newly design active learning spaces, but as Millennials age and become the educators and Generation Z becomes the learners, the space may need to function differently as new technology becomes available and integrated. Technology may become so integrated that it is a part of the human learner; another possibility is that humans become so inundated with technology that they need to incorporate technology free zones in our learning spaces and create oasis spaces. These are all are a few challenges for interior designers, architects, design educators, faculty developers, IT specialists, and Design Thinkers involved in institutional design.

Future Research

Many opportunities for research beyond these case studies is possible. The field of active learning environment research is becoming more active as more institutions adopt active learning practices and seek better learning environments.

Beyond the Classroom. The first theme that comes to mind is thinking beyond the classroom and into the active learning ecosystem. Active learning does not only occur in the classroom; it can occur anywhere and is enhanced if this system of learning is supported with the built environment (Miller & Metz, 2014). Auburn built the Mell Classroom to be a holistic ecosystem. The classrooms spill out into corridors that are wide enough for impromptu gatherings, and public gathering spaces are implemented throughout the building, connecting classrooms to breakout rooms. The public gathering spaces were modeled after the learning commons housed in the library and the lounge spaces in the student center. Both of these spaces are almost always at capacity and are popular meeting and study spaces for students across the university. Connections between these spaces could be further explored.

The Power of Team. Another theme is the interdisciplinary team: the collaboration of the interdisciplinary team was effective for Auburn's process, both in small-scale renovations and a large-scale new building. This model could be implemented in other situations. There may also be value to incorporating an interdisciplinary team similar to this one in other university construction projects besides active learning classrooms and classroom buildings. By identifying each member's specific role and capturing their reflections on the process, it's possible that a framework could be created with recommendations for future team building. The benefits of the collaborative effort and the team's approach to problem solving could also warrant further exploration.

Build the Space, Build the People. Building people while building infrastructure is another theme that could warrant further examination. While they were designing and constructing all three active learning classroom projects, the interdisciplinary team was also working to train faculty to teach in the spaces, and to redesign their courses so that they were prepared to teach actively. Faculty are as much a part of the active learning ecosystem as the built environment is, and by building both simultaneously the interdisciplinary team approached the projects from a more holistic viewpoint than most classroom construction projects and created a culture of engagement and excitement about teaching and learning.

Active Learning Ecosystem. Other parts of the active learning ecosystem include the culture of the students, the financial support available from the various departments and the institution, and the implementation of new active learning styles. These components all represent soft parts of the institution's culture and attitude toward active learning. Auburn University wanted to implement more active learning spaces and dedicated space, time, expertise, training, and money to achieve that goal. This may not be the case in other institutions where the culture is more hostile towards active learning, or where the faculty and the institutional vision do not align. Further exploration into the soft parts of the active learning ecosystem and how they affect and are affected by the institutional culture of Auburn University could be an area of future research.

Benefits of Prototyping. The process of prototyping full-scale classrooms was expensive but was integral to Auburn's process for determining what worked with the institutional culture and what did not. Prototyping full-scale classrooms may be a model that other universities should consider. While cardboard mock-ups and virtual reality may be able to simulate what engaging with an active learning space is like, building a prototype that all users can interact with over a prolonged period of time may be more useful than a temporary mock-up or virtual reality experience. Research into the differences and outcomes of the different types of prototypes available is a future possibility.

Within the Classroom. Interviewing faculty who have taught classes in both lecture-style classrooms and in the new active-learning classrooms and listening to their perceptions, hearing how they restructured their classes, and to what efficacy is another opportunity for future research within active learning research.

Park and Choi (2014) address the discovery of golden and shadow zones in lecture-style classrooms, where the learner's location in the room affects their learning outcomes. Little research has been done to see if active learning classrooms have such zones. Perhaps a different type of zone exists but has the same detrimental effect on a portion of learners.

Considering the Users. The primary learner considered in the planning of these classrooms is the Millennial. In 2022 the last Millennials will be 18, and a new generation called Generation Z (Gen Z) will be entering college (Bump, 2014). There is little literature available on the learning style of this generation, and how they interact with the built environment, with technology, or with each other. A more long-term research idea is to begin investigating how these learners are currently interacting with their learning environments and begin to track changes in the way those environments shift to accommodate new learning styles and technology.

The primary educators considered in the design process of the active learning spaces were not digital natives; that is, they did not grow up with technology as ubiquitously embedded in life as Millennials. But more and more Millennials are getting older and becoming educators themselves. Learning spaces may need to be reassessed and change to accommodate the needs of a new user group, the Millennial educator.

Building Utility. Conducting a post-occupancy evaluation on the Mell Classroom Building would be a long-term future research. In its first year of operation, building was popular and highly utilized, but it was also a new building that still had the "shiny factor." Assessing the building usage over a few years both during and after regular operating hours and seeing how the public gathering spaces, breakout rooms, and classrooms after hours are utilized by students, faculty, and staff may prove informative.

These are just a few opportunities for future research. Many more come to mind, and since the Mell Classroom Building was built to last for 50-100 years, many more will likely surface.

The case study of the Mell Classroom building reveals a long and iterative design process that was informed by a series of related design cases. The process, including the series of cases described herein, began in 2011 and concluded with the Mell Classroom building opening in 2017. This six-year-long process provided an opportunity for the interdisciplinary active learning team to develop, practice, and refine what came to be known as EASL and the Auburn Thinking model. Like the SCALE-UP and TEAL models, Auburn's model for the contemporary active learning environment will be reviewed and assessed by other researchers. Critique, and time, will reveal the flaws of the EASL model, which will in turn reveal new directions for research and new challenges for the future of engaged, active student learning experiences.

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Comprehensive List of Data

<u>Haley Center 2213</u>

Data Related to Project Management

- Project Initiation Form
- Initial Scope Document + 2 revisions
- Conceptual Budget and 3 budget revisions
- Meeting notes from: 9/15/12, 11/8/12, 12/3/12, 1/15/13,2/21/13, 3/14/13, 4/23/13
- Design and Construction Milestone Schedule
- Actual Schedule
- Purchase Requisitions
- Itemized proposals for all furniture and glassboards (ordered 5/1/13)

Data Related to Design and Design Process

- Existing condition & construction photos
    - 7 from 9/24/12
    - 38 from 3/20/13
    - 2 from 4/23/13
- 1 full set of As-Built Construction Documents
- 1 full set of Construction Documents
- 8 iterations of Furniture Plans
- Finalized Furniture Floorplan
- Final installation photos: 8/16/13

Personal Communications

- 142 with keyword "12-239"
- 96 with keywords "Haley 2213"
- 304 with keywords "incubator classroom"
- 3 with keywords "incubator furniture"
- 148 with keywords "Haley active learning"
- 24 with keywords "Haley EASL"
- 3 with keywords "Haley engaged active student learning"
- 19 with keywords "new classroom in Haley"
- 16 with keywords "Haley Charles Rogers"
- 207 with keywords "Haley Contina McCall"
- 392 with keywords "Haley Wiebke Kuhn"
- 61 with keywords "Haley Greg Perkins"
- 38 with keywords "Haley Debbie Caldwell"

**note: the author conducted a manual search via email archives to ensure that emails were not counted twice. A limitation of this method of search is that the author is human, and even with copious note taking may have miscounted during a keyword search.*

Science Center

Data Related to Project Management

- Project Initiation Form
- Initial Scope Document with 1 revision
- Conceptual Budget with 1 revision
- Meeting notes from: 10/14/13, 12/9/13, 1/8/14, 1/15/14, 1/22/14, 1/29/14, 2/5/14, 2/12/14, 2/19/14, 2/26/14, 3/5/14, 3/12/14, 3/19/14, 3/26/14, 4/2/14, 4/9/14, 4/16/14, 4/23/14, 5/14/14, 6/11/14, 7/16/14
- Design and Construction Milestone Schedule
- Actual Schedule
- Purchase Requisitions
- Itemized proposals for all furniture and glassboards (ordered 4/28/14)

Data Related to Design and Design Process

- Existing condition & construction photos
    - 20 from 6/11/14
    - 2 from 8/8/14
    - 18 from 8/11/14
    - 60 from 8/17/14
    - 13 from 8/20/14
    - 7 from 8/27/14
- 1 full set of As-Built Construction Documents
- 1 full set of Construction Documents
- Construction Site and Punch List Photographs
    - 20 from 6/11/14
    - 2 from 8/8/14
    - 18 from 8/11/14
    - 60 from 8/17/14
    - 7 from 8/27/14
- 8 iterations of Furniture Plans
- Final installation photos
    - 14 from 8/26/14

Personal Communications

- 99 with keywords "SCC 118"
- 5 with keywords "118 EASL"
- 188 with keywords "Sciences Center 118"
- 365 with keyword "14-014"
- 93 with keywords "SCC EASL"
- 82 with keyword "EASL"
- 37 with keywords "new classroom SCC"
- 12 with keywords "active learning SCC"

- 121 with keywords “SCC Contina McCall”
- 79 with keywords “SCC Wiebke Kuhn”
- 45 with keywords “SCC Greg Perkins”
- 38 with keywords “Haley Debbie Caldwell”

**note: the author conducted a manual search via email archives to ensure that emails were not counted twice. A limitation of this method of search is that the author is human, and even with copious note taking may have miscounted during a keyword search.*

<u>Mell Classroom Building</u>

Conceptual Project Vision Data

- 33 Conceptual 3D Color Renderings

Data Related to Project Management

- Project Initiation Form
- Initial Scope Document
- Budget
- Meeting notes from: 11/2/11, 9/11/12, 10/4/12, 10/8/12, 10/18/12, 10/20/12, 10/24/12, 10/25/12, 11/29/12, 12/7/12, 12/12/12, 1/7/13, 1/9/13, 1/14/15, 1/23/13, 2/1/13, 2/8/13, 2/15/13, 2/22/13, 3/6/13, 3/20/13, 4/3/13, 4/8/13, 4/24/13, 5/22/13, 6/19/13, 7/25/13, 8/9/13, 8/21/13, 8/26/13, 8/28/13, 9/5/13, 9/25/13, 10/2/13, 10/9/13, 10/30/13, 11/12/13, 11/25/13, 6/10/14, 6/11/14, 6/18/14, 6/30/14, 7/1/14, 7/7/14, 7/8/14, 7/17/14, 7/28/14, 7/30/14, 7/31/14, 8/14/14, 9/16/14, 9/17/14, 10/8/14, 10/24/14, 10/29/14, 10/30/14, 11/03/14, 11/11/14, 12/2/14, 12/3/14, 12/10/14, 1/9/15,1/20/15, 4/28/15, 5/27/15, 6/18/15, 12/7/15, 1/30/16, 2/11/16, 3/9/16, 4/18/16, 6/20/16, 6/21/16, 11/8/16, 1/10/17, 1/27/17, 3/3/17, 3/4/17, 3/16/17, 5/17/17, 5/26/17, 5/30/17, 6/2/17, 6/8/17, 6/22/17, 7/5/17, 7/11/17
    - Summary of Scheduled & Regular meetings for Dec. 2015-July 2017, including required and optional attendees, objectives, and list for daily coordination, OAC meeting, and quarterly executive meetings.
- Design and Construction Milestone Schedule
- Actual Schedule
- Coordination Items Checklists from: 9/1/16, 9/7/16, 9/14/16, 9/19/16, 10/6/16, 10/13/16, 1/12/17, 1/19/17, 5/25/17, 6/1/17, 6/8/17, 6/15/17, 6/22/17, 6/29/17, 7/6/17, 7/28/17, 8/10/17.
- Furniture Tracking Spreadsheets from: 1/17/17, 2/17/17, 2/21/17, 2/24/17, 3/9/17, 3/16/17, 3/23/17, 3/24/17, 3/29/17, 4/4/17, 4/6/17, 4/7/17, 4/12/17, 4/13/17, 4/20/17, 5/3/17, 5/5/17, 5/10/17, 9/22/17
- Purchase Requisitions
- Itemized proposals for all furniture and glassboards (ordered 2/22/16, 2/6/17, 2/9/17, 3/7/17, 3/20/17, 3/27/17, 4/12/17, 5/10/17, 5/18/17, 5/30/17, 6/1/17, 7/20/17, 8/11/17, 9/28/17)

Data Related to Design and Design Process

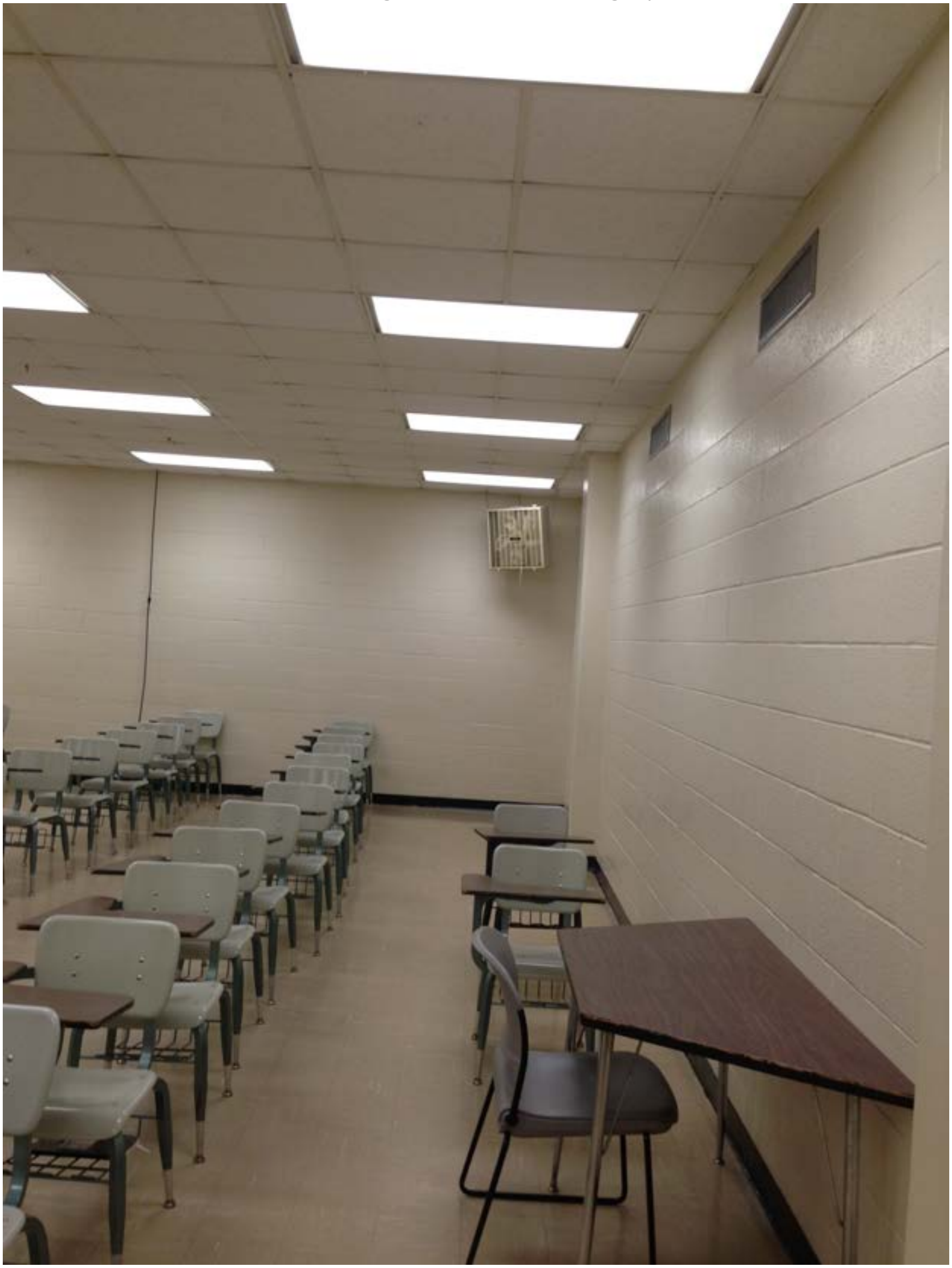
- 3 Site Plans
- 1 full set of Construction Documents
- Construction Site and Punch List Photographs
  - 3 from 3/9/17
  - 37 from 5/26/17
  - 23 from 6/27/17
- 3 iterations of Furniture Plans
- 4 iterations of Furniture Specification Packages from: 1/27/17, 2/9/17, 4/3/17, 5/1/17
- 1 Final Furniture Plan
- 4 iterations of Furniture Installation Plans from: 5/30/17, 6/8/17, 6/22/17, 7/18/17
- 1 furniture Maintenance Binder
- Final installation photos
  - 21 from 8/20/17
  - 32 from 8/24/17

Personal Communications

- 527 with keywords "Mell Classroom Building"
- 592 with keyword "Mell"
- 141 with keywords "Mell EASL"
- 349 with keyword "11-209"
- 418 with keyword "Mell@RBD"
- 145 with keyword "active learning building"
- 78 with keyword " new classroom building"

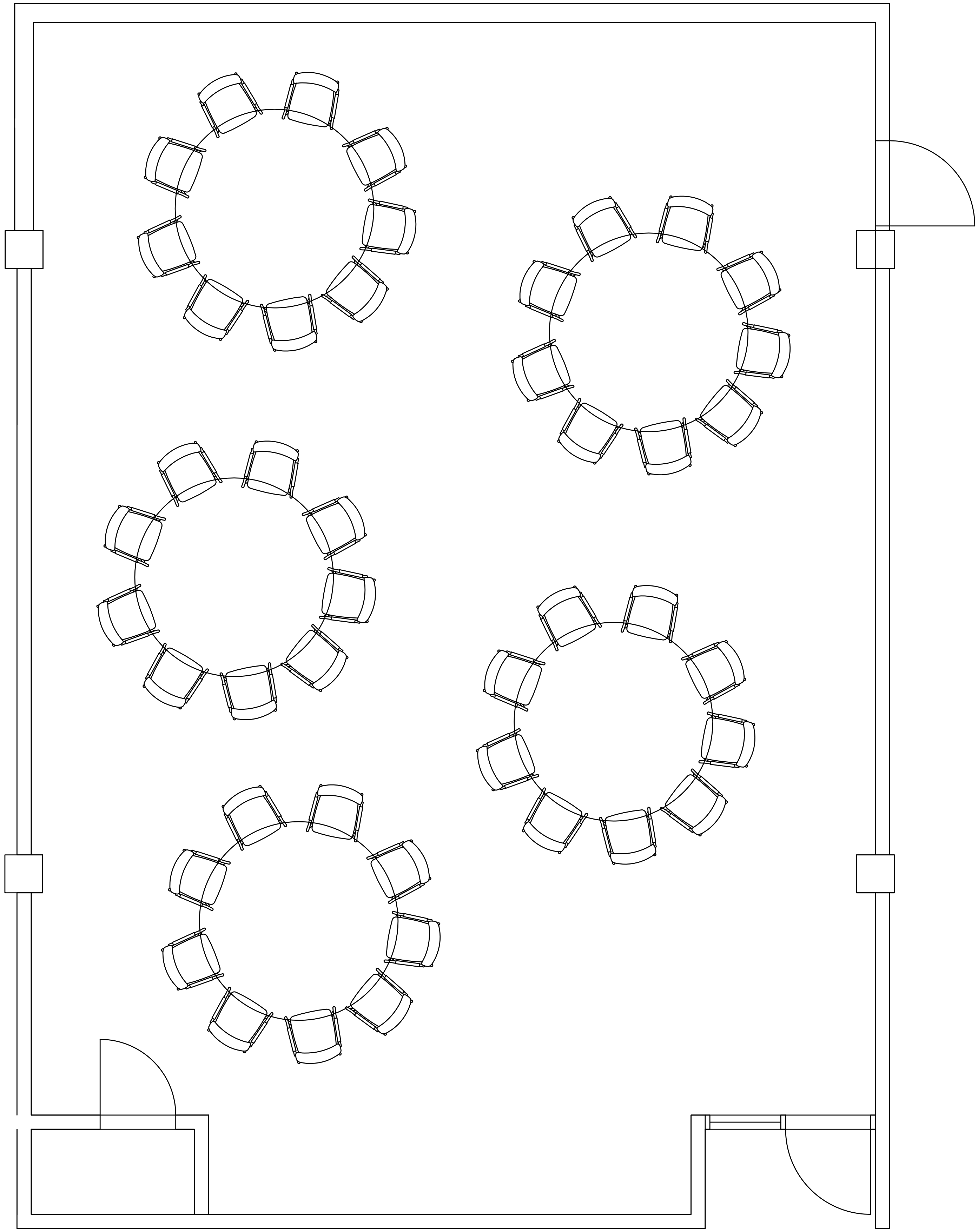
**note: the author conducted a manual search via email archives to ensure that emails were not counted twice. A limitation of this method of search is that the author is human, and even with copious note taking may have miscounted during a keyword search.*

Existing Conditions Photographs



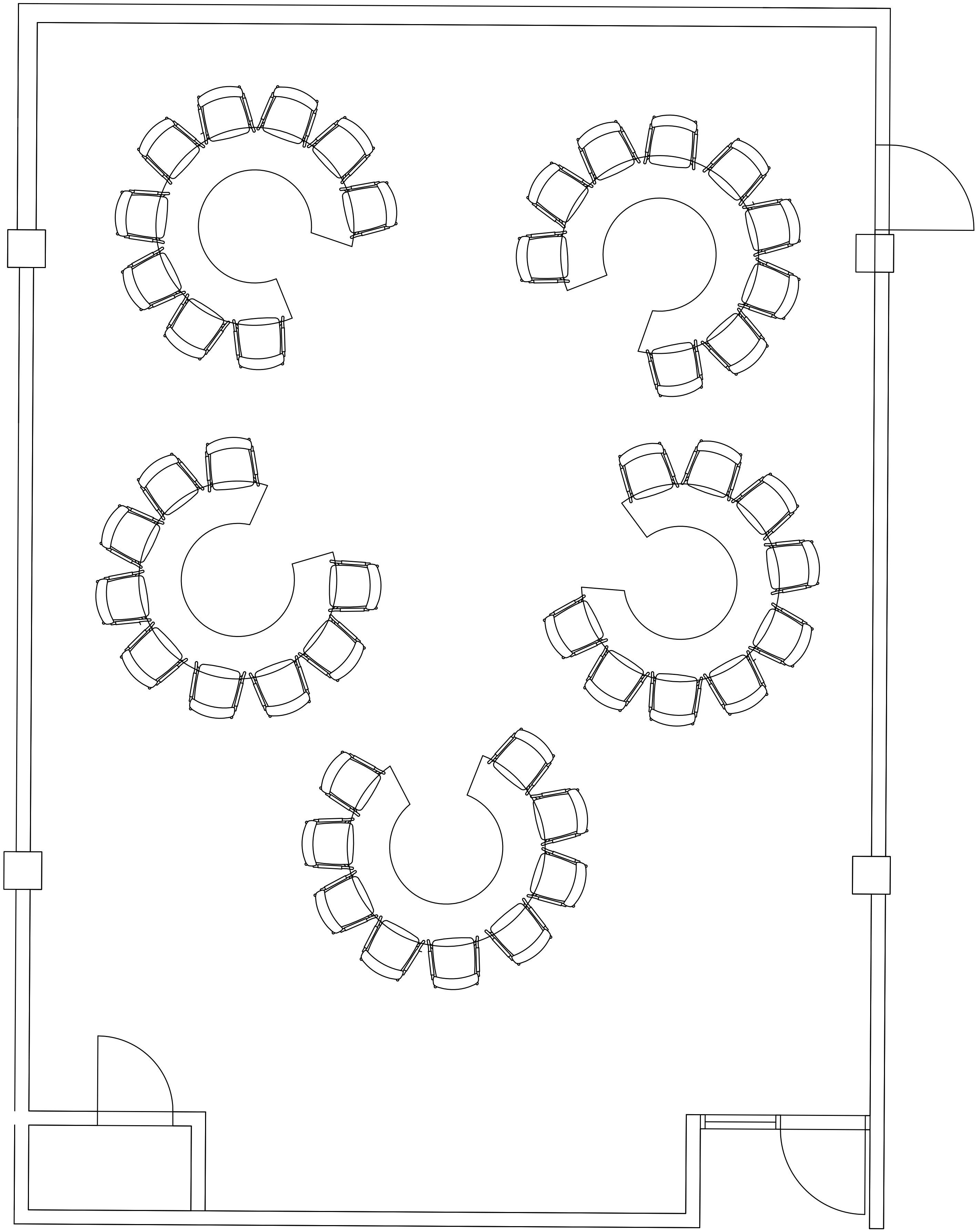
Haley Center 2213 Existing Conditions Photo – 3/20/13


Haley Center 2213 Existing Conditions Photo – 3/20/13



OPTION 1

2213



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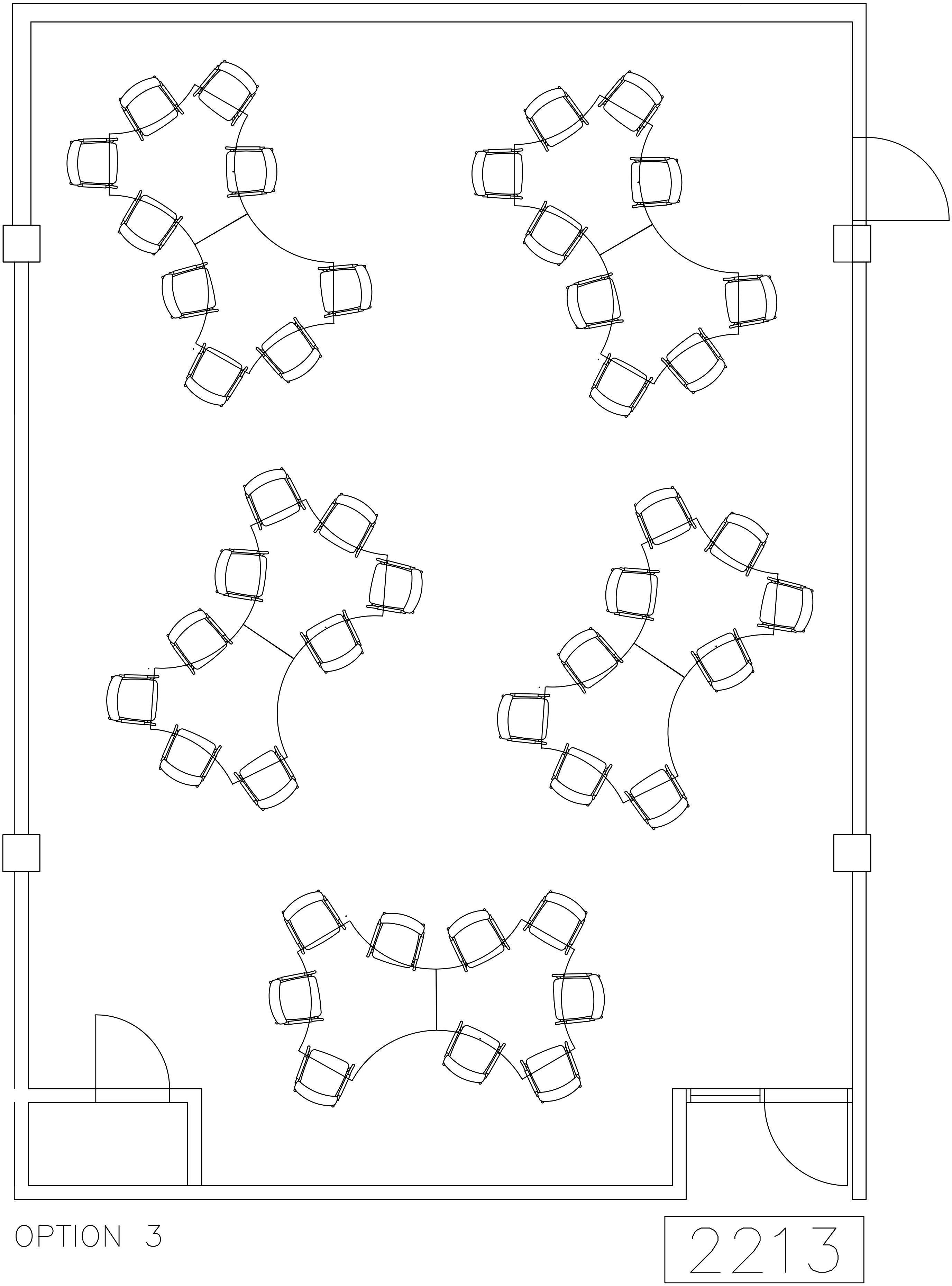
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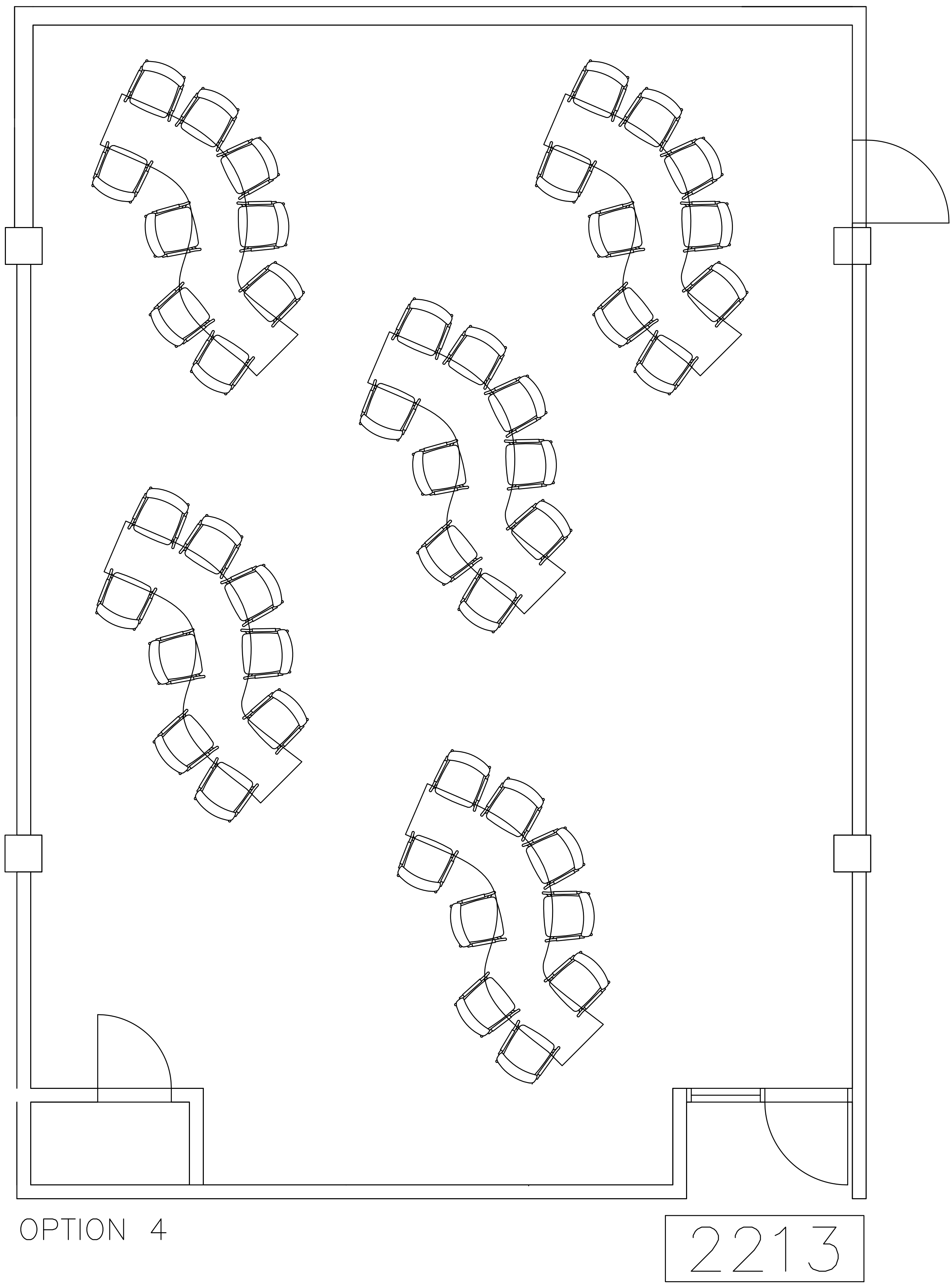
2213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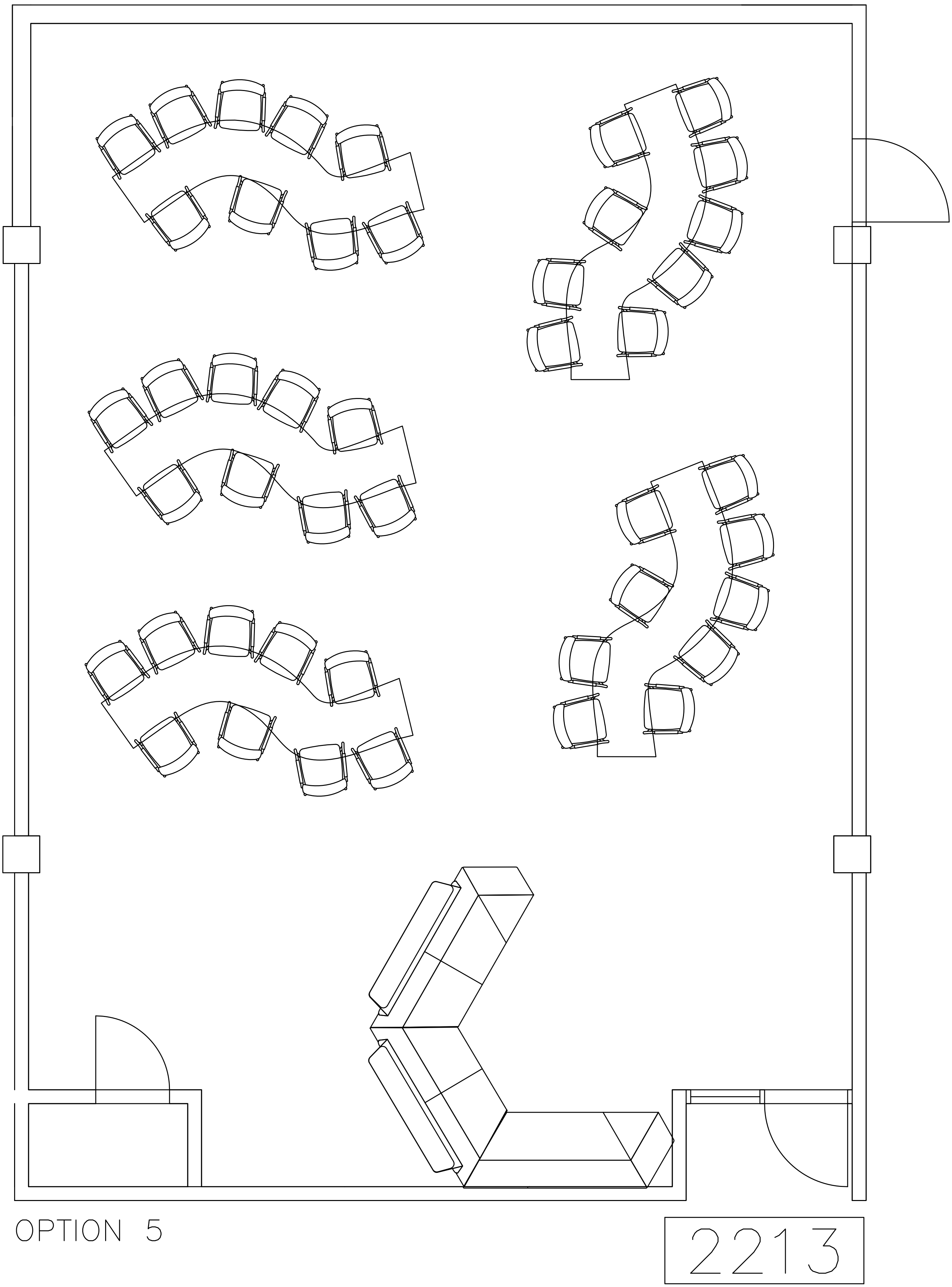
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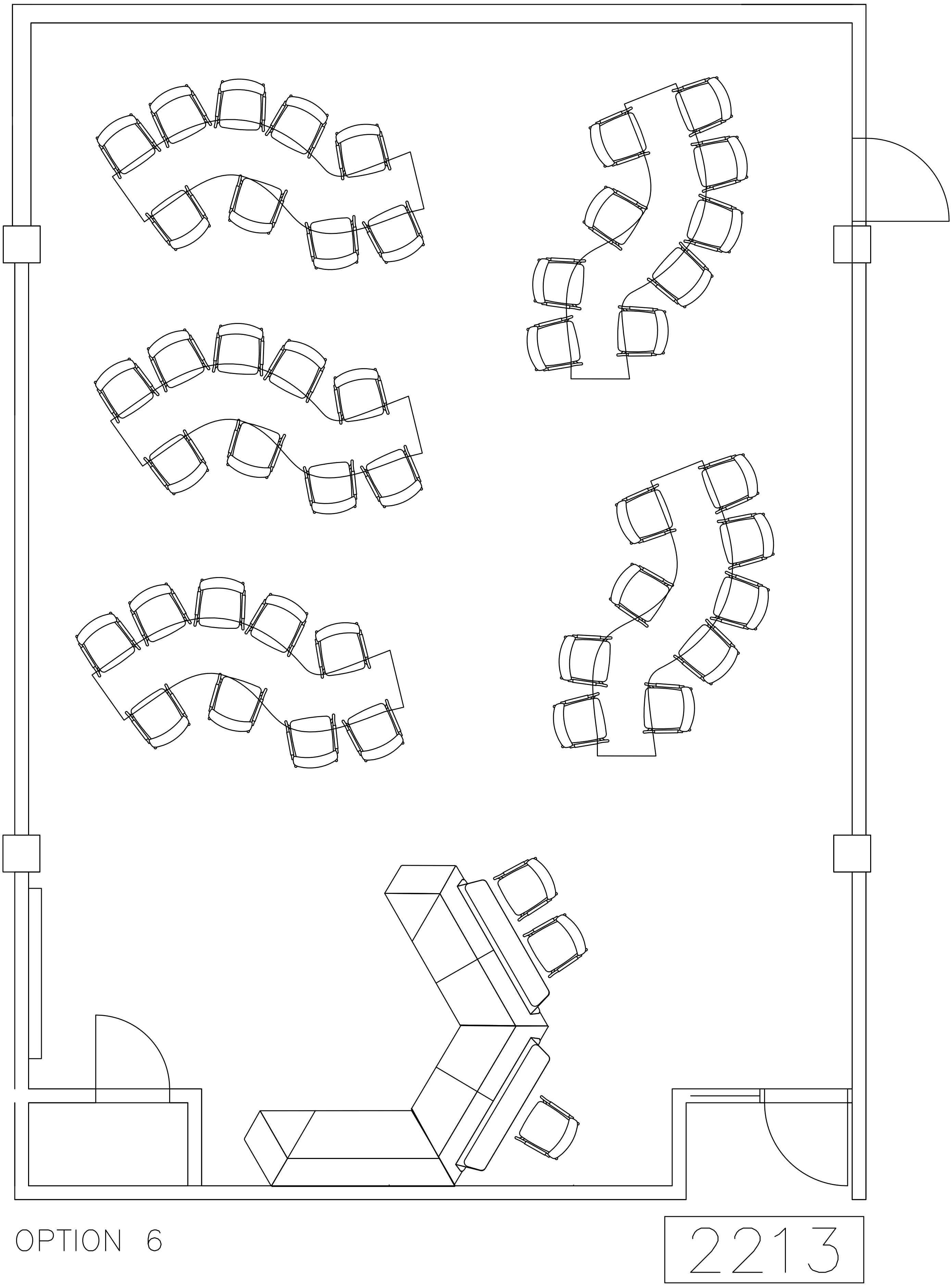

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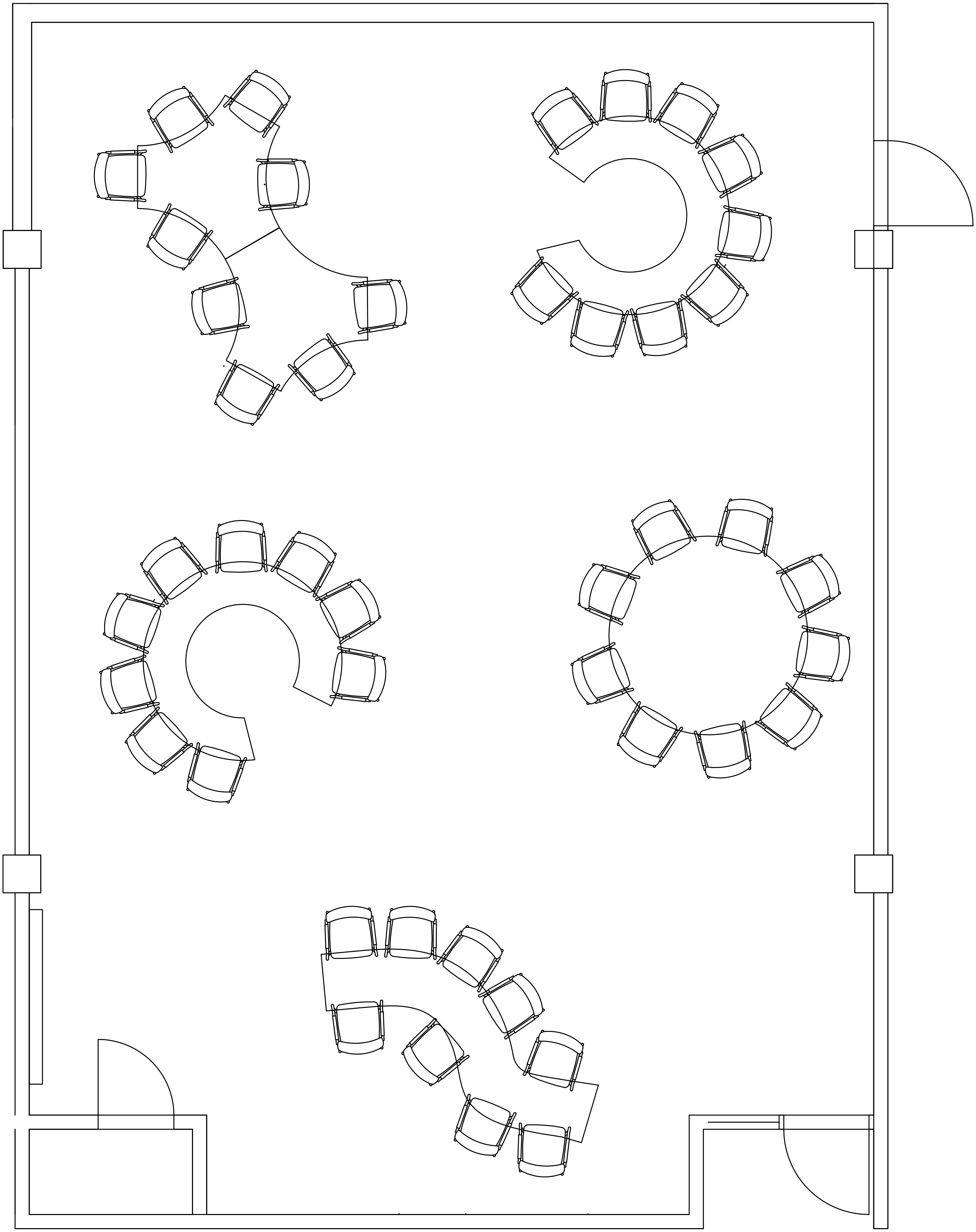

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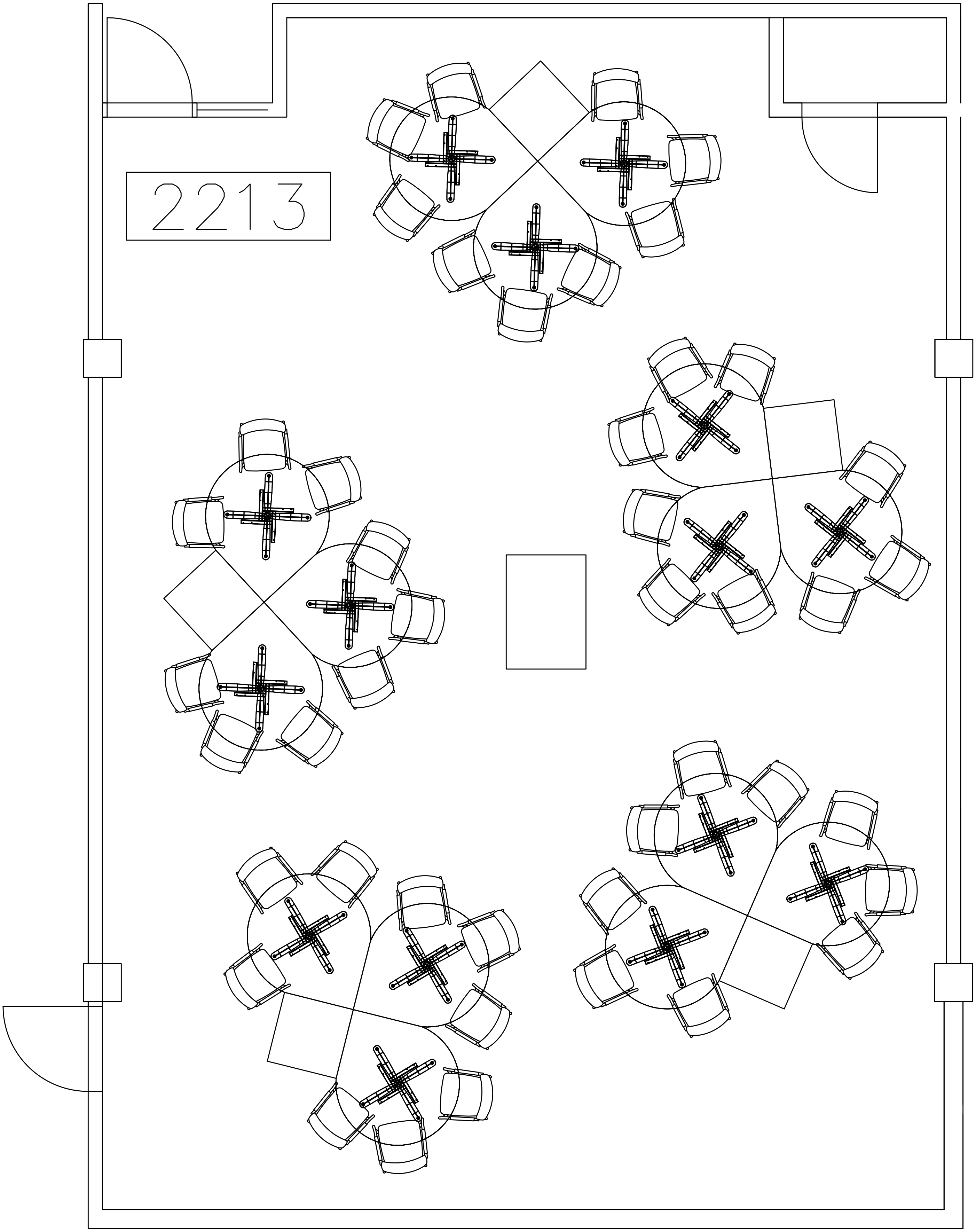
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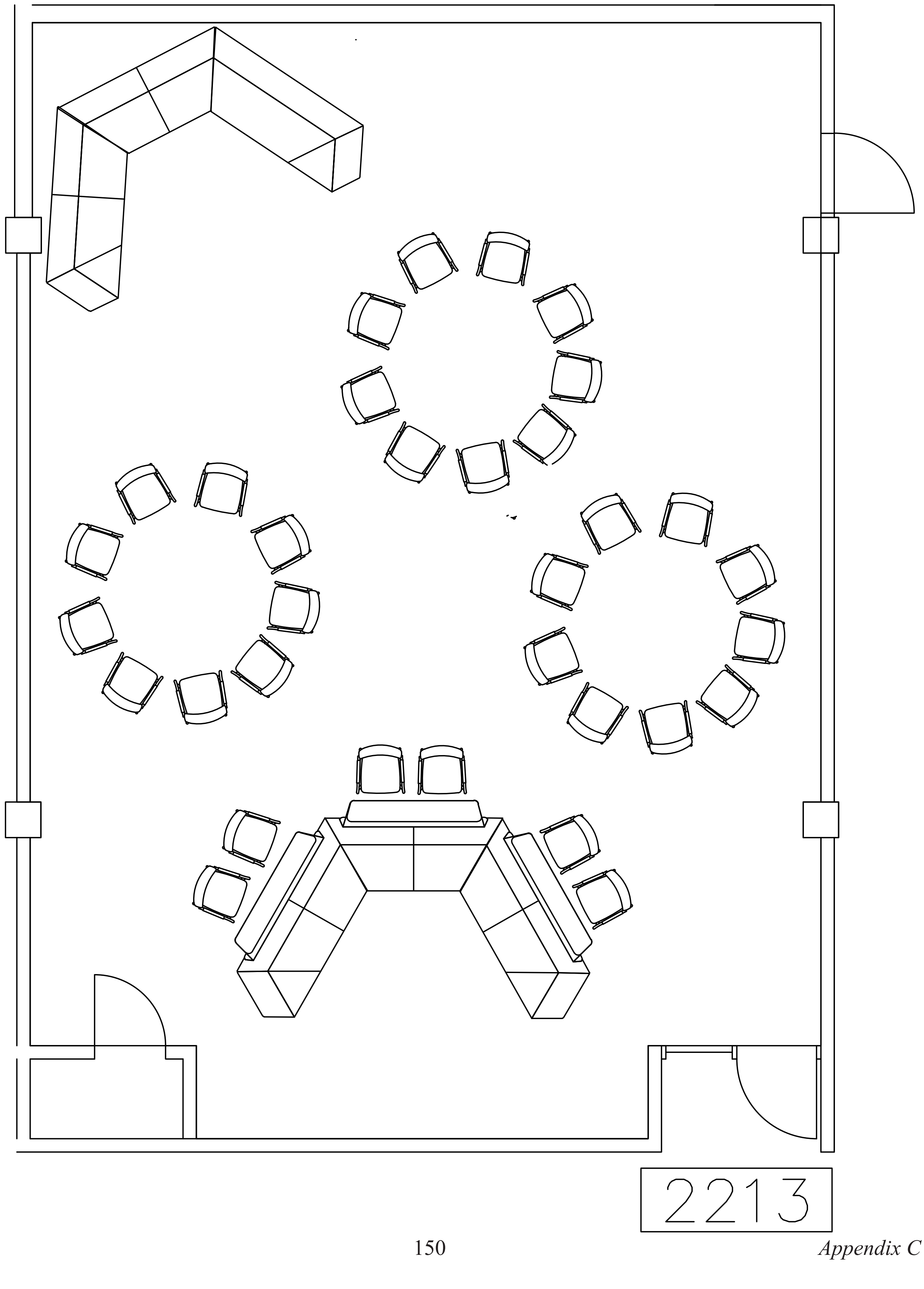
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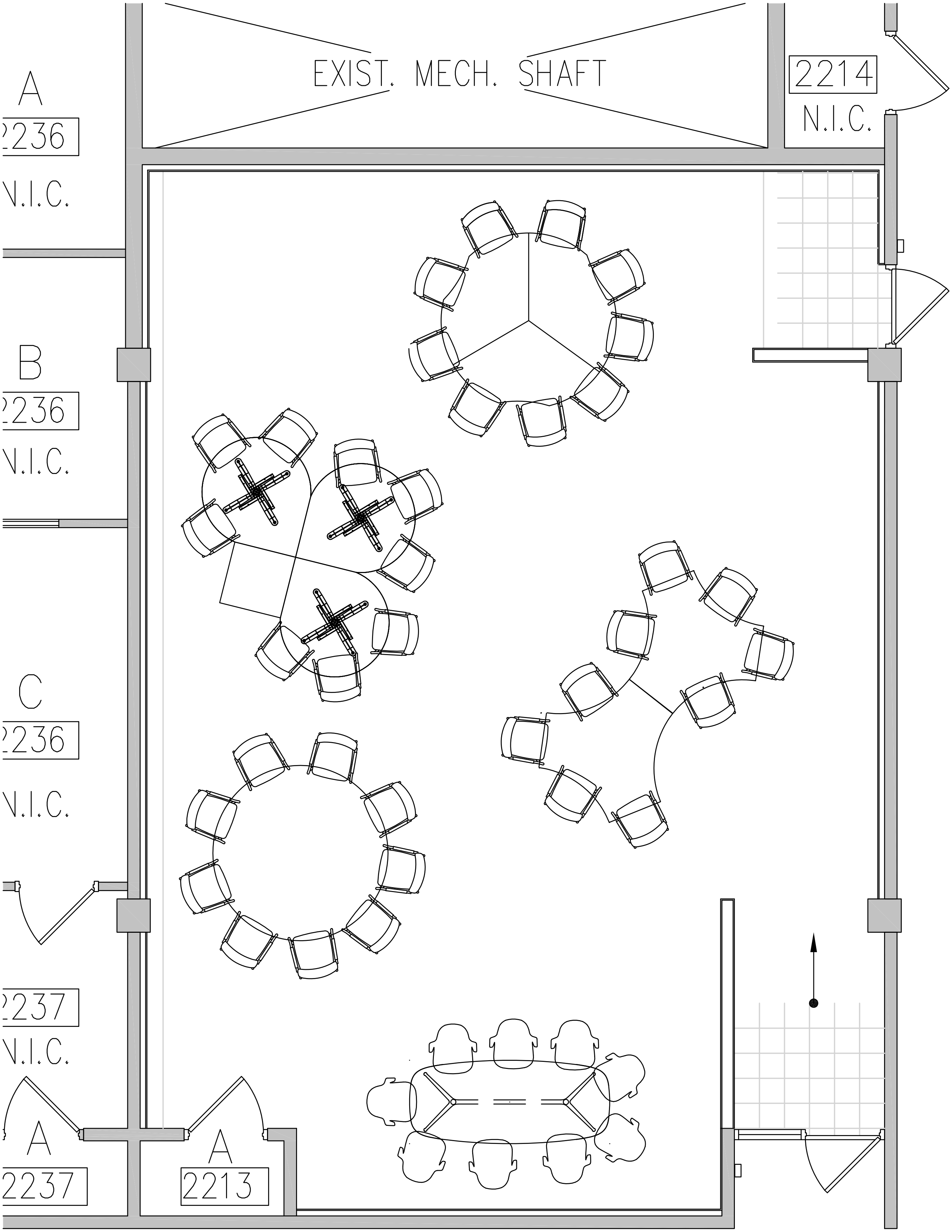

CLASSROOM

2213

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ClickShare also makes it simple
to choose the right model for you.

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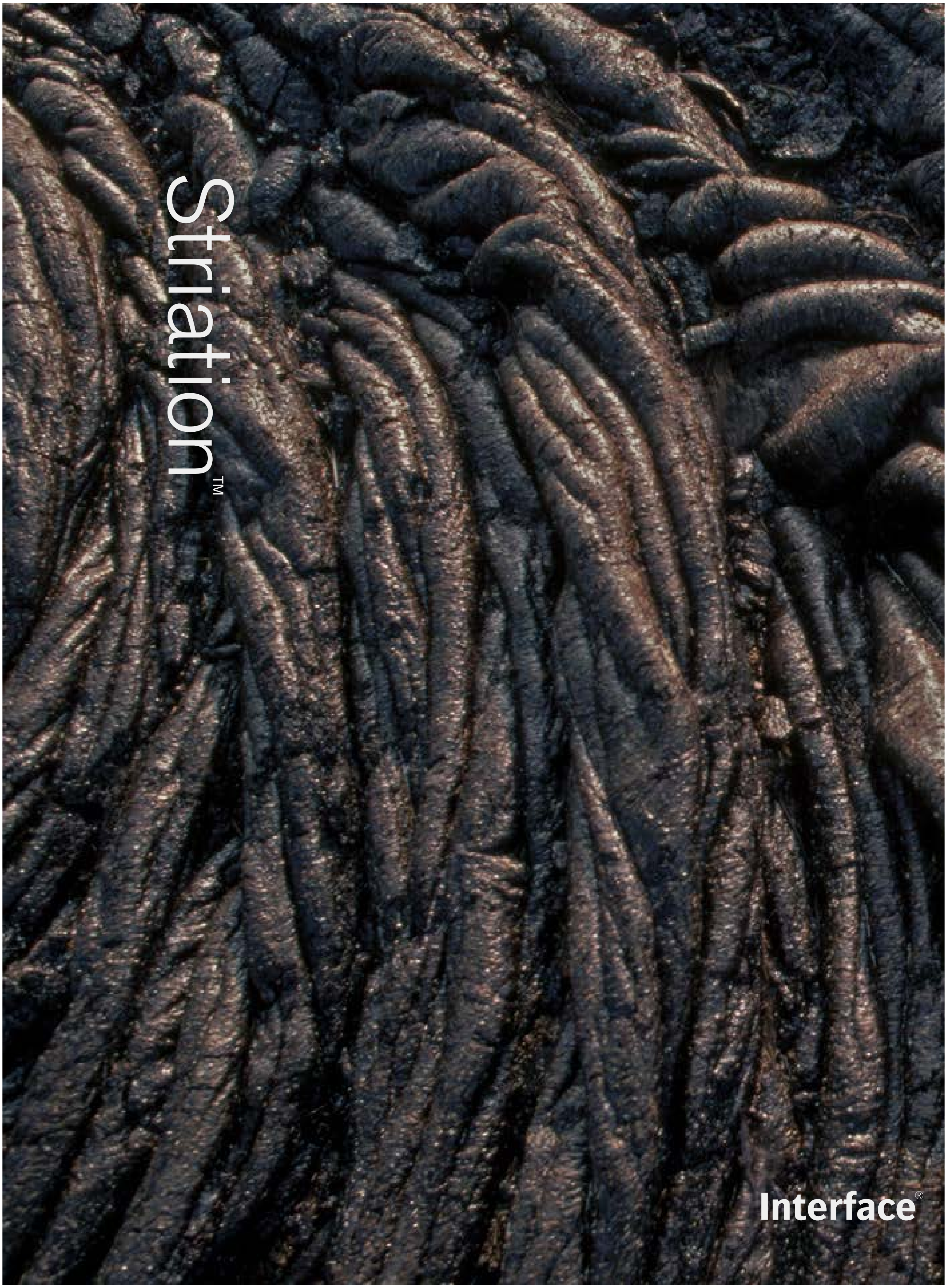
Ideal for huddle rooms & meeting spaces where sharing is needed, this standalone model delivers full HD to meeting room displays and includes one Button for instant sharing	For enterprise rollouts which require enhanced security features or central management, the CSE-200 delivers full HD and comes with two Buttons enabling two to share on screen at the same time
Ideal for SME	Ideal for Enterprise
Standard security	Enhanced security
HDMI (Full HD) output	HDMI (Full HD) output
No inputs	No inputs
Internal antennas	External antennas
1 x Button included	2 x Button included
1 x user on screen	2 x users on screen
Up to 8 users connected	Up to 16 users connected
No interactivity	No interactivity
No moderation	No moderation
iOS app, Android app, MirrorOp	AirPlay, Google Cast, iOS app, Android app, MirrorOp
Standalone operation	Standalone or network integrated operation
API - no	REST API
Central management - no	ClickShare Management Suite
Firmware updates	Firmware updates & upgrades
3 years warranty	3 years warranty (+optional 2 years extended)


Striation™
Interface®

Striation™ Colorline


100147 HEMATITE


100148 SOAPSTONE


100149 OLIVINE


100150 LIMESTONE


100151 FELDSPAR


100152 PUMICE


100153 SANDSTONE

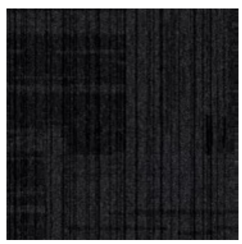

100154 QUARTZ


100155 JASPER


100156 FIELDSTONE


100157 OBSIDIAN


100158 BASALT


100159 ANTHRACITE

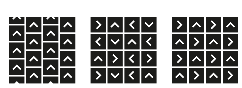

100160 FLINT


100161 SHALE


100162 GRANITE

Specifications

Modular, 50 cm x 50 cm	139220250H
Backing System	GlasBac®RE
Yarn Manufacturer	Aquafil
Yarn System	100% Recycled Content Type 6 Nylon
Color System	100% Solution Dyed
Construction	Tufted Sheared
Preservative Protection	Intersept®
Soil/Stain Protection	Protekt2®
Pile Thickness	0.102 in., 2.6 mm
Pile Density	7,765
Total Recycled Content	80% (35% Post-Consumer)
Indoor Air Quality	CRI Green Label Plus #GLP0820


ASHLAR NON DIRECTIONAL QUARTER-TURN

All product specifications reflect averages derived from product sample testing, are subject to normal manufacturing and testing tolerances and inherent pattern variances, and may be changed without notice. For more information about these and other important attributes of the product(s) described herein, including recycled content and product warranty information, please see www.interface.com/disclaimer.

Why Our Modular Carpet?

Modular Carpet Tile
Performance and Flexibility. Interface's standard backing systems set the industry standard for modular performance. Tiles stay on the floor with no upcurl, no tapping and no rippling effect, yet are easy to selectively replace. Our modular carpet is also easier to handle, install and maintain than bulky roll carpet. And, it installs with less waste so you save time and money — 3-4% for typical modular carpet compared to an average waste factor of 14% for traditional roll carpet.

Cool Carpet™
Help Stop Global Warming and Earn a LEED® Innovation Credit. ALL Interface modular carpet sold in North America is third party verified climate neutral Cool Carpet. Cool Carpet zeros out all greenhouse gas (GHG) emissions associated with the entire lifecycle of your carpet. And climate neutral verified Cool Carpet may be eligible for a USGBC or CaGBC LEED Innovation Credit.

TacTiles®
No Glue Installation. Our revolutionary TacTiles installation system eliminates the need for glue, adhering tiles securely together to form a floor that "floats" for greater flexibility, easier replacement and long-term performance. The result? Less mess, less waste and virtually no VOCs, not to mention an environmental footprint that is over 90% lower than that of traditional glue adhesives.

Intersept®
Mold Protection. Our proprietary preservative, Intersept, protects our modular carpet against mold growth and odor-causing bacteria — guaranteed. Intersept treated carpet, with proper maintenance, shows no mold or bacterial growth when tested per the ASTM E2471 Standard Test Method. Intersept is low in toxicity, water insoluble and contains no arsenic, heavy metals, phenols or formaldehyde.

ReEntry® 2.0
Recyclable is Now a Reality. Our ReEntry 2.0 program uses innovative technology that gives us the ability to cleanly separate the face fiber and backing of nearly any carpet type. Separated Type 6 and 6,6 nylon are recycled into new 6 and 6,6 nylon, while separated GlasBac® and similar competitor backings are recycled into new GlasBac®RE non-virgin PVC backing using our Cool Blue™ technology. The result? Products with up to 81% total recycled content, including as much as 35% post-consumer content.

Sustainable Choice
Environmental Responsibility. Interface was the industry's first to earn an EPD (Environmental Product Declaration), which evaluates consistent factors based on full lifecycle assessment (LCA). We achieved an EPD based on our Convert™ products and have now expanded our EPDs into four catagories covering more than 90% of our products.

In addition, all Interface products with GlasBacRE backing meet the Platinum level of the NSF/ANSI 140 Sustainable Assessment for Carpet. GlasBac or NexStep® backed products meet the Gold level. All may contribute toward a USGBC or CaGBC LEED Innovation Credit.

Third Party Certification

cool carpet™

Cool Carpet – Our third party verified carbon offset program zeroes out all greenhouse gas (GHG) emissions associated with the entire lifecycle of your carpet.

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION

Environmental Product Declaration (EPD) – A statement of product ingredients and environmental impacts over the entire life cycle of a product. A comprehensive life cycle assessment (LCA) is performed to ISO standards to develop an EPD, after which both the EPD and LCA must be third party verified.

NSF Platinum Certified NSF/ANSI 140 • 2007e Sustainable Carpet Assessment

Sustainable Assessment for Carpet – The only carpet sustainability standard in North America that evaluates the environmental impact of carpet for its entire lifecycle.

CRI GREEN LABEL +PLUS Indoor Air Quality Carpet Testing Program carpet-rug.org

CRI Green Label Plus – An independent testing program that identifies carpet and adhesives with very low emissions of VOCs to help improve indoor air quality.

Rubber Flooring and Vinyl Flooring Products 1.800.537.9527 419.435.8546 sales@roppe.com

ROPPE.
Proven. Flooring. Experiences.

home | products | resources | sustainability | IMPACT | sample request | collection | company

700 series wall base

Home > 700 series wall base

series wall base

:s moderate pricing and beautiful color palette, our 700 Series wall base is an outstanding selection for any
ation. Easier to work with and providing more flexibility than vinyl base products, Roppe's unique blend of
oplastic rubber and vinyl makes the 700 Series an attractive and economical choice for a variety of applicat

BIO-BASED PHTHALATE FREE

ROPPE. 700 series

PRODUCT SUBMITTAL TPR WALL BASE

700 Series Wall Base, 4 1/2" Cove

Manufacturer

Roppe Corporation
1602 N. Union Street
P.O. Box 1158
Fostoria, Ohio USA 44830-1158
Website - www.roppe.com
t: (419) 435.8546 tf: (800) 537.9527
f: (419) 435.1056
e-mail: sales@roppe.com

Product Description

Our 700 Series wall base is an outstanding selection for any installation. Easier to work with and providing more flexibility than vinyl base products, Roppe's unique blend of thermoplastic rubber and vinyl makes the 700 Series an attractive and economical choice for a variety of applications.

Features

Extremely Durbale and Flexible
Will not Shrink, Gap or Cup
Recycleable (IMPACT Recycling Program)
Qualifies for LEED® Credits
FloorScore® Certified

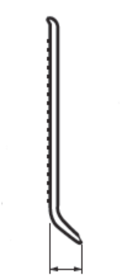
700 Series, 4 1/2"

Toe Type:	**Cove**
Base Height:	**4 1/2" (114.3 mm)**
Base Thickness:	**1/8" (3.2 mm)**
Base Length:	**48" Sections or 120' ft. Coils**
Carton Quantity:	**30 pieces or 1 coil**
Carton Weight:	**45 lbs.**

Additional Accessories: Inside and outside factory corners are available to match wall base installations.

attach color submittal

sample here



Standard
Toe Base 5/8"

Technical Data

LEED v2009 IEQ Credit 4.1: Qualifies
ASTM F1861 - Resilient Wall Base: Type TP, Group 2, Style B
ASTM E648 (NFPA 253) - Critical Radiant Flux: Class I, > 0.45 W/cm2
ASTM E662 (NFPA 258) - Smoke Density: Passes, <450
ASTM E84 - Flammability: Class A
CAN/ULC-S102.2 - Surface Burning: FSR 10, SDS 60
Acclimation Time: 48 Hours
Storage & Acclimation Temperature: 65 ° - 85 ° F

Adhesives* (Visit our website for complete Adhesive instructions)

AW-510 Acrylic Wet-Set Adhesive
Unit Size: 1 or 4 Gallon Units
VOC: < 0.1 g/l
Coverage Rate: 160 sq. ft. per gallon
Substrate: Porous

WB-600 Acrylic Wall Base Adhesive
Unit Size: 30 oz. Cartridge, 1 Gallon and 4 Gallon Units
VOC: < 12 g/l
Trowel Coverage Rate: 180-340 lin. ft. per gallon
Cartridge Coverage Rate: 30-70 lin. ft. per cartridge
Substrate: Porous

C-630 Contact Adhesive
Unit Size: 1 Quart
VOC: 0.0 g/l
Coverage Rate: 20-40 sq. ft. per unit or 120-140 lin. ft. per unit.
Substrate: Non-Porous

Installation* (Visit our website for complete Installation instructions)

All material is to be delivered to the installation location in its original packaging with labels intact. The installation area, unboxed wall base and adhesive are to be maintained between 65° (19°C) and 85° (30°C) for at least 48 hours before installation, during installation and thereafter. Proceed with the installation only when the conditions are proper and correct. Inspect all material for proper type and color. A bond test should be performed at least 72 hours prior to the scheduled installation to ensure the surface is suitable and there should be extreme difficulty in removing the wall base from the surface.

Maintenance* (Visit our website for complete Maintenance instructions)

700 Series wall base can be cleaned with a neutral pH cleaner and a soft wet cloth.

Availability, Cost & Samples

Roppe Flooring products are sold through distribution. To locate the nearest distributor, visit www.roppe.com. or send an email to solutions@roppe.com

Technical Document Support

Additional product resources and technical documents are available online at www.roppe.com. For additional technical support, send an e-mail to solutions@roppe.com

Warranty

Roppe Provides a 2 year Limited Warranty on all 700 Series Wall Base. For additional information, see associated Warranty documents.

***For complete adhesive, installation & maintenance instructions, visit www.roppe.com**


700 series wall base colors
100 black
177 steel blue
150 dark gray
193 black brown
123 charcoa
114 lunar dust
129 dolphir
178 pewter
194 burnt umber
148 steel gray
175 slate
174 smoke
197 icebero
110 brown
147 light brown
182 toffee
623 nutmeg
624 chamel
140 fawn
191 camel
125 fig
171 sandstc
130 bucksk
198 ivory
632 flax
184 almonc
170 white
131 bisque
127 harvest yellow
631 sahara
639 beigew
640 creekb
122 natural
195 light gray
663 aged fern
648 pear green
647 spring dill
646 gecko
160 forest green
649 sweet basil
169 hunter green
662 envy
118 peacoc
187 blue
139 deep navy
627 marine
618 auberg
665 horizor
664 blue jay
656 bluebe
654 lagoon
638 cadet
637 night mist
655 peacefi blue
657 sorbet
658 berry ice
621 merlin
659 grape
186 red
137 cinnaba
188 brick
617 terraco
660 citrus
661 marma
643 mimosa
644 sunbea
642 jonquil
645 blonde
641 moonri
161 snow

SHERWIN-WILLIAMS.

SW 7036 Accessible Beige

Interior/Exterior

Locator Number 249-C1

Color Details

Color Family: Neutral

RGB Value: R-209 | G-199 | B-184

Hexadecimal Value: #D1C7B8

LRV: 58

Due to individual computer monitor limitations, colors seen here may not accurately reflect the selected color. To confirm your color choices, visit your neighborhood Sherwin-Williams store and refer to our in-store color cards.

MY STORE:

NOTES:

SHERWIN-WILLIAMS.

SW 7069
Iron Ore
Interior / Exterior
Locator Number: 251-C7

COORDINATING COLORS

SW 7063
Nebulous White

SW 7006
Extra White

SW 7067
Cityscape

SIMILAR COLORS

DETAILS

COLOR STRIP 251

FIND INTERIOR PAINT →

FIND EXTERIOR PAINT →

Save to mySW.com

Add to my Project List

Actual color may vary from on-screen representation. To confirm your color choices prior to purchase, please view a physical color chip, color card, or painted sample.

Your Sherwin-Williams

Sorry, we're unable to locate your store at this time.

FIND A STORE

Akira
conference + classroom tables

Steelcase

STATEMENT OF LINE

TABLE TOPS

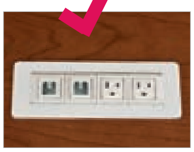
Rectangular Top:
28.5" and adjustable
27.5 – 32.5" H;
30", 20", 24", 30", 36", 60" W
D Shape Top:
28.5" and adjustable
27.5 – 32.5" H;
28", 34" W; 48", 60" L
Trapezoid Top:
30" W; 60" L; 28.5" H

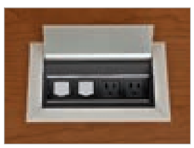
PRODUCT FEATURES


Flip top mechanism

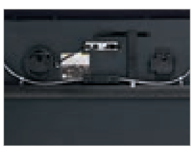

Release handle for flipping/nesting


Optional power: Miniport

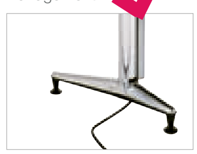

Optional power: Axil Z


Optional power: Ellora


Horizontal wire management


Modular power system

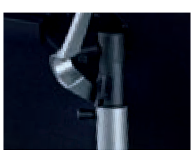

Color coded connectors


Vertical wire management


In-line nesting


Casters


Glides


Height-adjustment

SURFACE MATERIALS

Legs available in:

- 4140 Arctic White Gloss
- 4145 Milk Gloss
- 4146 Champagne Matte
- 4147 Champagne Gloss
- 4141 Platinum Matte
- 4142 Platinum Gloss
- 4138 Graphite Gloss
- 4148 Midnight Brown Gloss
- 7196 Midnight Brown Textured
- 7197 Anthracite Textured
- 4144 Black Gloss

Also available in standard Steelcase paint finsihes.

Optional polished aluminum base finish.

Note: all flipping tables and all height adjustable tables have an inner column that is always matte black anodized, regardless of base finish specified. Wings on flipping tables are always silver powder coat.

Colors are representative and may vary slightly from actual material. For further options, visit us online.

SUSTAINABILITY

At its heart, sustainability at Steelcase is about people. It's about creating and supporting the economic, environmental and social conditions that allow people and communities to reach their full potential.

Research and insights direct our path.
It's not only about creating goods, it's about creating good. It's not only about creating value, it's about living our values. It's not just about reducing our footprint, it's about expanding our reach. It's about creating lasting and meaningful change to enable the long-term wellbeing of current and future generations.

Innovative products and solutions result.
In the development of our products, we work to consider each stage of the life cycle: from materials extraction, production, transport, use and reuse, until the end of its life. We demonstrate performance through third-party verified certifications and voluntary product declarations.

Steelcase's sustainability promises, actions, and results are communicated in an annual Corporate Sustainability Report.

Steelcase®

Call 800.333.9939 or visit steelcase.com

facebook.com/steelcase **twitter.com/steelcase** **youtube.com/steelcasetv**


SW_1 COLLECTION
Scott Wilson + Minimal
coalesse

Collaborative Height (26"H) Solutions

Conference Height (28.5"H) Solutions

Product Features

A. Tabletops. 1/2" thick tops available in glass, veneer, Corian or laminate.
B. Pull-out tablet. Bring your work to you. Available as an option on select 26" high tables only.
C. PowerPod. Convenient tabletop access to six power outlets, disguised when not in use by an accessory tray.
D–F. Wire management. Grommet with wire manager allows wires to be accessed at the tabletop while routing them down the outside of the leg to the floor.
G. 4-star base with glides. Aluminum glides include non-marring plastic inserts.
H. 5-star base with casters. Black, dual wheel hard casters.
I. Table glide. Adjusts 3/4" for leveling on uneven floors.

Details

Lounge Chair with optional tablet
A Mid Back
B Low Back
C Ottoman

Conference Chair
D 4-Star Base
E 5-Star Base

Low Collaborative Conference Table 26"H

F Rectangular	42D x 84 120W

Also available in:

Large-Round	60, 72, 84, 96
Large-Square	42, 60, 72, 84, 96
Super-Elliptical	40D x 72 84 96W
	44D x 120W

Conference Table 28.5"H

G Large-Round	60, 72, 84, 96

Also available in:

Round	30, 36, 42, 48
Square	30, 36, 42
Large-Square	60, 72, 84, 96
Super-Square	45.5
Rectangular	42D x 84W
	48D x 96 120 144W
Super-Elliptical	40D x 84 96W
	44D x 120W
	48D x 144W
	52D x 168W
	56D x 192W
	60D x 216 240W

Work Table 28.5"H

H Super-Elliptical	40D x 60 72W

Also available in:

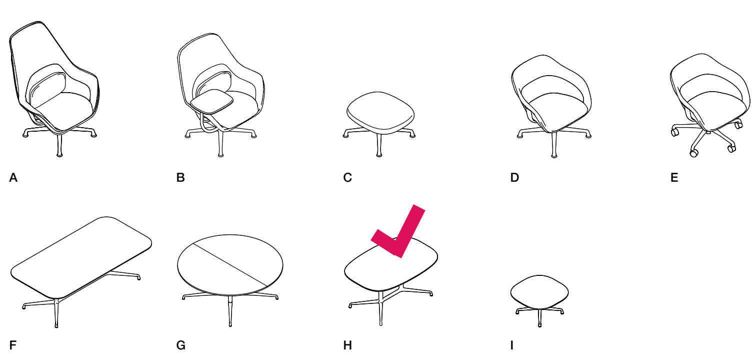
Rectangular	30D x 60 72W
	36D x 60 72W

Occasional Table 15"H

I Square	30, 36, 42

Also available in:

Large-Square	60
Super-Square	45.5
Round	30, 36, 42, 48
Large-Round	60



dewey® tables

fixturesfurniture®

C-LEG TABLE
D 20, 24, 27, 30"
W 36, 48, 60, 66, 72, 84"
H 18, 21, 25, 29"
pin-set H 18-24, 27-33"

T-LEG TABLE
D 20, 24, 27, 30"
W 36, 48, 60, 66, 72, 84"
H 18, 21, 25, 29"
pin-set H 18-24, 27-33"

CRANK HEIGHT ADJUSTABLE TABLE
D 24, 27"
W 36, 48, 60, 66, 72, 84"
crank H 27- 37"

X-BASE
ROUND 27, 36, 42, 48"
SQUARE 27, 36, 42"
TEAM 40x44"
H 18, 21, 25, 29, 36, 42"

120 DEGREE FIXED C-LEG TABLE
D 27"
W 62, 83"
H 18, 21, 25, 29"
pin-set H 18-24, 27-33"

CORNER FIXED C-LEG TABLE
D 20, 24, 27"
W 36, 48, 60, 68, 72"
H 18, 21, 25, 29"
pin-set H 18-24, 27-33"

HALF ROUND FIXED T-LEG TABLE
D 24, 27"
W 48, 53"
H 18, 21, 25, 29"
pin-set H 18-24, 27-33"

TRAPEZOID FIXED T-LEG TABLE
D 24, 27"
W 48, 60"
H 18, 21, 25, 29"
pin-set H 18-24, 27-33"

6-TOP TABLE
D 27"
W 60" straight edge
W 42" curved edge
H 18, 21, 25, 29, 36, 42"

ANTI-CORNER FIXED C-LEG TABLE
D 18, 27"
W 72 , 60"
H 18, 21, 25, 29"
pin-set H 18-24, 27-33"

EXTENDED-CORNER FIXED C-LEG TABLE
D 27"
W 48, 72"
H 18, 21, 25, 29"
pin-set H 18-24, 27-33"

dewey tables for collaborative spaces -flexible, reconfigurable, and technology supporting

FEATURES
- C, T, X-leg base options
- fixed, folding, pin-height and crank-height adjustable
- flip-top on rectangle, square or round tops for easy storage
- 6 seated to standing heights, or height adjustable
- laminate with urethane or 2MM edgeband
- low maintenance leg design

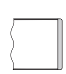
OPTIONS
- aluminum frame modesty panel in laminate or frosted acrylic
- casters
- permanent floor mounting without defacing product
- ganging brackets - to connect tables
- grommets
- flip-up and flush-mount power

DESIGN
joey ruiter

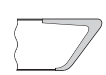
POWER/ WIRE MANAGEMENT SYSTEM/DATA SYSTEM
available on C- or T-Leg tables

ENVIRONMENT
izzy+ uses manufacturing processes that are kind to the environment. Dewey is SCS Indoor Advantage™ Gold and BIFMA level® 1 certified.

TOP EDGE DETAIL



2MM edgeband



urethane edge

NOTE: Direction of wood grains will apply to product lengthwise.

COVER: RLNTR6070CB dover white laminate, dolphin urethane edge, silver frame

CLARA TABLES

Like any good puzzle, the unique shapes of Clara fit together perfectly… allowing you to create the best spaces for working, learning and all of the in-between. With over 23 shapes, Clara offers a collection of products ready to support a variety of needs and solutions, including:

- Rectangular Tables: a variety of sizes for any application
- Corner Tables: anti-corner (left and right), extended corner, corner
- Geometric Tables: diamond, trapezoid, square, circle, half round, 120 degree, team
- Storage: mobile pedestals that serve as extra storage space; add the pedestal seat pad and there's always an extra seat.

With a variety of heights in both fixed and pin-set, Clara fits in everywhere… K-12 and college classrooms, lounge, and corporate.

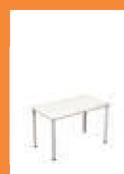
Clara's earned top marks in these areas:

Flexibility: Today's collaborative spaces call for furniture that brings people together, and Clara does so with a variety of shapes that make space planning a breeze.

Durability: To withstand the rigors of frequent rearranging and constant use, Clara was designed with long-lasting materials and components, from cast and extruded aluminum bases to urethane edges. For those polished meeting rooms, the oak veneer option makes for a great addition.

Technology Supporting: Products are available with flip-up and surface-mount power

Timeless Design: Clara's clean lines and modern design details keep her relavant now and for years to come.

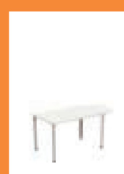

Straight


Arc


Corner

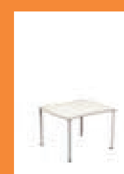

Extended Corner

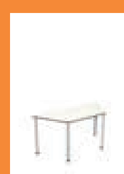

Anti Corner


D-Top

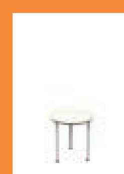

120 Degee


Diamond


Team

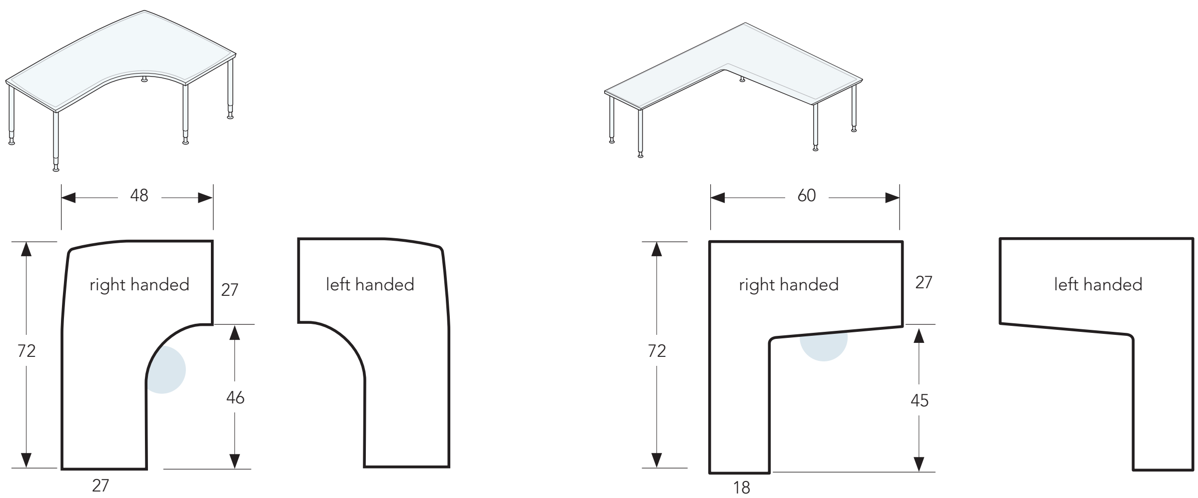

Trapezoid


Conference

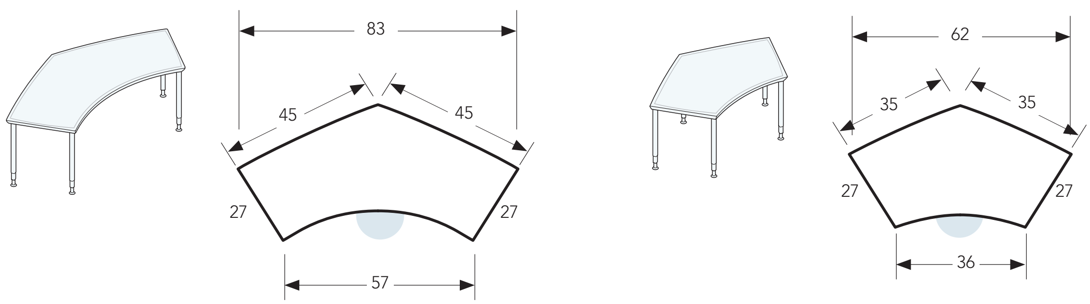

Circle


Half Round

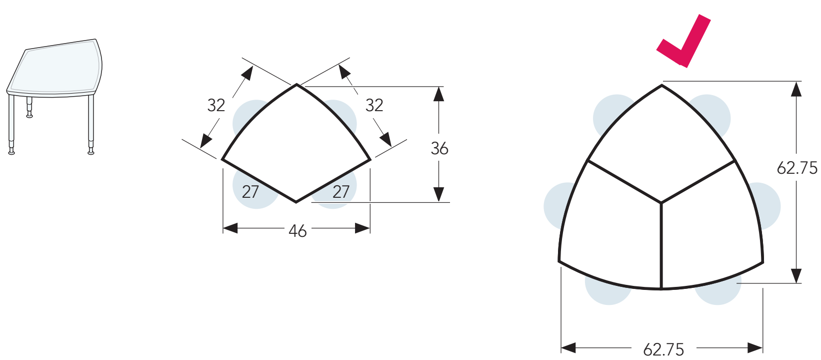
Extended & Anti CornersTables
left & right handed



120 Degree Tables



Diamond Tables
single & cluster of 3




BALLET
Douglas Ball, USA
coalesse®

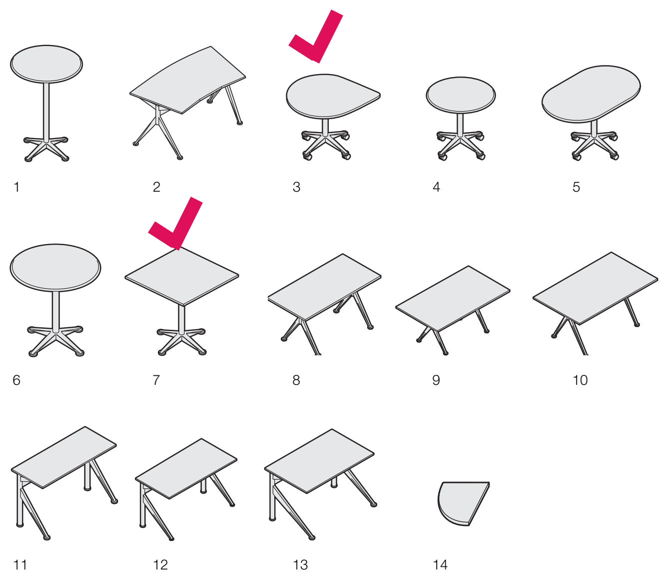
Product Features

- K-Base with modesty panel (A)
- X-Base (B)
- Cast Aluminum legs (C)
- Dual wheel caster (D)
- Dolly for folded tables (E)
- Edge detail (F)

Product Features

Product Elements

1. Round Cafe: 36” & 30”dia. 41.5”H;
2. Arc (folding and non-folding): 55” & 82”L 30”W 28.5”H;
3. Teardrop: 36”L 18”W 28.5”H / 40”L 20”W 28.5”H;
4. Round: 27”dia. 25.5”H; **5.** Racetrack: 36”L 25.5”H;
6. Round Pedestal Base: 36” & 30”dia. 28.5”H;
7. Square Pedestal Base: 30”L 30”W 28.5”H / 36”L 36”W 28.5”H;
8. Rectangular Folding / Non-Folding X Base:
30”W 60”, 72”, 84”, 96”L 28.5”H;
9. Rectangular Folding / Non-Folding X Base:
36”W 60”, 72”, 84”, 96”L 28.5”H;
10. Rectangular Folding / Non-Folding X Base:
42”W 72”, 84”, 96”L 28.5”H;
11. Rectangular Folding / Non-Folding K Base:
20”W 48”, 60”, 72”L 28.5”H;
12. Rectangular Folding / Non-Folding K Base:
24”W 48”, 60”, 72”L 28.5”H;
13. Rectangular Folding / Non-Folding K Base:
30”W 48”, 60”, 72”L 28.5”H;
14. 90° Connecting top: 20”, 24”, 30”



Surface Materials

Edge:
Available in a black ribbed vinyl profile.

Top:
Laminate in all Coalesse selections. Custom and Steelcase laminates also available.

GLASSBOARDS

Float + Depth

clarus

CLARUS GLASS

- 1/4" Clarus tempered safety writing glass
- Non-staining writing surface
- Compatible with any marker, even permanent
- Clarus Opti-Clear Polish and eased corners for safety

COLORS & PRINTING

COLORS BY CLARUS

- 150+ standard colors
- Unlimited options with Clarus' color-matching ability

COLORDROP

- Custom logos, patterns and artwork printing
- Direct-to-glass UV printing is guaranteed to never fade or discolor

SURROUND

BOLD COLORS

- Broad spectrum of beautiful, richly finished color frame options
- Constructed from premium powder-coated aluminum

TIMBER

- Premium wood frame options
- Hand-crafted from solid wood, responsibly harvested in the USA

SIZE

- Any size up to 72" x 144"
- Custom sizes and shapes available

MAGNETIC

- Available in both magnetic & non-magnetic finish

MOUNTING STYLE

FLOAT

- Concealed mounting hardware and anchors included
- Clarus' patented TruMount hardware allows horizontal or vertical mounting

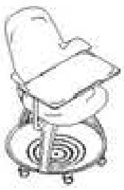
DEPTH

- Stainless steel standoff hardware and anchors included
- Surround frames not available for Depth

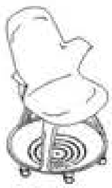
Node™
classroom seating

Steelcase®
EDUCATION

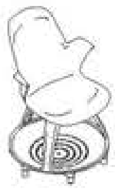
NODE CHAIR OPTIONS



tripod base with worksurface and casters

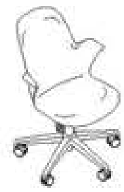


tripod base without worksurface, with casters



tripod base without worksurface, with glides

five-star base with worksurface

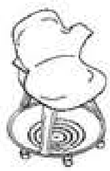


five-star base without worksurface

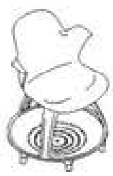
five-star stool

NODE MID-BACK CHAIR OPTIONS

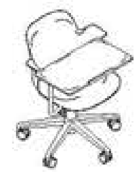
tripod base with worksurface and casters



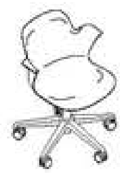
tripod base without worksurface, with casters



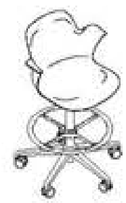
tripod base without worksurface, with glides



five-star base with worksurface



five-star base without worksurface



five-star stool

DIMENSIONS

item	tripod base	five-star base	five-star stool
seat depth	16 9/16"	16 9/16"	16 9/16"
seat depth for mid-back	15 1/2"	15 1/2"	15 1/2"
maximum seat width	19 1/2"	19 1/2"	19 1/2"
seat height from floor	18 1/4"	15 7/8" to 21 7/8"	23 7/8" to 31 7/8"
back height from floor (not seat)	36"	33 1/4" to 38 1/2"	40 7/8" to 48 1/4"
back height from floor (not seat) for mid-back	31 1/4"	28 7/8" to 34"	37 1/2" to 44 1/2"
width	23 3/4"	23 3/4"	27 1/4"
worksurface size	22 1/4" x 12"	22 1/4" x 12"	22 1/4" x 12"
worksurface depth adjustment	7 1/4" to 15"	7 1/4" to 15"	7 1/4" to 15"
maximum width between arms	20 1/8"	20 1/8"	20 1/8"
worksurface height from floor	28 1/2"	N/A	N/A

COMPONENTS

Flexible seat. Flexible seat with simple adjustments keeps people comfortable in a variety of postures.

Easy maintenance. Comfort without upholstery means easy maintenance.

Open seat design. Open seat design offers easy access, while arms serve as bag or purse hooks.

Swivel seat. Swivel seat keeps open sight lines.

Casters. Casters lend mobility for quick, easy transitions between configurations.

Cupholder. Optional cupholder frees up worksurface area for books and technology.

Base. Base keeps backpacks and personal belongings out of the aisle.

Personal worksurface. Personal worksurface is adjustable, non-handed, and large enough to support digital and analog resources.

Tablet stand. Tablet stand supports all top-selling tablets and smartphones in both portrait and landscape positions, making content easy to view and freeing up space on the worksurface for other class materials.

Steelcase warranty. Steelcase warranty with elevated durability testing makes Node an easy choice.

SURFACE MATERIALS

Standard colors

sterling dark solid (6059)	platinum (6249)
citron (6332)	black (6205)
midnight (6259)	jazz blue (6336)
wasabi (6335)	chili (6338)
picasso (6333)	element (6337)
arctic white (6009)	flash (6334)

Paint palette

- champagne metallic (4750)
- platinum (4799)
- black (0835)

Tripod base

- element (6337)
- platinum solid (6249)
- near black (6295)

Worksurface

- platinum solid (6249)
- seagull (6053)
- sand (6654)
- element (6337)
- near black (6295)

Signature plastics

crimson (6BC1)	orange (6BC6)
purple (6BC2)	brown (6BC7)
green (6BC3)	gold (6BC8)
burgundy (6BC4)	red (6BC9)
blue (6BC5)	

Colors are representative and may vary slightly from actual material.

For further options, visit us online.

SUSTAINABILITY

PEOPLE. PLANET. PROFIT.

By rethinking our business systems and designing our products to avoid negative impacts on humans and the environment, we contribute to a sustainable future for the planet and its people. We commit to advance our practices through continuous learning and building partnerships with our customers, business partners and environmental thought leaders to optimize our performance and contribute to the science and practice of sustainability.

TO FIND OUT MORE, VISIT
WWW.STEELCASE.COM/SUSTAINABILITY

PRODUCT ENVIRONMENTAL CERTIFICATIONS

- McDonough Braungart Design Chemistry (MBDC)
- Life Cycle Assessment
- MBDC's Cradle to Cradle™ Silver certification
- BIFMA Level® 2 certification
- Indoor Advantage™ Gold from Scientific Certification Systems

Installed Photographs of Table Pods

Table Pod A – Steelcase Akira

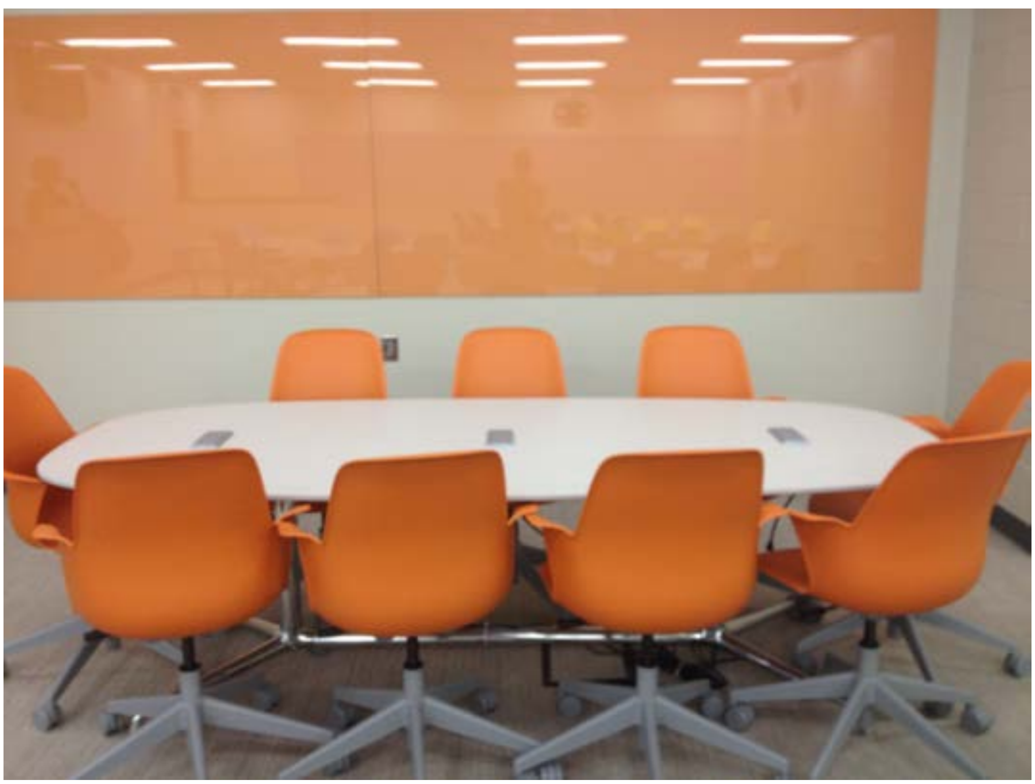


Table Pod B – Coalesse SW-1

Table Pod C – Izzy+ Dewey

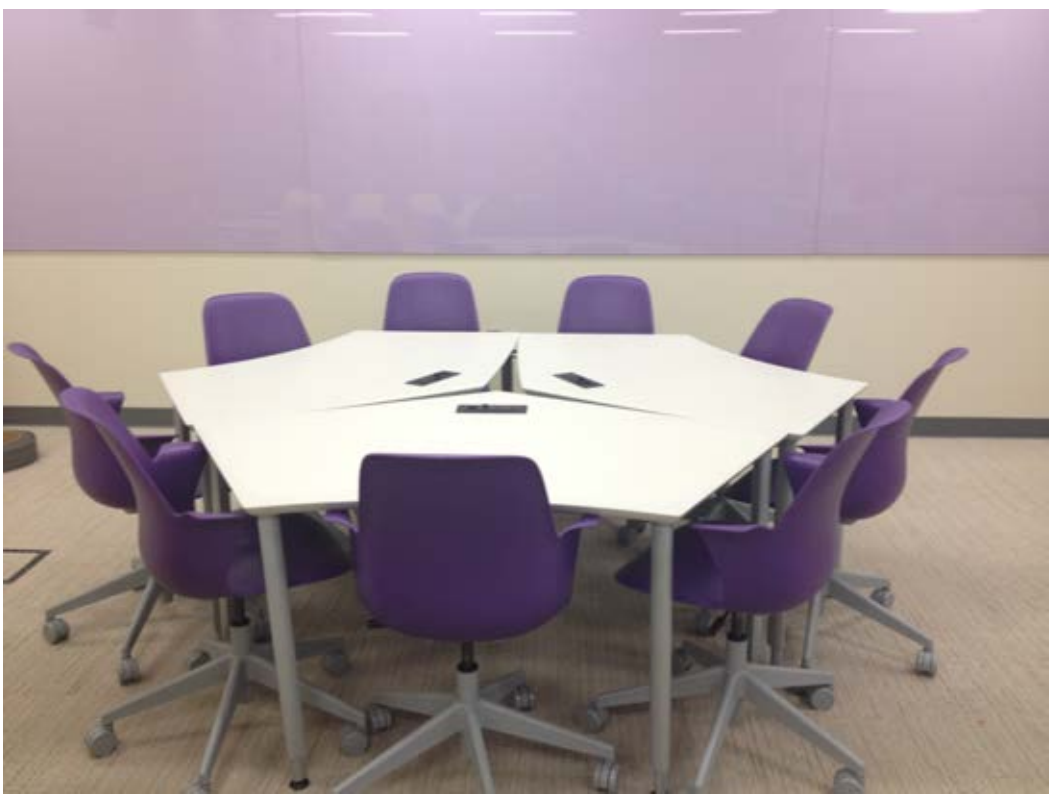
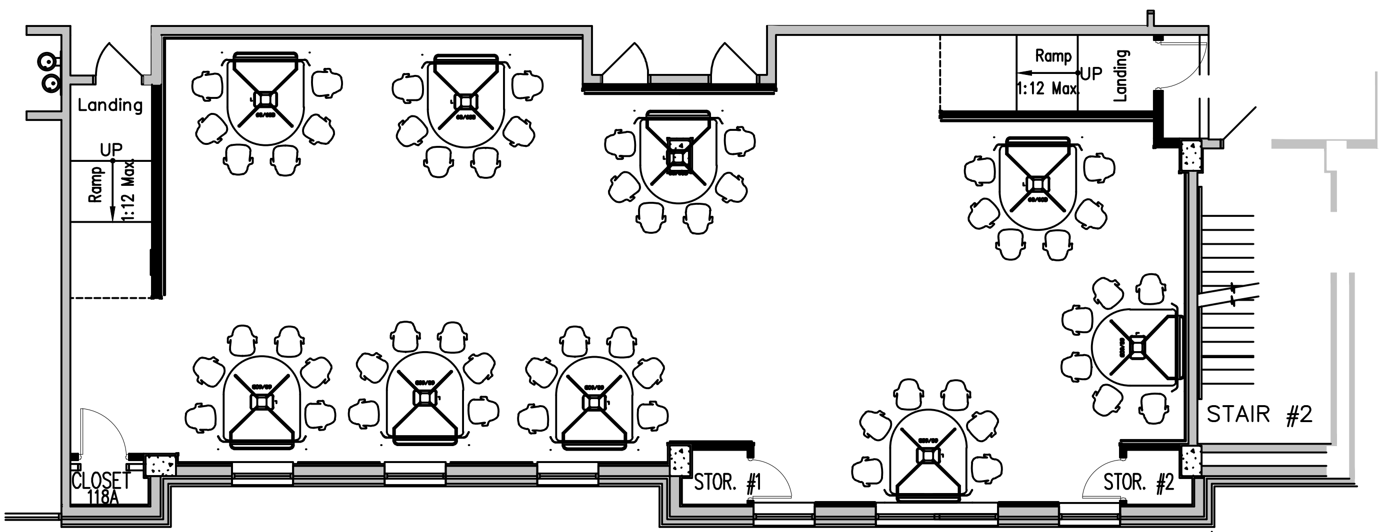
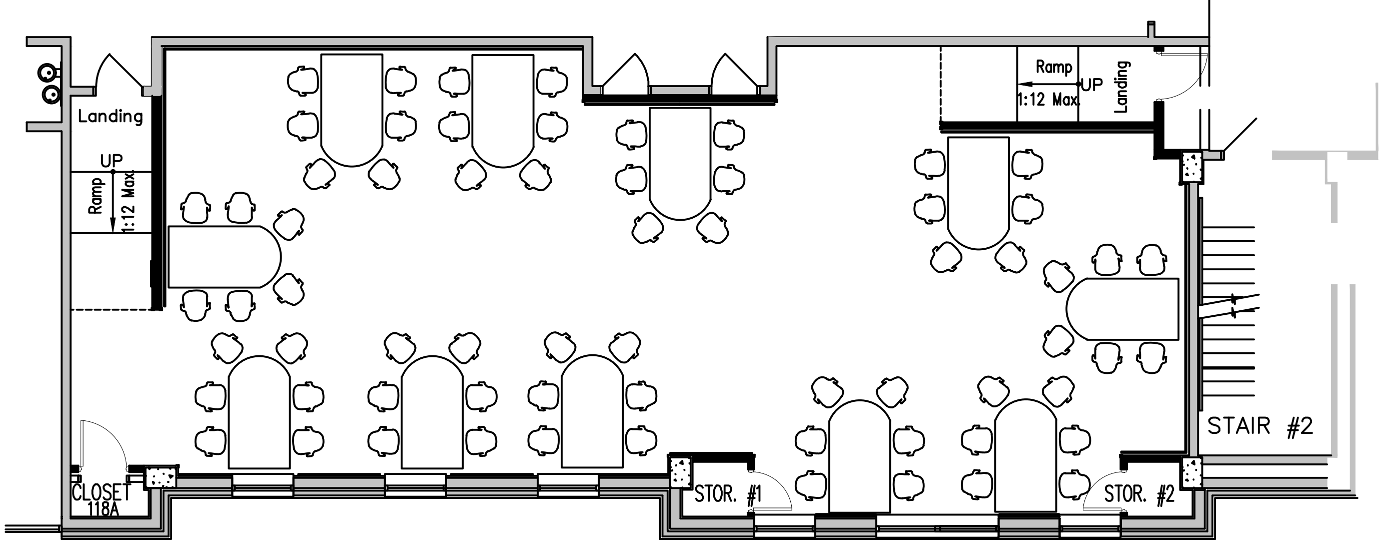


Table Pod D – Izzy+ Clara

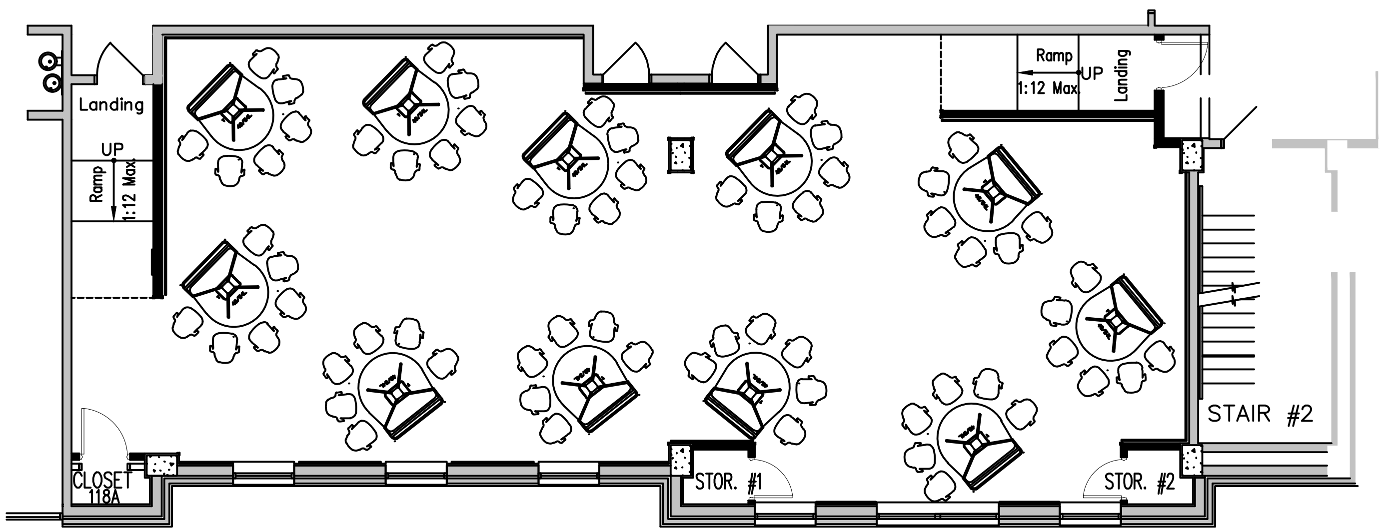
Table Pod E – Steelcase Ballet



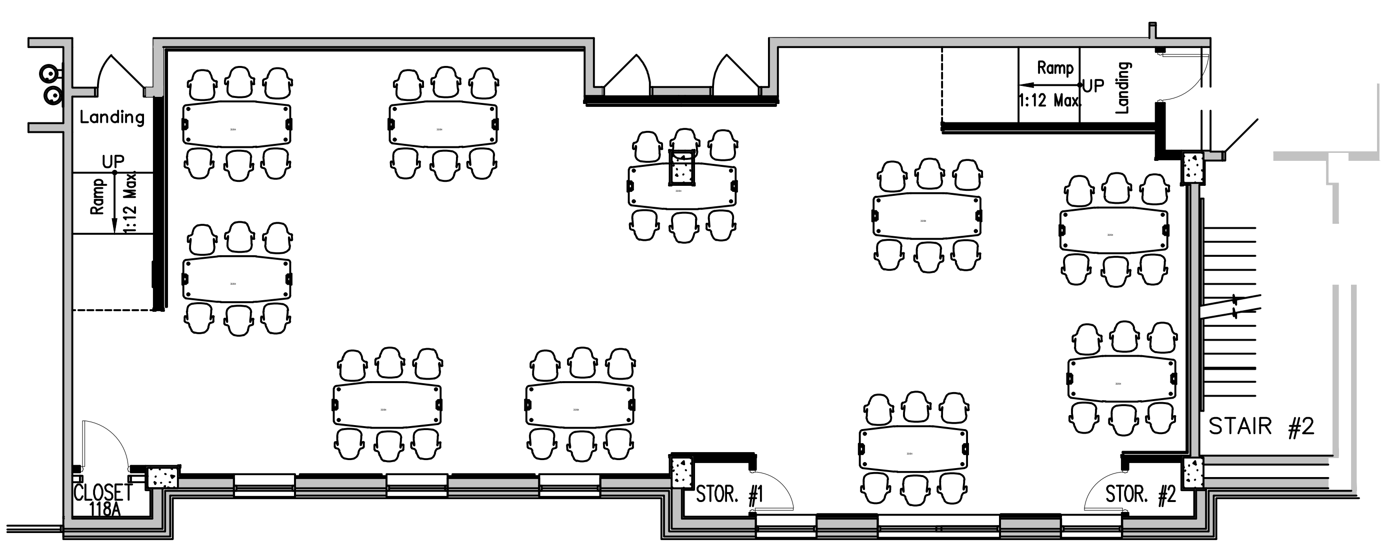
OPTION 1



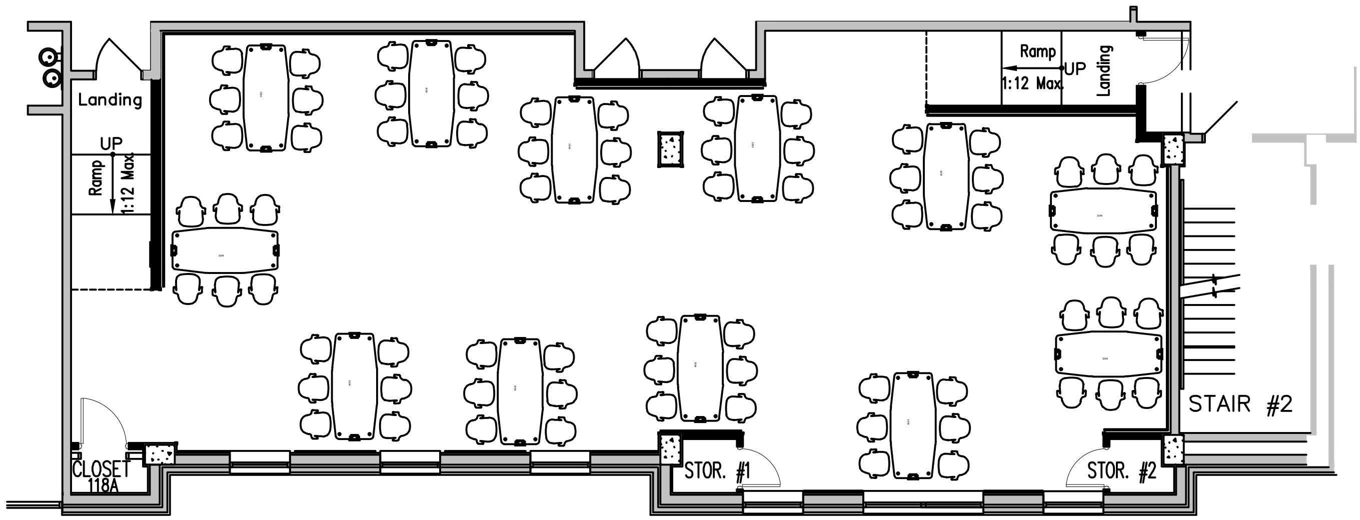
OPTION 2



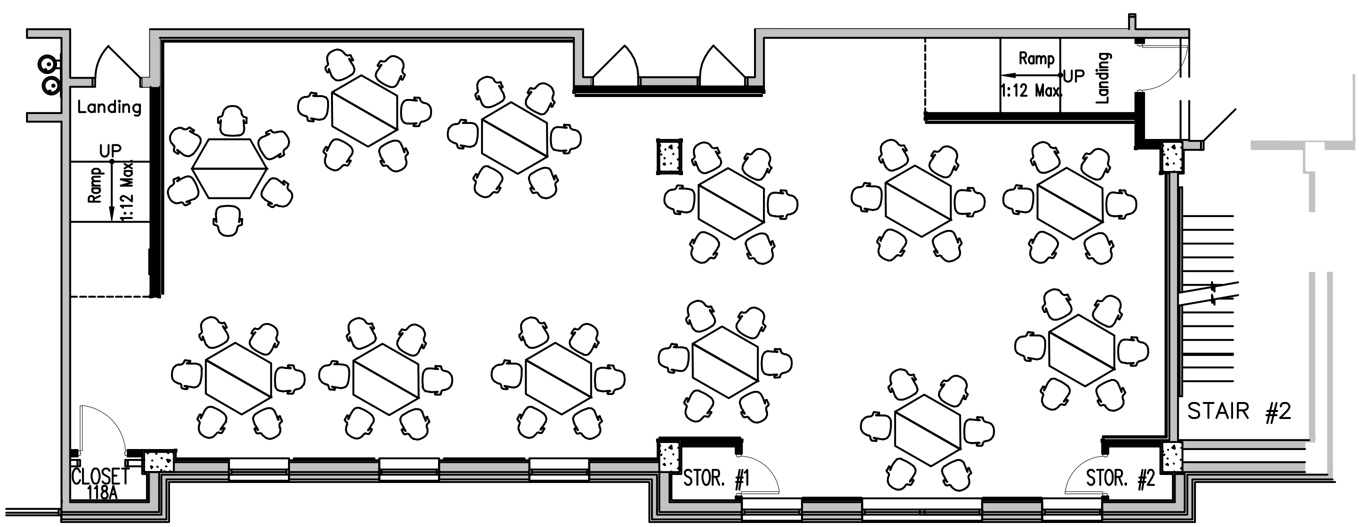
OPTION 3



OPTION 4



OPTION 5



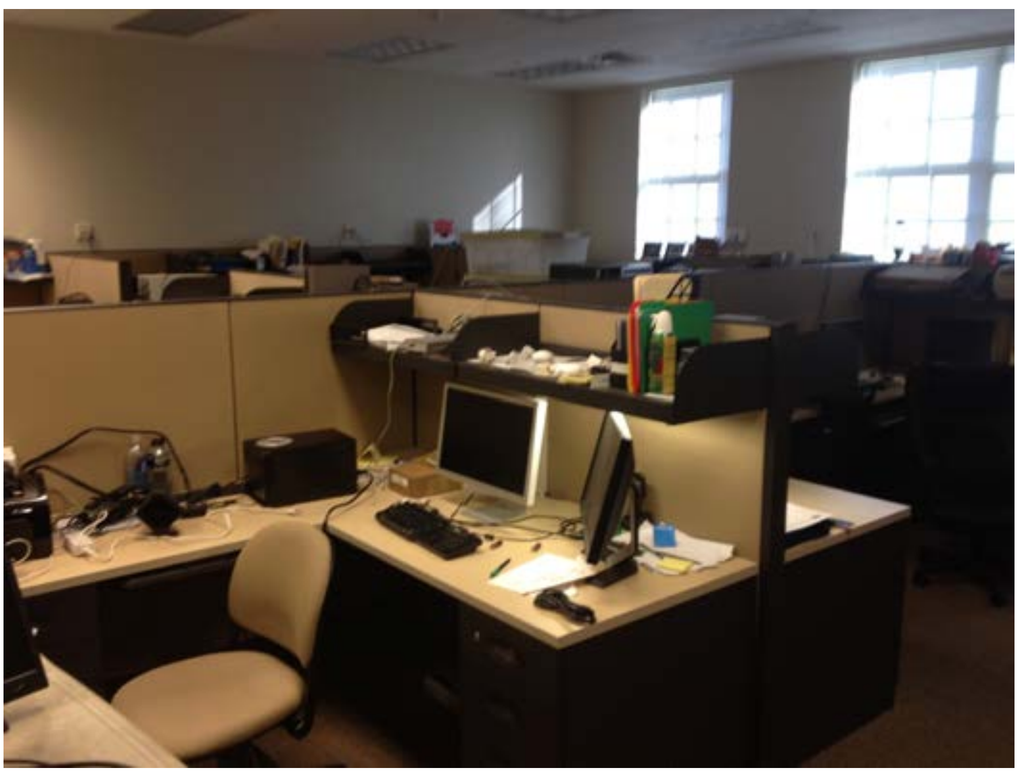
OPTION 6

Existing Conditions Photographs

Sciences Center Classroom Building 118 Existing Conditions Photo – 10/23/14

Sciences Center Classroom Building 118 Existing Conditions Photo – 10/23/14

Sciences Center Classroom Building 118 Existing Conditions Photo – 10/23/14



Sciences Center Classroom Building 118 Existing Conditions Photo – 10/23/14


LINEN 2.0
Linen 2.0
PRICE
Milliken

Colorline images shown are cropped for greater pattern detail and represent only a part of full a 1m x 1m tile.


LIN015 LINEAR B


LIN121 LINSEED


LIN060 CAMLET


LIN010 MURREY


LIN077 FLAX


LIN124 CAMBRAI


LIN145 HELEN


LIN083 LINSEY


LIN096 CARTHAGE

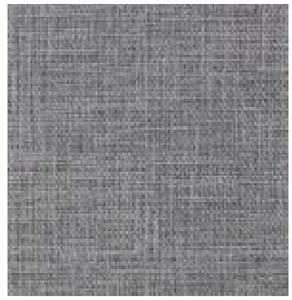

LIN069 REED


LIN059 CAMBRESINE


LIN097 NEITH


LIN120 SINDON

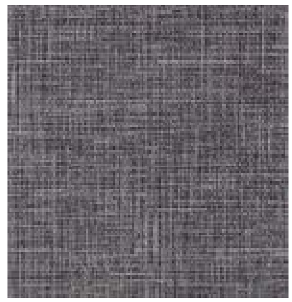

LIN067 BARRAS


LIN005 LISBURN


LIN043 PENELOPE

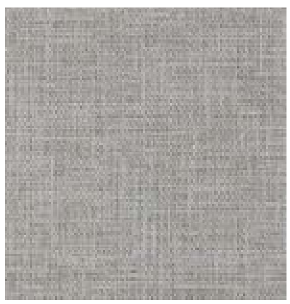

LIN079 CROMMELIN


LIN046 LOCKRAM

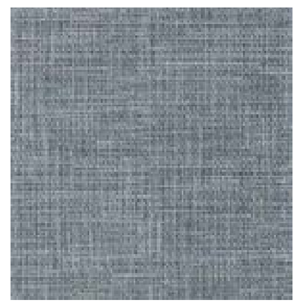

LIN118 VALLEY OF THE NILE


LIN101 WESTPHALIA


LIN108 CALYPSO


LIN171 BELFAST


LIN107 CRETE


LIN106 TUNIC


LIN075 SIRCE


LIN122 PYLOS


LIN071 ISLE OF BUGEN


LIN081 RAMSES


LIN087 LICHEN

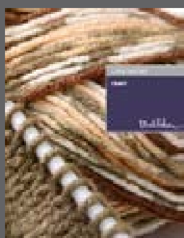

LIN094 MARCELLA


LIN023 BAST


LIN093 ISIS

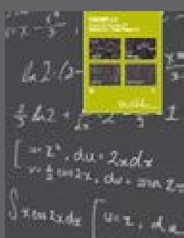
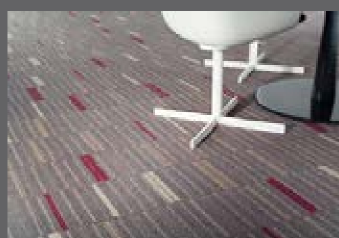
LINEN 2.0

Have you seen our other collections? Visit us online today.




Craft


Illumine

Theory 2.0


Yarn Storm

Construction
Tufted, Textured Loop

Tile Size
1 m x 1 m (39.4" x 39.4")

Yarn Type
Milliken-Certified WearOn® Nylon Type 6,6

Stain Repel / Stain Resist / Soil Release
StainSmart®

Tufted Face Weight
20 oz/yd² (678.1 g/m²)

Finished Pile Height
0.11" (2.8 mm)

Average Density
6,583

Standard Backing
PVC-Free Comfort Plus® ES Cushion
Comfort Plus® is available with TractionBack®

Texture Appearance Retention Rating (TARR)
Severe

Recommended Installation Methods

VERTICAL ASHLAR

MONOLITHIC

TractionBack®
Simplify your modular installation with Milliken's patented TractionBack®, an innovative backing system that is faster, more cost efficient, and environmentally superior to wet adhesives and peel-and-stick carpet tile.

This cushion-back carpet tile product is covered by one or more patents, published applications and/or patents pending. Specifications are subject to normal manufacturing tolerances and may be changed without prior notice.

Growing greener for over 100 years.
Visit milliken.com for more information.

Customer Concierge 800.824.2246 | millikencarpet.com

Cover image: *Linens,* by Trinidad P.

2710019315
CP 0113

700 series wall base

series wall base

:s moderate pricing and beautiful color palette, our 700 Series wall base is an outstanding selection for any
ation. Easier to work with and providing more flexibility than vinyl base products, Roppe's unique blend of
oplastic rubber and vinyl makes the 700 Series an attractive and economical choice for a variety of applicat

ROPPE.

PRODUCT SUBMITTAL

700 series

TPR WALL BASE

700 Series Wall Base, 4 1/2" Cove

Manufacturer
Roppe Corporation
1602 N. Union Street
P.O. Box 1158
Fostoria, Ohio USA 44830-1158
Website - www.roppe.com
t: (419) 435.8546 tf: (800) 537.9527
f: (419) 435.1056
e-mail: sales@roppe.com

Product Description
Our 700 Series wall base is an outstanding selection for any installation. Easier to work with and providing more flexibility than vinyl base products, Roppe's unique blend of thermoplastic rubber and vinyl makes the 700 Series an attractive and economical choice for a variety of applications.

Features
Extremely Durbale and Flexible
Will not Shrink, Gap or Cup
Recycleable (IMPACT Recycling Program)
Qualifies for LEED® Credits
FloorScore® Certified

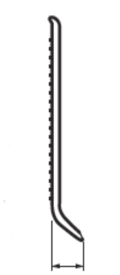
700 Series, 4 1/2"

Toe Type:	**Cove**
Base Height:	**4 1/2" (114.3 mm)**
Base Thickness:	**1/8" (3.2 mm)**
Base Length:	**48" Sections or 120' ft. Coils**
Carton Quantity:	**30 pieces or 1 coil**
Carton Weight:	**45 lbs.**

Additional Accessories: Inside and outside factory corners are available to match wall base installations.

attach color submittal

sample here



Standard
Toe Base 5/8"

Technical Data
LEED v2009 IEQ Credit 4.1: Qualifies
ASTM F1861 - Resilient Wall Base: Type TP, Group 2, Style B
ASTM E648 (NFPA 253) - Critical Radiant Flux: Class I, > 0.45 W/cm2
ASTM E662 (NFPA 258) - Smoke Density: Passes, <450
ASTM E84 - Flammability: Class A
CAN/ULC-S102.2 - Surface Burning: FSR 10, SDS 60
Acclimation Time: 48 Hours
Storage & Acclimation Temperature: 65 ° - 85 ° F

Adhesives* (Visit our website for complete Adhesive instructions)
AW-510 Acrylic Wet-Set Adhesive
Unit Size: 1 or 4 Gallon Units
VOC: < 0.1 g/l
Coverage Rate: 160 sq. ft. per gallon
Substrate: Porous
WB-600 Acrylic Wall Base Adhesive
Unit Size: 30 oz. Cartridge, 1 Gallon and 4 Gallon Units
VOC: < 12 g/l
Trowel Coverage Rate: 180-340 lin. ft. per gallon
Cartridge Coverage Rate: 30-70 lin. ft. per cartridge
Substrate: Porous
C-630 Contact Adhesive
Unit Size: 1 Quart
VOC: 0.0 g/l
Coverage Rate: 20-40 sq. ft. per unit or 120-140 lin. ft. per unit.
Substrate: Non-Porous

Installation* (Visit our website for complete Installation instructions)
All material is to be delivered to the installation location in its original packaging with labels intact. The installation area, unboxed wall base and adhesive are to be maintained between 65° (19°C) and 85° (30°C) for at least 48 hours before installation, during installation and thereafter. Proceed with the installation only when the conditions are proper and correct. Inspect all material for proper type and color. A bond test should be performed at least 72 hours prior to the scheduled installation to ensure the surface is suitable and there should be extreme difficulty in removing the wall base from the surface.

Maintenance* (Visit our website for complete Maintenance instructions)
700 Series wall base can be cleaned with a neutral pH cleaner and a soft wet cloth.

Availability, Cost & Samples
Roppe Flooring products are sold through distribution. To locate the nearest distributor, visit www.roppe.com. or send an email to solutions@roppe.com

Technical Document Support
Additional product resources and technical documents are available online at www.roppe.com. For additional technical support, send an e-mail to solutions@roppe.com

Warranty
Roppe Provides a 2 year Limited Warranty on all 700 Series Wall Base. For additional information, see associated Warranty documents.

***For complete adhesive, installation & maintenance instructions, visit www.roppe.com**

700 series wall base colors

SHERWIN-WILLIAMS.

SW 7661
Reflection
Interior / Exterior
Locator Number: 233-C1

COORDINATING COLORS

SW 6252
Ice Cube

SW 9161
Dustblu

SW 9178
In the Navy

SIMILAR COLORS

DETAILS

COLOR STRIP 233

FIND INTERIOR PAINT

FIND EXTERIOR PAINT

Save to mySW.com +

Add to my Project List +

Actual color may vary from on-screen representation. To confirm your color choices prior to purchase, please view a physical color chip, color card, or painted sample.

Your Sherwin-Williams

Sorry, we're unable to locate your store at this time.

FIND A STORE

SHOW YOUR #SWCOLORLOVE SO THAT WE CAN SHARE IT WITH THE WORLD.

Tag your most inspiring and colorful Twitter and Instagram posts with #SWCOLORLOVE or upload a photo.

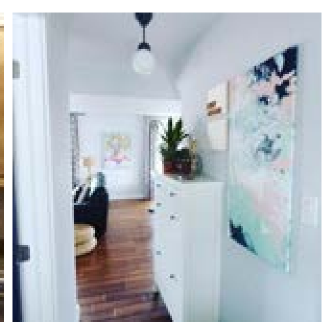
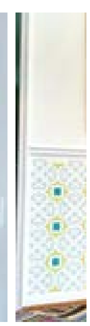
Terms of Use

UPLOAD A PHOTO

Paint Projects | Color Inspiration

Get Ideas From Customer-Submitted Projects



SHERWIN-WILLIAMS.

Akira
conference + classroom tables

Steelcase

STATEMENT OF LINE

TABLE TOPS

Rectangular Top:
28.5" and adjustable
27.5 – 32.5" H;
30", 20", 24", 30", 36", 60" W
D Shape Top:
28.5" and adjustable
27.5 – 32.5" H;
28", 34" W; 48", 60" L
Trapezoid Top:
30" W; 60" L; 28.5" H

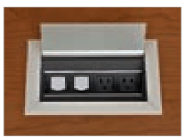
PRODUCT FEATURES


Flip top mechanism


Release handle for flipping/nesting


Optional power: Miniport

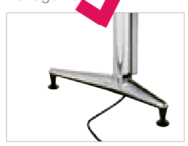

Optional power: Axil Z


Optional power: Ellora


Horizontal wire management


Modular power system

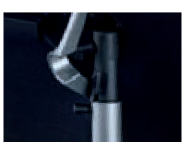

Color coded connectors


Vertical wire management


In-line nesting


Casters


Glides


Height-adjustment

SURFACE MATERIALS

Legs available in:

- 4140 Arctic White Gloss
- 4145 Milk Gloss
- 4146 Champagne Matte
- 4147 Champagne Gloss
- 4141 Platinum Matte
- 4142 Platinum Gloss
- 4138 Graphite Gloss
- 4148 Midnight Brown Gloss
- 7196 Midnight Brown Textured
- 7197 Anthracite Textured
- 4144 Black Gloss

Also available in standard Steelcase paint finsihes.

Optional polished aluminum base finish.

Note: all flipping tables and all height adjustable tables have an inner column that is always matte black anodized, regardless of base finish specified. Wings on flipping tables are always silver powder coat.

Colors are representative and may vary slightly from actual material. For further options, visit us online.

SUSTAINABILITY

At its heart, sustainability at Steelcase is about people. It's about creating and supporting the economic, environmental and social conditions that allow people and communities to reach their full potential.

Research and insights direct our path.
It's not only about creating goods, it's about creating good. It's not only about creating value, it's about living our values. It's not just about reducing our footprint, it's about expanding our reach. It's about creating lasting and meaningful change to enable the long-term wellbeing of current and future generations.

Innovative products and solutions result.
In the development of our products, we work to consider each stage of the life cycle: from materials extraction, production, transport, use and reuse, until the end of its life. We demonstrate performance through third-party verified certifications and voluntary product declarations.

Steelcase's sustainability promises, actions, and results are communicated in an annual Corporate Sustainability Report.

Steelcase®

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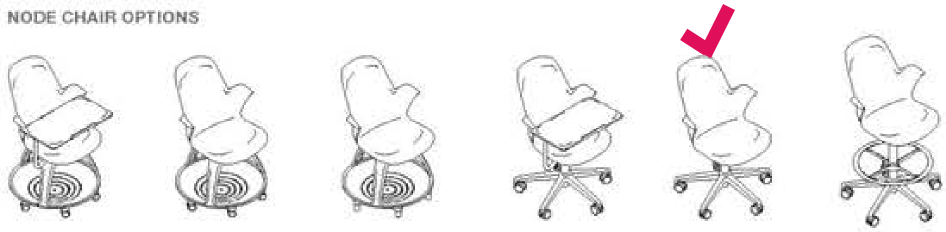
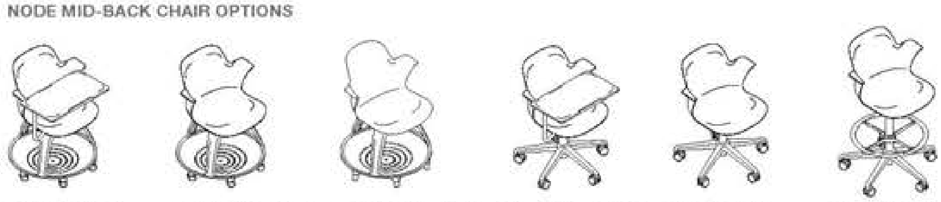
EDUCATION

NODE CHAIR OPTIONS



tripod base with worksurface and casters | tripod base without worksurface, with casters | tripod base without worksurface, with glides | five-star base with worksurface | five-star base without worksurface | five-star stool

NODE MID-BACK CHAIR OPTIONS



tripod base with worksurface and casters | tripod base without worksurface, with casters | tripod base without worksurface, with glides | five-star base with worksurface | five-star base without worksurface | five-star stool

DIMENSIONS

item	tripod base	five-star base	five-star stool
seat depth	16 9/16"	16 9/16"	16 9/16"
seat depth for mid-back	15 1/2"	15 1/2"	15 1/2"
maximum seat width	19 1/2"	19 1/2"	19 1/2"
seat height from floor	18 1/4"	15 7/8" to 21 7/8"	23 7/8" to 31 7/8"
back height from floor (not seat)	35"	33 1/4" to 38 1/2"	40 7/8" to 48 1/4"
back height from floor (not seat) for mid-back	31 1/4"	28 7/8" to 34"	37 1/4" to 44 1/2"
width	23 3/4"	23 3/4"	27 1/4"
worksurface size	22 1/4" x 12"	22 1/4" x 12"	22 1/4" x 12"
worksurface depth adjustment	7 1/4" to 15"	7 1/4" to 15"	7 1/4" to 15"
maximum width between arms	20 1/8"	20 1/8"	20 1/8"
worksurface height from floor	28 1/2"	N/A	N/A

COMPONENTS

Flexible seat. Flexible seat with simple adjustments keeps people comfortable in a variety of postures.

Easy maintenance. Comfort without upholstery means easy maintenance.

Open seat design. Open seat design offers easy access, while arms serve as bag or purse hooks.

Swivel seat. Swivel seat keeps open sight lines.

Casters. Casters lend mobility for quick, easy transitions between configurations.

Cupholder. Optional cupholder frees up worksurface area for books and technology.

Base. Base keeps backpacks and personal belongings out of the aisle.

Personal worksurface. Personal worksurface is adjustable, non-handed, and large enough to support digital and analog resources.

Tablet stand. Tablet stand supports all top-selling tablets and smartphones in both portrait and landscape positions, making content easy to view and freeing up space on the worksurface for other class materials.

Steelcase warranty. Steelcase warranty with elevated durability testing makes Node an easy choice.

SURFACE MATERIALS

Standard colors

- sterling dark solid (6059)
- citron (6332)
- midnight (6259)
- wasabi (6335)
- picasso (6333)
- arctic white (6009)
- platinum (6249)
- black (6206)
- jazz blue (6336)
- chili (6338)
- element (6337)
- flash (6334)

Paint palette

- champagne metallic (4750)
- platinum (4799)
- black (0835)

Tripod base

- element (6337)
- platinum solid (6249)
- near black (6295)

Worksurface

- platinum solid (6249)
- seagull (6053)
- sand (6654)
- element (6337)
- near black (6295)

Signature plastics

- crimson (6BC1)
- purple (6BC2)
- green (6BC3)
- burgundy (6BC4)
- blue (6BC5)
- orange (6BC6)
- brown (6BC7)
- gold (6BC8)
- red (6BC9)

Colors are representative and may vary slightly from actual material.

For further options, visit us online.

SUSTAINABILITY

PEOPLE. PLANET. PROFIT.

By rethinking our business systems and designing our products to avoid negative impacts on humans and the environment, we contribute to a sustainable future for the planet and its people. We commit to advance our practices through continuous learning and building partnerships with our customers, business partners and environmental thought leaders to optimize our performance and contribute to the science and practice of sustainability.

TO FIND OUT MORE, VISIT
WWW.STEELCASE.COM/SUSTAINABILITY

PRODUCT ENVIRONMENTAL CERTIFICATIONS

- McDonough Braungart Design Chemistry (MBDC)
- Life Cycle Assessment
- MBDC's Cradle to Cradle™ Silver certification
- BIFMA Level® 2 certification
- Indoor Advantage™ Gold from Scientific Certification Systems

GLASSBOARDS

Float + Depth

CLARUS GLASS

- 1/4" Clarus tempered safety writing glass
- Non-staining writing surface
- Compatible with any marker, even permanent
- Clarus Opti-Clear Polish and eased corners for safety

COLORS & PRINTING

COLORS BY CLARUS

- 150+ standard colors
- Unlimited options with Clarus' color-matching ability

COLORDROP

- Custom logos, patterns and artwork printing
- Direct-to-glass UV printing is guaranteed to never fade or discolor

SURROUND

BOLD COLORS

- Broad spectrum of beautiful, richly finished color frame options
- Constructed from premium powder-coated aluminum

TIMBER

- Premium wood frame options
- Hand-crafted from solid wood, responsibly harvested in the USA

SIZE

- Any size up to 72" x 144"
- Custom sizes and shapes available

MAGNETIC

- Available in both magnetic & non-magnetic finish

MOUNTING STYLE

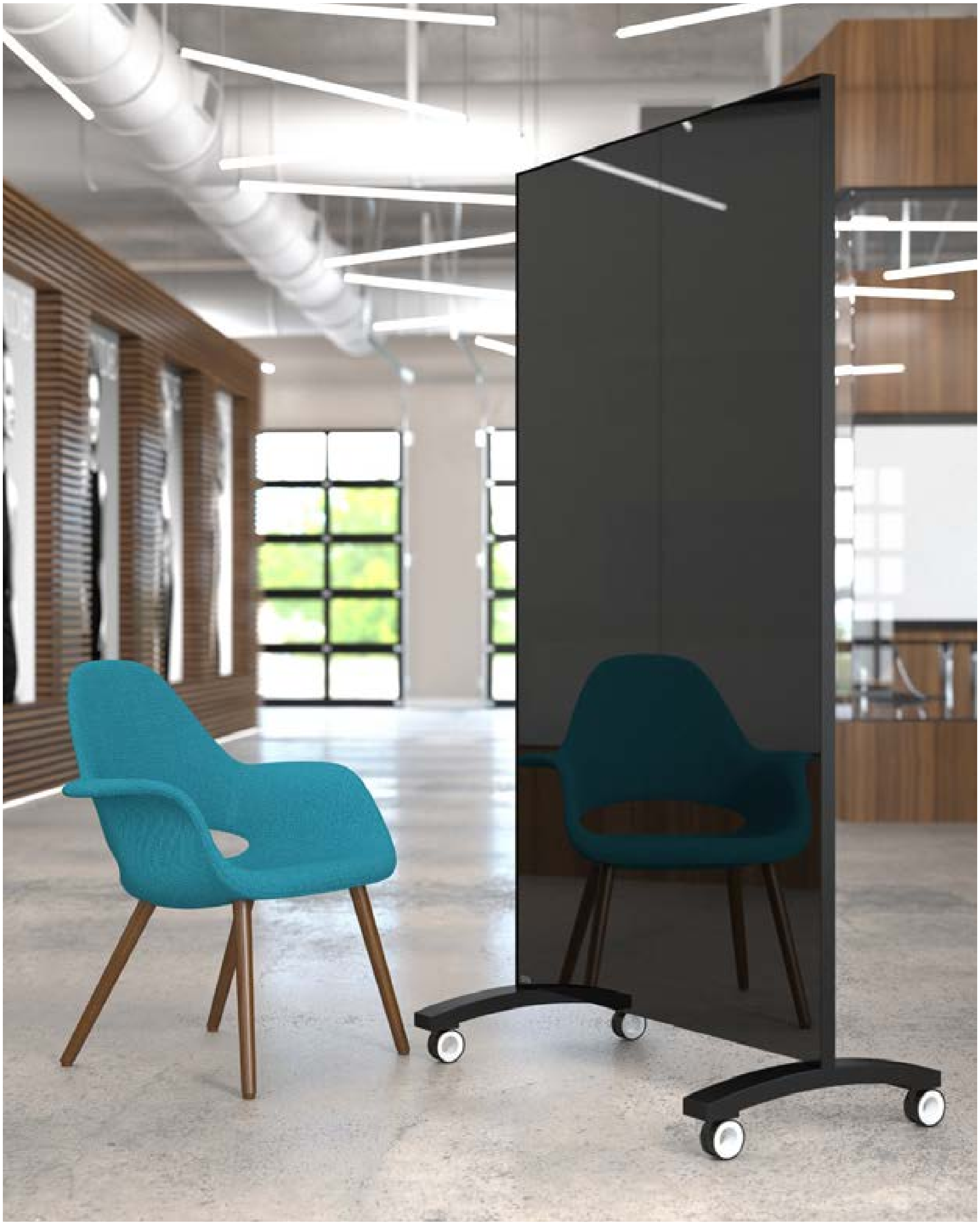
FLOAT

- Concealed mounting hardware and anchors included
- Clarus' patented TruMount hardware allows horizontal or vertical mounting

DEPTH

- Stainless steel standoff hardware and anchors included
- Surround frames not available for Depth

clarus.com | 888.813.7414



GO! MOBILE

The ultimate mobile collaboration tool

clarus

CLARUS GLASS

- Clarus tempered safety writing glass
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- Compatible with any marker, even permanent
- Clarus Opti-Clear Polish and eased corners for safety

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COLORDROP

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- Direct-to-glass UV printing is guaranteed to never fade or discolor

FRAME FINISHES

BOLD COLORS

- Broad spectrum of beautiful, richly finished color frame options
- Constructed from premium powder-coated aluminum

TIMBER

- Premium wood frame options
- Hand-crafted from solid wood, responsibly harvested in the USA

CASTER COLORS

- Four colors to perfectly complement your frame finish and glass color

SIZE

FOUR WHEEL

- XS (40" x 54")
- S (60" x 54")
- M (40" x 73")
- XL (60" x 73")

THREE WHEEL

- XS (40" x 54")
- S (60" x 54")
- M (40" x 73")

GO! HUBS

- Use go! Hubs for additional ganging with 3-wheel go!'s
- By ganging multiple go!'s, users can create nooks and workspaces in open areas

MAGNETIC

- Available in both magnetic & non-magnetic finish

Installation Photographs

Sciences Center Classroom Building 118 Installation Photo – 12/3/14

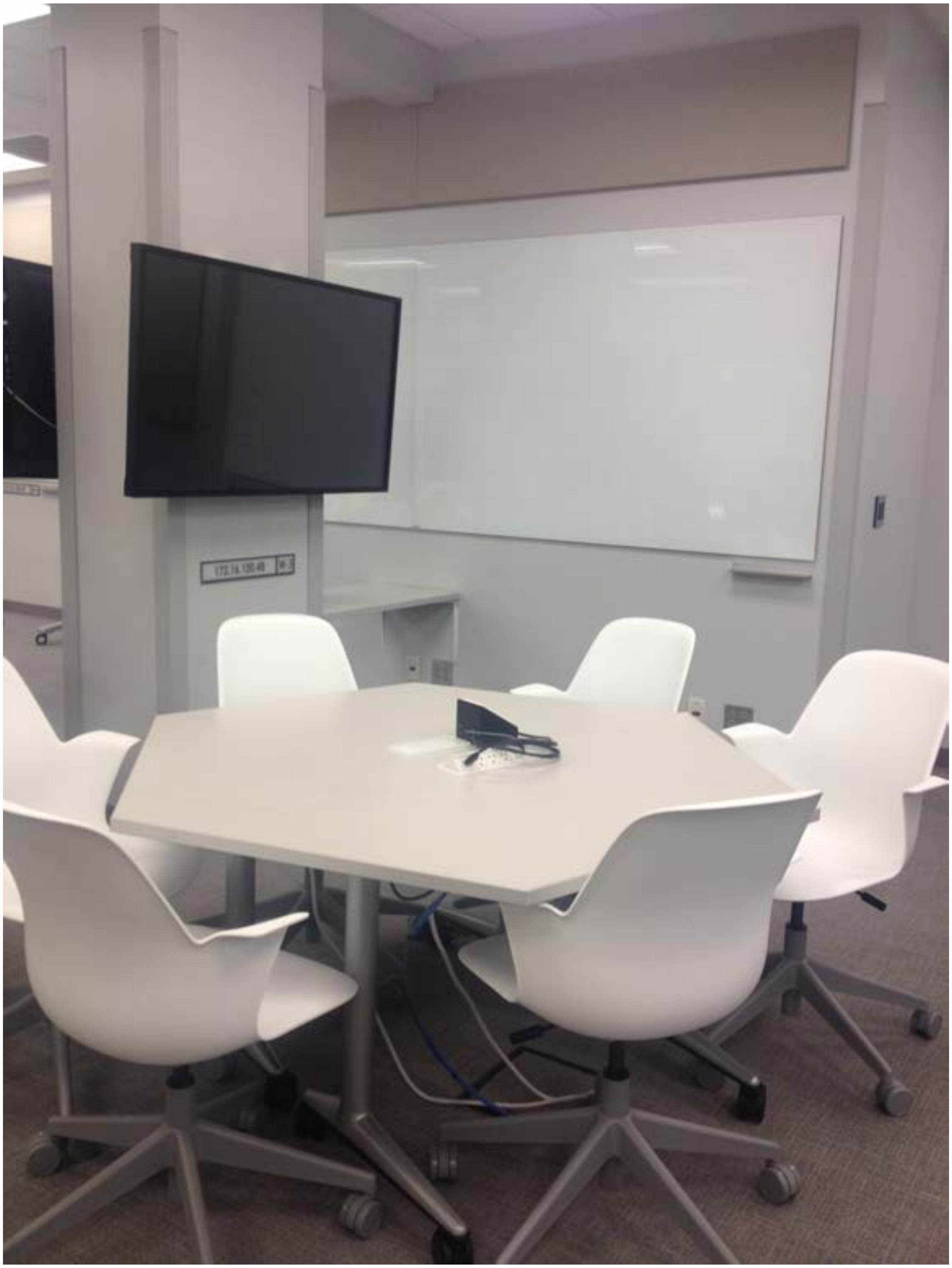
Sciences Center Classroom Building 118 Installation Photo – 12/3/14

Sciences Center Classroom Building 118 Installation Photo – 12/3/14

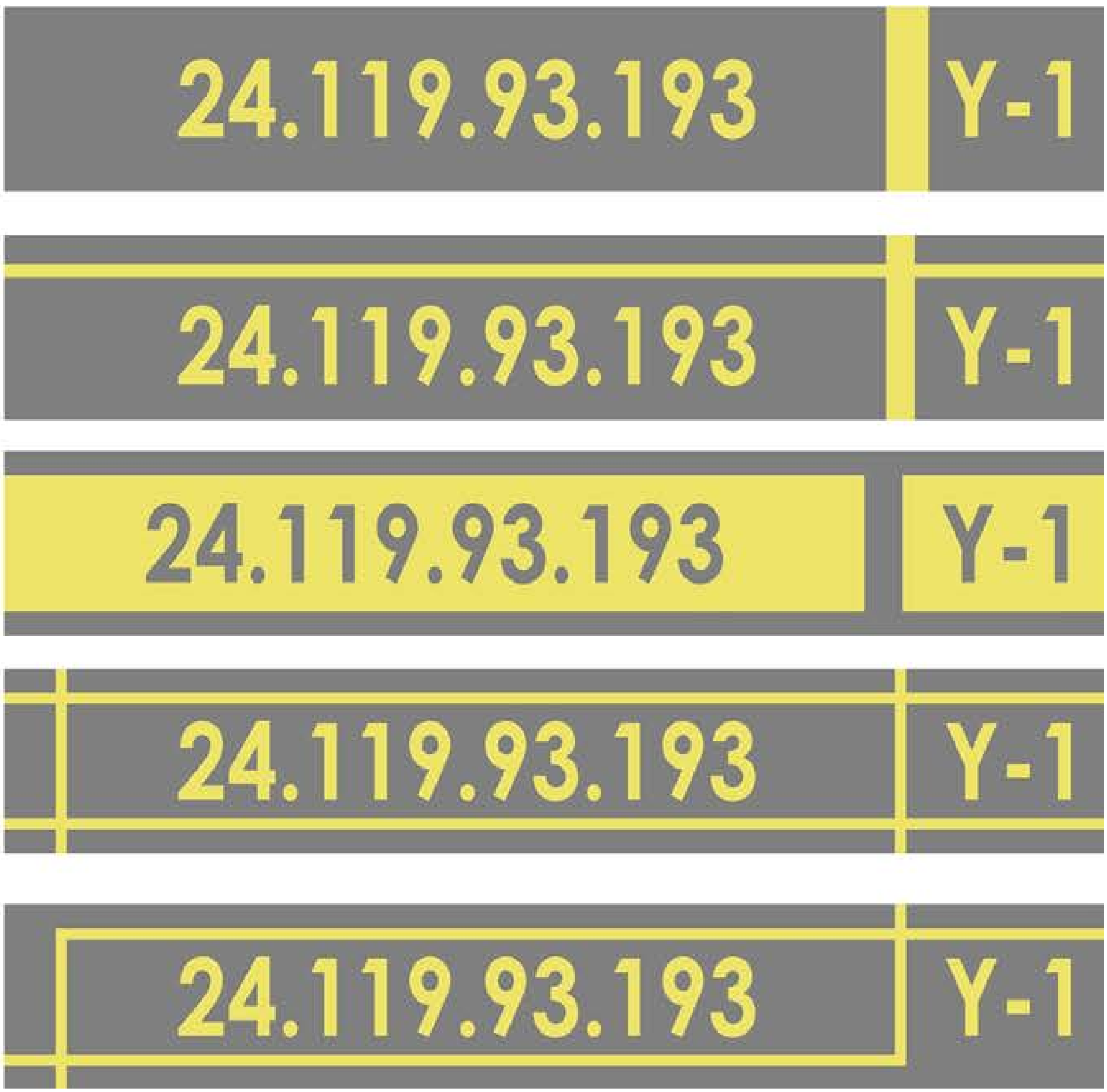
Sciences Center Classroom Building 118 Installation Photo – 12/3/14

Sciences Center Classroom Building 118 Installation Photo – 12/3/14

Sciences Center Classroom Building 118 Installation Photo – 12/3/14


Sciences Center Classroom Building 118 Installation Photo – 12/3/14


18 in
3 in
24.119.93.193
Y-1
24.119.93.193
Y-1
24.119.93.193
Y-1


24.119.93.193
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Christie Brio
Share more

Boardrooms
Classrooms
Conference rooms
Research labs
Study groups
Training rooms

Working as a team has never been easier

In fast-paced business and academic environments Christie® Brio offers presentation and collaboration solutions that remove technical barriers to help business professionals, teachers and students easily share, discuss and contribute ideas. Bring group members together, with up to five computers, smart phones, or tablets, by wirelessly streaming content onto displays and channeling audio through a meeting room or classroom's sound system.

Groups can share content, edit in real time, save their work and capture action items for quicker follow-up – avoiding the challenges of traditional collaboration sessions. With Christie Brio solutions, teammates make decisions quickly and focus on what matters most. Participants are freed from the constraints of meeting rooms, traditional classrooms and cumbersome equipment, while having the option to collaborate virtually across locations.

CHRISTIE®

Support a BYOD environment

Today's business and education environments rely on secure information sharing while offering flexibility in an individual's device choice. For academic teams and businesses to succeed, they require the most supportive and enabling technology on the market to allow them to use their own network-connected devices. Many of these devices are not standard issue, and yet may be used for gathering, developing and sharing information and ideas.

Creating an infrastructure that allows all of these devices to network in a common session is an ongoing challenge for IT managers. By using wireless connection and communication protocols that are already part of the operating system, Christie® Brio enables real-time screen mirroring from participants' Microsoft®, Apple, or Android™ computers and devices without installing custom drivers.

Check out Christie Brio for your next collaboration session and start sharing more.

▲ Christie Brio enables quick, straightforward collaboration.

▲ Christie Brio allows you to synthesize multiple sources of data.

		Christie Brio Enterprise and Team+	Christie Brio Team
Outputs		• 2 DisplayPort: Up to 2560 x 1600 pixels per output	
Inputs		• 2 DVI-D: Support for up to 2560 x 1600 pixels per input (wired connection) • Up to 5 video sources from 640 x 480 to 1920 x 1080 encoded to H.264 • 2 analog 3.5mm stereo audio • Up to 5 audio encoded streams to H.264 • Support for HDCP (High-bandwidth Digital Content Protection) • 4 USB ports	• Up to 5 video sources from 640 x 480 to 1920 x 1080 encoded to H.264 • Up to 5 audio encoded streams to H.264 • 4 USB ports
Network		Christie Brio Enterprise • Gigabit Ethernet:1000 Mbps Ethernet, RJ-45 connector. Support for IGMPv2, IPv4, RTSP, SRTP, HTTP, TCP/IP Christie Brio Team+ • Internal 2.4 GHz wireless access point • IEEE 802.11 a/b/g/n standard • 2Tx/2Rx MIMO • Up to 300 Mbps data rate • 64/128/152 bit WEP, WPA, WPA2, 802.1x, AES & TKIP	• Internal 2.4 GHz wireless access point • IEEE 802.11 a/b/g/n standard • 2Tx/2Rx MIMO • Up to 300 Mbps data rate • 64/128/152 bit WEP, WPA, WPA2, 802.1x, AES & TKIP
Protocols supported		• Airplay • MS network projector • Brio screen projector (for use with MS Windows or Android devices)	
Encoding		• 2 high-definition DVI-D inputs to L5 H.264 video streams @ 30 FPS • 2 stereo audio streams	
		• Up to 5 high-definition L5 H.264 video streams @ 30 FPS • Support for variable bitrate	
Decoding		• Up to 5 high-definition network video streams @ 30Hz	
Sound pressure (0.5m distance)		• 40.7dBA max • 39.2dBA max	
Power	voltage range	• 100-240VAC (auto-ranging power supply)	
	current	• 2-4A (max)	• 2A
	power consumption	• 220W (max)	• 120W (max)
	dissipation	• 750 BTU/hr (max)	• 410 BTU/hr (max)
Physical	size	• (WxHxD): 17.40 x 1.74 x 9.5" (442 x 44 x 241mm)	• (WxHxD): 8 x 1.9 x 8.9" (204 x 49 x 252mm)
	chassis	• 1U form factor	
	mounting	• Optional rack ears • Optional under table mount • Optional VESA "sandwich" mount	
	weight	• 6.5lbs (2.95kg)	• 2.8lbs (1.27kg)
Reliability		• MTBF>50,000 hours for major modules	
Regulatory		• CAN/CSA C22.2 No. 60950-1 • UL 60950-1 • IEC 60950-1 emissions • FCC CFR47, Part 15, Subpart B, Class A –unintentional radiators • EN55103-1 Class A audio, video, audio-visual equipment emission; EN55103-2 audio video, audio-visual equipment immunity; EN61000-3-2, EN61000-3-3 • Directives: (EC) 2011/65/EU (RoHS); 2012/19/EU (WEEE) • Regulation: (EC) No. 1907/2006 (REACH) • Certification marks (check with Christie for latest update): cULus (Canada & US), CE (EU), CCC (China), Saudi Arabia, South Africa, Ukraine, Mexico, GoST-R (Russia) and/or Customs Union which includes Belarus, Kazakhstan, Russia, KC (Korea), S-Mark (Japan), C-Tick (Australia & New Zealand) Taiwan	
Manufacturing location		• Designed, manufactured and tested by Christie Digital Systems USA, Inc.'s facility in Phoenix, Arizona, USA	
Warranty		• Limited two years parts and labor	

Mell Classroom Conceptual Renderings

Mell Commons Conceptual Rendering –3/14/14

Mell Commons Conceptual Rendering –8/4/14

Mell Commons Conceptual Rendering –11/5/14


Mell Commons Conceptual Rendering –11/5/14


Mell Commons Conceptual Rendering –11/5/14


Mell Commons Conceptual Rendering –11/5/14

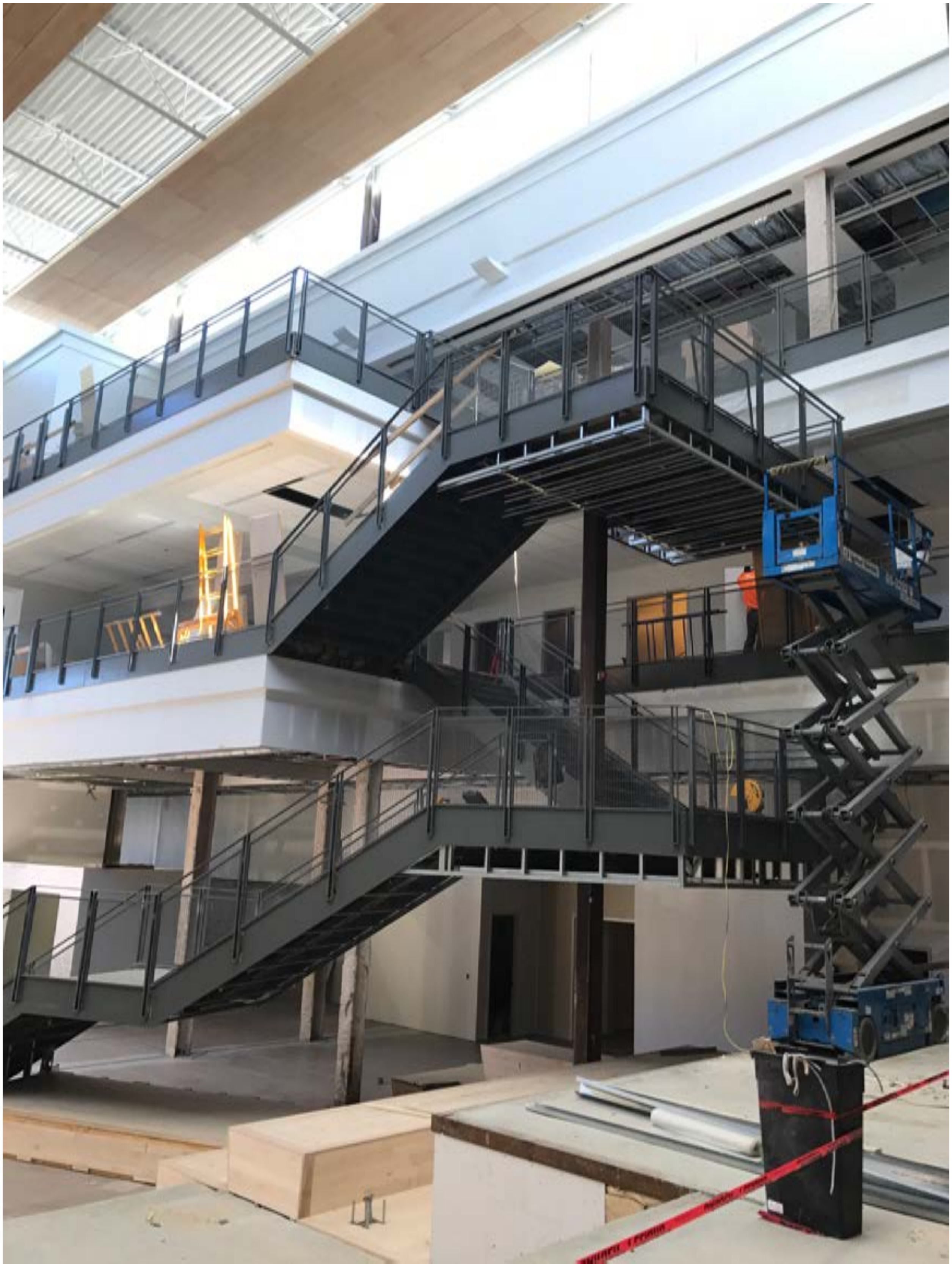
Construction Photographs

Mell Classroom Building 118 Construction Photo – Public Gathering Space – 3/9/17

Mell Classroom Building 118 Construction Photo – Public Gathering Space – 3/9/17

Mell Classroom Building 118 Construction Photo – Classroom – 3/9/17

Mell Classroom Building 118 Construction Photo – Lecture Hall – 3/9/17



Mell Classroom Building 118 Construction Photo – Public Gathering Space – 3/9/17

Verb
classroom collection

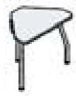
Steelcase
EDUCATION

STATEMENT OF LINE

PERSONAL TABLES


Keystone table


Rectangle table


Triangle table

STUDENT TABLES

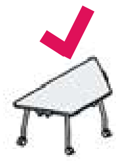

Chevron table
for two


Chevron table
for three


Team table
for four


Team table
for six


Rectangle table


Trapezoid table

MEDIA TABLES

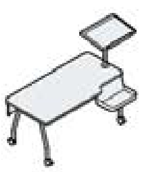

Rounded table


Trapezoid table


Square table

INSTRUCTOR STATION

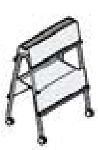

Instructor station
with caddy on left


Instructor station
with caddy on right


Instructor station
without caddy

WHITEBOARD AND DISPLAY

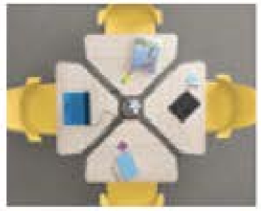
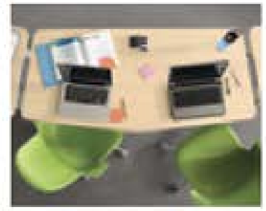

Whiteboard


Easel – medium


Easel – large


Wall track
and hooks

TABLE SHAPES

				
TRAPEZOID TABLES	TEAM TABLES	TRIANGLE TABLES	KEYSTONE TABLES	CHEVRON TABLES

SURFACE MATERIALS

- Legs and modesty panels are available in 10 finishes plus PerfectMatch.
- Instructor station storage caddy, lectern arm and easel legs are available in Platinum Metallic (4799), Champagne Metallic (4750) and Merle (7360).
- Easel display shelves are available in Merle (7360) and Arctic White (7075) markerboard paint.
- Tables available in all Steelcase laminates and open line laminates.
- Side dock with storage hook and center dock available in the following plastic finishes: Midnight (6259), Sterling Dark Solid (6059), Platinum Solid (6249) and Element (6337).

PAINT FINISHES

Price Group 1:

- Black (7207)
- Sand (7225)
- Arctic White (7241)
- Seagull (7243)
- Merle (7360)

Price Group 2:

- Champagne Metallic (4750)
- Sterling Metallic (4798)
- Platinum Metallic (4799)
- Midnight Metallic (7246)
- Dark Bronze (7278)

PLASTIC COLORS

- Midnight (6259)
- Sterling Dark Solid (6059)
- Platinum Solid (6249)
- Element (6337)

LECTERN COLOR COMBOS

- Element Urethane (6337) w/ Dune Laminate (2885)
- Platinum Urethane (6249) w/ Seagull Laminate (2883)
- Sterling Dark Urethane (6059) w/ Seagull Laminate (2883)

Colors are representative and may vary slightly from actual material.

For further options, visit us online.

SUSTAINABILITY

At its heart, sustainability at Steelcase is about people. It's about creating and supporting the economic, environmental and social conditions that allow people and communities to reach their full potential.

Research and insights direct our path. It's not only about creating goods, it's about creating good. It's not only about creating value, it's about living our values. It's not just about reducing our footprint, it's about expanding our reach. It's about creating lasting and meaningful change to enable the long-term wellbeing of current and future generations.

Innovative products and solutions result. In the development of our products, we work to consider each stage of the life cycle: from materials extraction, production, transport, use and reuse, until the end of its life. We demonstrate performance through third-party verified certifications and voluntary product declarations.

Steelcase's sustainability promises, actions and results are communicated in an annual Corporate Sustainability Report.

BIFMA level™ 2 certified

SCS Indoor Advantage™ certified Gold

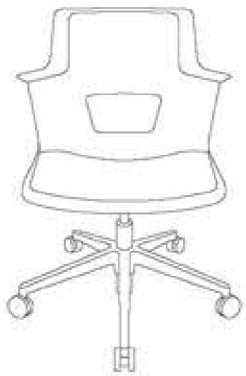
SHORTCUT

seating

turnstone.
A Steelcase Brand

STATEMENT OF LINE

Shortcut chair
TS31201A



Shortcut chair with optional cushion
TS31201A

Shortcut stool
TS31202B

Shortcut stool with optional cushion
TS31202B

SEAT CUSHION

- TS31203
- Optional seat cushion available in all standard Steelcase fabrics and all price groups.
- Available on both chair and stool.
- Can be purchased separately.

SURFACE MATERIALS

SHELL COLORS

- Arctic White
- Picasso
- Wasabi
- Chili
- Element
- Sterling Dark Solid
- Black
- Citron
- Midnight
- Jazz
- Platinum

BASE COLORS

- Arctic White Gloss
- Platinum
- Black

Colors are representative and may vary slightly from actual material.

Installation Photographs

Mell Classroom Building 118 Installation Photo – Classroom - 8/14/17

Mell Classroom Building 118 Installation Photo – Classroom - 8/14/17

Mell Classroom Building 118 Installation Photo – Public Gathering Space -8/14/17

Mell Classroom Building 118 Installation Photo – Public Gathering Space - 8/14/17

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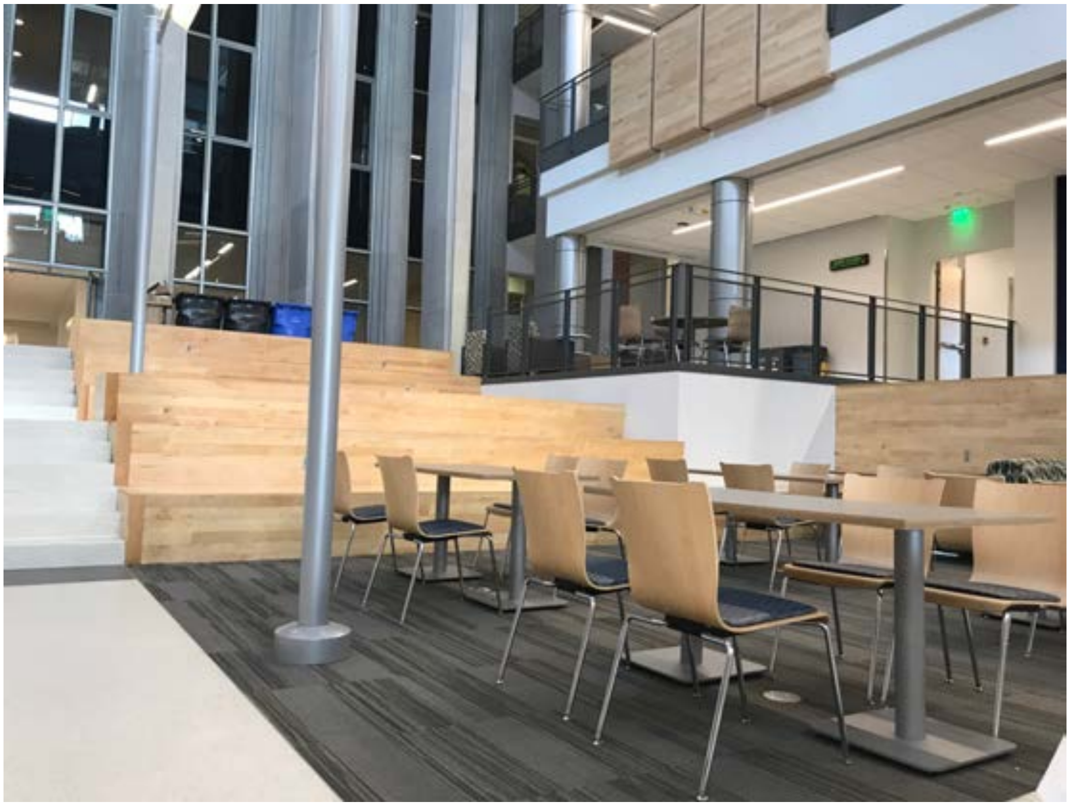
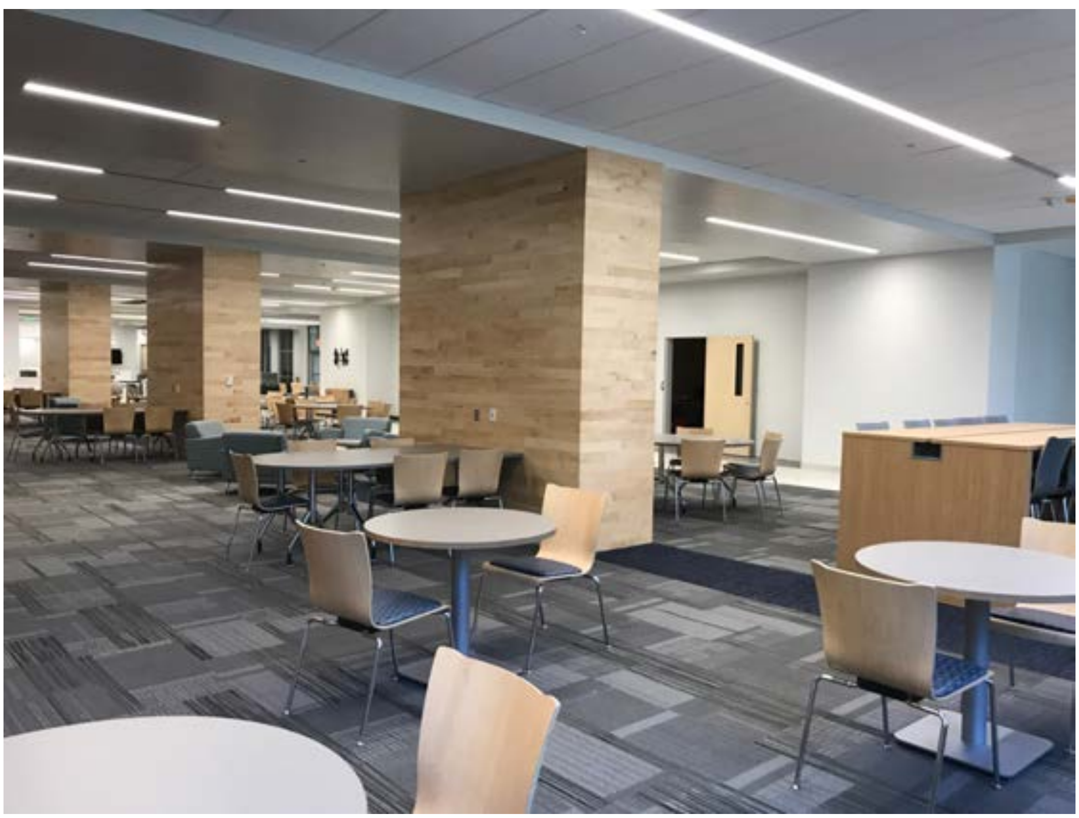


Mell Classroom Building 118 Installation Photo – Public Gathering Space - 8/14/17



Mell Classroom Building 118 Installation Photo – Public Gathering Space - 8/14/17


Mell Classroom Building 118 Installation Photo – Public Gathering Space - 8/14/17

Mell Classroom Building 118 Installation Photo – Public Gathering Space - 8/14/17

Mell Classroom Building 118 Installation Photo – Public Gathering Space - 8/14/17

Mell Classroom Building 118 Installation Photo – Lecture Hall - 8/14/17

GLASSBOARDS

Float + Depth

clarus

CLARUS GLASS

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- Non-staining writing surface
- Compatible with any marker, even permanent
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SURROUND

BOLD COLORS

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- Constructed from premium powder-coated aluminum

TIMBER

- Premium wood frame options
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SIZE

- Any size up to 72" x 144"
- Custom sizes and shapes available

MAGNETIC

- Available in both magnetic & non-magnetic finish

MOUNTING STYLE

FLOAT

- Concealed mounting hardware and anchors included
- Clarus' patented TruMount hardware allows horizontal or vertical mounting

DEPTH

- Stainless steel standoff hardware and anchors included
- Surround frames not available for Depth

ShareLink 250 Series

WIRELESS COLLABORATION GATEWAY

Transforms any room into a wireless collaboration space

- Wirelessly share content from laptops, tablets, and smartphones
- Integrated dual band wireless access point - ShareLink 250 W only
- Provides full screen mirroring for Apple iOS devices
- Dropbox, Google Drive, iCloud, and OneDrive integration provides easy access to content stored in the cloud
- Collaboration mode allows anyone to display content
- Moderator mode ensures only approved content is displayed
- WebShare™ technology enables attendees to view content on personal devices via a Web browser

ShareLink 250 W

ShareLink 200 N

Extron Electronics
INTERFACING, SWITCHING AND CONTROL

Overview

Power over Ethernet – PoE
The ShareLink 250 Series can be powered by a PoE connection, eliminating the need for a local power supply.

Front-mounted antennas for easy rack installation - ShareLink 250 W only
Front-mounted antennas provide an unobstructed access for optimal reception.

Gigabit Ethernet port
High-speed data link for accessing the Internet or other network resources.

USB ports on front and rear panels
Provides easy access for a keyboard or mouse, and enables simple annotation capabilities.

Compact, low profile enclosure
The 1" (2.5 cm) enclosure can be rack mounted or discreetly installed behind a flat panel display.

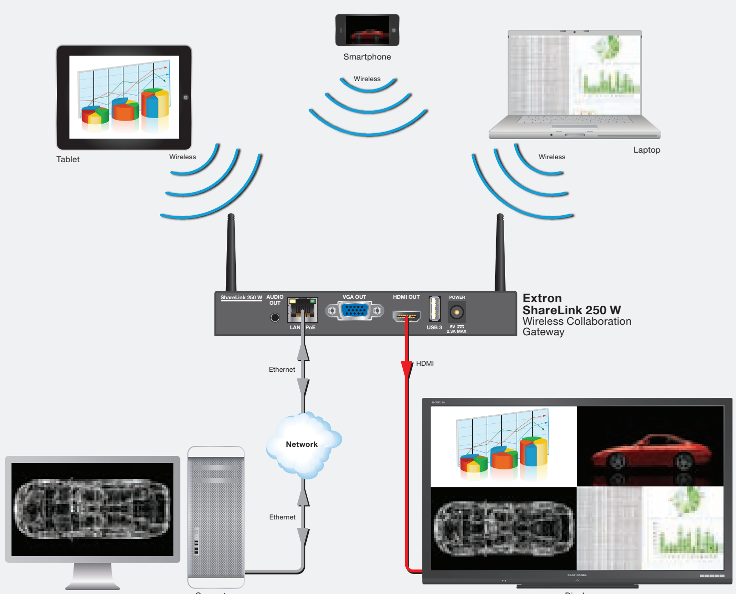
Integrated dual band wireless access point at 2.4 GHz or 5 GHz - ShareLink 250 W only
Offers a local connection point for attendees and enables segmentation of guest and private networks.

Stereo audio output
Line-level audio output connects to the room audio system.

HDMI and VGA video outputs
The ShareLink 250 Series supports displays and AV systems with digital and analog inputs.

Pivoting antennas - ShareLink 250 W only
The antennas can be repositioned to accommodate multiple mounting options, such as vertical mounting behind a flat panel display.

APPLICATION DIAGRAM



Specifications

SOFTWARE AND CONTROL OPTIONS	
Software	ShareLink™ Software
Operating systems	Windows® 7/8/10, Mac® OS X (10.7-10.11)
Supported formats	
Video file formats	MP4, MPG, MPEG, AVI, MOV, MKV, WMV
Audio file formats	MP3, WAV, WMA, AAC
Image file formats	JPG, BMP, PNG, GIF
Supported codecs	
Video codecs	MPEG-2, MPEG-4 (Microsoft® MPEG-4 v1-3 is not supported), Motion JPEG, WMV9 (only WMV3/WVC1 is supported)
Audio codecs	LPCM, AAC, MP3, WMA
Image codecs	JPG, BMP, PNG, GIF
Mobile apps	
MirrorOp® for Extron ShareLink	
Operating systems	Apple® iOS 7.0 or later, Android™ 4.0 or later
Supported formats	Image file formats: JPEG, PNG Document file formats: Microsoft Word (.doc, .docx), PowerPoint (.ppt, .pptx), Excel (.xls, xlsx); Keynote for iOS (.key) (iOS only); PDF
MirrorOp Sender for Galaxy	
Operating system	Android 4.0 or later
Control function	Full mirroring of device screen

NETWORK CONNECTIVITY	
ShareLink 250 W only	
Standards	IEEE 802.11 a/b/g/n 2.4 GHz/5 GHz
Security Encryption Standards	IEEE Standard 64/128 bit WEP, WPA PSK, WPA2 PSK, WPA Enterprise, WPA2 Enterprise
ShareLink 250 W and ShareLink 200 N	
Standards	IEEE 802.3 (10BASE-T), IEEE 802.3u (100BASE-TX), IEEE 802.3ab (1000BASE-T)

VIDEO OUTPUT	
Number/signal type	1 HDMI 1 RGBHV
Output resolution	800x600 @60Hz, 1024x768 @60Hz, 1280x720 @60Hz (720p) (default), 1280x768 @60Hz, 1280x800 @60Hz, 1360x768 @60Hz, 1440x900 @60Hz, 1600x1200 @60Hz, 1920x1080 @30Hz (1080i), 1920x1080 @60Hz (1080p)

AUDIO OUTPUT	
Number/signal type	1 digital, 2-channel PCM 1 analog stereo, unbalanced

ETHERNET PORT	
Ethernet data rate	10/100/1000Base-T, half/full duplex with autodetect

USB PORTS	
Number/signal type	3 high-speed USB 2.0
Connectors	3 USB type A connectors
USB standards	USB 2.0, USB 1.1, USB 1.0 compatible
USB player feature	
Supported formats	
Video file formats	MP4, MPG, MPEG, AVI, MOV, MKV, WMV
Audio file formats	MP3, WAV, WMA, AAC
Image file formats	JPG, BMP, PNG, GIF

Document file formats	Microsoft Word (.doc, .docx), PowerPoint (.ppt, .pptx), Excel (.xls, xlsx); PDF
Supported codecs	
Video codecs	MPEG-2, MPEG-4 (Microsoft MPEG-4 v1-3 is not supported), Motion JPEG, WMV9 (only WMV3/WVC1 is supported)
Audio codecs	LPCM, AAC, MP3, WMA
Image codecs	JPG, BMP, PNG, GIF

GENERAL	
Power supply	External Input: 100-240 VAC, 50-60 Hz Output: 5 VDC, 2.6 A, 13 watts
Power input requirements	5 VDC or Power over Ethernet (PoE 802.3at, class 0)
Power consumption	
ShareLink 250 W	
Device and power supply	11.5 watts
ShareLink 200 N	
Device and power supply	11.8 watts
Power over Ethernet (PoE)	Complies with PoE 802.3at, class 0 (type 1)
Cooling	Convection, no vents
Thermal dissipation	
ShareLink 250 W	
Device and power supply	14.6 BTU/Hr
ShareLink 200 N	
Device and power supply	15.9 BTU/Hr
Mounting	
Rack mount	Yes, with optional 1U rack shelf
Furniture mount	Yes, with optional MBU 125 mounting kit
Enclosure type	Metal
Enclosure dimensions	1.0" H x 6.51" W x 3.3" D (1 inch high, 3/8th rack wide) (2.5 cm H x 16.5 cm W x 8.5 cm D) (Depth excludes connectors.)
Product weight	1.0 lb (0.5 kg)
Regulatory compliance	
Safety	UL, c-UL, CE UL Listed for use in plenum air handling spaces: meets UL 2043 for heat and smoke release
Environmental	Complies with the appropriate requirements of RoHS, WEEE
Warranty	3 years parts and labor

Model	Version Description	Part number
ShareLink 250 W US	Wireless Collaboration Gateway - Dual Band; US	60-1558-01
ShareLink 250 W EU	Wireless Collaboration Gateway - Dual Band; EU	60-1558-11
ShareLink 200 N	Collaboration Gateway – Network Version - no WAP	60-1508-02

Mounting Hardware

Model	Version Description	Part number
HRB 109	1U Basic Half Rack Shelf, gray	60-1251-10
HRU 109	1U Universal Half Rack Shelf Kit, gray	60-1251-20
RSF 123	1U 3.5" Deep Rack Shelf Kit, Gray	60-190-20
RSB 123	1U 3.5" Deep Basic Rack Shelf, Gray	60-604-21
MBU 125	1U, 1/2 Rack Width Low-Profile Mount Kit	70-077-01
UTS 100	Primary Shelf, gray	70-1028-01
UTS 150	Secondary Shelf, gray	70-1028-02

For complete specifications, please go to www.extron.com
Specifications are subject to change without notice.

03-2017
68-3033-01
REV. B1
Letter - English - NP

TITAN

2" or 3" footless post legs that won't get in the way.

CONFIGURE & PRICE (http://www.bercodesigns.com/index.php/more/configurator#/berco/titan())

PRICING & SPECS (https://osberco.dcatalog.com/v/Berco-2018-Price-List/#page=96)

REVIT DRAWINGS (http://www.bercodesigns.com/index.php/tables/titan/titan-revit)

PRODUCTS

Tables (http://www.bercodesigns.com/tables/tables)

Booths (http://www.bercodesigns.com/booths)

Seating (http://www.bercodesigns.com/options/seating)

Collaborative (http://www.bercodesigns.com/collaborative/platform)

Custom (http://www.bercodesigns.com/custom)

OPTIONS

Finishes (http://www.bercodesigns.com/options/table-finishes)

Technology (http://www.bercodesigns.com/options/technology)

Mobility (http://www.bercodesigns.com/options/mobility)

Folding/Nesting (http://www.bercodesigns.com/options/folding)

Modesty Panels (http://www.bercodesigns.com/options/modesty-panels)

Adjustable Height (http://www.bercodesigns.com/options/adjustable-height)

RESOURCES

Table Builder (http://www.bercodesigns.com/index.php/tables/table-builder)

Pricing & Specs (https://osberco.dcatalog.com/v/Berco-2018-Price-List/)

Revit Symbols (http://www.bercodesigns.com/options/revit)

COMPANY

Contact (http://www.bercodesigns.com/more/contact-us)

Find a Rep (http://www.bercodesigns.com/more/find-rep)

GSA/Contracts (http://www.bercodesigns.com/more/government-contracts)

About (http://www.bercodesigns.com/more/about-berco-designs)

Careers (http://www.bercodesigns.com/options/careers)

Diffrient world™

Humanscale®

Features & Innovations

1. Self-Adjusting Recline

- Revolutionary mechanism-free design harnesses the laws of physics and the user's body weight
- Automatically provides appropriate support and resistance regardless of user's size
- No unnecessary recline locks or tension springs to set or adjust
- User maintains near-constant eye level during recline

2. Pivoting Backrest

- Extra backrest motion automatically adjusts to changing needs of the spine
- Adapts automatically to provide additional lumbar support as needed

3. Form-Sensing Mesh Technology

- Tri-panel, non-stretch mesh construction creates body-fitting contours and self-adjusting lumbar support for an automatic, customized fit
- No external lumbar devices to adjust, break or lose
- Low-abrasion mesh protects clothing

4. Mesh Seat

- Frameless front edge eliminates contact stress behind the knee
- Low-abrasion mesh protects clothing
- Optional upholstered seat

5. Armrests

- Adjustable or fixed armrests connect to the backrest instead of the seat to stay with the body during recline
- Armless model also available

6. Body Fit

- Size-adjustable to fit widest range of body sizes
- Automatically customizes recline resistance and lumbar support for every user
- Size-to-fit settings for seat height and seat depth
- Optional height-adjustable armrests for custom arm support

7. Casters

- Standard casters for hard surfaces
- Optional soft casters or glides





Specifications

- Designed for users up to 300 pounds
- Total major parts: 8
- Total number of parts: 31
- Weight: 30 pounds
- CAL 133-approved
- Certified by BIFMA level® and GREENGUARD
- May contribute to a number of LEED-CI, -NC and -EB credits
- 15-year 24/7 warranty

Options

- Diverse selection of mesh styles and colors
- Frame color options: Black, Gray, White
- Adjustable arms, fixed arms or armless
- Textile-covered seat
- Brushed stainless steel base caps
- Casters or glides
- Multiple cylinder heights
- Foot ring

Humanscale®

Creating a more comfortable place to work

www.humanscale.com
800.400.0625

HSBDWC0610


Trek®
Table Collection
attractive leg profile | contemporary edges | affordable price
Furnishing Knowledge®

FRESH VERSATILITY WHEREVER YOU NEED IT.

Trek tables easily adapt to a wide range of applications, including training environments, large or small group interaction, and collaborative spaces.

Training environments

Large group interaction

Small group interaction

Collaborative spaces

Trek tables offer an attractive, angled leg base profile, which allows ample leg clearance on all sides.

An optional modesty panel enhances Trek's sleek, contemporary design.

A variety of table top shapes provide versatility for a wide range of applications and configurations.

In addition to a variety of shapes, Trek is offered in a variety of sizes, from small side tables to large conference tables.

Easy-folding, flip-top tables maximize space.

Pin-height adjustable bases adjust to a variety of needs and uses.

Trek Plus options create varied configurations. An easy-to-use, quick-connect ganger locks tables together.

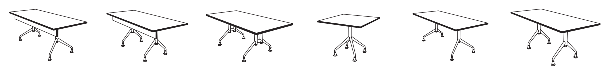
Distinctive, oversized glides and casters complement the unique Trek leg profile. Glides and casters can be combined for varying levels of mobility.

Trek tables offer a fresh, contemporary look. The angled profile of the Trek leg is a significant departure from traditional floor-hugging bases. KI edge styles offer subtle visual accents, while the dramatic glide design complements the leg profile.

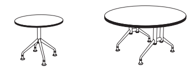
Functional Options

For training rooms, cafés, or multi-purpose rooms, Trek tables offer great design and superior functionality and are available as folding, fixed or flip-top models with standard or lightweight tops. Oversized glides or casters complement the leg design. Optional quick-release modesty panels are also available. PowerUp® modules provide convenient power and data access.

Trek® Shapes



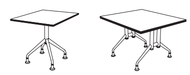
Rectangular
- Fixed leg (X-base, T-base, V-base, TT-base)
- Fixed w/ modesty (T-base, V-base)
- Pin-height adjustable (X-base, T-base)
- Folding leg (T-base, TT-base)
- Folding with modesty panel (T-base)
- Flip-top (T-base)
- Flip-top with modesty panel (T-base)
- Lightweight folding leg (T-base)



Round
- Fixed leg (X-base, TT-base)
- Pin-height adjustable (X-base)
- Folding leg (TT-base)
- Flip-top (X-base)

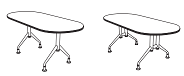
Half Round
- Fixed leg (T-base)
- Folding leg (T-base)

Crescent
- Fixed leg (T-base)
- Folding leg (T-base)



Square
- Fixed leg (X-base, TT-base)
- Folding leg (TT-base)
- Flip-top (X-base)

Trapezoid
- Fixed leg (T-base)
- Flip-top (T-base)

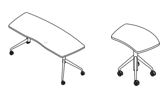


Racetrack/Oval
- Fixed leg (T-base, TT-base)
- Folding leg (T-base, TT-base)
- Flip-top (T-base)

Boat
- Fixed leg (TT-base)

Corner
- Fixed height (T-base)
- Pin-height adjustable (T-base)

Dune
- Fixed height (V-base)
- Pin-height adjustable (V-base)



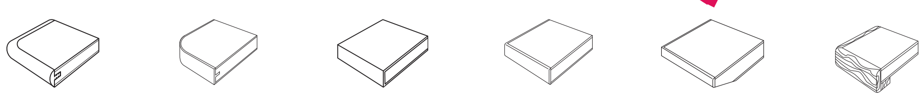
Swash
- Fixed height (V-base)
- Pin-height adjustable (V-base, X-base)

Ellipse
- Fixed height (V-base)
- Pin-height adjustable (V-base)

Slate
- Fixed height (V-base)
- Pin-height adjustable (V-base, X-base)
- Asymmetrical Slate (X-base)

Monitor Stand
- Pin-height adjustable (V-base)
- Pin-height adjustable w/ CPU holder (V-base)

Trek Edges



Vinyl Bullnose | Vinyl T-Edge | Self-Edge | 74P Edge | Knife Edge | Wood Bullnose

Learn more about
Trek Table Collection

GSA Contract Holder

Printed on FSC® certified paper using only vegetable-based inks, including metallics. Please recycle.

MIX
Paper from responsible sources
FSC® C016863

KI is a trusted expert for furniture and wall systems around the globe.
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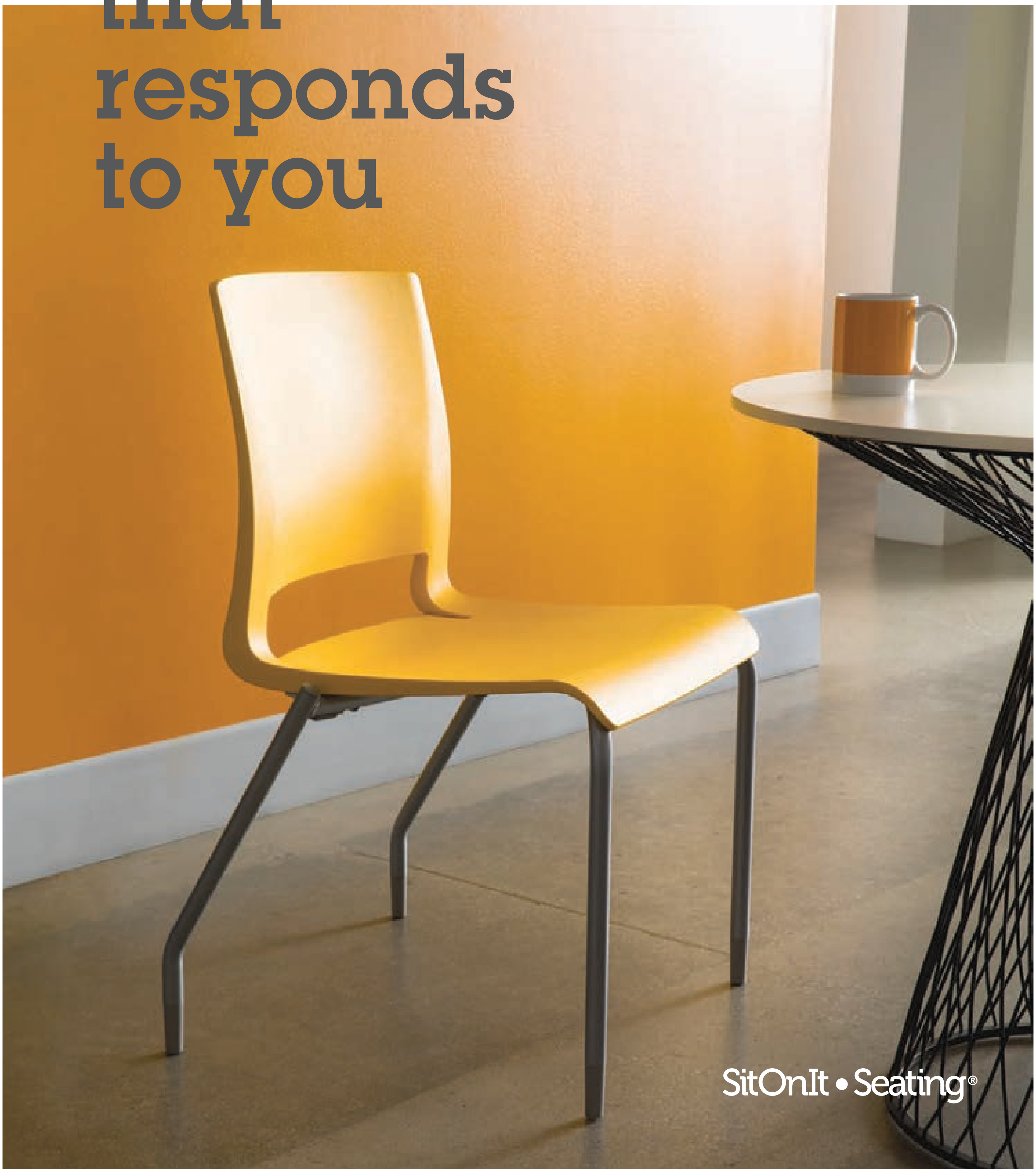
Furnishing Knowledge®

design that responds to you

RIO®



color theory 101

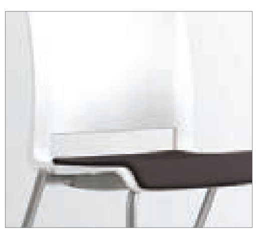
With our user-friendly ChairBuilder® tool, you can specify the exact look you want. Whether you need an all-plastic solution for higher traffic areas or partially upholstered styles for guest seating, choose from tons of shell colors and textile options.

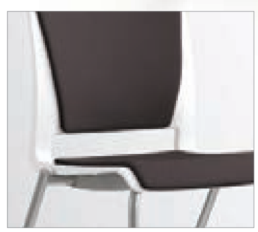
14 SHELL COLORS

Arctic	Bisque	Latte	Sterling	Slate
Apple	Lemon	Tangerine	Red	Navy
Pacific	Lagoon	Chocolate	Black	

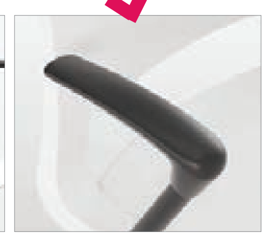
a closer look

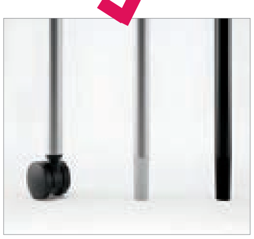

Plastic


Upholstered Seat


Upholstered Seat & Back


Tablet


Black or Fog Fixed Arms


Caster or Glide Options


Ganging Bracket

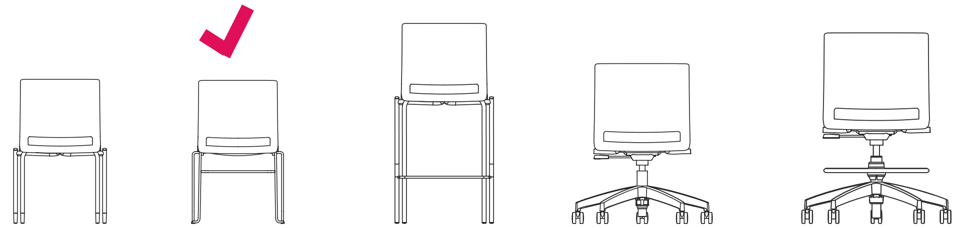

Stacks 4 on floor, 8 on the optional cart*.


Wire Rod


Task

*Wire rod model stacks 6 on the floor, 15 on the optional cart.

specifications



MODEL	1051 FT1 4-LEG SIDE CHAIR	1051 FT2 WIRE ROD SIDE CHAIR	1051 FT1 S9/1051 FT1 S2 24" COUNTER/30" BAR STOOL	1052 LIGHT TASK CHAIR	1052 S21/1052 S22 TASK STOOL/EXTENDED TASK STOOL
Overall Width Armless	21.2	21.2	21.2	27	27
Overall Width with Arms	22.2	22.2	22.2	27	27
Overall Depth	21.6	23.2	22.2	27	27
Overall Height	33.4	33.4	40.35/45.6	31.9-36.9	37.9-45.9/41.9-51.9
Seat Width	18.5	18.5	18.5	18.5	18.5
Seat Depth	18.2	18.2	18.2	18.2	18.2
Seat Height	17.9	17.9	24.85/30.1	16.62-21.75	18-26/23-33
Back Width	18.2	18.2	18.2	17.5	17.5
Back Height	17.5	17.5	17.5	18.2	18.2
Weight Armless	12.3 lbs.	15 lbs.	17 lbs./20.3 lbs.	20.5	25.1/26
Weight with Arms	13.8 lbs.	18 lbs.	18.7 lbs./21.9 lbs.	22.2	26.8/27.7
COM (upholstered type)	(us) 1 yd. (us) 1.25 yds.	(us) 1 yd. (us) 1.25 yds.	(us) 1 yd. (us) 1.25 yds.	(us) 1 yd. (us) 1.25 yds.	(us) 1 yd. (us) 1.25 yds.
COL (upholstered type)	(us) 15 sq. ft. (us) 20 sq. ft.	(us) 15 sq. ft. (us) 20 sq. ft.	(us) 15 sq. ft. (us) 20 sq. ft.	(us) 15 sq. ft. (us) 20 sq. ft.	(us) 15 sq. ft. (us) 20 sq. ft.
Weight Capacity	300 lbs.	300 lbs.	300 lbs.	300 lbs.	300 lbs.

Dimensions are in inches.

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FRONT COVER PLASTIC: Lemon

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Premium Whiteboards

Steelcase

PRODUCTS

Edge™ Series
With a sleek, slim design and exceptional value, the Edge Series is a perfect fit within a range of spaces.

Session™ Series
Beautiful hardwood trim, offered in a variety of Steelcase premium wood finishes, adds an upscale warmth to higher education, corporate and non-clinical healthcare environments.

Senti™ Series
The Senti Series' clean lines and compact scale makes it the ideal small to mid-size board. It's great for private offices and clinical healthcare settings. Senti's unique mounting options let you screw in or use magnets on a steel surface.

110™ Series
Value and durability make the 110 Series perfect for hard-working environments, such as corporate training rooms and classrooms.

555™ Series
The 555 Series delivers the same quality and durability of the 110 Series with the added bonus of a boxed end marker tray and a line of tack boards.

COMPLIMENTARY PRODUCTS

Groupwork® Mobile Easel
The Groupwork Mobile Easel features a mobile design that provides a great way to add a whiteboard to any space.

Groupwork Screen™
Lightweight and mobile — the Groupwork Screen can be used anywhere — to support your next presentation or as a privacy divider.

Huddleboard™
Lightweight, portable, and versatile — Huddleboard puts marker and display surfaces wherever they are needed.

STATEMENT OF LINE

DIMENSIONS

Edge Series

Whiteboard:	24.25"W x 18.25"H to 192.25"W x 48.25"H
Tackboard:	24.25"W x 18.25"H to 120.25"W x 48.25"H

Session Series

Whiteboard:	24.25"W x 18.25"H to 120.25"W x 48.25"H
Tackboard:	24.25"W x 18.25"H to 120.25"W x 48.25"H

Senti Series

Whiteboard:	22"W x 18"H to 72"W x 48"H

110/555 Series

Whiteboard:	24.25"W x 18.25"H to 192.25"W x 48.25"H
Tackboard:	24.25"W x 18.25"H to 120.25"W x 48.25"H

PARAMETRIC SIZING

Parametric sizing is the ability to change dimensions of a product within pre-engineered limits. Parametric sizing allows for the specification of non-standard sizes on the following Steelcase Premium Whiteboards: Edge, Session, 110 and 555 series. Sizes can be specified to 1/16 of an inch, allowing for virtually any size to be ordered. Parametric sizing reduces the need to place orders through specials, leading to a decrease in order processing time, immediate availability of pricing, and an overall cost savings for the customer.

SURFACE MATERIALS

Surface materials shown in brochure:

FABRICS

- Cogent:Connect Tangerine 5S17
- Cogent:Connect Scarlet 5S18
- Cogent:Connect Blue Jay 5S21
- Cogent:Connect Concord 5S19

HARD SURFACES

- Arctic White 2L30
- Blonde on Maple 3952
- Virginia Walnut 2535
- Clear Oak 2HAK

Colors are representative and may vary slightly from actual material.

For further options visit us online.

SUSTAINABILITY

At its heart, sustainability at Steelcase is about people. It's about creating and supporting the economic, environmental and social conditions that allow people and communities to reach their full potential.

Research and insights direct our path.
It's not only about creating goods, it's about creating good. It's not only about creating value, it's about living our values. It's not just about reducing our footprint, it's about expanding our reach. It's about creating lasting and meaningful change to enable the long-term wellbeing of current and future generations.

Innovative products and solutions result.
In the development of our products, we work to consider each stage of the life cycle: from materials extraction, production, transport, use and reuse, until the end of its life. We demonstrate performance through third-party verified certifications and voluntary product declarations.

Steelcase's sustainability promises, actions, and results are communicated in an annual Corporate Sustainability Report.

Allsteel®

Belong®

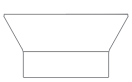
As part of the Gather™ collection, Belong offers surface for small-group meetings or impromptu gathering spaces. Available as a coffee or side table.

The sculpted spun-aluminum base provides legroom.

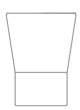
Belong is available in a variety of base colors and tabletop finishes.

Perfect for small-group meeting spaces.

Belong Statement of Line



Coffee Table
16″H x 32″ dia.



Side Table
21″H x 16″ dia.

Go to **allsteeloffice.com/configurator**
to customize this product for your space.

Allsteel®

Allsteel Inc.
Muscatine, Iowa 52761

allsteeloffice.com

Form # A8093.B1 (12/16)

Allsteel supports green initiatives in the contract furniture industry as a member of the U.S. Green Building Council. Belong is an SCS Indoor Advantage™ Gold and level® 2 certified product.

Allsteel®

Further™

Further is a collection of thoughtfully designed elements that helps you plan an inspired, productive workplace where people thrive. You can easily accommodate a variety of workstyles, from highly mobile, interactive work to more desk-bound, focused work. Using the same components, you are free to create multiple, unique solutions across the entire floorplan that can easily evolve over time to keep pace with changing business needs.

Further invites you to continuously re-imagine the workplace, and move business forward with the ability to adapt at a moment's notice. Connecting teams. Optimizing real estate. All while supporting a broad range of users and the work they do.

Choice is yours.

Further is an agile furniture solution that embraces the ever-changing workplace and frees people to adapt their environment – simply, elegantly, and efficiently – at their own pace.

Powerful Possibilities

At the heart of Further is the hub. Ultimately flexible, the hub provides power and data support for a variety of applications, whether beam-supported or freestanding. Power and data is located along the beam and is managed in either low- or high-capacity baskets and troughs for quick installation and easy access.

Shape Matters

Further's signature trapezoid surface allows multiple configurations, provides unique user orientation that maximizes footprint efficiency, and accommodates both focused and collaborative workspaces.

Celebrate Change

Further opens the door to simple, intuitive planning and usage. A concentrated kit-of-parts allows for ease of installation and reconfiguration, with retrofit capabilities so you can stay flexible as needs change over time.

People First

Go where you want, work how you want, think your best, perform to your utmost potential. This is the control that Further provides users, across a variety of workstyles through integrated height-adjustable worksurfaces, unique storage elements and accessories, and a variety of space division options.

Allsteel®

Allsteel Inc.
Muscatine, Iowa 52761-5257

allsteeloffice.com

Allsteel supports green initiatives in the contract furniture industry as a member of the U.S. Green Building Council. Further is an SCS Indoor Advantage™ Gold and level® 2 certified product.

Allsteel®

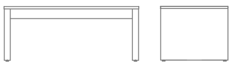
Harvest™ Classic

As part of the Gather™ collection, Harvest is a multi-purpose table available in a variety of sizes and finishes.

Features

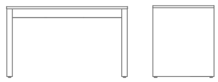
Seated or standing heights
Split or full tabletop
Power access

Harvest Classic Statement of Line



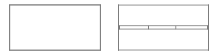
Seated

Widths 72", 96", 120"
Depths 36", 42", 48"
Height 29"



Standing

Widths 72", 96", 120"
Depths 36", 42", 48"
Height 42"



Tabletops

Full Top
Split Top

Full top and split top with or without power are available in both heights.

Laminate Top Finishes

Frosty White
Loft
Muslin
Bungalow
Brownstone
Flint

Phantom Ecru
Beigewood
Natural Maple
Fawn Cypress
Natural Recon
Brazilwood
Branded Oak
Portico Teak
Phantom Charcoal

Amber Cherry
Lowell Ash
Mangalore Mango
Shaker Cherry
Skyline Walnut
Columbian Walnut
Ebony Recon

Veneer Top Finishes

Clear Maple
Clear Oak
Wheat Cherry
Light Cherry
Light Walnut
Burnished Cherry
Coffee Walnut
Dark Roast Walnut
Dark Rift Oak

Trough Finishes

Brilliant White
Loft
Muslin
Bungalow
Brownstone
Flint
Black

Silver
Platinum Metallic
Champagne Metallic
Gunmetal Metallic
Sprout
Ocean
Tangelo
Flame

Allsteel®

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Form # A8400.A1 (12/16)

Transfer™

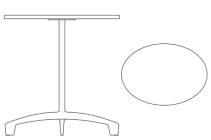
As part of the Gather™ collection, Transfer is a portable worksurface for collaborative spaces.

Tops are available in oval or trapezoid with a painted or polished base.

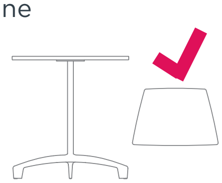
The base design allows you to tuck your feet while working.

Transfer easily pulls close for an instant worksurface.

Transfer Statement of Line



Oval Table
26"H x 25"W x 18"D



Trapezoid Table
26"H x 16"/ 24"W x 16"D

Go to **allsteeloffice.com/configurator**
to customize this product for your space.

Allsteel®

Allsteel Inc.
Muscatine, Iowa 52761

allsteeloffice.com

Form # A8094.B1 (12/16)

Allsteel supports green initiatives in the contract furniture industry as a member of the U.S. Green Building Council. Transfer is an SCS Indoor Advantage™ Gold and level® 2 certified product.

Allsteel®

Vicinity™

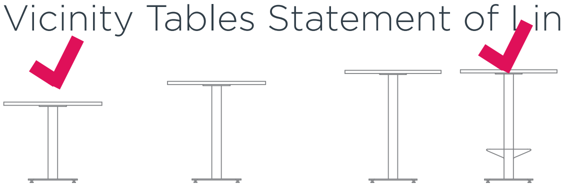
Tables

As part of the Gather™ collection, Vicinity is a coordinated offering of multi-use seating and tables.

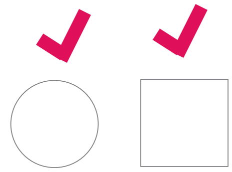
Features

Multiple height options
Optional foot ring
Power access

Vicinity Tables Statement of Line



Seated	Counter	Cafe
29″H	36″H	42″H



Tabletops

Round	30″, 36″, 42″, 48″ dia.
Square	30″, 36″, 42″, 48″

Centered power cutout is available on all tops.

Laminate Top Finishes

Frosty White, Loft, Muslin, Bungalow, Brownstone, Flint

Phantom Ecru, Beigewood, Natural Maple, Fawn Cypress, Natural Recon, Brazilwood, Branded Oak, Portico Teak, Phantom Charcoal

Amber Cherry, Lowell Ash, Mangalore Mango, Shaker Cherry, Skyline Walnut, Columbian Walnut, Ebony Recon

Base Finishes

Textured White, Chrome, Textured Silver, Textured Black

Allsteel®

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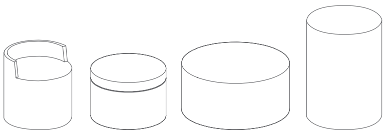
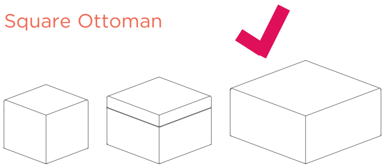
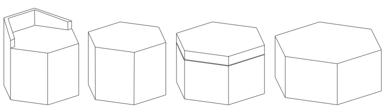
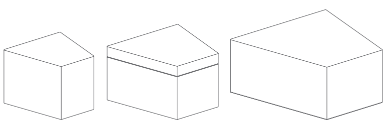
Form # A8440.A1 (02/17)

firstoffice

BOOST

Round Ottoman 	Dimensions 20.75"w X 20.75"d X 17.75"h (Small) 25.5"w X 25.5"d X 17.75"h (Medium) 36"w X 36"d X 17.75"h (Large) 20.75"w X 20.75"d X 29.75"h (Barstool)	Details • Fully upholstered • Removable top for storage (Small & Medium) • Concealed Glide (standard) • Optional casters, or wood leg • Optional active base (Small) • Optional tablet • Optional low back (Small & Medium) • Optional power (Large)
Square Ottoman 	Dimensions 20.75"w X 20.75"d X 17.75"h (Small) 25.5"w X 25.5"d X 17.75"h (Medium) 36"w X 36"d X 17.75"h (Large)	Details • Fully upholstered • Removable top for storage (Small & Medium) • Concealed Glide (standard) • Optional casters, or wood leg • Optional tablet • Optional power (Large)
Hexagon Ottoman 	Dimensions 24"w X 21"d X 17.75"h (Small) 29.25"w X 25.75"d X 17.75"h (Medium) 41.75"w X 36"D X 17.75"h (Large)	Details • Fully upholstered • Removable top for storage (Small & Medium) • Concealed Glide (standard) • Optional casters, or wood leg • Optional tablet • Optional low back (Small & Medium) • Optional power (Large)
Trapezoid Ottoman 	Dimensions 20.75"w X 20.5"d X 17.75"h (Small) 25.5"w X 25.25"d X 17.75"h (Medium) 35.5"w X 36"d X 17.75"h (Large)	Details • Fully upholstered • Removable top for storage (Small & Medium) • Concealed Glide (standard) • Optional casters, or wood leg • Optional tablet • Optional power (Large)

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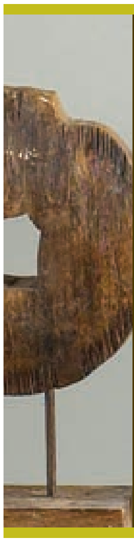
FOBOOSTBR



X & O

OCCASIONAL TABLES

carolina

X & O

Classic Cube and Cylinder tables are perfect in any area and complement any seating design. Available in various sizes and two different heights, X & O are offered in maple veneers or durable laminates.

O Cylinder Table	20˝w 20˝d
O Cylinder Table	24˝w 24˝d
O Cylinder Table	36˝w 36˝d
X Cube Table	18˝w 18˝d
X Cube Table	24˝w 24˝d
X Cube Table	36˝w 36˝d

specify 15˝h or 20˝h

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12.13


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FOCOACTBR

Elite Lounge Seating

Elite Lounge Seating

Chair
w 33 d 30.5 h 32 sw 24 sd 21 sh 18.5

Power Port Options

All Black
All White
Silver/White

Power Port Option with Plug-in Cord
Elite shown with optional Brushed Aluminum Nave Legs

Tablet Arm Option
has a 300 lb Capacity. Shown with optional heavy duty casters, recessed pull, shelf and cup holder.

Hide & Go Mobility Option
Beautifully Concealed Mobility

Settee
w 57 d 30.5 h 32 sw 48 sd 21 sh 18.5

Wood Cap and Wood Leg Options
Available on all Elite Seating

Sofa
w 81 d 30.5 h 32 sw 72 sd 21 sh 18.5

Ottomans
w 26 d 22 h 18.5
w 48 d 22 h 18.5
w 36 d 36 h 18.5

Elite Lounge Seating Features
Lifetime Warranty
Superior Strength: All Elite Chairs pass 1200 lb drop test & 2000 lb capacity
Replaceable & Recoverable Components
Steel Inner Construction
Dymetrol Suspension

Options
Tablet Arm with 300 lb Capacity
Cup Holder (used with Tablet)
Wood or Kydex® Arm Caps
Solid Hard Maple Leg
Solid Steel Bar Leg
Brushed Aluminum Nave Leg
Hide & Go Mobility
Heavy Duty Casters
Recessed Pull (used with mobile options)
Power Port with Plug-in Cord
Shelf (not avail. with power option)
Perma-Coat Wood Leg Protector
Weighted
Tamper Resistant Fasteners
Combination Fabrics
Moisture Barrier and Fire Barrier

Integra®
PO Box M Walworth, WI 53184 800.235.0234 fax 262.275.3614 integraseating.com

All Terrain®

Accessories

reconfigurable | easy to use | simple, functional design

All Terrain Accessories

All Terrain Accessories add the finishing touch to any highly organized environment. With a wide variety of screens, storage bins, markerboards and other accessories, they make ingenious use of space to maximize productivity.

Screens can be easily configured to serve as temporary workspace dividers. They integrate with a variety of accessories to add a level of functionality and convenience.

Lightweight foam core markerboards can be hung on panels, wall rails and storage units.

A variety of other accessories are available to make workspaces and multi-purpose rooms more useful and efficient.

Private screening.
The All Terrain screens connect with magnetic strips to provide privacy and functionality. Available in two sizes, screens feature three-point base for easy movement and magnetic strips for quick connections. Optional four-point bases add stability for semi-permanent applications.

Lightweight and mobile, foam core markerboards can be mounted to wall rails, panels and storage units.

Use the tool rail to store accessory items like hard bins, file folder hangers, and pencil cups. More workspace means increased productivity.

The markerboard cart's 4-castered base offers easy mobility. The cart accommodates storage for several foam core markerboards.

Learn more about
All Terrain Accessories

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Apply®
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ELEGANT CONTOURS. UNLIMITED DESIGN OPTIONS.

Apply's tapered, curved design and waterfall front edge deliver body-conforming comfort and an elegant aesthetic. From seating styles to fabric and finish options, Apply offers nearly unlimited specification opportunities. Apply is ideal for cafés, dining halls, waiting and reception areas … anywhere elegant, yet practical seating is needed.

"Ears" on the Apply seat back are ideal for hanging backpacks, courier bags, and more.

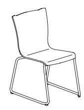
4-leg and sled-base chairs stack 15-high on dolly and 6-high on the floor. (Café stools do not stack)

Waterfall front edge delivers a more comfortable sit.

APPLY SEATING COLLECTION

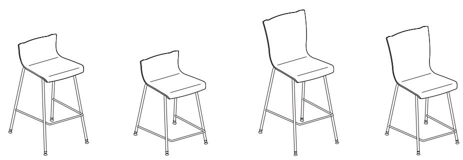
Apply 4-Leg Stack Chair
W20-1/4 H32-1/2
Seat: W17-1/2 D17-3/8 H17-1/2

Apply Task Chair
W27-1/2 D27-1/2 H32-1/2 to 37-1/2
Seat: W17-1/2 D17-3/8 H17-1/2 to 22-1/2



Apply Sled Base Stack Chair
W20 H32-1/2
Seat: W17-1/2 D17-3/8 H17-1/2

Apply Task Stool
W27-1/2 D27-1/2 H35-1/2 to 43
Seat: W17-1/2 D17-3/8 H22-1/2 to 32-3/4



Apply Café Stool
Low Back 30": W18-3/4 D23-3/4 H36
Low Back 24": W17-3/4 D22-1/2 H30
High Back 30": W18-3/4 D23-3/4 H44-3/8
High Back 24": W17-3/4 D22-1/2 H38-3/8
Seat: W17-1/2 D17-3/8 H23-1/2 (LH) or 29-1/2 (HB)
Café stools do not stack.

SHELLS – plywood with laminate overlay

Italian Silver Ash
River Cherry
Florence Walnut
Cocobala
Kensington Maple
Monticello Maple
Cherry Storm
Windsor Mahogany

Frosty White
White Sand
Grey
Grey Moss
North Sea
Black
Coffee Bean

Hollyberry
Orange Grove
Island
Ocean
Lapis Blue

FRAMES – 4-leg, Sled Base, and Café – available in 27 powdercoat finishes plus chrome.
TASK/SPIDER BASE – Task Chairs available in aluminum or black – Task Stools are black only.
UPHOLSTERED SEAT OPTION – Seat pad available in KI Ingrade, COM, or Pallas upholstery.

Learn more about Apply Seating

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Furnishing Knowledge®

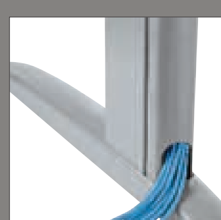
In Tandem®

Table System

impressive wire management | compelling appearance | flexible configurations

Power infeed
Power can be fed through the leg to maintain an uncluttered look (dual infeed shown).

Top feed
Power and data can be fed from the ceiling through power poles, separating cables.



Data cable entry
For a cleaner, neater look, up to 24 data wires can feed through all InTandem legs.

Table-to-table connection
Snap-together connectors easily distribute power from table to table. Data cables are routed through continuous data channels (no gaps).

Hard-wired power
Simplex electrical outlets can be hard-wired on location. 10-wire powered or non-powered beams are also available.

The InTandem table system is the easiest way to access power and data for worksurfaces. Unique internal beams hold separated wires and cables, eliminating interference and tangled wires.

Each beam features flip-down doors for convenient access from the front or back sides of the table. Concealed power distribution allows for a variety of table configurations unhampered by power and data wiring.

InTandem furnishes a fresh leg profile and a streamlined, contemporary design. Choose from a variety of options when specifying. KI offers 10-wire, hard wire or non-powered beams, in addition to several leg heights and a wide range of finish options.

InTandem tables are tough enough to endure the day-to-day wear of educational environments. KI's quality construction is backed by a lifetime warranty.

PowerUp® modules
Modules have two power receptacles and two stationary data jack connections.

Grommet
Surface grommets are sized for easy retrofitting with KI's PowerUp module.

Activ8 Electrical System
Activ8 allows up to eight duplex power modules to be connected to one standard 15-amp power cord.

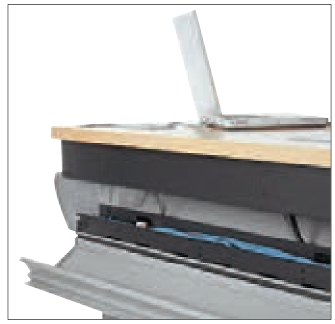
Villa Series™
Villa Series contains two data ports and receptacles, while featuring a thinner module profile and metallic paint options.

CPU holder
The system's CPU holder adjusts vertically and horizontally. It also pulls out for easier access to the CPU unit.

Access power and data easily.

Beam - front

Access power and data from the user's side. The beam conveniently opens underneath the worksurface. Power and data run through separate channels to avoid interference.



Beam - back

Also access data wires and cables from the back side of the beam (shown without data covers). Troubleshoot problems and make change-outs without disturbing students or going under the table.

Beam interior

The unique double access beam separates power and data wires to prevent interference. Optional data covers (shown) keep data wires and cables fully enclosed.

Back-to-back power access

Optional receptacles on the back side of the beam allow back-to-back configurations to share power.

Apply options for even greater flexibility.

Worksurface edges

Choose either durable 74P, post-formed laminate edges or urethane edges.

Wheelchair access

For easy access by those in wheelchairs, the InTandem wheelchair kit converts selected surfaces to a 32" surface height without changing the height of the trough.

Privacy screens

Create seated privacy with screens that span the length of the worksurface. Back-to-back configurations share privacy screens. Screens have laminate surfaces with durable PVC edges and come in three different heights. Metal fasteners are attractive and tamper-resistant.

Dividers

Dividers separate workstations or create individual study carrels. They also have laminate surfaces with durable PVC edges, tamper-resistant fasteners and come in three different heights.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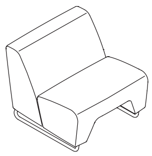
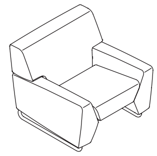
MYWAY® STATEMENT OF LINE *W/D/H=OVERALL DIMENSIONS


(MYNN)
W33" D32" H29.5"


(MYLL)
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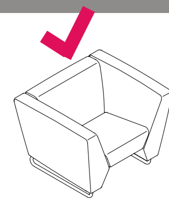
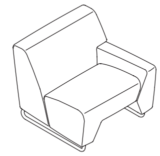

(MYHH)
W40" D34.5" H29.5"


(MYNL)
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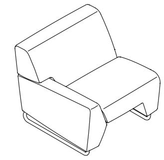
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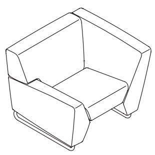
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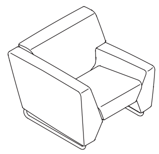
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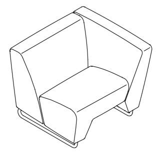
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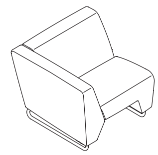
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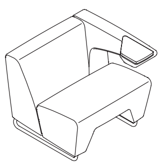
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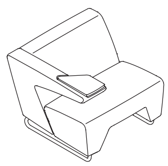
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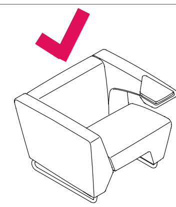
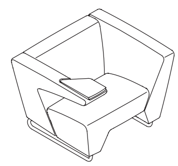

(MYHW)
W40" D34.5" H29.5"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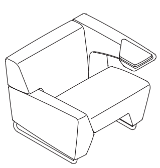
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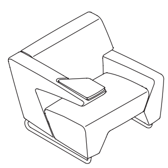
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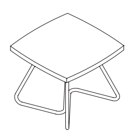
(MYTB9012)
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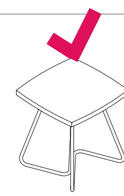
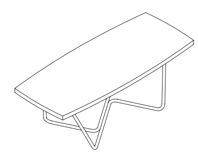
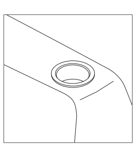

(MYTB9013)
W24" D24" H22"


(MYTB9014)
W42" D24" H16"

OPTIONS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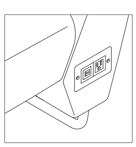
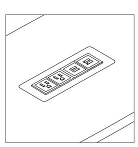
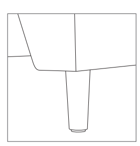
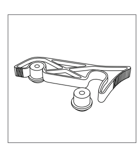
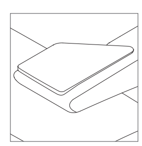

POWER IN CHAIR


POWER IN TABLE


TAPERED LEG


GANGER


TABLET ARM

Pallas Textiles specifying notes: All furniture shown inside covered in Pallas Textiles fabric. Cover: Sheepish Lipstick; pages 2/3: Sheepish Smoke, Sheepish Frost; pages 4/5: Sheepish Smoke, Sheepish Frost, Sheepish Lipstick; pages 6/7: Sheepish Smoke, Sheepish Frost, Line Tomato.

Learn more about MyWay Lounge Collection

GSA Contract Holder

Printed on FSC® certified paper, using only vegetable-based inks, including metallics. Please recycle.

FSC www.fsc.org MIX Paper from responsible sources FSC® C016863

KI is a trusted expert for furniture and wall systems around the globe.
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Furnishing Knowledge®

Kimball®

DOCK®
Meeting + Social Spaces

BASE STYLES

Reference the price list for a complete offering of base options.

Blade X Pull Up
Height 26"

Blade X
Height 16, 20, 29, 36, 42"

Blade X
Height 16, 20, 29, 36, 42"

Blade X End Table
Height 16"

Tubular X
Height 29, 42"

Disc with Cord Management
Height 16, 29, 36, 42"

Cylinder
Height 29"

Square
Height 29"

Work Table
Height 29, 42"

Beam Standing
Height 42"

Rectangular
Height 29"

Beam with Aluminum
Radius End Caps
Height 29"

Rectangular with Aluminum
Radius End Caps
Height 29"

Blade Quad
Height 29, 36, 42"

Blade Y Occasional
Height 16

Disc Standing Height
Height 42"

Blade Y Standing Height
Height 42"

Training T-Leg with Casters and with
Meeting Rectangular Soft Square top
Height 29"

Blade X
Two independent side by side
Height 29"

Panel
Height 29"

Cylinder
Height 29"

Beam
Height 29"

OPTIONS & DETAILS

Reference the price list for a complete offering of material options.
Slight variations within commercial tolerance may occur in color and texture between this printed piece and the finished product. Material samples can be ordered at www.kimballoffice.com.

WOODGRAIN: VENEER, TFL & HPL, PVC RIM

Monterey Oak
Also available in 3D Laminate.

Brighton Maple

Huntington Maple

Clear Zebrawood

Tuscan Walnut
Also available in 3D Laminate.

Cordoba Cherry

Sedona Cherry

Sienna Sapele
Available in Veneer only.

Amber Cherry
Also available in 3D Laminate.

Midtown Walnut

Coco Sapele
Available in Veneer only.

Tribeca Walnut

Canyon Oak
Also available in 3D Laminate.

Mocha Cherry

Urban Walnut

Espresso Walnut
Available in Veneer only.

SOLID: TFL & HPL, PVC RIM

Reference the price list for additional HPL finish options.

Designer White
Also available in 3D Laminate.

Frosty White

Antique White
Also available in 3D Laminate.

Wallaby

Putty
Available in HPL only.

Cloud
Also available in 3D Laminate.

Fog
Also available in 3D Laminate.

Chamois

Sandstone
Also available in 3D Laminate.

Shadow

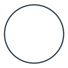
Storm

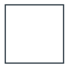
Graphite

Cinder
Also available in 3D Laminate.

Dark Chocolate
Available in PVC rim only.

TOPS


Round
Diameter 24-60"


Square
Width 24-60"
Depth 24-60"


Soft Square
Width 24-60"
Depth 24-60"


Rectangular
Width 48-240"
Depth 24-60"


Soft Rectangular
Width 48-240"
Depth 24-60"


Arc Rectangular
Width 60-240"
Depth 30-60"


Boat
Width 72-240"
Depth 36-60"


Racetrack
Width 60-240"
Depth 30-60"


Ellipse
Width 48-96"
Depth 24-48"


Tapered
Width 72-120"
Depth 36-48"

RIM PROFILES

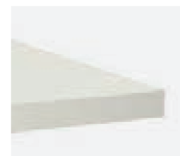

Softened Wood


Reed


Knife


Sloped


Softened PVC


Self Edge

POWER OPTIONS


Dock Blade Base
Wire Manager


Mho®


M2X


Node®


Vault Turnbox


E2X

DOCK®

Meeting + Social Spaces

Kimball®

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kimball.com

1600 Royal Street
Jasper, Indiana 47549

Form No. BRDOCKMT ver. 17a

Hinchada

Hinchada Modular Lounge is low profile, plush seating that is sure to be the place where everyone wants to kick up their feet. Fresh details like contrasting wide welts and slatted platforms enhance a simple statement of line. With a few components you can create a lounge layout to fit your lifestyle.

HN-4636C
HN-2434C
Chaise Cushion
36w x 46d x 24h
24w x 34d x 24h

HN-4646CR
HN-4646CL
HN-3434CR
HN-3434CL
Corner Cushion
46w x 46d x 24h
34w x 34d x 24h

HN-3636C
HN-2424C
Square Cushion
36w x 36d x 12h
24w x 24d x 12h

HN-3030C
Round Cushion
30w x 30d x 12h

HN-2436C
Rectangular Cushion
36w x 24d x 12h

HN-36SQ
Large Square Ottoman
36w x 36d x 18h

HN-20SQ
Small Square Ottoman
20.75w x 20.75d x 18h

HN-36RD
Large Round Ottoman
36w x 36d x 18h

HN-20RD
Small Round Ottoman
20.75w x 20.75d x 18h

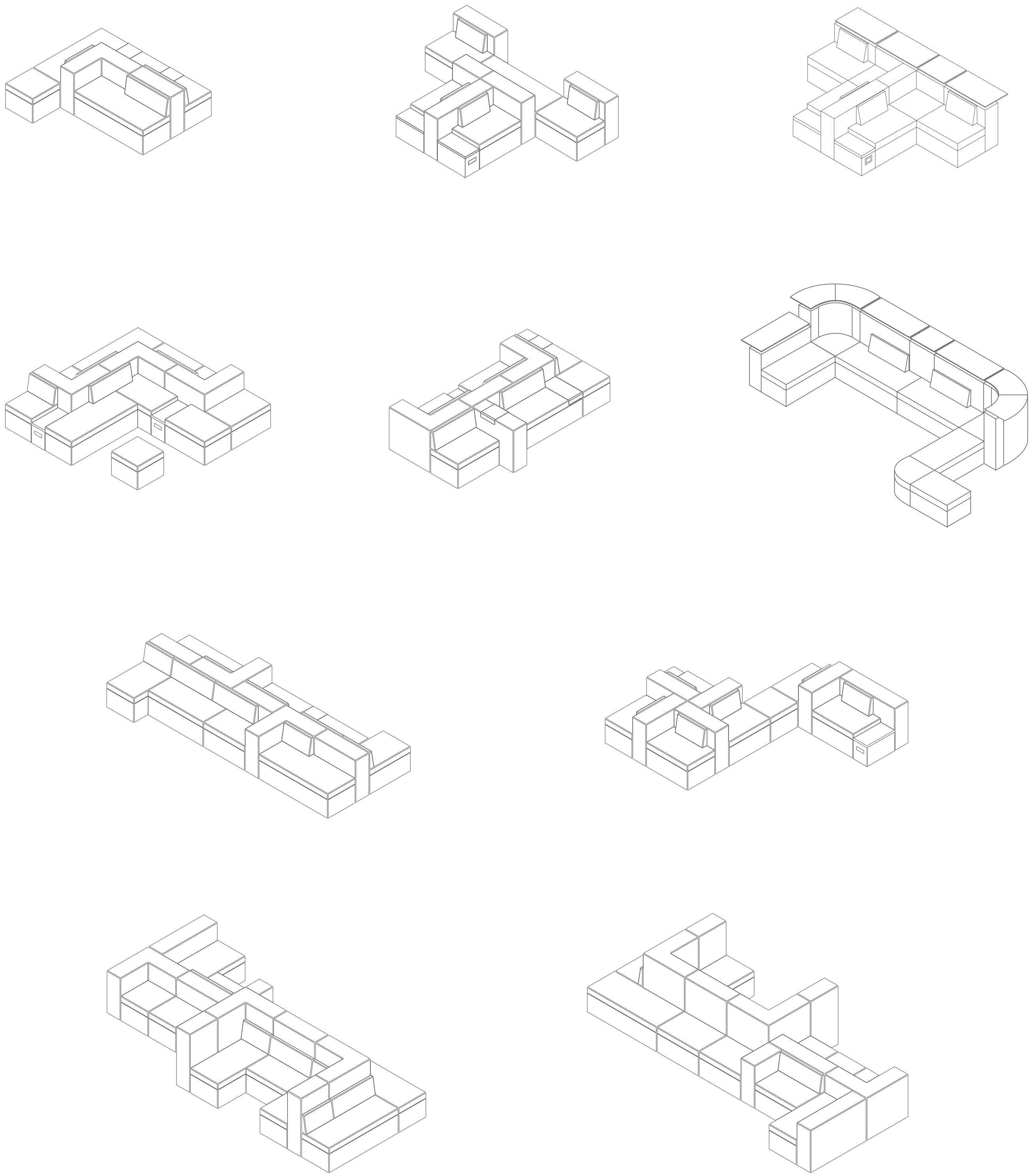
HN-4646WP
Slatted Platform
46w x 46d x 4h
(Refer to Price List for Additional Sizes)

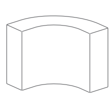
Tangent

Loewenstein.

Refresh and Reinvent

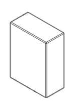
Perhaps the greatest feature of Tangent is the longevity that it affords a space. This product has been designed to have the capability to change the way a space functions through simple reconfiguration. Designers can now offer multiple alternatives within one budget, creating designs that can be refreshed and reinvented as needed.





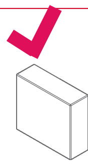
TN-3333CCWS
33" Corner Wall Curved - Short
33w x 33d x 30h

TN-3333CCWT
33" Corner Wall Curved - Tall
33w x 33d x 41h



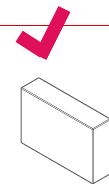
TN-1122WS
22" Straight Wall - Short
22w x 11d x 30h

TN-1122WT
22" Straight Wall - Tall
22w x 11d x 41h



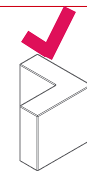
TN-1133WS
33" Straight Wall - Short
33w x 11d x 30h

TN-1133WT
33" Straight Wall - Tall
33w x 11d x 41h



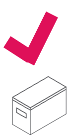
TN-1144WS
44" Straight Wall - Short
44w x 11d x 30h

TN-1144WT
44" Straight Wall - Tall
44w x 11d x 41h

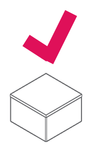


TN-3333CWS
33" Corner Wall - Short
33w x 33d x 30h

TN-3333CWT
33" Corner Wall - Tall
33w x 33d x 41h

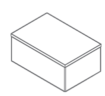


TN-2211PM
11" Power Module
11w x 22d x 15h



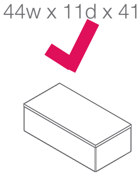
TN-2222T
22" Table
22w x 22d x 15h

TN-2222B
22" Bench
22w x 22d x 18h



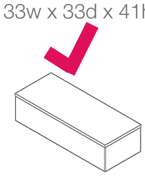
TN-2233T
33" Table
33w x 22d x 15h

TN-2233B
33" Bench
33w x 22d x 18h



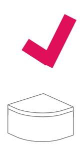
TN-2244T
44" Table
44w x 22d x 15h

TN-2244B
44" Bench
44w x 22d x 18h



TN-2255T
55" Table
55w x 22d x 15h

TTN-2255B
55" Bench
55w x 22d x 18h

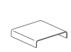


TN-2222CT
Table Curved
22w x 22d x 15h

TN-2222CB
Bench Curved
22w x 22d x 18h

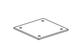
TN-22C
22" Cushion
22w x 4d x 12h

TN-33C
33" Cushion
33w x 4d x 12h

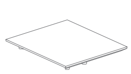


TN-1111LT
11" Layover Table
11w x 11d x 2h

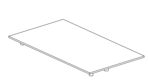
TN-2211LT
22" Layover Table
22w x 11d x 5h



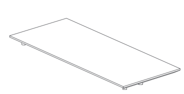
CP-1
Clamp Plate Kit
4w x 4d x 0.125h



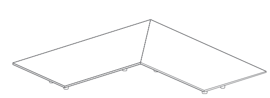
TN-1122TP
21" Top
21w x 18d x 1.0375h



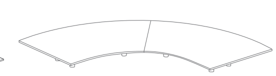
TN-1133TP
32" Top
32w x 18d x 1.0375h



TN-1144TP
43" Top
43w x 18d x 1.0375h



TN-3333STP
40" Top
40w x 40d x 1.0375h



TN-3333CTP
40" Top
40w x 40d x 1.0375h

PETER PEPPER PRODUCTS

Products » Tables » Go-To Wall Mounted » GTW48

Model GTW48
48"w Go-To Wall Mounted Worktable

Image shown for illustrative purposes only and may not match the configured product.

SPECIFICATIONS

SIZE
48"w x 7½"h x 13⅜"d

FRAME FINISH
Bright White, Graphite, Aluminum Metallic, and Taupe Metallic

FRAME MATERIAL
Steel

TOP FINISH
Bright White, Graphite, Aluminum Metallic, and Taupe Metallic

TOP MATERIAL
1/4" Aluminum

INCLUDED
(2) Aluminum hooks mounted to frame.

OPTION
Electrical Module
Each module contains (2) 120v, 15 amp receptacles and (2) USB charging ports, 2100mA 5V/DV.
Includes 8 foot wire drop, 14/3 gauge with grounded plug.
Specify 1 electrical module for any model.
Color matched cover plate is provided if no electrical module ordered.

PACKING
Shipped KD in 2 boxes.

NOTE
Mounting hardware is not included.

ESTIMATED SHIP WEIGHT
38 lbs.

FOB

SIZES + OPTIONS

48"w Go-To Wall Mounted Worktable

SPEC + PRICE

FRAME COLOR

Select

WORK SURFACE COLOR

Select

ELECTRICAL MODULE
YES (+ $389)

List Price as Specified

$1,586

Ready to Ship: 8 weeks

OSSIAN, IN

RESOURCES

ASSEMBLY

GTW Assembly Guide PDF

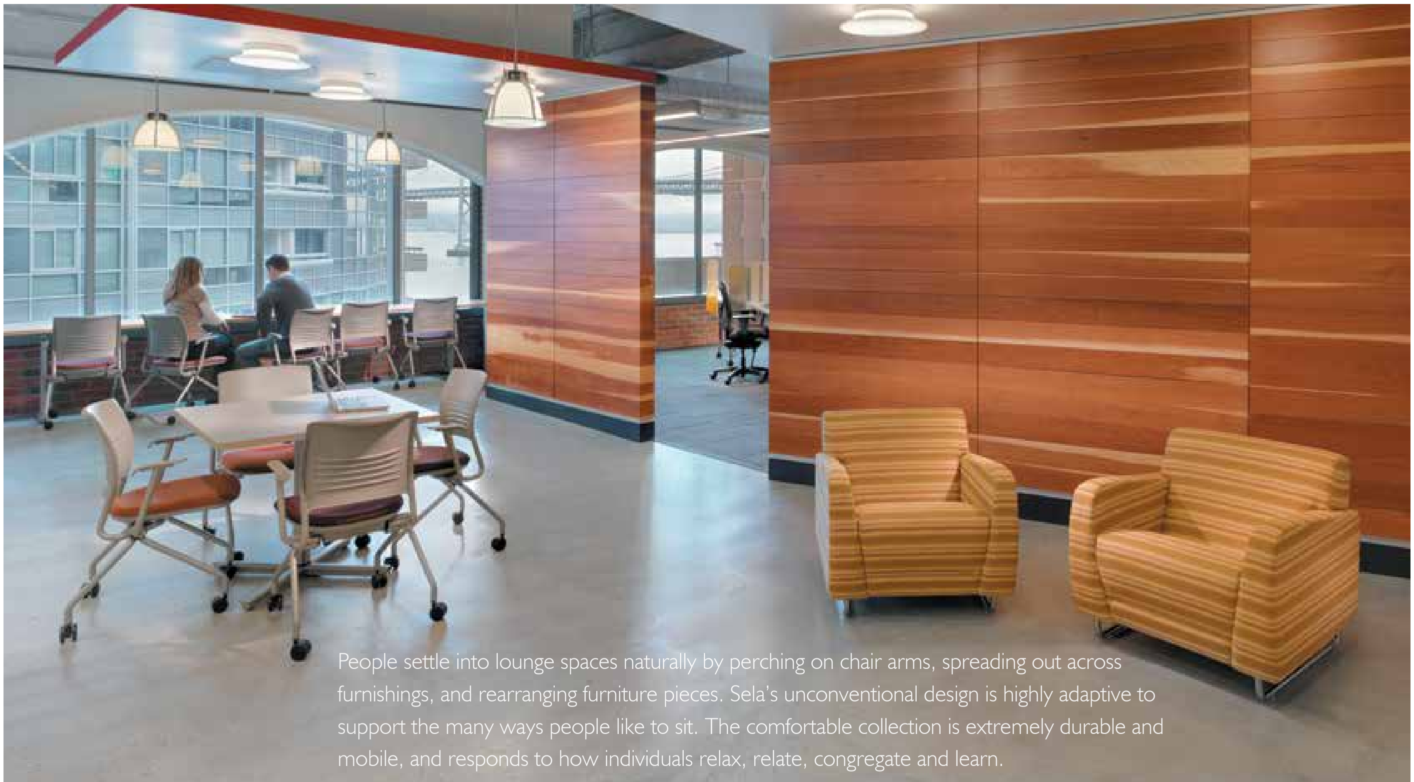
CAD

GoTo Wall CAD Symbols ZIP
GTW + GTR Tables Revit Model RFA
GTW 3D CAD Symbols ZIP

CARE + MAINTENANCE

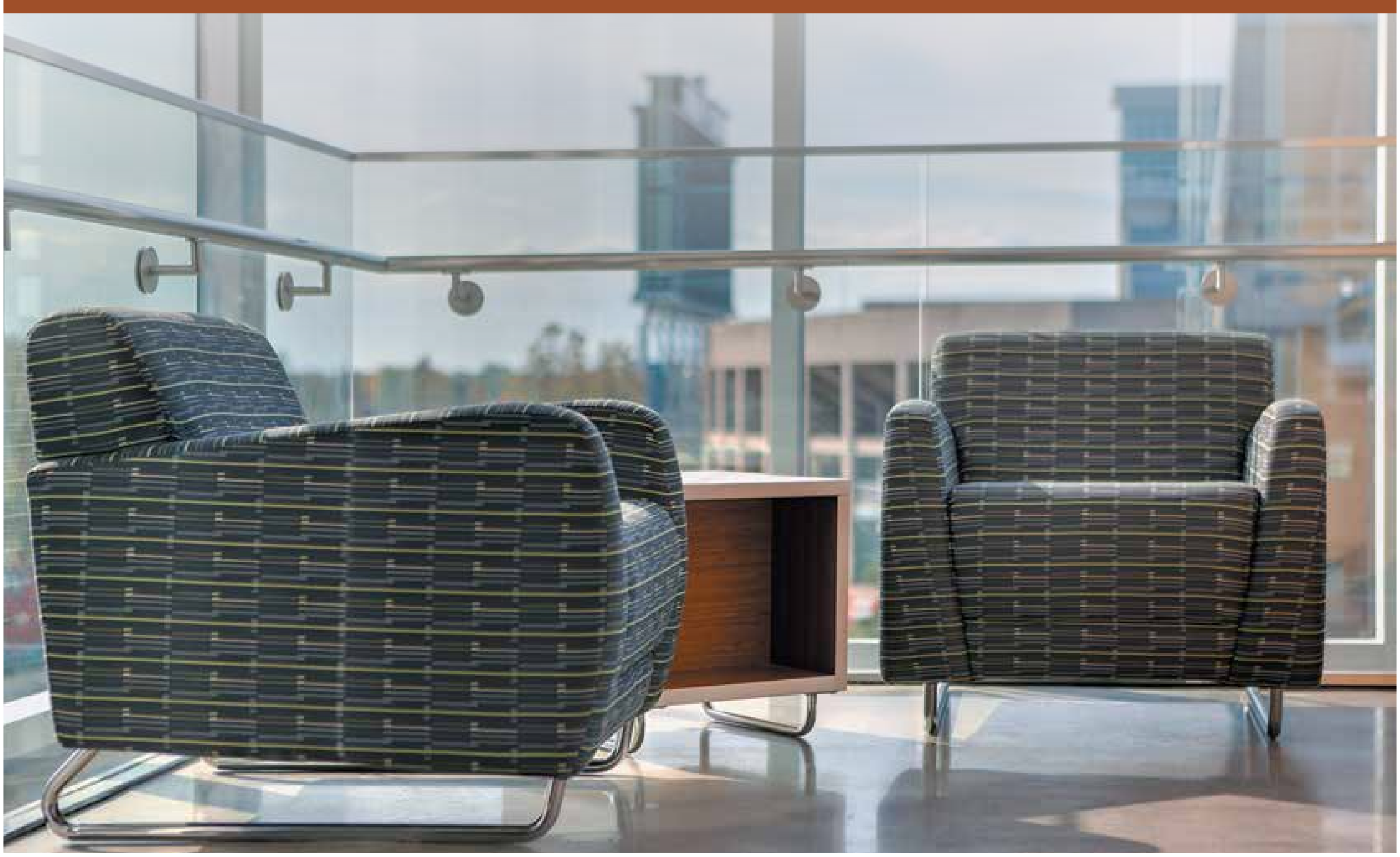
GoTo Cleaning Instructions PDF


Sela®
Lounge Collection
comfortable design | casual function | contemporary style
KI
Furnishing Knowledge®



People settle into lounge spaces naturally by perching on chair arms, spreading out across furnishings, and rearranging furniture pieces. Sela's unconventional design is highly adaptive to support the many ways people like to sit. The comfortable collection is extremely durable and mobile, and responds to how individuals relax, relate, congregate and learn.

lounge redefined



casual appeal

Sela responds to the realities of lounging and the rigors of use. The collection offers an oversized scale with an increased degree of recline. Individuals are made to feel more comfortable, encouraging interaction and supporting spontaneous learning.

Design Options

Tablet Arm
Supports laptops, books, note-taking, or snacking.

Sled Base
Maneuvers easily across any floor.

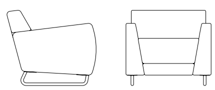
Markerboard Tabletop
Provides a ready canvas for sharing ideas.

Wood Base
Establishes a polished yet inviting aesthetic to support refined spaces.

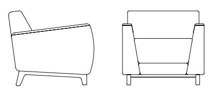
Wood Armcaps
Reflects sophisticated style to complement any environment.

contemporary style

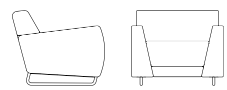
The Sela collection captures the less formal, casual lifestyle of today's students and workers while complementing a variety of interiors. The pieces are residentially influenced with popular mid-century modern elements. Highly functional and well-built, the furnishings ensure both ease and comfort — precisely what a lounge space is intended to provide.



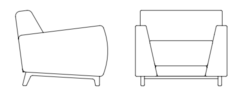
1323 Sela Lounge Chair
Width: 32 Depth: 33.5 Height: 28.25
COM: 5 yards Weight: 65 lbs



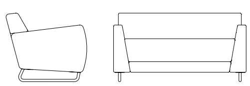
1323WAB/WA/B Sela Lounge Wood Base Chair
Width: 32 Depth: 33.5 Height: 28.25
COM: 5 yards Weight: 65 lbs



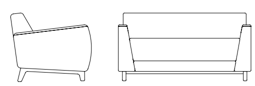
1223 Sela Chair and a Half
Width: 38 Depth: 38.25 Height: 31
COM: 6 yards Weight: 75 lbs



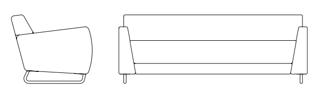
1223WAB/WA/B Sela Wood Base Chair and a Half
Width: 38 Depth: 38.25 Height: 31
COM: 6 yards Weight: 75 lbs



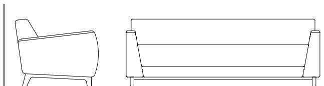
1333 Sela Loveseat
Width: 55 Depth: 33.5 Height: 28.25
COM: 7.25 yards Weight: 90 lbs



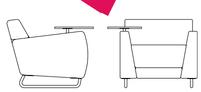
1333WAB/WA/B Sela Wood Base Loveseat
Width: 55 Depth: 33.5 Height: 28.25
COM: 7.25 yards Weight: 90 lbs



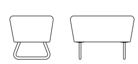
1343 Sela Sofa
Width: 78 Depth: 33.5 Height: 28.25
COM: 9.5 yards Weight: 110 lbs



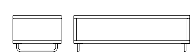
1343W Sela Wood Base Sofa
Width: 78 Depth: 33.5 Height: 28.25
COM: 9.5 yards Weight: 110 lbs



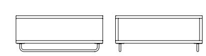
1313-T Sela Lounge Chair with Tablet Arm
Width: 32 Depth: 33.5 Height: 28.25
COM: 5 yards Weight: 65 lbs



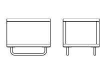
1220 Sela Ottoman
Width: 24 Depth: 26 Height: 18
COM: 1 yard Weight: 50 lbs



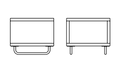
1350 Sela Rectangular Coffee Table
Width: 48 Depth: 20 Height: 15
Weight: 150 lbs



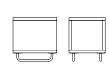
1360 Sela Square Coffee Table
Width: 36 Depth: 36 Height: 15
Weight: 150 lbs



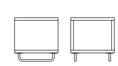
1351 Sela Rectangular End Table
Width: 15 Depth: 18 Height: 18
Weight: 60 lbs



1361 Sela Square End Table
Width: 18 Depth: 18 Height: 18
Weight: 60 lbs



1352 Sela Rectangular Lamp Table
Width: 15 Depth:18 Height: 15
Weight: 60 lbs



1362 Sela Square Lamp Table
Width: 18 Depth: 18 Height: 15
Weight: 60 lbs

Printed on FSC® certified paper, using only vegetable-based inks, including metallics. Please recycle.

MIX
Paper from responsible sources
FSC® C016863

KI is a trusted expert for furniture and wall systems around the globe.

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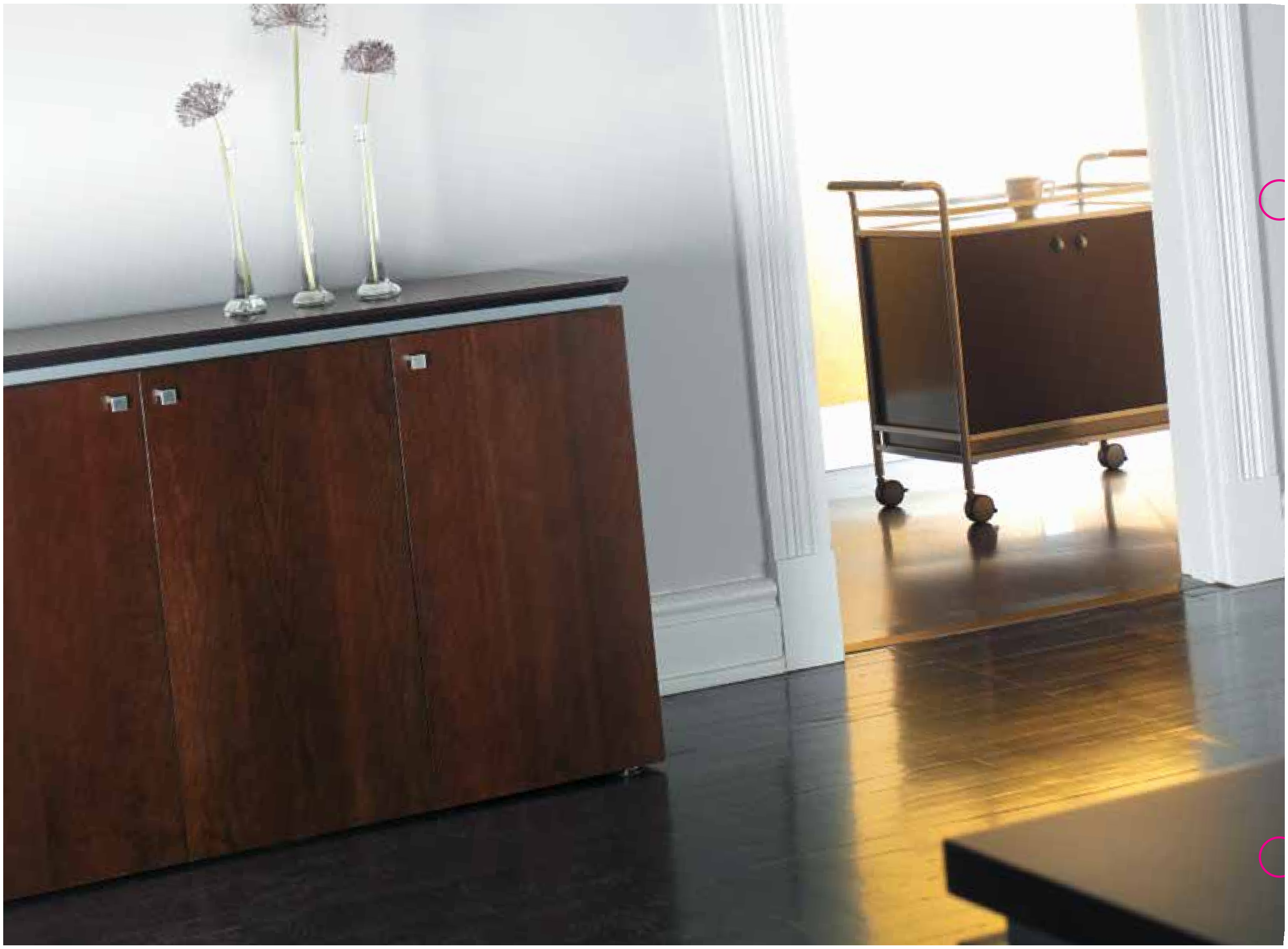
Furnishing Knowledge®


ENTOURAGE™
VERSTEEL



ENTOURAGE™

VERSATILITY Whether it's storing items or displaying something beautiful, you'll see your space transform. **SUBSTANTIAL** Entourage is engineered to work and built to last. Steel frames and unique construction mean you will enjoy each piece for quite some time. **HARMONIOUS** Not only do members of the Entourage family work well together, they can complete any room by working with other Versteel products to create new environments easily. **FINISHES AND MATERIALS** It's your vision; we're here to help. With so much variety to choose from, you'll find a look to fit your particular space. From laminates to powder coats, we have the finish to create the feel you're looking for.

VERSTEEL®

www.versteel.com
P: 800.876.2120 F: 812.482.9318
2332 Cathy Lane Jasper, Indiana 47546

ENTOURAGE™. COMPLETE ANY CONFERENCE ROOM.

By coordinating mobile carts, cabinets, lecterns and wall boards, the Entourage family of products completes any conference room with function and elegance. Available in a variety of sizes and configurations, this line combines a steel frame for rigidity with laminate surfaces for durability or wood surfaces for warmth. All pieces coordinate perfectly with your Versteel tables and seating, creating a unique and complete conference room solution.

ENTOURAGE CART

Our mobile carts provide an elegant and convenient solution for additional storage or utility to any space.

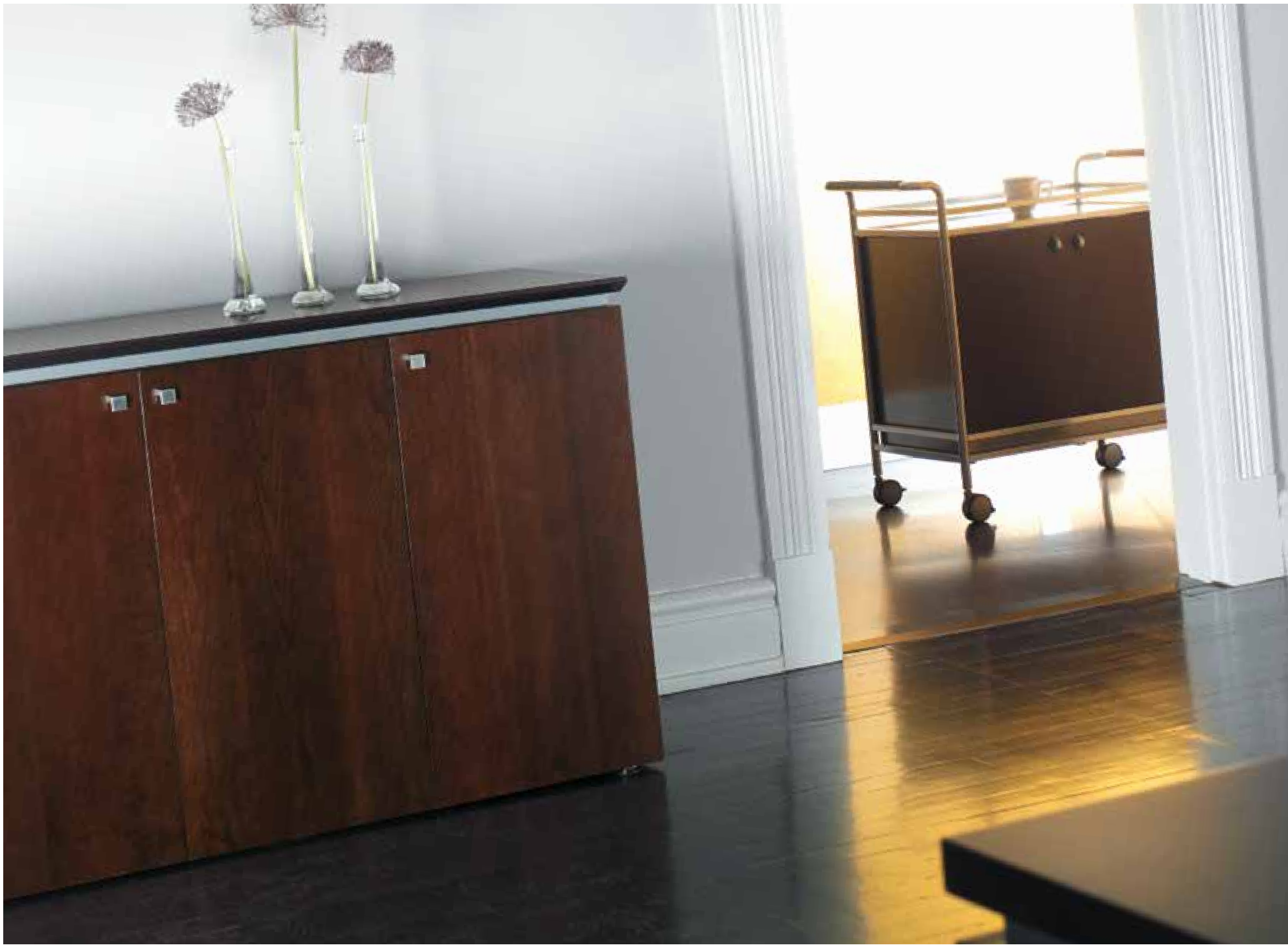
ENTOURAGE WALL BOARD

Add the finishing touch to your conference or training area with our functional and flattering wall board that easily transforms into a practical presentation aide.

ENTOURAGE CABINET

Heighten the look and feel of any room with our contemporary design that encompasses all of your conference storage needs.


ENTOURAGE™
VERSTEEL



ENTOURAGE™

VERSATILITY Whether it's storing items or displaying something beautiful, you'll see your space transform. **SUBSTANTIAL** Entourage is engineered to work and built to last. Steel frames and unique construction mean you will enjoy each piece for quite some time. **HARMONIOUS** Not only do members of the Entourage family work well together, they can complete any room by working with other Versteel products to create new environments easily. **FINISHES AND MATERIALS** It's your vision; we're here to help. With so much variety to choose from, you'll find a look to fit your particular space. From laminates to powder coats, we have the finish to create the feel you're looking for.

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level™

Tandus Centiva
A Tarkett Company

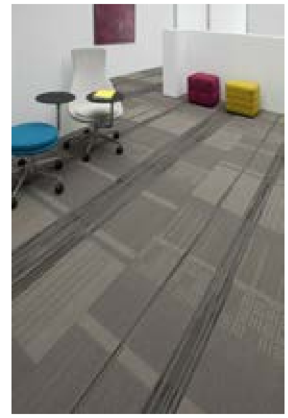
POWERBOND MODULAR

Unit 1 #04640

ER3® Modular RS

Product Specifications

18 x 36 / Sero / Interconnected Group



Product Size	6' Roll and 24" x 24" Tile (18" x 18", 18" x 36" and 36" x 36" also available)	
Pattern Scale	Large	
Pattern Type	Geometric	
Collection	18 x 36 / Sero / Interconnected Group	
Coordinating Group	Coordinate Group 12	
Primary Backing	Non-woven synthetic fiber	
Construction	Stratatec® Patterned Loop	
Blink	Yes	
Face Weight	17 oz/sq yd	576.3 g/sq m
Gauge	5/64	50.4 rows/ 10 cm
Stitches Per Inch	10.4 stitches / inch	40.9 stitches/10 cm
Pile Height Average	.187 inch	4.7 mm
Fiber System	Antron® Legacy Nylon	
Dye Method	85% Solution Dyed / 15% Yarn Dyed	
Fluorine-Free Soil Protection	DuraTech®	
Pattern Match	6' W x 98.08" L	
Colorfastness to Light	> 4 after 60 hours (AATCC 16E)	
Soil Protection	Application rate: 2% of face weight	
Electrostatic Propensity	1.0 kV (AATCC 134); Permanent Conductive Fiber	
Surface Flammability	Passes CPSC FF 1-70 (ASTM D-2859)	
Smoke Generation	Less than 450 (ASTM E-662)	

Environmental Attributes

Recycled Content	Yes
ER3 Note	Recycled content percentages are third-party certified annually based on the prior year's formulations and use. Recycled content specifications may be changed without notice when formulations are modified due to, for example, new manufacturing capabilities, environmental efficiencies, or postconsumer market availability.
Antimicrobial Chemicals	No antimicrobials (EPA Registered pesticides) added to product (ASTM E2471-05)

Performance Testing

Flooring Radiant Panel	Class 1 (mean average CRF: 0.45 w/sq cm or higher) (ASTM E-648)

Installation Methods

Installation Method	Vertical Ashlar / Herringbone - 18" X 36" / Vertical Ashlar - 18" X 36"

Tandus Centiva
A Tarkett Company

POWERBOND MODULAR

Unit 2 #04641

ethos® Modular with Omnicoat Technology'(TM)'

Product Specifications

18 x 36 / Interconnected Group

Product Size	6' Roll and 24" x 24" Tile (18" x 18", 18" x 36" and 36" x 36" also available)	
Pattern Scale	Medium	
Pattern Type	Linear	
Collection	18 x 36 / Interconnected Group	
Coordinating Group	Coordinate Group 12	
Primary Backing	Non-woven synthetic fiber	
Construction	Stratatec® Patterned Loop	
Blink	Yes	
Face Weight	17 oz/sq yd	576.3 g/sq m
Gauge	5/64	50.4 rows/ 10 cm
Stitches Per Inch	10.4 stitches / inch	40.9 stitches/10 cm
Pile Height Average	.187 inch	4.7 mm
Fiber System	Antron® Legacy Nylon	
Dye Method	75% Solution Dyed / 25% Yarn Dyed	
Fluorine-Free Soil Protection	Eco-Ensure	
Pattern Match	Not required	
Colorfastness to Light	> 4 after 60 hours (AATCC 16E)	
Soil Protection	Application rate: 2% of face weight	
Electrostatic Propensity	1.0 kV (AATCC 134); Permanent Conductive Fiber	
Surface Flammability	Passes CPSC FF 1-70 (ASTM D-2859)	
Smoke Generation	Less than 450 (ASTM E-662)	

Environmental Attributes

Recycled Content	Yes
ER3 Note	Recycled content percentages are third-party certified annually based on the prior year's formulations and use. Recycled content specifications may be changed without notice when formulations are modified due to, for example, new manufacturing capabilities, environmental efficiencies, or postconsumer market availability.
Antimicrobial Chemicals	No antimicrobials (EPA Registered pesticides) added to product (ASTM E2471-05)

Performance Testing

Flooring Radiant Panel	Class 1 (mean average CRF: 0.45 w/sq cm or higher) (ASTM E-648)

Installation Methods

Installation Method	Vertical Ashlar / Herringbone - 18" X 36" / Vertical Ashlar - 18" X 36"

Tandus Centiva
A Tarkett Company

POWERBOND MODULAR

Metri #04654

ethos® Modular with Omnicoat Technology'(TM)'

Product Specifications

18 x 36 / Code Series / Suzanne Tick / Publicolor / 9 x 36

Product Size	6' Roll and 24" x 24" Tile (18" x 18", 18" x 36" and 36" x 36" also available) and 9" x 36" Plank	
Stain Resistance	>8 (AATCC 175-08 Stain Resistance Pile Floor Coverings)	
Dynex SD Stain Warranty	Lifetime Limited Stain Resistance Dynex SD Stain	
Platform Sizes	18" x 18" Tile, 36" x 36" Tile, 6' Roll, 24" x 24" Tile, 18" x 36" Tile, 9" x 36"	
Pattern Scale	Small	
Pattern Type	Linear	
Collection	18 x 36 / Code Series / Suzanne Tick / Publicolor / 9 x 36	
Coordinating Group	Textures / Coordinate Group 12	
Primary Backing	Non-woven synthetic fiber	
Construction	Stratatec® Patterned Loop	
Blink	Yes	
Face Weight	21 oz/sq yd	711.9 g/sq m
Gauge	5/64	50.4 rows/ 10 cm
Stitches Per Inch	10.0 stitches / inch	39.4 stitches/10 cm
Pile Height Average	.187 inch	4.7 mm
Fiber System	Dynex SD® Nylon(Permanent Stain Resistance)	
Dye Method	100% Solution Dyed	
Fluorine-Free Soil Protection	Eco-Ensure	
Pattern Match	Not required	
Colorfastness to Light	> 4 after 100 hours (AATCC 16E)	
Soil Protection	Application rate: 2% of face weight	
Electrostatic Propensity	1.2 kV (AATCC 134); Permanent Conductive Fiber	
Surface Flammability	Passes CPSC FF 1-70 (ASTM D-2859)	
Smoke Generation	Less than 450 (ASTM E-662)	

Environmental Attributes

Recycled Content	Yes
ER3 Note	Recycled content percentages are third-party certified annually based on the prior year's formulations and use. Recycled content specifications may be changed without notice when formulations are modified due to, for example, new manufacturing capabilities, environmental efficiencies, or postconsumer market availability.
Antimicrobial Chemicals	No antimicrobials (EPA Registered pesticides) added to product (ASTM E2471-05)

Performance Testing

Flooring Radiant Panel	Class 1 (mean average CRF: 0.45 w/sq cm or higher) (ASTM E-648)

Installation Methods

Installation Method	Quarter Turn / Herringbone - 18" X 36" / Vertical Ashlar - 18" X 36" / Herringbone 9" X 36" / Vertical Ashlar-9" X 36"

NURAZZO
A NU DIMENSION IN TERRAZZO TILE

P.O. BOX 1208 DALTON, GA 30722
(P) 706-275-8000
(F) 706-275-8004
WWW.NURAZZO.COM

Technical Specifications

Part I – General

Nurazzo is manufactured from marble and glass chips embedded in an epoxy resin and then polished to a high-resolution finish. Nurazzo Tile can contain up to 70% post consumer recycled contents. Prior to installation, Nurazzo tile should be stored in a controlled environment inside the building for 72 hours at a minimum temperature of 70 degrees F. Pallets of tile should be broken down, removed from packaging and tile stacked to facilitate the warming process. Keep all traffic off the completed floor for 24 hours.

Limited Warranty

Nurazzo is warranted to be free from workmanship or material defects at the time of shipment. Due to natural characteristics of stones there could be some shade variance. Any claimed defect must be received in writing by Nurazzo within the first year of installation. Under normal usage Nurazzo Tile are warranted against excessive wear in recommended applications for a period of 20 years.

Part II – Product

Nurazzo is 12" x 12", 12" x 24", or 24" x 24" square –edged, 3/16" or 1/4" gauge and 4" x 48" or 6" x 48" straight cut edge base. Shades may vary due to natural characteristics of Nurazzo Tiles.

Technical Data

Abrasive Resistance – ASTM D-4060	35 mg
Impact Resistance – MILD3134F	Withstands 16 ft/lbs without cracking, delamination or chipping
Slip Resistance – ASTMD-2047	
Wet	.62
Dry	.85
Compressive Strength – ASTM C-579, 7 days	10,000 psi minimum
Tensile Strenth – ASTM C-307	2,500 psi
Flame Spread – ASTM D-84	20
Smoke Generation – ASTM E-622	
Flaming	124
Non-Flaming	20
Fire Rating	Class A
Water Absorption – ASTM D-570	0.01%
Freeze Thaw – ASTM 6-1026	No Effect
Stain Resistance – ASTMD-2299	Completely removed after 24 hours
Toxicity Material SAfety Data	Negative
Critical Radiant Flux – ASTM D-648	1.0 (Class 1)
Fungus and Bacteria Growth – MIL-F-5205	Will not support growth of fungus or bacteria when subjected to mildew and bacteria tests
Indentation – MIL-D3134f	Withstands 2,000 lbs/sq. in. for 30 minutes without indentation
Flexuaral Strength – ASTM C-580	3,000 psi
Thermal Coefficient of Expansion – ASTM -531	21×10^{-6}

Cumberland Quartzstone

ceramictechnics.com/product/cumberland-quartstone/ (http://ceramictechnics.com/product/cumberland-quartstone/)

CUMBERLAND QUARTZSTONE is available in 4 colors: **Pearl**, **Camel**, **Pewter** and **Tobacco**.
Available Size: **12″x24″ Rectified** and **24″x48″ Rectified**.
Available Finish: **Natural**.
Available Thickness: **8mm = 5/16″**.
Available Decors: **Mosaic** and **Strip Mosaic**.
Available Special Pieces: **Bullnose**.

⇒ **MADE IN USA**

Cumberland Quartzstone Brochure (https://ceramictechnics.sharepoint.com/_layouts/15/guestaccess.aspx?guestaccesstoken=uDivSgw4A59%2bZwtkIDwJhypjufnCDItuveFiXEgiMCE%3d&docid=090a97598aa6b4704b31f0972a7dcadc9)

Availability: See product page for availability
SKU: n/a.
Categories: Porcelain Tile (http://ceramictechnics.com/tile-category/porcelain/), Linear Visual (http://ceramictechnics.com/tile-category/porcelain/linear-visual/), Natural Vein Visual (http://ceramictechnics.com/tile-category/porcelain/linear-visual/natural-vein-visual/), Natural Stone Visual (http://ceramictechnics.com/tile-category/porcelain/natural-stone-visual/), Limestone Visual (http://ceramictechnics.com/tile-category/porcelain/natural-stone-visual/limestone-visual/), Domestic Inventory (http://ceramictechnics.com/tile-category/porcelain/domestic-inventory/).
Tags: Made in USA (http://ceramictechnics.com/product-tag/made-in-usa/), Recycled Content (http://ceramictechnics.com/product-tag/recycled-content/).

Request a Sample

Clear selection (http://ceramictechnics.com/product/cumberland-quartstone/#)

Add to wishlist (http://ceramictechnics.com/product/cumberland-quartstone/#) Add to compare (http://ceramictechnics.com/product/cumberland-quartstone/#)
Request Sample (http://ceramictechnics.com/product/cumberland-quartstone/#)
Tweet (https://twitter.com/share)

Color Availability.

Pewter

Tobacco

Decors.

Mosaic 12"x12" (1"x2" Pieces)

Available in all colors

Mosaic 12"x12" (1"x2" Pieces)	8mm = 5/16"	Natural	Pearl/Camel/Pewter/Tobacco
Strip Mosaic 12"x24"	8mm = 5/16"	Natural	Pearl/Camel/Pewter/Tobacco

Special Pieces

	SIZES	THICKNESS	FINISH	AVAILABLE COLORS
Bullnose	3"x24"	8mm = 5/16"	Natural	Pearl/Camel/Pewter/Tobacco

TECHNICAL INFORMATION

DESCRIPTION	STANDARD	REQUIRED VALUE	RESULT
			Natural
D.C.O.F.	ANSI A 137.1-2012 (BOT 3000)	≥ 0.42 Wet	0.62 Wet
Water Absorption	ASTM C373	0.5% Max.	< 0.5%
Resistance to Stains	ASTM C1378		Class A
Breaking Strength	ASTM C648	250 lbf or Greater	385 lbf

- Made in USA
- Recycled Content

Application	Floor Tile, Wall Tile
Availability	Domestic Inventory, Made in USA
Colors	Pearl, Tobacco, Camel, Pewter
Tile Size	Bullnose 3″x24″, Strip Mosaic 12″x24″, Mosaic 12″x12″, 12″x24″ Rectified, 24″x48″ Rectified
Finish	Natural
Thickness	8mm

Sienna Board Formed

ceramictechnics.com/product/sienna-board-formed/ (http://ceramictechnics.com/product/sienna-board-formed/)

SIENNA BOARD FORMED is available in 3 colors: **Cement Taupe**, **Cement Quartz**, and **Cement Grigio**.
Available Sizes: **24″x48″ Rectified**, **18″x36″ Rectified**, **24″x24″ Rectified** and **12″x24″ Rectified**.

Available Finishes: **Natural** and **Lappato**.
Available Thickness: **10mm**.
Available Decor: **Mosaic**.
Available Special Pieces: **Bullnose**, **Step** and **Corner Tile DX/SX**.

See available Inventory below, not all sizes and colors are in stock, Contact a sales representative for further information.

Sienna Board Formed Brochure (https://ceramictechnics.sharepoint.com/_layouts/15/guestaccess.aspx?guestaccesstoken=G%2fMZmQfH8wWKygRSAuAEpjwM8QTBYlqbtk5m9bdKkuo%3d&docid=0b10cd8c3dd9c4821a54d1d7e9e012adb)

Availability: See product page for availability
SKU: n/a.
Categories: Porcelain Tile (http://ceramictechnics.com/tile-category/porcelain/), Concrete Visual (http://ceramictechnics.com/tile-category/porcelain/concrete-visual/), Wood Visual (http://ceramictechnics.com/tile-category/porcelain/wood-visual/), Domestic Inventory (http://ceramictechnics.com/tile-category/porcelain/domestic-inventory/).
Tag: Recycled Content (http://ceramictechnics.com/product-tag/recycled-content/).

Request a Sample

Clear selection (http://ceramictechnics.com/product/sienna-board-formed/#)

Add to wishlist (http://ceramictechnics.com/product/sienna-board-formed/#) Add to compare (http://ceramictechnics.com/product/sienna-board-formed/#)
Request Sample (http://ceramictechnics.com/product/sienna-board-formed/#)
Tweet (https://twitter.com/share)

Color Availability.

Cement Quartz

SIZE	THICKNESS	FINISH	COLORS
Mosaic 12"x12"	10mm	Natural	Cement Taupe/Cement Quartz/Cement Grigio

Special Pieces

	SIZES	THICKNESS	FINISH	AVAILABLE COLORS
Bullnose	3"×24" Recitifed	-	Natural	Cement Taupe/Cement Quartz/Cement Grigio
Step	13"×24"×1.25"×1.x25" Rectified	-	Natural	Cement Taupe/Cement Quartz/Cement Grigio
	13"×48"×1.25"×1.x25" Rectified	-	Natural/Lappato	Cement Taupe/Cement Quartz/Cement Grigio
Corner Tile DX/SX	13"×24"×1.25"×1.x25" Rectified	-	Natural	Cement Taupe/Cement Quartz/Cement Grigio
	13"×48"×1.25"×1.x25" Rectified	-	Natural	Cement Taupe/Cement Quartz/Cement Grigio

TECHNICAL INFORMATION

DESCRIPTION	STANDARD	REQUIRED VALUE	RESULT	
			Natural	Lappato
D.C.O.F.	ANSI A 137.1-2012	≥ 0.42 Wet	0.57 Wet*	0.43 Wet*
Water Absorption	ASTM C373	≤ 0.5%	Compliant	Compliant
Resistance to Stains	ISO 10545-14	Min. Class 3	Class 5	Class 5
Breaking Strength	ISO 10545-4	S ≥ 1300N	≥ 2000N	≥ 2000N
	ISO 10545-4	R ≥ 35N/mm^2	R ≥ 50N/mm^2	R ≥ 50N/mm^2

** Values obtained with certificate n° 20130034. Date 03/11/2013.*

CTL Projects: Sienna Board Formed

Application	Floor Tile, Wall Tile
Availability	Domestic Inventory
Colors	Cement Taupe, Cement Quartz, Cement Grigio
Tile Size	Bullnose 3″x24″ Rectified, Step 13″x48″x1.25″x1.25″ Rectified, Mosaic 12″x12″, Step 13″x24″x1.25″x1.25″ Rectified, Corner Tile DX/SX 13″x24″x1.25″x1.25″ Rectified, Corner Tile DX/SX 13″x48″x1.25″x1.25″ Rectified, 12″x24″ Rectified, 18″x36″ Rectified, 24″x24″ Rectified, 24″x48″ Rectified
Finish	Natural, Lappato
Thickness	10mm

FLOOR

QUARRY NATURALS®

QUARRY FLOOR

QUARRY NATURALS®

QUARRY FLOOR

FLOOR TILE

SHADOW GRAY N46 ✱ (2)

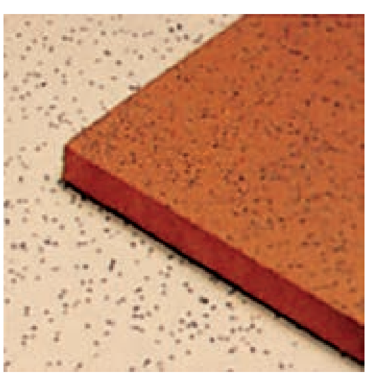
DESERT N03 ✱ (1)

LAVA RED N01 ✱ (1)

SHADOW FLASH N56 (2)

PRAIRIE FLASH N04 (1)

FIRE FLASH N02 (1)



ABRASIVE GRAIN

✱ SPECIAL SURFACES:
Abrasive grain available in N01, N03 and N46 in 6 x 6 and 8 x 8 sizes.
Abrasive grain particles added to Quarry Naturals give improved slip resistance for many types of footwear, depending on maintenance conditions.

(1) & (2) notations indicate price group, (1) being the least expensive.

QUARRY NATURALS®

QUARRY FLOOR

SIZES

			THICKNESS	SQ. FT./ CARTON	PIECES/ CARTON
	8 x 8 Floor Tile	8" x 8" (20.30 cm x 20.30 cm)	1/2"	11.11	25
	6 x 6 Floor Tile	6" x 6" (15.20 cm x 15.20 cm)	1/2"	11.00	44
	3-7/8 x 8 Floor Tile	3-7/8" x 8" (9.80 cm x 20.30 cm)	1/2"	10.76	50

TRIM

			NUMBER	PIECES/ CARTON
	Floor Bullnose	6 x 6	Q-1665U	44
	Floor Bullnose Corner	6 x 6	QCRL-1665U	44
	Floor Bullnose	8 x 8	Q-1885U	25
	Floor Bullnose Corner	8 x 8	QCRL-1885U	25
	Cove Base ★	5 x 8	Q-3585U	24
	Cove Base ★	5 x 6	Q-3565U	44
	Cove Base Outcorner ★	5 x 6	QCR-L-3565U	20
	Cove Base Incorner ★	5 x 1	QB-3565U	25

Cove base trim is intended to coordinate with floor tile in the standard 90-degree installation position.
★ Not available in Flash colors; use coordinating solid color

INSTALLATION & PRICING

RECOMMENDED GROUT JOINT:
Floor: 3/8"

RELATIVE PRICING: Low to High

SHADE VARIATION

MEDIUM	HIGH
(V2)	(V3)
(Solid)	(Flashed)

PERFORMANCE CHARACTERISTICS

	ASTM#	FLOOR RESULT
Water Absorption	C373	≤ 3.0%
Breaking Strength	C648	> 400 lbs.
Scratch Hardness	MOHS	7.0
Chemical Resistance	C650	Resistant
Abrasion Resistance	C1027	N/A

For additional information on test results, visit us at: americanolean.com/information/TestResults.

USAGE

FLOORS	WALLS	COUNTERTOPS
F	W	C

APPLICATIONS

	TARGET DCOF WET	SUITABLE
Dry & Level – Interior Floor	N/A	●
Wet & Level – Interior Floor	≥ 0.42	●
Shower Floors (Residential or Light Commercial)	≥ 0.42	
Exterior Floor Applications (including pool decking & other wet areas with minimal footwear)	≥ 0.60	●*
Ramps & Inclines	≥ 0.65	●*
Walls/Backsplashes	N/A	●
Countertops	N/A	●
Pool Linings	N/A	●**

A DCOF value of ≥ 0.42 is the standard for tiles specified for level interior spaces expected to be walked upon when wet, as stated in ANSI A137.1-2012, Section 9.6. For more information about DCOF and the DCOF AcuTest™, visit americanolean.com/DCOF.

APPLICATION NOTES:

Suitable for exterior applications in freezing and non-freezing climates, when proper installation methods are followed.
Suitable for industrial installations requiring high compressive strength.
Subject to Oils: Absorbs oils, grease and other liquids to keep floors slip-resistant, yet does not contaminate the surface. Proper cleaning methods easily remove any contaminants that do get absorbed into the tile.
* Abrasive surface only
** 6 x 6 floor tile only

NOTES

Since there are variations in all fired ceramic and natural products, tile and trim supplied for your particular installation may not match samples. Final confirmation should be made from actual tiles and trim prior to installation. Manufactured in accordance with ANSI A137.1 standards.

For additional information refer to "Factors to Consider" at: americanolean.com/Factors.

We do not recommend light colored quarry tile in commercial kitchens unless properly sealed or a grout release is used. Periodic resealing of the tile may be necessary.

Special care should be taken when grouting; a grout release is recommended to prevent finely powdered pigments from lodging in the pores of the tile surface.

It is necessary to follow the proper procedures and recommendations from the grout and maintenance products' manufacturers.

PRE-CONSUMER RECYCLED MATERIALS

MADE IN THE U.S.A.

All or select items within this series meet the requirements for these qualifications. For more information visit americanolean.com.

AMERICAN OLEAN greenworks™ ENVIRONMENTAL LEADERSHIP THAT WORKS

Naturally, many of our products can help you earn LEED™ credits.

888.AOT.TILE

AMERICAN OLEAN® PROVEN IN TILE™

SW 7056 Reserved White

Interior/Exterior

Locator Number 258-C2

Color Details

Color Family: White & Pastel

RGB Value: R-224 | G-224 | B-217

Hexadecimal Value: #E0E0D9

LRV: 74

Due to individual computer monitor limitations, colors seen here may not accurately reflect the selected color. To confirm your color choices, visit your neighborhood Sherwin-Williams store and refer to our in-store color cards.

MY STORE:

NOTES:

SW 7528
Windsor Greige
Interior / Exterior
Locator Number: 285-C5

COORDINATING COLORS

SW 6147
Panda White

SW 7008
Alabaster

SW 7535
Sandy Ridge

SIMILAR COLORS

DETAILS

COLOR STRIP 285

FIND INTERIOR PAINT

FIND EXTERIOR PAINT

Save to mySW.com +

Add to my Project List +

Actual color may vary from on-screen representation. To confirm your color choices prior to purchase, please view a physical color chip, color card, or painted sample.

Your Sherwin-Williams

Sorry, we're unable to locate your store at this time.

FIND A STORE

SHERWIN-WILLIAMS.

SW 6913
Funky Yellow
Interior
Locator Number: 138-C5

COORDINATING COLORS

SW 7005
Pure White

SW 7566
Westhighland White

SW 6484
Meander Blue

SIMILAR COLORS

DETAILS

COLOR STRIP 138

FIND INTERIOR PAINT

Save to mySW.com +

Add to my Project List +

Actual color may vary from on-screen representation. To confirm your color choices prior to purchase, please view a physical color chip, color card, or painted sample.

Your Sherwin-Williams

Sorry, we're unable to locate your store at this time.

FIND A STORE

SAVE YOUR COLORS

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Installation Accessories

WELD RODS
Color-Integrated WALL BASE
STAIR TREADS/RISERS/LANDING TILES
TRANSITION STRIPS

Armstrong®
COMMERCIAL FLOORING

12 shadow gray

69 light gray

61 graphite gray

71 mid gray

65 soft white

64 fresh taupe

70 flaxen

80 stone

73 parchment

03 bisqueware

16 sand

75 desert sand

22 satin

20 oyster

21 edelweiss

04 butterscotch

46 conch

47 cabernet

48 rosehip

45 violet petal

92 cadet blue

52 blue spruce

06 olivine

Color-Integrated WALL BASE Vinyl and Rubber Product Availability Chart

PRODUCT	GAUGE	SIZE	WT. NOM. (lbs/ctn.)	PIECES/CTN
VINYL	1/8 in.	2-1/2 in. x 48 in. (6.35 cm x 121.9 cm)	30 (14 kg)	30
	(3.2 mm)	4 in. x 48 in. (10.16 cm x 121.9 cm)	46 (21 kg)	30
		6 in. x 48 in. (15.24 cm x 121.9 cm)	54 (25 kg)	24
		4 in. x 120 ft. (10.16 cm x 36.58 m)	46 (21 kg)	1 roll – 1 pc.
		6 in. x 96 ft. (15.24 cm x 29.26 m)	54 (25 kg)	1 roll – 1 pc.
		4 in. (10.16 cm) coved external corners	7 (3 kg)	30
VINYL	0.080 in.	4 in. x 48 in. (10.16 cm x 121.9 cm)	34 (15 kg)	30
	(2.0 mm)	4 in. x 160 ft. (10.16 cm x 48.77 m)	45 (20 kg)	1 roll – 1 pc.
		2-1/2 in. x 48 in. (6.35 cm x 121.9 cm)	22 (10 kg)	30
		6 in. x 48 in. (15.24 cm x 121.9 cm)	39 (18 kg)	24
RUBBER	1/8 in.	2-1/2 in. x 48 in. (6.35 cm x 121.9 cm)	30 (14 kg)	30
	(3.2 mm)	4 in. x 48 in. (10.16 cm x 121.9 cm)	46 (21 kg)	30
		6 in. x 48 in. (15.24 cm x 121.9 cm)	54 (25 kg)	24
		4 in. x 120 ft. (10.16 cm x 36.58 m)	46 (21 kg)	1 roll – 1 pc.
		4 in. (10.16 cm) coved external corners	7 (3 kg)	30

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Armstrong® COMMERCIAL FLOORING

Color-Integrated WALL BASE ▪ STAIR TREADS/RISERS/LANDING TILES ▪ TRANSITION STRIPS

Specification Data

MATERIAL

Color-Integrated WALL BASE:
Vinyl: a composition of polyvinyl chloride resin, plasticizers, stabilizers, fillers and pigments. Rubber: A composition of rubber binder, fillers and pigments.

STAIR TREADS/RISERS/LANDING TILES:
A vulcanized composition of rubber binder, reinforcing fillers and pigments.

TRANSITION STRIPS:
A composition of polyvinyl chloride resin, plasticizers, stabilizers, fillers and pigments.

PATTERNS AND COLORS

Color-Integrated WALL BASE:
A wide range of colors with a durable matte finish in a choice of either straight or coved-toe surface design. Color pigments are insoluble in water and resistant to cleaning agents and light.

STAIR TREADS/RISERS/LANDING TILES:
Have low profile raised elements that have chamfered shoulders with sharply defined edges at the top. The solid color is uniform throughout the entire thickness of the tread, riser and tile. Color pigments are insoluble in water and resistant to cleaning agents and light.

TRANSITION STRIPS:
Available in five different colors, Armstrong® homogeneous vinyl transition strips are offered in eight profiles with a semi-gloss finish.

SIZE AND GAUGE

See Product Availability charts.

Limitations

Color-Integrated WALL BASE should not be used in the following areas:
- Below grade outside walls where moisture or alkali is present.
- Exterior areas

STAIR TREADS/RISERS/LANDING TILES & TRANSITION STRIPS should not be used in the following areas:
- Heavy industrial and exterior areas
- Commercial kitchens and commercial food processing areas.
- Where pointed spikes such as golf or track shoes will be used.
- Where the floor will be subjected to unusually concentrated or dynamic loads.

NOTE: Concentrated static and dynamic loads such as hospital beds, rollout beds, portable x-ray machines, etc., may visibly damage resilient as well as other types of floor coverings. For questions regarding product stability, detailed instructions for floor preparation and installation in these applications, please contact Armstrong.

Suitable for Application Over

Color-Integrated WALL BASE:
- Clean, dry, smooth, structurally sound interior vertical surfaces, including gypsum drywall, plaster, concrete, plywood, paneling and masonry.

STAIR TREADS/RISERS/LANDING TILES & TRANSITION STRIPS:
- Concrete, terrazzo and other dry, structurally sound monolithic subfloors on all grade levels.
- Suspended wood subfloor construction with approved wood underlayments, and a minimum of 18 in. (45.7 cm) well-ventilated air space below.
- Steel, stainless steel and aluminum floors
- Radiant-heated subfloors with a maximum surface temperature of 85° F (29° C).

Unsuitable for Application Over

Color-Integrated WALL BASE:
- Nonporous surfaces such as vinyl wall coverings and nonporous paints. Wall coverings and nonporous paints should not extend more than 1/2 in. (1.27 cm) below the top of the wall base.

STAIR TREADS/RISERS/LANDING TILES & TRANSITION STRIPS:
- Subfloors where excessive moisture or alkali is present.
- Wood subfloors applied directly over concrete or on sleeper-construction subfloors.
- Lightweight aggregate concretes having a density of less than 90 lbs. per cu. ft. and cellular concretes having plastic (wet) densities over 100 lbs. per cu. ft. (1442 kg/m²) or cellular concrete having a plastic (wet) density less than 100 lbs. per cu. ft. (1602 kg/m²) [94 lbs. per cu. ft. (1506 kg/m²) dry weight] or concrete having a compressive strength of less than 3500 psi (24 MPa). Concrete slabs with heavy static and/or dynamic loads should have higher design strengths and densities calculated to accommodate such loads.

TECHNICAL DATA

Shipping Weight and Packaging

See Product Availability Chart

Gloss (typical value)

Color-Integrated WALL BASE: 60 degrees specular: 35-55
STAIR TREADS/RISERS/LANDING TILES: 60 degrees specular: 10-18
TRANSITION STRIPS: NA

Reference Specifications

Color-Integrated WALL BASE:
ASTM F 1861
Type TV – Vinyl, Thermoplastic
Type TP – Rubber, Thermoplastic
Group 2 – Layered
Style A – Straight
Style B – Cove

STAIR TREADS/RISERS/LANDING TILES:
ASTM F 2169, Type TS, Class 2
(Supersedes FS RR-T-650 Composition A, Type 2)

RUBBER TILES:
ASTM F 1344, Class I A – Solid Color

TRANSITION STRIPS: N/A

Static Load Limit

250 lbs./sq. in. (17.6 kg/cm²)
ASTM F 970
Floors should be protected from sharp-point loads and heavy-static loads. High-heeled traffic [1000 psi (70.3 kg/cm²) or more] may visibly damage wood, resilient and other floor coverings.

Comparative Subjective Property Ratings

Durability – Excellent
Maintainability – Good
Resilience – Excellent
Subjective ratings (excellent, very good, good, fair) are in relation to other Armstrong resilient floors. Ratings are not directly related to any one test; rather, they are broadly based on tests and experience of Armstrong Research and Development under varying conditions and circumstances. These ratings should not be used for comparison to ratings used by other manufacturers to rank their own products.

Fire Test Data

ASTM E 648 Flooring Radiant Panel Critical Radiant Flux – 0.45 watts/cm² or more, Class I
ASTM E 662 Smoke Chamber Specific Optical Smoke Density – 450 or less
Numerical flammability ratings alone may not define the performance of the product under actual fire conditions. These ratings are provided only for use in the selection of products to meet the specified limits.

INSTALLATION

Job Conditions

Color-Integrated WALL BASE and RISERS:
Vertical surfaces shall be dry, clean, smooth and structurally sound. They shall be free from loose paint or plaster, vinyl wall coverings, moisture, alkali, dust, dirt, wax, oils, grease or other foreign matter. Existing adhesive must be left so that no ridges or puddles are evident and what remains is a thin, smooth film. Rough or uneven wall surfaces my telegraph through the wall base. For more detailed requirements, refer to Armstrong Guaranteed Installation Systems manual, F-5061.

Temperature shall be maintained at a minimum of 65° F (18° C) and a maximum of 100° F (38° C) for 48 hours prior to installation, during installation and 48 hours after completion. A minimum temperature of 55° F (13° C) shall be maintained thereafter. Condition all flooring materials and adhesives to room temperature at least 48 hours prior to starting installation. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.

STAIR TREADS/RISERS/LANDING TILES & TRANSITION STRIPS:
Subfloors/underlayments shall be dry, clean and smooth. They shall be free from paint, varnish, solvents, wax, oil, existing adhesive residue or other foreign matter.

For more detailed requirements of concrete, wood and metal subfloors, as well as wood and trowelable underlayments, refer to Armstrong Guaranteed Installation Systems manual, F-5061. Calcium Chloride Tests for moisture must be conducted. Armstrong offers a guideline of a maximum acceptable moisture emission level of 3.0 lbs. per 1000 sq. ft. per 24 hours or an internal relative humidity not greater than 80%. Bond Tests should also be conducted for compatibility with the substrate. When testing for alkalinity, the allowable readings for the installation of Armstrong flooring are 5 to 9 on the pH scale.

Temperature shall be maintained at a minimum of 65° F (18° C) and a maximum of 85° F (29° C) for 48 hours prior to installation, during installation and 48 hours after completion. A minimum temperature of 55° F (13° C) shall be maintained thereafter. Condition all flooring materials and adhesives to room temperature at least 48 hours prior to starting installation. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.

Procedure

Color-Integrated WALL BASE and RISERS:
Install Armstrong Color-Integrated WALL BASE with S-725 Adhesive. WALL BASE can be formed, or mitered around outside corners, or preformed outside corners may be used. WALL BASE may be mitered, scribed or wrapped with toe notched for inside corners. Detailed instructions may be found in the Armstrong Guaranteed Installation Systems manual, F-5061.

STAIR TREADS/LANDING TILES:
Armstrong STAIR TREADS and LANDING TILES must be installed using S-240 Epoxy Adhesive full spread. Detailed instructions may be found in the Armstrong Guaranteed Installation Systems manual, F-5061.

TRANSITION STRIPS:
Armstrong TRANSITION STRIPS must be installed using a solvent-based contact adhesive full spread. Detailed instructions may be found in the Armstrong Guaranteed Installation Systems manual, F-5061.

MAINTENANCE

Color-Integrated WALL BASE and RISERS:
Wash with a mild cleaner such as Armstrong S-485 diluted 3 to 4 ounces per gallon in water. Use a sponge or clean cloth. If a higher gloss or protective finish is required, apply two coats of a high quality commercial floor polish, such as Armstrong S-480.

STAIR TREADS/RISERS/LANDING TILES & TRANSITION STRIPS:
Detailed maintenance instructions may be found in the Armstrong Guaranteed Installation Systems manual, F-5061.

WARRANTIES

Armstrong warrants its regular (first quality) WALL BASE, STAIR TREADS/RISERS/LANDING TILES & TRANSITION STRIPS to be free from manufacturing defects for five years from the date of purchase if installed according to the Armstrong Guaranteed Installation Systems manual, F-5061. See Armstrong Commercial Floor Warranty, F-3349, or visit www.armstrong.com for warranty details, limitations and exclusions.

⚠ WARNING

DO NOT SAND, DRY SWEEP, DRY SCRAPE, DRILL, SAW, BEADBLAST OR MECHANICALLY CHIP OR PULVERIZE EXISTING RESILIENT FLOORING, BACKING, LINING FELT, ASPHALTIC "CUT BACK" ADHESIVES OR OTHER ADHESIVES.
These products may contain either **asbestos fibers** and/or **crystalline silica**. Avoid creating dust. Inhalation of such dust is a cancer and respiratory tract hazard. Smoking by individuals exposed to asbestos fibers greatly increases the risk of serious bodily harm. See current edition of the Resilient Floor Covering Institute (RFCI) publication Recommended Work Practices for the Removal of Resilient Floor Coverings, for instructions on removing all resilient floor covering structures.

For specifications, technical information or samples,
phone: **1 877 ARMSTRONG (276 7876)**
fax: **1 800 599 9335**
web site: **www.armstrong.com/flooring**

The knowledge and technical support you need to bring your vision to life.

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