SECTION 06 18 00

FABRICATED STRUCTURAL GLUED-LAMINATED CONSTRUCTION

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\*\* NOTE TO SPECIFIER \*\* Timberlab; Timber, Mass Timber, Glued-laminated Timber, Glulam, Cross-laminated Timber, CLT, Beams, Columns, Lamination, Laminator, Preservative Treatment, Connectors, Fasteners, Anchors, Adhesives, Structural.
This section is based on the products of Timberlab, which is located at:
1601 N.E. Columbia Blvd.
Portland, OR 97211
Tel: 503-749-7500
Email: [request info (mark.fusco@timberlab.com)](https://arcat.com/rfi?action=email&company=Timberlab&message=RE%253A%2520Spec%2520Question%2520(06180tbb)%253A%2520&coid=54232&spec=06180tbb&rep=&fax=)
Web: <https://timberlab.com>
 [ [Click Here](https://arcat.com/company/timberlab-54232) ] for additional information.
We are experienced builders on a bold mission: to innovate, produce, and deliver mass timber solutions like no other - transforming the built environment and changing the planet's future.
We're driven to test new ideas and reach new heights through transparency, collaboration, and creativity. Breaking boundaries and pushing forward with inspired motivation. We see projects through the eyes of the builder. When they say "it won't work" or "this hasn't been done before," We show them how eliminating speculation and mitigating risk.
Timberlab was born out of and is a subsidiary of Swinerton, a company known for excellence and innovation for over 135 years. As the first mass timber buildings were being built in the Pacific Northwest, Swinerton's Portland office recognized the opportunity to reduce their impact on the natural environment, deliver projects with improved quality and safety outcomes, support rural economies, and create beautiful spaces by bringing the outside in. Some of the earliest projects in the region, including First Tech Federal Community Credit Union, Wingspan Event Center, and Beaverton Public Safety Building emerged as a part of this team that would later become Timberlab.
Timberlab was launched as a separate business entity with a mission to advance the mainstream adoption of mass timber. As a team of architects, engineers, and builders, we see every project from multiple vantage points providing solutions that result in the highest value for the owner and occupant and offer services to support your team throughout the project life cycle. We're driven to test new ideas and reach new heights through transparency, collaboration, and creativity - breaking boundaries and pushing forward with inspired motivation.
In 2020, our team opened its first location in Portland, Oregon, where it produces timber annually to build an estimated 800,000 sq ft (0 sq m) of fabricated glulam components for projects throughout the United States. This facility helped support the Pacific Northwest as a regional powerhouse for mass timber construction by providing value-add fabrication services for glulam production. The intention was to expand the supply chain and, thereby, reduce the cost of mass timber structures, ultimately promoting the deployment of timber across many applications.
In 2023, Timberlab launched its second fabrication facility in Greenville, SC to assist the growing market along the East Coast. Timberlab uses its facilities to create custom mass timber mock-ups and conduct industry innovation to advance our mission and vision for mainstream adoption of mass timber construction. Between both facilities, Timberlab is able to serve the entire domestic U.S. market with premium engineering wood products through sophisticated CNC machine programming.

1. GENERAL

\*\* NOTE TO SPECIFIER \*\* This specification is written for Timberlab glulam members (typically beams and columns) that are manufactured to ANSI A190.1 and ANSI 117 as referenced inChapter 23 of the IBC and fabricated with connection hardware to meet specific building project requirements. If a project uses glulam that is manufactured to other standards (e.g. Canadian or European standards), Specifier to revise this specification accordingly and ensure it is coordinated with information documented on the Contract Documents. It is the responsibility of the design professional to attain approval from the Authorities Having Jurisdiction for glulam that does not conform to ANSI A190.1 or ANSI 117. This Specification is written to be a companion to a CLT Specification 06 17 19. The Specifier is responsible for ensuring the information in the project Specifications, Drawings and general notes are coordinated.

* 1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.

* + 1. Structural Glued-Laminated Timber.
		2. Preservative Wood Treatment.
		3. Timber Connectors.
		4. Miscellaneous Materials.
		5. Fabrication and Tolerances.
	1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.
\*\* NOTE TO SPECIFIER \*\* If engineering is delegated to the contractor for any part of the glulam design, include the detailed and complete scope, performance requirements, and submittals in a Division 1 delegated design specification or the structural drawing general notes. In these documents, also state if the delegated engineering is a deferred submittal. If a Division 1 delegated design section will not be part of the project specifications, delegated design requirements for glulam (connections only or members and connections) can be included in this specification section. Include "Delegated Design Submittal" in the Action Submittals subsection and note design criteria and applicable design standards in the Performance Requirements subsection. Alternatively, include performance criteria in the structural general notes and refer to Contract Documents in the Performance Requirements subsection.

* + 1. Section 01 35 73 - Delegated Design Procedures.

\*\* NOTE TO SPECIFIER \*\* Sample specification language for sustainability requirements has been included. Coordinate with project requirements and with Division 1 specification sections.

* + 1. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
		2. Section 01 81 13 - Sustainable Design Requirements.
		3. Section 03 30 00 - Cast-in-Place Concrete.
		4. Section 05 12 00 - Structural Steel Framing.
		5. Section 06 10 00 - Rough Carpentry.
		6. Section 06 17 19 - Cross-Laminated Timber.

\*\* NOTE TO SPECIFIER \*\* Any paints, stains, coatings, or other field-applied finishes should be included in a Division 9 specification.

* + 1. Section 09 91 13 - Exterior Painting.
		2. Section 09 91 23 - Interior Painting.
		3. Section 09 93 00 - Staining and Transparent Finishing.
	1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section. The publication date (year) of all reference standards is intended to be the edition referenced in Chapter 35 of the IBC year adopted as Code.

* + 1. American Concrete Institute (ACI):
			1. ACI 117, Specification for Tolerances for Concrete Construction and Materials and Commentary; 2010 (Reapproved 2015).
		2. American Institute of Steel Construction (AISC):
			1. AISC 303, Code of Standard Practice for Steel Buildings and Bridges; 2022, with Errata (2025).
		3. American Institute of Timber Construction (AITC):
			1. AITC 110, Standard Appearance Grades for Structural Glued Laminated Timber, 2001.
			2. AITC A190.1, American National Standard for Wood Products - Structural Glued Laminated Timber; 2007.
		4. American National Standards Institute (ANSI):
			1. ANSI 117, Standard Specification for Structural Glued Laminated Timber of Softwood Species; 2020.
			2. ANSI 405, Standard for Adhesives for use in Structural Glued Laminated Timber; 2023.
			3. ANSI A190.1, Product Standard for Structural Glued Laminated Timber; 2022.
		5. APA - The Engineered Wood Association (APA):
			1. APA EWS R540, Builder Tips: Proper Storage and Handling of Glulam Beams; 2019.
		6. American Society of Civil Engineers (ASCE):
			1. ASCE 7, Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
		7. American Society for Testing and Materials (ASTM):
			1. ASTM A36/A36M, Standard Specification for Carbon Structural Steel; 2019.
			2. ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
			3. ASTM A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
			4. ASTM A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
			5. ASTM A500/A500M, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.
			6. ASTM A563, Standard Specification for Carbon and Alloy Steel Nuts; 2021a.
			7. ASTM A563/A563M, Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric); 2021a.
			8. ASTM A572/A572M, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2021, with Editorial Revision.
			9. ASTM A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
			10. ASTM D2559, Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions; 2012a (Reapproved 2018).
			11. ASTM D2898, Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010 (Reapproved 2017).
			12. ASTM D3737, Standard Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam); 2023.
			13. ASTM D7612, Standard Practice for Categorizing Wood and Wood-Based Products According to Their Fiber Sources; 2021.
			14. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
			15. ASTM F844, Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use; 2019 (Reaffirmed 2024).
			16. ASTM F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2020.
			17. ASTM F3125/F3125M, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.
		8. American Wood Council (AWC):
			1. AWC FDS, Fire Design Specification for Wood Construction; 2024.
			2. AWC NDS, National Design Specification (NDS) for Wood Construction; 2018, with Errata (2021).
		9. American Wood Protection Association (AWPA):
			1. AWPA BS, American Wood Protection Association Book of Standards; 2024.
			2. AWPA U1, Use Category System: User Specification for Treated Wood; 2024.
		10. American Welding Society (AWS):
			1. AWS B2.1/B2.1M, Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).
			2. AWS D1.1/D1.1M, Structural Welding Code - Steel; 2020, with Errata (2023).
		11. International Building Code (IBC):
			1. International Building Code, most recent edition adopted by Authority Having Jurisdiction, including amendments and supplements.
		12. International Code Council (ICC):
			1. Evaluation Service, current edition.
		13. The Masonry Society (TMS):
			1. TMS 402/602, Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).
		14. West Coast Lumber Inspection Bureau (WCLIB):
			1. WCLIB (GR), WCLB Standard Grading Rules for West Coast & Imported Softwood Lumber No.18; 2024.
		15. Western Wood Products Association (WWPA):
			1. WWPA G-5, Western Lumber Grading Rules; 2021.
	1. ACTION SUBMITTALS
		1. Submit under provisions of Section 01 30 00, Administrative Requirements.
		2. Product Data:
			1. Manufacturer's data sheets and installation instructions for each product specified.
			2. Preparation instructions and recommendations.
			3. Wood preservative application instructions.
			4. Storage and handling requirements and recommendations.
			5. Typical installation methods.
			6. Manufacturer's Authorization to Mark or Letter of Good Standing from third-party agency.
			7. Product evaluation reports and installation instructions for fasteners and hardware.
			8. For preservative-treated glulam, include the treatment plant's AWPA or ICC-ES product data.
		3. Samples:
			1. Glulam:
				1. Minimum dimension of 12 inch depth x 12 inch length x typical member width, for each finish grade and species combination demonstrating range of variation in appearance to be expected.
				2. Apply specified finishes and sealers to three sides of half-length of each sample.
		4. Engineering Calculations required by the Authorities Having Jurisdiction, showing installed panels and attachment system meeting wind load requirements for project.
		5. Shop Drawings:

\*\* NOTE TO SPECIFIER \*\* Choose one or the other of the two Shop Drawings articles below as appropriate. Item 2 would likely be used for a project utilizing Building Information Modeling.

* + - 1. Include framing system, sizes and spacing of members, loads and cambers, bearing and anchor details, bridging and bracing, and framed openings. Include relationships with adjacent construction.
			2. Two-Dimensional (2D) shop drawings tracking the increased Level of Detail (LOD) throughout the submittal process in the following order:
				1. LOD300 Framing Plans:

Floor plans showing each framing member within the glulam construction scope.

Interfaces with related structural trades shown for reference purposes only including, but not limited to, steel construction and concrete construction.

Lamination combinations, camber, species, sizes, and special shapes.

Fire-resistance-rated components, including notation on minimum required wood thicknesses to achieve fire rating of connections and accessory materials.

Members exposed to view in the final condition.

Framing geometry requiring coordination between Architect and Consultants including, but not limited to, elevations, framing locations, or other information not specifically shown in the Contract Documents.

Approved LOD300 submittal will serve as approval for glulam manufacturing only. See LOD350 for release of fabrication.

* + - * 1. LOD350 Connection Details:

LOD300 framing plans with callouts to unique connection conditions shown in enlarged details.

Enlarge details to indicate fabrication and installation tolerances.

Size, type, and grade of fasteners.

Dimensioned details of custom metal fabrications required for each connection condition including grade of steel, weld size and types, fasteners and spacings, and unique conditions.

Approved LOD350 submittal will serve as approval for fabrication of glulam members and custom steel fabrications for glulam installation.

* + - * 1. LOD400 Single-Piece Shop Drawings of Record:

Show each unique framing including:

Section shape.

Wood species.

Lamination combination.

Fire-resistance rating.

Camber.

Appearance classification and edge condition.

Wet or dry service conditions.

Location and quantity included in Project.

Overall and unique dimensions (for CNC quality control and applicable assembly).

Fabrication and/or milling.

Connection information and required fasteners.

Finishes and coatings.

Weight.

Coordinate extent of Shop Drawings with the Architect, Consultant, Subcontractors, Suppliers, and Manufacturer to assist in development of detailing for procurement and overall construction schedule.

* + 1. Coordination Model:
			1. Provide Three-dimensional (3D) digital model of glulam geometry showing the following:
				1. Interfaces with related structural components.
				2. Coordination with Cross-Laminated Timber Shop Drawings. See Section 06 17 19, Cross-Laminated Timber.
				3. Manufacturing and fabrication capabilities and tolerances.
			2. Provide digital model in format compatible for coordination with other trades.
				1. Acceptable Formats:

SAT.

IFC.

DWG.

DFX.

RVT.

NWC.

* + 1. Designer's qualification statement.
		2. Manufacturer's qualification statement.
		3. Installer's qualification statement.
		4. Welder's Qualification Statement.
		5. Include Welders Certificates in accordance with AWS B2.1/B2.1M and dated within the past 12-month period prior to commencement of Work.
		6. Manufacturer's Instructions: Include manufacturer's written instructions for storage, handling preparation, and installation.
		7. Delegated Design Submittal:
			1. Timber to timber connections.
			2. Timber to timber and timber to concrete connections.
			3. Timber to timber, timber to concrete, and timber to structural steel connections.
			4. Timber gravity system, inclusive of the glulam sizing and engineering, timber to timber, timber to concrete, and timber to structural steel connections.

\*\* NOTE TO SPECIFIER \*\* Include the following for projects pursuing LEED certification for MR Credit 3, 4, IEQ Credit 2, and MR Credit.

* + 1. Sustainable Design Submittals:
			1. Reference Section 01 81 13, Sustainable Design Requirements.
			2. MR Credit 3 - BPDO, Sourcing of Raw Materials:
				1. Certified Wood: Documentation indicating percentage new wood, percentage Forest Stewardship Council (FSC) SFI PFEC and Chain-of-Custody (CoC) certificates for manufacturer and vendor. Include vendor invoice indicating FSC and CoC.
				2. Pilot Alternative Compliance Path - Legal Wood: Documentation of wood products from Certified Sources as defined by ASTM D7612 meeting following requirements:

100 percent of wood is verified to be from Legal, non-controversial Sources as defined by ASTM D7612.

70 percent of wood used on the Project is from Responsible Sources as defined by ASTM D7612.

* + - 1. MR Credit 4 - BPDO, Material Ingredients:
				1. Material Ingredient Report.
			2. IEQ Credit 2 - Low-Emitting Materials:
				1. Interior Wet-Applied Coatings, Adhesives, Sealants: Certificate stating compliance with California Department of Public Health (CDPH) Standard Method V1.1-2010, including total volatile organic compounds (TVOC) range.

Product data stating VOC content in g/L.

Volume of material applied per product.

* + - * 1. Composite Wood Installed Within the Building Interior: Certificate stating compliance with California Air Resources Board (CARB) Airborne Toxic Control Measures (ATCM), Phase II for ultra-low-emitting formaldehyde (ULEF) resins or product data stating product does not contain added formaldehyde resins.
			1. MR Credit - Environmental Product Declarations (EPDs).
				1. Data confirming glulam complies with most recent American Wood Council's UL Certified Environmental Product Declaration for North American Glued Laminated Timber.
	1. INFORMATIONAL SUBMITTALS
		1. Submit under provisions of Section 01 30 00, Administrative Requirements.
		2. Certificate of Conformance: Indicating structural glulam manufactured and marked for Project complies with requirements in ANSI A190.1.
		3. Method Statements:
			1. Rigging Plan: Description of lifting and handling requirements for each different glulam type, taking into consideration openings and cut-outs in components.
			2. Bracing Plan:
				1. Engineered installation method statement and bracing plan, stamped, and signed by design professional registered in the jurisdiction where Project is located.
				2. Include an evaluation of temporary loading conditions and bracing of glulam components to structure during installation.
				3. Indicate support and connection type of bracing to glulam components.
				4. Where concealed connections are not possible, include proposed repair procedures for bracing and other temporary connections.
		4. Weather and Moisture Protection Plan:
			1. Include proposed coverings and removal sequence.
			2. Include standing water mitigation plan during construction.
		5. Copy of Pre-Installation Meeting minutes.
	2. QUALITY ASSURANCE
		1. See Section 01 40 00, Quality Requirements.
		2. Designer Qualifications: Professional Structural Engineer experienced in glued-laminated timber design and licensed in the jurisdiction of the location of the Work.
		3. Manufacturer Qualifications: Company specializing in the manufacturing of glued-laminated structural timber with a minimum of 5-years of documented experience and certified by:
			1. AITC.
			2. APA/EWS.
		4. Installer Qualifications: Company specializing in the installation of glued-laminated timber with a minimum of 5-years experience and approved by manufacturer.
		5. Welder Qualifications: Welding operators qualified in accordance with AWS D1.1/D1.1M and certified within the previous 12-months.
		6. Preservative Treatment: Mark each individual glulam member with third party quality mark for treatment in accordance with IBC Chapter 23 or ICC-ES report on a face that is not exposed to view in the completed Work.
		7. Glulam Members: Factory mark each individual member with the APA Trademark in accordance with ANSI 190.1 on a face that is not exposed to view in the completed Work.

\*\* NOTE TO SPECIFIER \*\* Include mock-up if the project size or quality warrant the expense. The following is one example of how a mock-up might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

* + 1. Mock-Up:
			1. Construct mock-up for Architect's review in sufficient time to prevent delays in construction.
			2. Obtain approval of mock-up prior to commencement of Work.
			3. Rebuild rejected mock-ups until approval is obtained.
			4. Locate mock-ups where directed by Architect.
			5. Mock-up to demonstrate quality of workmanship and visual appearance.
			6. Maintain approved mock-up during construction as standard for comparison with completed Work.
			7. Do not alter or remove mock-up until Work is complete.

\*\* NOTE TO SPECIFIER \*\* Consider scheduling a pre-installation meeting for large and complex projects.

* + 1. Pre-Installation Conference:
			1. Conduct conference a minimum of 2-weeks prior to commencement of Work.
			2. Conference agenda to include, but is not limited to:
				1. Installation methods and procedures.
				2. Connection procedures.
				3. Preservative wood treatment.
				4. Structural requirements.
				5. Inspection requirements.
				6. Schedule.
			3. Invite Owner, Architect, Consultant, applicable trades, Authorities Having Jurisdiction, Manufacturer's Representative, and Installer.
	1. DELIVERY, STORAGE, AND HANDLING
		1. Storage and handling in strict accordance with manufacturer's written instructions and recommendations.
		2. Comply with provisions in APA R540, Proper Storage and Handling of Glulam Beams.
		3. Wrap members or bundled grouping of members using vapor-permeable, plastic-coated paper covering with water-resistant seams.
		4. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.
		5. Protect from damage due to weather, excessive temperature, and construction operations.
	2. SITE CONDITIONS
		1. Maintain environmental conditions within limits recommended in manufacturer's written requirements.
		2. Do not install products under environmental conditions outside of manufacturer's recommended limits.
	3. WARRANTY
		1. Manufacturer's standard limited warranty.
1. PRODUCTS
	1. MANUFACTURERS
		1. Manufacturer: Timberlab which is located at: Main Office: 850 NW 13th Avenue, Portland, Oregon, 97209; Tel: 203-749-7500; Email: estimating@timberlab.com; Web: www.timberlab.com.
			1. Timberlab Laminators, LLC. P.O. Box 297, Drain, OR 97435.
				1. Plant Location: Drain OR, APA Plant #1156.
				2. Plant Location: Swisshome OR, APA Plant #1157.
		2. Approved Fabricator:
			1. Timberlab Laminators LLC, 1601 NE Columbia Blvd., Portland, OR 97211; (503) 749-7500; www.timberlab.com.
			2. Timberlab Laminators LLC, 1610 Old Grove Rd., Piedmont, SC 29673; (503) 749-7500; www.timberlab.com.

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
		2. Requests for substitutions in accordance with the provisions of Section 01 60 00, Product Requirements.
	1. PERFORMANCE REQUIREMENTS
		1. Comply with applicable Authorities Having Jurisdiction for loads, seismic zoning, and other load criteria.
		2. Structural Performance: Structural glued-laminated timber and connectors to withstand the effects of structural loads shown on Drawings without exceeding allowable design working stresses listed in ANSI 117 or determined according to ASTM D3737 and acceptable to Authorities Having Jurisdiction.
		3. Seismic Performance: Structural glued-laminated timber and connectors to withstand effects of earthquake motions determined according to ASCE/SEI 7.
		4. Fire Resistance of Exposed Wood: Exposed wood fire-resistive rating in accordance with applicable building code. Fire resistance of exposed wood members in accordance with Chapter 16 of AWC National Design Specification for Wood Construction (NDS).

\*\* NOTE TO SPECIFIER \*\* Include applicable sustainability requirements for project. Include the following for projects pursuing LEED certification MR Credit 3 - Sourcing of Raw Materials; FSC, PFFC, or SFI Certified Wood.

* + 1. Sustainability Requirements: Comply with Section 01 81 13 - Sustainable Design Requirements.
			1. Forest Certification: Provide wood products made from forests certified by an FSC-accredited certification body or USGBC-approved equivalent.
			2. VOC limits to comply with Section 01 81 13 - Sustainable Design Requirements, for composite wood materials, including adhesives, sealants, coatings, and finishes.
				1. Prohibit Methylene chloride and perchloroethylene in sealants.
				2. Comply with California Air Resources Board (CARB) Airborne Toxic Control Measure (ATCM), Phase II for ultra-low-emitting formaldehyde (ULEF) resins or containing no formaldehyde resins.
			3. Lumber fabricated from old growth timber is not permitted.
			4. Provide sustainably harvested lumber, certified or labeled as specified in Section 01 60 00, Product Requirements.
			5. Provide lumber harvested within 500 miles of the Project.
		2. Design Floor Live and Dead Load: \_\_\_\_\_\_ lbs/sq ft with deflection limited to 1/360 \_\_\_\_\_ of span.
		3. Design Roof Live and Dead Load: \_\_\_\_\_\_ lbs/sq ft with deflection limited to 1/240 \_\_\_\_\_ of span.
		4. Fire Rating: Comply with \_\_\_\_\_.
		5. Sustainability Requirements: Comply with Section 01 81 13, Sustainable Design Requirements.

\*\* NOTE TO SPECIFIER \*\* Delete articles not required.

* 1. MATERIALS
		1. Comply with ANSI A190.1 and ANSI 117.
		2. Design Parameters:
			1. Bending (Fb): \_\_\_\_ psi.
			2. Tension Parallel to Grain (Ft): \_\_\_\_ psi.
			3. Compression Parallel to Grain (Fc): \_\_\_\_ psi.
			4. Compression Perpendicular to Grain Bottom (Fc1): \_\_\_\_ psi.
			5. Compression Perpendicular to Grain Top (Fc1): \_\_\_\_ psi.
			6. Horizontal Shear (Fv): \_\_\_\_ psi.
		3. Modulus of Elasticity (E): \_\_\_\_ psi.
		4. Lumber:
			1. Softwood.

\*\* NOTE TO SPECIFIER \*\* Glulam member species, combination symbol, grade, fire rating, etc. should be called out on the structural Drawings general notes with member sizes on the plans. Refer to the Timberlab Glulam Product Guide available for download on our website: www.timberlab.com.

* + 1. Species:
			1. Douglas Fir-Larch.
			2. Southern Pine.
			3. Ponderosa Pine.
			4. Alaska Cedar.
			5. Eastern Spruce.
			6. Hem Fir.
			7. Canadian Spruce Pine.
			8. European Spruce.
		2. Grade:

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two gradings not required.

* + - 1. In compliance with WWPA G-5 grading rules with \_\_ percent maximum moisture content before fabrication.
			2. In compliance with WCLIB grading rules with \_\_ percent maximum moisture content before fabrication.
		1. Species and Beam Stress Classifications - Beams and Purlins:
			1. Ponderosa Pine: 16F-1.3E.
			2. Alaska Cedar: 20F-1.5E.
			3. Eastern Spruce: 20F-1.5E.
			4. Any Species: 20F-1.5E.
			5. Any Species: 24F-1.7E.
			6. Douglas Fir-Larch: 24F-1.8E.
			7. Southern Pine: 24F-1.8E.
			8. Douglas Fir-Larch: 24F-1.8E.
			9. Southern Pine: 24F-1.8E.
			10. Southern Pine: 30F-2.1E.
			11. Lay-up:
				1. Balanced.
				2. Either balanced or unbalanced.
				3. Reference General Structural Notes on Drawings.

\*\* NOTE TO SPECIFIER \*\* Retain paragraph below if the Structural Engineer of Record designs glulam.

* + - 1. Reference General Structural Notes on Drawings.
		1. Species and Column Stress Classification - Columns:
			1. Species: \_\_\_\_\_\_.
			2. Classification: \_\_\_\_\_\_.
			3. Framing: Suitable for construction in conventional framing applications where appearance is not a primary concern and size of glulam matches size of framing.
			4. Industrial: Suitable for construction where appearance is not a primary concern.
			5. Architectural: Suitable for construction where appearance is a priority.
			6. Premium: Highest standard appearance grade.
			7. Reference General Structural Notes on Drawings.

\*\* NOTE TO SPECIFIER \*\* Glulam member appearance classification should be called out on the Structural Drawings with specific member requirements denoted, as applicable.

* + 1. Appearance Classification: Comply with ANSI A190.1.
		2. Appearance Grade:
			1. In compliance with AITC 110.
			2. Framing:
				1. Suitable for non-visual applications.
				2. Non-sanded.
				3. Meet width requirements.
			3. Industrial:
				1. Suitable for construction where appearance is not a primary concern.
				2. Two sides.
				3. Non-sanded.
			4. Architectural:
				1. Suitable for visual applications.
				2. Fill voids as required by AITC 110.
				3. Two sides with smooth visual sides.
			5. Premium:
				1. Suitable when appearance is the primary concern.
				2. Use clear wood inserts of matching grain and color to fill voids and knot holes more than 1/4 inch (6 mm) wide as required by AITC 110.
				3. Two sides with exposed surfaces sanded smooth.
			6. conforming to ANSI 405.

\*\* NOTE TO SPECIFIER \*\* Beveled members has specific layup requirements. The structural design and dimensions of beveled members should be consistent with ANSI 117.

* + 1. Non-Prismatic Shapes:
			1. Compression-side bevel-cut glulam members in accordance with ANSI 117.

\*\* NOTE TO SPECIFIER \*\* Tapered-depth members have specific layup requirements to ensure the intended design strength is achieved. The structural design and dimensions of these members should be consistent with ANSI 117. If your project has Tudor arch glulam members, contact Timberlab to confirm specifications.

* + - 1. Tapered-depth glulam members in accordance with ANSI 117 based on dimensioned details.
	1. ADHESIVES
		1. Face Bond:
			1. Hexion Ecobind 6500 with Wonderbond Hardener M-650Y providing a clear bond lineconforming to ANSI 405.

\*\* NOTE TO SPECIFIER \*\* Alternate equivalent option for dark glue: Hexion Cascophen LT-75 with FM-282 Hardener that conforms to ANSI 405.

* + - 1. Finger Joints:
				1. Hexion Cascomel 472 with Wonderbond Hardener 5025A conforming to ANSI 405.

\*\* NOTE TO SPECIFIER \*\* Preservative-treated glulam should be specified for Douglas Fir or Southern Pine glulam used in exterior applications where it is not adequately protected by an eave or overhang to prevent the accumulation or moisture on its surfaces or at connections, or where there is a high termite hazard. Alaska Cedar heartwood glulam is a naturally durable species option that precludes the need for preservative treatment. Refer to the Timberlab Glulam Product Guide available for download on our website: www.timberlab.com.

* 1. PRESERVATIVE TREATMENT
		1. Preservative Treatment: Comply with AWPA U1.
		2. Use Category for Above Ground Use:
			1. 3A.
			2. 3B
			3. 4A.

\*\* NOTE TO SPECIFIER \*\* All AWPA-approved treatments for Douglas Fir require incising. Tru-Core PTI Preservative Treated Wood per ICC-ESR 3834 makes incising for Douglas Fir optional. Southern Pine glulam does not require incising.

* + - 1. Glulam Species to be Treated:
				1. Coastal Douglas Fir.
				2. Southern Pine.
			2. Treat after gluing and before any metal fasteners or hardware are installed.
			3. Provide Coastal Douglas Fir for all Douglas Fir glulam treated to AWPA standards.

\*\* NOTE TO SPECIFIER \*\* Delete incise option not required.

* + - 1. Douglas Fir Glulam:
				1. Incise.
				2. Do not incise.
			2. Perform treatment process in accordance with AITC 109, Section 7 Retention, Penetration, Certification, and Marking Requirements.

\*\* NOTE TO SPECIFIER \*\* AWPA-listed glulam treatments need to be carefully considered to ensure there are qualified treatment facilities, compatibility with the wood species specified, and acceptability of the aesthetic of the treated wood. Reference APA Technical Note S580D, Preservative Treatment of Glued Laminated Timber, for additional information. Choose one of the following options.

* + 1. Preservative - AWPA Listed Treatment:

\*\* NOTE TO SPECIFIER \*\* Permapost, located in Hillsboro, Oregon, is listed as a certified treater for Tru-Core PTI product in the ICC-ESR report and has been evaluated for use on Douglas Fir glulam without incising. Permapost markets this product as Kleargard 25.

* + - 1. Tru-Core PTI Preservative Treated Wood. In accordance with ICC ESR-3834.
			2. Hi-Clear II Preservative Treated Wood.
				1. Carrier: Solvent.
				2. Biocide Chemicals: Permethrin and IPBC.
			3. CLEAR-GUARD Preservative Treated Wood.
				1. Carrier: Solvent.
				2. Biocide Chemicals: Permethrin and IPBC.
	1. TIMBER CONNECTORS
		1. Custom Fabricated Metal Connectors:
			1. Materials:
				1. Rolled Plate and Flat Bar: ASTM A572, Grade 50.
				2. Angles and Channels: ASTM A36, Grade 36.
				3. HSS: ASTM A500, Grade B (rectangular) or Grade C (round).
			2. Steel Shop Primer:
				1. Clean surfaces prior to prime painting.
				2. Paint steel assemblies and fasteners with rust-inhibitive primer, 2-mil (0.05-mm) dry film thickness.
			3. Galvanizing: Hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A123.
		2. Timber Self-Tapping Screws:
			+ 1. Timber screws evaluated to ICC Acceptance Criteria 233, Dowel-type Threaded Fasteners Used in Wood.
				2. Timber screws specified with corrosion-resistant coating evaluated to ICC Acceptance Criteria 257, Corrosion-resistant Fasteners and Evaluation of Corrosion Effects of Wood Treatments.
				3. Timber Bolts: ASTM A307, Grade A, with ASTM F844 washers and ASTM A563 hex nuts.
				4. Tight Fit Pins: One or both ends of pins to have a 1/8 inch (3.18 mm) chamfer.
				5. Anchor Rod Assemblies for Attachment to Concrete: ASTM F1554:
			1. Grade 36.
			2. Grade 55.
		3. Pre-Engineered Metal Connectors:
			1. Provide metal connector hardware and finishes or coatings.
			2. Provide metal hangers, straps, and splines evaluated to ICC Acceptance Criteria 13, Joist Hangers and Similar Devices.
			3. For fire-rated connection assemblies, provide fire protection products.
	2. MISCELLANEOUS MATERIALS
		1. Shop Sealer: Manufacturer's standard, clear wood sealer for retarding transmission of moisture at cross-grain cuts and compatible with finish.
			1. Basis-of-Design Product: Walker Emulsions K-7067 Clear Sealer; www.walkeremulsions.com.
			2. Apply sealers in one coat in accordance with sealer manufacturer's written instructions.
		2. Wood Plugs:
			1. For countersunk holes, utilize same species and quality of wood to match glulam material.
			2. Pre-finish wood plugs with matching sealer and finish.
	3. FABRICATION
		1. Verify dimensions and site conditions prior to fabrication.
		2. Cut and fit members accurately to length to achieve tight joint fit.
		3. Fabricate member with built-in camber.
		4. Do not splice or join members without prior written approval.
		5. Fabricate steel hardware and connections with joints neatly fitted, welded, and ground smooth.
		6. Welding: Perform in accordance with AWS D1.1/D1.1M.
		7. After End Trimming:

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs not required.

* + - * 1. Seal with penetrating sealer, in accordance with manufacturer's written requirements.
				2. Seal with sealer coat, in accordance with manufacturer's written requirements.
				3. Do not seal.
		1. Appearance Classification: Comply with ANSI A190.1.
		2. Fabrication Tolerances: Comply with ANSI A190.1, unless otherwise agreed to between purchaser and manufacturer.
		3. Fire-Resistance Ratings: Where the Contract Documents require specific glulam beams fire-resistance rating, modify lamination layup as specified in ANSI 117 and mark accordingly.
		4. Shop fabricate and install hardware connections including cutting to length and milling to receive custom welded steel connectors or pre-engineered connectors.
			1. Finish exposed surfaces of glulam to specified appearance classifications provided in ANSI A190.1.
		5. End-Cut Shop Sealing: After end cutting each member to final length, and prior to installing any hardware, apply shop sealer to ends and other cut or milled surfaces.
		6. Shop Sealer: Apply shop sealer on surfaces of each member after manufacturing and repairs for the specified architectural classification performed.
		7. Fabricate glulam members specified to be preservative-treated prior to treatment.
			1. Do not apply shop sealer to members that are treated.
			2. Do not install metal fasteners or hardware until after treatment.
			3. Where fabrication must be done after treatment, apply a preservative treatment on cut surfaces in compliance with AWPA M4.
	1. FABRICATION TOLERANCES.
		1. Cutting, Drilling, and Hardware Installation:
			1. Glulam tolerances for length, width, depth and straightness to comply with ANSI A190.1.
			2. Holes, daps, and cuts true within tolerances specified. Fabrication to permit assembly of connecting parts.
			3. Fabricate to a plus or minus 1/8 inch (3.18 mm) location tolerance from theoretical.
		2. Trim ends square within 1/16 inch (1.59 mm) per foot of depth and width.
			1. Variations in tolerances allowed when approved by Architect in writing.
1. EXECUTION
	1. EXAMINATION
		1. With installer present, examine substrates in areas to receive structural glulam for compliance with requirements, installation tolerances, and other conditions affecting performance of the Work.
			1. Provide a survey record of the substrates to installer prior to commencement of Work.
		2. Proceed with installation only after unsatisfactory conditions have been corrected.
		3. Verify supports are ready to receive units.
		4. Verify sufficient end bearing.
	2. PREPARATION

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs not required.

* + 1. Coordinate placement of bearing items.
		2. Coordinate placement of support items.
	1. INSTALLATION
		1. Fit members together accurately without trimming, cutting, splicing, or other unauthorized modifications.
		2. Swab and seal interior wood surfaces of field drilled holes with primer.
		3. General:
			1. Erect structural glulam true and plumb and with uniform, close-fitting joints.
			2. Provide firm and uniform surface contact at gravity connection compression bearing joints.
			3. Provide temporary bracing and anchorage to maintain lines and levels until permanent supporting members are in place.
			4. Handle and temporarily support glulam to prevent surface damage, compression, and other effects that might interfere with indicated finish.
		4. Site cutting or boring of glulam, other than shown on shop drawings, is not permitted without written approval of Architect.
		5. Timber Connectors:
			1. Install in accordance with manufacturer's written instructions.
			2. Install bolts with same orientation within each connection and in similar connections.
		6. Provide gap or moisture barrier where glulam abuts concrete or masonry construction.
		7. Where preservative-treated members must be cut during erection, apply a field-treatment preservative to comply with AWPA M4.
		8. Mark members for identification during erection.
			1. For members exposed to view, ensure marks are concealed in final assembly.
			2. Clearly mark top surface.
	2. TOLERANCES
		1. At interfaces where glulam is supported by other structure, tolerance requirements are as follows:
			1. Concrete: Anchor bolt and embed tolerances in accordance with ACI 117.
			2. Masonry: Anchor bolt and embed tolerances in accordance with TMS 402/602.
			3. Steel: Steel framing erection tolerances in accordance with AISC 303.
		2. Joint at Glulam Beam Ends to Face of Supporting Glulam Beams and Columns: Gap tolerance at time of installation minus 0-inch to plus 3/16 inch (4.77 mm).
		3. Columns:
			1. Plumbness: 0.20 percent of column height (1:500) maximum deviation from plumb between floors or roof.
			2. Position: Plus or minus 3/8 inch (9.53 mm) from theoretical at base in both plan directions.
			3. Column Base Plate Tolerance: At concrete interfaces in accordance with AISC 303.
		4. Beams:
			1. Elevation: Plus or minus 3/8 inch (9.53 mm) relative elevation between each end.
		5. Plan Position: Plus or minus 3/16 inch (4.77 mm) from theoretical at each end.
	3. FIELD FINISHES
		1. Reference Division 09 Painting, Staining and Transparent Finishing Sections.
	4. ADJUSTING
		1. Repair damaged surfaces and finishes after completion of erection. Replace damaged, warped, split, or poor fitting members at joints.
	5. PROTECTION

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs not required.

* + 1. Remove wrappings at appropriate stage of construction and in accordance with manufacturer's written instructions.
		2. Remove wrappings at appropriate stage of construction in accordance with submitted Weather and Moisture Protection Plan and in accordance with manufacturer's written instructions.

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs not required.

* + 1. Comply with APA R540 and manufacturer's written instructions for storage and protection prior to installation.
		2. Comply with submitted Weather and Moisture Protection Plan and APA R540 and manufacturer's written instructions for storage and protection prior to installation.
		3. Slit underside of wrapping to prevent accumulation of moisture inside wrapping.

END OF SECTION