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ACQUISITION,
TECHNOLOGY,
AND LOGISTICS

APR 27 2017

The Honorable Charles W. Dent
Chairman, Subcommittee on Military Construction,
Veterans Affairs, and Related Agencies
Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

House Report 114-497, to accompany H.R. 4974, of the Military Construction, Veterans Affairs, and Related Agencies Appropriations Bill for Fiscal Year 2017, requests that the Secretary of Defense study the economic viability of using cross-laminated timber (CLT) in future Department of Defense facilities and to determine if any Fiscal Year (FY) 2017 or FY 2018 project could be used as a demonstration project. Enclosures 1 and 2 provide this information.

The Department recognizes that CLT can significantly improve sustainability and shorten construction duration compared with conventional construction, but is less certain about its cost and availability in the current construction market. The Air Force will invite prospective designers to consider CLT as part of the contract solicitation for two FY 2017 projects. In support of this, the Department has recently published a Unified Facilities Guide Specification (UFGS) for CLT (UFGS 06 17 19) that will enable designers to readily access our performance requirements.

This report cost the Department an estimated \$7,700 for the 2017 Fiscal Year. Thank you for your support of the Department's military construction program.

Sincerely,

A handwritten signature in black ink, appearing to read "J MacStravic", is located below the "Sincerely," text.

James A. MacStravic
Performing the Duties of the
Under Secretary of Defense
for Acquisition, Technology,
and Logistics

Enclosures:
As stated

cc:
The Honorable Debbie Wasserman Schultz
Ranking Member

Assessment of Economic Viability of the Use of Cross-Laminated Timber in DoD Facilities

Background:

1. Current industry codes and design standards
 - a. The 2015 International Building Code (IBC) (paragraph 602.4) classifies Cross-Laminated Timber (CLT) as Type IV construction and no different than traditional timber construction. The International Code Council is reconsidering the current height limitations for wood (6 stories) to allow taller CLT structures as part of the 2018-2021 code review and update cycle.
 - b. Basic CLT design methods have been incorporated into the latest edition of the National Design Specification for wood construction by the American Wood Council.
 - c. Seismic design standards (American Society of Civil Engineers (ASCE) standard 7-10) do not yet include values for CLT. However, the U.S. Forest Service is collaborating with Oregon State University in researching CLT seismic performance, and submitting results for incorporation into future standards (target: 2020-2021).
 - d. The State of Oregon has issued Statewide Alternative Method 15-1, "Cross-Laminated Timber Provisions," for code compliance in their state, which includes preliminary seismic design criteria as a supplement to the ASCE 7-10 standard:
http://www.cbs.state.or.us/bcd/programs/structural/alt_methods/15-01_Cross_Laminated_Timber_SAM.pdf
2. Current Department of Defense (DoD) status
 - a. The U.S. Army Corps of Engineers (USACE) published a "TechNote" on CLT describing the technical details of this new technology as an attachment to Engineering and Construction Bulletin 2016-2: https://www.wbdg.org/ccb/ARMYCOE/COEECB/ecb_2016_2.pdf
 - b. USACE conducted blast testing of CLT panels to determine anti-terrorism protective characteristics and developed a DoD Unified Facilities Guide Specification (06 17 19) for CLT, published in November 2016.
 - c. The privatized asset manager for Army lodging constructed a four-story Candlewood Suites hotel at Redstone Arsenal, Alabama, using CLT. As the largest and tallest CLT structure in the U.S., it was built in less than two-thirds the time needed for conventional construction, and meets DoD standards for progressive collapse and blast resistance.

Assessment:

1. CLT is more expensive than "stick-built" wood stud construction, but slightly less than concrete/steel. It is potentially economical within the current building code (2015 IBC) where Type IV construction is allowed, and where additional stiffness and mass (compared with traditional wood) is desirable.

Assessment of Economic Viability of Cross-Laminated Timber (CLT) in DoD Facilities

2. The largest impediment to the use of CLT in military construction is the same for the private sector: the lack of building code acceptance and design criteria. In the interim, there are processes that allow for waivers to current codes/standards on a case-by-case basis. However, this requires solid justification and compelling evidence to assure that CLT will achieve an “equivalent” level of safety.

3. A lack of domestic suppliers also restricts the use of CLT. This will likely improve in the next year when one or two more domestic suppliers come on line.

ENCLOSURE 1

Department of Defense Candidate Projects for Demonstrating Cross-Laminated Timber Technology

Given the lack of industry experience with Cross-Laminated Timber (CLT) in the United States, a CLT demonstration project may provide benefits to the Department of Defense (DoD) by testing the technology in a domestic application with a domestic supplier. DoD Components were asked to assess Fiscal Year (FY) 2017 and FY 2018 projects against the following criteria and identify suitable candidate projects:

Criteria for evaluating candidate projects

- (Required) Project is planned for FY 2017 or FY 2018 authorization.
- (Required) Project for which International Building Code (IBC) 2015 allows Type IV construction.
- (Desirable) Project requires or would benefit from additional stiffness, durability, and protection compared to traditional wood or light-gauge steel construction.
- (Desirable) Project is located near a lumber-producing region of the U.S.
- (Desirable) Facility is planned to be in the mid-rise range (4-6 stories in height).

Desired results from demonstration projects

- Data on cost and schedule performance of supplier and general contractor versus traditional construction.
- Experience with contract supervision and administration effort versus traditional construction.
- Understanding of short-term quality issues or benefits.

DoD has identified two candidate military construction projects, both from the Air Force, where the use of CLT technology is a viable option. The DD Form 1391 for each project is attached.

FY	Project Number	Installation	Project Title	Amount (\$000)	Design / Const Agent
2017	MHMOV103108	Kirtland AFB, NM	CRH Simulator	\$ 7,300	Army Corps of Engineers
2017*	PNQS072140	Maxwell AFB, AL	Judge Advocate General School Expansion	\$ 15,500	Army Corps of Engineers

* Project was programmed for FY 2018 in the FYs 2017-2021 PB FYDP, but being considered for execution as part of the FY 2017 Unfunded Priority List.

Department of Defense Candidate Projects for Demonstrating Cross-Laminated Timber Technology

The solicitation for the design of these projects will indicate the Department's interest in demonstrating CLT technology, and will invite prospective designers to consider its use in developing their proposals. Should any designer submit a CLT proposal, the Department will evaluate it against the project selection criteria which includes consideration for life-cycle cost effectiveness. The Department's intent is to clearly invite consideration of CLT as a new technology without mandating its use.

Attachments:

Air Force DD Form 1391s

ENCLOSURE 2

1. COMPONENT AIR FORCE	FY 2017 MILITARY CONSTRUCTION PROJECT DATA (computer generated)			2. DATE
3. INSTALLATION, SITE AND LOCATION KIRTLAND AIR FORCE BASE KIRTLAND SITE # 1 NEW MEXICO		4. PROJECT TITLE COMBAT RESCUE HELICOPTER (CRH) SIMULATOR		
5. PROGRAM ELEMENT 27229	6. CATEGORY CODE 171-212	7. RPSUID/PROJECT NUMBER 2445/MMMV103108	8. PROJECT COST (\$000) 7,300	
9. COST ESTIMATES				
ITEM	U/M	QUANTITY	UNIT	COST (\$000)
PRIMARY FACILITIES				4,120
FLIGHT SIMULATOR (171-212)	SM	902	4,478	(4,039)
SUSTAINABILITY & ENERGY MEASURES	LS			(81)
SUPPORTING FACILITIES				2,166
UTILITIES	LS			(980)
PAVEMENTS	LS			(285)
SITE IMPROVEMENTS	LS			(124)
COMMUNICATIONS SUPPORT	LS			(737)
DEMOLITION	LS			(40)
SUBTOTAL				6,286
CONTINGENCY (5.0%)				314
TOTAL CONTRACT COST				6,600
SUPERVISION, INSPECTION AND OVERHEAD (5.7%)				376
DESIGN/BUILD - DESIGN COST (4.0% OF SUBTOTAL)				251
TOTAL REQUEST				7,228
TOTAL REQUEST (ROUNDED)				7,300)
EQUIPMENT FROM OTHER APPROPRIATIONS (NON-ADD)				(31,000
10. Description of Proposed Construction: High bay simulator with foundation, floors, walls, and roof to match general appearance and character of existing facility. Include one 60' X 60' high-bay simulator room, restrooms, mechanical room, image generator room, office, and multi-purpose rooms to accommodate meeting, educational, and briefing functions. Work will include site preparation, seismic provisions, communications support, secure communications trench, classified and unclassified areas, plumbing, electrical, HVAC and fire protection systems, landscaping, storm drainage and all supporting utilities. Due to substandard soil conditions, over-excavation and special foundations will be required. An existing generator enclosure is to be demolished as part of the project, as well as the relocation of two electrical transformers. Facilities will be designed as permanent construction in accordance with DoD Unified Facilities Criteria (UFC) 1-200-01, General Building Requirements, and UFC 1-200-02, High Performance and Sustainable Building Requirements. This project will comply with DoD antiterrorism/force protection requirements per UFC 4-101-01. Air Conditioning: 300 Tons				
11. Requirement: 902 SM Adequate: 0 SM Substandard: 0 SM <u>PROJECT:</u> Construct CRH Full Motion Simulator Facility (New Mission). <u>REQUIREMENT:</u> Adequate space is required to install and operate an HH-60W flight simulator to train Combat Rescue Helicopter (CRH) personnel as part of the forthcoming aircraft replacement. The facility will house the HH-60W simulator				

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<p>that provides realistic training and accurately portrays the Mission Design Series (MDS) to train and increase readiness of CRH flight crews.</p> <p><u>CURRENT SITUATION:</u> There are currently no facilities at Kirtland AFB to house the new simulator and HH-60M training requirements. The current HH-60G flight simulator facility must continue to operate until the HH-60W completely replaces legacy aircraft. As existing HH-60G aircraft and simulators are phased out, additional HH-60W simulators will replace them.</p> <p><u>IMPACT IF NOT PROVIDED:</u> There are no workarounds in lieu of constructing a new facility. Without this project, students will not be provided the critical training required to fly the new HH-60W aircraft. New flight simulators will be delivered without a facility to house them, and these costly and sensitive devices will have to be stored at government expense.</p> <p><u>ADDITIONAL:</u> This project meets the criteria/scope specified in Air Force Manual 32-1084, "Facility Requirements". A preliminary analysis of reasonable options for accomplishing this project (status quo, renovation, new construction) indicated there is only one option that will meet operational requirements: new construction. A certificate of exception is being prepared. Base Civil Engineer: (505) 846-7911. HH-60 Simulator Facility: 902 SM = 9,709 SF</p> <p><u>JOINT USE CERTIFICATION:</u> This facility can be used by other components on an "as available" basis; however, the scope of the project is based on Air Force requirements.</p>				

1. COMPONENT AIR FORCE	FY 2017 MILITARY CONSTRUCTION PROJECT DATA (computer generated)			2. DATE	
3. INSTALLATION, SITE AND LOCATION MAXWELL AIR FORCE BASE MAXWELL APB SITE # 1 ALABAMA		4. PROJECT TITLE JAG SCHOOL EXPANSION			
5. PROGRAM ELEMENT 85976	6. CATEGORY CODE 171-851	7. RPSUID/PROJECT NUMBER 2777/PNQS072140	8. PROJECT COST (\$000) 15,500		
9. COST ESTIMATES					
ITEM		U/M	QUANTITY	UNIT	COST (\$000)
PRIMARY FACILITIES					11,287
ADD TO JAG SCHOOL, BUILDING 649		SM	3,774	2,932	(11,065)
SUSTAINABILITY & ENERGY MEASURES		LS			(221)
SUPPORTING FACILITIES					2,895
UTILITIES		LS			(396)
PAVEMENTS		LS			(1,342)
SITE IMPROVEMENTS		LS			(965)
COMMUNICATIONS		LS			(192)
SUBTOTAL					14,182
CONTINGENCY (5.0%)					709
TOTAL CONTRACT COST					14,891
SUPERVISION, INSPECTION AND OVERHEAD (5.7%)					849
TOTAL REQUEST					15,740
TOTAL REQUEST (ROUNDED)					15,500
EQUIPMENT FROM OTHER APPROPRIATIONS (NON-ADD)					(4,000.0)
10. Description of Proposed Construction: A two-story facility, constructed with reinforced concrete foundation and floor slabs, structural steel frame, masonry walls and sloped architecturally compatible roof. Project includes front office/lobby, administrative offices, instructor offices, classrooms, auditoriums, refreshment areas and lounge, audio/visual equipment, elevator, storage areas, site improvements, extended utilities and all necessary support. Facilities will be designed as permanent construction in accordance with the DoD Unified Facilities Criteria (UFC) 1-200-01, General Building Requirements and UFC 1-200-02, High Performance and Sustainable Building Requirements. This project will comply with DoD antiterrorism/force protection requirements per UFC 4-101-01.					
11. Requirement: 9059 SM Adequate: 5285 SM Substandard: 0 SM PROJECT: JAG School Expansion (Current Mission) REQUIREMENT: A facility of adequate size and configuration to accommodate a dynamic educational institution of law serving the Air Force JAG Corps and future Air Force leaders. A new facility will provide needed office space for the increase in instructor and support personnel, adequate storage space, a new auditorium, technical space for distance education initiatives, and sufficiently large instruction space for paralegal apprentice courses to meet critical needs. CURRENT SITUATION: Bldg 694 (existing JAG facility) was constructed in 1993. Supplementing the standard instruction (30 courses in 43 offerings; in session 50 out of 52 weeks annually), JAG teaches selected courses via satellite through AUTV to locations nationwide, conducts monthly internet webcasts highlighting select legal assistance topics, and develops web-based training for non-resident courses.					

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<p>In addition, JAG provides instruction to approximately 12,000 students annually at Air University (AU) Schools. JAG School also assumed the Paralegal School mission from Keesler AFB soon after opening, to include 6 Paralegal Apprentice and 3 Paralegal Craftsmen courses annually. Several seminar rooms were converted into office space for paralegal instructors and staff. Currently, Paralegal Apprentice course classes have to be split into two groups taught concurrently in smaller rooms, requiring an additional instructor that would otherwise be unneeded. In March 2006, the Air Force Chief of Staff (CSAF) approved and directed the implementation of JAG Corps 21 (JAGC21). This initiative resulted in the complete reorganization of the JAG School, expanded the scope of its core mission and has authorized an additional 33 manpower positions to date. The JAG School and the Legal Information Services Directorate (JAS) were originally co-located within Bldg 694 from 1993-2008. However, because of the JAGC21 reorganization initiative, JAS was required to relocate to Bldg 678. JAS is authorized a staff of 45 military and civilian employees; JAG School is authorized 65 military and civilian employees. In addition, each organization employs as many as 6-10 reserve Judge Advocates and paralegals at any one time throughout the year. The original JAG School design was based on a normal maximum student load of 90-100 students in class at any time, now JAGC21 will increase that to a maximum student load of 299. Because of this mission increase, JAG has been working in a space deficit for many years.</p> <p>IMPACT IF NOT PROVIDED: The premise that AU is the Intellectual and Leadership Center for the Air Force will suffer because the existing facility, with its space limitations, will not be able to provide adequate support to current and increased mission requirements under the JAGC21 initiative. The JAG School will remain functionally substandard for the JAG commitment to AU students at Maxwell or elsewhere. The fact that JAS is physically separated from the JAG School has a distinct, identifiable negative impact on the AF JAG Corps education and training mission. The concept of collocating JAS and the JAG School dates back more than 20 years. It also creates a center of excellence for the JAG Corps through abundant opportunities to improve all aspects of training and education within the JAG Corps as a whole. The impact of not providing this opportunity to collocate again simply means that the JAG School and JAS will remain functionally substandard for the JAG commitment to its mission to AU and the AF in general.</p> <p>ADDITIONAL: This project meets the criteria/scope specified in Air Force Handbook 32-1084, "Facility Requirements." An economic analysis was performed comparing the alternatives of status quo, new construction and an addition to the existing JAG School facility (this request). This analysis identified an addition to the existing JAG facility as the most economical option which meets mission requirements. Base Civil Engineer: 334-953-3544. JAG School Expansion: 3,774 SM = 40,623 SF.</p> <p>JOINT USE CERTIFICATION: This facility can be used by other components on an "as available" basis, however, the scope of the project is based on Air Force requirements.</p>				