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Requirements Analysis and Conceptual Design of a Fort Bragg Deployment Complex

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Abstract: A critical component of the US Security Strategy is maintaining the capability to rapidly project military power across the globe through Army installations referred to as Power Projection Platforms. Fort Bragg, North Carolina is designated as an Army PPP and maintains critical infrastructure to facilitate the rapid deployment of personnel and equipment in support of the national military strategy. However, Fort Bragg does not currently have a functioning, centralized deployment center. In this research we apply the system decision making process to identify critical capabilities, functions, requirements, and a conceptual design for a Fort Bragg deployment center. This center will provide deploying units the capability to conduct parallel planning, centralized command and control, and final soldier and equipment preparation in a designated secure facility. The presented conceptual design increases coordination and control, time to conduct mission planning and synchronization, and facilitates critical mission preparation while reducing unnecessary travel and movement.

Keywords: Deployment Infrastructure, Global Response Force, Rapid Deployment

1. Introduction

A critical component of the US National Security Strategy is maintaining the capability to rapidly project military power across the globe. In support of this capability, the Department of Defense resources and maintains numerous military installations, referred to as power projection platforms (PPP). A PPP is an Army installation that strategically deploys one or more high priority combat units. Installations designated as PPP are prioritized and resourced to perform power projection functions in conjunction with designated strategic sea and aerial ports in support of the national military strategy. There are 15 designated Army power projection platforms within the continental United States (CONUS), in addition to two Marine Corps installations that perform a similar function. Fort Bragg, North Carolina is designated as an Army PPP and maintains critical infrastructure to facilitate the rapid deployment of personnel and equipment. Fort Bragg is home to more than 45,000 deployable soldiers and over 250 combat units – including the 82nd Airborne Division.

The 82nd Airborne Division (82nd) serves as the Army's strategic immediate response force (IRF). The IRF is tasked to rapidly deploy and conduct forcible entry to gain access for military operations in support of US national interests (Joint Readiness Standing Operating Procedures, 2015). The 82nd must be able to rapidly assemble and deploy combat power anywhere in the world within 18 hours. Within this 18-hour period, the IRF is expected to conduct mission planning, final personnel and equipment preparation, mission preparation and rehearsals, and issue of mission essential supplies or equipment. These activities are currently conducted in unit areas and across the Fort Bragg installation. Fort Bragg does not have a secure, centralized location to conduct these critical pre-deployment activities. The lack of a centralized location for units to assemble and prepare for rapid deployment creates inefficiencies in the outload process, reduces time for mission planning, and causes unnecessary movement.

The systems decision-making process is used to identify critical capabilities, functions, requirements, and a conceptual design for a Fort Bragg deployment complex. The proposed conceptual design is not comprehensive, detailed design; however, it contains essential functional requirements that will aid in the ultimate design and construction of a fully designed facility. This facility will provide deploying units with the capability to conduct parallel planning, centralized command and control, and final soldier and equipment preparation in a designated secure facility.

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Literature Review

Army Field Manual 3-35 details Army doctrine and procedures for force projection, deployment, and redeployment. This foundational reference also highlights activities units engage in prior to being alerted for deployment, the procedures involved in the movement of units from home station to the port of embarkation, and reception, staging, onward movement, and integration (RSOI) (Army Deployment and Redeployment, 2010). There are numerous military deployment-related studies and research in the literature. Immediate Response Force (IRF) readiness and deployment training has been the focus of frequent study and analysis. Several studies examine the condition and adequacy of infrastructure to support deployment activities. Other analysis is focused on improving the efficiency of deployment processes.

The IRF, based out of Fort Bragg, retains a key role in military force projection capability. The competitive edge that the IRF provides the National Command Authority is its speed. The IRF is designed to be anywhere in the world within hours of notification. Several studies have identified actions that the IRF should consider in increasing its readiness and efficiency in order to successfully execute their mission when called upon. In 2016, the RAND corporation conducted a study under the commission of the 82nd to evaluate IRF capabilities. RAND recommended that the IRF execute realistic training scenarios that test key functions of the IRF required during the deployment process. RAND identified the outload process as one of the key deployment functions that should be validated through training exercises (Pernin, 2016). In 2017, the Government Accountability Office (GAO) conducted a study on the challenges surrounding the IRF and implications for the Department of Defense. The study concluded that while components of the IRF conduct exercises on an individual basis, the IRF currently lacks Joint Force integrated exercises. In response to this finding, the GAO recommended that the IRF conduct higher echelon, joint task force exercises in order to increase readiness for a diverse mission set (Russell, 2017). These studies highlight the need for joint training exercises and deployment process training, in addition to appropriate supporting infrastructure to conduct successful IRF mobilizations.

Power projection platforms must possess and maintain adequate infrastructure to support air movement, rail movement, ground movement, equipment staging and preparation, mission essential equipment storage and issue as well as adequate transportation to move soldiers and equipment to key deployment outload nodes. A recent Army Corps of Engineers study on the impact of climate change on deployment infrastructure highlights three attributes of deployment infrastructure. These critical attributes are air deployment infrastructure, surface deployment infrastructure, and deployment support infrastructure (Myers et al., 2017). In 2017, Surface Deployment and Distribution Command Transportation Engineering Agency (SDDCTEA) conducted a site visit to Fort Bragg to assess the Fort Bragg's rail deployment and supporting infrastructure capabilities. SDDCTEA recommended that Fort Bragg upgrade rail infrastructure to provide the capacity to stage both inbound and outbound unit trains, support loading vehicles on all tracks, and enable loading of containers onto railcars (King, 2017). SDDCTEA also conducted an analysis to compare Fort Bragg air deployment requirements to the existing outload capability in 2018. They recommended that Fort Bragg construct an air-specific marshaling and staging area (MASA), expand the Division Ready Cage (DRC) to accommodate storage of additional pre-rigged emergency contingency items, and perform road maintenance to rehabilitate the pavement condition near the airfield and Green Ramp (King, 2018). Recently, an installation-wide working group was established at Fort Bragg to critically examine all deployment outload nodes and facilities. They identified improvements or new capabilities required to match outload node requirements with deployment requirements. The working group recommended construction of a deployment complex near the airfield (Fort Bragg Outload Node Area Development Plan Workshop Summary, 2019). In February 2020, a follow-on working group met to identify the specific requirements for a deployment complex. This group specified that a strategic deployment complex must provide a Brigade-sized headquarters space enabled with Non-secure Internet Protocol Router (NIPR), Secure Internet Protocol Routing (SIPR), Secure Video Tele-Conference (SVTC), and Joint mission command platform interoperability. Included with this HQ space should be three multi-use facilities that can accommodate 200-250 personnel. Additionally, the complex should provide 10 BN sized HQs with NIPR, SIPR, and Joint Force system compatibility. The deployment complex must also have a centralized command room to control facility management, intercom, and mission command system network infrastructure (Outload Node WG Summaries v4.1, 2020). The information provided by these working group documents provide useful insights into desired capabilities, functions, and requirements for a Fort Bragg deployment complex.

2. Methodology

2.1 Approach

A tailored application of the systems decision process (SDP) was used to generate and evaluate conceptual design alternatives for a Fort Bragg deployment complex (Figure 1). First, extensive stakeholder analysis was conducted to identify critical functions and requirements for the complex. Then, functional analysis and value modeling were performed to identify measures that reflect elements of importance to the stakeholders. Alternative concepts were then generated, analyzed, and compared. After identification of a preferred concept, a facility layout schematic was developed to depict the recommended facility footprint. Lastly, a specification document was created as a deliverable that Fort Bragg could use as a baseline for charette design and request for proposal development.

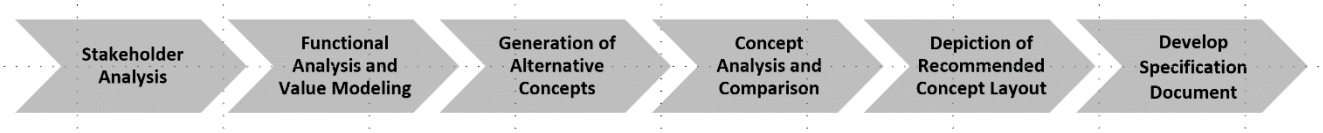

Figure 1. Graphical Representation of the Tailored System Decision Process (SDP)

2.2 Stakeholder Analysis

Stakeholder analysis was conducted to ensure the final solution is aligned with and achieves the fundamental objective of the client. Stakeholder analysis facilitates identification of the people and organizations relevant to the problem, helps determine their needs, wants, and desires, and aids in developing a better understanding of the problem. Stakeholders for this effort include: Fort Bragg deploying units, outload support units, operations officers, intelligence officers, logistics and support units, communication specialists, facility development and maintenance organizations, and 82nd Airborne Division senior leadership. Interviews with these stakeholders revealed several common themes:

- Mission planning and preparation are the most important concerns of the stakeholders.
- The facility should be equipped with appropriate computer, video, and audio equipment to facilitate command and control, parallel planning, and synchronization.
- Security for the units and equipment is necessary.
- Flexible, multi-use structures are desired.
- Stakeholders desired a capability to temporarily store and issue various classes of supply.
- The facility must provide basic life support for deploying soldiers.
- The location of the deployment complex needs to be proximal to Green Ramp.

2.3 Problem Statement

During the stakeholder analysis process, critical information was collected in order to refine the problem statement and determine the system's necessary functions. The refined problem statement is: **Develop a deployment complex conceptual design that supports consolidated, secure, coordinated, parallel planning and mission preparation for deploying Fort Bragg units.**

2.4 Functional Analysis and Value Modeling

After carefully analyzing stakeholders needs, wants, and desires, four top-tier functions were identified (Figure 2). For the system to achieve the fundamental objective, the complex must support command and control operations, the preparation for mission requirements, house and support personnel, and secure units and equipment. Each top-level function was subsequently broken down into multiple sub-functions in order to more precisely articulate the scope of the facility and its functions. The top-level functions are the basis for determining essential facility infrastructure elements.

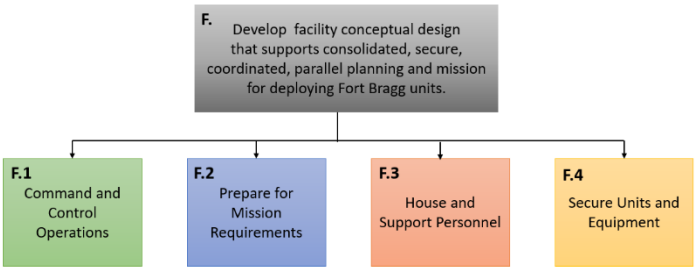

Figure 2. Top-level Functions Required of a Fort Bragg Deployment Complex

Value measures are key metrics that can be used to compare and evaluate design alternatives. These metrics quantify the level of performance of the system in relation to the top-level functions and supporting objectives. Value measures for a Fort Bragg deployment complex are outlined in Table 1. As an example, value measures that support coordinated, parallel planning include a subjective measure of information transfer (more is better) and distance between planning cells (less is better).

Table 1. Value Measures for a Fort Bragg Deployment Complex

1.0: Conduct coordinated, parallel mission planning	Information Transfer (1-10) Distance between planning cells (ft)	More is better Less is better
2.0: Provide secure audio and visual capability	Resource Variety and Availability (#) Network and Device Security (#) Tasked Personnel for Maintenance (#) Upkeep Frequency (#)	More is better More is better Less is better Less is better
3.0: Command and control operations	Communication Lag (minutes) Dissemination (%)	Less is better More is better
4.0: Prepare for mission requirements	Mission Preparation Facilitated (1-10)	More is better
5.0: House personnel and equipment	Fixed Infrastructure (%) Dual-Purpose Space (%) Congestion (#/sq ft)	Less is better More is better Less is better
6.0: Secure units and equipment	Secure Unit Storage Space (cu ft) Personnel and Equipment Needed to Secure Equipment (#)	More is better Less is better
7.0: Store and issue required supplies and equipment	Distance traveled (mi)	Less is better

3. Concept Generation and Selection

3.1 Conceptual Design Alternatives

The identification and refinement of the system's functions and value measures prompted the conceptual design process, where concepts were generated aimed at satisfying system functions. The first consideration in the conceptual design process was determining the structure type(s) of the facility, being single or multi story, permanent, temporary, or pre-engineered. Other considerations for conceptual design generation included the locations of the storage/IIA, MASA, and the type of life support inside the facility. Performance and schedule were used as measures to evaluate alternatives consisting of different combinations of functional concepts. In this case, performance is defined as the ability to achieve all necessary functions, and schedule is measured in construction time. Each concept was placed into a Zwicky's morphological analysis to generate alternatives. The alternatives were then ranked based on the essential values agreed upon by the stakeholders. Following the comparison of all alternatives, the most desirable solution consisted of a two-story permanent structure.

3.2 Recommended Conceptual Design

Based on the performance and schedule criteria, the proposed facility consists of a two-story, permanent mission planning and command and control structure equipped with adequate planning space and technology to support an out-loading brigade, in addition to the integration of the Outload Support Battalion, Air Force, and any other necessary joint force considerations. Additionally, eight pre-engineered structures will surround the centrally located planning building in order to house and support the out-loading brigade, equipped with temporary life support capabilities. Adjacent to these structures will be two more temporary structures; one for the IIA and one for a maintenance hangar. Adjacent to the maintenance hangar will be space for the motor pool and maintenance bay. Additionally, a permanent storage structure, partitioned in eight sections to support multiple storage specifications for a variety of classes of supply, will be located on the edge of the complex, accessible by road and equipped with adequate loading docks. The entire complex will be surrounded by a fence and have multiple controlled access points with roads traversing through the complex in order to increase throughput of transportation and decrease travel time.

3.3 Preliminary Design Depiction

Figure 3 depicts the layout of the proposed Fort Bragg deployment complex. The proposed facility conceptual design incorporates aspects of other current Army installations, such as the Mission Training Complex at Ft. Bragg, Aviano Air Base a Vicenza, Italy, and the National Training Center at Ft. Irwin. The recommended deployment complex includes six flexible, multi-use open bays, a mission planning and command & control facility (MPC2), an 8-bay storage facility for temporary storage and issue of supplies, a small motor pool, a personally owned vehicle (POV) storage area, and three pole barns. The MPC2 facility (not pictured) is a two-story permanent structure that consists of ten reconfigurable mission planning modules (including a sensitive compartmentalized information facility –SCIF), a small auditorium, three executive conference rooms, eight small meeting rooms, and eight tactical operations centers. The proposed MPC2 will facilitate IRF coordinated parallel planning and synchronization in a secure, isolated location. The MPC2 maximizes information transfer and coordination and minimizes the distance between planning cells.

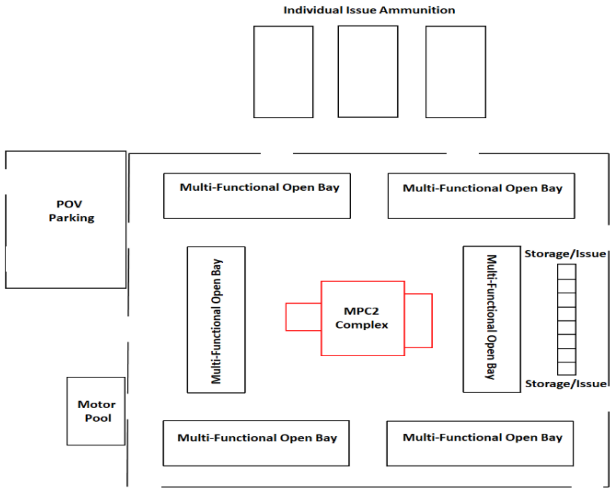

Figure 3. Fort Bragg Deployment Complex

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4. Design Specification

Each structure in Figure 3a supports one or more functions presented in Table 2. Fort Bragg facility planners require detailed specifications that can be used for charette design and request for proposal development. Detailed specifications were documented for each facility within the Fort Bragg deployment complex. For brevity, only the specifications for the MPC2 facility are highlighted in Table 2.

Table 2. Facility Functions and Top-Level Specifications

Function	Facility	Specifications
1.0 Support Coordinated, Parallel Mission Planning	Mission Planning and Command & Control	1.1 The MPC2 shall provide a Brigade planning area and a Brigade TOC for C^2 1.1.2 The Brigade planning area shall consist of three multi-use facilities that can accommodate up to 200-250 personnel. 1.1.3 The Brigade planning area shall have secure servers and computers pre-configured with secure mission planning software, NIPR/SIPR capabilities, SVTC and Joint Mission Command platform interoperability. 1.2 The MPC2 shall provide ten reconfigurable battalion-sized planning modules. 1.2.1 Each battalion-sized planning module shall 1.3 The MPC2 shall have a sensitive compartmentalized information facility (SCIF)

5. Conclusion and Discussion

The application of the system decision process (SDP) allowed for a detailed analysis of the problem, stakeholder considerations, and system design. Fort Bragg's need for a centralized deployment complex to better support the Global Response Force's mission was satisfied through the final design. The proposed design combination of both permanent and temporary structures enables Fort Bragg to meet their mission requirements in a manner that is cost and time effective, while maintaining a high level of performance. The proposed solution enables the out-loading brigade to conduct coordinated, parallel planning and mission preparation in isolation with enhanced efficiency from the current outload process. A centralized planning facility, equipped with an increased number of secure devices, accelerates the planning process, giving more time back to lower echelons, thus increasing overall mission preparedness on the short GRF timeline. Furthermore, increased efficiency due to proximity decreases the burden on the outload support units, in addition to Soldiers themselves and allows for heightened flexibility of the deploying unit in the face of changing circumstances and mission requirements.

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