

Construction Photo Documentation Standards

1.1 SUMMARY

- A. Section Includes:
 - 1. Scopes of Work
 - 2. Photographic documentation.
 - 3. Task Manager
 - 4. Video documentation.
 - 5. Owner training videos.
 - 6. Construction webcam.
 - 7. UAV Services.
 - 8. 3D Laser Scanning
- B. Related Requirements:
 - 1. Preliminary Project Schedule
 - 2. Demonstration and Training

1.2 DEFINITIONS

- A. Client: Clemson University
- B. Cloud System: Internet-based hosting and storage of photographic and video documentation.
- C. Key Plan/Indexing System: Digitized drawings of the Project, including an indexing system for photographic documentation which shows location and direction of each captured image, including cloud-based hosting and storage.
- D. Months of Documentation Services: Duration of services.
- E. Vendor: Provider of photographic and video documentation services specified in this Section.
- F. Web-Based Management Portal: The software used to access the information in the Cloud System, from desktop computers and from mobile smartphone applications (unless otherwise specified), using a similar navigation structure. A singular secure web application shall be used which incorporates access to all reality capture information provided.

1.3 SCOPE OF WORK

- A. For New Construction, the following documentation will be performed:
 - 1. Existing Conditions Survey
 - 2. Exterior Progressions + UAV
 - 3. 360 Interior Progressions
 - 4. Site & Utility UAV Mapping (underground utility installations)
 - 5. Pre-Slab As-Built (in-slab conditions)
 - 6. MEP As-Built in-wall / above ceiling conditions)
 - 7. Elevation As-Built (waterproofing conditions)
 - 8. 360 Finished Walk-Through

- 9. Owner Training Videos
- B. For Interior Renovations, the following documentation will be performed:
 - 1. Existing Conditions Survey
 - 2. 360 Interior Progressions
 - 3. MEP As-Built
 - 4. 360 Finished Walk-Through
 - 5. Owner Training Videos
- C. For Utility and Infrastructure Improvements, the following documentation will be performed:
 - 1. Existing Conditions Survey
 - 2. Site Progressions + UAV
 - 3. Site & Utility UAV Mapping (underground utility installations)
 - 4. Owner Training Videos
- D. For Existing Conditions Assessment, the following documentation will be performed:
 - 1. UAV Site Mapping
 - 2. Laser Scanning + As-Built Modeling
 - 3. 360 Walk-Through
 - 4. Above Ceiling Firestopping Assessments
- 1.4 ADMINISTRATIVE REQUIREMENTS
 - A. Coordinate with the Work of other Sections.
 - 1. Document duration of construction, impacting duration of documentation services specified in applicable Scope of Work.
 - 2. Submit photographic and video documentation with project record documents.
 - 3. Coordinate Owner training videos with other aspects of demonstration and training.
 - B. Coordinate to arrange Project access and documentation schedules. Provide regular updates regarding documentation status, availability, and upcoming shoot dates.
- 1.5 PHOTOGRAPHIC AND VIDEO DOCUMENTATION VENDORS
 - A. Provide services from the following, or approved equal:
 - 1. Multivista, Website: <https://info.multivista.com/contact>, Email: info@multivista.com, (888) 811-8477, US Headquarters: 5345 Spring Valley Rd, Dallas, TX 75254
- 1.6 INFORMATIONAL SUBMITTALS
 - A. Submit examples of final product of each type of service.
 - 1. Example construction photographs tied to key plan.
 - 2. Video: Online and mobile app video interface.
 - 3. Hardware Information: Product data or manufacturer's specifications.
 - B. Submit Vendor Qualifications for each type of service specified in this Section including qualifications under "Quality Assurance" specified below and showing experience with each type of photographic and video documentation specified throughout this Section.
- 1.7 QUALITY ASSURANCE
 - A. Vendor Qualifications, General: Specialist (not the General Contractor or Construction Manager), experienced in construction photographic and video documentation for each type of equipment, technology, and service specified, carrying OSHA certifications, related insurance coverage(s), and other certification and clearances required for

operations on the Project site, having a minimum of five years' experience engaged as a professional photographer/videographer of construction projects while using an advanced software platform, indexing system, and navigation interface, and having examples of at least 5 construction projects in the past 2 years of similar type, size, duration and complexity to this Project. Demonstrate the ability to contract through the General Services Administration schedule. Must have a local office within 100 miles of the Project site and be able to respond to site visit requests with qualified personnel within 24 hours of notice. Must respond to service and support requests/inquiries within 24 hours. Submit qualifications upon request.

1. In-House Software Programming And Development Team: Photographic and Video Documenter directly employs in-house software programming and development team to support, maintain, and when needed customize the software platform, online interface, mobile application, and BIM model integration services.
2. Attend Project meetings as required. Participate in any required project safety training.

1.8 PROJECT CONDITIONS

- A. Verification for Photographic and Video Documentation, General:
 1. Verify site conditions are acceptable for documentation work to proceed.
 2. Notify Client of obstructions that impede documentation progress.
 3. Verify necessity for access to neighboring properties and/or buildings, if any.
 - a. Notify Client of required access to neighboring property 7 calendar days prior to proceeding with field work.
 - b. Client to coordinate access with each property.
 4. Do not proceed in conditions that do not allow the visibility of the scope of work, as due to rain, fog, snow, dust, reflectivity, and similar conditions.
 5. Comply with published hardware specifications of environmental conditions.

1.9 PHOTOGRAPHIC AND VIDEO DOCUMENTATION, GENERAL

- A. Single Source: Perform each type of documentation specified in this Section under a single Photographic and Video Documenter's responsibility, who meets the Vendor Qualifications specified in this Section's Quality Assurance Article.
- B. Provide factual presentation. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
- C. Use overlapping photographic techniques to ensure maximum coverage, including 360 degrees of exterior and interior features, where applicable.
- D. Identification for Each Photograph and Video:
 1. Project name.
 2. Orientation in Key Plan.
 3. Date taken.
 4. Name and address of photographer/videographer.
 5. Unique reference number or other identifier.
 6. Name and contact information of Architect and Contractor Available in Web-Based Management Portal.
 7. For Videos: Detailed description of video purpose and chapter titles.
- E. Progress Documentation: Document progress for all trades at pre-determined intervals, but not less than once per month.
 1. Exterior Progress: Document site perimeters and building envelopes during erection. Increase concentration and resolution of photographs to allow greater zoom

- capability for exterior envelope, concentrating on air/weather barriers, openings, roofing, and transitions between each of the aforementioned.
2. Interior Progress: Document interior improvements beginning when partition construction commences and continuing until Project completion.
- F. Milestone Documentation: Document conditions prior to each construction milestone, including but not limited to each of the following:
1. Site Existing Conditions:
 - a. Document site to limits of the Work as indicated on Contract Drawings, and immediately surrounding area.
 2. Facility Existing Conditions:
 - a. Document interior of building once furniture is removed from the space and prior to demolition.
 - b. Document the building pad, adjacent streets, roadways, parkways, driveways, curbs, sidewalks, landscaping, adjacent utilities and adjacent structures surrounding the building pad and site.
 3. Post-Demolition:
 - a. Document site and facility conditions after demolition work.
 4. Underground Utilities:
 - a. Document site utilities prior to backfill.
 - b. Document pre-foundation utilities prior to concealment.
 - c. Underground Utilities must include capture of measurable images utilizing a Leica BLK3D which are also to be indexed and made available within the online floorplans. Measurement tools need to be available online as noted in below sections.
 5. Underslab Plumbing and Electrical Work: Document all underslab plumbing and electrical work prior to backfill and cover.
 6. Below-Grade Waterproofing: Document waterproofing application prior to concealment.
 7. Slab Construction:
 - a. Comprehensive structural record of the horizontal slabs. Include overlapping images of below-slab vapor retarder, forming, reinforcing, roughed-in MEP, cabling systems and other structural components within the building slabs, post-inspection, just prior to the concrete being poured.
 - b. Include utilities enclosed in slab-on-deck in multi-story buildings.
 - c. Slab construction imagery must include capture of measurable images utilizing a Leica BLK3D which are also to be indexed and made available within the online floorplans. Measurement tools need to be available online as noted in below sections.
 8. Facility Services: Document MEP (Mechanical/Electrical/Plumbing), fire protection, cabling, and other facility service rough-ins in every wall and ceiling post-inspection, prior to concealment.
 - a. Documentation of Facility Services must include capture of measurable images utilizing a Leica BLK3D which are also to be indexed and made available within the online floorplans. Measurement tools need to be available online as noted in below sections.
 9. Exterior Air/Weather Barrier: Overlapping photography of the exterior vertical faces of the building prior to cladding.
 10. Roof System: Document roof system(s), accessories, and rooftop equipment.
 11. Phase Completion Documentation (minimum):
 - a. MEP Completion prior to enclosing.
 - b. Utility Installation Completion prior to backfill.
 - c. Any other phases deemed appropriate by University.

12. Substantial Completion Record Documentation: Capture of conditions at Substantial Completion.
 13. Project Completion Record Documentation: Post-inspection, completed condition of:
 - a. Exterior Finished Conditions: Document exterior skin and elevations, flashings, detailing, openings, and other features.
 - b. Interior Finished Conditions: Document walls, ceilings and floors, openings, and other features.
 - c. Site Conditions: Document final grading, site and landscape features.
- G. Permanent Record: Provide offline, digital media copies of final standard photographic, video, and webcam documentation ("The Permanent Record") upon completion of the contract.
1. Permanent Record shall include the underlying software platform, indexing and navigation system, typically as a DVD flash drive or external hard drive. Include one multiple-user license for the underlying software, indexing and navigation for accessing the digital media.
 2. Online access shall terminate upon delivery of the final documentation copies or as otherwise agreed by the Client.
 3. Intellectual property rights associated with the documentation prepared in direct service of the Project shall transfer to the Client, along with the digital media itself.
- H. Additional Types of Documentation: If requested by Client or Client's agent in writing, make proposal for additional documentation not covered in the scope of this Section. Provide such additional documentation if approved by written Change Order.
- I. Additional Duration of Documentation: If duration of Project extends beyond Quantity Allowance for Months of Documentation Services, make proposal for additional duration. Provide such additional duration of documentation if approved by written Change Order.
- 1.10 PHOTOGRAPHIC DOCUMENTATION
- A. Refer to Document 003113.13 - Preliminary Project Schedule for coordinating duration of photographic documentation services.
 - B. Make photographs available within 24 hours from time of capture.
 - C. Each digital image shall be taken with a professional grade camera capable of producing no less than 2144 by 1424 pixel images, using a camera with a 12 megapixel sensor.
- 1.11 TASK MANAGER
- A. The interface must provide an integrated task management tool which supports multiple task lists per project.
 - B. The integrated task management tool must support the following functionality:
 1. The tool must support multiple task lists per project.
 2. The tool must support creation of any number of tasks per task list.
 3. The tool must support association of one to many project users as to a single task, "assignees", for purposes of editing and notification.
 4. The tool must support association of tasks to:
 - a. Contractor photographic documentation.
 - b. User-added photographic documentation.
 - c. Project plan locations.
 5. The software must support an automated email notification program which triggers email notifications to specified users for the following occurrences:
 - a. Task creation.
 - b. Task assignment.

c. Task updates.

1.12 VIDEO DOCUMENTATION

- A. Refer to Document 003113.13 - Preliminary Project Schedule for coordinating duration of photographic documentation services.
- B. Make videos available online within 10 business days. This includes all post-production, editing, chapterization by topic covered, and uploading to Web-Based Management Portal.
- C. Each digital video shall be taken with a professional grade camera capable of recording in high-definition and as follows:
 - 1. 16:9 effective to 14.2 megapixels.
 - 2. 1920 x 1080 up to 60p.
 - 3. 12x Optical Zoom minimum.
 - 4. 48x Digital Zoom minimum.
- D. Video must be made available for streaming via cloud-based hosting and storage for on demand access.
- E. Video Documentation: Video must be made available for streaming via cloud-based hosting and storage for on demand access.
- F. Narration: Include narration describing Project status and details of each location. Begin with Project name and location. Use wireless microphone or other recording device to audibly capture narration and discussions with Project site personnel and others present. Reiterate questions into the microphone.
- G. Transcript: Include transcript of English audio/video file to and English document file, in electronic form with a cover sheet, name of Project and date of video recording on each page.
- H. Closed Captioning (English captions for English videos): Display text on video screen of audio portion of the video, designed for the hearing impaired, compliant with Federal Communication Commission (FCC) requirements.
- I. Professional Video Production and Post-Production:
 - 1. Record and index individual videos by piece of equipment, by building system, or by event.
 - 2. Chapterize each independent video by topic. Chapters must be independently selectable within the Web-Based Management Portal.
 - a. Review with Client to determine proper organizational structure within the Web-Based Management Portal. For example, organize videos by CSI MasterFormat Section, or by sub-trades. Recommended Sections: Mechanical, Electrical, Plumbing, Life Safety Systems, Building Automation System, Kitchen Equipment, Lighting Controls

1.13 OWNER TRAINING VIDEOS

- A. Equipment and Systems Owner Training Video Recordings:
 - 1. The Client or the Client's representative shall provide the videographer with a list of all equipment and systems that are to be trained on based upon the specification requirements of the project. This list shall be provided (60) days prior to the start of training to ensure proper scheduling occurs.
 - 2. The Owner's representative, a qualified trainer or factory authorized representative, and the qualified videographer shall be present at every recording session.

Coordinate scheduling training activities with Owner, videographer, and other attendees, giving a minimum of 48 hours notice.

- B. Final Completion Construction Videos: Record video documentation of facilities management, operations and maintenance presentations of any key systems, and training presentations for any construction project-related subject matter

1.14 WEBCAM MONITORING

- A. Refer to Preliminary Project Schedule for coordinating duration of photographic documentation services.
- B. Live Streaming footage: Provide web-accessible live streaming footage of Project site.
- C. Time-lapse video shall be available as an on-demand feature of the Web-Based Management Portal, 60 days after archiving begins.
- D. Deliver webcams and all required/included components to locations as directed. Mount webcam fixtures and connect webcams.
 - 1. Installation / Decommissioning and Coordination: Vendor will:
 - a. Set Up: Recommend proper installation locations in order provide the best overall view of the Project, and supply renderings prior to install showing the placement of the camera and the view expected from the camera location.
 - b. Deliver webcam to Client site and coordinate installation of webcam, connect camera to 4G cellular network and initiate live streaming.
 - c. Take Down: Coordinate decommissioning and removal of the camera.
 - 2. See Vendor-Client agreement for equipment rentals for install which may be at an additional charge.
 - 3. Power: Vendor or General Contractor to connect to power source determined by sight review and approval by Project Manager
 - 4. Mounting: to be determined by site review and approved by University Project Manager
 - 5. Internet: Vendor to connect to existing internet provided by University unless otherwise instructed.
- E. Configure webcams once connected, to ensure connectivity, proper aim, and focus of the cameras.
- F. Install in accordance with construction webcam provider recommendations to provide acceptable overall views of the project.
- G. Webcam Documentation: Provide for the Permanent Record all static image captures and time-lapse videos, typically as a flash drive or hard drive. Integrate the Permanent Record of all webcam documentation will into the Permanent Record of photographic and video documentation for the Project.
- H. Webcam Features for the Web Based management portal:
 - 1. Require Secure Login credentials provided on an individual basis to access Webcam Interface.
 - 2. Smart Device Mobile Support for Apple IOS and Android.
 - 3. Camera Access page must display camera name as well as project logo.
 - 4. Dashboard to be able to display cameras from multiple projects on a single display.
 - 5. Provide live viewable video stream.
 - 6. Support export of webcam live streams for purposes of embedding streams in external web pages/public feeds.
 - 7. Upon request, a public-facing link can be provided for any webcam.
 - 8. Must be able to provide HTML5 Low Latency Streaming.

9. Full screen mode on live stream.
10. Full screen mode with digital enhancement on saved images.
11. Ability to easily switch between Live View and Archived images.
12. The system will automatically generate a time lapse video on the system in a downloadable MP4 format after 60 days from start.
13. Ability to have camera automatically save images at a frequency of 5Min, 10 Min, 15 Min, 30 min, or 60 min. As well the ability to modify the archiving duration from anywhere between 12 hour and 24 hour.
14. Automated remote monitoring of camera functionality; Notification via email alerts and follow up with webcam service provider personnel to reduce camera downtime.
15. Comment communication feature that allows the users to perform the following:
 - a. Add private and public comments to the static images hosted on the server.
 - b. Tag comments for keyword Searches.
 - c. Generate visual lists of all project activity and comments.
 - d. Ability to tag images as favorites.
16. Ability to have a Grid view for projects with Multiple Webcams and select/deselect which webcams will be displayed in the grid.
17. Ability to access live view and stored images 24/7.
18. Ability to add user presets.
19. Ability to select stored images from previous days via selectable calendar.
20. Must be able to provide Custom Date Query as well as Slide Show on all saved images.
21. Must be able to display live view as well as archived images in full screen mode.
22. Must be able to provide links to be embedded onto project web page - Links options for Live Feed or Still image refresh. Live Feed must support non-Flash player option.
23. Ability to SAVE images to a local device from an existing saved image on the Web Portal or while viewing the live stream.
24. Live view must display current weather conditions.
25. Archived images must store Weather conditions at time of image archive, as well as current date and time.
26. Web based Management software will be able to support live viewing of webcam for 1 to multiple users simultaneously.

- I. Fixed Position Webcam Requirements:
 1. Capable of HDTV 1080p at 30fps in all Resolutions.

1.15 UAV SERVICES

- A. Perform drone-captured photography, video recordings, and panoramas, as directed in the applicable Scope of Work and make available through internet-based hosting platform within 24 hours from time of capture.
 1. Preconstruction UAV services.
 2. Work-in-progress UAV services.
 3. Milestone completion UAV services.
 4. Final completion UAV services.
- B. Comply with aviation regulations and insurance requirements to ensure flight safety and compliance with regulations.
- C. Construction UAS Equipment Requirements:
 1. Multi-rotor aircraft: commercially registered with the FAA as required.
 2. Must have traditional stick R/C controller along with tablet control for automated flight.
 3. Minimum 12 MP camera and 4k video.

4. Operators must have full Personal Protective Equipment (PPE) applicable to Project site.
 5. Safety equipment to include:
 - a. Site Signage:
 - 1) Establish presence of UAV operation on site.
 - 2) Clearly mark command and control location for UAS operation.
 - b. Fire extinguisher.
 - c. 2-way VHR air band radio.
 - d. Air horn.
 - e. First aid kit.
 6. Must operate under a company SOP.
 - a. Able to produce safety checklists and operations brief for every flight.
- D. Operational and Flight Procedures: the following must be detailed in the SOP.
1. Pre-Operational Procedures:
 - a. Identify the type and purpose of operation.
 - b. Produce a flight plan to address and identify: the class(s) of airspace that the operations are planned within and operational boundaries, applicable FAA and ATC coordination, weather, and alternate dates.
 - c. Provide UAS team roles, qualifications, and contact list.
 - d. Outline a means of contact during the operation.
 2. Site Survey:
 - a. Hazard assessment of the site and surrounding areas.
 - b. Identify operational work zones and alternate safe areas with the person responsible for jobsite safety.
 3. Pre-Flight Procedures:
 - a. Preparation and planning: Operational checklist covering pre-flight procedures, communications, and pre-flight checks to ensure all equipment and personnel are ready and fit for the operation.
 4. In-Flight Procedures:
 - a. Operational checklist outlining the "In-Flight" roles of each member of the UAS team.
 5. Post-Flight Procedures:
 - a. Operational checklist outlining the safe shut down of the operation to include:
 - 1) Addressing flight duty and additional operation requirements.
 - 2) Regulatory notifications.
 - 3) Data management.
 - 4) Removal of equipment from Project site.
 6. Security Plan:
 - a. The security plan for the area(s) of operation and the fly over area(s) to ensure no hazard is created to persons or property.
 7. Emergency Contingency Plan:
 - a. The emergency contingency plan outlines proper actions to be taken in an event of a disaster resulting from the operation.

1.16 ARCHITECTURAL 3D SCANNING

- A. Make 3D scanning documentation available within 5 to 10 business days from time of capture, to the Web-Based Portal desktop interface (not currently available to mobile smartphone interface).
- B. Capture Architectural 3D Scanning imaging with either Leica Truview or Matterport Pro2 3D camera, or equivalent.
- C. Security: External drive encrypted with pre-defined software and password.

- D. Documentation Purpose
 - 1. Design and construction relating to renovation of existing structure(s).
 - 2. Producing two and three dimensional drawings and details.
 - 3. Produce photo based immersive environment.
 - E. Duration of storage of deliverables by service provider: 10 years minimum.
 - F. Data Access: Provide web virtual site access for duration of 5 years minimum.
 - G. Document Format: Comply with ASTM E57 - File Format for 3D Imaging Data Exchange.
 - 1. Units: Feet.
 - 2. Imperial System: English.
 - 3. File Format: .pts, .ptx, .ptz, .ptg, or .rcs. Use one type for entire project.
 - H. Output: Point Cloud in ASTM E57 format.
 - 1. Color mapping: Photo overlay.
 - I. Point Cloud Resolution:
 - 1. Medium Resolution: 1 inch to 6 inches.
 - J. Coordinate System: State Plane.
 - K. Level of Accuracy Specifications According to most recent [USIBD](#) Document C220:
 - 1. UniFormat Level: USIBD C220 Recommended Value for Project Type.
 - 2. Measured Accuracy LOA: USIBD C220 Recommended Value for Project Type.
 - a. Absolute or Relative: USIBD C220 Recommended Value for Project Type.
 - b. Measured Validation: USIBD C220 Recommended Value for Project Type.
 - 3. Represented Accuracy LOA: USIBD C220 Recommended Value for Project Type.
 - a. Represented Validation: USIBD C220 Recommended Value for Project Type.
 - 4. LOA Schema: USIBD C220 Recommended Value for Project Type.
 - L. BIMForum LOD: See Section 01 33 00 of Clemson's [Standards for Commissioned Architects and Engineers](#).
 - M. Virtual Site Access:
 - 1. Spherical imagery: Minimum 25 MP, Recommended 40 MP.
 - 2. View format: HTML 5 with a map interface showing all scan locations.
 - 3. High Dynamic Range (HDR).
 - N. BIM: Building Information Modeling (BIM) is not included under this specification Section.
 - O. Field Validation:
 - 1. Ensure hardware calibration meets manufacturer's published specifications.
 - 2. Use survey control network for validating point cloud accuracy.
 - 3. Place targets as necessary for horizontal and vertical control.
 - P. Work Product Verification: Supply the following Project-specific items:
 - 1. Closure report for survey data.
 - 2. Registration results identifying error between scan data and survey control.
 - 3. Maps identifying location of all survey control used.
 - Q. Data Cleaning:
 - 1. Remove all moving objects, such as people and cars, if applicable.
 - 2. Remove landscape and other obstructions to architectural features, as requested.
- 1.17 SOFTWARE PLATFORM REQUIREMENTS
- A. The software must use cloud-based hosting and storage for all visual documentation throughout the construction project and for the duration of the contract, except as modified under specified provisions for Contract Modification.

- B. Provide storage and online hosting for all documentation for the duration of Project construction, except where a standalone, offline implementation of the software platform is requested. The servers through which the documentation is stored and hosted must have redundant back-ups and use security protocols to ensure minimal downtime and prevent unauthorized access. See "Data Privacy and Security Requirements" Article specified in this Section.
- C. Provide software which delivers visual documentation throughout the construction project. The software must be fully tested and proven for the functionality described herein.
- D. The software must include an indexing system for photographic documentation that is based on the project's plans:
 1. The software must support integration of any number of project plans per construction project to accommodate all contracted photographic documentation.
- E. The software must support the following functionality for video documentation:
 1. The software must provide an integrated video player which allows all video documentation to be viewed within the web-based interface and via a mobile application.
- F. The software must support Leica 3D Images:
 1. Must offer Leica 3D Image integration within software offering available for exterior and interior work.
 2. Two-dimensional photographic documentation captured with 3D imaging device.
 3. Resulting 3D Image photographic documentation allows client to take approximate measurements of three-dimensional spaces on the 2D photo.
 4. Measurement functionality needs to be available to client to be performed within the online platform.

1.18 ONLINE INTERFACE REQUIREMENTS

- A. Provide technical support for all documentation services, software, and user interfaces, with customizations as needed, and BIM model integrations. Technical support includes Project site visits when needed.
- B. The interface must support multiple active projects per user.
- C. The interface must support simultaneous access by multiple users to a single project.
- D. The interface must provide an integrated task management tool which supports multiple task lists per project.
- E. Access to the interface must be controlled by unique username and password combinations per user.
- F. The interface must support and enforce multiple permission levels for access to project documentation.
 1. Multiple permission levels must be assignable per user at the project level.
- G. The interface must allow access to all software content in accordance with users' project-level permissions. This includes photographic documentation and the project plans to which it is indexed, including immersive 360° panoramic documentation, video, UAV (drone), registered point cloud data, webcam live feed(s), and task lists.

1.19 MOBILE APPLICATION REQUIREMENTS

- A. Vendor must provide and support a mobile application that provides direct access to photographic and webcam documentation from mobile devices.

- B. The mobile application must be available for Apple iOS and Android mobile devices.
- C. The mobile application must inherit and control access to documentation by the same unique usernames and passwords used for the online interface.
- D. The mobile application must inherit and enforce the permission levels assigned per user for the online interface.
- E. The mobile application must support the following interactive features and functionality for photographic documentation:
 1. Navigation of documentation by indexed locations on the project plans.
 2. Navigation of documentation by collections of photographs grouped by date-stamp and/or subject matter (shoot type);
 3. Navigation of immersive 360° panoramic documentation by tap, drag/scroll, and/or other device-supported touch gestures to provide a seamless, 3-D virtual tour experience of the immersive documentation.
 4. Upload images to the software platform.
 5. Users must be able to access/view their uploaded images via the mobile application.

1.20 DATA PRIVACY AND SECURITY REQUIREMENTS

- A. Privacy: The Vendor must protect the privacy of all Client and Project information through the following methods:
 1. The Vendor-provided software must require and enforce unique username and password access for each user. The software must require strong password formats and support password expiration policies to further ensure password integrity.
 2. The Vendor-provided software must support granular permissions to control access levels to projects, specific project content, and advanced software features which allow interaction with/modification project content.
 3. The Vendor must observe the information security "principle of least privilege" for all staff, including support personnel and system administrators. Only staff members providing direct support to the project and a limited group of system administrators and quality auditors shall have access to Client and Project information.
- B. Application and Data Security: The Vendor must provide the following security protocols to ensure application and data security:
 1. All traffic to Web-Based Management Portal shall be secured with 2048-bit SSL/TLS encryption and use certificates issued by the Symantec Corporation or equivalent.
 2. All data at rest, including user passwords, must be hash and salt encrypted to impede brute force or reverse lookup attacks. Vendor personnel must not be able to decode passwords.
- C. High-Security and Sensitive Facilities:
 1. Create an offline standalone (on-site) version of documentation software platform, except for immersive 360-degree panoramic documentation and navigation support and the task management tool.
 2. Standalone, offline implementations of the software must be possible to provide heightened security for sensitive projects and for final delivery of documentation after contract completion.
- D. Data Centers and Hardware: The Vendor must only utilize data centers and hardware which meet the following security requirements:
 1. All data must be stored in US-based data centers which maintain multiple power feeds, fiber links, dedicated generators, and battery backup to ensure high availability.

2. All application and database servers must run on dedicated physical hardware in load-balanced, high-availability clusters with automatic mirror failover procedures.
 3. Data centers must be owned and operated by SoftLayer, an IBM company, or an equivalent provider. The data centers must employ the following security and compliance protocols:
 - a. Biometric access control and monitoring
 - b. Independent auditing of strict industry compliance standards and controls
- E. Data Backup and Recovery: The Vendor must have contingency plans for component-level, system-level, and site-level failures, including the following:
1. Database mirroring
 2. Database backups performed daily and shipped off-site
 3. Multiple copies of each photo and video file saved within each storage cluster
 4. Storage cluster mirroring between geographically diverse datacenters