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MEMORANDUM

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To: Nick Nicholson, Bob Douglass, Paul Gudelski
From: Jim Ruddell
Cc: Russ Fuhrman, Dan Hacker, Larry Anderson, Norine Walker, Jerry Long, Carolyn Headen
Date: November 6, 2003
Subject: Overhead Visual Imagery Requirements and Recommendation

This memorandum offers PCC's assessment of the requirements for overhead visual imagery for the Woodrow Wilson Bridge project and provides a PCC-recommended course of action to meet those requirements. PCC recommends engaging Air Survey, Inc., of Dulles, Va., as a PCC subconsultant under the GEC contract. Air Survey would be tasked to provide digital orthophotographic images of the Project corridor at a regular frequency and processing level that makes sense, balancing the cost and benefits to the advantage of the Project and the sponsoring agencies. PCC also recommends continuing discussions with Space Imaging, Inc., of Lanham, Md., and Sisson Studios, of Springfield, Va., to satisfy niche requirements for overhead imagery as they may arise.

Background. Aerial photos of the project have been taken since April 2001, when flight clearance was first given. The project was flown at approximately monthly intervals. Imagery through July 2003 was processed and is accessible through the Project website. Except for the costs of hosting the imagery on the website, done through PCC JV member firm URS, all costs to date have been borne by resources external to the Project. [Air Survey was performing as a subconsultant to Burgess & Niple, Inc., under a consultant services contract with VDOT's Northern Virginia District.]

On October 2, 2003, Nick Nicholson advised Jim Ruddell that VDOT desired to cease providing this service to the Woodrow Wilson Bridge project *gratis*, but desired that—if the Project determined the service to be advantageous to it—the Project should make its own arrangements to obtain it. The service was said to remain available to the Project during a reasonable transition period; however, Air Survey advises that their last collection flight was on Sept. 16 and the October collection and data rectification was suspended.

PCC Approach. On learning of VDOT's decision, Jim Ruddell convened a working group comprising Dan Hacker, Norine Walker, Larry Anderson, and himself to assess the situation and develop a recommended course of action. The working group met collectively on Oct. 6, 9, and Oct. 15, and conducted interviews with possible service providers as a group or individually on Oct. 20, Oct. 27, and Nov. 4. The group obtained specifications for what VDOT had provided in the past and searched for possible alternative providers using both open sources (e.g., Yellow

Pages and Switchboard.com) and the DBE resources known to CAM Systems. Jerry Long, RLS, survey manager with A. Morton Thomas, assisted the working group in its reviews.

Requirement Definition. Because the history of aerial imagery on the Project was one of receiving a no-cost service, no firm requirement for imagery had been articulated. The following list describes the uses to which the digital orthophoto imagery has been put in the 2½ years it has been available:

- Post on website to inform public of progress
- Provide copy on CD to construction contractor for his purposes [*engendering goodwill*]
- Serve as an underlying background for survey information provided using MicroStation or other CADD system to communicate field stakeout locations most effectively
- Form a visual archive of construction contract status at a series of dates certain, serving as an indisputable record in the event of a contractor claim
- Establish a basis from which estimate quantities can be confirmed when the work in question is primarily horizontal in nature

Other uses which have not yet been made, but which are contemplated, include these:

- Confirm the success of vegetation establishment for specific environmental mitigation contracts
- Obtain oblique aerial construction photography from many aspects which could be used for purposes including public information, award nomination packages, and detailed construction claim analysis
- Publicize the availability of digital orthophotos among the Project design team, who may use it as a background for certain design tasks

PCC recognizes that the imagery requirements for the Project are not static but may change as circumstances change with construction or community needs. The requirements may also be influenced by what can be achieved technologically at a price the Project can afford.

Options Evaluated. The working group assessed different technical solutions and competing service providers within each family of technical solutions. Here is a synopsis of what the working group learned.

1. **Satellite Imagery.** Larry Anderson contacted two prospective providers of satellite imagery to assess their capability to meet Project requirements. One firm, Orbital Imaging Corporation (“Orb Image”), of Dulles, Va., was not responsive. A second firm, Space Imaging, Inc., of Lanham, Md., was interested in supporting the Project. They have color imagery available from their “Ikonos” satellite at a nominal 1-meter resolution. Space Imaging provided a sample TIFF file from their archive showing the WWB Project site, with a MRSID viewer, for the working group to review. Their representative indicated that their standard price for such imagery would be \$1,980 per occasion, and that they might well be willing to negotiate a lower price if the Project were to purchase the imagery repetitively.

The working group members each looked at the Ikonos imagery. The satellite imagery is of distinctly lower resolution than the digital orthophotos the Project has been receiving, but it is adequate for some purposes. It would be useful for providing a public overview, for instance, or for confirming whether vegetation had been established. It could be used to determine the presence of a construction crane, for example, on a jobsite, but could tell little about the type of crane. It would not be suitable as a background for survey data or design layout.

Even if satellite imagery is not selected as the general resource for the project, it may be a valuable resource (on a limited frequency) for confirming vegetation establishment. Tim Morris determined that the minimum order area, 100 km², would encompass in a

single file most of the environmental mitigation sites required in Virginia, and would meet his needs.

2. *Oblique Aerial Photography*. After winnowing out several firms for whom aerial construction photography was clearly not a specialty, Larry Anderson contacted Sisson Studios of Springfield, Va. Larry and Norine Walker received a presentation from Mr. Duane Lempke of Sisson. Sisson has photographed many of the major projects in the DC area, including the Pentagon Renovation. Larry and Norine were particularly impressed with Mr. Lempke's knowledge of the medium, understanding of the challenges of producing effective images of a construction site, and the artistic and technical excellence of Sisson's portfolio. Sisson provided a detailed commercial price list. It would be difficult to make a price comparison between oblique photography and straight-down imagery, since the price would be determined by how many separate views were desired.

Larry and Norine agreed that, despite its overall excellence, the oblique photography as offered by Sisson would not meet several of the Project's requirements and should not be considered as the primary imagery source. It provides no basis for measuring quantities or locating specific features. If the Project were, say, a major building instead of a linear transportation corridor, the oblique photography might be more suitable. The working group recommends keeping the relationship with Sisson open and making its availability known among senior project staff, in case a requirement emerges that would be met best in this way.

3. *Digital Orthophotography*. PCC contacted two local firms who provide digital orthophotography. Both were given the same work description that the VDOT Northern Virginia District used to describe the products and services that have been provided since April 2001.

The first firm evaluated was Digital Geographic Mapping, Inc., (DGM) of Sterling, Va. This firm is a small DBE that has been actively seeking an opportunity to work with PCC. After preliminary discussions by telephone, DGM visited PCC on Oct. 27 to present their capabilities. Larry, Carolyn Headen, and Jerry Long received the presentation for PCC. During the presentation, DGM emphasized their low overhead and their confidence that they could perform the work successfully. An Internet search on the qualifications of their company president revealed that the firm he was associated with from 1994 through 1999 (Photogrammetric Data Services, Inc., of Herndon) was debarred by FHWA in 2001 for a three-year period (although this individual was not personally debarred). DGM provided a written proposal to PCC on Oct. 30. Their proposed price for providing color digital orthophotography, equivalent to what VDOT was receiving from Air Survey under the Northern Virginia District contract, is \$5,958 per event.

The second firm considered was Air Survey, Inc., of Dulles, Va. This 55-person firm was the service provider through the Northern Virginia District contract. Larry and Jerry met with their representatives Bill McKeague and Dan DuCharme on Nov. 4. Air Survey displayed an intimate knowledge of what has been done up until now. Their price for providing the current service is approximately \$3,300 per event.

Air Survey suggested several tactics which PCC, VDOT, and MSHA could implement in order to reduce the cost:

- Perform full ortho-rectification only once per quarter, while continuing to collect imagery each month. Imagery only could be delivered for about \$2,000 per event. If it were later found necessary to obtain measurements from a non-rectified set of images, the rectification and processing could be performed *ad hoc*.

- Perform ortho-rectification only in specific areas where PCC advises Air Survey that significant construction activity has been occurring. For example, Air Survey could be guided by regularly updated versions of the rainbow chart in focusing their effort.
- Reduce the extent of the area that has been collected in the past. The flight lines up until now have extended well up I-295, covering the District of Columbia work at Oxon Hill Cove, and have extended well west of the Telegraph Road interchange. Imaging of the Telegraph Road interchange could be delayed until construction begins at that location. An extension further down U.S. Route 1 should be evaluated.
- Black and white imagery could be obtained instead of color imagery. However, it is less useful than color imagery for locating features. The cost savings for this strategy was not specified; Air Survey implied that it was not great.
- If Air Survey is authorized to resume imagery collection for the Springfield Interchange project, imagery collection at the Woodrow Wilson Bridge project could be done on the same flights, eliminating duplicate mobilization charges.
- If an oblique photograph were required to document a specific feature of interest, Air Survey could be tasked to obtain it as part of their regularly scheduled flight.

Recommendation. With your approval, PCC will request a price proposal from Air Survey to provide overhead visual imaging services to the Woodrow Wilson Bridge project. The parameters of the request would be as follows:

- ✓ Establish Air Survey as a regular PCC subconsultant under the VDOT-administered GEC contract. Bill this work using Air Survey's VDOT-approved overhead rate (approximately 130 percent) on a cost-type contract.
- ✓ Air Survey would collect and delivery color images every month, identical in resolution to what has been provided in the past; they would process images to be suitable for measurement once per quarter
- ✓ Air Survey would meet with Jim Ruddell and Area Engineers to reduce the area that was imaged in the recent past down to the area where work is actually occurring at the present time.
- ✓ PCC would manage the scope of work in conjunction with Air Survey so that the average monthly cost would not exceed \$2,500.
- ✓ VDOT and MSHA would share these costs 50/50 under the existing cost sharing agreement.

PCC should continue to develop its relationships with Space Imaging, Inc., and Sisson Studios in the event that their services are required on an *ad hoc* basis.

Please indicate your approval of this recommendation by signature below. Upon your approval, PCC will proceed as indicated and report to you its progress at obtaining the overhead visual imagery for Project use.

APPROVED/DATE:

Robert D. Douglass, MSHA Project Director

Ronaldo T. Nicholson, P.E., VDOT Project
Manager